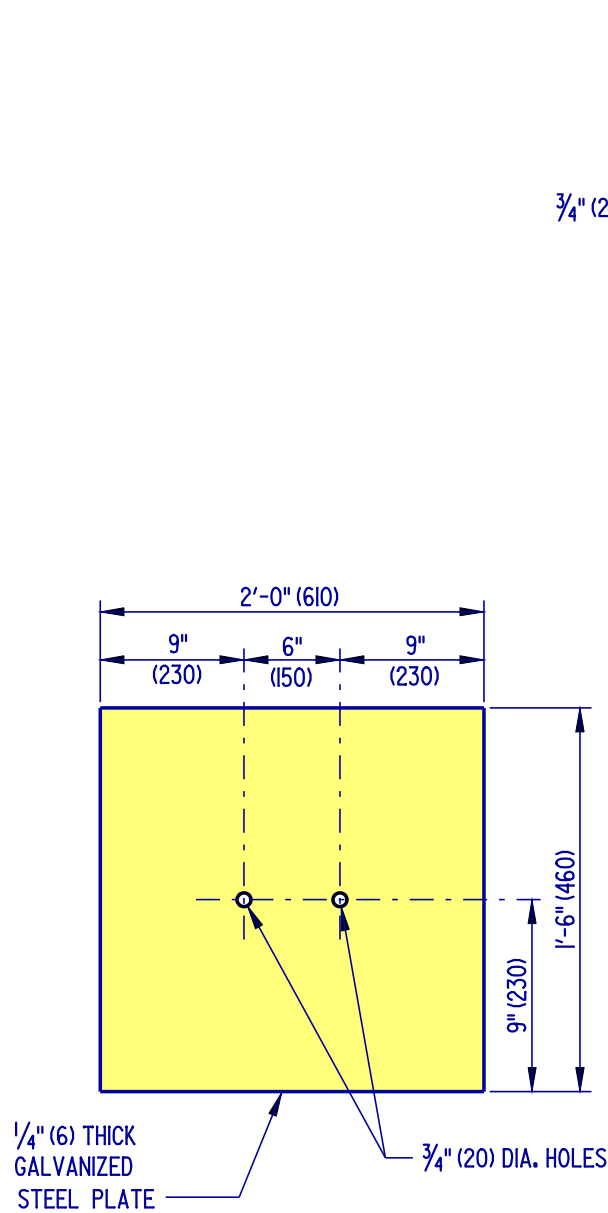
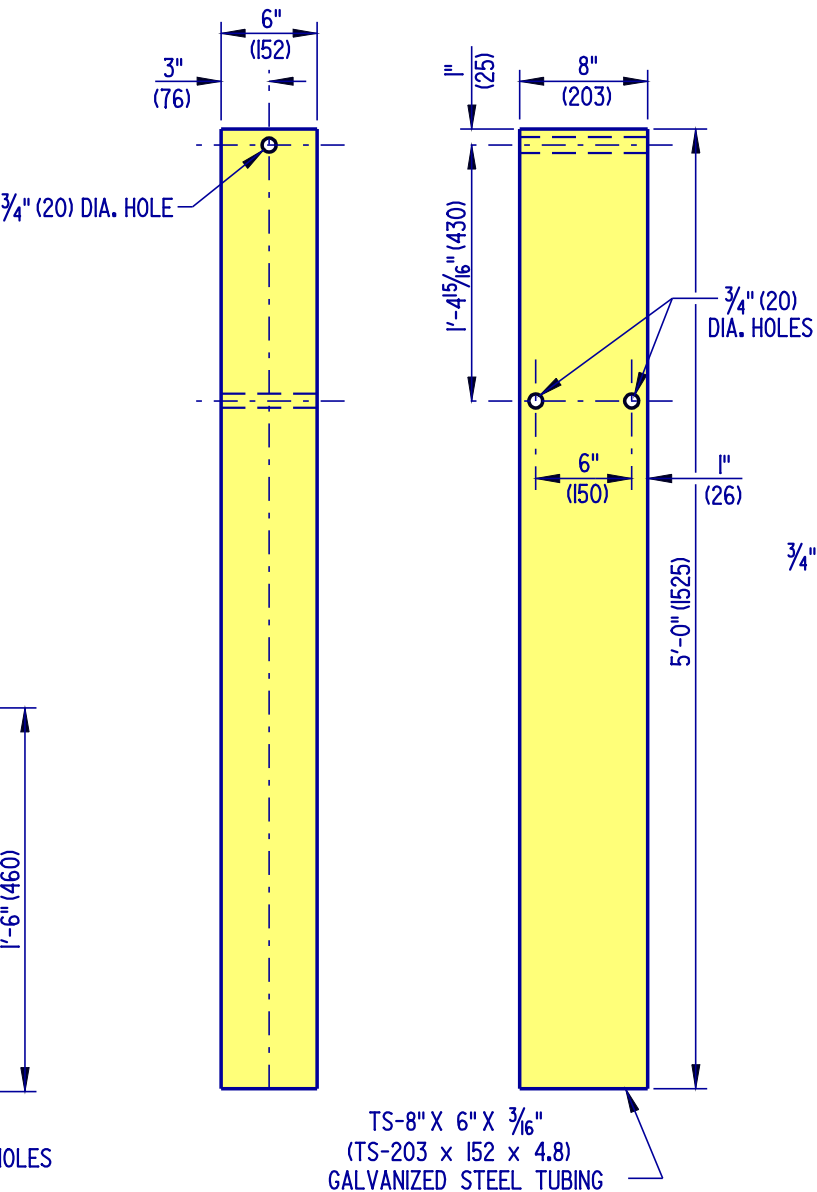


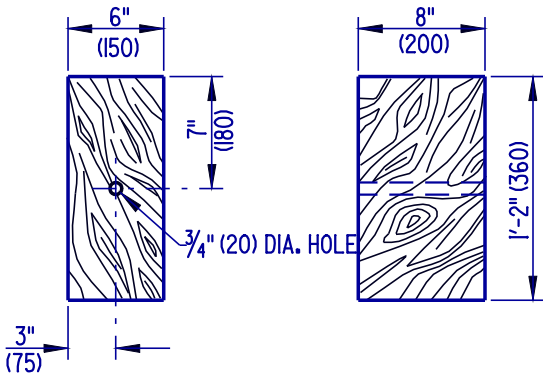
NOTES : 1). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
2). ALL WOOD SIZES ARE NOMINAL DIMENSIONS.



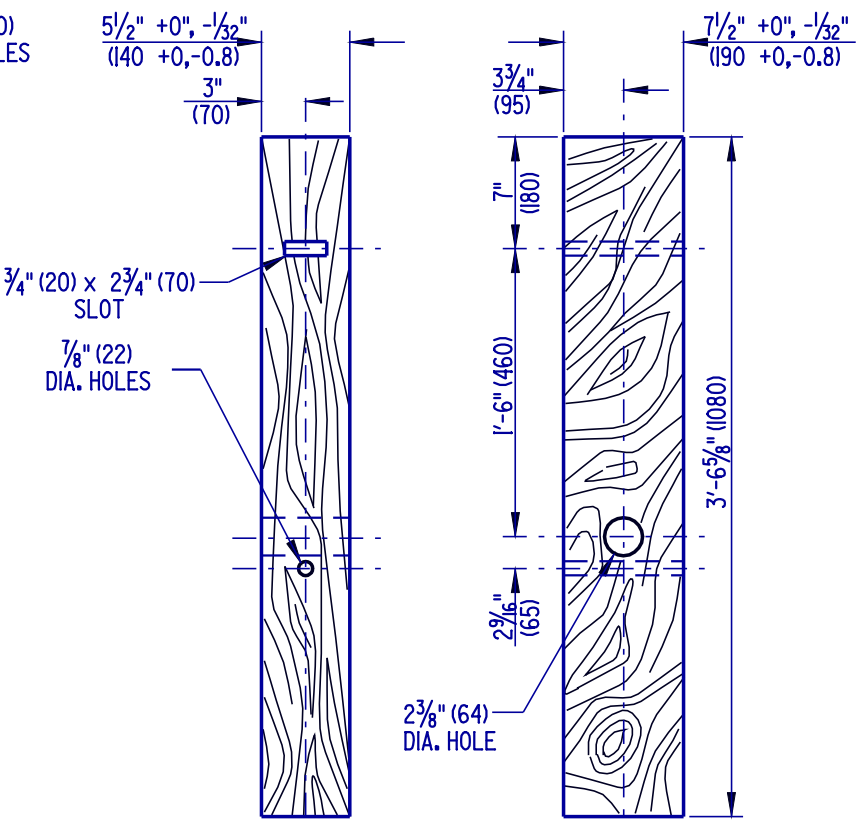
SOIL PLATE



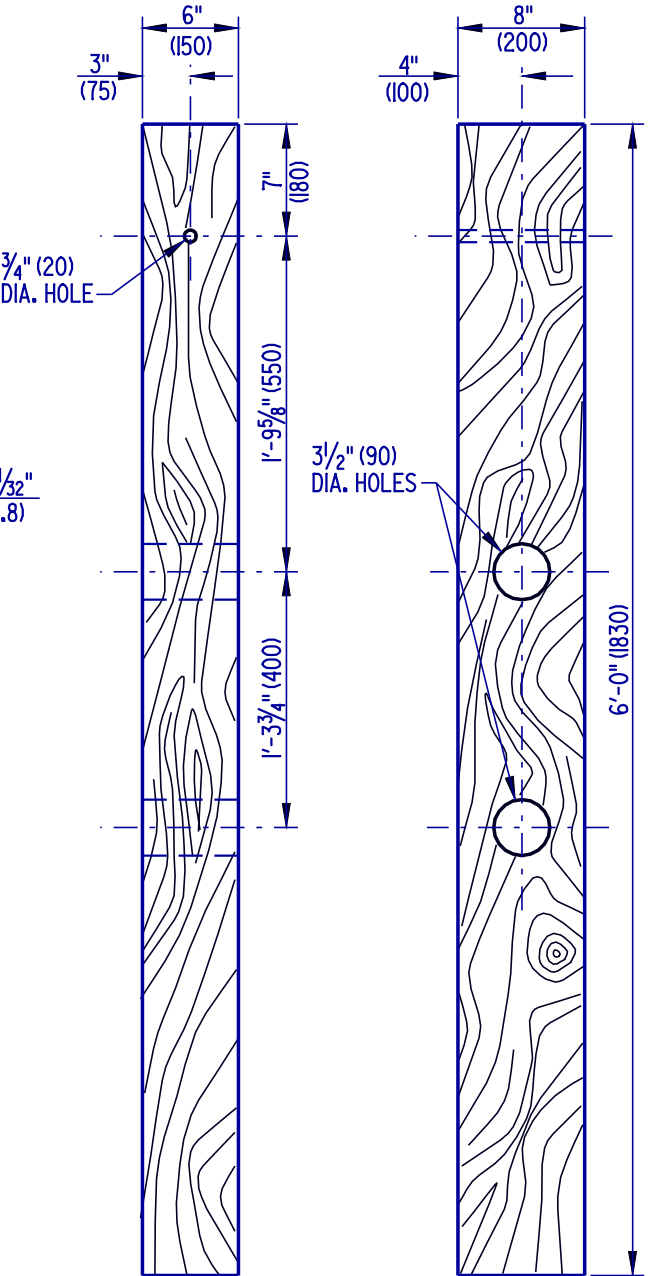
STEEL TUBE



WOOD BLOCK



SHORT WOOD BREAKAWAY POST



LONG WOOD BREAKAWAY POST

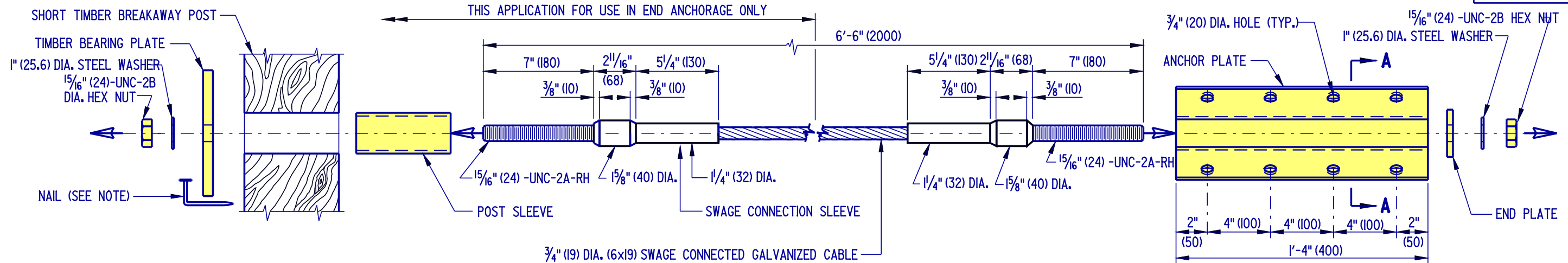


DELAWARE
DEPARTMENT OF TRANSPORTATION

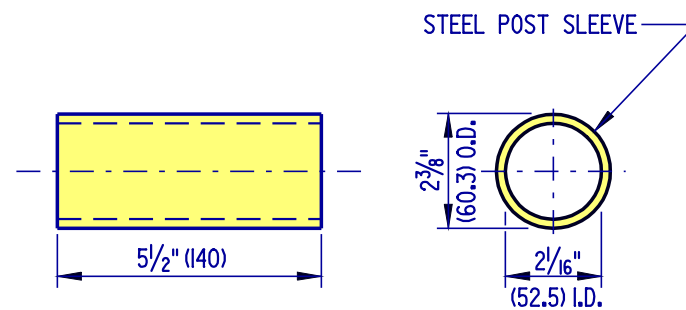
HARDWARE			
STANDARD NO.	B-13 (2004)	SHT.	7 OF 13

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

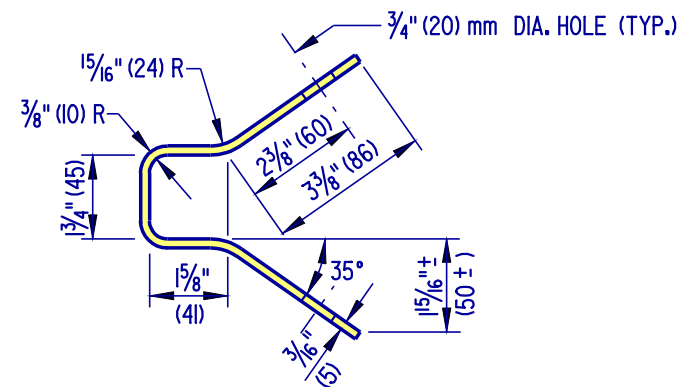
SCALE : N.T.S.



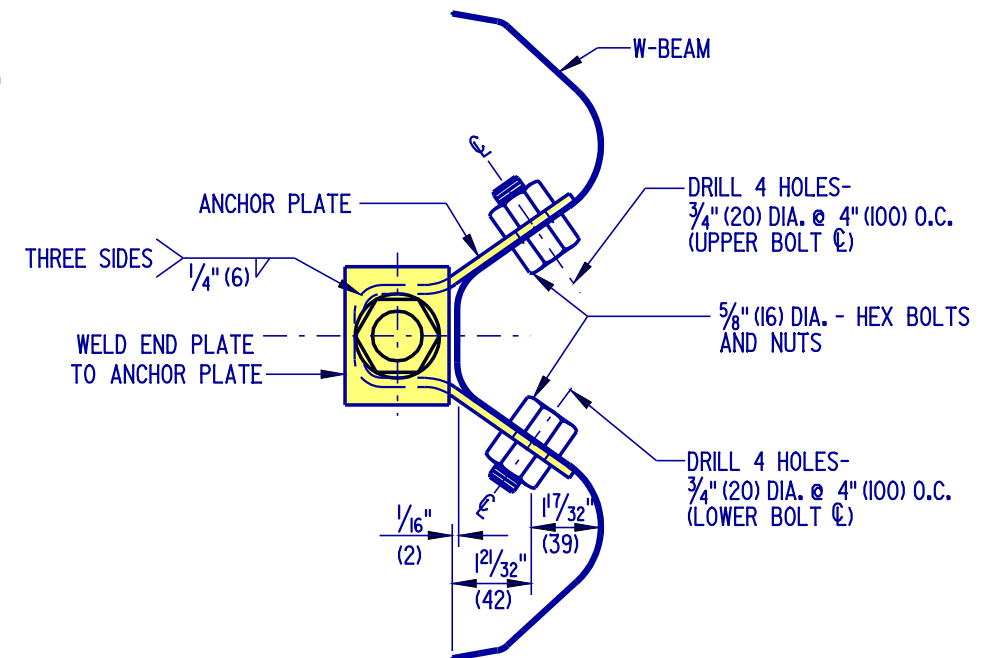
SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY



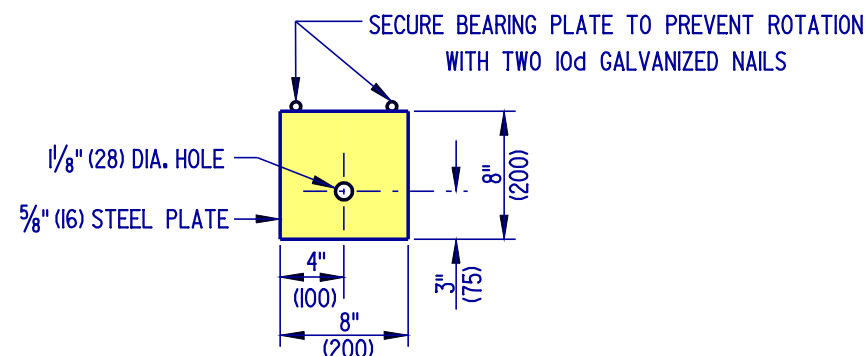
POST SLEEVE



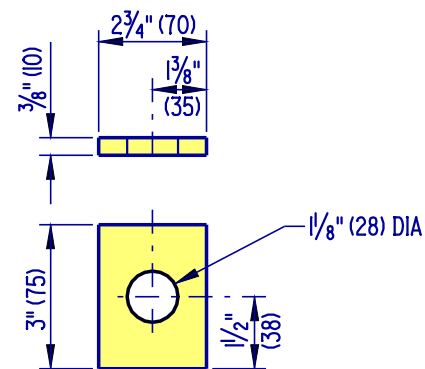
SECTION A-A



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

STANDARD NO. B-13 (2004)

HARDWARE

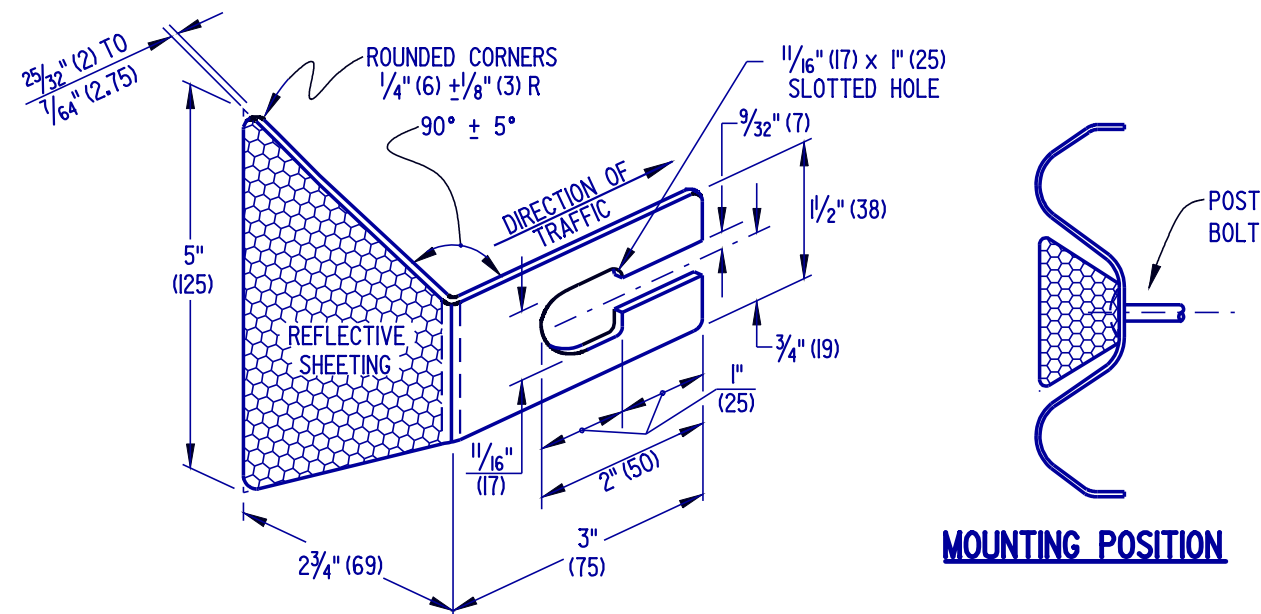
SHT. 8 OF 13

APPROVED

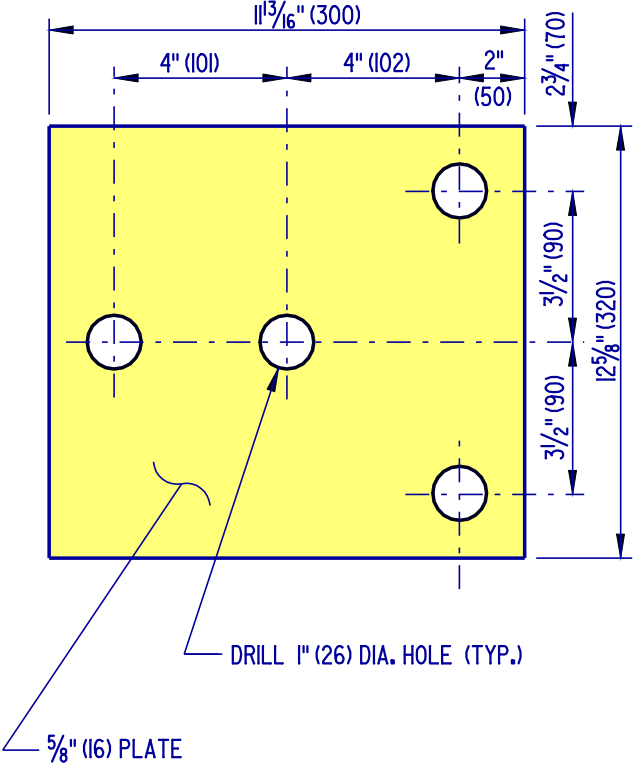
Carolann Wicks 1/10/05
CHIEF ENGINEER DATE

RECOMMENDED

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



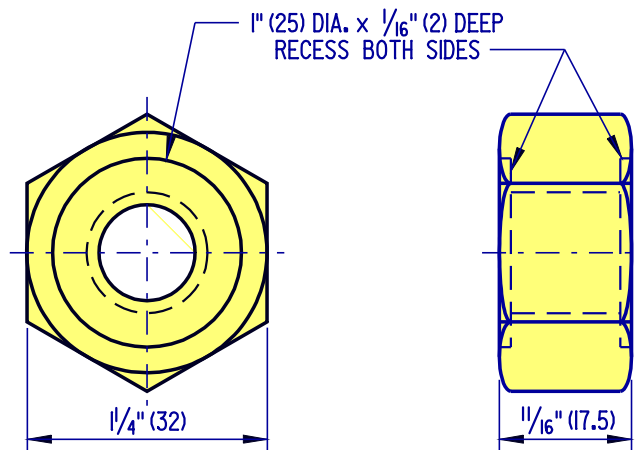
MOUNTING POSITION



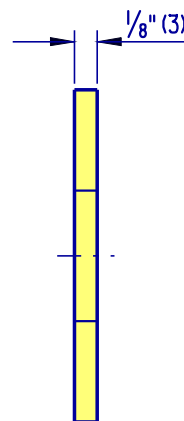
BEARING PLATE DETAIL

II

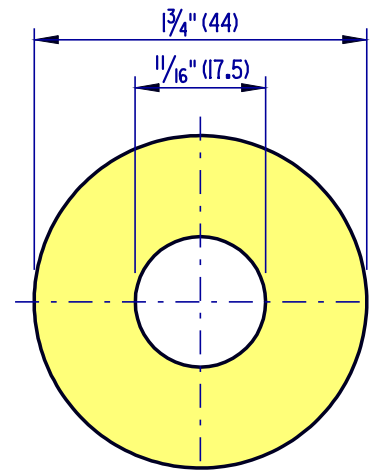




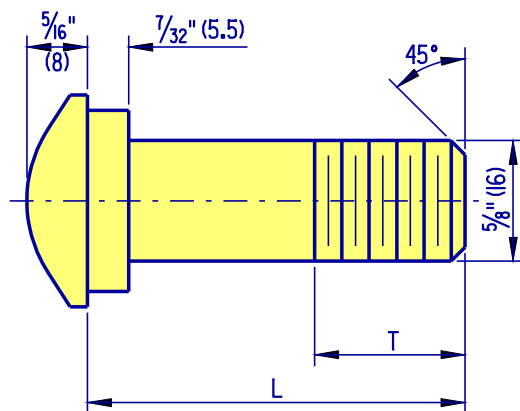
RECESSED NUT
(FOR 5/8\" (16) GUARDRAIL BOLT)



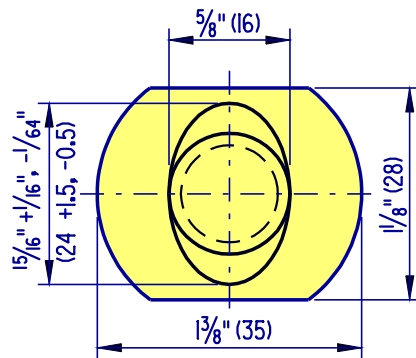
STEEL WASHER (FOR 5/8\" (16) GUARDRAIL BOLT)



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



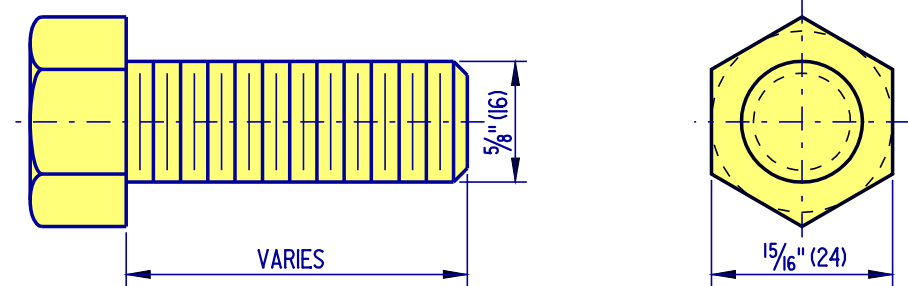
GUARDRAIL BOLT



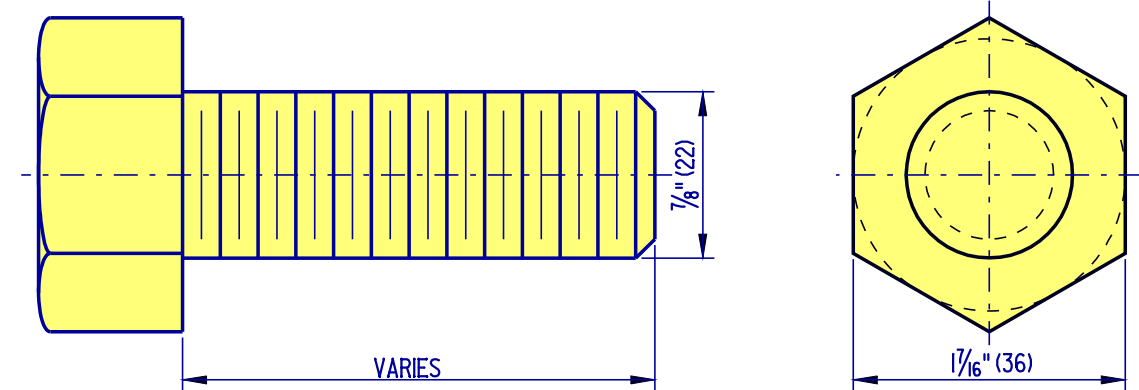
L	T (MIN.)
1 1/4\" (35)	FULL THREAD LENGTH
2\" (50)	FULL THREAD LENGTH
4\" (100)	FULL THREAD LENGTH
10\" (255)	4\" (100) THREAD LENGTH
18\" (460)	4\" (100) THREAD LENGTH

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.





