



THE STATE OF DELAWARE DEPARTMENT OF TRANSPORTATION



STANDARD CONSTRUCTION DETAILS

DESIGN VALUES ARE PRESENTED IN THIS DOCUMENT IN BOTH METRIC AND U.S. CUSTOMARY UNITS AND WERE DEVELOPED INDEPENDENTLY WITHIN EACH SYSTEM. THE RELATIONSHIP BETWEEN THE METRIC AND U.S. CUSTOMARY VALUES IS NEITHER AN EXACT (SOFT) CONVERSION NOR A COMPLETELY RATIONALIZED (HARD) CONVERSION. THE METRIC VALUES ARE THOSE THAT WOULD HAVE BEEN USED HAD THIS DOCUMENT BEEN PRESENTED EXCLUSIVELY IN METRIC UNITS; THE U.S. CUSTOMARY VALUES ARE THOSE THAT WOULD HAVE BEEN USED IF THIS DOCUMENT HAD BEEN PRESENTED EXCLUSIVELY IN U.S. CUSTOMARY UNITS. THEREFORE, THE USER IS ADVISED TO WORK COMPLETELY IN ONE SYSTEM AND NOT ATTEMPT TO CONVERT DIRECTLY BETWEEN THE TWO.

SECTION I - BARRIER

SHEET NO.	NAME
B-L (2010)	– BARRIER LEGEND
B-1	– GUARDRAIL APPLICATIONS (TYPES 1-31, 2-31, AND 3-31)
	(2018) - 1 PLAN VIEWS
	(2017) - 2 ELEVATION VIEWS AND SPLICE DETAIL
	(2018) - 3 SECTION VIEWS
B-2	– GRADING FOR GUARDRAIL END TREATMENTS (TYPES 1, 2, AND 3)
	(2013) - 1 GUARDRAIL END TREATMENT, TYPE 1
	(2013) - 2 GUARDRAIL END TREATMENT, TYPE 2
	(2010) - 3 GUARDRAIL END TREATMENT, TYPE 3
B-3	– GUARDRAIL OVER CULVERTS (TYPES 1-31, 2-31, AND 3-31)
	(2013) - 1 GUARDRAIL OVER CULVERTS, TYPE 1-31
	(2013) - 2 GUARDRAIL OVER CULVERTS, TYPE 2-31
	(2013) - 3 GUARDRAIL OVER CULVERTS, TYPE 3-31
B-4 (2012)	– END ANCHORAGE , TYPE 31
B-5	– GUARDRAIL TO BARRIER CONNECTION (TYPES 1-31, 2-31, AND EXIT TYPE 31)
	(2010) - 1 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31
	(2010) - 2 GUARDRAIL TO BARRIER CONNECTION, TYPE 1 HARDWARE
	(2010) - 3 GUARDRAIL TO BARRIER CONNECTION, BENT PLATE RUB RAIL
	(2012) - 4 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-31
	(2010) - 5 GUARDRAIL TO BARRIER CONNECTION, TYPE 2 HARDWARE
	(2010) - 6 GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE 31
B-6	– BRIDGE RAIL RETROFIT (TYPES 1, 2, 3, AND 4)
	(2013) - 1 BRIDGE RAIL RETROFIT, ENTRANCE AND END APPLICATIONS
	(2010) - 2 BRIDGE RAIL RETROFIT, TYPES 1 AND 2
	(2010) - 3 BRIDGE RAIL RETROFIT, TYPE 2 HARDWARE
	(2010) - 4 BRIDGE RAIL RETROFIT, TYPE 3
	(2010) - 5 BRIDGE RAIL RETROFIT, TYPE 4
B-7 (2010)	– W-BEAM, TYPE 1-27 TO TYPE 1-31 TRANSITION SECTION
B-8	– RESERVED
B-9	– RESERVED
B-10	– RESERVED
B-11	– RESERVED
B-12	– RESERVED
B-13	– HARDWARE
	(2010) - 1 W-BEAM ELEVATION AND SECTION VIEWS
	(2010) - 2 W-BEAM STEEL POST AND OFFSET BLOCK
	(2010) - 3 W-BEAM TERMINAL CONNECTOR
	(2010) - 4 THRIE BEAM AND THRIE BEAM EXPANSION ELEMENT ELEVATION AND SECTION VIEWS
	(2010) - 5 THRIE BEAM STEEL POST AND OFFSET BLOCK
	(2010) - 6 ASYMMETRIC AND SYMMETRIC W-BEAM TO THRIE BEAM TRANSITION SECTION
	(2010) - 7 SHORT AND LONG WOOD BREAKAWAY POSTS, STEEL TUBE, SOIL PLATE, AND OFFSET BLOCKS
	(2012) - 8 SWAGED CABLE ASSEMBLAGE AND HARDWARE
	(2010) - 9 GUARDRAIL DELINEATOR AND W-BEAM BEARING PLATE
	(2010) - 10 GUARDRAIL MOUNTED RAIL
B-14	– CONCRETE SAFETY BARRIER (F SHAPE)
	(2012) - 1 32" (960) CONCRETE BARRIER, TYPICAL CAST-IN-PLACE OR SLIP-FORM ELEVATION AND SECTION VIEWS
	(2009) - 2 32" (960) CONCRETE BARRIER, TYPICAL PRE-CAST ELEVATION AND SECTION VIEWS
	(2009) - 3 42" (1050) CONCRETE BARRIER, TYPICAL CAST-IN-PLACE OR SLIP-FORM ELEVATION AND SECTION VIEWS
	(2009) - 4 SLOTTED PLATE CONNECTION DETAILS
B-15	– GUARDRAIL APPLICATIONS (TYPES 1-27, 2-27, AND 3-27)
	(2010) - 1 PLAN VIEWS
	(2010) - 2 ELEVATION VIEWS AND SPLICE DETAIL
	(2010) - 3 SECTION VIEWS



SHEET NO. NAME

SECTION I - BARRIER (CONT'D)

B-16 – GUARDRAIL OVER CULVERTS (TYPES 1-27, 2-27, AND 3-27)

(2013) - 1 GUARDRAIL OVER CULVERTS, TYPE 1-27

(2013) - 2 GUARDRAIL OVER CULVERTS, TYPE 2-27

(2013) - 3 GUARDRAIL OVER CULVERTS, TYPE 3-27

B-17 (2010) – GUARDRAIL END TREATMENT (TYPE 4-27)

B-18 (2010) – CURVED GUARDRAIL SECTION

B-19 (2012) – END ANCHORAGE (TYPE 27)

B-20 – BURIED END SECTION

(2010) - 1 BURIED END SECTION - SINGLE RAIL

(2010) - 2 BURIED END SECTION - DOUBLE RAIL

(2010) - 3 POST, CONCRETE BLOCK, AND RUBRAIL DETAILS

B-21 – GUARDRAIL TO BARRIER CONNECTION (TYPES 1-27, 2-27, AND EXIT TYPE 27)

(2010) - 1 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-27

(2010) - 2 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-27

(2010) - 3 GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE 27

SHEET NO. NAME

SECTION II - CURB & GUTTER

C-1 – P.C.C. CURB AND INTEGRAL P.C.C. CURB & GUTTER

(2013) - 1 P.C.C. CURB, TYPICAL CURB SECTION, AND TYPICAL TAPER SECTION AT NOSE OF MEDIANS

(2012) - 2 INTEGRAL P.C.C. CURB & GUTTER

(2018) - 3 INTEGRAL P.C.C. CURB & GUTTER (FOR USE AT CURB RAMPS ONLY)

C-2 – CURB RAMPS

(2018) - 1 TYPE 1

(2018) - 2 TYPE 2, 3, AND 4

(2018) - 3 TYPE 5

C-3 (2018) – ENTRANCES

C-4 (2012) – CURB OPENING DETAILS

C-5 (2017) – CURB OPENING WITH SIDEWALK DETAIL

C-6 (2017) – CURB RETAINING WALL

SHEET NO. NAME

SECTION III - DRAINAGE

D-1 – CONCRETE 6:1 SAFETY END STRUCTURE

(2018) - 1 DETAIL VIEWS

(2018) - 2 SCHEDULES

D-2 – CONCRETE 10:1 SAFETY END STRUCTURE

(2018) - 1 DETAIL VIEWS

(2018) - 2 SCHEDULES

D-3 – SAFETY GRATES

(2005) - 1 SAFETY END STRUCTURE GRATE AND ASSEMBLY DETAIL

(2007) - 2 PERSONNEL SAFETY GRATE FOR PIPE INLET DETAIL

D-R (2017) – DRAINAGE INLET REFERENCE SHEET

D-4 (2009) – INLET BOX DETAILS

D-5 – DRAINAGE INLET DETAILS

(2010) - 1 DRAINAGE INLET ASSEMBLY

(2014) - 2 DRAINAGE INLET FRAME AND GRATES

(2012) - 3 DRAINAGE INLET TOP UNITS

(2010) - 4 DRAINAGE INLET COVER SLAB DETAILS

(2010) - 5 DOUBLE INLET COVER SLAB DETAILS

(2012) - 6 34" x 24" DRAINAGE INLET AND COVER SLAB DETAILS

(2010) - 7 34" x 18" DRAINAGE INLET DETAILS

(2018) - 8 DRAINAGE INLET TOP UNIT, TYPE S

(2010) - 9 DOGHOUSE INLET BOX



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INDEX OF SHEETS (2018)

SHEET 2 OF 5

SHEET NO. NAME

SECTION III - DRAINAGE (CONT'D)

D-6	– MAHOLE DETAILS
	(2009) - 1 BOX MANHOLE ASSEMBLY
	(2001) - 2 ROUND MANHOLE ASSEMBLY
	(2001) - 3 MANHOLE, TOP UNIT, FRAME AND COVER
	(2007) - 4 BOX MANHOLE COVER SLAB
D-7	– JUNCTION BOX DETAILS
	(2009) - 1 JUNCTION BOX ASSEMBLY
	(2007) - 2 JUNCTION BOX COVER SLAB
D-8 (2018)	– PIPE BEDDING
D-9 (2018)	– PERFORATED PIPE UNDERDRAIN
D-10 (2011)	– PIPE PLUGGING DETAIL
D-11 (2018)	– SAFETY METAL END SECTION

SHEET NO. NAME

SECTION IV - EROSION

E-1 (2014)	– CONCRETE WASHOUT
E-2 (2014)	– SILT FENCE
E-3 (2014)	– SEDIMENT TRAP
E-4 (2014)	– INLET SEDIMENT CONTROL, DRAINAGE INLET
E-5 (2014)	– INLET SEDIMENT CONTROL, CULVERT INLET
E-6 (2014)	– PORTABLE SEDIMENT TANK
E-7 (2014)	– SUMP PIT
E-8 (2014)	– SKIMMER DEWATERING DEVICE
E-9 (2014)	– STONE CHECK DAM
E-10 (2014)	– TEMPORARY SLOPE DRAIN
E-11 (2014)	– INCREMENTAL STABILIZATION
E-14 (2014)	– STABILIZED CONSTRUCTION ENTRANCE
E-15 (2014)	– SANDBAG DIKE
E-16 (2014)	– SANDBAG DIVERSION
E-17 (2014)	– GEOTEXTILE-LINED CHANNEL DIVERSION
E-18 (2014)	– TURBIDITY CURTAIN
E-19 (2014)	– STILLING WELL
E-20 (2014)	– RIPRAP ENERGY DISSIPATOR
E-21 (2014)	– STONE OUTLET DETAIL



SECTION V - LANDSCAPING

SHEET NO.	NAME
L-1	– PLANTING DETAILS
(2017) - 1	ROADSIDE SHRUB PLANTING DETAIL
(2017) - 2	TREE PLANTING DETAIL
(2017) - 3	PERENNIAL/GROUND COVER PLANTING DETAIL

SECTION VI - MISCELLANEOUS

SHEET NO.	NAME
M-1 (2001)	– RIGHT-OF-WAY FENCE
M-2 (2017)	– RIGHT-OF-WAY MONUMENTATION
M-3 (2018)	– SHARED-USE PATH & SIDEWALK DETAILS
M-4 (2011)	– BIKE RACK LAYOUT DETAILS
M-5 (2004)	– WOOD RAIL FENCE
M-6 (2011)	– PATTERNED HOT-MIX OR CONCRETE & BRICK PAVER DETAILS
M-7 (2006)	– CHAIN LINK FENCE DETAILS
M-8 (2014)	– P.C.C. PARKING BUMPER
M-9	– BUS STOP PAD DETAILS
(2018) - 1	BUS STOP PAD DETAILS, TYPES 1, 2, & 3
(2018) - 2	BUS STOP PAD WITH SHELTER DETAILS, TYPES 1 & 2
M-10	– BRIDGE SAFETY FENCE
(2014) - 1	BRIDGE SAFETY FENCE, TYPE 1
(2014) - 2	BRIDGE SAFETY FENCE, TYPE 2
(2017) - 3	HARDWARE
M-11 (2017)	– STEEL PLATE
M-12 (2018)	– DRIVEWAY TRANSVERSE SLOPE GRADING

SECTION VII - PAVEMENT

SHEET NO.	NAME
P-1	– P.C.C. PAVEMENT
(2001) - 1	SLAB PLAN (WITH DOWEL AND TIE LOCATIONS)
(2018) - 2	JOINT AND SEALANT DETAILS
(2001) - 3	W BOLT, HOOK BOLT, DOWEL AND TIE BAR DETAILS
(2001) - 4	DOWEL SUPPORT BASKET
(2001) - 5	DOWEL AND TIE BAR PLACEMENT TOLERANCES
P-2	– P.C.C. PAVEMENT PATCHING
(2008) - 1	FULL DEPTH PATCH, PLAN VIEW
(2008) - 2	FULL DEPTH PATCH, SECTION VIEWS
(2004) - 3	FULL DEPTH PATCH, SEALANT DETAILS, GROUT RETENTION DISK, AND DOWEL BAR
(2001) - 4	FULL DEPTH PATCH, DOWEL AND TIE BAR PLACEMENT TOLERANCES
(2001) - 5	PARTIAL DEPTH PATCH, PLAN AND SECTION VIEWS
P-3 (2014)	– BUTT JOINTS
P-4 (2013)	– PERMANENT CROSS-ROAD PATCH OVER PIPE TRENCH DETAIL
P-5 (2018)	– RUMBLE STRIPS
P-6 (2018)	– PAVEMENT SAFETY EDGE



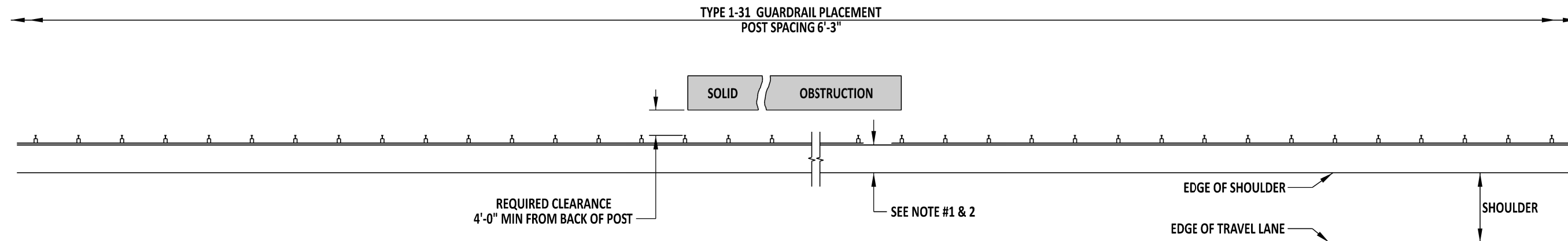
SECTION VIII - TRAFFIC

SHEET NO.	NAME
T-1	<div>- CONDUIT JUNCTION WELLS</div> <div>(2013) - 1 TYPE 1</div> <div>(2013) - 2 TYPE 4</div> <div>(2013) - 3 TYPE 5</div>
T-2 (2011)	<div>- JUNCTION WELL, GROUNDING & BONDING FOR STEEL FRAMES & LIDS</div>
T-3	<div>- CONDUIT JUNCTION WELLS</div> <div>(2013) - 1 TYPE 11</div> <div>(2012) - 2 TYPE 14</div> <div>(2012) - 3 TYPE 15</div>
T-4	<div>- CABINET BASES</div> <div>(2013) - 1 TYPES M & F</div> <div>(2017) - 2 TYPE "P & R"</div>
T-5	<div>- POLE BASES</div> <div>(2017) - 1 ROUND BASE & ROUND BASE WITH SQUARE FOUNDATION HEADER</div> <div>(2013) - 2 TYPICAL SECTION AND INSTALLATION (BASES 1, 2, 2A, 2B, 3, 3A, AND 3B)</div> <div>(2017) - 3 TYPICAL SECTION (BASES 6) AND POLE BASE DATA CHART</div> <div>(2014) - 4 TYPICAL SECTION (BASE 4A AND 4B) AND ANCHOR DETAIL</div>
T-6 (2011)	<div>- SPECIAL POLE BASE</div>
T-7 (2005)	<div>- SIGN FOUNDATION</div>
T-8	<div>- LOOP DETECTOR LEAD-IN WIRE INSTALLATION</div> <div>(2013) - 1 JUNCTION WELL BEHIND CURB OR CURB AND GUTTER WITH GRASS STRIP</div> <div>(2013) - 2 JUNCTION WELL BEHIND CURB OR CURB & GUTTER WITH SIDEWALK AND JUNCTION WELL DIRECTLY BEHIND CURB OR CURB & GUTTER</div> <div>(2013) - 3 JUNCTION WELL IN CONCRETE ISLAND</div> <div>(2013) - 4 JUNCTION WELL WITHOUT CURB OR CURB & GUTTER WITH SIDEWALK AND GRASS STRIPS AND JUNCTION WELL DIRECTLY ADJACENT TO PAVED SURFACE</div>
T-9	<div>- LOOP DETECTOR INSTALLATION</div> <div>(2013) - 1 LOOP DETECTOR SAWCUT TYPICAL, HOT MIX SURFACE TYPICAL SECTION, AND SPLICE KIT</div> <div>(2013) - 2 TYPICAL INTERSECTION LAYOUT</div> <div>(2013) - 3 PEDESTRIAN CROSSING TYPICAL LAYOUT</div>
T-10	<div>- **DETAIL REMOVED IN 2012 REVISION**</div>
T-11	<div>- MESSENGER WIRE ATTACHMENT</div> <div>(2005) - 1 INTERMEDIATE MESSENGER WIRE ATTACHMENT ON WOOD POLES</div> <div>(2005) - 2 ANGULAR INTERMEDIATE MESSENGER WIRE ATTACHMENT</div>
T-12	<div>- MESSENGER WIRE ATTACHMENT</div> <div>(2005) - 1 SPAN WIRE ATTACHMENT BETWEEN POLES</div> <div>(2005) - 2 DEAD END MESSENGER WIRE ATTACHMENT</div>
T-13 (2013)	<div>- CONDUIT JUNCTION WELL, TYPE 7</div>
T-14	<div>- EMERGENCY PREEMPTION RECIEVER</div> <div>(2006) - 1 UPRIGHT MOUNT</div> <div>(2005) - 2 INVERTED MOUNT</div>
T-15 (2013)	<div>- BREAKAWAY SIGN POST AND PIN ASSEMBLY DETAILS</div>
T-16 (2010)	<div>- WOOD BARRICADE DETAILS</div>
T-17 (2013)	<div>- ELECTRICAL SERVICE PEDESTAL - LIGHTING, SIGNAL & 'ITMS' COMPONENT INSTALLATIONS</div>

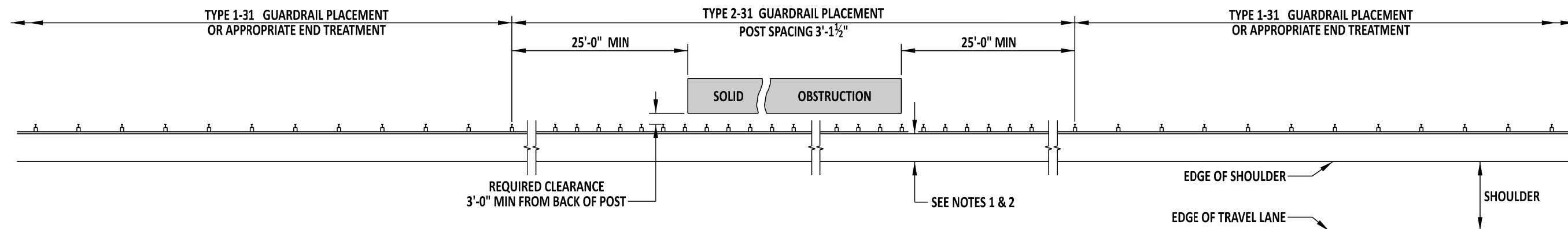


BARRIER LEGEND	
ITEM NO.	DESCRIPTION
1	W-BEAM
2	W6 X 9 STEEL POST
3A 3B	3A- 6" x 12" x 14" OFFSET BLOCK 3B- 6" x 8" x 14" OFFSET BLOCK
4	SPLICE - REQUIRES EIGHT(8) 5/8" GUARDRAIL BOLTS (L=1¼") WITH RECESS NUTS
5	W-BEAM TERMINAL CONNECTOR
6	5/8" GUARDRAIL BOLT (L=1¼") AND RECESS NUT
7A 7B	7A- 5/8" GUARDRAIL BOLT (L=14") AND RECESS NUT 7B- 5/8" GUARDRAIL BOLT (L=10") AND RECESS NUT
8	5/8" GUARDRAIL BOLT (L=10"), STEEL WASHER, AND RECESS NUT
9	7/8" HIGH STRENGTH STRUCTURAL HEX BOLT (L=VARIES) AND HEX NUT
10	5/8" CARRIAGE BOLT (L=VARIES), STEEL WASHER, AND HEX NUT
11	BEARING PLATE

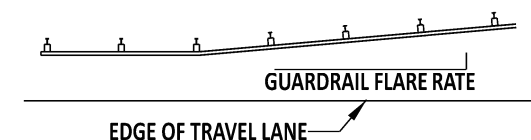




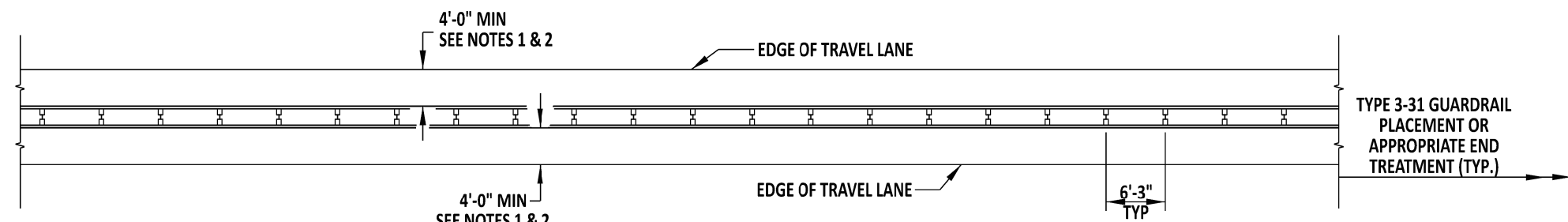
TYPE 1-31 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT WHEN THE REQUIRED
4'-0" CLEARANCE TO THE OBSTRUCTION IS AVAILABLE



TYPE 2-31 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT WHEN 3'-0" TO 4'-0"
OF CLEARANCE TO OBSTRUCTION IS AVAILABLE



FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH	15:1
60 MPH	14:1
55 MPH	12:1
50 MPH	11:1
45 MPH	10:1
40 MPH	8:1
30 MPH	7:1



TYPE 3-31 GUARDRAIL
TYPICAL MEDIAN GUARDRAIL TREATMENT

NOTES:

- 1). MAXIMIZE THE DISTANCE FROM THE EDGE OF THE TRAVEL LANE OR SHOULDER TO THE FACE OF GUARDRAIL. THIS AREA SHALL BE GRADED 10:1 OR FLATTER.
- 2). GRADE THIS AREA 10:1 OR FLATTER



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TYPES 1-31, 2-31, AND 3-31 GUARDRAIL APPLICATIONS

STANDARD NO. B-1 (2018)

SHT. 1 OF 3

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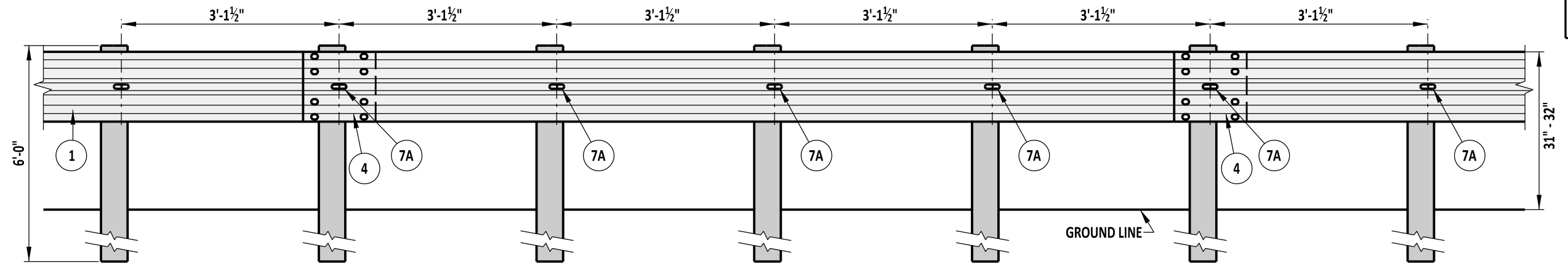
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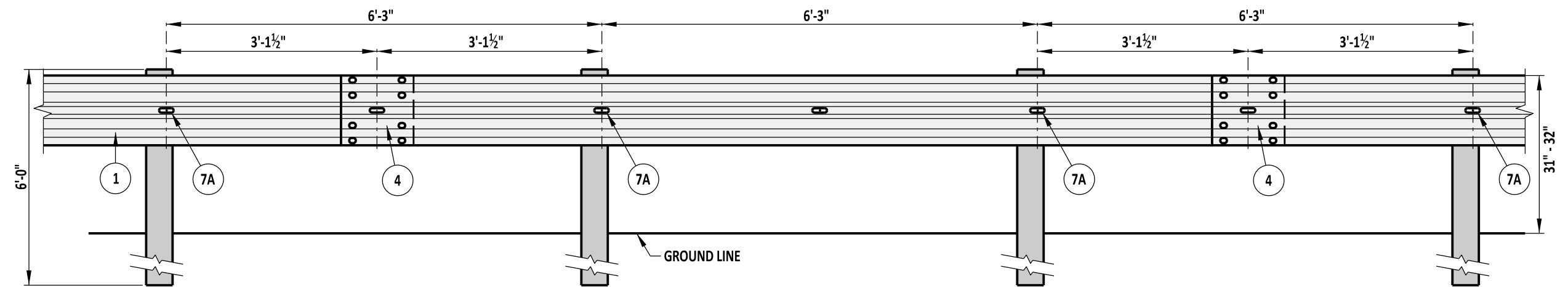
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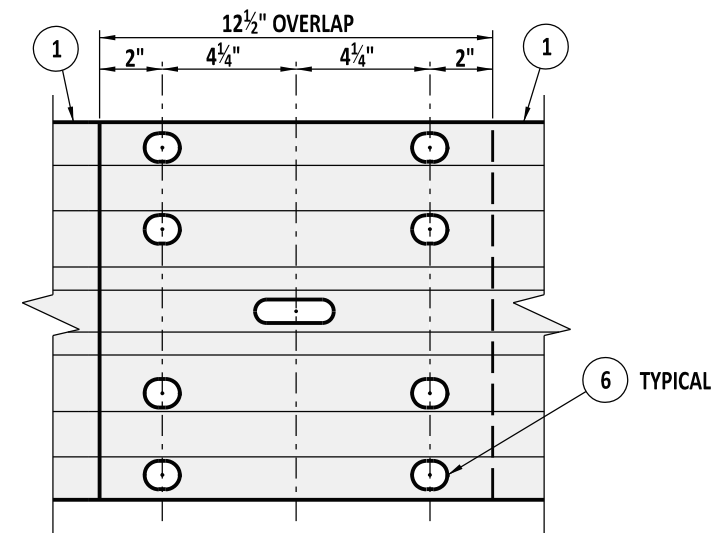
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TYPE 2-31



TYPE 1-31 OR 3-31



4 SPLICE DETAIL

- NOTE :**
- 1). OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.
 - 2). SEE DETAIL B-L, SHEET 1 FOR MORE INFORMATION



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TYPES 1-31, 2-31, AND 3-31 GUARDRAIL APPLICATIONS

STANDARD NO. B-1 (2017)

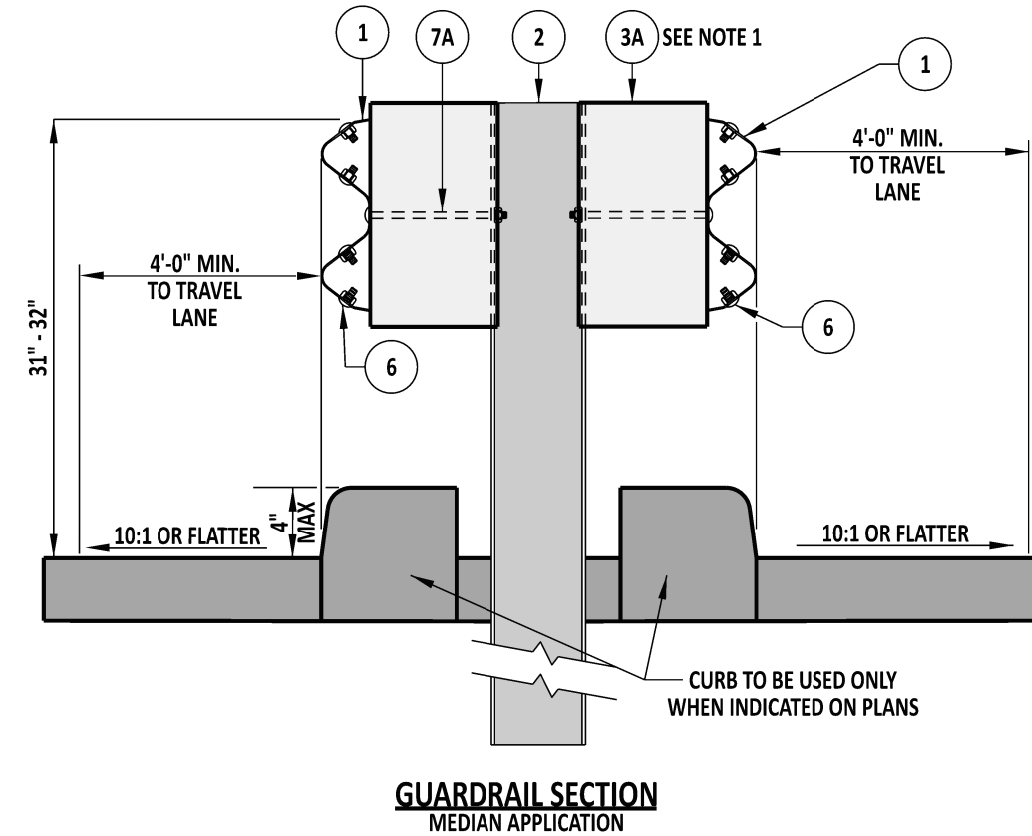
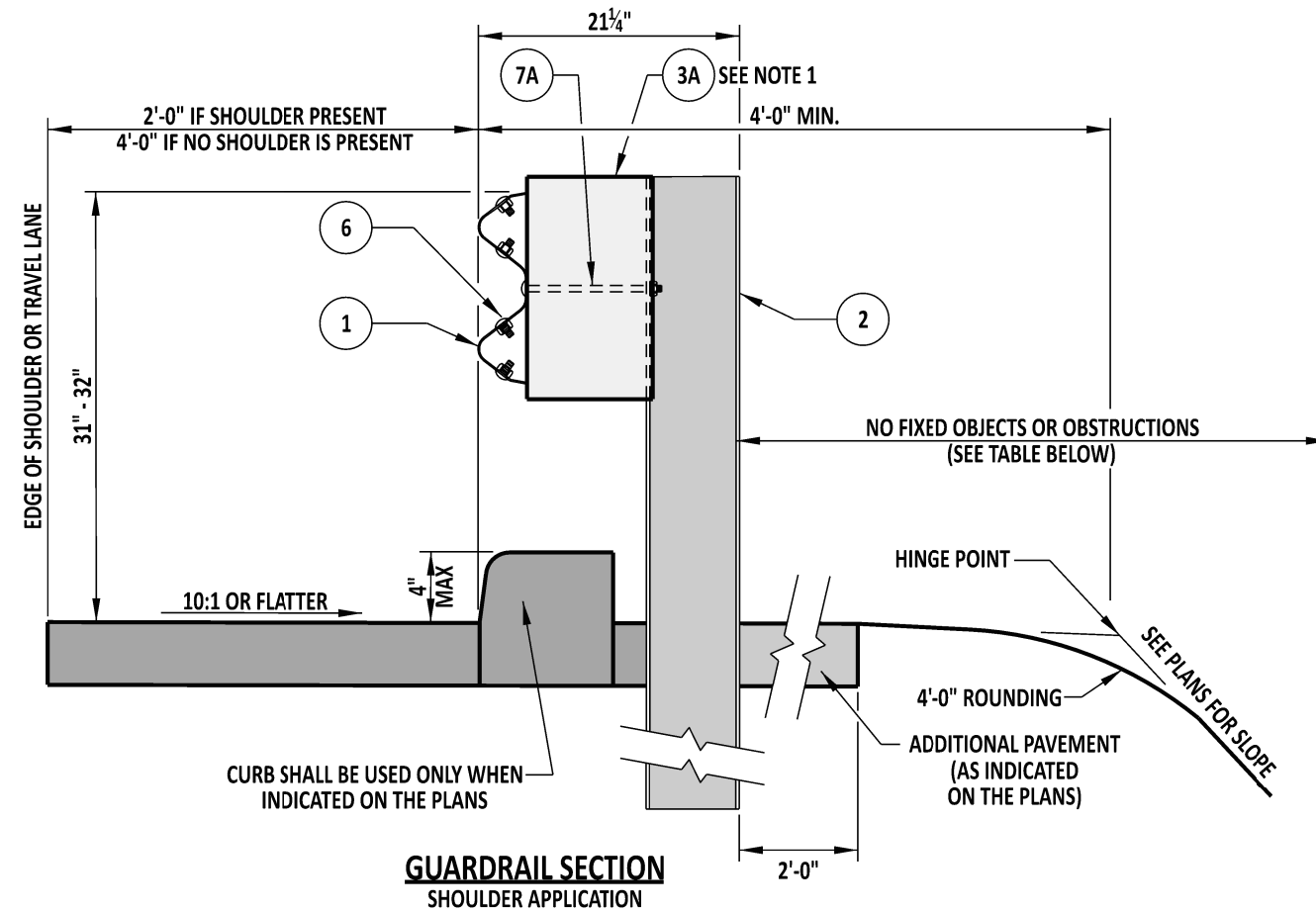
SHT. 2 OF 3

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CHIEF ENGINEER DATE

RECOMMENDED

SIGNATURE ON FILE **5/18/2017**
DESIGN ENGINEER DATE

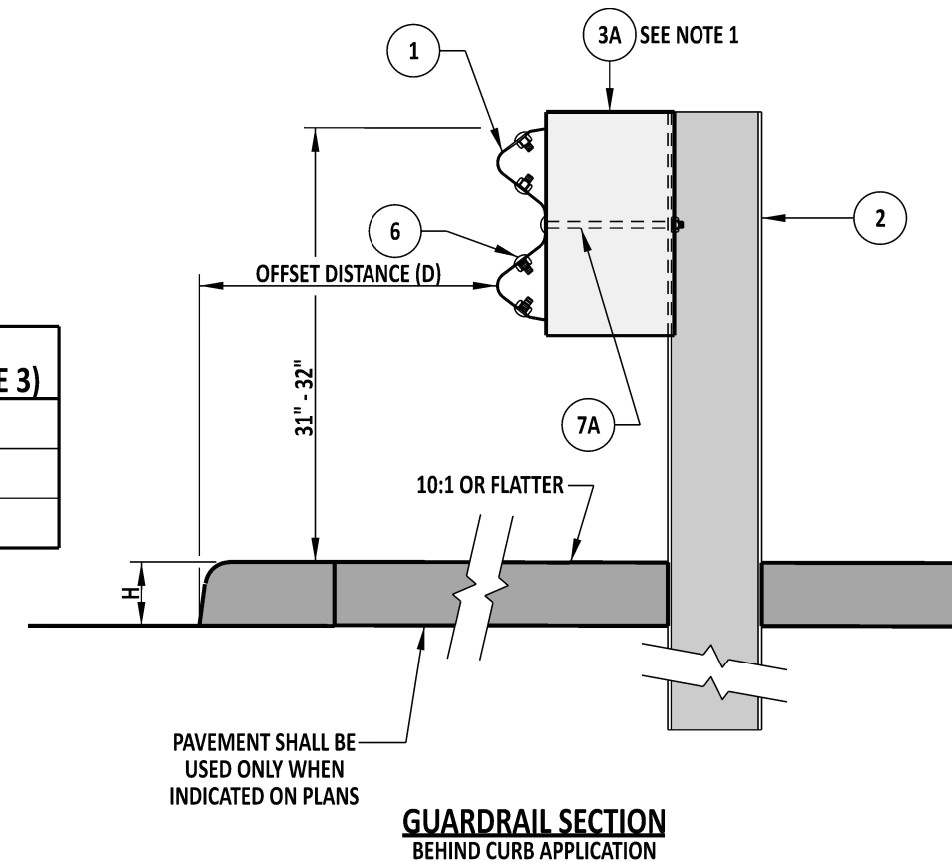


TYPE	POST SPACING	CLEAR AREA BEHIND POST
1	6'-3"	4'-0" MIN
2	3'-1 1/2"	3'-0" MIN

DESIGN SPEED	D (SEE NOTE 2)	H (SEE NOTE 3)
< 45 MPH	8'-0"	6"
45 TO 50 MPH	13'-0"	4"
> 50 MPH	SEE NOTE NOTE 4	4"

NOTES:

- 1). SEE STANDARD SPECIFICATIONS CONCERNING THE USE OF ALTERNATIVE OFFSET BLOCK MATERIALS.
- 2). THE FACE OF GUARDRAIL SHALL BE INSTALLED EITHER FLUSH WITH THE CURB FACE OR OFFSET A DISTANCE GREATER THAN D.
- 3). H IS DEFINED AS THE MAXIMUM CURB HEIGHT FOR THE CURB/ GUARDRAIL APPLICATION.
- 4). ON 50 MPH AND GREATER ROADWAYS, GUARDRAIL SHALL BE INSTALLED FLUSH TO THE CURB FACE.



DELAWARE
DEPARTMENT OF TRANSPORTATION

TYPES 1-31, 2-31, AND 3-31 GUARDRAIL APPLICATIONS

STANDARD NO. B-1 (2018)

SHT. 3 OF 3

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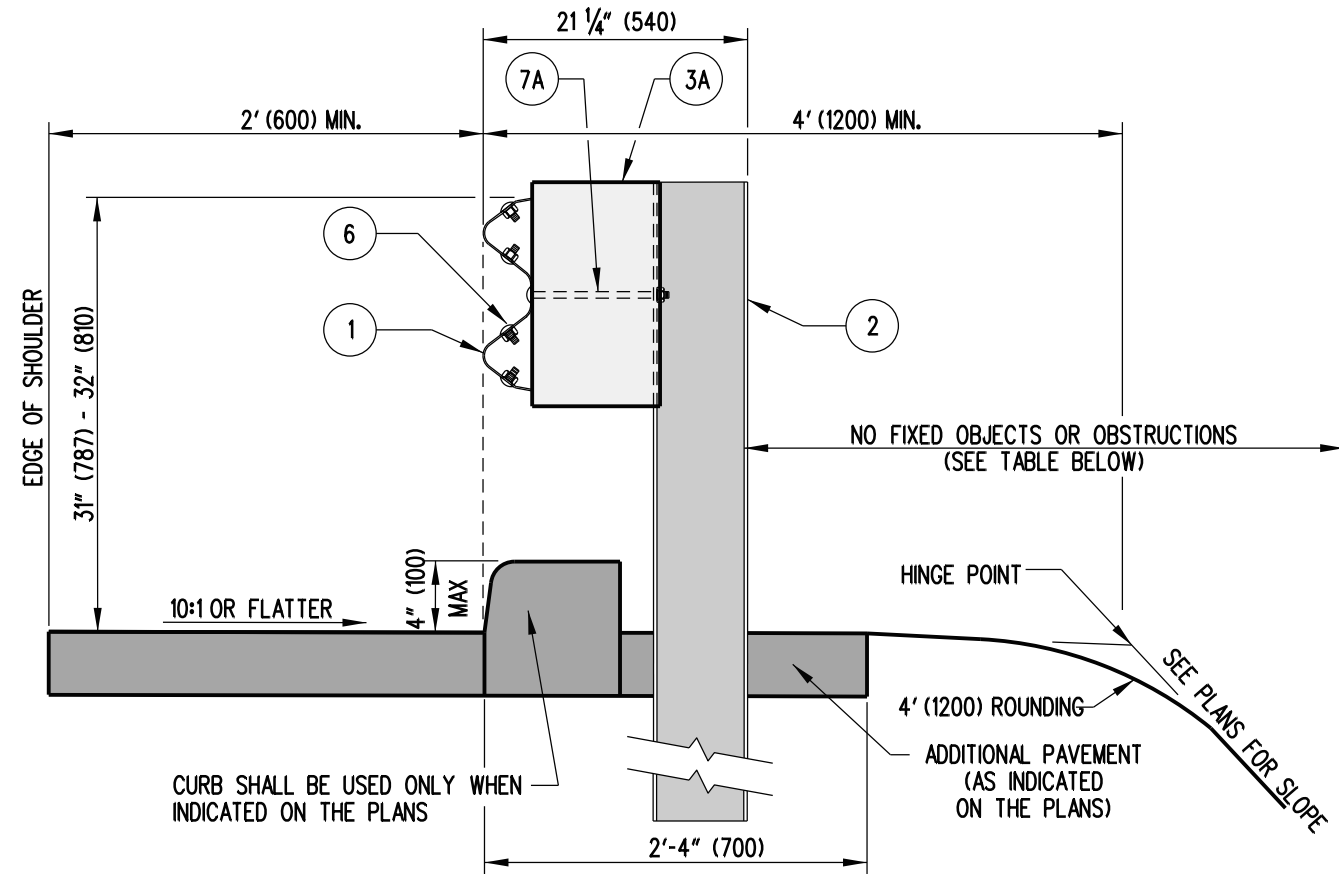
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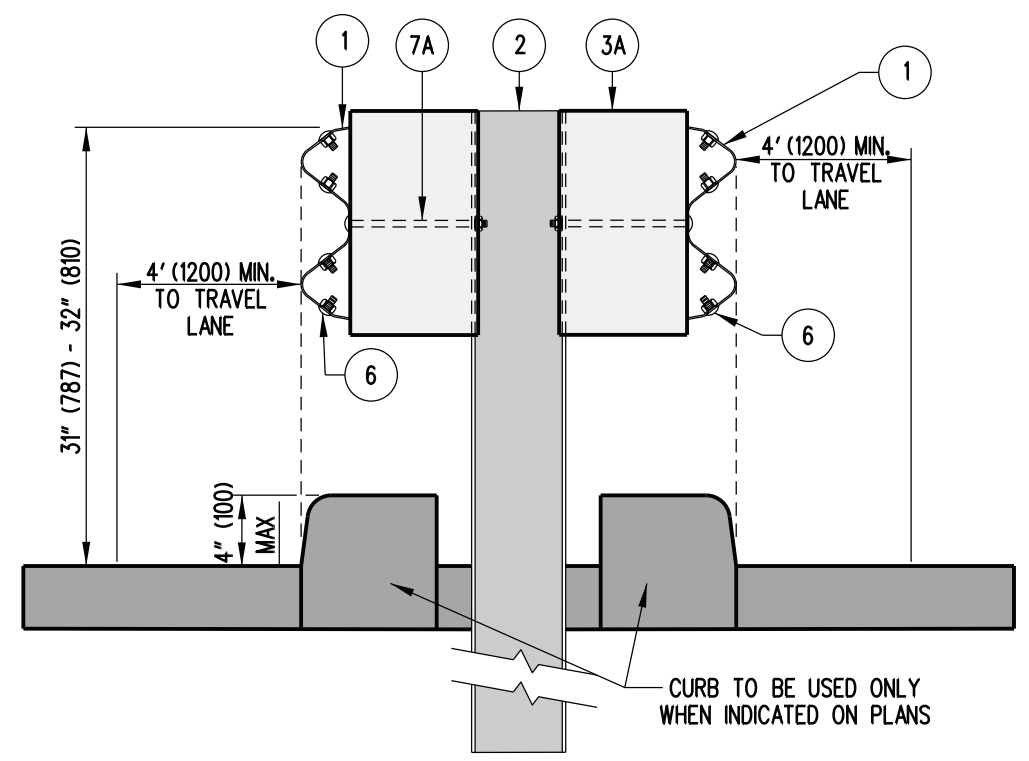
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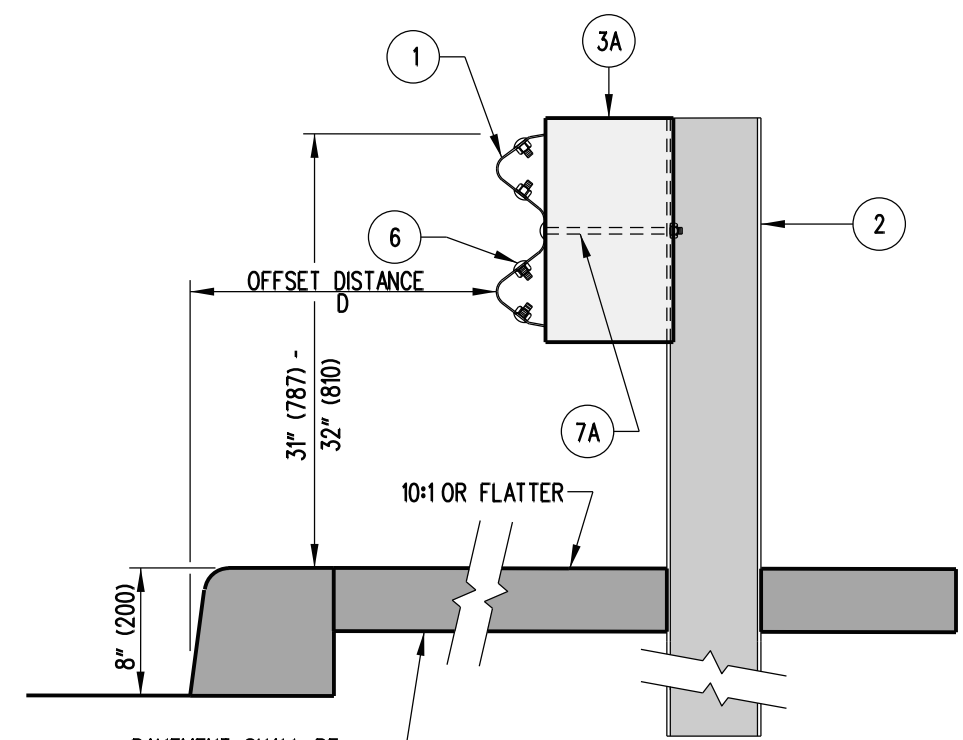
GUARDRAIL SECTION
RURAL SHOULDER APPLICATION

TYPE	POST SPACING	CLEAR AREA BEHIND POST
1	6'-3" (1905)	3'-0" (900) MIN
2	3'-1 1/2" (952.5)	2'-0" (600) MIN

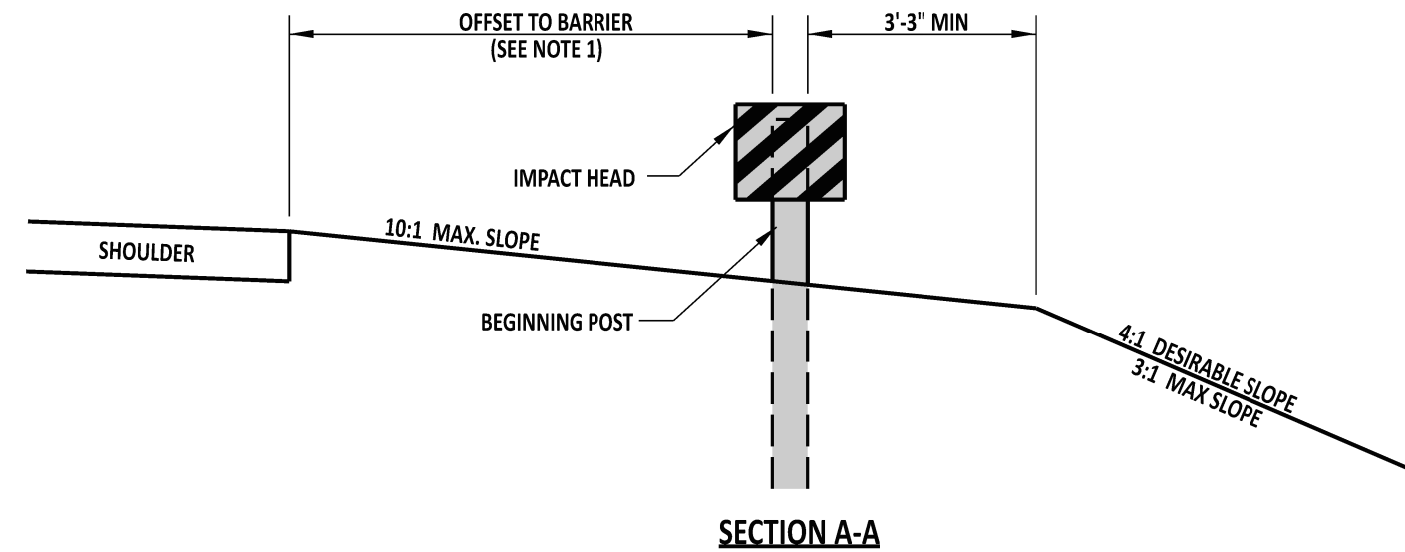
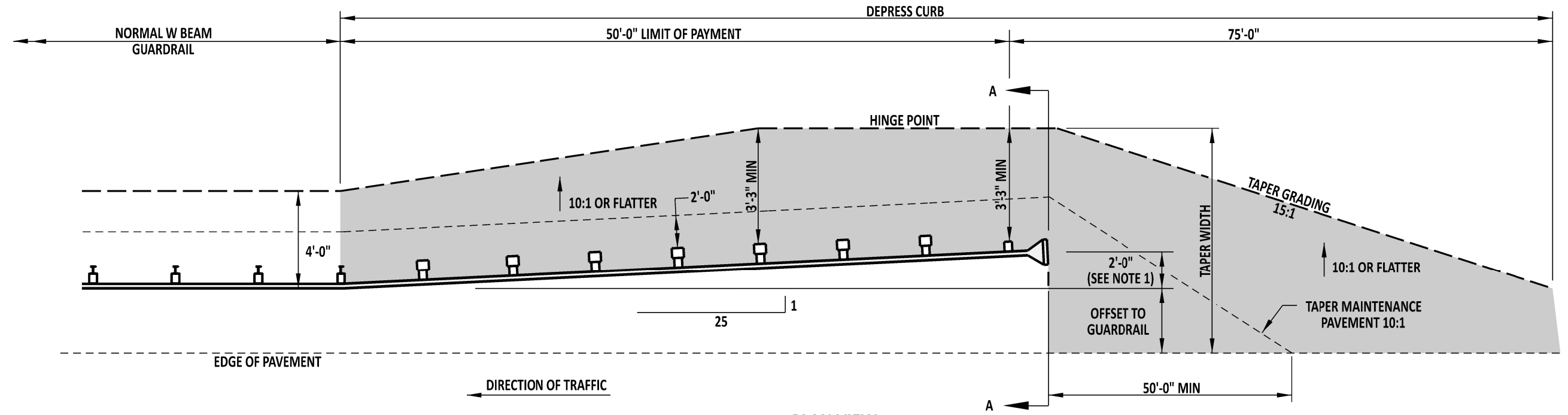
DESIGN SPEED	D
< 50 MPH (80 km/h)	8'-0" (2400)
> 50 MPH (80 km/h)	13'-0" (3900)



GUARDRAIL SECTION
MEDIAN APPLICATION



GUARDRAIL SECTION
URBAN SHOULDER APPLICATION



NOTES:

- 1). FLARE THE END TREATMENT AT 25:1 BEGINNING 50'-0" FROM THE END OF THE IMPACT HEAD, UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE.
- 2). THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.
- 3). THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.
- 4). IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2" WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1

STANDARD NO. B-2 (2018)

SHT. 1 OF 3

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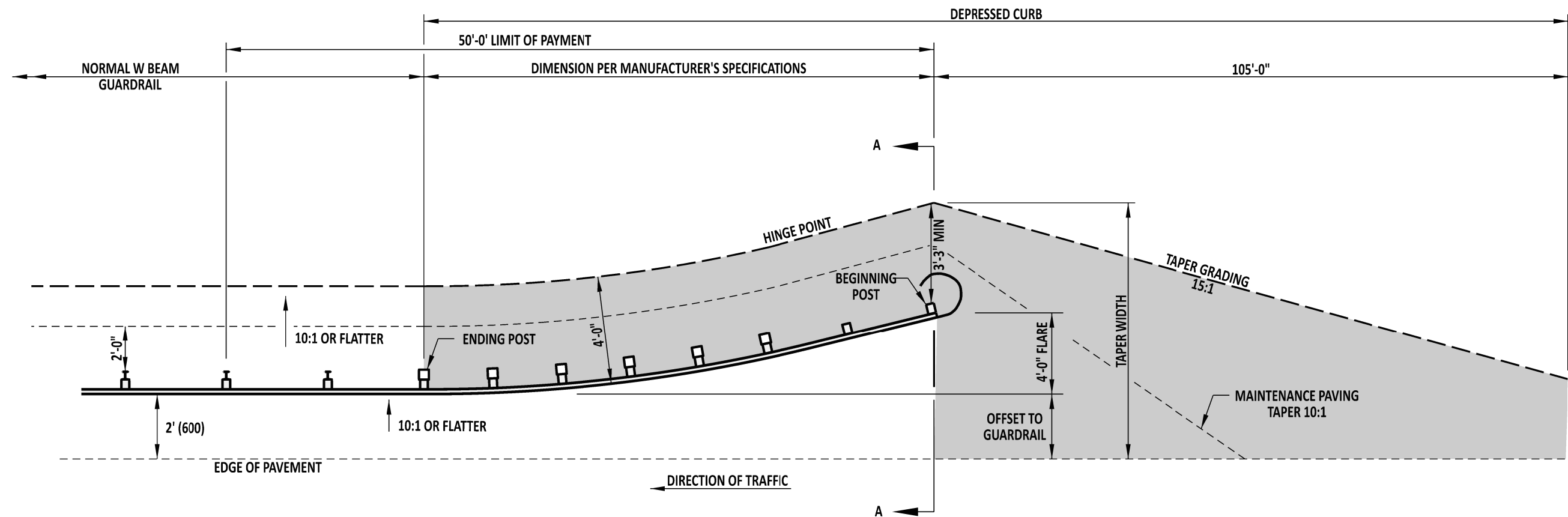
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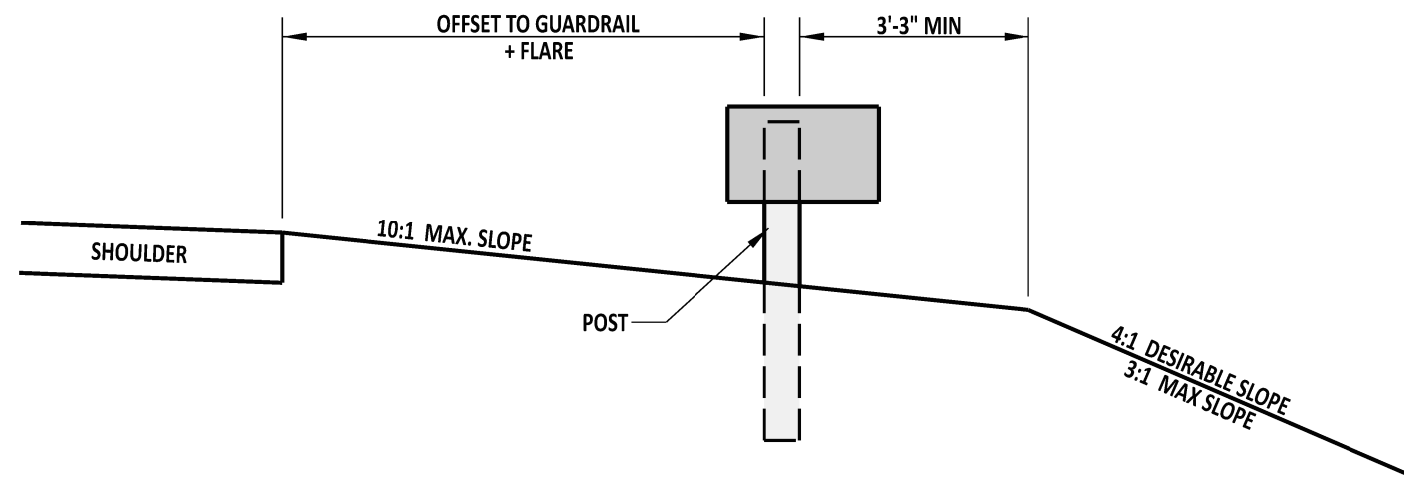
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PLAN VIEW

= NO OBSTRUCTIONS IN SHADED AREA



SECTION A-A

NOTES:

- 1). FLARE SHALL BE 4'-0" UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE. FLARE MAY BE PARABOLIC OR STRAIGHT BASED ON MANUFACTURER'S SPECIFICATIONS.
- 2). THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.
- 3). THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.
- 4). IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2" WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2

STANDARD NO. B-2 (2018)

SHT. 2 OF 3

APPROVED

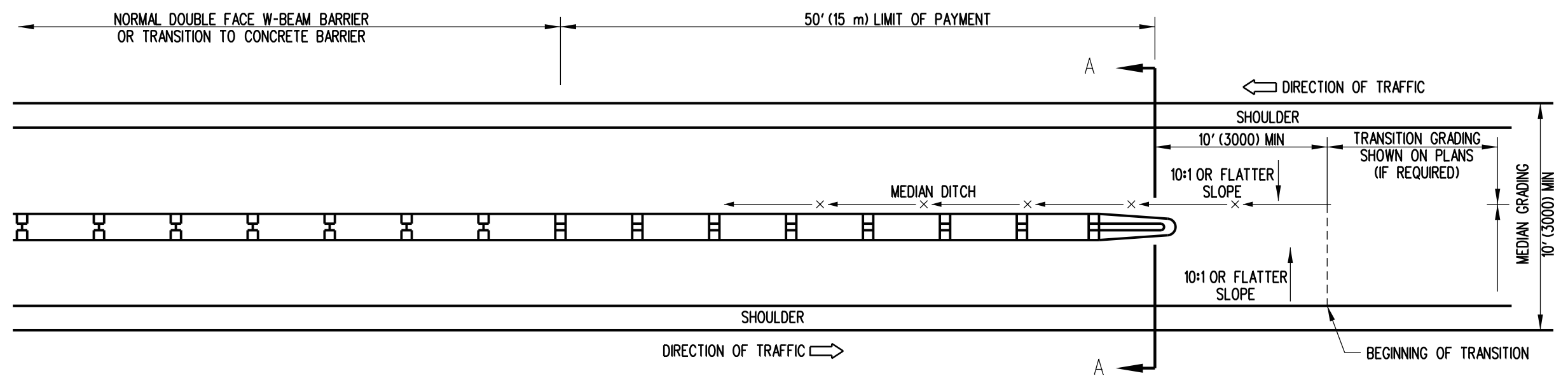
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CHIEF ENGINEER

1/04/2019
DATE

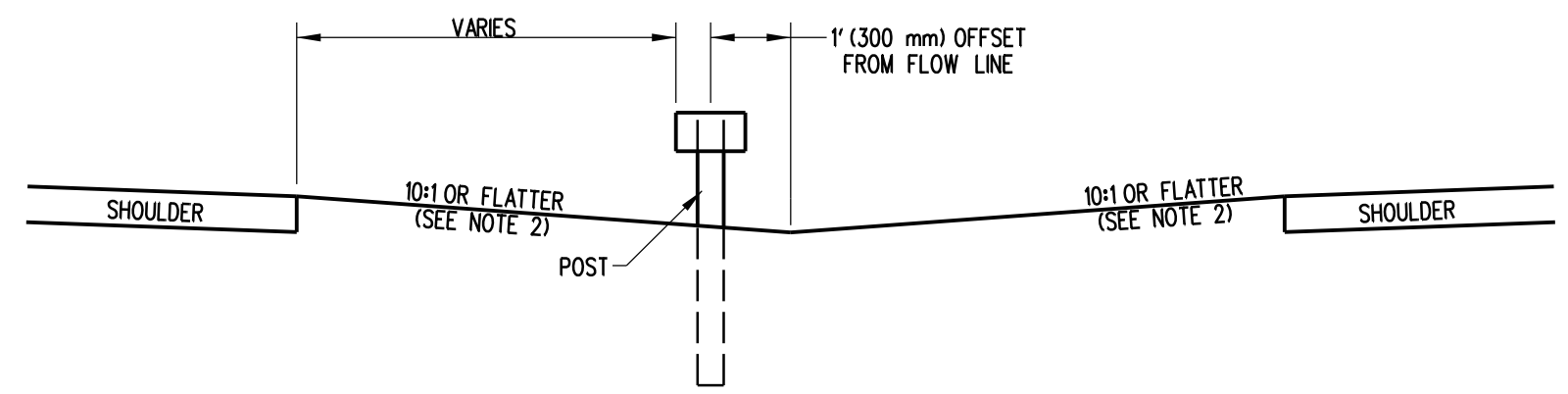
RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2018
DATE




PLAN VIEW

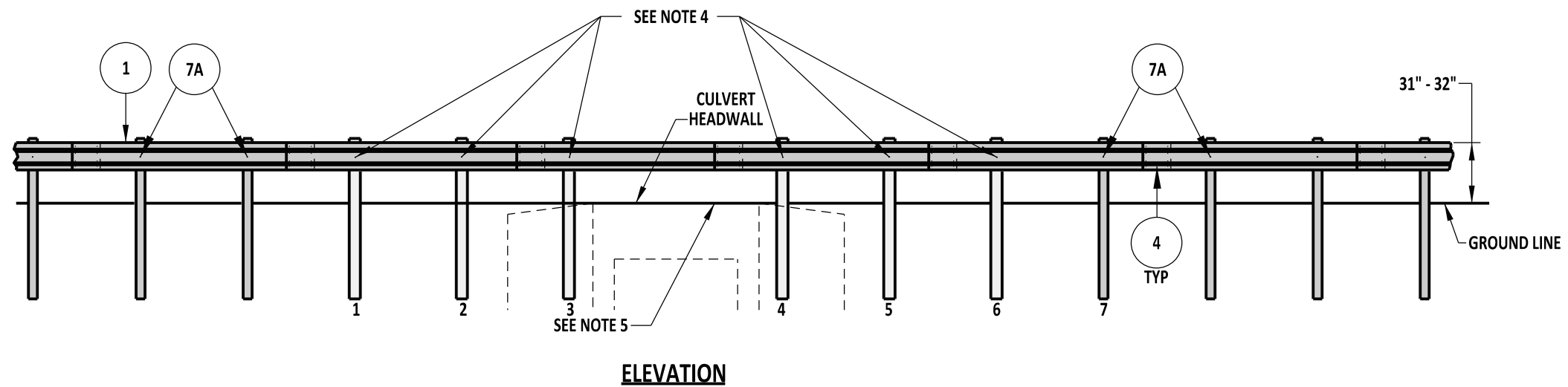
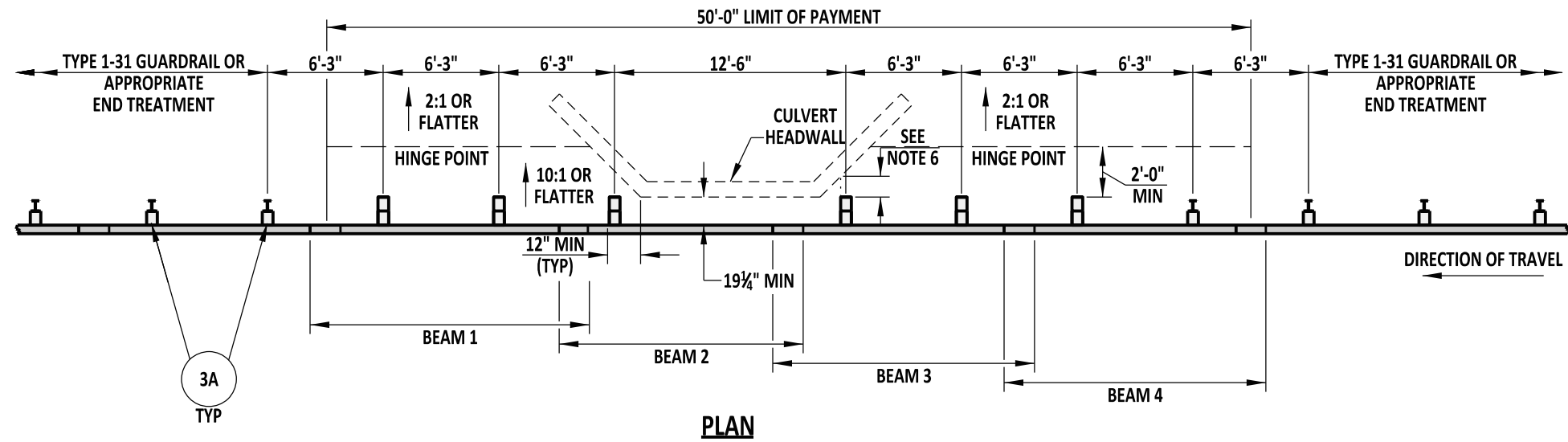


SECTION A-A

GRADING FOR END TREATMENT ATTENUATOR, TYPE 3

- NOTES:
- 1). THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.
 - 2). 6:1 OR FLATTER GRADING IS ALLOWABLE WHEN THE BARRIER IS LOCATED 12' (3.65m) OR MORE FROM THE OUTSIDE EDGE OF THE SHOULDER.
 - 3). THIS END TREATMENT CAN ALSO BE USED IN RAMP GORES OR OTHER AREAS WHERE TWO RAILS OF W-BEAM COME TOGETHER AND TERMINATE WITH ONE END TREATMENT.
 - 4). WHEN OPPOSING ROADWAYS HAVE EQUAL ELEVATIONS THE TRAFFIC BARRIER SYSTEM SHOULD BE PLACED ON THE OPPOSITE SIDE OF THE DITCH LINE FROM APPROACHING TRAFFIC.
 - 5). THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.
 - 6). IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2" (50) WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.

 DELAWARE DEPARTMENT OF TRANSPORTATION	GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3			APPROVED _____ CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. B-2 (2010)	SHT. 3	OF 3	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE

**NOTES:**

- 1). ALL W-BEAMS ARE 13'-6½" IN LENGTH.
- 2). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 3). POSTS 1 THROUGH 6 ARE TO BE TYPE 31 LONG, WOOD BREAKAWAY POSTS. POST 7 IS TO BE A W6x9 STEEL POST.
- 4). THE RAIL SHALL BE ATTACHED AT POSTS 1 THROUGH 6 WITH A ⅝" x 22" GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.
- 5). CULVERT HEADWALL SHALL NOT EXTEND MORE THAN 2" ABOVE GRADE.
- 6). THERE SHALL BE A MINIMUM OF 8" FROM THE BACK OF POST TO THE CULVERT WINGWALLS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 1-31

STANDARD NO.

B-3 (2013)

SHT. 1

OF 3

APPROVED

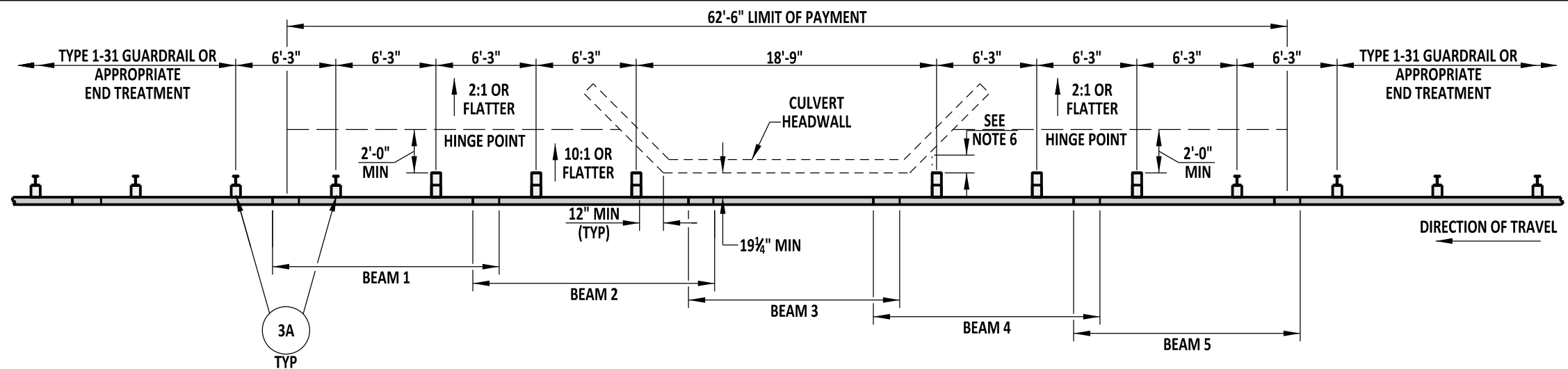
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CHIEF ENGINEER

02/14/2014
DATE

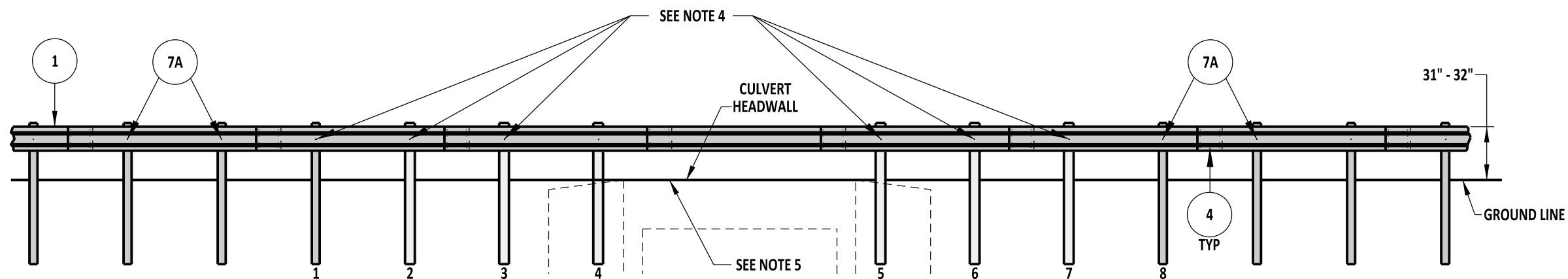
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SIGNATURE ON FILE
DESIGN ENGINEER

01/14/2014
DATE



PLAN



ELEVATION

NOTES:

- 1). ALL W-BEAMS ARE 13'-6½" IN LENGTH.
- 2). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 3). POSTS 1 & 8 ARE TO BE W6x9 STEEL POSTS. POSTS 2 THROUGH 6 ARE TO BE TYPE 31 LONG, WOOD BREAKAWAY POSTS.
- 4). THE RAIL SHALL BE ATTACHED AT POSTS 2 THROUGH 7 WITH A ⅝" x 22" GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.
- 5). CULVERT HEADWALL SHALL NOT EXTEND MORE THAN 2" ABOVE GRADE.
- 6). THERE SHALL BE A MINIMUM OF 8" FROM THE BACK OF POST TO THE CULVERT WINGWALL.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

GUARDRAIL OVER CULVERTS, TYPE 2-31

STANDARD NO.

B-3 (2013)

SHT. 2

OF 3

APPROVED

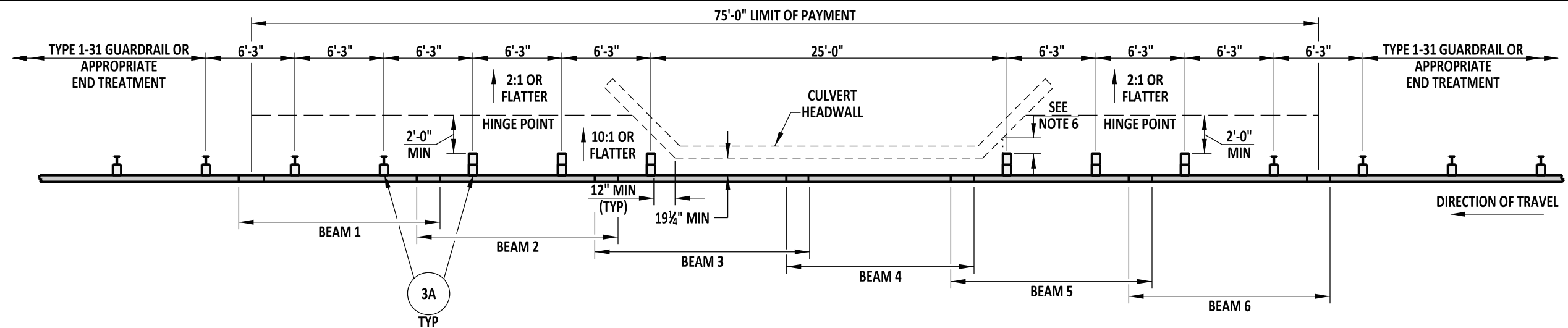
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02/14/2014
DATE

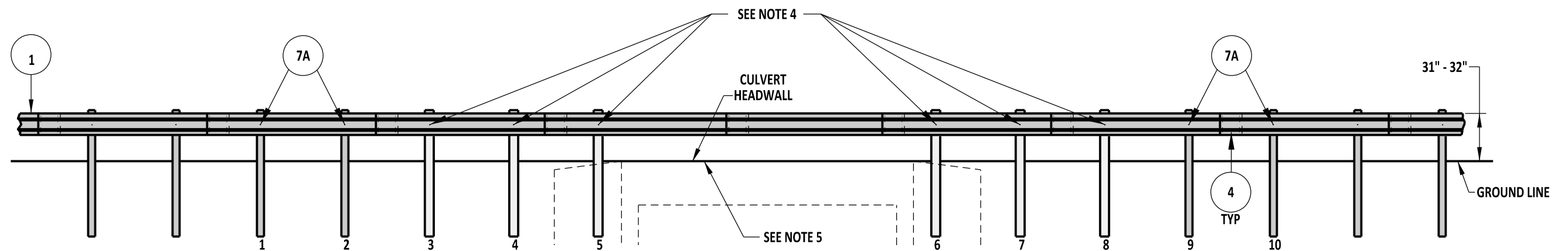
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SIGNATURE ON FILE
DESIGN ENGINEER

01/14/2014
DATE



PLAN



ELEVATION

NOTES:

- 1). ALL W-BEAMS ARE 13'-6½" IN LENGTH.
- 2). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 3). POSTS 1, 2, 9, & 10 ARE TO BE W6x9 STEEL POSTS. POSTS 3 THROUGH 8 ARE TO BE TYPE 31 LONG, WOOD BREAKAWAY POSTS.
- 4). THE RAIL SHALL BE ATTACHED AT POSTS 3 THROUGH 8 WITH A ⅝" x 22" GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.
- 5). CULVERT HEADWALL SHALL NOT EXTEND MORE THAN 2" ABOVE GRADE.
- 6). THERE SHALL BE A MINIMUM OF 8" FROM THE BACK OF POST TO THE CULVERT WINGWALLS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 3-31

STANDARD NO.

B-3 (2013)

SHT. 3

OF 3

APPROVED

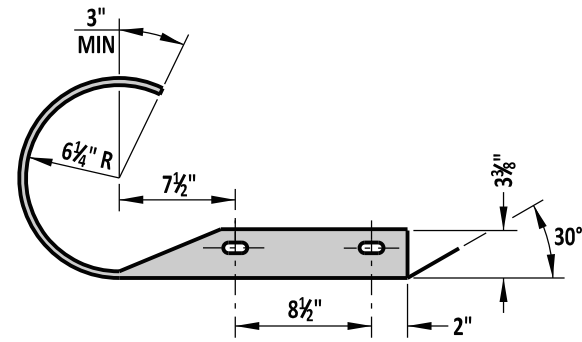
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02/14/2014
DATE

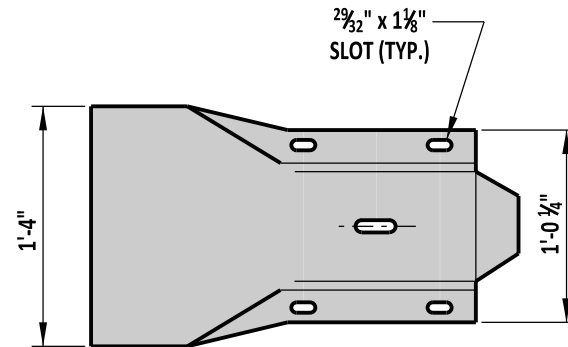
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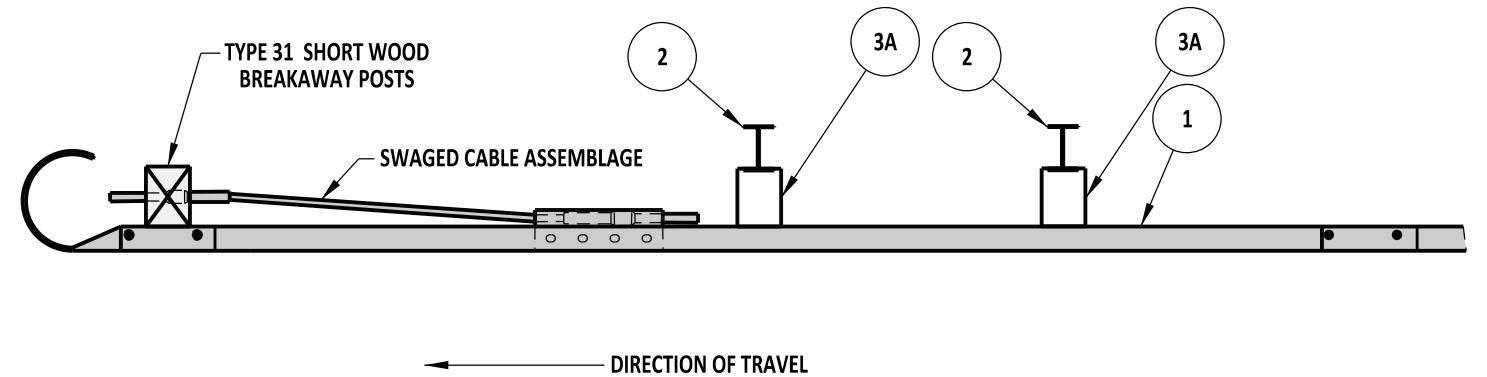
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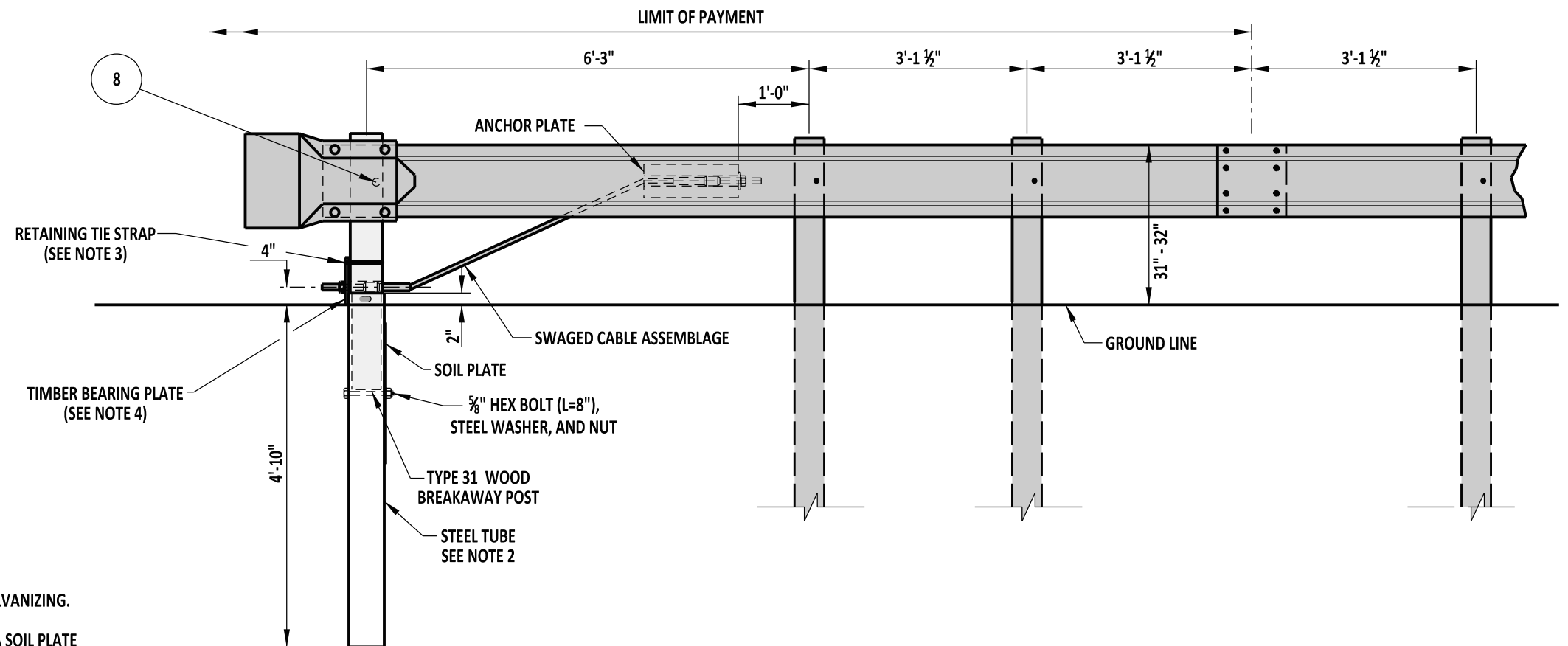
END SECTION PLAN



END SECTION ELEVATION



PLAN



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'-0" STEEL TUBE WITHOUT A SOIL PLATE OR A 5'-0" STEEL TUBE WITH A SOIL PLATE.
- 3). PLACE A 1/2" WIDE PLASTIC RETAINING TIE STRAP AROUND THE SHORT TIMBER BREAKAWAY POST AND TIMBER BEARING PLATE TO ENSURE THE PROPER ORIENTATION OF THE TIMBER BEARING PLATE.
- 4). REFER TO DETAIL B-13, SHEET 8 OF 10 FOR PROPER TIMBER BEARING PLATE ORIENTATION.



