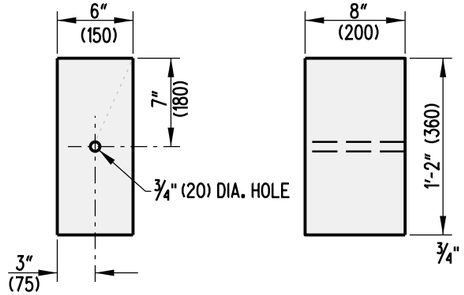
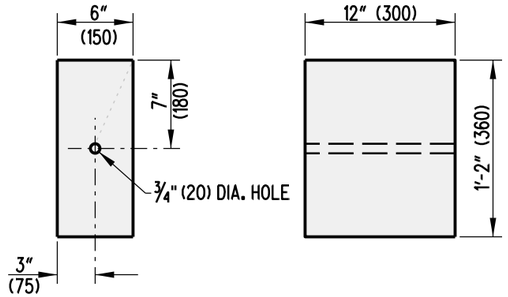
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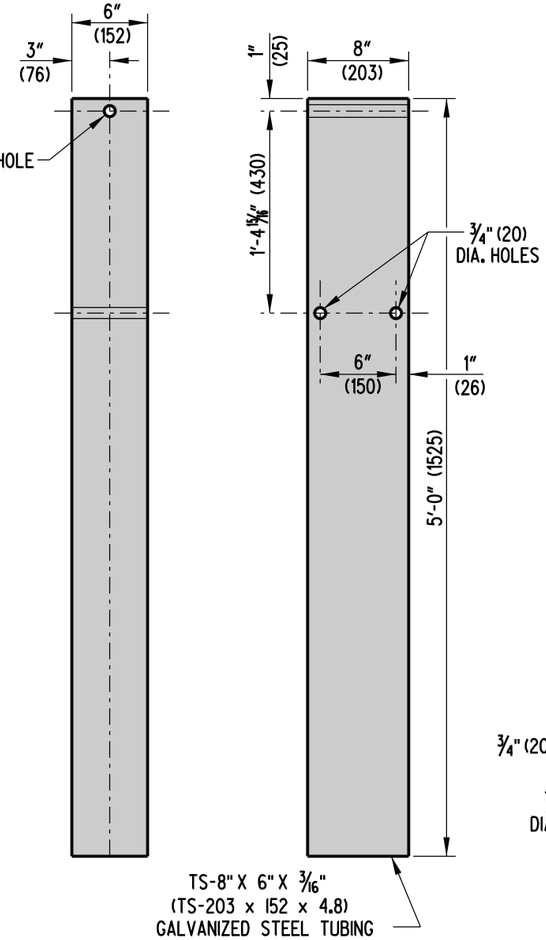


OFFSET BLOCK,
TYPE 27

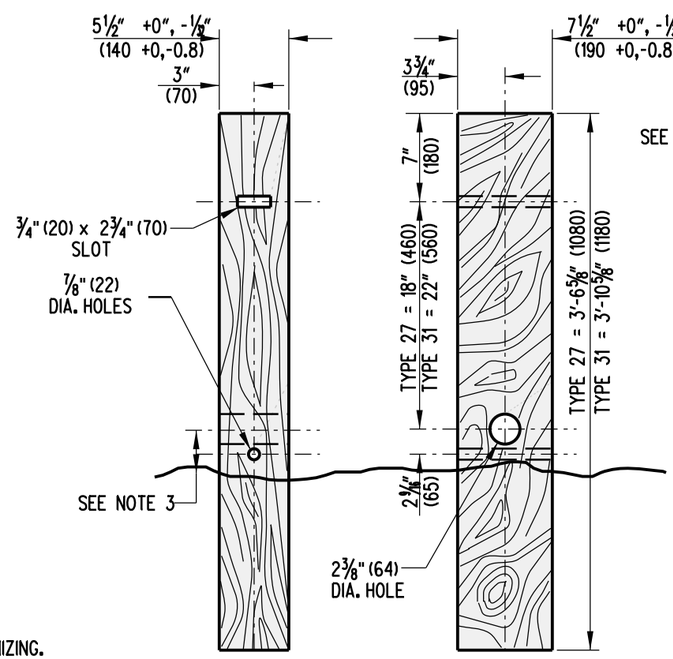


OFFSET BLOCK,
TYPE 31

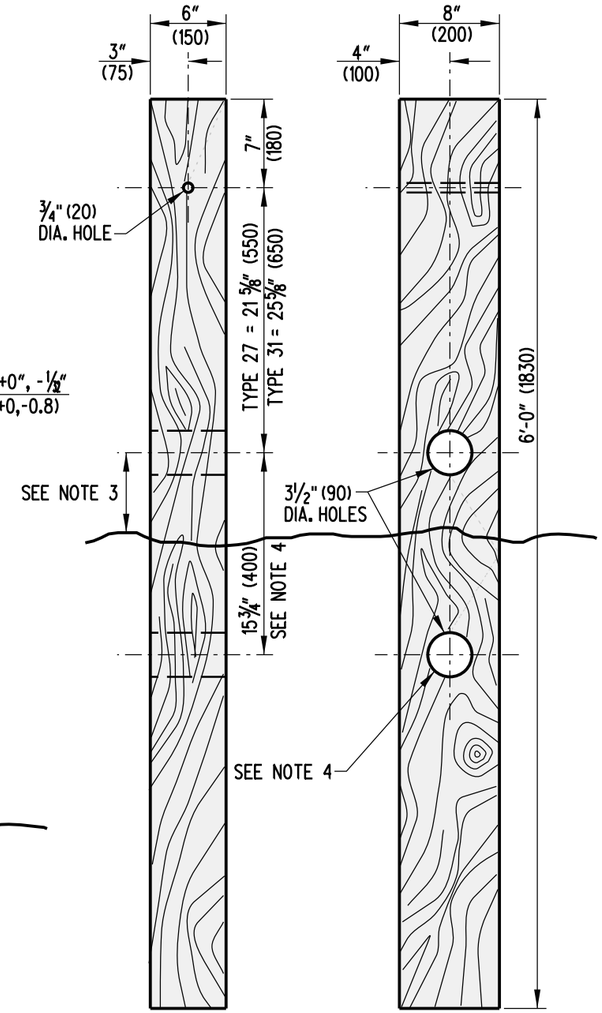
SOIL PLATE



STEEL TUBE



SHORT WOOD BREAKAWAY POST



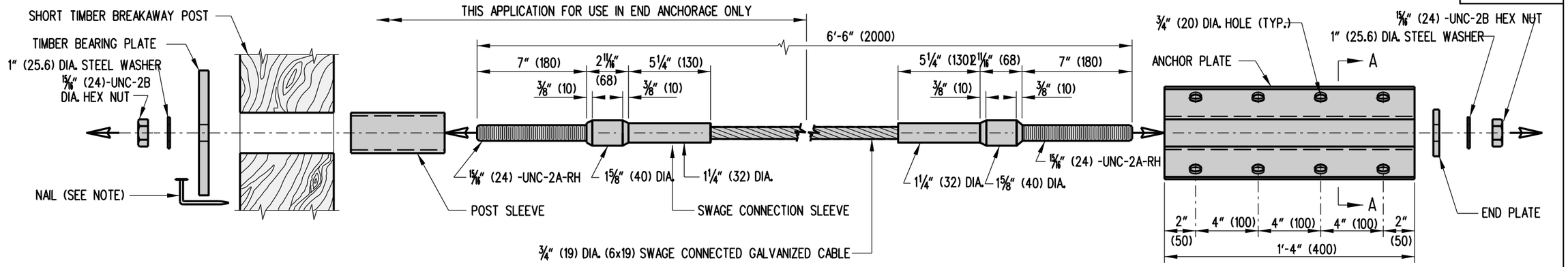
LONG WOOD BREAKAWAY POST

NOTES :
1). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
2). ALL WOOD SIZES ARE NOMINAL DIMENSIONS.
3). POSTS SHOULD BE PLACED SO THAT BREAKAWAY HOLES ARE NO LOWER THAN GROUND LEVEL AND NO HIGHER THAN 4" (100) ABOVE GROUND LEVEL.
4). LOWER BREAKAWAY HOLE ONLY NEEDED ON BURIED END SECTION, TYPE 2.

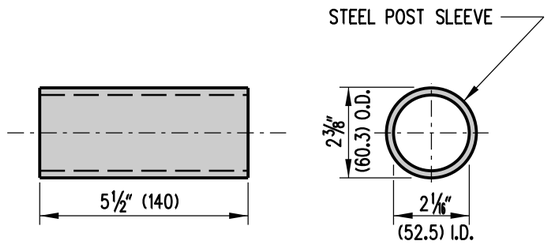
DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-13 (2010)	SHT. 7 OF 10	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/17/2010

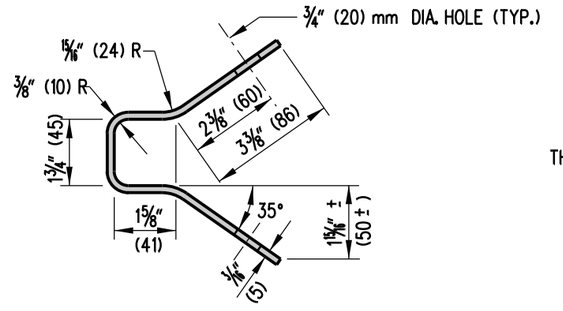
SCALE : N.T.S.



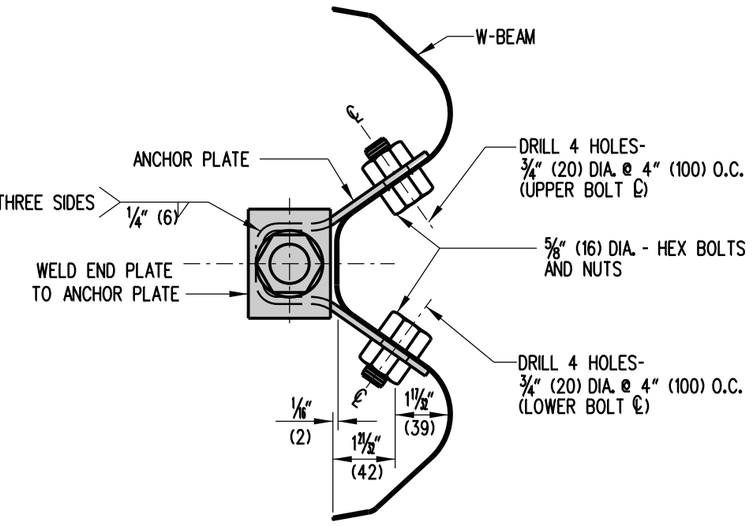
SWAGED CABLE ASSEMBLAGE AND RELATED HARDWARE ASSEMBLY



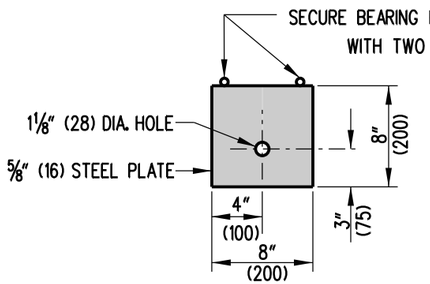
POST SLEEVE



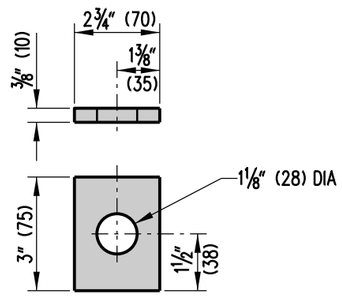
SECTION A-A



ANCHOR PLATE TO W-BEAM CONNECTION DETAIL



TIMBER BEARING PLATE



END PLATE

NOTES: 1). TO ENSURE THAT THE TIMBER BEARING PLATE REMAINS IN POSITION, 2 - 10d GALVANIZED STEEL NAILS SHALL BE DRIVEN IN THE SHORT TIMBER BREAKAWAY POST, AND BENT OVER BEARING PLATE.

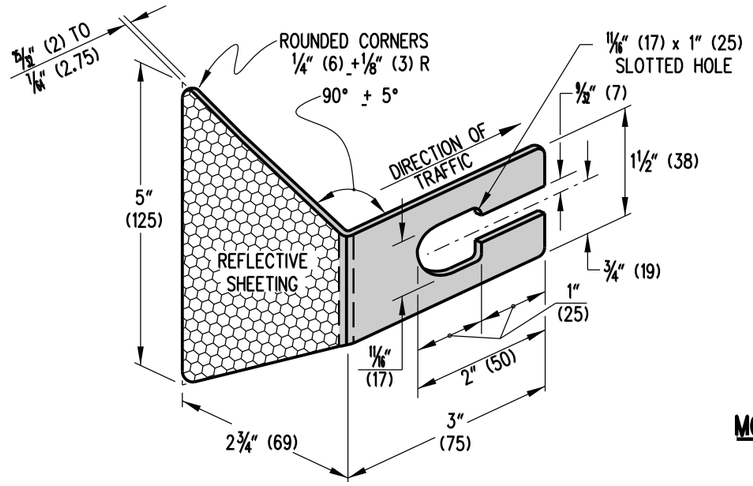
2). TIGHTEN ASSEMBLY UNTIL CABLE IS TAUGHT.

3). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.

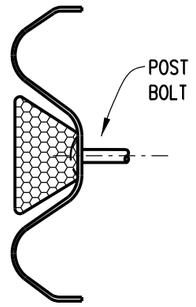
DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE		APPROVED SIGNATURE ON FILE CHIEF ENGINEER 12/28/2010 DATE
	STANDARD NO. B-13 (2010)	SHT. 8 OF 10	RECOMMENDED SIGNATURE ON FILE DESIGN ENGINEER 12/27/2010 DATE

09/17/2010

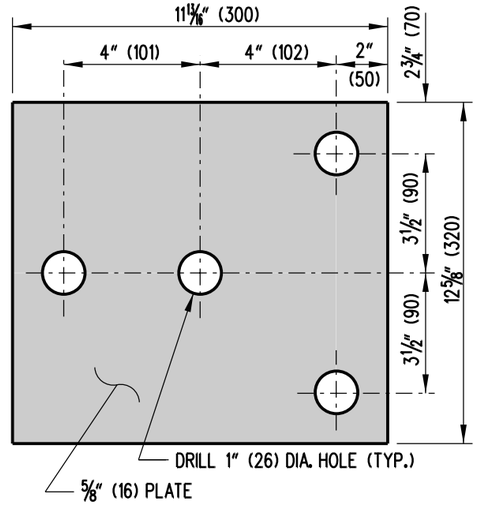
SCALE : N.T.S.



GUARDRAIL DELINEATOR



MOUNTING POSITION

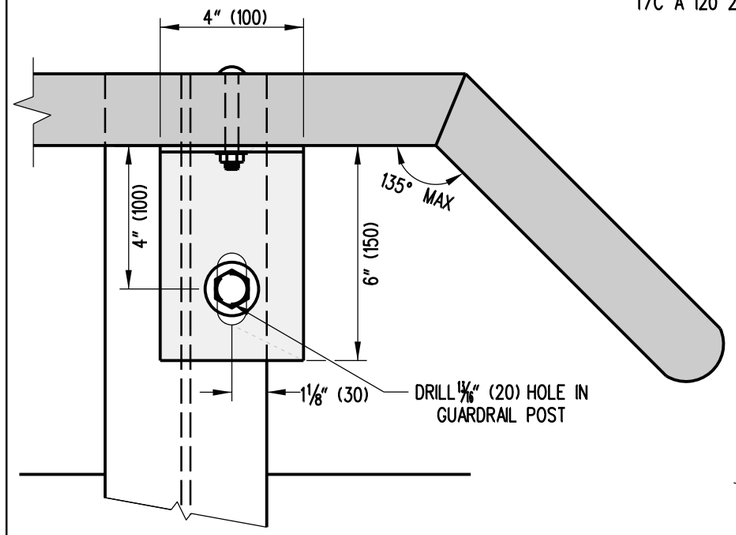


W-BEAM BEARING PLATE DETAIL (11)

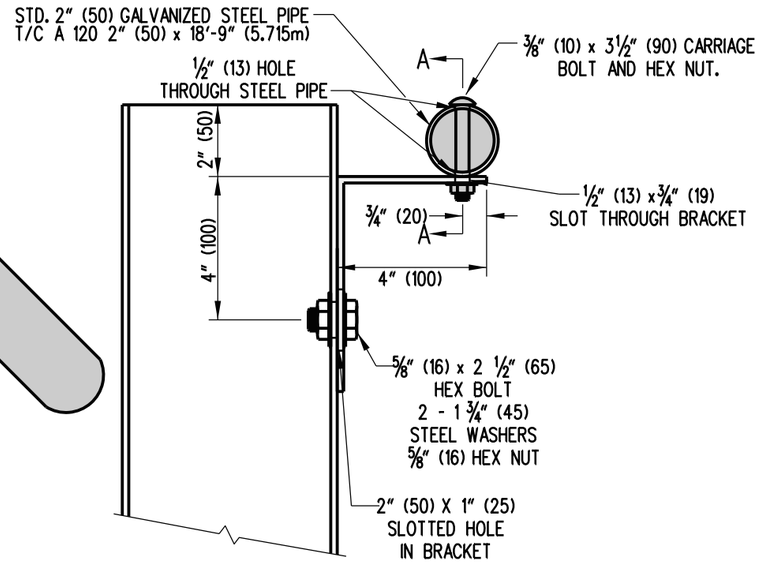
DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-13 (2010)	SHT. 9 OF 10	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

10/14/2010

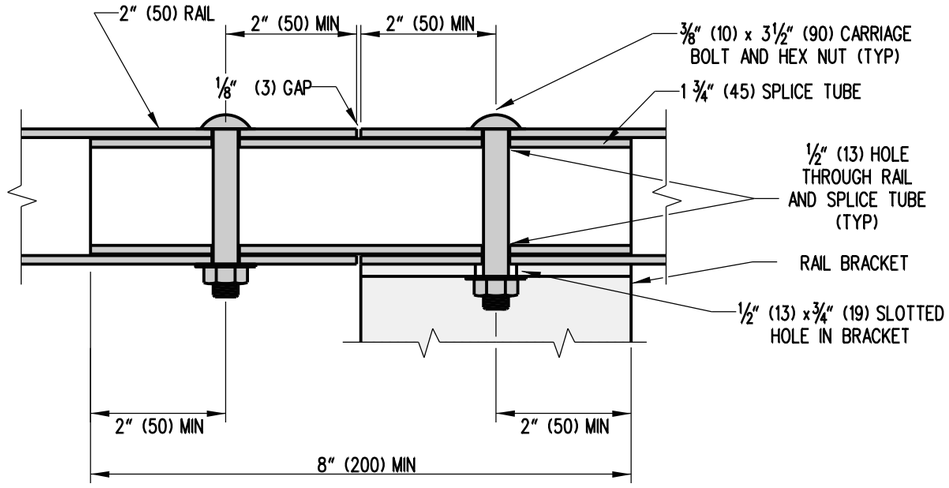
SCALE : N.T.S.



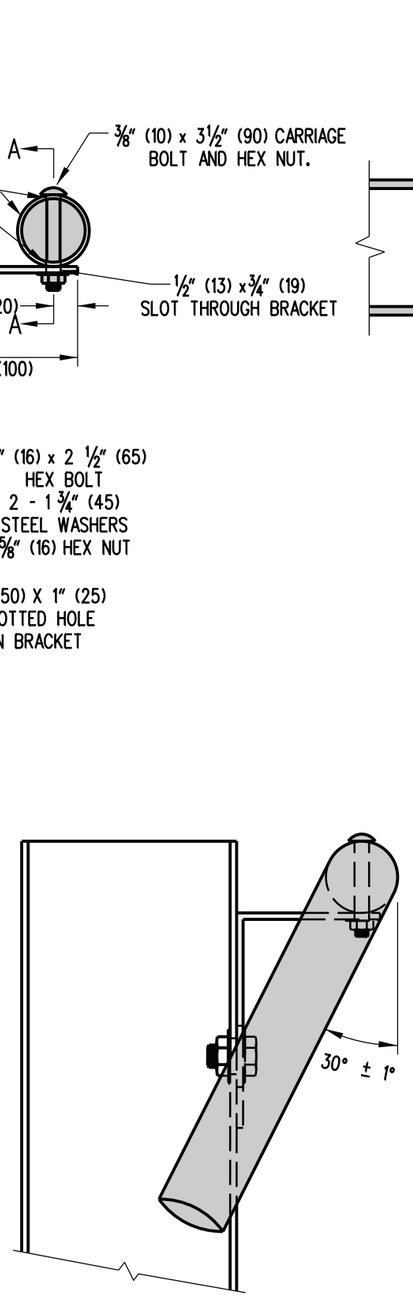
REAR VIEW WITH START & END SECTION



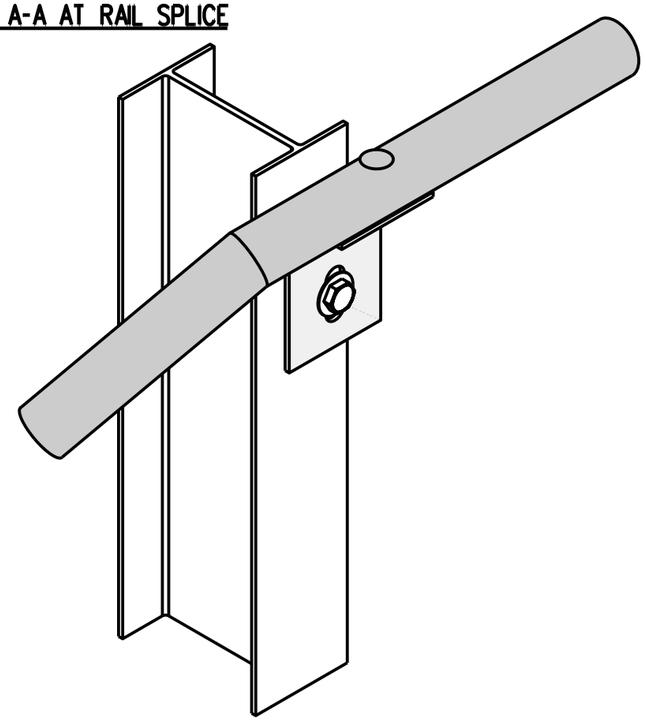
SIDE VIEW



SECTION A-A AT RAIL SPLICE



SIDE VIEW WITH START & END SECTION



ISOMETRIC VIEW WITH START & END SECTION

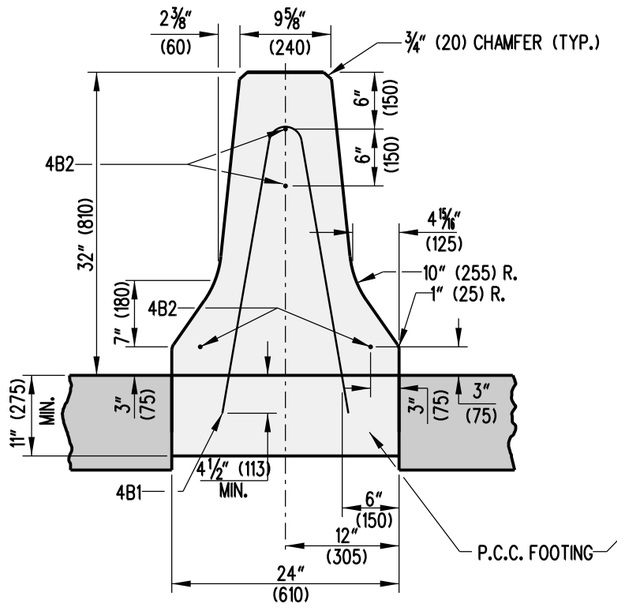
NOTES:

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.