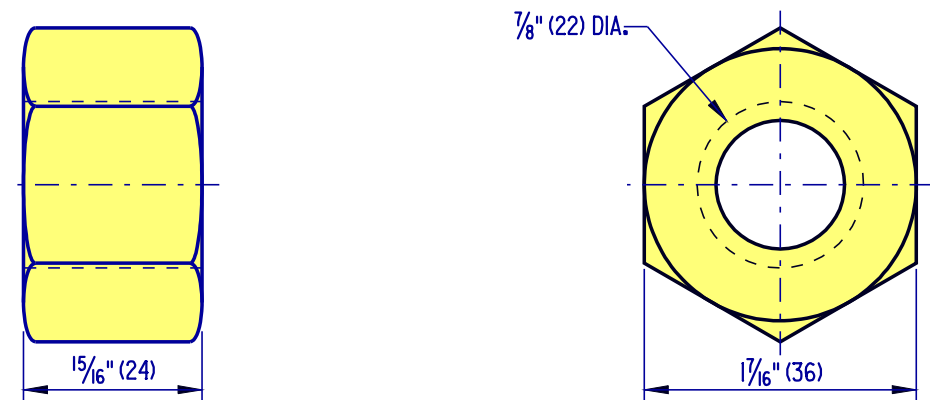
5/8" (16) HEX BOLT



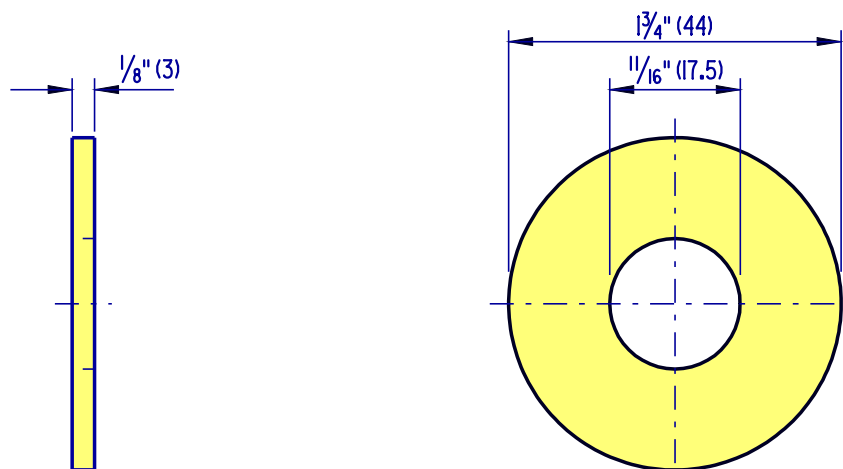
HIGH-STRENGTH STRUCTURAL HEX BOLT



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.



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

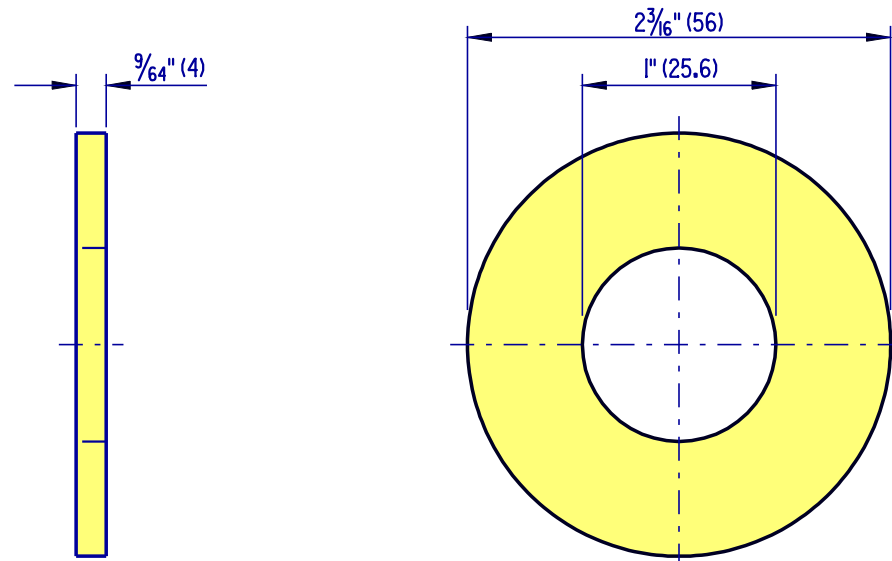
SHT. 11 OF 13

APPROVED

Carolann Wicks
CHIEF ENGINEER
DATE 1/10/05

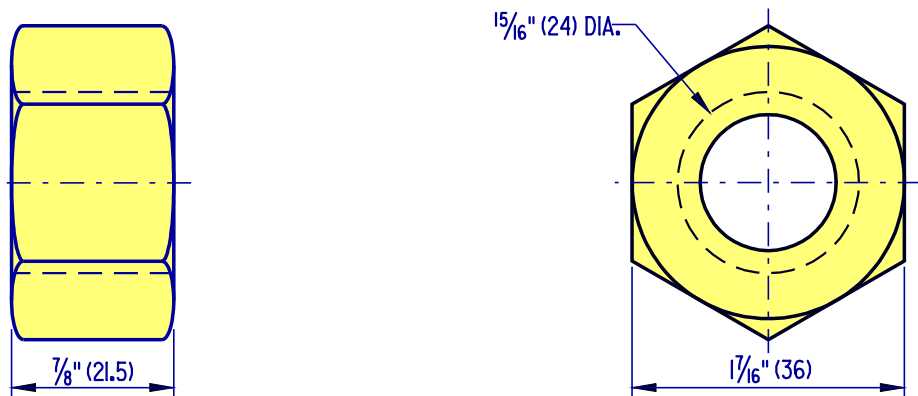
RECOMMENDED

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



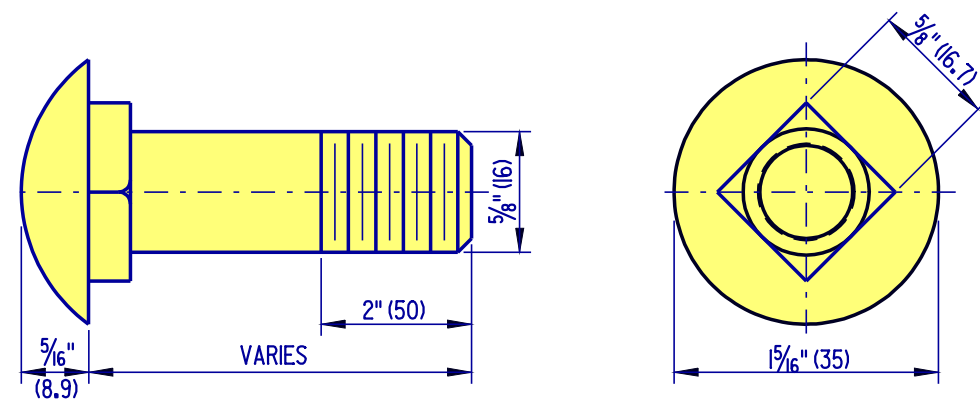
STEEL WASHER

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

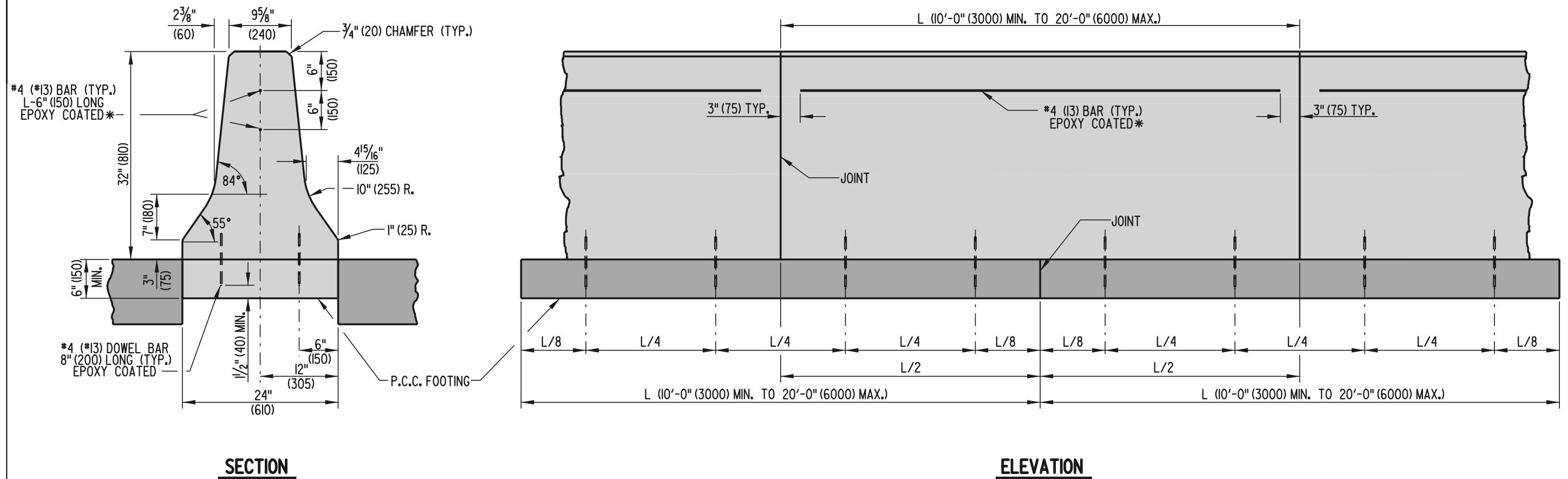
Carolann Wicks
CHIEF ENGINEER

1/10/05
DATE

RECOMMENDED

Dennis M. O'Flaherty
DESIGN ENGINEER

1/3/05
DATE



TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

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



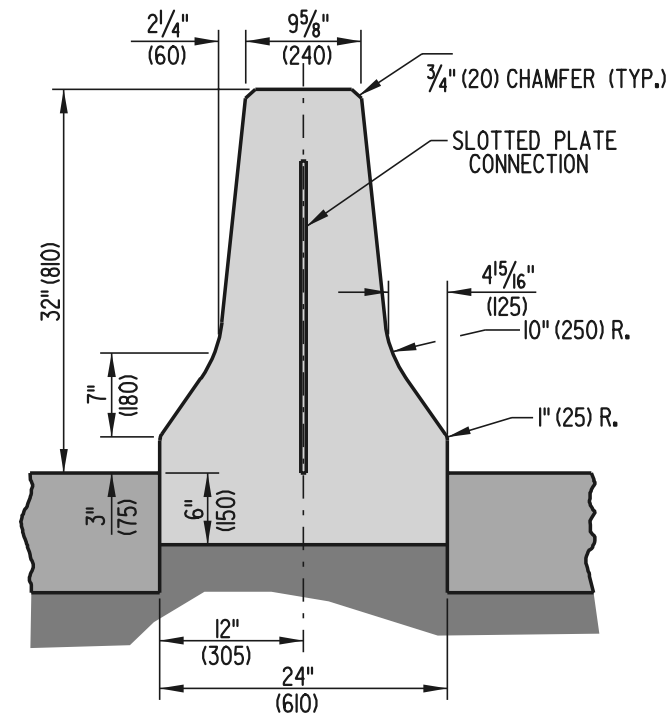
DELAWARE
DEPARTMENT OF TRANSPORTATION

CONCRETE SAFETY BARRIER (F SHAPE)

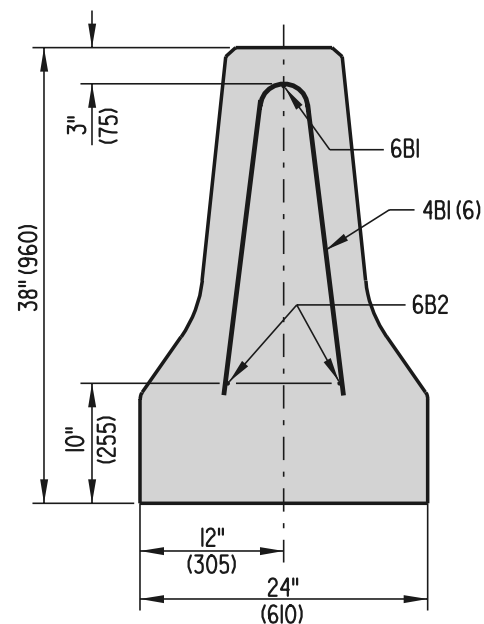
STANDARD NO. B-14 (2001)

SHT. 1 OF 3

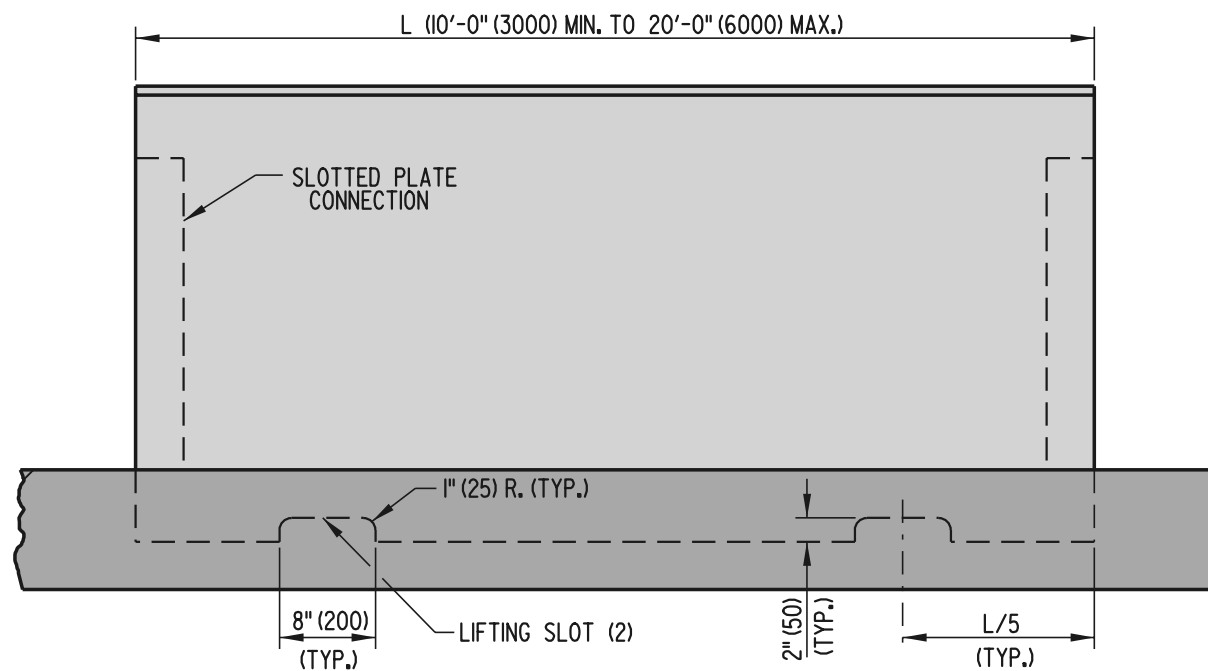
APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE
RECOMMENDED *Mehmet Akpinar* 6/18/01
DESIGN ENGINEER DATE



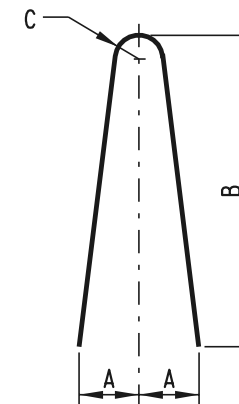
TYPICAL PRE-CAST CONSTRUCTION



F SHAPE BARRIER SECTION



ELEVATION



TYPE 1 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

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)

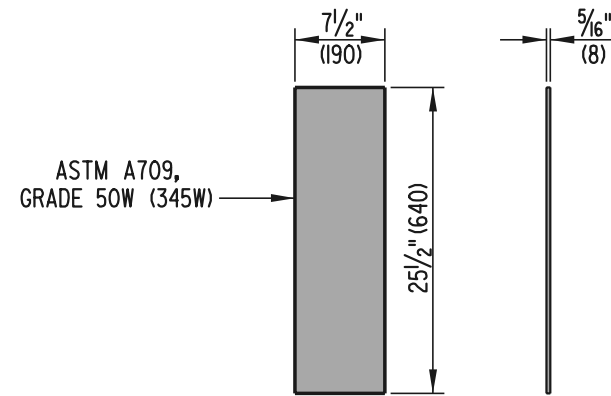
SHT. 2 OF 3

APPROVED

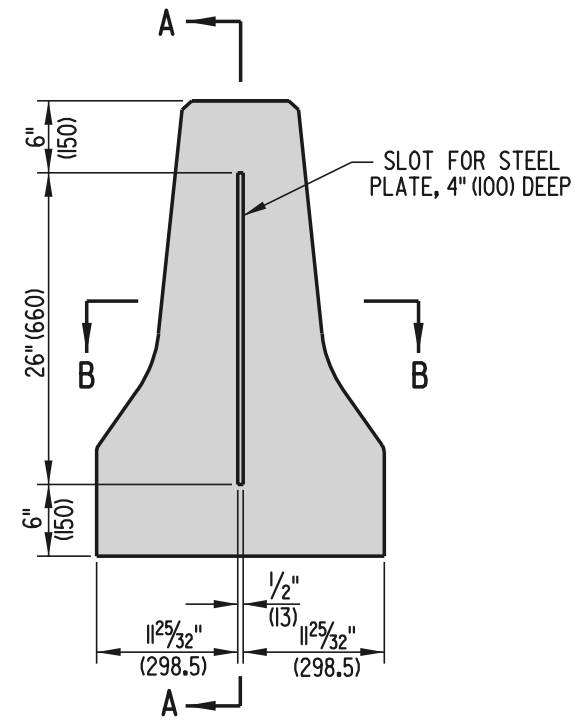
Ryan M. Hershman
CHIEF ENGINEER
DATE 6/18/01

RECOMMENDED

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

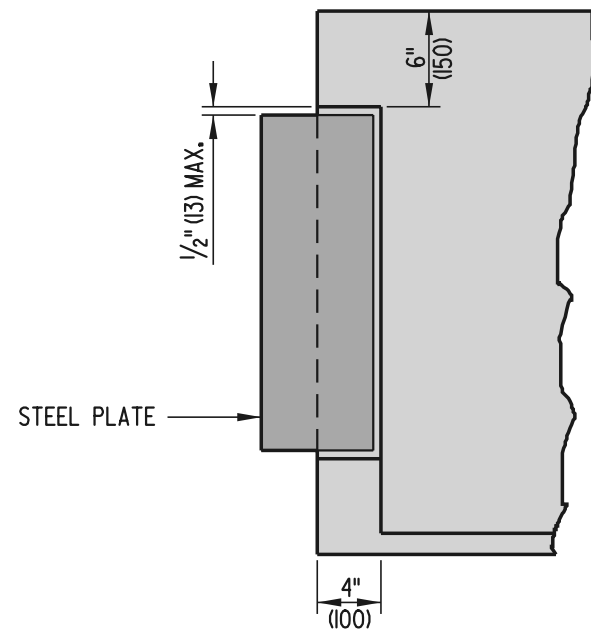


STEEL CONNECTOR PLATE

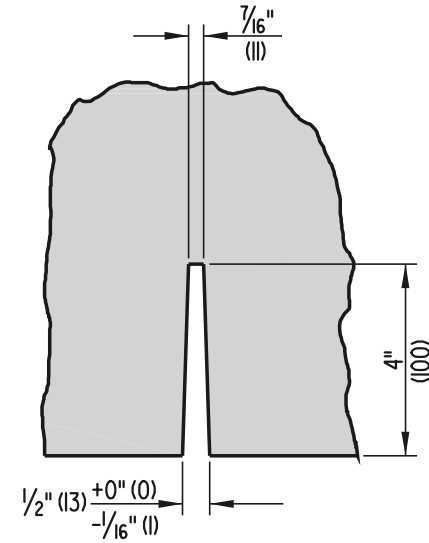


SLOT DIMENSIONS

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



SECTION A-A



SECTION B-B



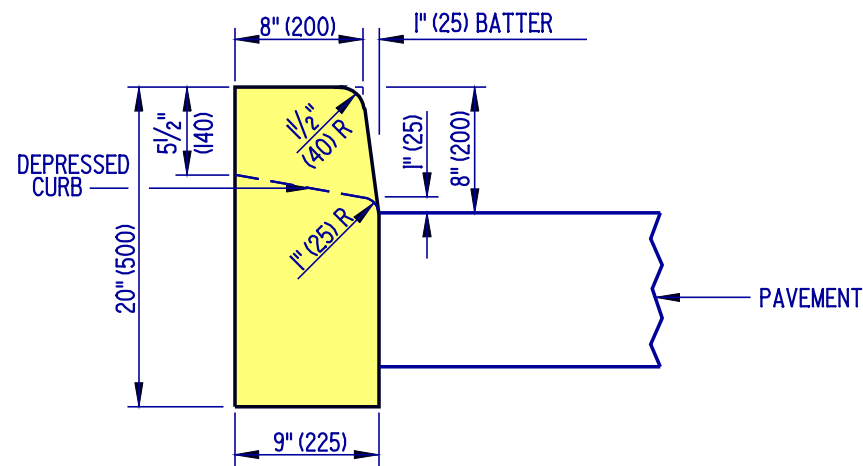
DELAWARE
DEPARTMENT OF TRANSPORTATION

SLOTTED PLATE CONNECTION DETAILS

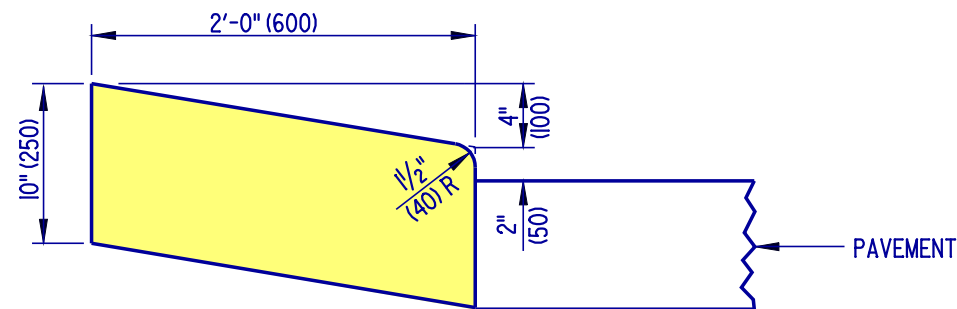
STANDARD NO. B-14 (2001)

SHT. 3 OF 3

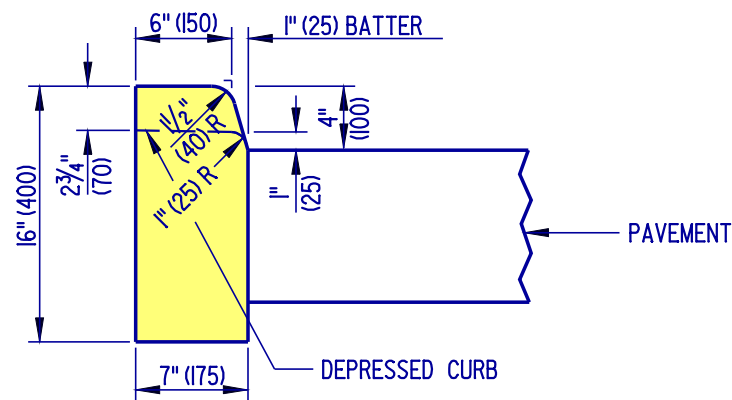
APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE
RECOMMENDED *Michael P. Gotsch* 6/18/01
DESIGN ENGINEER DATE



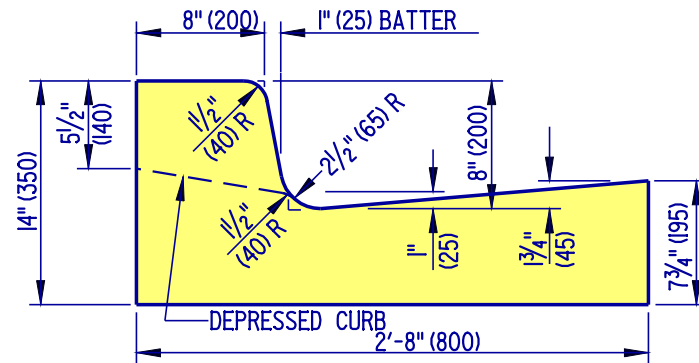
P.C.C. CURB
TYPE 1



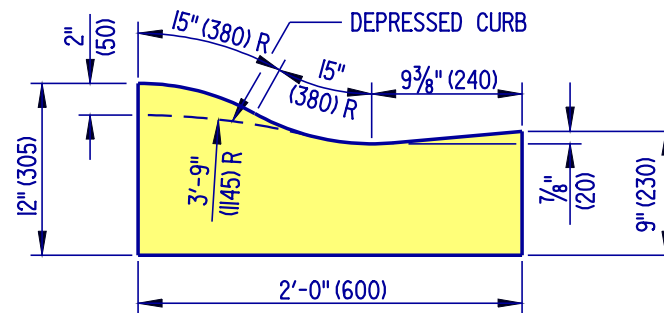
P.C.C. CURB
TYPE 2



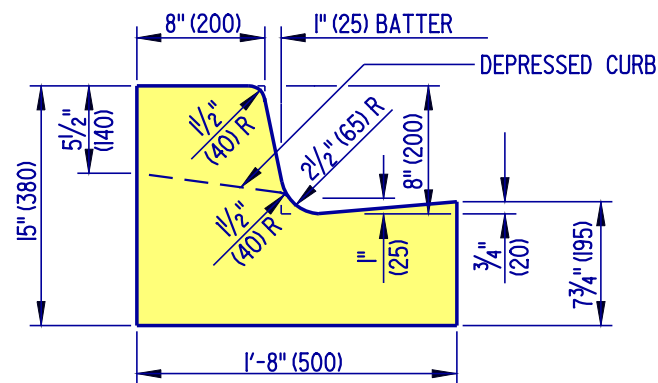
P.C.C. CURB
TYPE 3



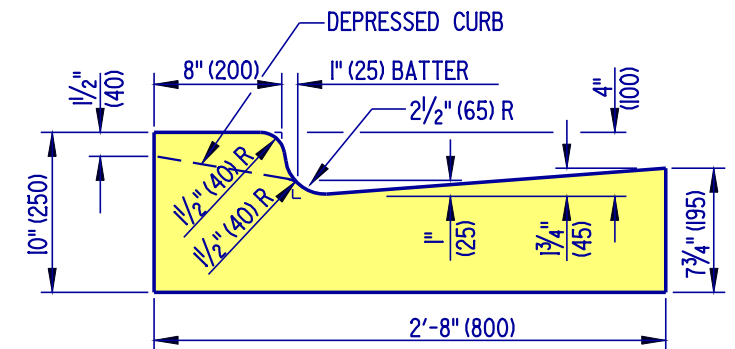
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 1



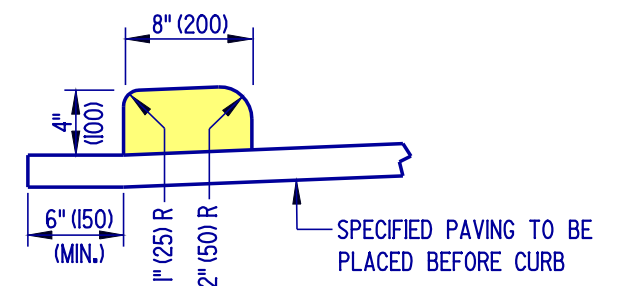
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 2



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 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 DRIVEWAYS AS DETAILED.
3. DEPRESS CURB FLUSH WITH PAVEMENT AT CURB RAMPS. MAXIMUM SLOPE OF DEPRESSED CURB IS 12:1.