DELAWARE
DEPARTMENT OF TRANSPORTATION

END ANCHORAGE, TYPE 31

STANDARD NO.

B-4 (2012)

SHT. 1

OF 1

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

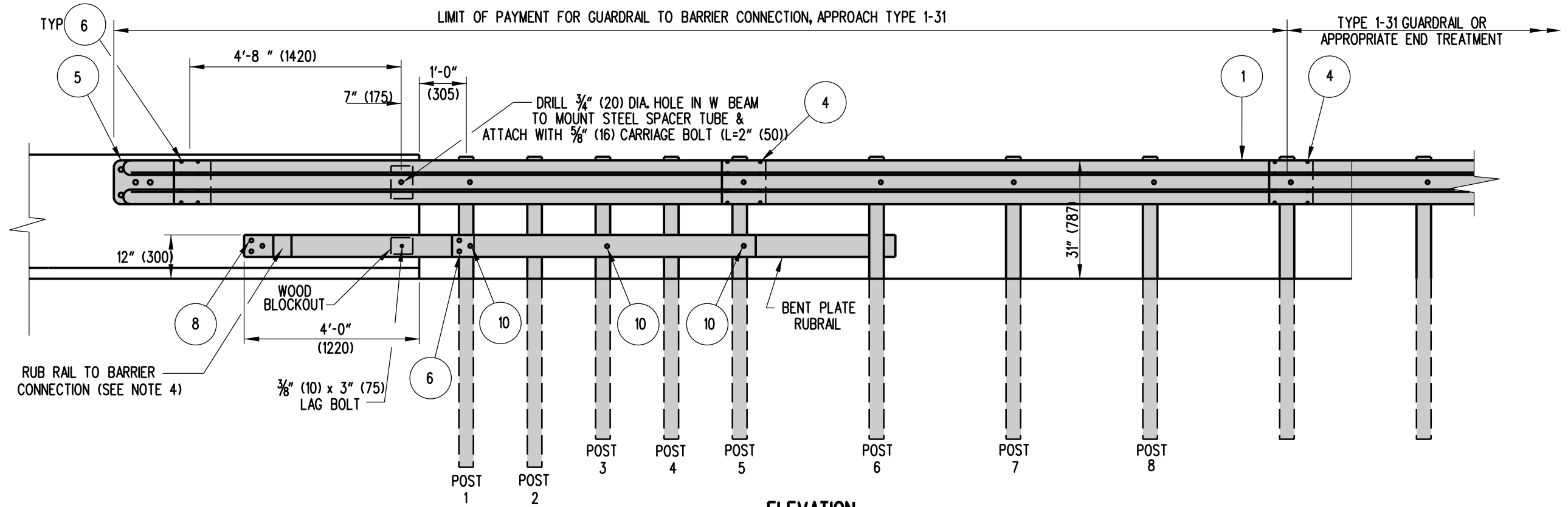
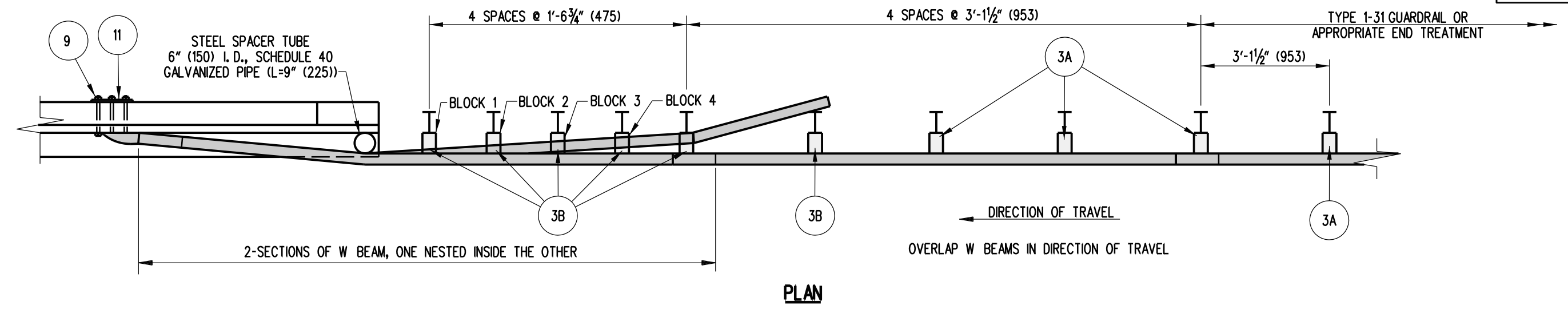
01/07/2013
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2012
DATE

SCALE : N.T.S.



NOTES:

- 1). DO NOT ATTACH W BEAM TO POSTS 2 THROUGH 4.
- 2). DO NOT ATTACH RUB RAIL TO POSTS 2 AND 4.
- 3). POSTS 1 THROUGH 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER OFFSET BLOCKS AND/OR RUBRAIL AND WOOD BLOCK.
- 4). USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (FOR 3/8" (16) BOLT) BETWEEN HEADS AND RUB RAIL.
- 5). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.

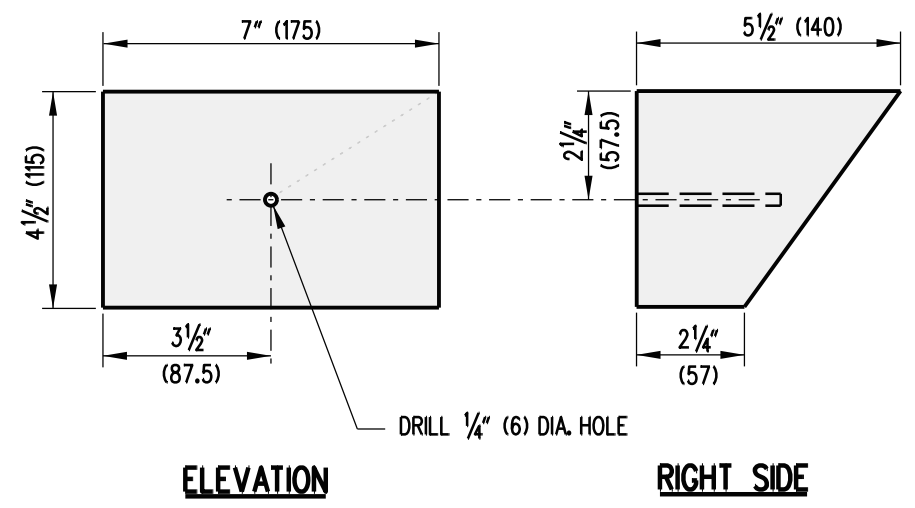
ELEVATION

- 6). PLACE GUARDRAIL REFLECTOR AS PER THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 7). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
- 8). POSTS 1 & 2 ARE W8x13 (W200x19.3), 7'-6" (2.3m) LONG. ALL OTHER POSTS IN TRANSITION ARE W6x9 (W150x13.5), 6'-0" (1.82m) LONG.
- 9). A 6" (150) x 8" (200) x 14" (350) OFFSET BLOCK IS USED AT POSTS 1 THROUGH 6 AND A 6" (150) x 12" (300) x 14" (350) OFFSET BLOCK IS USED AT POSTS 7 THROUGH 9.

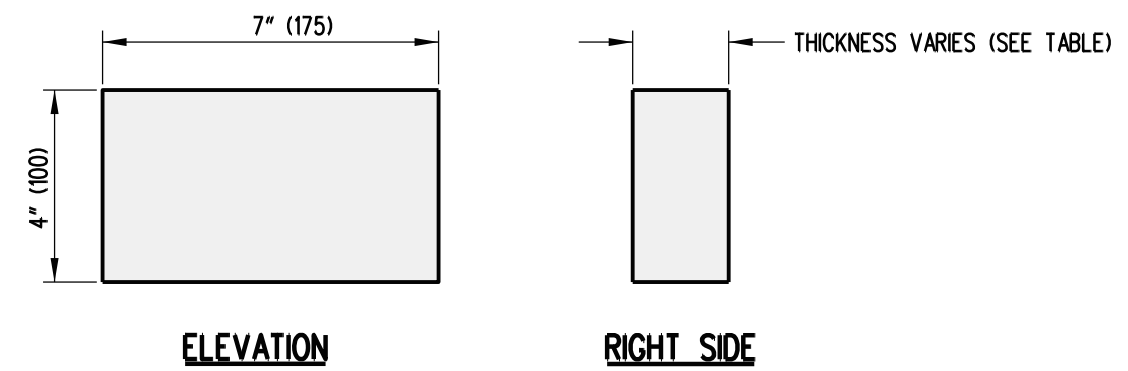


DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31			APPROVED	SIGNATURE ON FILE	12/28/2010
STANDARD NO. B-5 (2010)				CHIEF ENGINEER	DATE
SHT. 1 OF 6			RECOMMENDED	SIGNATURE ON FILE	12/27/2010
				DESIGN ENGINEER	DATE

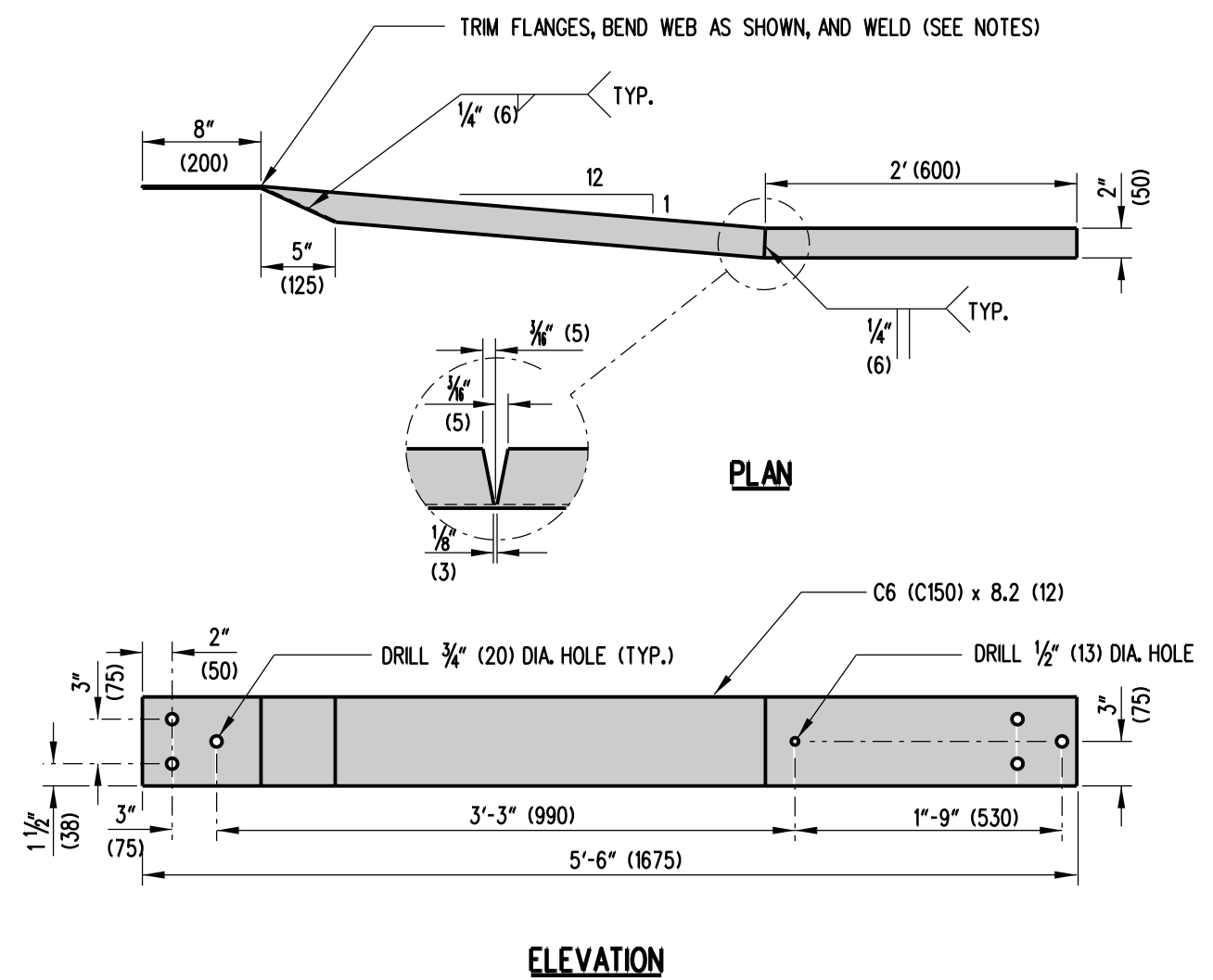


OFFSET BLOCK DETAIL



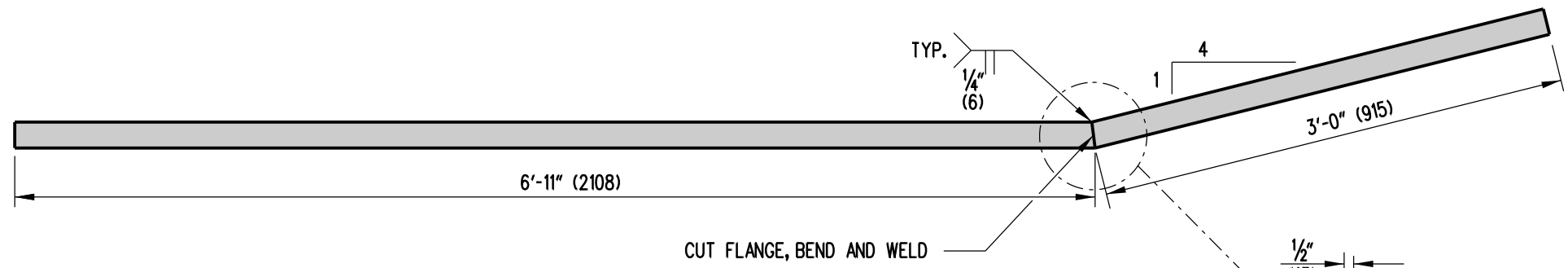
RUB RAIL OFFSET BLOCKS

RUB RAIL OFFSET BLOCKS (7" (175) x 4" (100))		
POST NO.	THICKNESS	BOLT LENGTH
1	4 1/4" (108)	6" (150)
2	3 1/4" (83)	4" (100)
3	2" (50)	4" (100)
4	1" (25)	2" (50)

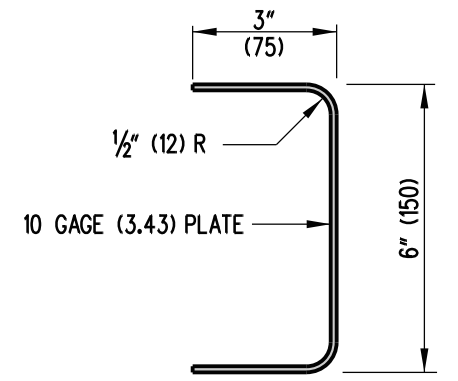
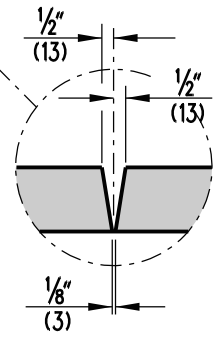


RUB RAIL TO BARRIER CONNECTION

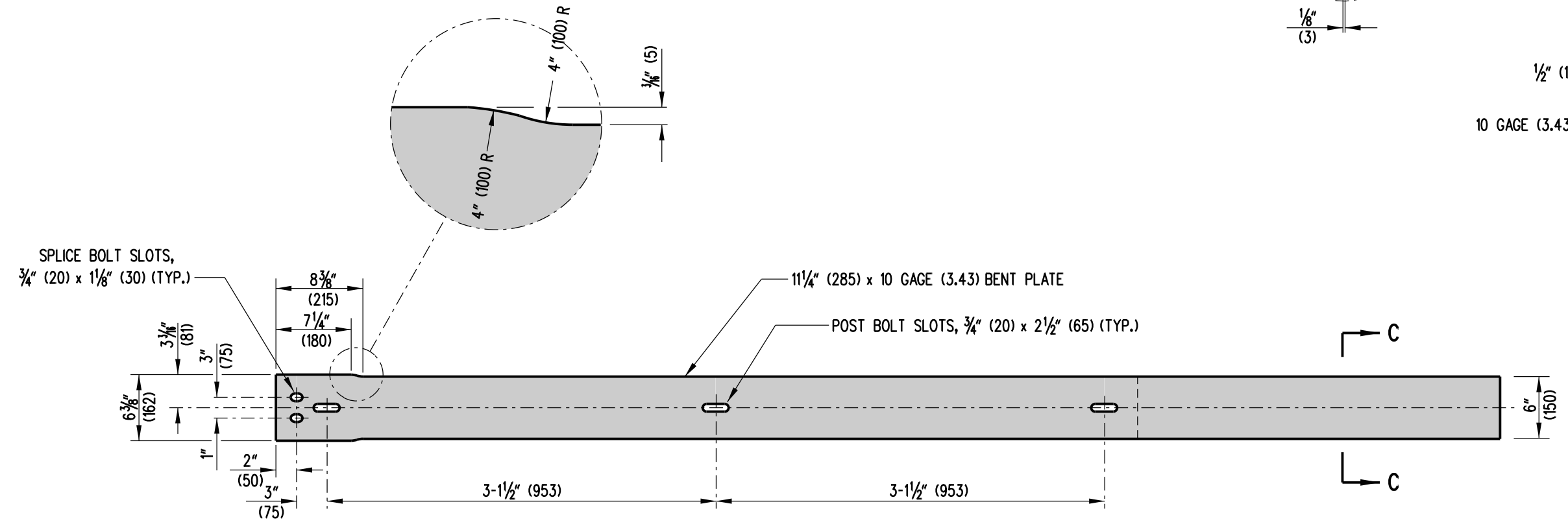
- NOTES:
- 1). THE RUB RAIL TO BARRIER CONNECTION END MUST BE ATTACHED FLUSH WITH THE SLOPED TOE OF THE SAFETY BARRIER. INSTALLATION CAN BE SIMPLIFIED BY FABRICATING OR SHOP TWISTING THE RUB RAIL END TO BE CONSISTENT WITH THE SLOPE OF THE BARRIER, HOWEVER, FIELD BENDING USING HEAT IS PERMITTED.
 - 2). STEEL SPACER TUBE IS SCHEDULE 40 GALVANIZED PIPE, 6" (150) x 9" (225)
 - 3). ALL HARDWARE ON THIS DETAIL IS COMPATIBLE WITH GUARDRAIL TO BARRIER CONNECTION, TYPES 1-31 AND 1-27.



PLAN
SCALE: 1"=1'-0"




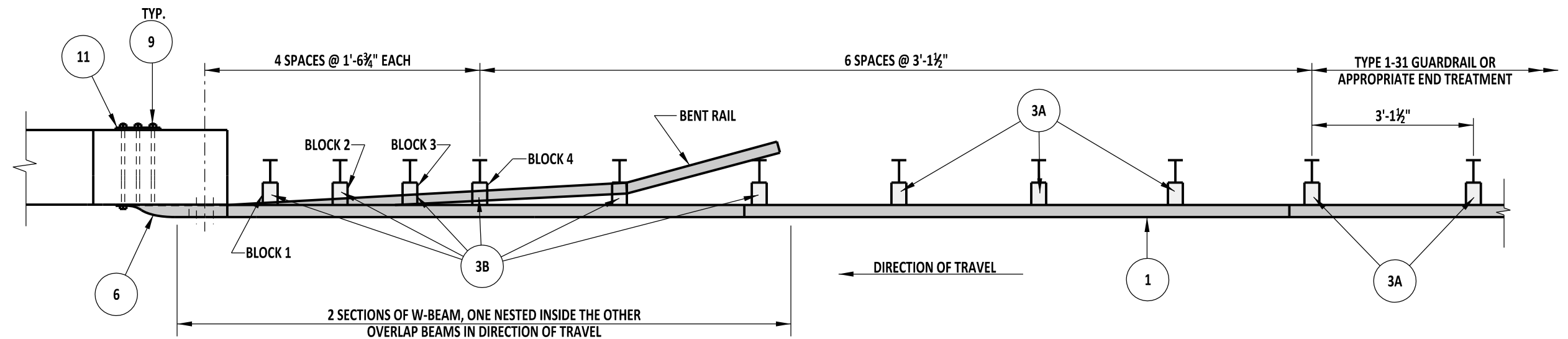
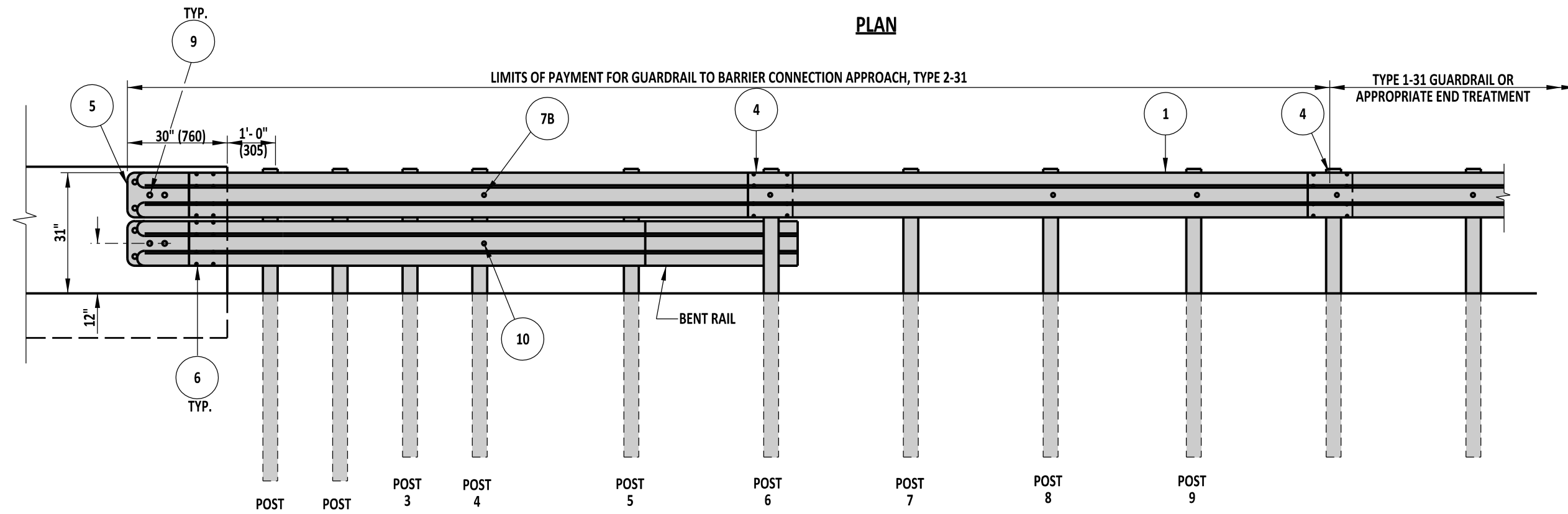
SECTION C-C
SCALE: 3" = 1'-0"



ELEVATION
SCALE: 1"=1'-0"

NOTE:
ALL HARDWARE ON THIS DETAIL IS COMPATIBLE WITH GUARDRAIL TO BARRIER CONNECTION, TYPES 1-31 AND 1-27.

 DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL TO BARRIER CONNECTION, BENT PLATE RUB RAIL			APPROVED	SIGNATURE ON FILE	12/28/2010
	STANDARD NO. B-5 (2010)	SHT. 3	OF 6	RECOMMENDED	SIGNATURE ON FILE	12/27/2010

**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 OFFSET 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, 7'-6" LONG. ALL OTHER POSTS IN TRANSITION ARE W6x9, 6'-0" LONG.
- 5). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
- 6). BENT RAIL MAY BE SHOP BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.
- 7). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.
- 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). A 6" x 8" x 14" OFFSET BLOCK IS USED AT POSTS 1 THROUGH 6 AND A 6" x 12" x 14" OFFSET BLOCK IS USED AT POSTS 7 THROUGH 9.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH, TYPE 2-31

STANDARD NO. B-5 (2012)

SHT. 4 OF 6

APPROVED

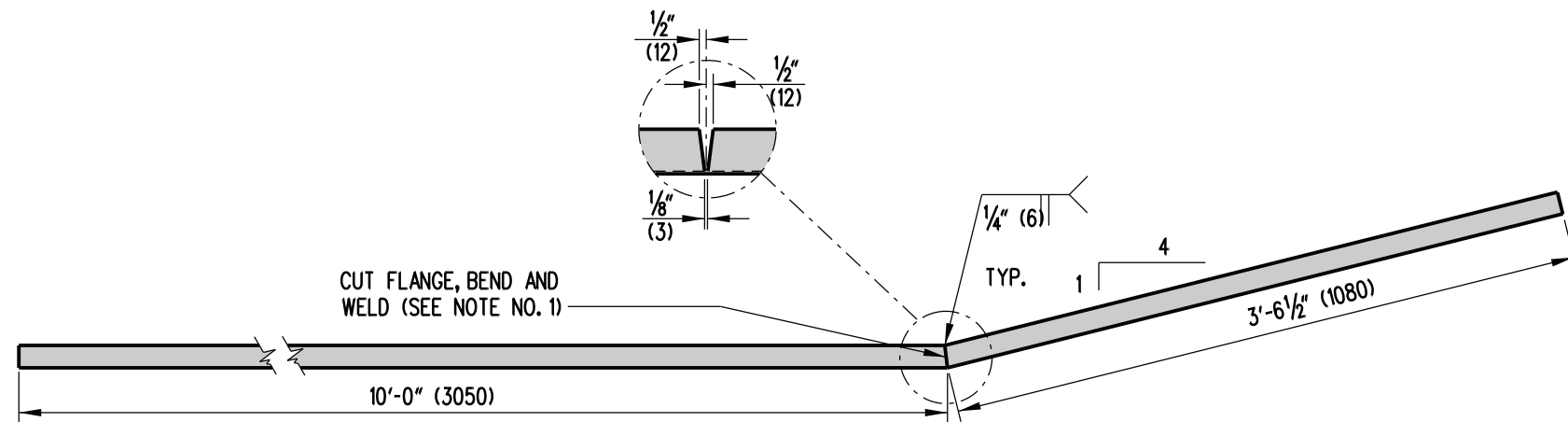
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CHIEF ENGINEER

01/07/2013
DATE

RECOMMENDED

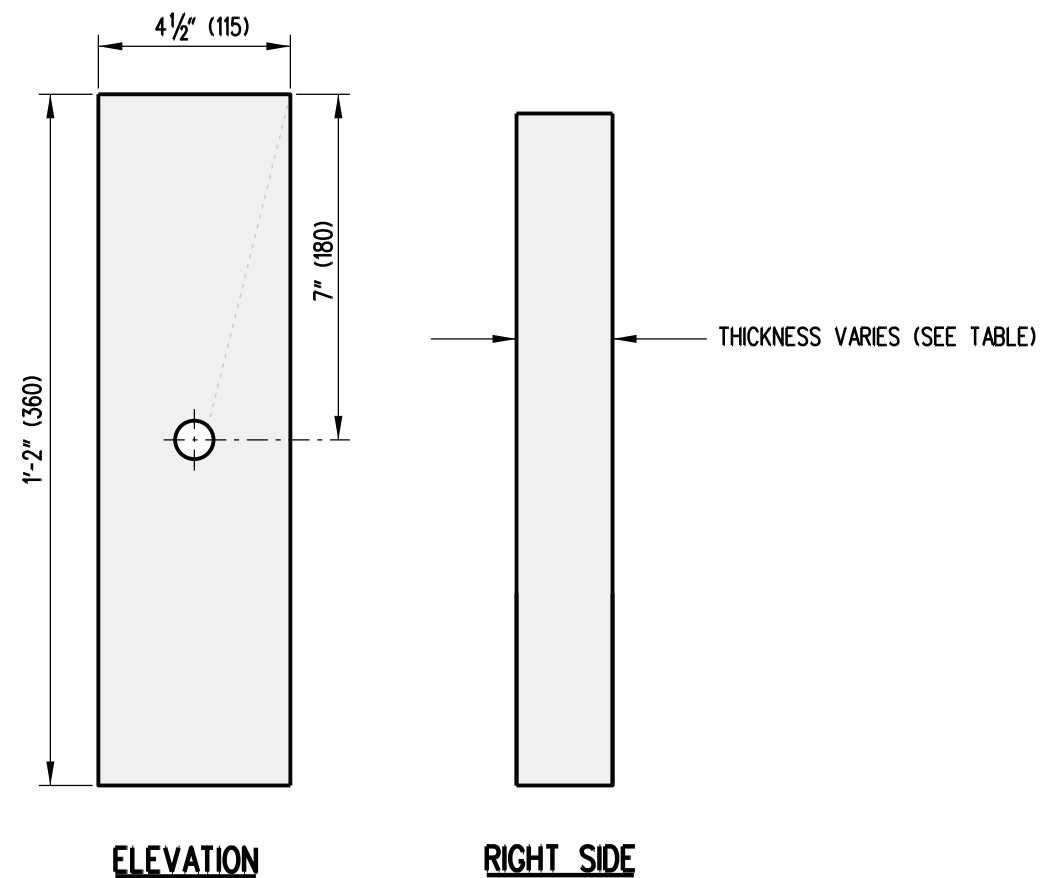
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DESIGN ENGINEER

12/20/2012
DATE



BENT RAIL

SCALE: 1"=1'-0"



ELEVATION

RIGHT SIDE

BENT RAIL OFFSET BLOCKS

SCALE: 3"=1'-0"

BENT RAIL OFFSET BLOCKS
1'-2" (360) x 4 1/2" (115)

BLOCK	THICKNESS	BOLT LENGTH
1	5" (125)	8" (200)
2	4" (100)	6" (150)
3	3" (75)	6" (150)
4	2" (50)	4" (100)

NOTES:

- 1). BOTTOM OFFSET BLOCKS LOCATED ON POSTS 1-4 ARE OFFSET DRILLED TO SIT SQUARELY ON THE POST FLANGE AND SECURED WITH 5/8" (16) CARRIAGE BOLTS. SEE BENT RAIL OFFSET BLOCK TABLE FOR BOLT LENGTH.
- 2). ALL HARDWARE ON THIS DETAIL IS COMPATIBLE WITH GUARDRAIL TO BARRIER CONNECTION, TYPES 2-31 AND 2-27.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, TYPE 2 HARDWARE

STANDARD NO. B-5 (2010)

SHT. 5 OF 6

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

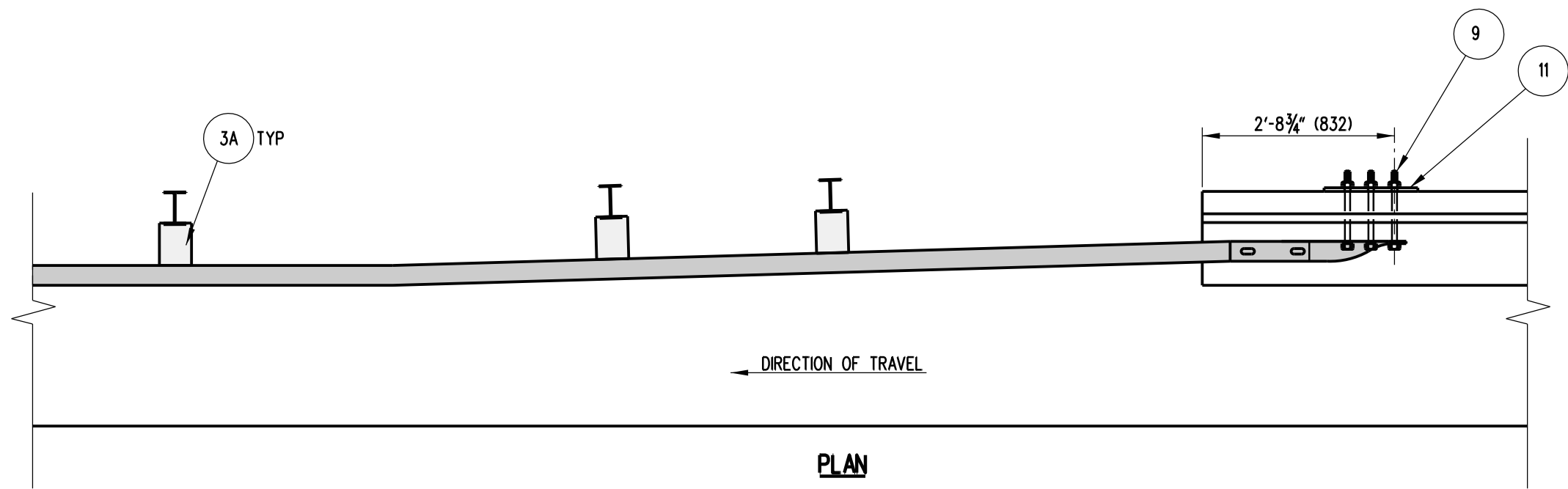
12/28/2010
DATE

RECOMMENDED

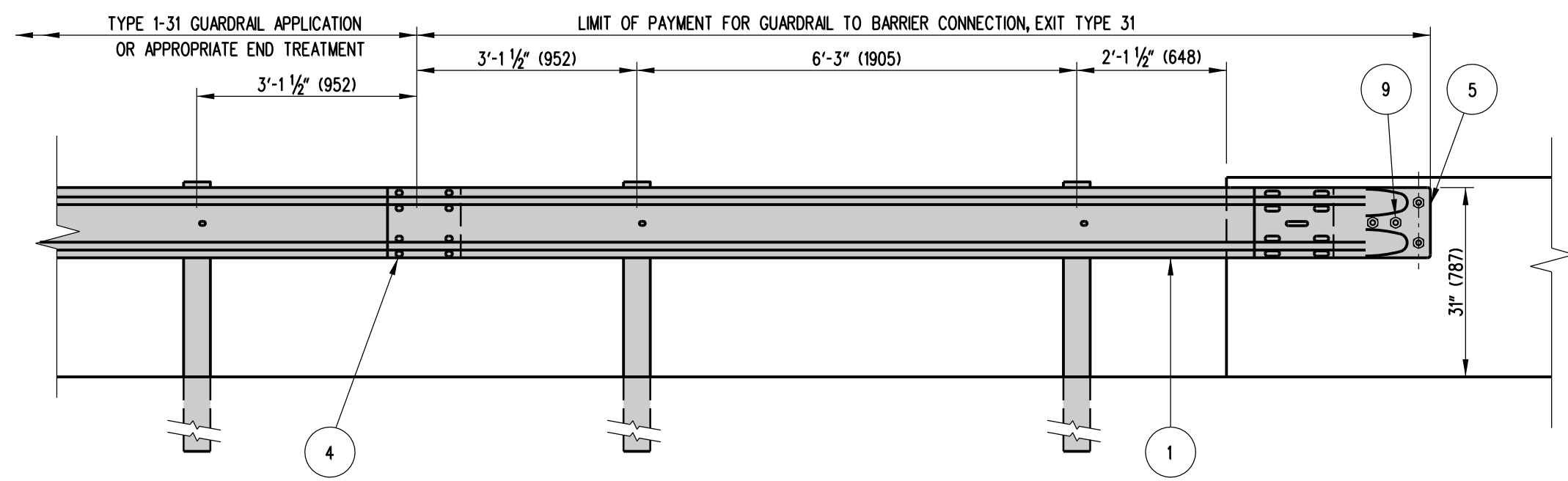
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12/27/2010
DATE

SCALE : N.T.S.




PLAN

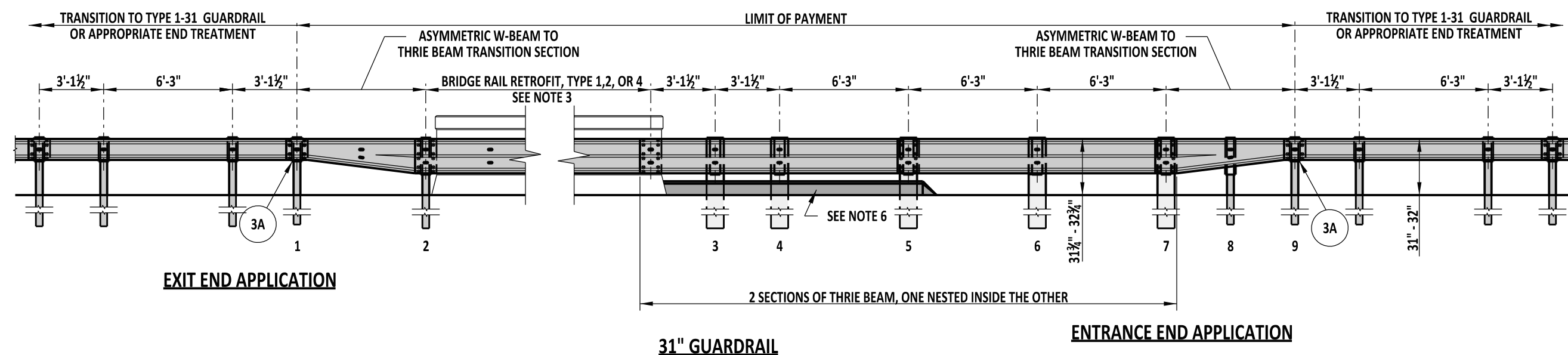
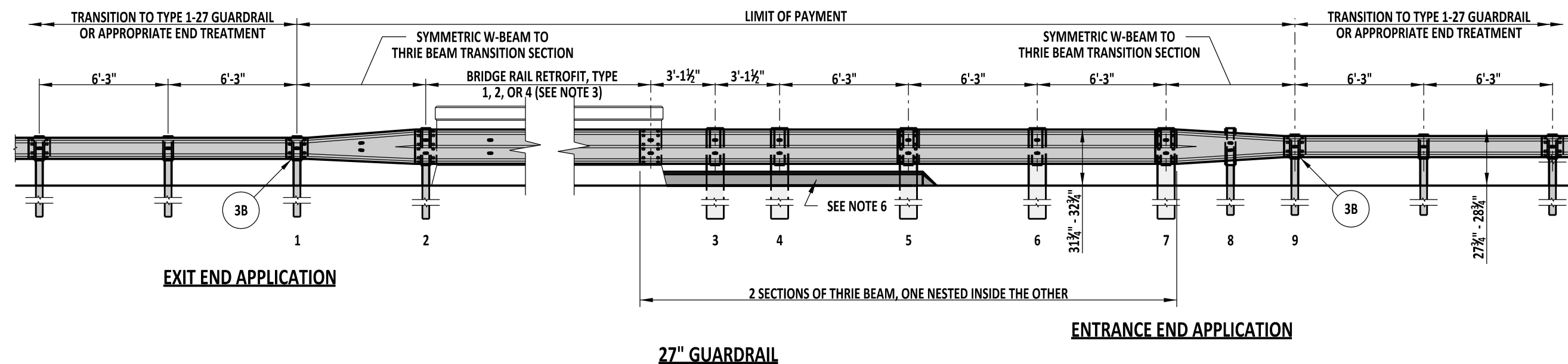


ELEVATION

NOTES:

- 1). CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
- 2). GUARDRAIL SECTION AND TERMINAL CONNECTIONS 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 31			APPROVED _____ CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. B-5 (2010)	SHT. 6	OF 6	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE



NOTES:

- 1). POSTS 1, 2, 8, & 9 ARE W6 x 9, 6'-0" LONG, STEEL POSTS AND POSTS 3 THRU 7 ARE 10" x 10" x 6'-6" TIMBER POSTS.
- 2). POSTS 2 THRU 8 HAVE STANDARD THRIE BEAM OFFSET BLOCKS. POSTS 1 & 9 HAVE STANDARD W-BEAM OFFSET BLOCKS.
- 3). SEE DETAIL B-6, SHEETS 4 AND 5 FOR NOTES PERTAINING TO THE BRIDGE RAIL RETROFIT SECTIONS.

- 4). THE EXIT END APPLICATION SHALL BE USED ONLY ON DIVIDED HIGHWAYS. FOR ALL OTHER CONDITIONS, THE ENTRANCE END APPLICATION SHALL BE USED ON BOTH ENDS OF THE BRIDGE PARAPET.
- 5). USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (FOR $\frac{5}{8}$ " BOLT) BETWEEN BOLT HEADS AND RUBRAIL.
- 6). PLACE P.C.C. CURB, TYPE 1-8, STARTING AT PARAPET WALL AND TERMINATING AFTER POST 5. TAPER CURB TO FLUSH AT A 1:1 RATIO.



DELAWARE
DEPARTMENT OF TRANSPORTATION

BRIDGE RAIL RETROFIT, ENTRANCE AND END APPLICATIONS

STANDARD NO. B-6 (2013)

SHT. 1 OF 5

APPROVED

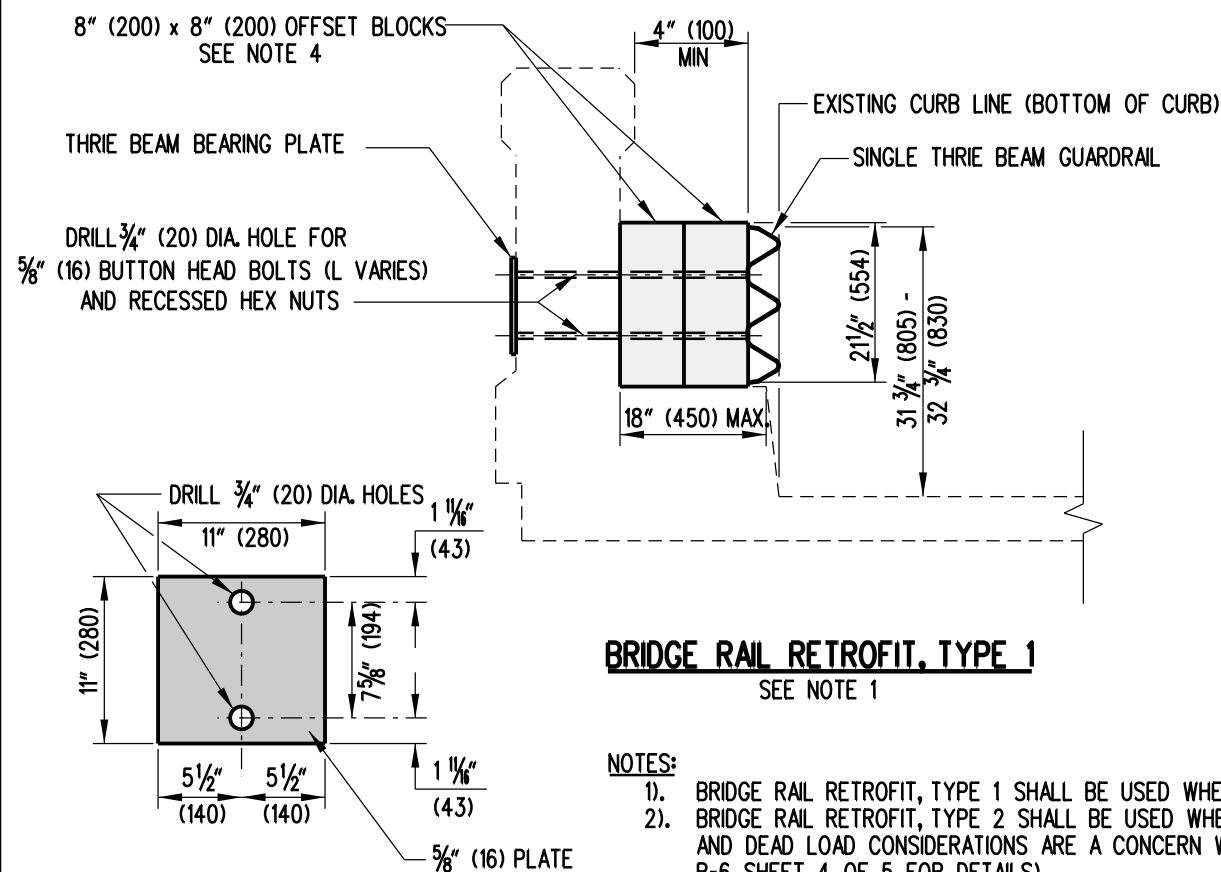
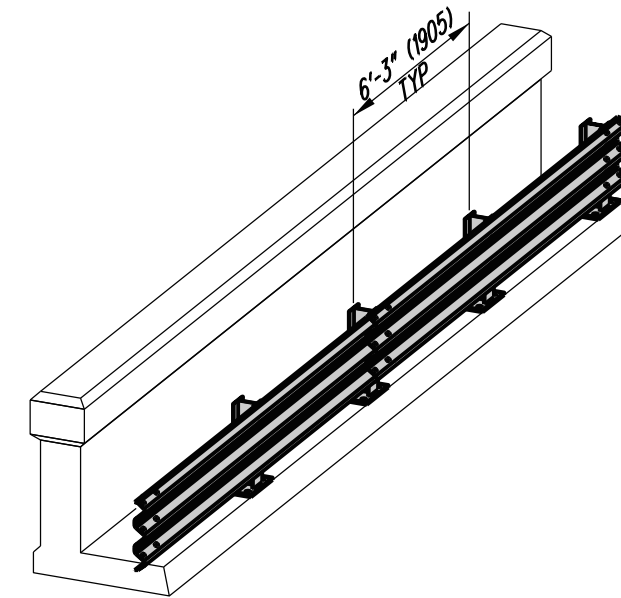
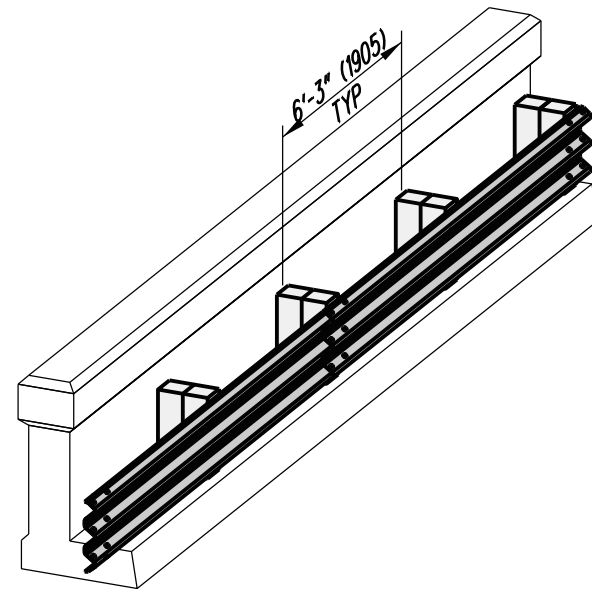
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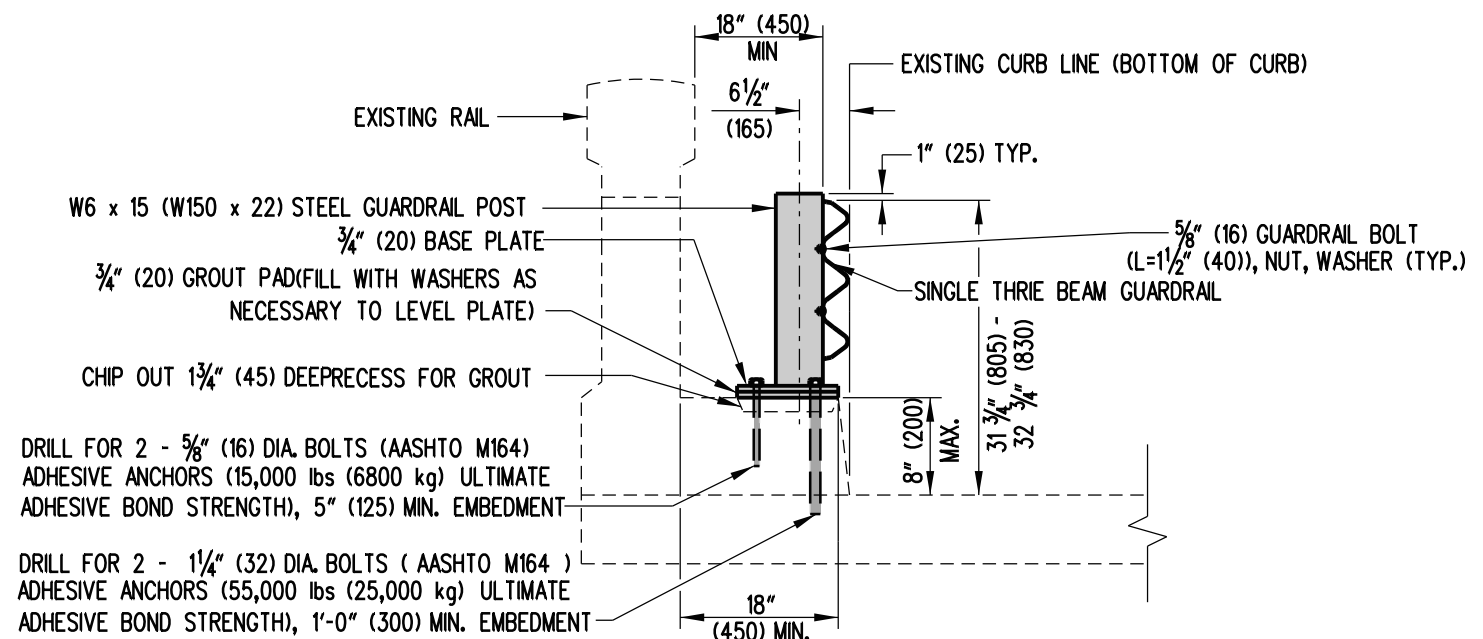
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BRIDGE RAIL RETROFIT, TYPE 1
SEE NOTE 1

NOTES:

- 1). BRIDGE RAIL RETROFIT, TYPE 1 SHALL BE USED WHEN THE PARAPET MONOLITHIC CURB IS 18" (450) OR LESS.
- 2). BRIDGE RAIL RETROFIT, TYPE 2 SHALL BE USED WHEN THE PARAPET MONOLITHIC CURB IS 18" (450) OR WIDER, AND DEAD LOAD CONSIDERATIONS ARE A CONCERN WHEN USING BRIDGE RAIL RETROFIT, TYPE 3 (SEE DETAIL B-6, SHEET 4 OF 5 FOR DETAILS).
- 3). ADHESIVE ANCHORS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS AND SHALL BE GALVANIZED.
- 4). OFFSET BLOCK THICKNESS SHALL BE ADJUSTED TO ALLOW THE FACE OF THE THRIE BEAM TO BE FLUSH WITH THE BOTTOM OF THE CURB (MINIMUM THICKNESS SHALL BE 4" (100)).



BRIDGE RAIL RETROFIT, TYPE 2
SEE NOTE 2

- 5). SEE DETAIL B-6, SHEET 3 OF 5 FOR BRIDGE RAIL RETROFIT, TYPE 2 HARDWARE DETAILS.
- 6). TYPICAL LATERAL SPACING OF OFFSET BLOCKS OR STEEL POSTS THROUGHOUT THE BRIDGE RAIL SECTION SHALL BE 6'-3" (1905). HOWEVER, SPACING MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP BLOCKS OR POSTS AT THE END OF THE PARAPET.
- 7). USE A THRIE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.
- 8). PLACE GUARDRAIL DELINEATORS IN THE UPPER VALLEY OF THE THRIE BEAM AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 9). SEE DETAIL B-6, SHEET 1 OF 5 FOR ENTRANCE AND END APPLICATION DETAILS.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

BRIDGE RAIL RETROFIT, TYPES 1 & 2

STANDARD NO. B-6 (2010)

SHT. 2 OF 5

APPROVED

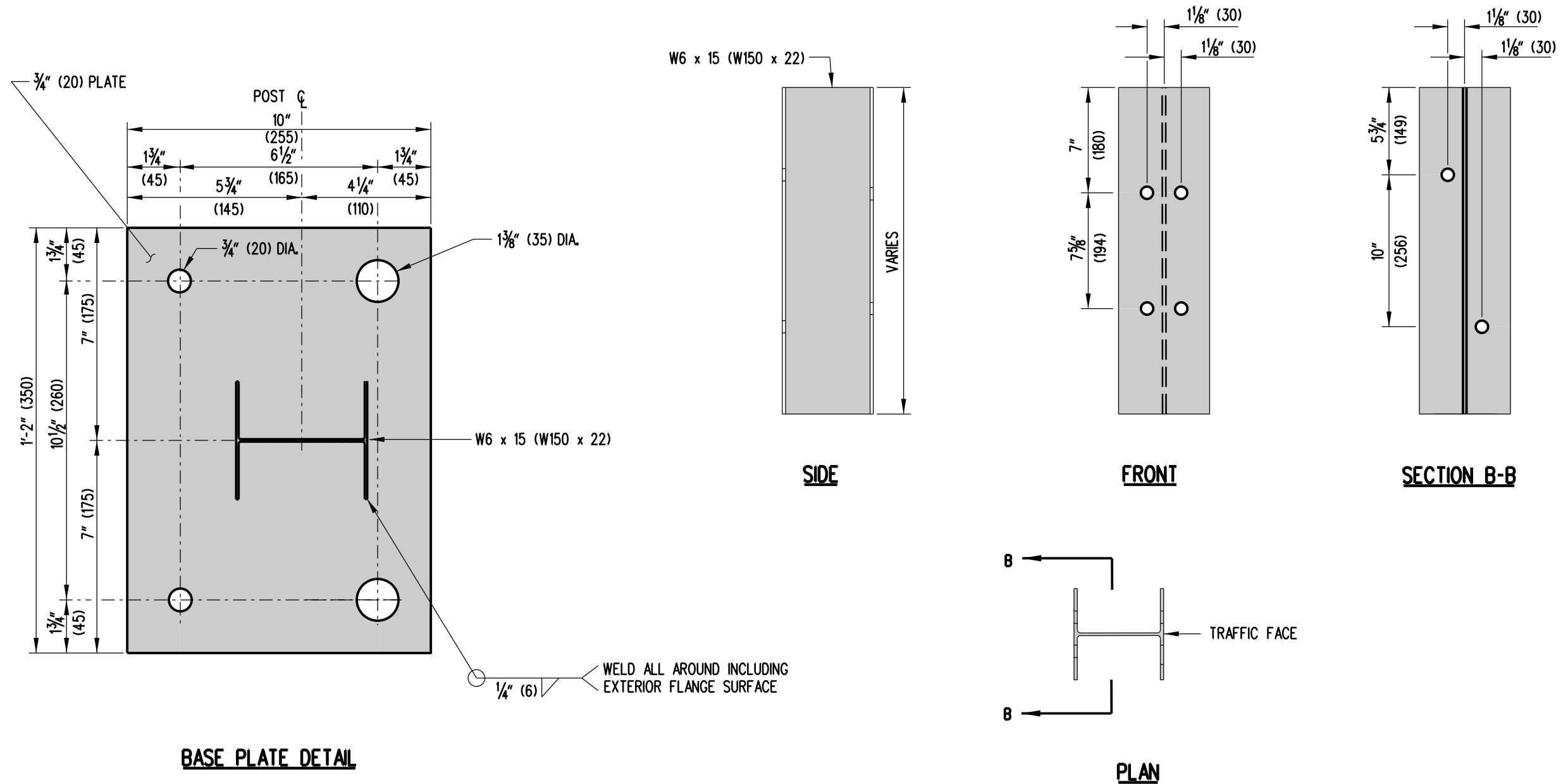
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DATE



W6 x 15 (W150 x 22) STEEL GUARDRAIL POST



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

BRIDGE RAIL RETROFIT, TYPE 2 HARDWARE

STANDARD NO. B-6 (2010)

SHT. 3 OF 5

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

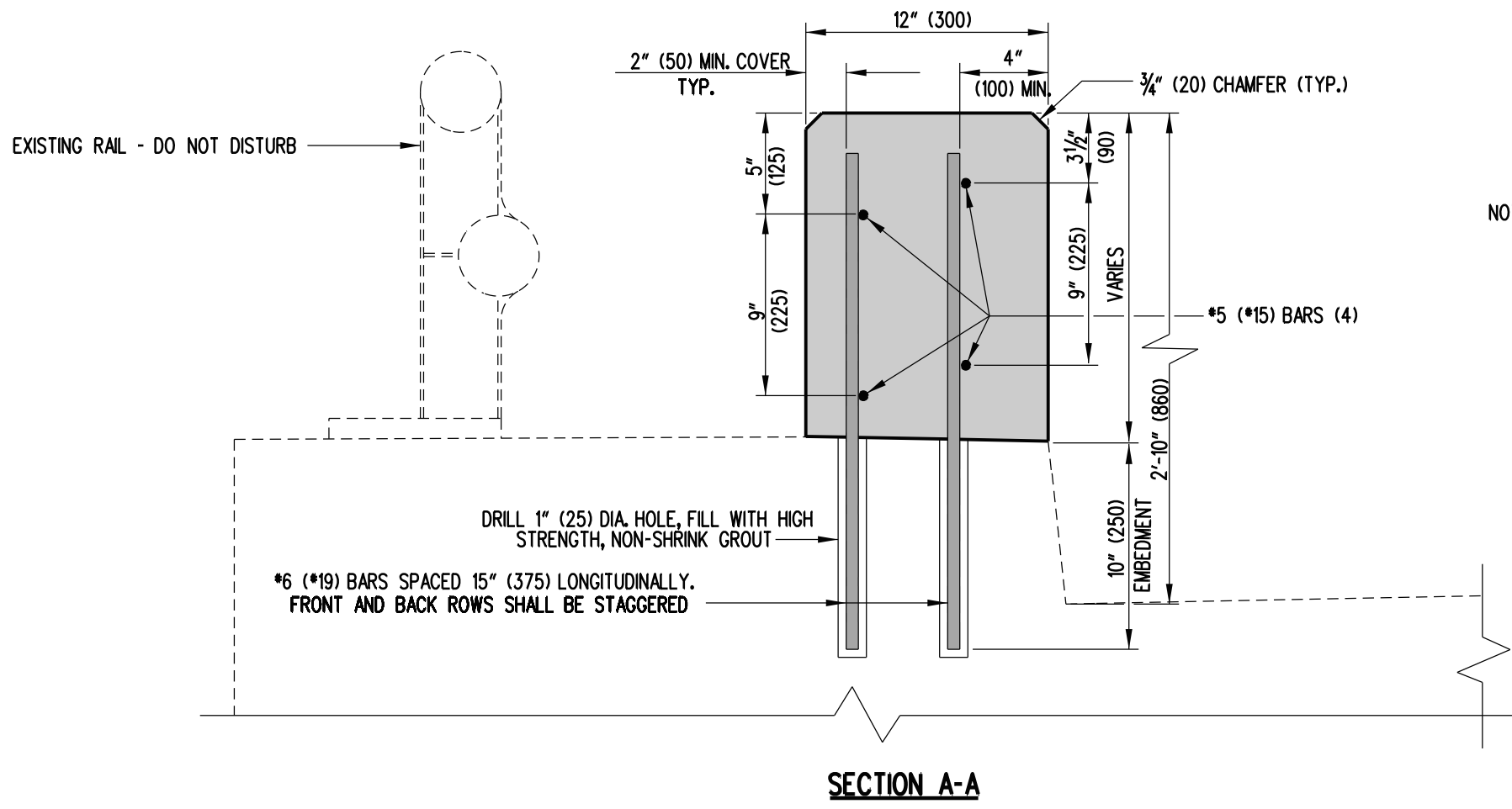
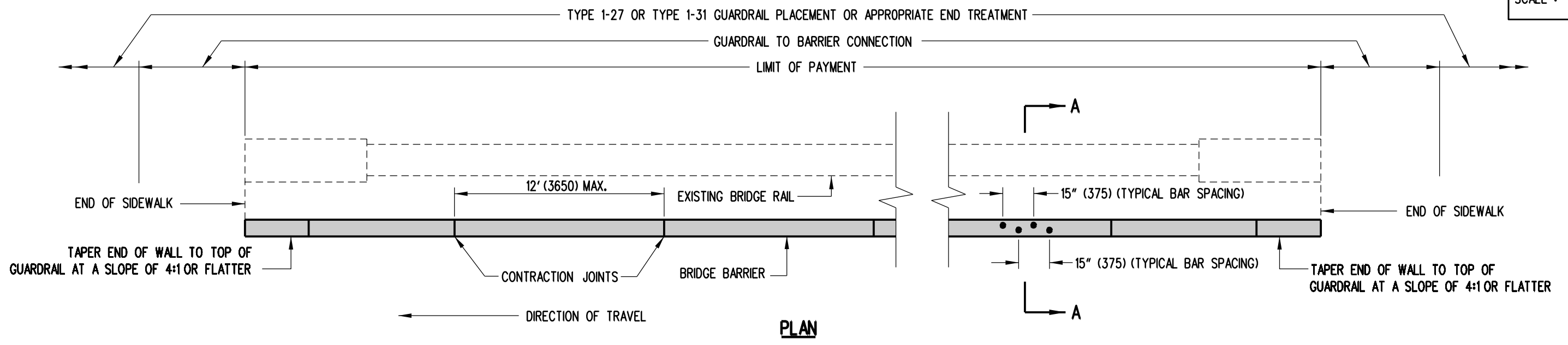
12/28/2010
DATE

RECOMMENDED


D SIGNATURE ON FILE
DESIGN ENGINEER

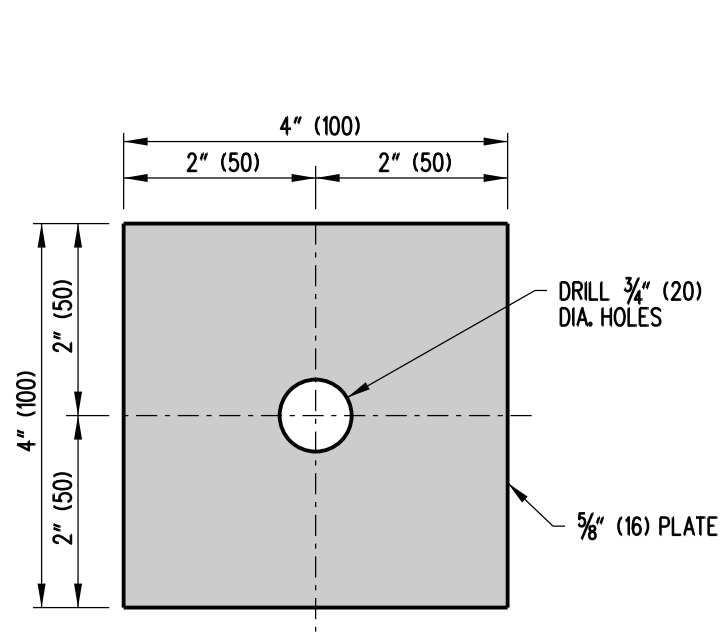
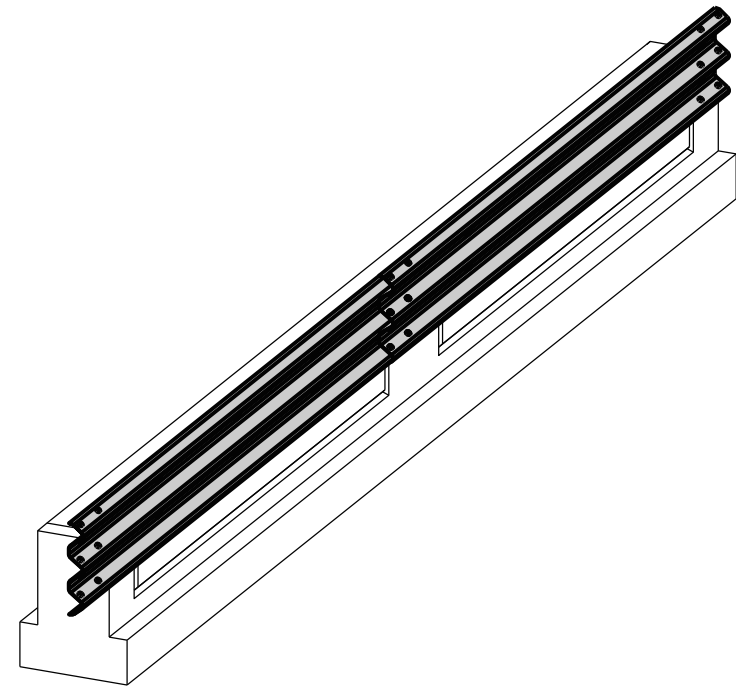
12/27/2010
DATE

SCALE : N.T.S.

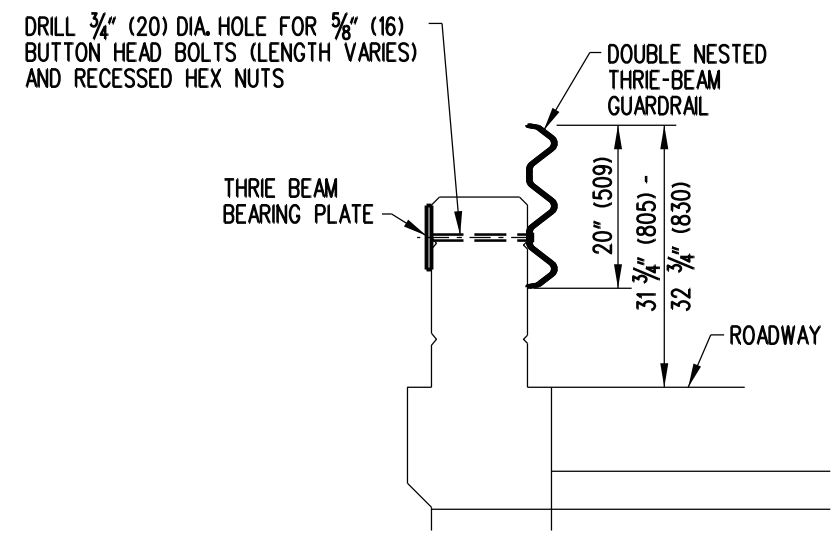


NOTE: STANDARD GUARDRAIL TO BARRIER CONNECTIONS SHALL BE CONNECTED TO THE ENDS OF THE NEW BRIDGE BARRIER AND TRANSITIONED TO THE EXISTING GUARDRAIL.

 DELAWARE DEPARTMENT OF TRANSPORTATION	BRIDGE RAIL RETROFIT, TYPE 3			APPROVED _____ CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. B-6 (2010)	SHT. 4	OF 5	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE




THRIE-BEAM BEARING PLATE DETAIL

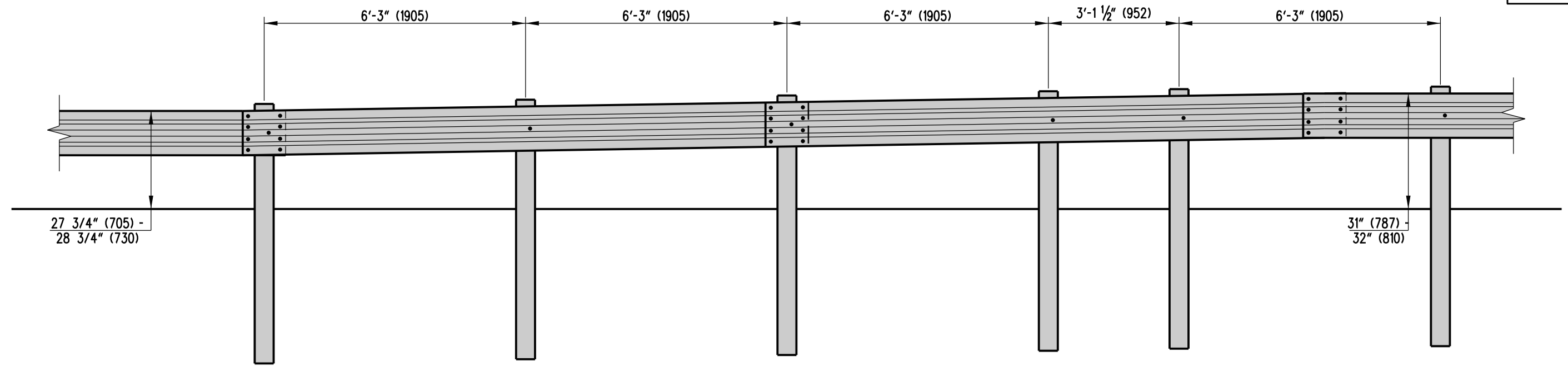


SECTION VIEW

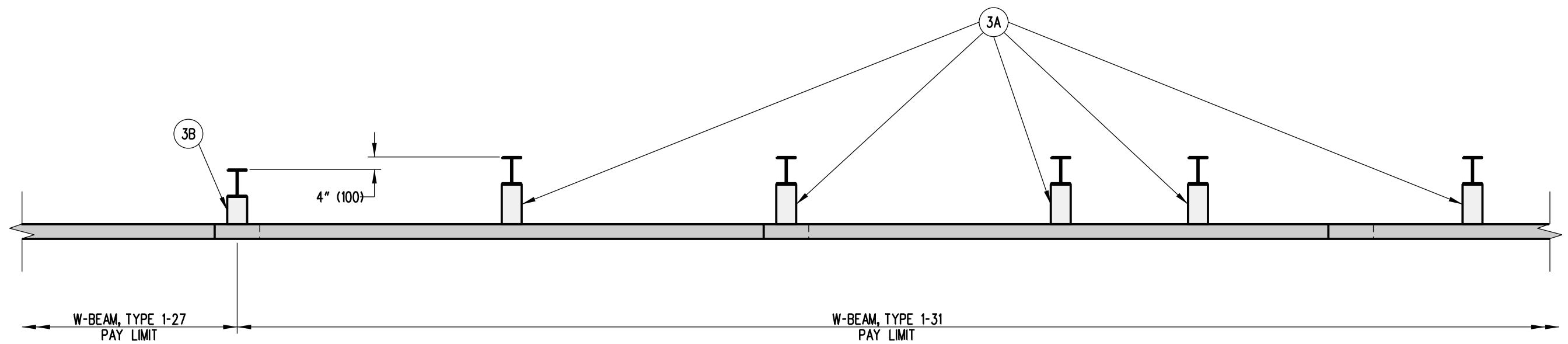
- NOTES:
- 1). BRIDGE RAIL RETROFIT, TYPE 4 SHALL BE USED WHEN THE EXISTING PARAPET HEIGHT IS BETWEEN 22" (559) AND 26" (660).
 - 2). USE A THRIE-BEAM EXPANSION ELEMENT AT BRIDGE EXPANSION JOINTS.
 - 3). PLACE GUARDRAIL DELINEATORS IN THE UPPER VALLEY OF THE THRIE-BEAM AT THE INTERVAL SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - 4). SEE DETAIL B-6, SHEET 1 OF 5 FOR ENTRANCE AND EXIT APPLICATION DETAILS AND NOTES.
 - 5). SPACING OF WOOD POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.
 - 6). USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (FOR 5/8" (16) BOLT) BETWEEN BOLT HEADS AND RUBRAIL.
 - 7). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.

 DELAWARE DEPARTMENT OF TRANSPORTATION	BRIDGE RAIL RETROFIT, TYPE 4			APPROVED	SIGNATURE ON FILE	12/28/2010
	STANDARD NO.	B-6 (2010)	SHT. 5 OF 5	RECOMMENDED	SIGNATURE ON FILE	12/27/2010

SCALE : N.T.S.



ELEVATION



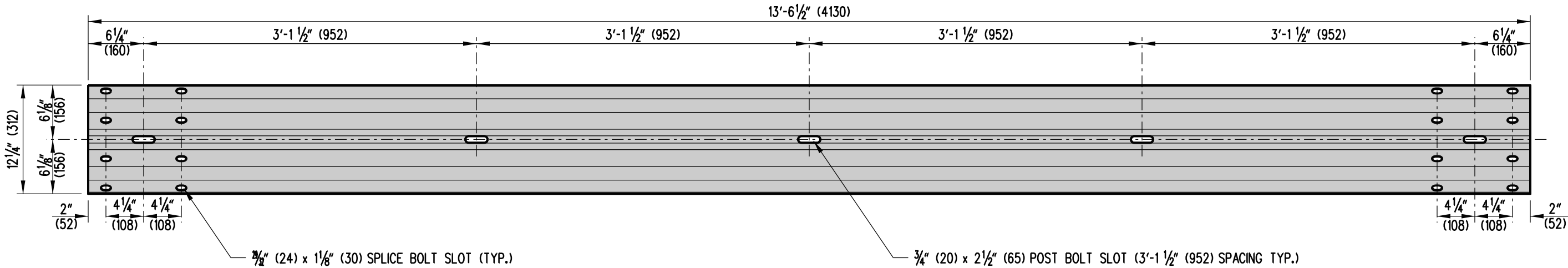
PLAN



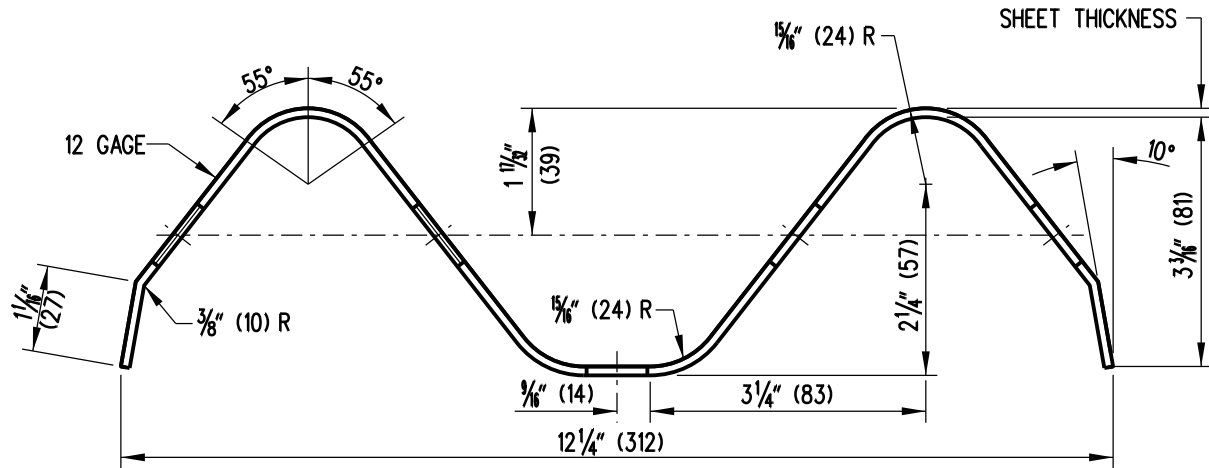
**DELAWARE
DEPARTMENT OF TRANSPORTATION**

W-BEAM, TYPE 1-27 TO TYPE 1-31 TRANSITION SECTION		APPROVED	SIGNATURE ON FILE	12/28/2010
STANDARD NO. B-7 (2010)			CHIEF ENGINEER	DATE
SHT. 1	OF 1	RECOMMENDED	SIGNATURE ON FILE	12/27/2010
			DESIGN ENGINEER	DATE

SCALE : N.T.S.



