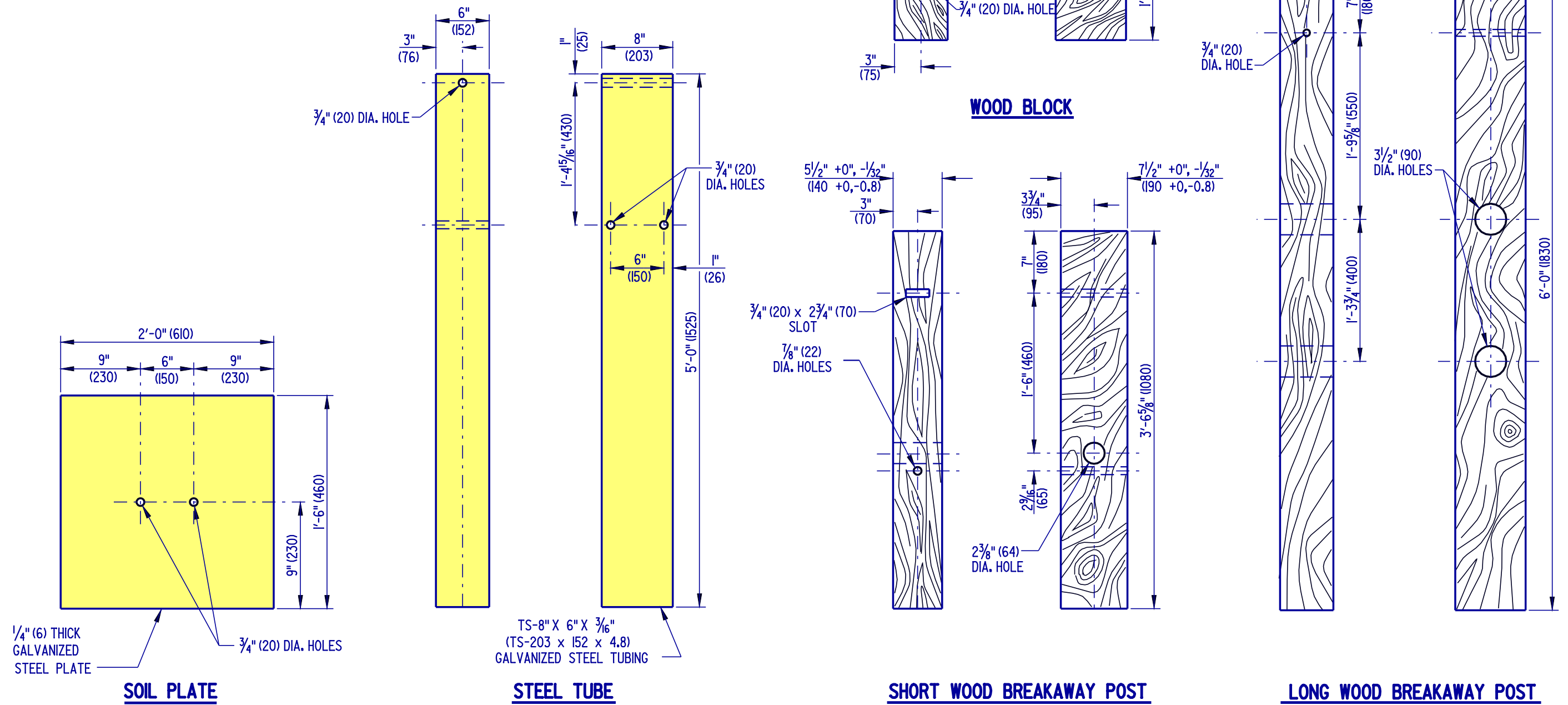


- NOTES :** 1). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
2). ALL WOOD SIZES ARE NOMINAL DIMENSIONS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

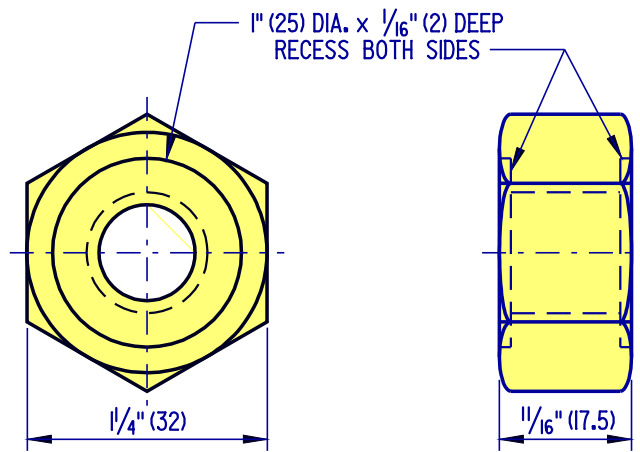
STANDARD NO. B-13 (2004)

HARDWARE

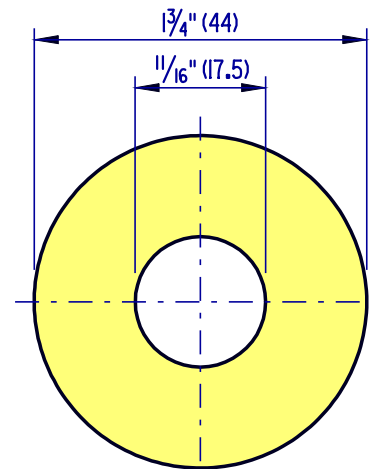
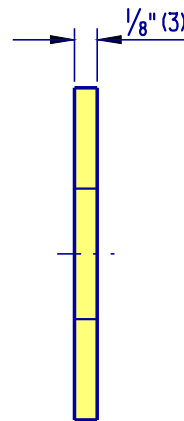
SHT. 7 OF 13

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

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

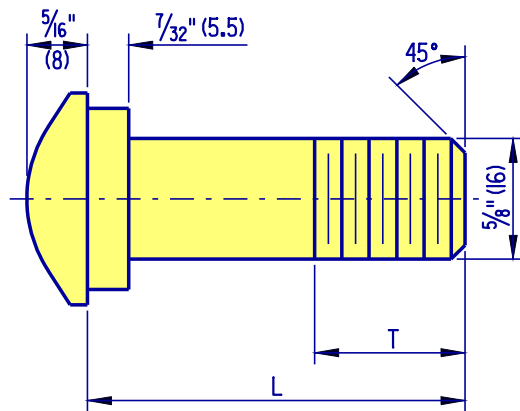


RECESSED NUT
(FOR 5/8\" (16) GUARDRAIL BOLT)

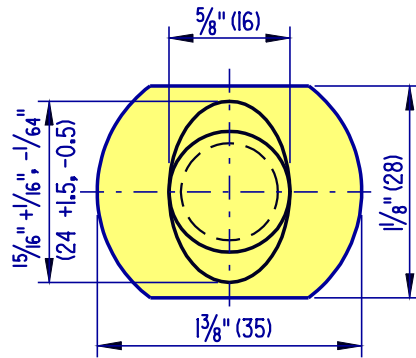


STEEL WASHER (FOR 5/8\" (16) GUARDRAIL BOLT)

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



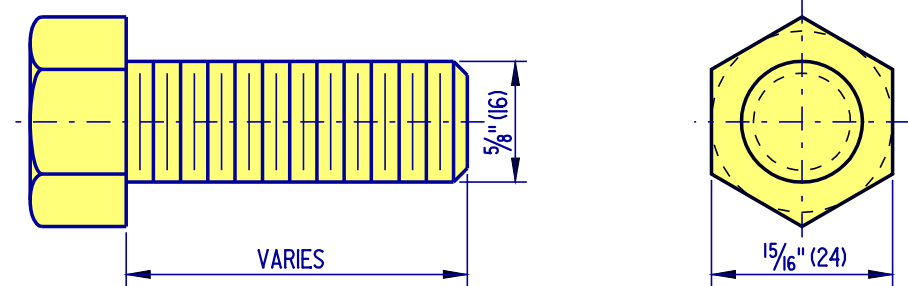
GUARDRAIL BOLT



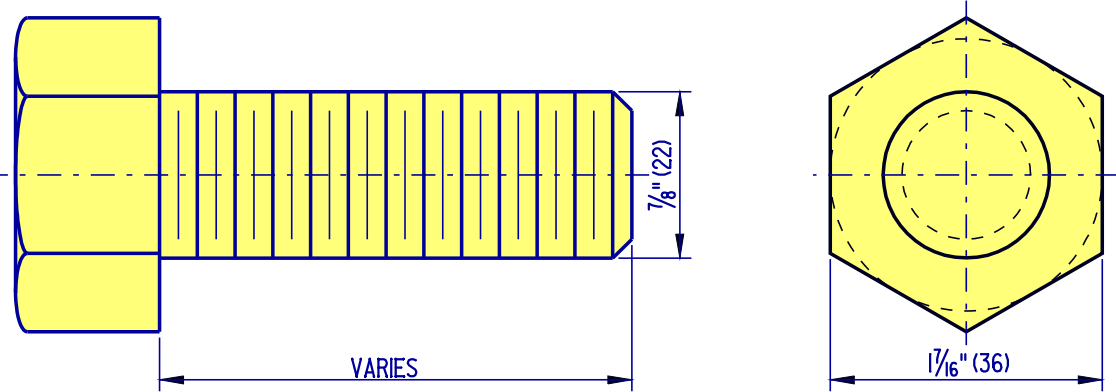
L	T (MIN.)
1 1/4\" (35)	FULL THREAD LENGTH
2\" (50)	FULL THREAD LENGTH
4\" (100)	FULL THREAD LENGTH
10\" (255)	4\" (100) THREAD LENGTH
18\" (460)	4\" (100) THREAD LENGTH

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.

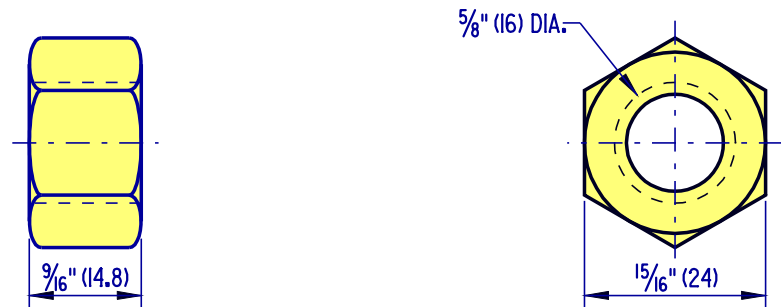




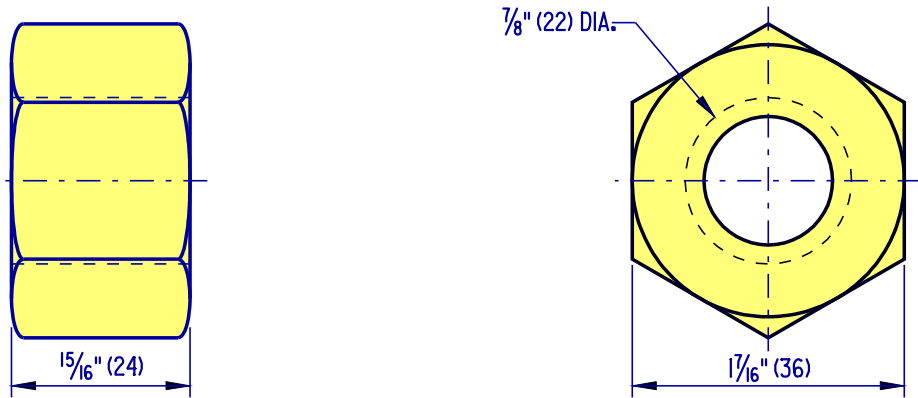
5/8" (16) HEX BOLT



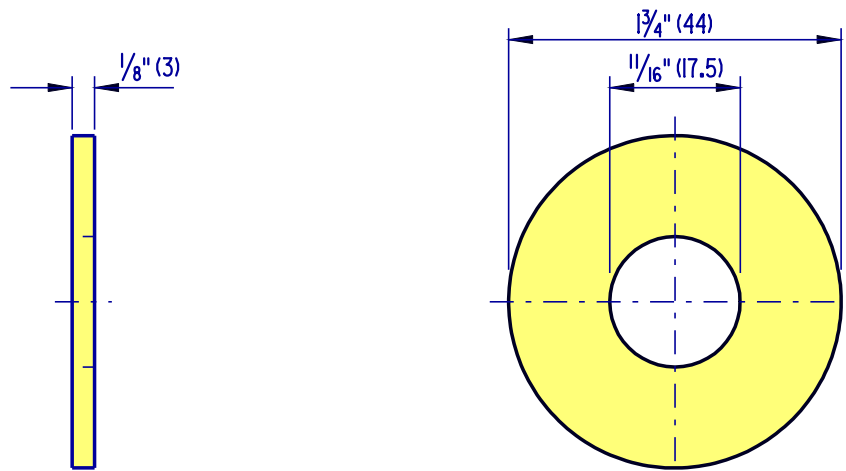
HIGH-STRENGTH STRUCTURAL HEX BOLT



5/8" (16) HEX NUT



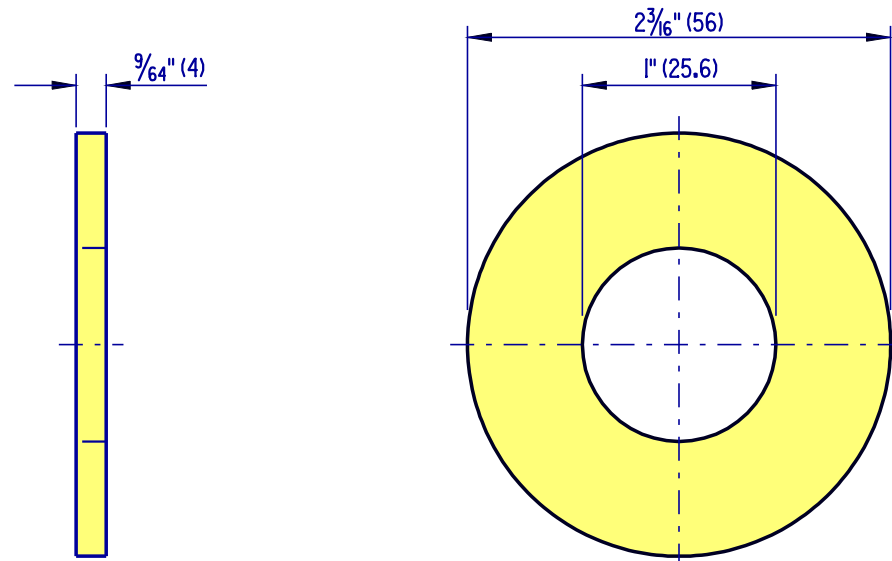
HIGH-STRENGTH STRUCTURAL HEX NUT



5/8" (16) STEEL WASHER

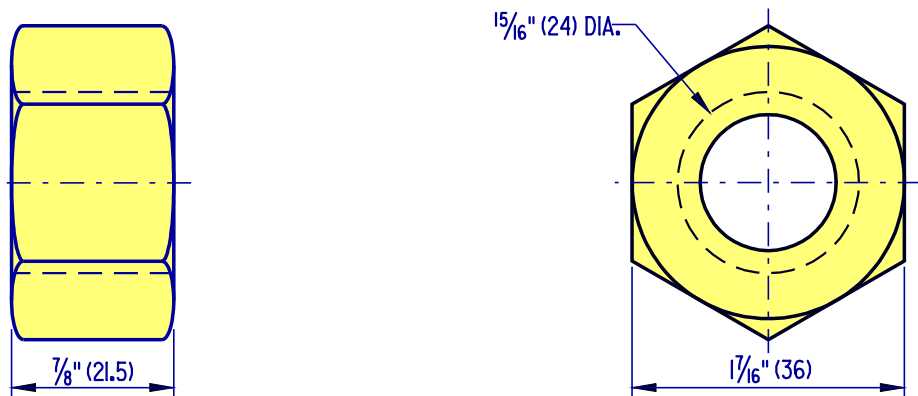
NOTE : DIMENSION FOR WASHER THICKNESS IS APPROXIMATE BASE METAL THICKNESS.





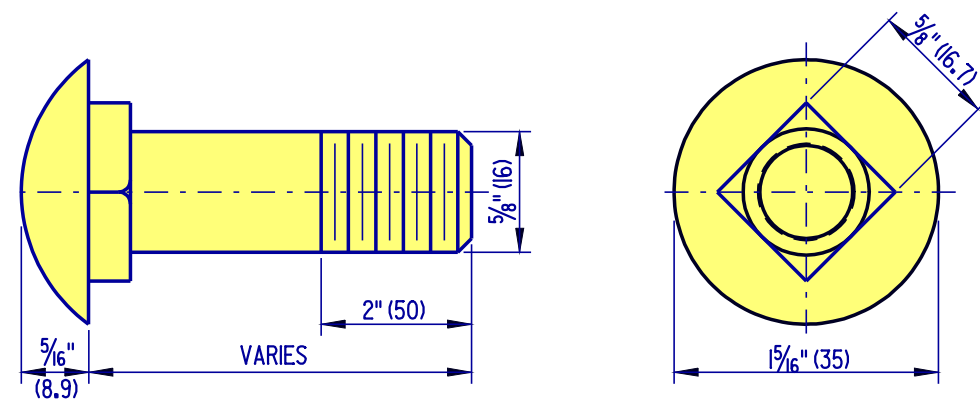
STEEL WASHER

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



$1\frac{5}{16}$ " (24) HEX NUT

NOTE : FOR USE WITH SWAGED CABLE ASSEMBLAGE.



$\frac{5}{8}$ " (16) CARRIAGE BOLT



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO.

B-13 (2004)

SHT.

12

OF

13

APPROVED

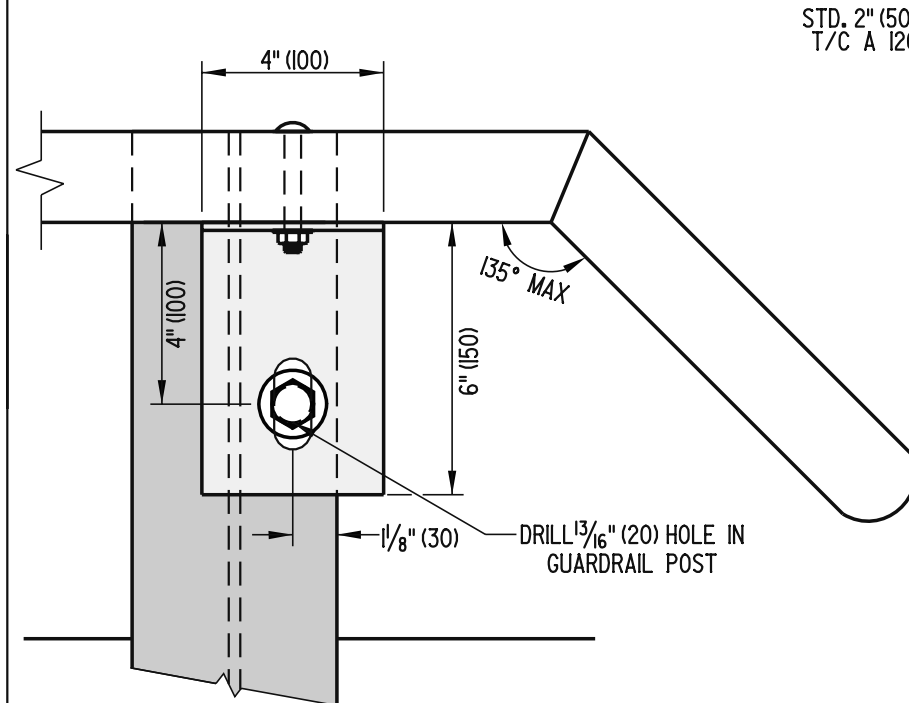
Carolann Wicks
CHIEF ENGINEER

1/10/05
DATE

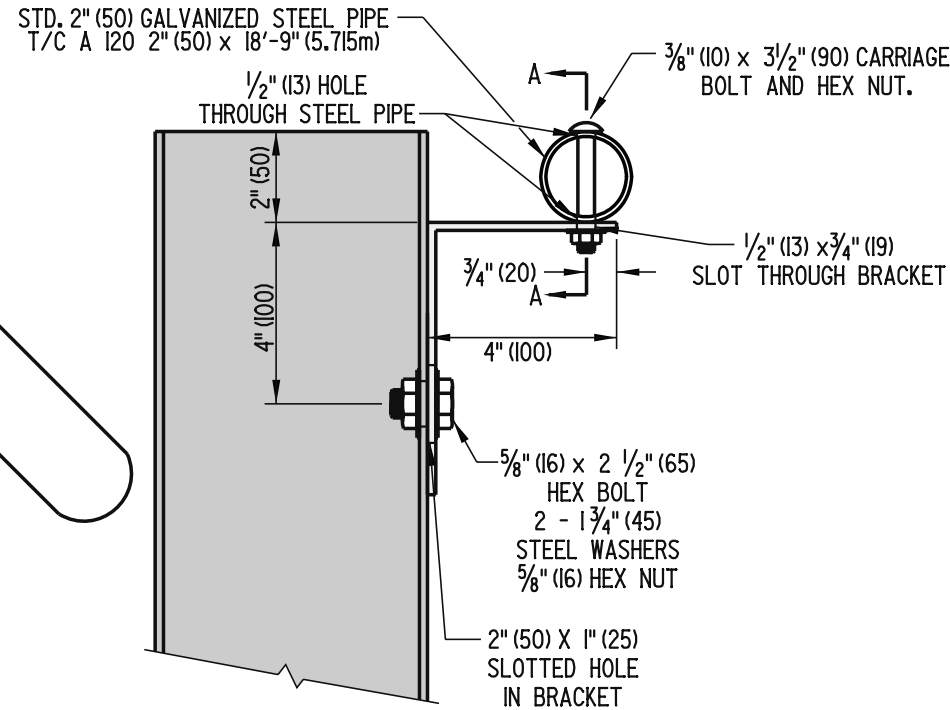
RECOMMENDED

Dennis M. O'Flaherty
DESIGN ENGINEER

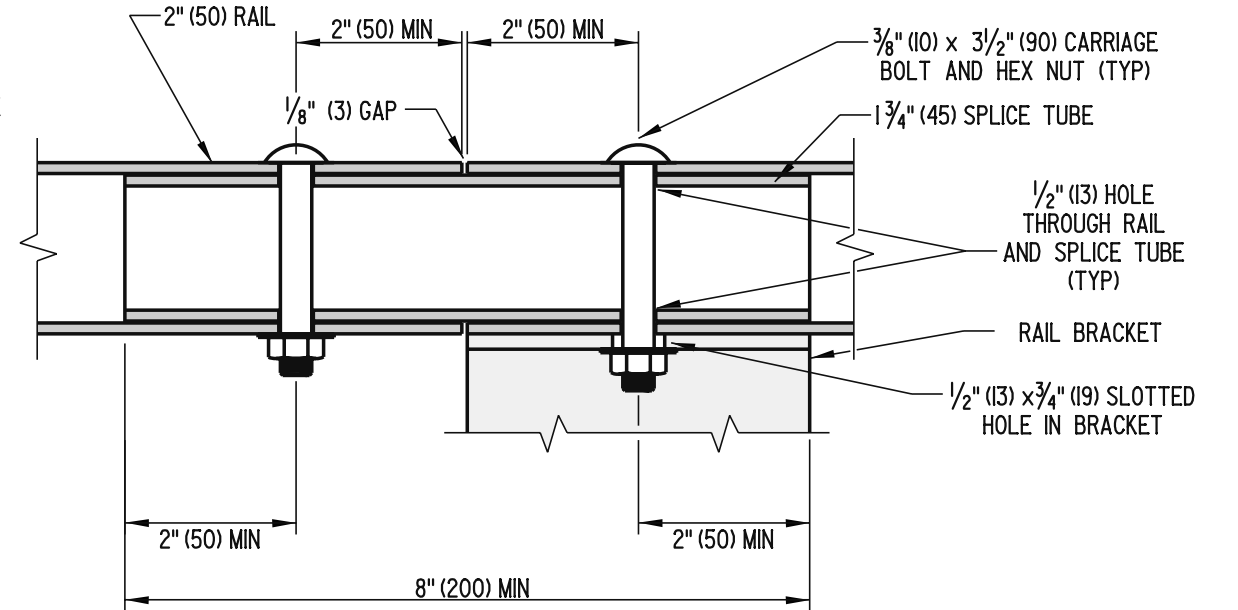
1/3/05
DATE



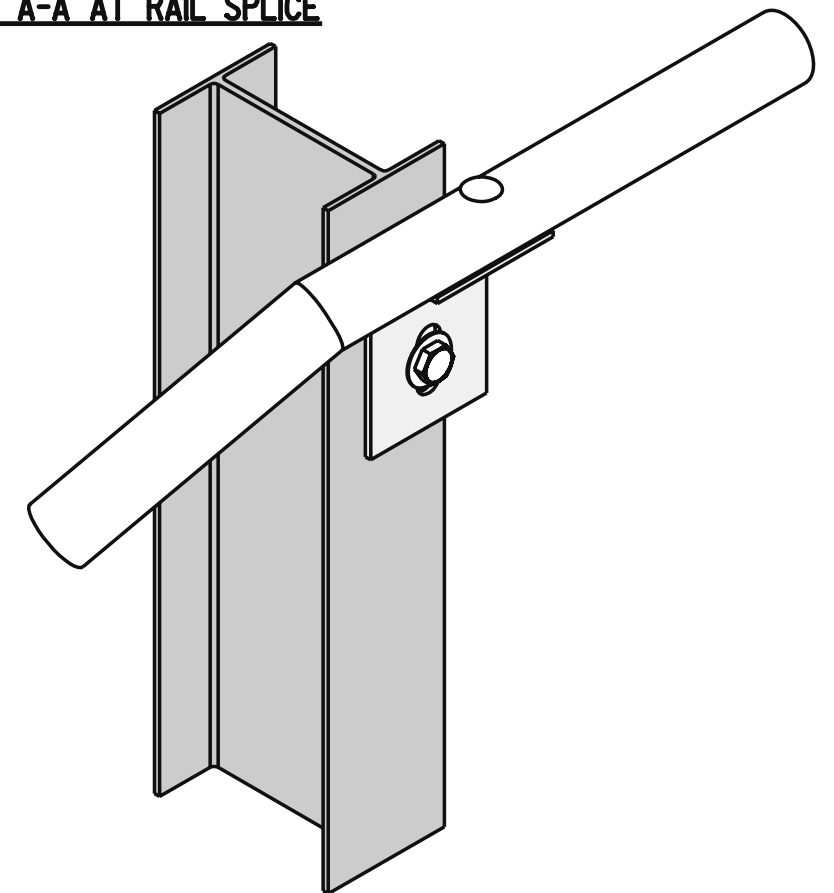
REAR VIEW WITH START & END SECTION



SIDE VIEW



SECTION A-A AT RAIL SPLICE



ISOMETRIC 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.