DELAWARE
DEPARTMENT OF TRANSPORTATION

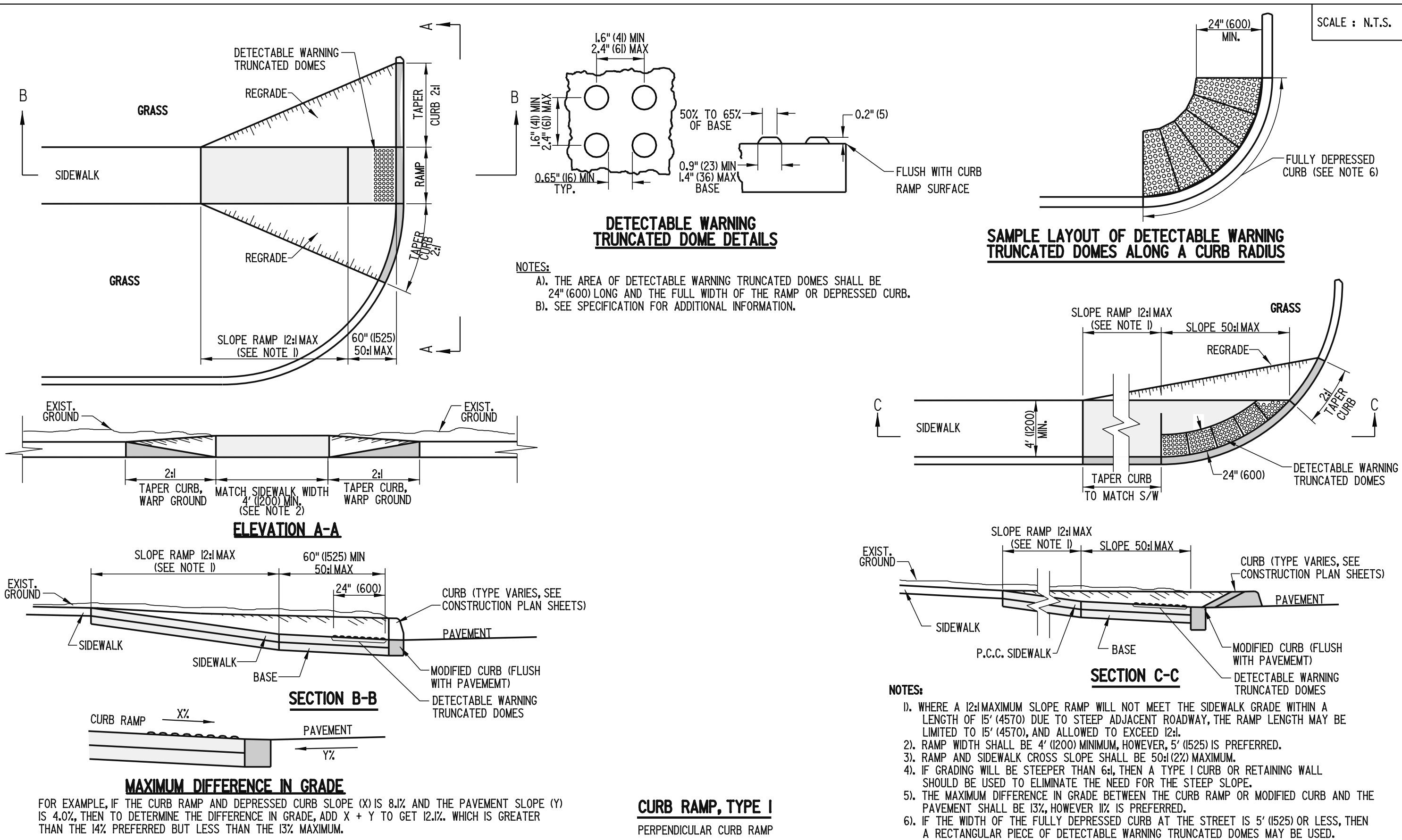
P.C.C. CURB, P.C.C. CURB & GUTTER, AND HOT-MIX CURB

STANDARD NO. C-1 (2004)

SHT. 1 OF 1

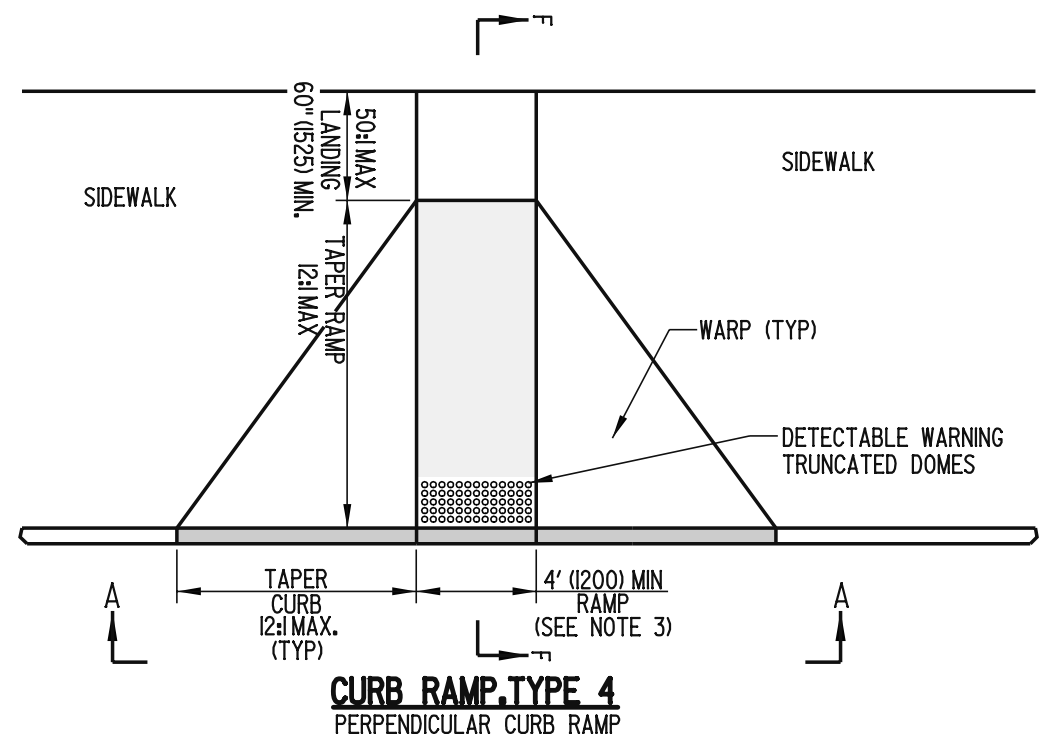
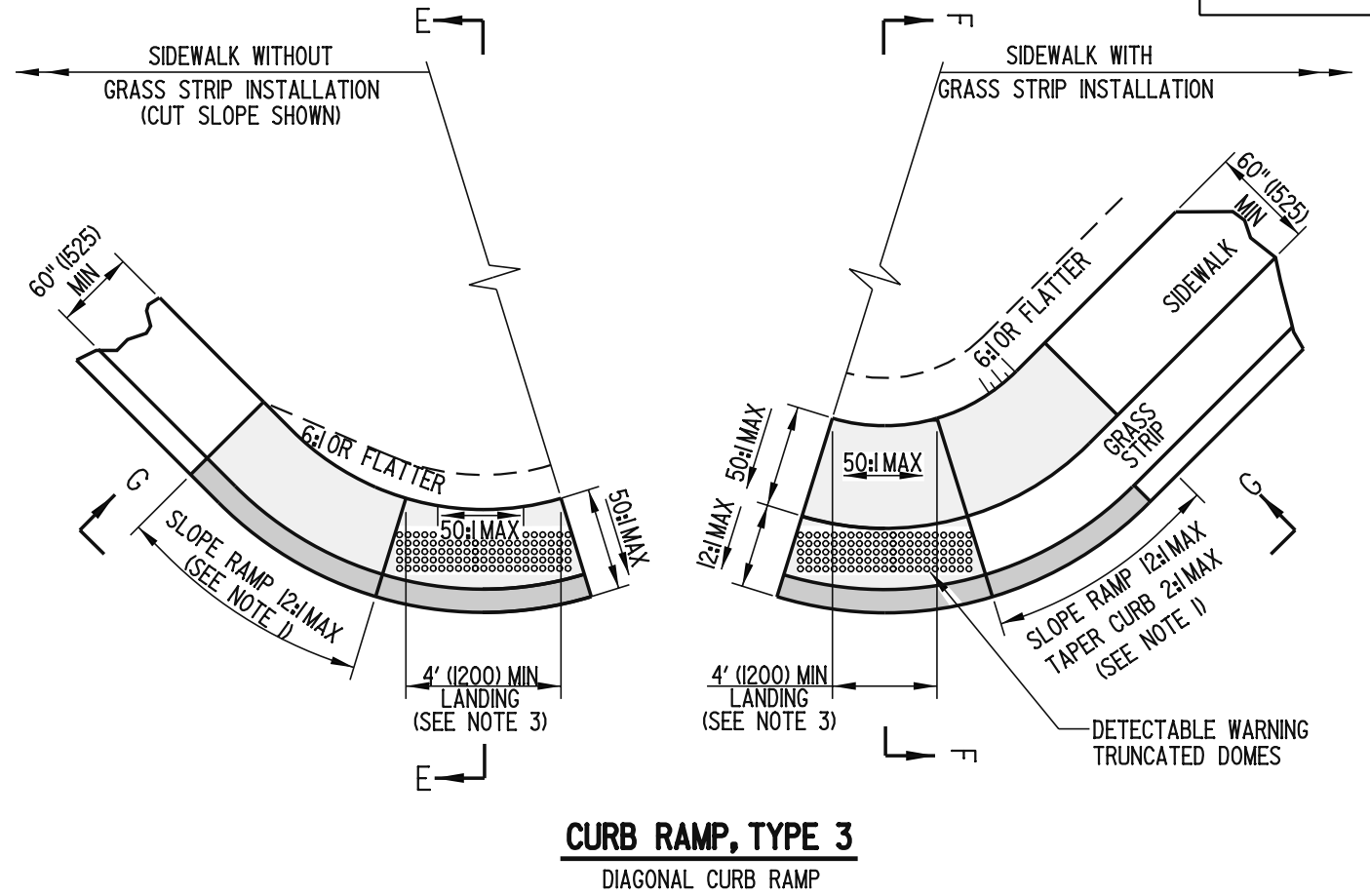
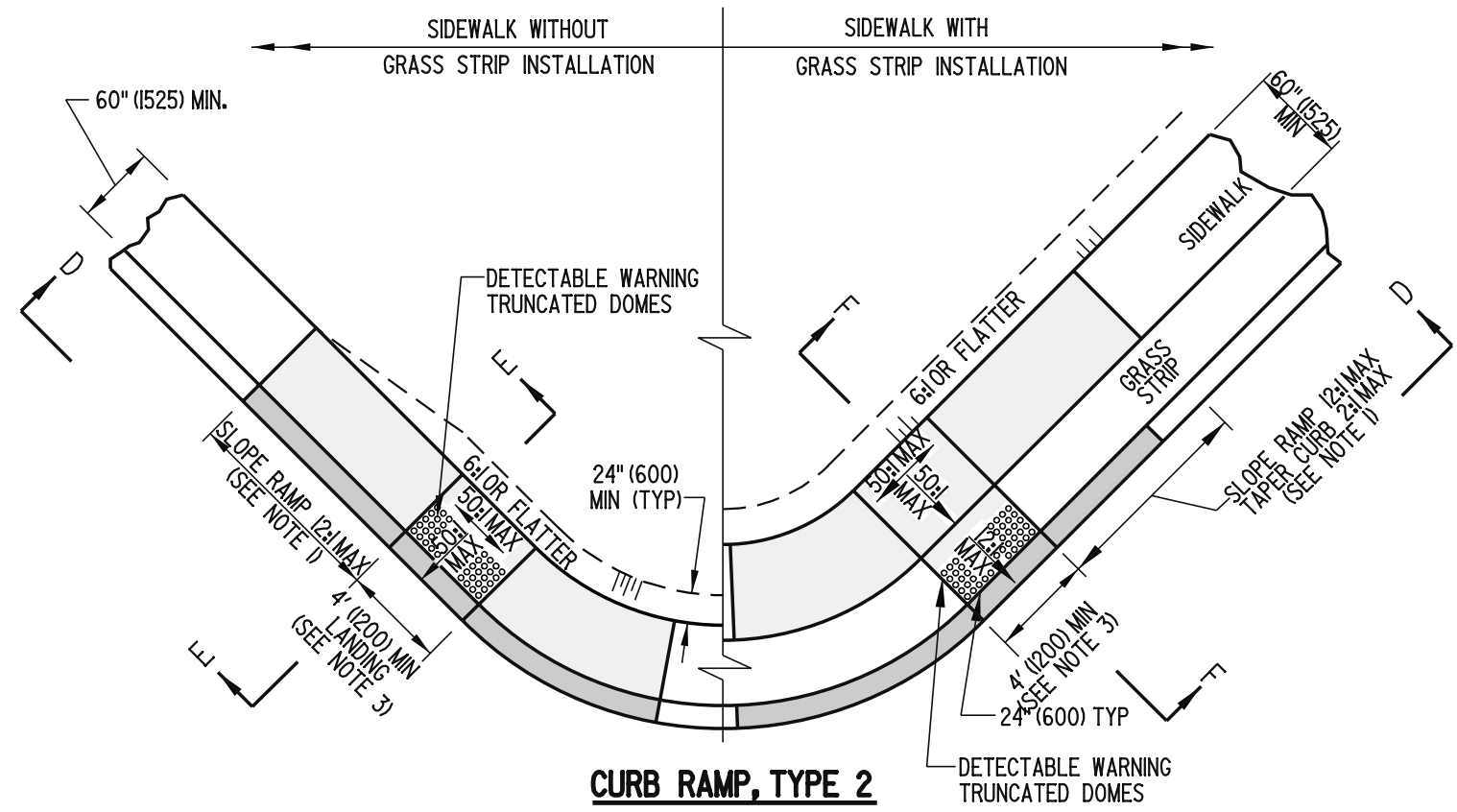
APPROVED *Carolann Wick* 1/10/05
CHIEF ENGINEER DATE

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






DELAWARE DEPARTMENT OF TRANSPORTATION	CURB RAMP, TYPE 1 AND SECTIONS			APPROVED	10/10/06
	STANDARD NO. C-2 (2006)	SHT. 1	OF 4	RECOMMENDED	10/13/06

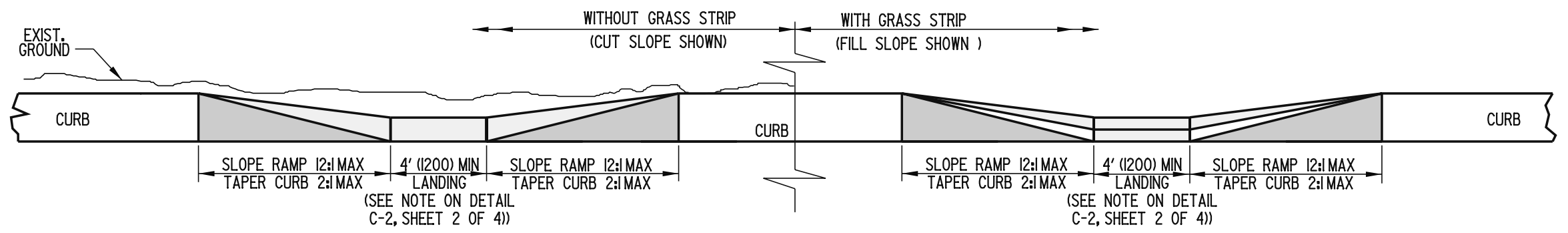
SCALE : N.T.S.



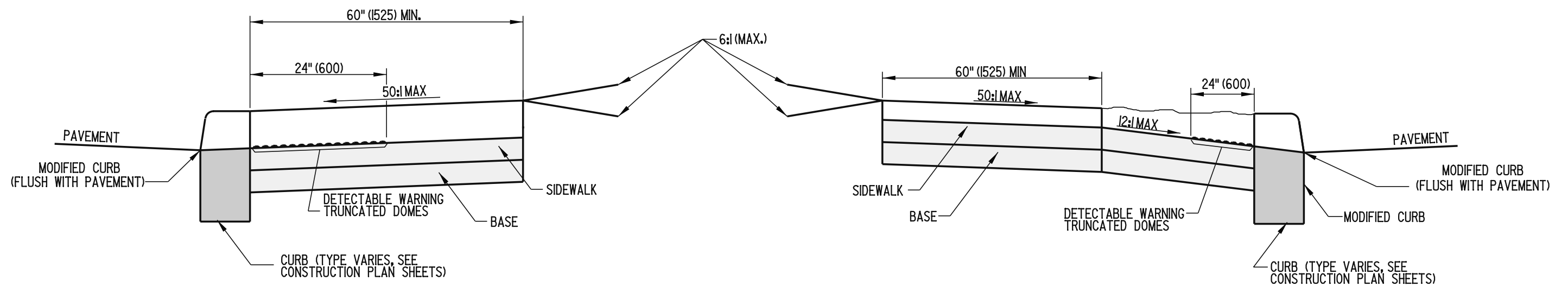
NOTES:

- 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 OR LANDING WIDTH SHALL BE 4' (1200) MINIMUM, HOWEVER, 5' (1525) IS PREFERRED.
- 4). RAMP AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM.
- 5). IF GRADING WILL BE STEEPER THAN 6:1 ADJACENT TO THE CURB RAMP OR SIDEWALK, THEN A TYPE 1 CURB OR RETAINING WALL SHOULD BE USED TO ELIMINATE THE NEED FOR THE STEEP SLOPE.
- 6). FOR THE CURB RAMP, TYPE 3, IF THE WIDTH OF THE FULLY DEPRESSED CURB AT THE STREET IS MORE THAN 5' (1525), THE DETECTABLE WARNING TRUNCATED DOMES SHALL FOLLOW THE RADIUS OF THE CURB CONTINUOUSLY WITHOUT GAPS FOR THE ENTIRE LENGTH OF DEPRESSED CURB. SEE STANDARD NO. C-2, SHEET 1 OF 4.
- 7). THE MAXIMUM DIFFERENCE IN GRADE BETWEEN THE SIDEWALK OR CURB AND THE PAVEMENT SHALL BE 13:1, HOWEVER 11:1 IS PREFERRED. SEE STANDARD NO. C-2, SHEET 1 OF 4.

 DELAWARE DEPARTMENT OF TRANSPORTATION	CURB RAMPS, TYPES 2, 3, & 4			APPROVED  10/10/06 CHIEF ENGINEER DATE
	STANDARD NO. C-2 (2006)	SHT. 2	OF 4	RECOMMENDED  10/13/06 DESIGN ENGINEER DATE

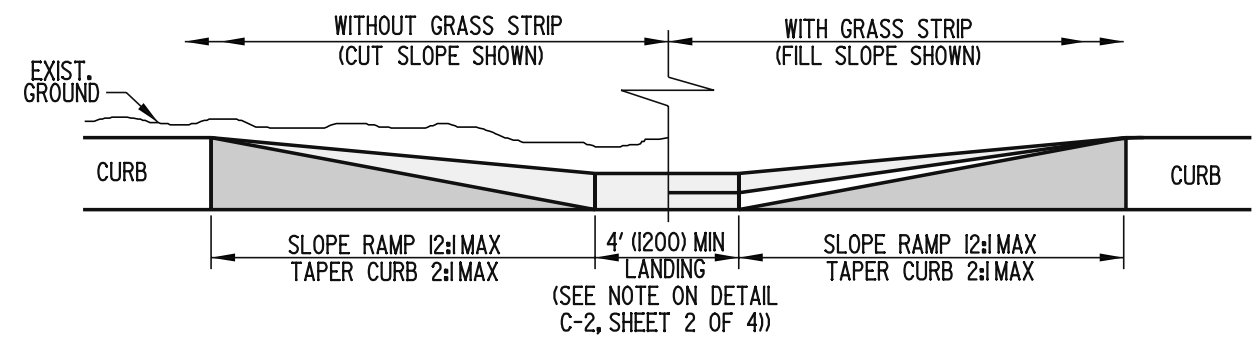


ELEVATION D-D






SECTION E-E

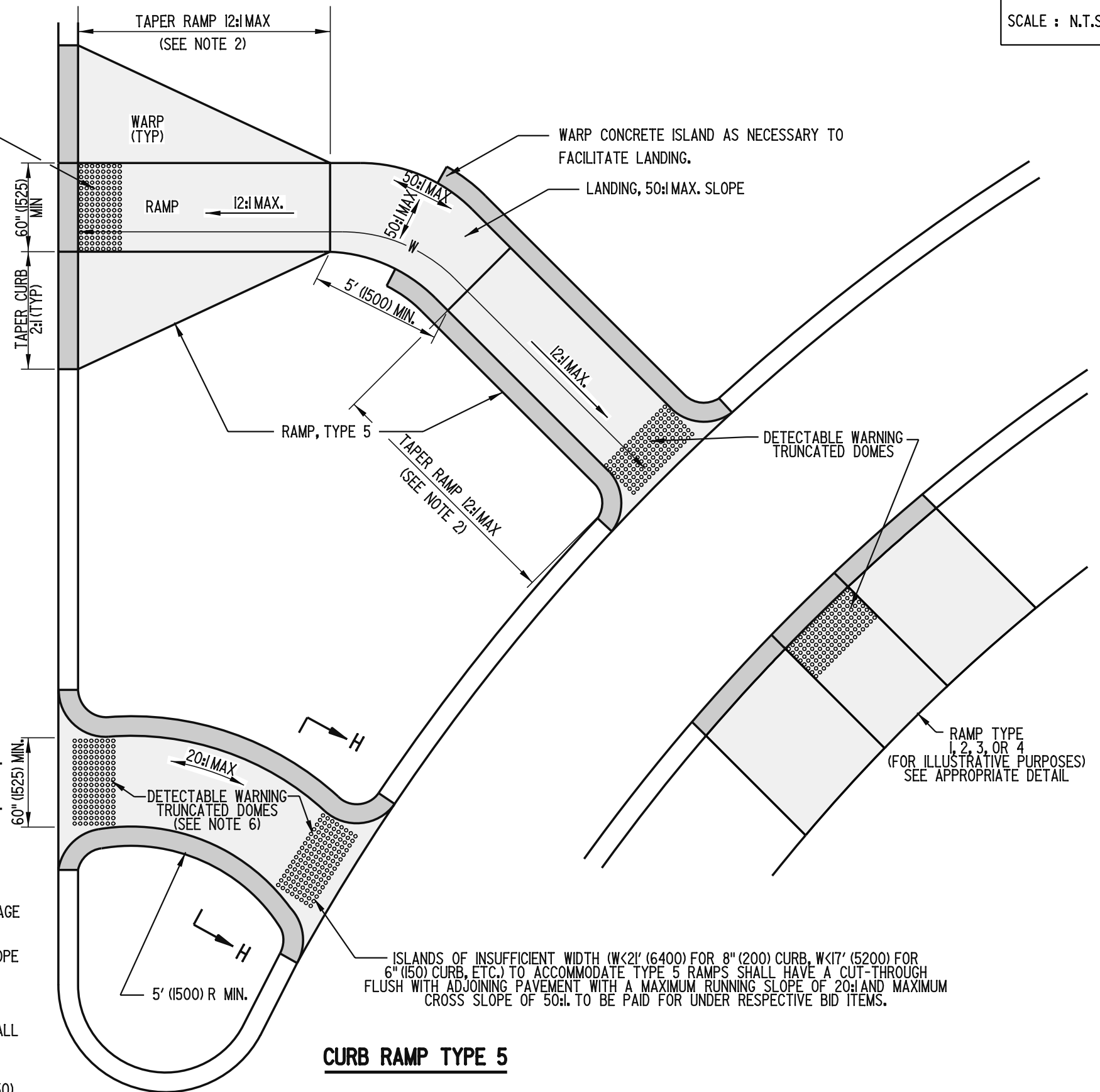
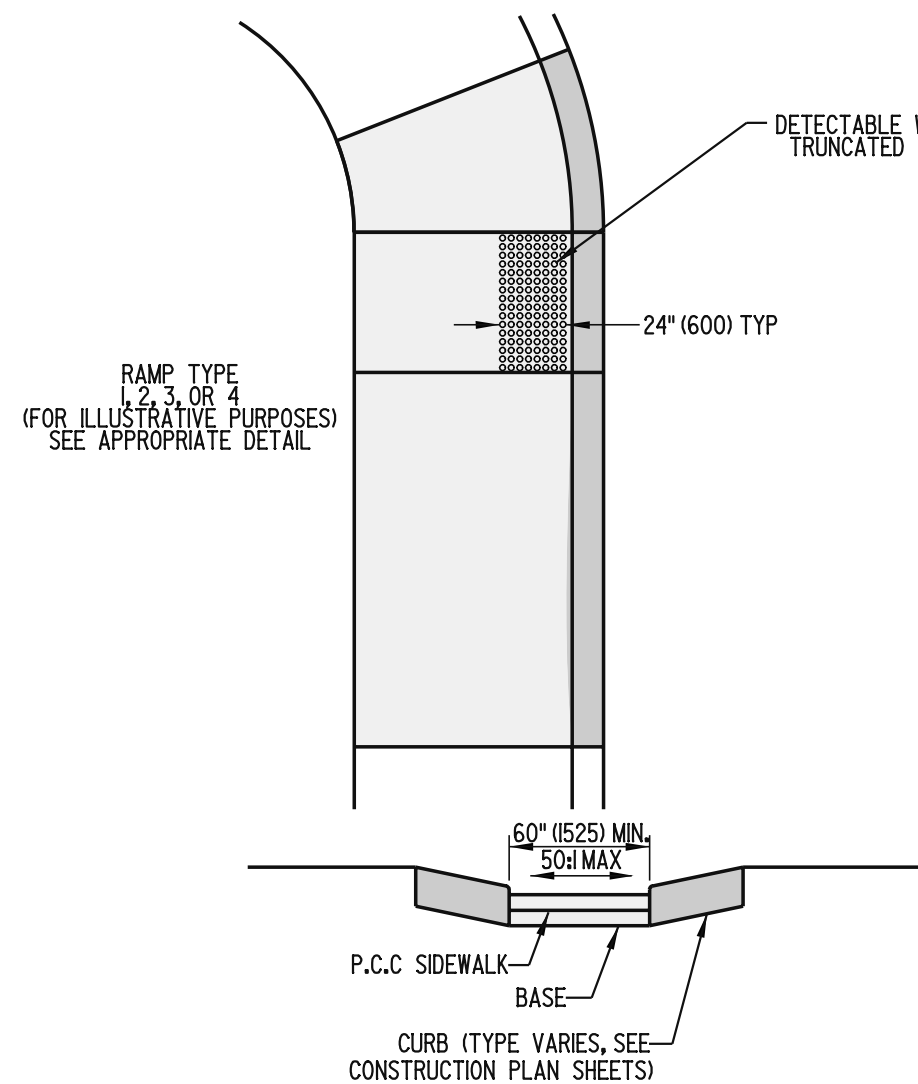
SECTION F-F



ELEVATION G-G

 DELAWARE DEPARTMENT OF TRANSPORTATION	CURB RAMP SECTIONS FOR TYPES 2 & 3			APPROVED  10/10/06 CHIEF ENGINEER DATE
	STANDARD NO. C-2 (2006)	SHT. 3 OF 4		RECOMMENDED  10/13/06 DESIGN ENGINEER DATE

SCALE : N.T.S.