W-BEAM ELEVATION



W-BEAM SECTION

NOTE:

- 1). FOUR ADDITIONAL $\frac{3}{4}$ " (20) x $2\frac{1}{2}$ " (65) SLOTS SHALL BE PROVIDED AT $3'-1\frac{1}{2}$ " (952) SPACING FOR A $26'-\frac{1}{2}$ " (7940) BEAM LENGTH.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

HARDWARE

STANDARD NO. B-13 (2010)

SHT. 1 OF 10

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

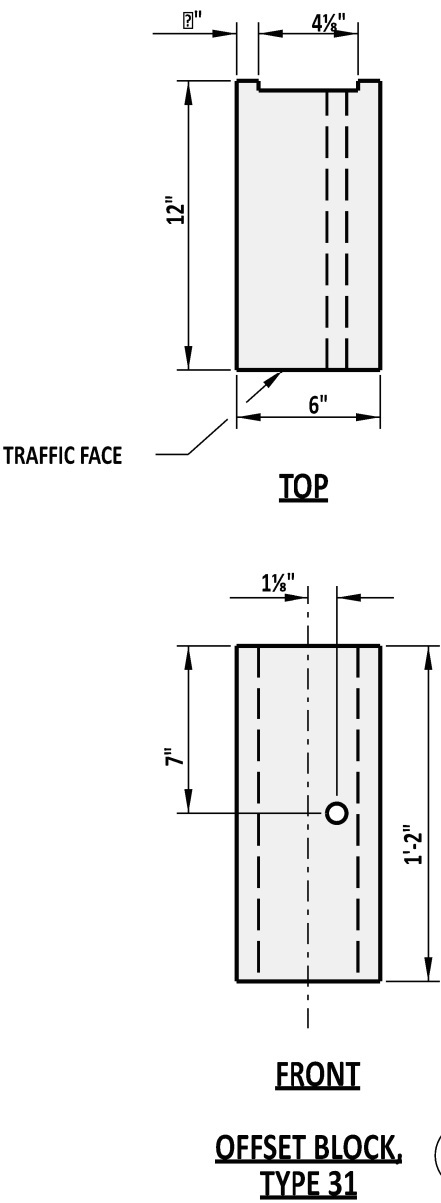
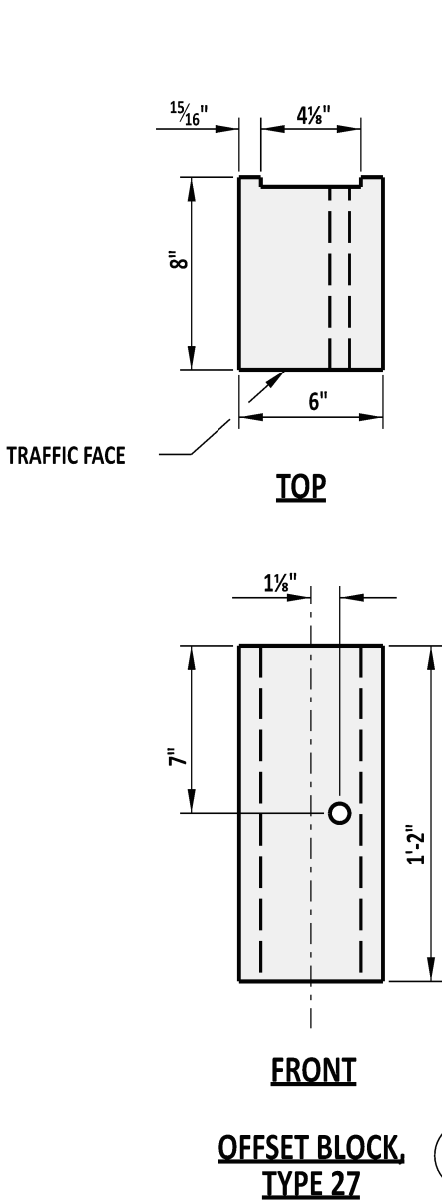
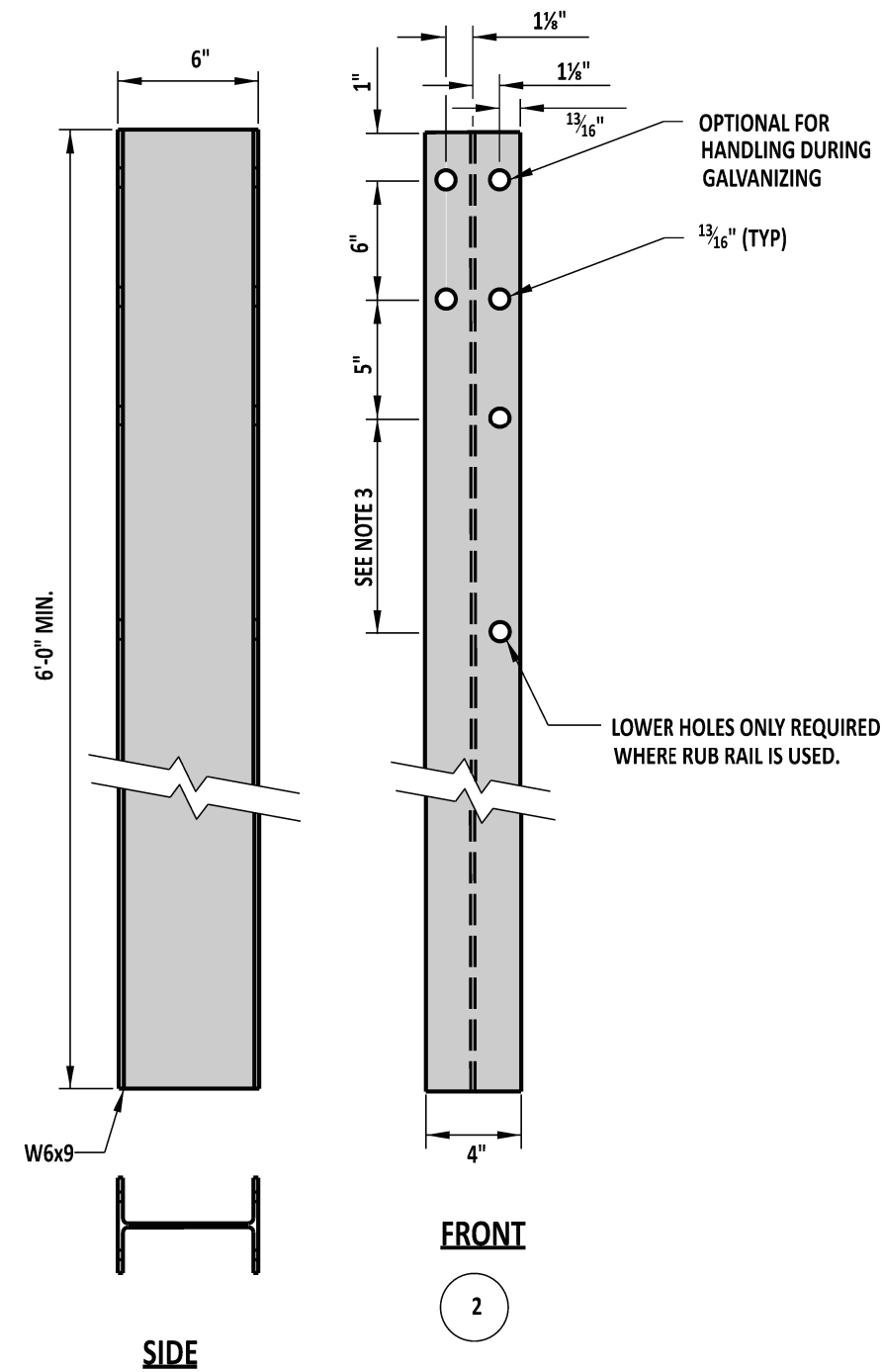
12/28/2010
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/27/2010
DATE

09/17/2010



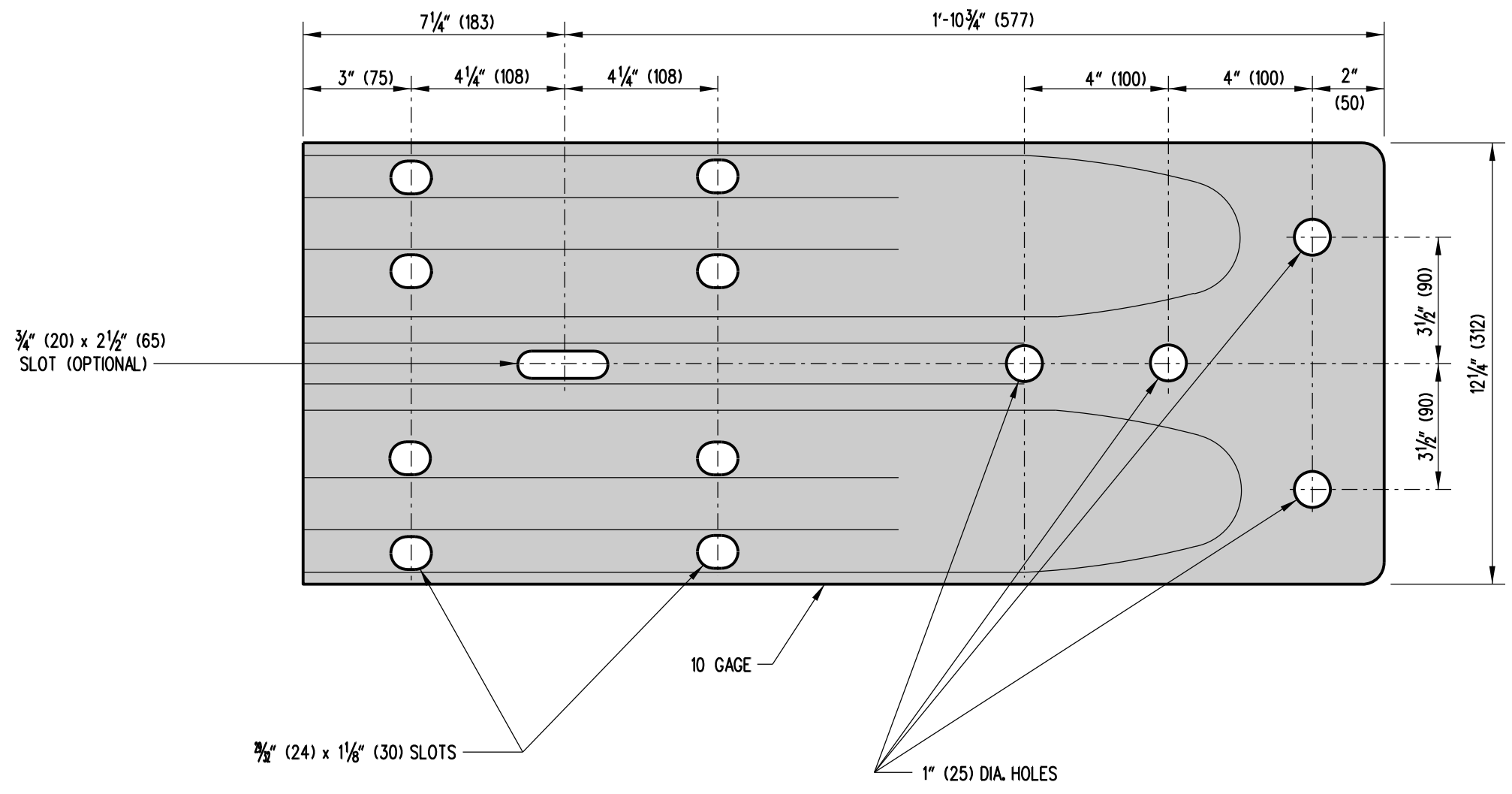
- NOTE:**
- 1). ALL HOLES SHALL BE 13/16" DIA. BOLT HOLE PATTERN IS SYMMETRICAL WITH RESPECT TO THE VERTICAL AXIS OF THE POST.
 - 2). WHERE CONDITIONS REQUIRE, ALTERNATE POST LENGTHS IN INCREMENTS OF 6" MAY BE USED.
 - 3). THE RUB RAIL HOLE OFFSET DISTANCE IS 10 1/2" FOR GUARDRAIL TO BARRIER CONNECTION, TYPE 1-27 AND 1-31, 1'-2" FOR GUARDRAIL TO BARRIER CONNECTION, TYPE 2-27, AND 7 7/8" FOR GUARDRAIL TO BARRIER CONNECTION, TYPE 2-31.



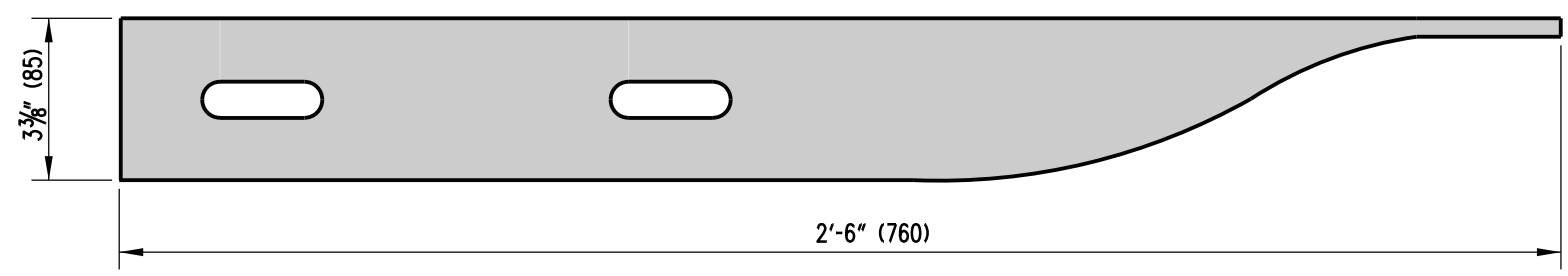
DELAWARE
DEPARTMENT OF TRANSPORTATION

W-BEAM STEEL POST AND OFFSET BLOCK

HARDWARE				APPROVED		SIGNATURE ON FILE		1/04/2019
STANDARD NO. B-13 (2018)				RECOMMENDED		SIGNATURE ON FILE		12/20/2018
SHT. 2 OF 10								




ELEVATION

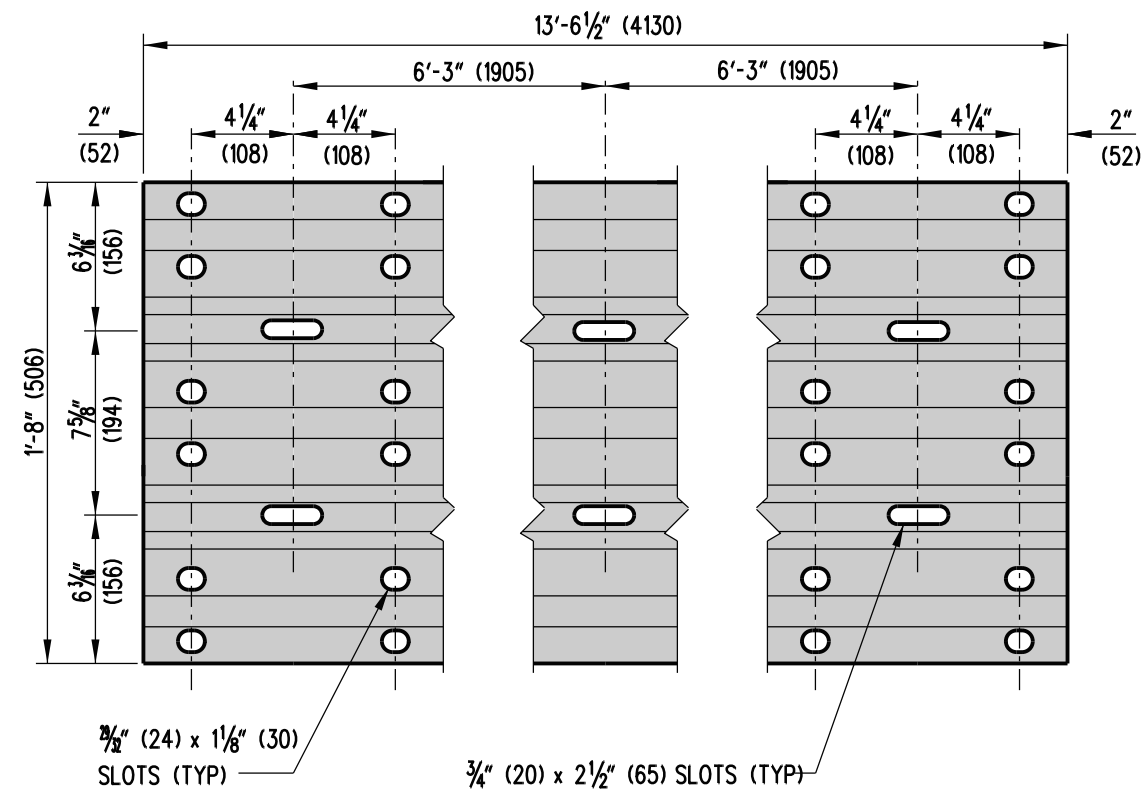


PLAN

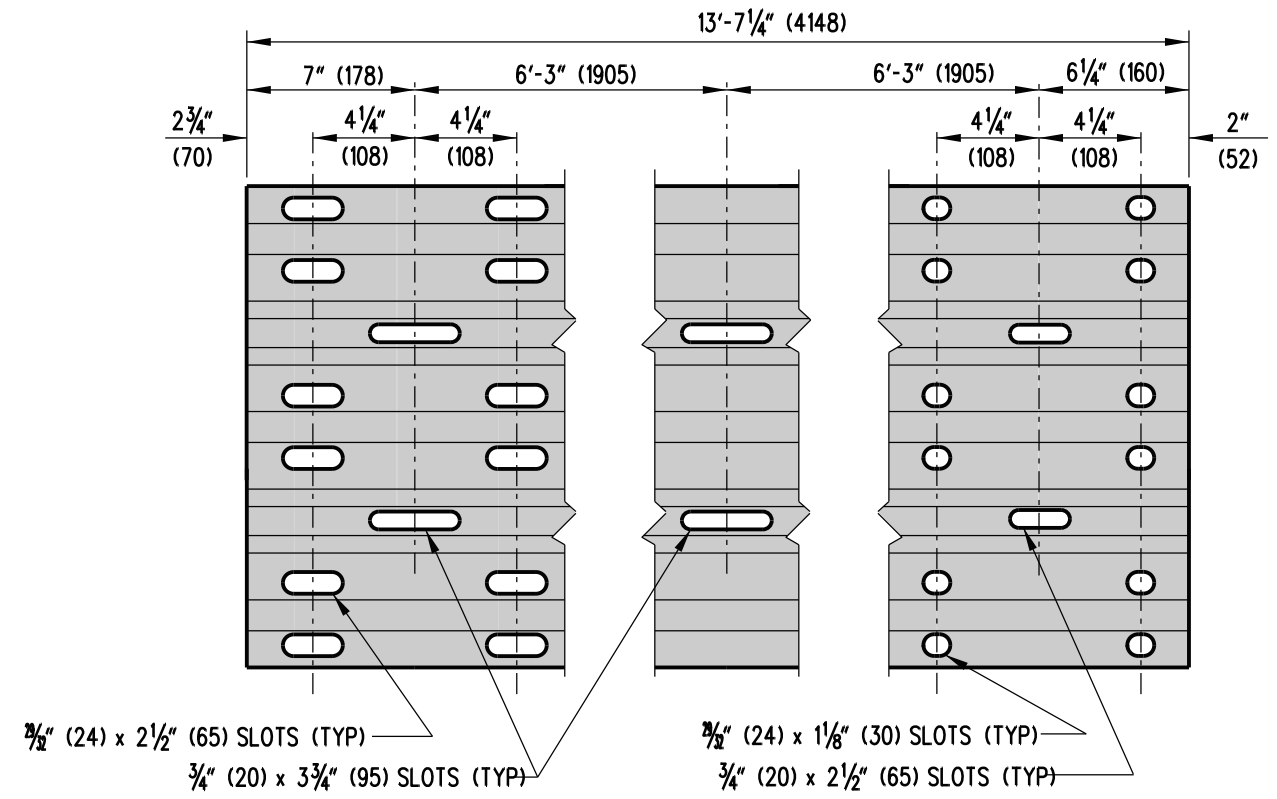
W-BEAM TERMINAL CONNECTOR

5

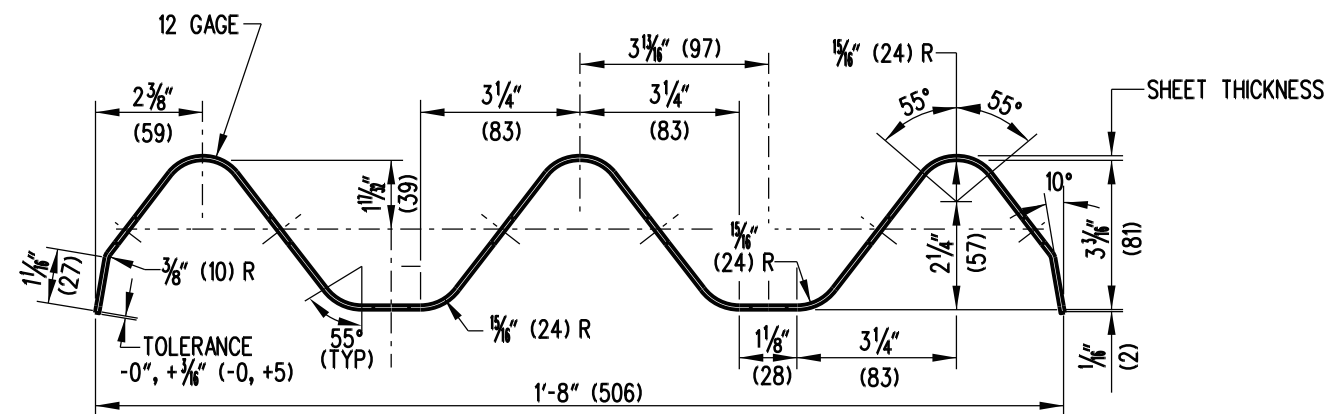
 DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE			APPROVED <u>SIGNATURE ON FILE</u> <u>12/28/2010</u> CHIEF ENGINEER DATE
	STANDARD NO. B-13 (2010)	SHT. 3	OF 10	RECOMMENDED <u>SIGNATURE ON FILE</u> <u>12/27/2010</u> DESIGN ENGINEER DATE



THRIE BEAM ELEVATION



THRIE BEAM EXPANSION ELEMENT



THRIE BEAM SECTION



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2010)

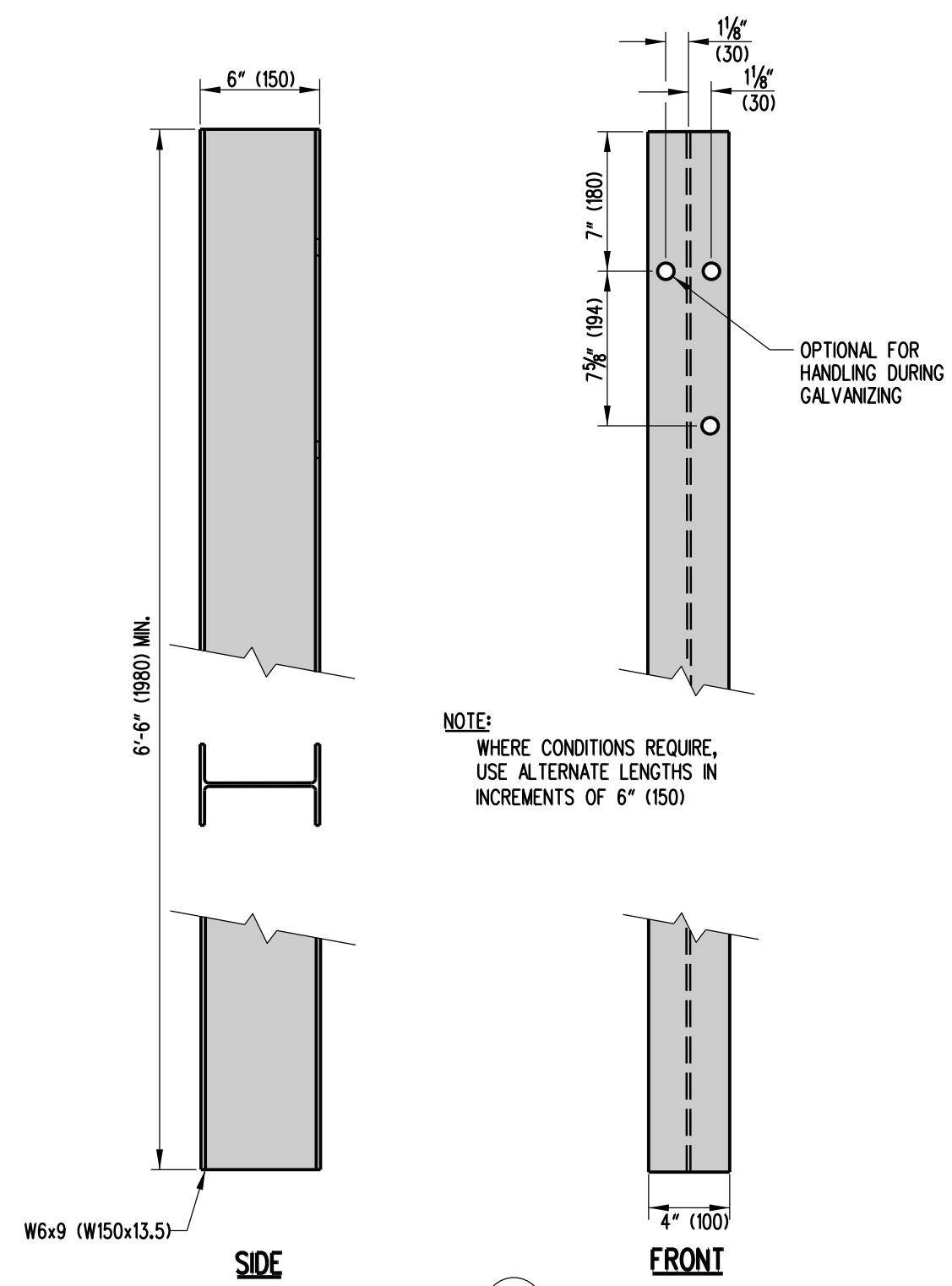
SHT. 4 OF 10

APPROVED

SIGNATURE ON FILE 12/28/2010
CHIEF ENGINEER DATE

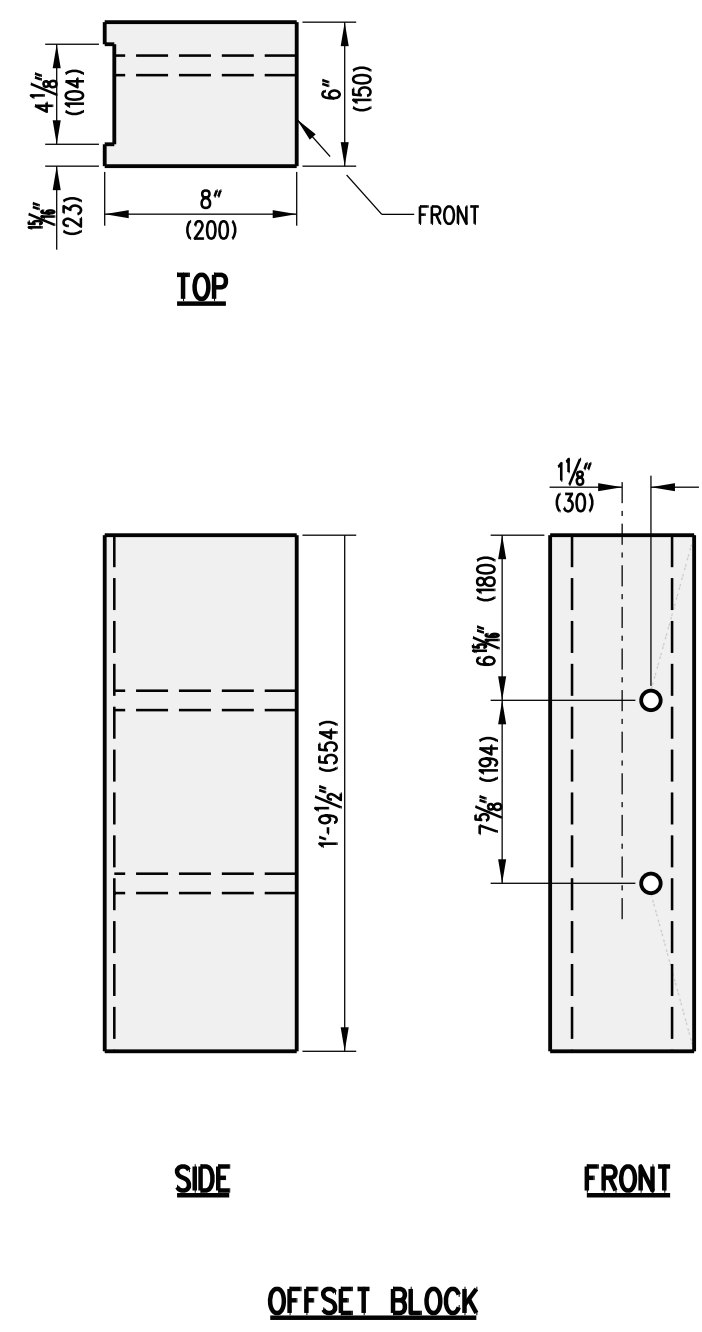
RECOMMENDED


SIGNATURE ON FILE 12/27/2010
DESIGN ENGINEER DATE



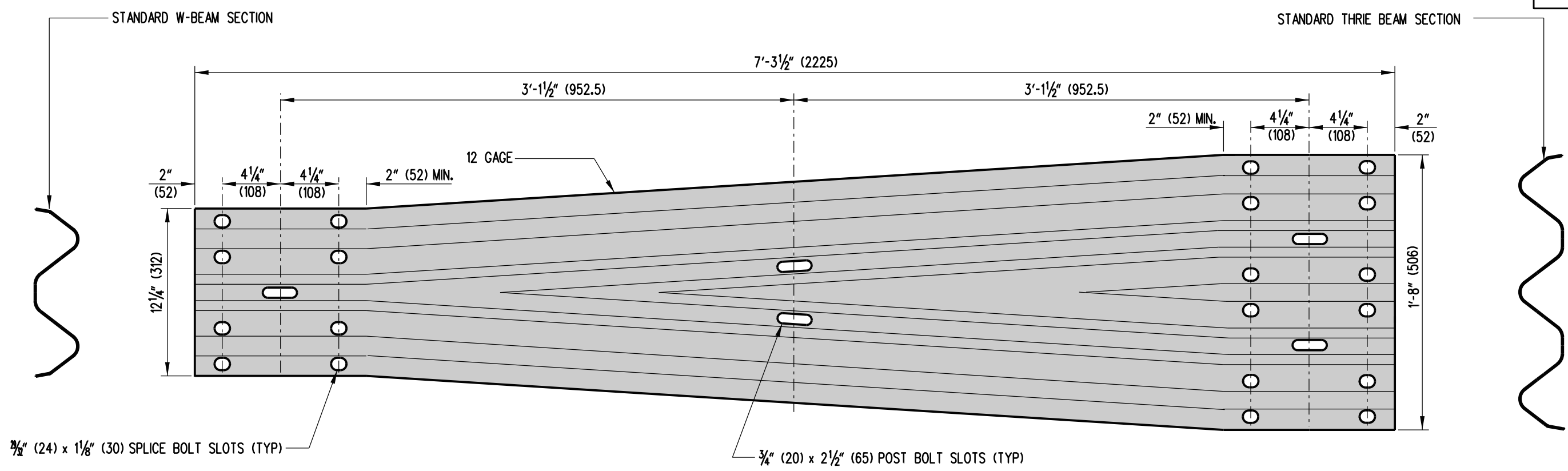
POST 2

THRIE BEAM STEEL POST AND OFFSET BLOCK

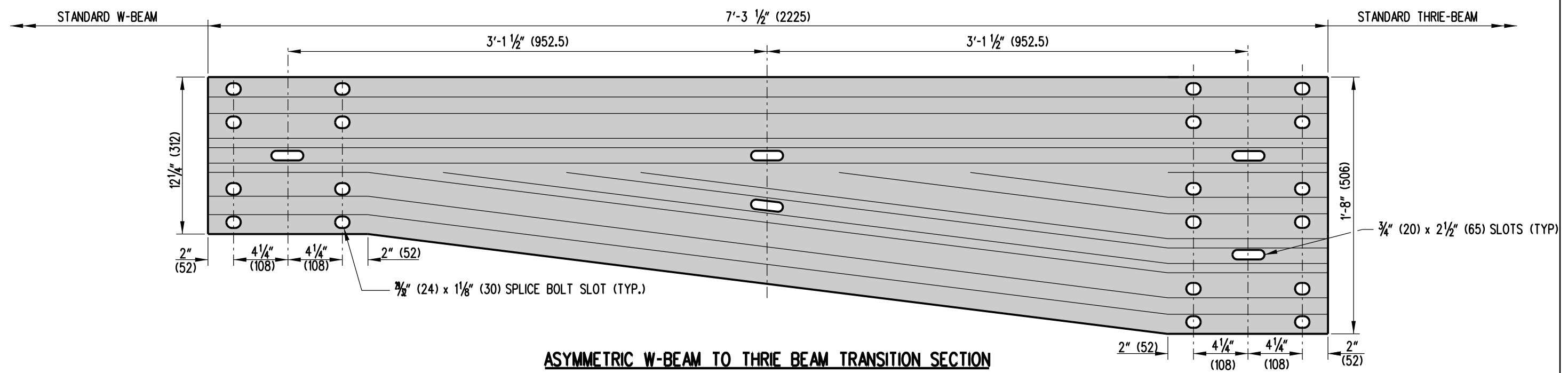


 DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE			APPROVED _____ CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. B-13 (2010)	SHT. 5	OF 10	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE


SCALE : N.T.S.

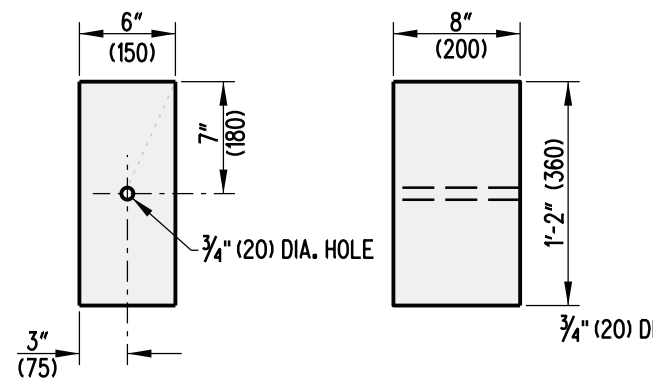


SYMMETRIC W-BEAM TO THRIE BEAM TRANSITION SECTION

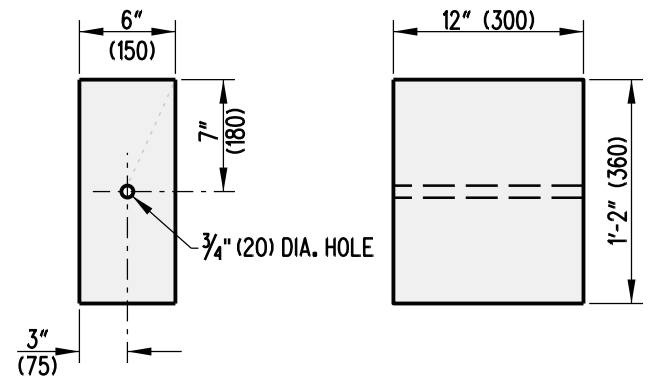


ASYMMETRIC W-BEAM TO THRIE BEAM TRANSITION SECTION

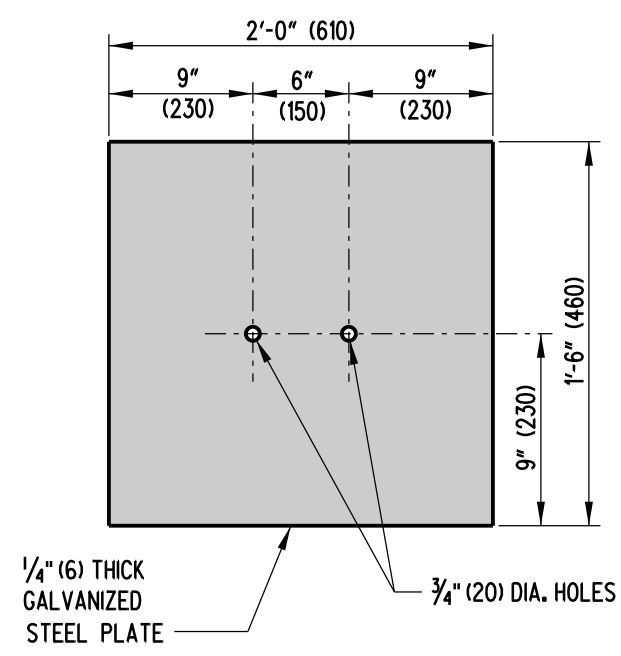
 DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE				APPROVED	SIGNATURE ON FILE	12/28/2010
	STANDARD NO.	B-13 (2010)	SHT.	6 OF 10	RECOMMENDED	SIGNATURE ON FILE	12/27/2010



OFFSET BLOCK,
TYPE 27

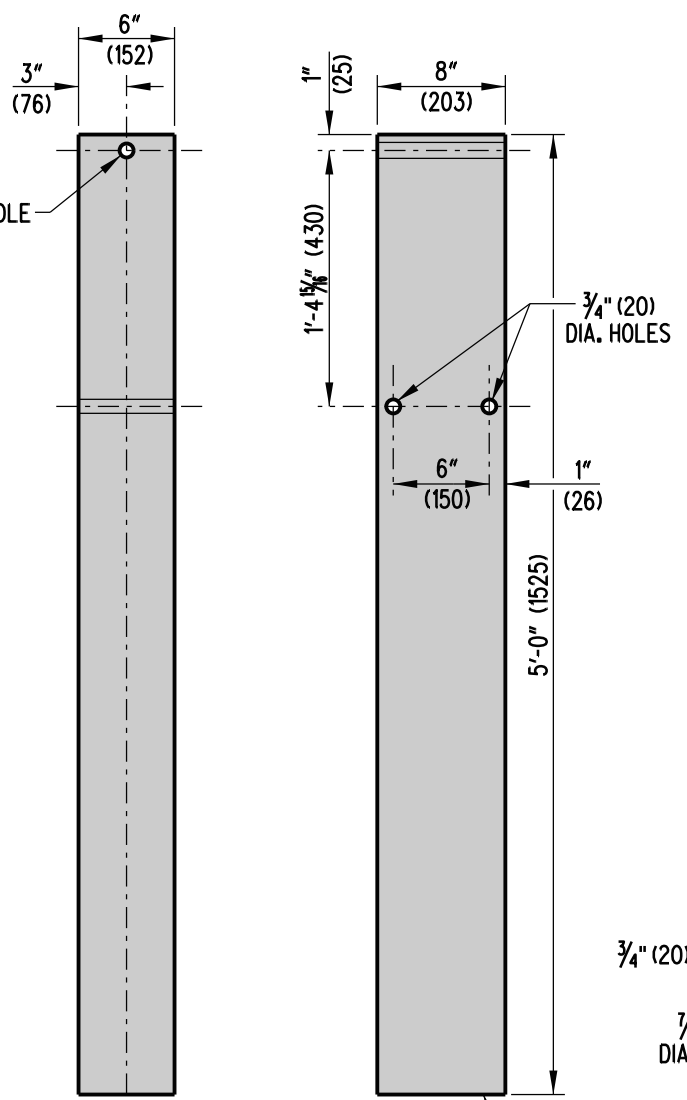


OFFSET BLOCK,
TYPE 31



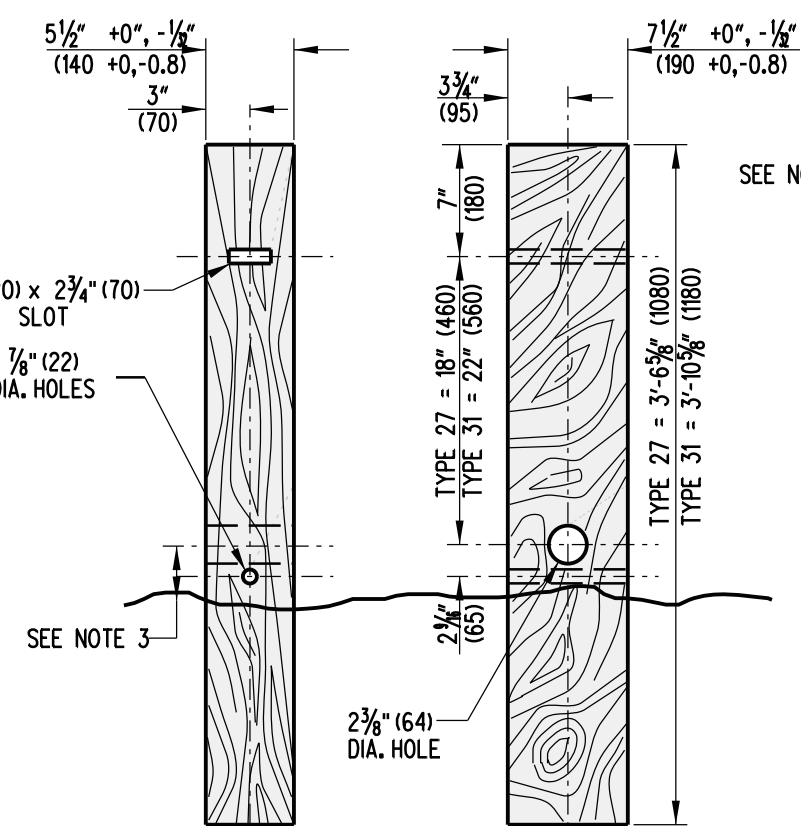
SOIL PLATE

- 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.

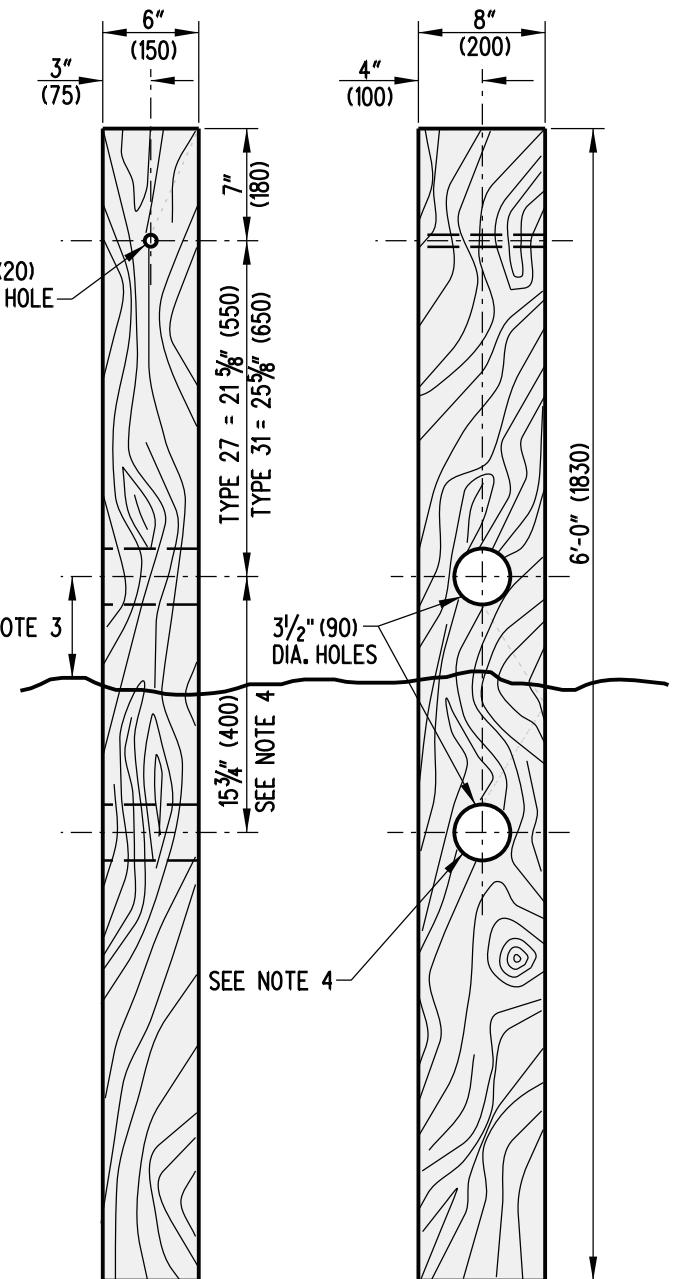


TS-8" X 6" X 3/16"
(TS-203 x 152 x 4.8)
GALVANIZED STEEL TUBING


STEEL TUBE



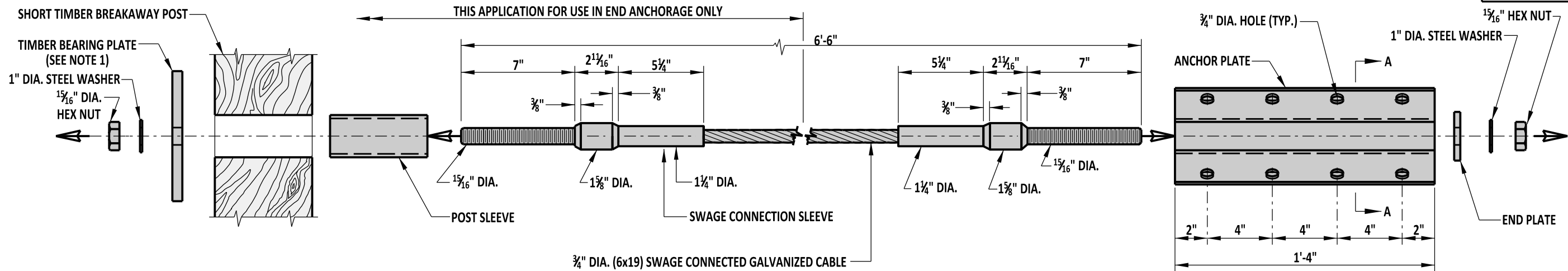
SHORT WOOD BREAKAWAY POST



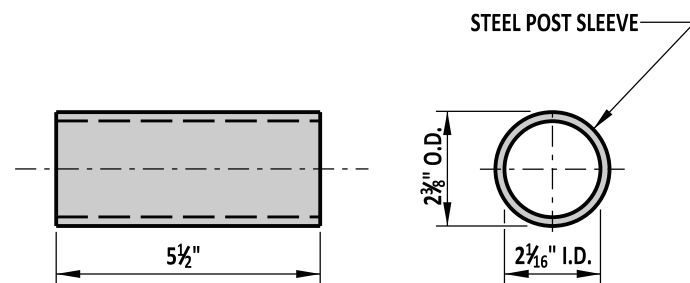
LONG WOOD BREAKAWAY POST

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

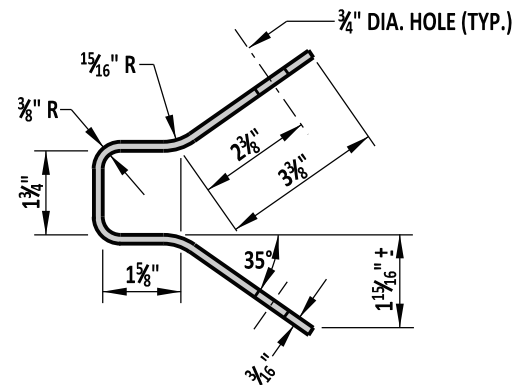
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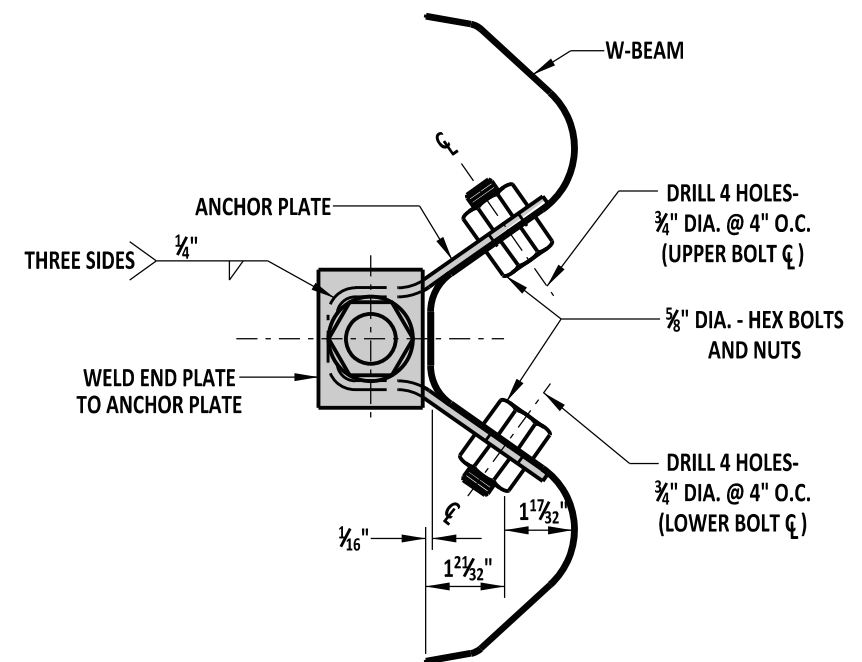
SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY



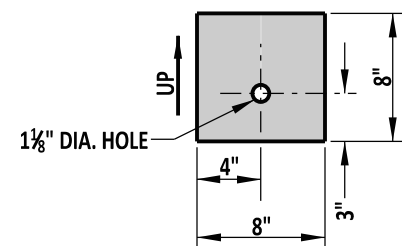
POST SLEEVE



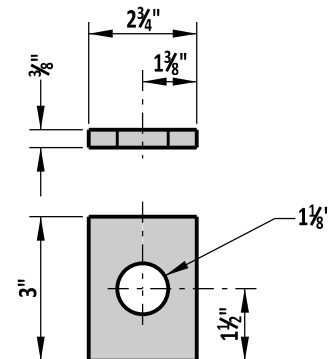
SECTION A-A



ANCHOR PLATE TO W-BEAM CONNECTION DETAIL



TIMBER BEARING PLATE



END PLATE

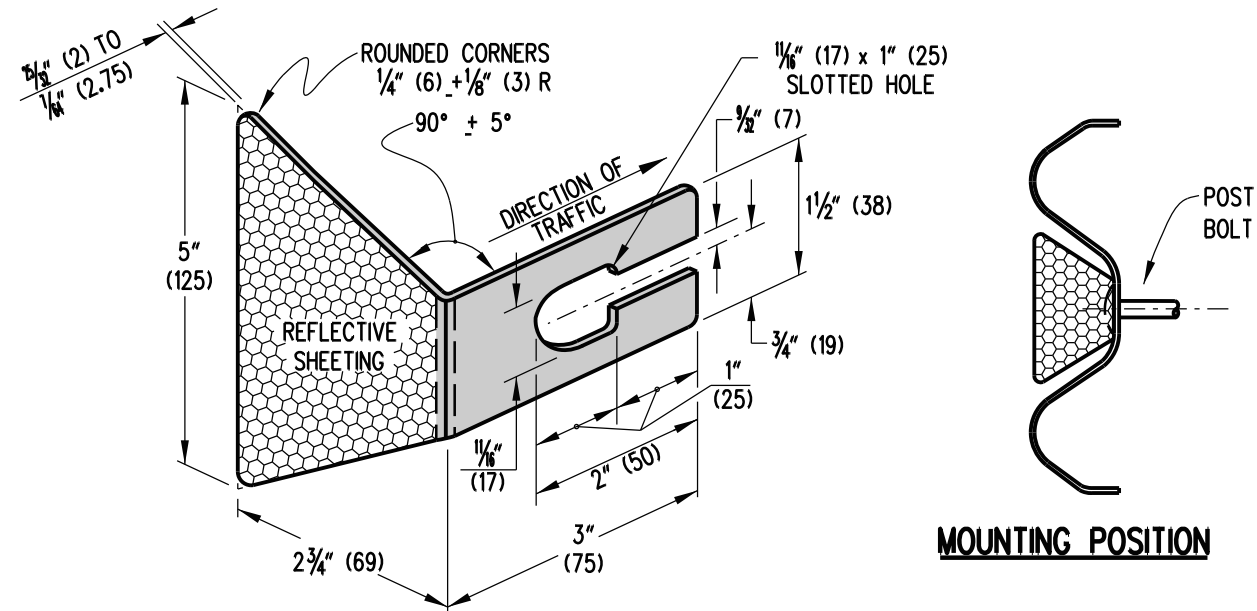
NOTES:

- 1). PLACE A 1/2" WIDE GALVANIZED RETAINING TIE STRAP AROUND THE SHORT TIMBER BREAKAWAY POST AND TIMBER BEARING PLATE TO ENSURE PROPER ORIENTATION OF THE TIMBER BEARING PLATE.
- 2). TIGHTEN ASSEMBLY UNTIL CABLE IS TAUGHT.
- 3). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.

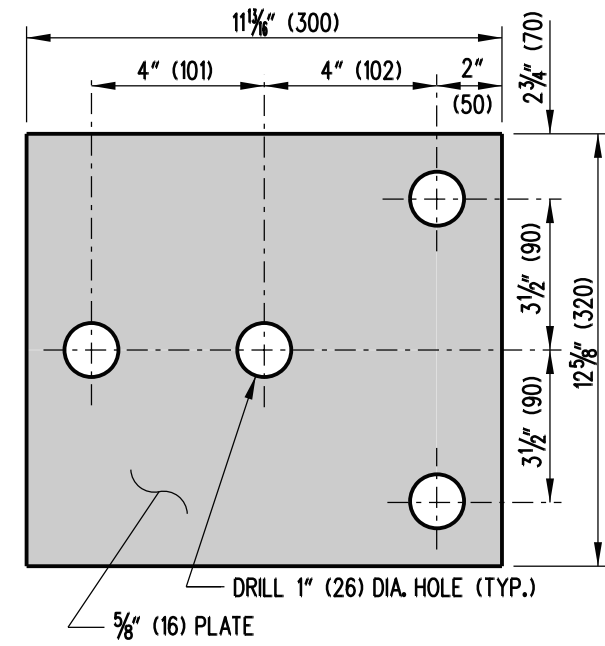


DELAWARE
DEPARTMENT OF TRANSPORTATION


HARDWARE				APPROVED		SIGNATURE ON FILE	01/07/2013
STANDARD NO. B-13 (2012)				RECOMMENDED		SIGNATURE ON FILE	12/20/2012
SHT. 8 OF 10						DESIGN ENGINEER	DATE

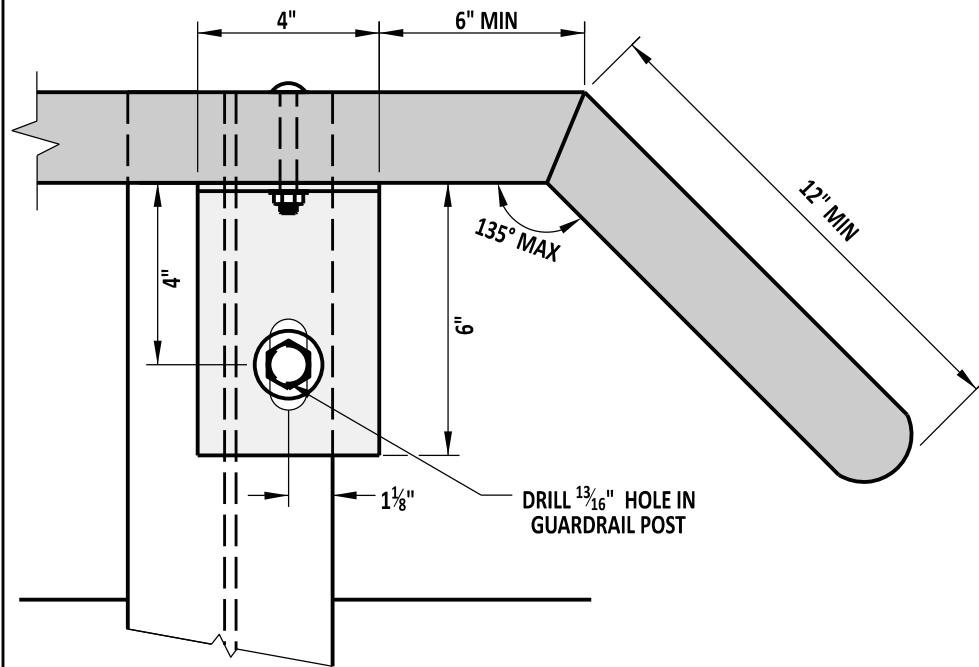


GUARDRAIL DELINEATOR

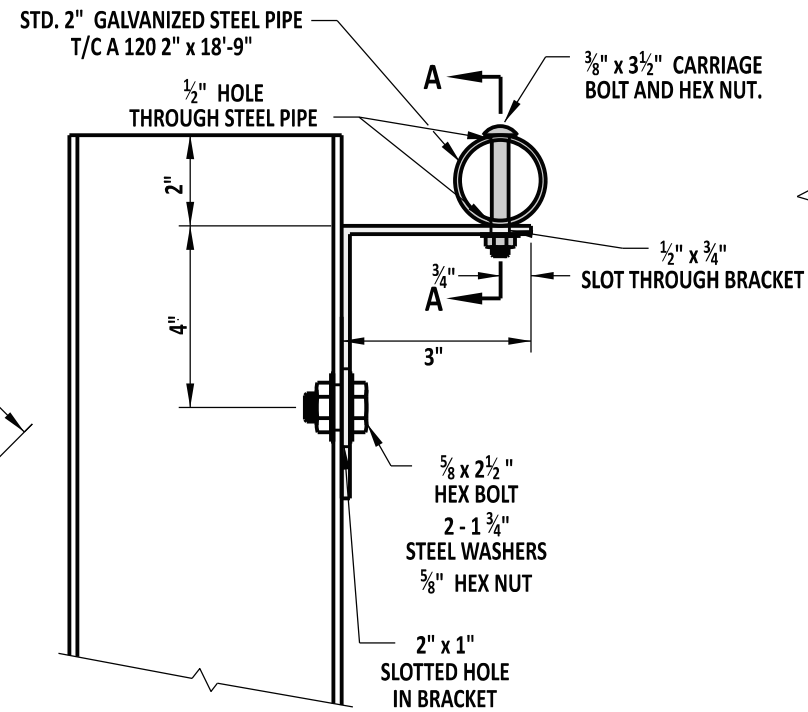


W-BEAM BEARING
PLATE DETAIL

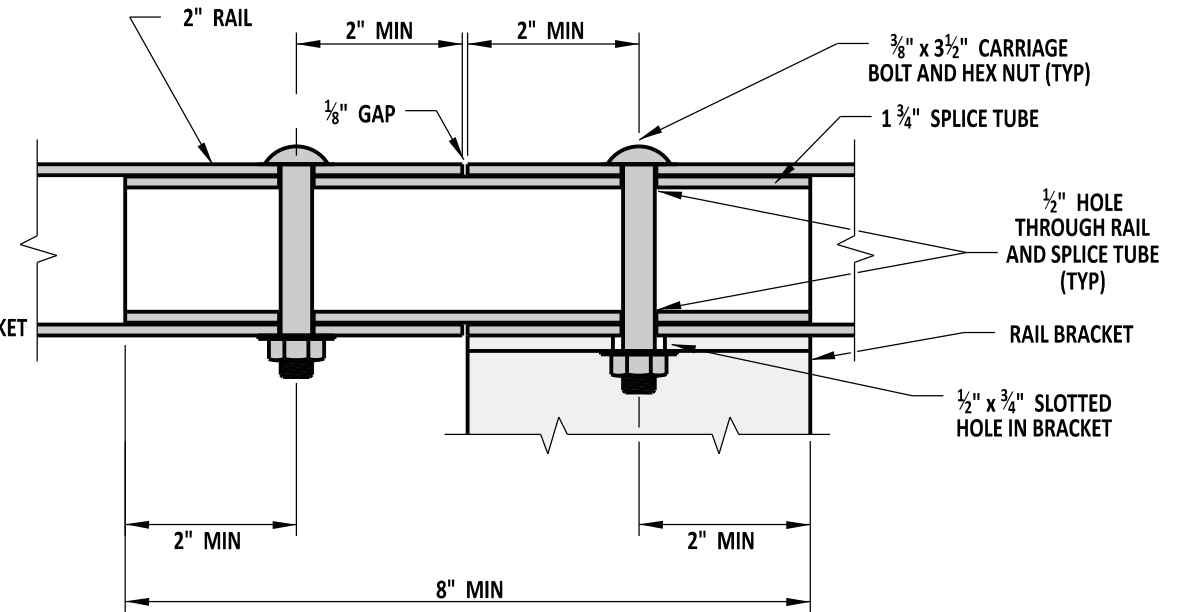
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	STANDARD NO.	B-13 (2010)	SHT.	9	OF	10	RECOMMENDED	<div>SIGNATURE ON FILE</div> <div>DESIGN ENGINEER</div>



REAR VIEW WITH START & END SECTION



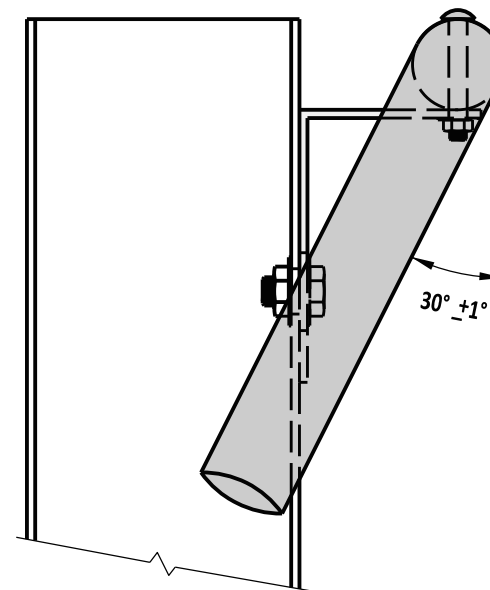
SIDE VIEW



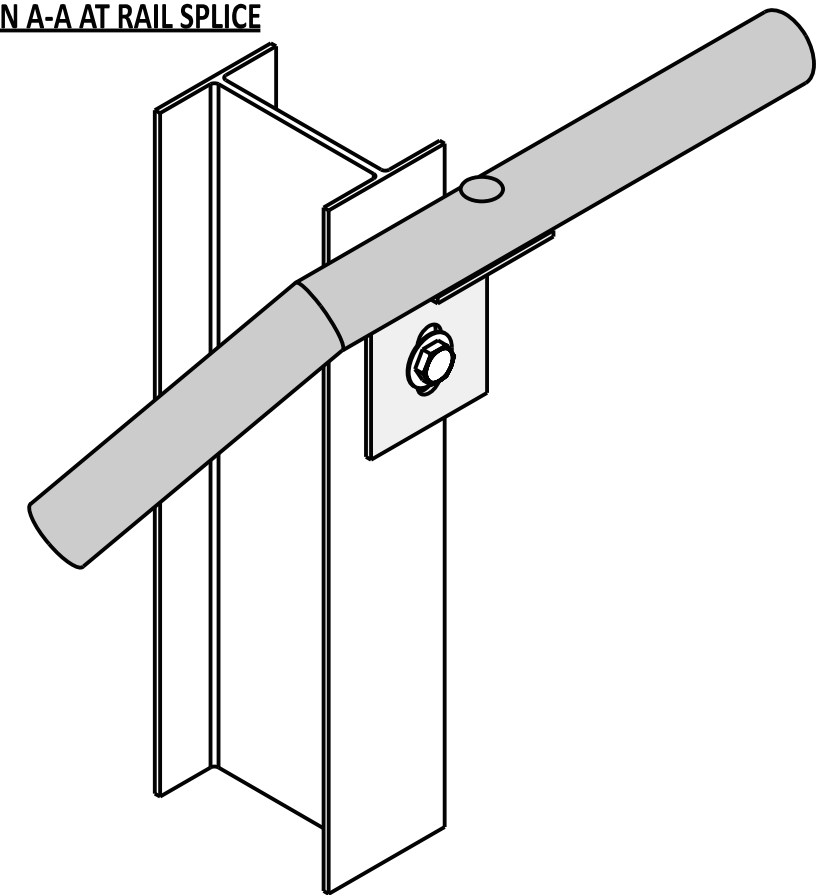
SECTION A-A AT RAIL SPLICE

NOTES:

- 1). USE THIS RAIL ADJACENT TO AN PEDESTRIAN ACCESS ROUTE.
- 2). SHOP FABRICATE ALL COMPONENTS OF THE RAIL INCLUDING CUTTING AND DRILLING.
- 3). BUR ALL EXPOSED THREADED HARDWARE TO ENSURE NUTS CAN NOT BE REMOVED.
- 4). PRIOR TO GALVANIZING, SHOP DRILL GUARDRAIL POSTS THAT RAIL BRACKETS WILL BE ATTACHED TO.
- 5). PLACE RAIL SPLICES AT RAIL SUPPORT BRACKETS, USING THE SAME BOLT TO ATTACH THE RAIL TO THE BRACKET, TO SECURE THE SPLICE TUBE.
- 6). ONLY INSTALL RAILS TO STANDARD W-BEAM SECTIONS AND AT LEAST ONE POST AWAY FROM THE PAYMENT LIMITS OF THE END TREATMENT.



SIDE VIEW WITH START & END SECTION



ISOMETRIC VIEW WITH START & END SECTION



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

GUARDRAIL MOUNTED RAIL

STANDARD NO.

B-13 (2017)

SHT. 10

OF 10

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

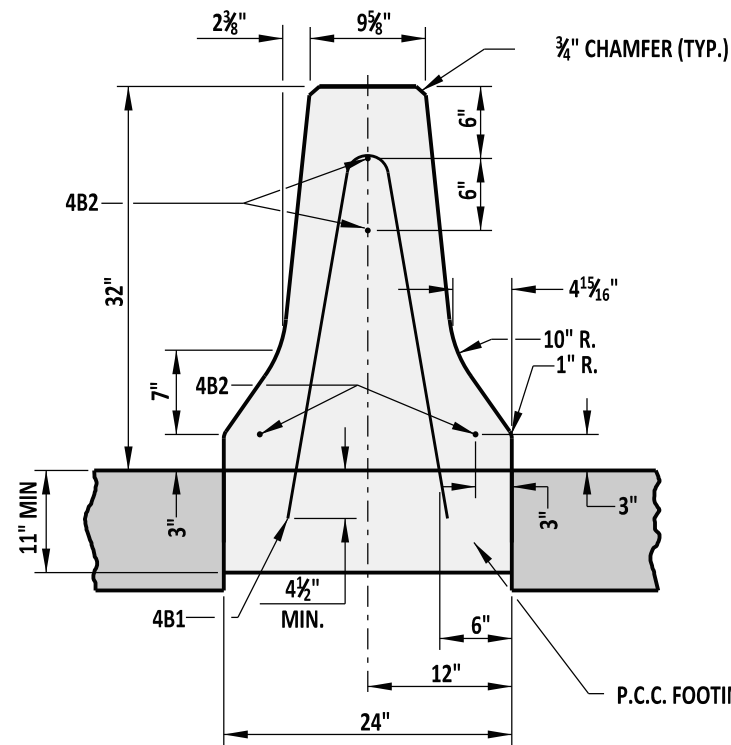
5/31/2017
DATE

RECOMMENDED

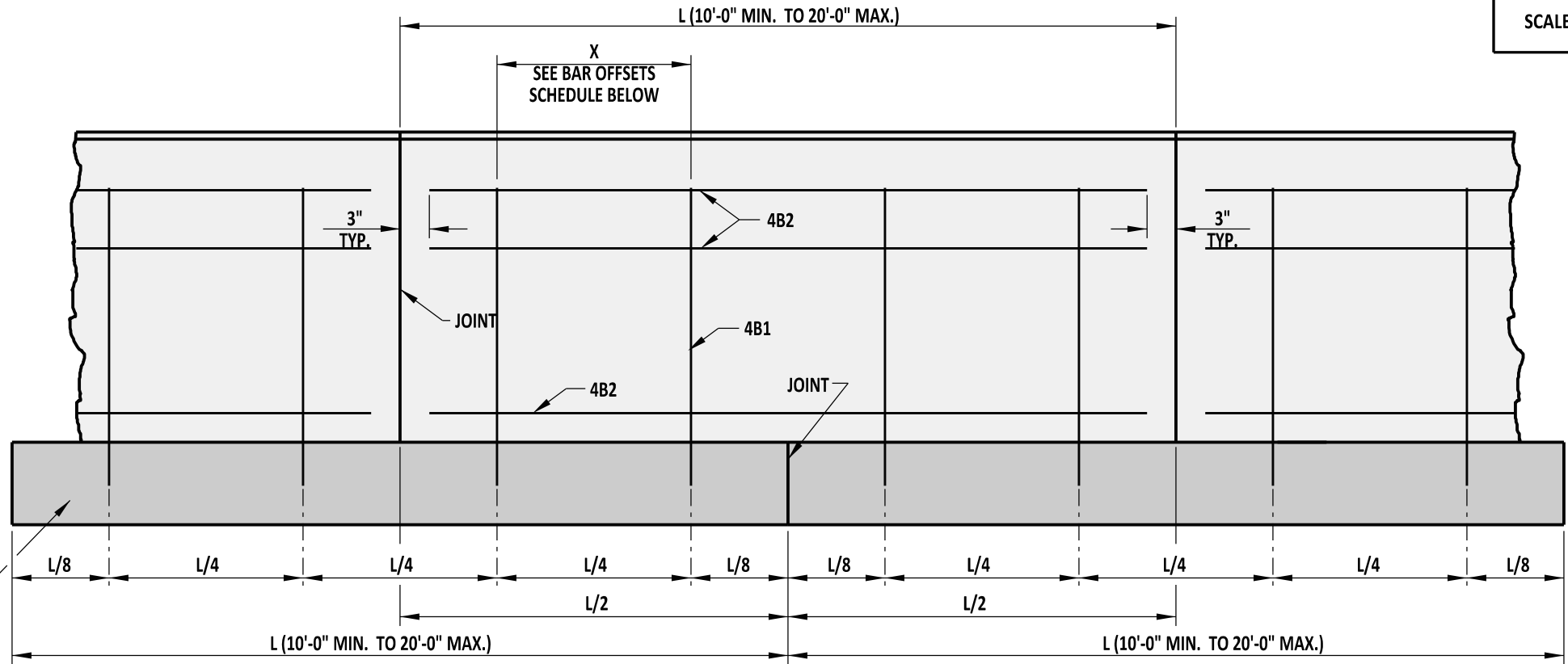
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5/18/2017
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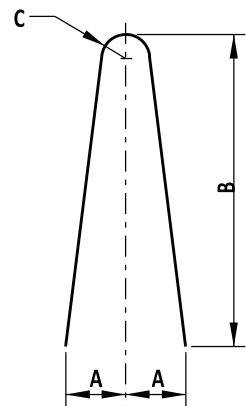


SECTION



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'-0"	5' - 0"	4
18'-0"	4' - 6"	4
16'-0"	4' - 0"	4
14'-0"	3' - 6"	4
12'-0"	3' - 0"	4
10'-0"	2' - 6"	4

BAR LIST							
MARK	SIZE	NUMBER IN EACH SECTION	LENGTH	TYPE	A	B	C
4B1	4	**	5'-4"	1	7"	30 1/2"	2"
4B2	4	4	*	STR.	N/A	N/A	N/A

* THE LENGTH OF BAR 4B2 SHALL BE 6" 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" MIN.
- 2). FOR SLIP-FORM CONSTRUCTION, THE 4B2 BARS SHALL BE PLACED AS ONE CONTINUOUS PIECE. THE BARS SHALL OVERLAP A MINIMUM OF 12" IN THIS CASE.
- 3). FOR SLIP-FORM CONSTRUCTION, A JOINT SHALL BE CUT IN THE BARRIER EVERY 10'-0" AT A MAX DEPTH OF 1/2"



DELAWARE
DEPARTMENT OF TRANSPORTATION

32" CONCRETE SAFETY BARRIER (F SHAPE)

STANDARD NO.

B-14 (2012)

SHT.

1

OF

4

APPROVED

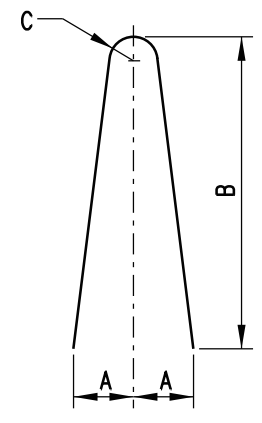
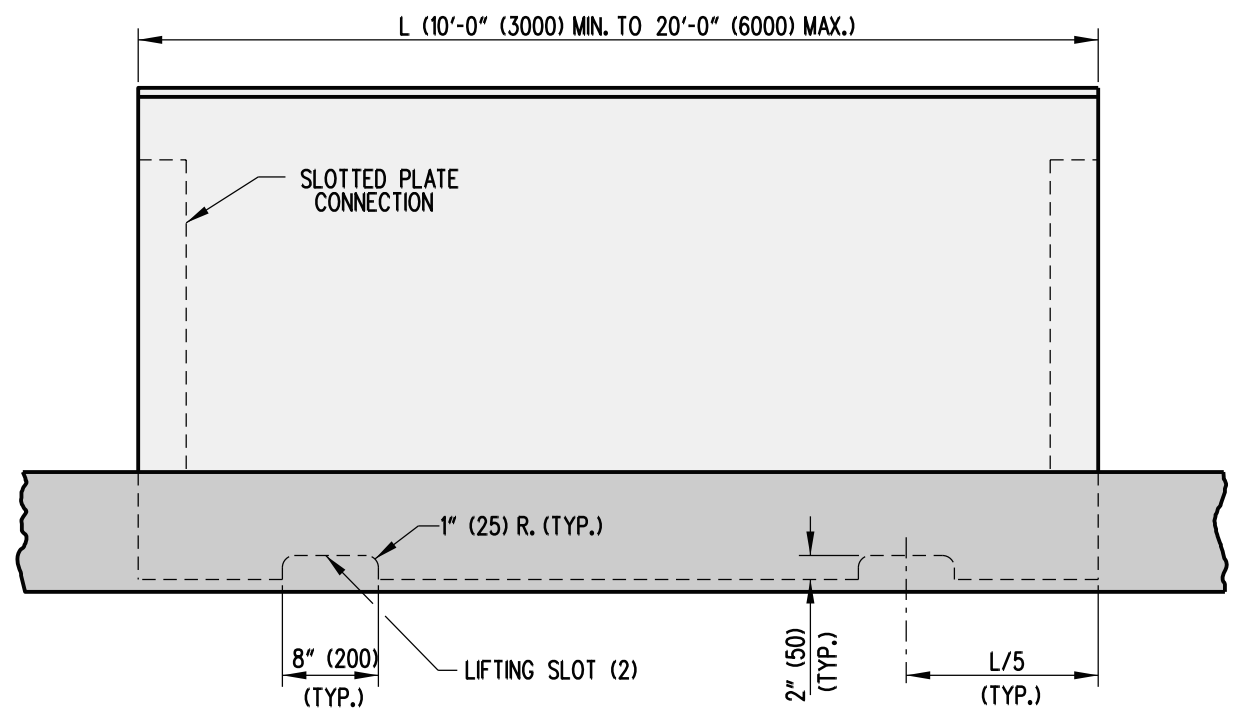
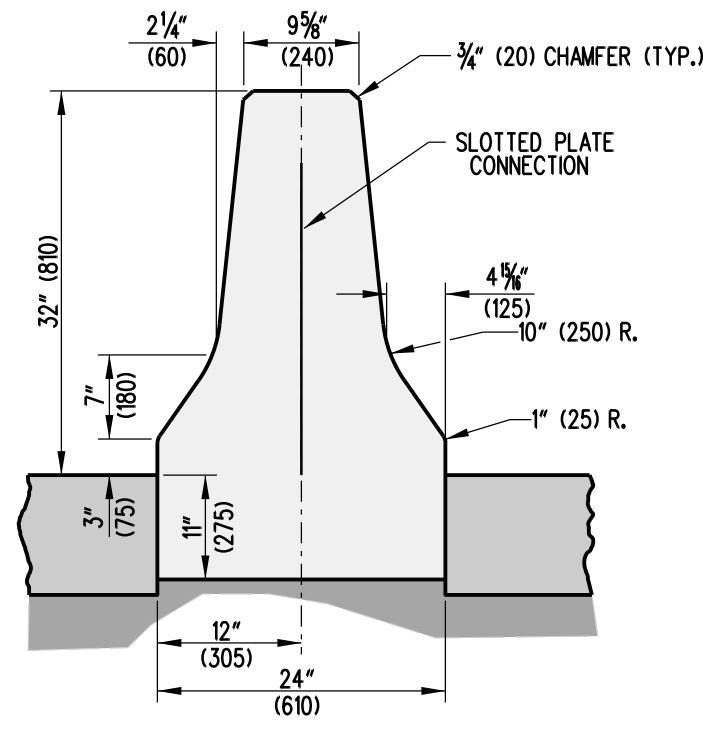
SIGNATURE ON FILE
CHIEF ENGINEER

01/07/2013
DATE

RECOMMENDED

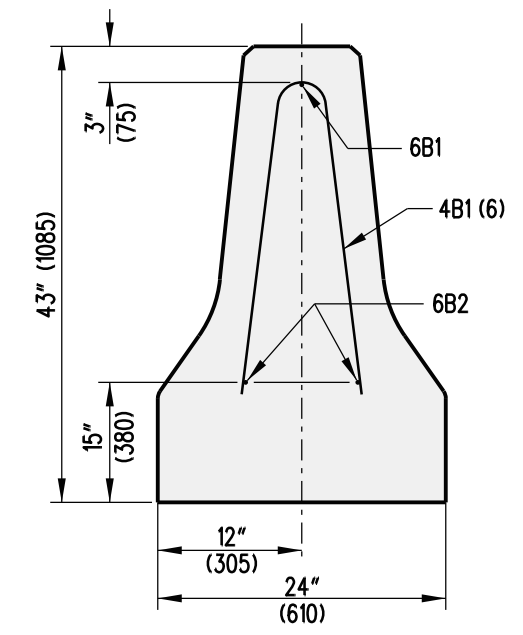
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DESIGN ENGINEER

12/20/2012
DATE

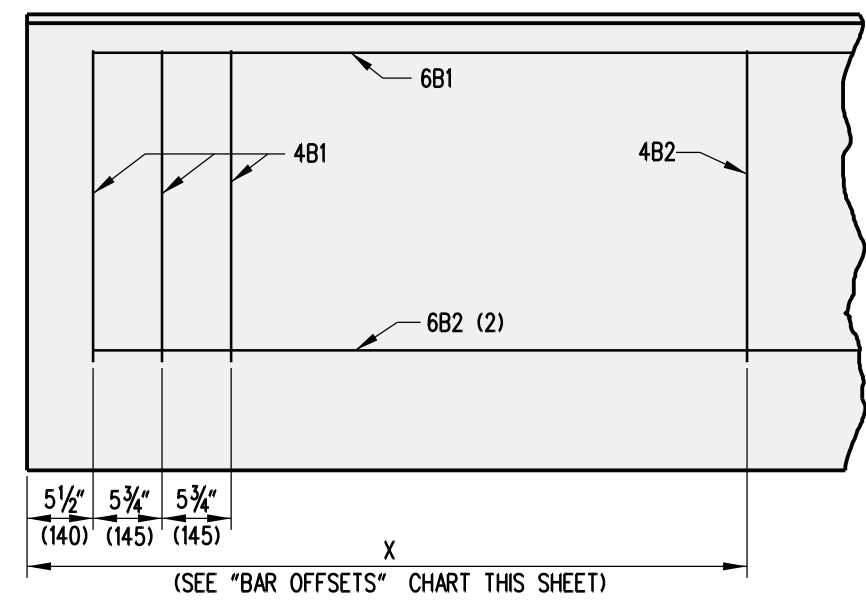


TYPE '1' BAR

TYPICAL PRE-CAST CONSTRUCTION



F' SHAPE BARRIER SECTION



ELEVATION

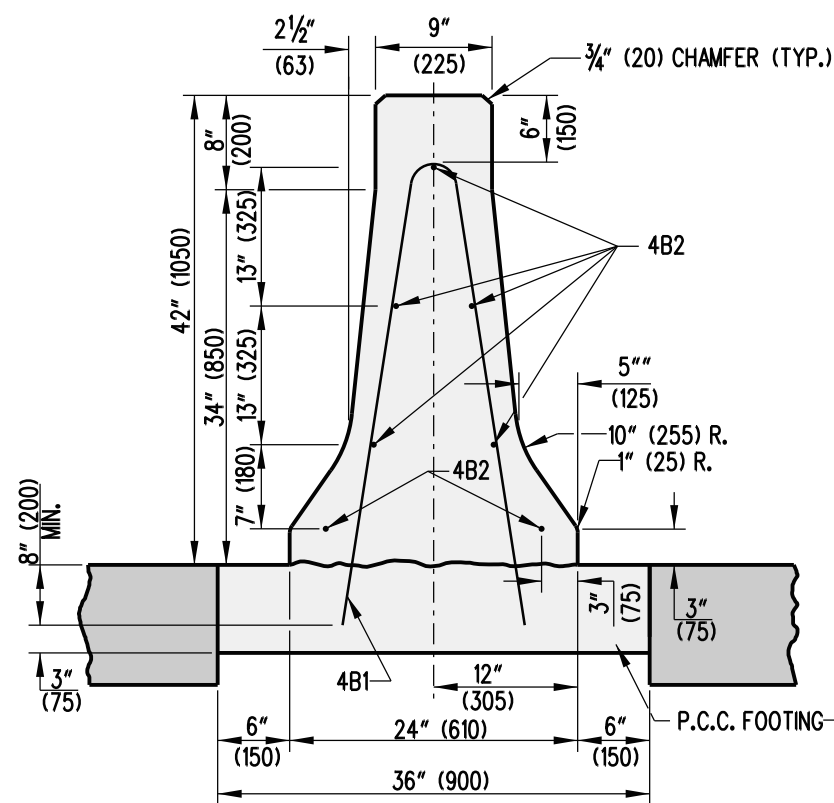
TYPICAL PRE-CAST REINFORCEMENT DETAILS

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

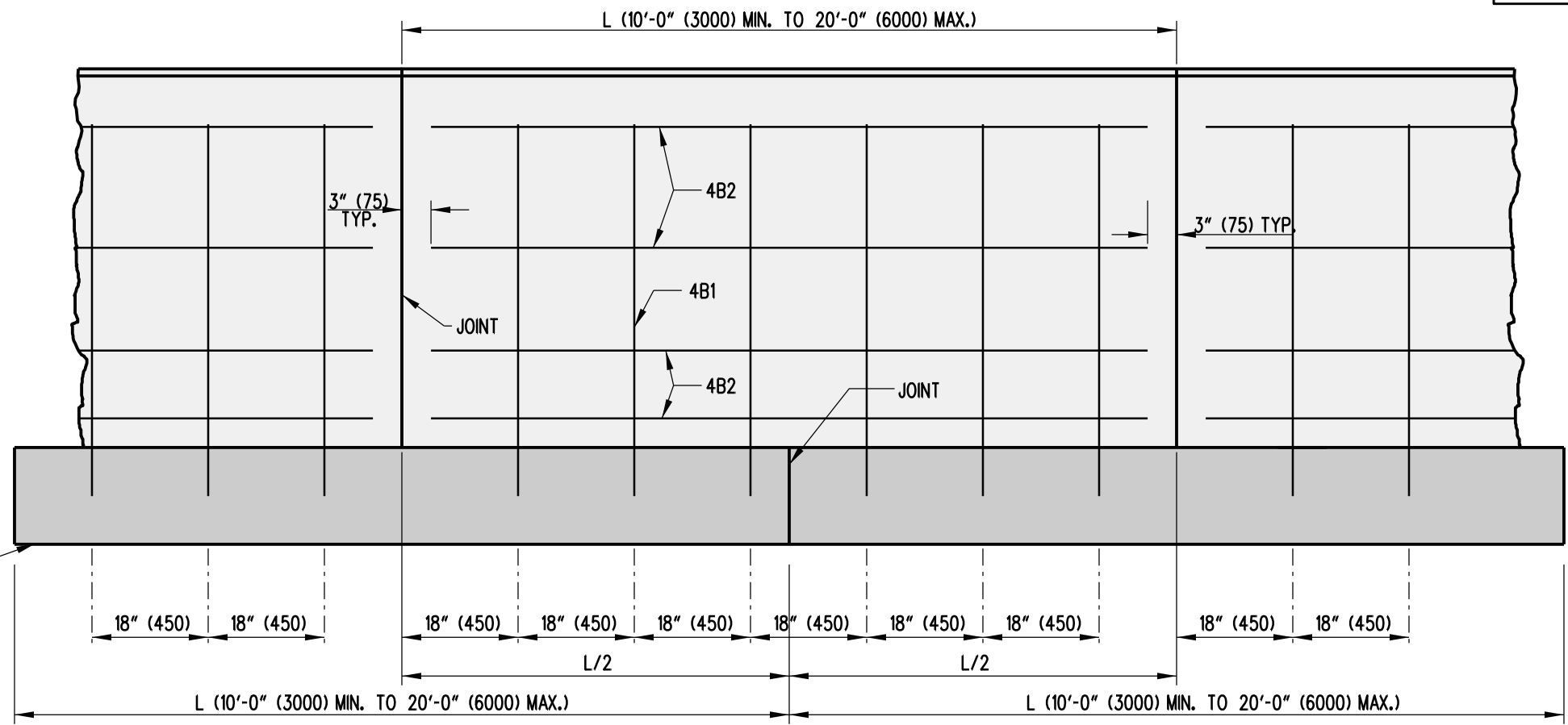
BAR LIST							
MARK	SIZE	NUMBER IN EACH SECTION	LENGTH	TYPE	A	B	C
4B1	4 (13)	6	4'-7" (1400)	1	5" (125)	26" (660)	2" (50)
4B2	4 (13)	**	4'-7" (1400)	1	5" (125)	26" (660)	2" (50)
6B1	6 (19)	1	*	STR.			
6B2	6 (19)	2	*	STR.			

* 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.

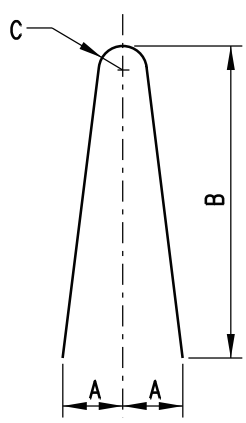
NOTES: 1). CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1 1/2" (40) MIN..