SIDE VIEW WITH START & END SECTION



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

GUARDRAIL MOUNTED RAIL

STANDARD NO.

B-13 (2005)

SHT. 13

OF 13

APPROVED

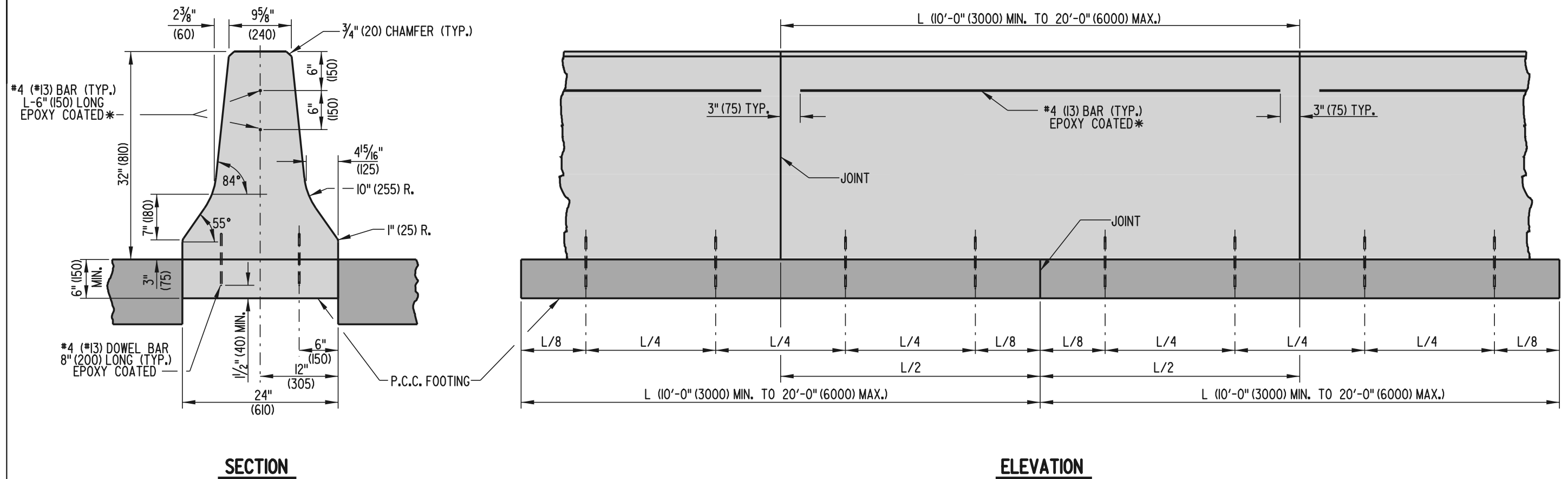
Carolann Wick
CHIEF ENGINEER

12/5/05
DATE

RECOMMENDED

James M. O'Brien
DESIGN ENGINEER

11/29/05
DATE



TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

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



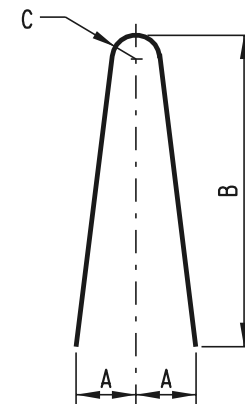
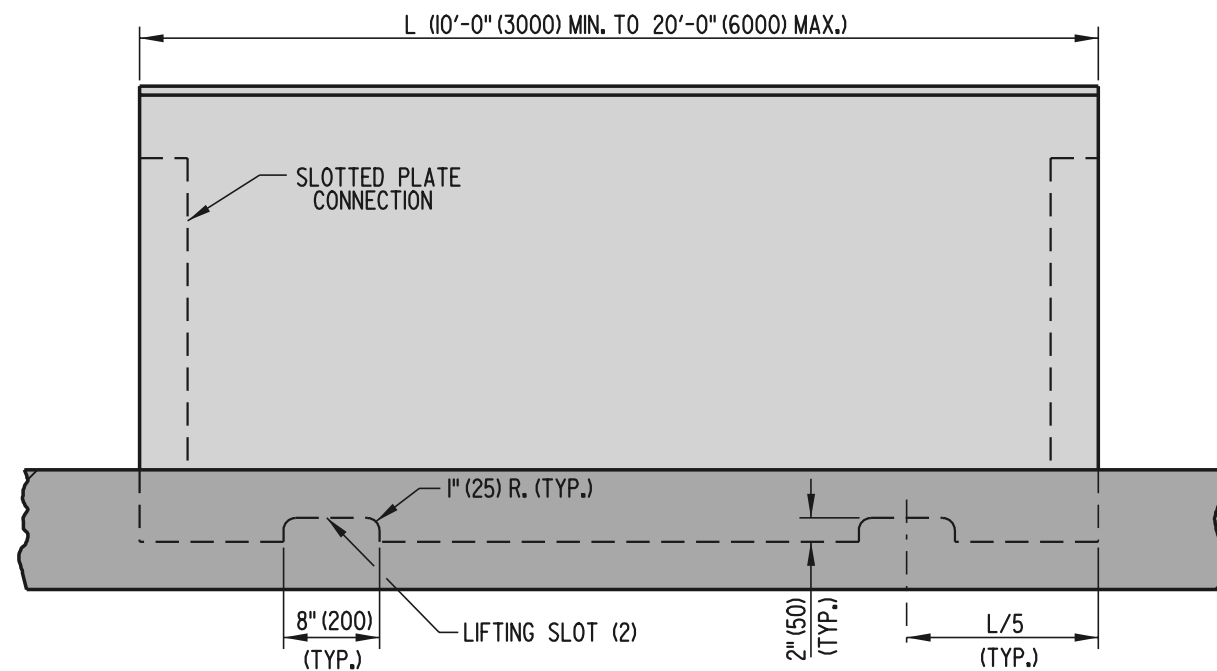
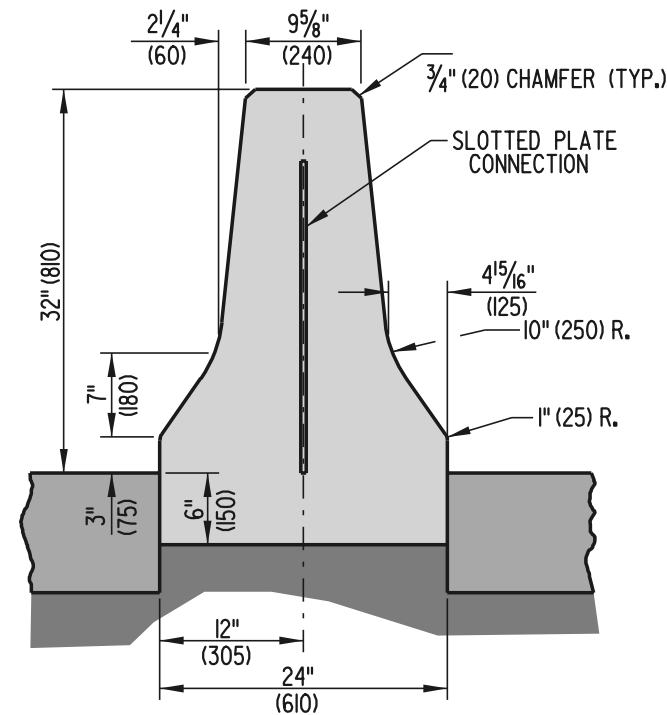
DELAWARE
DEPARTMENT OF TRANSPORTATION

CONCRETE SAFETY BARRIER (F SHAPE)

STANDARD NO. B-14 (2001)

SHT. 1 OF 3

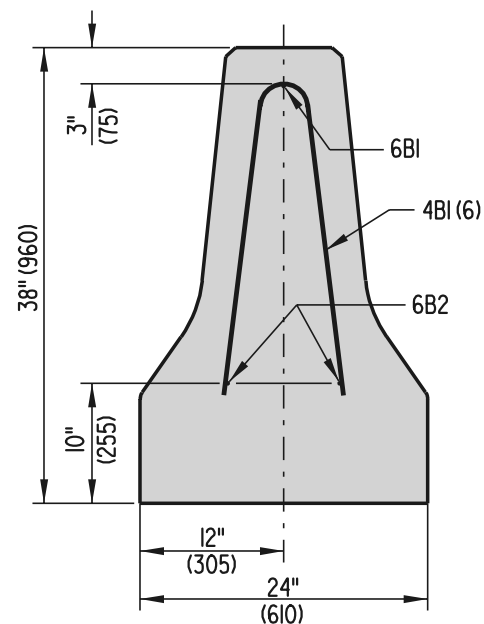
APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE
RECOMMENDED *Mehal Alghamdi* 6/18/01
DESIGN ENGINEER DATE



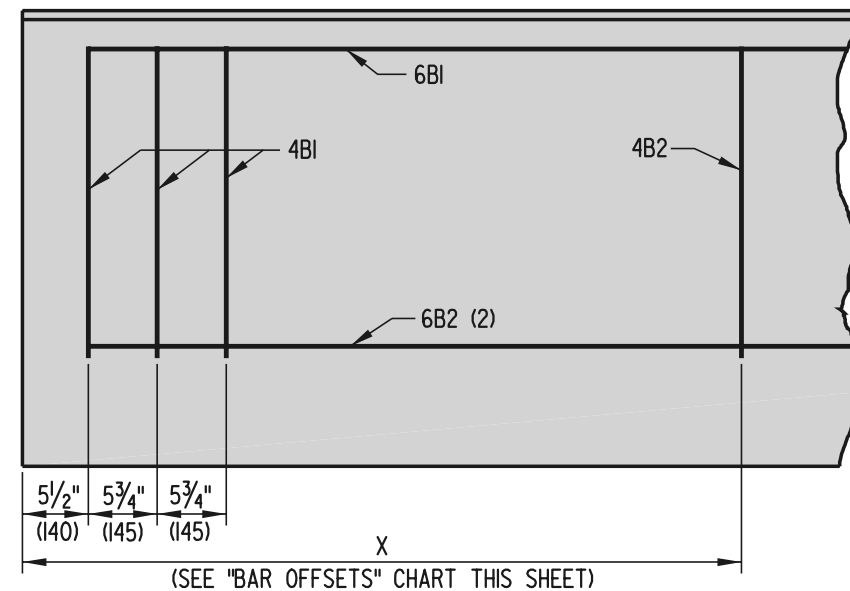
TYPE 'I' BAR

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 11" (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.

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



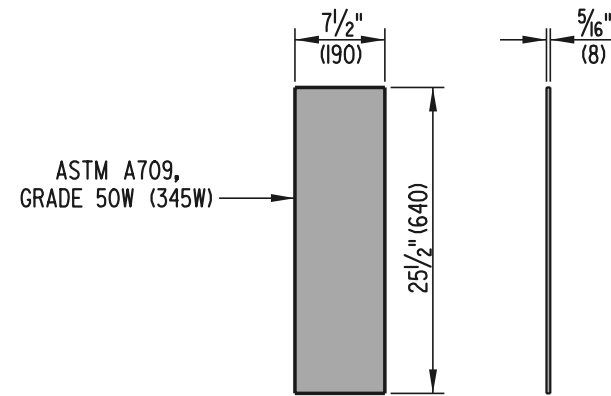
DELAWARE
DEPARTMENT OF TRANSPORTATION

CONCRETE SAFETY BARRIER (F SHAPE)

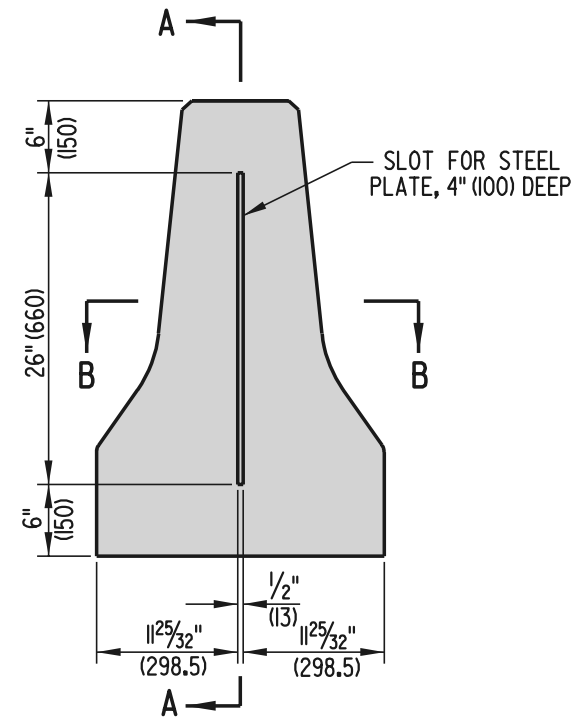
STANDARD NO. B-14 (2001)

SHT. 2 OF 3

APPROVED *Ryan M. Hershman* 6/18/01
CHIEF ENGINEER DATE
RECOMMENDED *Michael P. Gotsch* 6/18/01
DESIGN ENGINEER DATE

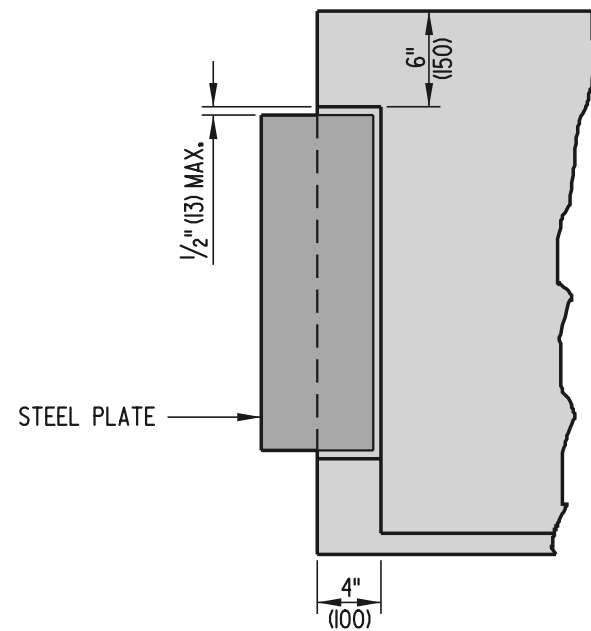


STEEL CONNECTOR PLATE

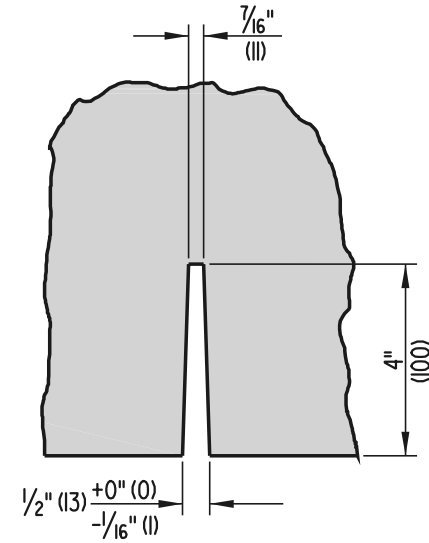


SLOT DIMENSIONS

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)

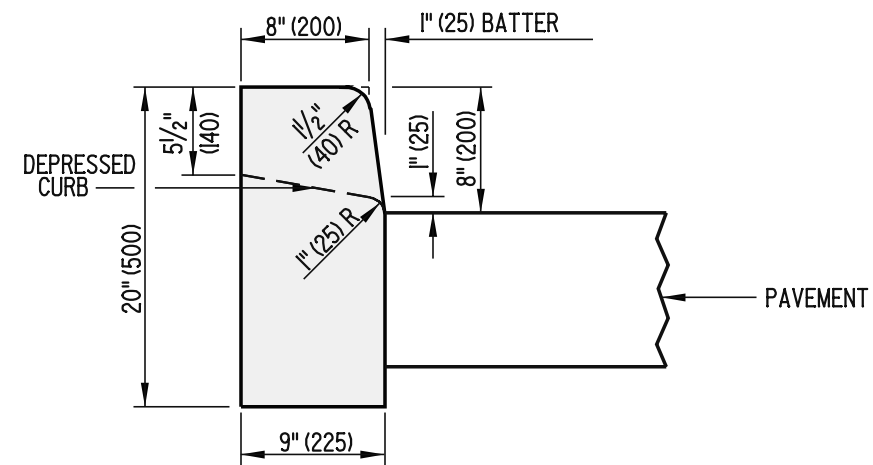
SHT. 3 OF 3

APPROVED

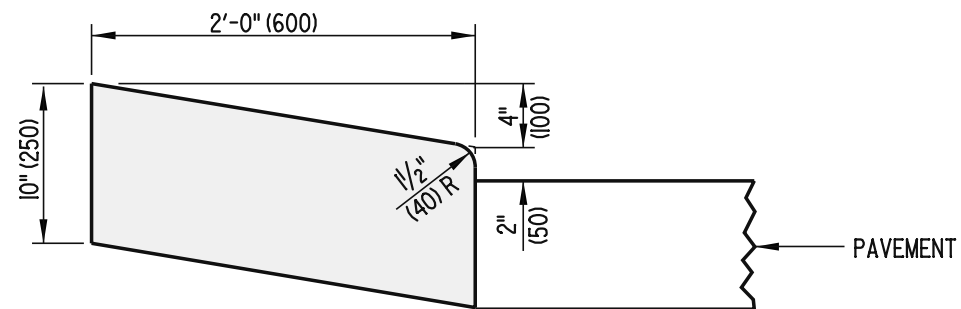
Ryan M. Harkins
CHIEF ENGINEER DATE 6/18/01

RECOMMENDED

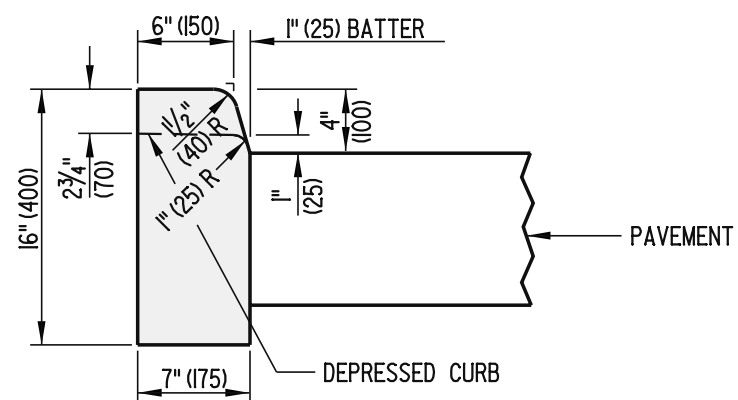
Michael P. Gotsch
DESIGN ENGINEER DATE 6/18/01



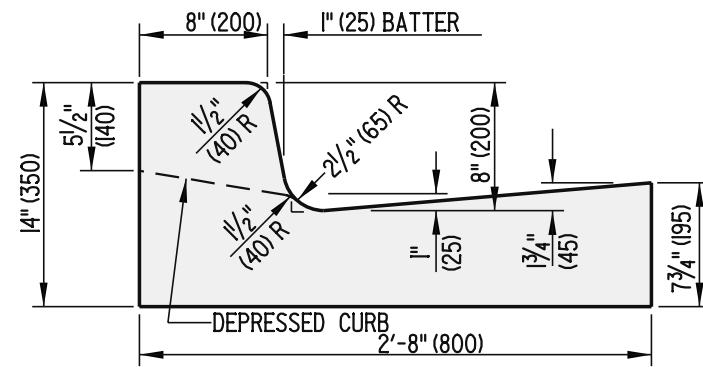
P.C.C. CURB
TYPE 1



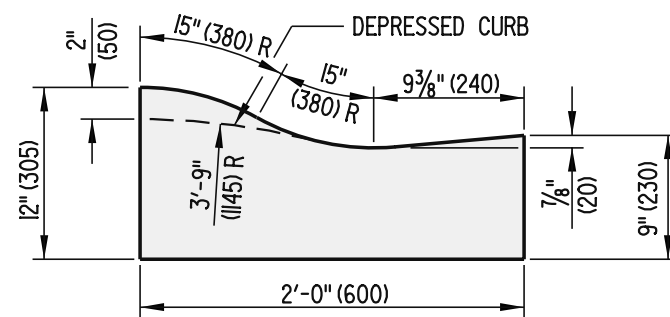
P.C.C. CURB
TYPE 2



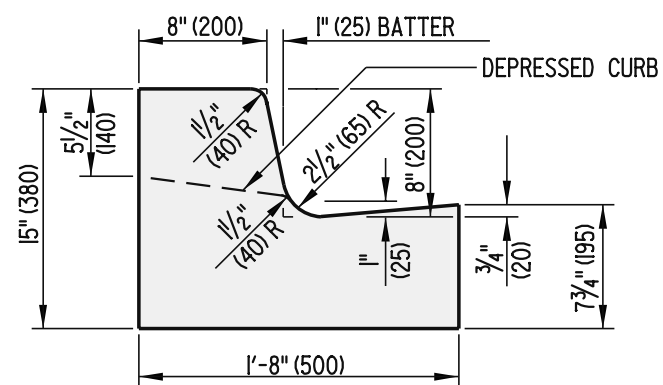
P.C.C. CURB
TYPE 3



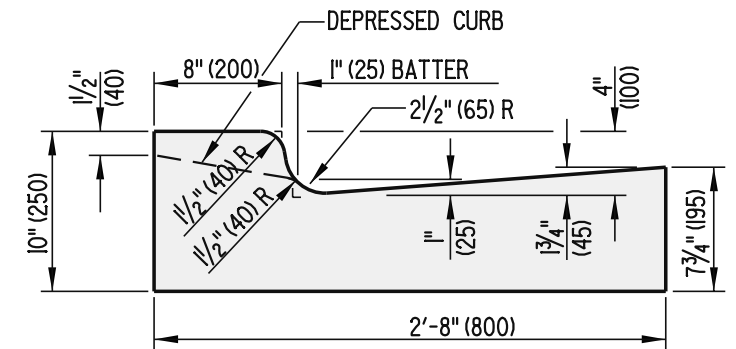
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 1



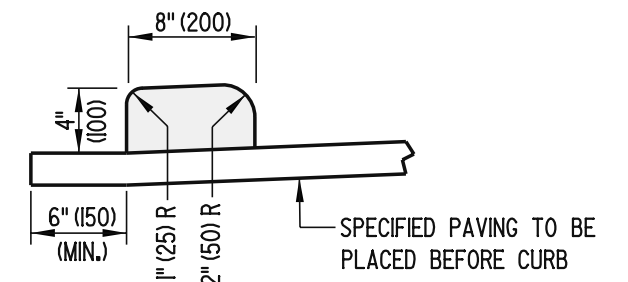
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 2



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



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



**HOT-MIX, HOT LAID BITUMINOUS
CONCRETE CURB**

- 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.