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 AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM.
- 5). WHERE THERE IS NO DEPRESSED CURB AT A CUT-THROUGH OR CURB RAMP, THE DETECTABLE WARNING SHALL BE INSTALLED 3" (75) FROM THE ROADWAY PAVEMENT.
- 6). IF THE MINIMUM CLEAR SPACE BETWEEN DETECTABLE WARNINGS IS LESS THAN 2' (600), THEN THE ENTIRE MEDIAN CURB RAMP AREA SHALL BE COVERED WITH DETECTABLE WARNINGS.
- 7). PEDESTRIAN SIGNALS SHALL BE ACCESSIBLE WITH A LEVEL LANDING, WHOSE EDGE IS NO MORE THAN 10" (250) FROM ALL PEDESTRIAN PUSH BUTTONS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB RAMP TYPE 5 & SECTIONS

STANDARD NO. C-2 (2006)

SHT. 4 OF 4

APPROVED

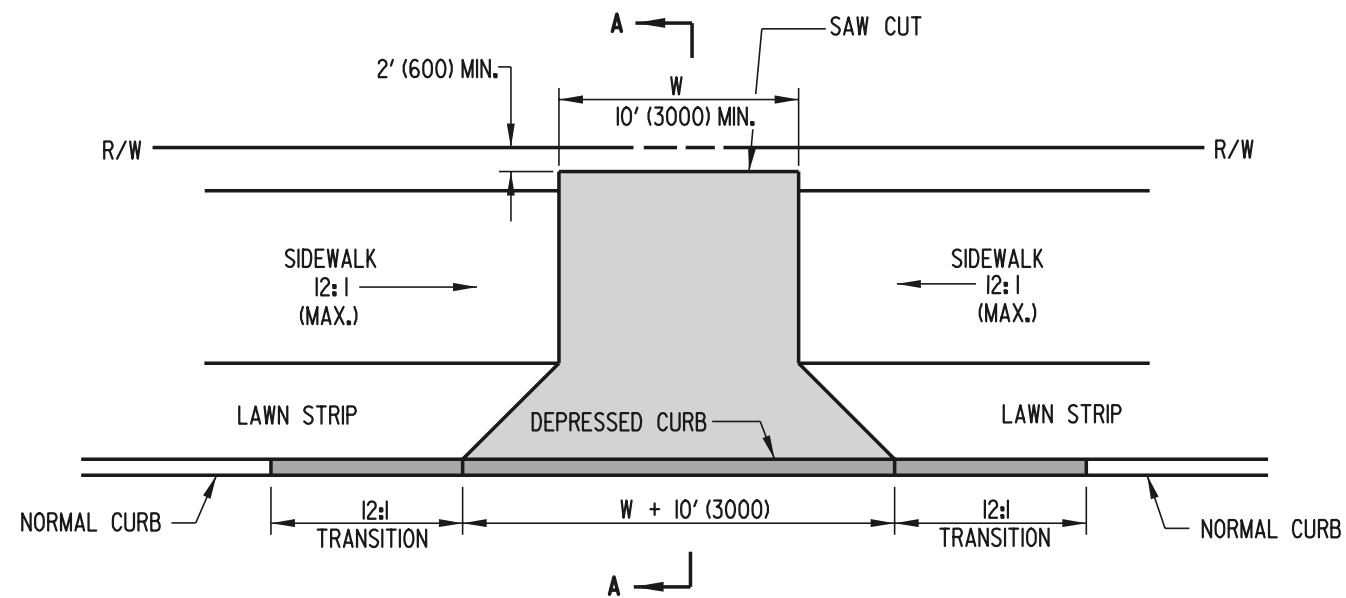
Frank Taylor
CHIEF ENGINEER

10/10/06
DATE

RECOMMENDED

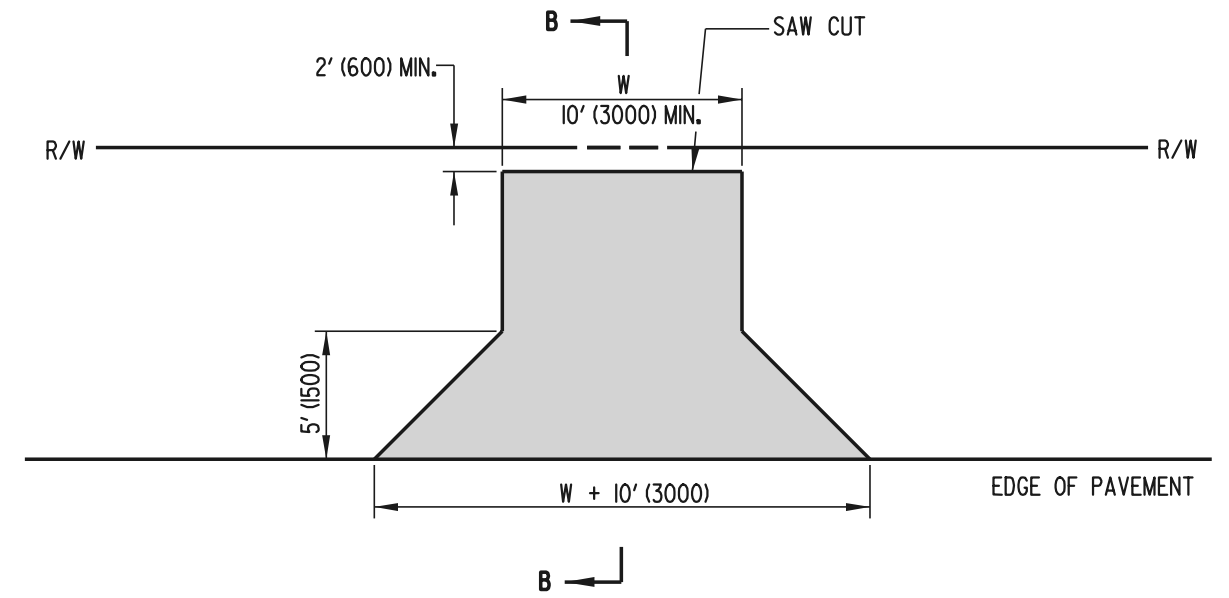
Don Smith
DESIGN ENGINEER

10/13/06
DATE



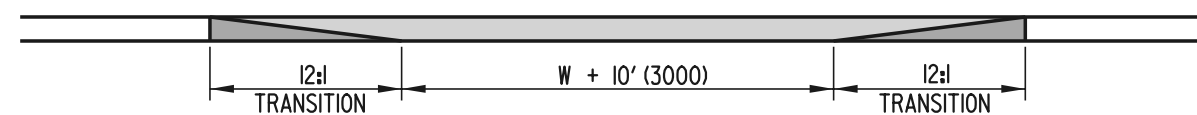
PLAN

URBAN APPLICATION

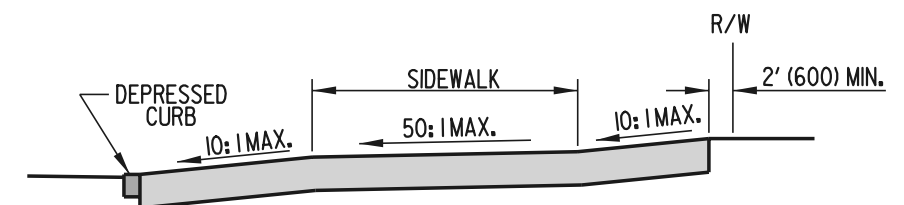


PLAN

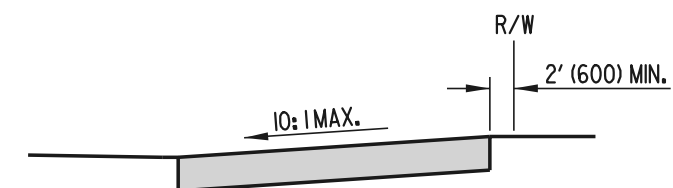
RURAL APPLICATION



ELEVATION



SECTION A-A



SECTION B-B



DELAWARE
DEPARTMENT OF TRANSPORTATION

ENTRANCES

STANDARD NO. C-3 (2001)

SHT. 1 OF 1

APPROVED

1) Ryane M. Harbo 6/18/01
CHIEF ENGINEER DATE

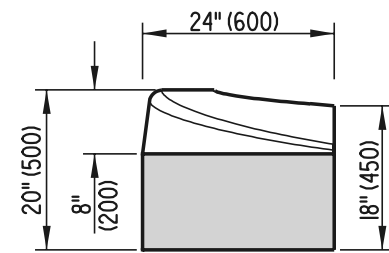
2) Merle R. R. R. 6/18/01
DESIGN ENGINEER DATE

RECOMMENDED

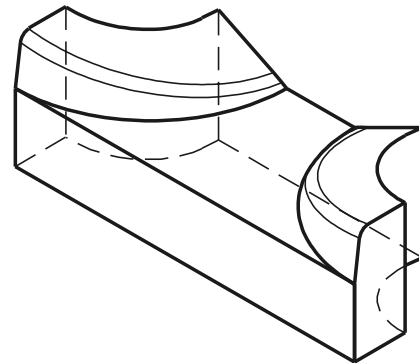
D Merle

03/09/2001

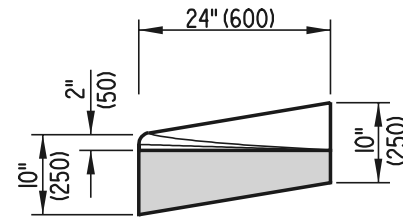
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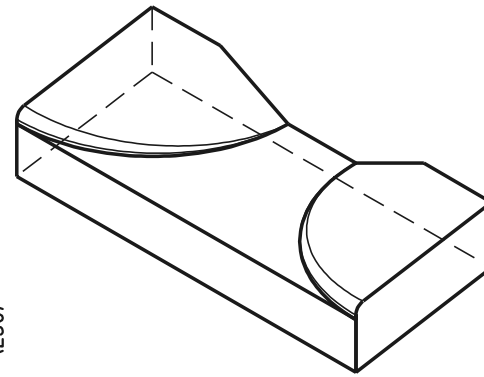
SECTION A-A



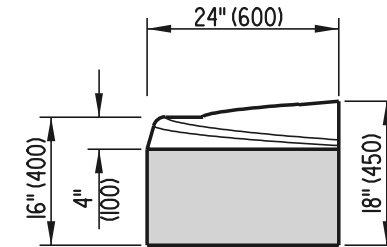
ISOMETRIC VIEW



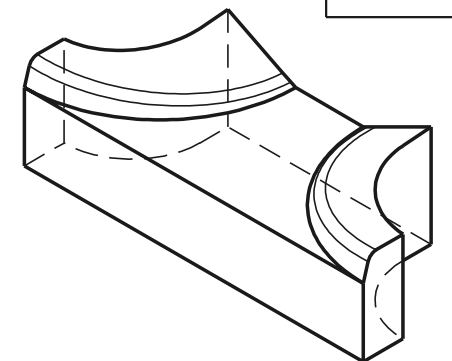
SECTION B-B



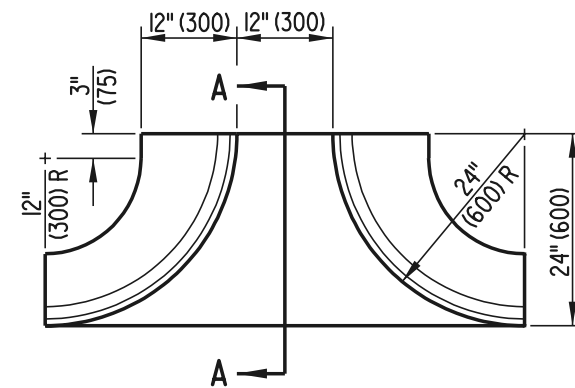
ISOMETRIC VIEW



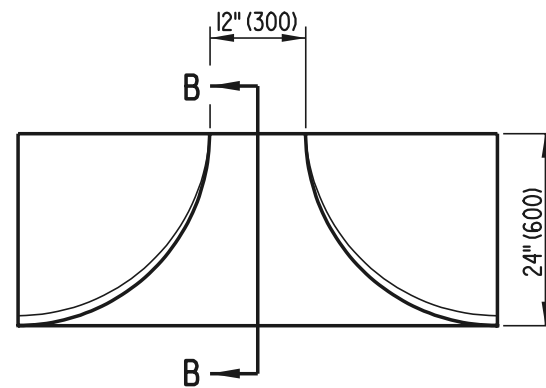
SECTION C-C



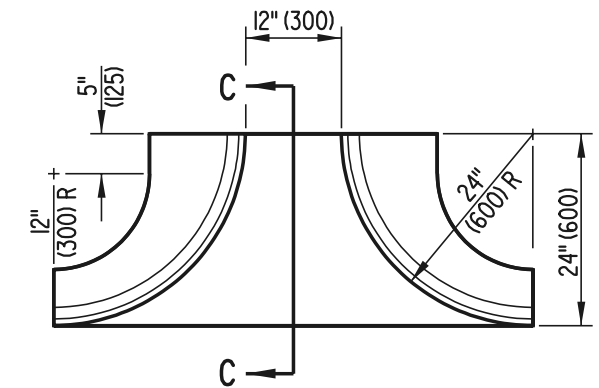
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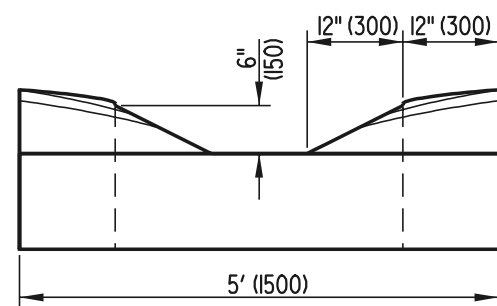
TOP VIEW



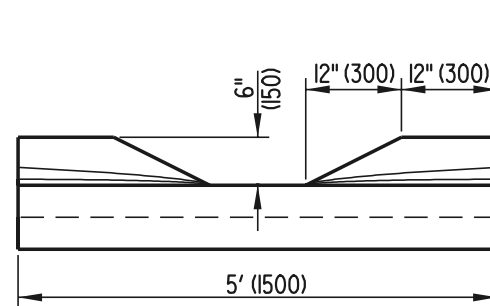
TOP VIEW



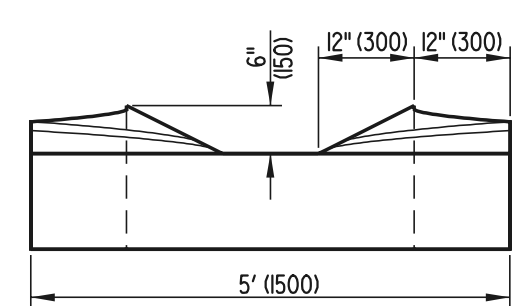
TOP VIEW



FRONT VIEW



FRONT VIEW



FRONT VIEW

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

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

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



DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB OPENINGS

STANDARD NO.

C-4 (2001)

SHT.

1

OF

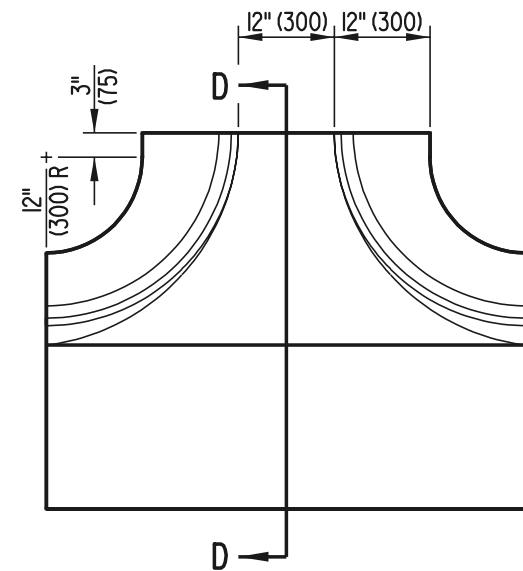
3

APPROVED

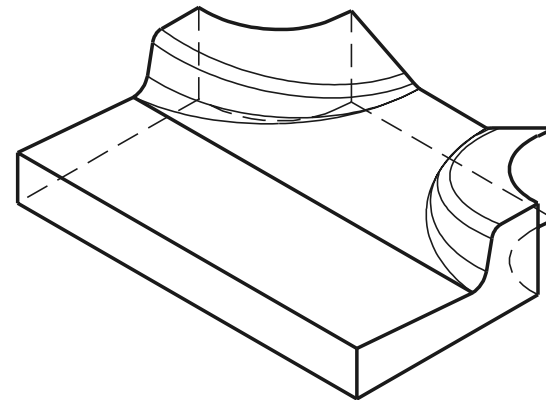
Ryan M. Hershman
CHIEF ENGINEER
DATE 6/18/01

RECOMMENDED

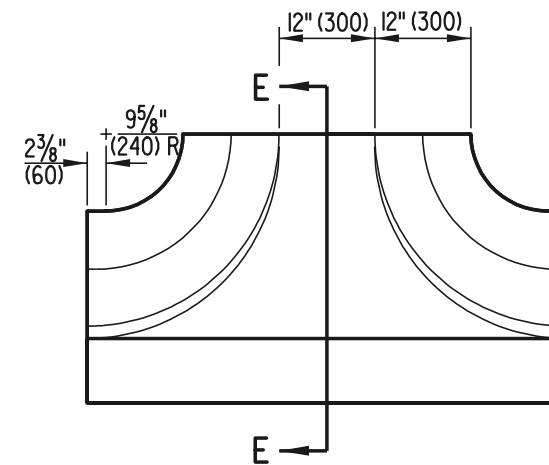
Michael P. Gotsch
DESIGN ENGINEER
DATE 6/18/01



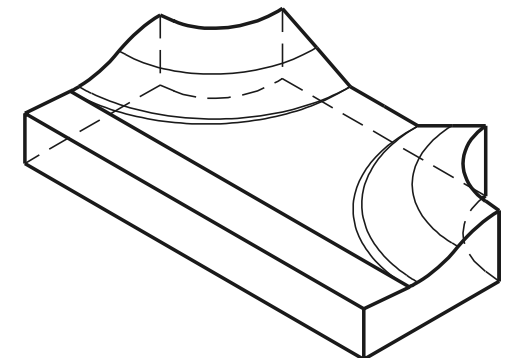
TOP VIEW



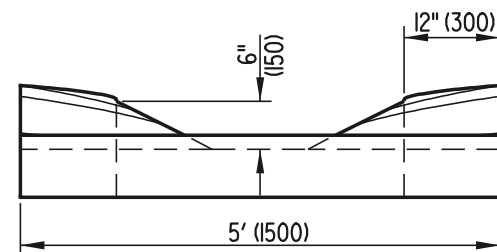
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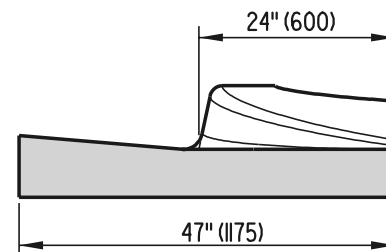
TOP VIEW



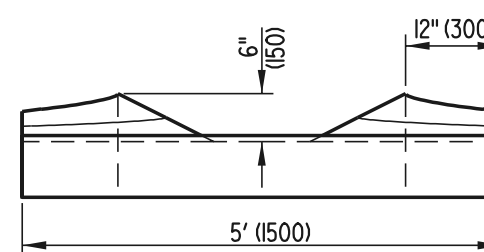
ISOMETRIC VIEW



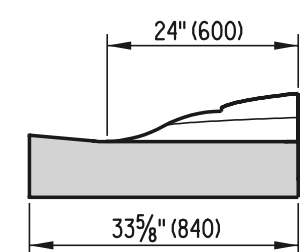
FRONT VIEW



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

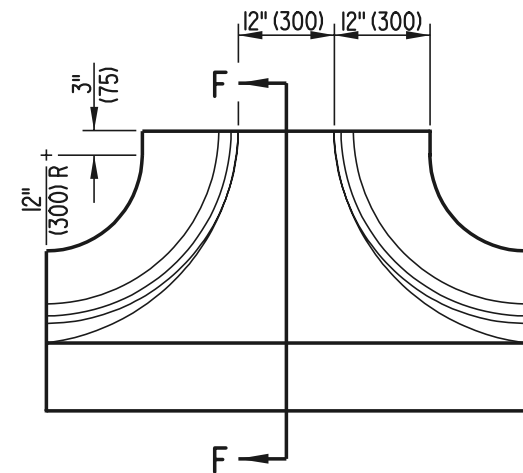
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APPROVED

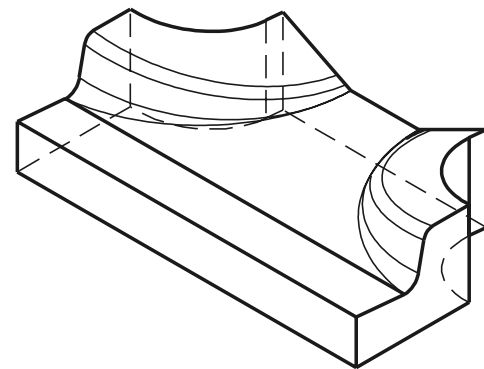
Ryan M. Harkness 6/18/01
CHIEF ENGINEER DATE

RECOMMENDED

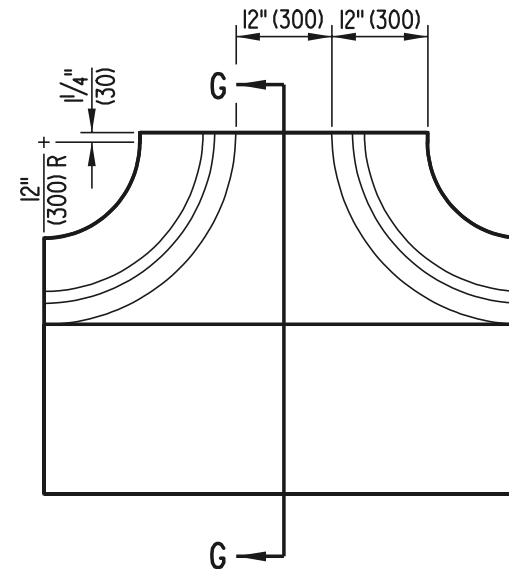
Mehal Akbar 6/18/01
DESIGN ENGINEER DATE



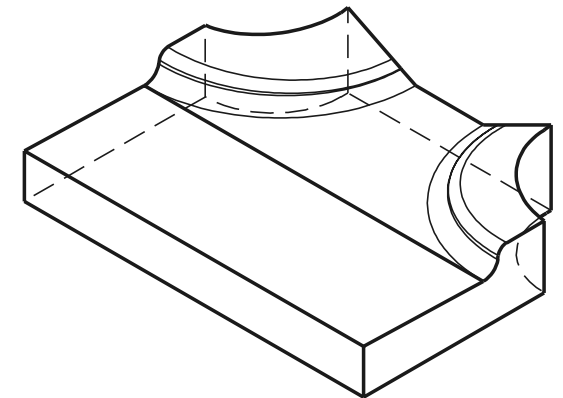
TOP VIEW



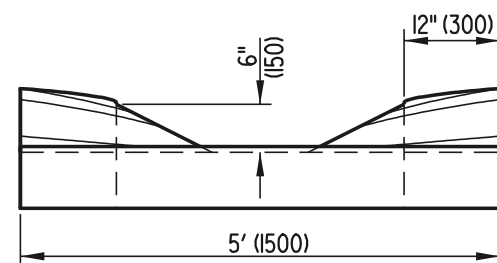
ISOMETRIC VIEW



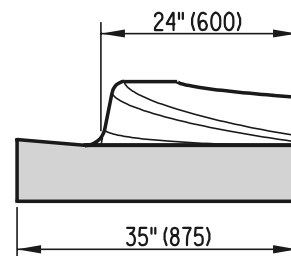
TOP VIEW



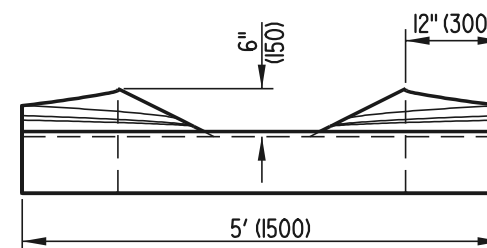
ISOMETRIC VIEW



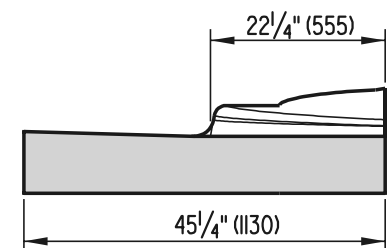
FRONT VIEW



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

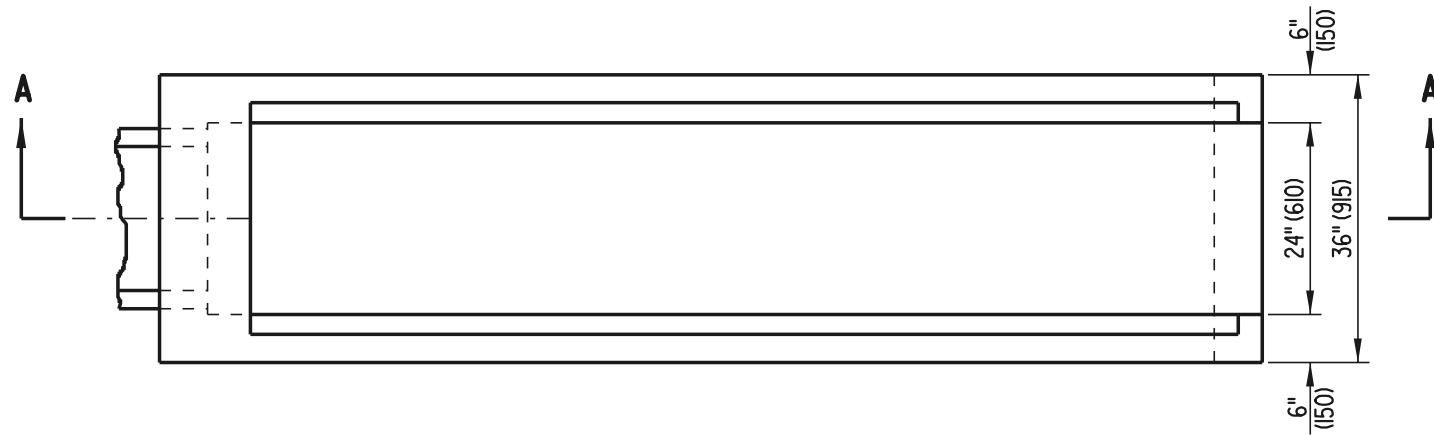
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APPROVED

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

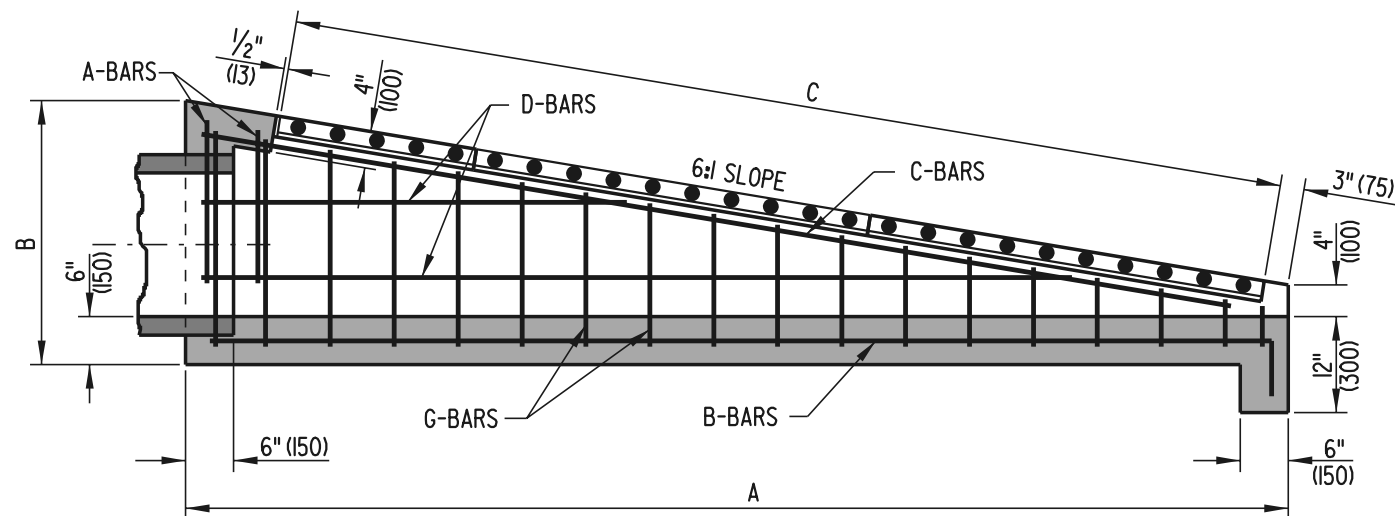
RECOMMENDED

Mehal Akbar 6/18/01
DESIGN ENGINEER DATE

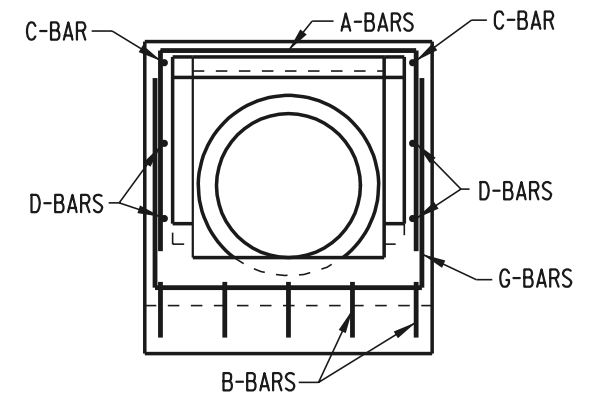


PLAN VIEW
SHOWN WITHOUT GRATE

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)