SECTION



ELEVATION



TYPE '1' BAR

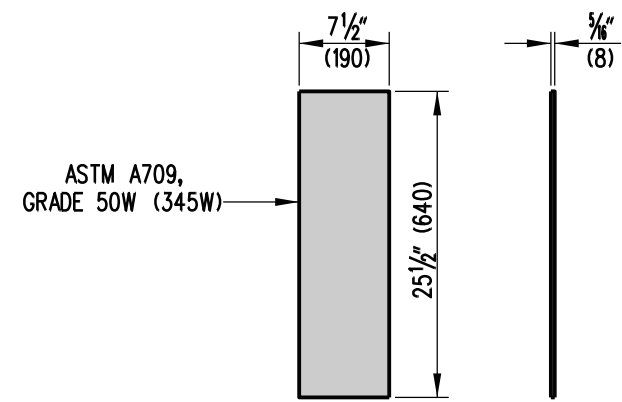
BAR OFFSETS	
NOMINAL LENGTH OF BARRIER SECTION (L)	NO. REQ'D FOR EACH BARRIER SECTION
20' (6000)	13
18' (5500)	12
16' (5000)	10
14' (4500)	9
12' (4000)	8
10' (3000)	6

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

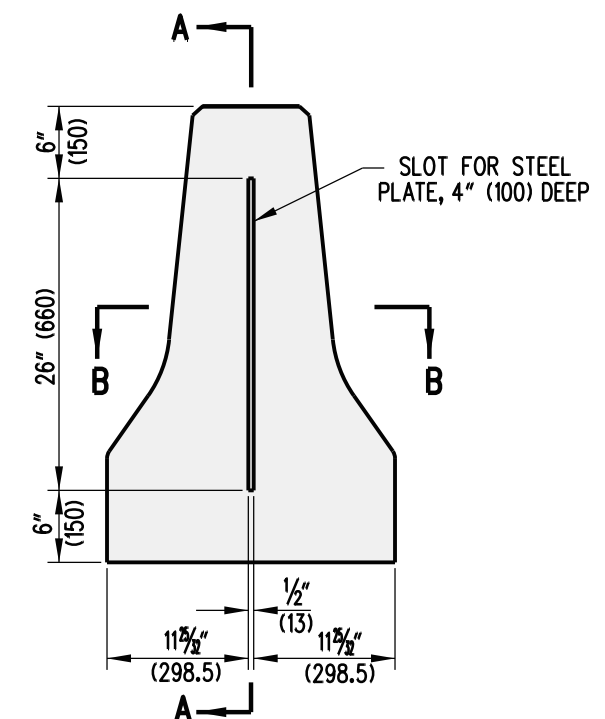
* THE LENGTH OF BAR 4B2 SHALL BE 6" (150) SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.
** SEE "BAR OFFSETS" CHART ON THIS SHEET FOR MORE INFORMATION.

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

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

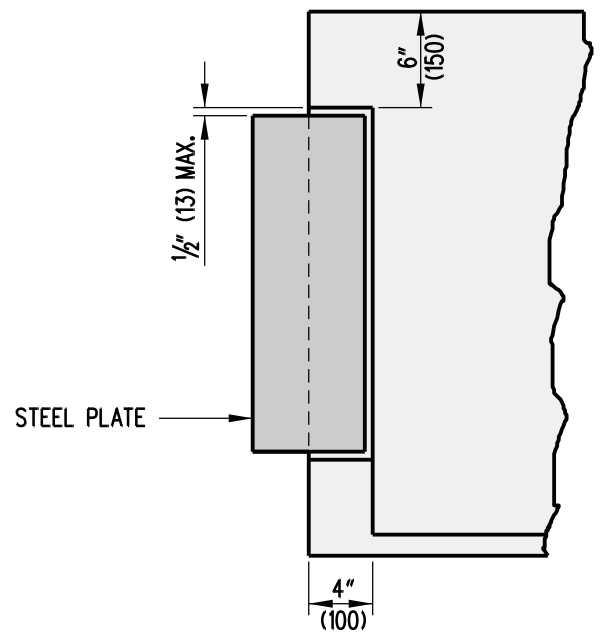


STEEL CONNECTOR PLATE

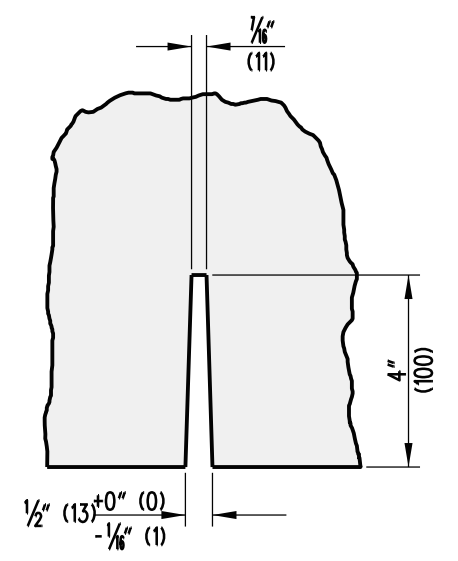


SLOT DIMENSIONS


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

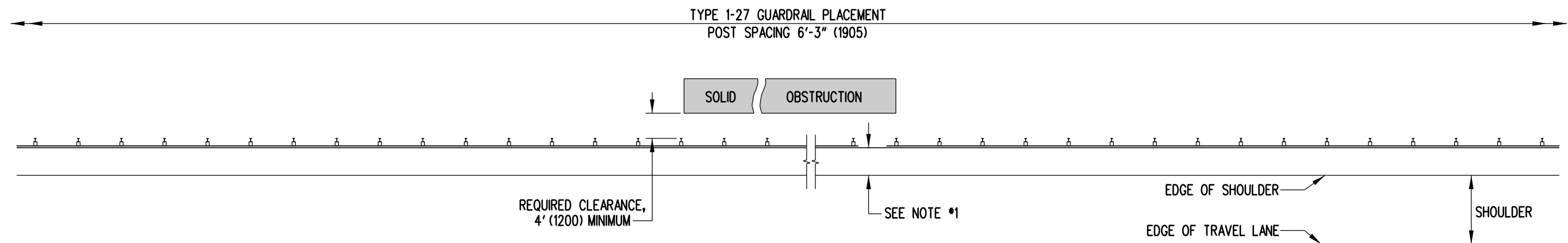


SECTION A-A

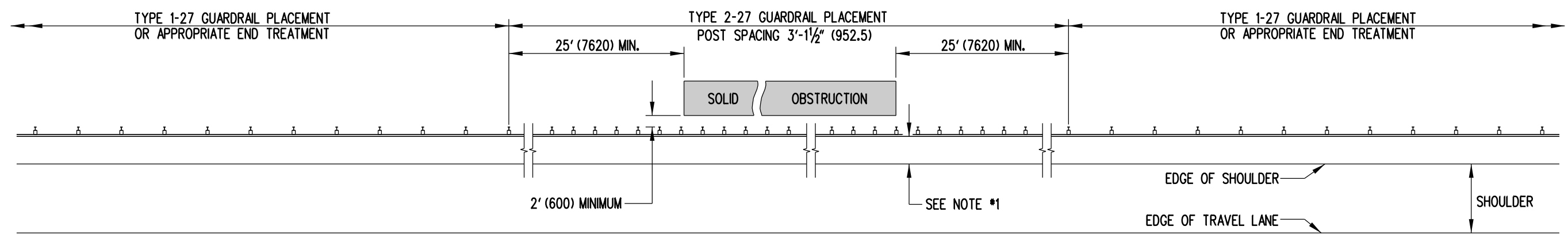


SECTION B-B

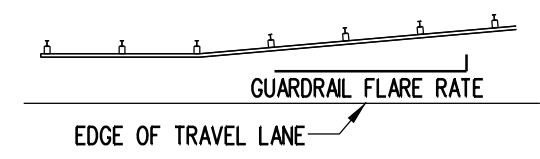
 DELAWARE DEPARTMENT OF TRANSPORTATION	SLOTTED PLATE CONNECTION DETAILS			APPROVED _____ CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. B-14 (2009)	SHT. 4	OF 4	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE



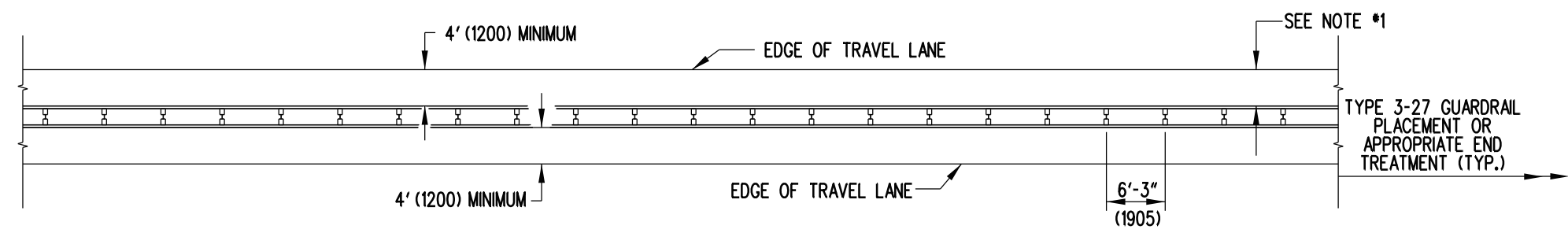
TYPE 1-27 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT
WHEN THE REQUIRED 4' (1200) CLEARANCE TO OBSTRUCTION IS AVAILABLE



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 SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

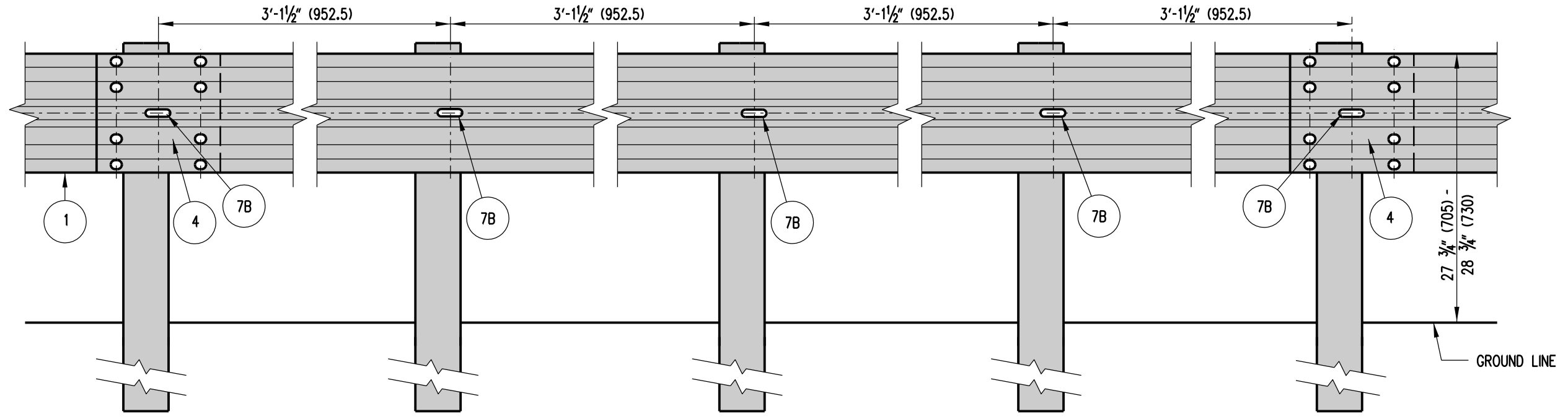


DELAWARE
DEPARTMENT OF TRANSPORTATION

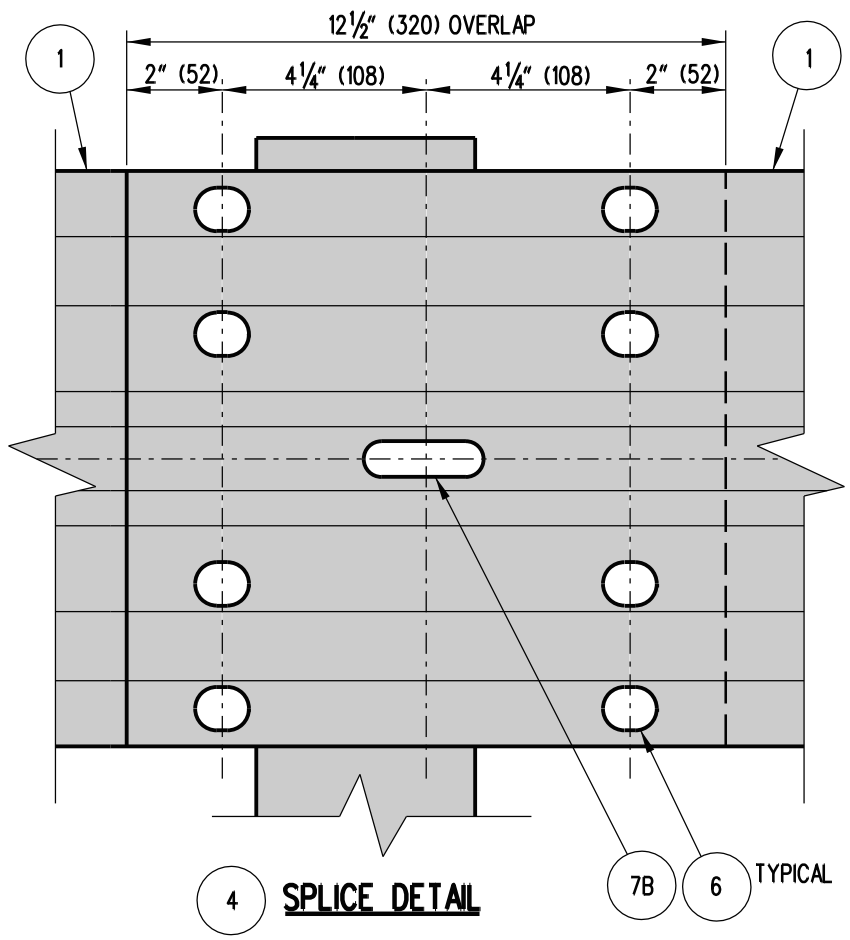
GUARDRAIL APPLICATIONS			
STANDARD NO.	B-15 (2010)	SHT.	1 OF 3

APPROVED	SIGNATURE ON FILE	12/28/2010
	CHIEF ENGINEER	DATE
RECOMMENDED	SIGNATURE ON FILE	12/27/2010
	DESIGN ENGINEER	DATE

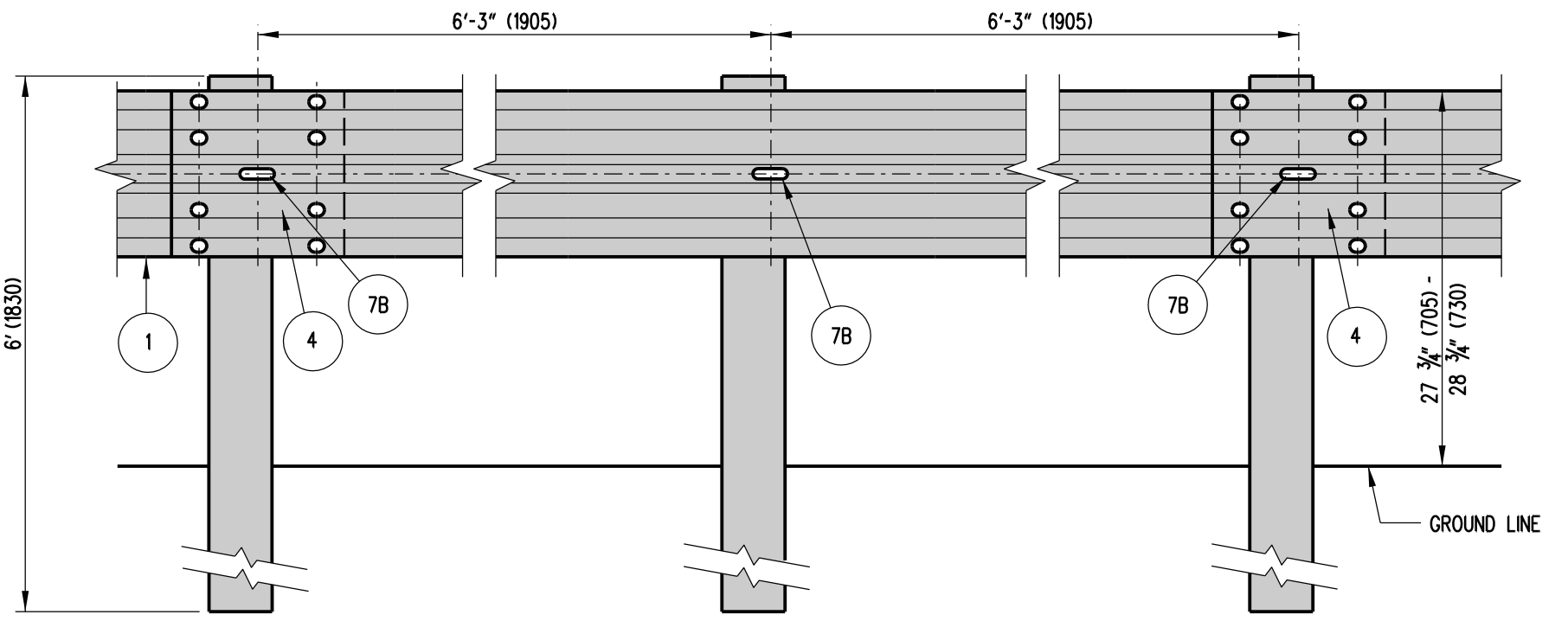
SCALE : N.T.S.



TYPE 2-27




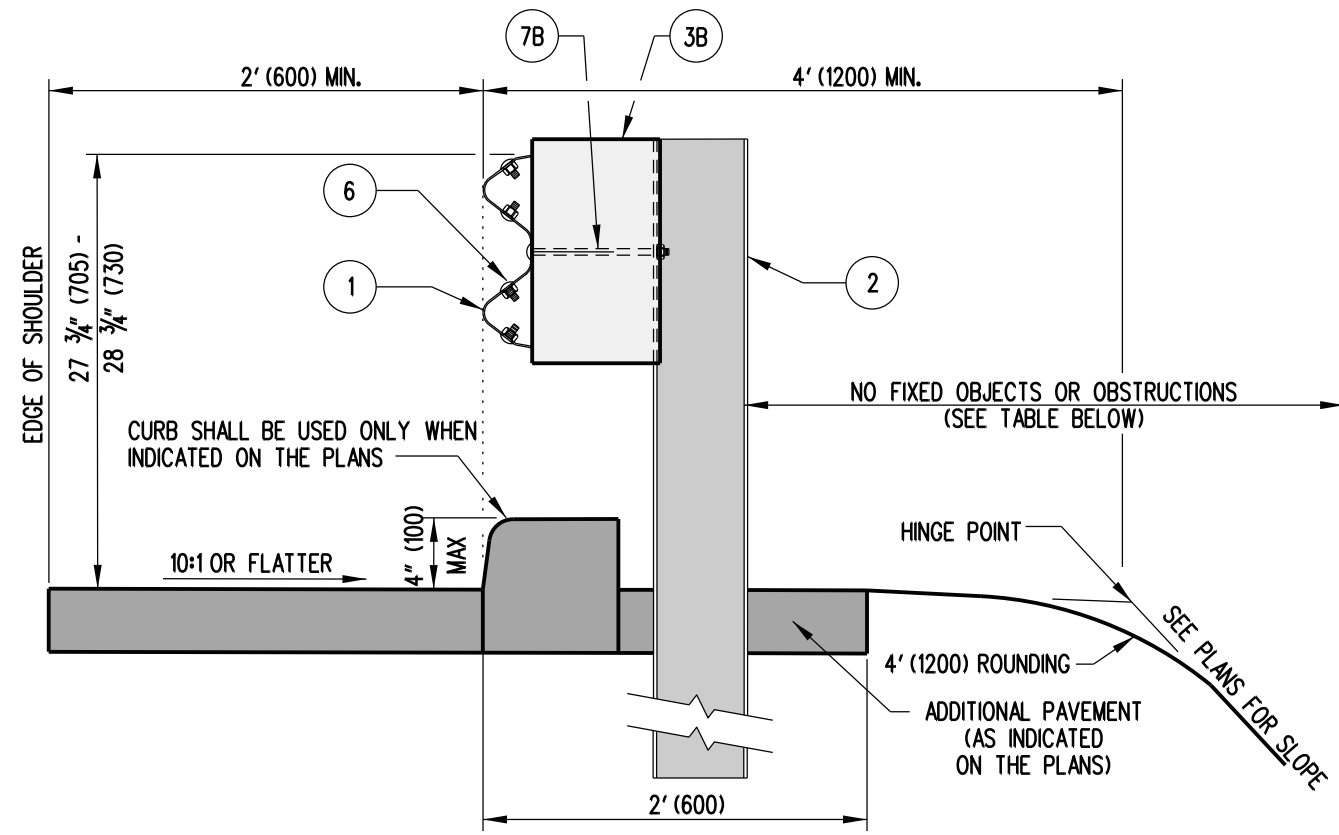
4 SPlice DETAIL



TYPE 1-27 OR 3-27

NOTE : OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.

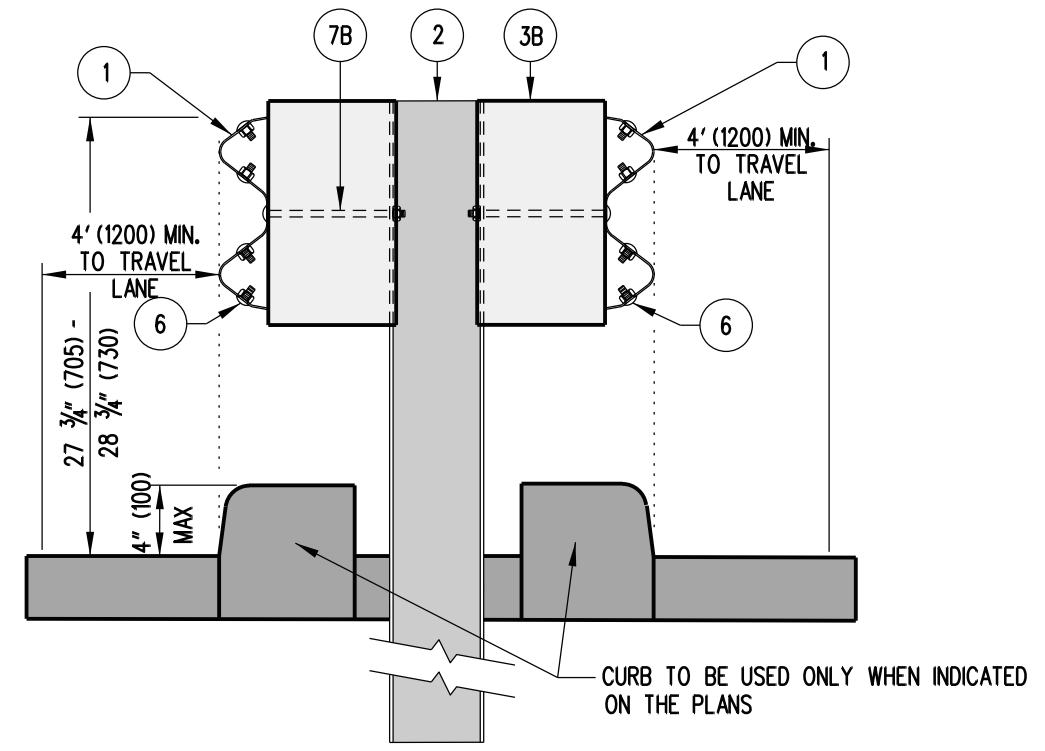
 DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL APPLICATIONS			APPROVED _____ CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. B-15 (2010)	SHT. 2	OF 3	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE



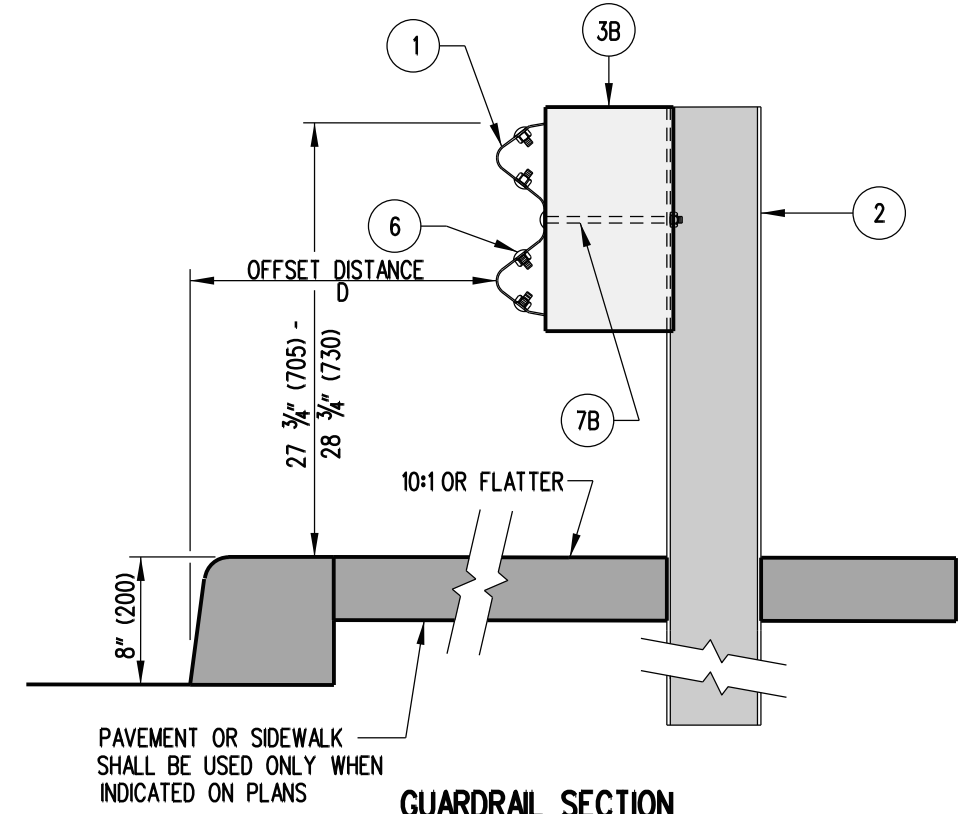
GUARDRAIL SECTION
RURAL SHOULDER APPLICATION

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

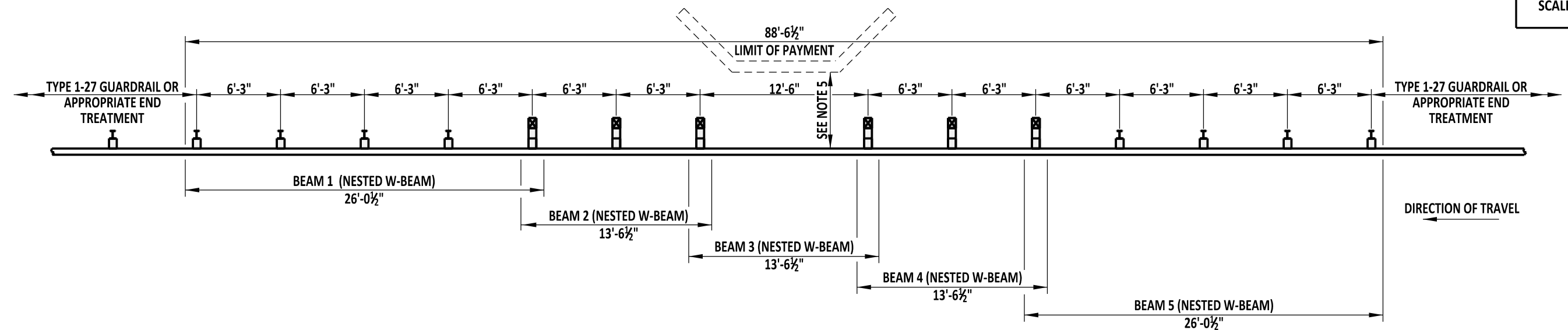
DESIGN SPEED	D
< 50 MPH (80 km/h)	6'-0" (1800)
≥ 50 MPH (80 km/h)	10'-0" (3000)



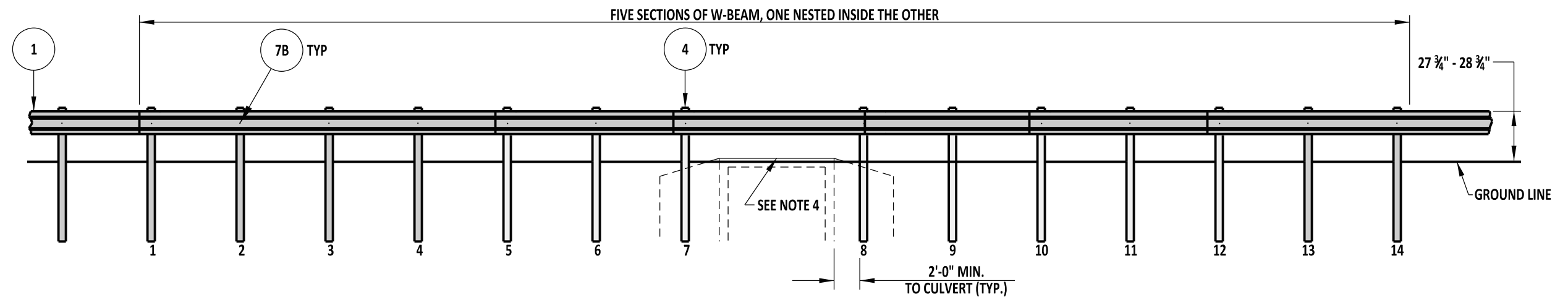
GUARDRAIL SECTION
MEDIAN APPLICATION



GUARDRAIL SECTION
URBAN SHOULDER APPLICATION



PLAN



ELEVATION

NOTES:

- 1). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 2). POSTS 1 THRU 4 AND 11 THRU 14 ARE TO BE W6X9 STEEL POSTS. POSTS 5 THRU 10 ARE TO BE 6"x8"x6'-0" 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 5/8" GUARDRAIL BOLT (L=26").
- 4). TOP OF HEADWALL SHALL NOT EXCEED 2" ABOVE FINISHED GRADE.
- 5). TOP OF HEADWALL OR TOP OF BANK SHALL NOT BE CLOSER THAN 5'-0" TO FACE OF GUARDRAIL.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 1-27

STANDARD NO.

B-16 (2013)

SHT. 1

OF 3

APPROVED

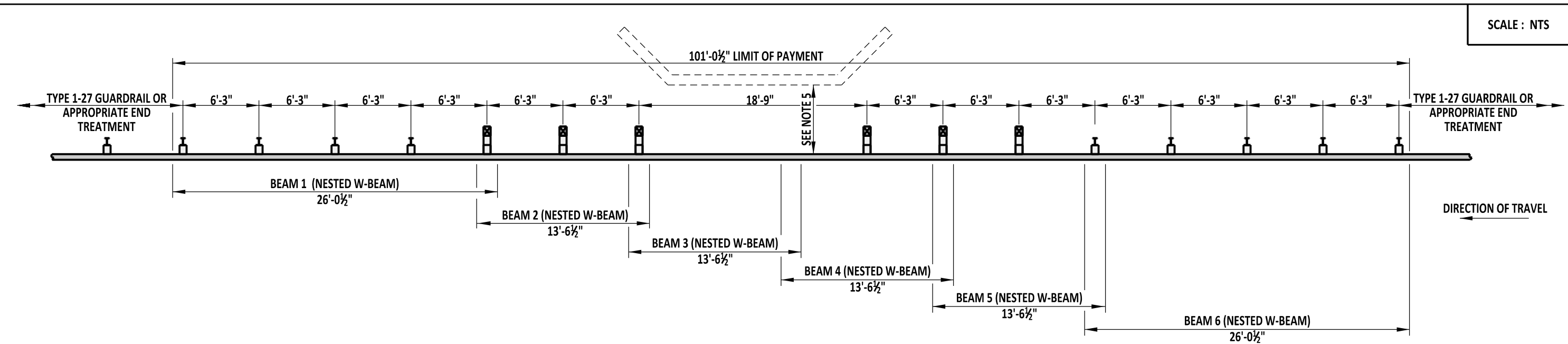
SIGNATURE ON FILE
CHIEF ENGINEER

02/14/2014
DATE

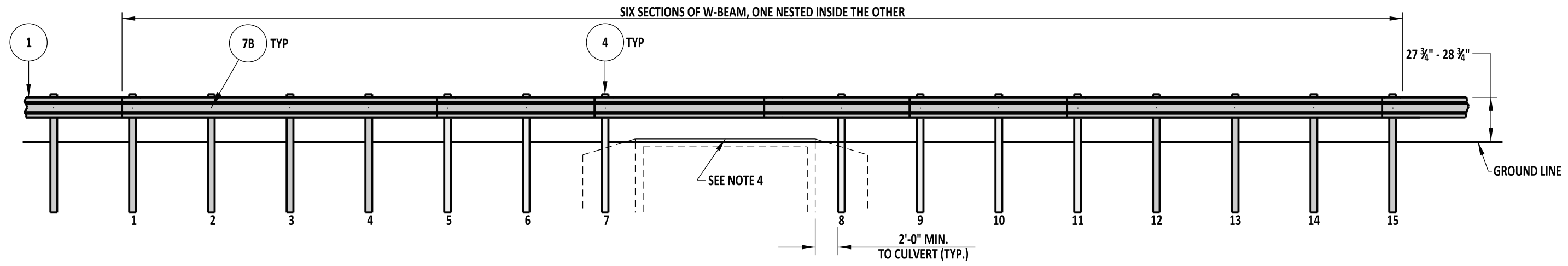
RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

01/14/2014
DATE




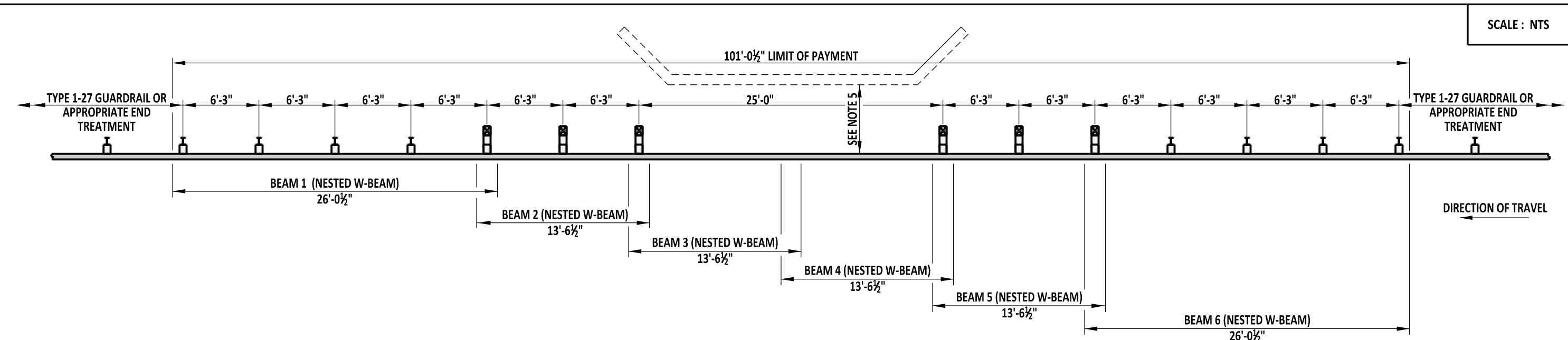
PLAN



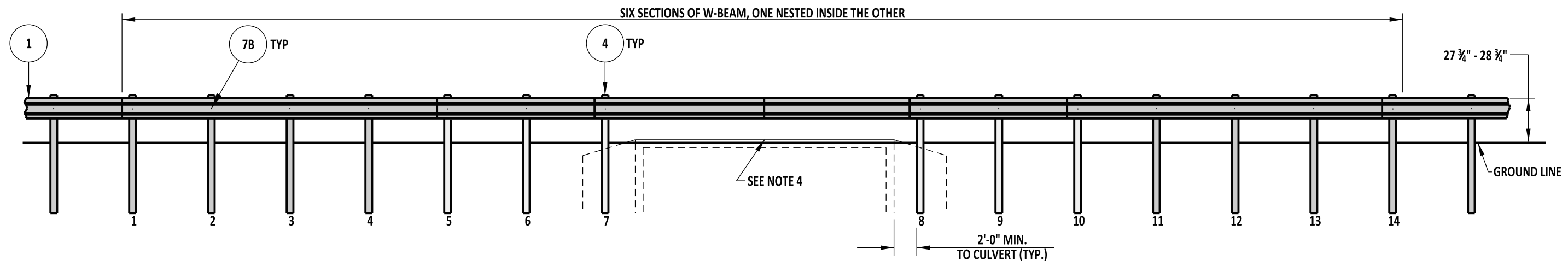
ELEVATION

- NOTES:
- 1). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - 2). POSTS 1 THRU 4 AND 11 THRU 15 ARE TO BE W6X9 STEEL POSTS. POSTS 5 THRU 10 ARE TO BE 6"x8"x6'-0" BREAKAWAY WOOD POSTS WITH 2 WOOD BLOCKS AT EACH OF THESE 6 POSTS.
 - 3). THE SPLICES AT POSTS 5, 7, & 9 ARE TO USE 5/8" GUARDRAIL BOLT (L=26").
 - 4). TOP OF HEADWALL SHALL NOT EXCEED 2" ABOVE FINISHED GRADE.
 - 5). TOP OF HEADWALL OR TOP OF BANK SHALL NOT BE CLOSER THAN 5'-0" TO FACE OF GUARDRAIL.

 <div>DELAWARE DEPARTMENT OF TRANSPORTATION</div>	GUARDRAIL OVER CULVERTS, TYPE 2-27				APPROVED	SIGNATURE ON FILE	02/14/2014	
	STANDARD NO.	B-16 (2013)	SHT.	2	OF	3	RECOMMENDED	SIGNATURE ON FILE



PLAN



ELEVATION

NOTES:

- 1). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 2). POSTS 1 THRU 4 AND 11 THRU 14 ARE TO BE W6X9 STEEL POSTS. POSTS 5 THRU 10 ARE TO BE 6"x8"x6'-0" 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 ½" GUARDRAIL BOLT (L=26").
- 4). TOP OF HEADWALL SHALL NOT EXCEED 2" ABOVE FINISHED GRADE.
- 5). TOP OF HEADWALL OR TOP OF BANK SHALL NOT BE CLOSER THAN 5'-0" TO FACE OF GUARDRAIL.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERT, TYPE 3-27

STANDARD NO.

B-16 (2013)

SHT. 3

OF 3

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

02/14/2014
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

01/14/2014
DATE

SCALE : N.T.S.

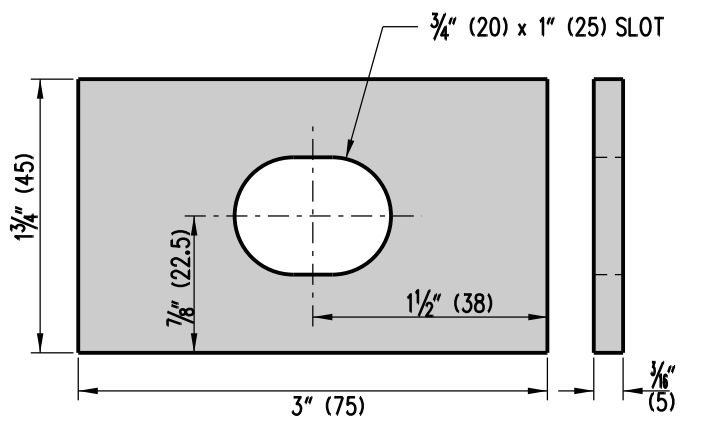
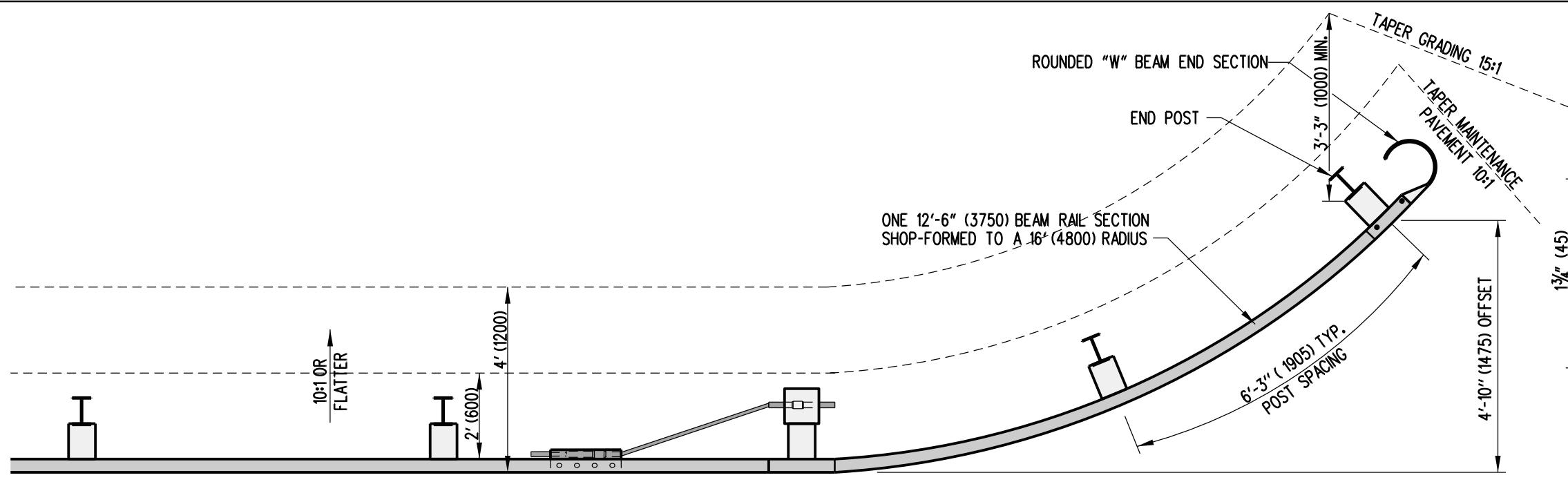
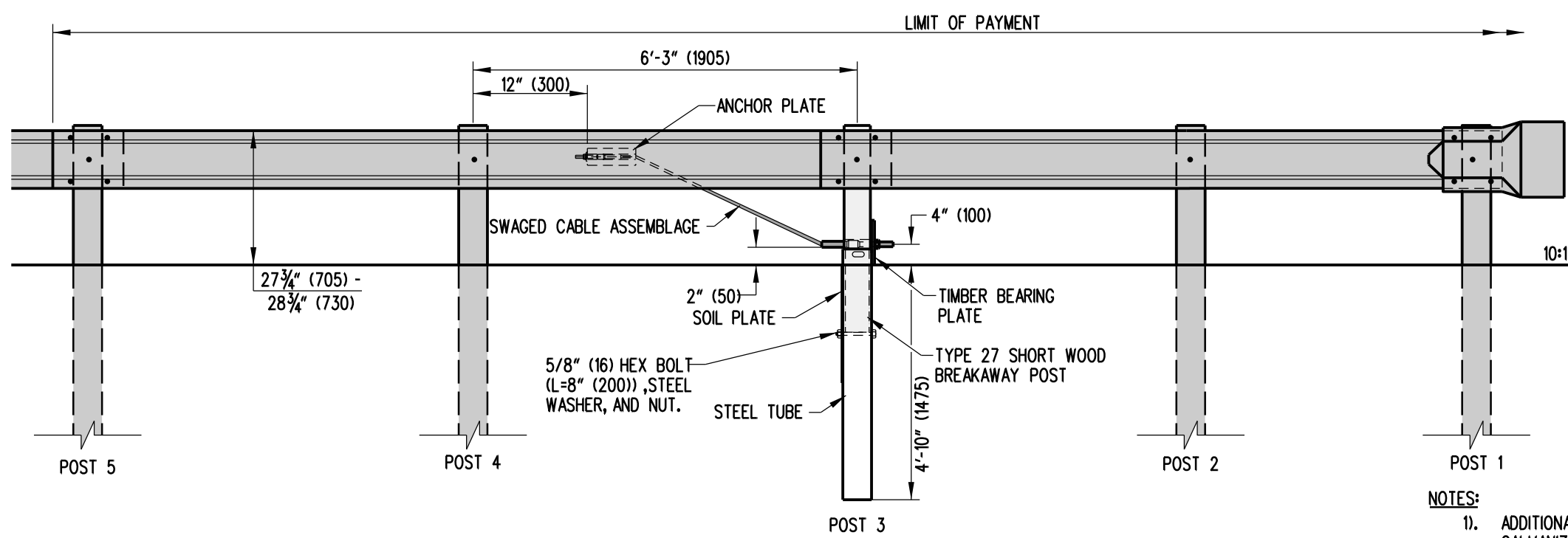


PLATE WASHER DETAIL

PLAN



ELEVATION

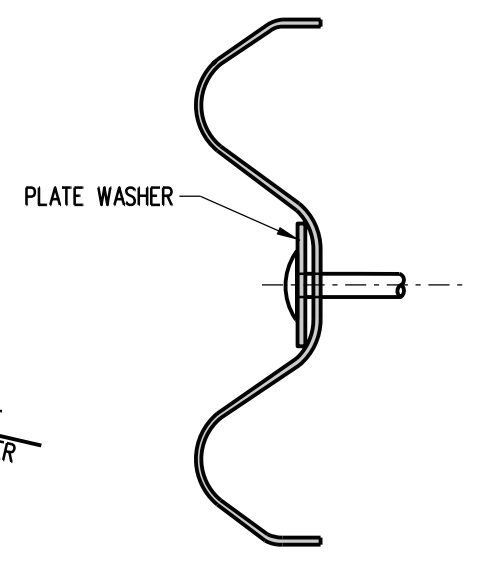

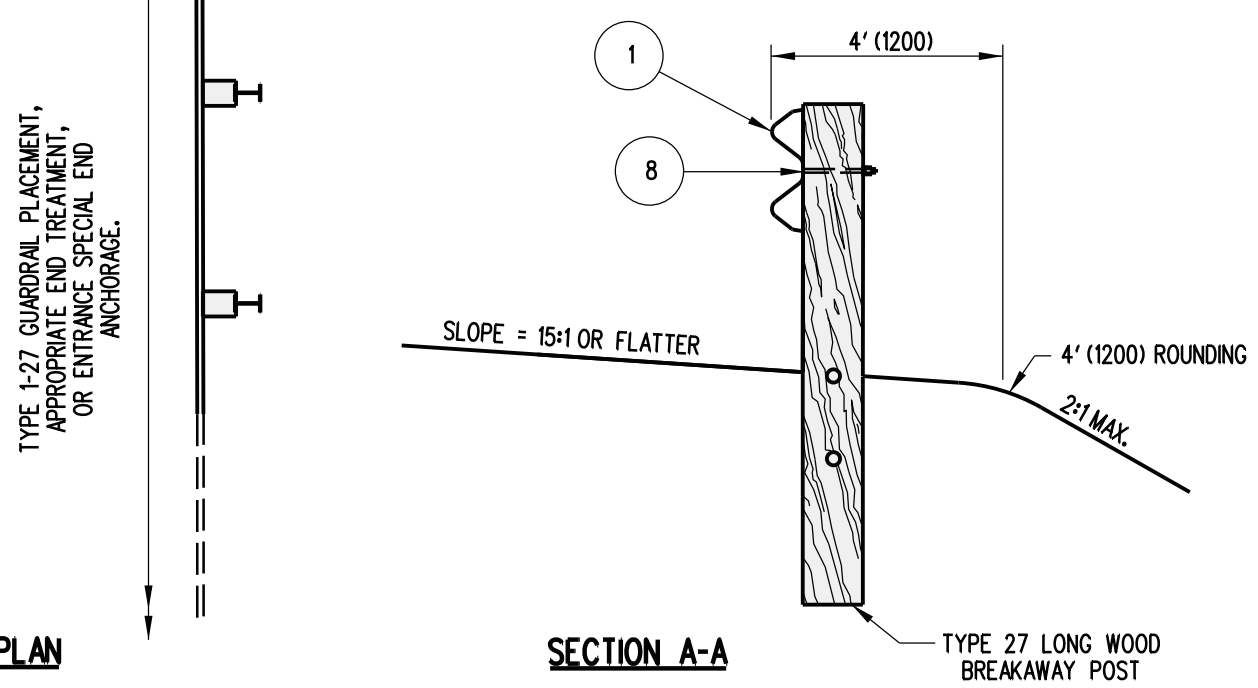
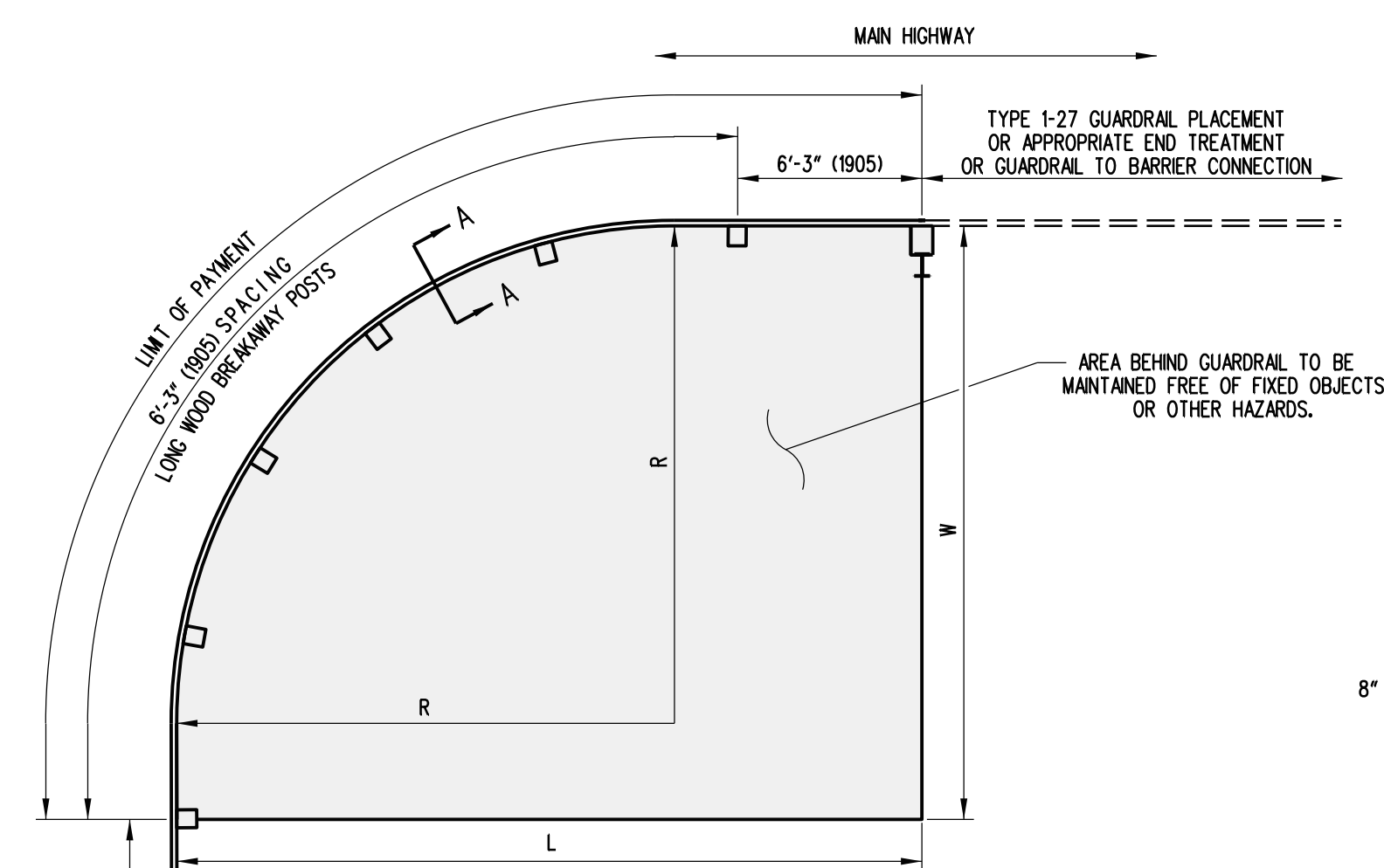


PLATE WASHER MOUNTING POSITION

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.

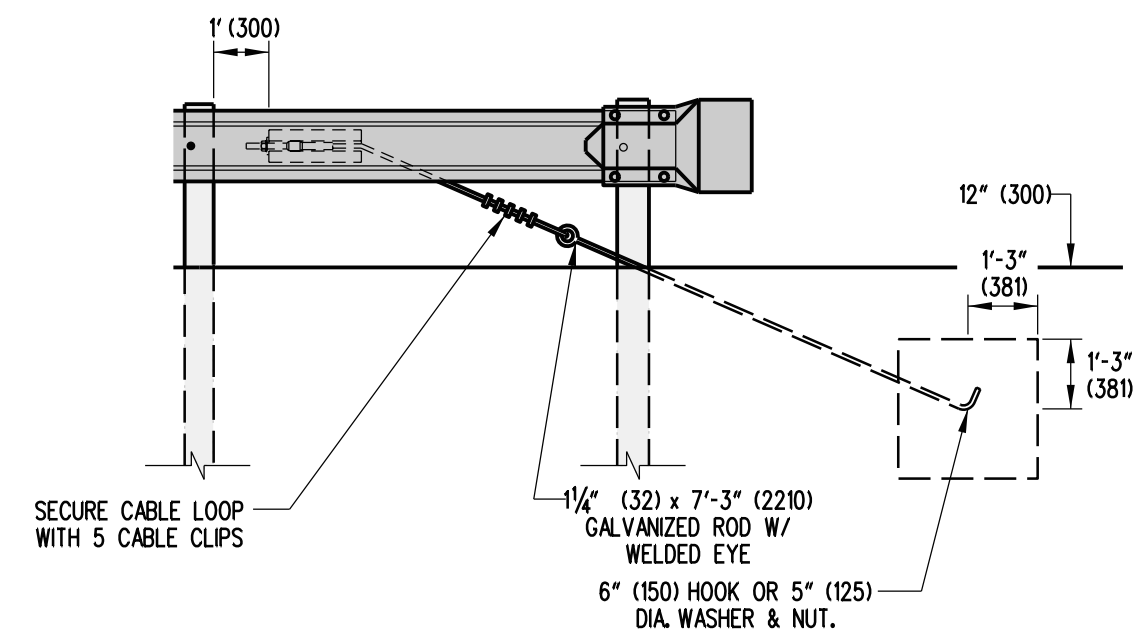
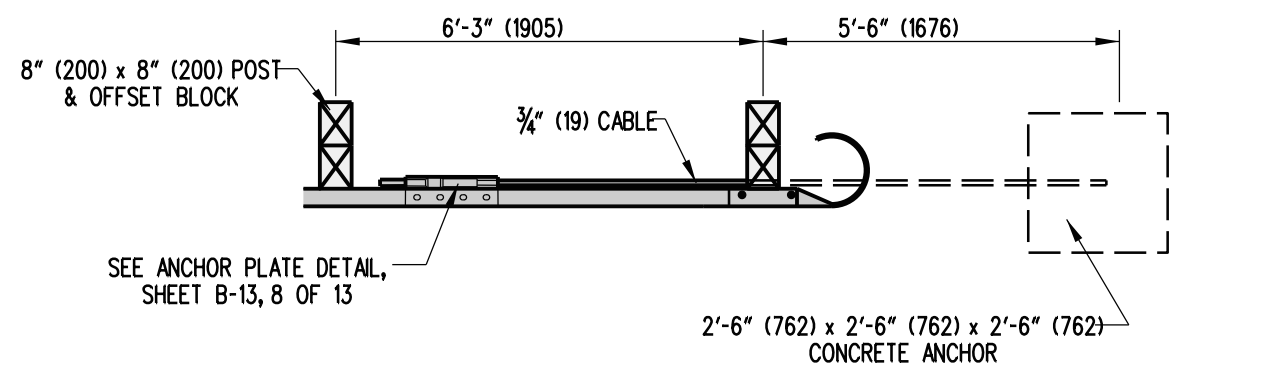
 DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL END TREATMENT, TYPE 4-27			APPROVED _____ SIGNATURE ON FILE CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. B-17 (2010)	SHT. 1	OF 1	RECOMMENDED _____ SIGNATURE ON FILE DESIGN ENGINEER	12/27/2010 DATE



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)

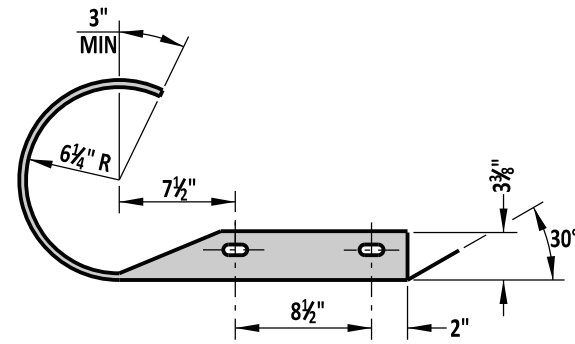
SCALE : N.T.S.

- 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.

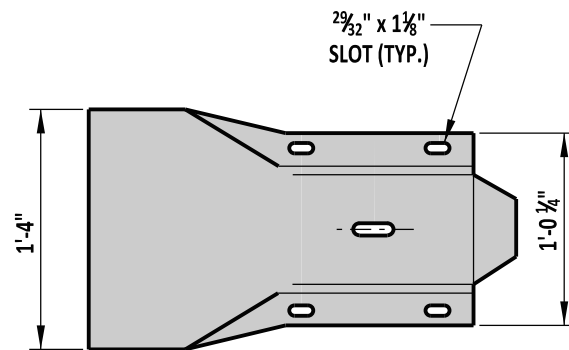


ENTRANCE SPECIAL END ANCHORAGE

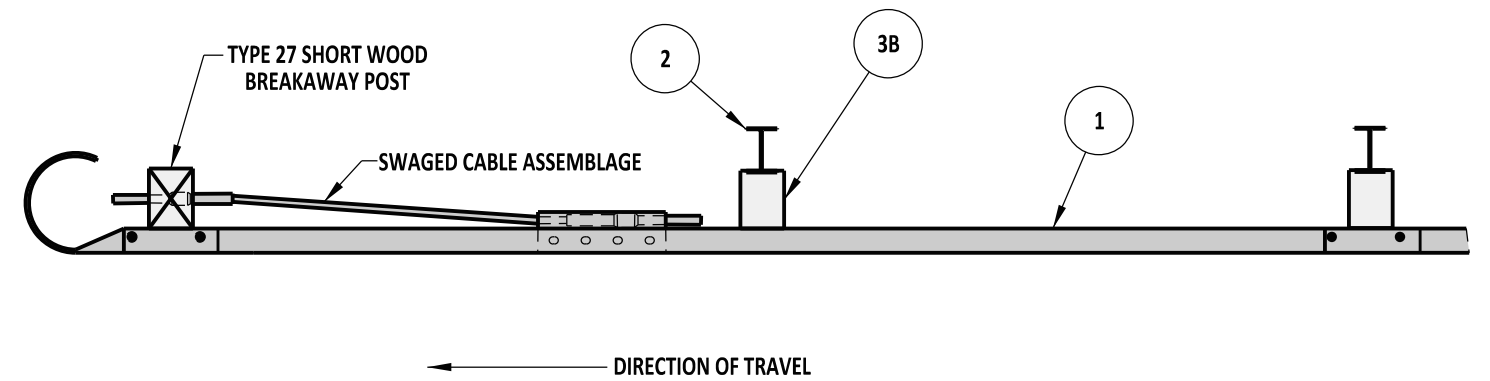
<p>DELAWARE DEPARTMENT OF TRANSPORTATION</p>	<p align="center">CURVED GUARDRAIL SECTION</p>			<p>APPROVED</p>	<p>SIGNATURE ON FILE</p>	<p>12/28/2010</p>
	<p>STANDARD NO. B-18 (2010)</p>	<p>SHT. 1</p>	<p>OF 1</p>	<p>RECOMMENDED</p>	<p>SIGNATURE ON FILE</p>	<p>12/27/2010</p>



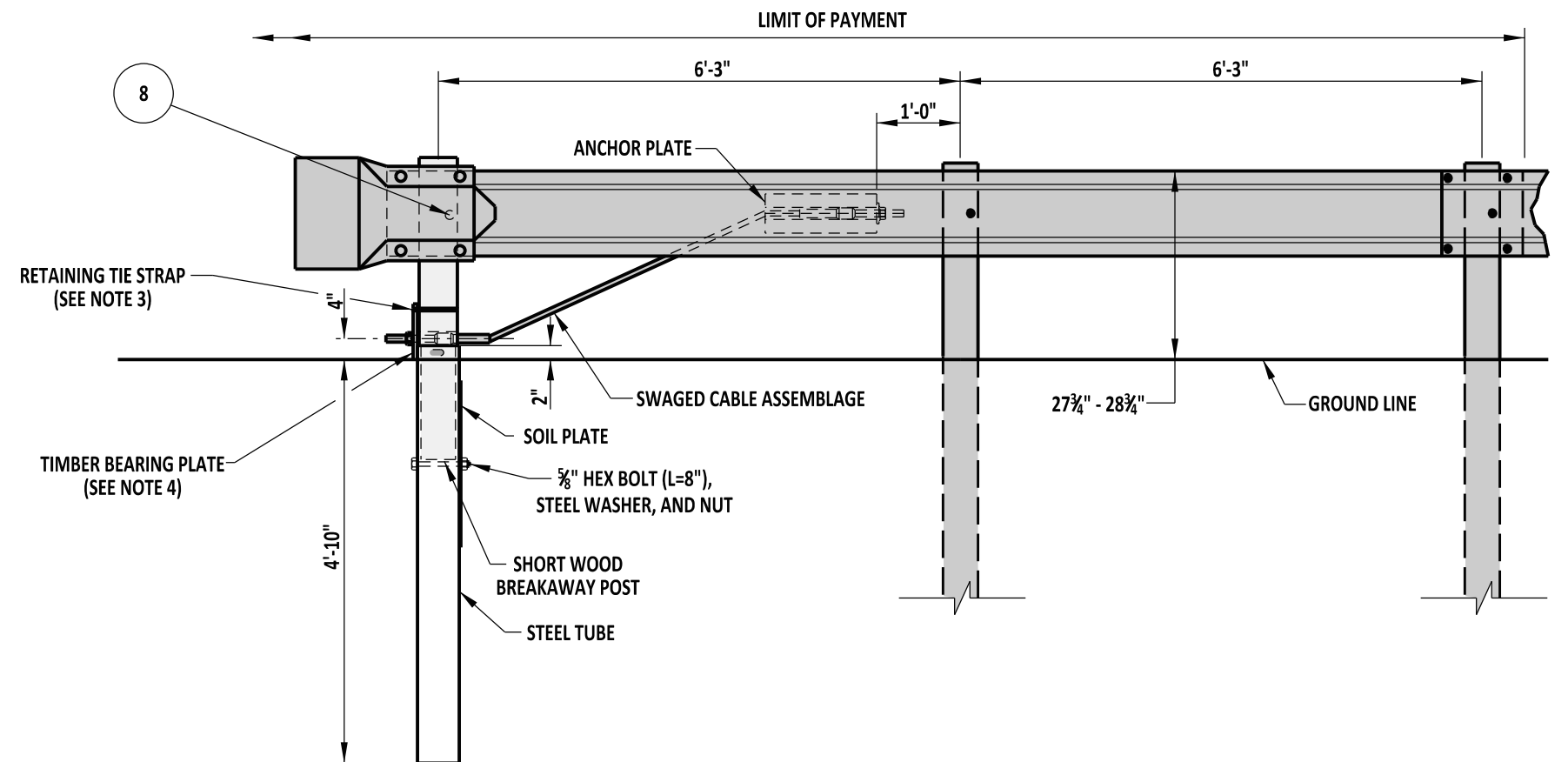
END SECTION PLAN



END SECTION ELEVATION



PLAN



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'-0" STEEL TUBE WITHOUT A SOIL PLATE OR A 5'-0" STEEL TUBE WITH A SOIL PLATE.
- 3). PLACE A 1/2" WIDE PLASTIC RETAINING TIE STRAP AROUND THE SHORT TIMBER BREAKAWAY POST AND TIMBER BEARING PLATE TO ENSURE THE PROPER ORIENTATION OF THE TIMBER BEARING PLATE.
- 4). REFER TO DETAIL B-13, SHEET 8 OF 10 FOR PROPER TIMBER BEARING PLATE ORIENTATION.



DELAWARE
DEPARTMENT OF TRANSPORTATION

END ANCHORAGE, TYPE 27

STANDARD NO.

B-19 (2012)

SHT. 1

OF 1

APPROVED

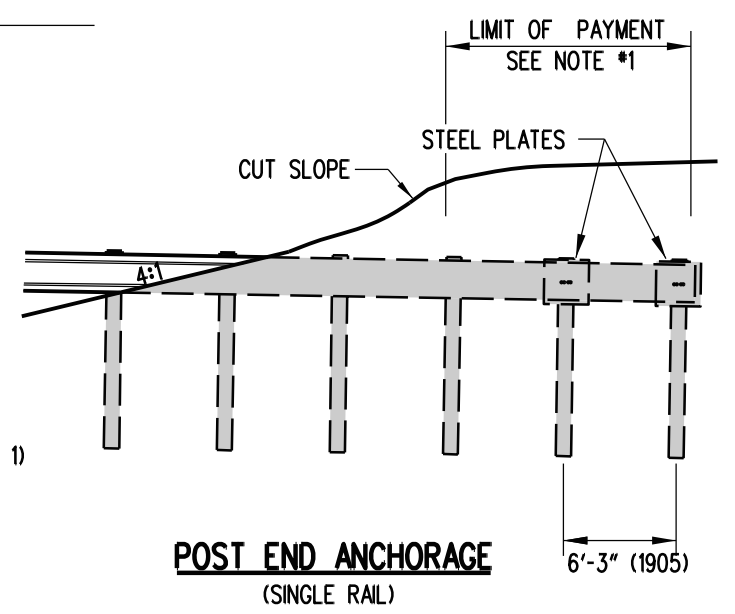
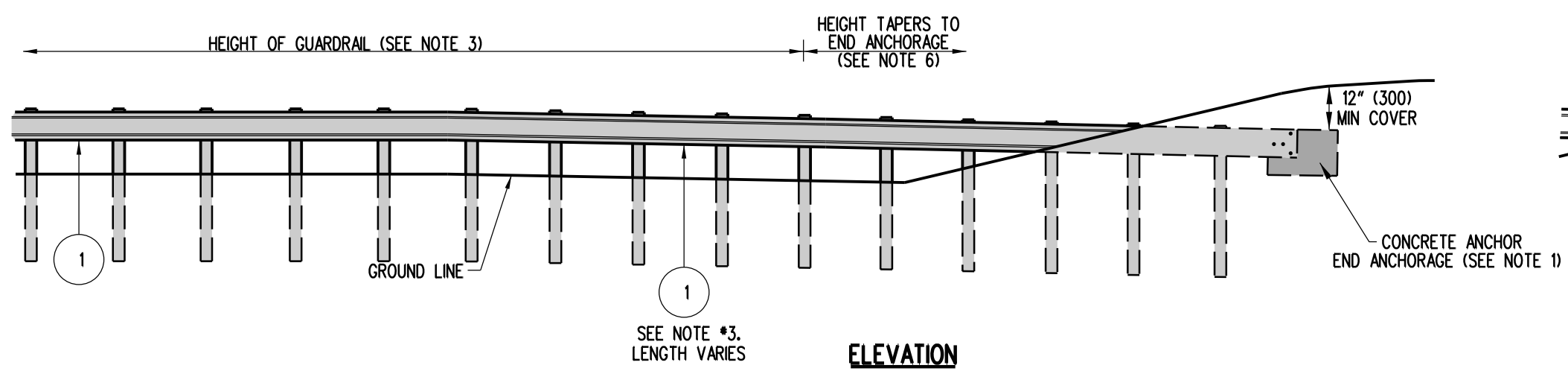
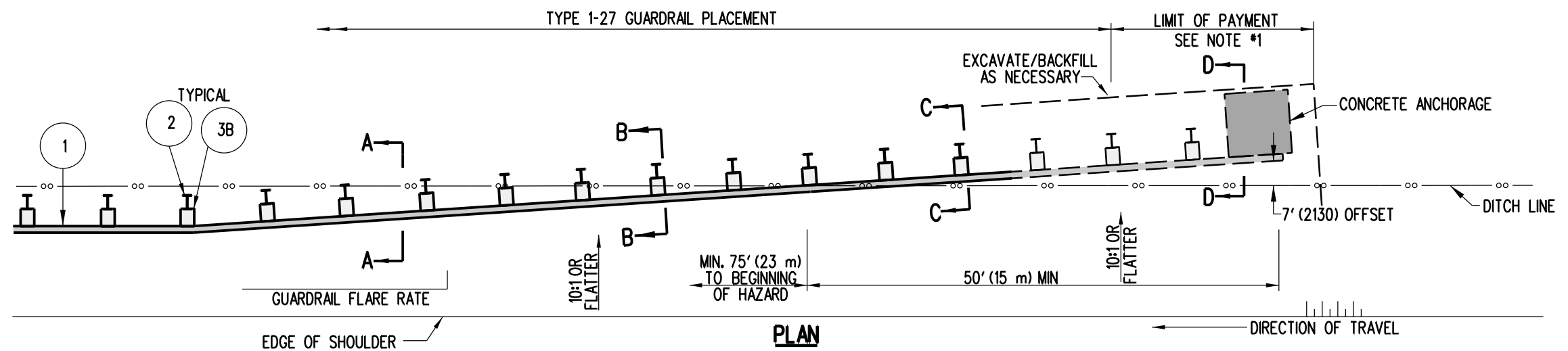
SIGNATURE ON FILE
CHIEF ENGINEER

01/07/2013
DATE

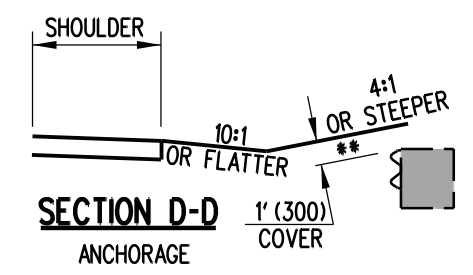
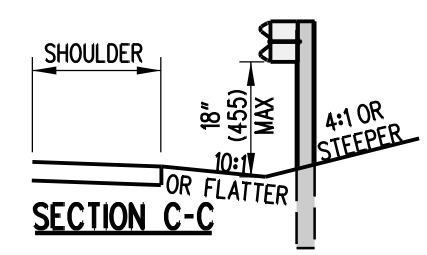
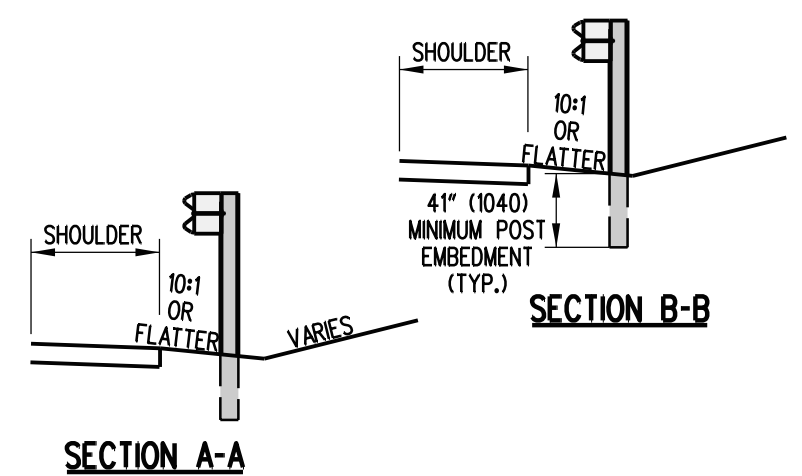
RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2012
DATE



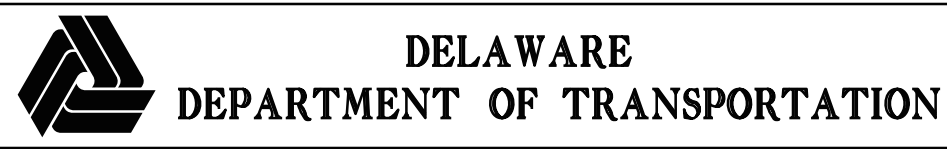
FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1



NOTES:

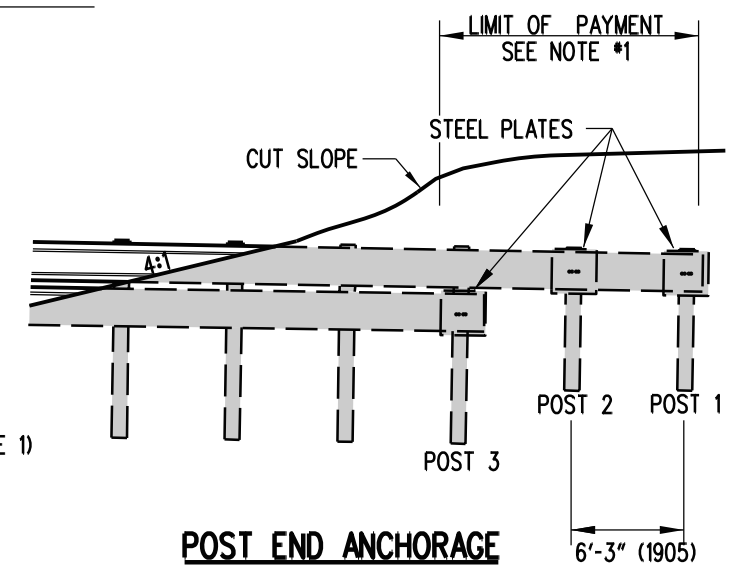
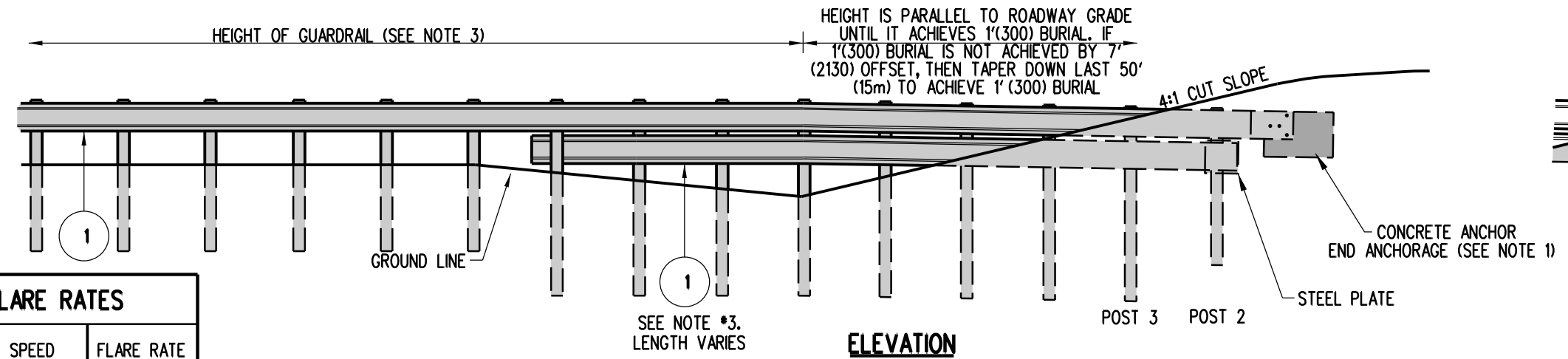
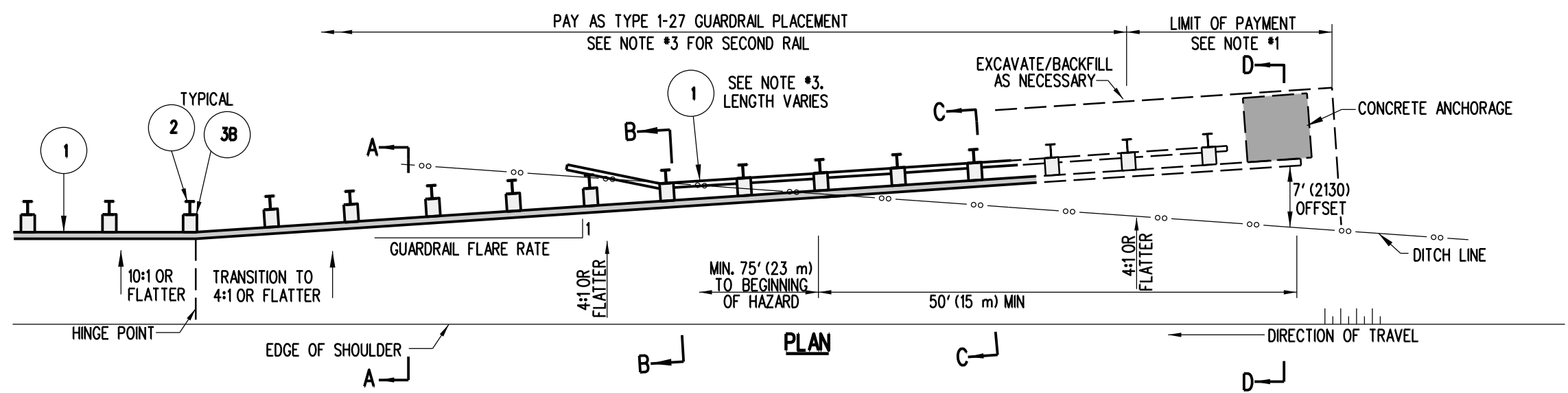
- 1). BURIED END SECTION PAYMENT INCLUDES THE CONCRETE OR POST ANCHORAGE, EXCAVATION, BACKFILL, AND ALL APPLICABLE ITEMS INCLUDING LABOR NECESSARY TO COMPLETE END ANCHORAGE.
- 2). THE CONTRACTOR HAS THE OPTION OF USING EITHER A CONCRETE BLOCK ANCHOR OR A POST ANCHOR TO TERMINATE THE BURIED END SECTION.
- 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.