DELAWARE
DEPARTMENT OF TRANSPORTATION

P.C.C. CURB, P.C.C. CURB & GUTTER, AND HOT-MIX CURB

STANDARD NO. C-1 (2005)

SHT. 1 OF 1

APPROVED *Carolann Wick*

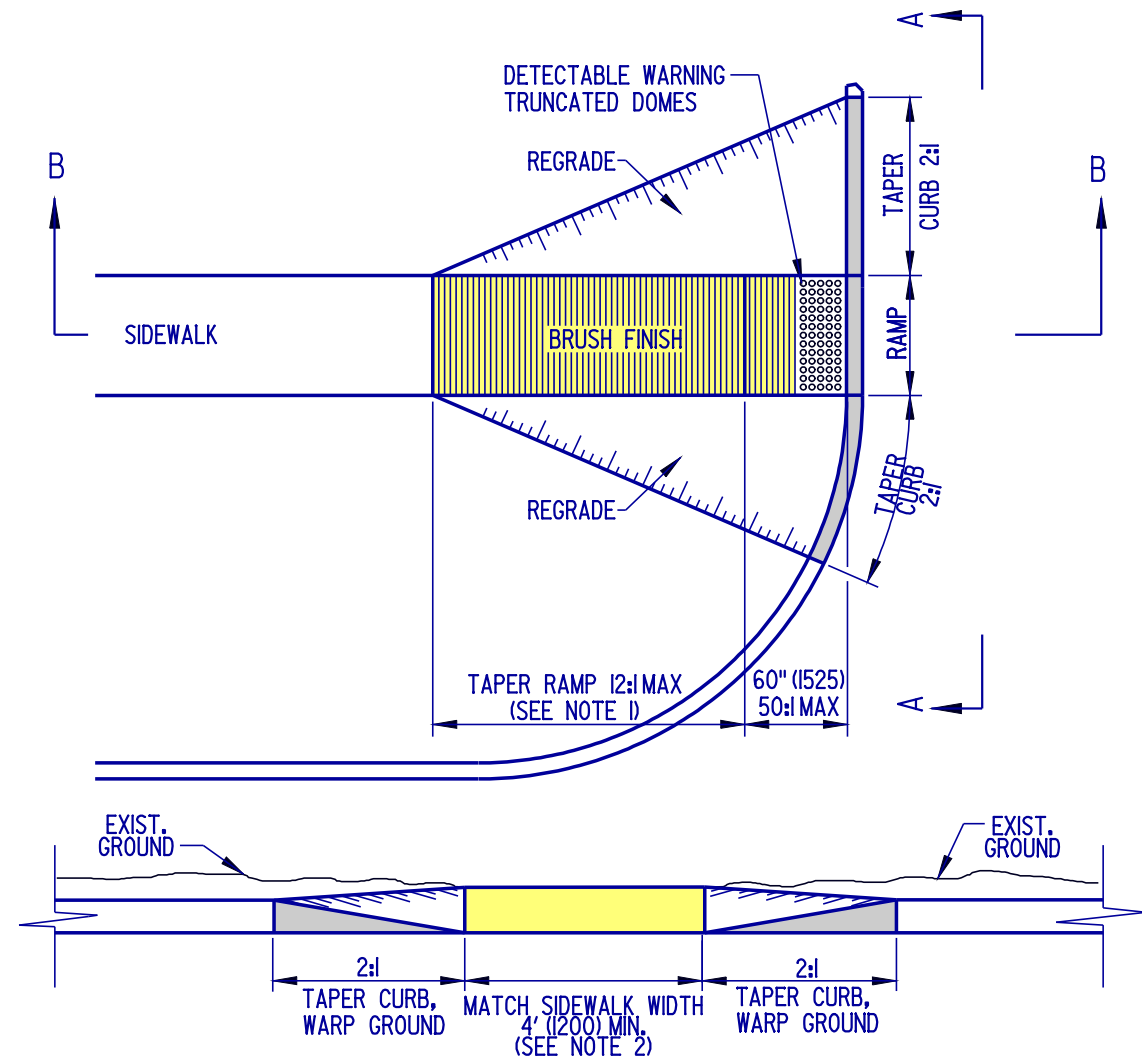
CHIEF ENGINEER

12/5/05
DATE

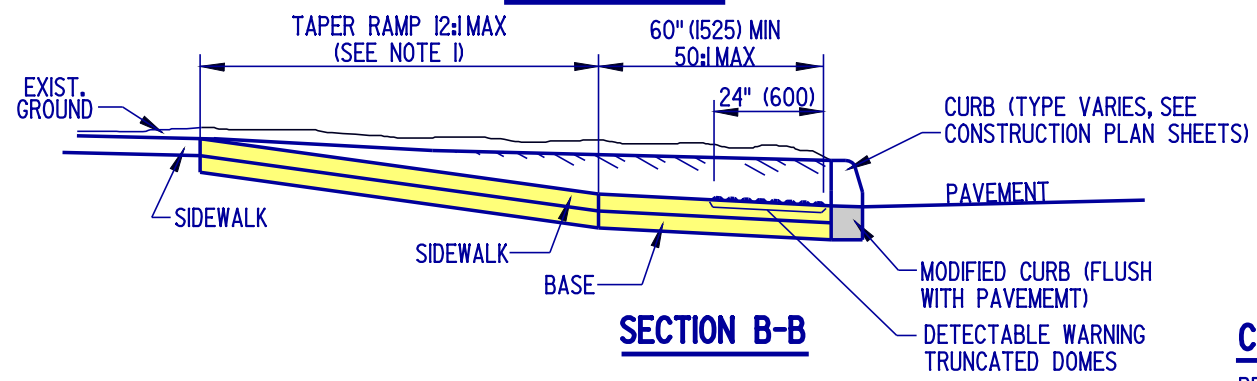
RECOMMENDED *James M. O'Brien*

DESIGN ENGINEER

11/29/05
DATE

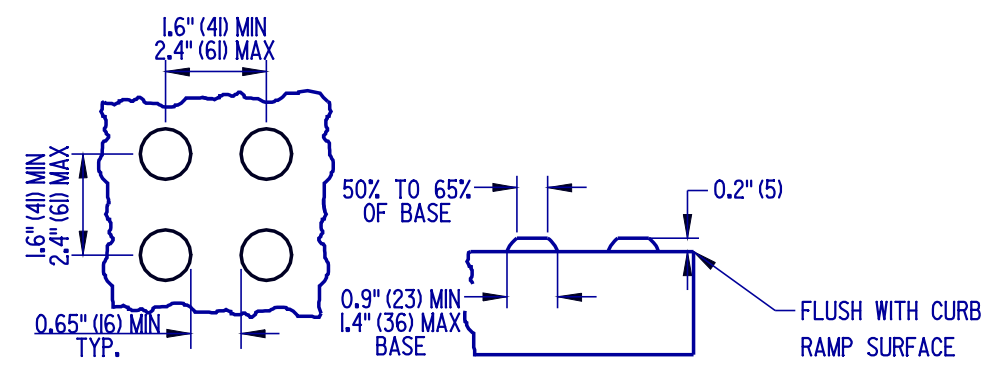


ELEVATION A-A



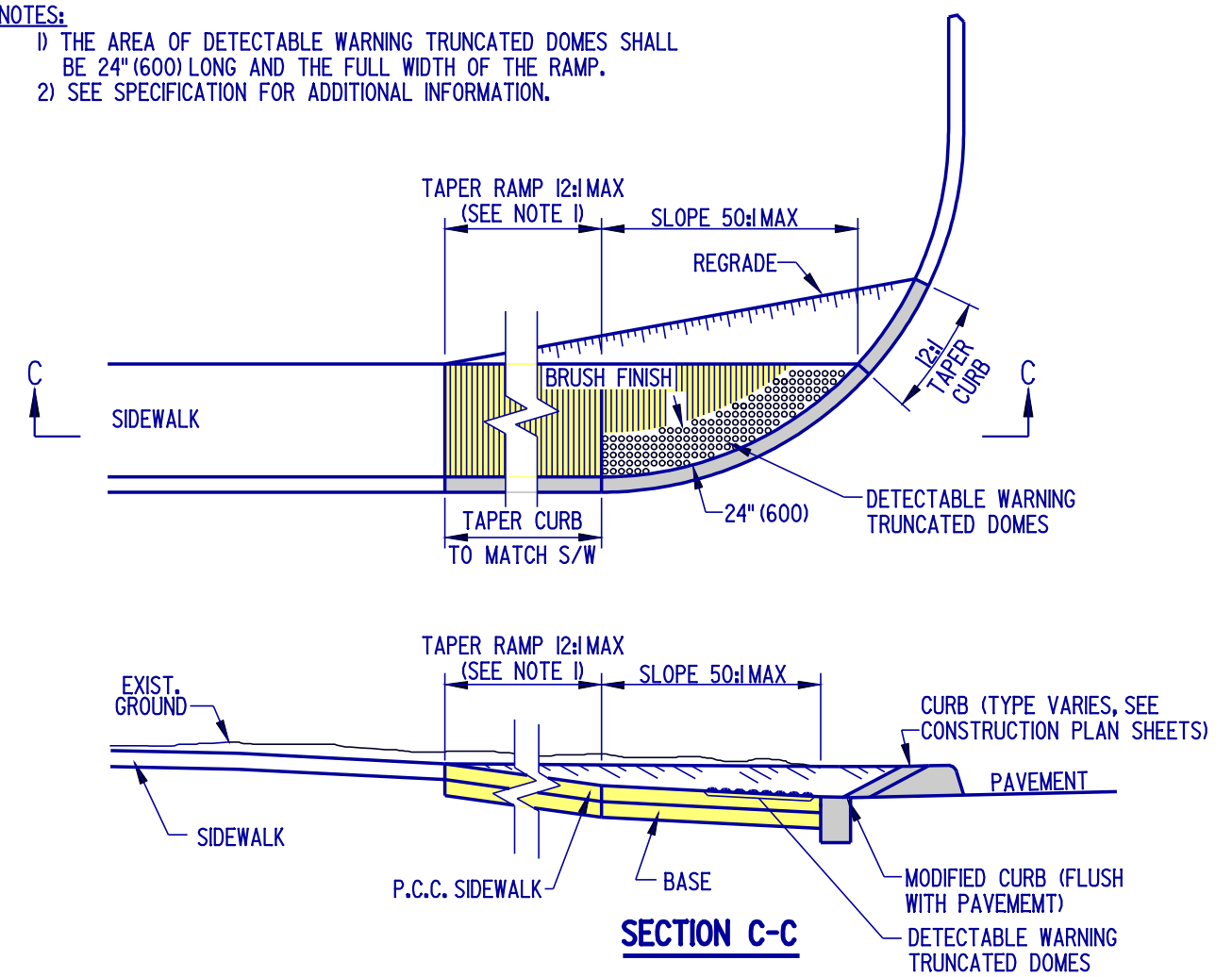
SECTION B-B

CURB RAMP, TYPE 1
PERPENDICULAR CURB RAMP



DETECTABLE WARNING TRUNCATED DOME DETAILS

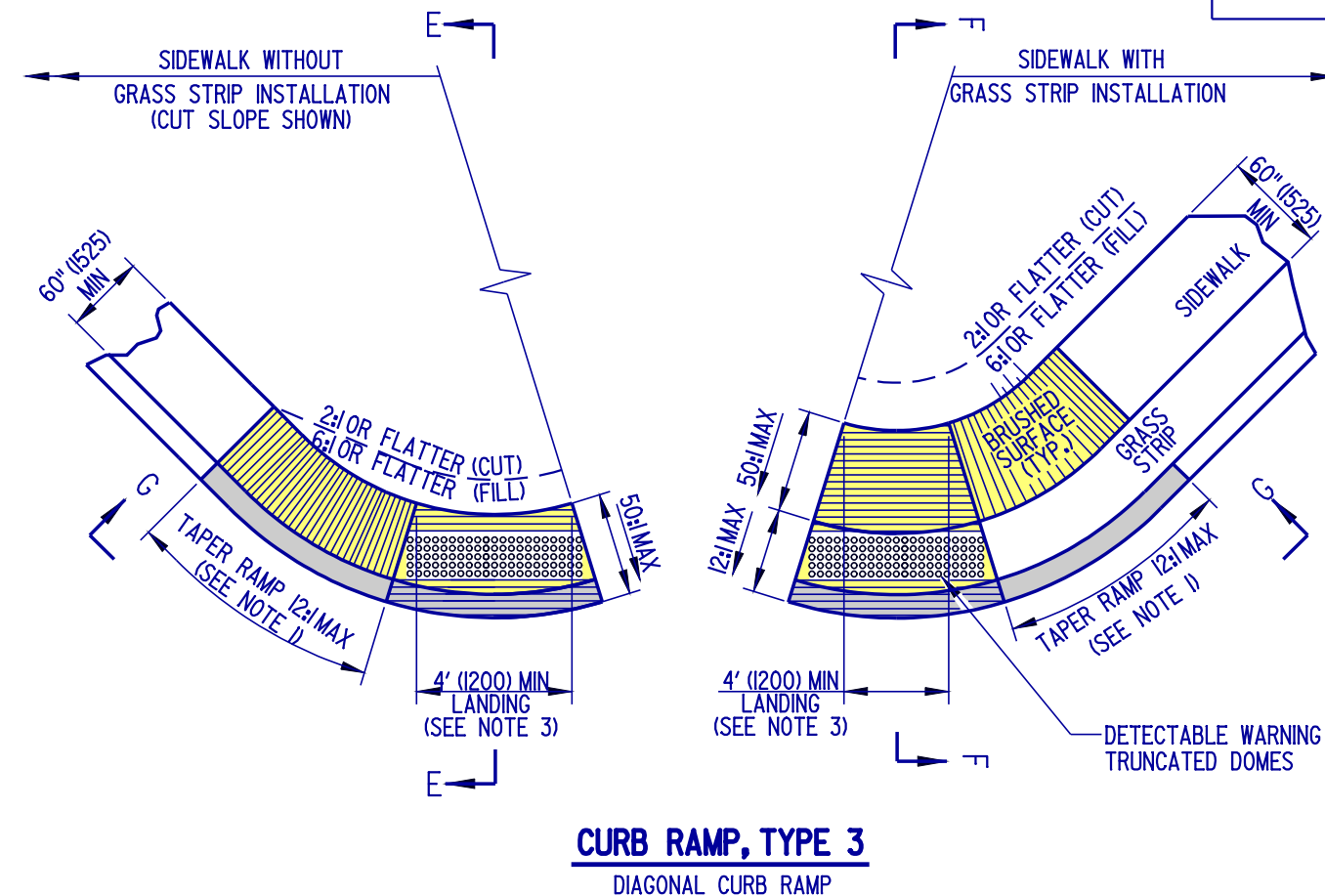
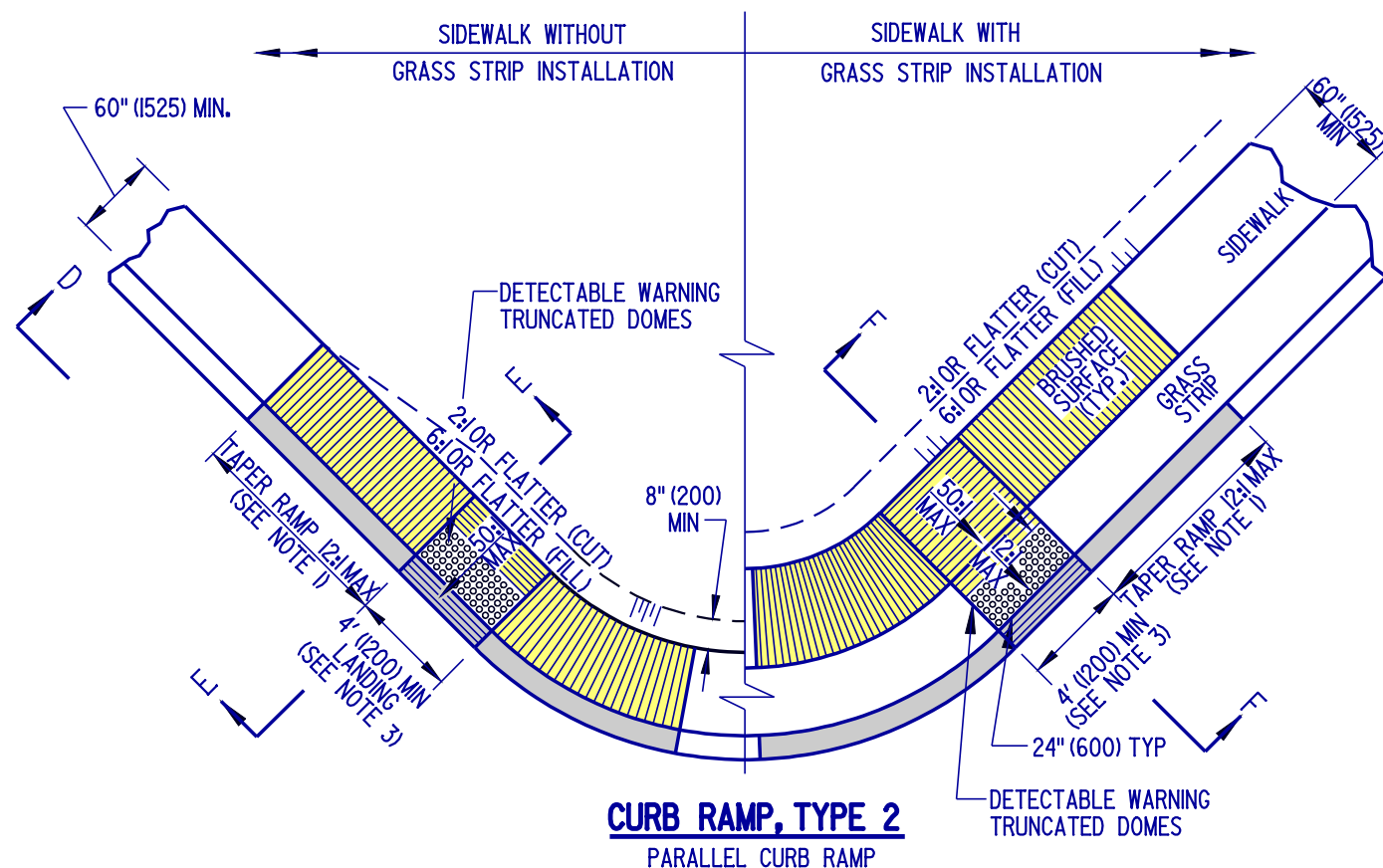
- NOTES:
- 1) THE AREA OF DETECTABLE WARNING TRUNCATED DOMES SHALL BE 24" (600) LONG AND THE FULL WIDTH OF THE RAMP.
 - 2) SEE SPECIFICATION FOR ADDITIONAL INFORMATION.



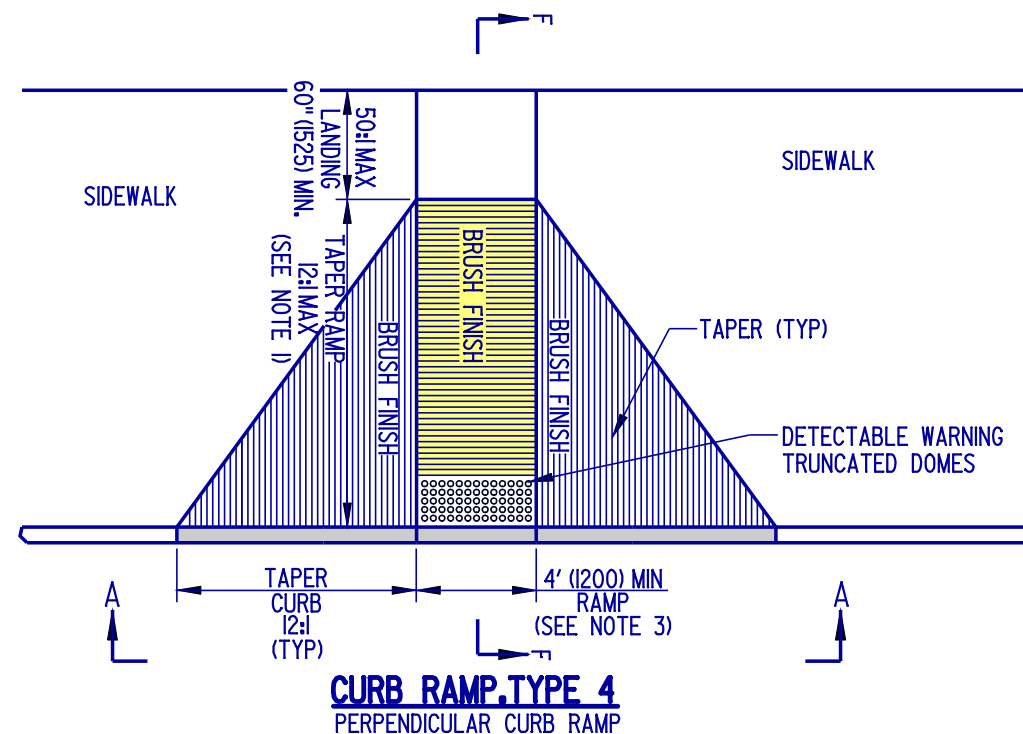
SECTION C-C

- 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.

SCALE : N.T.S.



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



- 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.



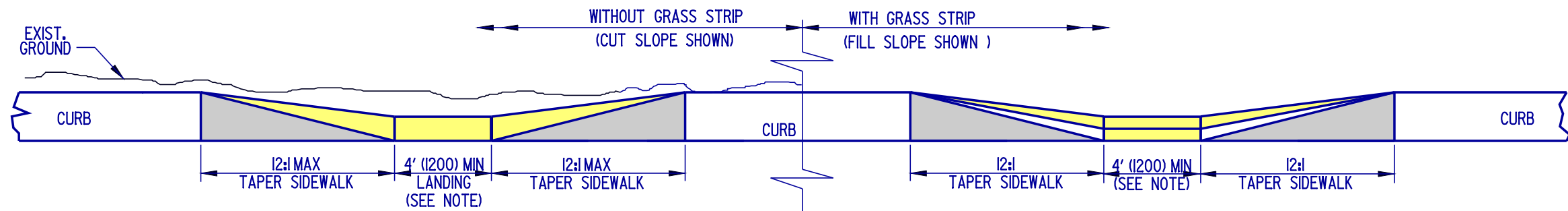
DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB RAMPS, TYPES 2, 3, & 4

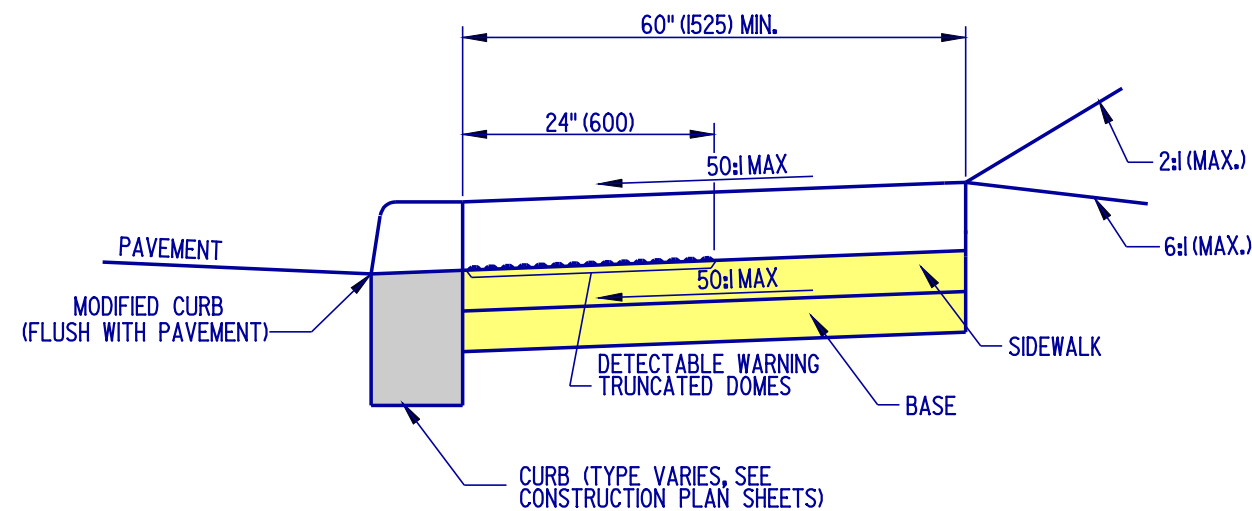
STANDARD NO. C-2 (2004)

SHT. 2 OF 4

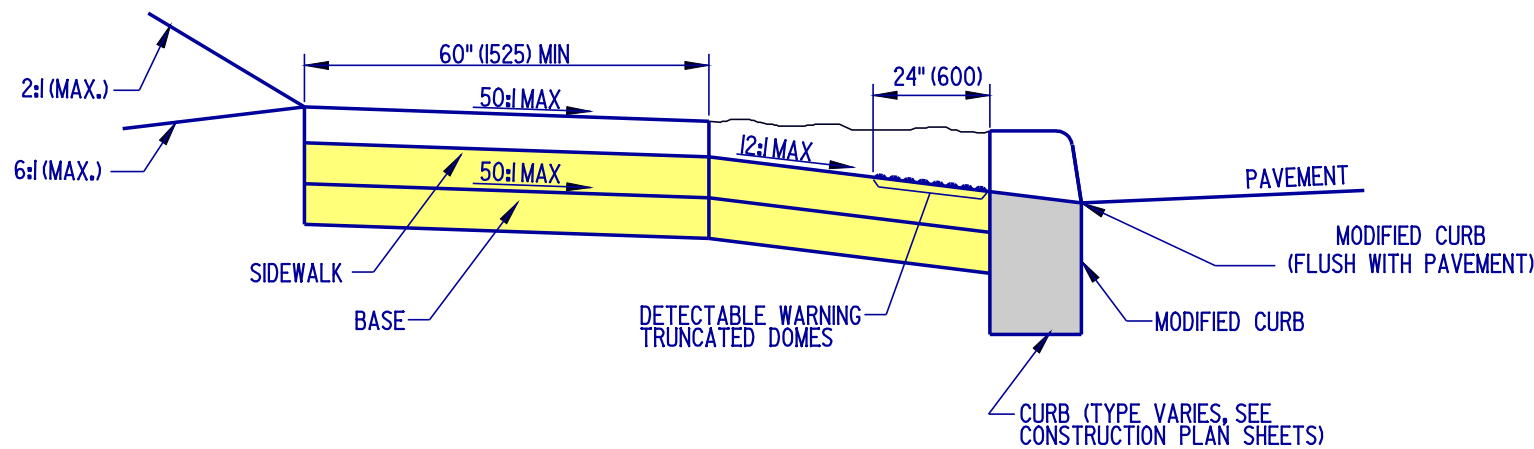
APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



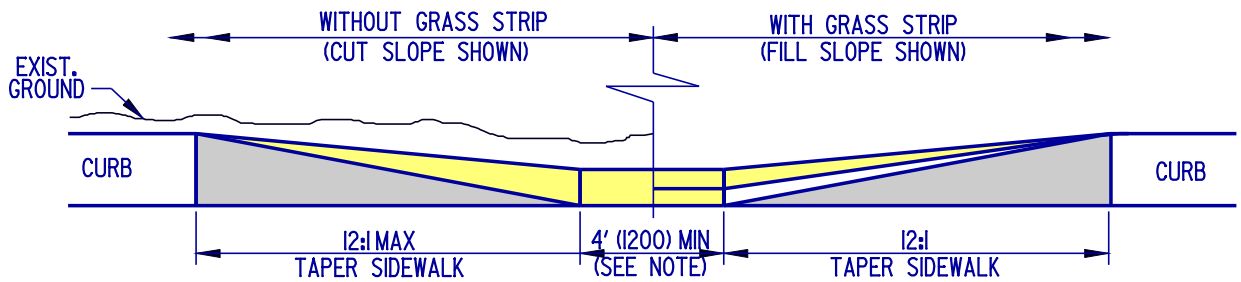
ELEVATION D-D



SECTION E-E



SECTION F-F



ELEVATION G-G

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

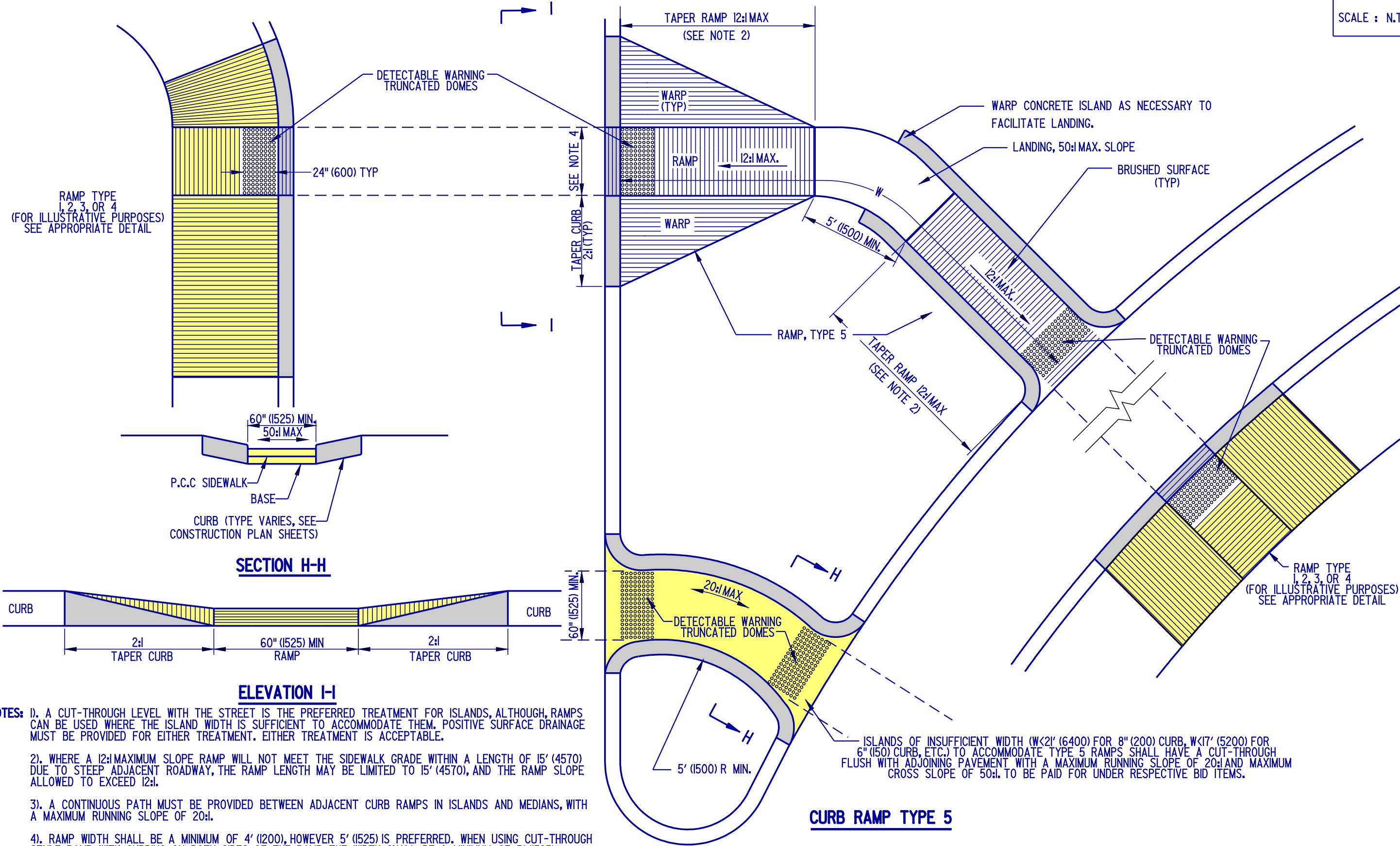


DELAWARE
DEPARTMENT OF TRANSPORTATION

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* 1/13/05
DESIGN ENGINEER DATE

SCALE : N.T.S.



DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB RAMP TYPE 5 & SECTIONS

STANDARD NO. C-2 (2004)

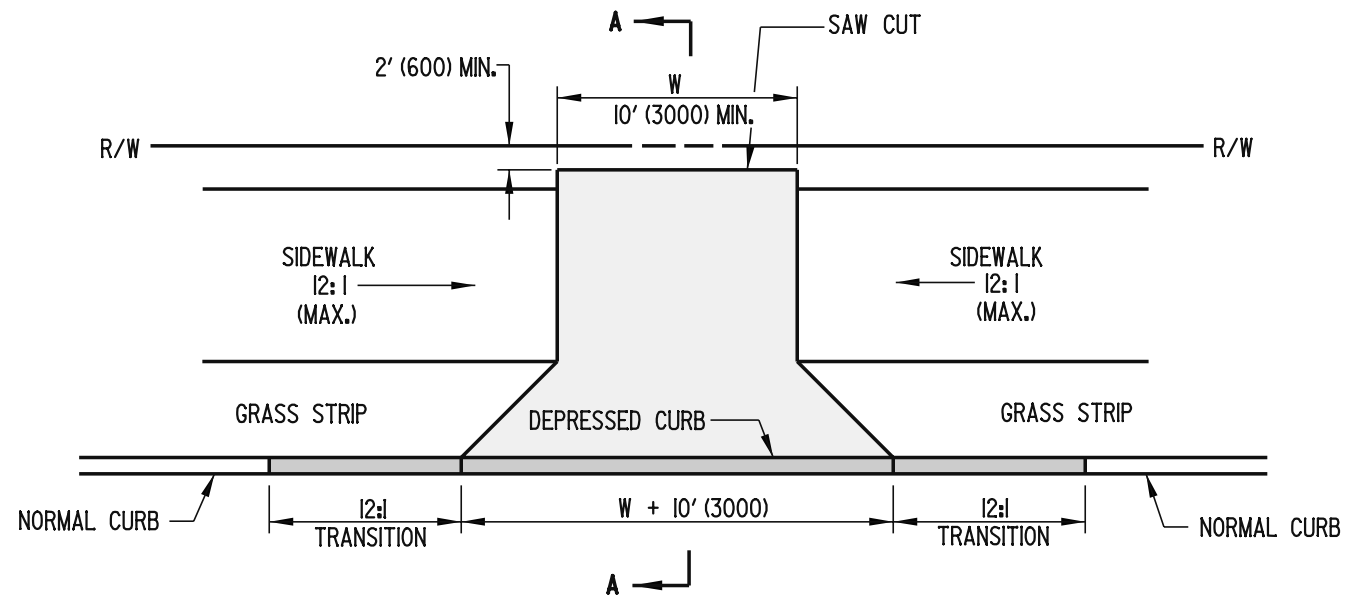
SHT. 4 OF 4

APPROVED

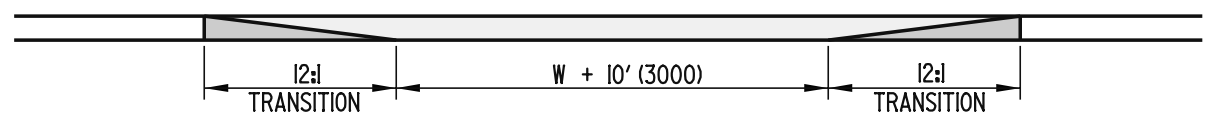
Carolann Wicks
CHIEF ENGINEER 1/10/05
DATE

RECOMMENDED

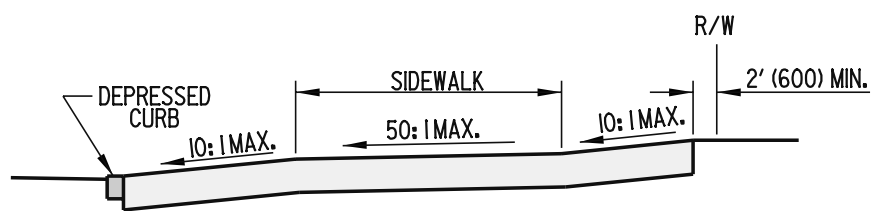
Dennis M. O'Flaherty
DESIGN ENGINEER 1/3/05
DATE



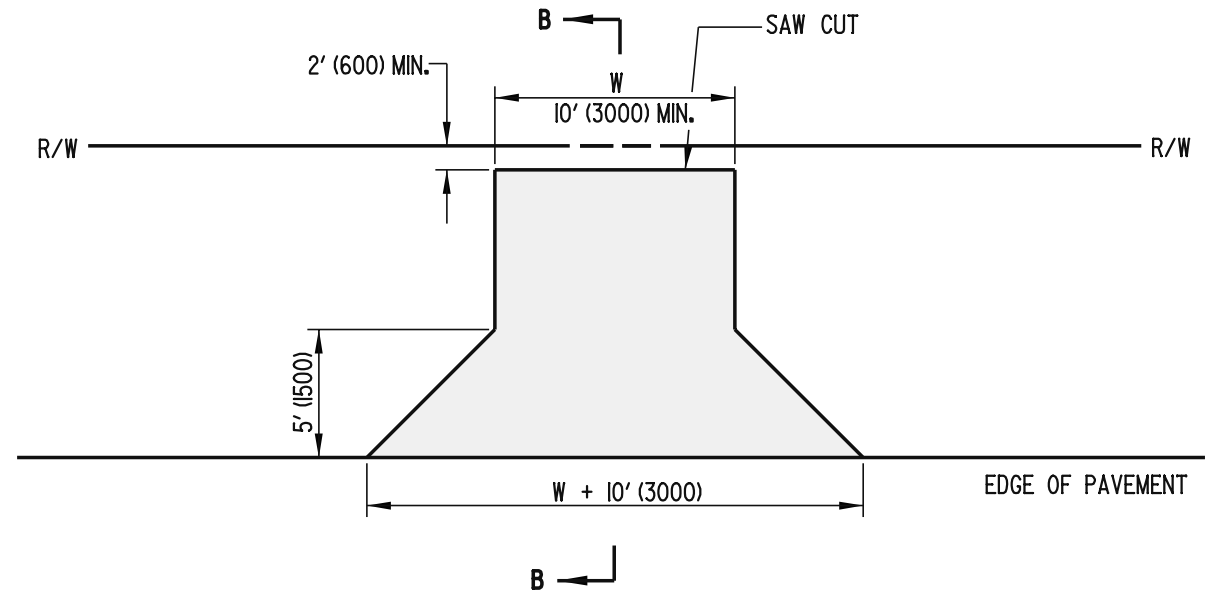
PLAN
ENTRANCE WITH SIDEWALK



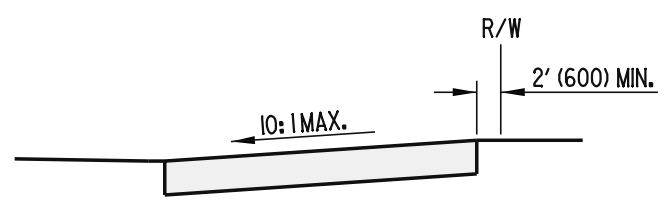
ELEVATION




SECTION A-A



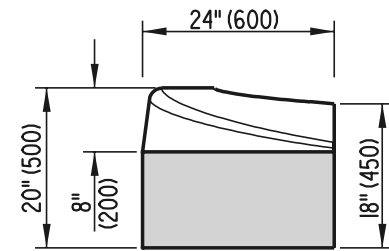
PLAN
ENTRANCE WITHOUT SIDEWALK



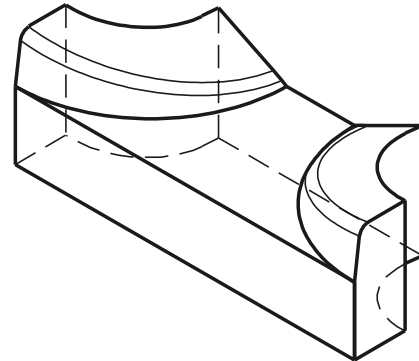
SECTION B-B

 DELAWARE DEPARTMENT OF TRANSPORTATION	ENTRANCES			APPROVED <i>Carolann Wick</i> 12/5/05 <small>CHIEF ENGINEER DATE</small>
	STANDARD NO. C-3 (2005)	SHT. 1	OF 1	RECOMMENDED <i>James M. O'Brien</i> 11/29/05 <small>DESIGN ENGINEER DATE</small>

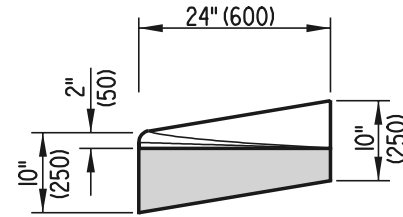
SCALE : N.T.S.



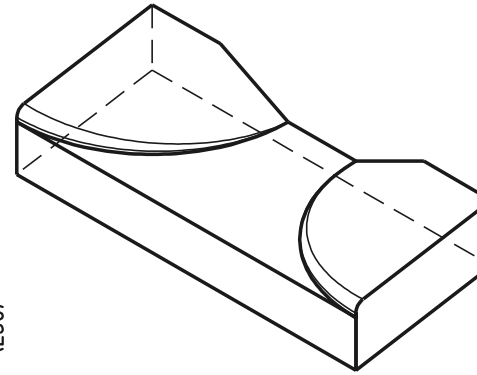
SECTION A-A



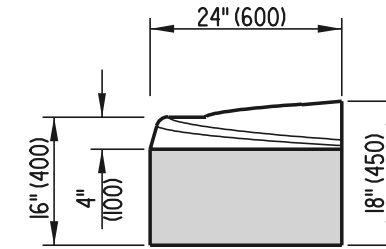
ISOMETRIC VIEW



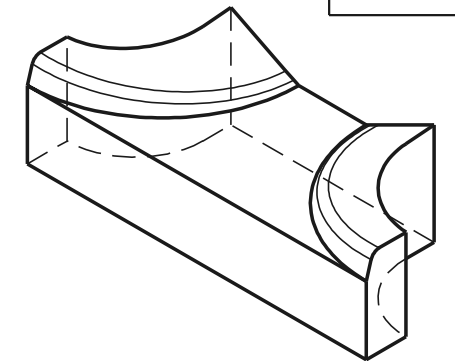
SECTION B-B



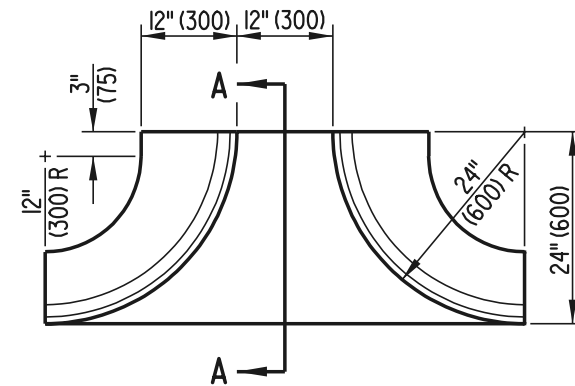
ISOMETRIC VIEW



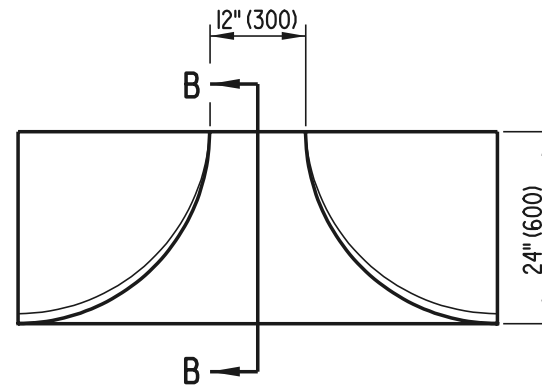
SECTION C-C



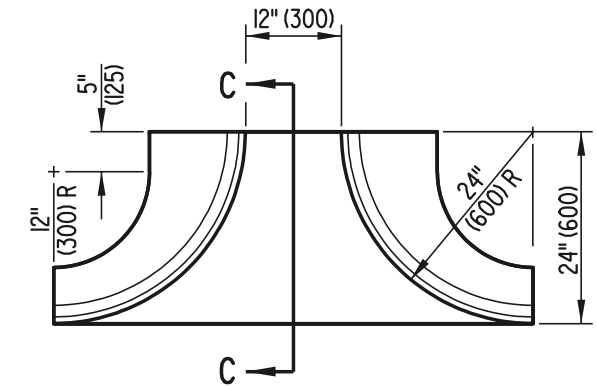
ISOMETRIC VIEW



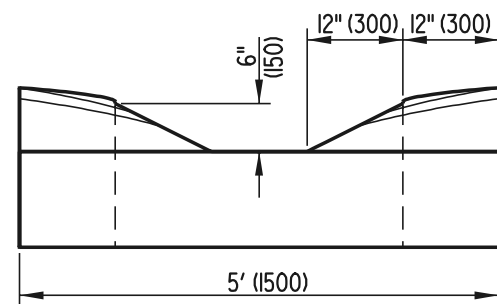
TOP VIEW



TOP VIEW

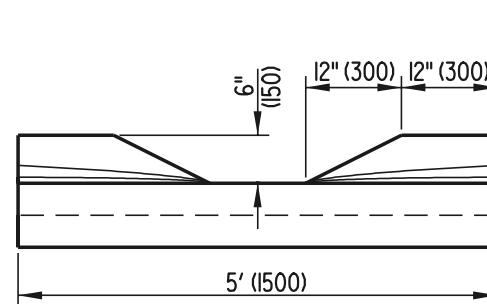


TOP VIEW



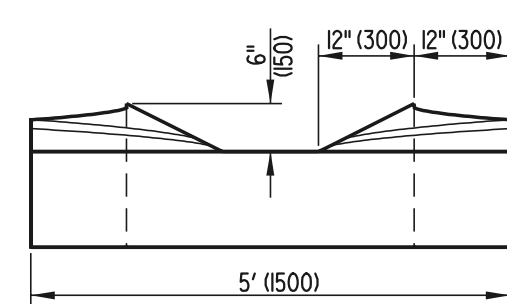
FRONT VIEW

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



DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB OPENINGS

STANDARD NO.

C-4 (2001)

SHT.

1

OF

3

APPROVED

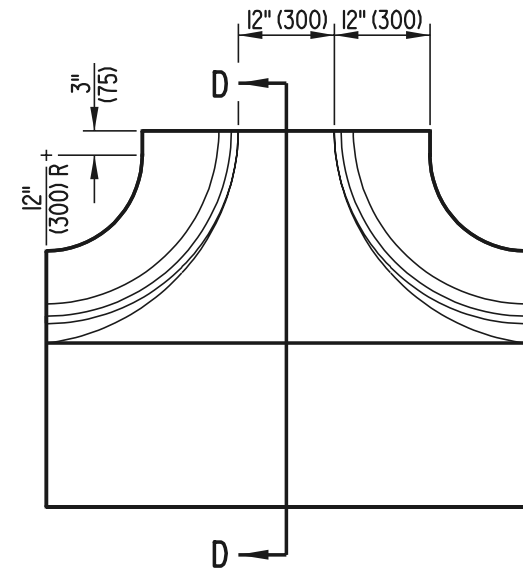
Ryan M. Harkness
CHIEF ENGINEER

6/18/01
DATE

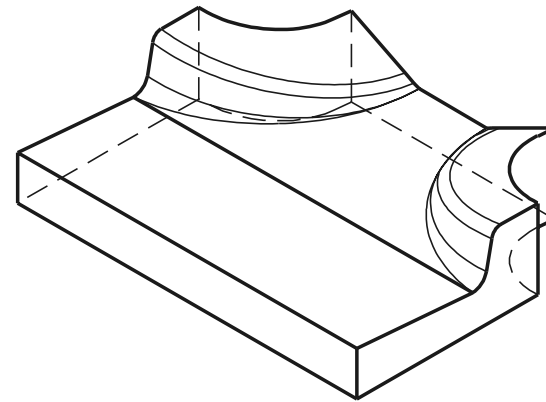
RECOMMENDED

Michael P. Gotsch
DESIGN ENGINEER

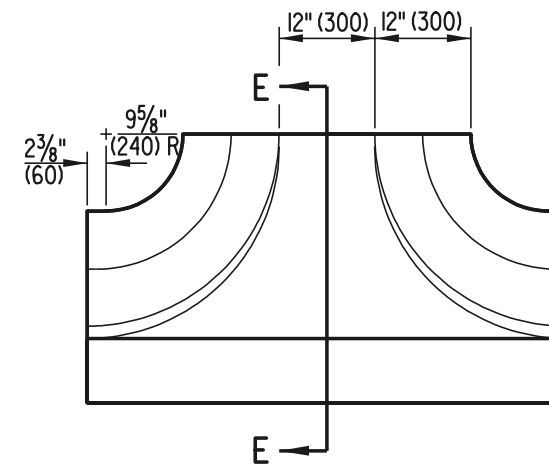
6/18/01
DATE



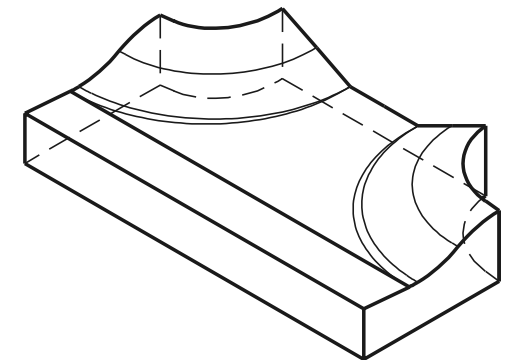
TOP VIEW



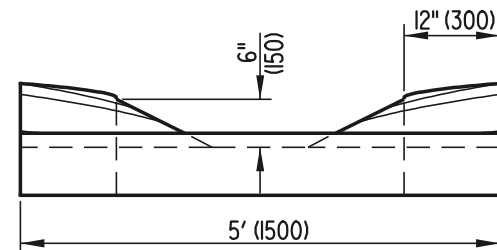
ISOMETRIC VIEW



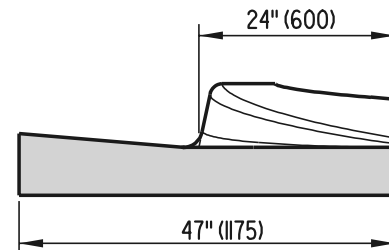
TOP VIEW



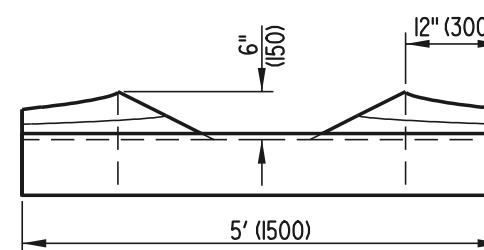
ISOMETRIC VIEW



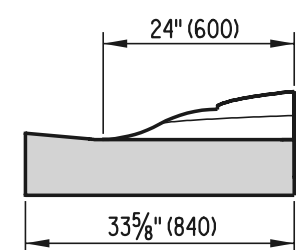
FRONT VIEW



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

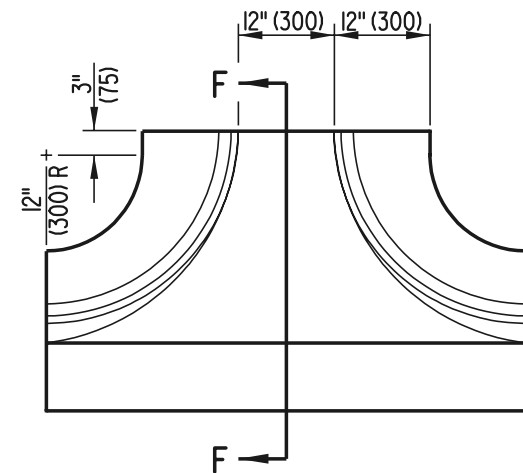
3

APPROVED

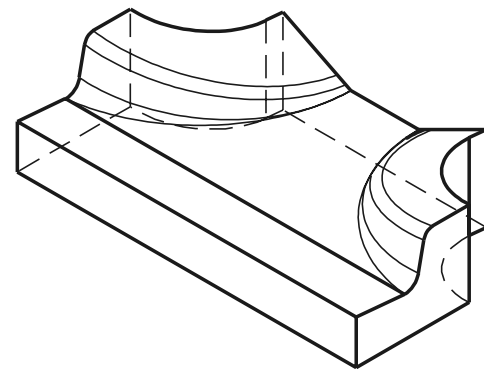
Ryan M. Harkness 6/18/01
CHIEF ENGINEER DATE

RECOMMENDED

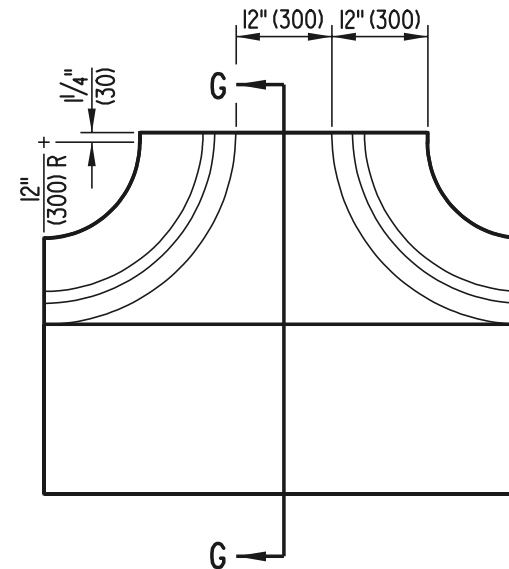
Mehal Akbar 6/18/01
DESIGN ENGINEER DATE