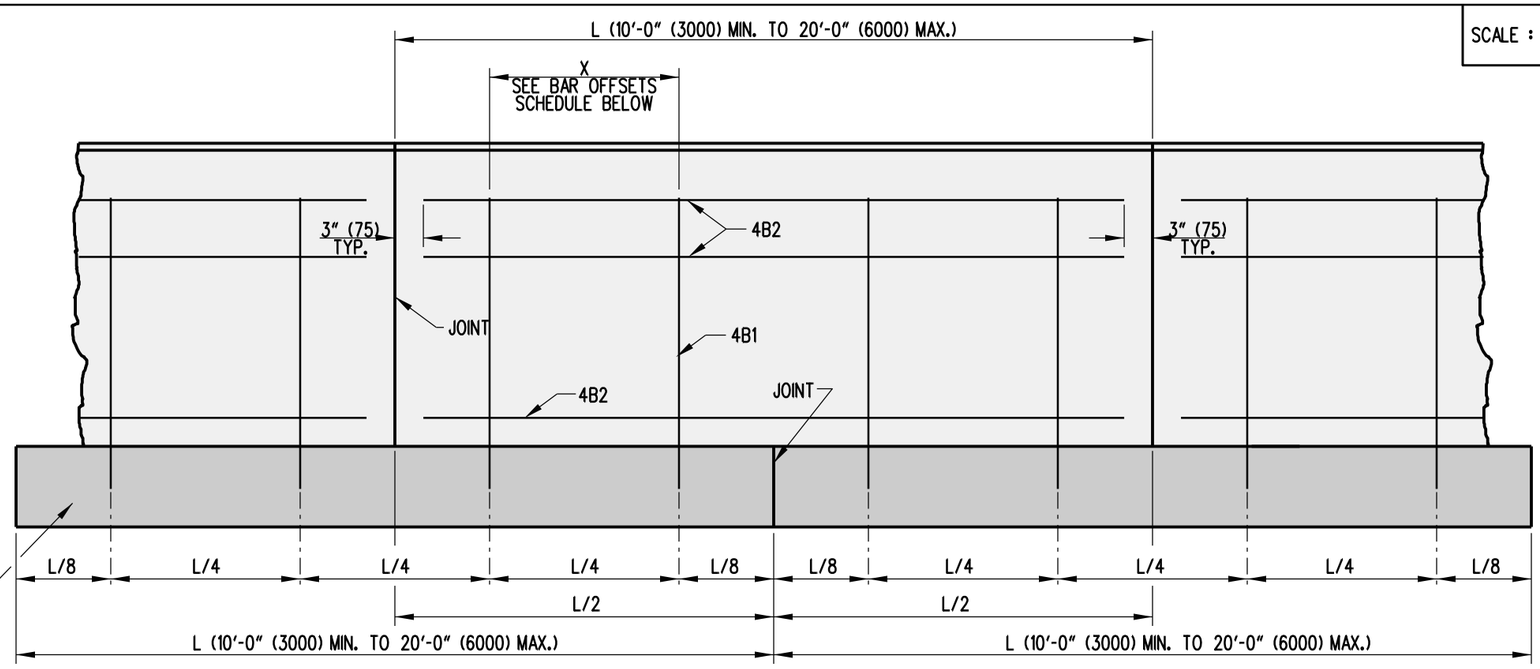
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL MOUNTED RAIL	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-13 (2010) SHT. 10 OF 10	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

08/25/2010

SCALE : N.T.S.

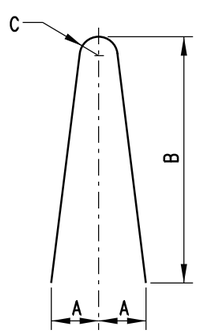


SECTION



ELEVATION

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION



TYPE '1' BAR

BAR OFFSETS		
NOMINAL LENGTH OF BARRIER SECTION (L)	X	NO. REQ'D FOR EACH BARRIER SECTION
20' (6000)	5' - 0" (1500)	4
18' (5500)	4' - 6" (1350)	4
16' (5000)	4' - 0" (1200)	4
14' (4500)	3' - 6" (1050)	4
12' (4000)	3' - 0" (900)	4
10' (3000)	2' - 6" (750)	4

BAR LIST							
MARK	SIZE	NUMBER IN EACH SECTION	LENGTH	TYPE	A	B	C
4B1	4 (13)	**	5'-4" (1625)	1	7" (175)	30½" (775)	2" (50)
4B2	4 (13)	4	*	STR.	N/A	N/A	N/A

* THE LENGTH OF BAR 4B2 SHALL BE 6" (150) SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.

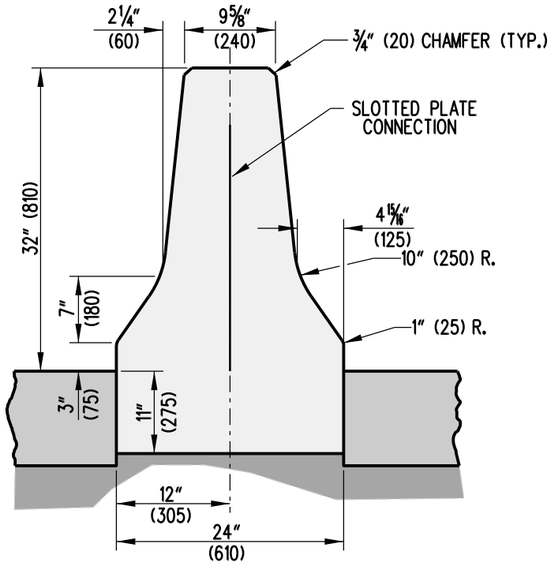
** SEE "BAR OFFSETS" CHART ON THIS SHEET FOR MORE INFORMATION.

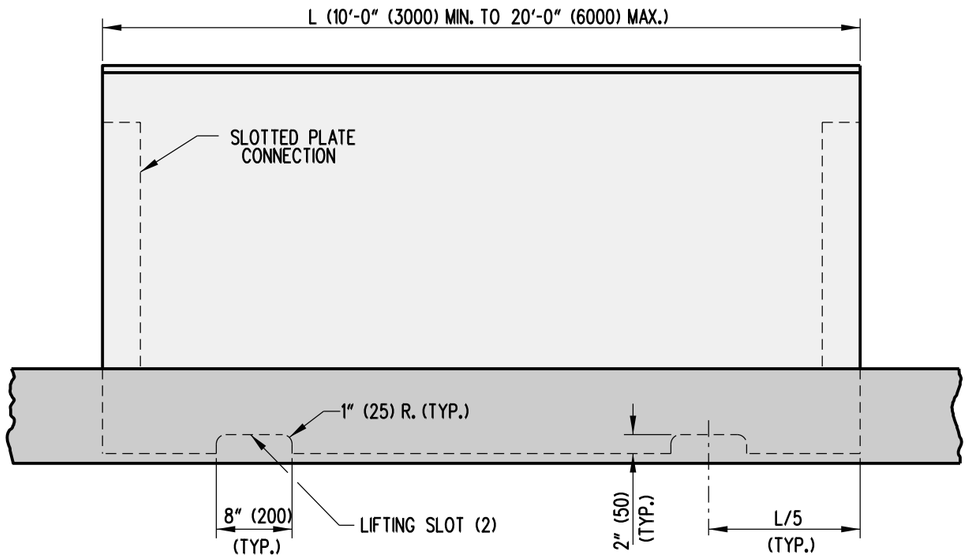
NOTES: 1). CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1½" (40) MIN.
2). BARS SHALL BE CUT AT EVERY JOINT IF MADE USING CONTINUOUS SLIP-FORM CONSTRUCTION.

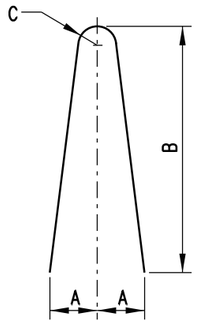
DELAWARE DEPARTMENT OF TRANSPORTATION	32" (960) CONCRETE SAFETY BARRIER (F SHAPE)	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-14 (2009) SHT. 1 OF 4	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

12/21/2009

SCALE : N.T.S.

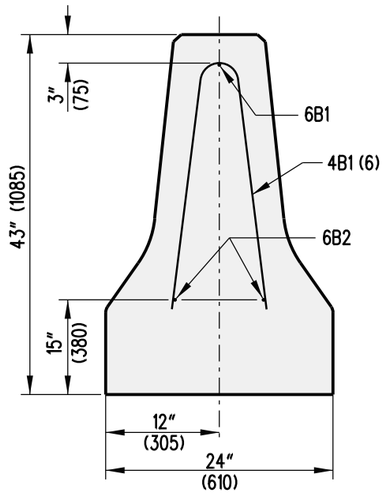




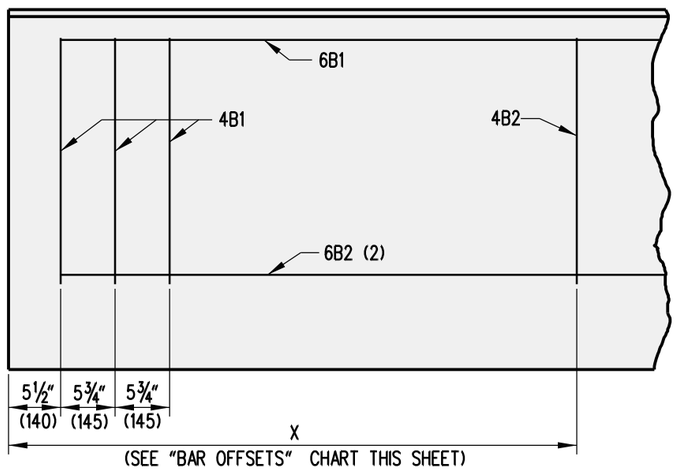


TYPE '1' BAR

TYPICAL PRE-CAST CONSTRUCTON



'F' SHAPE BARRIER SECTION



ELEVATION

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)	1	5" (125)	26" (660)	2" (50)
4B2	4 (13)	**	4'-7" (1400)	1	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.

TYPICAL PRE-CAST REINFORCEMENT DETAILS

NOTES: 1). CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1½" (40) MIN..

DELAWARE
DEPARTMENT OF TRANSPORTATION

32" (960) CONCRETE SAFETY BARRIER (F SHAPE)

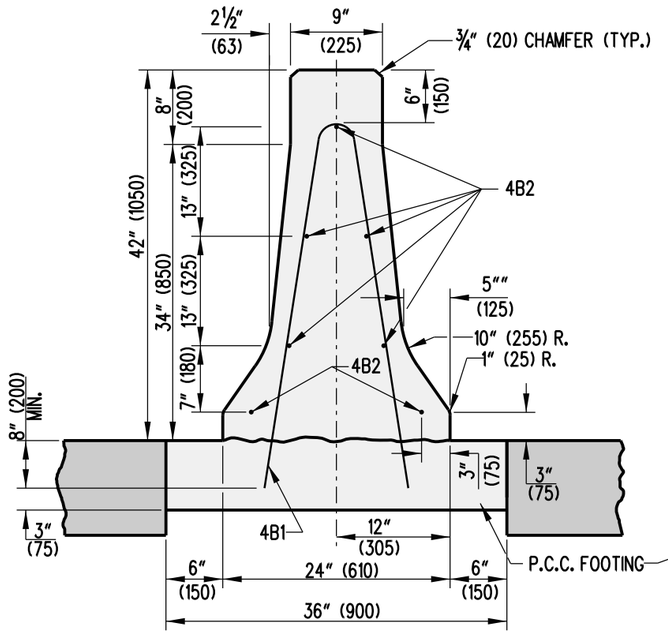
STANDARD NO. B-14 (2009) | SHT. 2 OF 4

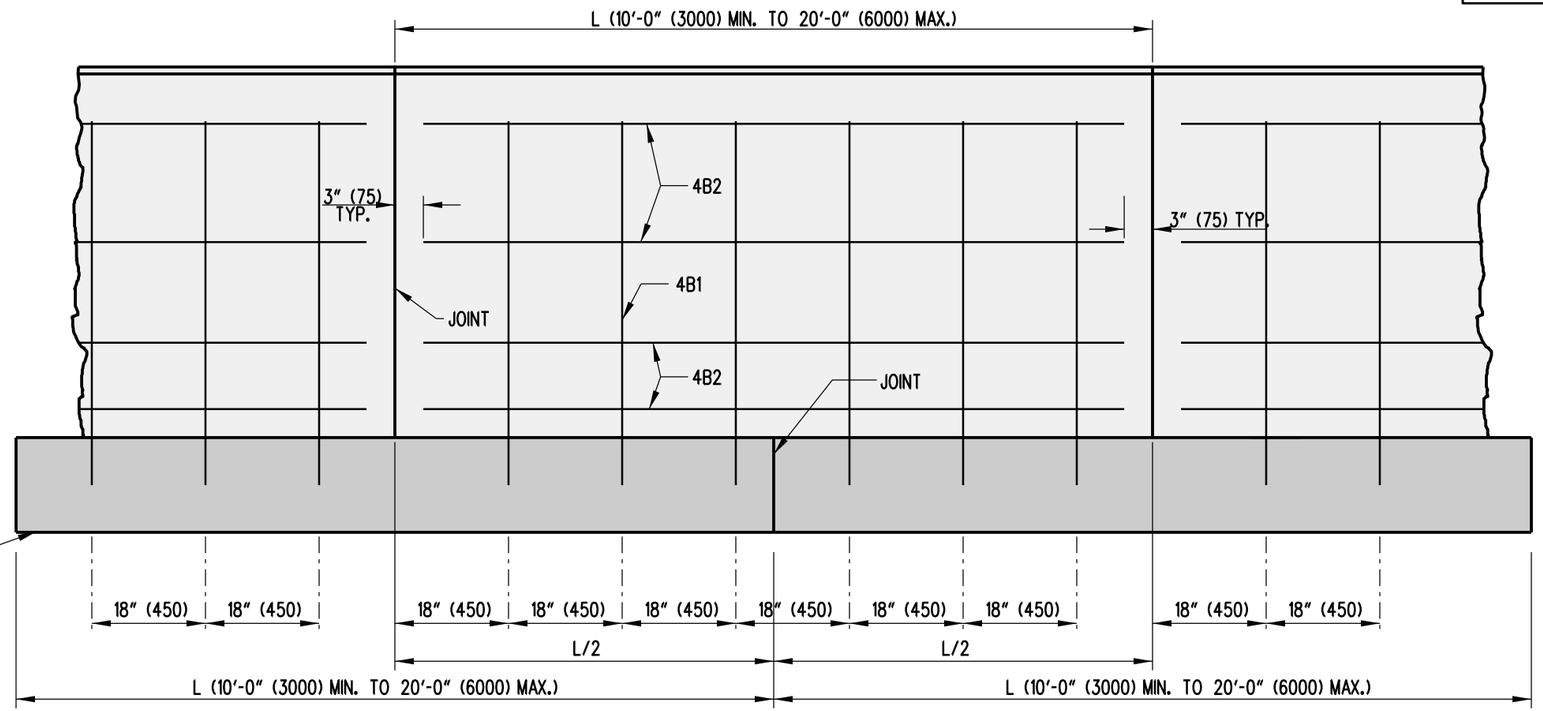
APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 DATE

RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 DATE

09/18/2009

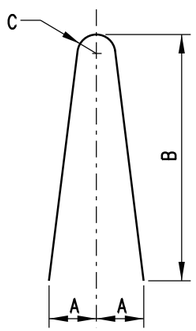
SCALE : N.T.S.





SECTION

ELEVATION



TYPE '1' BAR

BAR OFFSETS	
NOMINAL LENGTH OF BARRIER SECTION (L)	NO. REQ'D FOR EACH BARRIER SECTION
20' (6000)	13
18' (5500)	12
16' (5000)	10
14' (4500)	9
12' (4000)	8
10' (3000)	6

BAR LIST							
MARK	SIZE	NUMBER IN EACH SECTION	LENGTH	TYPE	A	B	C
4B1	4 (13)	* *	7'-6" (2286)	1	6" (150)	44" (1118)	2" (50)
4B2	4 (13)	7	*	STR.	N/A	N/A	N/A

* THE LENGTH OF BAR 4B2 SHALL BE 6" (150) SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.

* * SEE "BAR OFFSETS" CHART ON THIS SHEET FOR MORE INFORMATION.

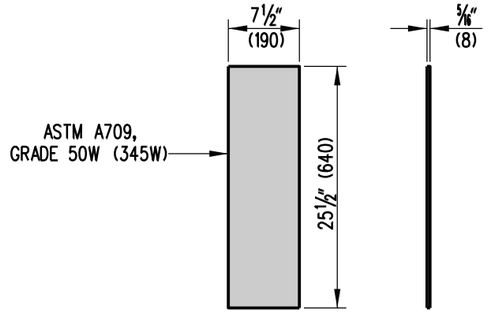
TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

NOTES: 1). CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1½" (40) MIN.
2). BARS SHALL BE CUT AT EVERY JOINT IF MADE USING CONTINUOUS SLIP-FORM CONSTRUCTION.

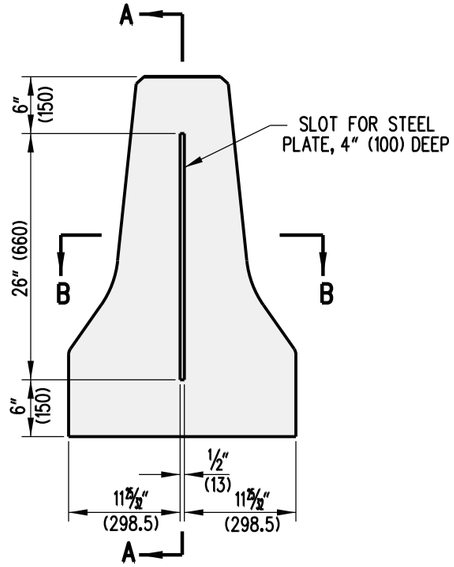
DELAWARE DEPARTMENT OF TRANSPORTATION	42" (1050) CONCRETE BARRIER DETAILS (F-SHAPE)	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-14 (2009) SHT. 3 OF 4	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

12/21/2009

SCALE : N.T.S.

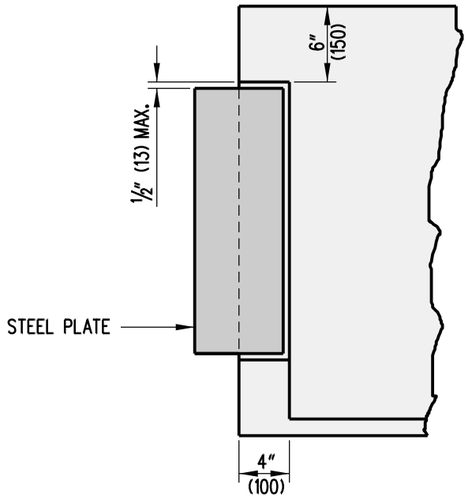


STEEL CONNECTOR PLATE

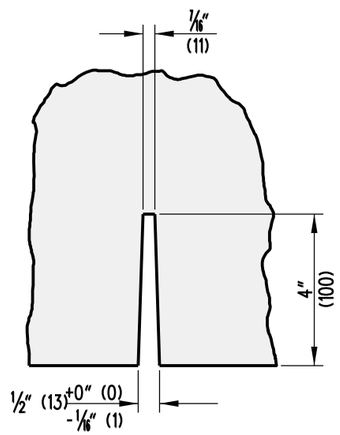


SLOT DIMENSIONS

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



SECTION A-A

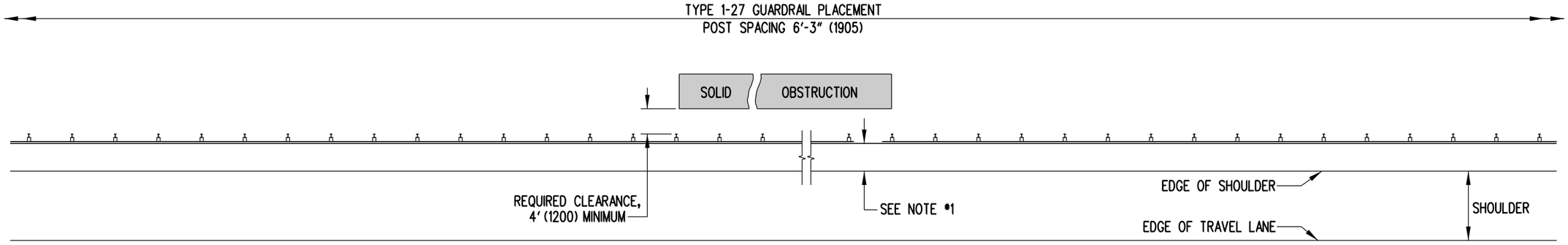


SECTION B-B

DELAWARE DEPARTMENT OF TRANSPORTATION	SLOTTED PLATE CONNECTION DETAILS		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-14 (2009)	SHT. 4 OF 4	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

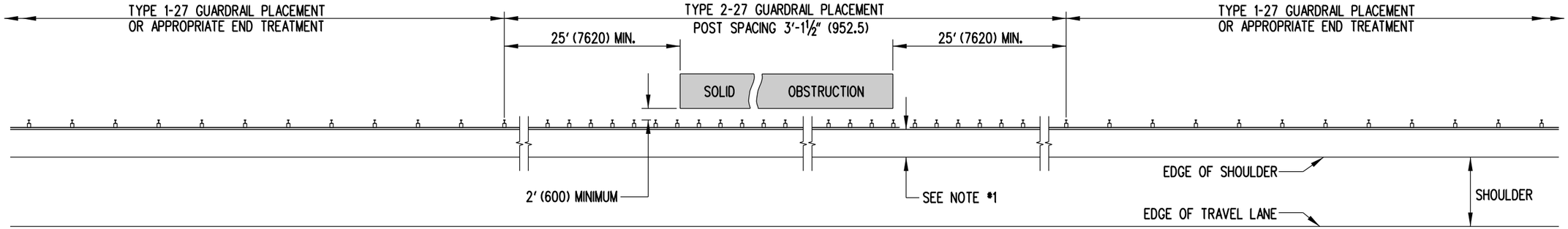
09/18/2009

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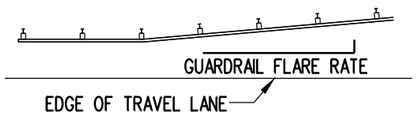
TYPE 1-27 GUARDRAIL

TYPICAL GUARDRAIL TREATMENT
WHEN THE REQUIRED 4' (1200) CLEARANCE TO OBSTRUCTION IS AVAILABLE

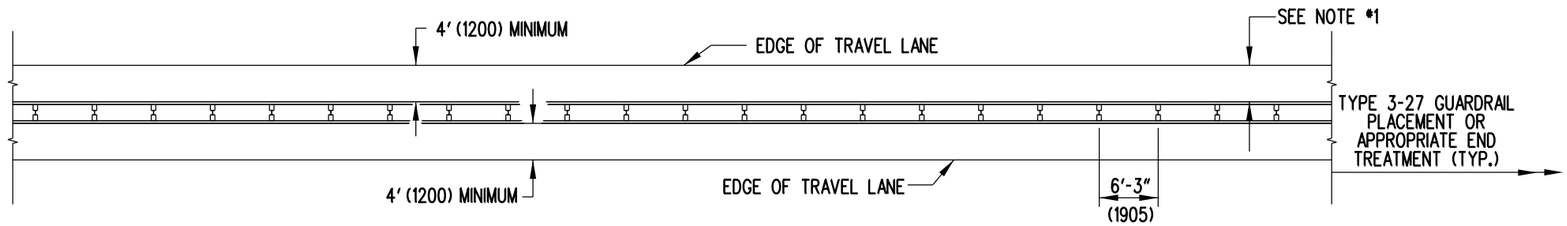


TYPE 2-27 GUARDRAIL

TYPICAL GUARDRAIL TREATMENT
WHEN 2' (600) TO 4' (1200) OF CLEARANCE TO OBSTRUCTION IS AVAILABLE



FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1



TYPE 3-27 GUARDRAIL

TYPICAL MEDIAN GUARDRAIL TREATMENT

NOTES:
1). THE DISTANCE FROM THE EDGE OF THE TRAVEL LANE OR SHOULDER TO THE FACE OF GUARDRAIL SHOULD BE MAXIMIZED. THIS AREA SHALL BE GRADED 10:1 OR FLATTER.
2). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFICIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