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

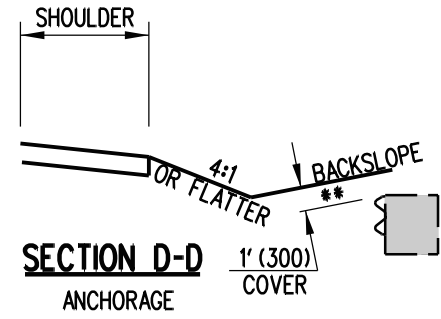
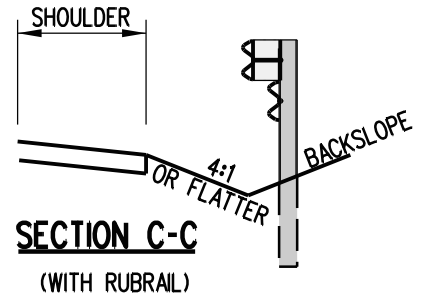
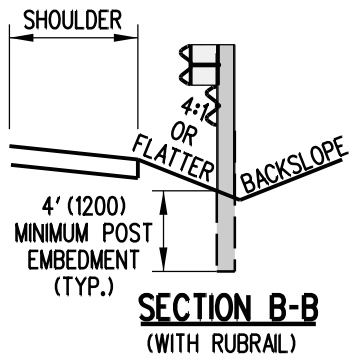
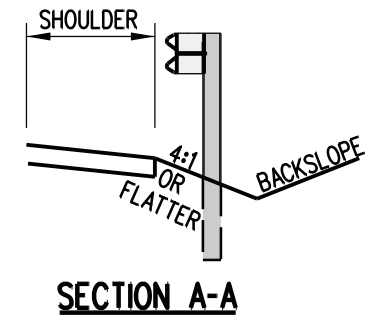


BURIED END SECTION			
STANDARD NO.	B-20 (2010)	SHT. 1	OF 3

APPROVED	SIGNATURE ON FILE	12/28/2010
	CHIEF ENGINEER	DATE
RECOMMENDED	SIGNATURE ON FILE	12/27/2010
	DESIGN ENGINEER	DATE



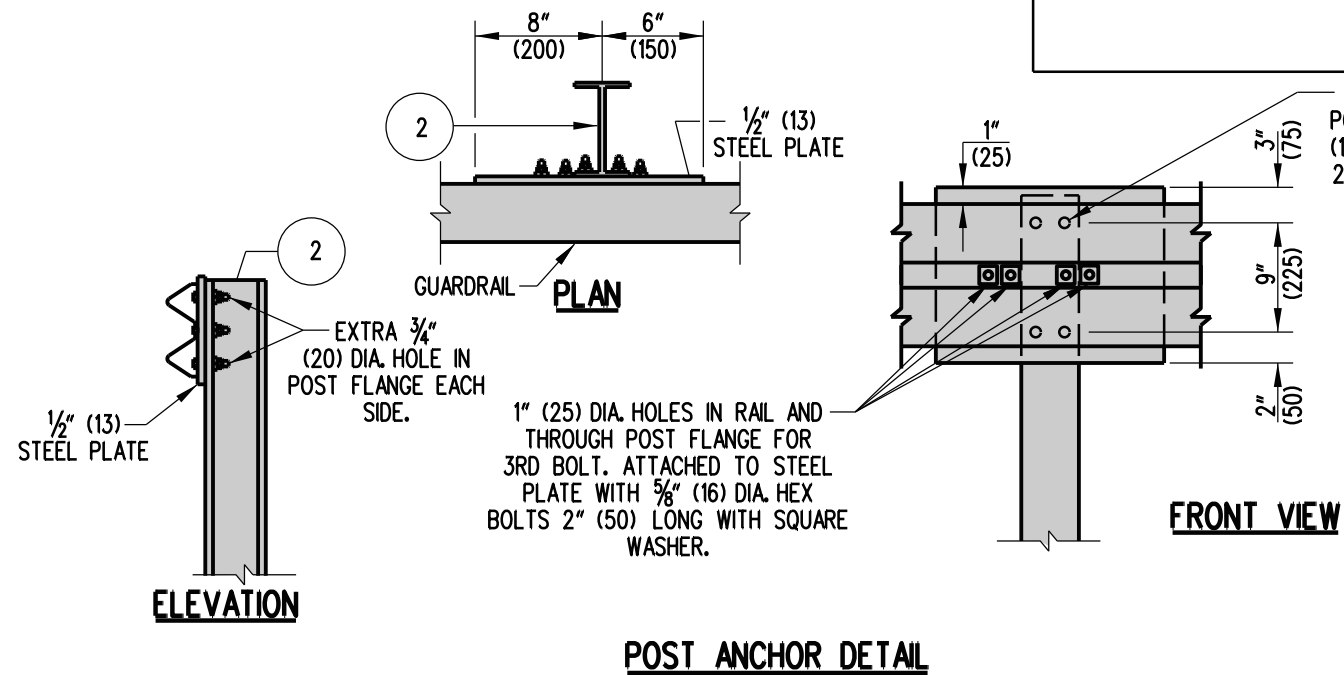
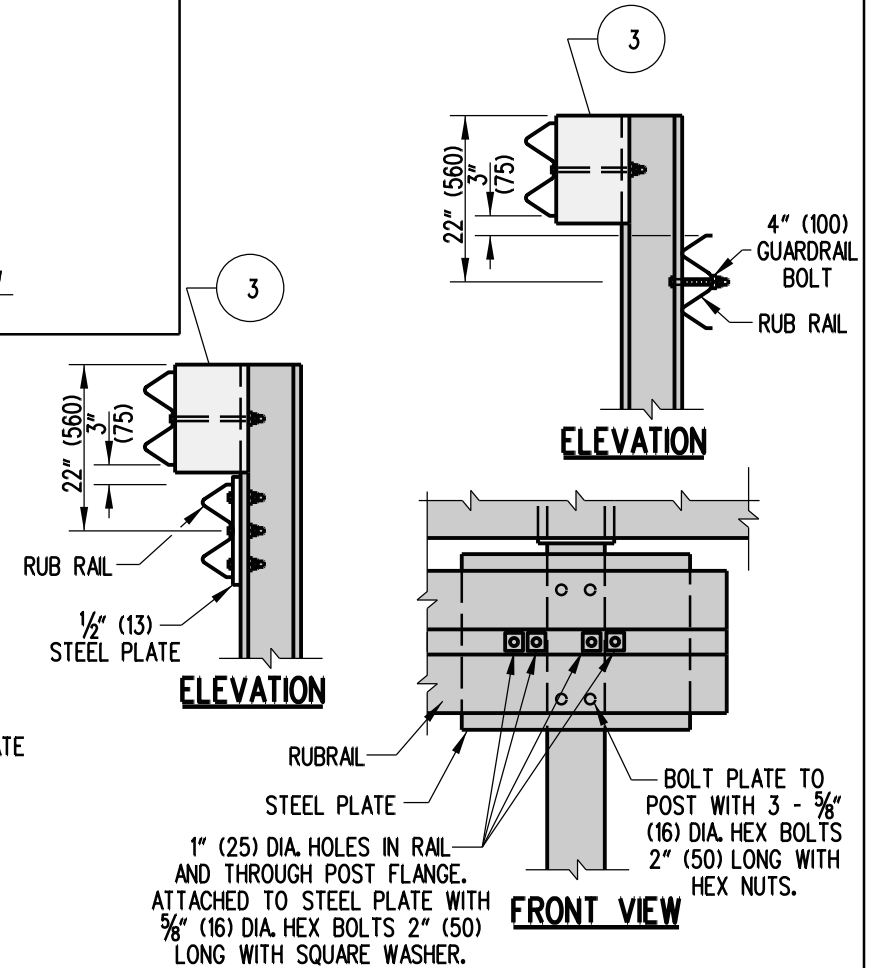
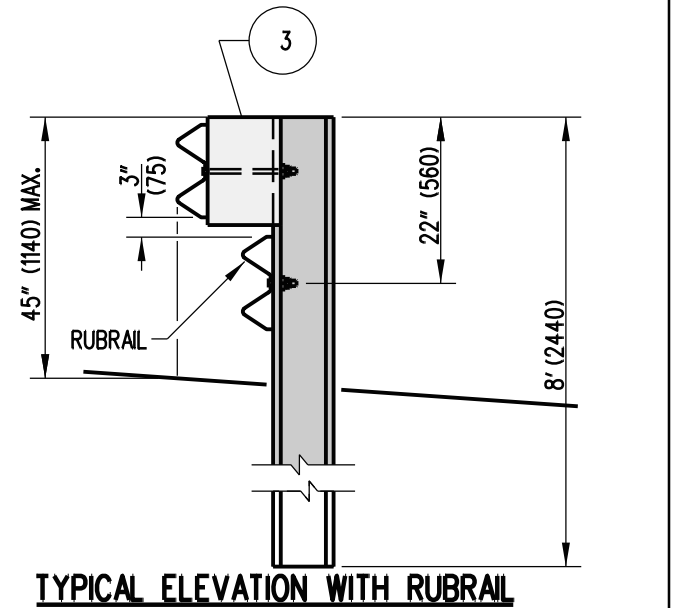
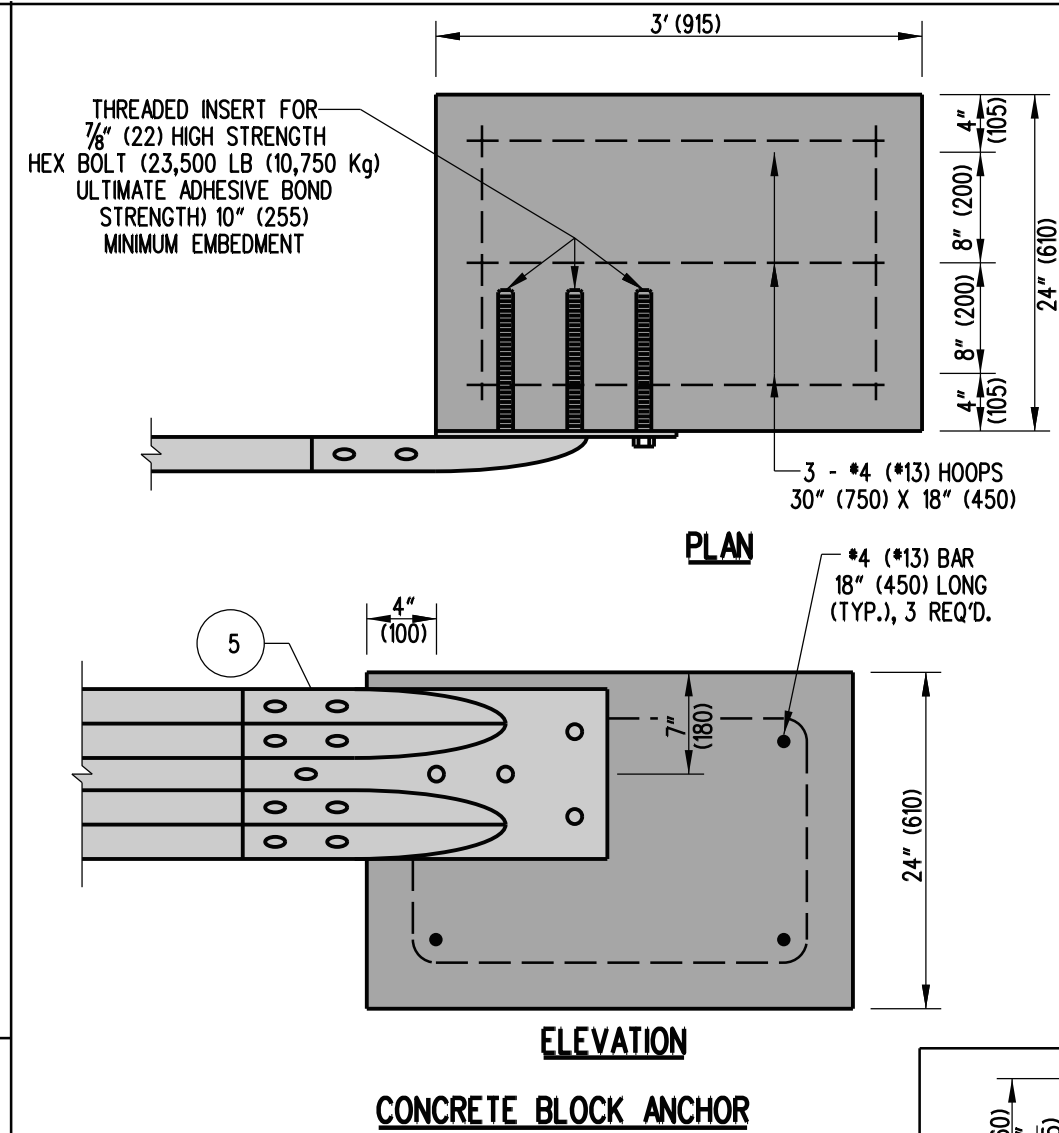
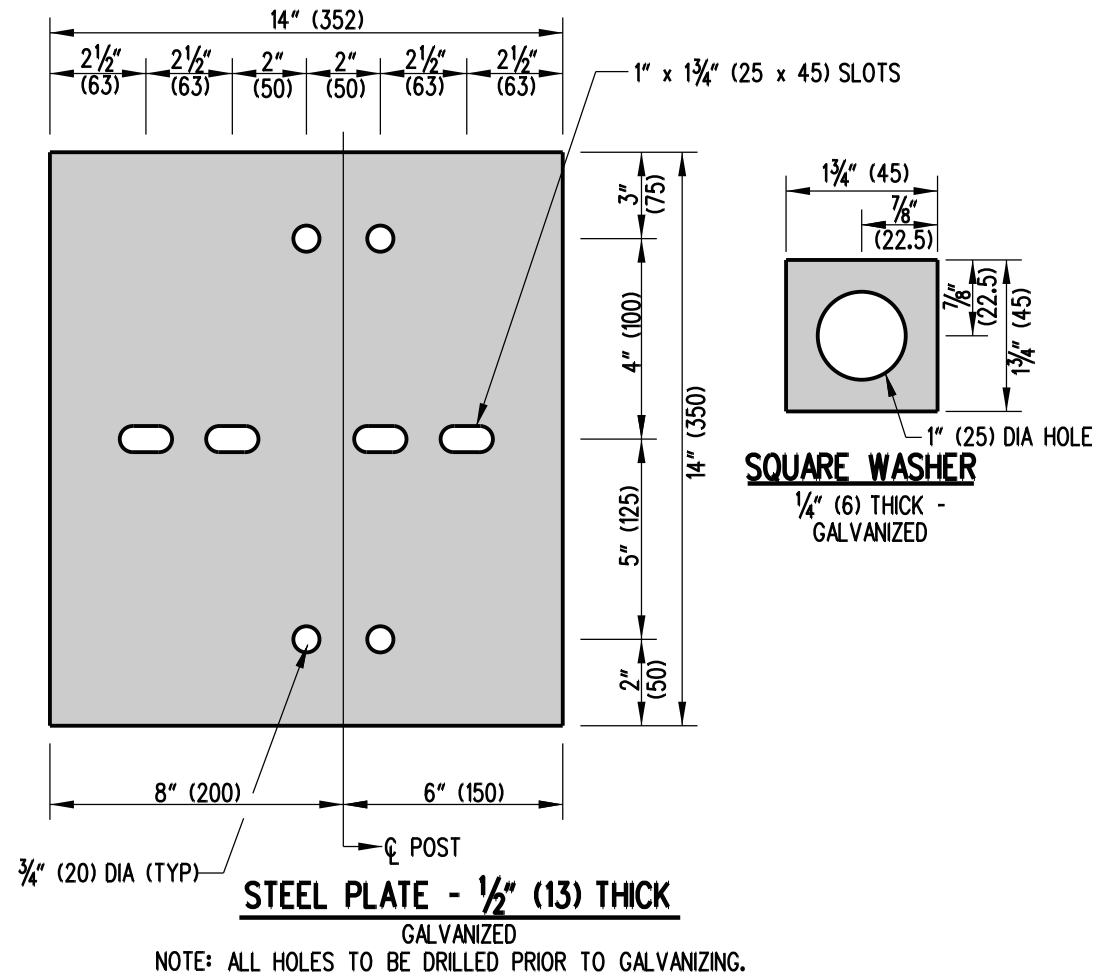
FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1



** 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.

SCALE : N.T.S.



DELAWARE
 DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

STANDARD NO.

B-20 (2010)

SHT. 3

OF 3

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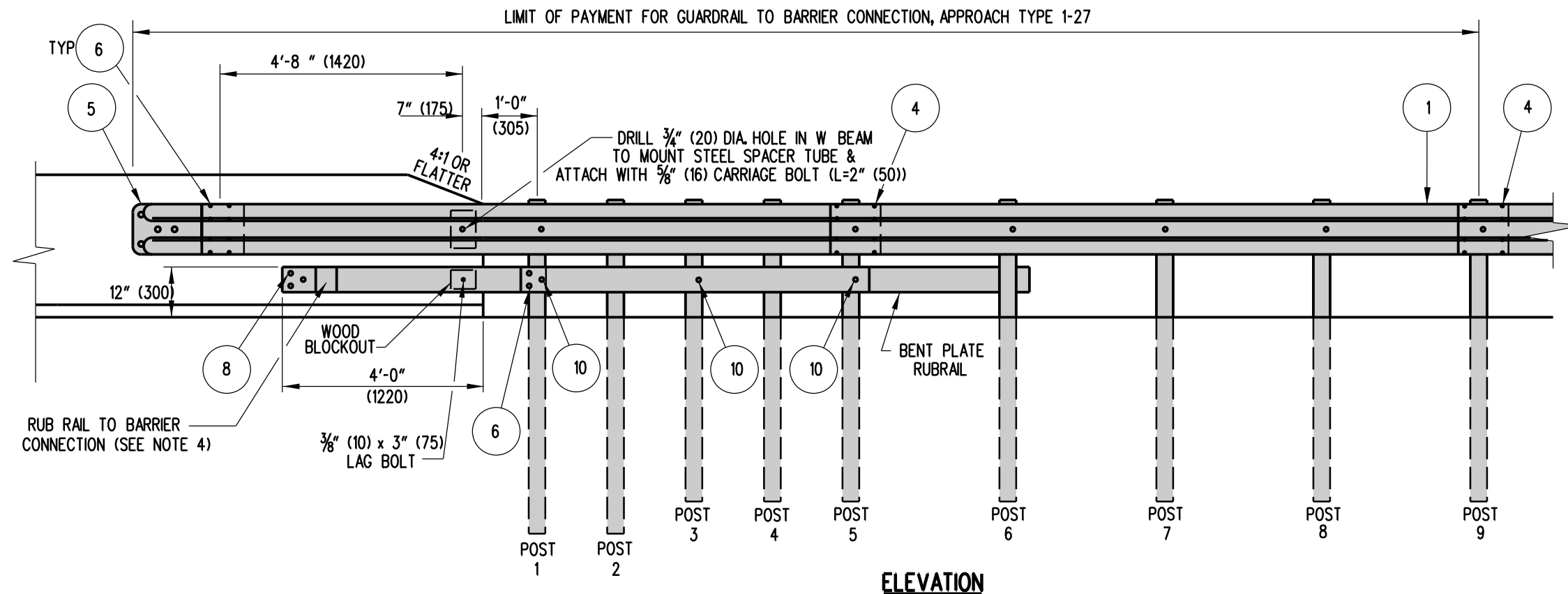
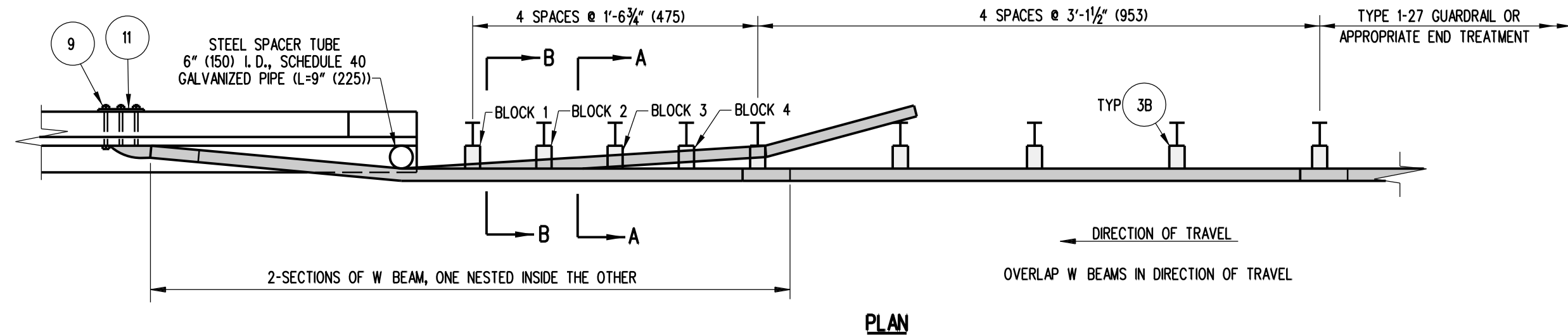
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 DESIGN ENGINEER

12/27/2010
 DATE



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 $\frac{5}{8}$ " (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

STANDARD NO. B-21 (2010)

SHT. 1 OF 3

APPROVED

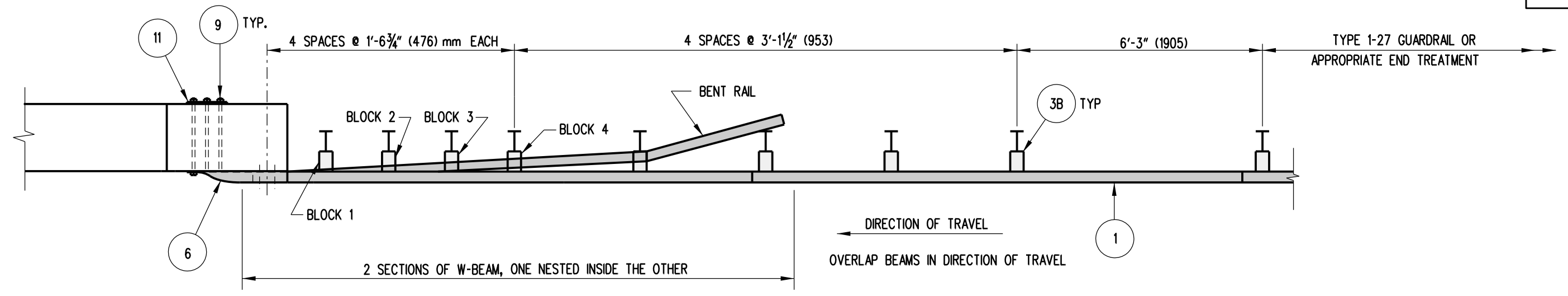
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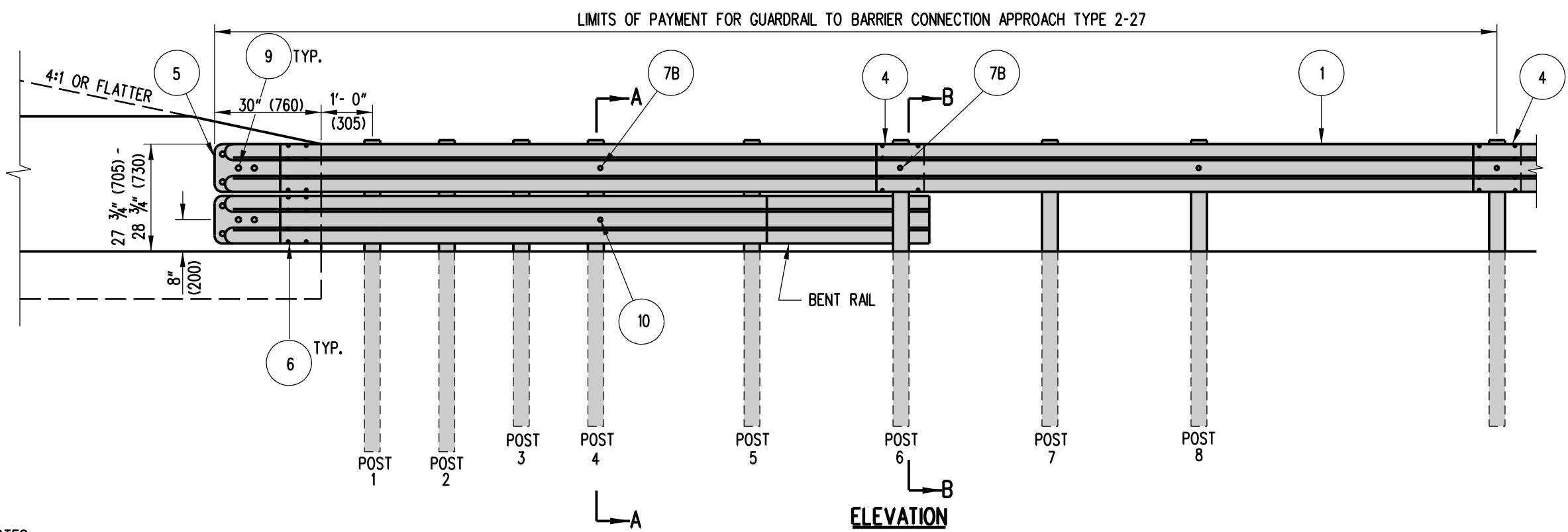
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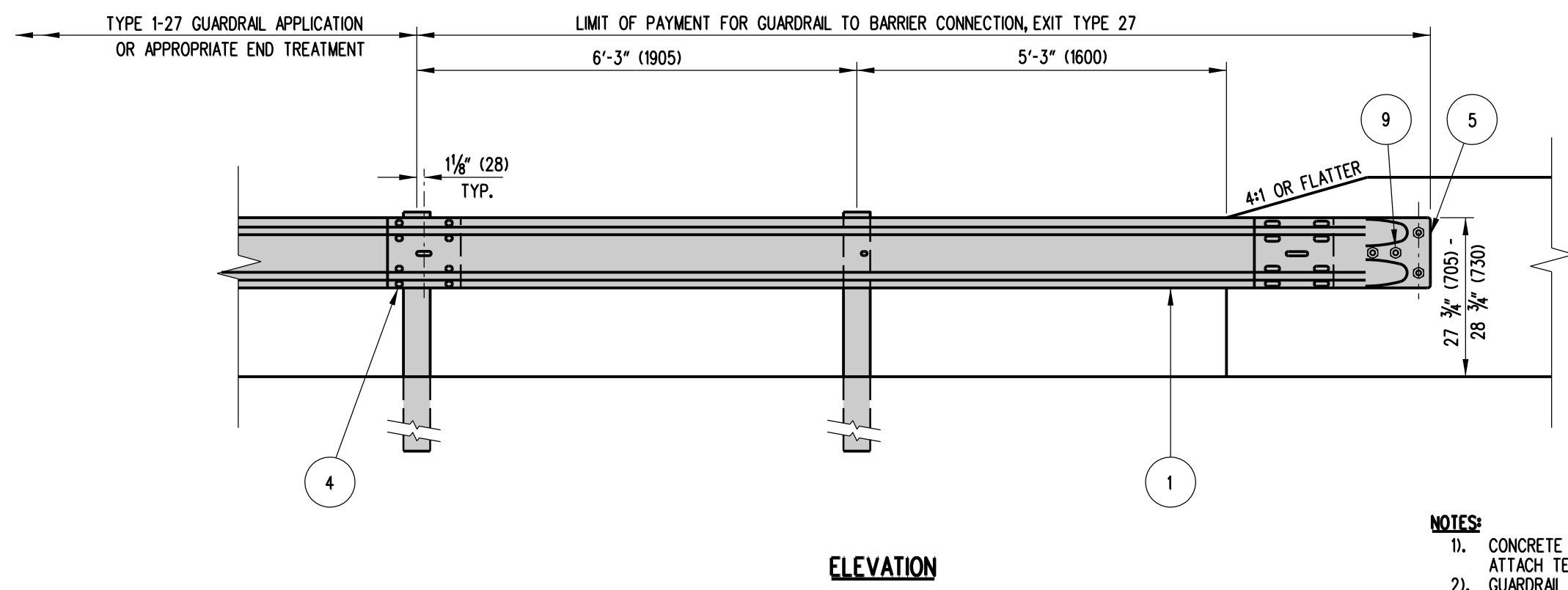
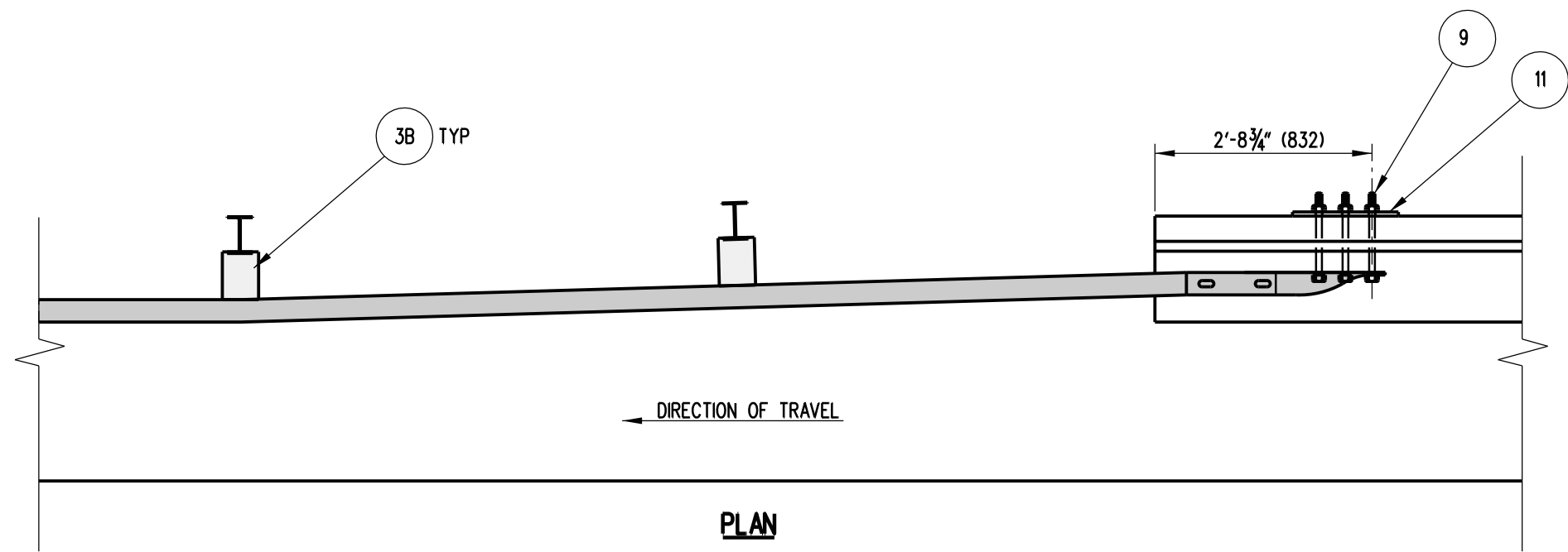


ELEVATION

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 5/8" (16) GUARDRAIL BOLT, 4" (200) LONG, WASHER, AND NUT.

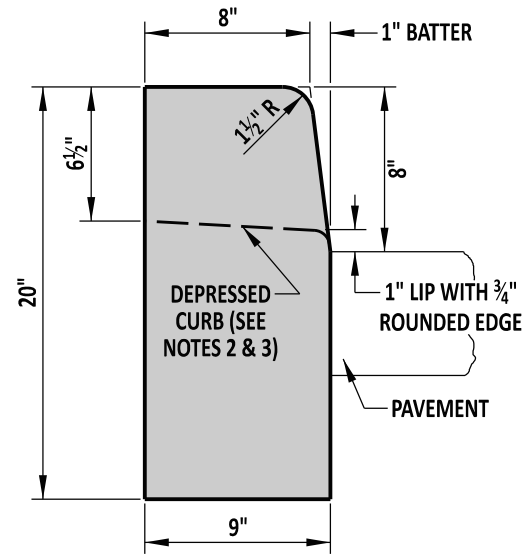
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	STANDARD NO. B-21 (2010)	SHT. 2	OF 3	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE



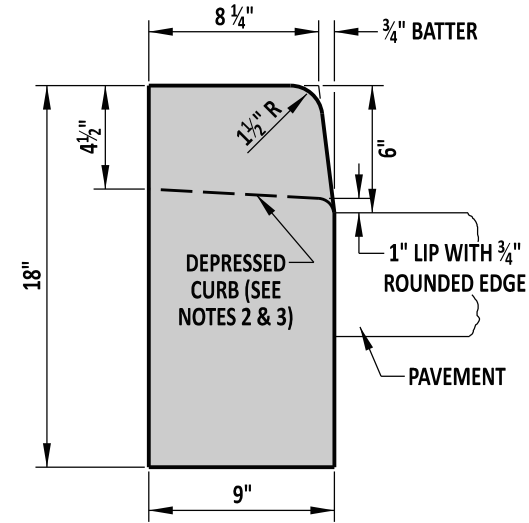
NOTES:

- 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.

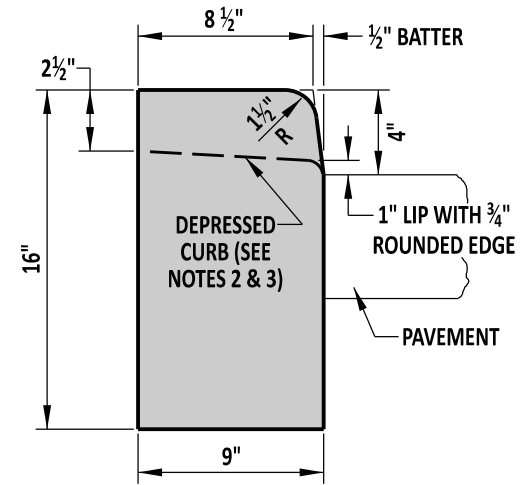
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	STANDARD NO. B-21 (2010)	SHT. 3	OF 3	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE



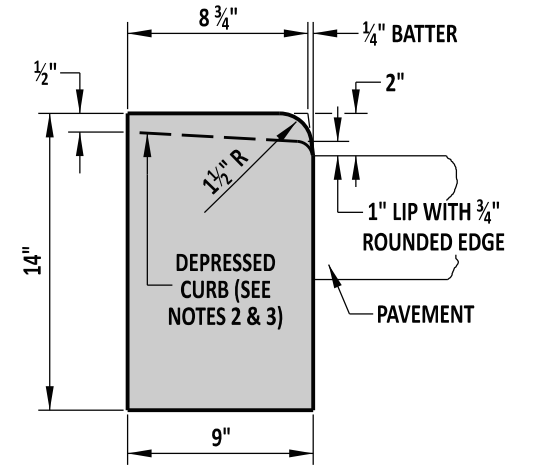
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TYPE 1-8



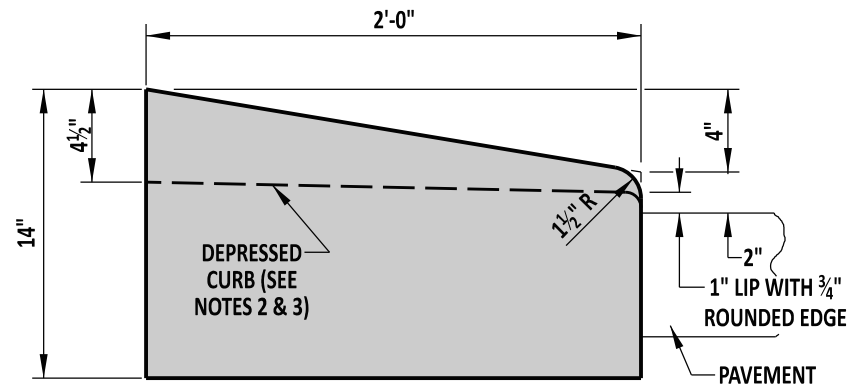
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TYPE 1-6



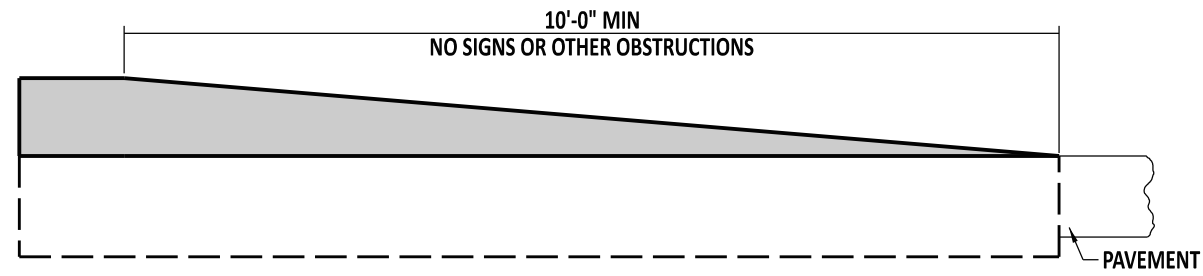
P.C.C. CURB
TYPE 1-4



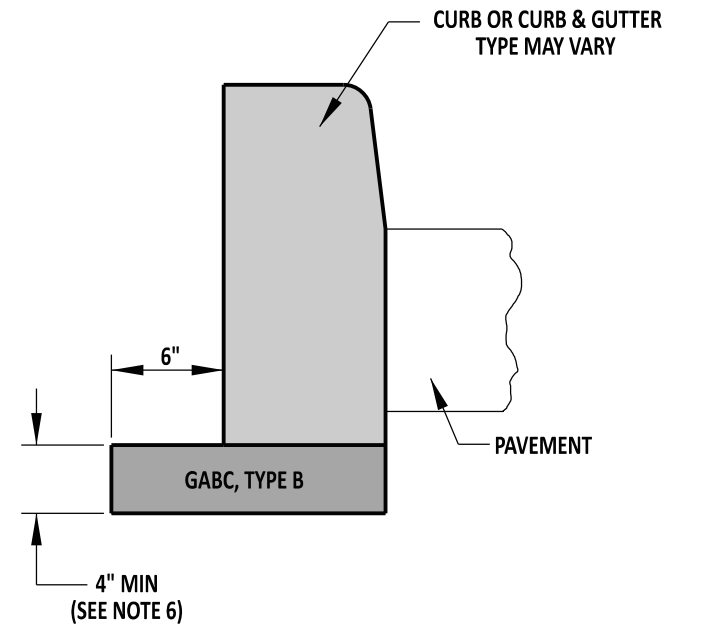
P.C.C. CURB
TYPE 1-2



P.C.C. CURB
TYPE 2



TYPICAL TAPER SECTION
AT NOSE OF MEDIANS
TYPE 1-8 CURB SHOWN



TYPICAL CURB SECTION

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. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
- 2). THE DEPRESSED CURB DIMENSIONS (INCLUDING 1" LIP) ON THIS SHEET ARE FOR USE AT ENTRANCES ONLY. FOR CURB DEPRESSIONS AT CURB RAMPS, SEE NOTE 3.
- 3). AT CURB RAMPS, DEPRESS CURB FLUSH WITH THE PAVEMENT (WITH NO LIP). SLOPE THE TOP OF THE CURB 8.3% OR FLATTER IN THE DIRECTION OF PEDESTRIAN TRAVEL.
- 4). DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT ALL CORNERS OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A RATE OF 4:1.
- 5). TAPER END OF CURB RUNS NOT PART OF AN ISLAND OR MEDIAN FLUSH WITH PAVEMENT OR ADJACENT AREA AT A RATE OF 12:1.
- 6). FOR SUBDIVISION APPLICATIONS, A MINIMUM OF 6" OF GABC IS REQUIRED.



DELAWARE
DEPARTMENT OF TRANSPORTATION

P.C.C. CURB
STANDARD NO. C-1 (2017)

SHT. 1 OF 3

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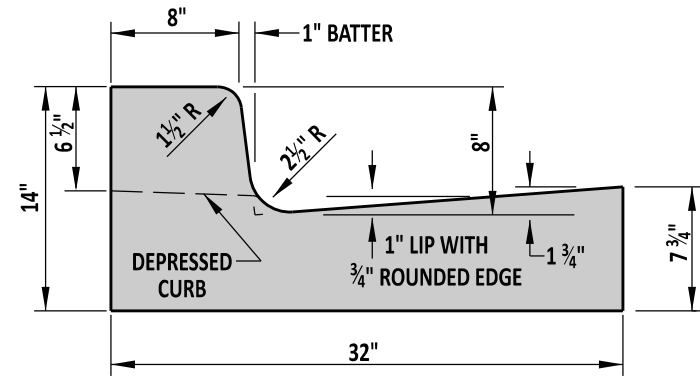
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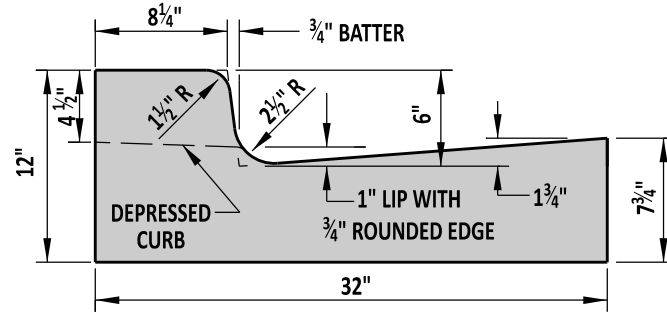
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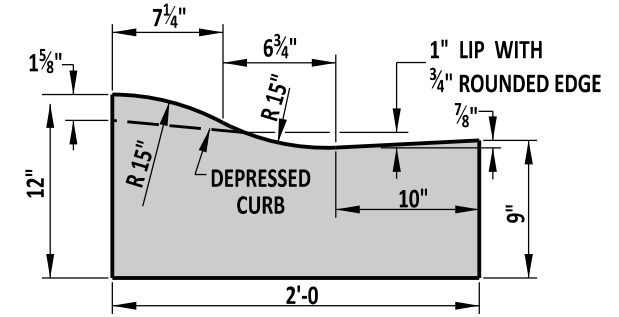
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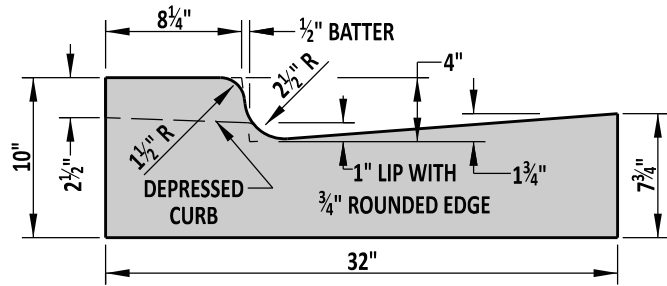
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TYPE 1-8



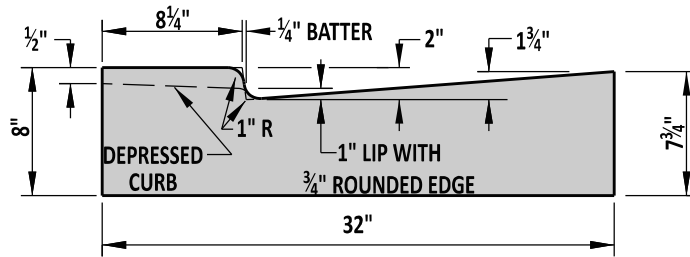
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TYPE 1-6



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



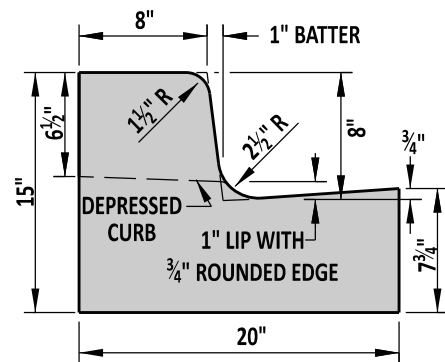
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TYPE 1-4



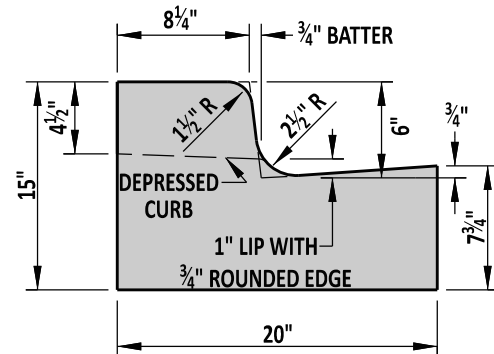
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 1-2

NOTES:

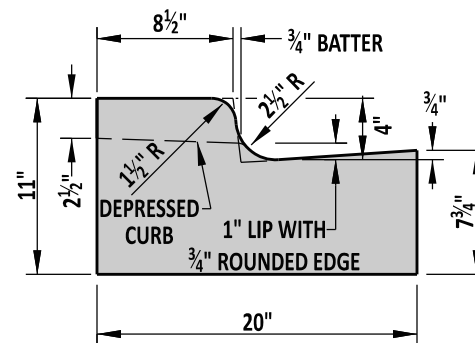
- 1). WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON DETAIL P-2, SHEET 3 OF 5. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
- 2). THE DEPRESSED CURB DIMENSIONS (INCLUDING 1" LIP) ON THIS SHEET ARE FOR USE AT ENTRANCES ONLY. FOR CURB DIMENSIONS AT CURB RAMPS, SEE NOTE 3.
- 3). SEE DETAIL C-1, SHEET 3 FOR DEPRESSING AT CURB RAMPS.
- 4). DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 4:1. SEE DETAIL C-1, SHEET 1 OF 2 FOR TYPICAL SECTION OF TAPER AT NOSE OF MEDIAN ISLANDS.
- 5). 4" OF GABC, TYPE B SHALL BE PLACED UNDER ALL P.C.C. CURB AND P.C.C. CURB AND GUTTER. SEE DETAIL C-1, SHEET 1 OF 2 FOR TYPICAL SECTION.
- 6). DEPRESS END OF CURB RUNS NOT PART OF AN ISLAND OR MEDIAN FLUSH WITH PAVEMENT OR ADJACENT AREA AT A SLOPE OF 12:1.



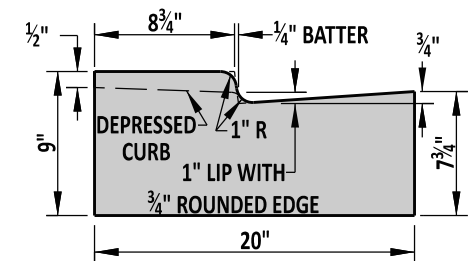
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 3-8



INTEGRAL P.C.C. CURB AND GUTTER
TYPE 3-6



INTEGRAL P.C.C. CURB AND GUTTER
TYPE 3-4



INTEGRAL P.C.C. CURB AND GUTTER
TYPE 3-2



DELAWARE
DEPARTMENT OF TRANSPORTATION

INTEGRAL P.C.C. CURB & GUTTER

STANDARD NO.

C-1 (2017)

SHT. 2

OF 3

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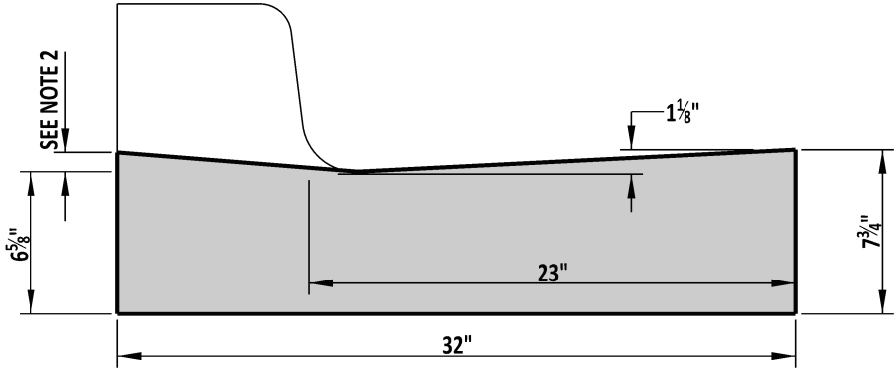
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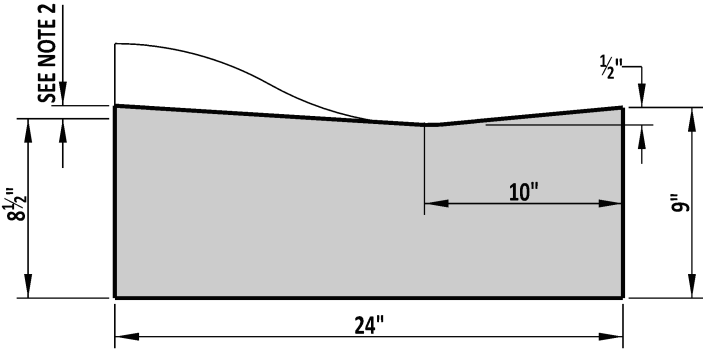
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THIS DETAIL IS TO BE USED ONLY FOR THE SECTIONS OF CURB & GUTTER THAT ARE DIRECTLY IN FRONT OF THE PEDESTRIAN CONNECTIONS. REFER TO
DETAIL C-1, SHEET 2 FOR TYPICAL CURB DIMENSIONS AND FOR DEPRESSING CURB AT ENTRANCES

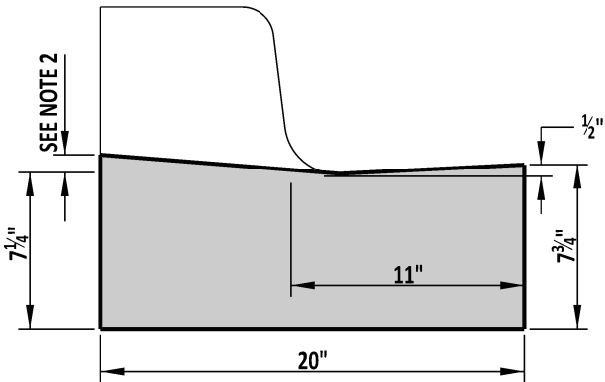
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INTEGRAL P.C.C. CURB AND GUTTER
TYPES 1-2 THRU 1-8



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



INTEGRAL P.C.C. CURB AND GUTTER
TYPES 3-2 THRU 3-8

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. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
- 2). DEPRESS CURB FLUSH WITH PAVEMENT (WITH NO LIP). SLOPE THE TOP OF THE CURB TO MATCH THE RUNNING SLOPE OF THE ADJACENT PEDESTRIAN CONNECTION. THE MAXIMUM RUNNING SLOPE IS 8.3%. THE MAXIMUM SLOPE OF THE GUTTER PAN AT THE PEDESTRIAN CONNECTION IS 5%.
- 3). SEE TYPICAL CURB SECTION DETAIL AND NOTE 6 ON DETAIL C-1, SHEET 1 FOR PLACEMENT OF GABC UNDER CURB AND GUTTER.
- 4). TRANSITION FROM STANDARD GUTTER SLOPE TO SLOPE SHOWN ON THIS DETAIL OVER A DISTANCE OF 5'-0".



DELAWARE
DEPARTMENT OF TRANSPORTATION

INTEGRAL P.C.C. CURB & GUTTER
(FOR USE AT PEDESTRIAN CONNECTIONS ONLY)

STANDARD NO.

C-1 (2018)

SHT. 3

OF 3

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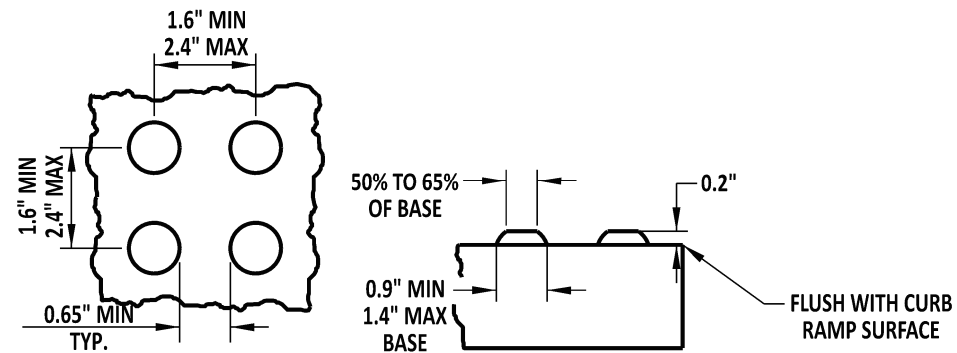
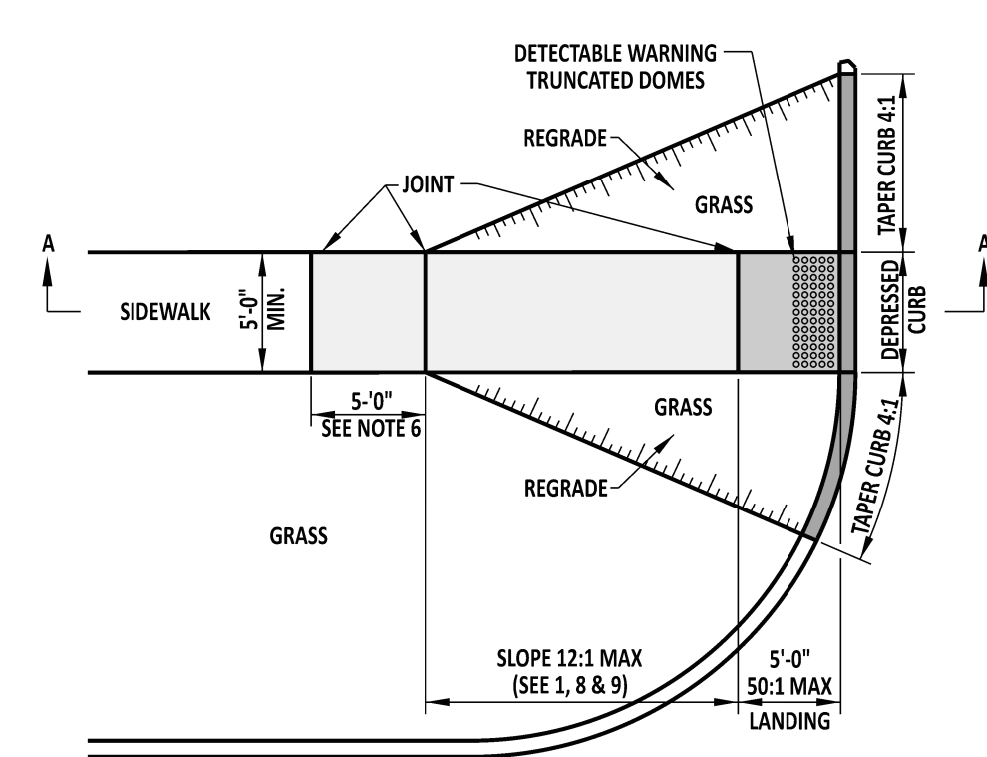
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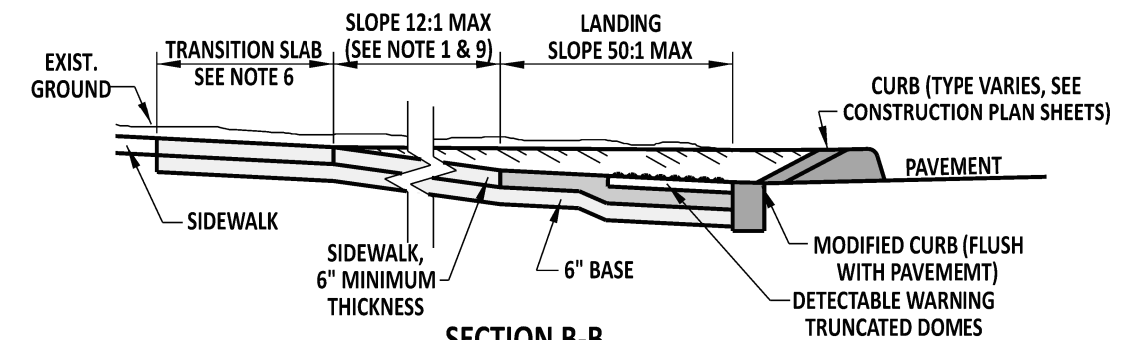
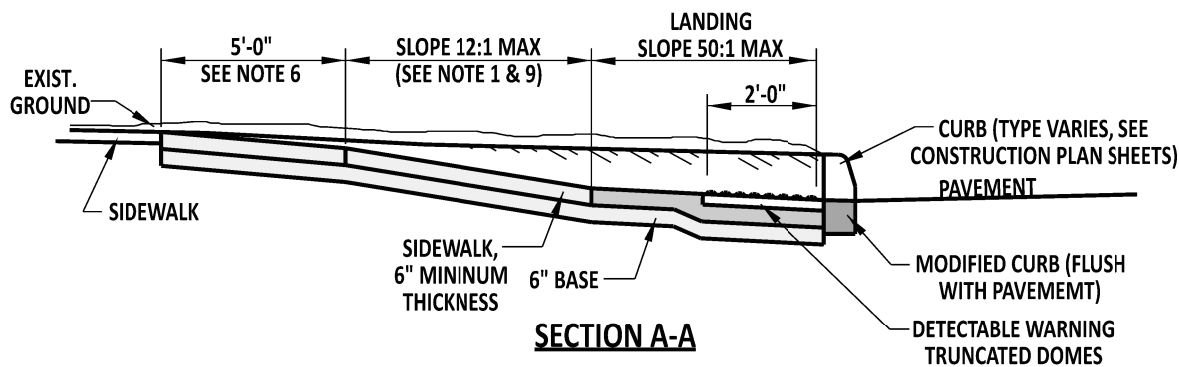
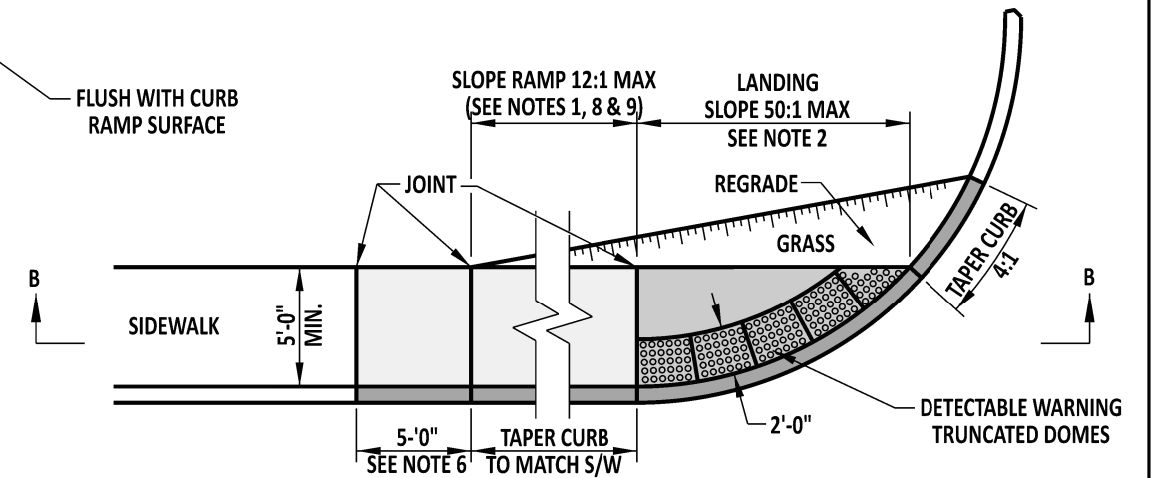
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DETECTABLE WARNING TRUNCATED DOME DETAILS

NOTES:

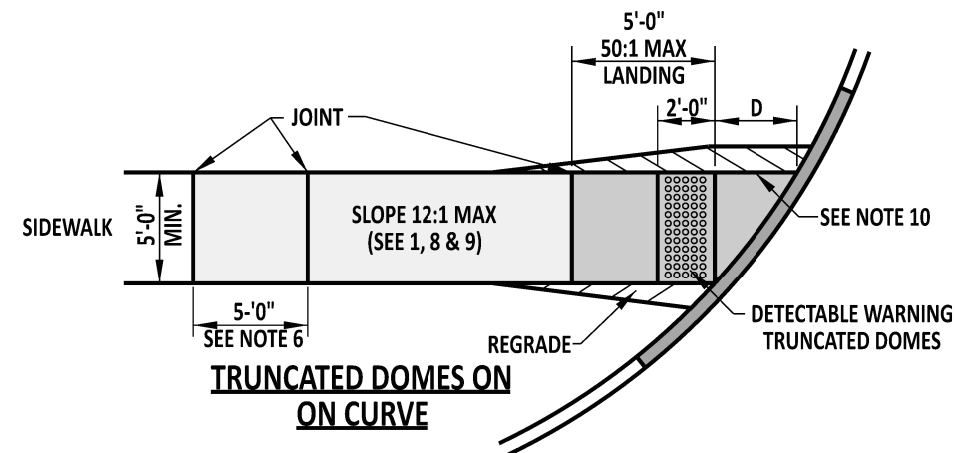
- ENTIRE DEPRESSED AREA OF CURB EXCLUDING THE TAPERED CURBS SHALL HAVE DETECTABLE WARNING TRUNCATED DOMES.
- THE DETECTABLE WARNING SYSTEM SHALL EXTEND AT LEAST 2'-0" IN LENGTH, MEASURED IN THE DIRECTION OF TRAVEL, FROM THE BACK OF THE CURB ALONG THE PEDESTRIAN CONNECTION SURFACE.
- SEE SPECIFICATION FOR ADDITIONAL INFORMATION.



NOTES:

- FOR ALTERATIONS WHERE THE MAXIMUM ALLOWABLE 12:1 RUNNING SLOPE WILL NOT MEET THE EXISTING SIDEWALK GRADE WITHIN A LENGTH OF 15'-0", THE SLOPED SEGMENT OF THE PEDESTRIAN CONNECTION MAY BE LIMITED TO 15'-0" AT A CONSTANT SLOPE, AND ALLOWED TO EXCEED THE 12:1 MAXIMUM SLOPE.
- PEDESTRIAN CONNECTION AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM. FOR REHABILITATION WORK, THE PEDESTRIAN CONNECTION CROSS SLOPE MAY MATCH THE SLOPE OF THE ADJACENT ROADWAY IN ACCORDANCE WITH THE LATEST VERSION OF THE PAS MANUAL.
- A 6:1 GRADE IS REQUIRED FOR A MINIMUM OF 2'-0" IMMEDIATELY ADJACENT TO THE PEDESTRIAN CONNECTION.
- THE MAXIMUM ALGEBRAIC DIFFERENCE IN GRADE BETWEEN THE PEDESTRIAN CONNECTION OR MODIFIED CURB AT THE FLOW LINE AND THE PAVEMENT SHALL BE 13.3%, HOWEVER 11% IS PREFERRED.
- LANDING AREA SHALL BE DELINEATED WITH JOINTS.
- FOR REHABILITATION WORK, PLACE TRANSITION SLAB TO TRANSITION FROM THE NEW PEDESTRIAN CONNECTION TO THE EXISTING SIDEWALK WHEN THE EXISTING SIDEWALK HAS A NON-CONFORMING RUNNING SLOPE, CROSS SLOPE, OR WIDTH. ADJACENT CURB TAPER SHOULD MATCH THE SLOPE OF THE TRANSITION SLAB.
- REFER TO THE DELAWARE MANUAL FOR UNIFORM TRAFFIC CONTROL DEVICES FOR DETAILS REGARDING THE LOCATION OF PEDESTRIAN PUSH BUTTONS.
- CONSTRUCTION JOINTS ARE REQUIRED ON RAMPS AT THE INTERVAL SPECIFIED IN NOTE 6 ON DETAIL M-3, SHEET 1 OF 1. HOWEVER, EXPANSION MATERIAL SHALL NOT BE USED IN THE PEDESTRIAN CONNECTION SECTION.
- IF THE RUNNING SLOPE IS LESS THAN 20:1 (5%) THEN THE 50:1 (2%) LANDING CAN BE OMITTED. DETECTABLE WARNING SYSTEM MUST STILL BE PLACED.
- FOR INSTALLATIONS ON A RADIUS AND WHEN DIMENSION D IS LESS THAN 5'-0", THE DETECTABLE WARNING TRUNCATED DOMES SYSTEM SHALL BE INSTALLED AT THE INTERSECTION OF THE BACK OF THE CURB AND THE BEGINNING OF THE FULL WIDTH OF THE PEDESTRIAN ACCESS ROUTE. THE DOMES SHALL BE INSTALLED PERPENDICULAR TO THE PATH OF THE PEDESTRIAN TRAVEL AND BE THE FULL WIDTH OF THE PEDESTRIAN ACCESS ROUTE.

SECTION B-B



PEDESTRIAN CONNECTION, TYPE 1



DELAWARE
DEPARTMENT OF TRANSPORTATION

PEDESTRIAN CONNECTION, TYPE 1 AND SECTIONS

STANDARD NO. C-2 (2018)

SHT. 1 OF 3

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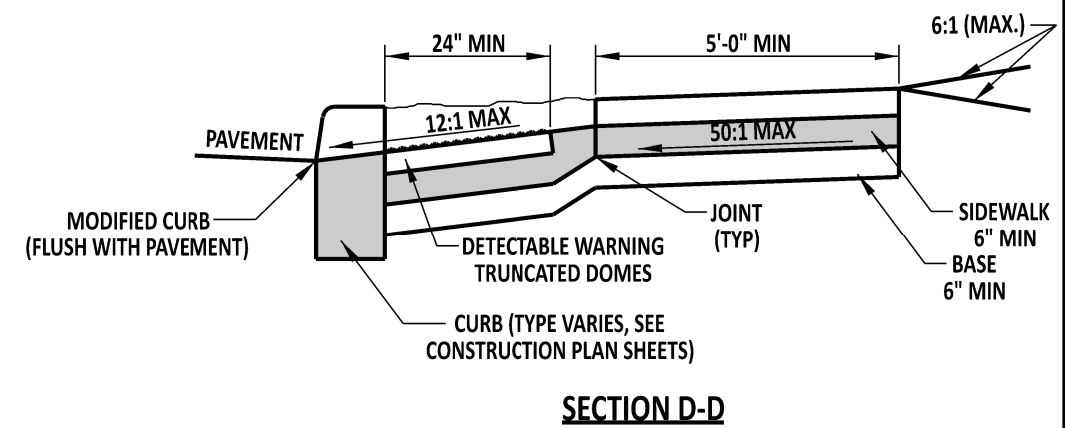
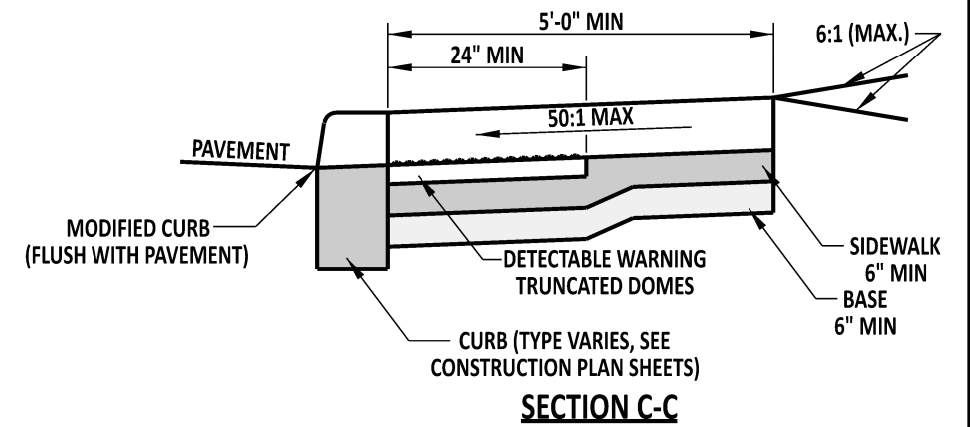
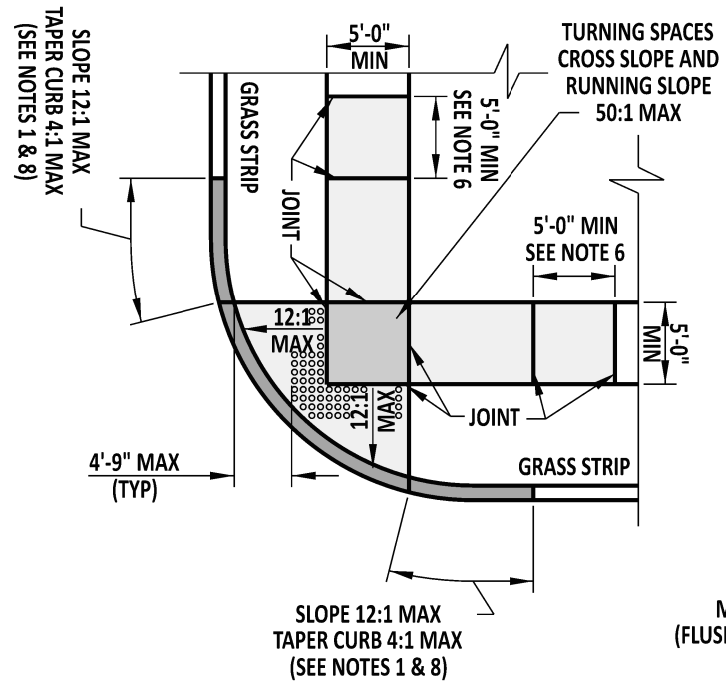
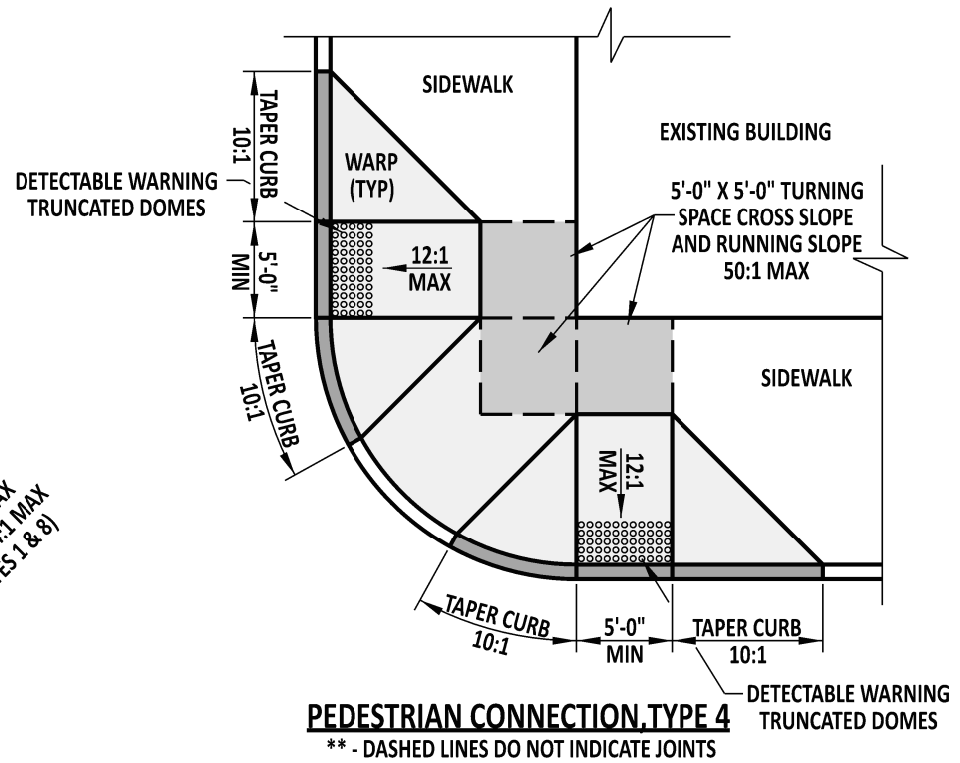
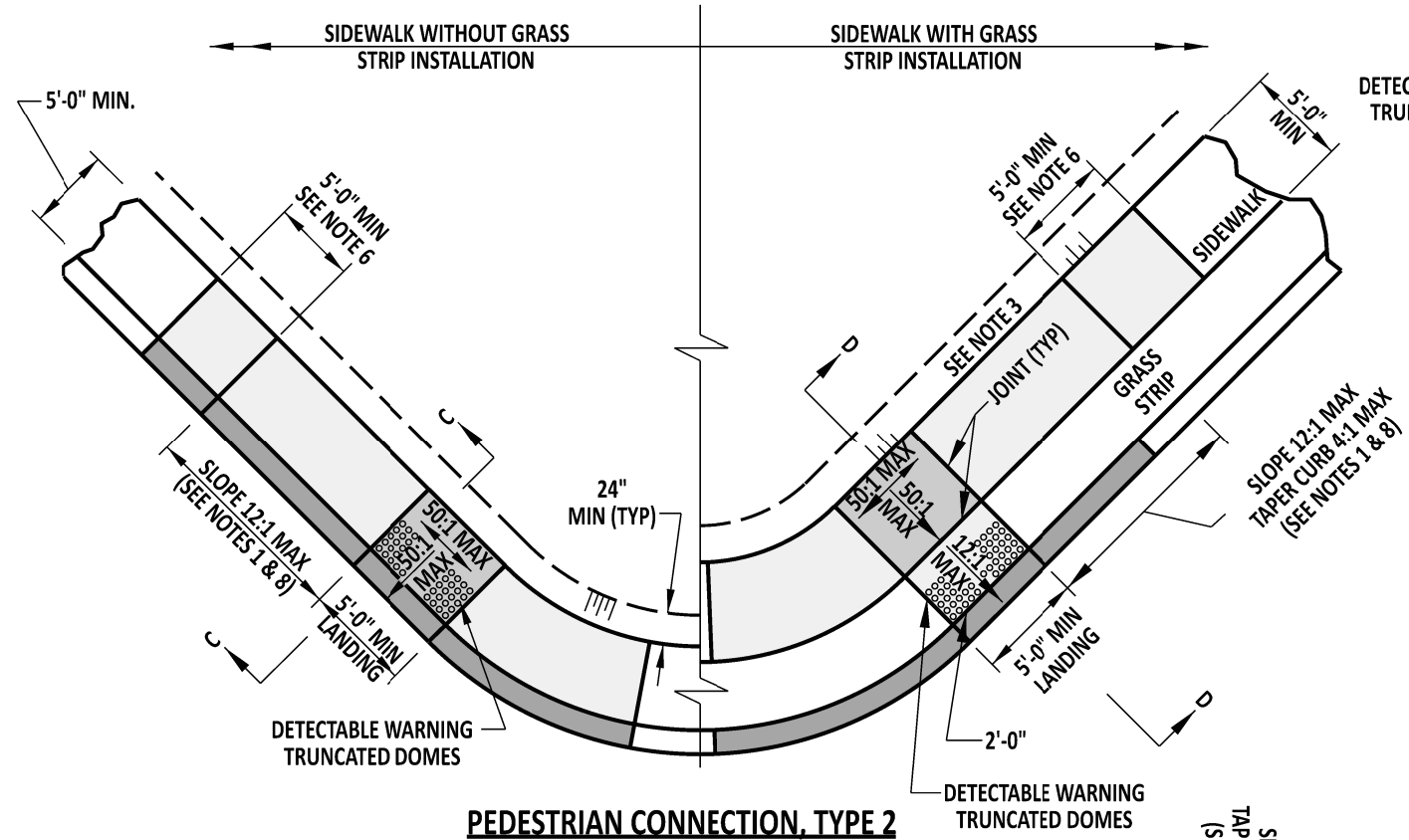
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12/20/2018
DATE



- NOTES:**

- 1). FOR ALTERATIONS WHERE THE MAXIMUM ALLOWABLE 12:1 RUNNING SLOPE WILL NOT MEET THE EXISTING SIDEWALK GRADE WITHIN A LENGTH OF 15'-0", THE SLOPED SEGMENT OF THE PEDESTRIAN CONNECTION MAY BE LIMITED TO 15'-0" AT A CONSTANT SLOPE, AND ALLOWED TO EXCEED THE 12:1 MAXIMUM SLOPE.
- 2). PEDESTRIAN CONNECTION AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM. FOR REHABILITATION WORK, THE PEDESTRIAN CONNECTION CROSS SLOPE MAY MATCH THE SLOPE OF THE ADJACENT ROADWAY IN ACCORDANCE WITH THE LATEST VERSION OF THE PAS MANUAL.
- 3). A 6:1 GRADE IS REQUIRED FOR A MINIMUM OF 2'-0" IMMEDIATELY ADJACENT TO THE PEDESTRIAN CONNECTION.
- 4). THE MAXIMUM ALGEBRAIC DIFFERENCE IN GRADE BETWEEN THE PEDESTRIAN CONNECTION OR CURB AND THE PAVEMENT SHALL BE 13.3%, HOWEVER 11% IS PREFERRED.
- 5). LANDING AREA SHALL BE DELINEATED WITH JOINTS.
- 6). FOR REHABILITATION WORK, PLACE TRANSITION SLAB TO TRANSITION FROM THE NEW PEDESTRIAN CONNECTION TO THE EXISTING SIDEWALK WHEN THE EXISTING SIDEWALK HAS A NON-CONFORMING RUNNING SLOPE, CROSS SLOPE, OR WIDTH. ADJACENT CURB SHOULD MATCH THE SLOPE OF THE TRANSITION SLAB.
- 7). REFER TO DELAWARE MANUAL FOR UNIFORM TRAFFIC CONTROL DEVICES FOR DETAILS REGARDING THE LOCATION OF PEDESTRIAN PUSH BUTTONS.
- 8). CONSTRUCTION JOINTS ARE REQUIRED AT THE INTERVALS SPECIFIED IN NOTE 6 ON DETAIL M-3, SHEET 1 OF 1. HOWEVER, EXPANSION MATERIAL SHALL NOT BE USED IN THE PEDESTRIAN CONNECTION SECTION.
- 9). ENTIRE DEPRESSED AREA OF CURB SHALL HAVE DETECTABLE WARNING TRUNCATED DOMES.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

PEDESTRIAN CONNECTION, TYPES 2, 3, & 4

STANDARD NO. C-2 (2018)

SHT. 2 OF 3

APPROVED

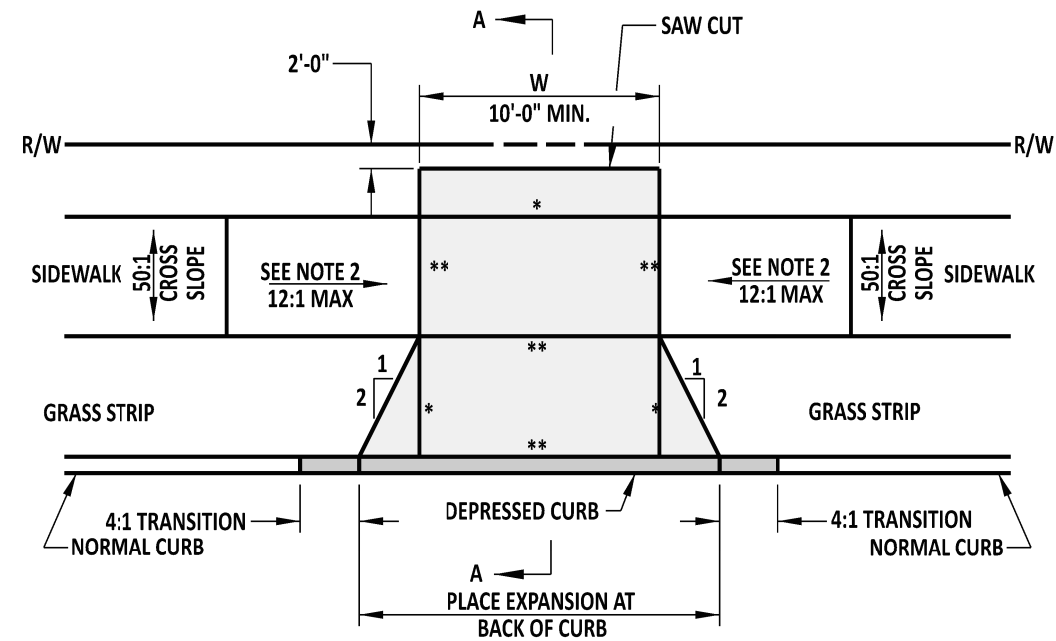
SIGNATURE ON FILE
CHIEF ENGINEER

1/04/2019

RECOMMENDED

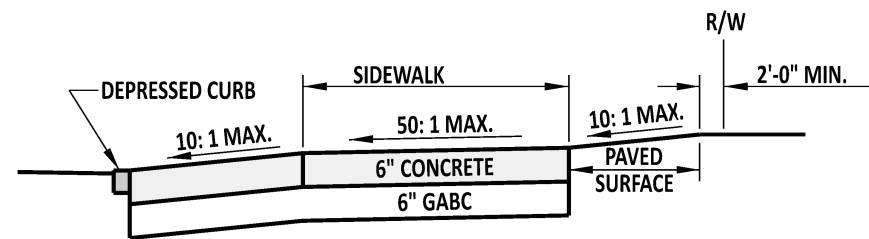
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DESIGN ENGINEER

12/20/2018

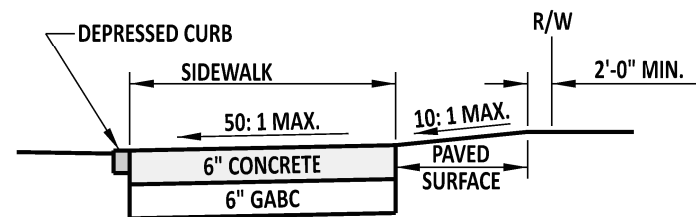


ENTRANCE WITH SIDEWALK AND GRASS STRIP

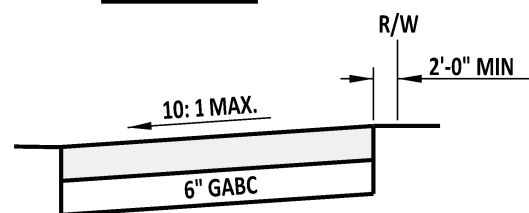
* - JOINT
** - EXPANSION MATERIAL



SECTION A-A



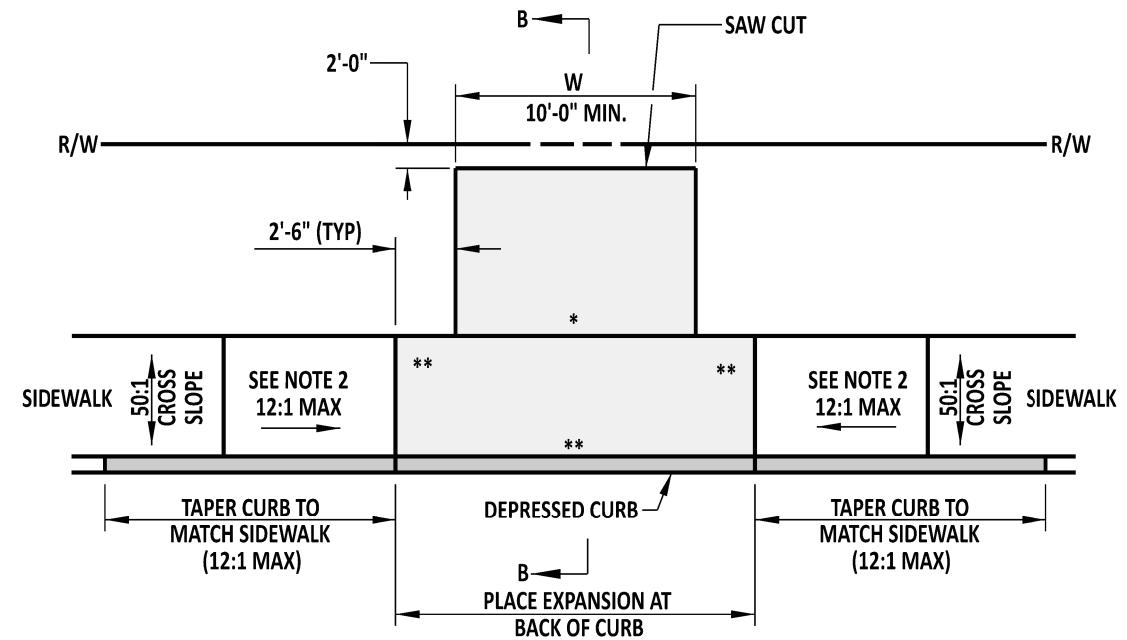
SECTION B-B



SECTION C-C

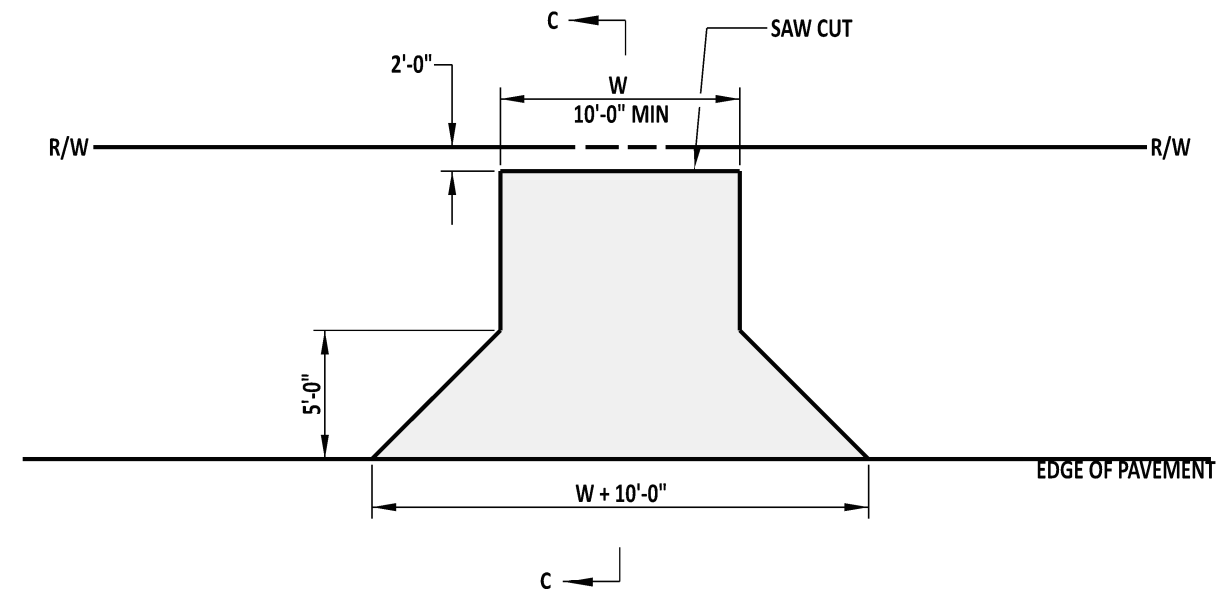
NOTE:

- 1). IF WIDTH OF DRIVEWAY IS 15'-0" OR GREATER, THE FLARE EXTENSIONS CAN BE OMITTED.
- 2). THE MAXIMUM RUNNING SLOPE TO TRANSITION THE SIDEWALK TO MEET DRIVEWAY ELEVATION IS 12:1 (8.3%), HOWEVER, 20:1 (5%) IS PREFERRED.