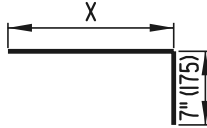
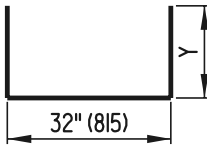
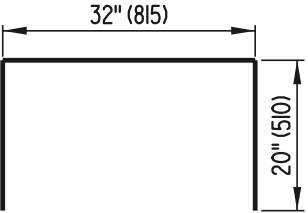
SHT. 1 OF 2

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)

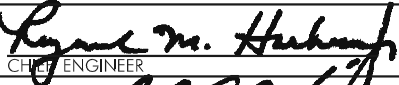



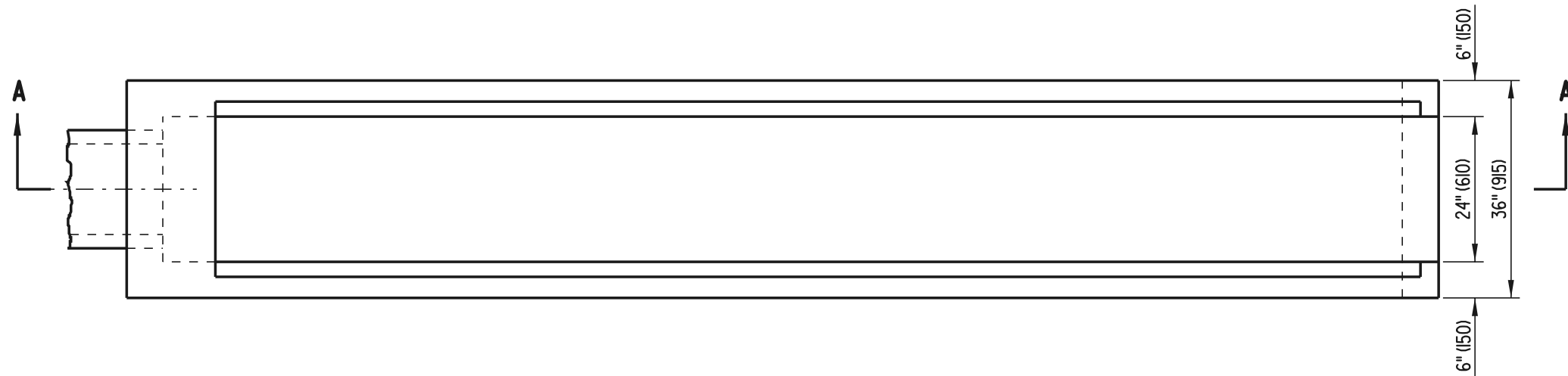
DELAWARE
DEPARTMENT OF TRANSPORTATION

6:1 SAFETY END STRUCTURE

STANDARD NO. D-1 (2001)

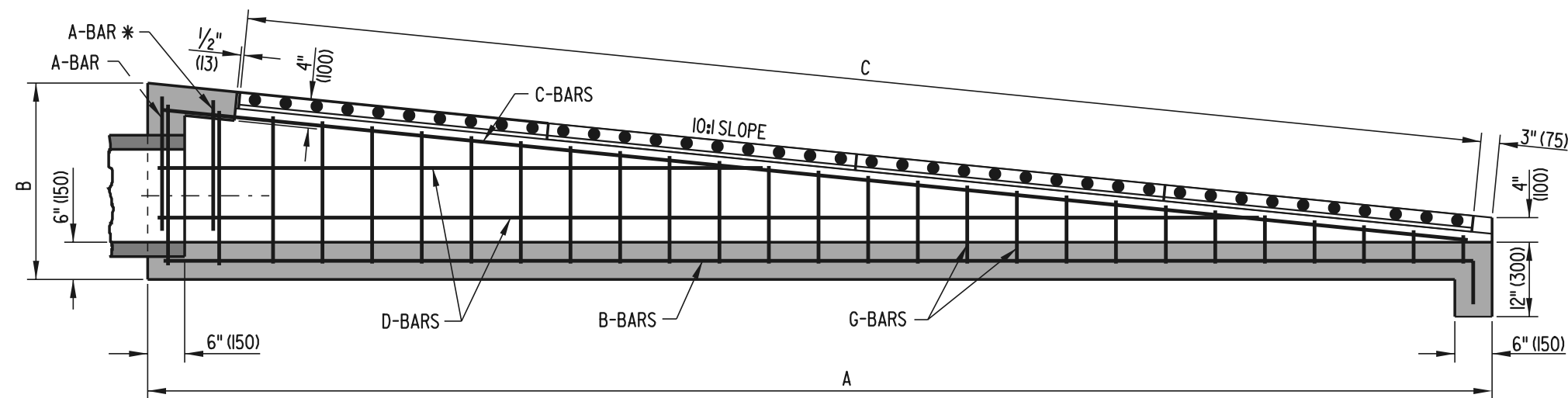
SHT. 2 OF 2

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



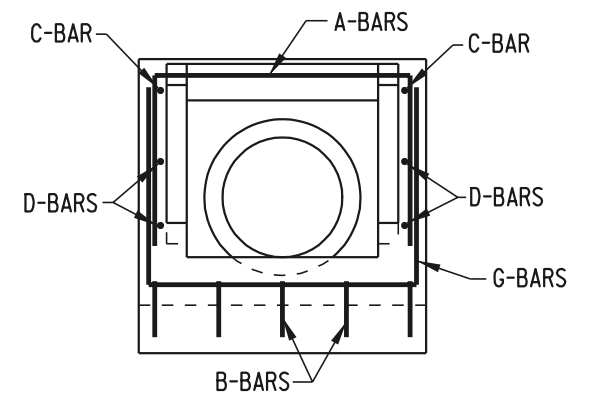
PLAN VIEW
SHOWN WITHOUT GRATE

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

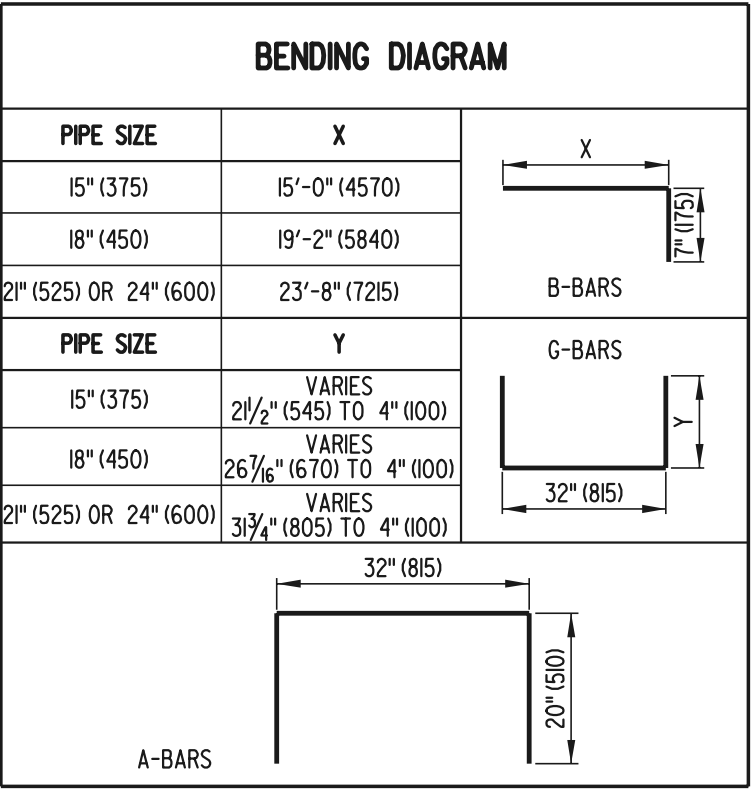
Ryan M. Harkness
CHIEF ENGINEER
DATE **6/18/01**

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)



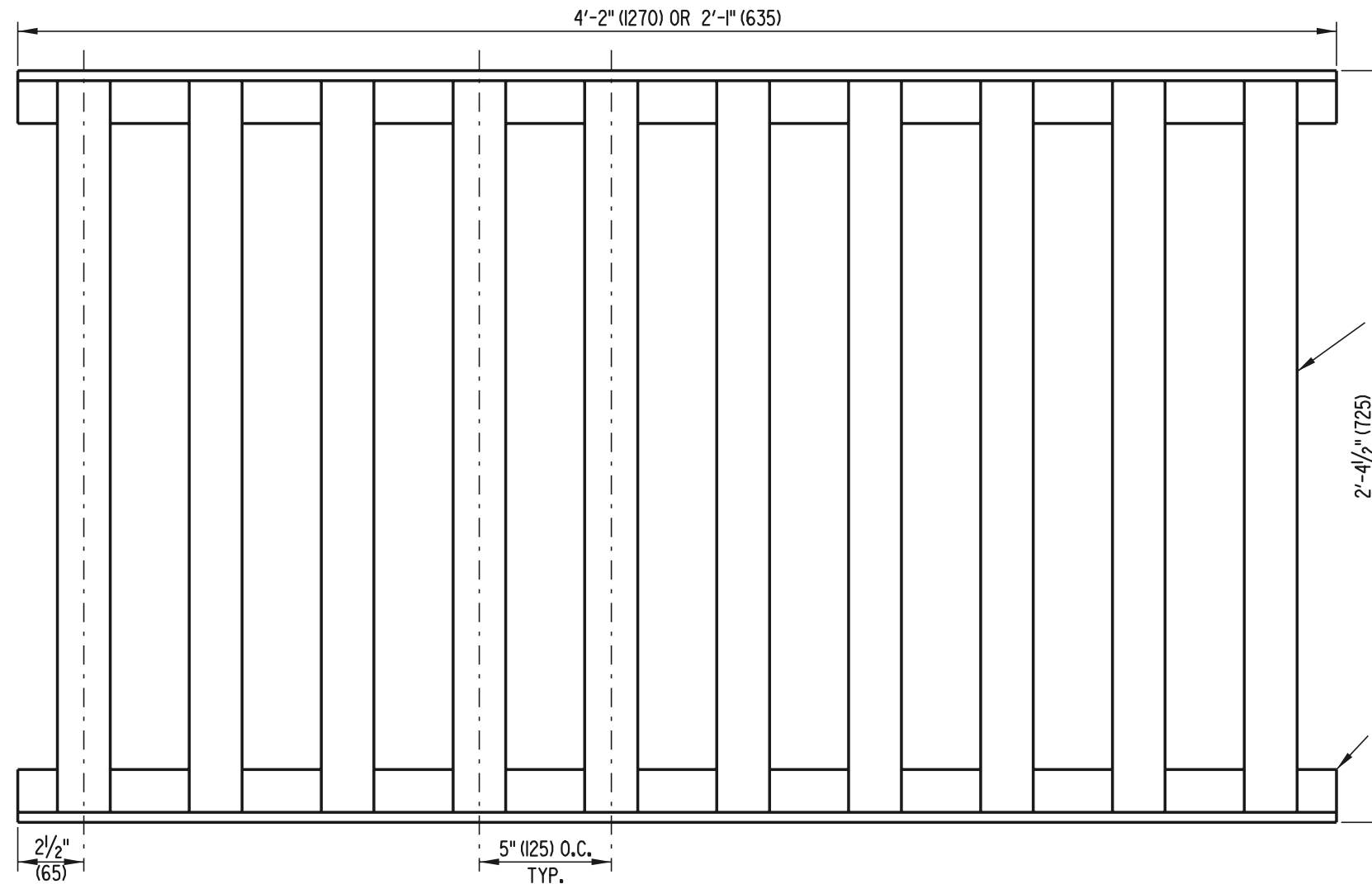
DELAWARE
DEPARTMENT OF TRANSPORTATION

10:1 SAFETY END STRUCTURE

STANDARD NO. D-2 (2001)

SHT. 2 OF 2

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



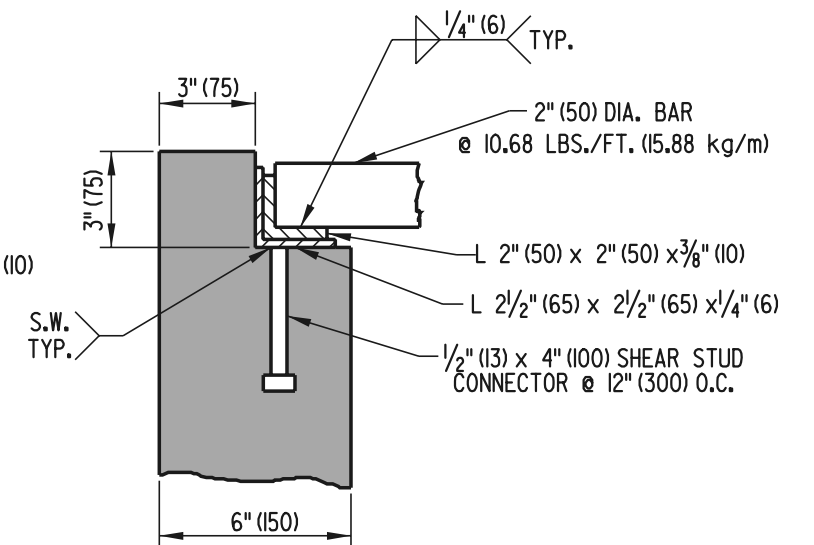
GRATE DETAIL

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)

S.W.
TYP.



FRAME & GRATE ASSEMBLY DETAIL



DELAWARE
DEPARTMENT OF TRANSPORTATION

SAFETY END STRUCTURE GRATE

STANDARD NO. D-3 (2001)

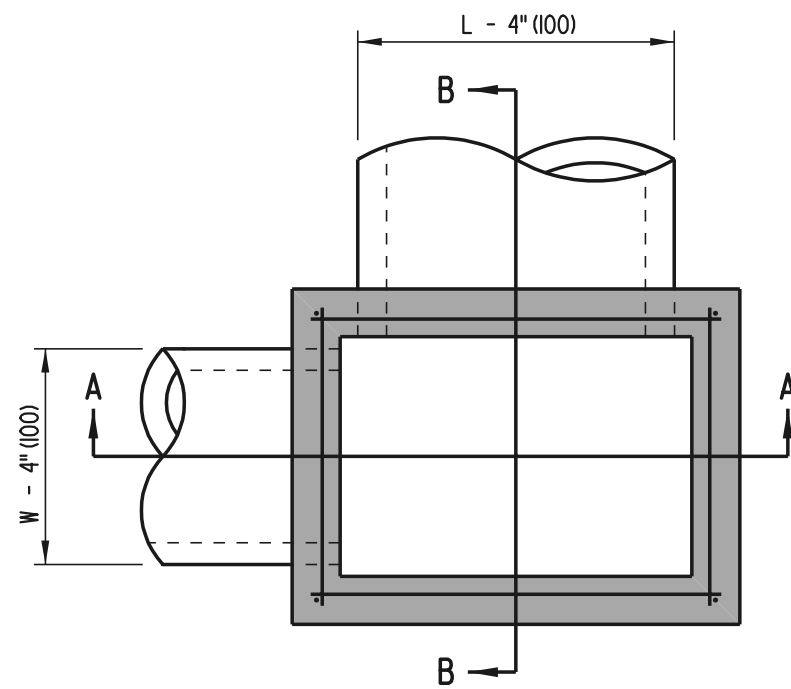
SHT. 1 OF 1

APPROVED

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

RECOMMENDED

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



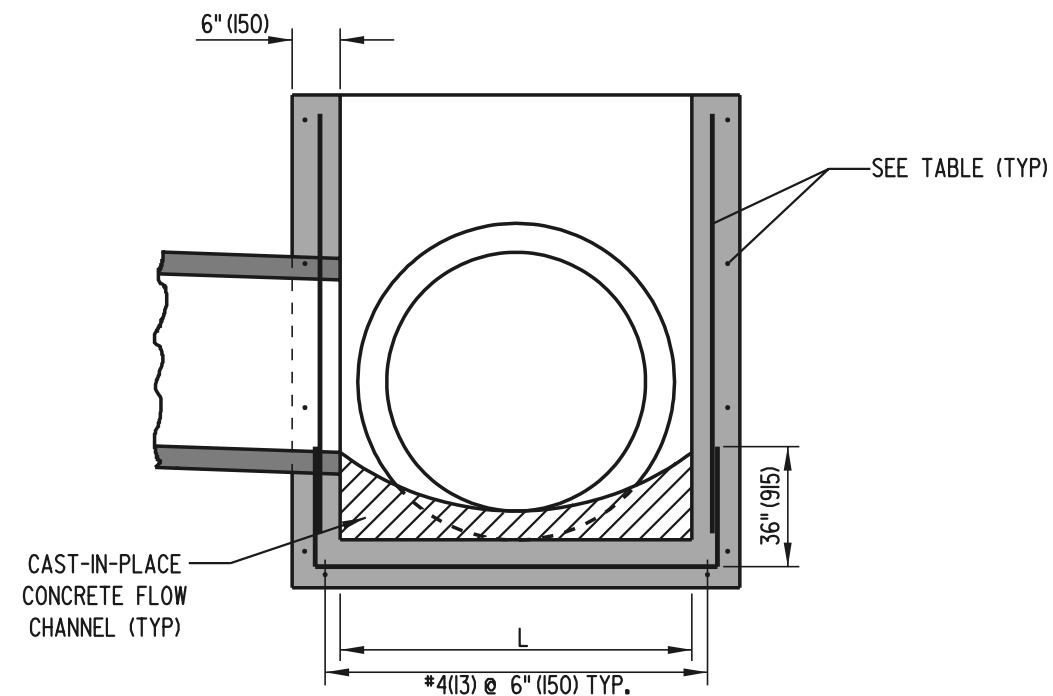
TOP VIEW

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)

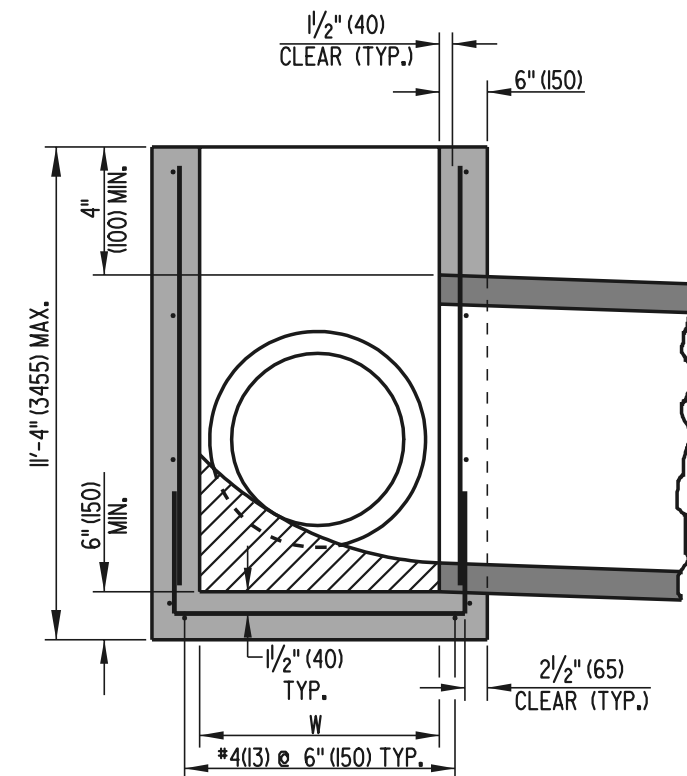
INLET BOX SCHEDULE			
L	W	L MAX	W MAX
34" (865)	18" (455)	34" (865)	18" (455)
34" (865)	24" (610)	34" (865)	24" (610)
48" (1220)	30" (760)	54" (1370)	36" (915)
48" (1220)	48" (1220)	54" (1370)	54" (1370)
66" (1675)	30" (760)	72" (1830)	36" (915)
66" (1675)	48" (1220)	72" (1830)	54" (1370)
66" (1675)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

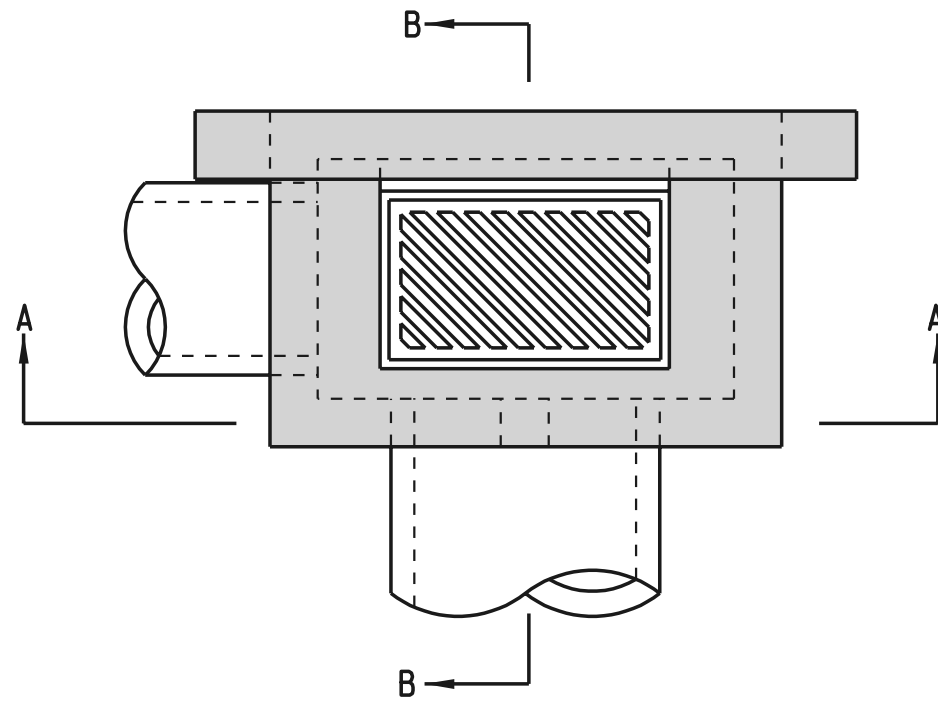
OF 1

APPROVED

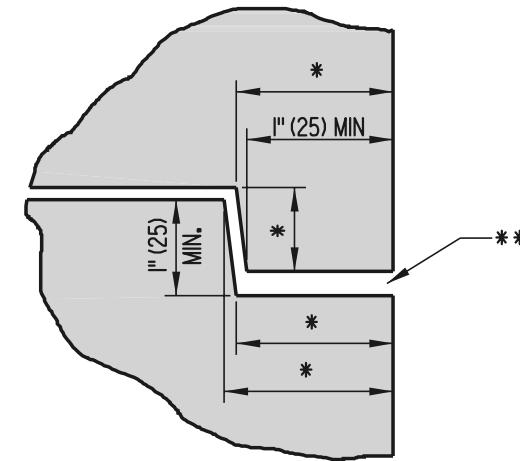
Caution Wicks 9/6/02
CHIEF ENGINEER DATE

RECOMMENDED

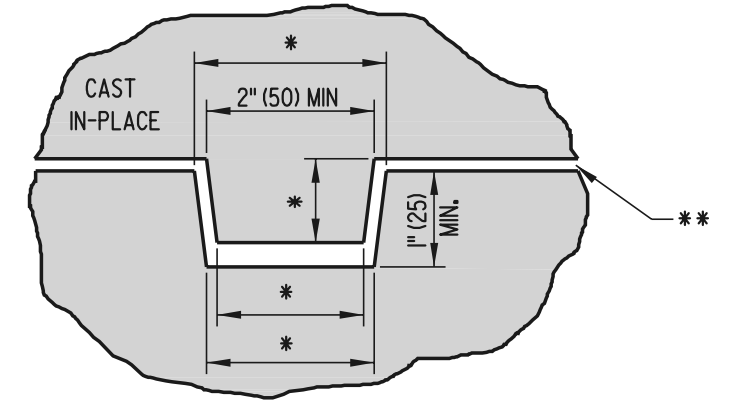
Theresa Delph 8/19/02
DESIGN ENGINEER DATE