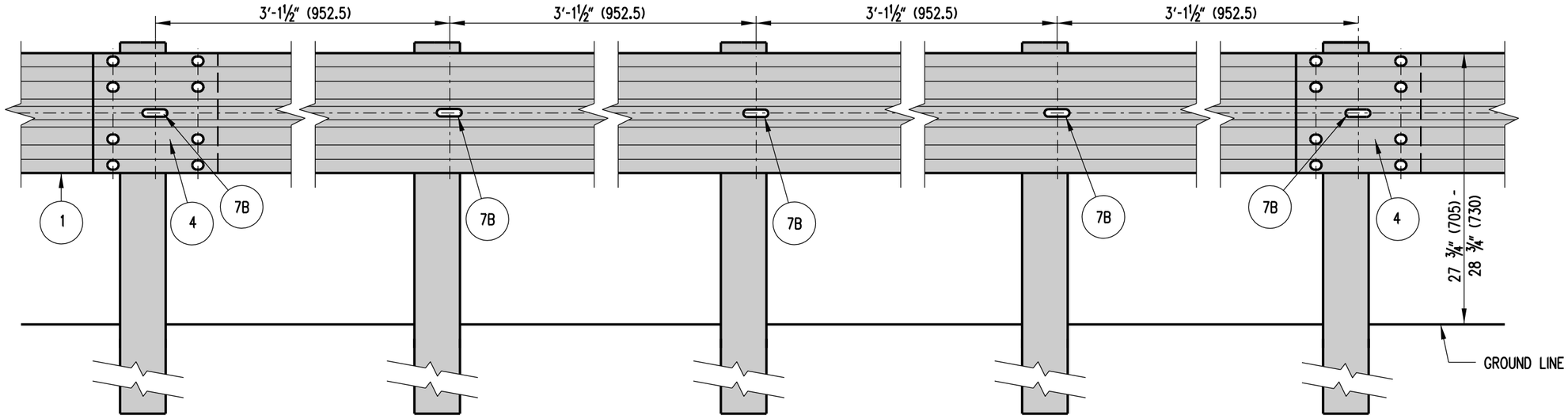
STANDARD NO. B-15 (2010) | **SHT. 1 OF 3**

APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 DATE

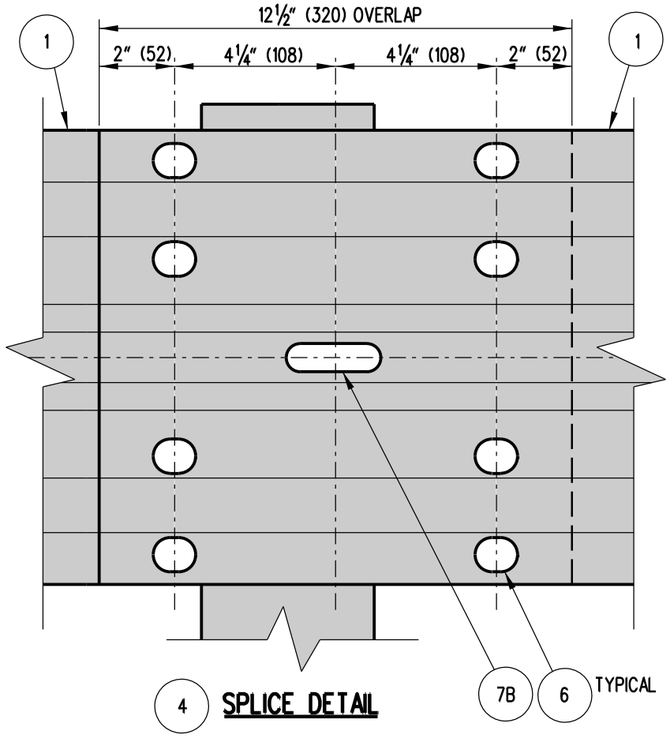
RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 DATE

09/03/2010

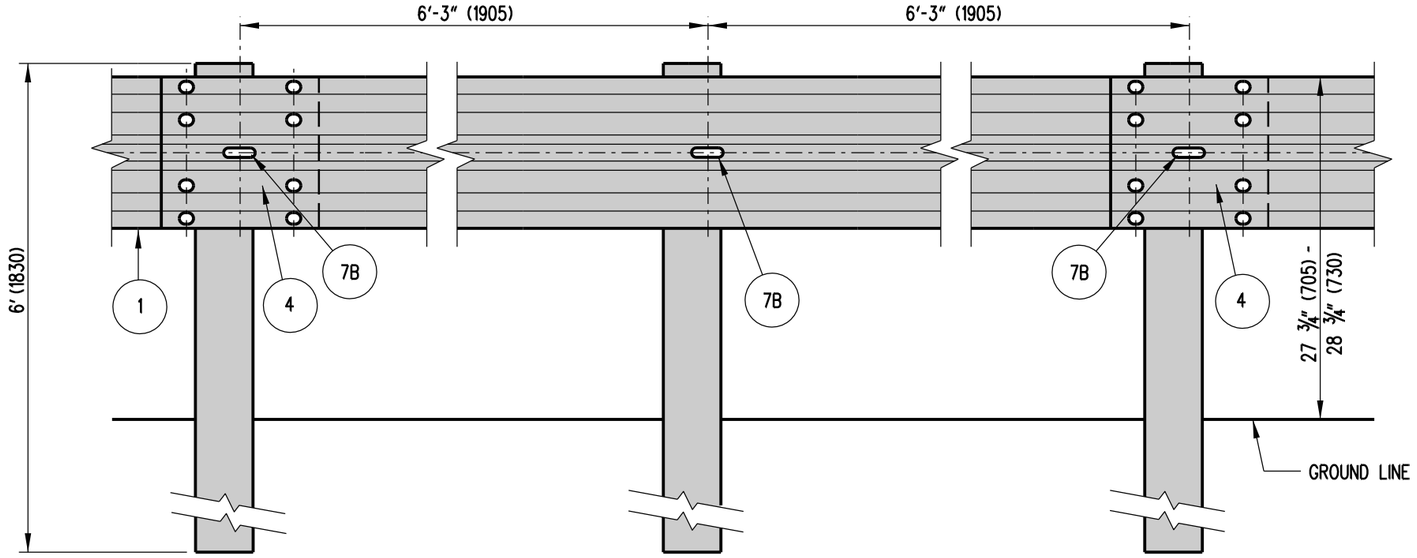
SCALE : N.T.S.



TYPE 2-27



4 SPLICE DETAIL



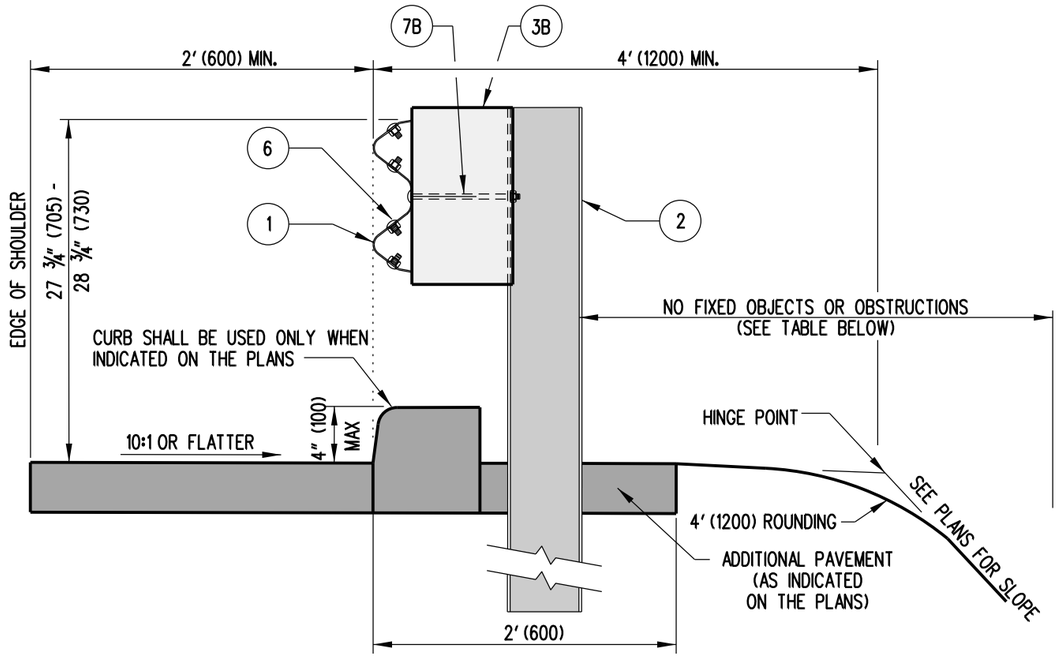
TYPE 1-27 OR 3-27

NOTE : OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.

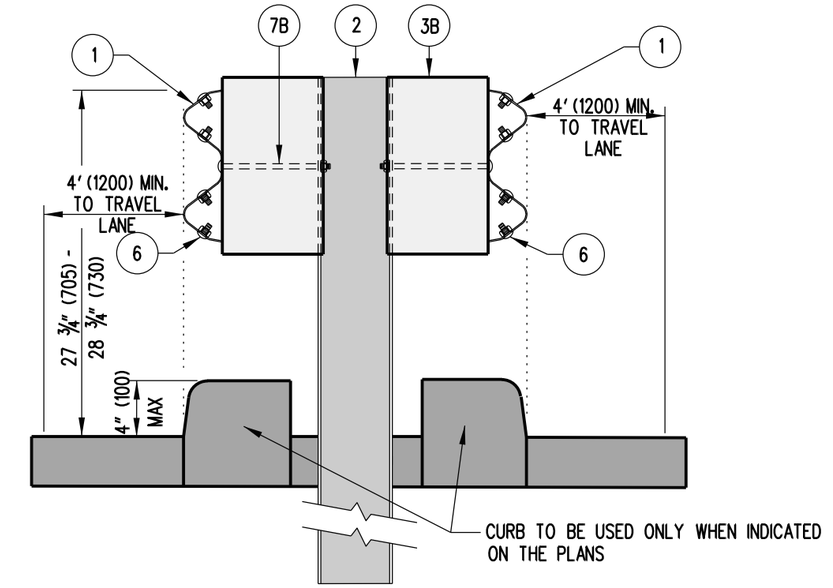
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL APPLICATIONS		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-15 (2010)	SHT. 2 OF 3	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/20/2010

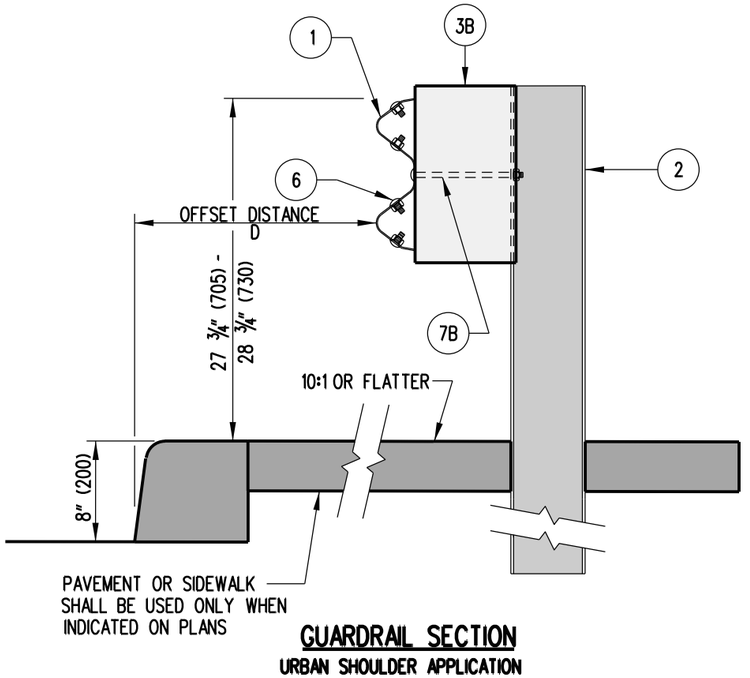
SCALE : N.T.S.



GUARDRAIL SECTION
RURAL SHOULDER APPLICATION



GUARDRAIL SECTION
MEDIAN APPLICATION



GUARDRAIL SECTION
URBAN SHOULDER APPLICATION

TYPE	POST SPACING	CLEAR AREA BEHIND POST
1	6'-3" (1905)	4'-0" (1.2m) MIN
2	3' 1-1/2" (952.5)	2'-0" (600) MIN

DESIGN SPEED	D
< 50 MPH (80 km/h)	6'-0" (1800)
≥ 50 MPH (80 km/h)	10'-0" (3000)

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

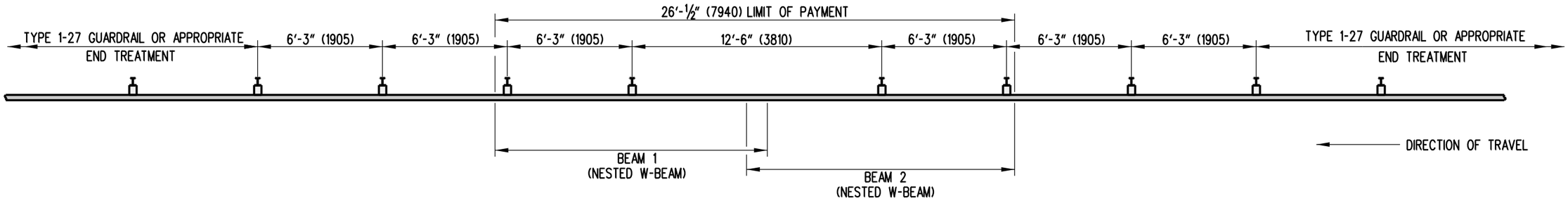
STANDARD NO. B-15 (2010) SHT. 3 OF 3

APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 DATE

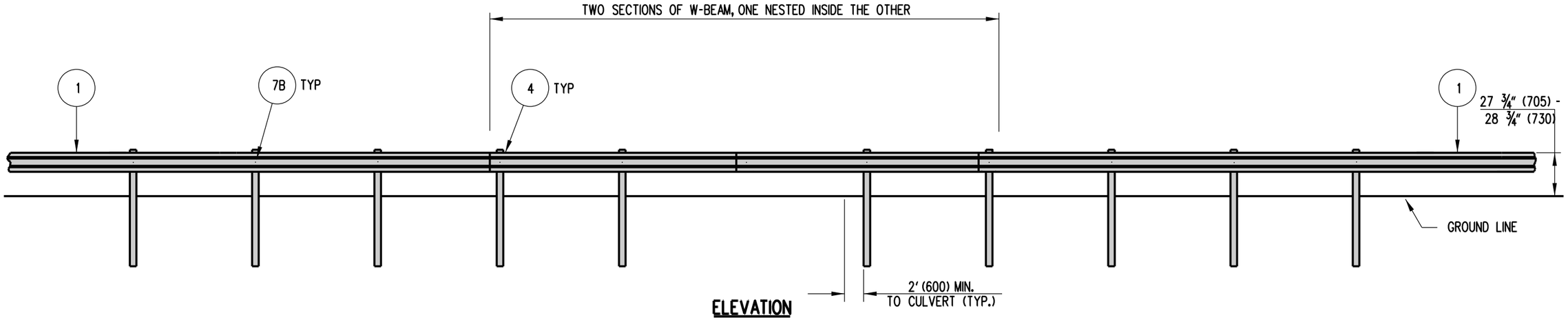
RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 DATE

09/20/2010

SCALE : N.T.S.



PLAN



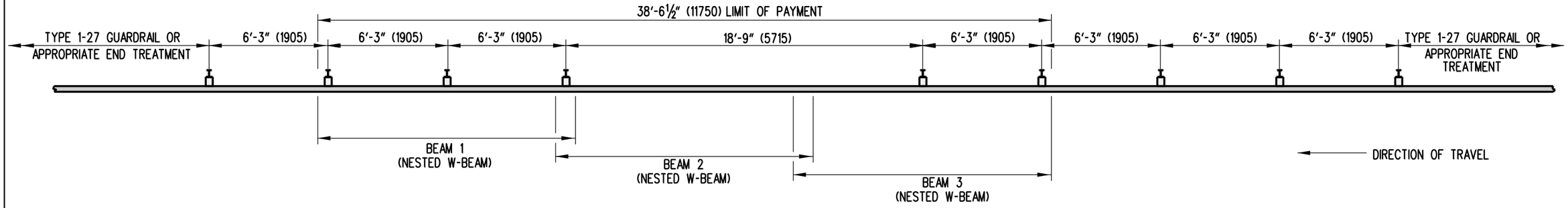
ELEVATION

NOTES:
1). ALL W-BEAMS ARE 13′-6½″ (4130) IN LENGTH.
2). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

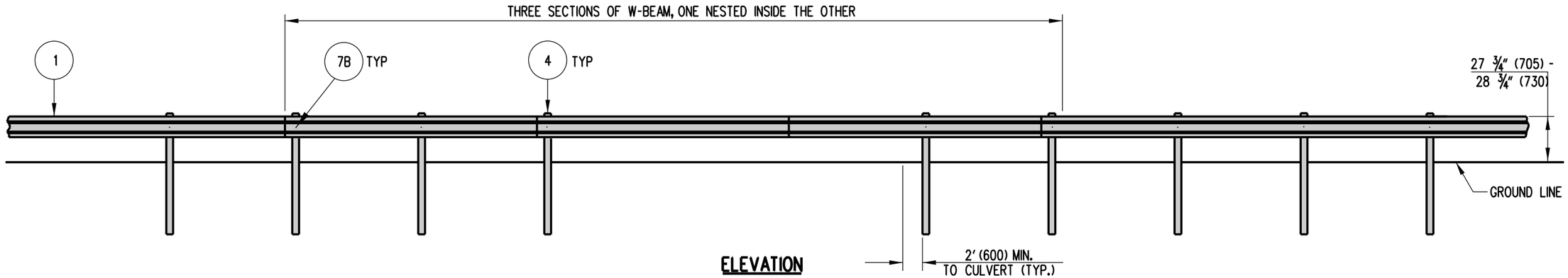
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL OVER CULVERTS, TYPE 1-27	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-16 (2010) — SHT. 1 OF 3	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/20/2010

SCALE : N.T.S.



PLAN



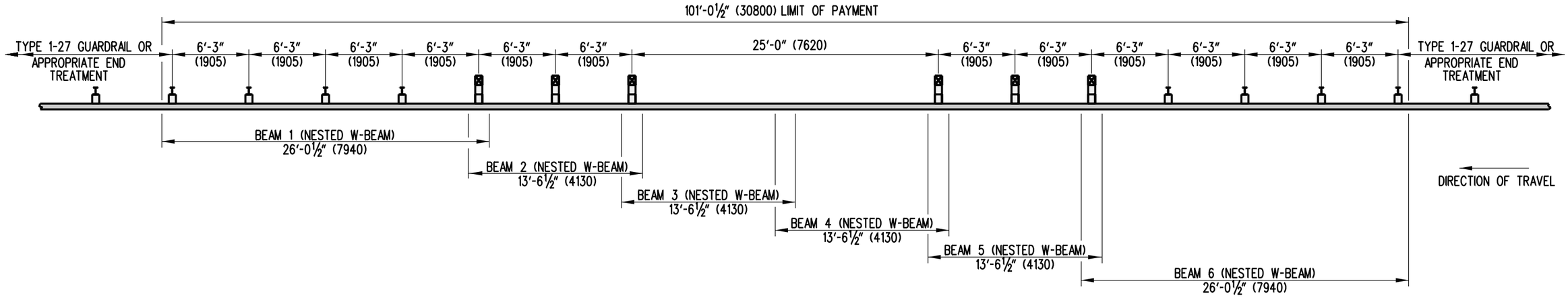
ELEVATION

NOTES:
1). ALL W-BEAMS ARE 13'-6½" (4130) IN LENGTH.
2). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

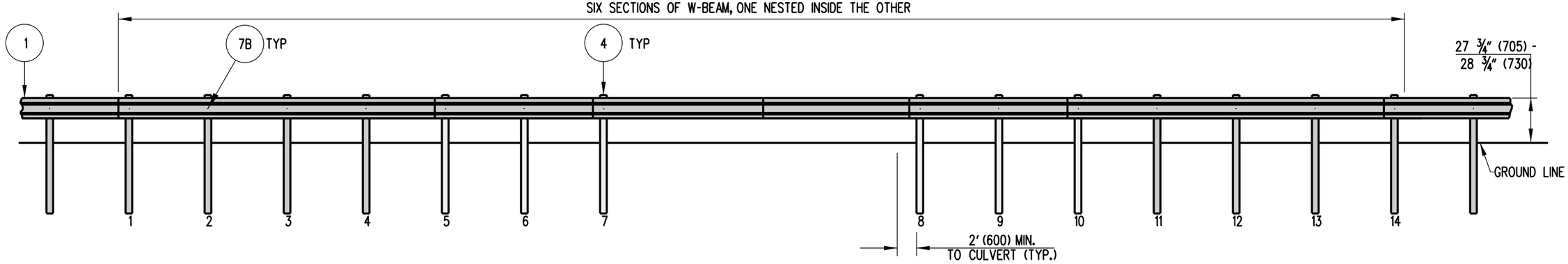
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL OVER CULVERTS, TYPE 2-27	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-16 (2010) SHT. 2 OF 3	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/03/2010

SCALE : N.T.S.



PLAN



ELEVATION

NOTES:

1). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

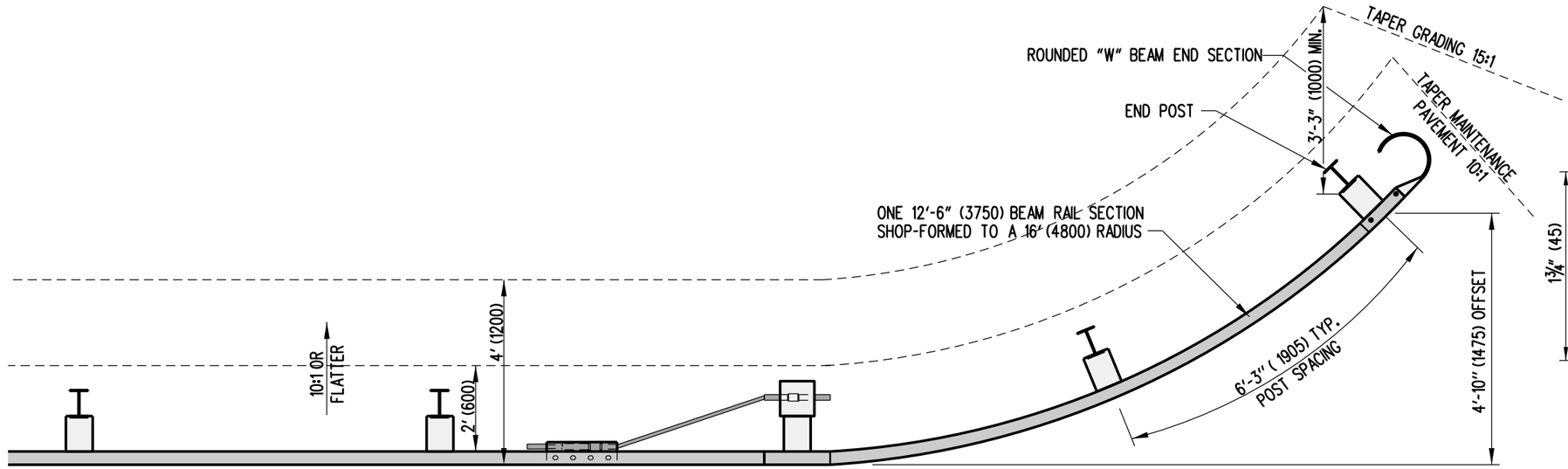
2). POSTS 1-4 AND 11-14 ARE TO BE W6X9 (W15-X13.5) STEEL POSTS. POSTS 5-10 ARE TO BE 6"x8"x6' (150x200x1830) BREAKAWAY WOOD POSTS WITH 2 WOOD BLOCKS AT EACH OF THESE 6 POSTS.

3). THE SPLICES AT POSTS 5, 7, 8, & 10 ARE TO USE ⅝" (16) GUARDRAIL BOLT (L=26" (660)).

DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL OVER CULVERT, TYPE 3-27	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-16 (2010) SHT. 3 OF 3	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

10/14/2010

SCALE : N.T.S.