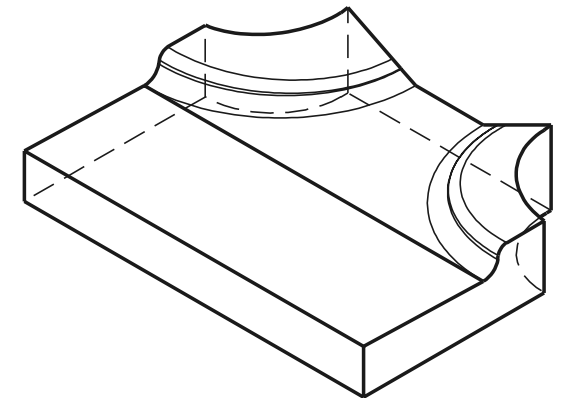
TOP VIEW



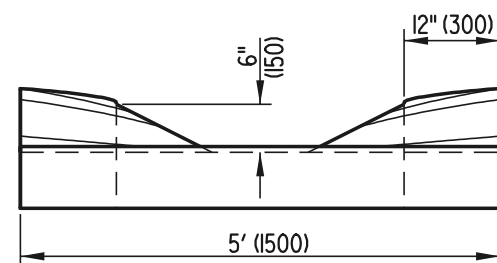
ISOMETRIC VIEW



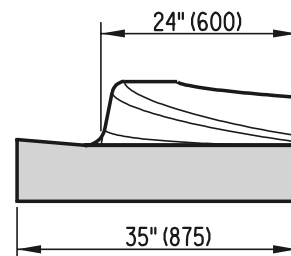
TOP VIEW



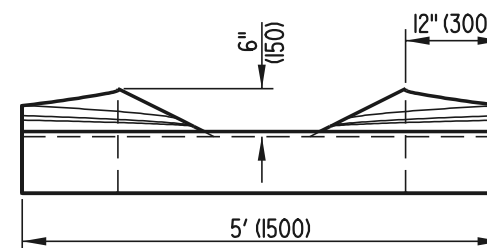
ISOMETRIC VIEW



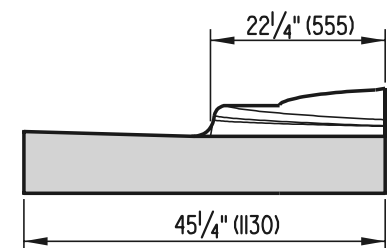
FRONT VIEW



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

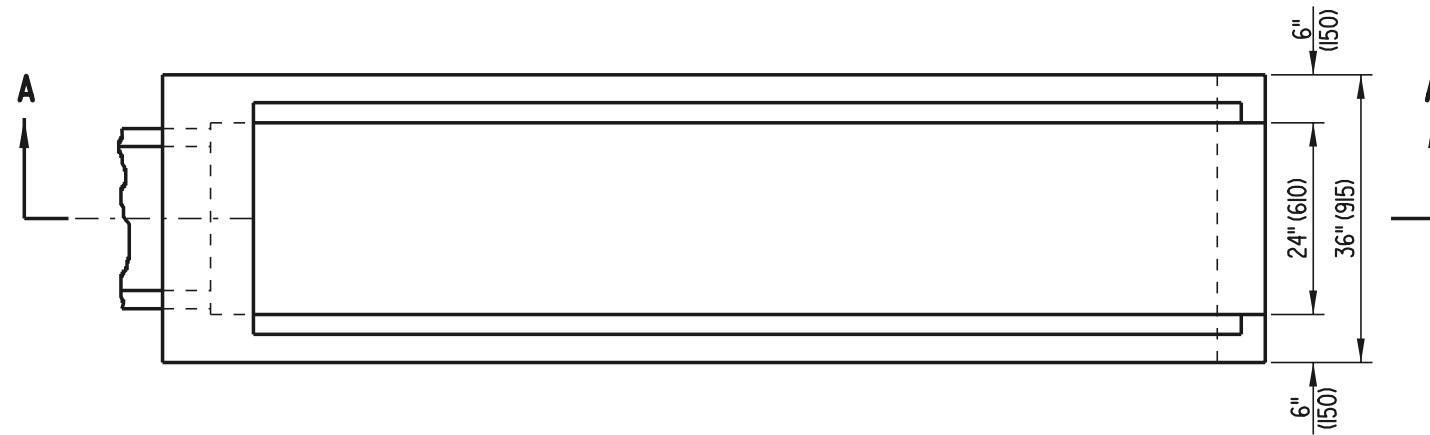
3

APPROVED

Ryan M. Harkness 6/18/01
CHIEF ENGINEER DATE

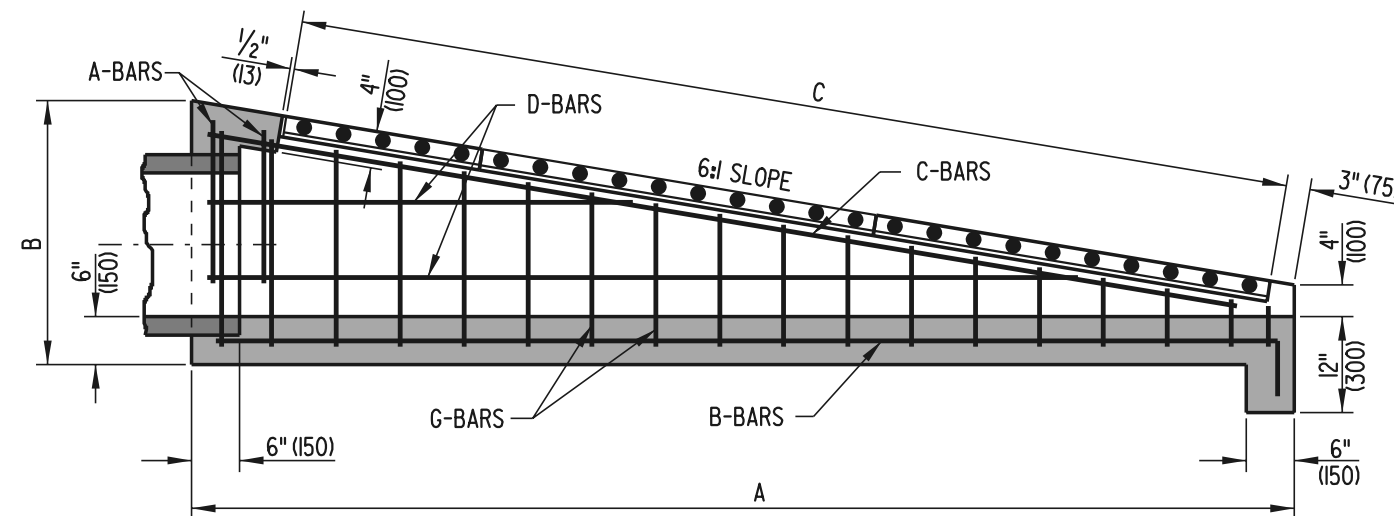
RECOMMENDED

Mehal Akbar 6/18/01
DESIGN ENGINEER DATE

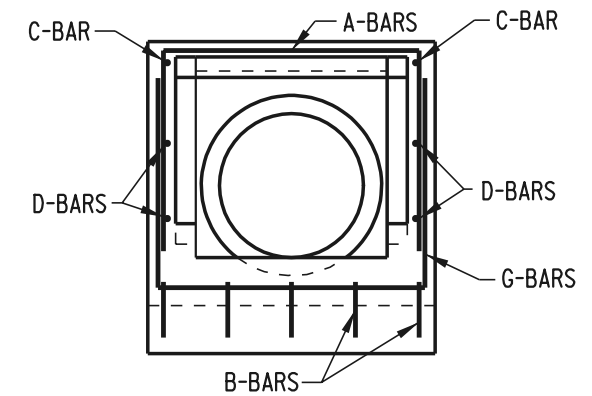


PLAN VIEW
SHOWN WITHOUT GRATE

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)

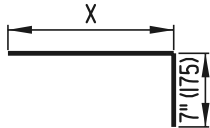

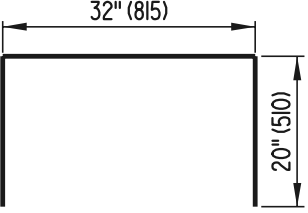
SHT. 1 OF 2

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

RECOMMENDED *Michael P. Gotsch* **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 FT³ (m³)		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)	--

BENDING DIAGRAM		
PIPE SIZE	X	
15" (375)	9'-2" (2795)	
18" (450)	11'-2" (3405)	
21" (525) OR 24" (610)	14'-0" (4265)	
PIPE SIZE	Y	
15" (375)	VARIES 25" (635) TO 4" (100)	
18" (450)	VARIES 29" (735) TO 4" (100)	
21" (525) OR 24" (610)	VARIES 34" (865) TO 4" (100)	
		
		A-BARS

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)	VARIES 43½" (1105) TO 130½" (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)

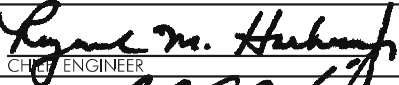



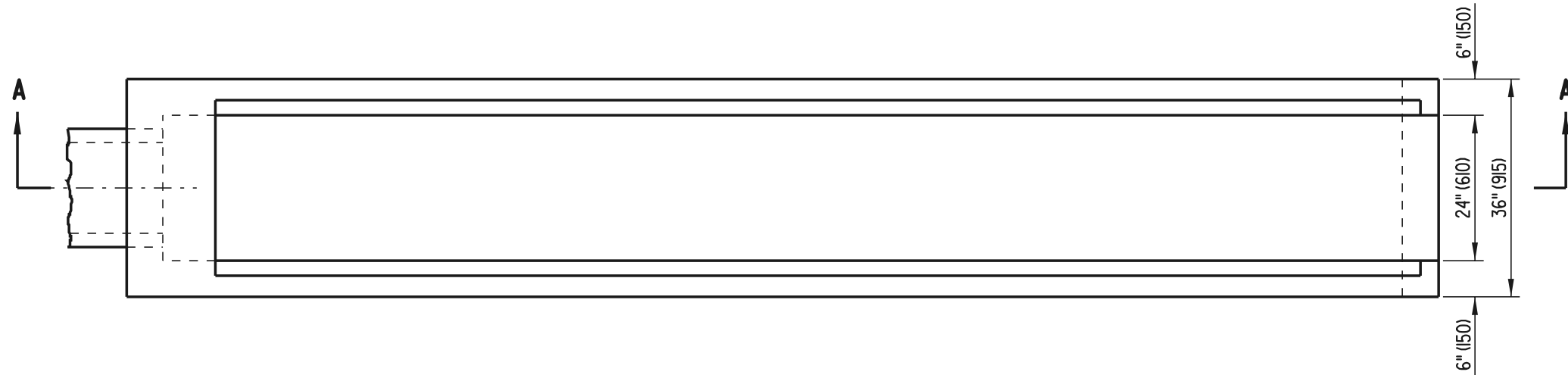
DELAWARE
DEPARTMENT OF TRANSPORTATION

6:1 SAFETY END STRUCTURE

STANDARD NO. D-1 (2001)

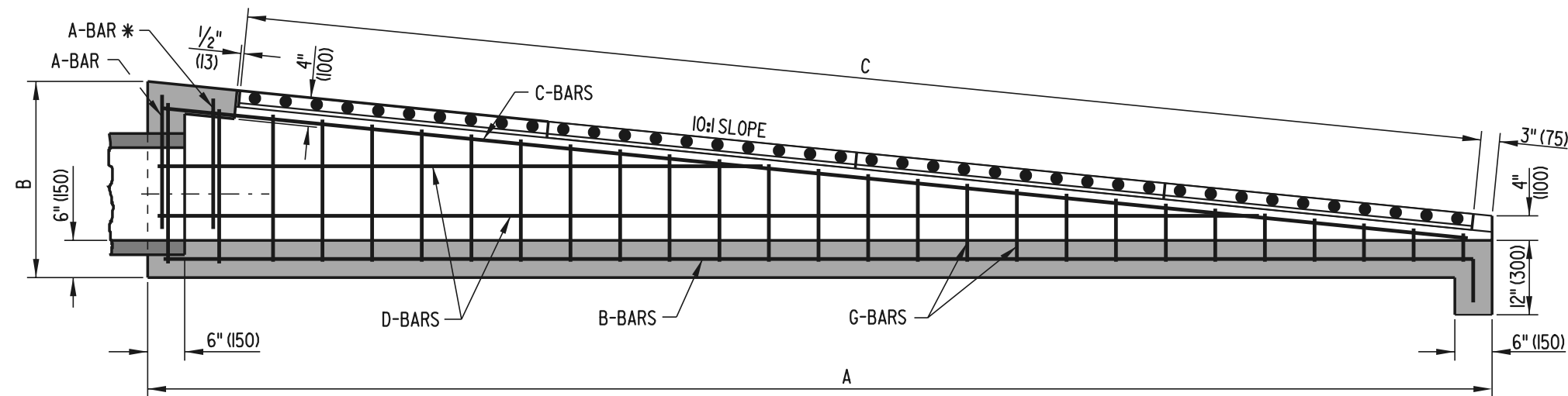
SHT. 2 OF 2

APPROVED  6/18/01
CHIEF ENGINEER DATE
RECOMMENDED  6/18/01
DESIGN ENGINEER DATE



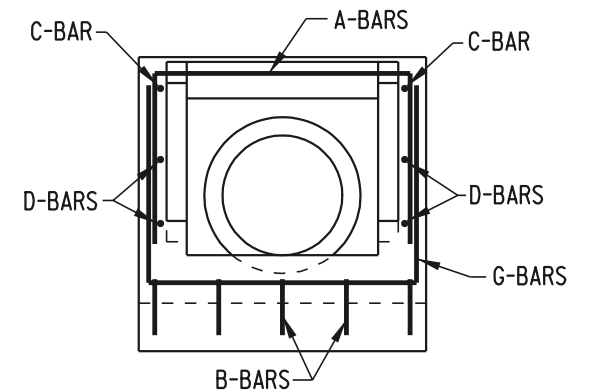
PLAN VIEW
SHOWN WITHOUT GRATE

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

STANDARD NO. D-2 (2001)

SHT. 1 OF 2

APPROVED

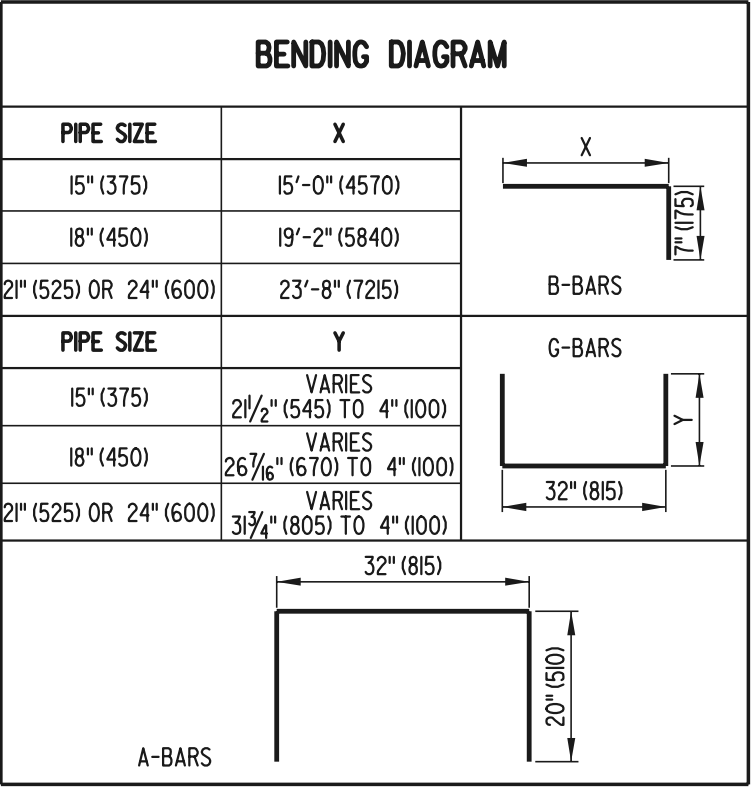
Ryan M. Harkness
CHIEF ENGINEER
DATE **6/18/01**

RECOMMENDED

Michael P. Gotsch
DESIGN ENGINEER
DATE **6/18/01**

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 FT³ (m³)		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 1 1/16" (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 3/16" (2455)

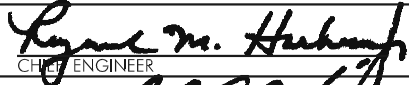



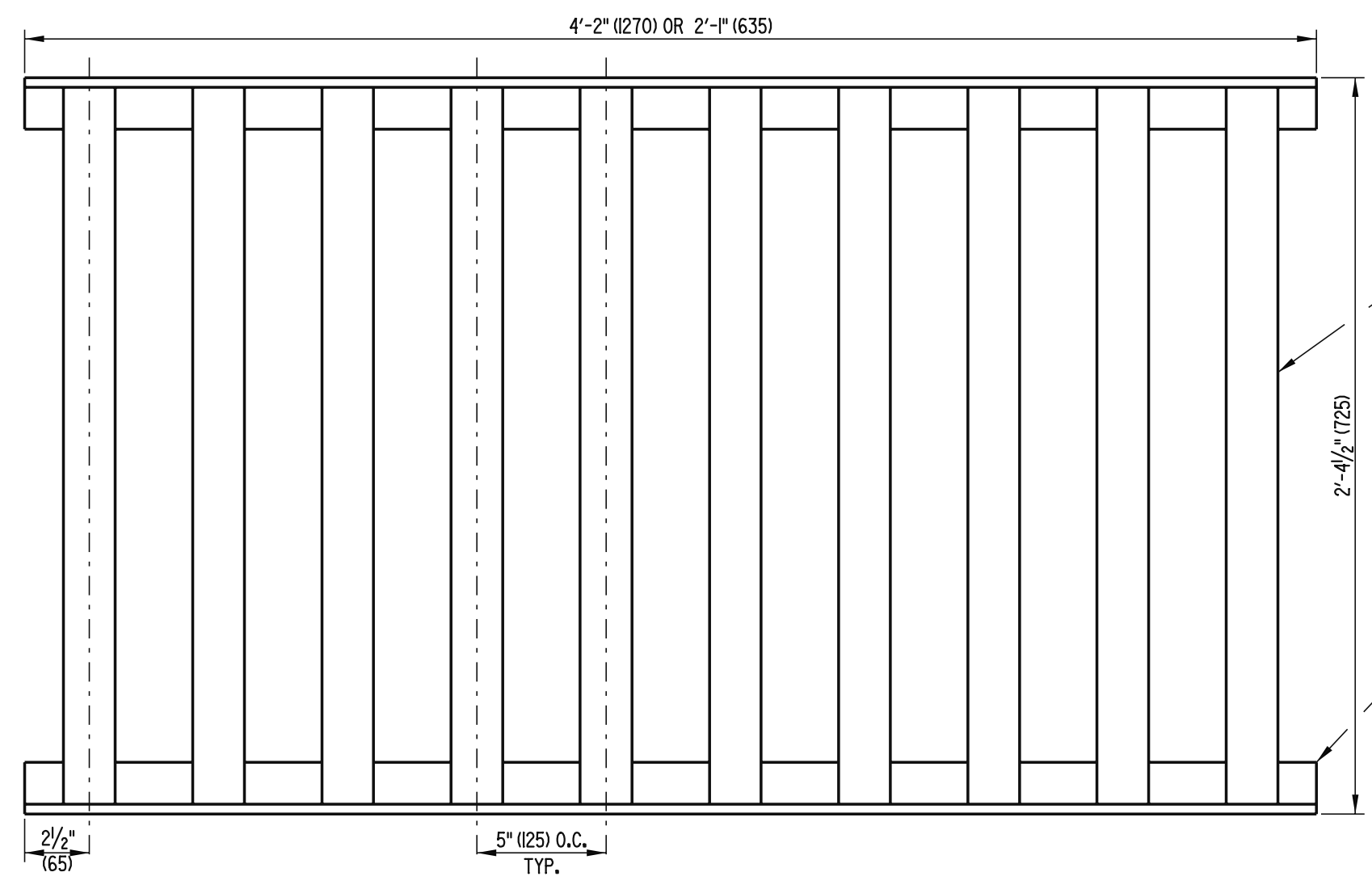
DELAWARE
DEPARTMENT OF TRANSPORTATION

10:1 SAFETY END STRUCTURE

STANDARD NO. D-2 (2001)

SHT. 2 OF 2

APPROVED  6/18/01
CHIEF ENGINEER DATE
RECOMMENDED  6/18/01
DESIGN ENGINEER DATE



GRATE DETAIL

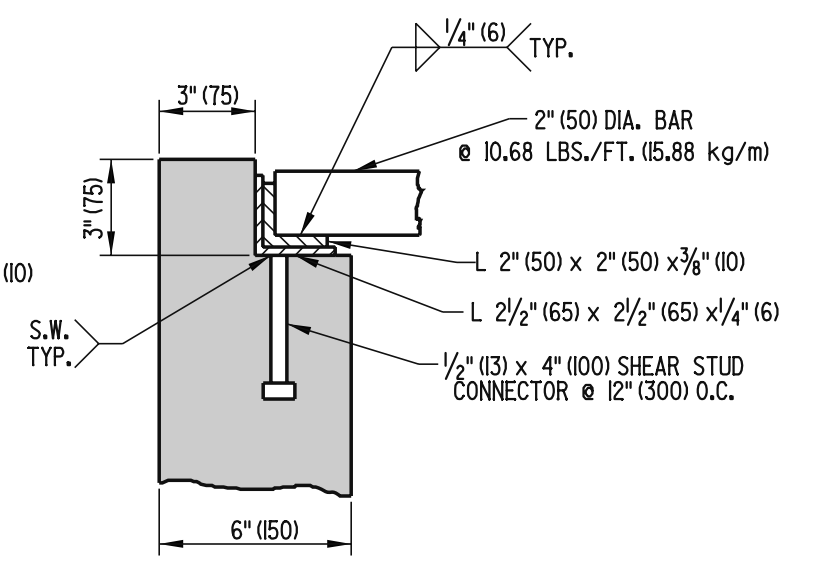
2" (50) DIA. BAR @ 10.68 LBS./FT. (15.88 kg/m)

2'-4 1/2" (725)

L 2" (50) x 2" (50) x 3/8" (10)

2 1/2" (65)

5" (125) O.C. TYP.



FRAME & GRATE ASSEMBLY DETAIL



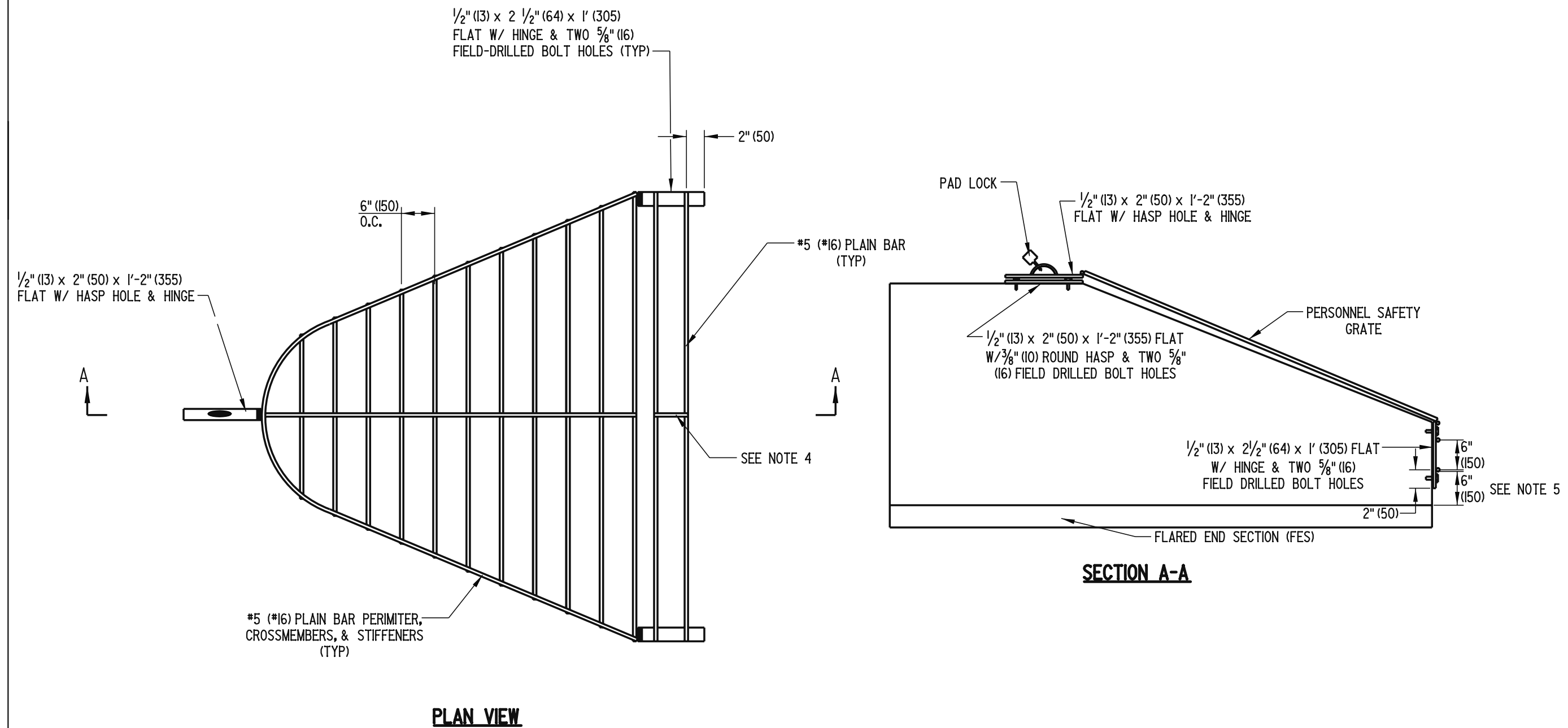
DELAWARE
DEPARTMENT OF TRANSPORTATION

SAFETY GRATES


STANDARD NO. D-3 (2005)

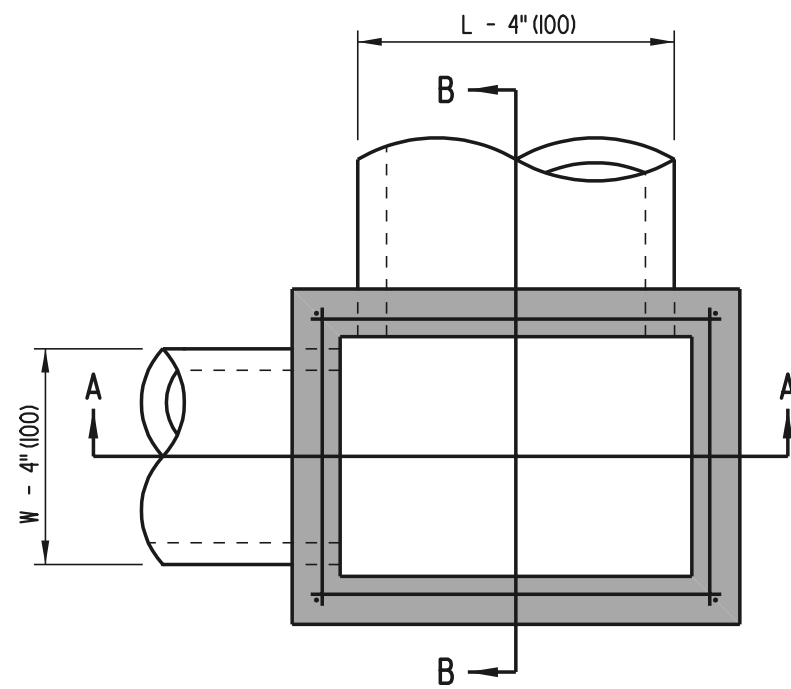
SHT. 1 OF 2

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



- 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>Carolann Wick</i> 12/15/05 CHIEF ENGINEER DATE
	STANDARD NO. D-3 (2005)	SHT. 2	OF 2	RECOMMENDED <i>James M. O'Brien</i> 11/29/05 DESIGN ENGINEER DATE



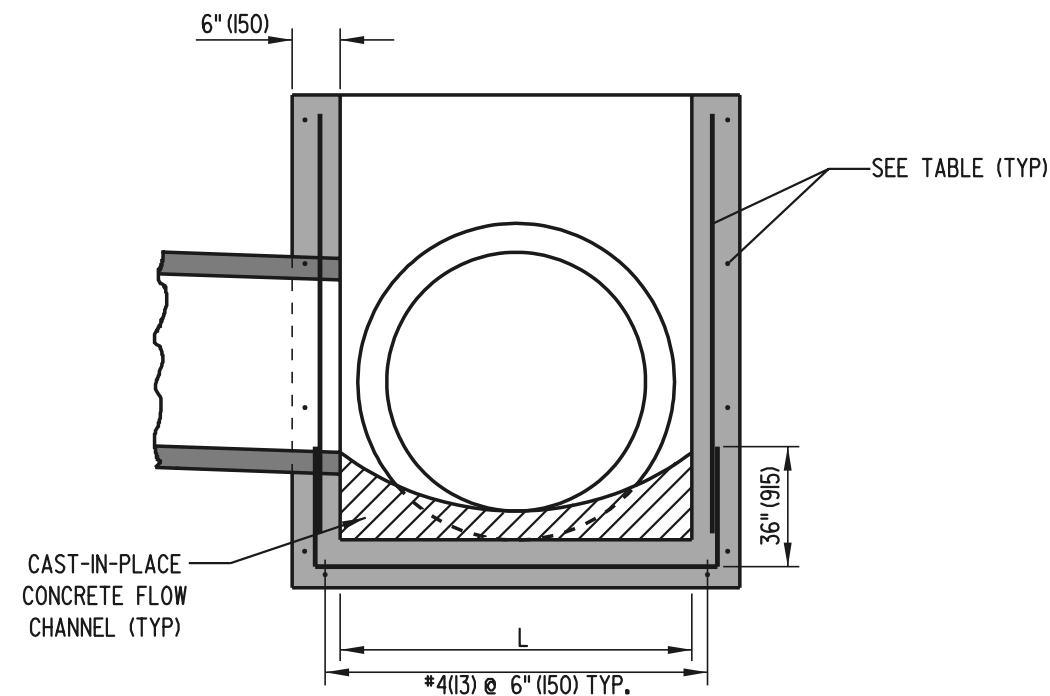
TOP VIEW

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)