PLAN

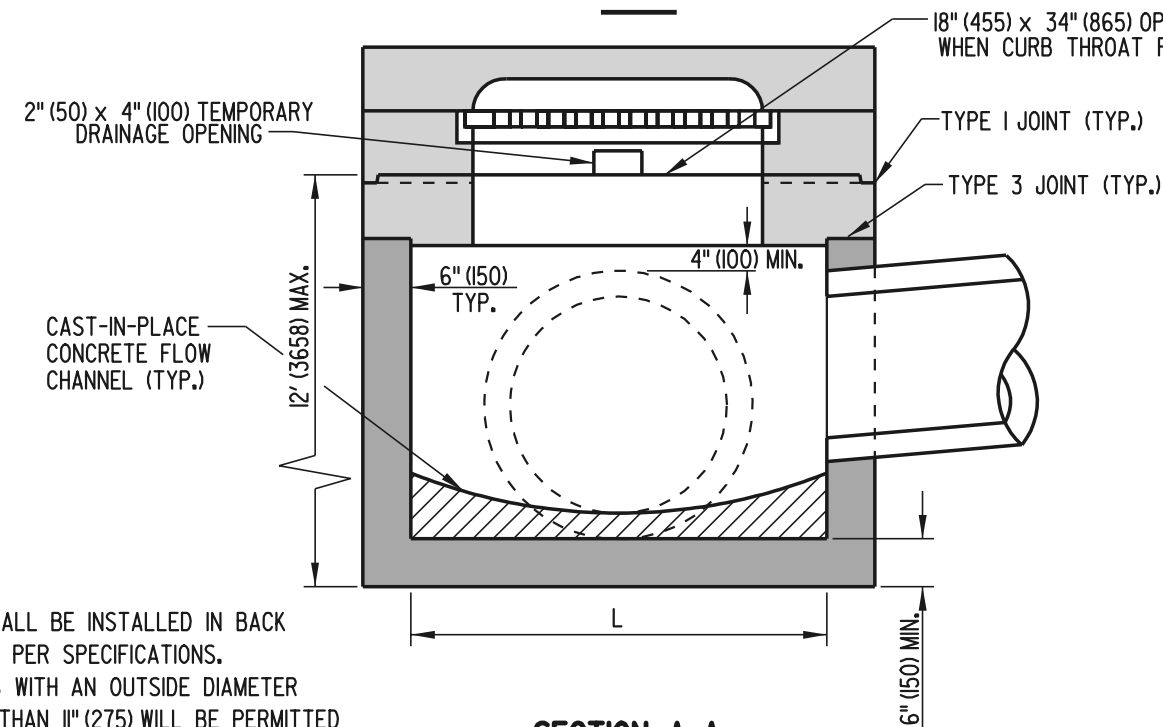


TYPE 1 JOINT DETAIL

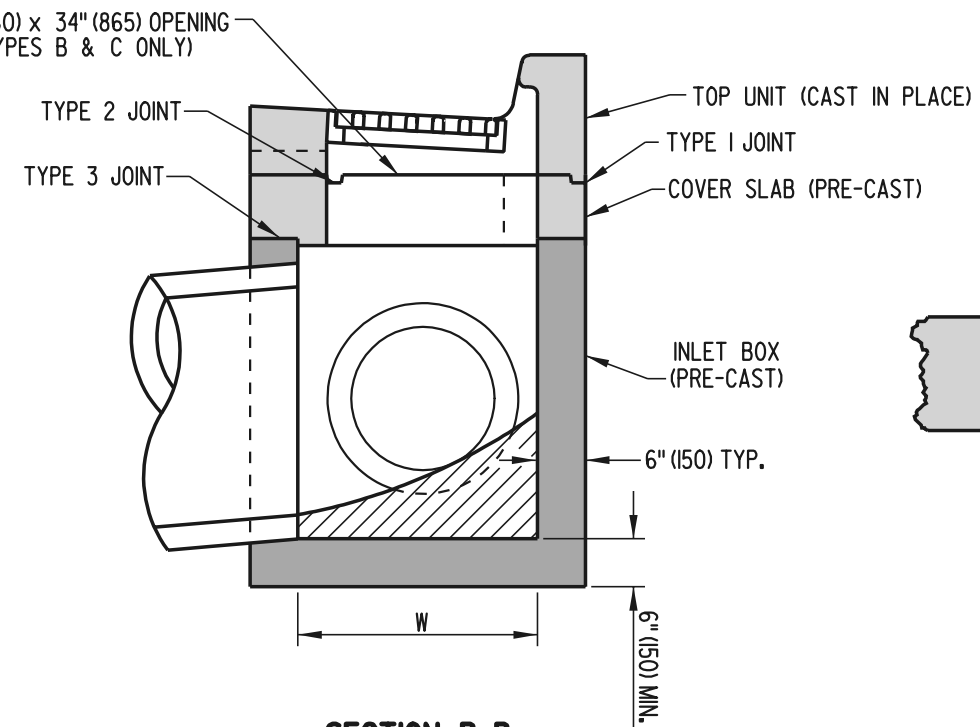


TYPE 2 JOINT DETAIL

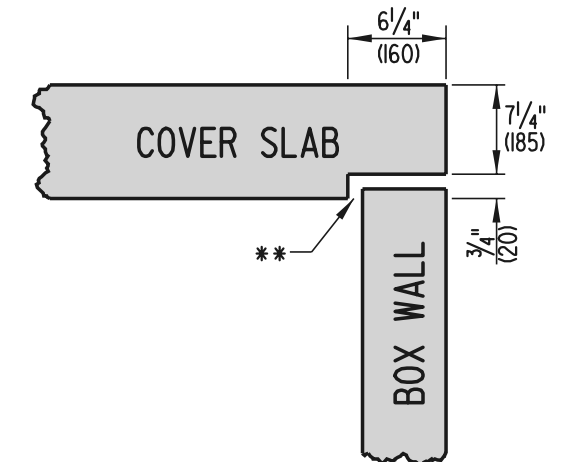
* DIMENSIONS WILL VARY
** JOINT SEALANT AS PER SPECIFICATIONS



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

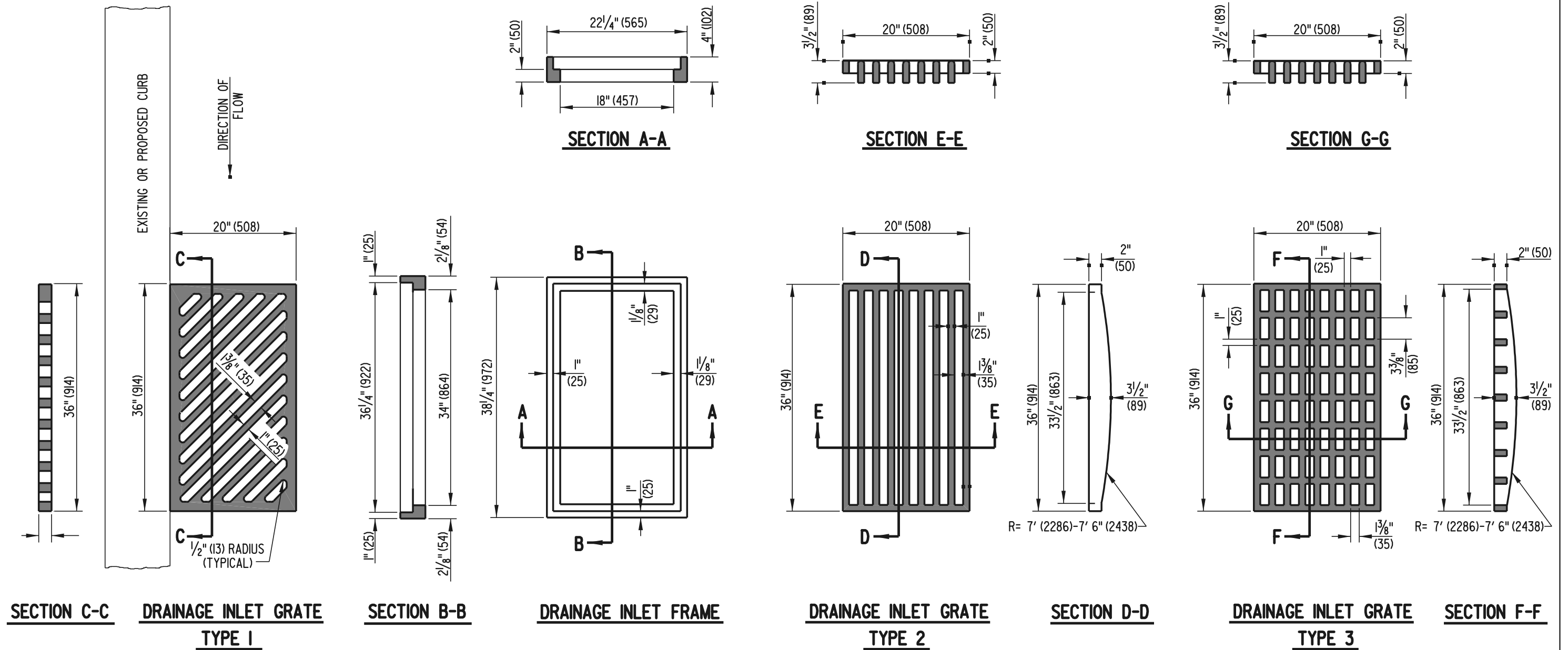
OF 8

APPROVED

Caroleen Wicks 9/6/02
CHIEF ENGINEER DATE

RECOMMENDED

Theresa Delph 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

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

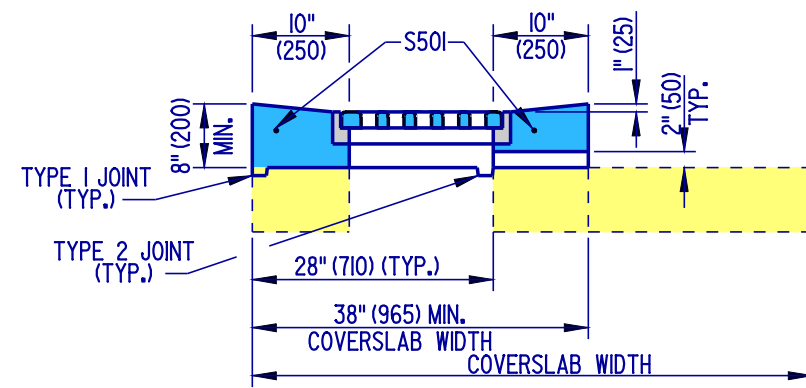
APPROVED

Caroleen Wicks 9/6/02
CHIEF ENGINEER DATE

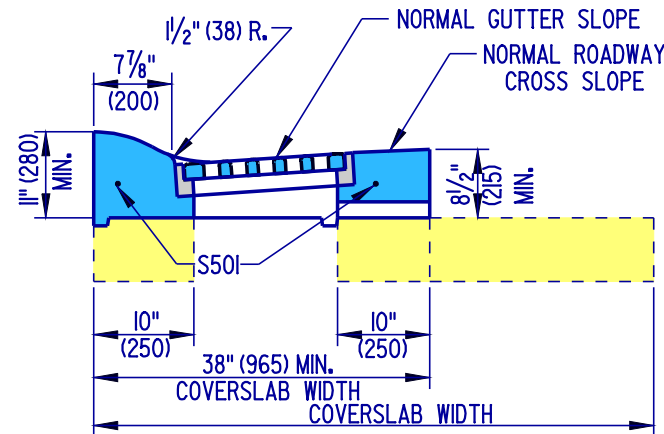
RECOMMENDED

Theresa Delph 9/19/02
DESIGN ENGINEER DATE

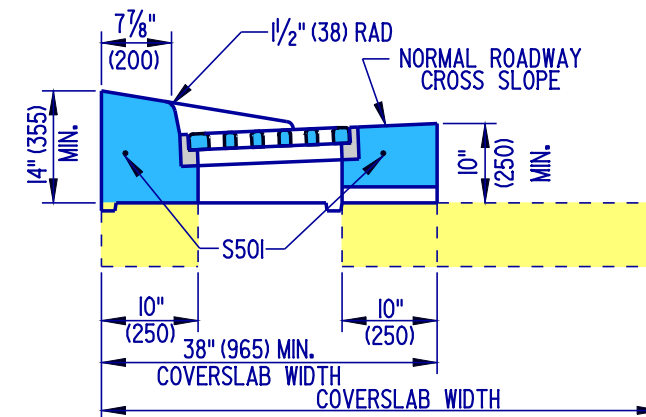
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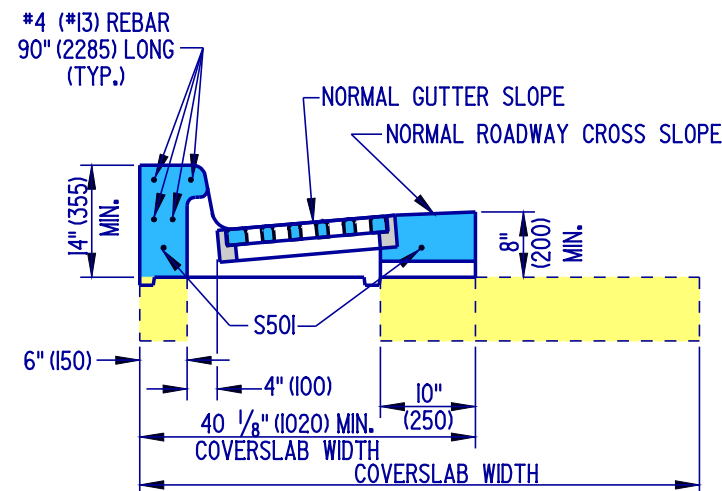
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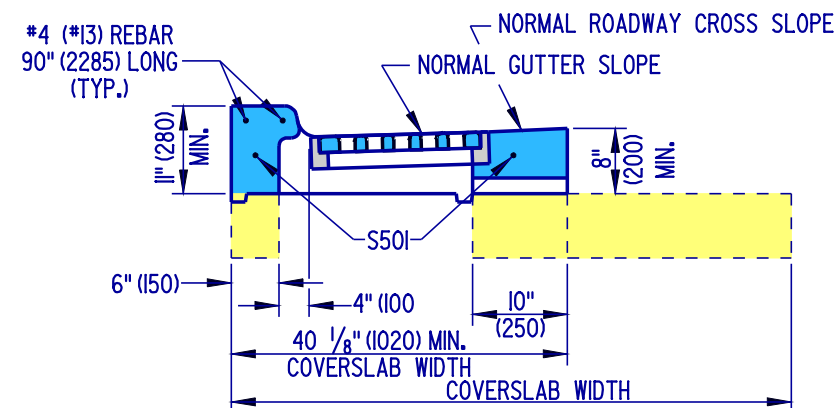
TYPE D



TYPE E

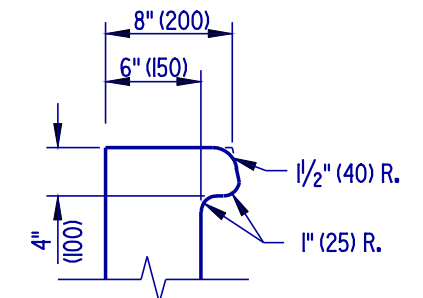


TYPE B

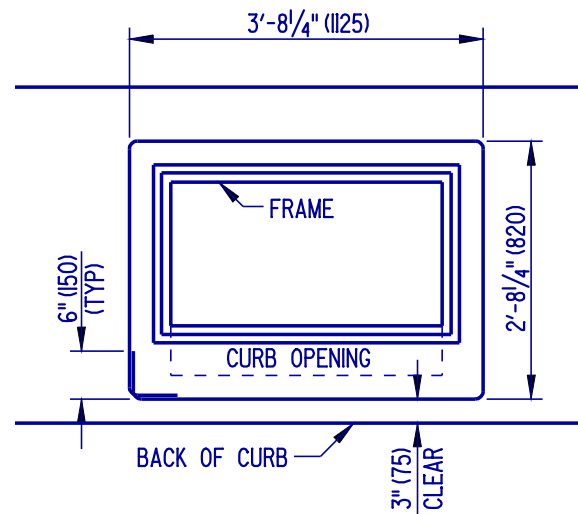


TYPE C

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

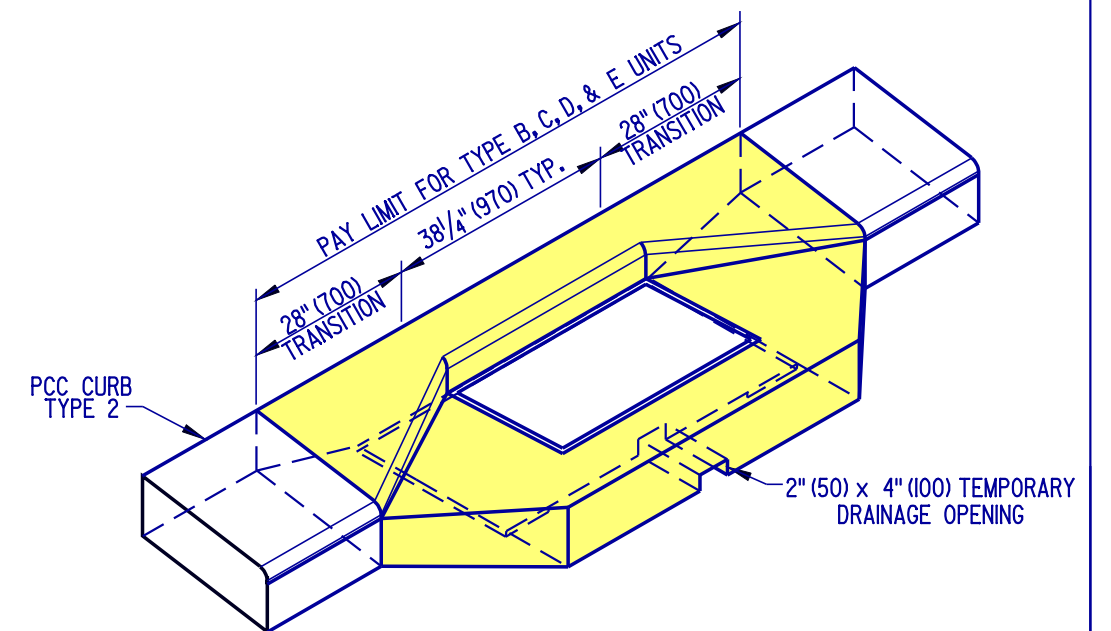


S501 BENDING DIAGRAM

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
CHIEF ENGINEER
DATE 1/10/05

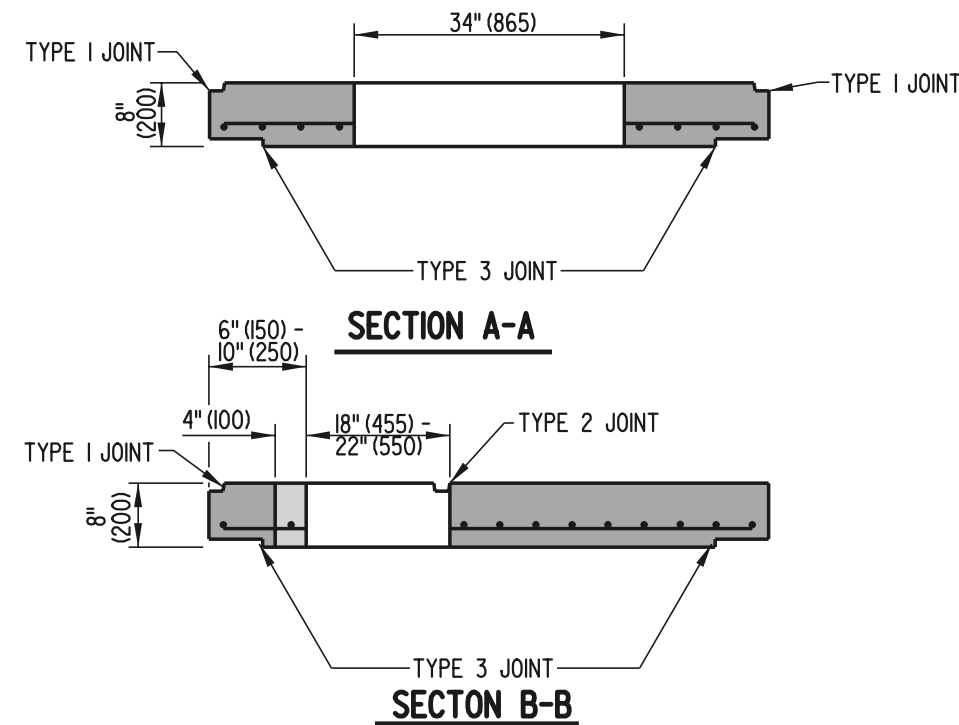
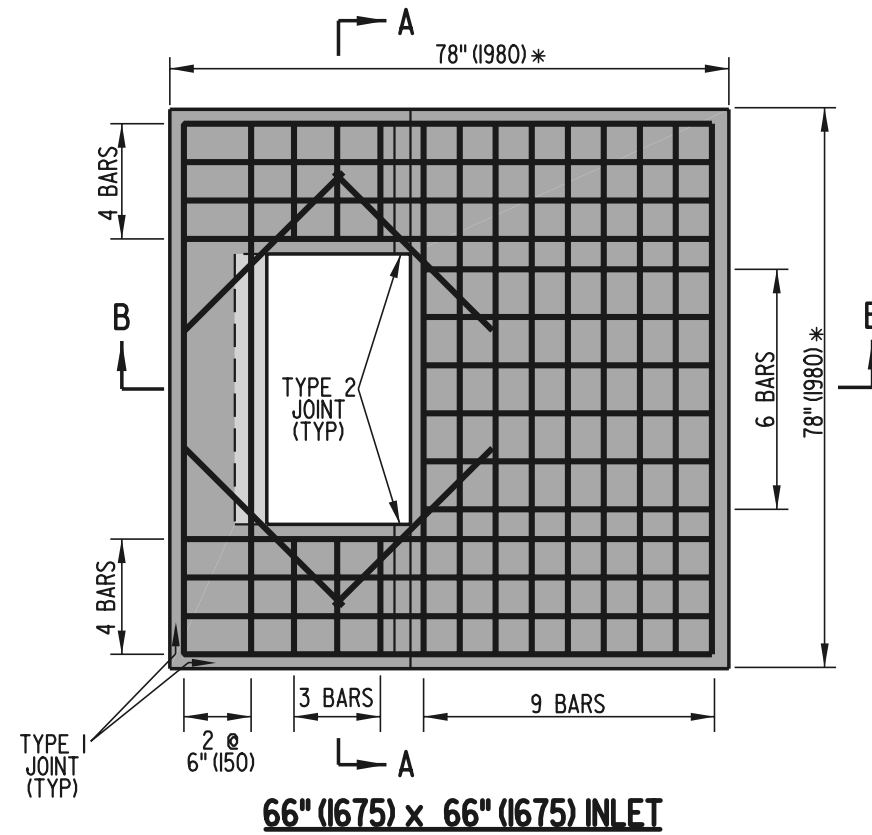
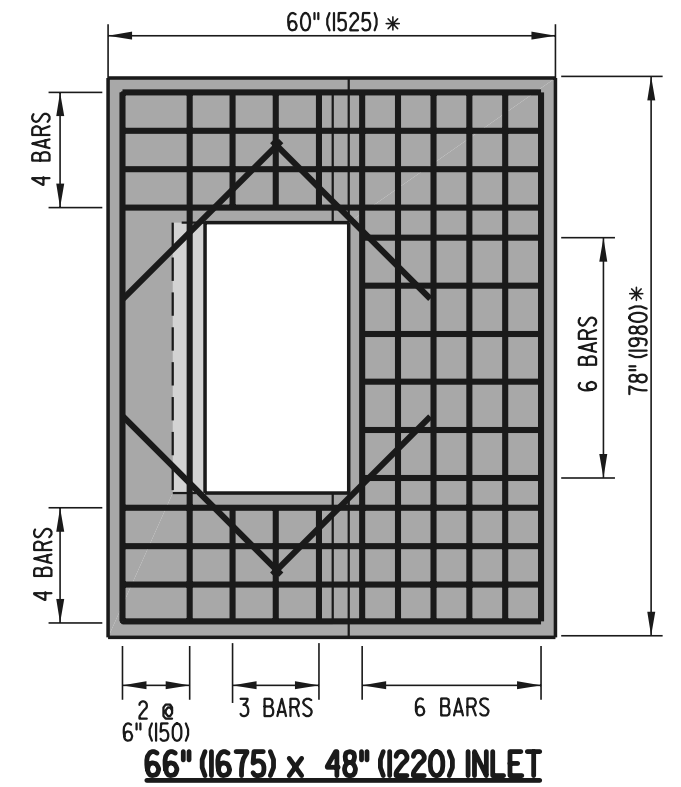
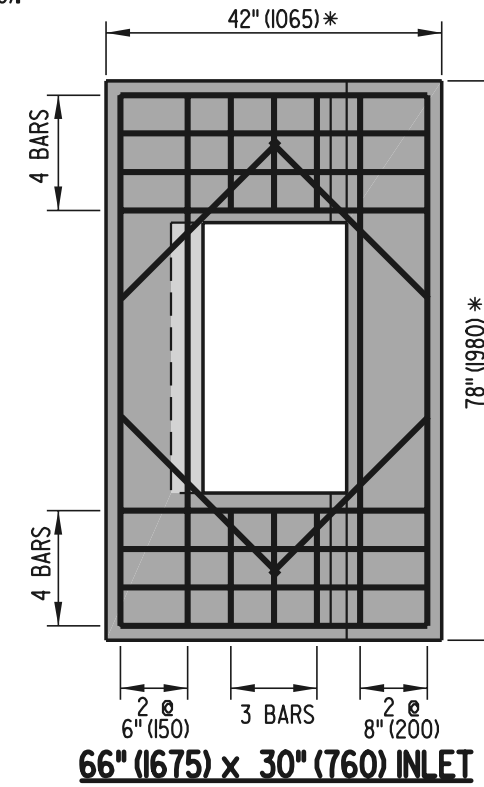
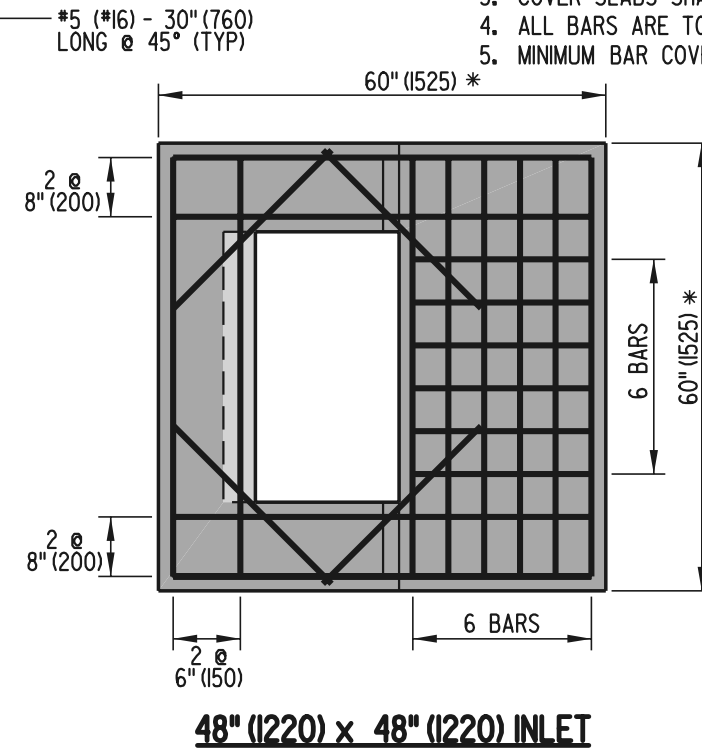
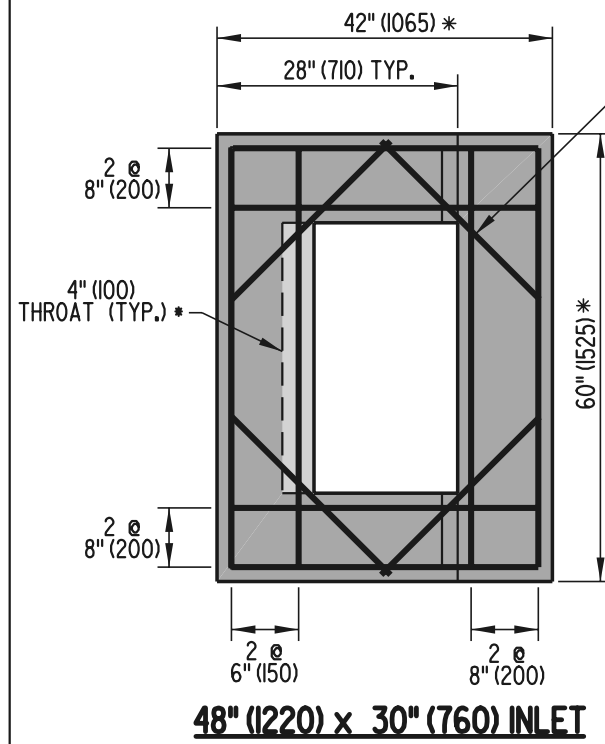
RECOMMENDED