PLAN

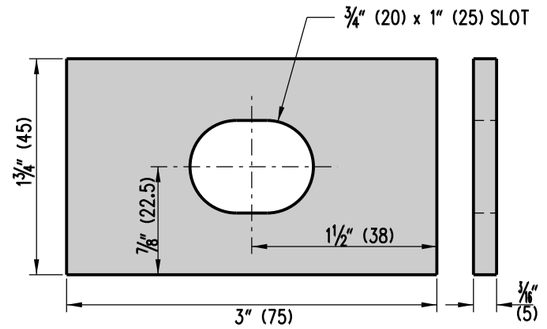
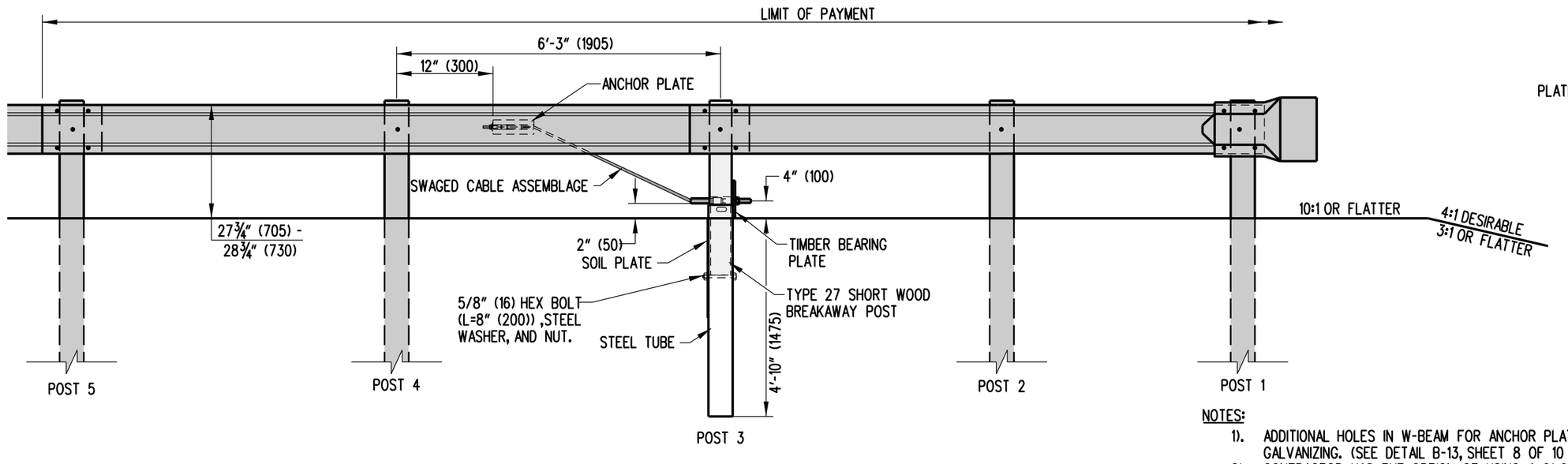


PLATE WASHER DETAIL



ELEVATION

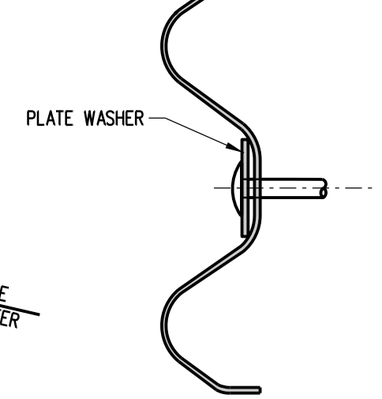


PLATE WASHER MOUNTING POSITION

NOTES:

1). ADDITIONAL HOLES IN W-BEAM FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING. (SEE DETAIL B-13, SHEET 8 OF 10 FOR HOLE SPACING INFORMATION).
2). CONTRACTOR HAS THE OPTION OF USING A 6'-0" (1830) STEEL TUBE WITHOUT A SOIL PLATE OR A 5'-0" (1525) STEEL TUBE WITH A SOIL PLATE.
3). PLATE WASHERS SHALL BE INSTALLED AT POSTS 3 & 4 ONLY.
4). THIS END TREATMENT SHALL ONLY BE USED ON TRAVEL WAYS WITH A POSTED SPEED LIMIT OF 40 MPH (64 KM/H) OR LESS.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL END TREATMENT, TYPE 4-27

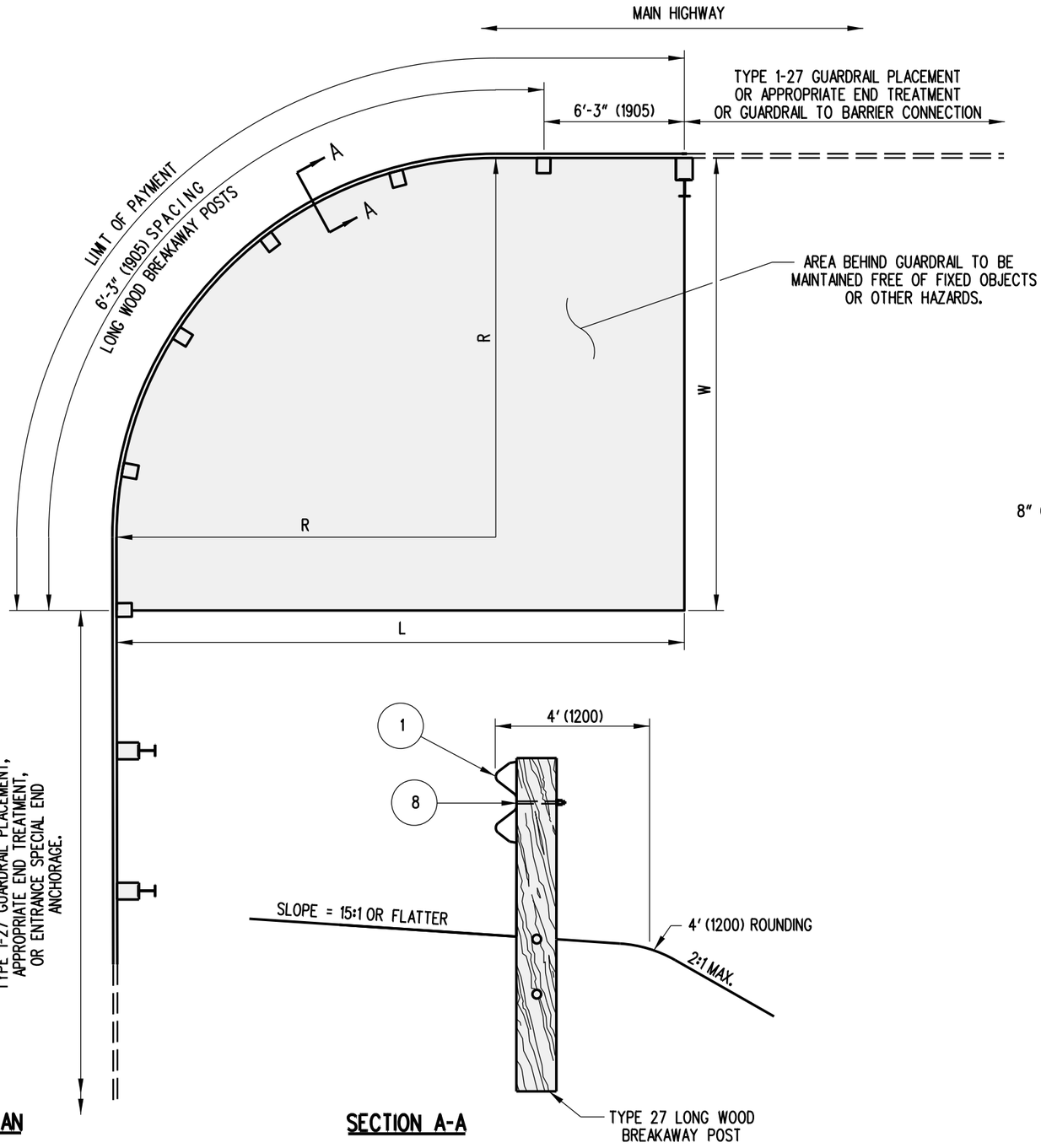
STANDARD NO. B-17 (2010) | **SHT. 1 OF 1**

APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 DATE

RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 DATE

09/03/2010

SCALE : N.T.S.

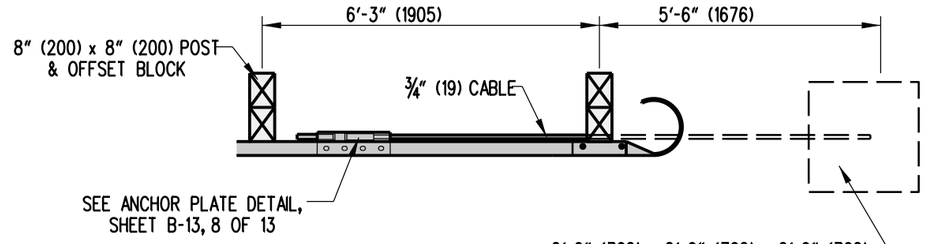


PLAN

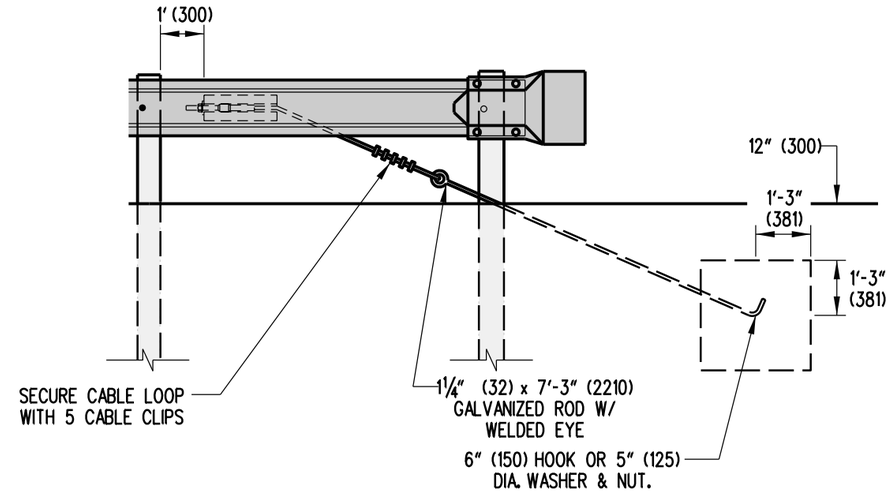
RADIUS	MIN. REQUIRED AREA FREE OF FIXED OBJECTS
	L x W
8'-6" (2600)	25' x 15' (7600 x 4500)
17'-0" (5200)	30' x 15' (9144 x 4500)
25'-6" (7800)	40' x 20' (1200 x 6000)
35'-0" (10700)	50' x 20' (15200 x 6000)

NOTES:

1). NO WASHERS ARE USED ON THE RAIL SIDE OF THE LONG WOOD BREAKAWAY POSTS.
2). THE CURVED GUARDRAIL SECTION SHALL BE SHOP BENT.
3). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
4). IF CURB IS USED IN CONJUNCTION WITH CURVED GUARDRAIL SECTION, THE CURB CANNOT BE HIGHER THAN 2" (50).
5). ON THE 8'6' (2600) RADIUS SYSTEM ONLY, THE RAIL IS NOT TO BE BOLTED TO THE CENTER POST.



SECTION A-A



ENTRANCE SPECIAL END ANCHORAGE

DELAWARE
DEPARTMENT OF TRANSPORTATION

CURVED GUARDRAIL SECTION

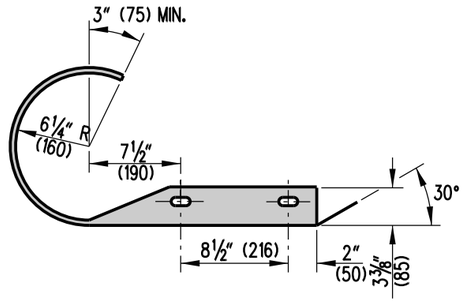
STANDARD NO. B-18 (2010) | **SHT. 1 OF 1**

APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)

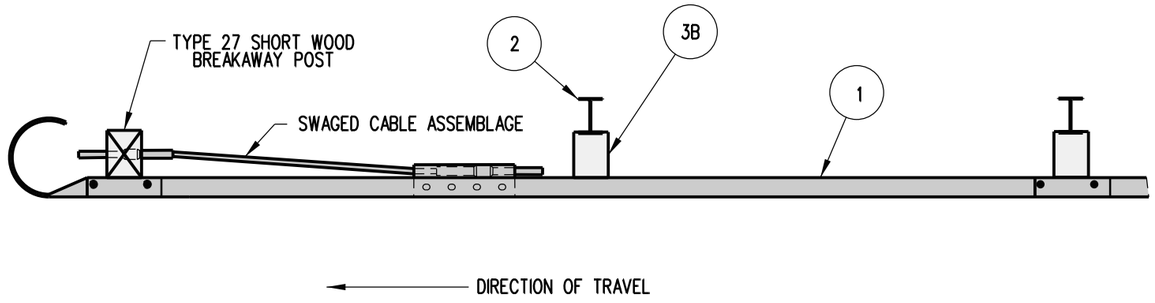
RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/03/2010

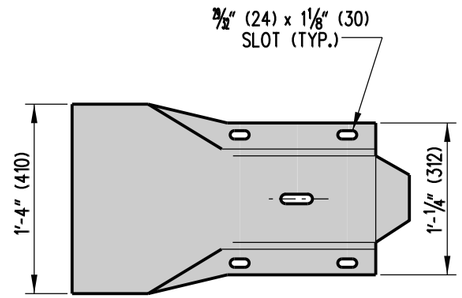
SCALE : N.T.S.



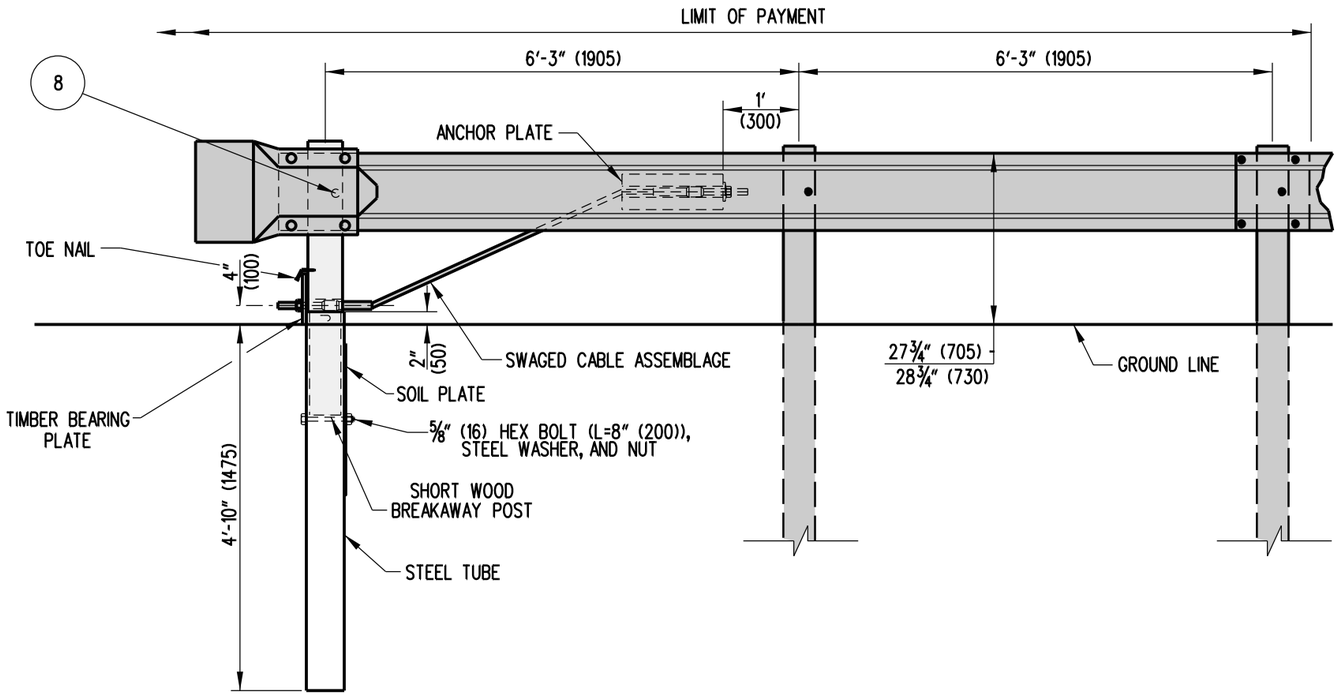
END SECTION PLAN



PLAN



END SECTION ELEVATION



ELEVATION

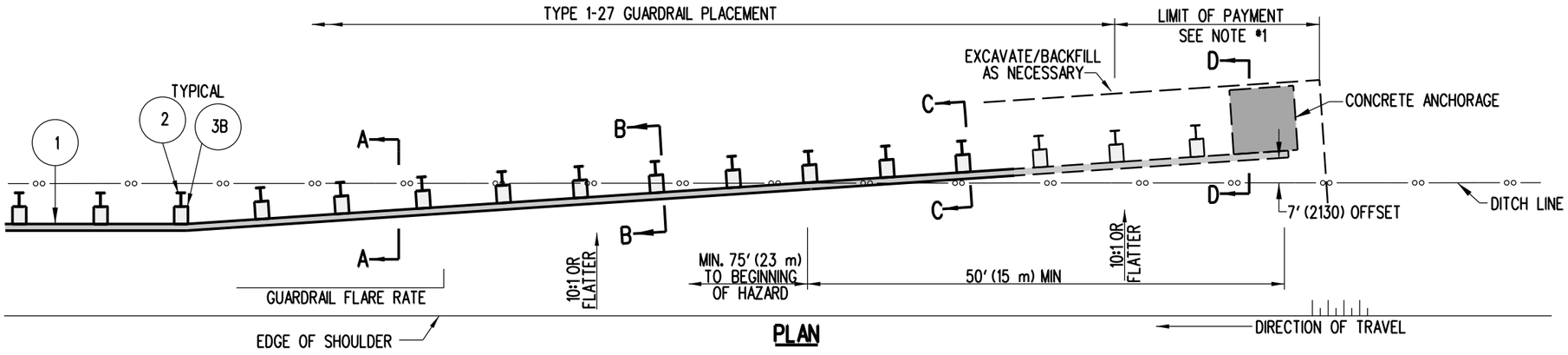
NOTES:

1. ADDITIONAL HOLES FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING. (SEE STANDARD HARDWARE SHEET FOR HOLE SPACING INFORMATION).
2. CONTRACTOR HAS THE OPTION OF USING A 6' (1830) STEEL TUBE WITHOUT A SOIL PLATE OR A 5' (1525) STEEL TUBE WITH A SOIL PLATE.

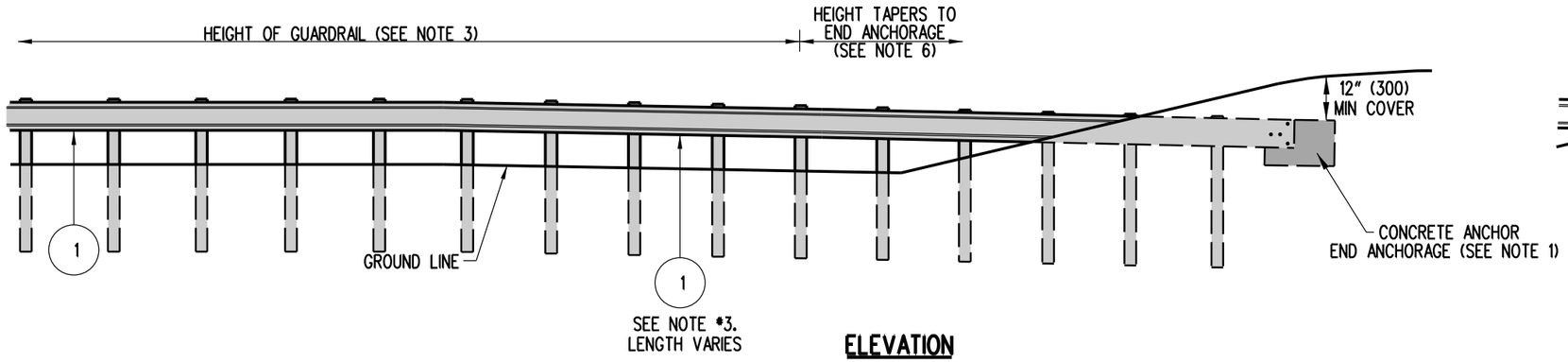
DELAWARE DEPARTMENT OF TRANSPORTATION	END ANCHORAGE, TYPE 27		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-19 (2010)	SHT. 1 OF 1	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/03/2010

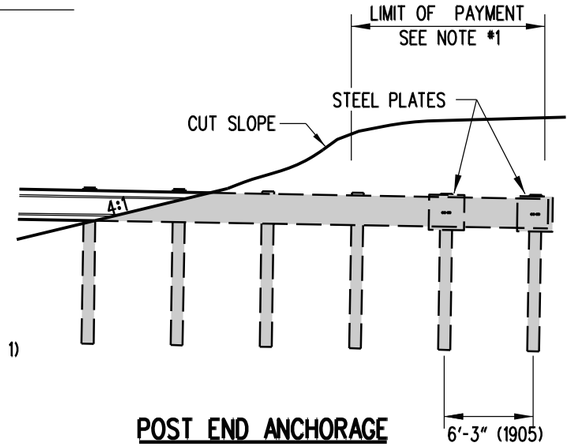
SCALE : N.T.S.



PLAN



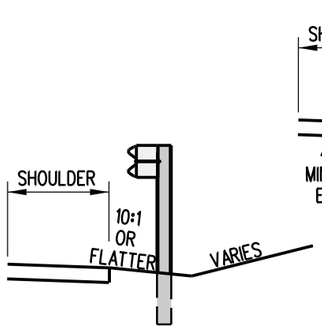
ELEVATION



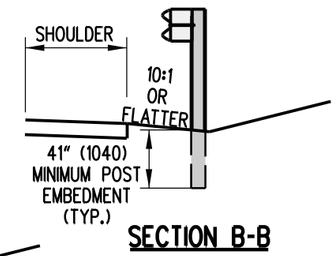
POST END ANCHORAGE

(SINGLE RAIL)

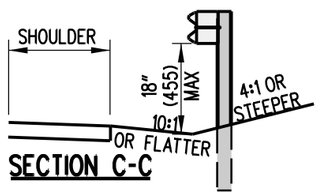
FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1



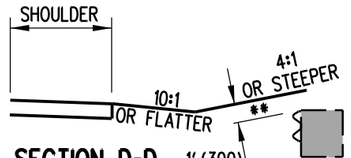
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

ANCHORAGE

** 1' (300) BURIAL IS NOT REQUIRED WHEN ANCHORING IN ROCK.

NOTES:

1). BURIED END SECTION PAYMENT INCLUDES THE CONCRETE OR POST ANCHORAGE, EXCAVATION, BACKFILL, AND ALL APPLICABLE ITEMS INCLUDING LABOR NECESSARY TO COMPLETE END ANCHORAGE.
2). THE CONTRACTOR HAS THE OPTION OF USING EITHER A CONCRETE BLOCK ANCHOR OR A POST ANCHOR TO TERMINATE THE BURIED END SECTION.
3). WHEN PLACING GUARDRAIL ON A 10:1 OR FLATTER SLOPE, THE HEIGHT OF THE GUARDRAIL SHALL BE HELD CONSTANT RELATIVE TO THE GROUND DIRECTLY UNDER THE FACE OF THE GUARDRAIL.
4). ALL POSTS SHALL BE 6' (1800) FOR SINGLE RAIL INSTALLATION.
5). WHEN USING THE BURIED END SECTION, THE DESIGN MUST PROVIDE A MINIMUM OF 75' (23 m) FROM WHERE THE GUARDRAIL CROSSES THE DITCH LINE TO THE BEGINNING OF THE HAZARD.
6). MAINTAIN THE FLARE OF THE GUARDRAIL UNTIL THE 12" (300) COVER HAS BEEN ATTAINED. IF THE 12" (300) COVER CANNOT BE ATTAINED BEFORE THE RAIL IS 7' (2100) BEHIND THE BOTTOM OF THE DITCH, THEN SLOPE THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 7' (2100) BEHIND THE DITCH, SO THAT IT HAS 12" (300) OF COVER.