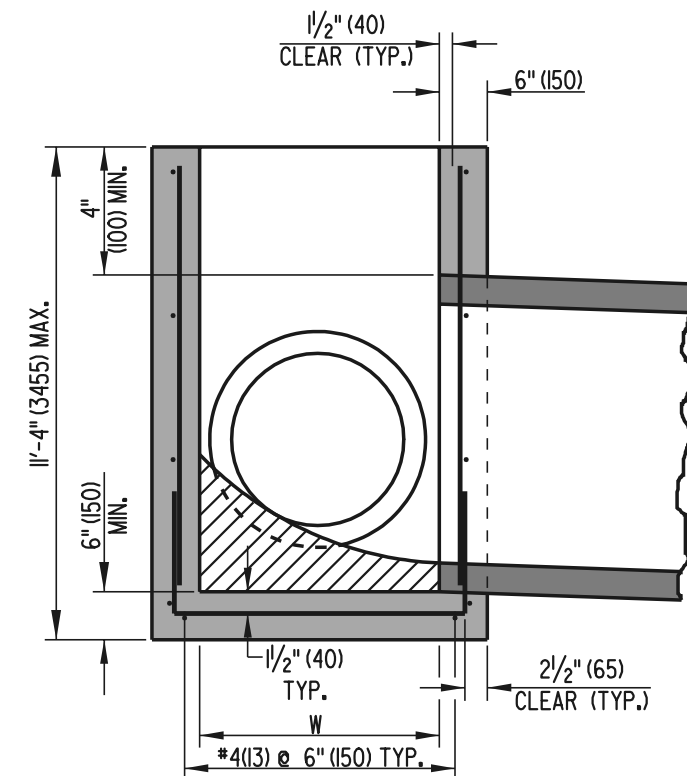
INLET BOX SCHEDULE			
L	W	L MAX	W MAX
34" (865)	18" (455)	34" (865)	18" (455)
34" (865)	24" (610)	34" (865)	24" (610)
48" (1220)	30" (760)	54" (1370)	36" (915)
48" (1220)	48" (1220)	54" (1370)	54" (1370)
66" (1675)	30" (760)	72" (1830)	36" (915)
66" (1675)	48" (1220)	72" (1830)	54" (1370)
66" (1675)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

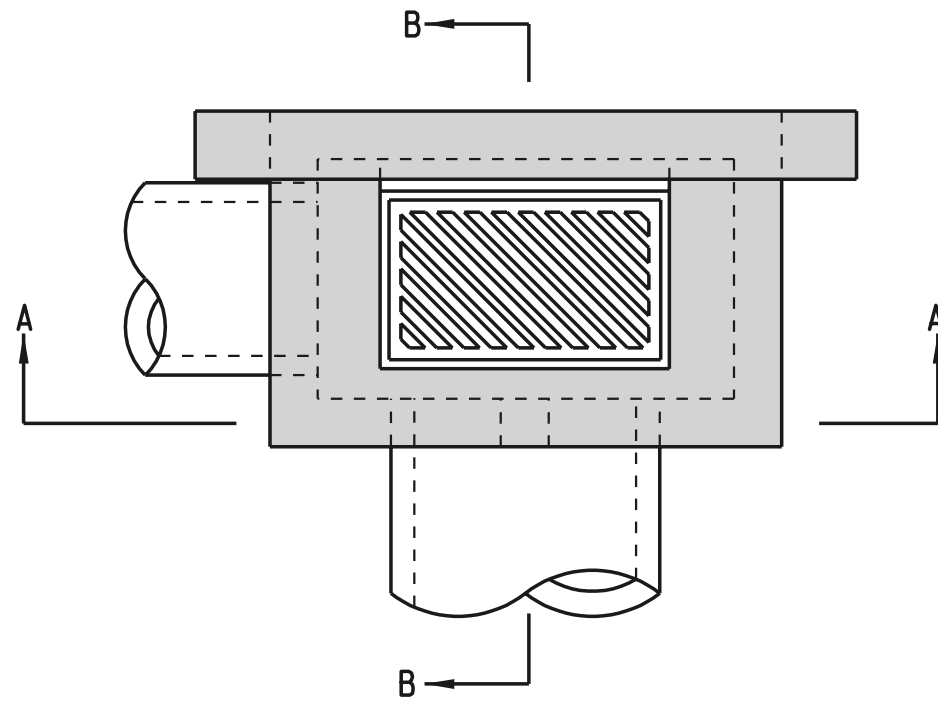
OF 1

APPROVED

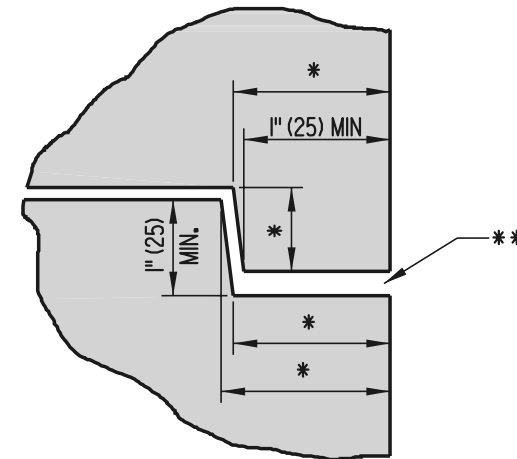
Caution Wicks 9/6/02
CHIEF ENGINEER DATE

RECOMMENDED

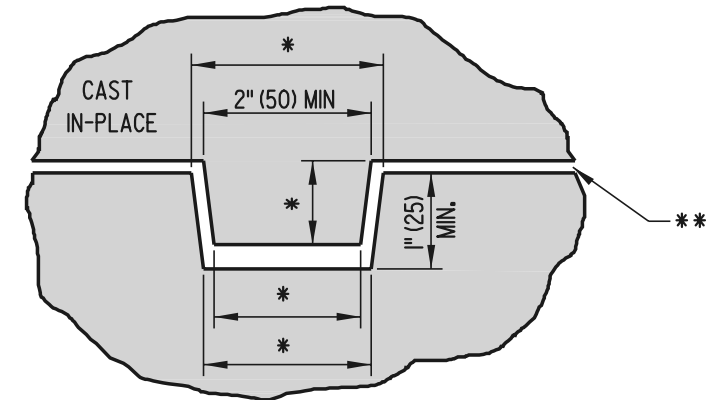
Theresa Delph 8/19/02
DESIGN ENGINEER DATE



PLAN

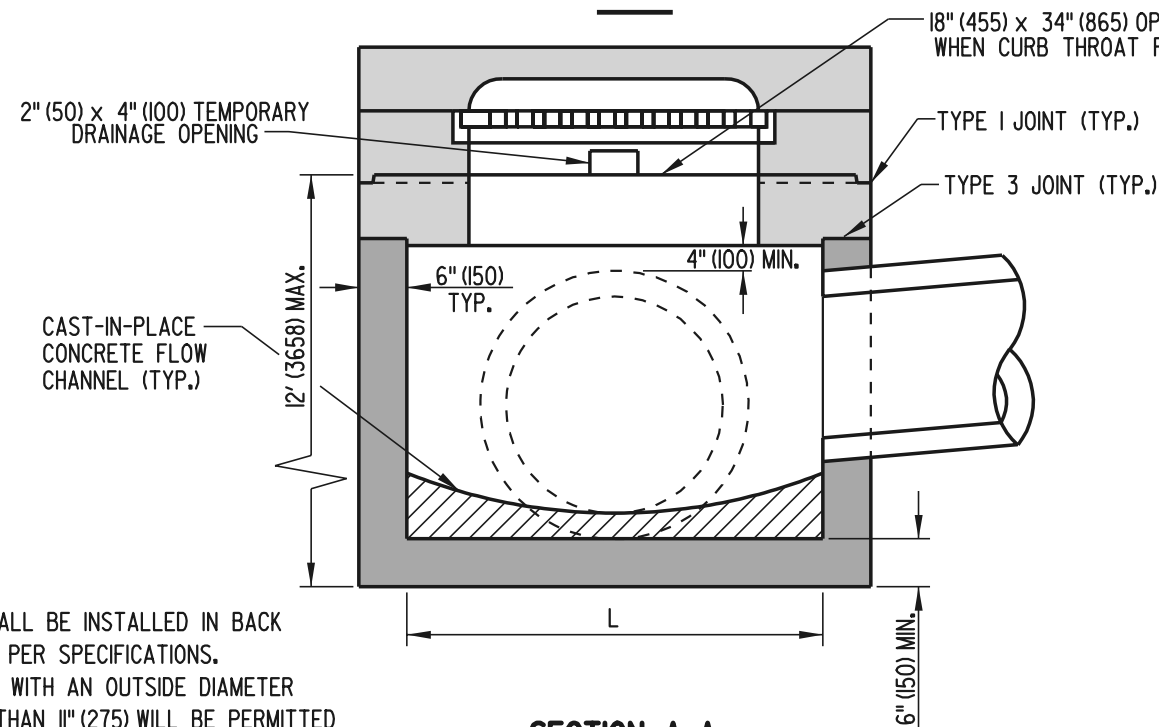


TYPE 1 JOINT DETAIL

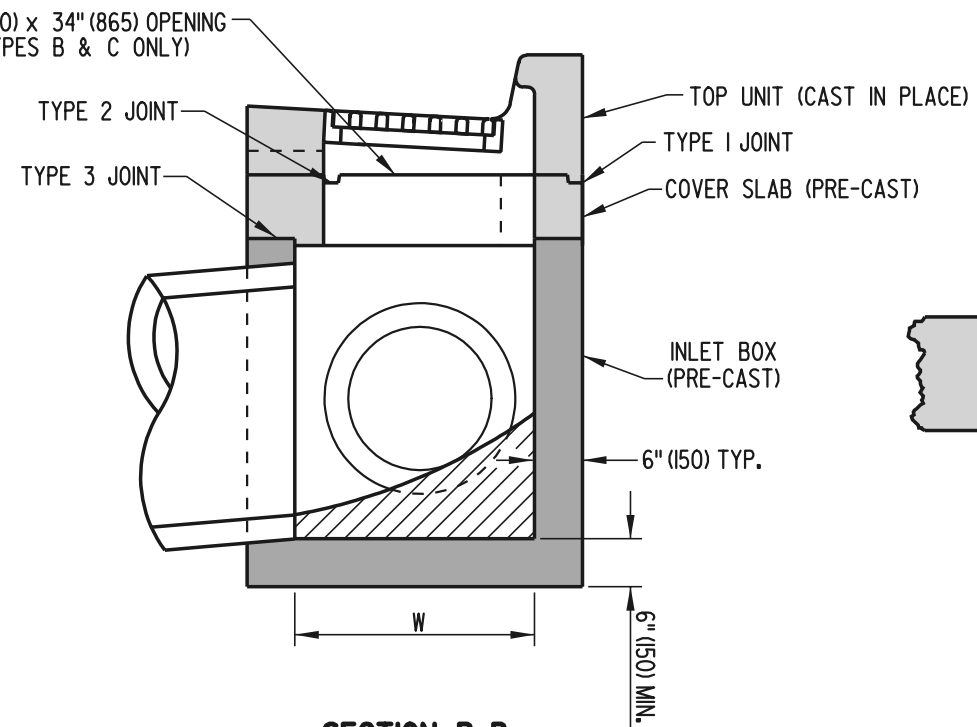


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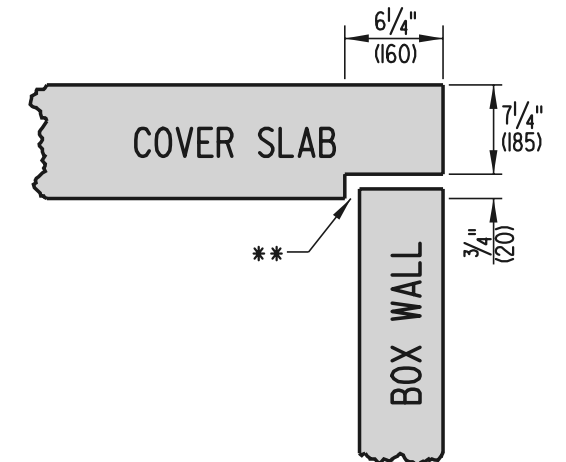
* DIMENSIONS WILL VARY
** JOINT SEALANT AS PER SPECIFICATIONS



SECTION A-A



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.

DRAINAGE INLET ASSEMBLY



DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO.

D-5 (2002)

SHT. 1

OF 8

APPROVED

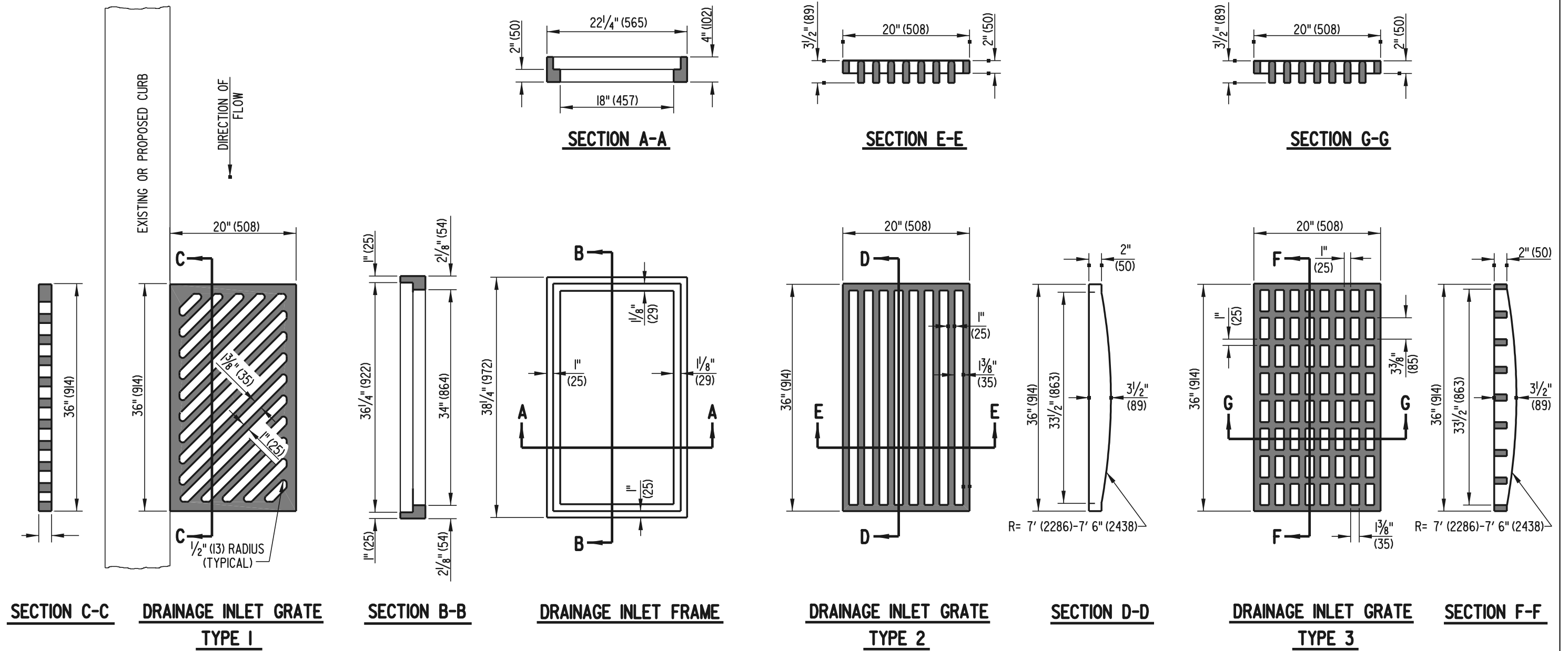
Carolee Wicks
CHIEF ENGINEER

9/6/02
DATE

RECOMMENDED

Theresa Delph
DESIGN ENGINEER

8/19/02
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

STANDARD NO. D-5 (2002) SHT. 2 OF 8

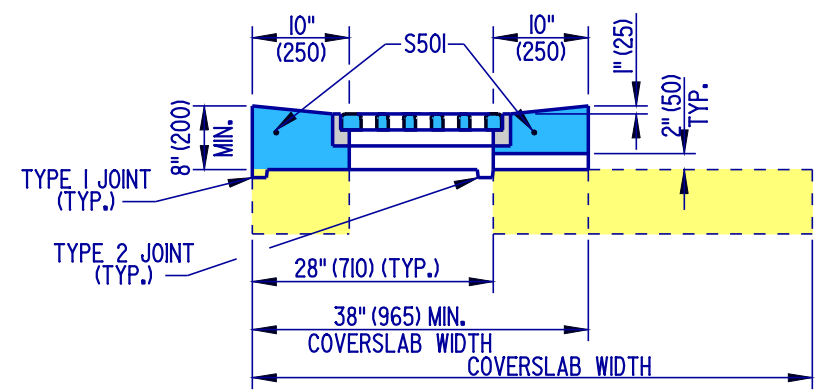
APPROVED

Caroleen Wicks 9/6/02
CHIEF ENGINEER DATE

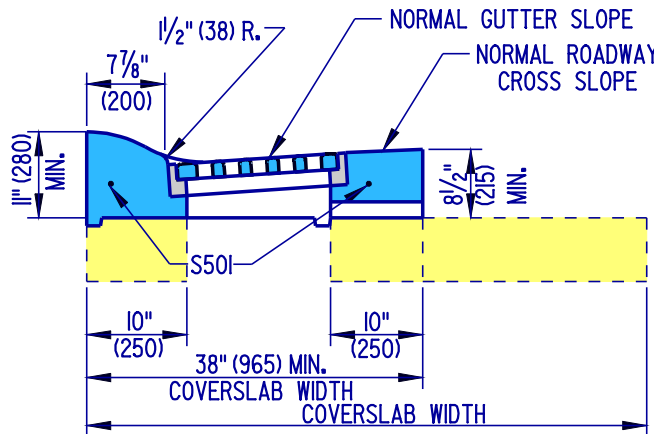
RECOMMENDED

Theresa Delph 9/19/02
DESIGN ENGINEER DATE

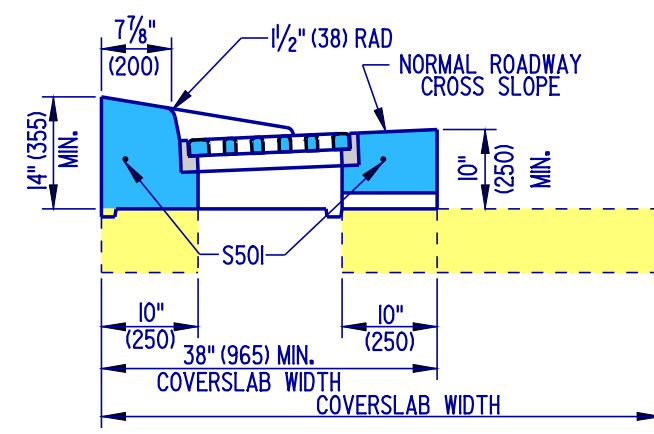
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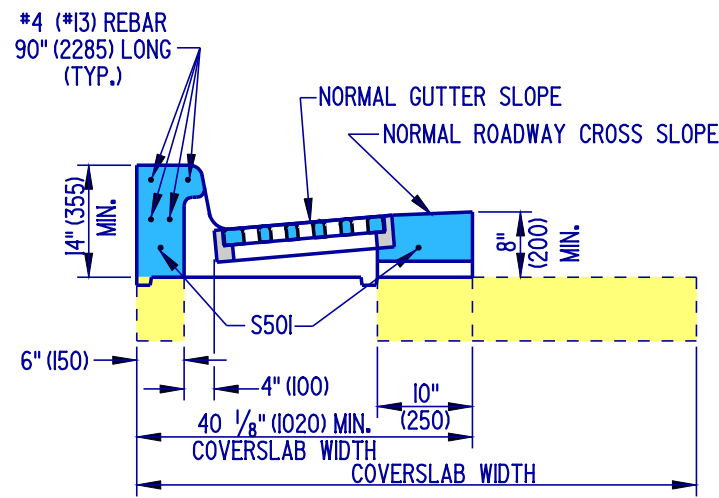
TYPE A



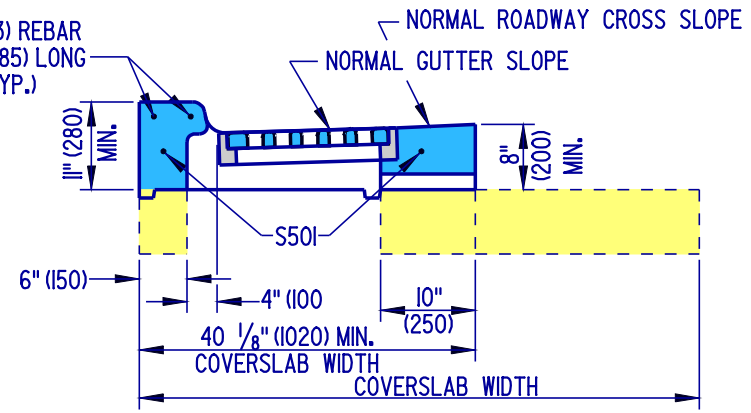
TYPE D



TYPE E

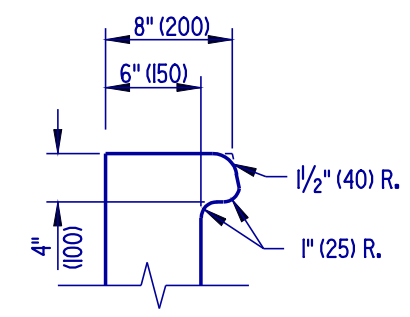


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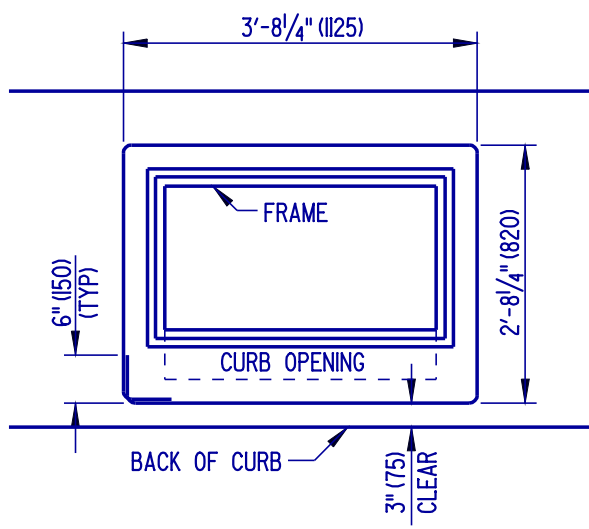