ENTRANCE WITH SIDEWALK AND NO GRASS STRIP

* - JOINT
** - EXPANSION MATERIAL



ENTRANCE WITHOUT SIDEWALK



DELAWARE
DEPARTMENT OF TRANSPORTATION

ENTRANCES

STANDARD NO. C-3 (2018)

SHT. 1 OF 1

APPROVED

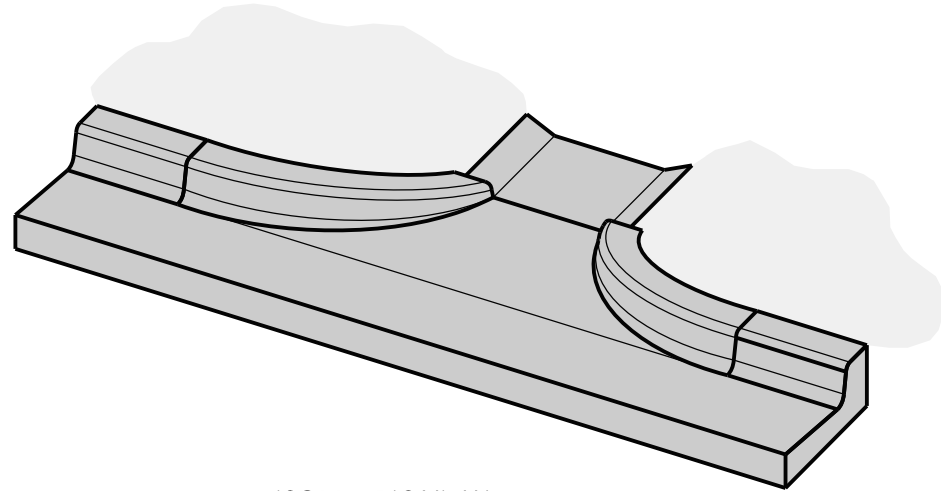
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CHIEF ENGINEER

1/04/2019
DATE

RECOMMENDED

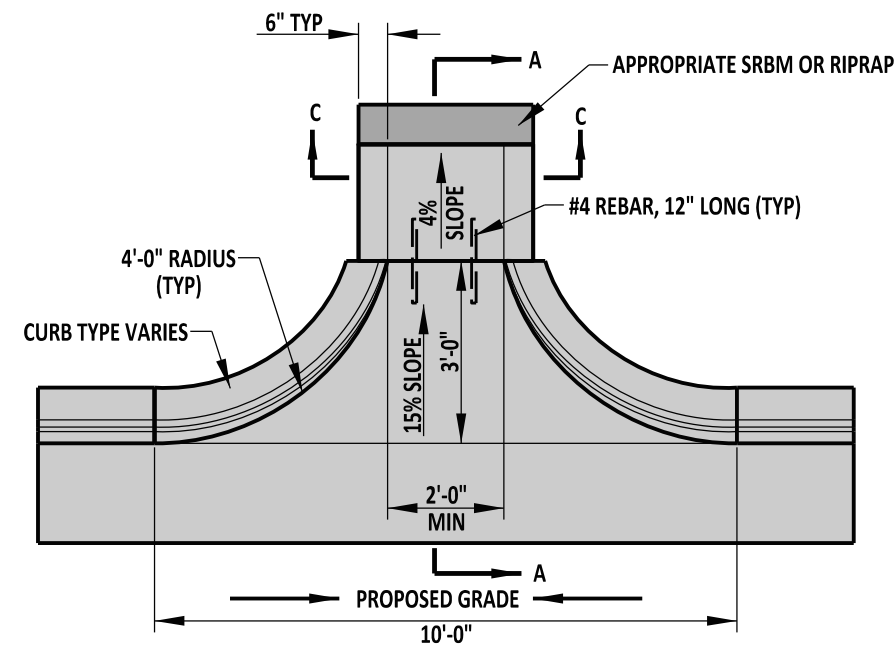
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DESIGN ENGINEER

12/20/2018
DATE



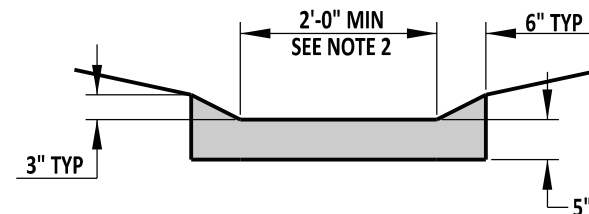
ISOMETRIC VIEW

SHOWN WITH INTEGRAL CURB & GUTTER, TYPE 1-8

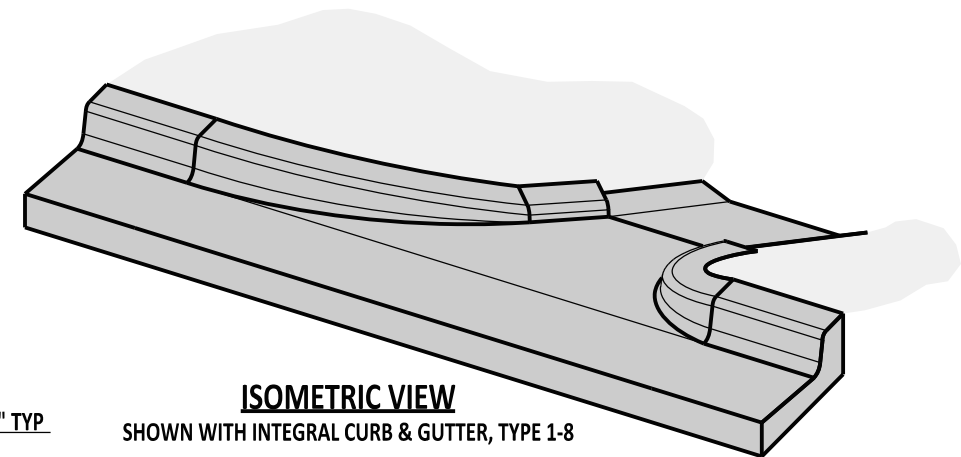


PLAN VIEW

IN SUMP LOCATION

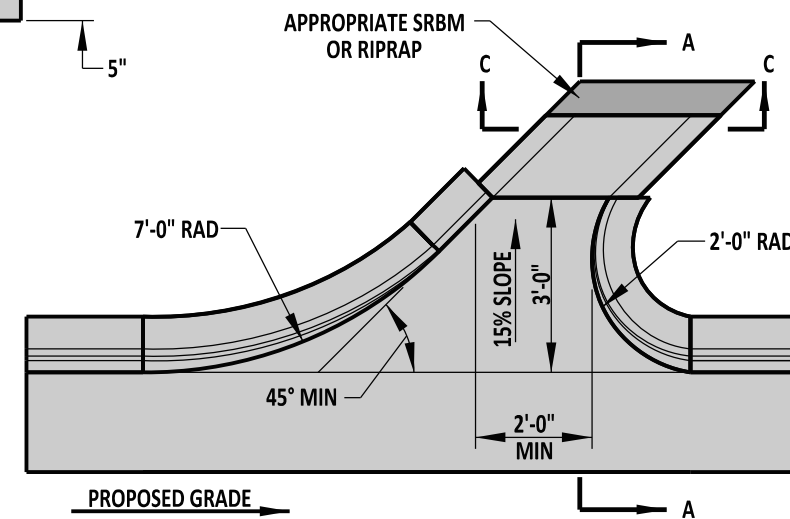


SECTION C-C



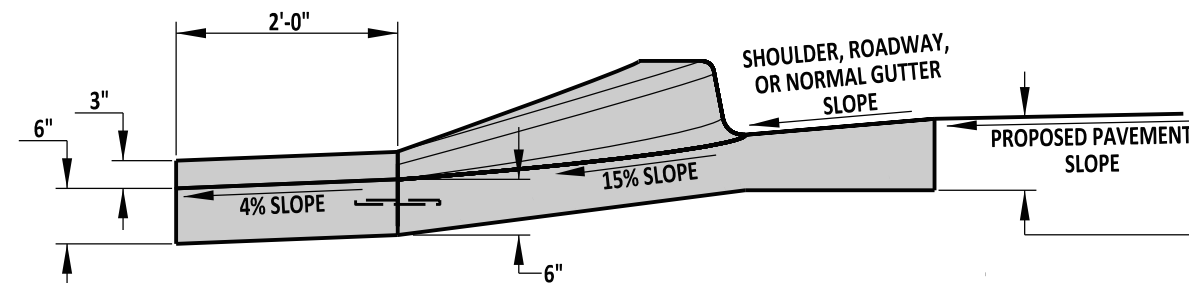
ISOMETRIC VIEW

SHOWN WITH INTEGRAL CURB & GUTTER, TYPE 1-8



PLAN VIEW

ON GRADE OR SLOPE



SECTION A-A

NOTES:

- 1). DESIGNER SHALL ESTABLISH WIDTH OF OPENING BASED ON DRAINAGE CALCULATIONS.
- 2). THE WIDTH OF THE APRON (SHOWN IN SECTION C-C) SHALL MATCH THE WIDTH OF THE CURB OPENING (SHOWN IN PLAN VIEW).



DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB OPENING DETAILS

STANDARD NO.

C-4 (2012)

SHT. 1

OF 1

APPROVED

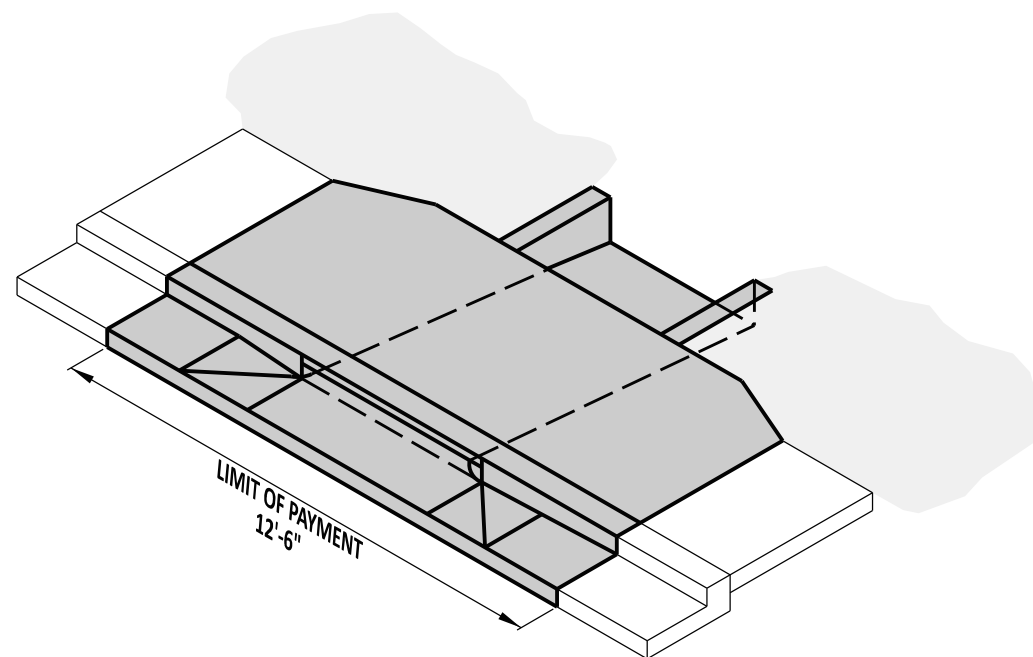
SIGNATURE ON FILE
CHIEF ENGINEER

01/07/2013
DATE

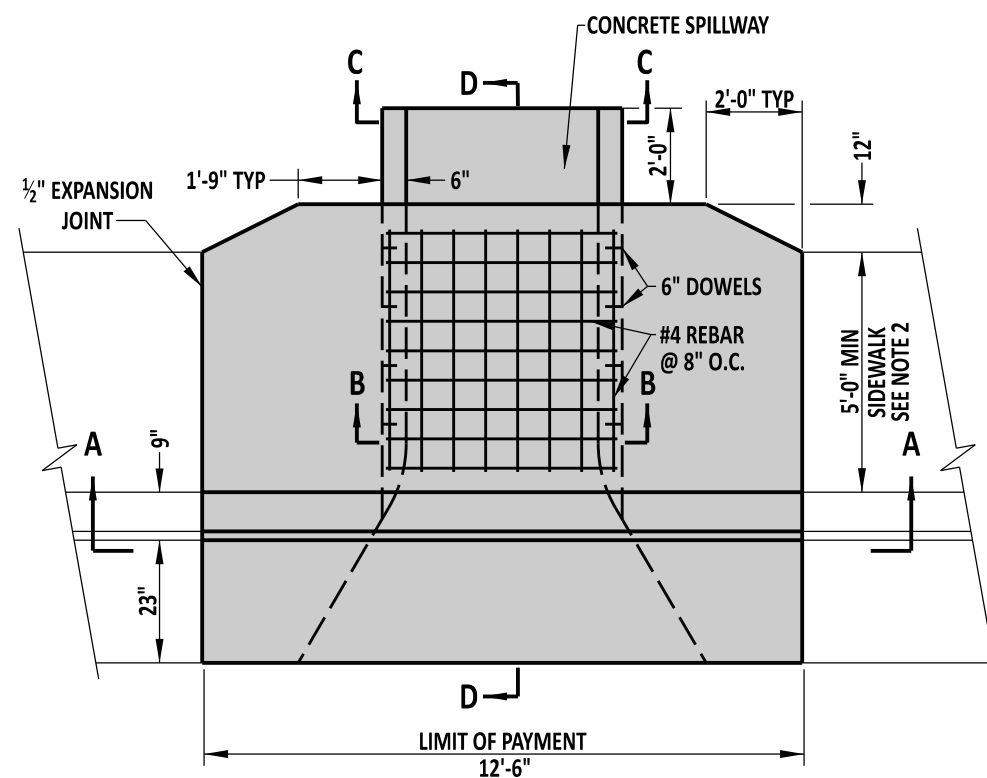
RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2012
DATE

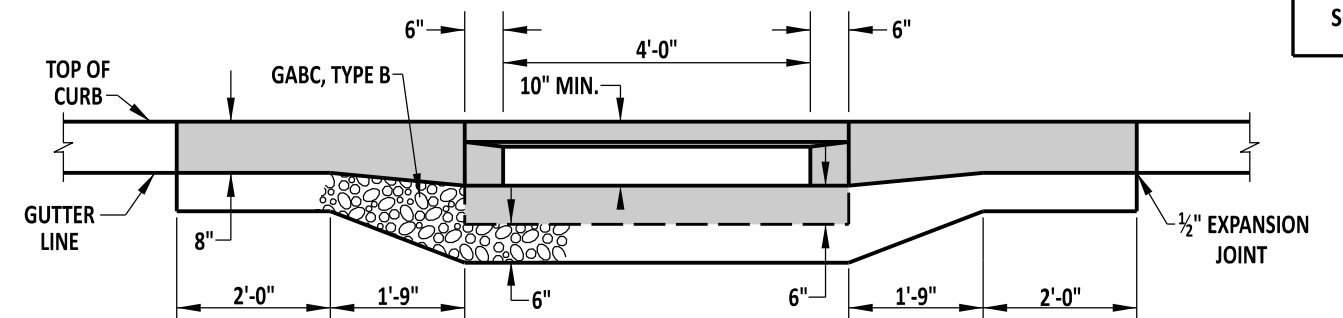


ISOMETRIC

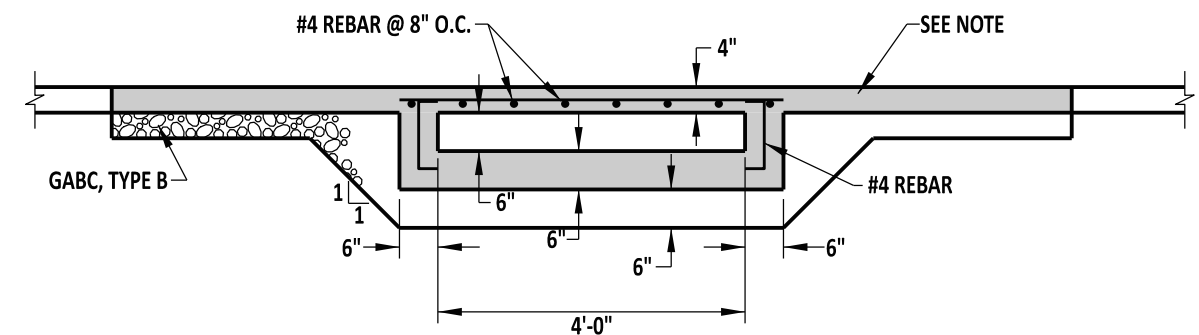


PLAN

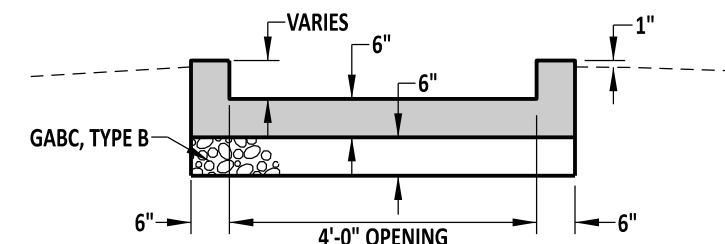
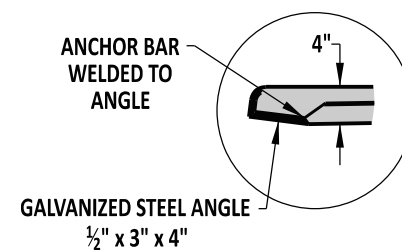
CURB / SIDEWALK OPENING



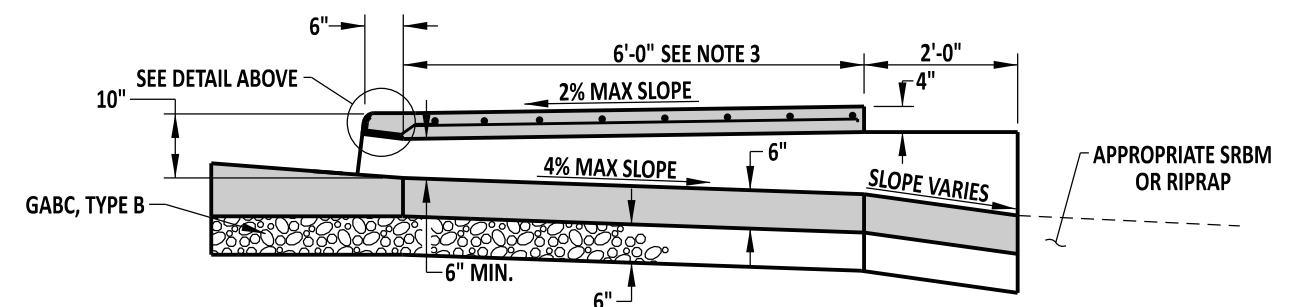
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

NOTE:

- 1). WHEN A GRASS STRIP IS PRESENT BETWEEN THE BACK OF CURB AND SIDEWALK, THE SIDEWALK PORTION OF THIS STRUCTURE MAY BE PRECAST. HOWEVER, WHEN THE SIDEWALK IS DIRECTLY BEHIND THE CURB, THE ENTIRE UNIT MUST BE CAST-IN-PLACE.
- 2). SIDEWALK WIDTHS LESS THAN SHOWN ON THIS SHEET REQUIRE DEPARTMENT APPROVAL. SEE PEDESTRIAN ACCESSIBILITY STANDARDS MANUAL FOR MORE GUIDANCE.
- 3). THE SLAB WIDTH OVER THE CONCRETE SPILLWAY SHALL BE 12" WIDER THAN THE SIDEWALK WIDTH ON THE APPROACH TO THE CURB OPENING



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

CURB OPENING WITH SIDEWALK DETAIL

STANDARD NO. C-5 (2017)

SHT. 1 OF 1

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

5/31/2017
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

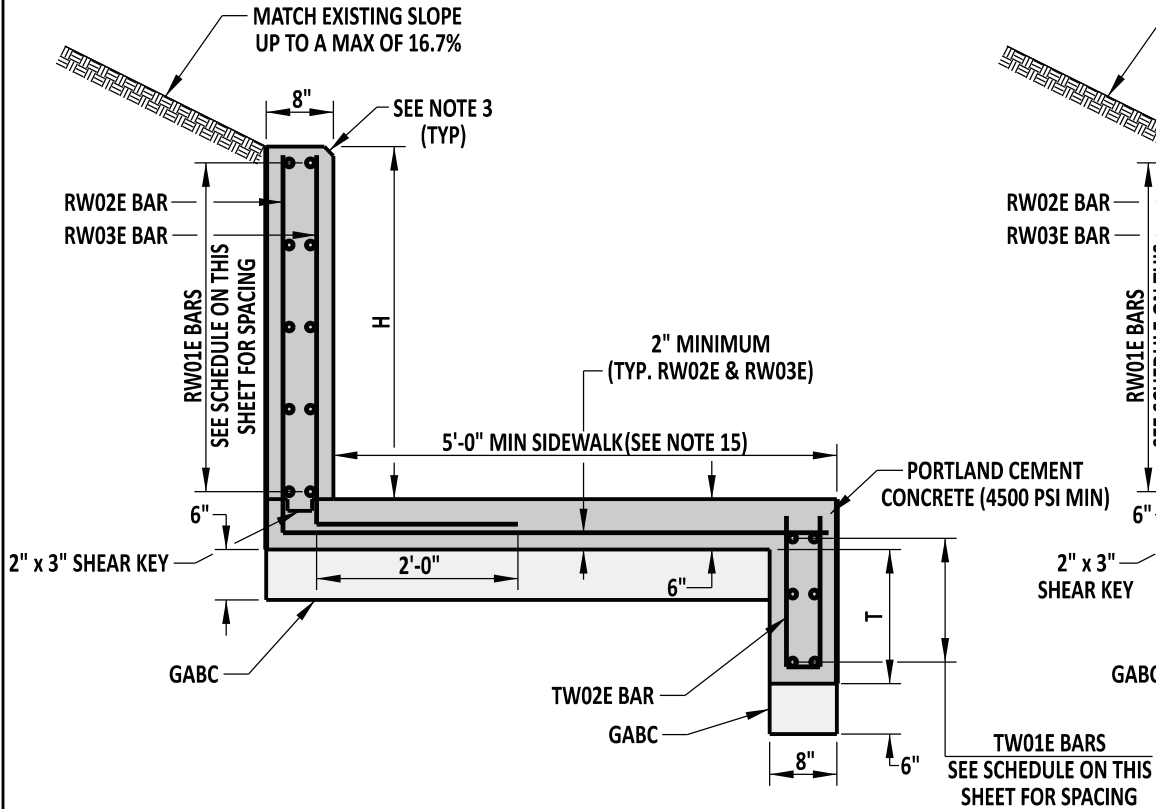
5/18/2017
DATE

WALL HEIGHT (H)	TOEWALL DEPTH (T)	REQUIRED TRANSVERSE REINFORCEMENT	REQUIRED LONGITUDINAL REINFORCEMENT
GREATER THAN 12" TO 2'-6"	NO TOEWALL NEEDED	#4 BARS @ 6" (RW02E, & RW03E)	#4 BARS @ 12" (RW01E & TW01E)
GREATER THAN 2'-6" TO 3'-0"	6"	#4 BARS @ 6" (RW02E, RW03E, & TW02E)	#4 BARS @ 12" (RW01E & TW01E)
GREATER THAN 3'-0" TO 3'-6"	12"	#5 BARS @ 6" (RW02E, RW03E, & TW02E)	#4 BARS @ 12" (RW01E & TW01E)

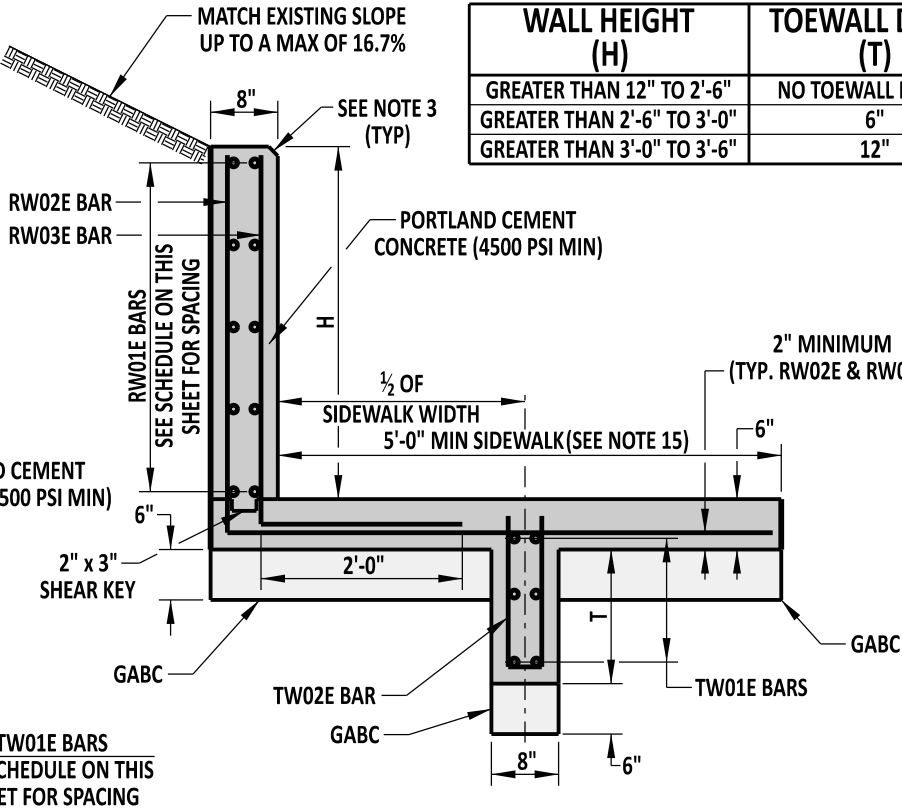
SCALE : NTS

NOTES:

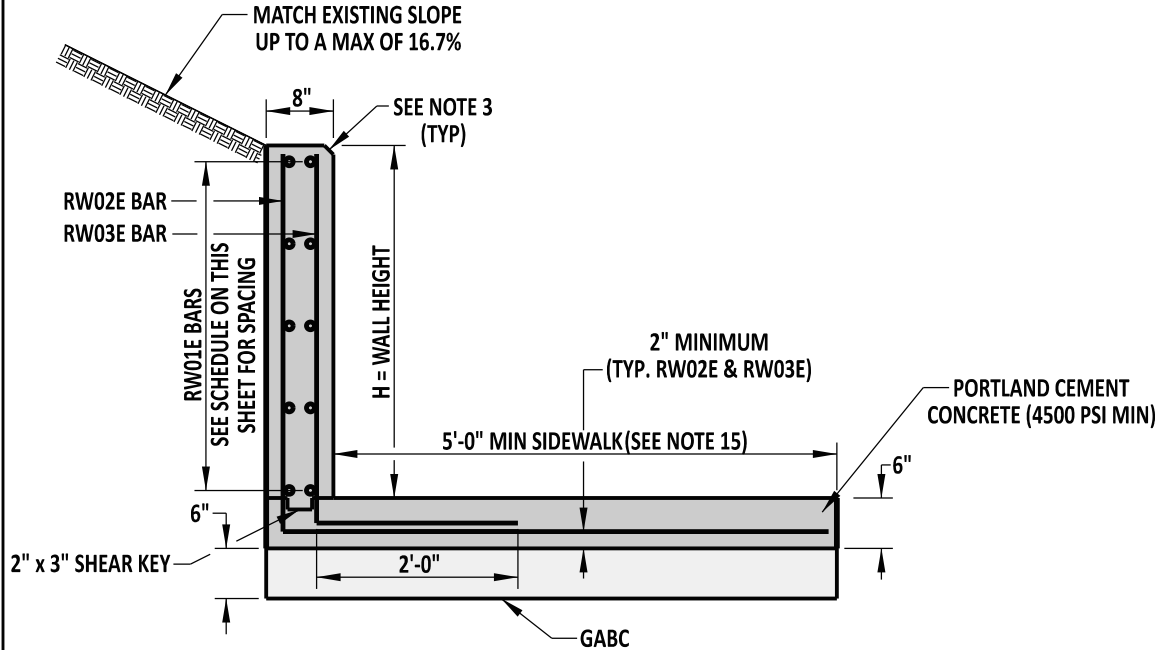
- 1). THE CURB RETAINING WALL DETAILS ARE FOR QUICK FIELD CHANGES WITH APPROVAL OF THE ENGINEER. MODULAR BLOCK WALLS OR ANY OTHER SMALL RETAINING WALLS ARE THE PREFERRED CHOICE DURING PLAN DEVELOPMENT.
- 2). WHEN H IS GREATER THAN 2'-6", CAST THE CURB RETAINING WALLS IN PLACE. WHEN H IS GREATER THAN 12" AND LESS THAN 2'-6", THE WALLS CAN BE EITHER PRECAST OR CAST-IN-PLACE.
- 3). CHAMFER EDGES 3/4" AT THE TOP OF WALL. PLACE A 1/4" ROUND EDGE AT THE FRONT OF SIDEWALK.
- 4). THE RETAINING WALL HAS BEEN DESIGNED TO RESIST EARTH PRESSURE ONLY. ADDITIONAL REINFORCEMENT MAY BE REQUIRED IF ANY SURCHARGE IS APPLIED BEHIND THE RETAINING WALL WITHIN A DISTANCE EQUAL TO 2 TIMES H AND WOULD REQUIRE AN APPROVED SHOP DRAWING.
- 5). MINIMUM BAR COVER IS 2" UNLESS OTHERWISE SPECIFIED ON THIS SHEET.
- 6). BEND THE RW02E AND RW03E BARS INTO ONE CONTINUOUS L-SHAPED BAR.
- 7). BEND THE TW02E BARS INTO 1 CONTINUOUS U-SHAPED BAR.
- 8). SEE DETAIL M-3 FOR SIDEWALK DETAILS AND NOTES, INCLUDING CONSTRUCTION JOINTS AND EXPANSION MATERIAL.
- 9). DO NOT PLACE RW01E AND TW01E BARS THROUGH EXPANSION JOINTS. STOP REINFORCEMENT AND MAINTAIN MINIMUM BAR COVER AS SPECIFIED IN PREVIOUS NOTES.
- 10). THE TOEWALL CAN OPTIONALLY BE PLACED AT MIDPOINT OF THE SIDEWALK.
- 11). ALL REINFORCING STEEL MUST BE EPOXY COATED.
- 12). IF A CURB IS CONSTRUCTED ADJACENT TO THE STRUCTURE, COAT THE FRONT FACE OF THE SIDEWALK/TOEWALL WITH AN APPROVED BOND BREAKER AGENT PRIOR TO THE PLACEMENT OF CONCRETE FOR THE CURB.
- 13). FOR CURB RETAINING WALLS WHERE H IS 12" OR LESS, A MODIFIED P.C.C. CURB TYPE 1-8 CAN BE USED.
- 14). CURB HAS BEEN OMITTED FROM THESE DETAILS FOR CLARITY PURPOSES. FOR INSTALLATIONS WHERE THE TOE WALL IS PLACED AT THE EDGE OF THE SIDEWALK, THE TOEWALL IS NOT A REPLACEMENT FOR CURB.
- 15). SIDEWALK WIDTHS LESS THEN SHOWN ON THIS SHEET REQUIRE DEPARTMENT APPROVAL. SEE PEDESTRIAN ACCESSIBILITY STANDARDS MANUAL FOR MORE GUIDANCE.



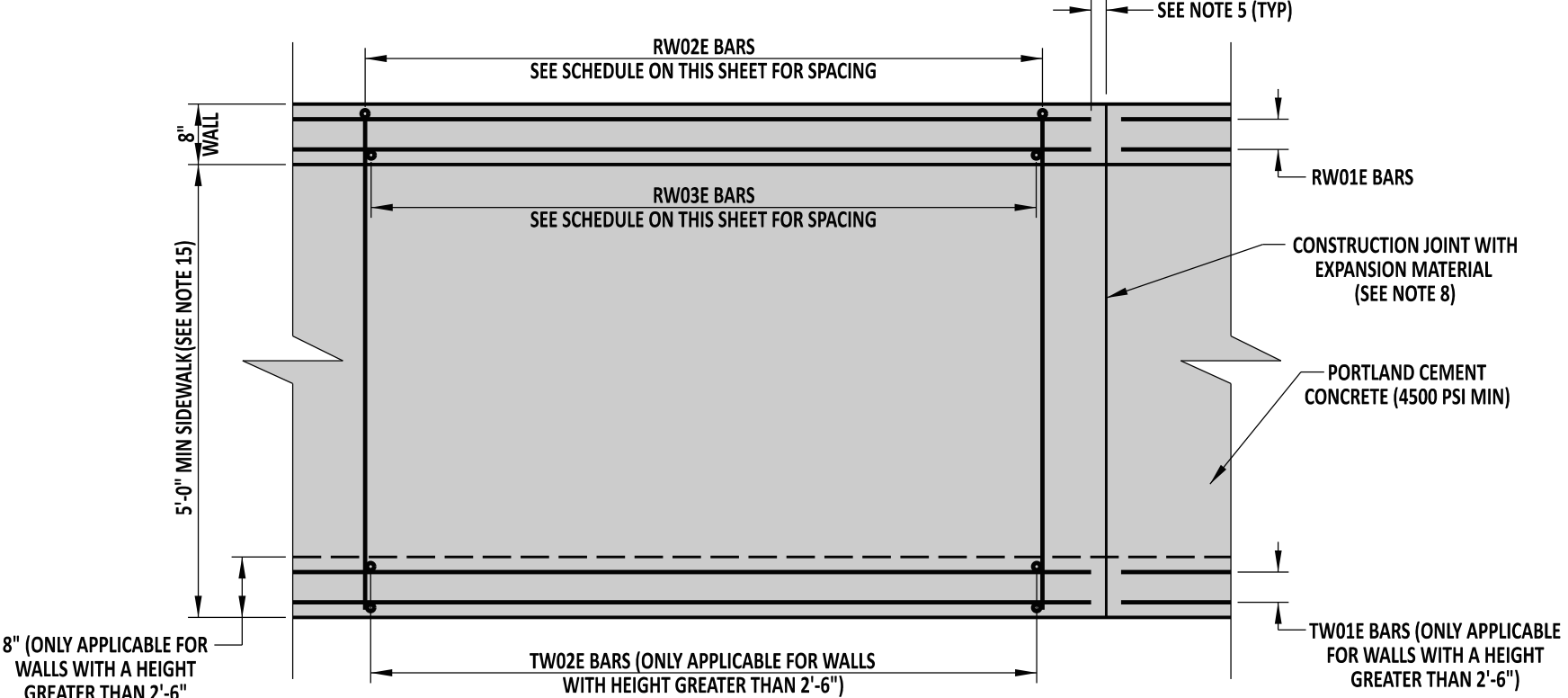
CURB RETAINING WALL SECTION
FOR H GREATER THAN 2'-6"



OPTIONAL TOEWALL PLACEMENT
CURB RETAINING WALL SECTION
FOR H GREATER THAN 2'-6"



CURB RETAINING WALL SECTION
FOR HEIGHTS GREATER THAN 12"
BUT LESS THAN OR EQUAL TO 2'-6"

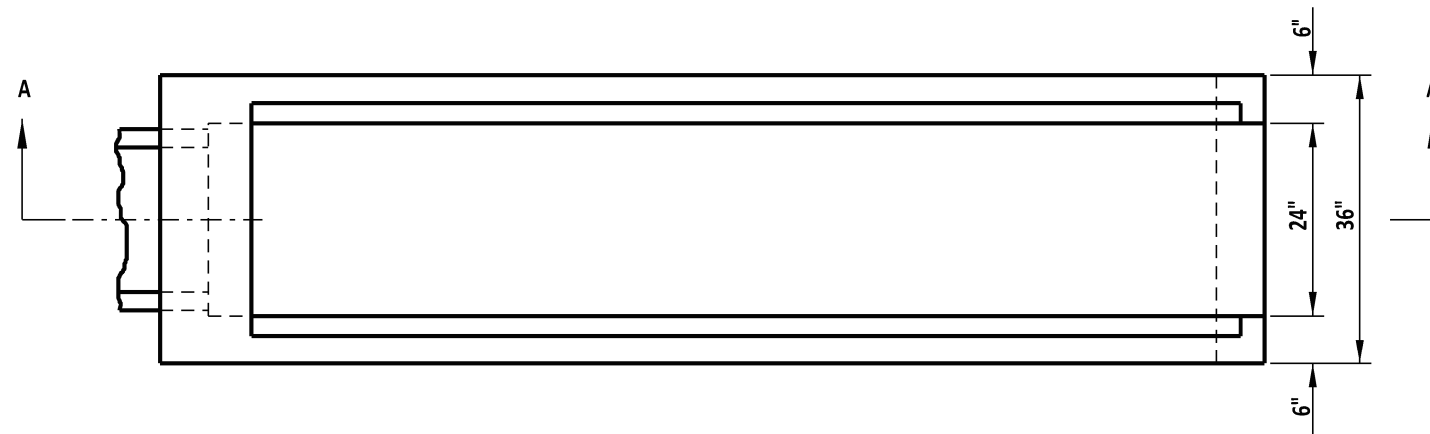


PLAN VIEW



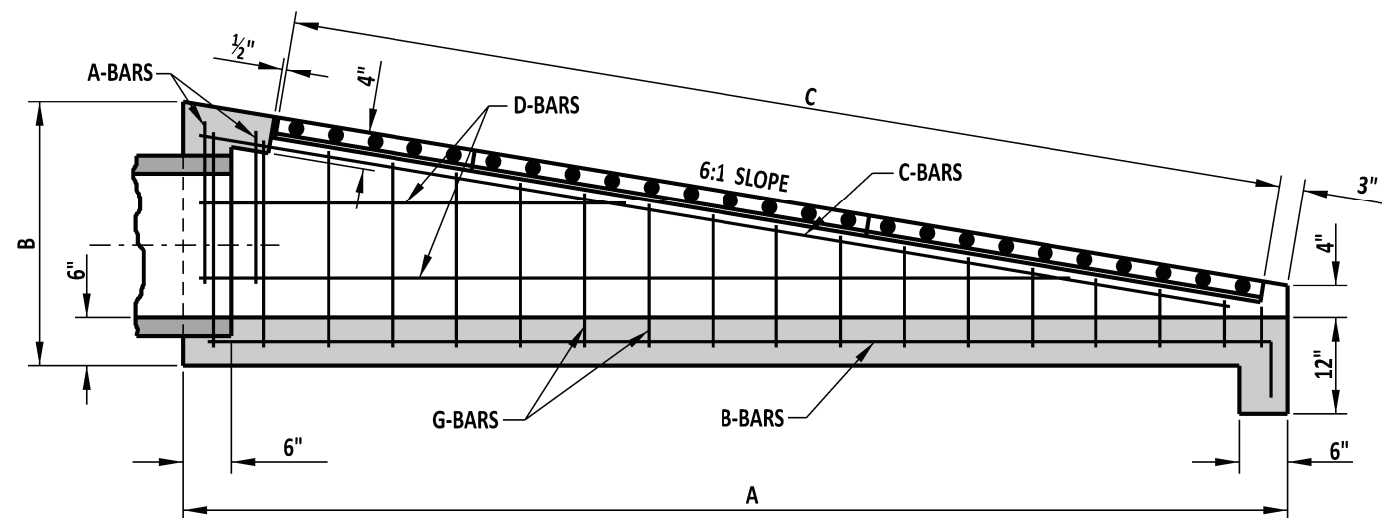
DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB RETAINING WALL				APPROVED	SIGNATURE ON FILE	5/31/2017
STANDARD NO. C-6 (2017)				RECOMMENDED	SIGNATURE ON FILE	5/18/2017
SHT. 1 OF 1					DESIGN ENGINEER	DATE

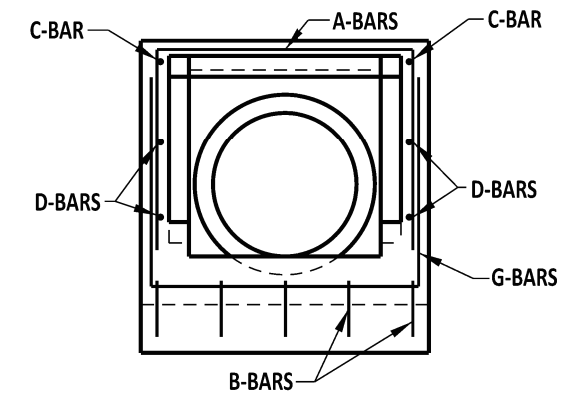


PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 6:1 SAFETY END STRUCTURE TO BE PRECAST



SECTION A-A



FRONT VIEW



DELAWARE
DEPARTMENT OF TRANSPORTATION

6:1 CONCRETE SAFETY END STRUCTURE

STANDARD NO. D-1 (2018)

SHT. 1 OF 2

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

1/04/2019
DATE

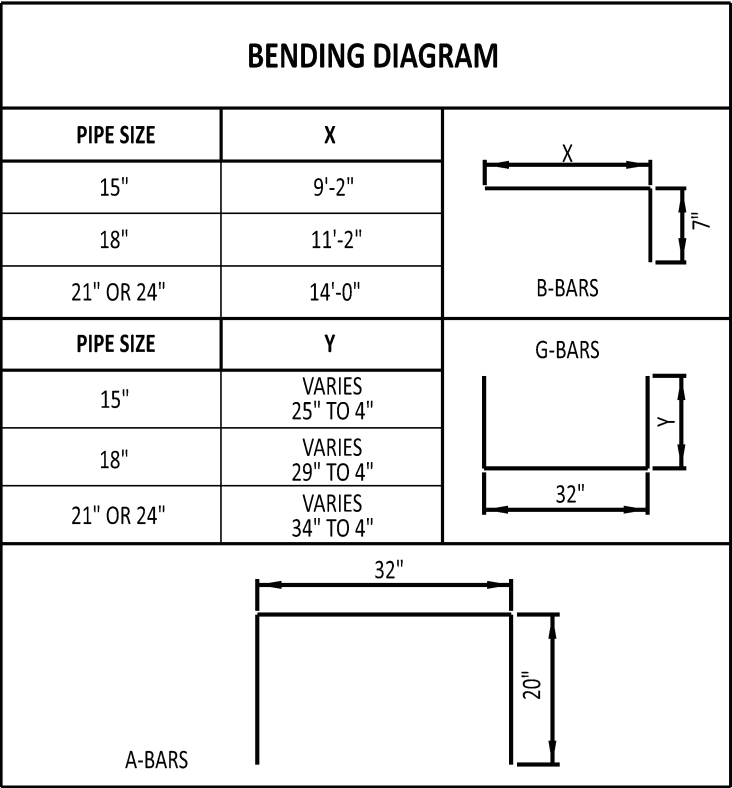
RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2018
DATE

DIMENSIONS			
PIPE SIZE	A	B	C
15"	9'-6"	2'-5"	8'-4"
18"	11'-6"	2'-9"	10'-5"
21" OR 24"	14'-4"	3'-2 ⁵ / ₈ "	12'-6"

APPROXIMATE QUANTITIES							
PIPE SIZE	CONCRETE FT ³		REINF. STEEL LBS.	NO. OF GRATES	LENGTH TO BE CUT FROM 1 GRATE	WEIGHT OF FULL SIZE GRATE LBS.	WEIGHT OF CUT GRATE LBS.
	CONC. PIPE	C.M. PIPE					
15"	25	25.43	121.12	2	--	270.92	--
18"	31.5	32.07	156.7	3	2'-1"	270.92	135.47
21" OR 24"	40.75	39.87	194.0	3	--	270.92	--



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"	#4	2	8"	72"	#4	5	8"	9'-9"	#4	2	-	9'-3"	#4	4	8"	VARIES 50" TO 100"	#4	15	8"	VARIES 40" TO 82"
18"	#4	2	8"	72"	#4	5	8"	11'-9"	#4	2	-	11'-5"	#4	6	8"	VARIES 43½" TO 130½"	#4	18	8"	VARIES 40" TO 90"
21" OR 24"	#4	2	8"	72"	#4	5	8"	14'-7"	#4	2	-	14'-3"	#4	6	8"	VARIES 51" TO 153"	#4	22	8"	VARIES 40" TO 100"



DELAWARE
DEPARTMENT OF TRANSPORTATION

6:1 CONCRETE SAFETY END STRUCTURE

STANDARD NO.

D-1 (2018)

SHT.

2

OF

2

APPROVED

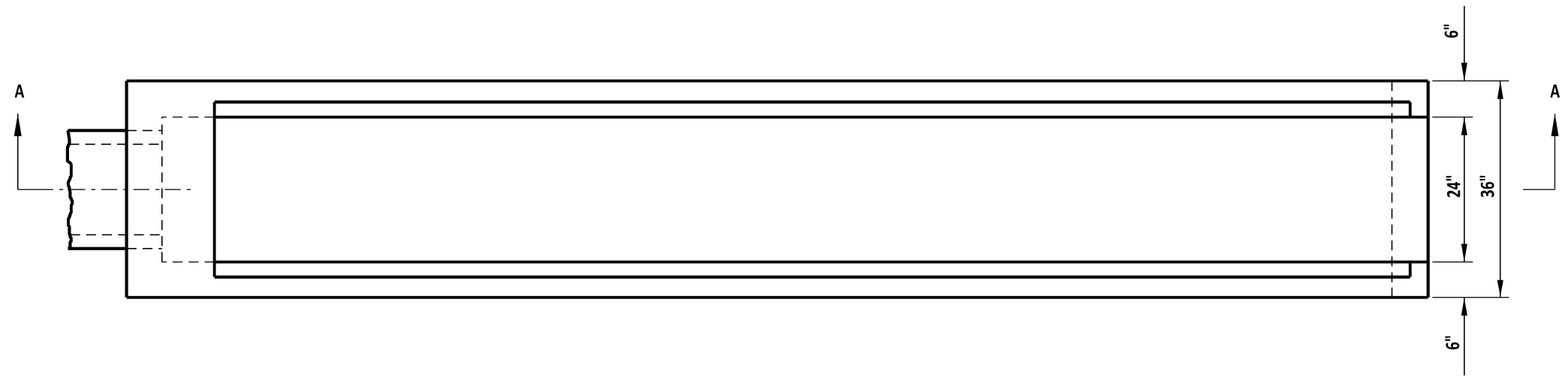
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1/04/2019
DATE

RECOMMENDED

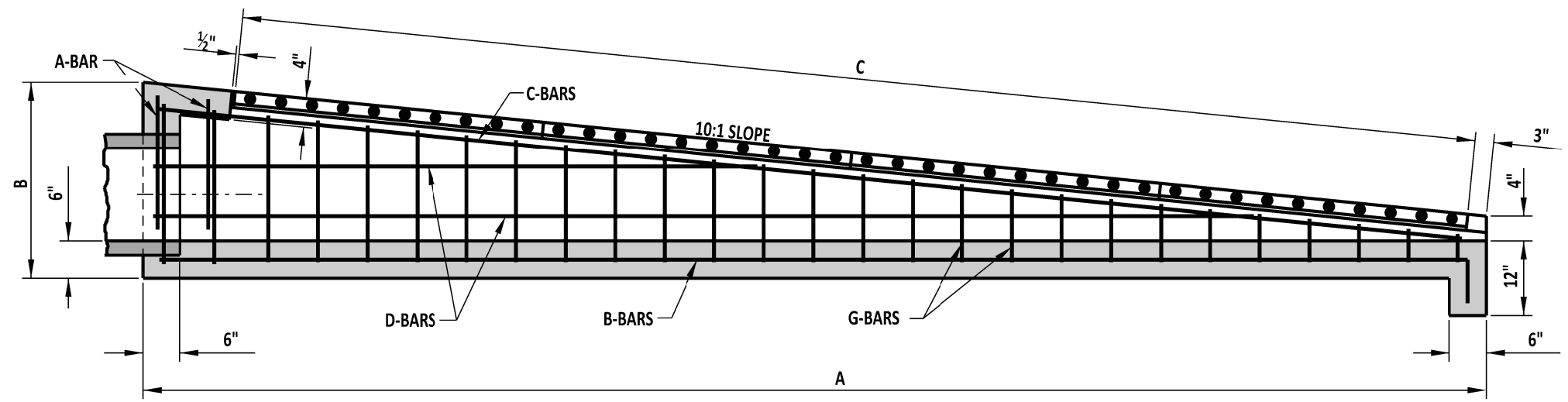
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DESIGN ENGINEER

12/20/2018
DATE

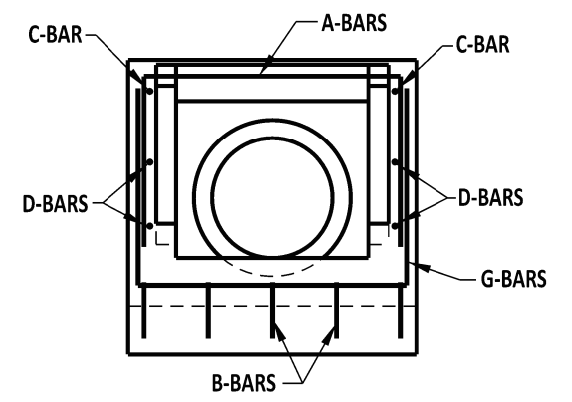


PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 10:1 SAFETY END STRUCTURE TO BE PRECAST



SECTION A-A

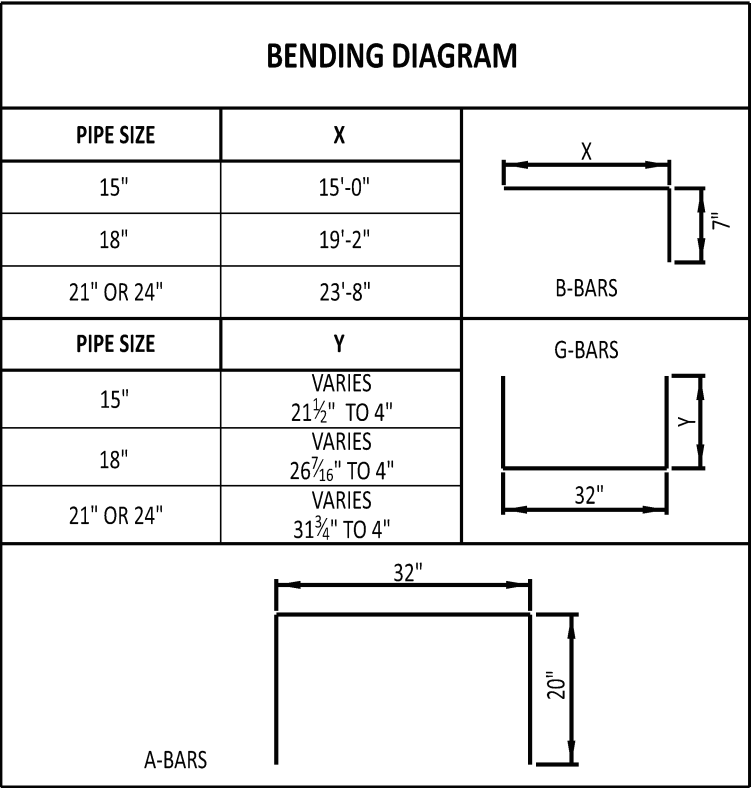


FRONT VIEW

 DELAWARE DEPARTMENT OF TRANSPORTATION	10:1 CONCRETE SAFETY END STRUCTURE			APPROVED	SIGNATURE ON FILE	1/04/2019
	STANDARD NO.	D-2 (2018)	SHT. 1 OF 2	RECOMMENDED	SIGNATURE ON FILE	12/20/2018

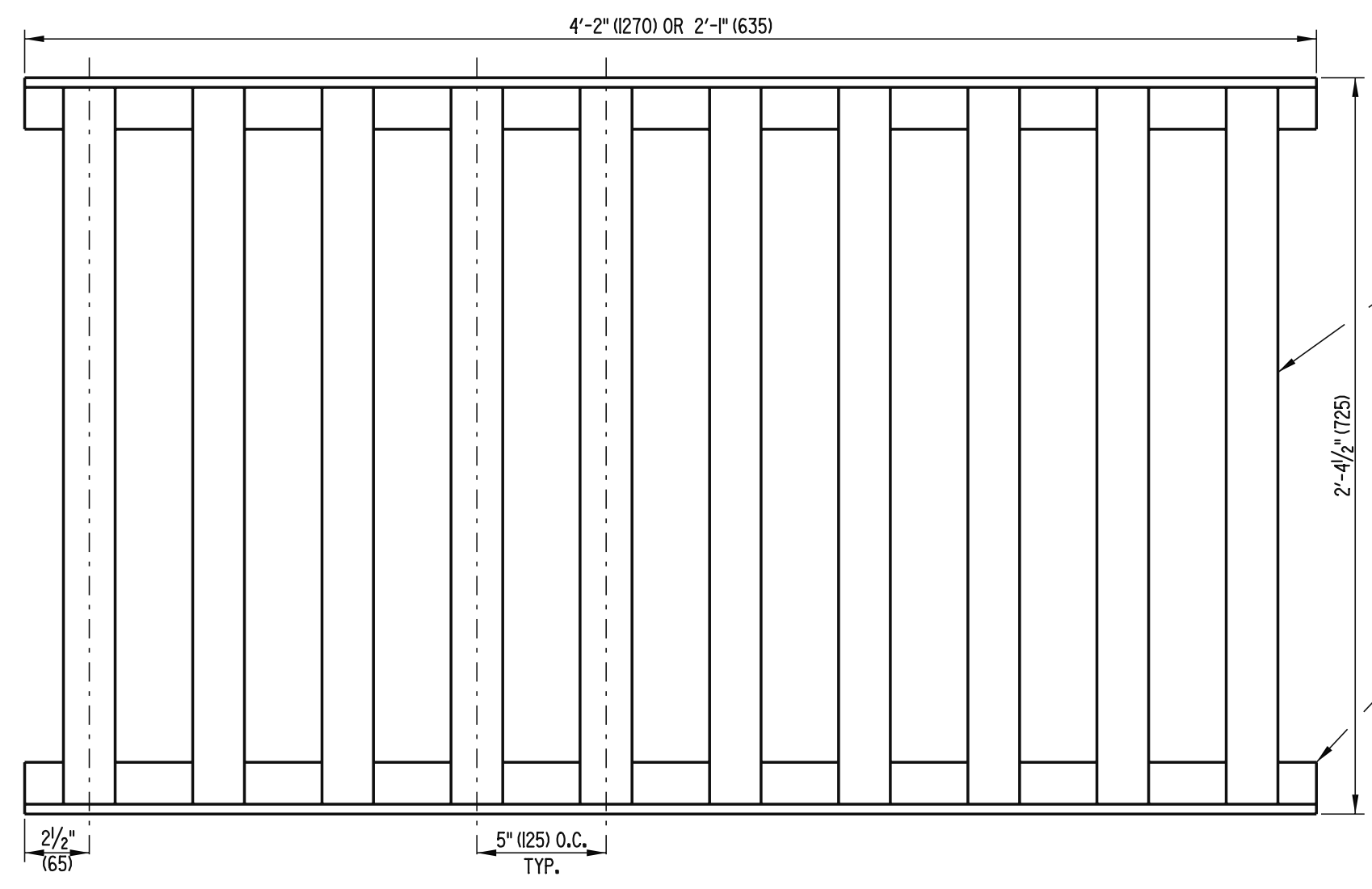
DIMENSIONS			
PIPE SIZE	A	B	C
15"	15'-4"	2'-4 ³ / ₈ "	14'-7"
18"	19'-6"	2'-9 ³ / ₈ "	18'-9"
21" OR 24"	24'-0"	3'-2 ¹³ / ₁₆ "	22'-11"

APPROXIMATE QUANTITIES							
PIPE SIZE	CONCRETE FT³		REINF. STEEL LBS.	NO. OF GRATES	LENGTH TO BE CUT FROM 1 GRATE	WEIGHT OF FULL SIZE GRATE LBS.	WEIGHT OF CUT GRATE LBS.
	CONC. PIPE	C.M. PIPE					
15"	41.35	41.78	175.0	4	2'-1"	270.92	135.47
18"	50.11	50.68	227.0	5	2'-1"	270.92	135.47
21" OR 24"	69.43	70.31	310.4	6	2'-1"	270.92	135.47



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"	#4	2	8"	72"	#4	5	8"	15'-7"	#4	2	-	15'-1 ¹ / ₁₆ "	#4	4	8"	VARIES 72 ¹³ / ₁₆ " TO 145 ⁵ / ₈ "	#4	24	8"	VARIES 40" TO 75 ¹¹ / ₁₆ "
18"	#4	2	8"	72"	#4	5	8"	19'-9"	#4	2	-	19'-3 ³ / ₈ "	#4	4	8"	VARIES 89 ⁵ / ₈ " TO 179 ³ / ₁₆ "	#4	30	8"	VARIES 40" TO 85 ³ / ₄ "
21" OR 24"	#4	2	8"	72"	#4	5	8"	24'-3"	#4	2	-	23'-9 ⁵ / ₈ "	#4	6	8"	VARIES 80 ³ / ₄ " TO 242 ¹ / ₈ "	#4	37	8"	VARIES 40" TO 96 ⁹ / ₁₆ "





GRATE DETAIL

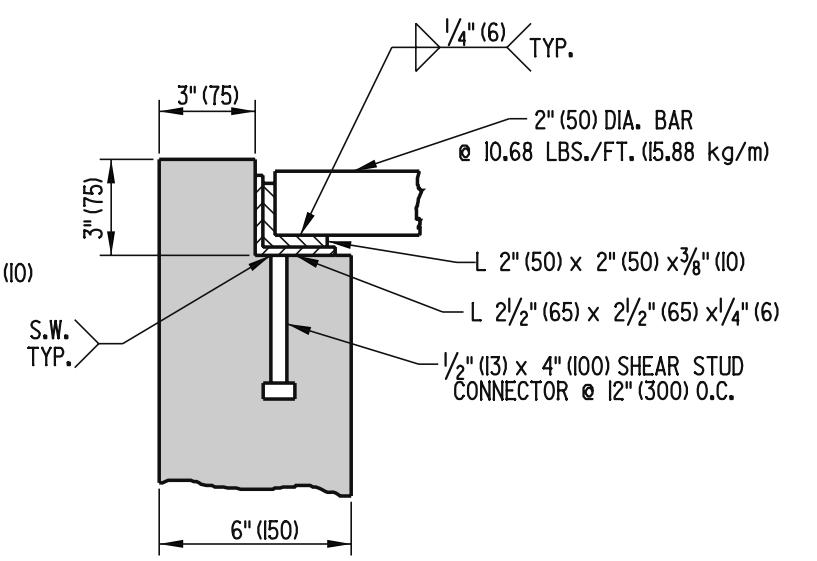
2" (50) DIA. BAR @ 10.68 LBS./FT. (15.88 kg/m)

2'-4 1/2" (725)

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

2 1/2" (65)

5" (125) O.C. TYP.



FRAME & GRATE ASSEMBLY DETAIL



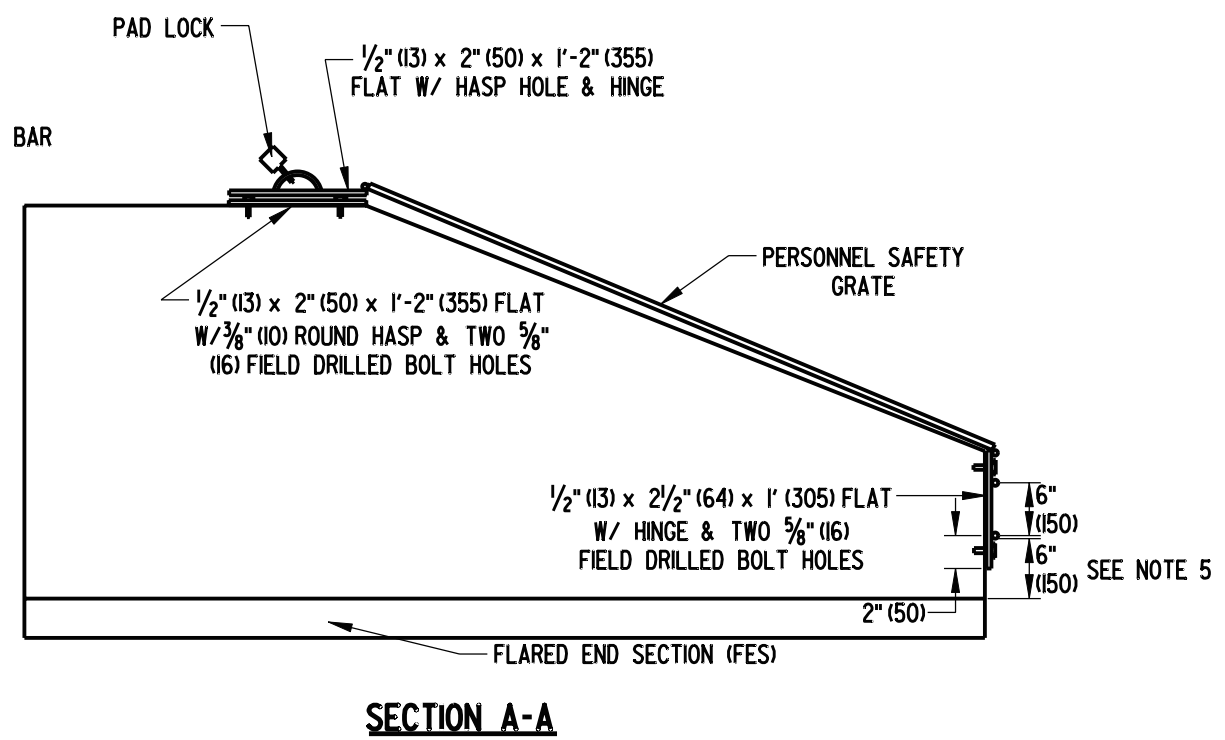
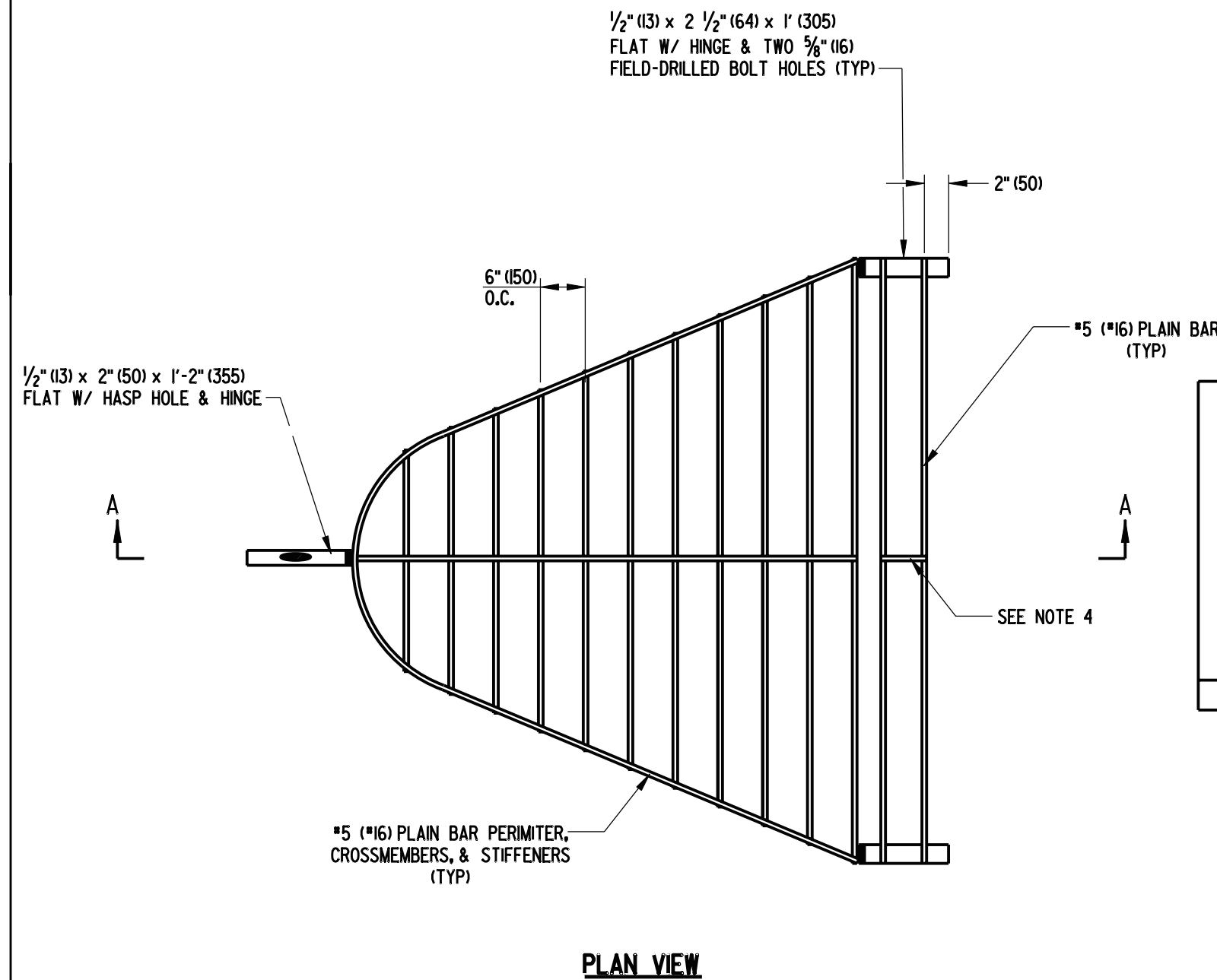
DELAWARE
DEPARTMENT OF TRANSPORTATION

SAFETY GRATES

STANDARD NO. D-3 (2005)

SHT. 1 OF 2

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



- NOTES:**
- 1). PERSONNEL SAFETY GRATES (PSG) SHALL ONLY BE INSTALLED ON THE INLETS OF STORM WATER PIPES 12" (300) OR LARGER IN DIAMETER THAT ARE NOT STRAIGHT FROM THE INLET TO THE OPEN OUTLET, REGARDLESS OF THE LENGTH.
 - 2). THE GRATE SHALL BE MADE TO FIT THE OUTSIDE PERIMETER OF THE FLARED END SECTION (FES) $\pm 1/2"$ (13).
 - 3). ALL BOLT HOLES ARE TO BE DRILLED IN THE FIELD.
 - 4). A STIFFENER IS TO BE INSTALLED WHERE TWO OR MORE BARS ARE USED.
 - 5). BOTTOM BAR SHALL BE 6" (150) ABOVE INVERT OF FES.
 - 6). ALL HARDWARE ATTACHED TO CONCRETE SHALL BE ATTACHED USING APPROVED TAMPER PROOF ANCHORS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

SAFETY GRATES				APPROVED	10/24/07
				CHIEF ENGINEER	DATE
STANDARD NO.	D-3 (2007)	SHT.	2 OF 2	RECOMMENDED	10/23/07
				DESIGN ENGINEER	DATE

INLET BOX SIZE		COVER SLAB SIZE (L X W)	DRAINAGE INLET TOP UNIT	INLET TOP UNIT REBAR LENGTH	INLET TOP UNIT LIMIT OF PAYMENT	INLET TOP UNIT BAR BENDING DIAGRAM	FRAME & GRATE (FOUND ON DETAIL D-5, SHEET 2) SEE NOTE 6	MAXIMUM PIPE SIZE (SEE NOTE 1)		MAXIMUM HEIGHT (TO TOP OF BOX)
L	W							L	W	
17 ⁵ / ₈ "	11 ⁵ / ₈ "	NO COVER SLAB	TYPE 5 (FRAME & GRATE COMBO)	N/A	N/A	N/A	TYPE 5 (FRAME & GRATE COMBO)	N/A	N/A	4'-0"
24"	24"	NO COVER SLAB	TYPE 6 (FRAME & GRATE COMBO)	N/A	N/A	N/A	TYPE 6 (FRAME & GRATE COMBO)	15"	15"	4'-0"
34"	18"	NO COVER SLAB	TYPES A, C, D, & E (DETAIL D-5, SHEET 7)	79"	82"	S504 (DETAIL D-5, SHEET 7)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	24"	12"	4'-0" (SEE NOTE 7)
34"	24"	NO COVER SLAB	TYPES A, B, C, D, E, & S (SEE NOTE 4)	79"	82"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	24"	15"	11'-4"
48"	30"	60" x 42" (DETAIL D-5, SHEET 4)	TYPES A, B, C, D, E & S (SEE NOTE 5)	93"	96"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	36"	21"	11'-4"
48"	48"	60" x 60" (DETAIL D-5, SHEET 4)	TYPES A, B, C, D, E & S (SEE NOTE 5)	93"	96"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	36"	36"	11'-4"
66"	30"	78" x 42" (DETAIL D-4, SHEET 4)	TYPES A, B, C, D, E & S (SEE NOTE 5)	111"	114"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	48"	21"	11'-4"
66"	48"	78" x 60" (DETAIL D-5, SHEET 4)	TYPES A, B, C, D, E & S (SEE NOTE 5)	111"	114"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	48"	36"	11'-4"
66"	66"	78" x 78" (DETAIL D-5, SHEET 4)	TYPES A, B, C, D, E & S (SEE NOTE 5)	111"	114"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	48"	48"	11'-4"
72"	24"	84" x 36" DETAIL D-5, SHEET 5)	TYPES A, B, C, D, E & S (SEE NOTE 5)	117"	120"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	54"	15"	11'-4"
72"	48"	84" x 60" (DETAIL D-5, SHEET 5)	TYPES A, B, C, D, E & S (SEE NOTE 5)	117"	120"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	54"	36"	11'-4"
72"	72"	84" x 84" (DETAIL D-5, SHEET 5)	TYPES A, B, C, D, E & S (SEE NOTE 5)	117"	120"	S501 (SEE NOTE 5)	TYPES 1 THRU 4 AND 7 GRATE STANDARD DRAINAGE INLET FRAME	54"	54"	11'-4"

NOTES :

- 1). MAXIMUM PIPE SIZES ARE CALCULATED USING REINFORCED CONCRETE PIPE PERPENDICULAR TO THE BOX WALL. FOR OTHER PIPE SIZES, TYPES AND SKEW ANGLES OTHER THAN PERPENDICULAR, SEE CHART ON DELDOT DESIGN RESOURCE CENTER.
- 2). STEPS ARE REQUIRED ON ALL BOXES WHOSE DEPTH IS 4'-0" OR GREATER.
- 3). SEE DETAIL D-4 OR APPROPRIATE DETAIL SHEET FOR ADDITIONAL NOTES.
- 4). FOR A 34" X 24" DRAINAGE INLET, SEE DETAIL D-5, SHEET 6 FOR INLET TOP UNIT TYPES A, B, C, D, & E. FOR INLET TOP UNIT TYPE S, SEE DETAIL D-5, SHEET 8.
- 5). FOR MORE INFORMATION ON DRAINAGE INLET TOP UNIT TYPES A, B, C, D, & E SEE DETAIL D-5, SHEET 3 AND FOR DRAINAGE INLET TOP UNIT, TYPE S, SEE DETAIL D-5, SHEET 8.
- 6). ONLY USE THE TYPE 7 DRAINAGE INLET GRATE WHEN SPECIFIED ON THE PLANS OR AFTER APPROVAL BY THE ENGINEER.
- 7). SEE DETAIL D-5, SHEET 7 FOR MORE INFORMATION ON THE MAXIMUM HEIGHT FOR THE 34" X 18" DRAINAGE INLET.



DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET REFERENCE SHEET

STANDARD NO. D-R (2017) SHT. 1 OF 1

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

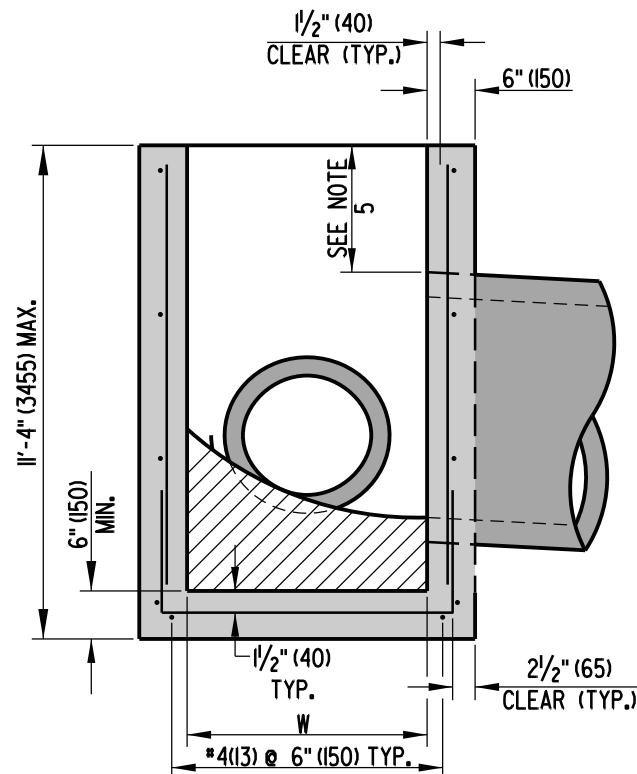
5/31/2017
DATE

RECOMMENDED

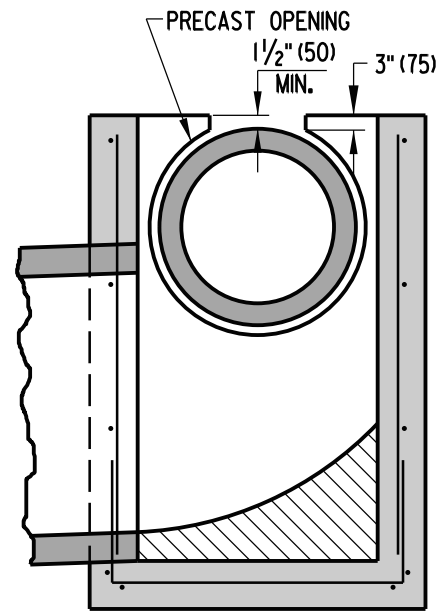
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5/18/2017
DATE

SCALE : N.T.S.



SECTION A-A



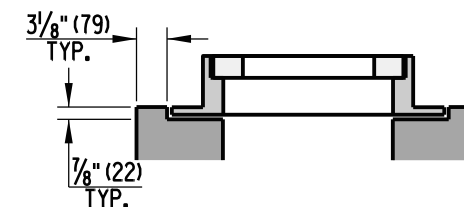
OPTIONAL PIPE OPENING DETAIL

SEE NOTE 5

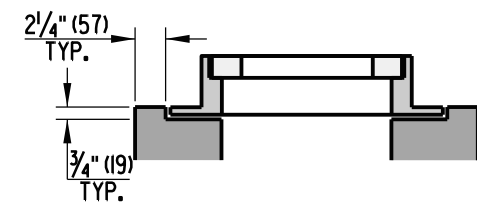
INLET BOX SCHEDULE		
L	W	FABRICATION TOLERANCE
17 5/8" (450)	11 5/8" (295)	+1" (25) *
24" (610)	24" (610)	+1" (25) *
34" (865)	18" (455)	-1" (25)
34" (865)	24" (610)	-1" (25)
48" (1220)	30" (760)	+6" (150)
48" (1220)	48" (1220)	+6" (150)
66" (1675)	30" (760)	+6" (150)
66" (1675)	48" (1220)	+6" (150)
66" (1675)	66" (1675)	+6" (150)
72" (1830)	24" (610)	-1" (25)
72" (1830)	48" (1220)	-1" (25)
72" (1830)	72" (1830)	-1" (25)

* - THESE BOXES ARE TO BE USED FOR LAWN INLETS AND ARE NOT INTENDED TO BE USED IN THE TRAVELWAY. THE MAX DEPTH FOR THESE BOXES IS 4' (1220). SEE NOTE 8 FOR REINFORCEMENT.