DELAWARE
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

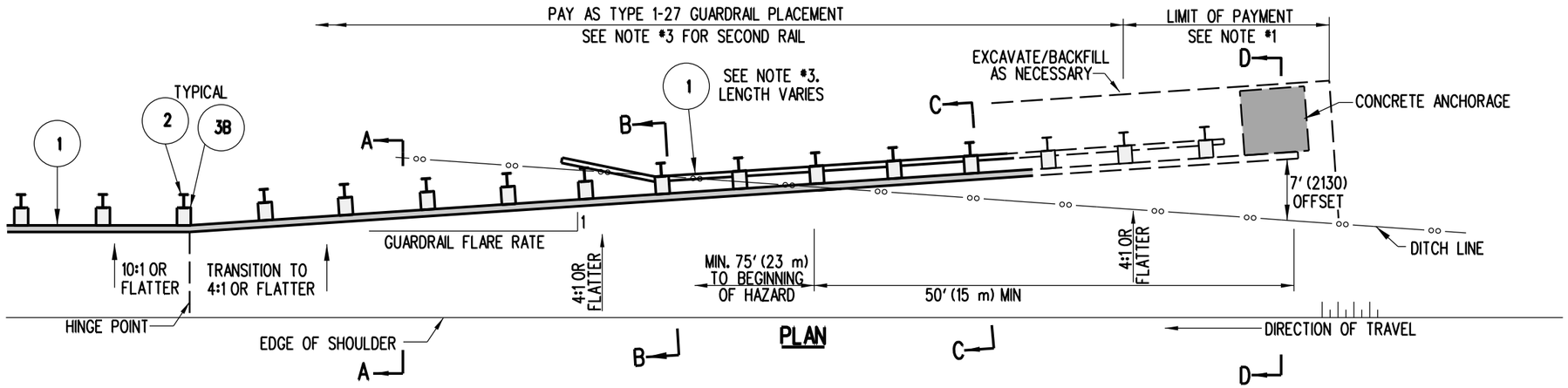
STANDARD NO.	B-20 (2010)	SHT. 1	OF 3

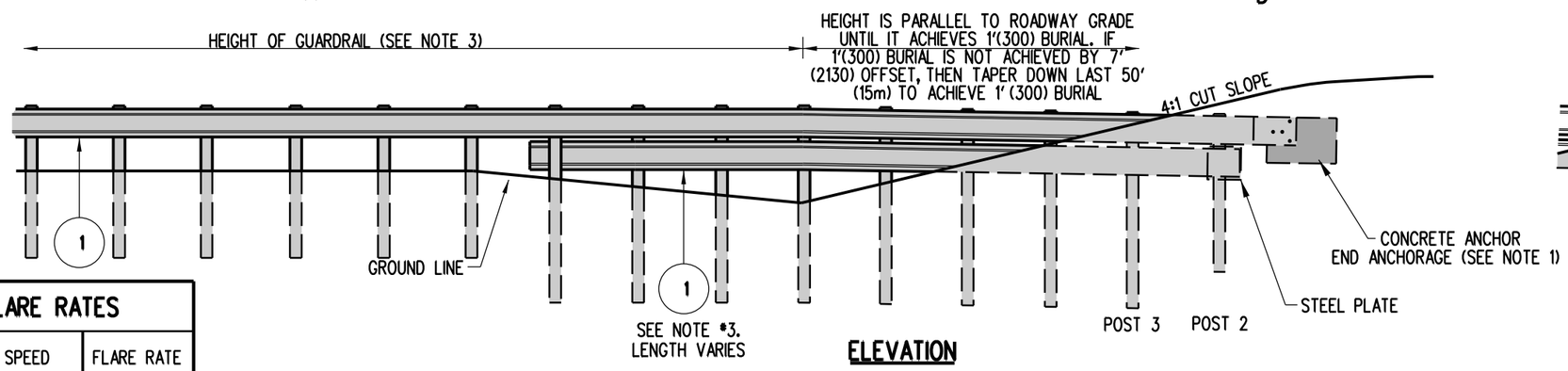
APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 — DATE

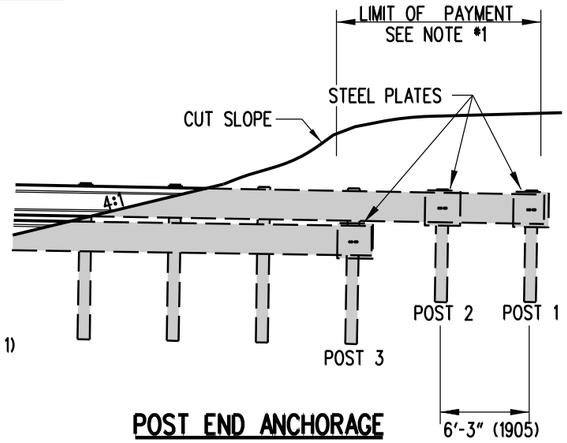
RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 — DATE

09/03/2010

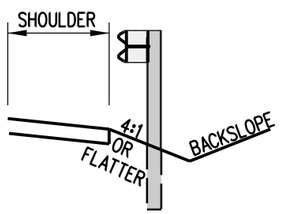
SCALE : N.T.S.

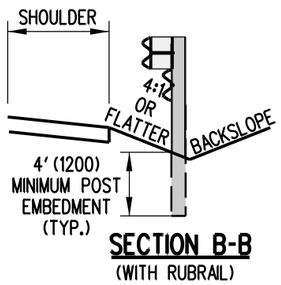


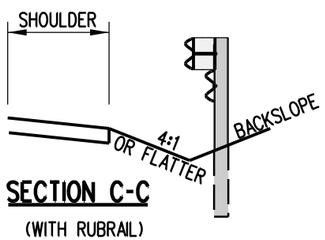


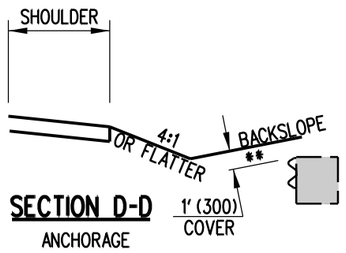


FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1









** 1' (300) BURIAL IS NOT REQUIRED WHEN ANCHORING IN ROCK.

NOTES:

1). BURIED END SECTION PAYMENT INCLUDES THE CONCRETE OR POST ANCHORAGE, EXCAVATION, BACKFILL, AND ALL APPLICABLE ITEMS, INCLUDING LABOR NECESSARY TO COMPLETE END ANCHORAGE.

2). THE CONTRACTOR HAS THE OPTION OF USING EITHER A CONCRETE BLOCK ANCHOR OR A POST ANCHOR TO TERMINATE THE BURIED END SECTION.

3). THE TOP OF THE W-BEAM SHALL BE HELD CONSTANT RELATIVE TO THE ROADWAY PROFILE GRADE UNTIL IT CROSSES THE DITCH FLOW LINE. A SECOND W-BEAM RAIL IS REQUIRED WHEN THE DISTANCE BETWEEN THE GROUND AND THE BOTTOM OF THE TOP RAIL EXCEEDS 18" (450). THE MAXIMUM HEIGHT OF THE DOUBLE RAIL SYSTEM IS 45" (1150). IF NECESSARY, TAPER BOTH RAILS DOWN TO MAINTAIN MAXIMUM HEIGHT. SECOND RAIL SHALL BE PAID FOR AS ADDITIONAL LINEAR FEET (LINEAR METERS) OF TYPE 1-27 OR 1-31 GUARDRAIL.

4). WHEN USING A SECOND RAIL, 8' (2400) LONG POSTS ARE REQUIRED. BEHIND THE DITCHLINE, POSTS MUST PROVIDE 4' (1200) MINIMUM EMBEDMENT (20" (510) WHEN ROCK IS ENCOUNTERED). POSTS FOR THE POST ANCHOR SHALL BE 6' (1800) LONG.

5). WHEN USING THE BURIED END SECTION, THE DESIGN MUST PROVIDE A MINIMUM OF 75' (23 m) FROM WHERE THE GUARDRAIL CROSSES THE DITCH LINE TO THE BEGINNING OF THE HAZARD.

6). MAINTAIN THE FLARE OF THE GUARDRAIL UNTIL THE 12" (300) COVER HAS BEEN ATTAINED. IF THE 12" (300) COVER CANNOT BE ATTAINED BEFORE THE RAIL IS 7' (2100) BEHIND THE BOTTOM OF THE DITCH, THEN SLOPE THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 7' (2100) BEHIND THE DITCH, SO THAT IT HAS 12" (300) OF COVER.

DELAWARE
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION - DOUBLE RAIL SYSTEM

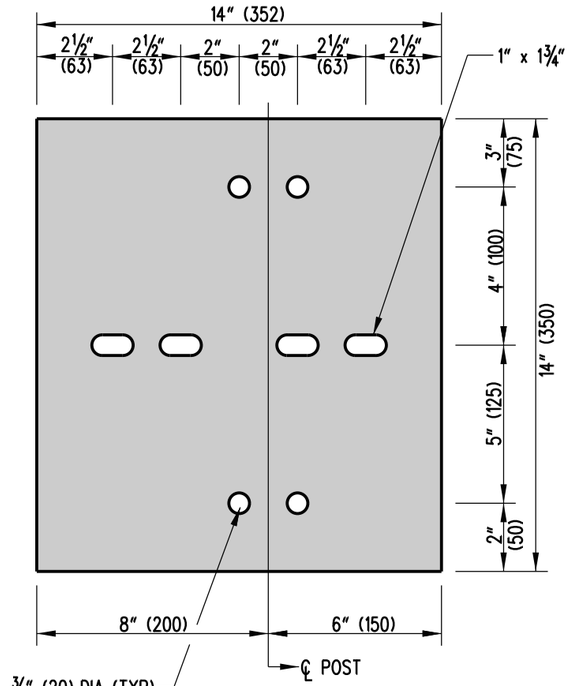
STANDARD NO. B-20 (2010) | **SHT.** 2 **OF** 3

APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 DATE

RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 DATE

09/03/2010

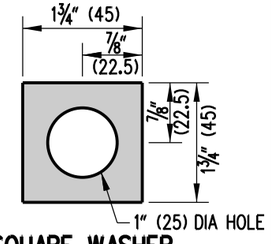
SCALE : N.T.S.



STEEL PLATE - ½" (13) THICK

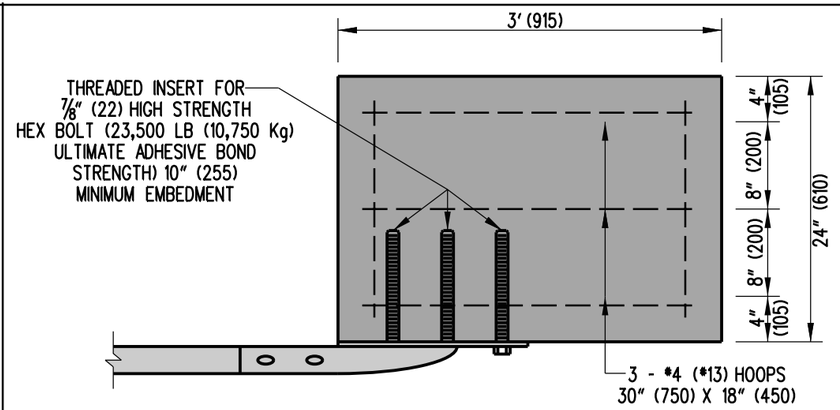
GALVANIZED

NOTE: ALL HOLES TO BE DRILLED PRIOR TO GALVANIZING.

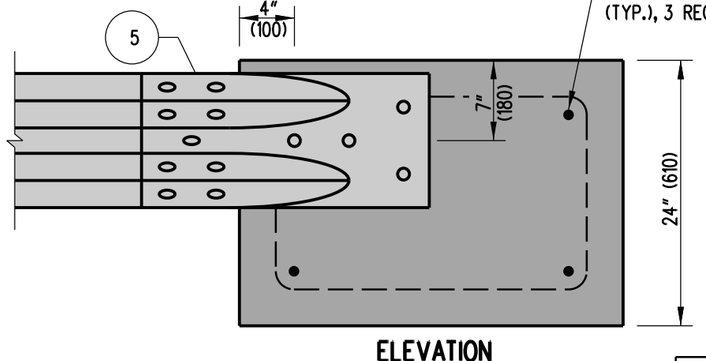


SQUARE WASHER

¼" (6) THICK - GALVANIZED

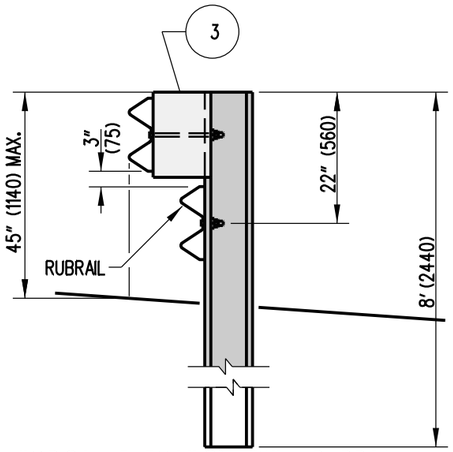


PLAN

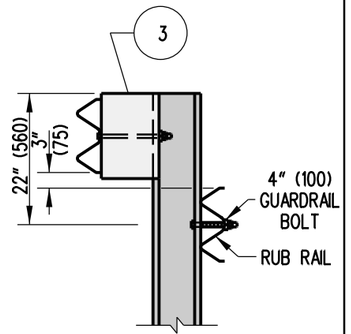


ELEVATION

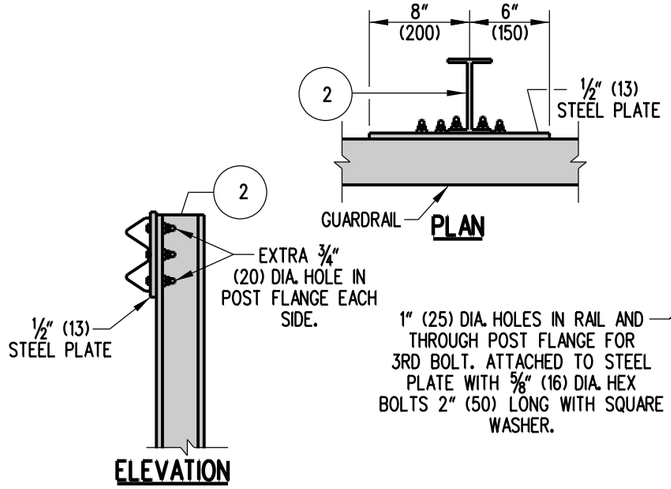
CONCRETE BLOCK ANCHOR



TYPICAL ELEVATION WITH RUBRAIL

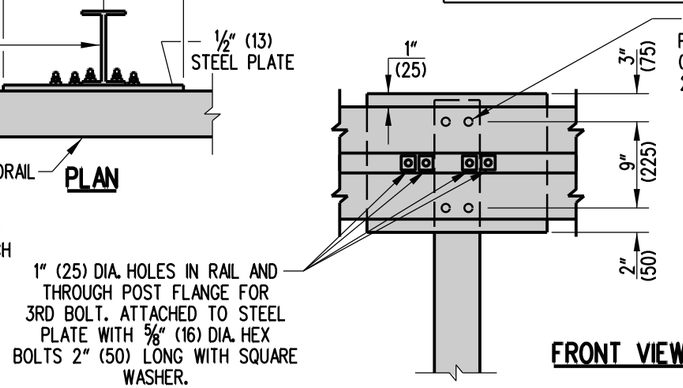


ELEVATION



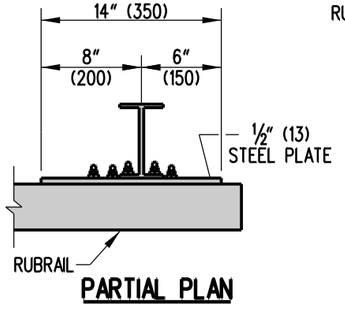
PLAN

ELEVATION

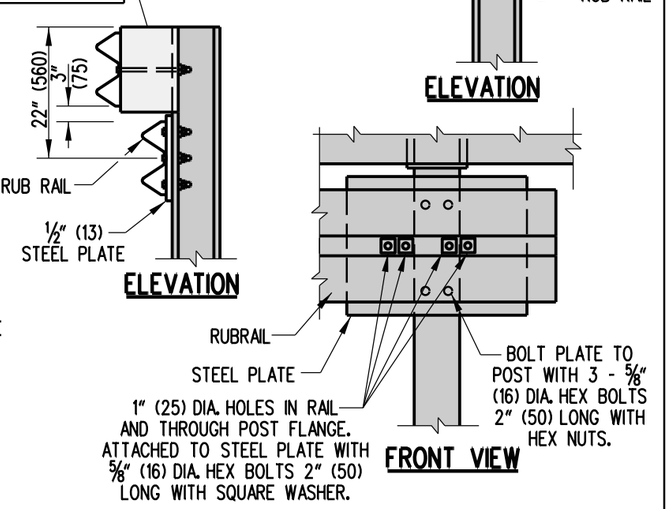


FRONT VIEW

POST ANCHOR DETAIL



PARTIAL PLAN



ELEVATION

FRONT VIEW

RUBRAIL ANCHOR ATTACHMENT

DELAWARE
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

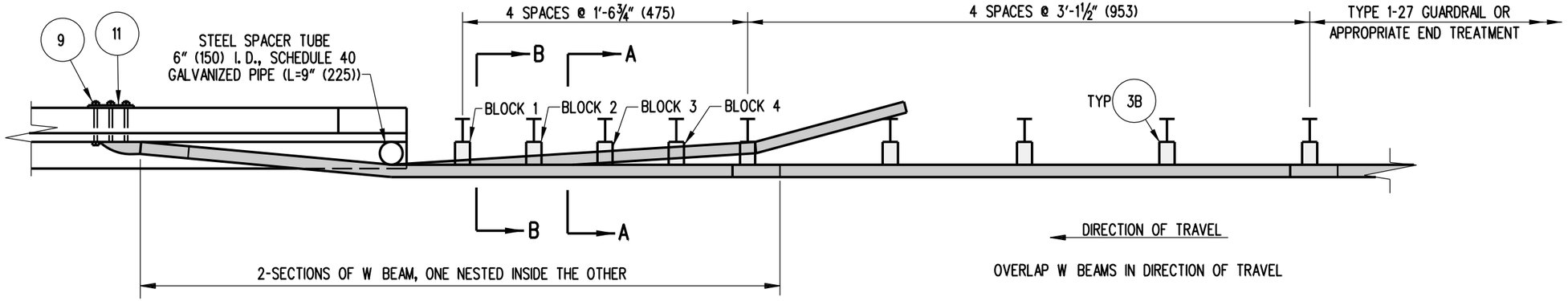
STANDARD NO.	**B-20 (2010)**	**SHT. 3**	**OF 3**

APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 DATE

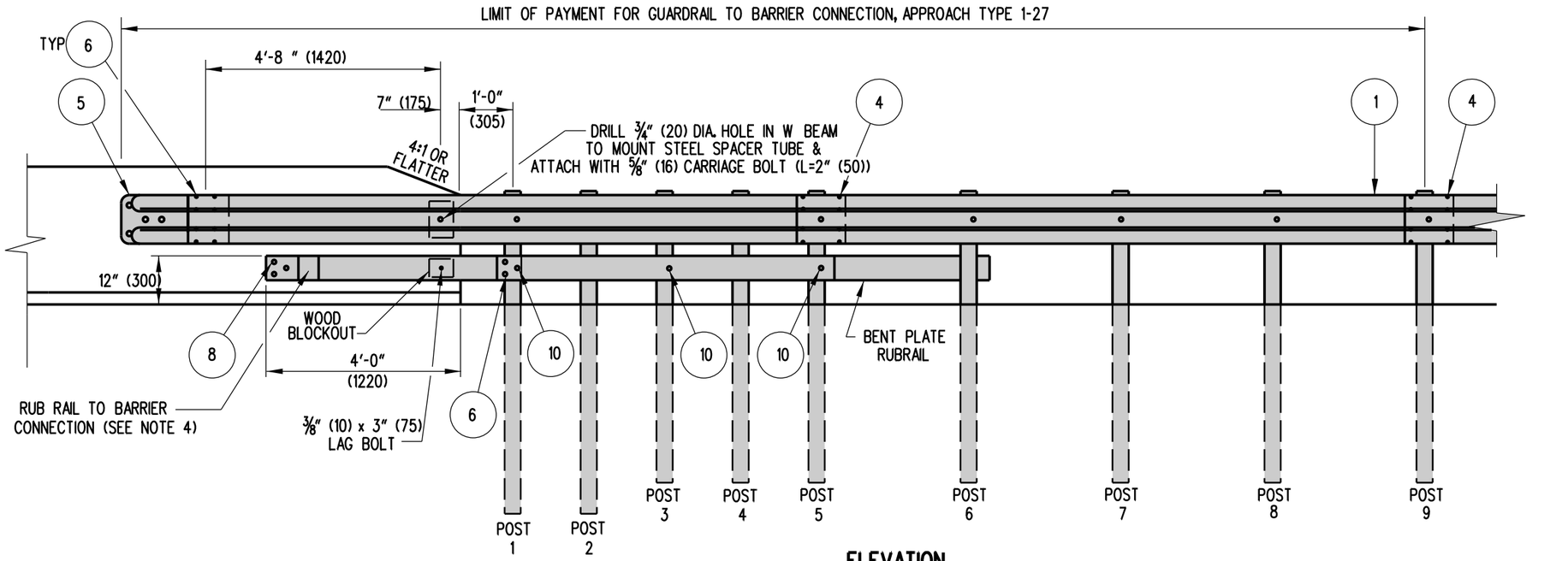
RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 DATE

12/17/2010

SCALE : N.T.S.



PLAN



ELEVATION

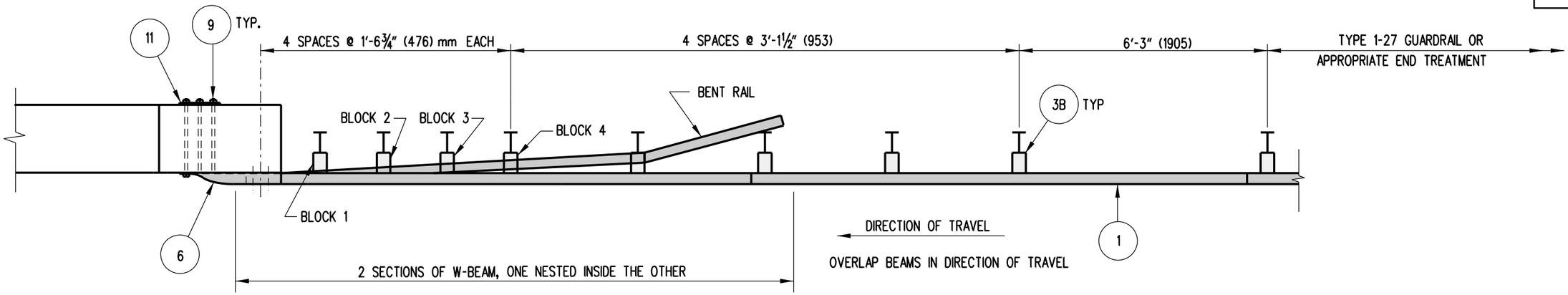
NOTES:

1). THE W-BEAM AND RUB RAIL ARE NOT BOLTED TO POSTS AT POSTS 2 THROUGH 4.
2). POSTS 1 THROUGH 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER WOOD BLOCKS AND/OR RUBRAIL AND WOOD BLOCK
3). USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (FOR ⅝" (16) BOLT) BETWEEN HEADS AND RUB RAIL.
4). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
5). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
6). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
7). POSTS 1 & 2 ARE W8x13 (W200x19.3), 7'-6' (2.28m) LONG. ALL OTHER POSTS IN TRANSITION ARE W6x9 (W150x13.5), 6'-0" (1.82m) LONG.
8). SEE DETAIL B-5, SHEETS 2 AND 3 OF 6 FOR HARDWARE DETAILS.