TYPE C

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

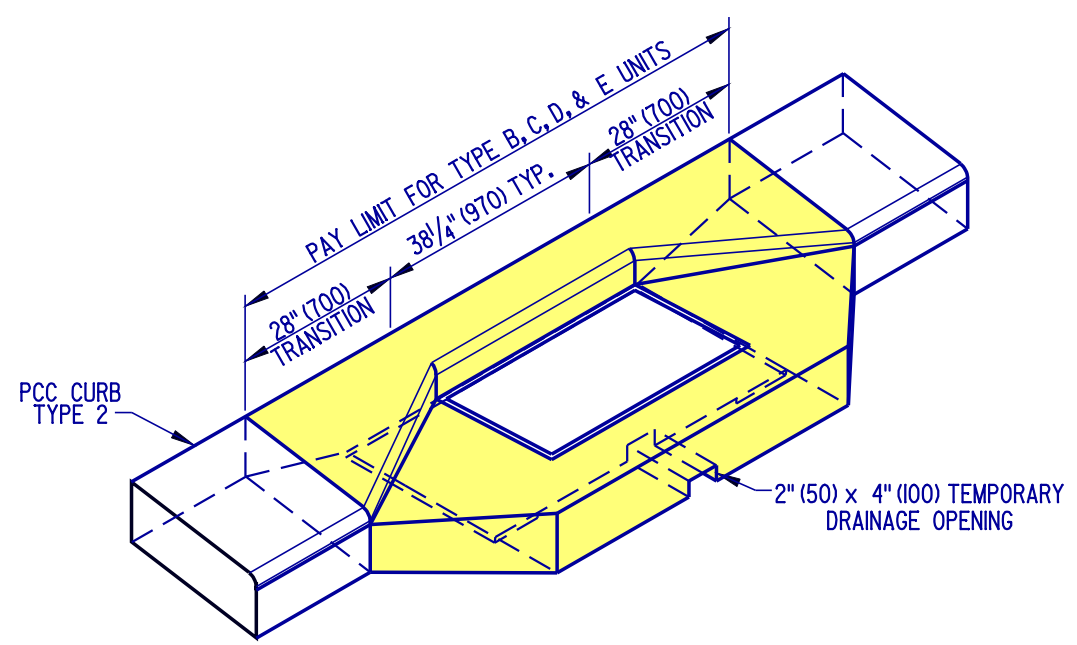


S50I BENDING DIAGRAM

S50I 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



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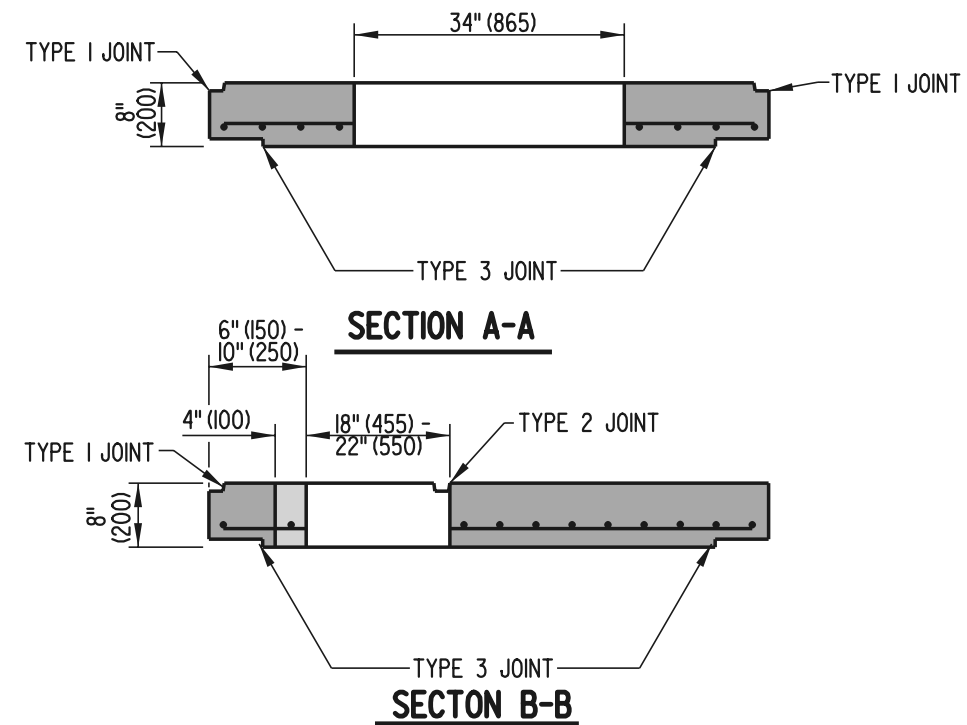
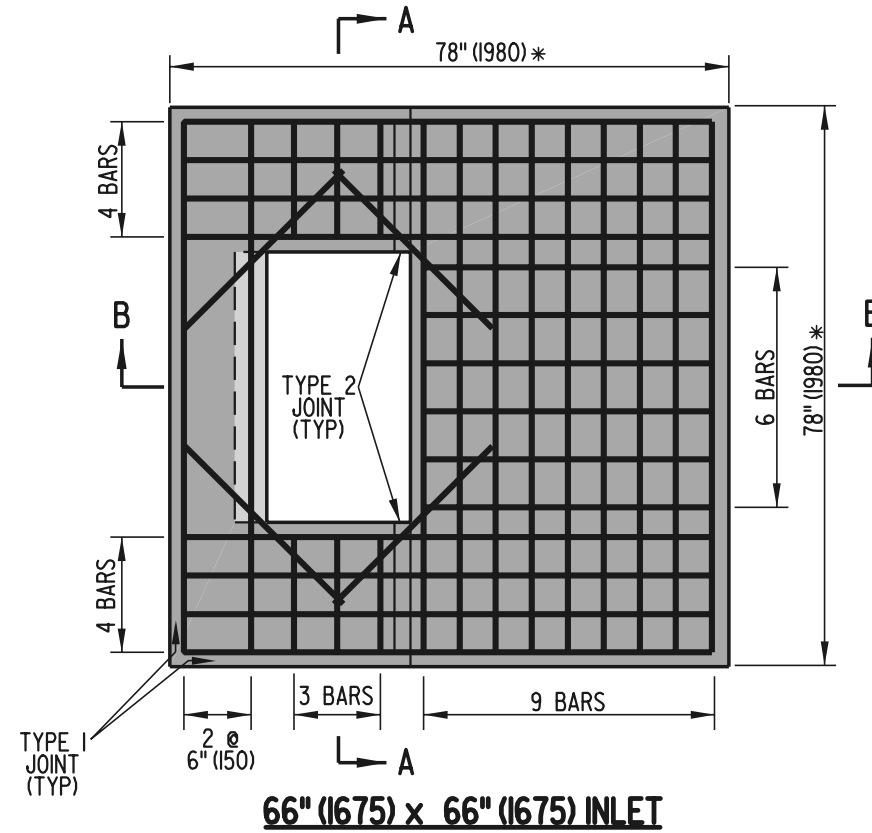
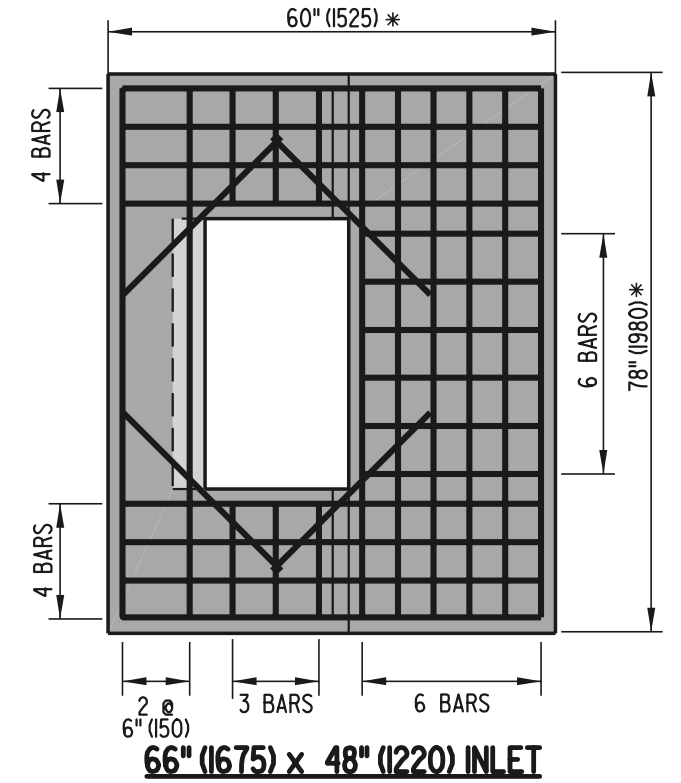
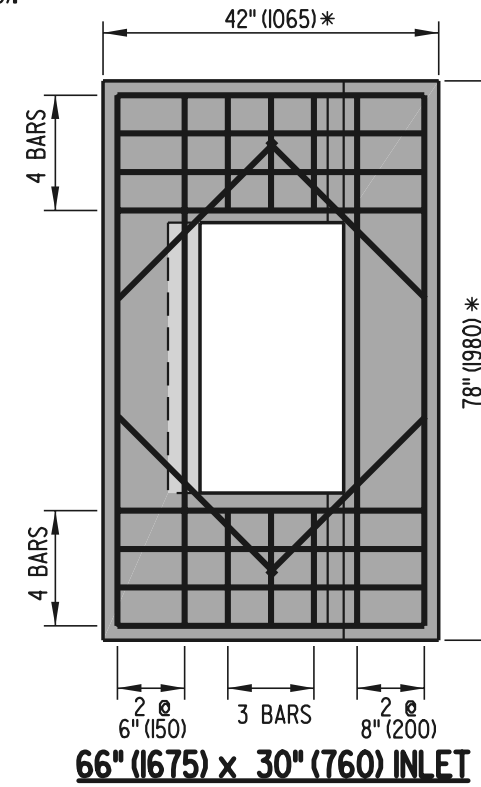
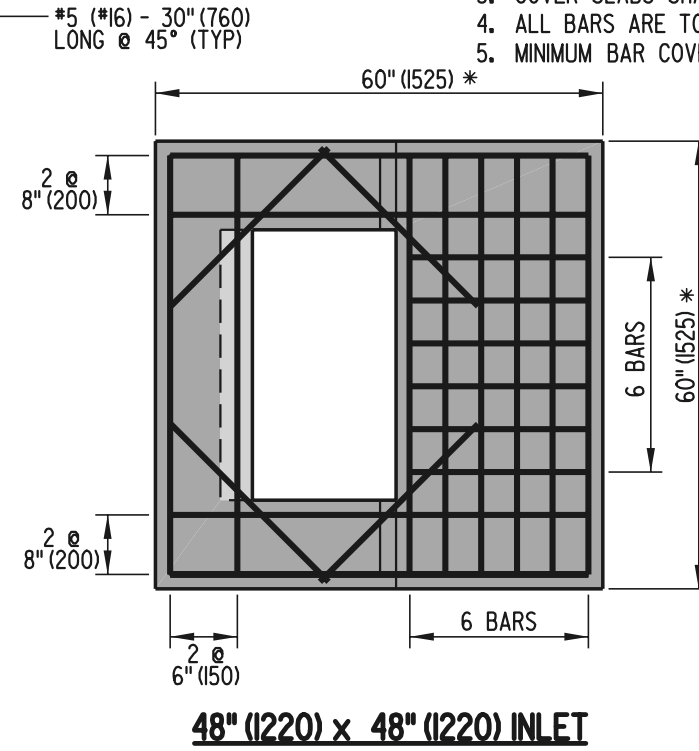
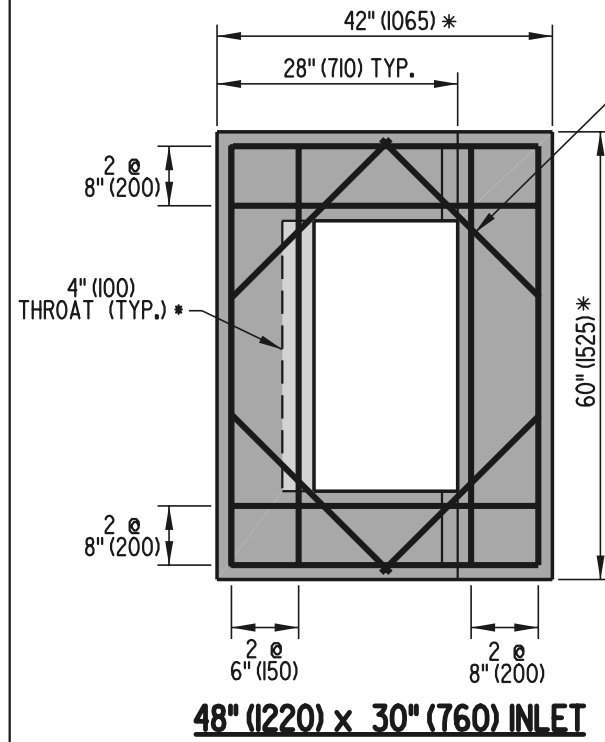
DRAINAGE INLET DETAILS			
STANDARD NO.	D-5 (2004)	SHT.	3 OF 8

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

SCALE : N.T.S.

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

* - DIMENSIONS TO MATCH
OUTSIDE TO OUTSIDE
DIMENSIONS OF BOX



DRAINAGE INLET COVER SLAB DETAILS



DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO.

D-5 (2002)

SHT. 4

OF 8

APPROVED

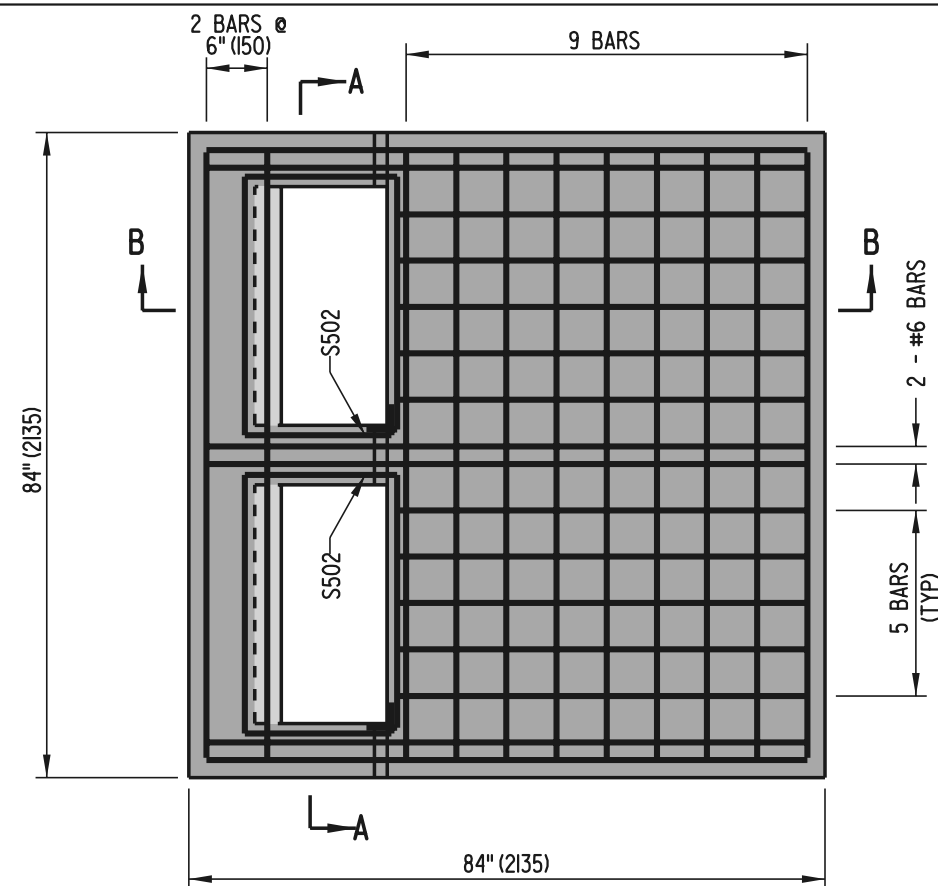
Caution Wicks
CHIEF ENGINEER

9/6/02
DATE

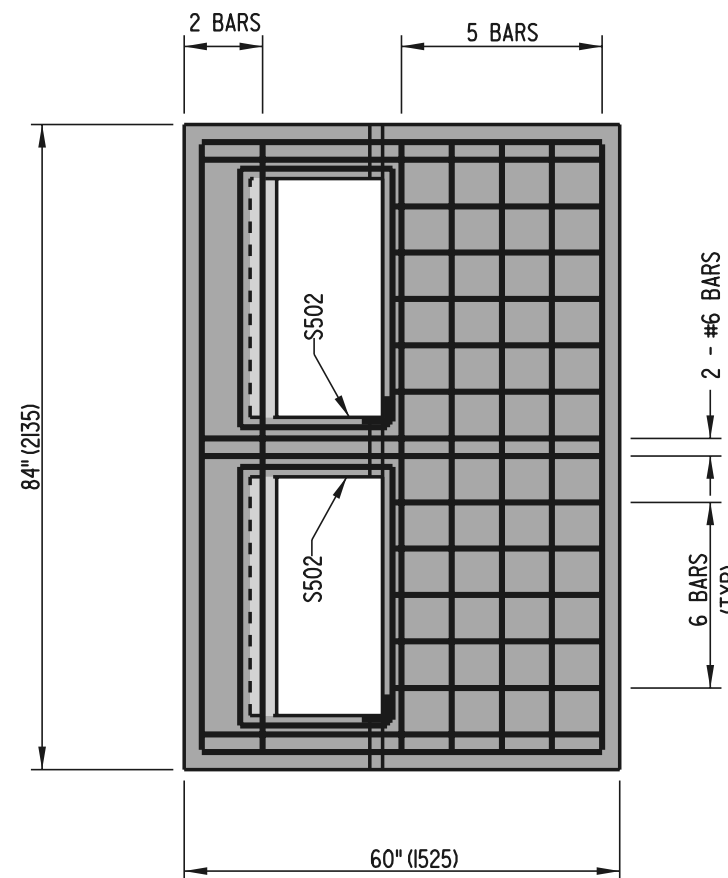
RECOMMENDED

Theresa Delph
DESIGN ENGINEER

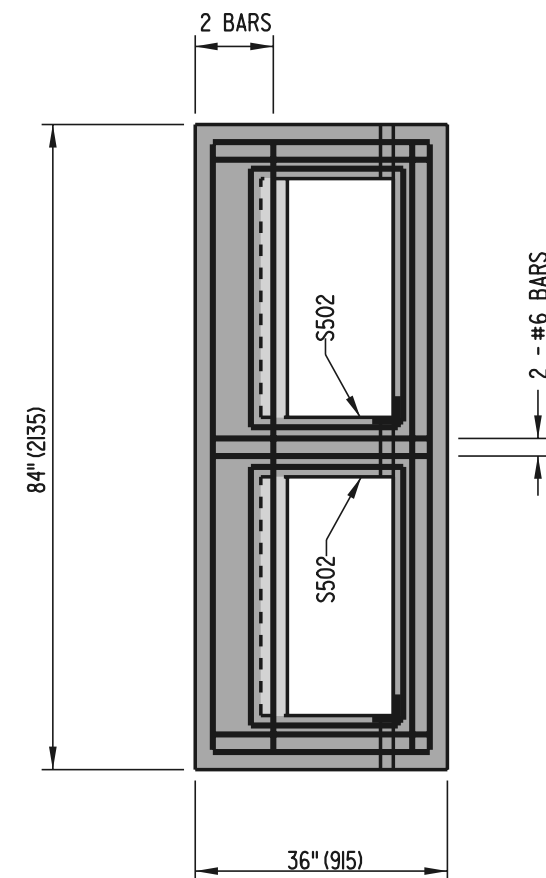
8/19/02
DATE



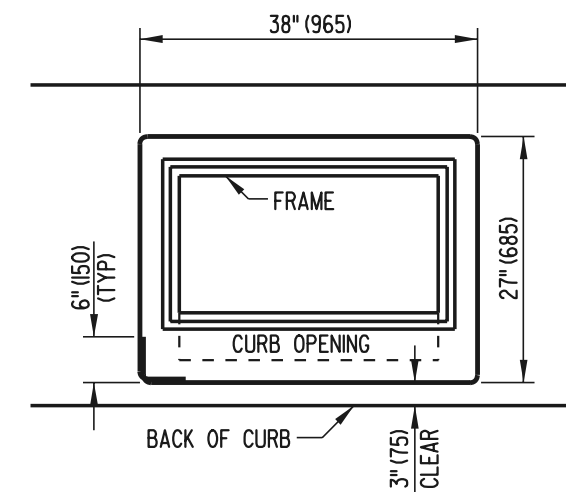
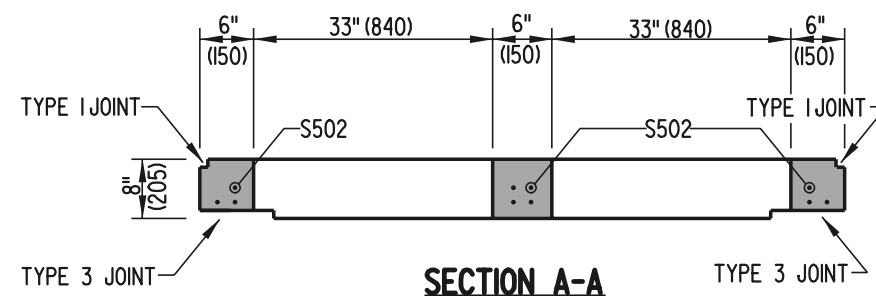
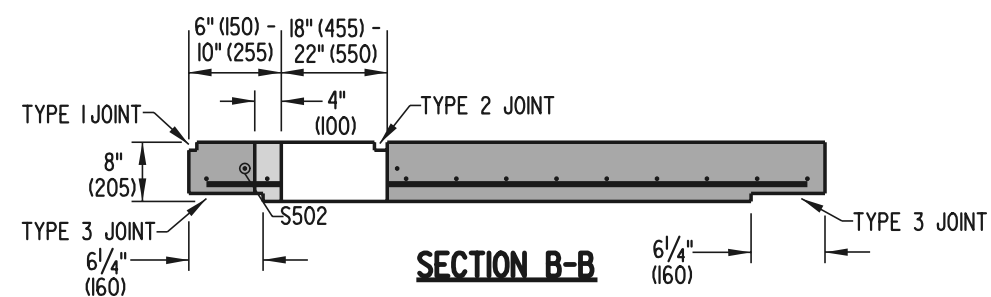
72" (1830) x 72" (1830) INLET



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



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



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



**DELAWARE
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DOUBLE INLET COVER SLAB DETAILS

STANDARD NO. **D-5 (2002)**

SHT. **5** OF **8**

APPROVED

Caroleen Wicks
CHIEF ENGINEER

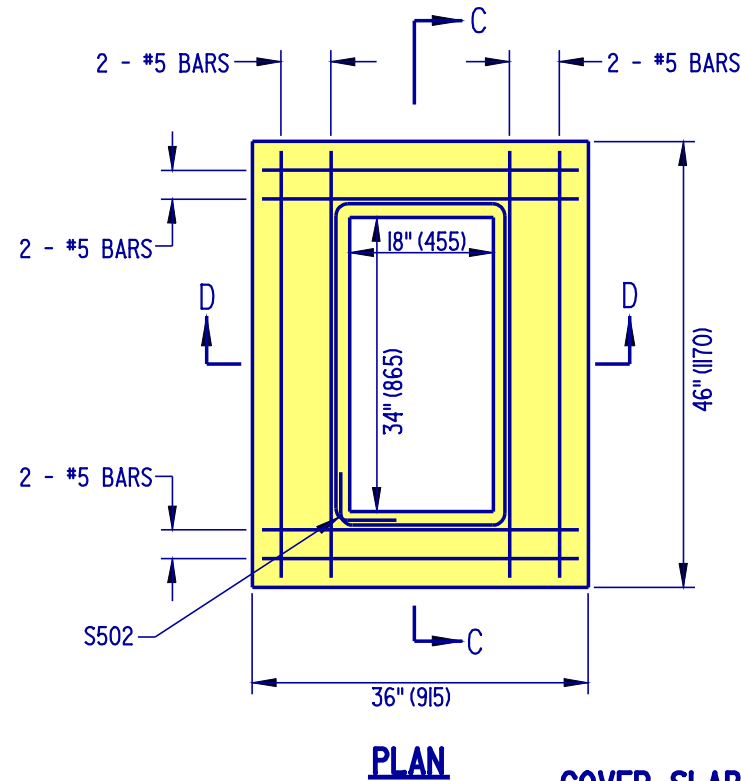
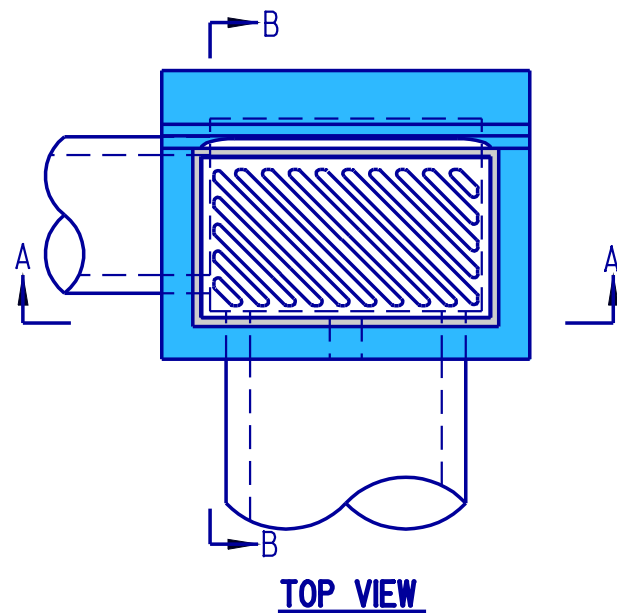
9/6/02
DATE

RECOMMENDED

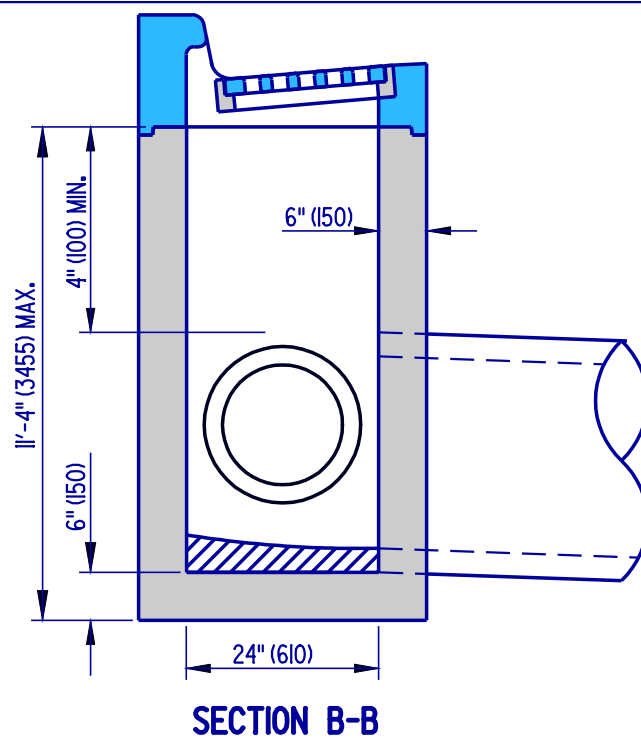
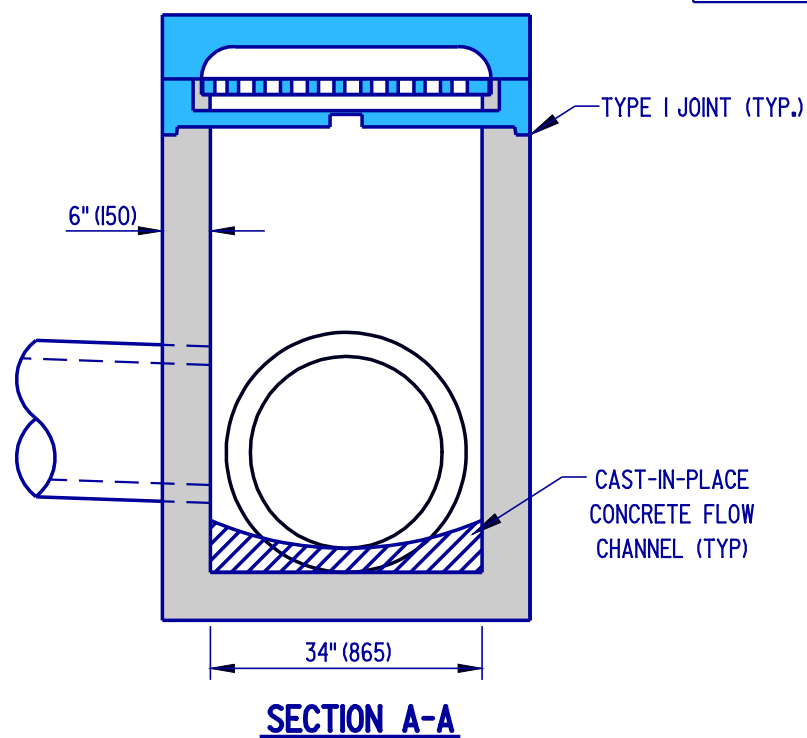
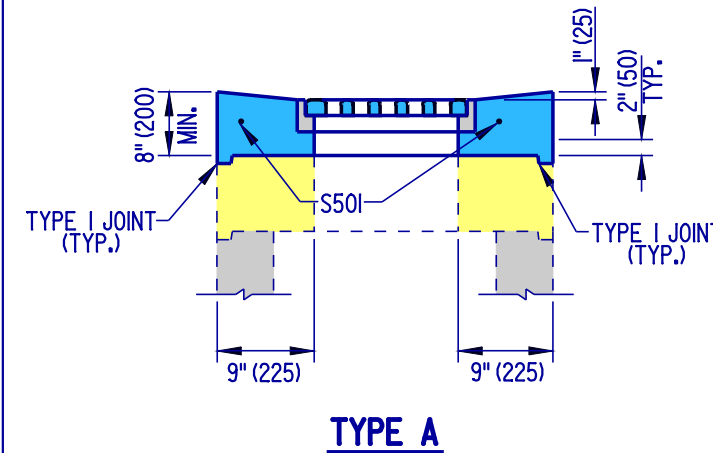
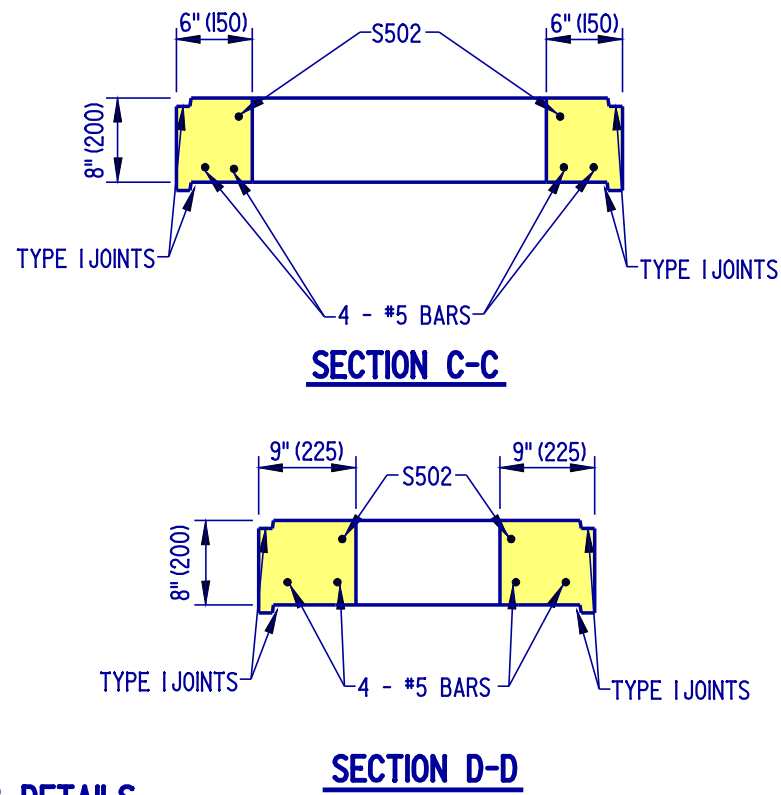
Theresa Delgado
DESIGN ENGINEER

8/19/02
DATE

SCALE : N.T.S.