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

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

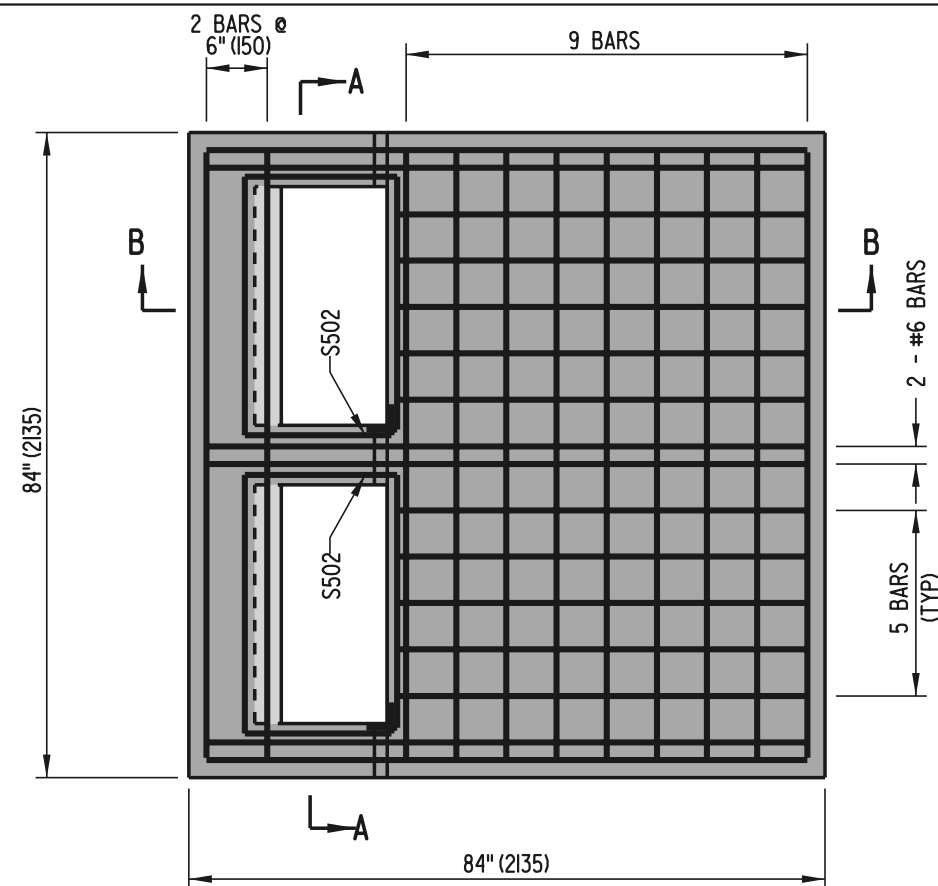
Caution Wicks
CHIEF ENGINEER

9/6/02
DATE

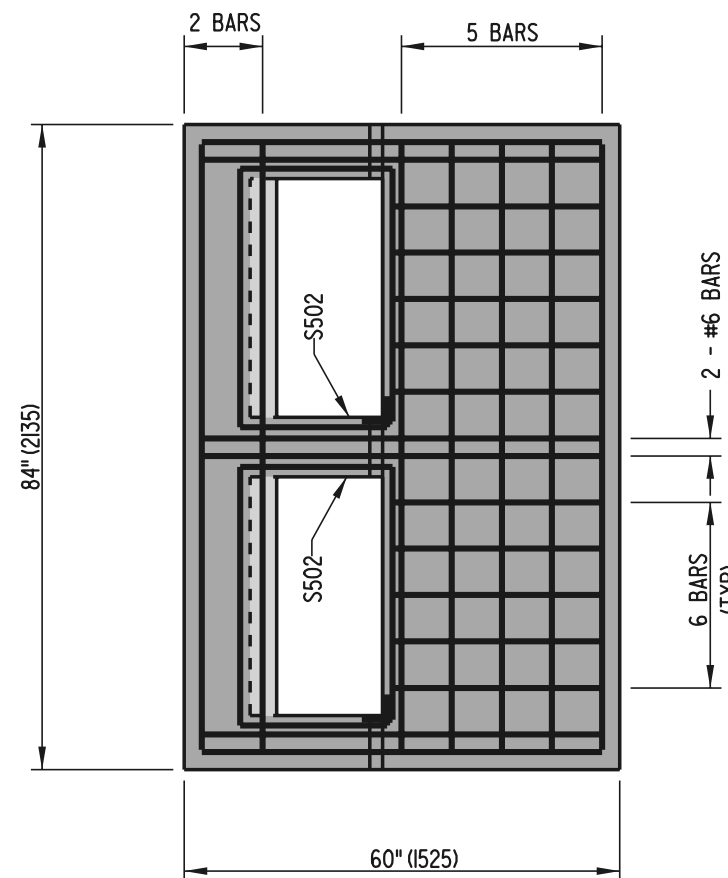
RECOMMENDED

Theresa Delph
DESIGN ENGINEER

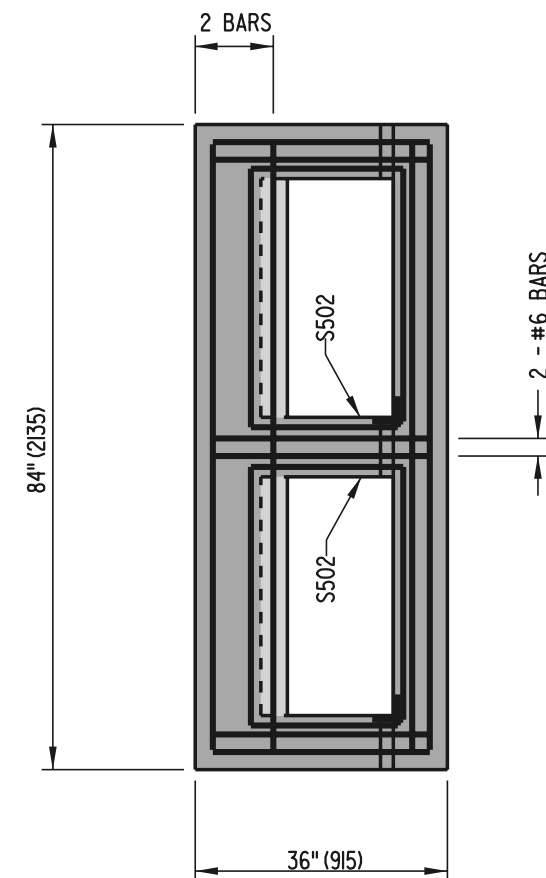
8/19/02
DATE



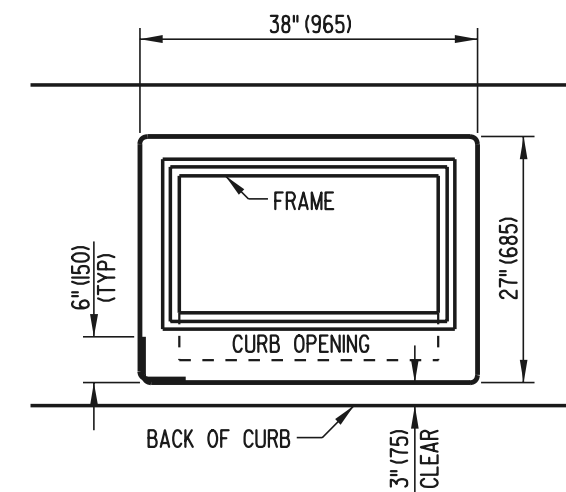
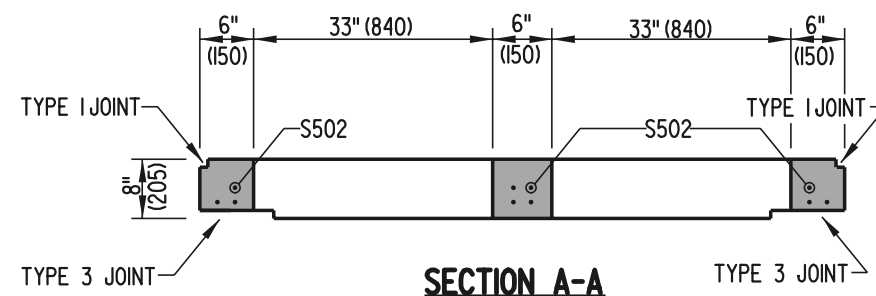
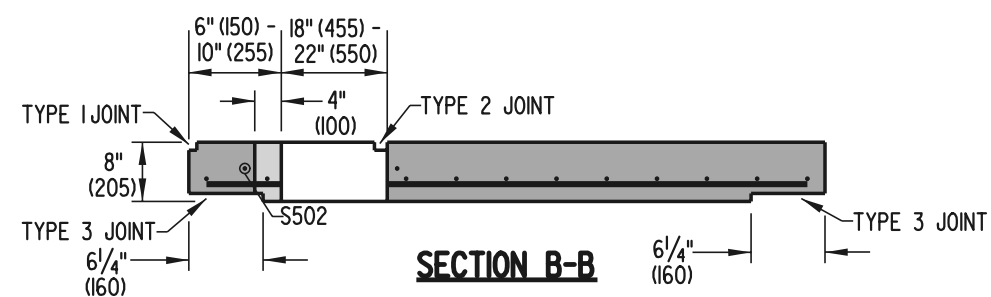
72" (1830) x 72" (1830) INLET



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 :**
- 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 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 1/2" (38).



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

DOUBLE INLET COVER SLAB DETAILS

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

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

APPROVED

Caroleen Wicks
CHIEF ENGINEER

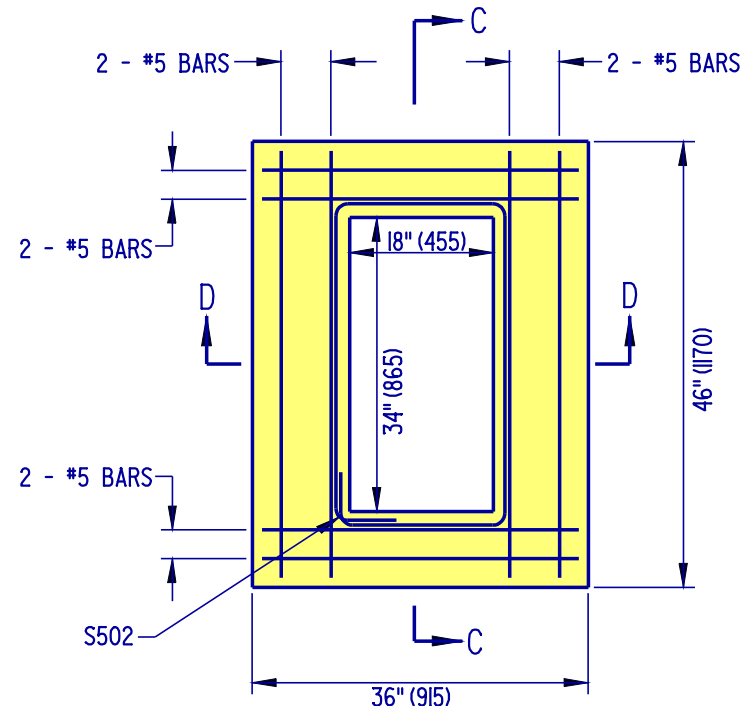
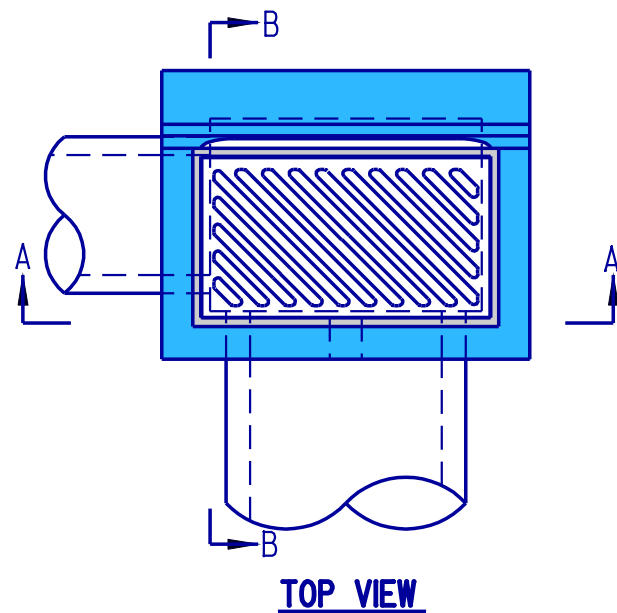
9/6/02
DATE

RECOMMENDED

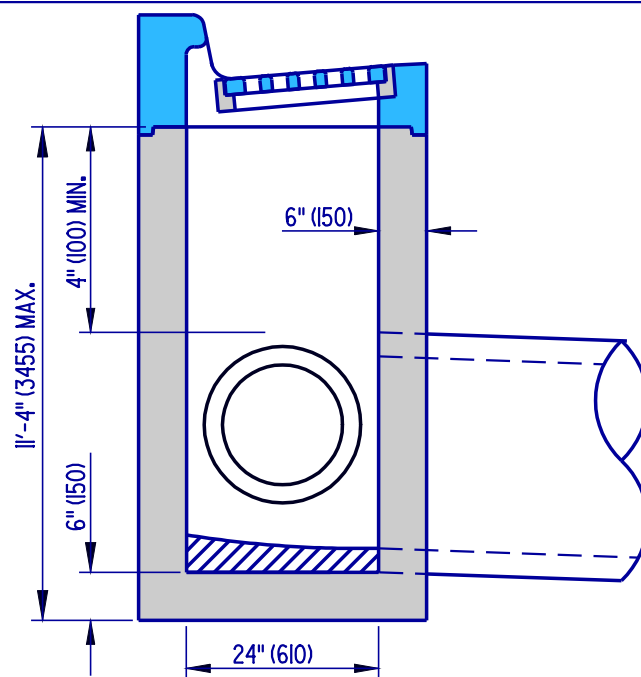
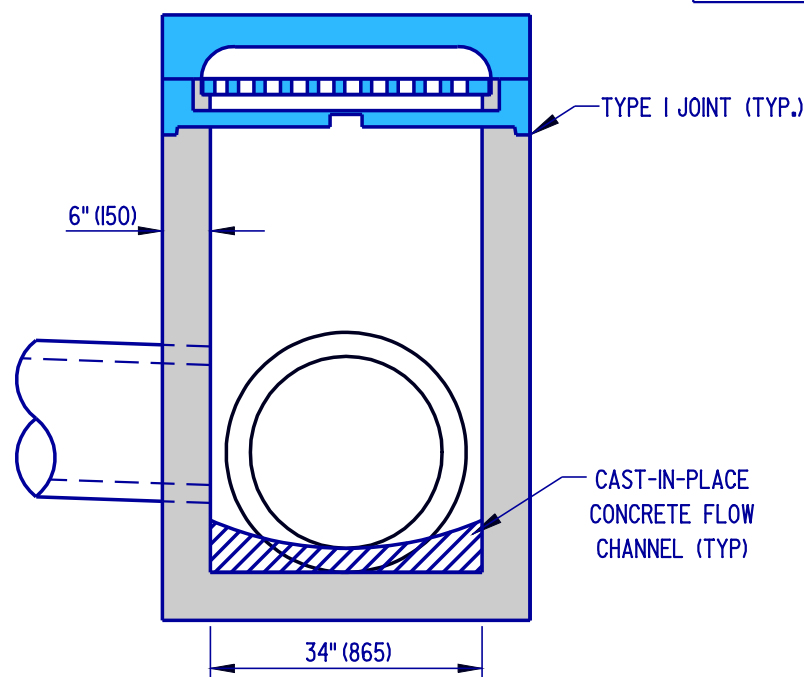
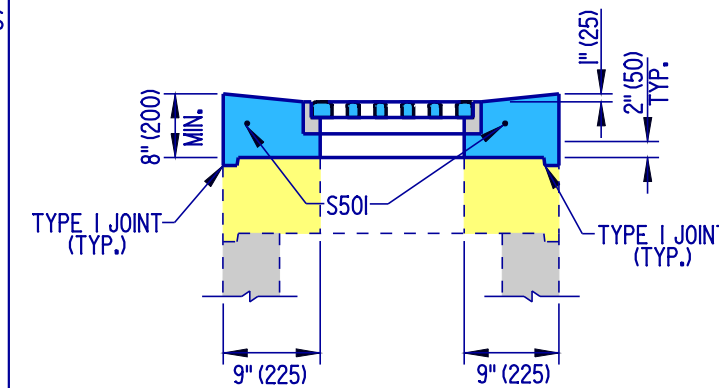
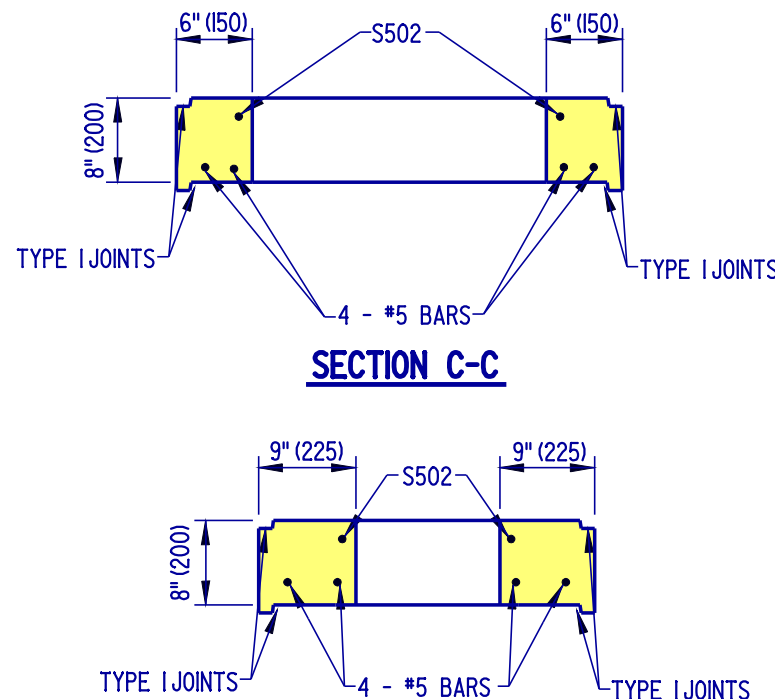
Theresa Delgado
DESIGN ENGINEER

8/19/02
DATE

SCALE : N.T.S.

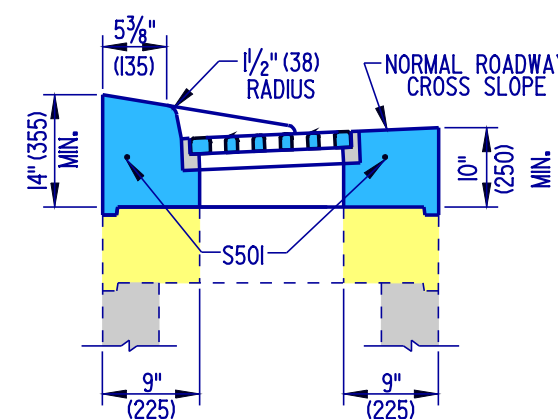
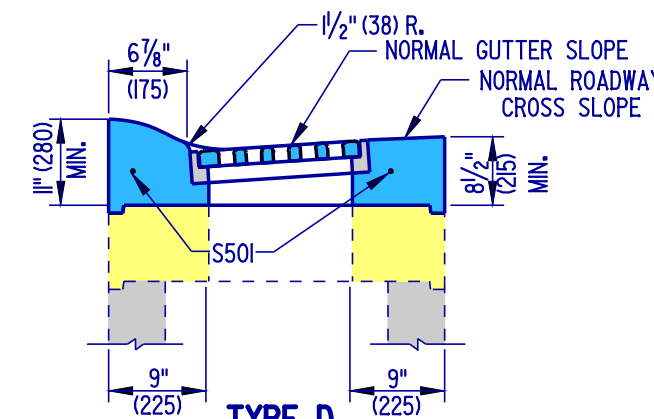
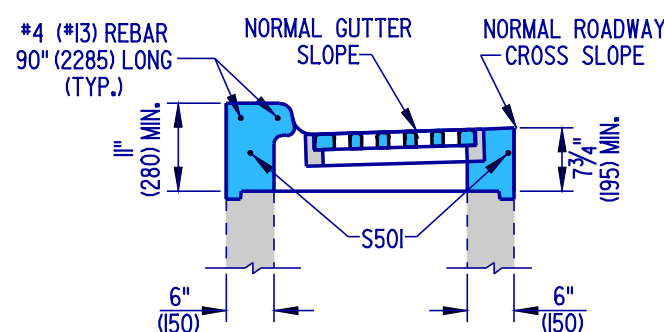
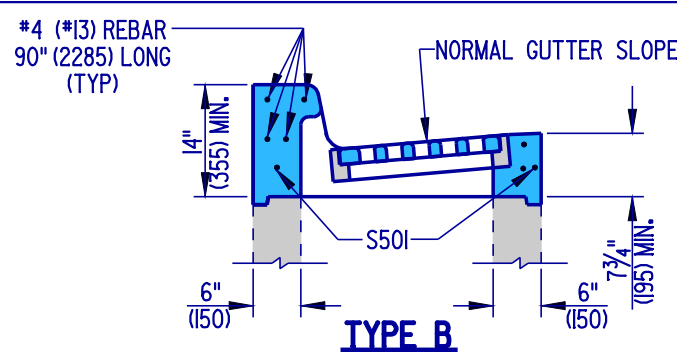


COVER SLAB DETAILS



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

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS



TOP UNIT DETAILS



DELAWARE
DEPARTMENT OF TRANSPORTATION

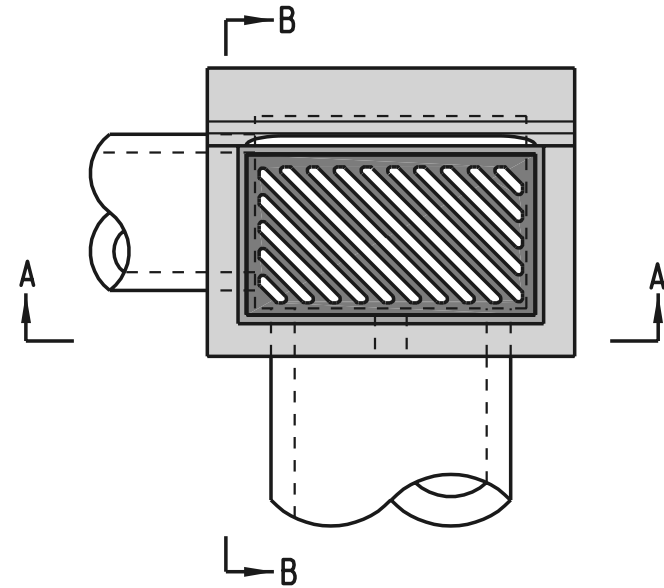
DRAINAGE INLET DETAILS

STANDARD NO. D-5 (2004)

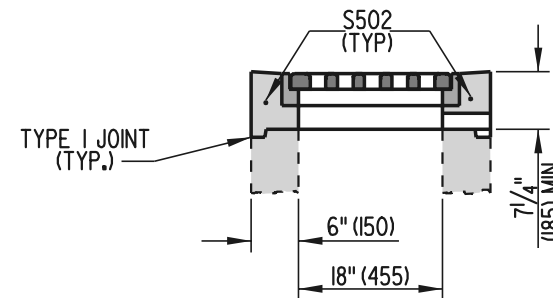
SHT. 6 OF 8

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

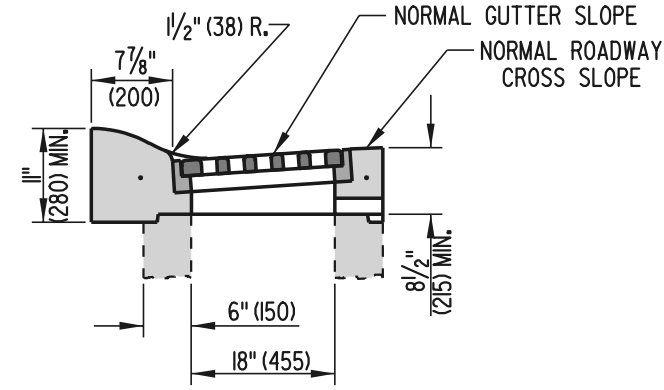
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



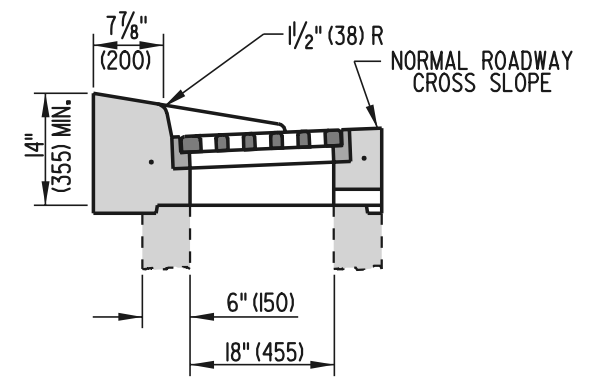
TOP VIEW



TYPE A

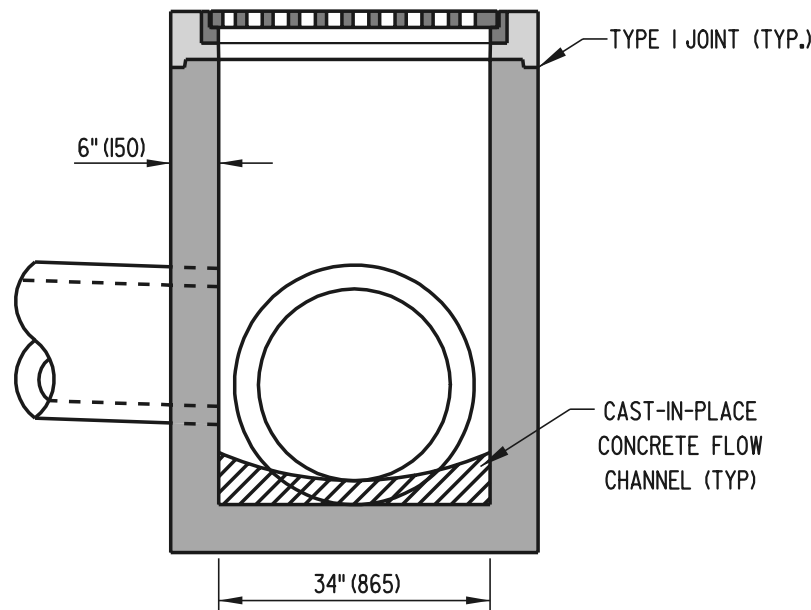


TYPE D

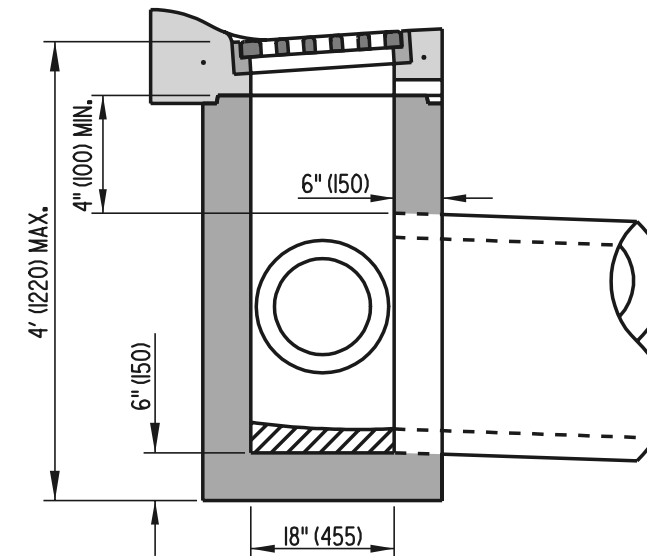


TYPE E

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

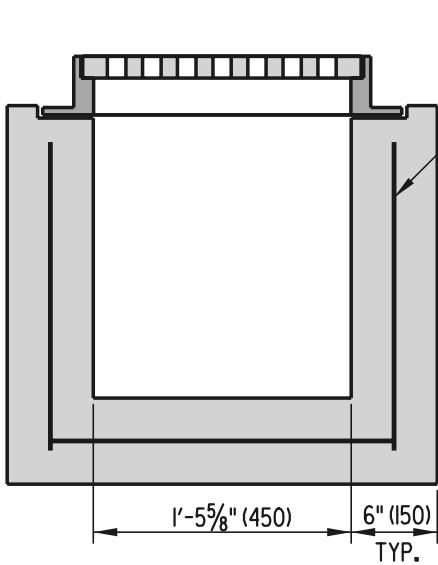
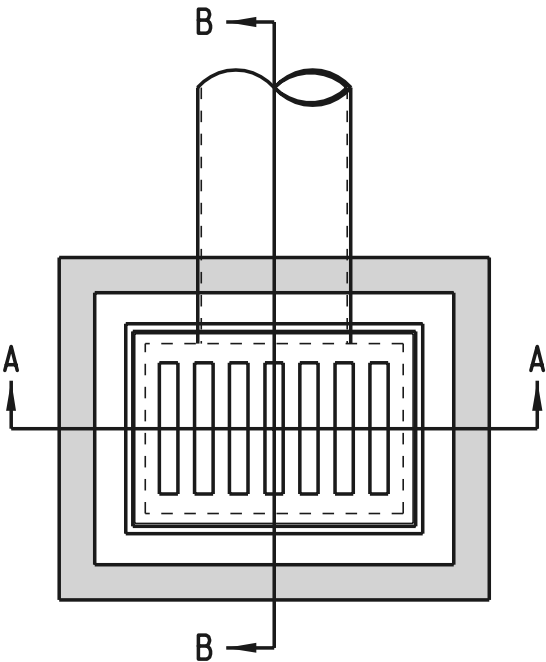
APPROVED

Caution Wicks 9/6/02
CHIEF ENGINEER DATE

RECOMMENDED

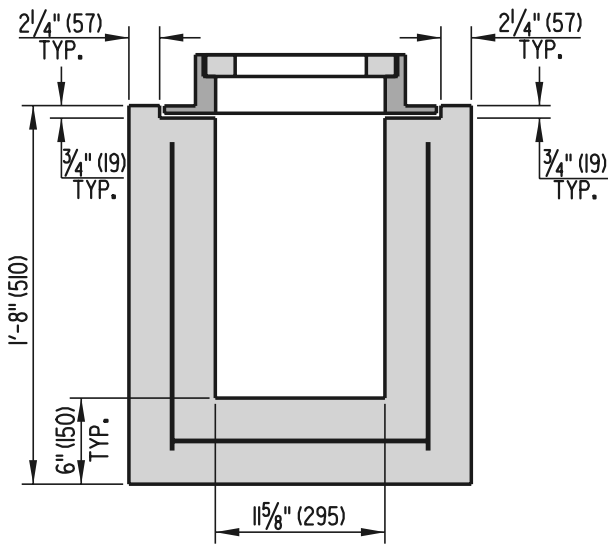
Theresa Delph 8/19/02
DESIGN ENGINEER DATE

- 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.