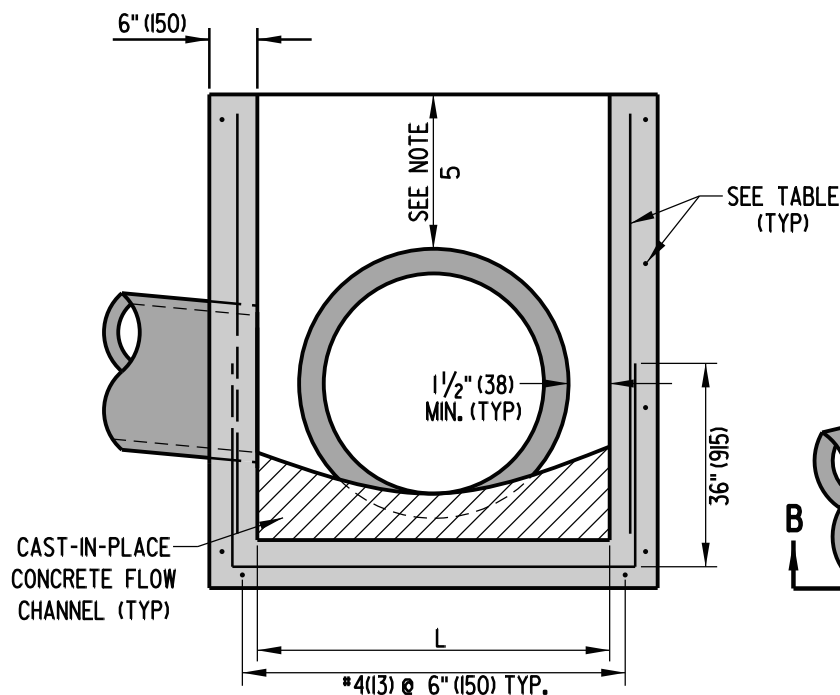
WALL REINFORCEMENT SCHEDULE		
INTERIOR WALL DIMENSION	AREA OF HORIZONTAL REINFORCEMENT PER FOOT (mm ²)	AREA OF VERTICAL REINFORCEMENT PER FOOT (mm ²)
	IN ² (mm ²)	IN ² (mm ²)
LESS THAN 4' (1220)	0.132 (85)	0.132 (85)
4' (1220) TO 4.5' (1370)	0.163 (105)	0.132 (85)
4.5' (1370) TO 5' (1525)	0.198 (128)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



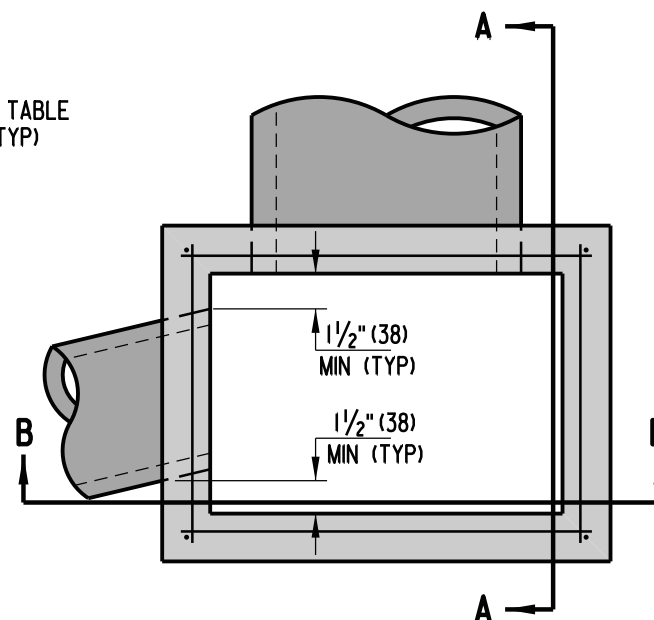
24" (610) x 24" (610) LAWN INLET BOX DETAIL



17 5/8" (450) x 11 5/8" (295) LAWN INLET BOX DETAIL



SECTION B-B



TOP VIEW

NOTES:

- 1). INLET BOXES SHALL BE PRECAST OR CAST-IN-PLACE.
- 2). PIPES SHALL NOT BE INSTALLED THROUGH ANY CORNER OF THE INLET BOX.
- 3). RISER SECTIONS MAY BE USED FOR DEEP INLET BOXES.
- 4). PIPES MAY BE INSTALLED NEAR OR THROUGH JOINTS FOR RISER SECTIONS.
- 5). WHEN THE COVER ABOVE THE PIPE IS LESS THAN 4" (100) TO THE COVER SLAB OR TOP UNIT OPENING, THE PORTION OF BOX WALL ABOVE THE PIPE MAY BE REMOVED AS SHOWN IN THE OPTIONAL PIPE OPENING DETAIL. THE AREA ABOVE THE PIPE SHALL THEN BE FORMED AND FILLED WITH HIGH-STRENGTH, NON-SHRINK GROUT MIXED WITH COARSE AGGREGATE IN A 1:1 RATIO BY WEIGHT.
- 6). CONCRETE FLOW CHANNEL SHALL BE WARPED FOR POSITIVE DRAINAGE.
- 7). WHEN INLET BOX IS PRECAST, PIPE OPENING SHALL BE BETWEEN 3" (75) AND 4" (100) LARGER THAN OUTSIDE DIAMETER OF PIPE AND SHALL NOT ENCROACH ON ADJACENT WALL.
- 8). REINFORCEMENT FOR LAWN INLET BOXES SHALL BE 4" (102) X 4" (102), W4 X W4 (W26 X W26) WELDED WIRE.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

INLET BOX DETAILS

STANDARD NO. D-4 (2009)

SHT. 1 OF 1

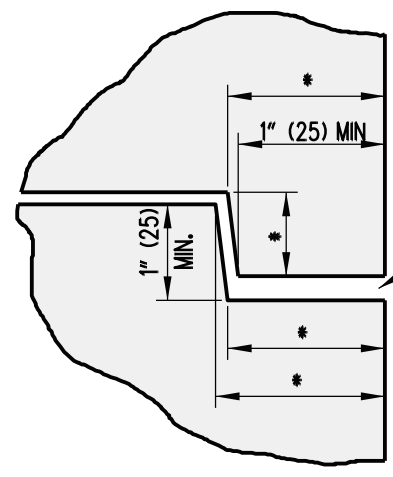
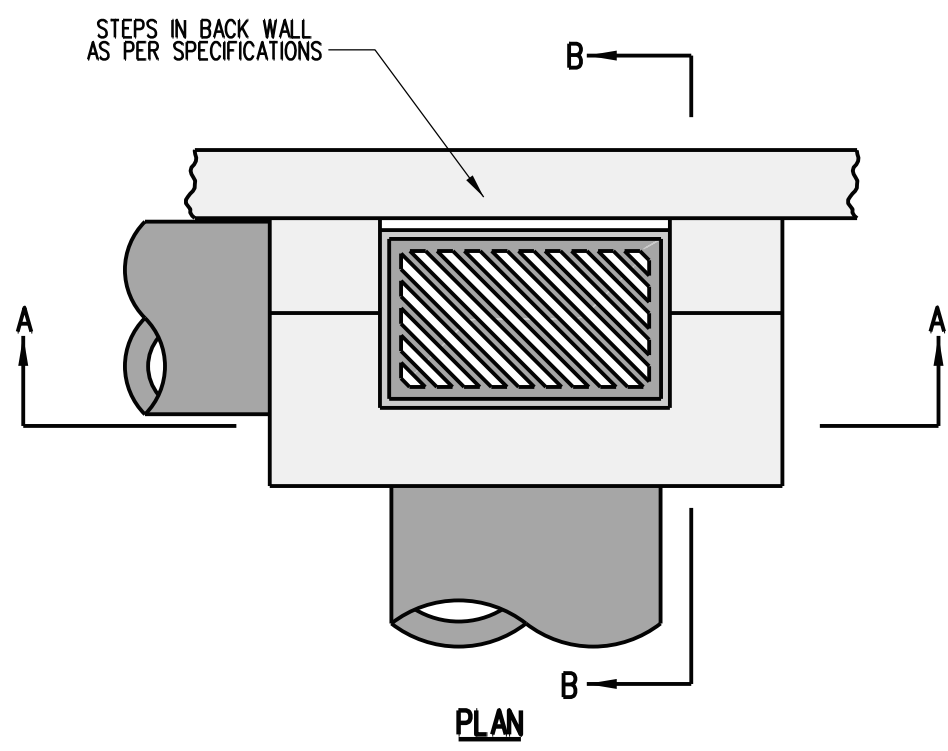
APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER
01/19/2010
DATE

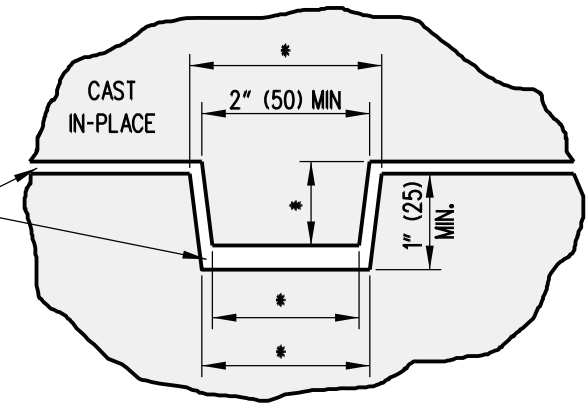
RECOMMENDED

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01/14/2010
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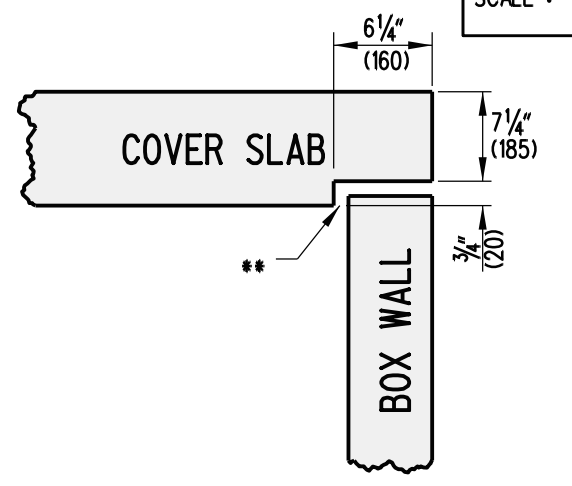
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TYPE 1 JOINT DETAIL

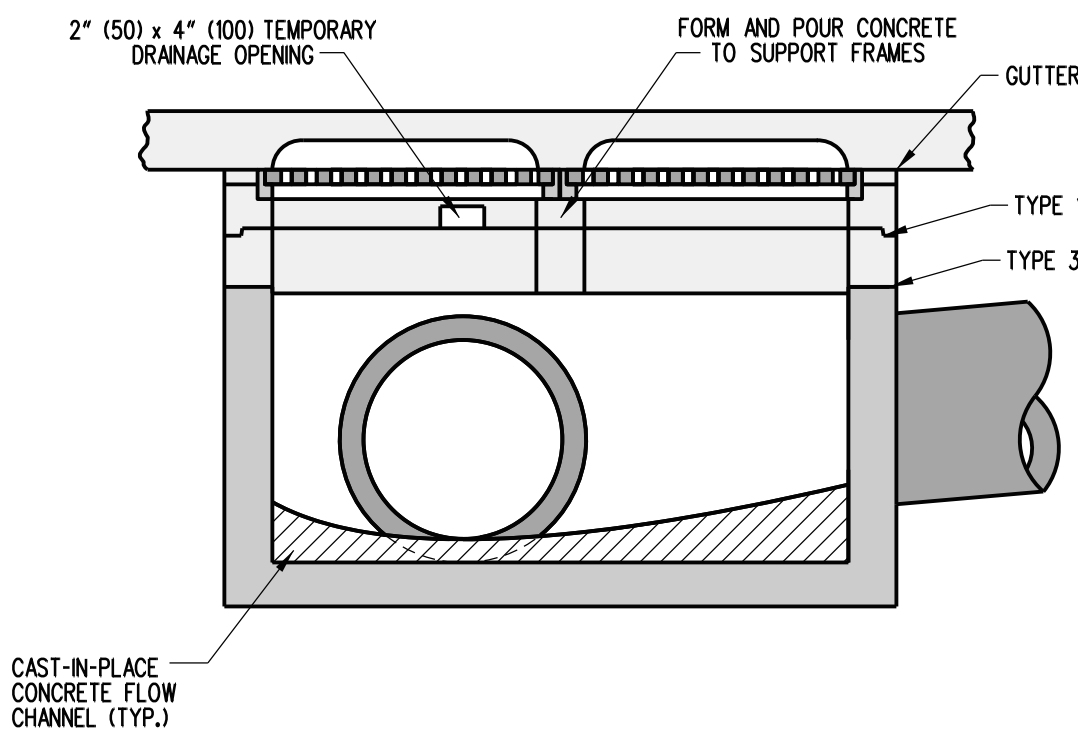


TYPE 2 JOINT DETAIL

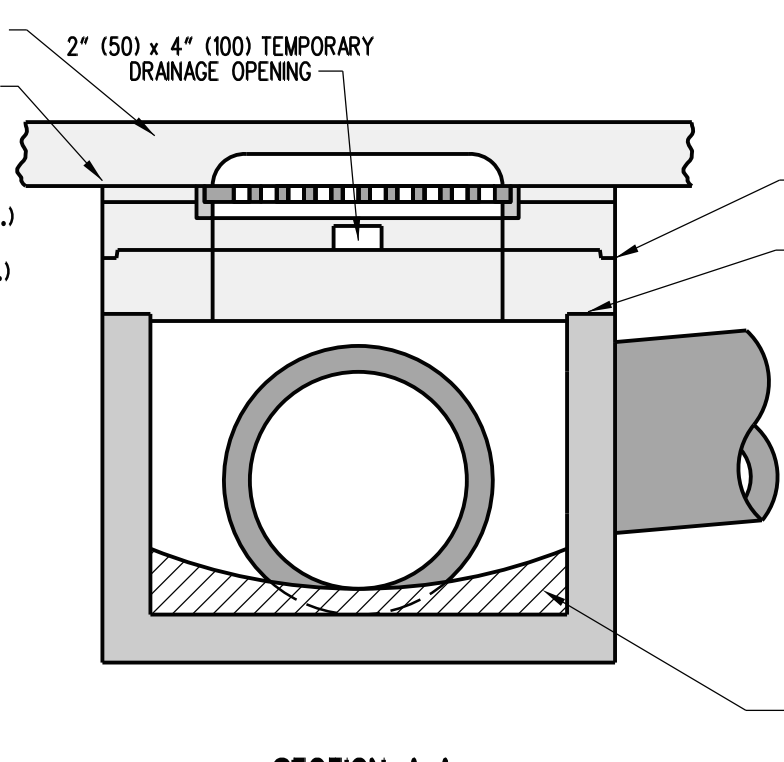


TYPE 3 JOINT DETAIL

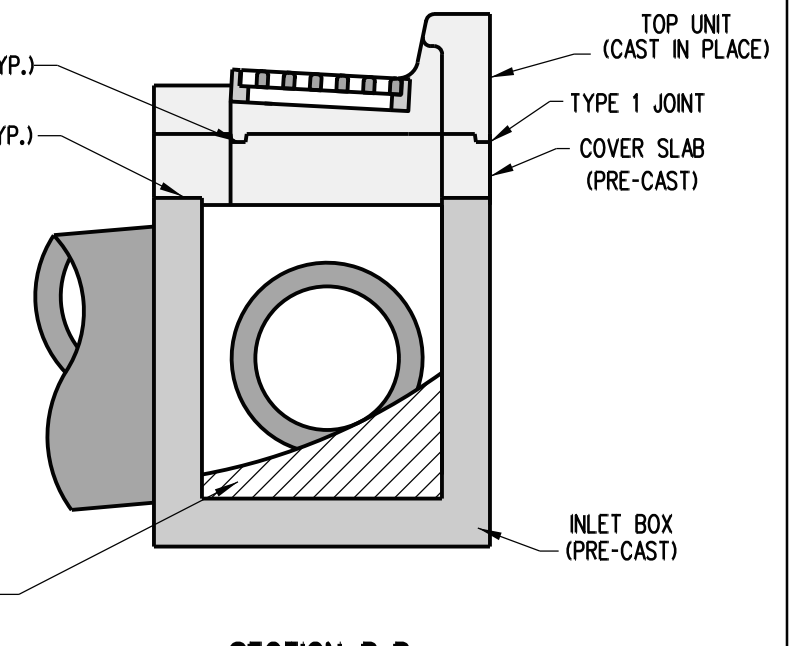
- * DIMENSIONS WILL VARY
- ** JOINT SEALANT AS PER SPECIFICATIONS ONLY BETWEEN 2 PRECAST UNITS




DOUBLE INLET SECTION



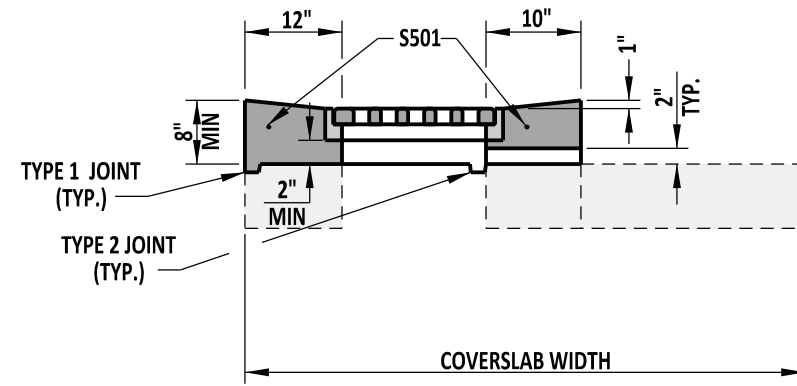
SECTION A-A



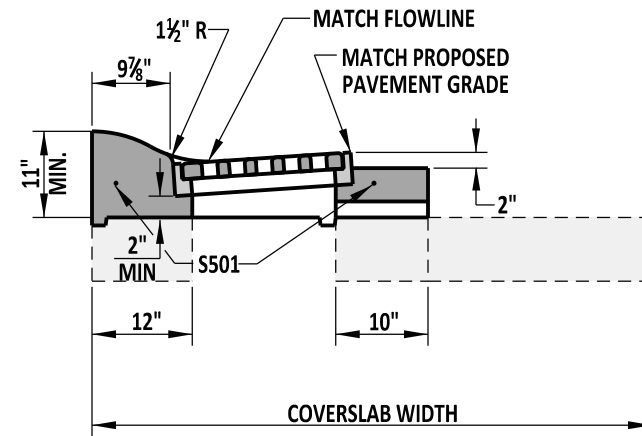
SECTION B-B

 DELAWARE DEPARTMENT OF TRANSPORTATION	DRAINAGE INLET ASSEMBLY			APPROVED _____ SIGNATURE ON FILE CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. D-5 (2010)	SHT. 1	OF 9	RECOMMENDED _____ SIGNATURE ON FILE DESIGN ENGINEER	12/27/2010 DATE

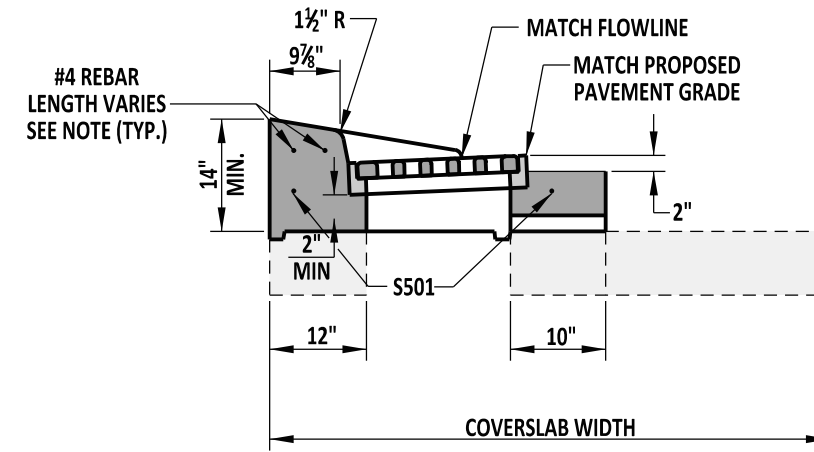
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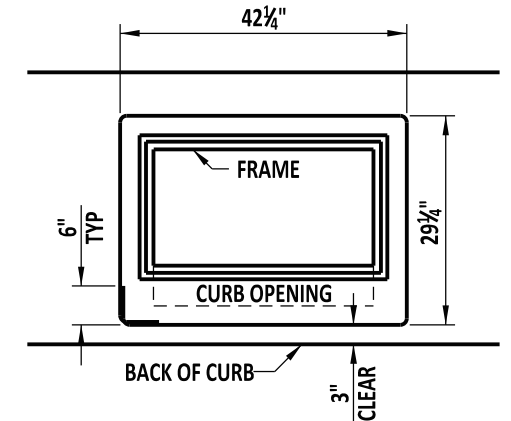
TYPE A



TYPE D

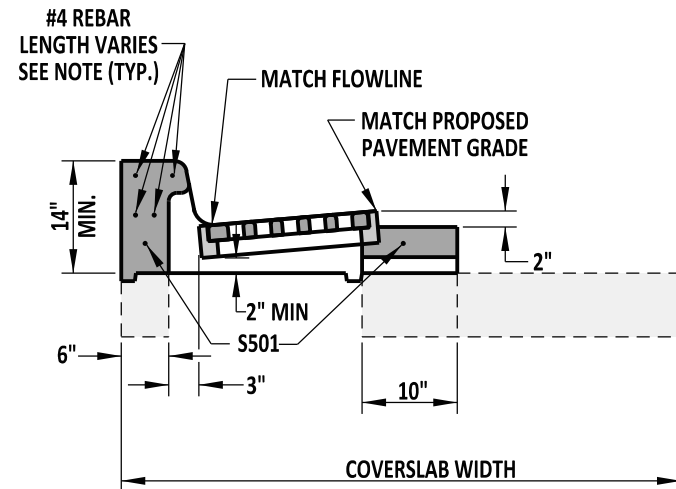


TYPE E



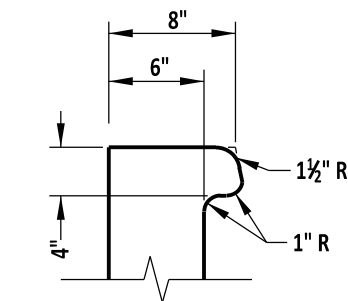
S501 BENDING DIAGRAM

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



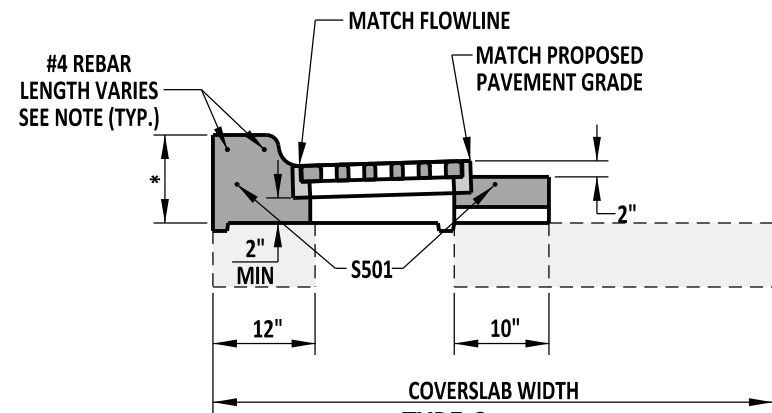
TYPE B

SEE CURB OPENING DETAIL ON THIS SHEET



CURB OPENING DETAIL

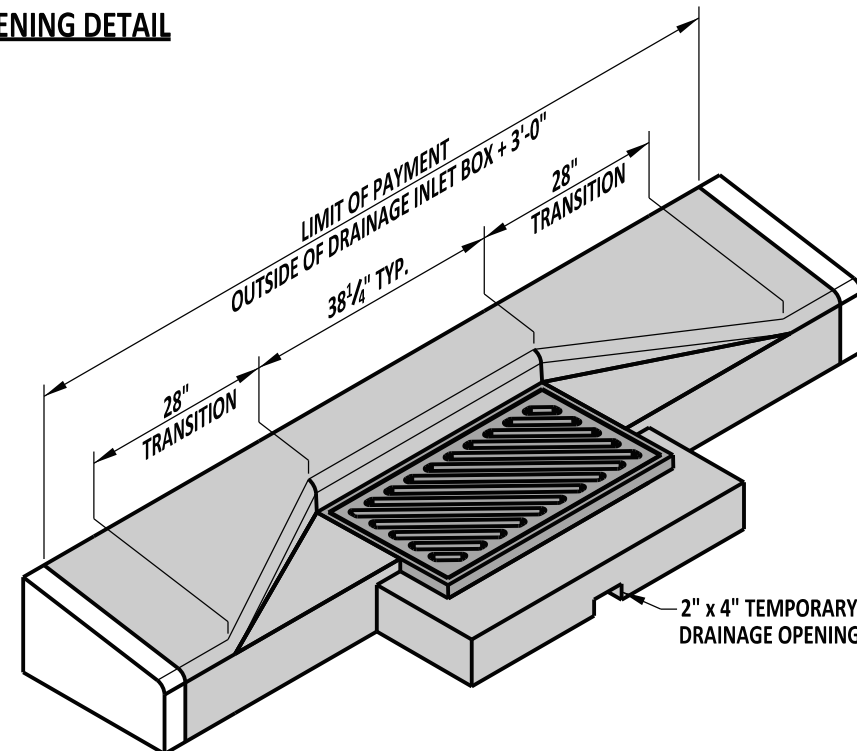
INLET TOP UNIT APPLICATIONS	
TOP UNIT	CURB
TYPE A	USE IN DRAINAGE SWALE
TYPE B	INTEGRAL PCC CURB & GUTTER, TYPE 1-8 & 3-8, PCC CURB TYPE 1-8
TYPE C	INTEGRAL PCC CURB & GUTTER, TYPES 1-6, 3-6, 1-4, 3-4, 1-2 AND 3-2 AND PCC CURB TYPE 1-6, 1-4, AND 1-2.
TYPE D	INTEGRAL PCC CURB & GUTTER, TYPE 2
TYPE E	PCC CURB TYPE 2



TYPE C

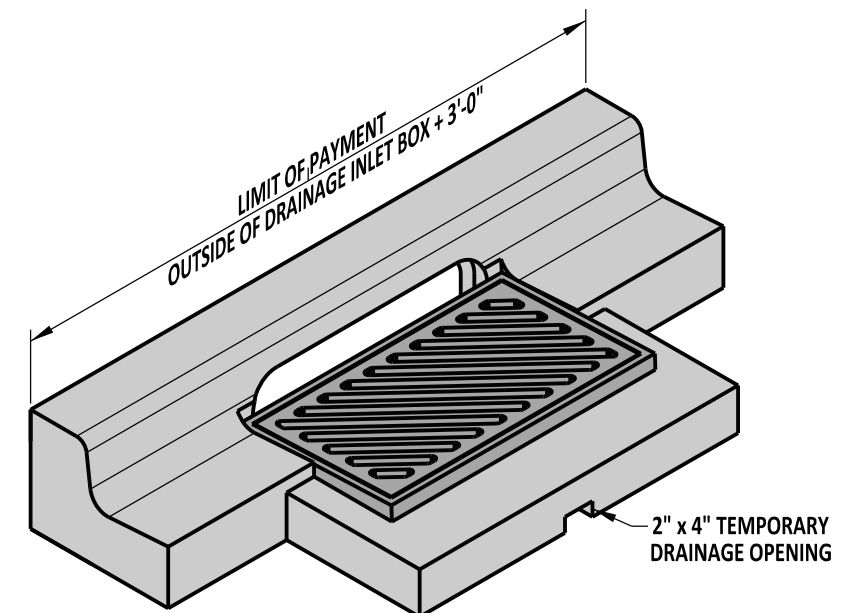
- * - THIS DIMENSION VARIES BASED ON THE HEIGHT OF THE CURB AND GUTTER OR CURB USED:
- INTEGRAL P.C.C. CURB AND GUTTER, TYPES 1-6 AND 3-6 & CURB, TYPE 1-6 - 12" MIN.
 - INTEGRAL P.C.C. CURB AND GUTTER, TYPES 1-4 AND 3-4 & CURB, TYPE 1-4 - 10" MIN.
 - INTEGRAL P.C.C. CURB AND GUTTER, TYPES 1-2 AND 3-2 & CURB, TYPE 1-2 - 8" MIN.

NOTE: LENGTH OF #4 REBAR SHALL BE THE OUTSIDE OF THE DRAINAGE INLET BOX PLUS 2'-9".



ISOMETRIC VIEW

TYPE E UNIT SHOWN



ISOMETRIC VIEW

TYPE B TOP UNIT SHOWN WITH INTEGRAL CURB & GUTTER TYPE 3



DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET TOP UNITS

STANDARD NO.

D-5 (2012)

SHT. 3

OF 9

APPROVED

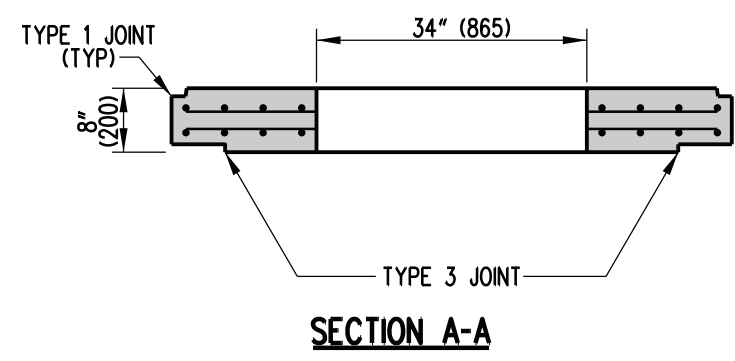
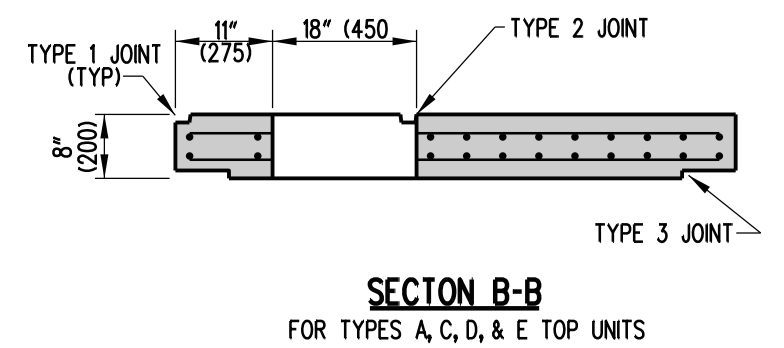
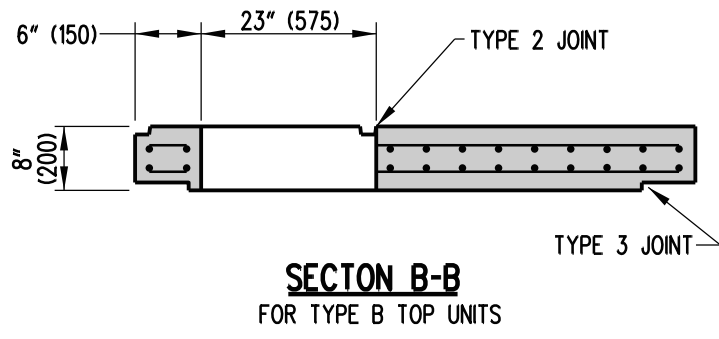
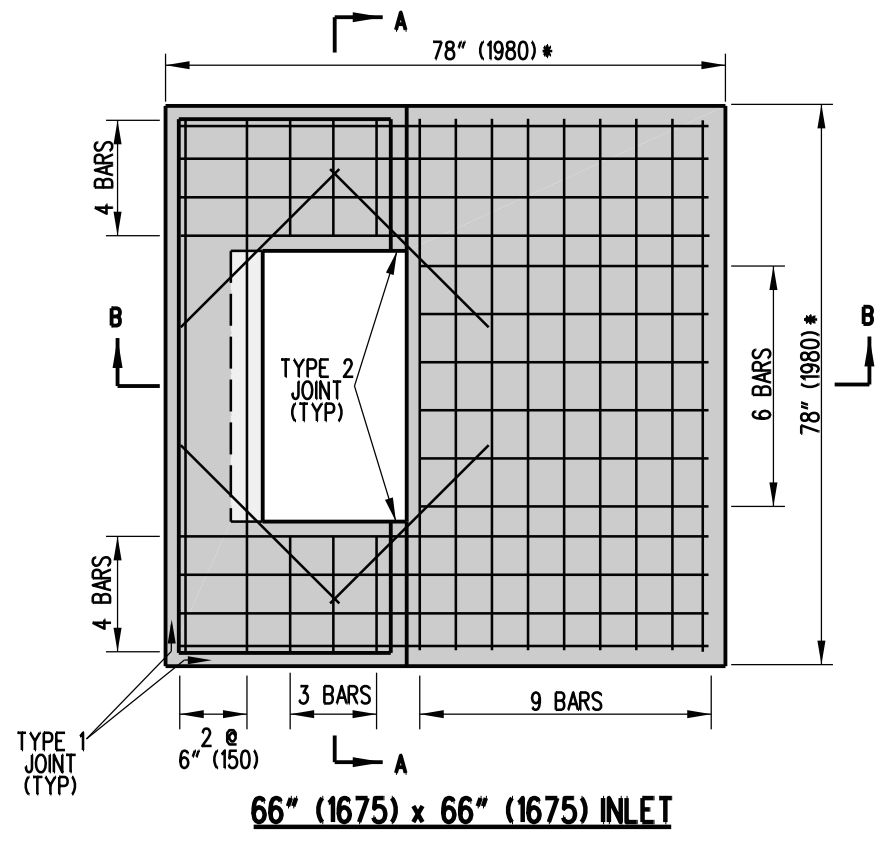
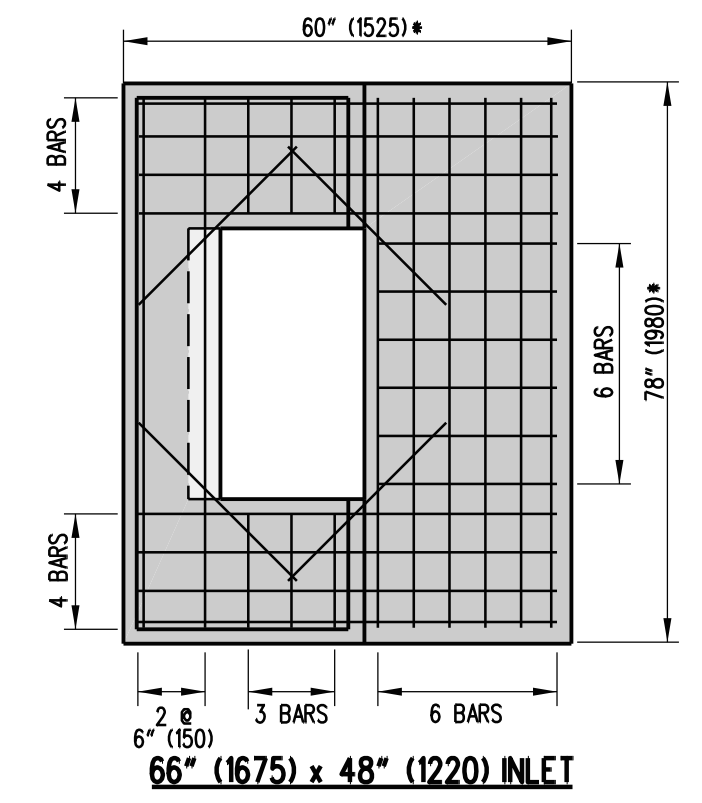
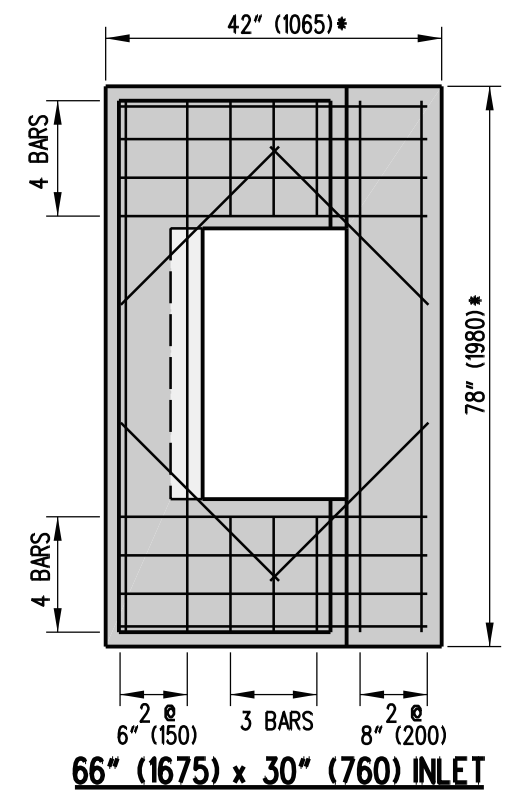
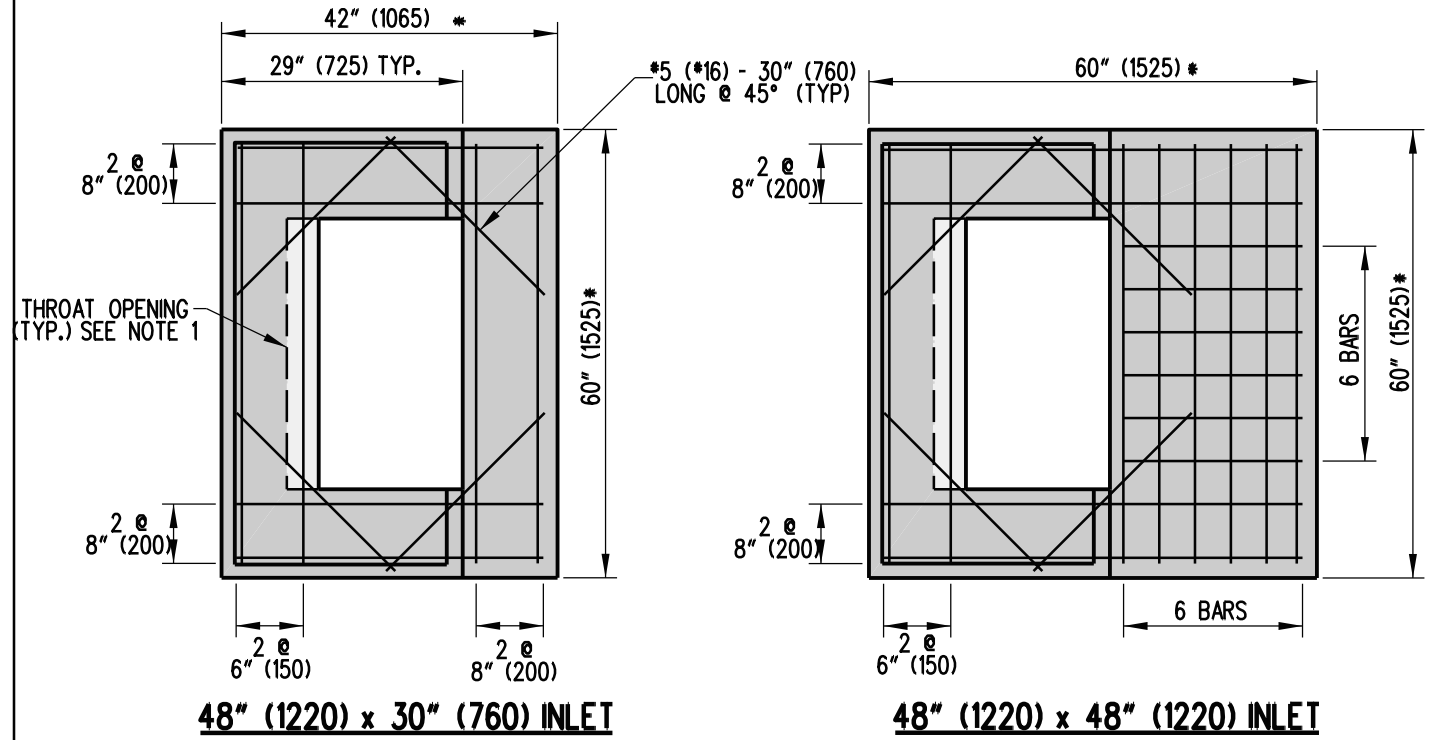
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CHIEF ENGINEER

01/07/2013
DATE


RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

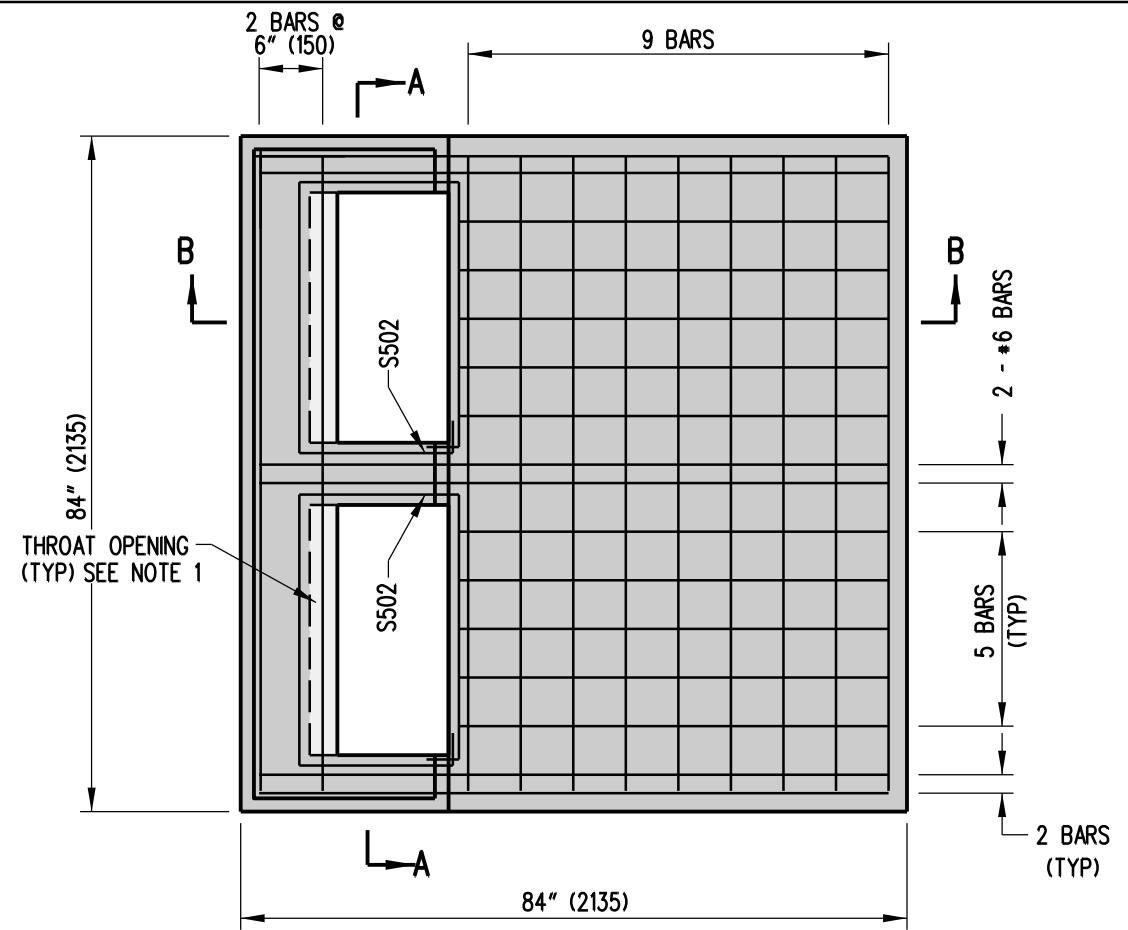
12/20/2012
DATE



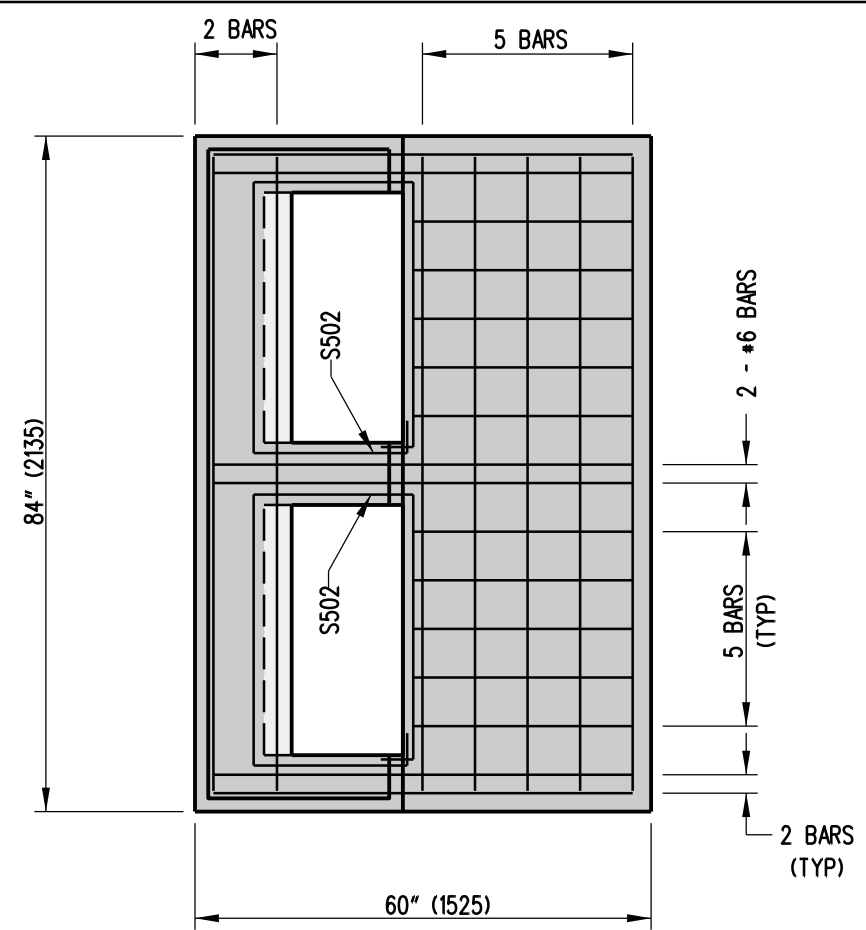
- NOTES :
- 1). RELOCATE ENCROACHING REINFORCING BARS WHEN USING TYPE B UNIT.
 - 2). COVER SLABS SHALL BE PRECAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
 - 3). ALL BARS ARE TO BE #5 (*16) SPACED @ 6" (150) UNLESS NOTED OTHERWISE. TOP REINFORCEMENT SHALL BE 0.11 IN² (70 mm²) HORIZONTAL REINFORCEMENT PER FOOT IN BOTH DIRECTIONS.
 - 4). MINIMUM BAR COVER = 1 1/2" (38).
- * - DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.

 DELAWARE DEPARTMENT OF TRANSPORTATION	DRAINAGE INLET COVER SLAB DETAILS			APPROVED _____ CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. D-5 (2010)	SHT. 4	OF 9	RECOMMENDED _____ DESIGN ENGINEER	12/27/2010 DATE

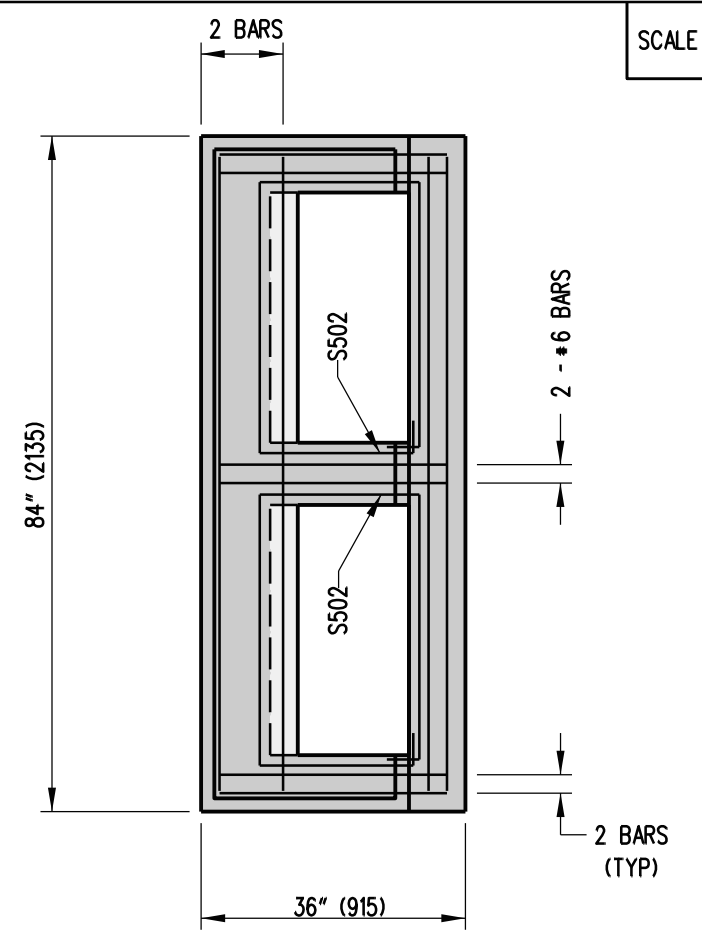
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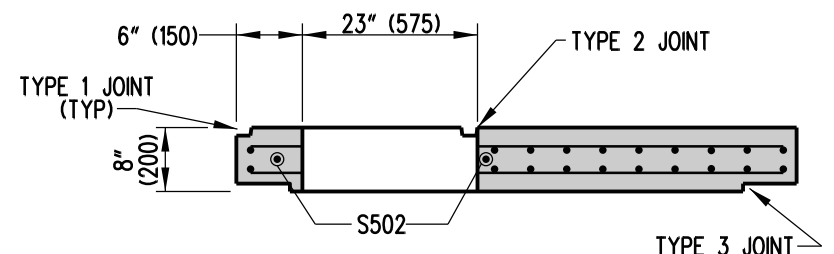
72" (1830) x 72" (1830) INLET



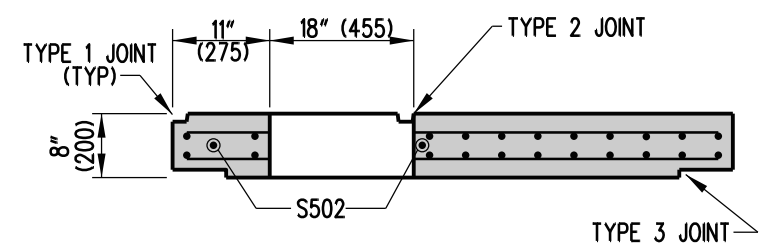
72" (1830) x 48" (1220) INLET



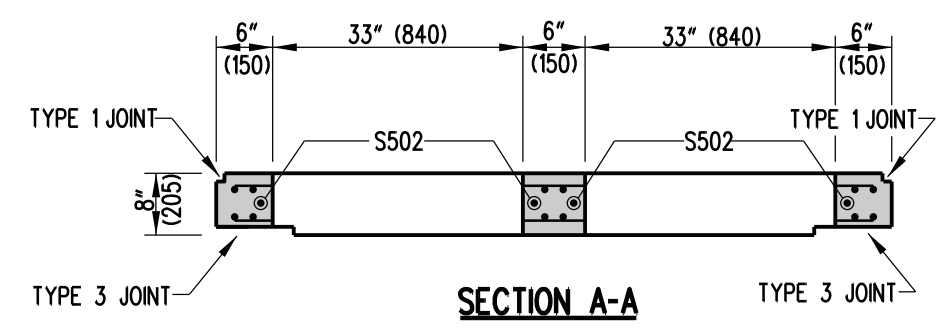
72" (1830) x 24" (610) INLET



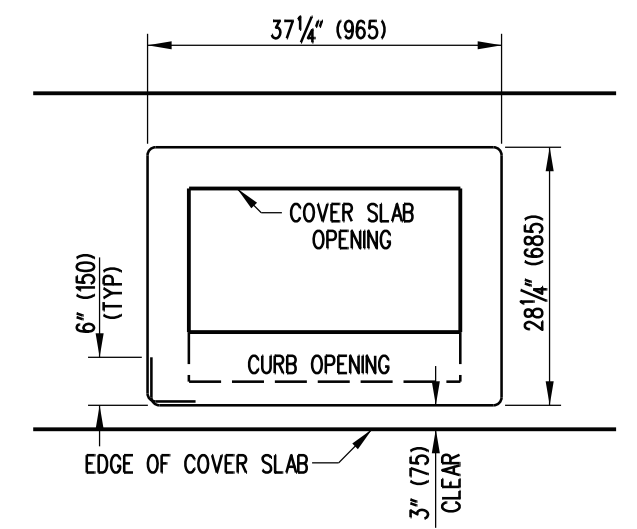
**SECTION B-B
FOR TYPE B TOP UNITS**



**SECTION B-B
FOR TYPES A, C, D, & E TOP UNITS**



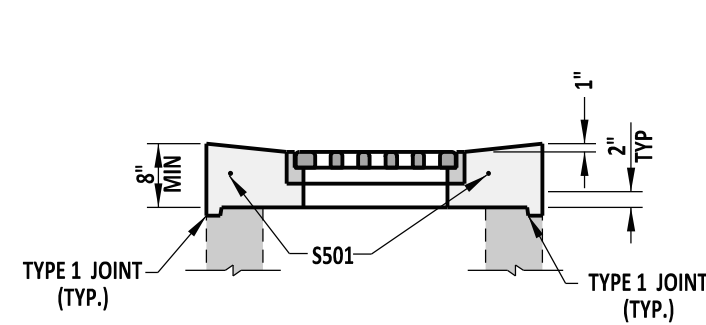
SECTION A-A



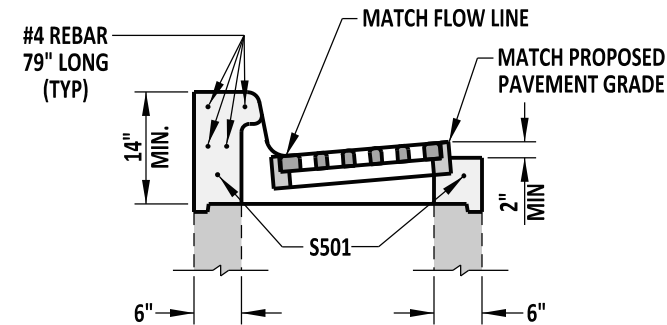
S502 BENDING DIAGRAM

- NOTES :**
- 1). RELOCATE ENCROACHING REINFORCING BARS WHEN USING TYPE B TOP UNIT.
 - 2). COVER SLABS ARE TO BE PRECAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
 - 3). ALL BARS ARE TO BE #5 (#16) SPACED @ 6" (150) UNLESS NOTED OTHERWISE. TOP REINFORCEMENT SHALL BE 0.11 IN² (70 mm²) MIN. HORIZONTAL REINFORCEMENT PER FOOT IN BOTH DIRECTIONS.
 - 4). MINIMUM BAR COVER = 1 1/2" (38).

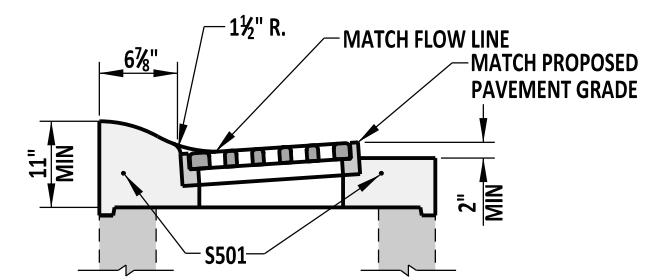
S502 IS NOT REQUIRED TO BE ONE CONTINUOUS BAR. IF MORE THAN ONE BAR IS USED, THERE MUST BE A 12" (300) OVERLAP BETWEEN BARS.



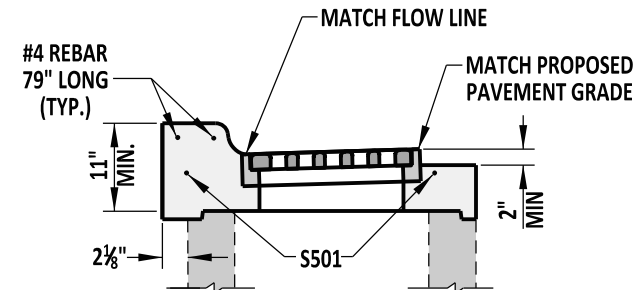
TYPE A



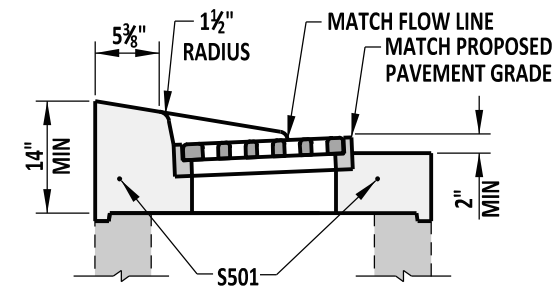
TYPE B



TYPE D



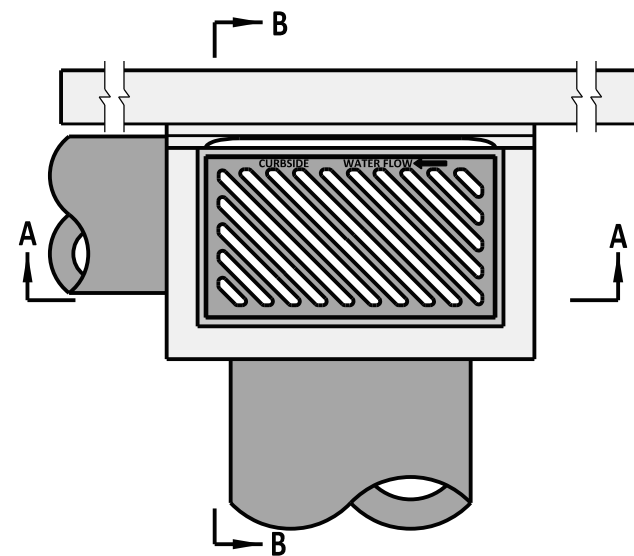
TYPE C



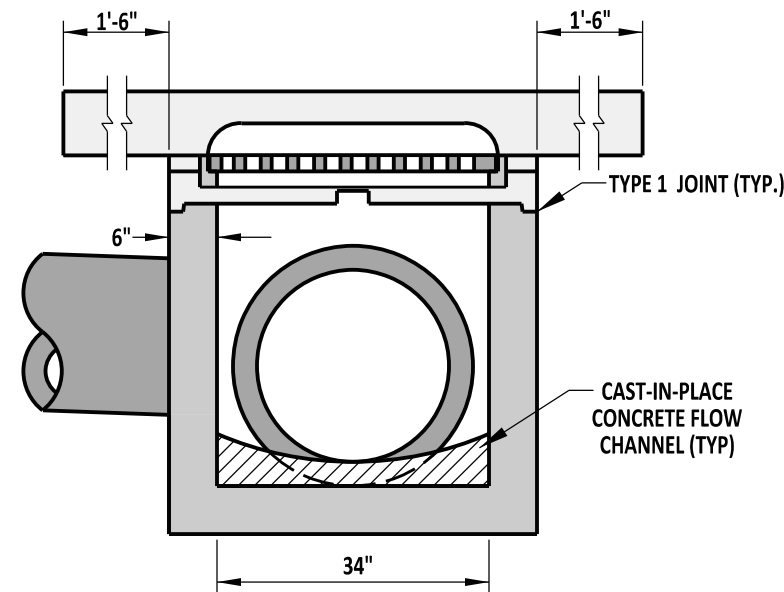
TYPE E

TOP UNIT DETAILS

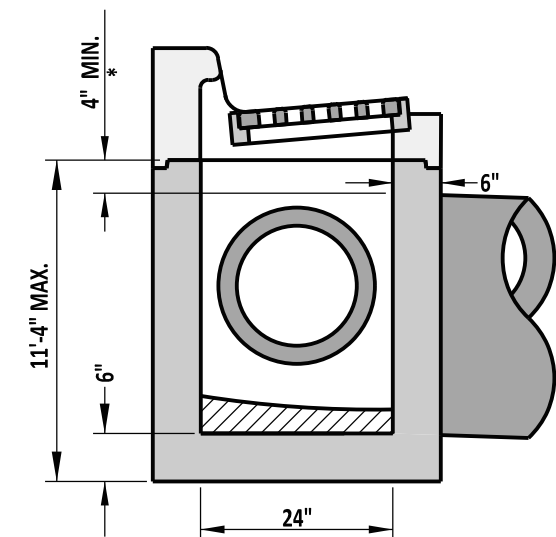
NOTE: SEE DETAIL D-5, SHEET 3 OF 9 FOR INLET TOP UNIT APPLICATIONS.



TOP VIEW



SECTION A-A



SECTION B-B

DRAINAGE INLET DETAILS

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS
* - SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD NO. D-4, SHEET 1 OF 1



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

34" x 24" DRAINAGE INLET DETAILS

STANDARD NO. D-5 (2012) SHT. 6 OF 9

APPROVED

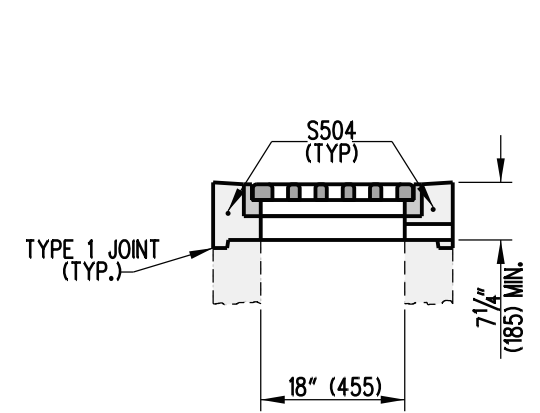
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01/07/2013
DATE

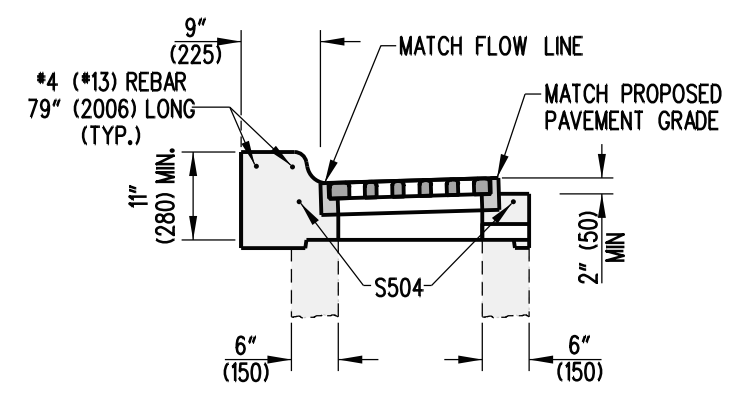
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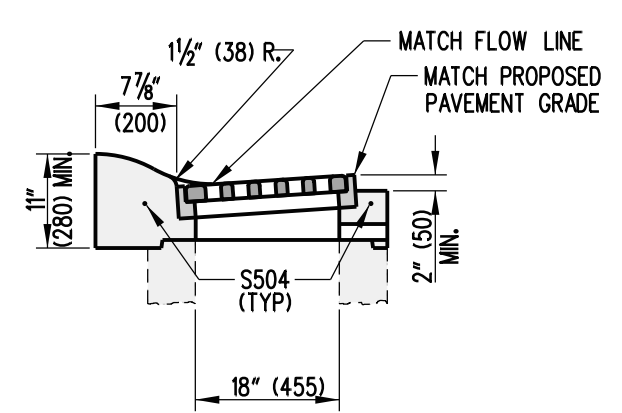
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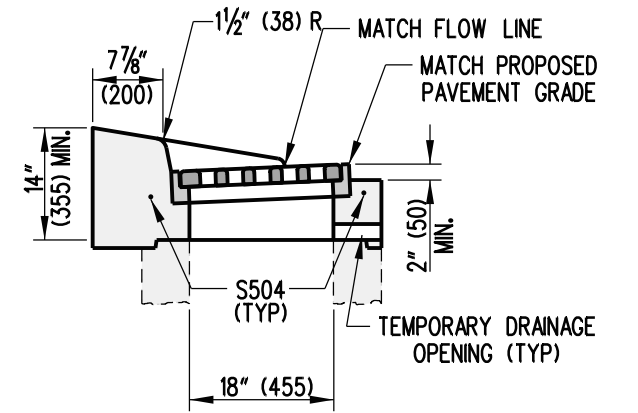
TYPE A



TYPE C

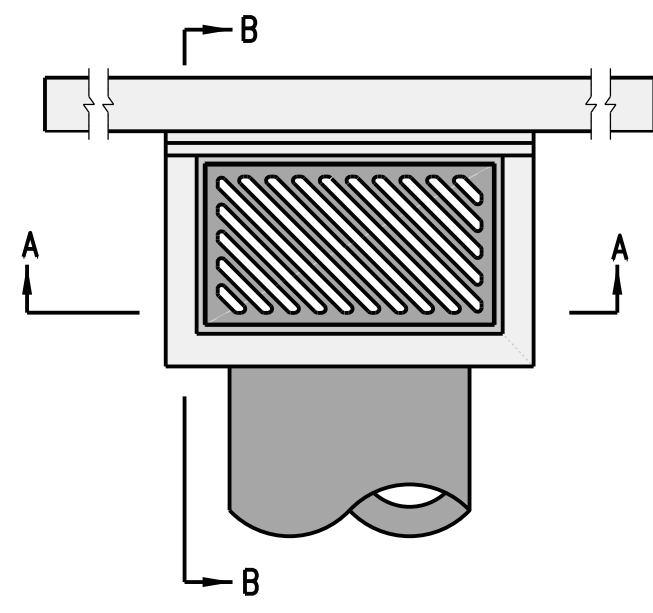


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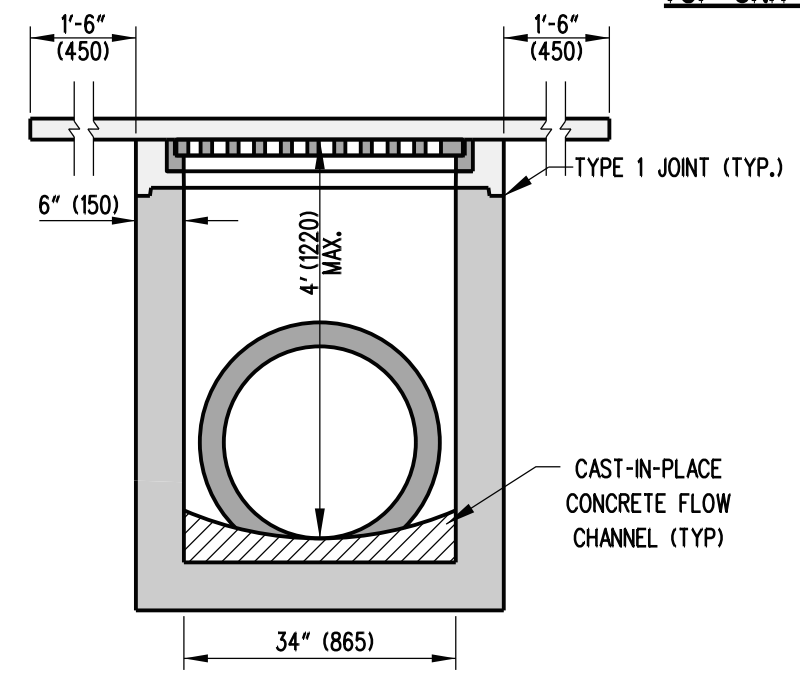


TYPE E

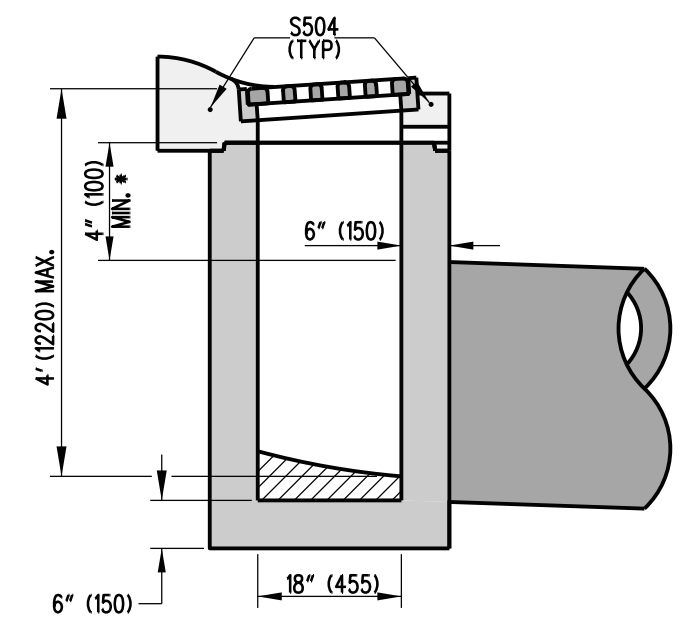
TOP UNIT DETAILS



TOP VIEW

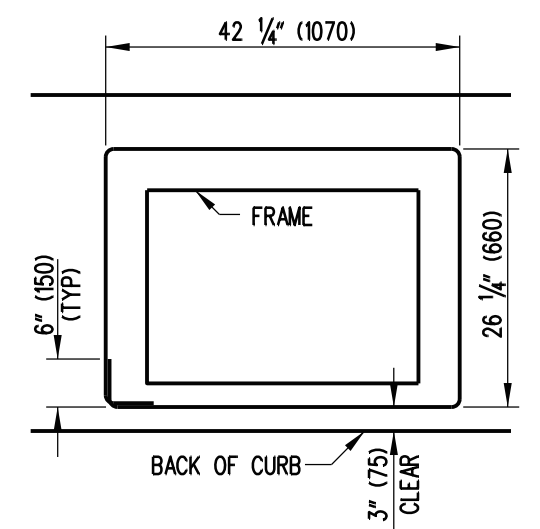


SECTION A-A



SECTION B-B

* - SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD D-4, SHEET 1 OF 1.



S504 BENDING DIAGRAM

S504 IS NOT REQUIRED TO BE ONE CONTINUOUS BAR. IF MORE THAN ONE BAR IS USED, THERE MUST BE A 12" (300) OVERLAP BETWEEN BARS.

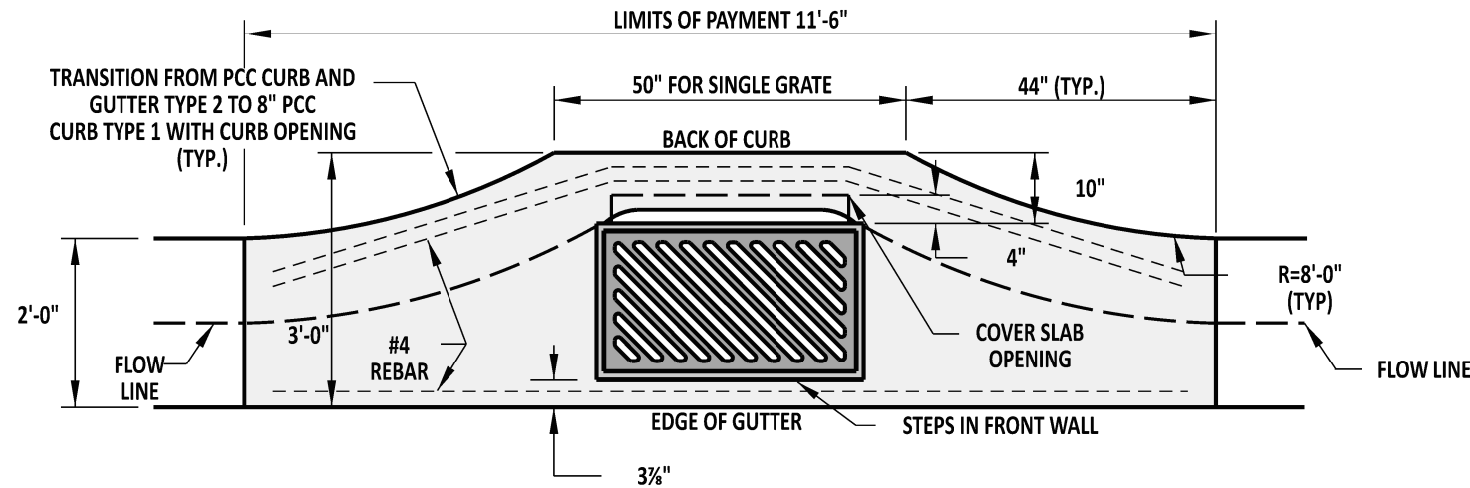
NOTES:

- 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.
- 3). REFER TO DETAIL D-5, SHEET 3 OF 9 FOR INLET TOP UNIT APPLICATION.



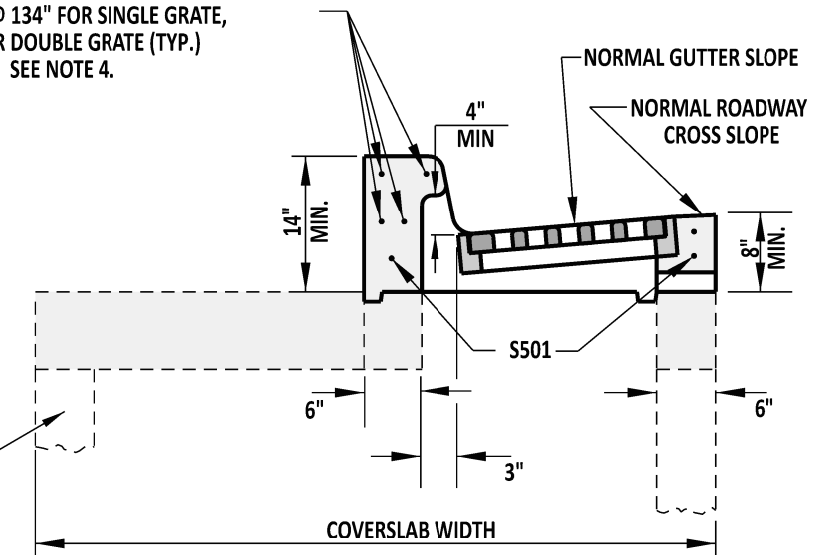
DELAWARE
DEPARTMENT OF TRANSPORTATION

34" (865) x 18" (455) DRAINAGE INLET DETAILS			APPROVED	SIGNATURE ON FILE	12/28/2010
STANDARD NO. D-5 (2010)			RECOMMENDED	SIGNATURE ON FILE	12/27/2010
SHT. 7 OF 9				DESIGN ENGINEER	DATE



SINGLE GRATE SETUP

#4 REBAR @ 134" FOR SINGLE GRATE,
172" FOR DOUBLE GRATE (TYP.)
SEE NOTE 4.



SUBDIVISION TOP & CONFIGURATION

NOTES:

- 1). MINIMUM BOX SIZE TO BE 34" x 24".
- 2). PIPE OPENINGS IN THE FRONT WALL SHALL NOT INTERFERE WITH THE STEPS. THE PIPE SHALL BE SHIFTED HORIZONTALLY TO AVOID THE STEPS. IT MAY BE NECESSARY TO USE A LARGER BOX TO AVOID CONFLICT BETWEEN STEPS AND PIPE OPENING.
- 3). SEE DETAIL D-5, SHEET 3 OF 9, FOR S501 BAR DIAGRAM.
- 4). THE REBAR IN THE HEAD IS PREFERRED TO BE 1 CONTINUOUS PIECE, HOWEVER, IF MULTIPLE PIECES ARE TO BE USED, EACH PIECE SHALL OVERLAP BY 12" MINIMUM AND THE FINAL LENGTH OF THE SPLICED REBAR SHALL BE AS NOTED ON THIS DETAIL.



DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET TOP UNIT, TYPE S

STANDARD NO.

D-5 (2018)

SHT. 8

OF 9

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

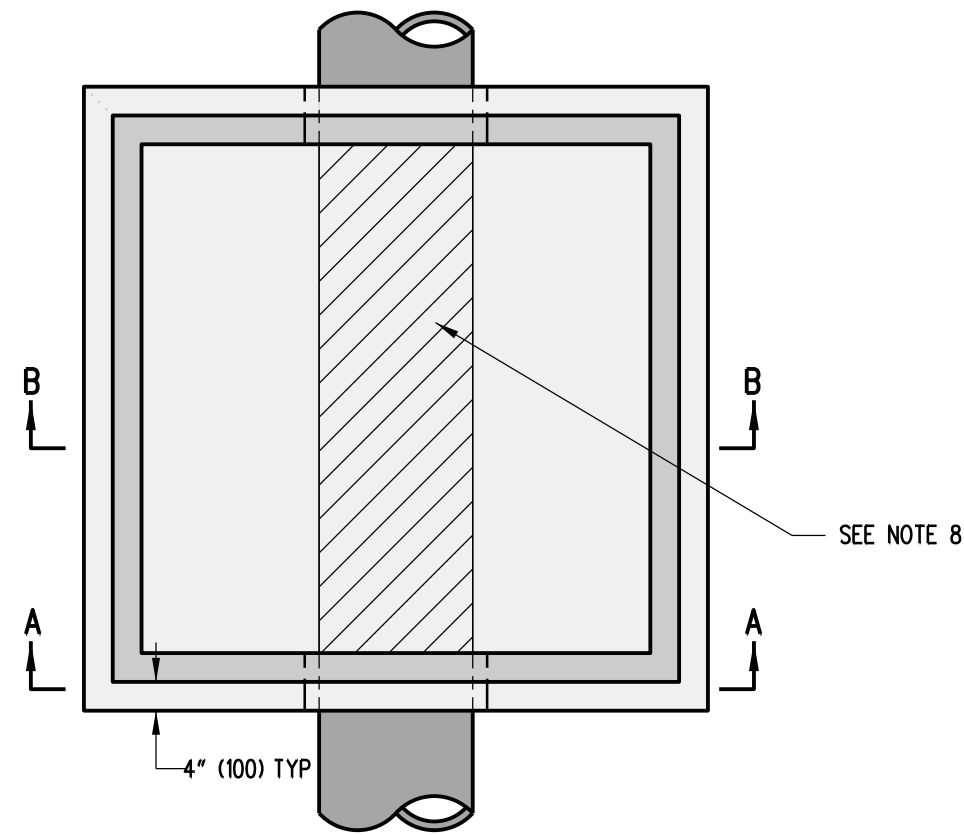
1/04/2019
DATE

RECOMMENDED

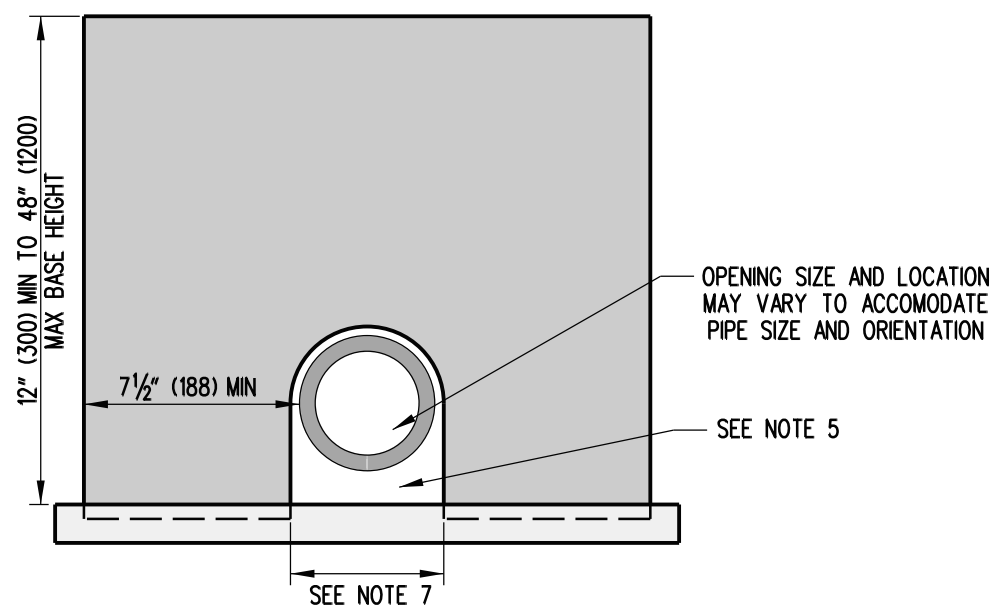
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12/20/2018
DATE

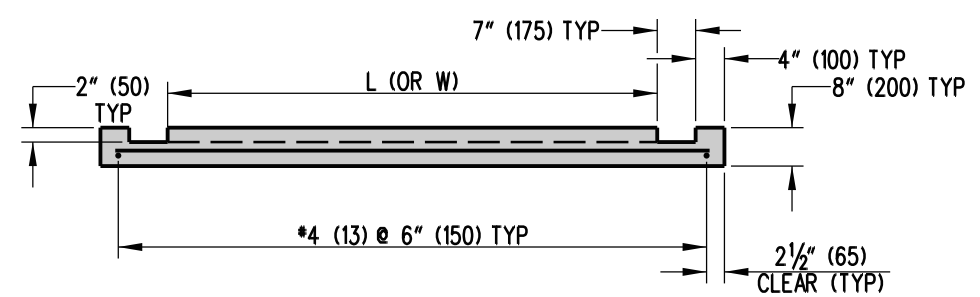
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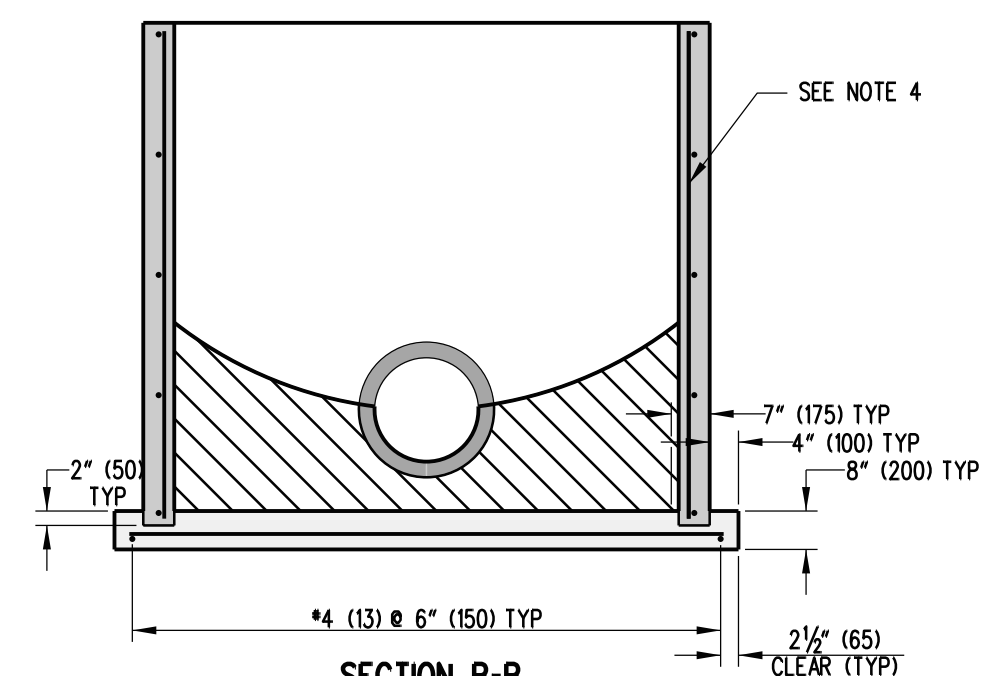
PLAN VIEW



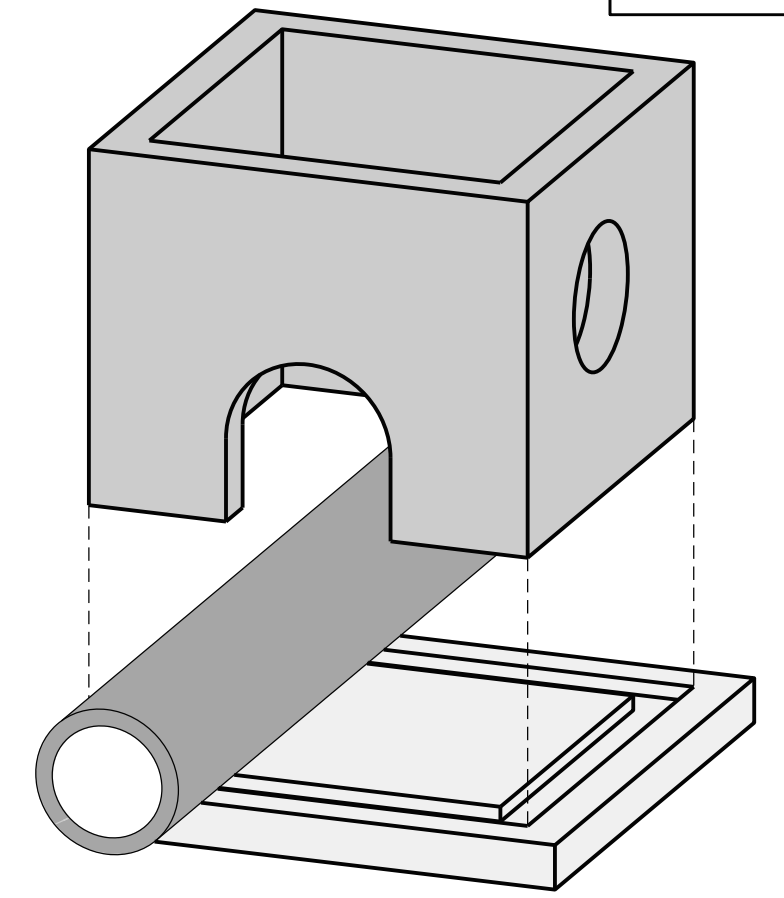
SECTION A-A



CAST-IN-PLACE BOTTOM
SECTION VIEW




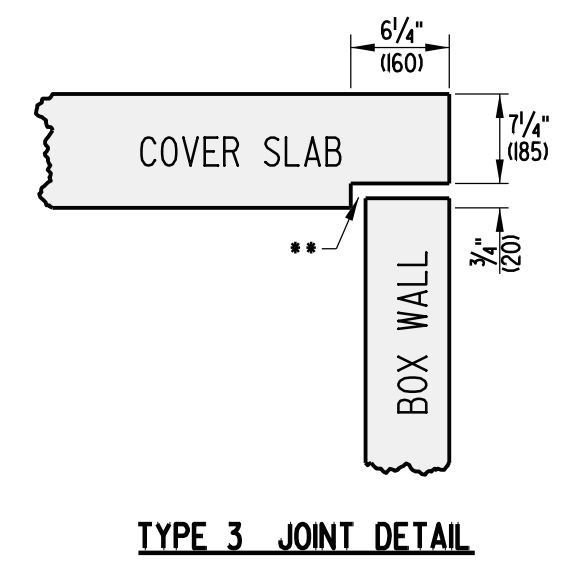
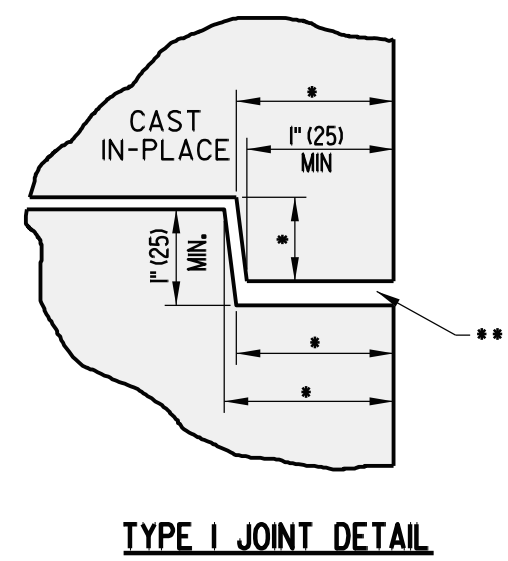
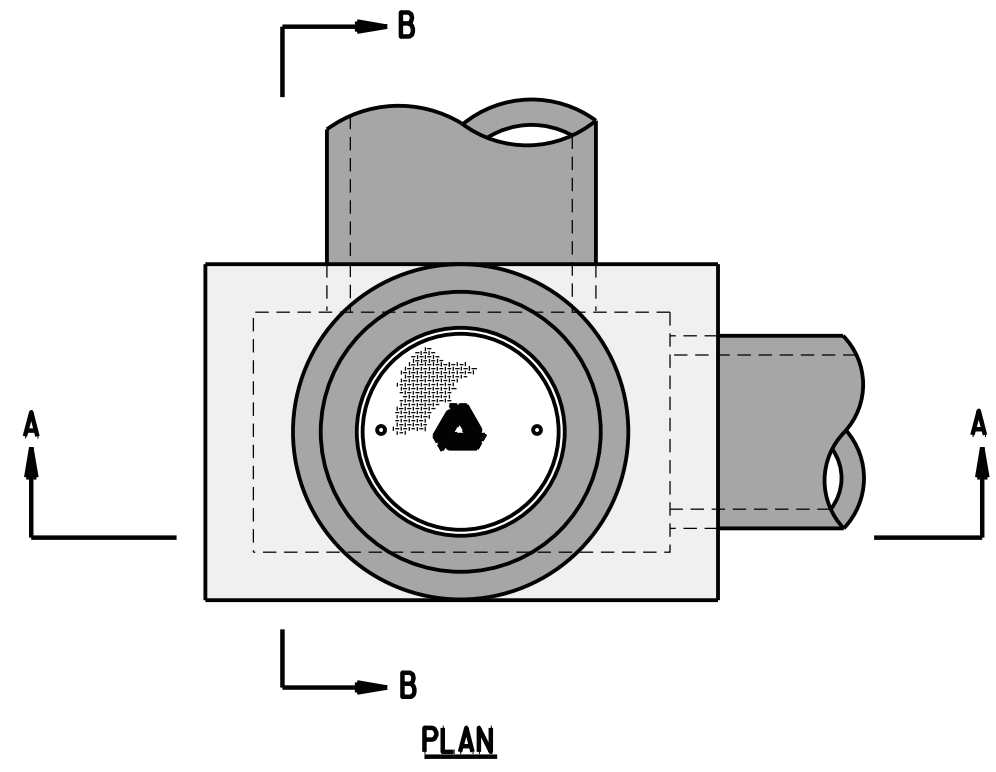
SECTION B-B



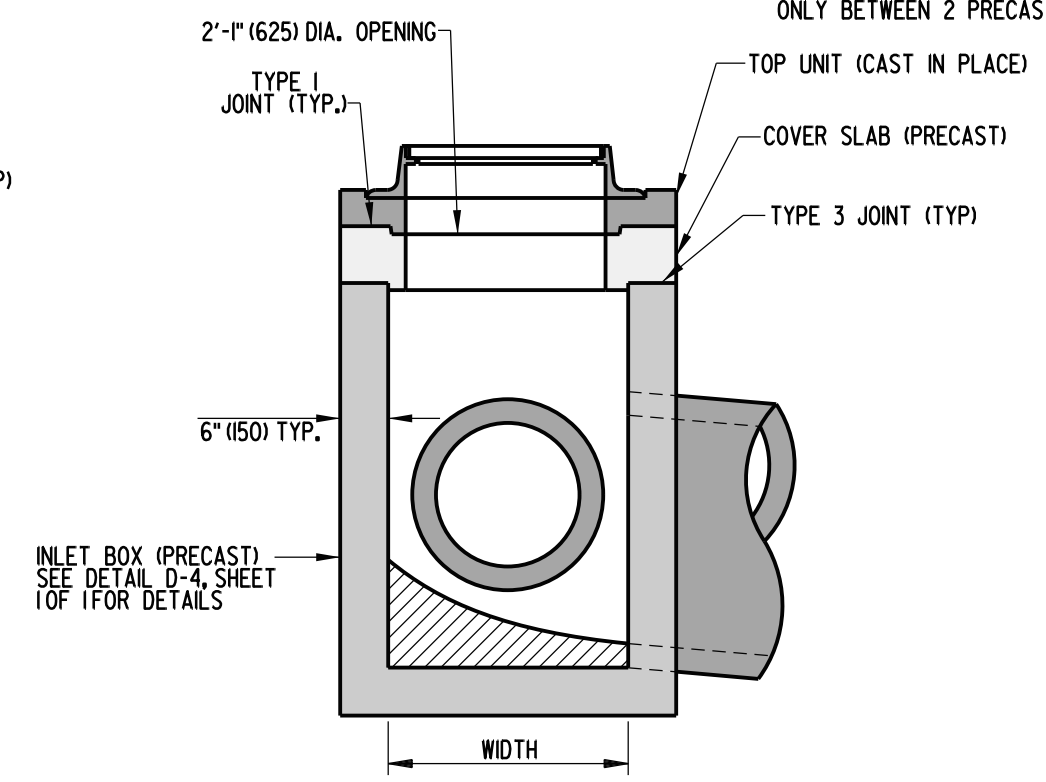
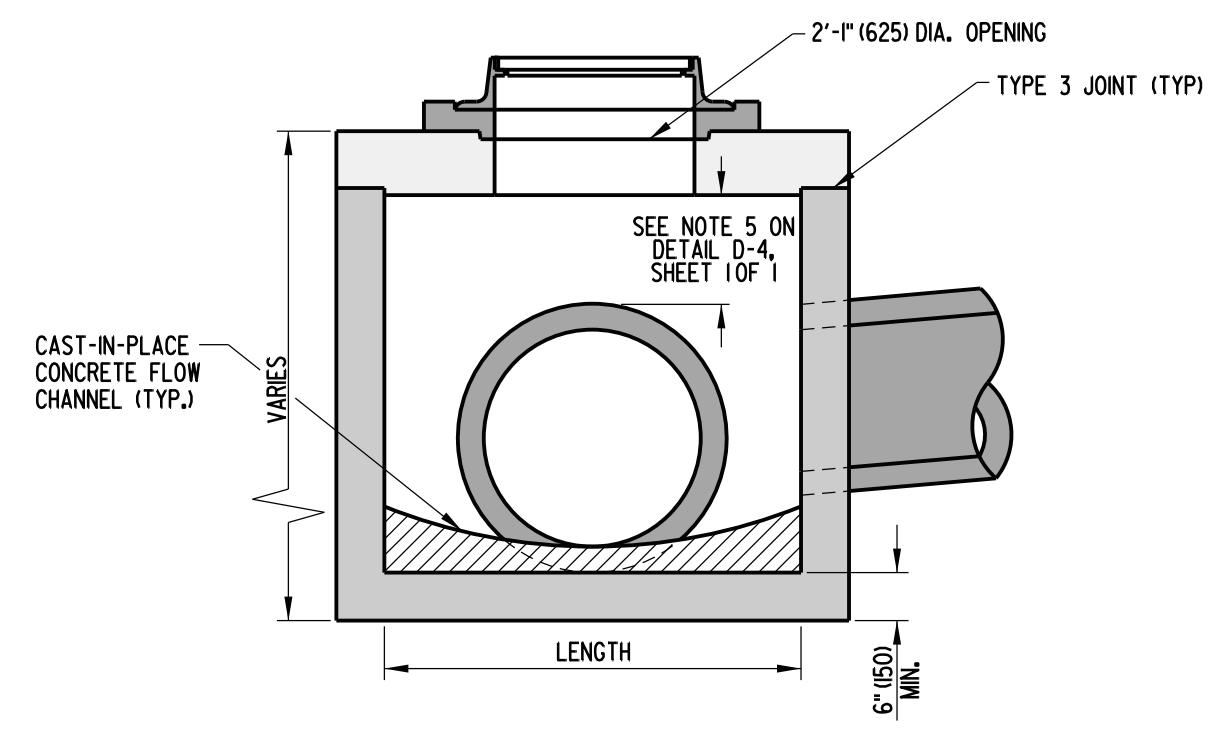
ISOMETRIC VIEW

- NOTES:
- 1). SEE DETAIL D-4, SHEET 1 OF 1 FOR BOX DETAILS AND NOTES.
 - 2). ALL REINFORCEMENT SHALL HAVE A MINIMUM COVER OF 1 1/2" (38) UNLESS NOTED OTHERWISE.
 - 3). PIPE SHALL BE SUPPORTED ON BOTH ENDS DURING THE CONSTRUCTION OF THE BASE.
 - 4). VERTICAL WALL REINFORCEMENT SHALL COMPLY WITH A.S.T.M. A615, 0.12 IN/FT IN EACH DIRECTION, VERTICALLY AND HORIZONTALLY.
 - 5). DOGHOUSE OPENING SHALL BE FILLED WITH HIGH STRENGTH, NON-SHRINK GROUT MIXED WITH COARSE AGGREGATE IN A 1:1 RATION BY WEIGHT.
 - 6). THE TOP OF THE DOGHOUSE OPENING SHALL, IN NO CIRCUMSTANCES, BE LESS THAN 4" (100) FROM THE TOP OF THE BOX.
 - 7). DOGHOUSE OPENING WIDTH SHALL BE BETWEEN 3" (75) AND 4" (100) LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE AND SHALL NOT ENCR OACH ON THE ADJACENT WALL.
 - 8). EXISTING PIPE IS TO EITHER BE COMPLETELY REMOVED BY SAWCUTTING AS CLOSE TO THE INSIDE BOX WALL AS POSSIBLE, OR BY REMOVING THE TOP PORTION OF THE PIPE AND USING THE REMAINING PIPE SECTION AS THE BOTTOM OF THE FLOW CHANNEL, AS SHOWN IN SECTION B-B.