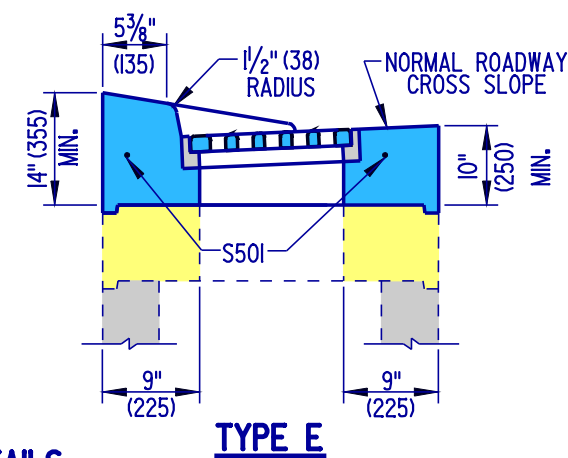
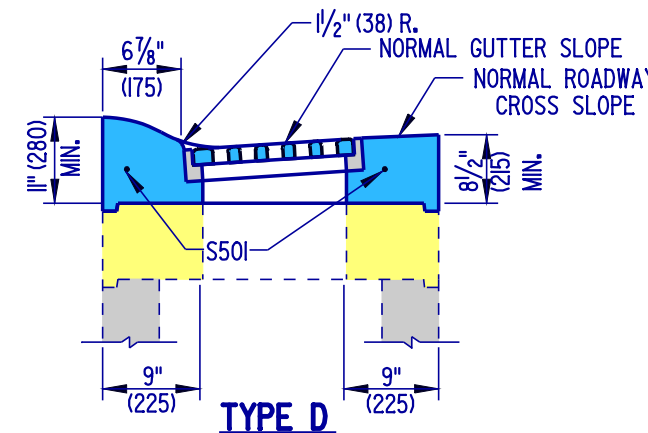
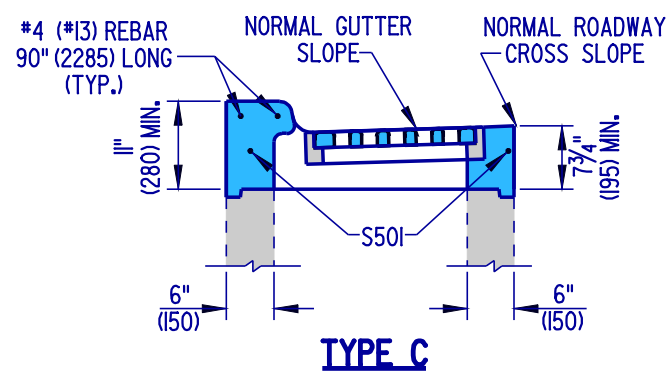
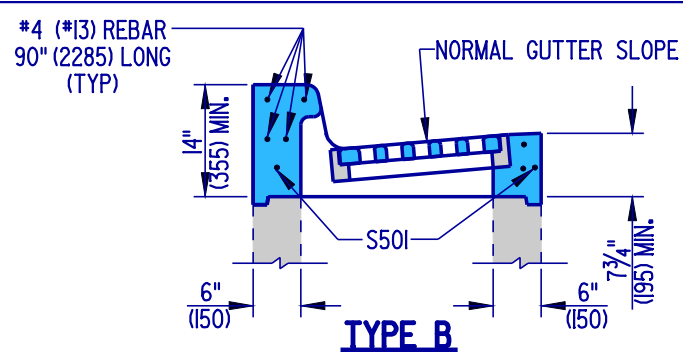


COVER SLAB DETAILS



34" (865) x 24" (610) DRAINAGE INLET DETAILS

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS



TOP UNIT DETAILS



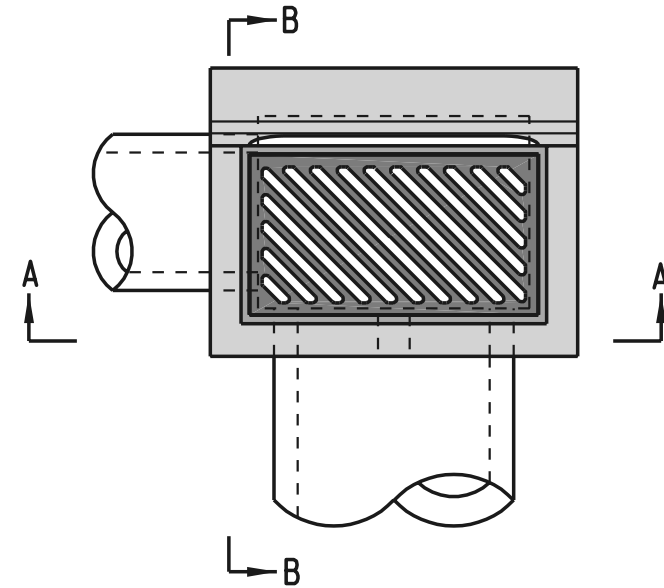
DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

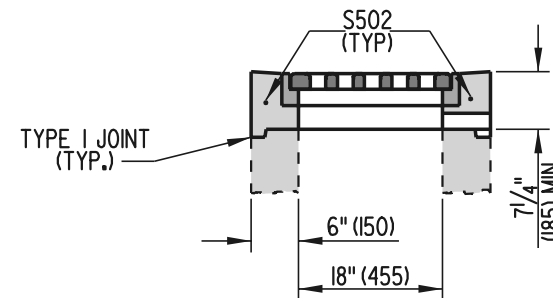
STANDARD NO. D-5 (2004)

SHT. 6 OF 8

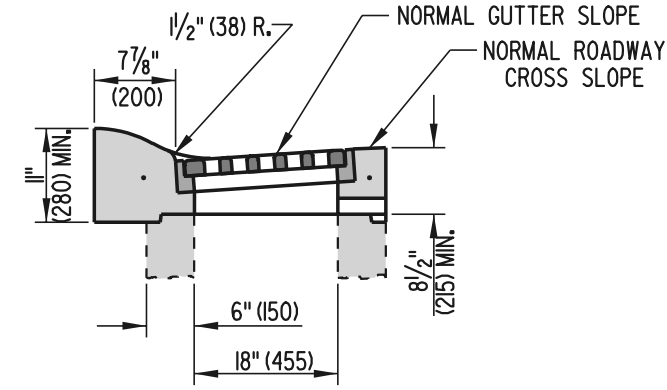
APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



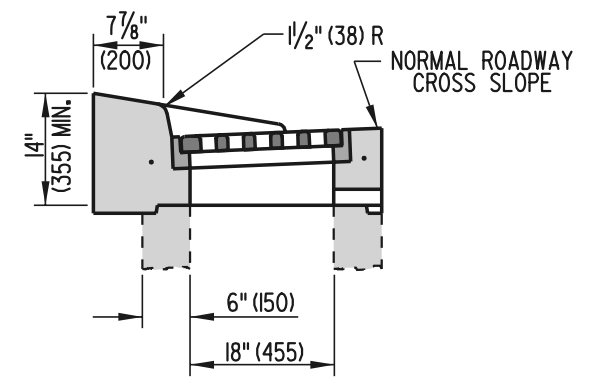
TOP VIEW



TYPE A

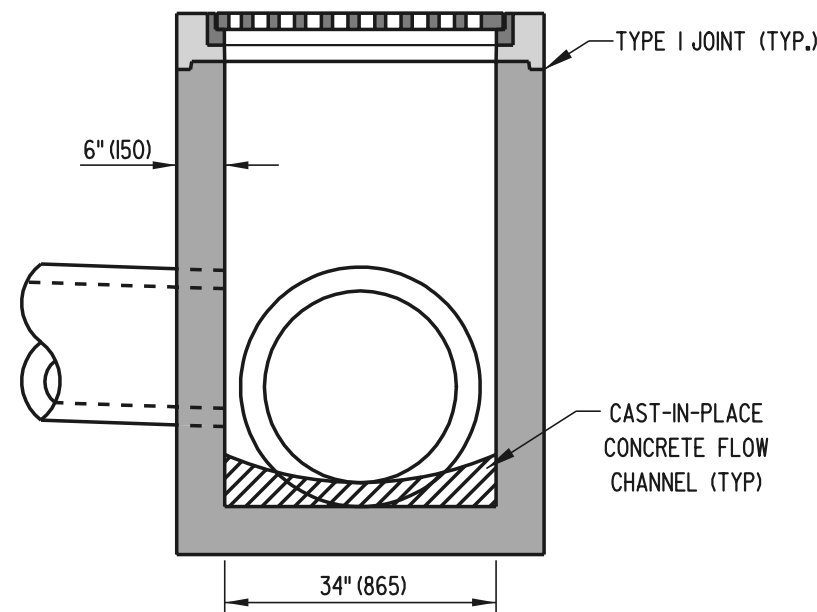


TYPE D

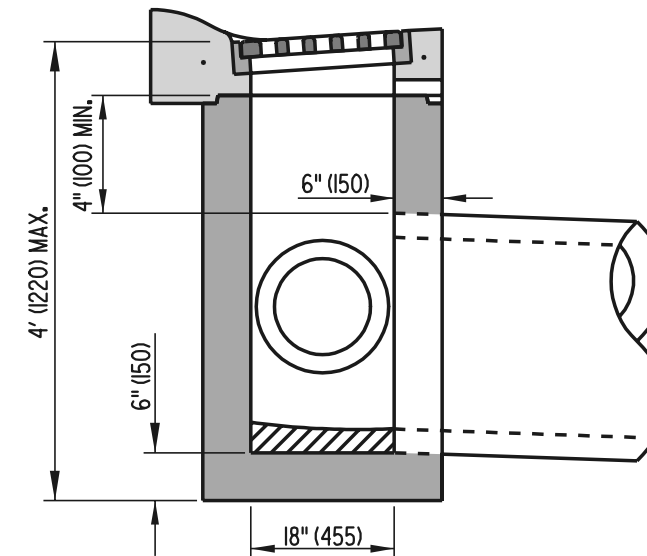


TYPE E

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.



DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO.

D-5 (2002)

SHT. 7

OF 8

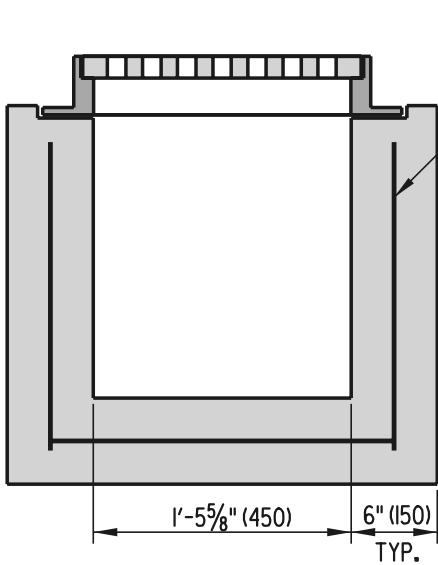
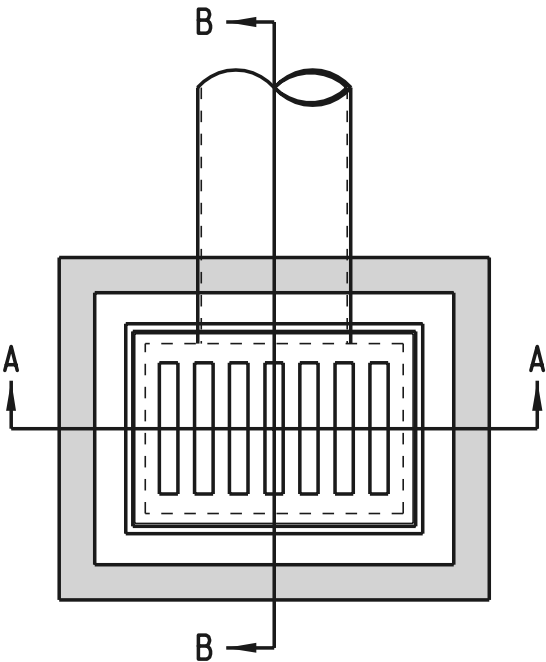
APPROVED

Caution Wicks 9/6/02
CHIEF ENGINEER DATE

RECOMMENDED

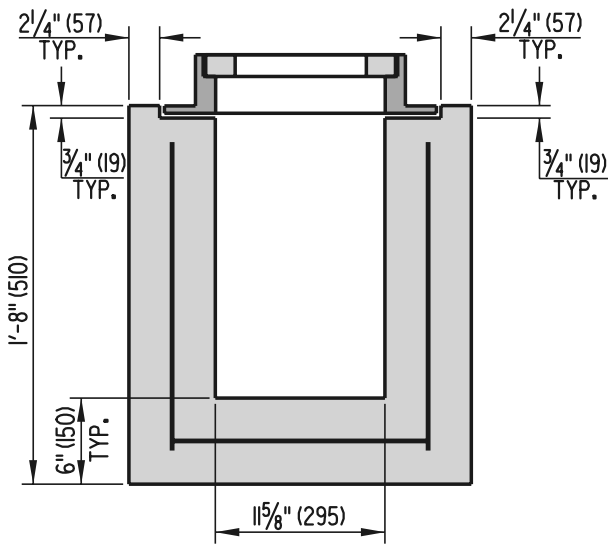
Theresa Delph 8/19/02
DESIGN ENGINEER DATE

- 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.

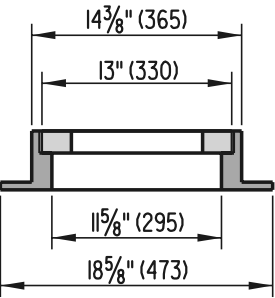
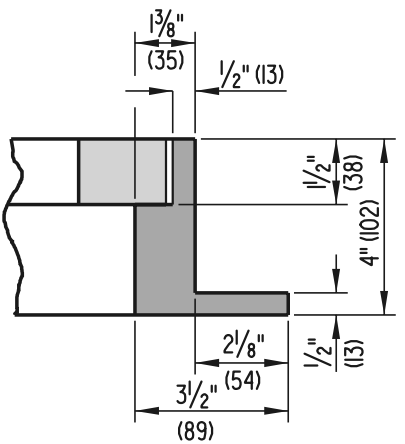
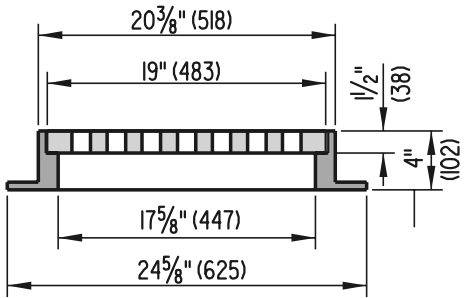
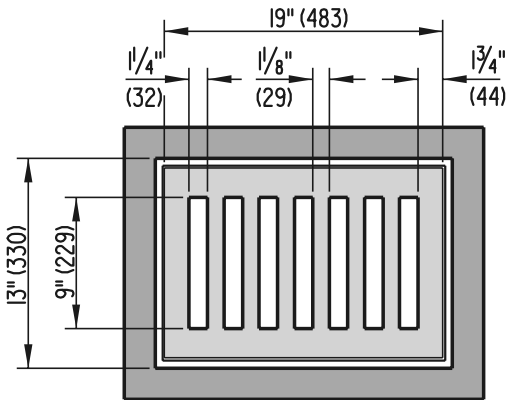


SECTION A-A

REINFORCEMENT
SEE NOTE



SECTION B-B



DELAWARE
DEPARTMENT OF TRANSPORTATION

LAWN INLET

STANDARD NO.

D-5 (2002)

SHT.

8

OF

8

APPROVED

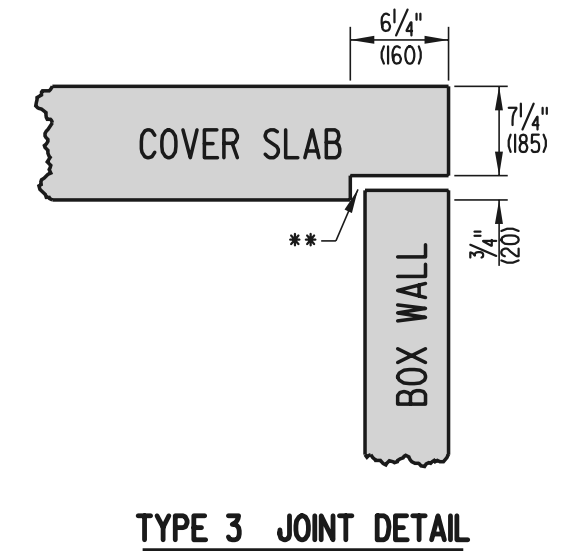
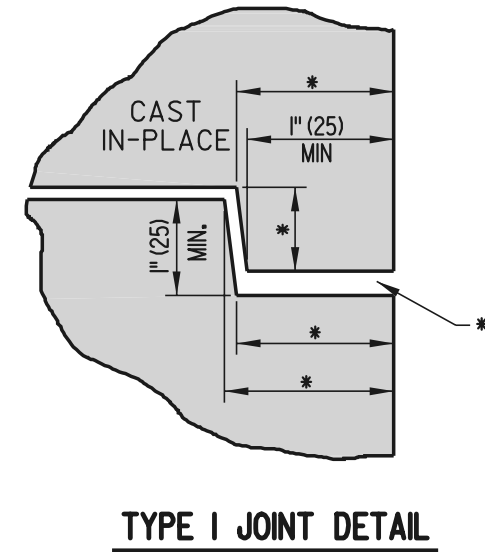
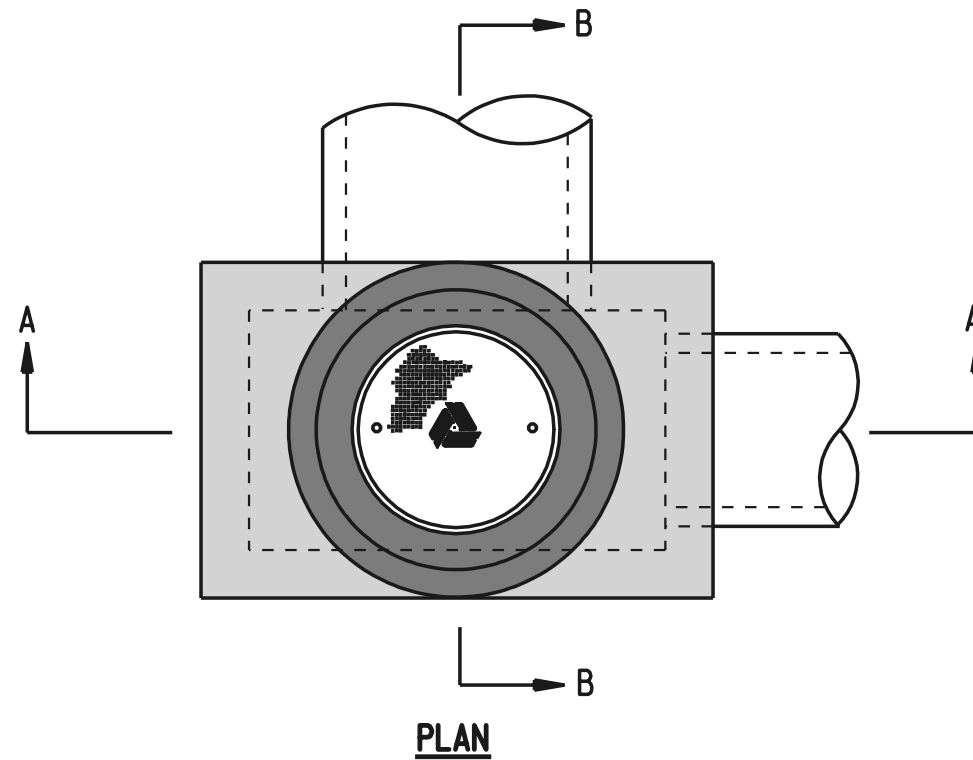
Caroleen Wicks
CHIEF ENGINEER

9/6/02
DATE

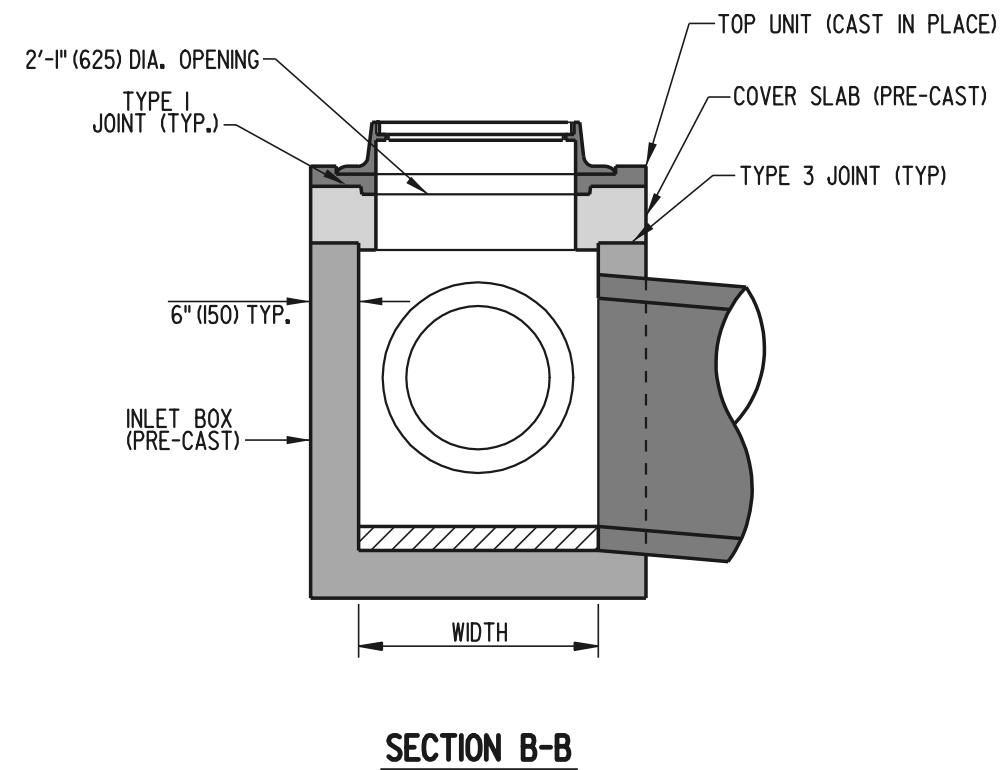
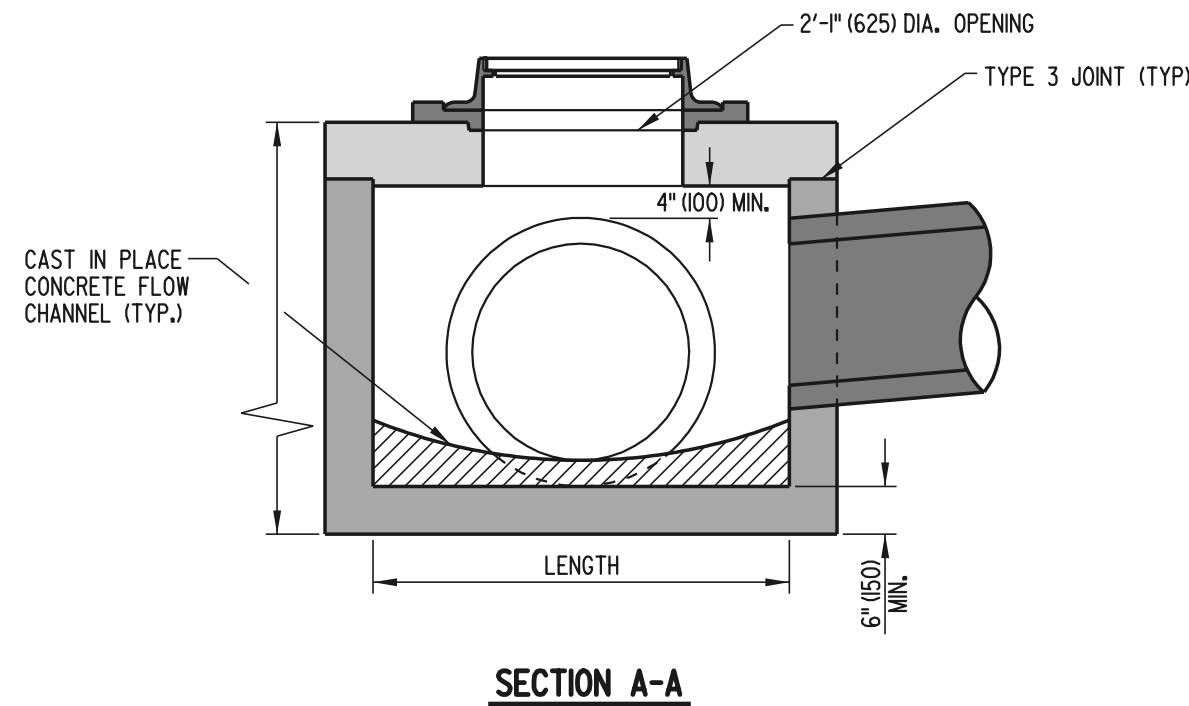
RECOMMENDED

Theresa Delph
DESIGN ENGINEER

8/19/02
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. Harkness 6/18/01
CHIEF ENGINEER DATE

RECOMMENDED

Michael P. Gotsch 6/18/01
DESIGN ENGINEER DATE