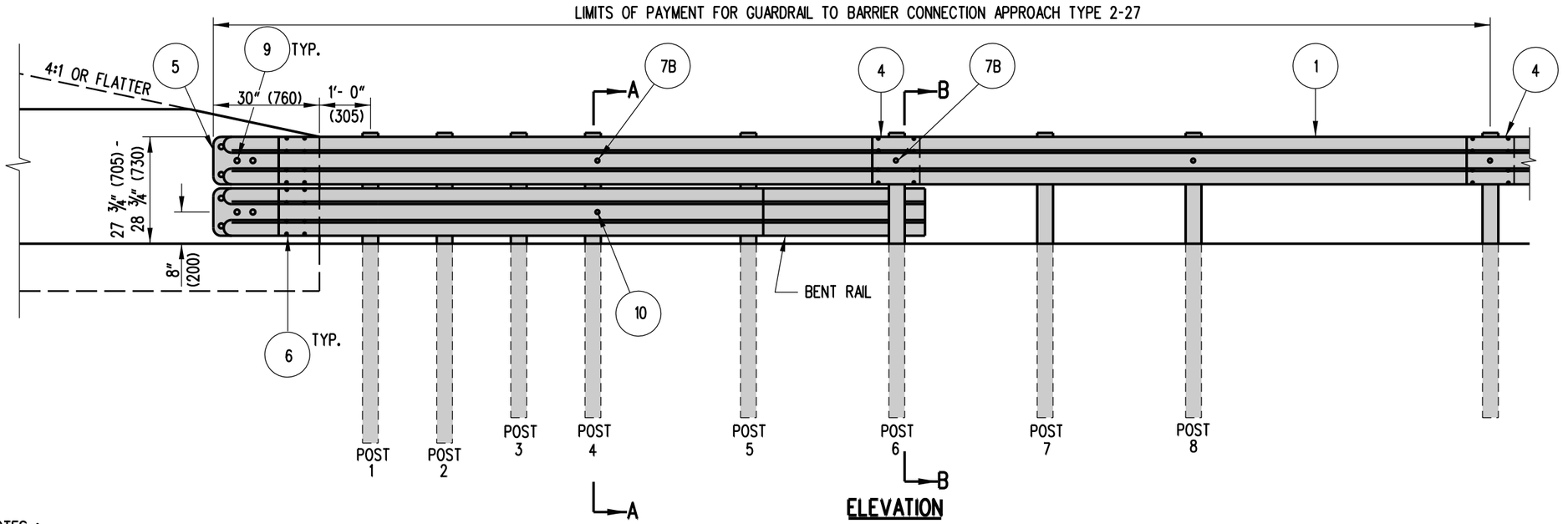
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-27		APPROVED SIGNATURE ON FILE — CHIEF ENGINEER — 12/28/2010 DATE
	STANDARD NO. B-21 (2010)	SHT. 1 OF 3	RECOMMENDED SIGNATURE ON FILE — DESIGN ENGINEER — 12/27/2010 DATE

09/20/2010

SCALE : N.T.S.



PLAN



ELEVATION

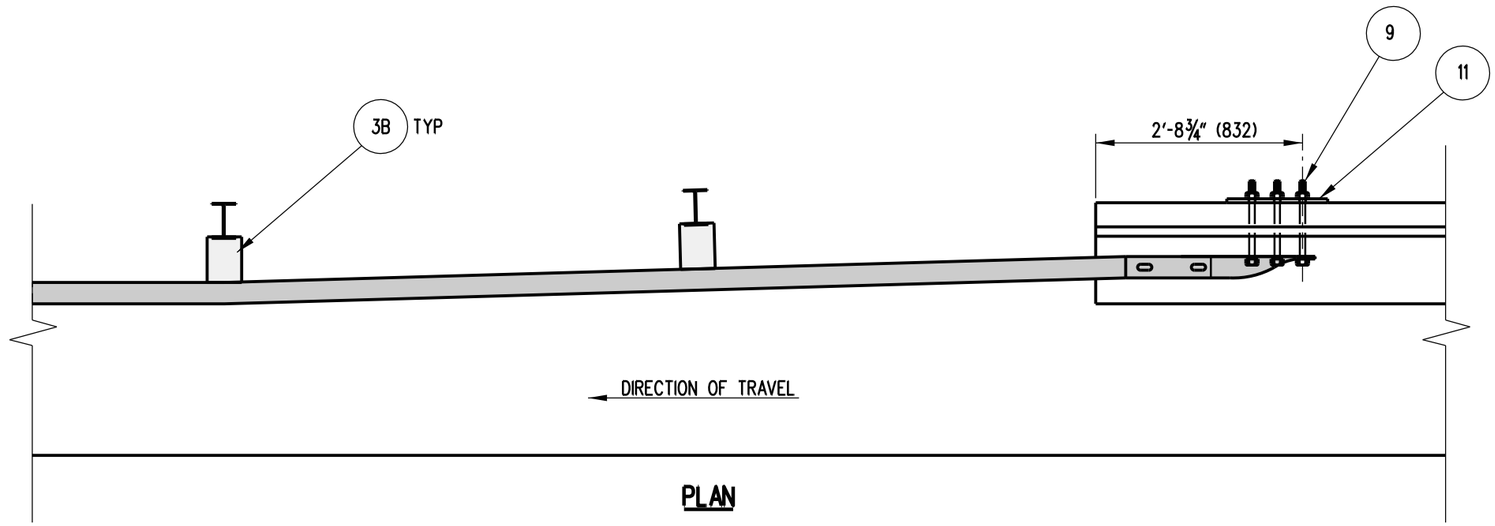
NOTES :

1). CURB SHALL NOT BE USED AT THE FACE OF RAIL WITHIN THE LIMITS OF THIS INSTALLATION.
2). POSTS 1, 2, 3, 4, AND 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH WOOD BLOCKS AND/OR BENT RAIL.
3). DO NOT ATTACH RAILS TO POSTS 1, 2, 3, 5, OR 7.
4). POSTS 1 AND 2 ARE W8x13 (W200x19.3), 7'-6" (2.28m) LONG. ALL OTHER POSTS IN TRANSITION ARE W6x9 (w150x13.5), 6'-0" (1.82m) LONG.
5). BENT RAIL MAY BE SHOP BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.
6). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.
7). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
8). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
9). FOR INSTALLATIONS WHERE CURB EXISTS, IF THE EXISTING CURB IS 8" (200) OR HIGHER AND CANNOT BE REMOVED, THE BOTTOM RAIL CAN BE ELIMINATED.
10). SEE DETAIL B-5, SHEET 5 OF 6 FOR HARDWARE DETAILS.
11). BENT RAIL SHALL BE BOLTED TO THE BACK OF POST 6 WITH A ⅝" (16) GUARDRAIL BOLT, 4" (200) LONG, WASHER, AND NUT.

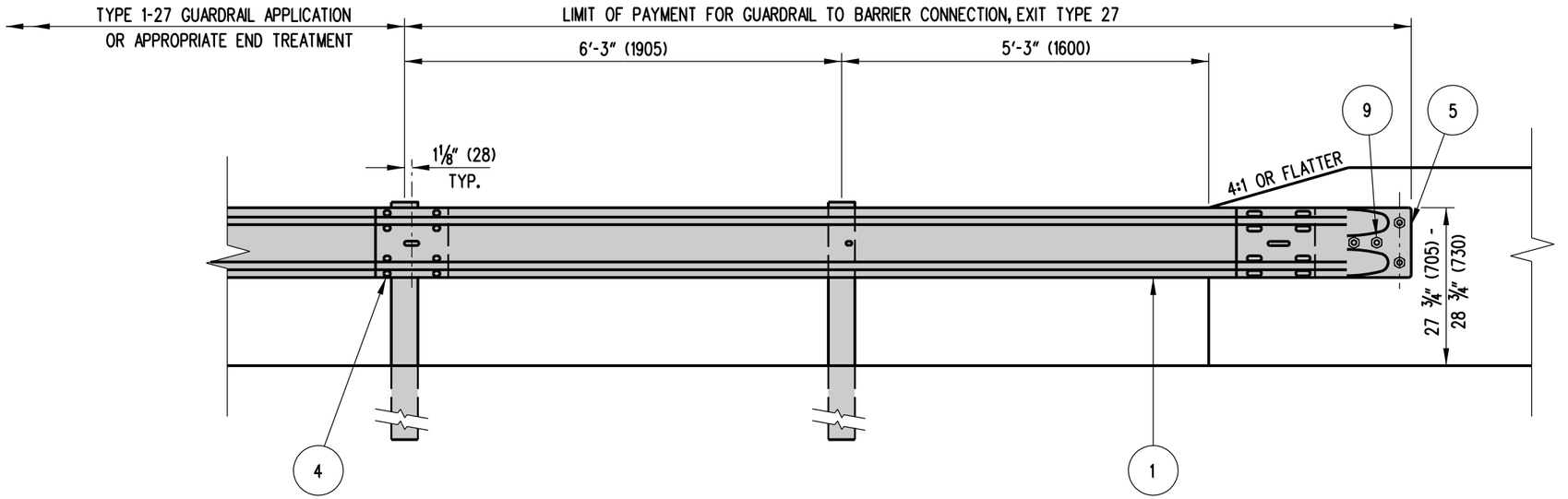
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-27		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-21 (2010)	SHT. 2 OF 3	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/20/2010

SCALE : N.T.S.



PLAN



ELEVATION

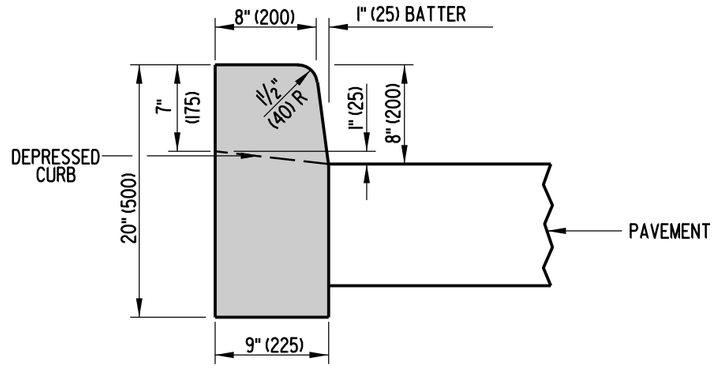
NOTES:

1). CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTO TO PARAPET.
2). GUARDRAIL SECTION AND TERMINAL CONNECTORS SHALL BE OVERLAPPED IN THE DIRECTION OF TRAVEL
3). INSTALLATION SHOWN ABOVE WITH AN 'F-TYPE' BARRIER FACE. GUARDRAIL SECTION OF BARRIER CONNECTION SHALL BE ADJUSTED HORIZONTALLY IN ORDER TO MEET FLUSH AGAINST VARIOUS TYPES OF WALLS AND BARRIERS.

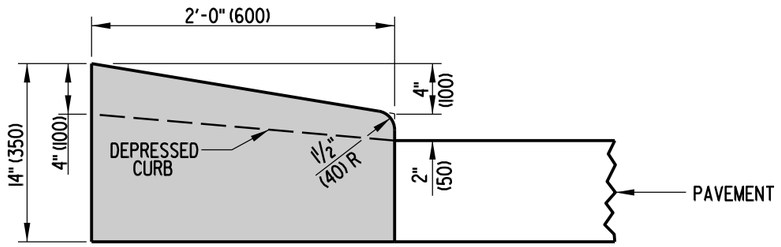
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE 27	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-21 (2010) SHT. 3 OF 3	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/20/2010

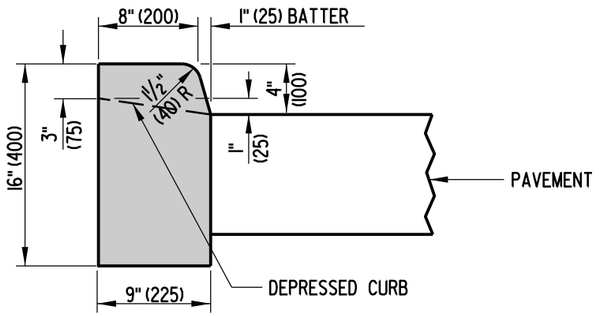
SCALE : N.T.S.



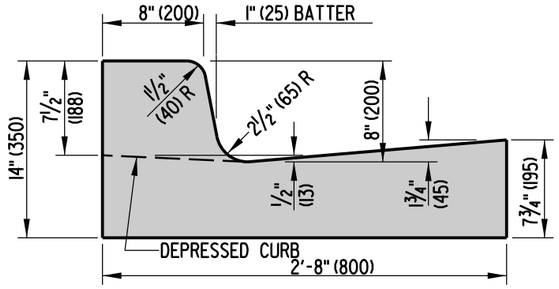
P.C.C. CURB
TYPE 1



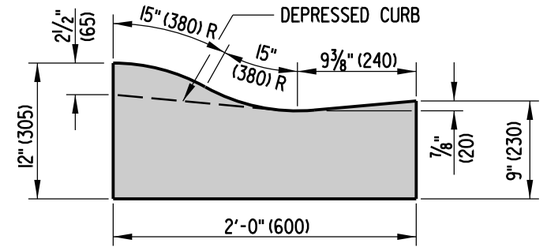
P.C.C. CURB
TYPE 2



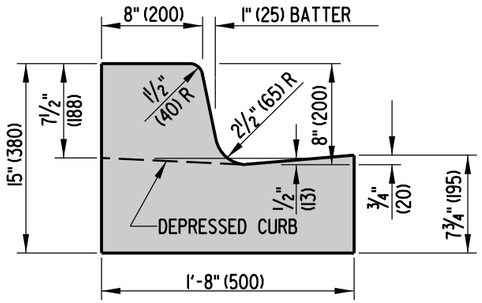
P.C.C. CURB
TYPE 3



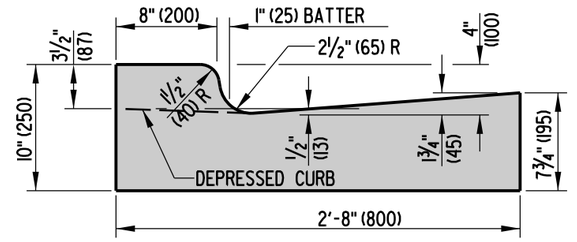
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 1



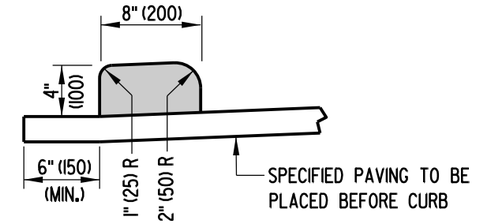
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 2



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

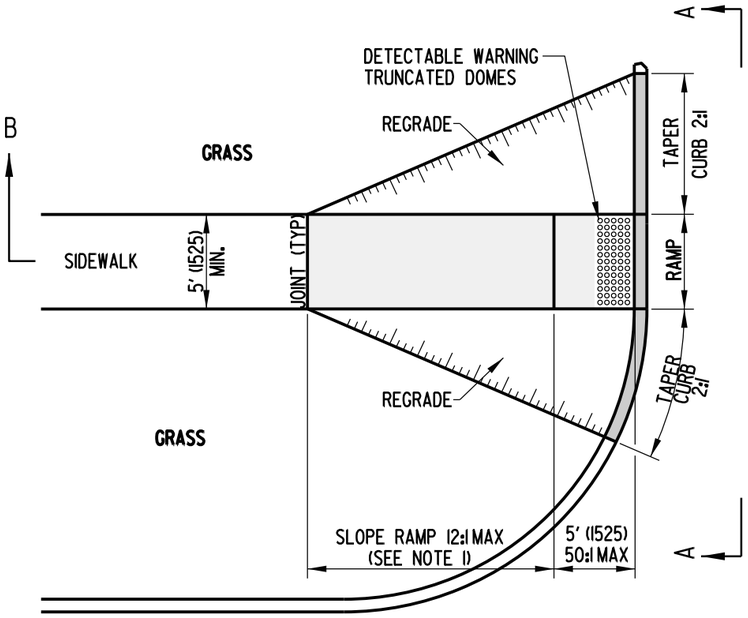
NOTES:

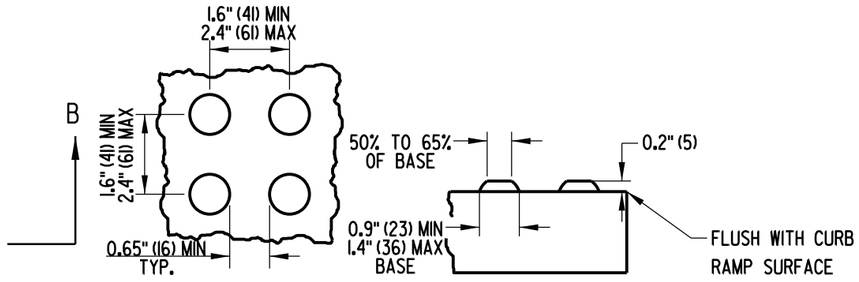
1. WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON DETAIL P-2, SHEET 3 OF 5. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
2. DEPRESS CURB AT ENTRANCES AND CURB RAMPS 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 DETAIL C-2, SHEET 1 OF 4.
4. DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT NOSE OF ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 12:1.

DELAWARE DEPARTMENT OF TRANSPORTATION	P.C.C. CURB, P.C.C. CURB & GUTTER, AND HOT-MIX CURB	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 01/19/2010 (DATE)
	STANDARD NO. C-1 (2009) SHT. 1 OF 1	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 01/14/2010 (DATE)

01/12/2009

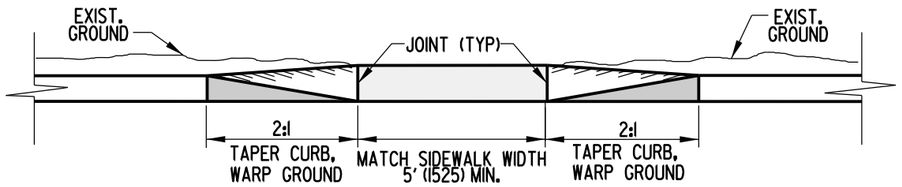
SCALE : N.T.S.



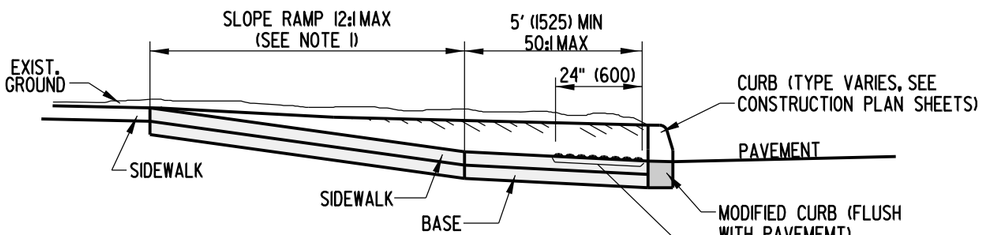


DETECTABLE WARNING TRUNCATED DOME DETAILS

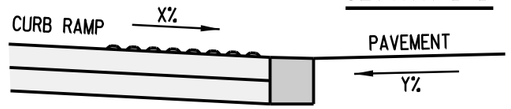
NOTES:
A). THE AREA OF DETECTABLE WARNING TRUNCATED DOMES SHALL BE 24" (600) LONG AND THE FULL WIDTH OF THE RAMP OR DEPRESSED CURB.
B). SEE SPECIFICATION FOR ADDITIONAL INFORMATION.



ELEVATION A-A

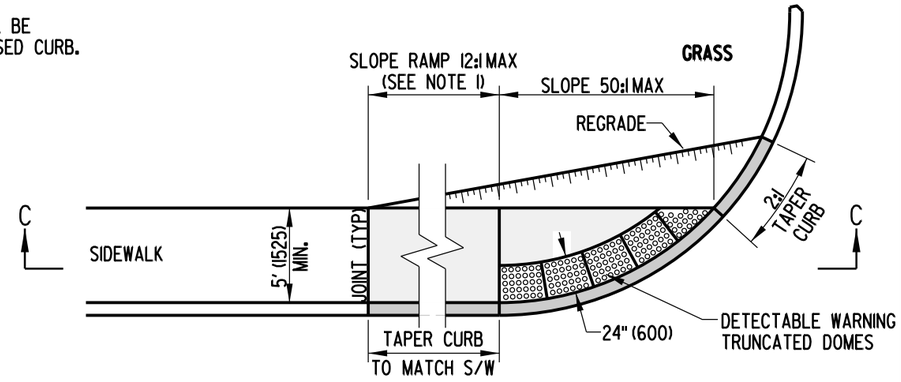


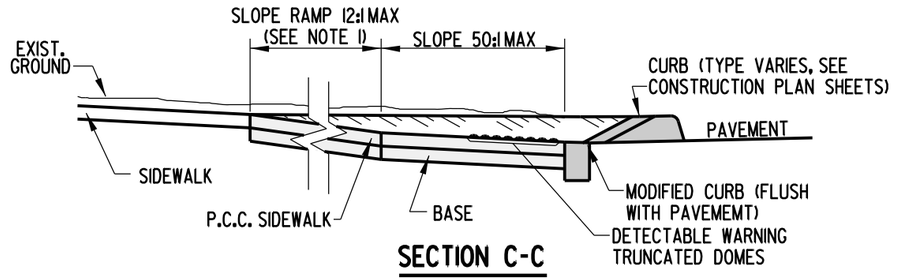
SECTION B-B



MAXIMUM DIFFERENCE IN GRADE

FOR EXAMPLE, IF THE CURB RAMP AND DEPRESSED CURB SLOPE (X) IS 8.1% AND THE PAVEMENT SLOPE (Y) IS 4.0%, THEN TO DETERMINE THE DIFFERENCE IN GRADE, ADD X + Y TO GET 12.1%. WHICH IS GREATER THAN THE 11% PREFERRED BUT LESS THAN THE 13% MAXIMUM.





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 ALLOWED TO EXCEED 12:1.
2). RAMP AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM.
3). IF GRADING WILL BE STEEPER THAN 6:1, THEN A TYPE 1 CURB OR RETAINING WALL SHOULD BE USED TO ELIMINATE THE NEED FOR THE STEEP SLOPE.
4). THE MAXIMUM DIFFERENCE IN GRADE BETWEEN THE CURB RAMP OR MODIFIED CURB AND THE PAVEMENT SHALL BE 13%, HOWEVER 11% IS PREFERRED.