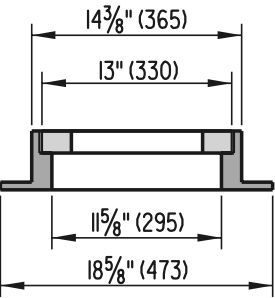
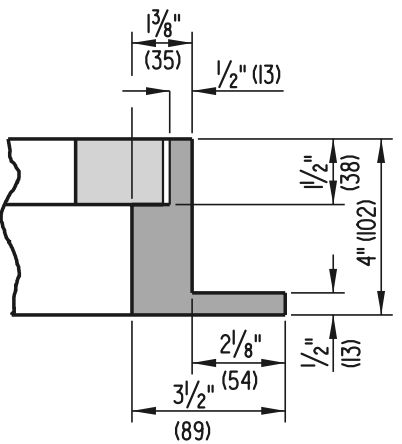
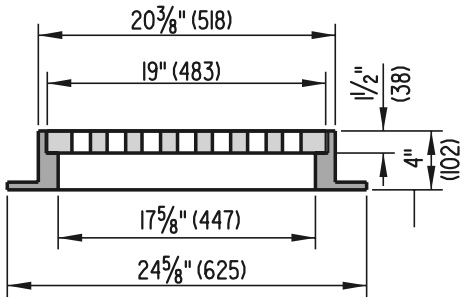
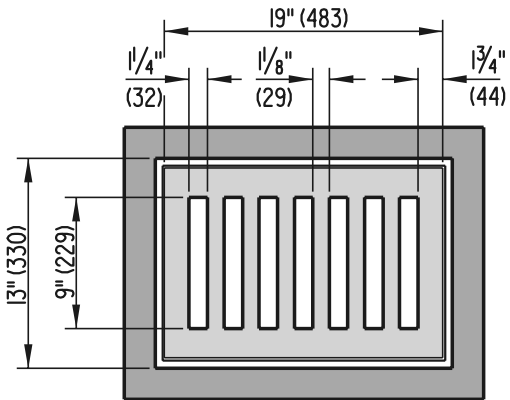


SECTION A-A

REINFORCEMENT
SEE NOTE



SECTION B-B



DELAWARE
DEPARTMENT OF TRANSPORTATION

LAWN INLET

STANDARD NO.

D-5 (2002)

SHT.

8

OF

8

APPROVED

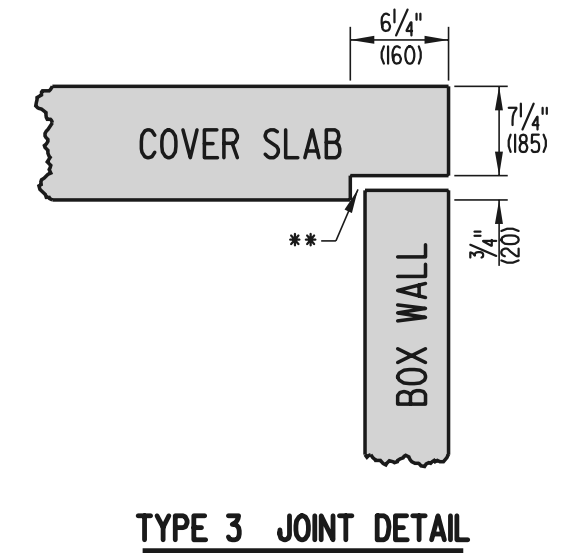
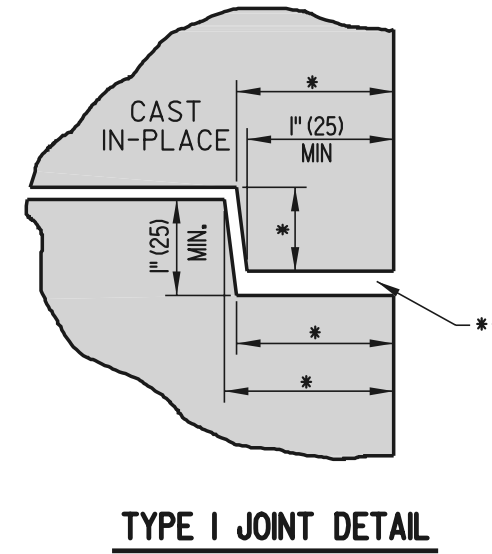
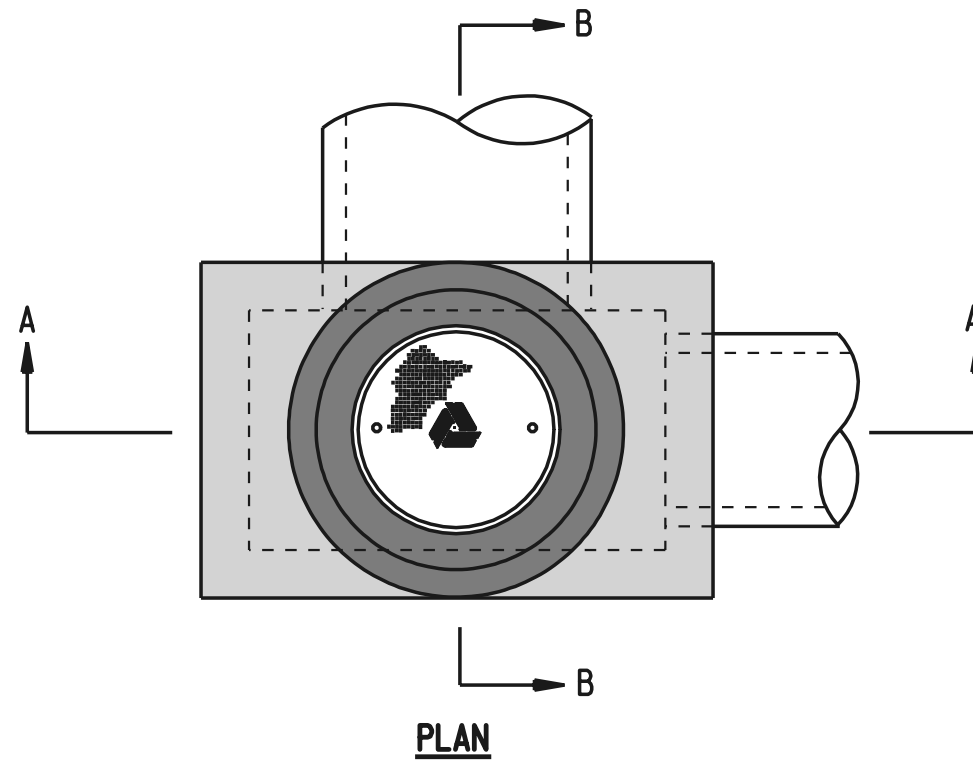
Caroleen Wicks
CHIEF ENGINEER

9/6/02
DATE

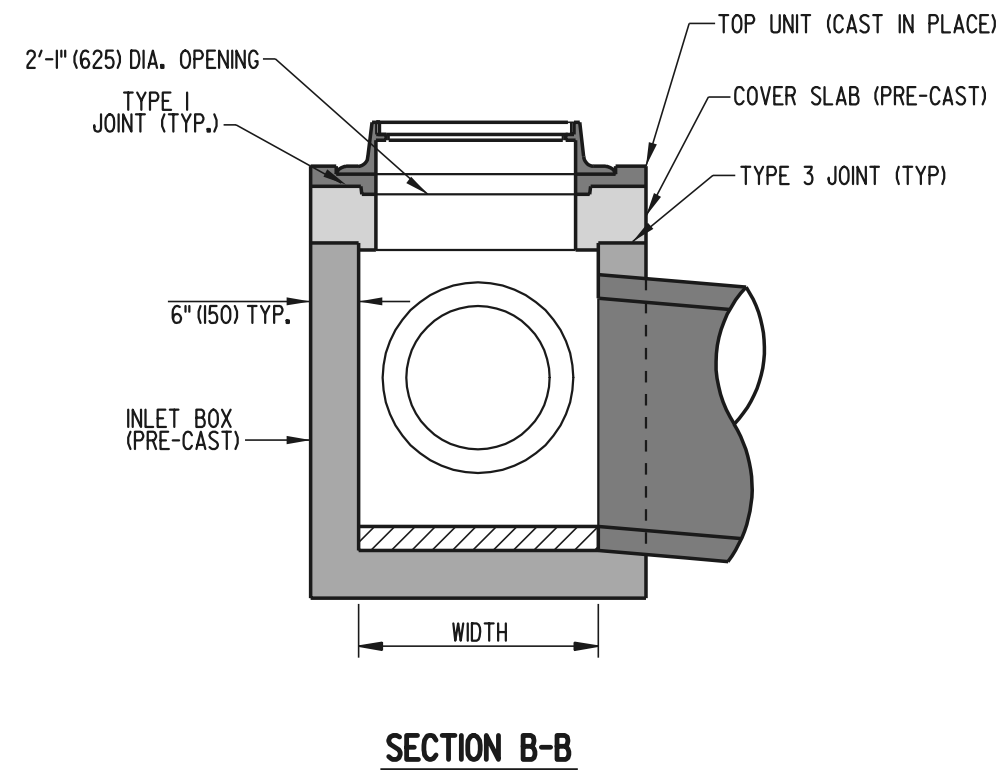
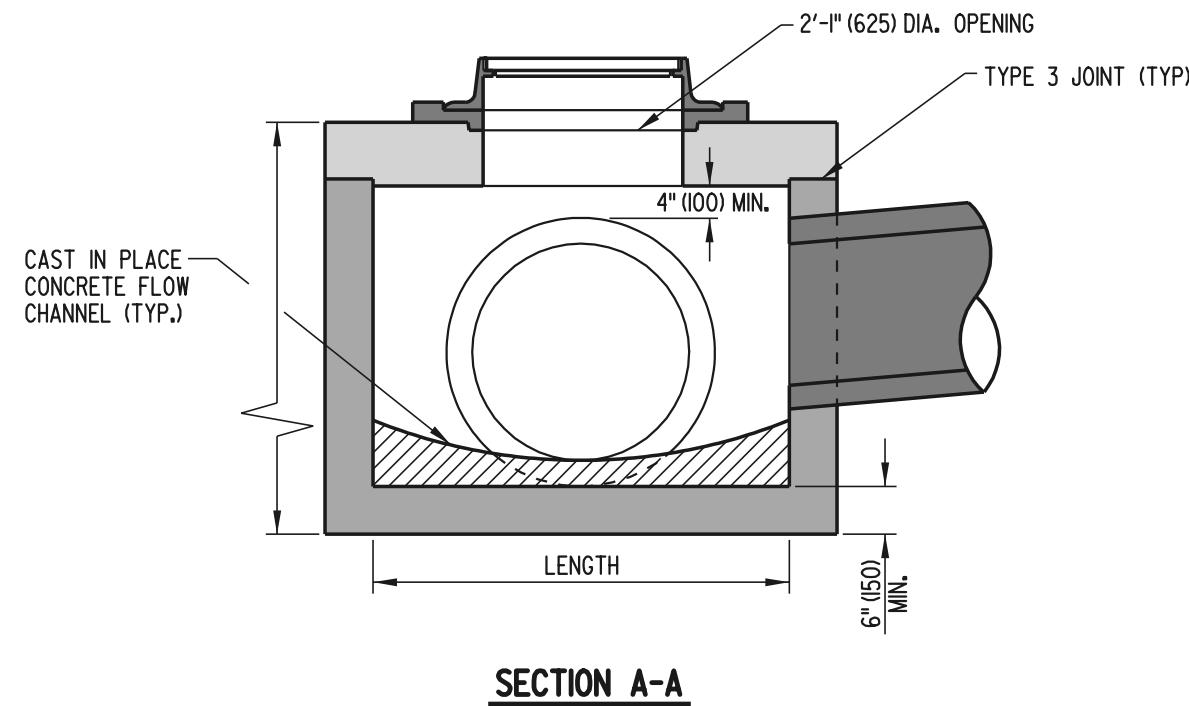
RECOMMENDED

Theresa Delph
DESIGN ENGINEER

9/19/02
DATE



* DIMENSIONS WILL VARY
** JOINT SEALANT



BOX MANHOLE ASSEMBLY



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

MANHOLE DETAILS

STANDARD NO.

D-6 (2001)

SHT. 1

OF 4

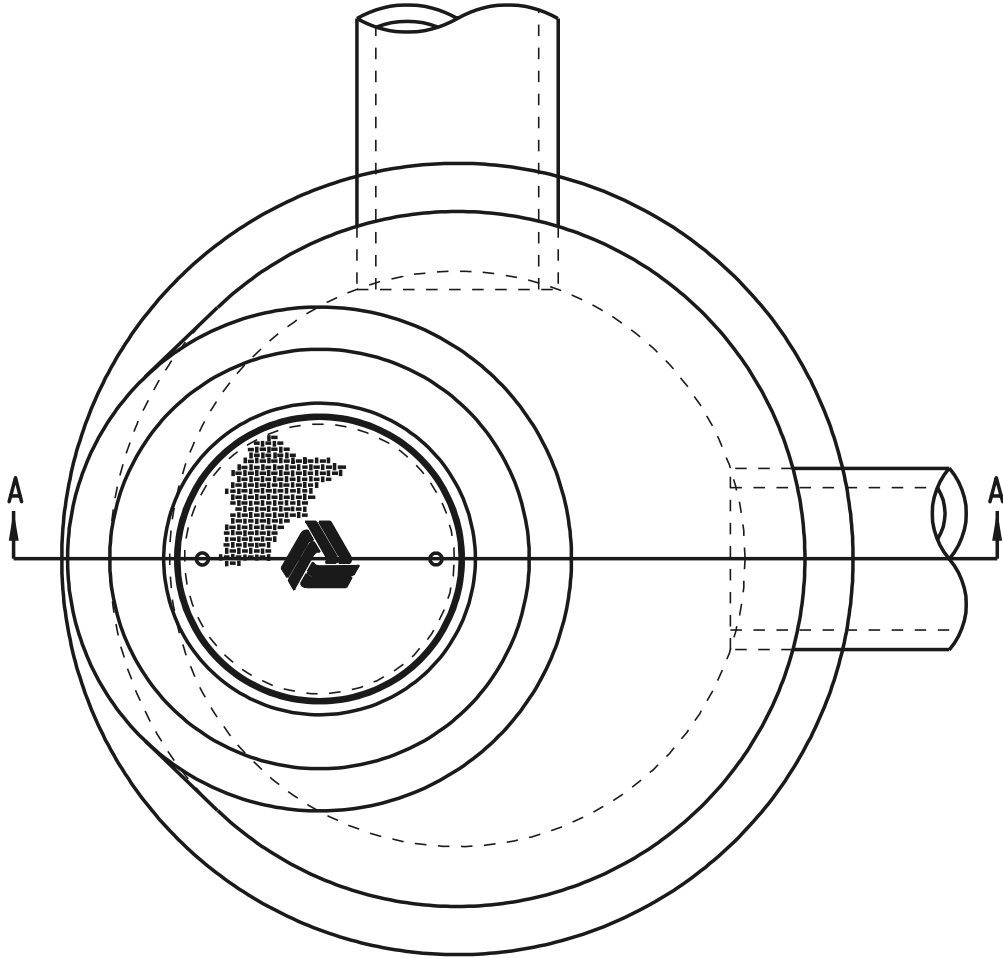
APPROVED

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

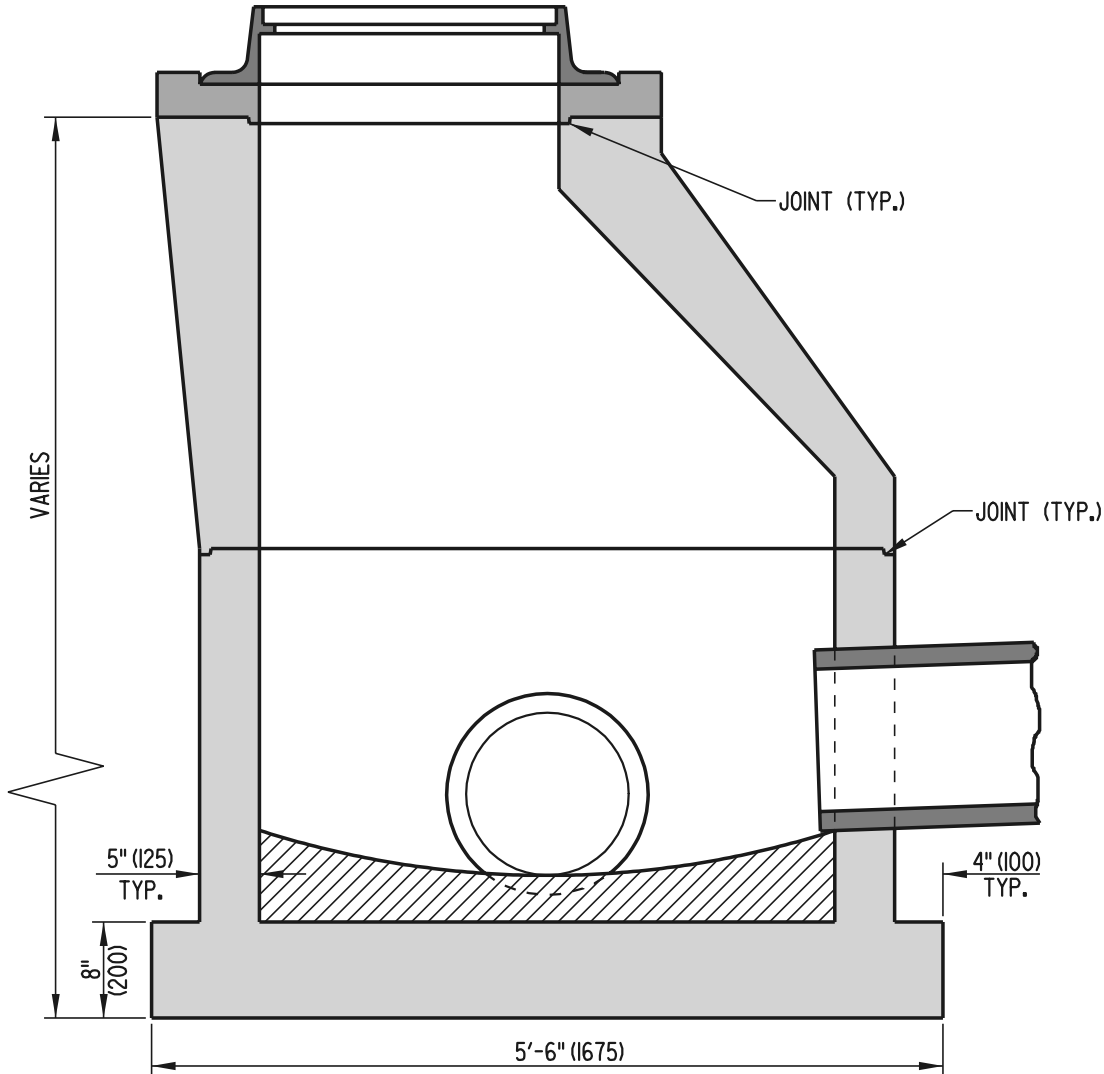
RECOMMENDED

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

SCALE : N.T.S.



PLAN



SECTION A-A

ROUND MANHOLE ASSEMBLY

NOTE: ROUND MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

MANHOLE DETAILS

STANDARD NO.

D-6 (2001)

SHT. 2

OF

APPROVED

Raymond W. Harbison
CHIEF ENGINEER

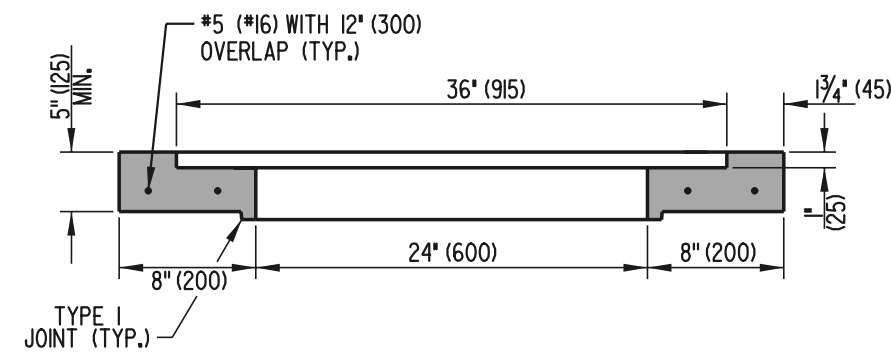
RECOMMENDED

Markus
DESIGN ENGINEER

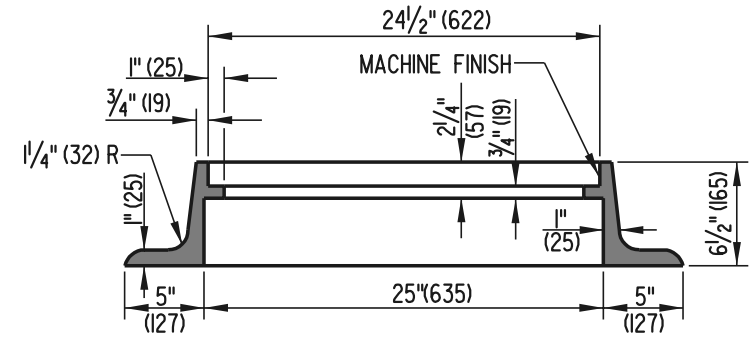
DATE 6/18/01

DATE 6/15/01

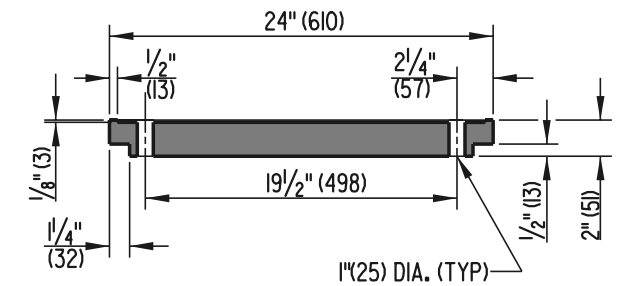
NOTE: TOP UNIT IS TO BE CAST IN PLACE TO GRADE AS SPECIFIED ON PLAN SHEETS OR AS DIRECTED BY ENGINEER.



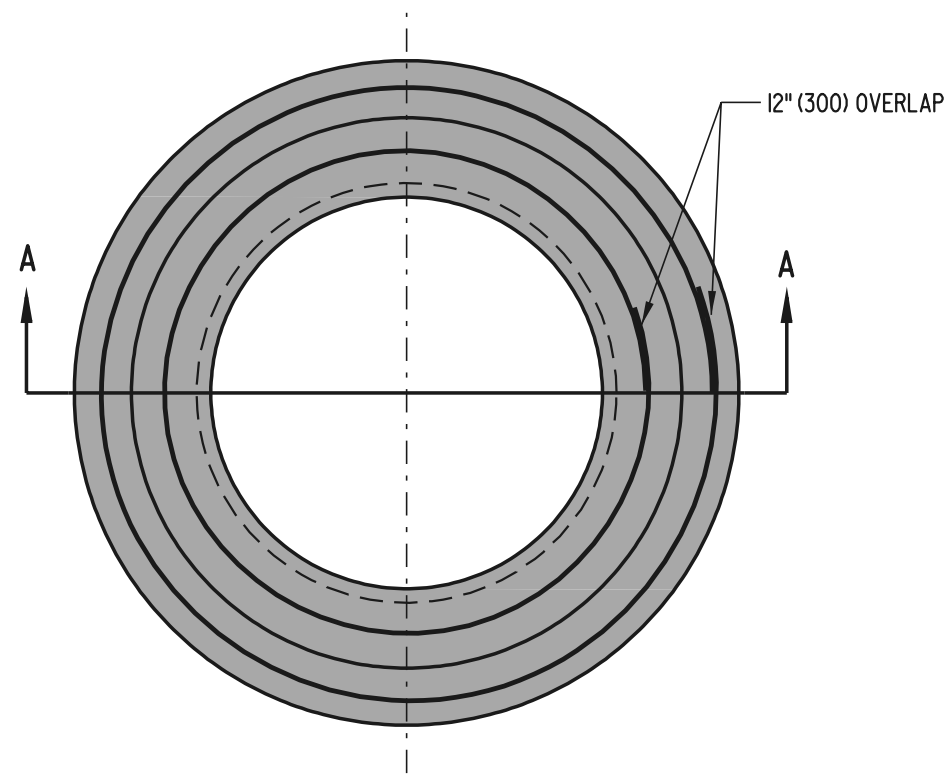
SECTION A-A



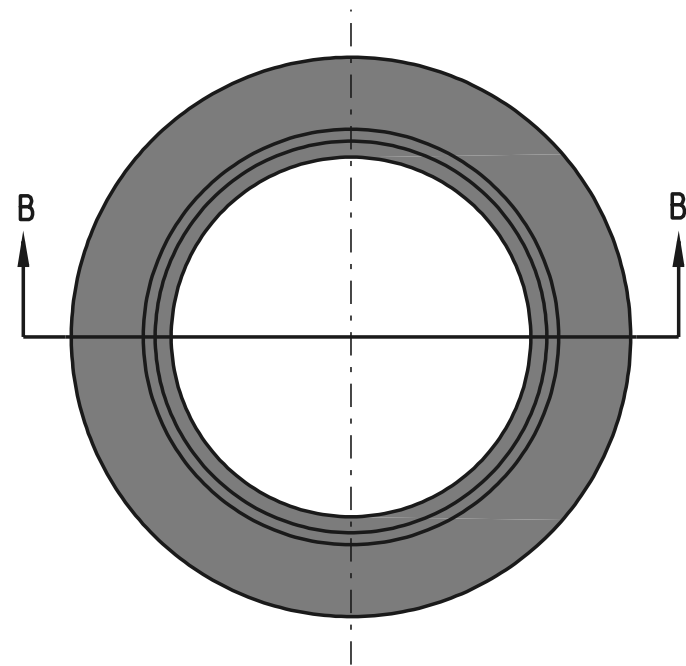
SECTION B-B



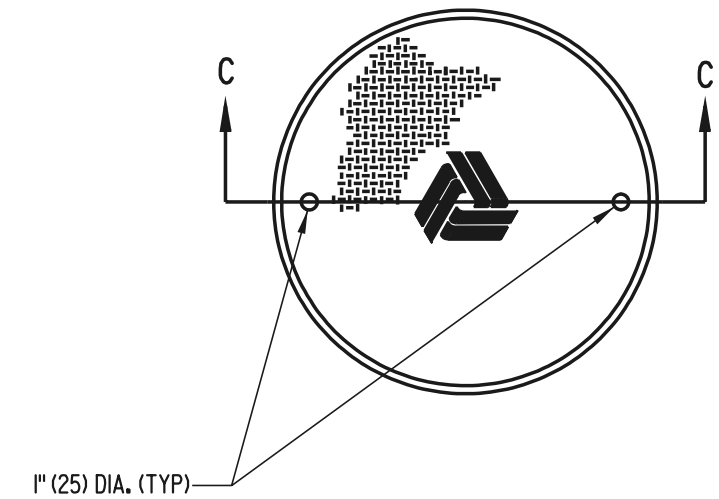
SECTION C-C




TOP UNIT



FRAME



COVER

 DELAWARE DEPARTMENT OF TRANSPORTATION	MANHOLE DETAILS			APPROVED <i>Ryan M. Harkins</i> <u>6/18/01</u> <small>CHIEF ENGINEER</small> <small>DATE</small>
	STANDARD NO. D-6 (2001)	SHT. 3	OF 4	
				RECOMMENDED <i>Michael R. G. G.</i> <u>6/18/01</u> <small>DESIGN ENGINEER</small> <small>DATE</small>