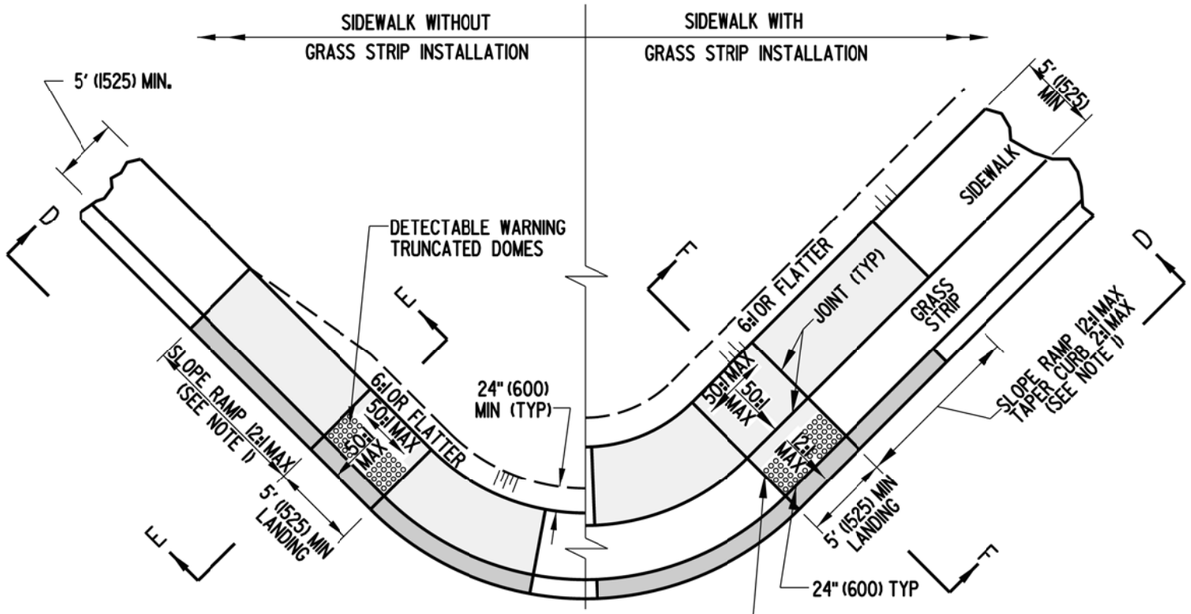
CURB RAMP, TYPE 1

PERPENDICULAR CURB RAMP

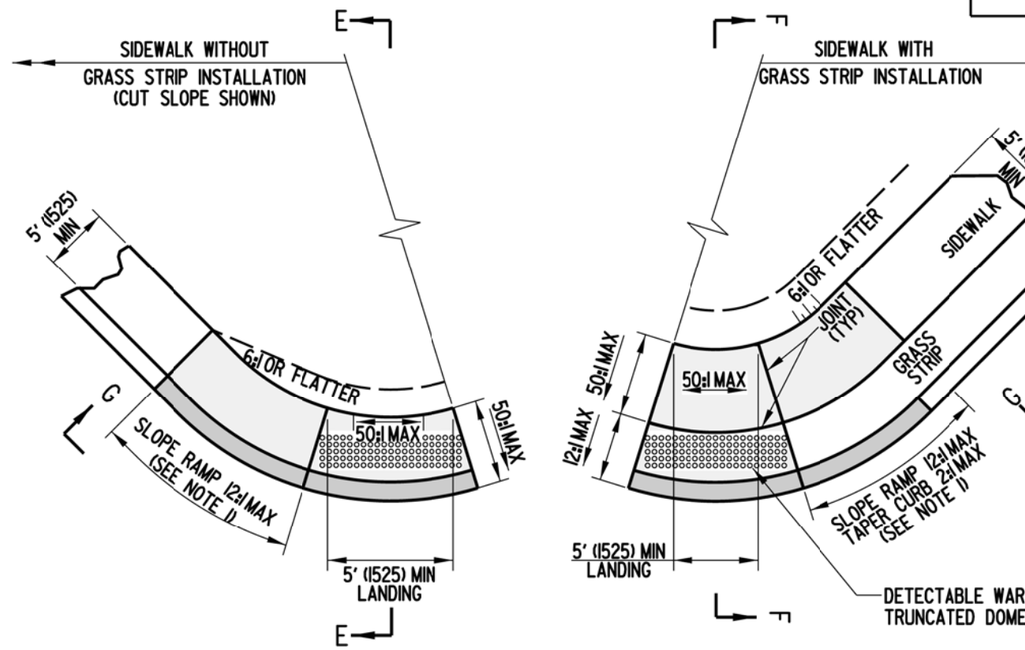
DELAWARE DEPARTMENT OF TRANSPORTATION	CURB RAMP, TYPE 1 AND SECTIONS		APPROVED CHIEF ENGINEER 11/18/08 DATE
	STANDARD NO. C-2 (2008)	SHT. 1 OF 4	RECOMMENDED DESIGN ENGINEER 11/17/08 DATE

10/16/2008

SCALE : N.T.S.

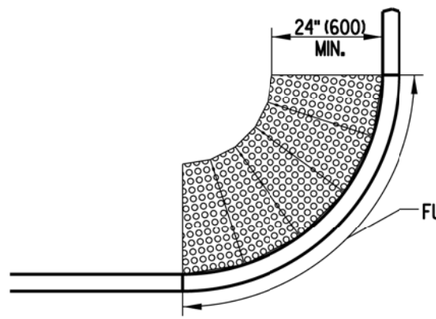


CURB RAMP, TYPE 2



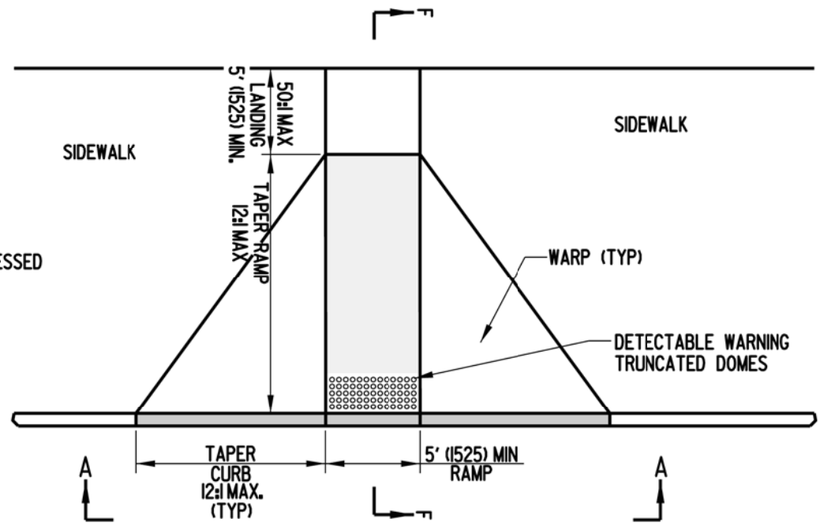
CURB RAMP, TYPE 3

DIAGONAL CURB RAMP



SAMPLE LAYOUT OF DETECTABLE WARNING TRUNCATED DOMES ALONG A CURB RADIUS

DETECTABLE WARNININGS SHALL BE PLACED
THE FULL WIDTH OF THE DEPRESSED CURB.



CURB RAMP, TYPE 4

PERPENDICULAR CURB RAMP

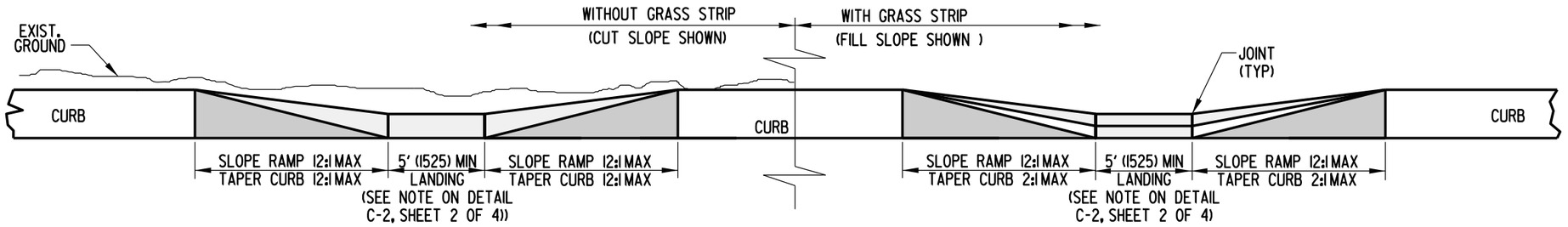
NOTES:

1). WHERE A 12:1 MAXIMUM SLOPE RAMP WILL NOT MEET THE SIDEWALK GRADE WITHIN A LENGTH OF 15' (4570) DUE TO STEEP ADJACENT ROADWAY, THE RAMP LENGTH MAY BE LIMITED TO 15' (4570), AND THE RAMP SLOPE ALLOWED TO EXCEED 12:1.
2). TRANSITION TO EXISTING SIDEWALK WIDTH OVER THE LENGTH OF THE RAMP.
3). RAMP AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM.
4). IF GRADING WILL BE STEEPER THAN 6:1 ADJACENT TO THE CURB RAMP OR SIDEWALK, THEN A TYPE I CURB OR RETAINING WALL SHOULD BE USED TO ELIMINATE THE NEED FOR THE STEEP SLOPE.
5). FOR THE CURB RAMP, TYPE 3, IF THE WIDTH OF THE FULLY DEPRESSED CURB AT THE STREET IS MORE THAN 5' (1525), THE THE DETECTABLE WARNING TRUNCATED DOMES SHALL FOLLOW THE RADIUS OF THE CURB CONTINUOUSLY WITHOUT GAPS FOR THE ENTIRE LENGTH OF DEPRESSED CURB.
6). THE MAXIMUM DIFFERENCE IN GRADE BETWEEN THE SIDEWALK OR CURB AND THE PAVEMENT SHALL BE 13%, HOWEVER 11% IS PREFERRED. SEE STANDARD NO. C-2, SHEET 1 OF 4.
7). IF THE WIDTH OF THE FULLY DEPRESSED CURVED CURB AT THE STREET IS 5' (1525) OR LESS, THEN A RECTANGULAR PIECE OF DETECTABLE WARNING TRUNCATED DOMES MAY BE USED.

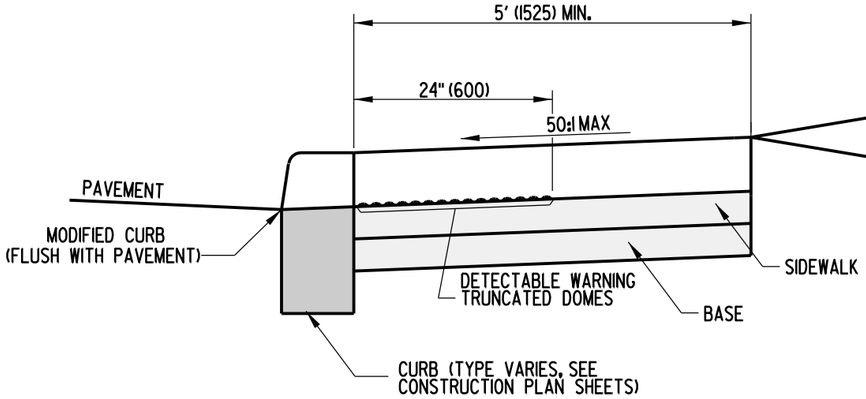
DELAWARE DEPARTMENT OF TRANSPORTATION	CURB RAMPS, TYPES 2, 3, & 4	APPROVED _____ CHIEF ENGINEER 11/18/08 DATE
	STANDARD NO. C-2 (2008) SHT. 2 OF 4	RECOMMENDED _____ DESIGN ENGINEER 11/17/08 DATE

11/16/2008

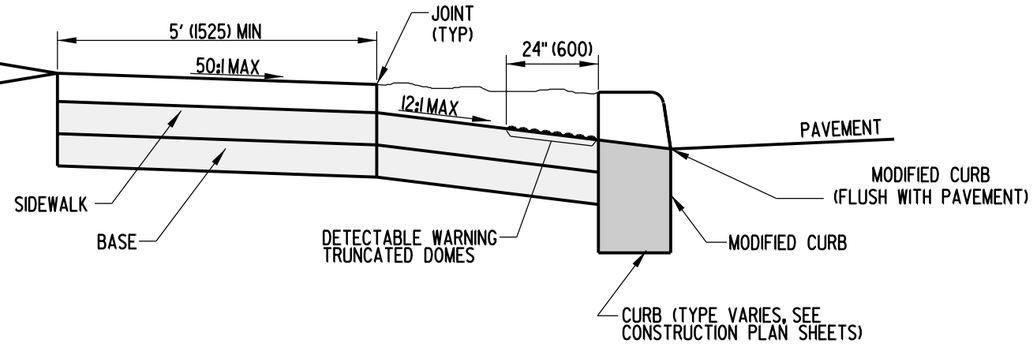
SCALE : N.T.S.



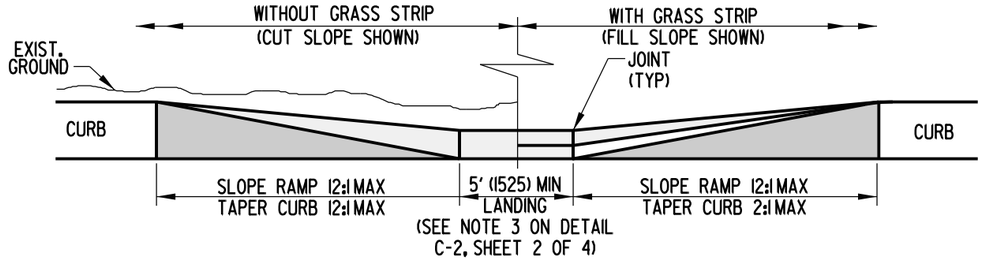
ELEVATION D-D



SECTION E-E



SECTION F-F

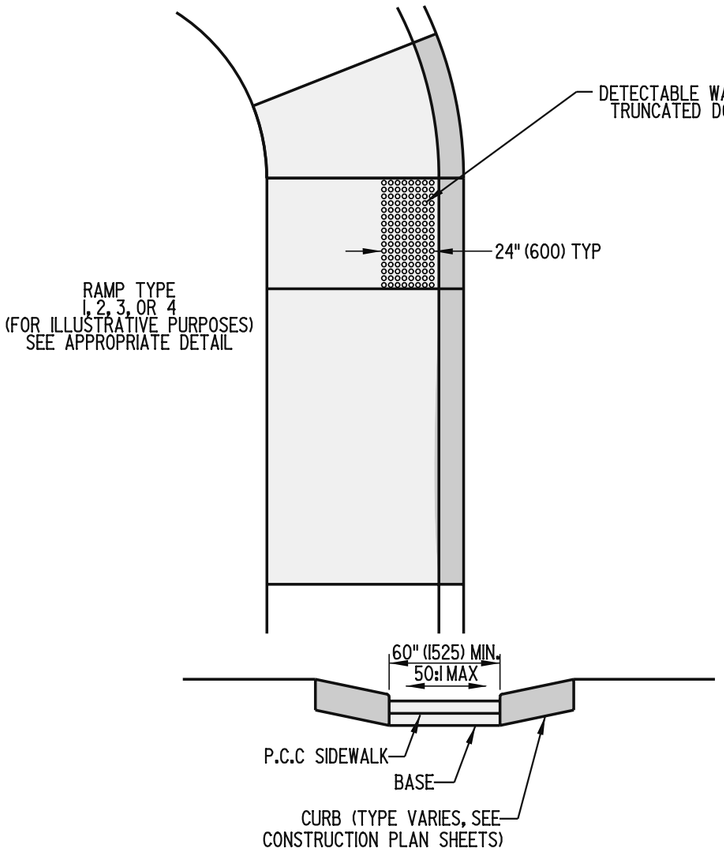


ELEVATION G-G

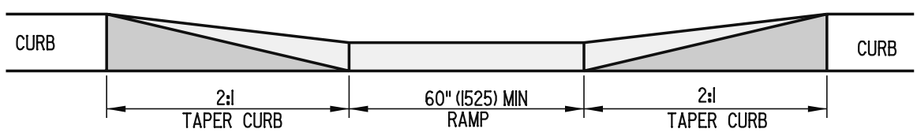
DELAWARE DEPARTMENT OF TRANSPORTATION	CURB RAMP SECTIONS FOR TYPES 2 & 3		APPROVED CHIEF ENGINEER 11/18/08 DATE
	STANDARD NO. C-2 (2008)	SHT. 3 OF 4	RECOMMENDED DESIGN ENGINEER 11/17/08 DATE

08/10/2004

SCALE : N.T.S.



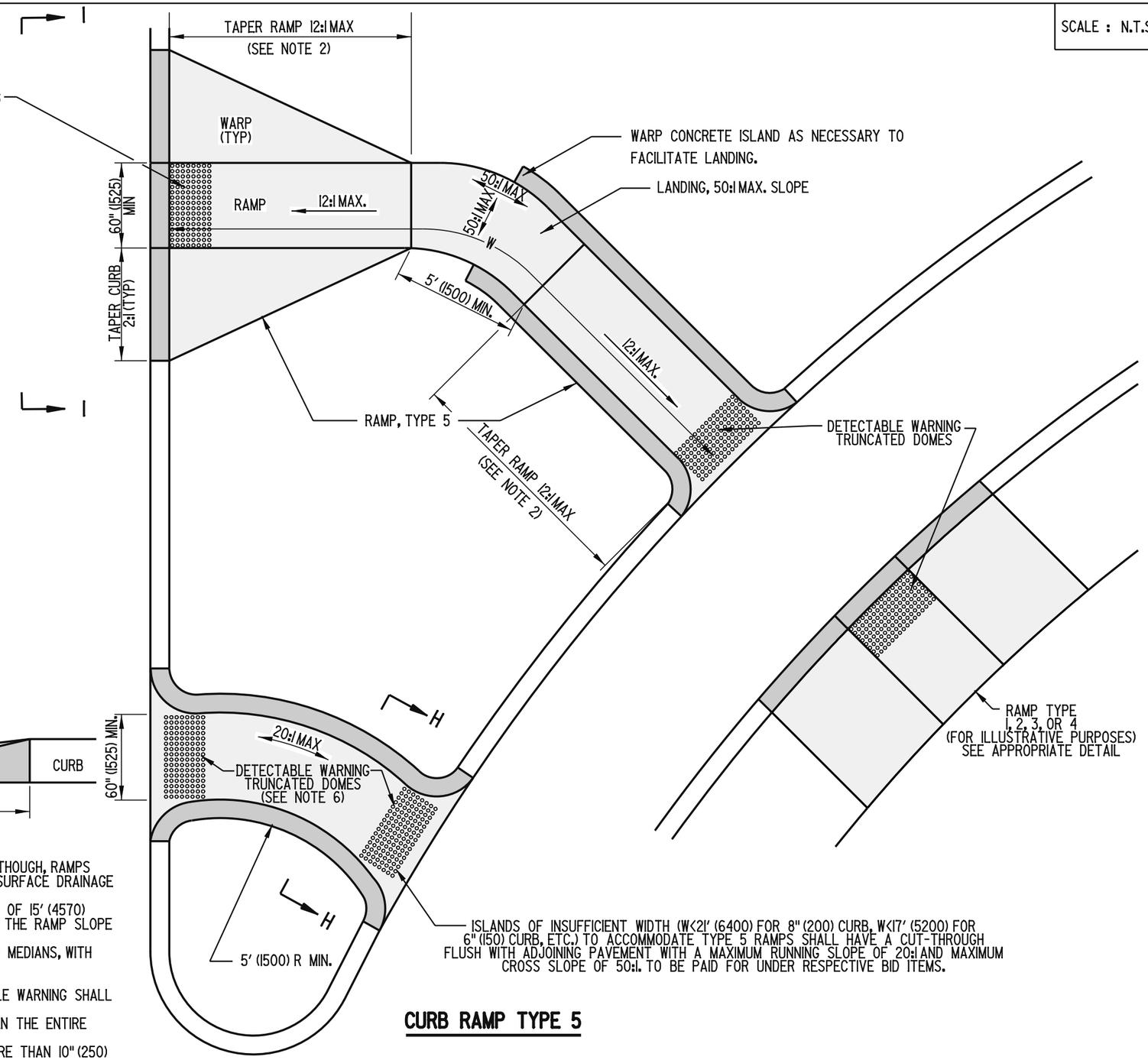
SECTION H-H



ELEVATION I-I

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.

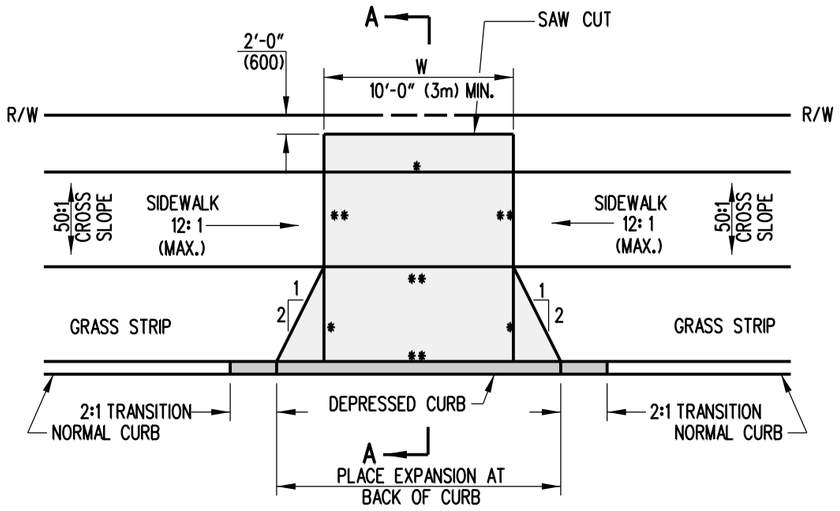


CURB RAMP TYPE 5

DELAWARE DEPARTMENT OF TRANSPORTATION	CURB RAMP TYPE 5 & SECTIONS		APPROVED _____ CHIEF ENGINEER DATE 10/10/06
	STANDARD NO. C-2 (2006)	SHT. 4 OF 4	RECOMMENDED _____ DESIGN ENGINEER DATE 10/9/06

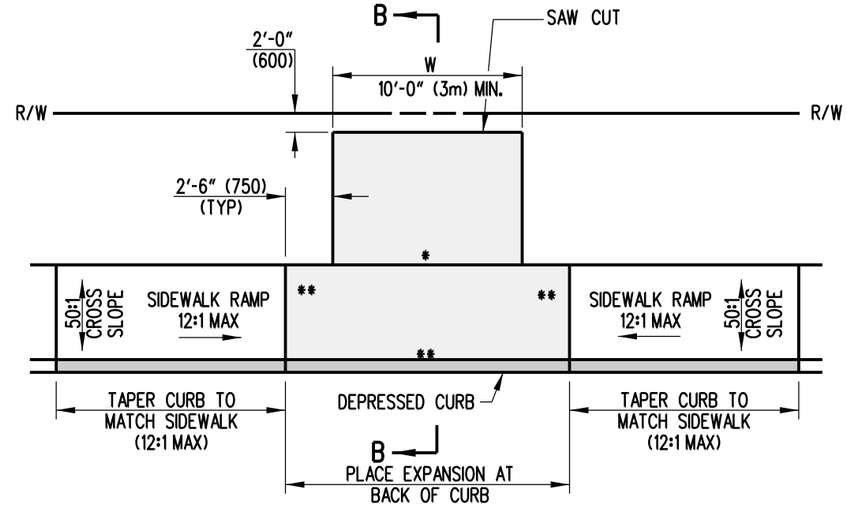
08/03/2006

SCALE : N.T.S.



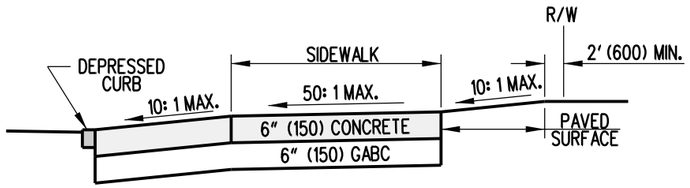
ENTRANCE WITH SIDEWALK AND GRASS STRIP

* - JOINT
** - EXPANSION MATERIAL

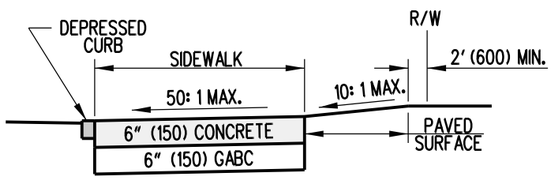


ENTRANCE WITH SIDEWALK AND NO GRASS STRIP

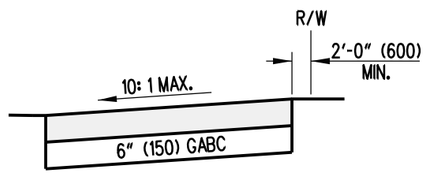
* - JOINT
** - EXPANSION MATERIAL



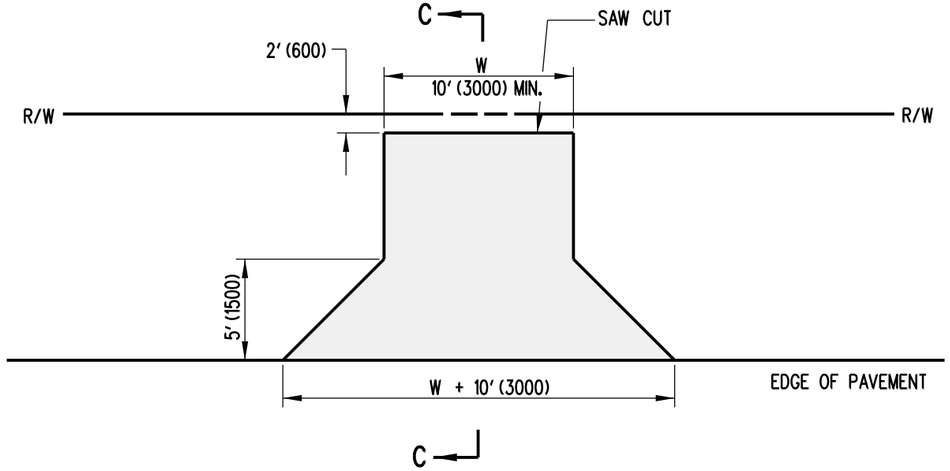
SECTION A-A



SECTION B-B



SECTION C-C



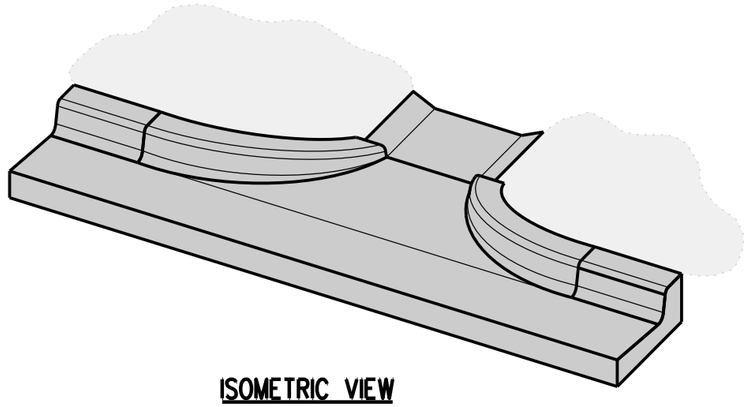
ENTRANCE WITHOUT SIDEWALK

NOTE: IF WIDTH OF DRIVEWAY IS 15' (4.5m) OR GREATER, THE FLARE AND EXTENSIONS CAN BE OMITTED.

DELAWARE DEPARTMENT OF TRANSPORTATION	ENTRANCES	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. C-3 (2010) — SHT. 1 OF 1	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

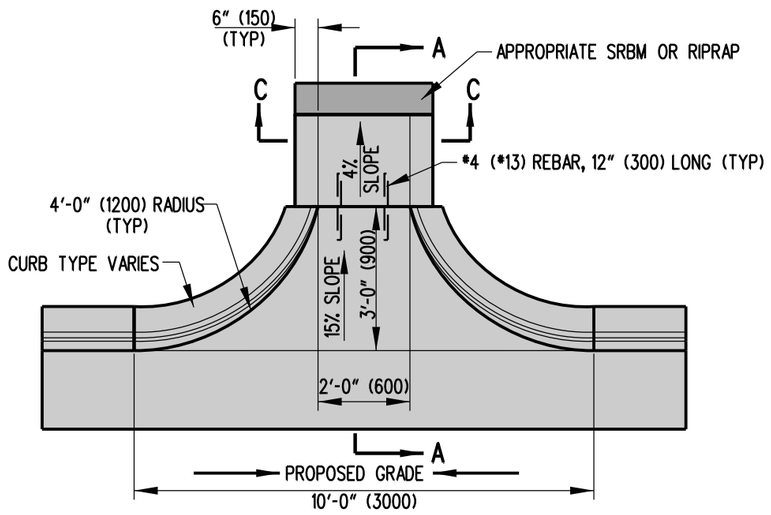
10/25/2010

SCALE : N.T.S.



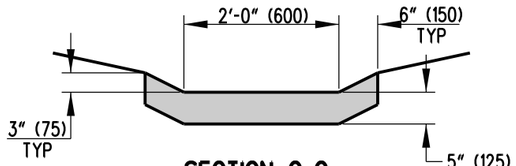
ISOMETRIC VIEW

SHOWN WITH INTEGRAL CURB & GUTTER, TYPE 1

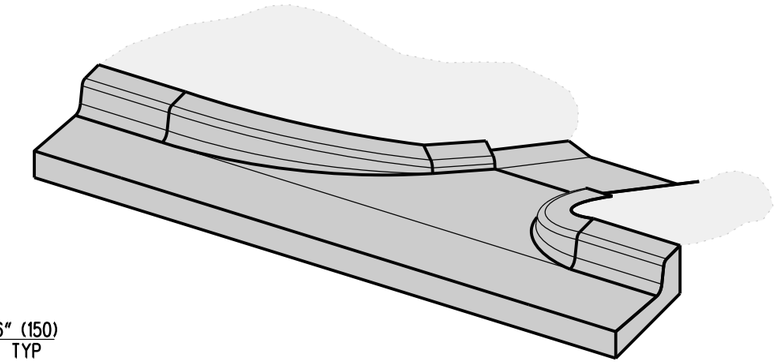


PLAN VIEW

IN SUMP LOCATION

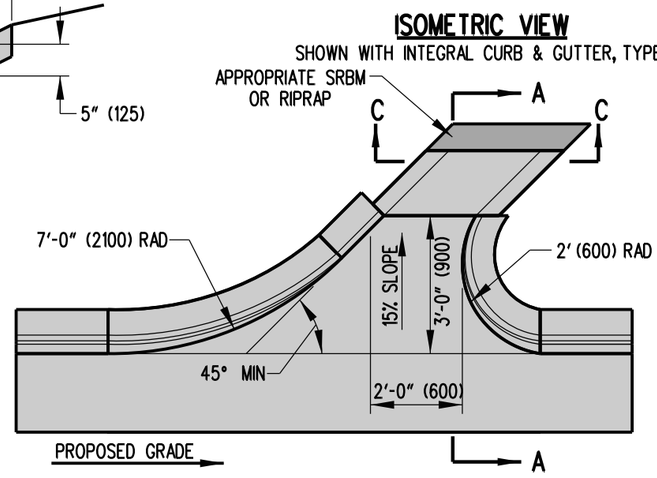


SECTION C-C



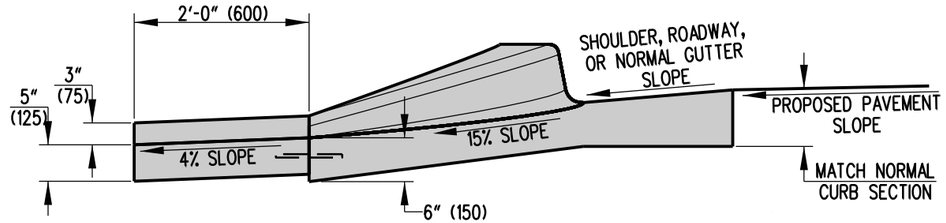
ISOMETRIC VIEW

SHOWN WITH INTEGRAL CURB & GUTTER, TYPE 1



PLAN VIEW

ON GRADE OR SLOPE

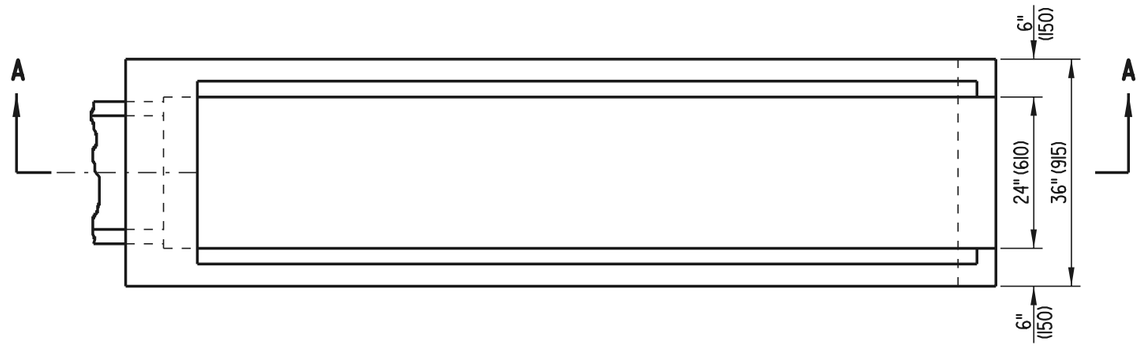


SECTION A-A

DELAWARE DEPARTMENT OF TRANSPORTATION	**CURB OPENING DETAILS**		**APPROVED** SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. C-4 (2010)	**SHT. 1 OF 1**	**RECOMMENDED** SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

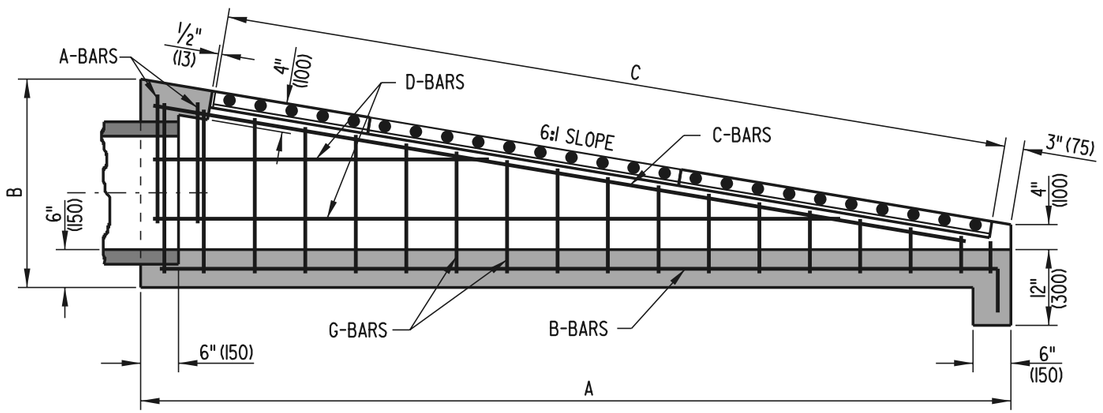
06/29/2010

SCALE : N.T.S.

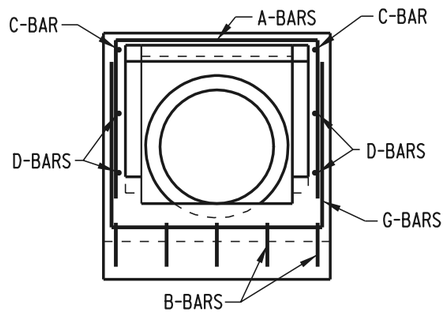


PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 6:1 SAFETY END STRUCTURE TO BE PRECAST



SECTION A-A



FRONT VIEW

DELAWARE DEPARTMENT OF TRANSPORTATION	6:1 SAFETY END STRUCTURE		APPROVED Lynne M. Hastings CHIEF ENGINEER DATE 6/18/01
	STANDARD NO. D-1 (2001)	SHT. 1 OF 2	RECOMMENDED DESIGN ENGINEER DATE 6/15/01

04/17/2001

SCALE : N.T.S.

DIMENSIONS

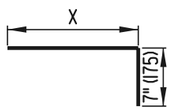
PIPE SIZE	A	B	C
15" (375)	9'-6" (2895)	2'-5" (735)	8'-4" (2540)
18" (450)	11'-6" (3505)	2'-9" (840)	10'-5" (3175)
21" (525) OR 24" (600)	14'-4" (4370)	3'-2⅝" (980)	12'-6" (3810)

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

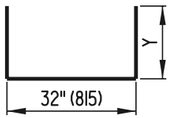
PIPE SIZE	X
15" (375)	9'-2" (2795)
18" (450)	11'-2" (3405)
21" (525) OR 24" (610)	14'-0" (4265)

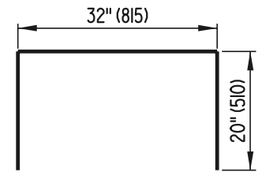


B-BARS

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)

G-BARS





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

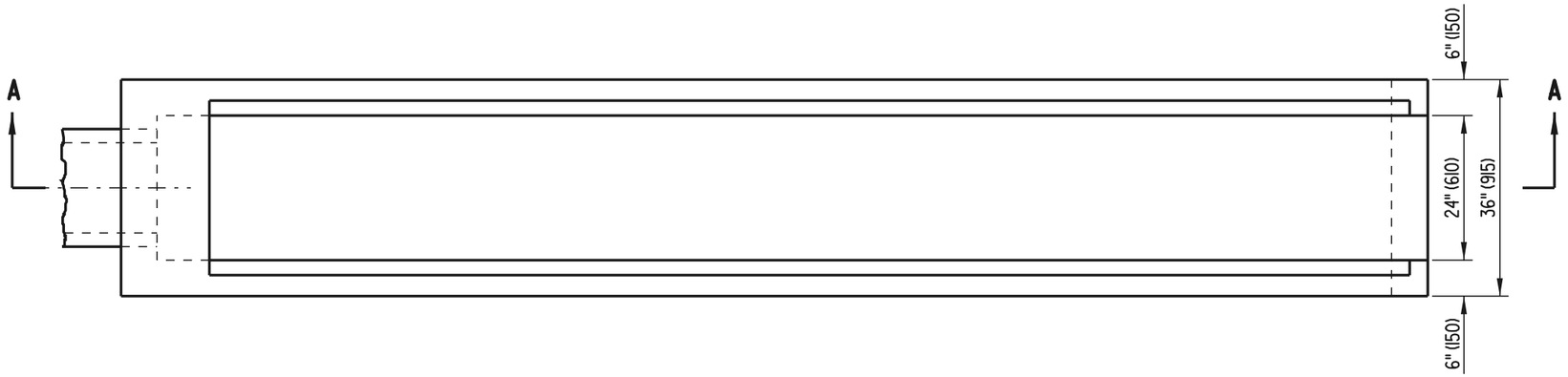
STANDARD NO. D-1 (2001) SHT. 2 OF 2

APPROVED Lynne M. Hastings CHIEF ENGINEER DATE 6/18/01

RECOMMENDED [signature] DESIGN ENGINEER DATE 6/15/01

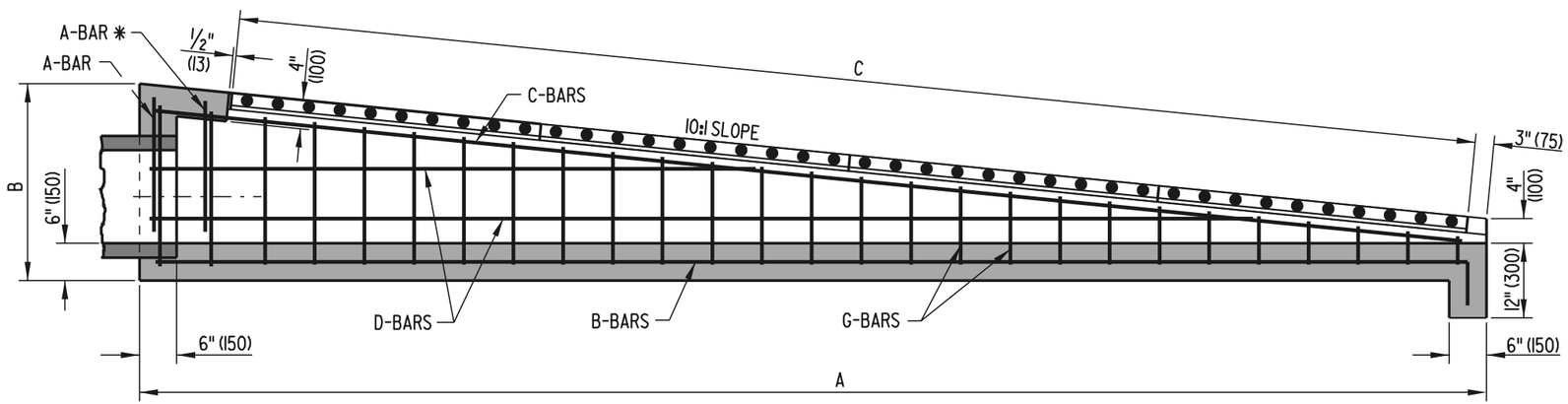
04/17/2001

SCALE : N.T.S.



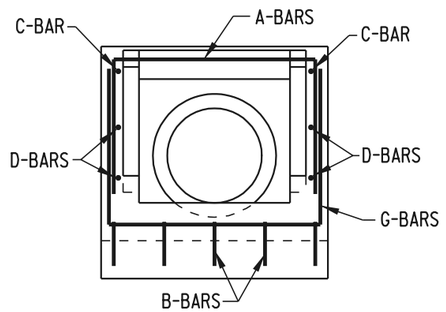
PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 10:1 SAFETY END STRUCTURE TO BE PRECAST



SECTION A-A

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



FRONT VIEW

DELAWARE DEPARTMENT OF TRANSPORTATION	10:1 SAFETY END STRUCTURE		APPROVED Lyme M. Hastings CHIEF ENGINEER DATE 6/18/01
	STANDARD NO. D-2 (2001)	SHT. 1 OF 2	RECOMMENDED DESIGN ENGINEER DATE 6/15/01

04/17/2001

SCALE : N.T.S.

DIMENSIONS

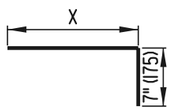
PIPE SIZE	A	B	C
15" (375)	15'-4" (4675)	2'-4 3/8" (720)	14'-7" (4445)
18" (450)	19'-6" (5945)	2'-9 3/8" (850)	18'-9" (5715)
21" (525) OR 24" (600)	24'-0" (7315)	3'-2 13/16" (985)	22'-11" (6985)

APPROXIMATE QUANTITIES

PIPE SIZE	CONCRETE FT³ (m³)		REINF. STEEL LBS. (kg)	NO. OF GRATES	LENGTH TO BE CUT FROM I 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)

BENDING DIAGRAM

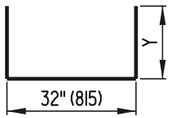
PIPE SIZE	X
15" (375)	15'-0" (4570)
18" (450)	19'-2" (5840)
21" (525) OR 24" (600)	23'-8" (7215)

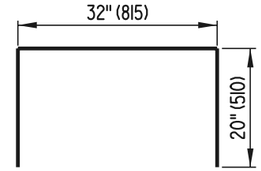


B-BARS

PIPE SIZE	Y
15" (375)	VARIES 21 1/2" (545) TO 4" (100)
18" (450)	VARIES 26 7/16" (670) TO 4" (100)
21" (525) OR 24" (600)	VARIES 31 3/4" (805) TO 4" (100)

G-BARS





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)	1	-	72" (1830)	#4 (#13)	5	8" (200)	15'-7" (4750)	#4 (#13)	2	-	15'-1 1/16" (4600)	#4 (#13)	4	8" (200)	VARIES 72 13/16" (1850) TO 145 5/8" (3700)	#4 (#13)	24	8" (200)	VARIES 40" (1015) TO 75 11/16" (1920)
18" (450)	#4 (#13)	1	-	72" (1830)	#4 (#13)	5	8" (200)	19'-9" (6020)	#4 (#13)	2	-	19'-3 3/8" (5875)	#4 (#13)	4	8" (200)	VARIES 89 5/8" (2275) TO 179 3/16" (4550)	#4 (#13)	30	8" (200)	VARIES 40" (1015) TO 85 3/4" (2180)
21" (525) OR 24" (600)	#4 (#13)	2	-	72" (1830)	#4 (#13)	5	8" (200)	24'-3" (7390)	#4 (#13)	2	-	23'-9 5/8" (7255)	#4 (#13)	6	8" (200)	VARIES 80 3/4" (2050) TO 242 1/8" (6150)	#4 (#13)	37	8" (200)	VARIES 40" (1015) TO 96 5/16" (2455)

DELAWARE
DEPARTMENT OF TRANSPORTATION

10:1 SAFETY END STRUCTURE

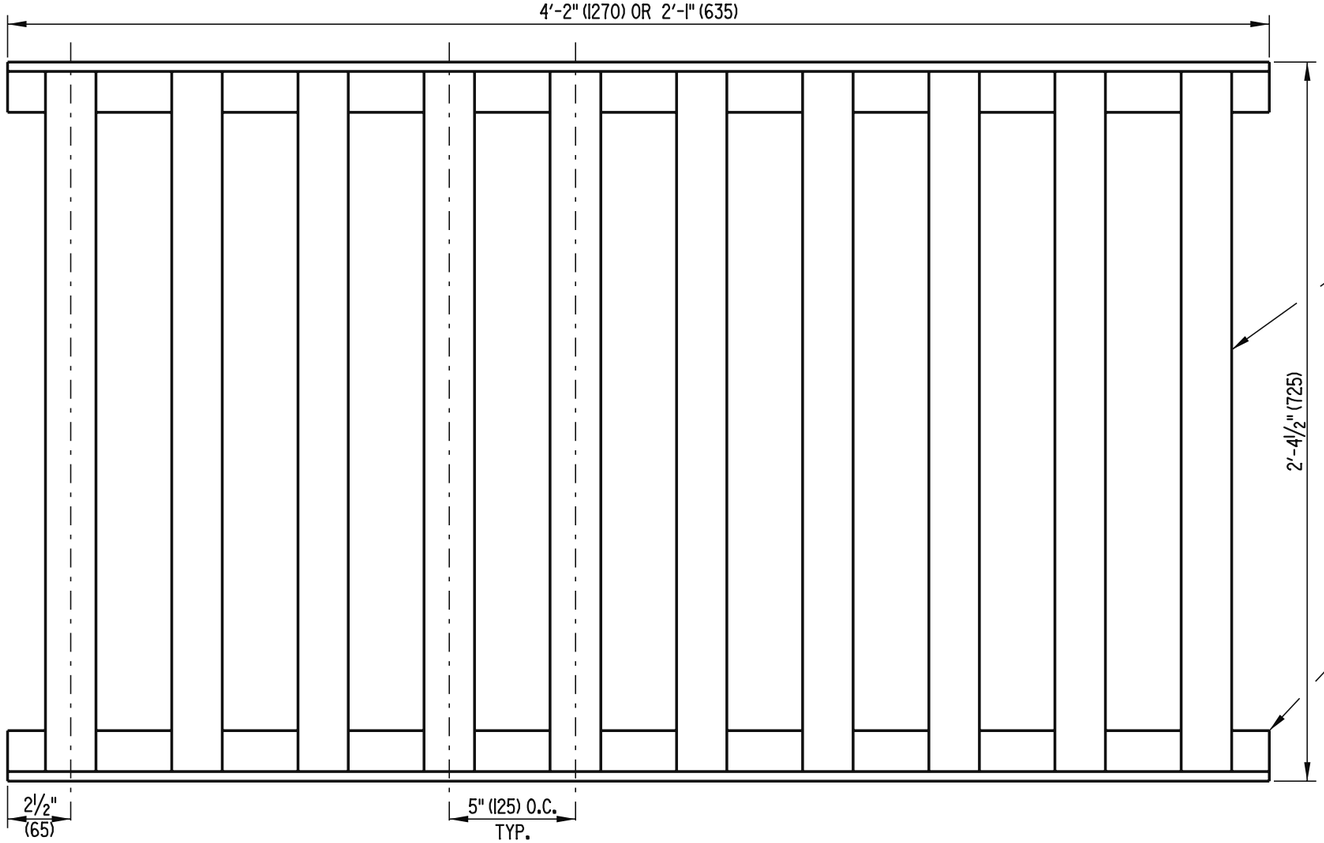
STANDARD NO. D-2 (2001) SHT. 2 OF 2

APPROVED Eugene M. Hastings CHIEF ENGINEER DATE 6/18/01

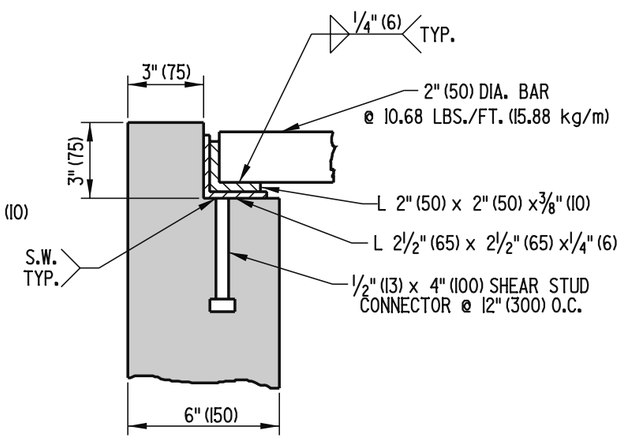
RECOMMENDED Michael A. Pigott DESIGN ENGINEER DATE 6/15/01

04/17/2001

SCALE : N.T.S.



GRATE DETAIL



FRAME & GRATE ASSEMBLY DETAIL

DELAWARE DEPARTMENT OF TRANSPORTATION	SAFETY GRATES		APPROVED Carolann Wicks CHIEF ENGINEER 12/5/05 DATE
	STANDARD NO. D-3 (2005)	SHT. 1 OF 2	RECOMMENDED James M. O'Neill DESIGN ENGINEER 11/29/05 DATE

11/23/2005