 DELAWARE DEPARTMENT OF TRANSPORTATION	DOGHOUSE INLET BOX			APPROVED _____ SIGNATURE ON FILE CHIEF ENGINEER	12/28/2010 DATE
	STANDARD NO. D-5 (2010)	SHT. 9	OF 9	RECOMMENDED _____ SIGNATURE ON FILE DESIGN ENGINEER	12/27/2010 DATE




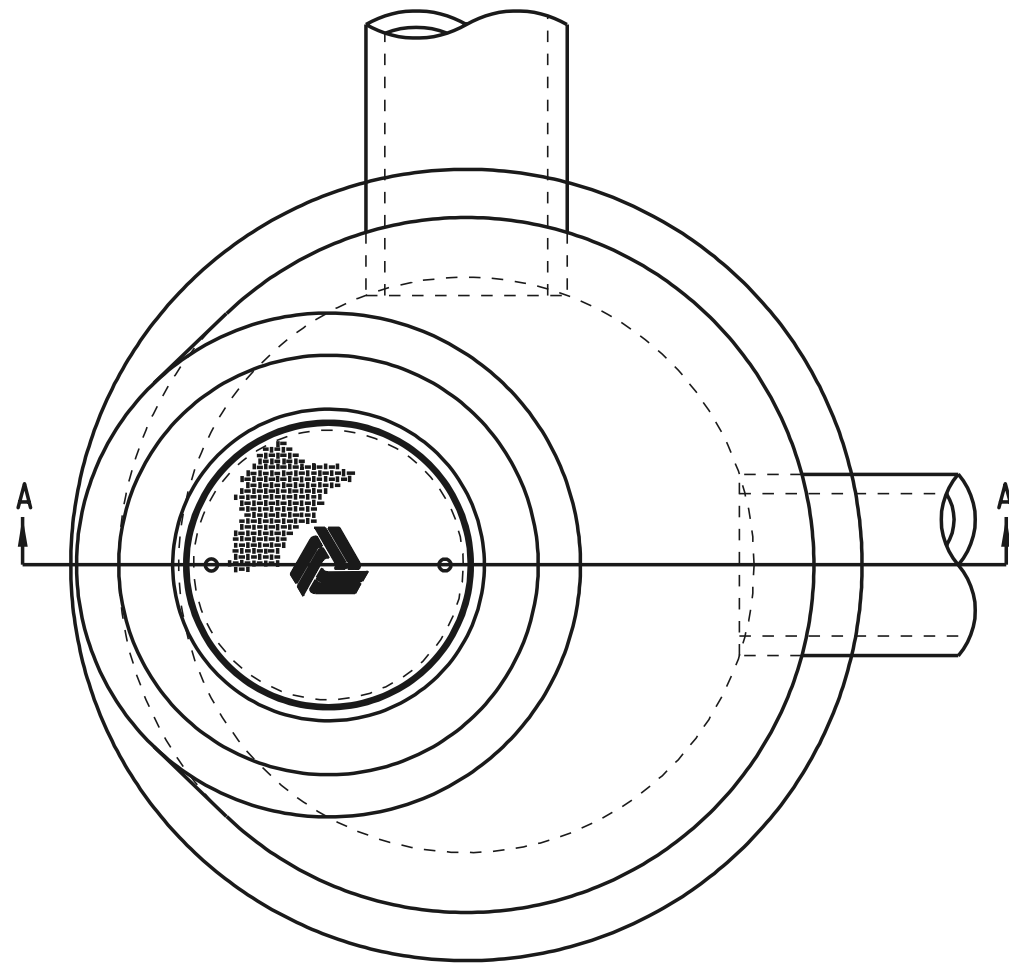
* DIMENSIONS MAY VARY
** JOINT SEALANT AS PER SPECIFICATIONS ONLY BETWEEN 2 PRECAST UNITS



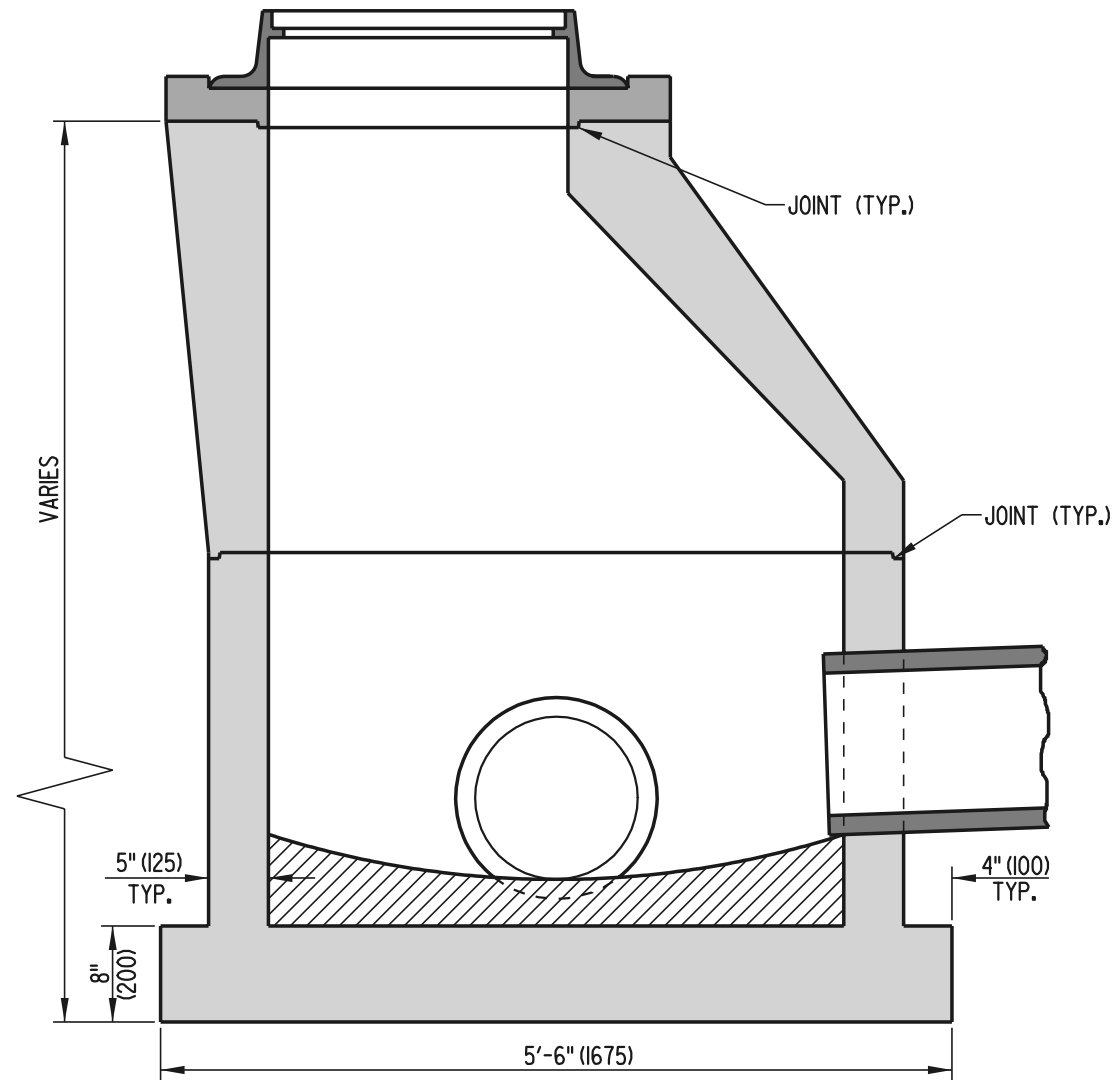
• - SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD D-4, SHEET 1 OF 1.

BOX MANHOLE ASSEMBLY

 DELAWARE DEPARTMENT OF TRANSPORTATION	MANHOLE DETAILS			APPROVED _____ CHIEF ENGINEER	01/19/2010 DATE
	STANDARD NO. D-6 (2009)	SHT. 1	OF 4	RECOMMENDED _____ DESIGN ENGINEER	01/14/2010 DATE



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 4

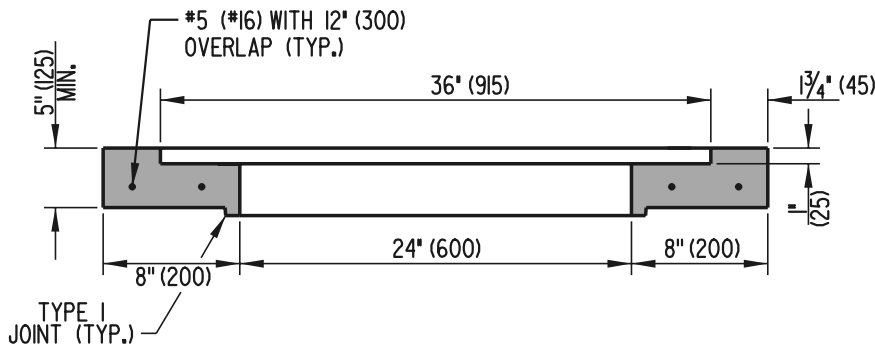
APPROVED

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

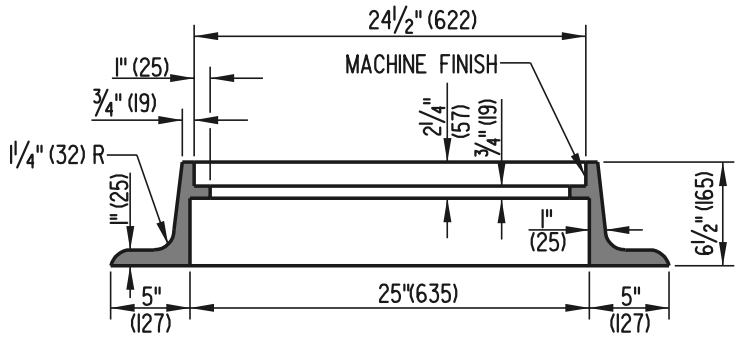
RECOMMENDED

Mehal Alghamdi
DESIGN ENGINEER
DATE 6/18/01

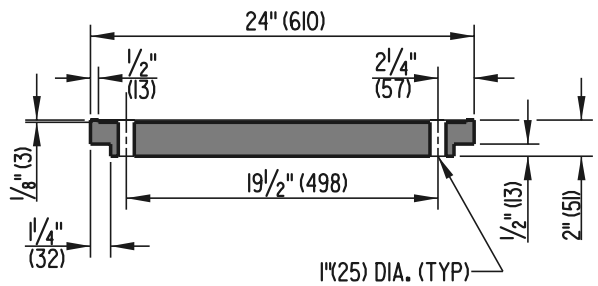
NOTE: TOP UNIT IS TO BE CAST IN PLACE TO GRADE AS SPECIFIED ON PLAN SHEETS OR AS DIRECTED BY ENGINEER.



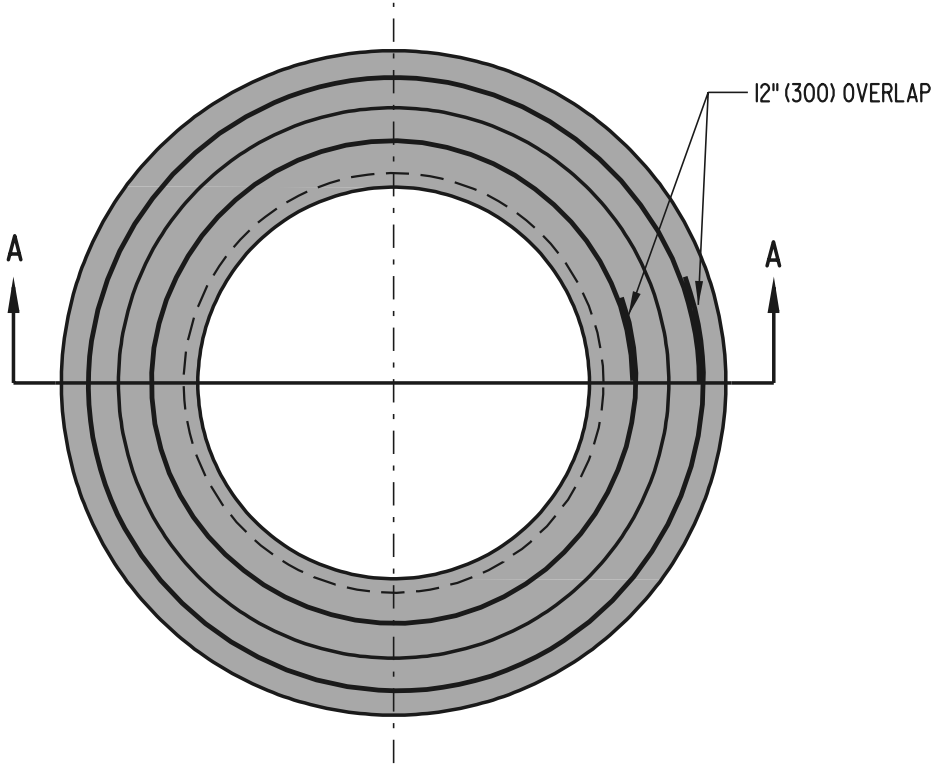
SECTION A-A



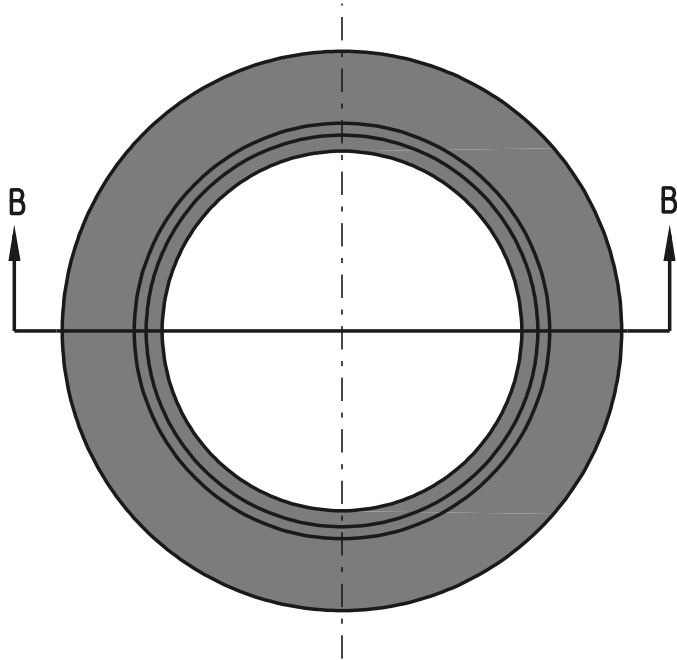
SECTION B-B



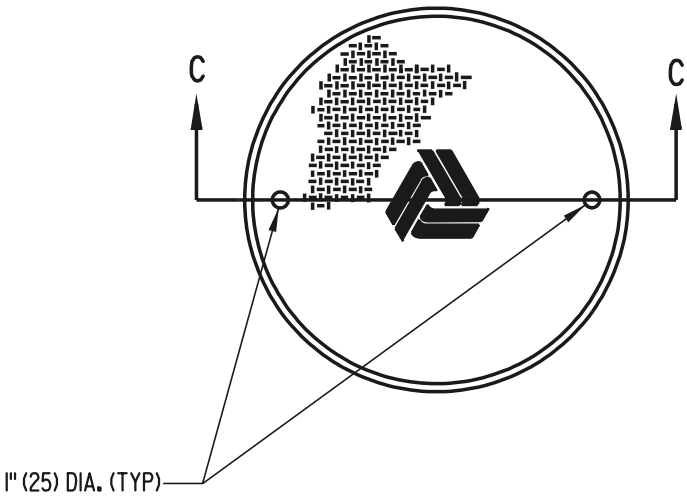
SECTION C-C



TOP UNIT



FRAME



COVER



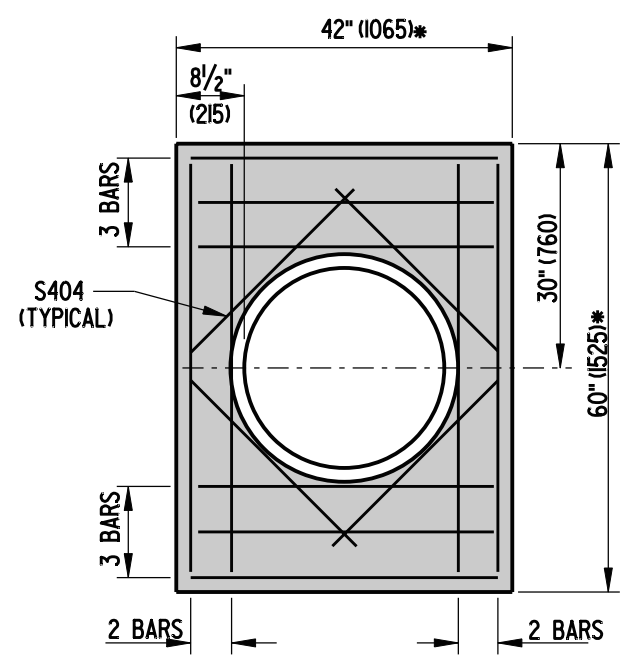
**DELAWARE
DEPARTMENT OF TRANSPORTATION**

MANHOLE DETAILS

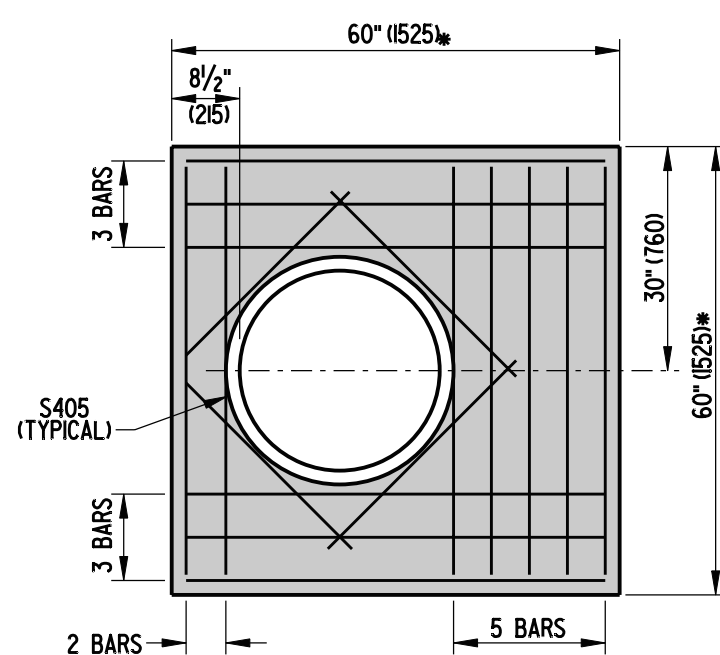
STANDARD NO. D-6 (2001) SHT. 3 OF 4

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

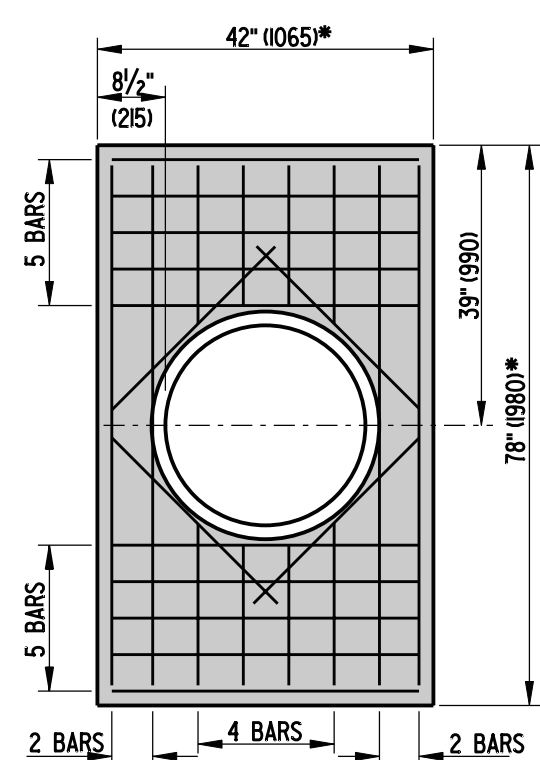
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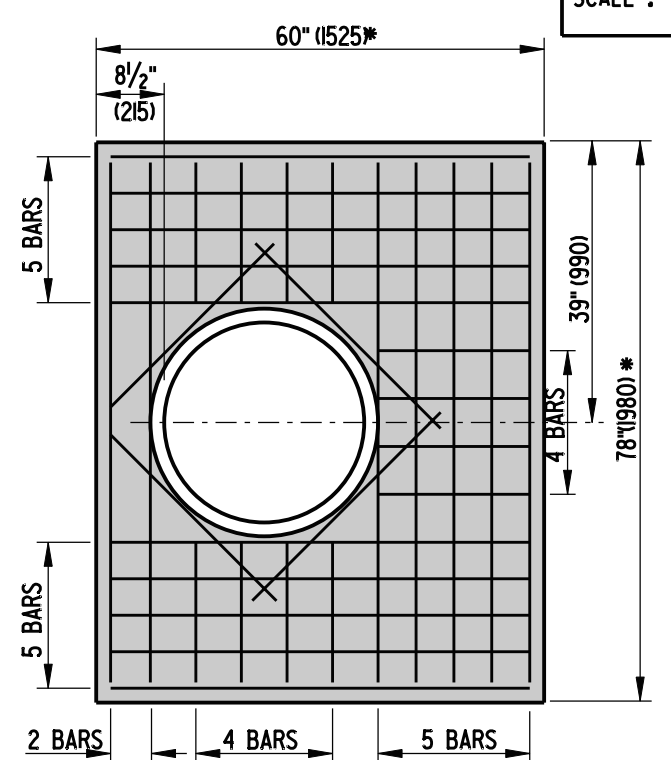
48" (1220) X 30" (760) MANHOLE



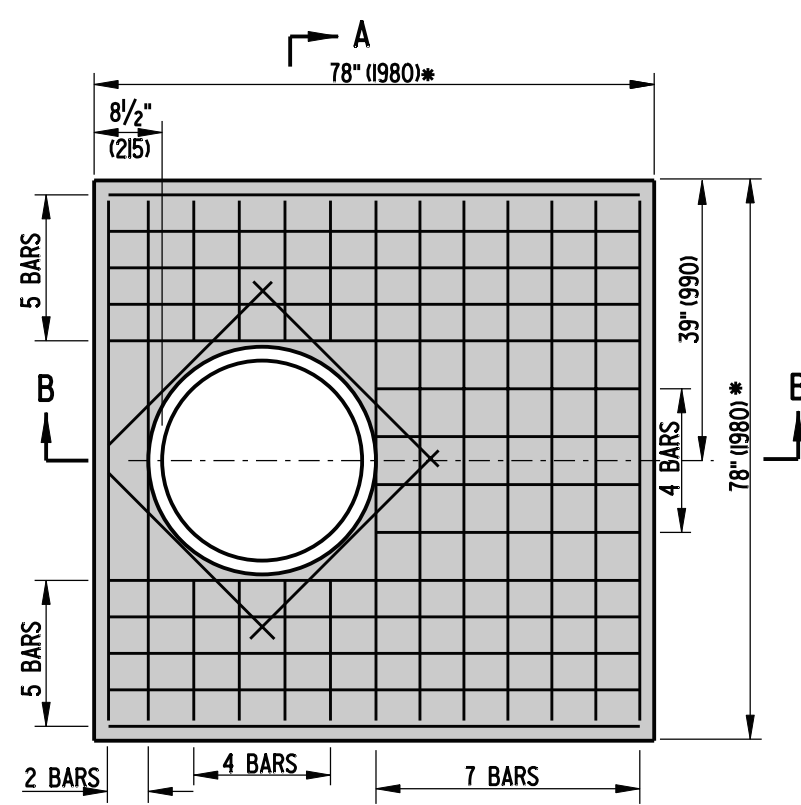
48" (1220) X 48" (1220) MANHOLE



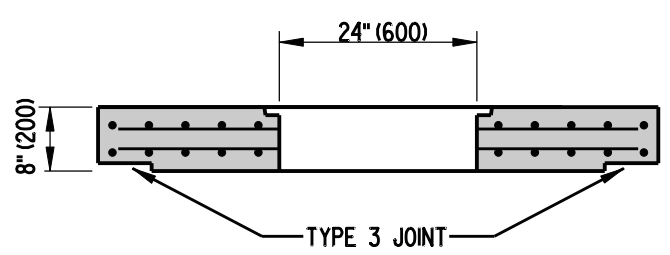
66" (1675) X 30" (760) MANHOLE



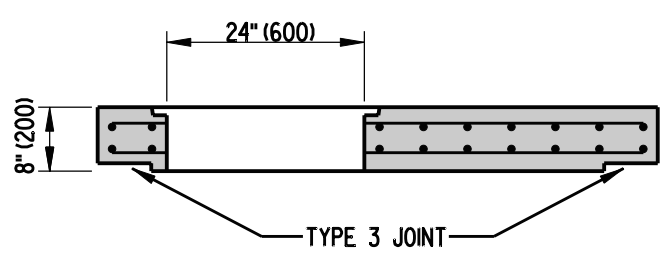
66" (1675) X 48" (1220) MANHOLE



66" (1675) X 66" (1675) MANHOLE



SECTION A-A



SECTION B-B

BOX MANHOLE COVER SLAB DETAILS

NOTES:

1. COVER SLABS SHALL BE PRE-CAST.
2. ALL BARS SHALL BE #5 (#16) SPACED AT 6" (150) ± UNLESS NOTED OTHERWISE.
3. MINIMUM BAR COVER = 1 1/2" (38).

* - DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.



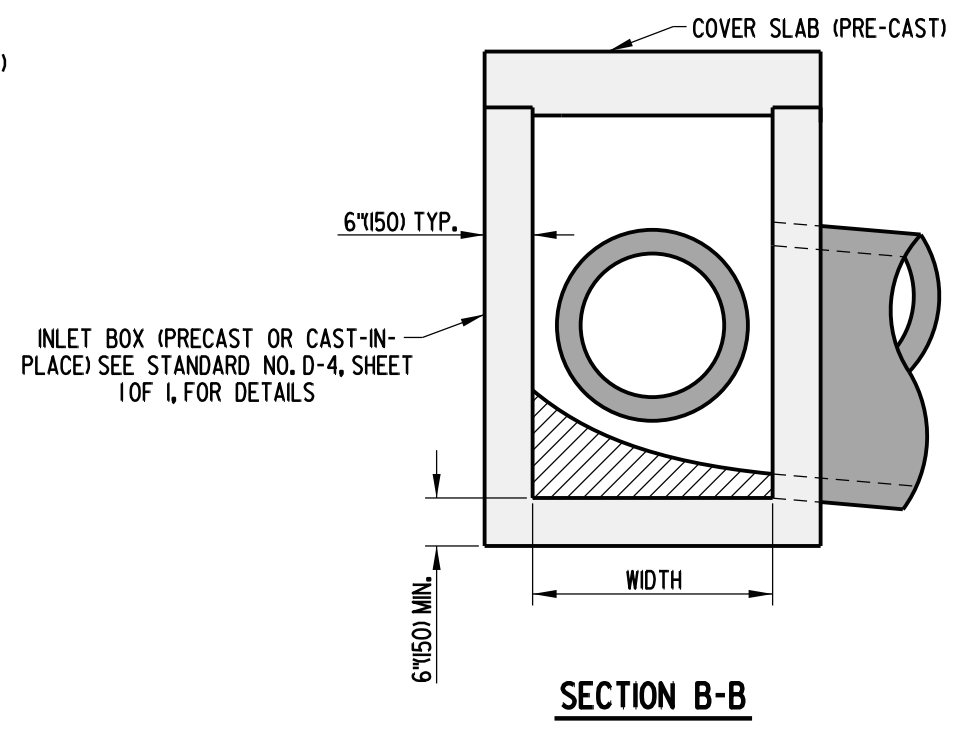
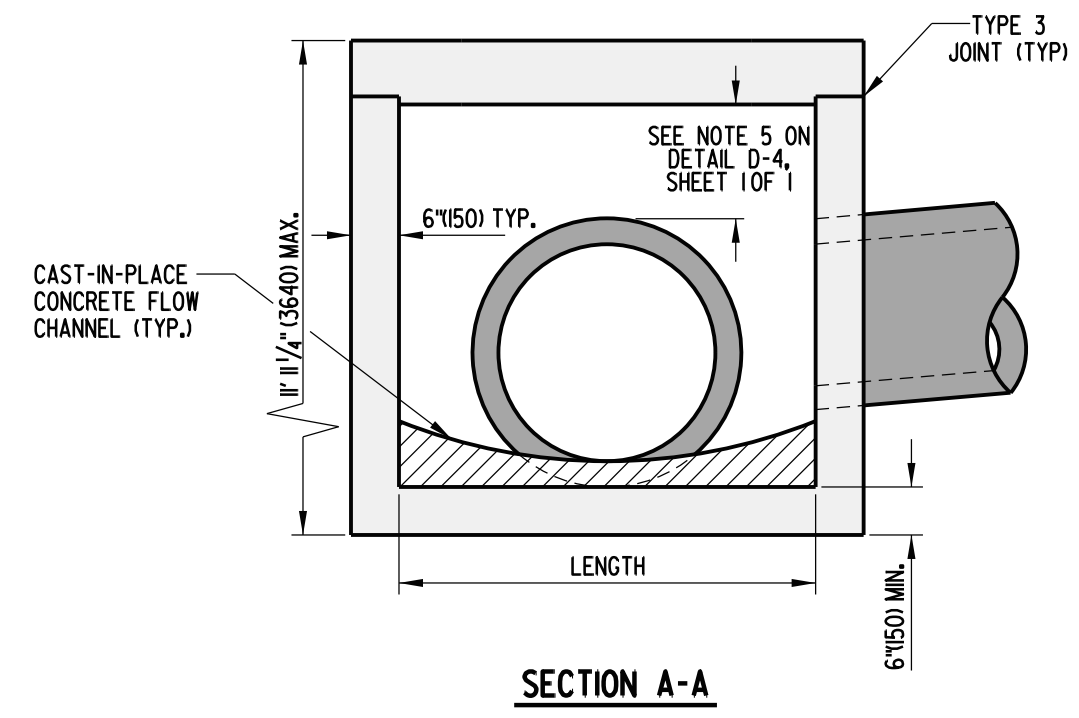
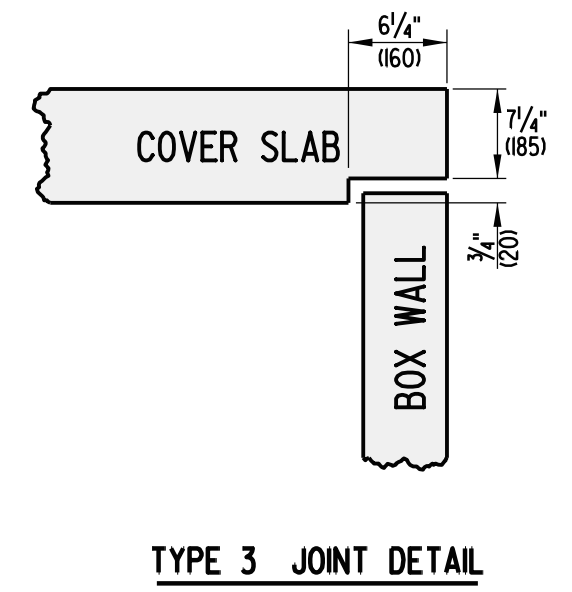
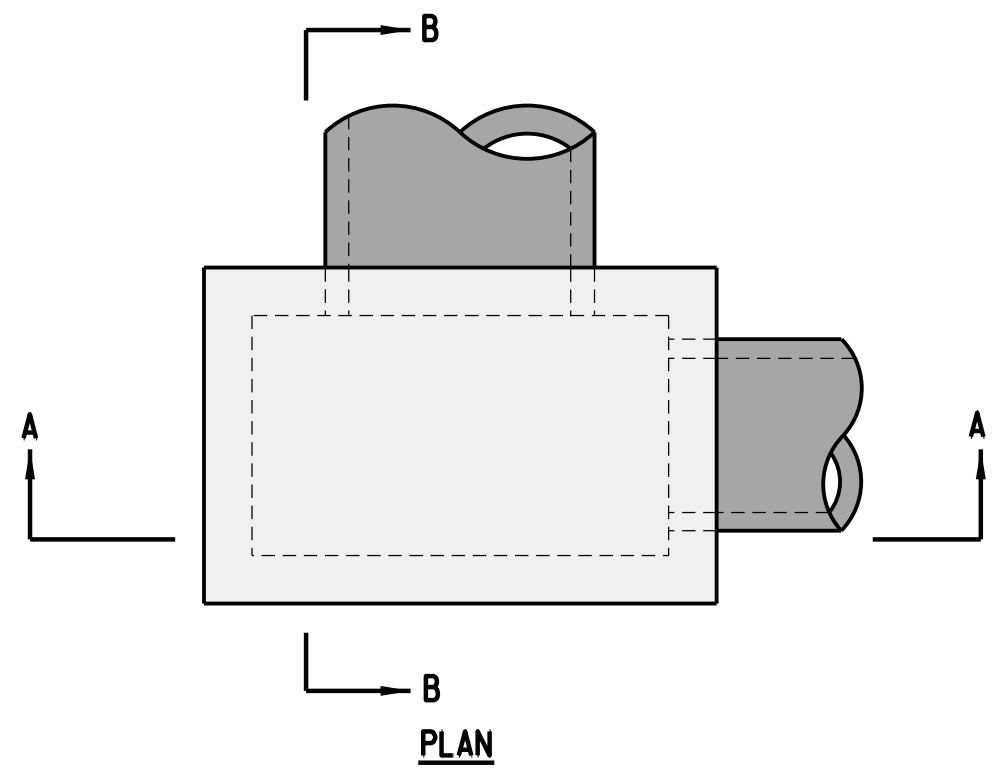
DELAWARE
DEPARTMENT OF TRANSPORTATION

MANHOLE DETAILS

STANDARD NO. D-6 (2007)

SHT. 4 OF 4

APPROVED *[Signature]* 10/24/07
CHIEF ENGINEER DATE
RECOMMENDED *[Signature]* 10/23/07
DESIGN ENGINEER DATE



• - SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD NO. D-4, SHEET 1 OF 1.

JUNCTION BOX ASSEMBLY



DELAWARE
DEPARTMENT OF TRANSPORTATION

JUNCTION BOX DETAILS

STANDARD NO. D-7 (2009)

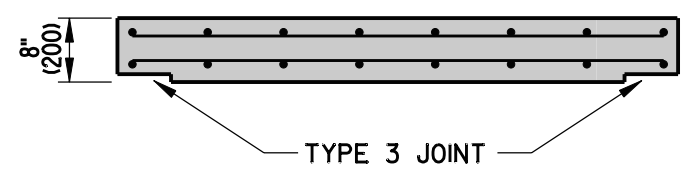
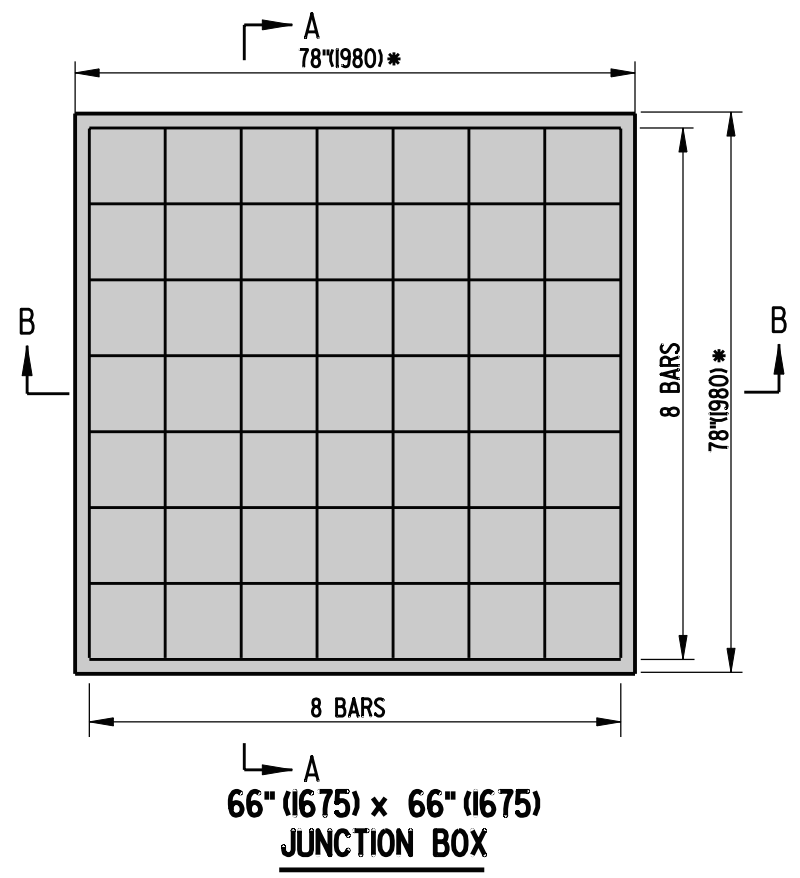
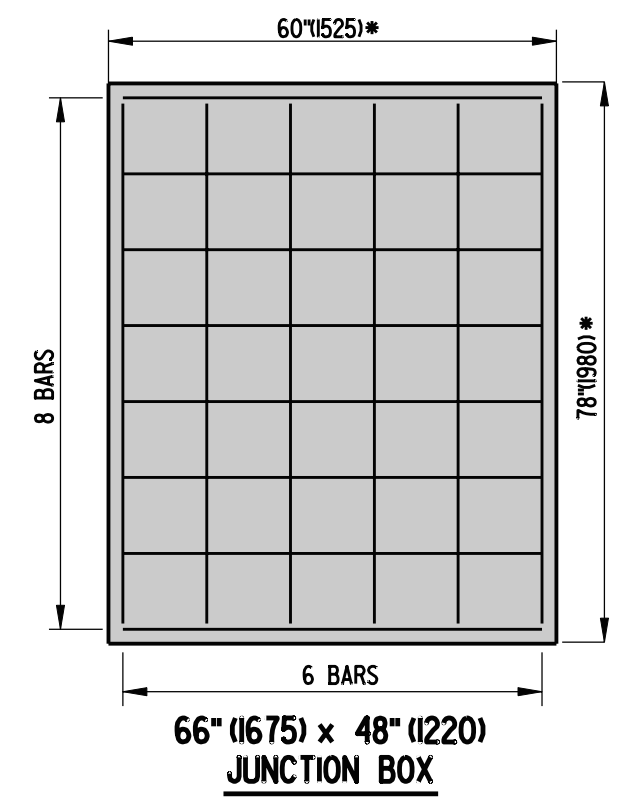
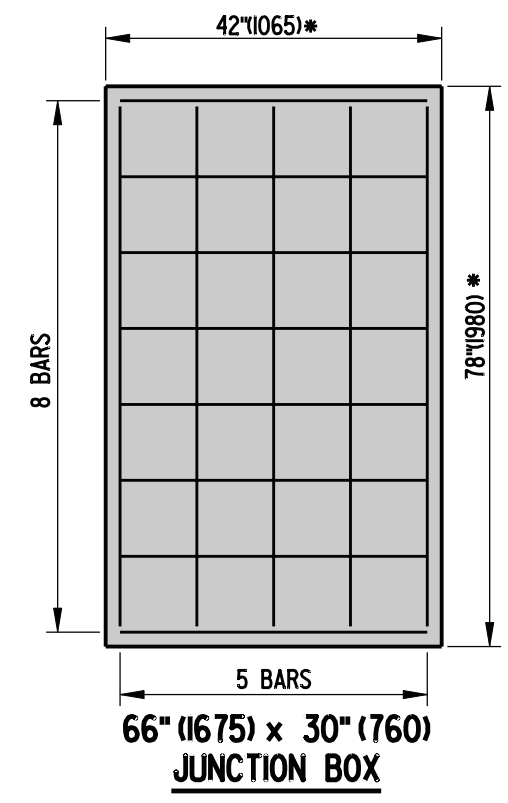
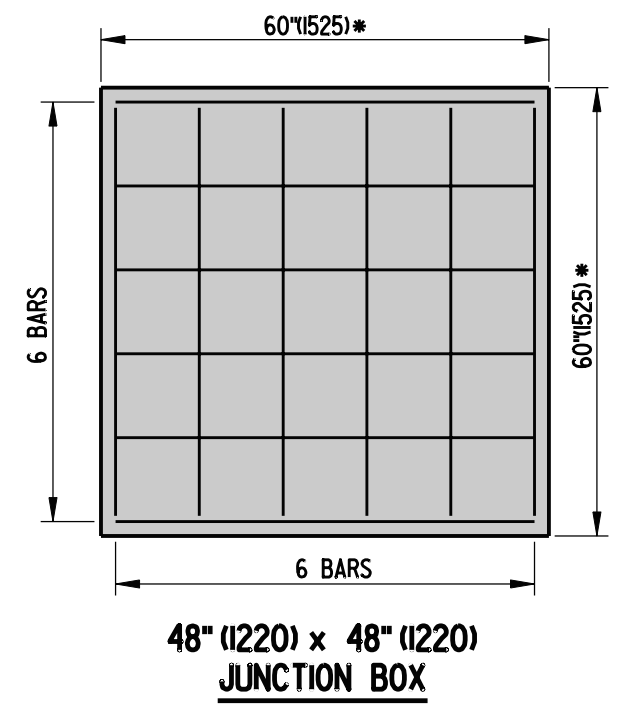
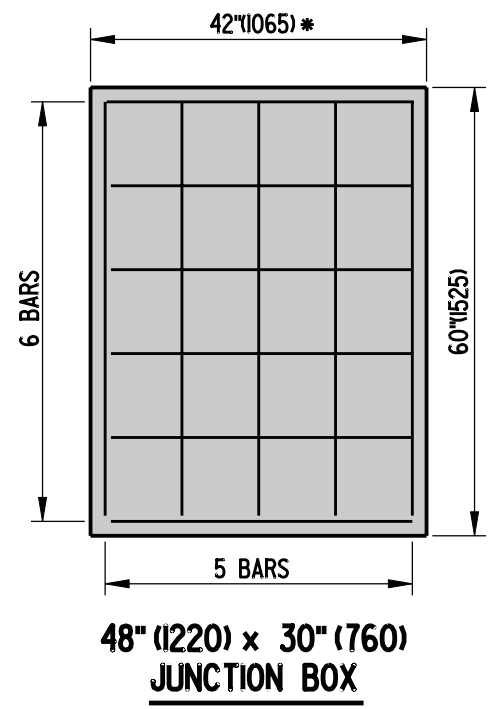
SHT. 1 OF 2

APPROVED

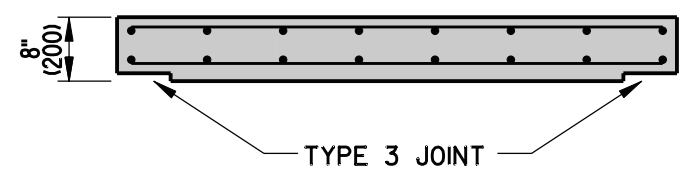
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CHIEF ENGINEER
01/19/2010
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER
01/14/2010
DATE




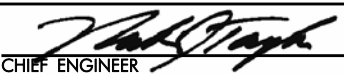

SECTION A-A

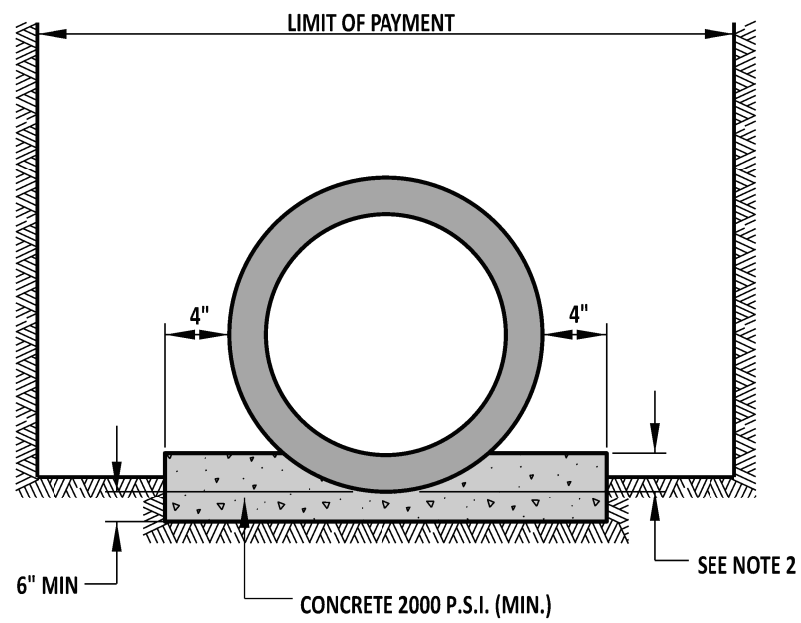


SECTION B-B

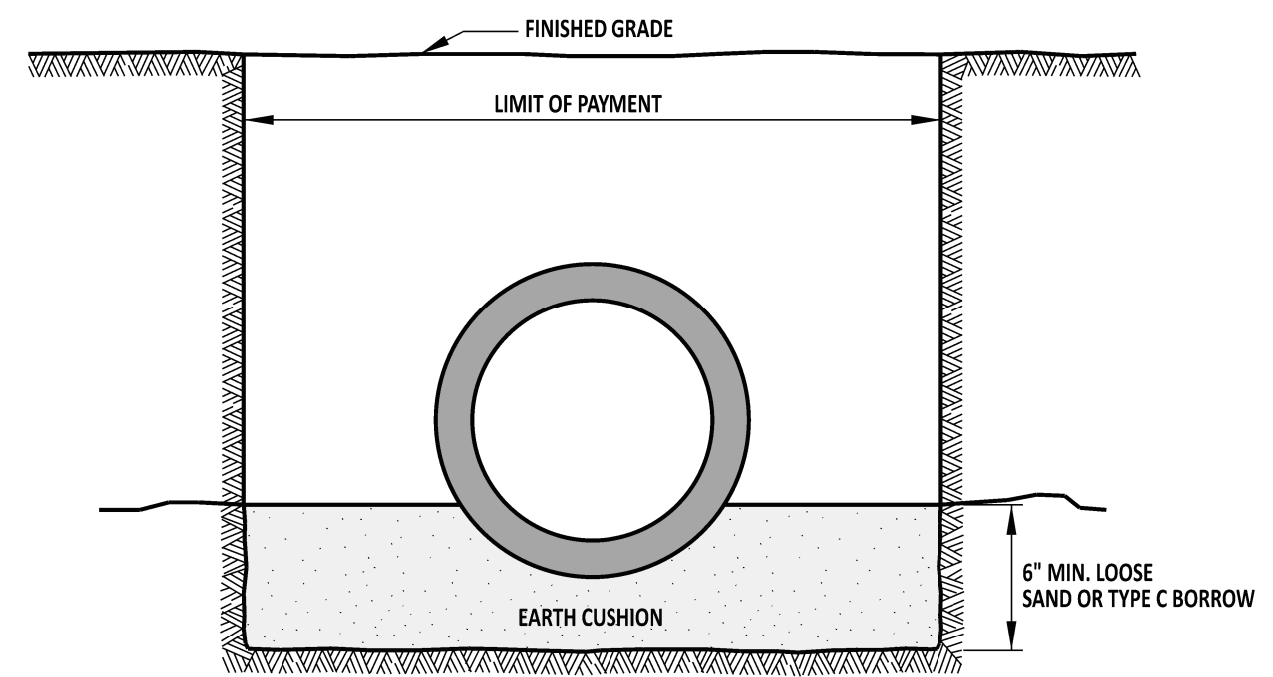
JUNCTION BOX COVER SLAB DETAILS

- NOTES:
- 1. COVER SLABS ARE TO BE PRE-CAST.
 - 2. ALL BARS ARE TO BE #5 (#16) SPACED @ 12" (305) ± UNLESS NOTED OTHERWISE.
 - 3. MINIMUM BAR COVER = 1 1/2" (38).
 - * - DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.

 DELAWARE DEPARTMENT OF TRANSPORTATION	JUNCTION BOX DETAILS			APPROVED  10/24/07 CHIEF ENGINEER DATE
	STANDARD NO. D-7 (2007)	SHT. 2	OF 2	RECOMMENDED  10/23/07 DESIGN ENGINEER DATE




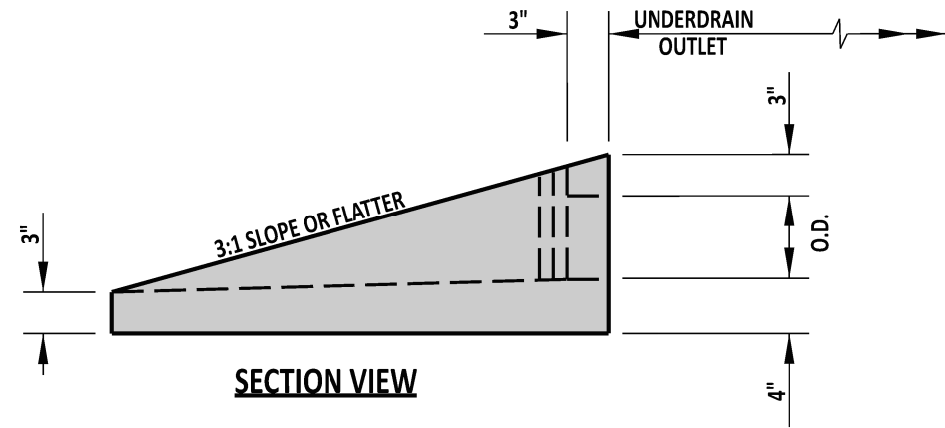
CLASS A BEDDING



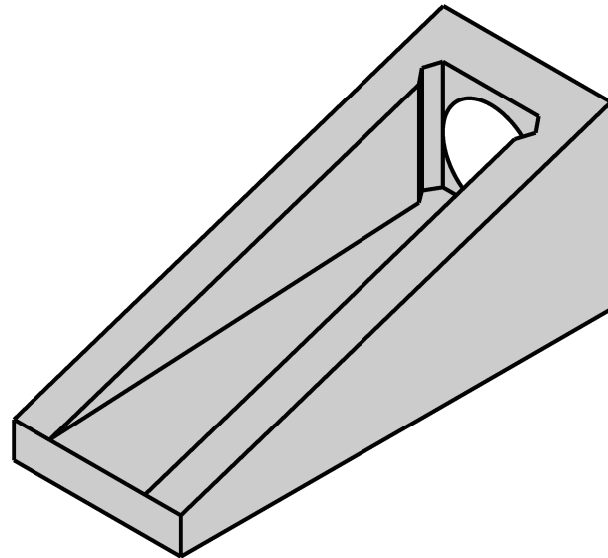
CLASS C BEDDING

- NOTE:
- 1). USE CLASS C BEDDING UNLESS OTHERWISE INDICATED.
 - 2). FOR CLASS A BEDDING, IMBED PIPE IN CONCRETE 6" FOR PIPES SMALLER THAN 24" I.D., 10" FOR PIPES 24" TO 60", AND FOR PIPES LARGER THAN 60" SEE PROJECT DETAILS.

 DELAWARE DEPARTMENT OF TRANSPORTATION	PIPE BEDDING			APPROVED	SIGNATURE ON FILE	1/04/2019
	STANDARD NO.	D-8 (2018)	SHT. 1 OF 1	RECOMMENDED	SIGNATURE ON FILE	12/20/2018

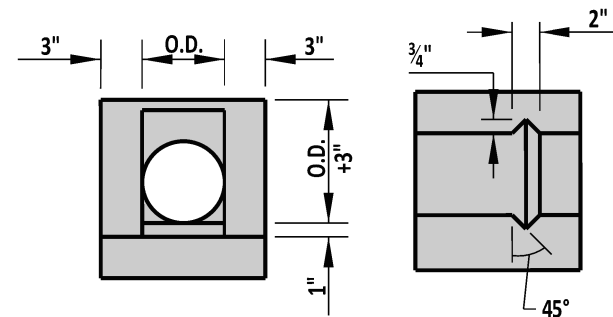


SECTION VIEW



ISOMETRIC VIEW

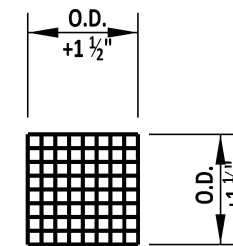
UNDERDRAIN OUTLET



FRONT VIEW

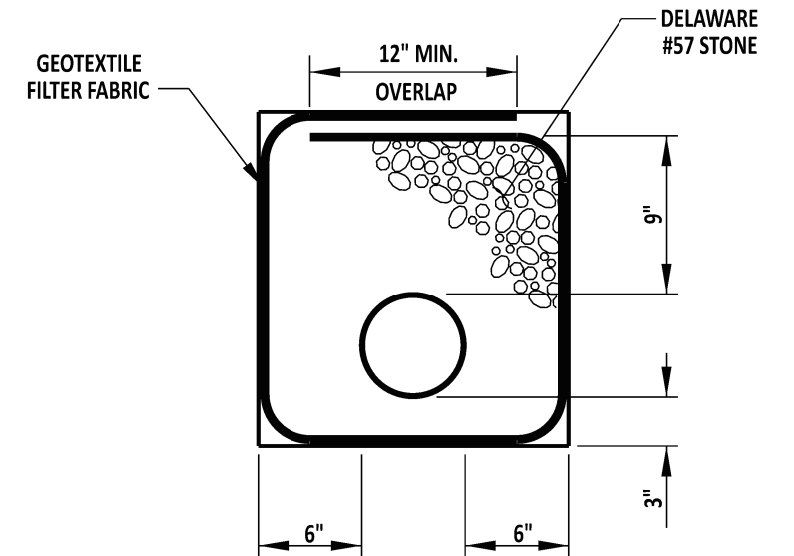
TOP VIEW

SLOTTED HEADWALL DETAIL

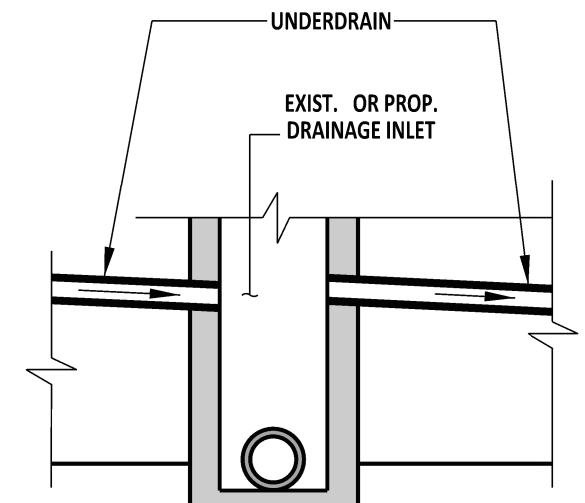


FRONT VIEW

RODENT SCREEN



SECTION



ELEVATION

PERFORATED PIPE UNDERDRAIN

NOTES:

- 1). THE PERFORATED PIPE UNDERDRAIN SHALL BE LOCATED AS SHOWN ON THE TYPICAL SECTIONS OF THE CONSTRUCTION PLANS.
- 2). GEOTEXTILE FILTER FABRIC SHALL BE PLACED ENTIRELY OVER THE TOP OF UNDERDRAIN TRENCH AND LAPPED AS SHOWN.
- 3). SLOPE OF UNDERDRAINS SHALL MATCH ROADWAY GRADE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- 4). OUTLET PIPE CONFIGURATIONS SHALL USE 45 DEGREE ELBOWS OR SHALL USE STRAIGHT PIPE WITH A MINIMUM RADIUS OF 3' TO DIRECT UNDERDRAIN PIPE INTO SIDE OF DRAINAGE INLET OR TO POSITIVE GRADE. PIPE SHALL ALSO BE NON-PERFORATED AND HAVE A SMOOTH INTERIOR.
- 5). RODENT SCREEN SHALL SNUGLY FIT THE PROVIDED SLOT WITH THE SCREEN LIP FITTING TIGHT TO THE BOTTOM FLOW LINE.
- 6). A DELINEATOR SHALL BE INSTALLED ADJACENT TO THE CONCRETE APRON OF THE UNDERDRAIN OUTFALL IN THE UPSTREAM DIRECTION OF VEHICULAR TRAVEL. THE DELINEATOR SHALL BE GALVANIZED TELESCOPING STEEL SIGN POST AND INSTALLED IN ACCORDANCE WITH STANDARD T-15 SHEET 1 OF 1. THE DELINEATOR SHALL EXTEND 4' ABOVE GROUND ELEVATION AND SHALL HAVE A 4" x 8" x 0.08" ALUMINUM RETROREFLECTIVE BLUE REFLECTOR BOLTED TO BOTH SIDES OF THE POST WITH HARDWARE COMPATIBLE WITH THE SIGN POST.
- 7). WHEN TWO LINES OF PIPE UNDERDRAIN DRAIN TO A LOW POINT, EACH PIPE MUST HAVE ITS OWN OUTLET.
- 8). PERFORATED PIPE UNDERDRAIN SHALL NOT BE PLACED UNDER GUARDRAIL IN ORDER TO AVOID PUNCTURING.



DELAWARE
DEPARTMENT OF TRANSPORTATION

PERFORATED PIPE UNDERDRAIN DETAIL

STANDARD NO.

D-9 (2018)

SHT. 1

OF 1

APPROVED

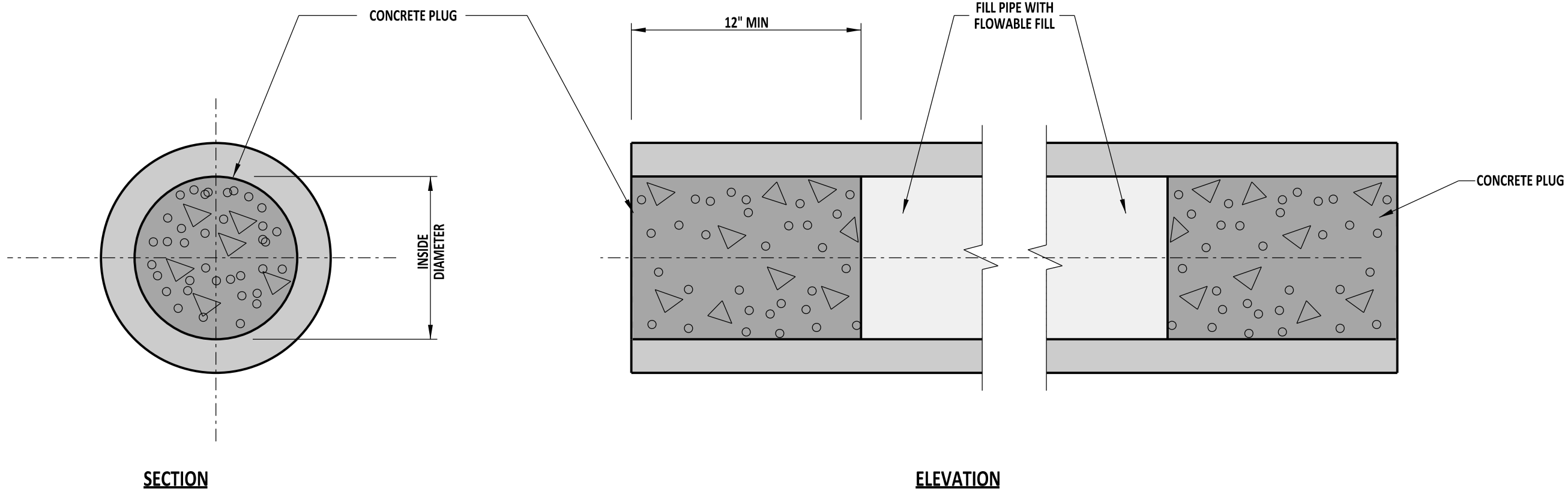
SIGNATURE ON FILE
CHIEF ENGINEER

1/04/2019
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2018
DATE



NOTE:
THE CONTRACTOR SHALL FURNISH MATERIAL AND PLUG ABANDONED DRAINAGE PIPES WITH CONCRETE AS DIRECTED BY THE ENGINEER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

PIPE PLUGGING DETAIL

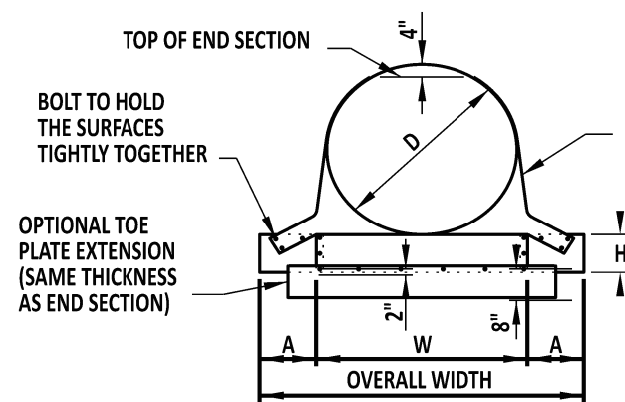
STANDARD NO. D-10 (2011) SHT. 1 OF 1

APPROVED

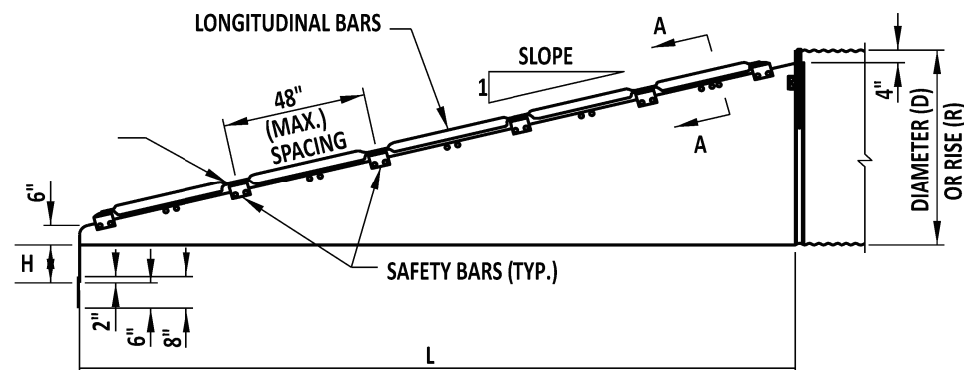
SIGNATURE ON FILE 12/22/2011
CHIEF ENGINEER DATE

RECOMMENDED

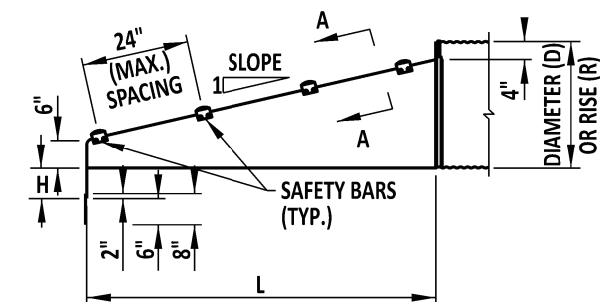
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DESIGN ENGINEER DATE



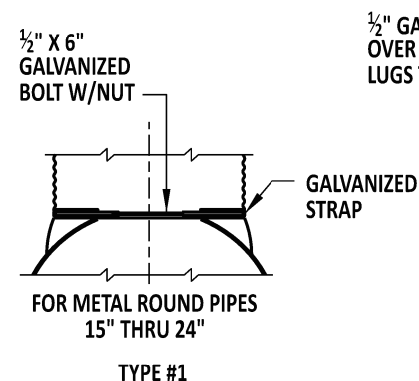
ROUND PIPE CULVERT



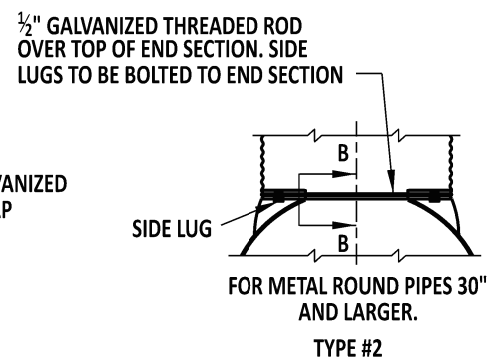
CROSS DRAINAGE END SECTION



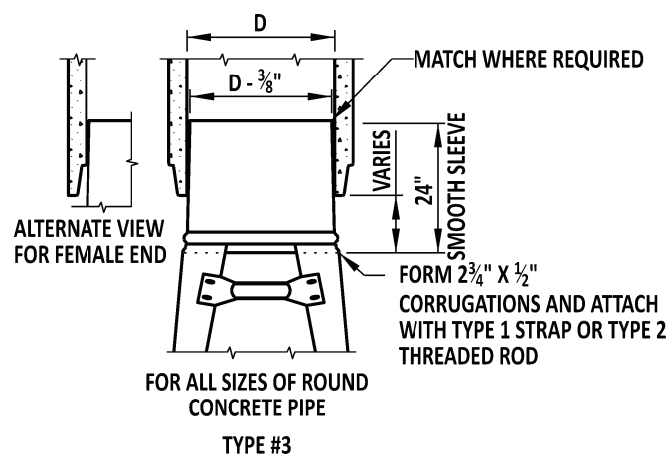
PARALLEL DRAINAGE END SECTION



TYPE #1



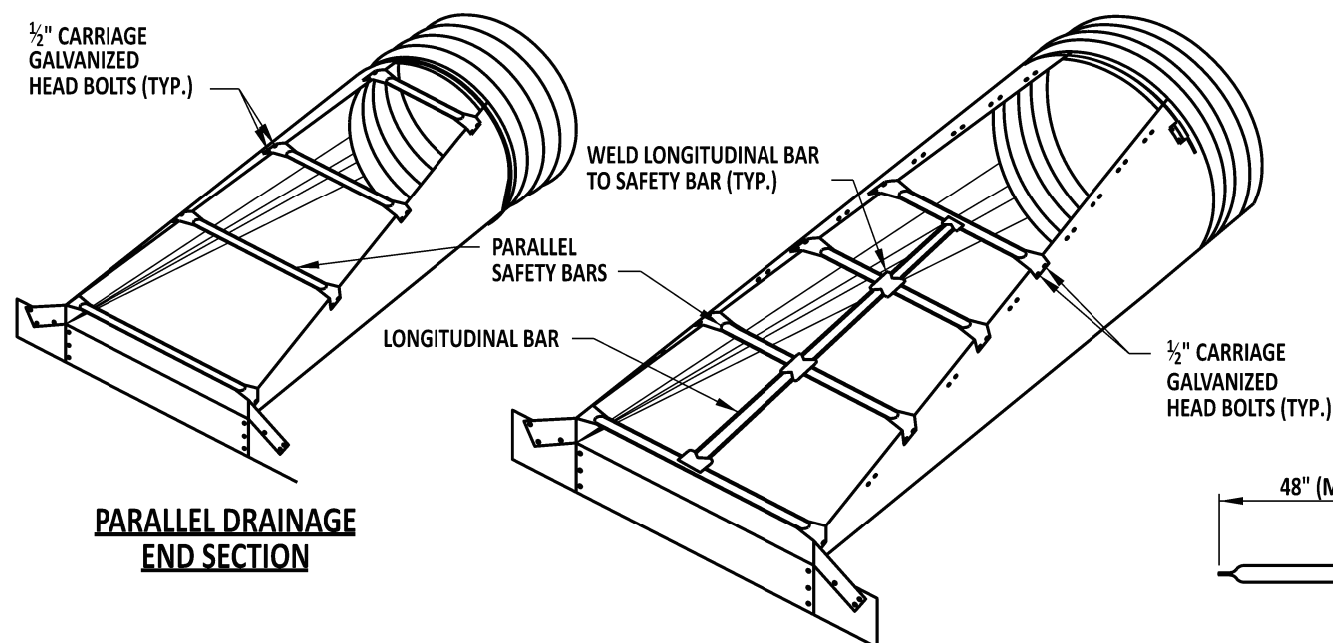
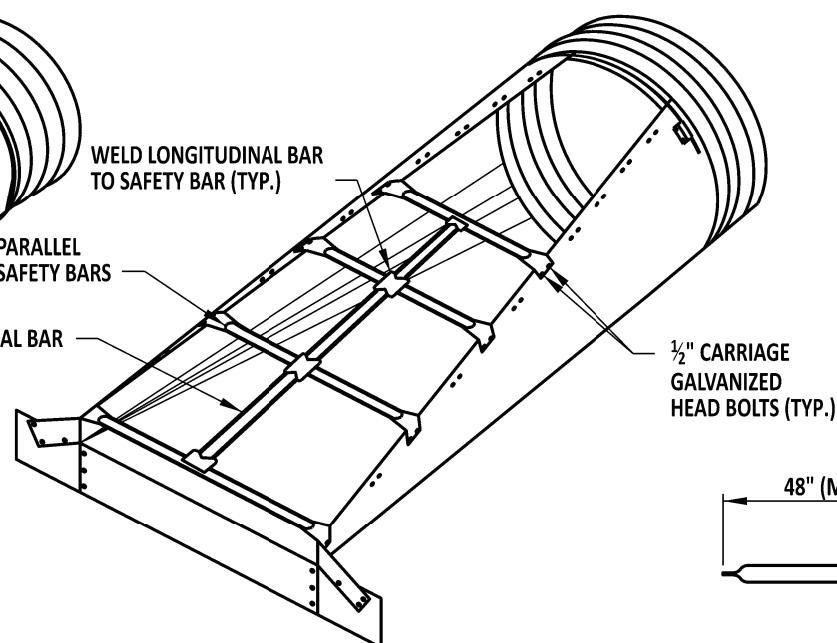
TYPE #2



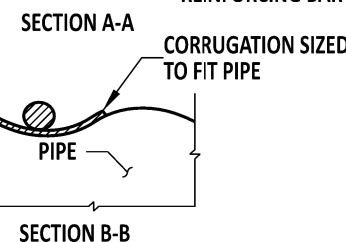
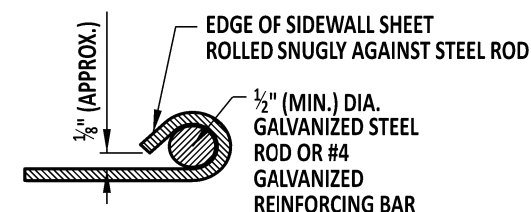
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CONNECTOR DETAILS

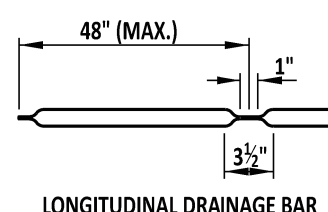
METAL END SECTIONS FOR ROUND PIPE CULVERT							
PIPE SIZE D INCHES	METAL THICK (MIN.) INCH/GAGE	DIMENSIONS IN INCHES					
		A	H	W	OVERALL WIDTH	L	
						Slope=4	Slope=6
18	0.064/16	8	6	24	40	32	32
24	0.064/16	8	6	30	46	55	83
30	0.109/12	12	9	36	60	79	118
36	0.109/12	12	9	42	66	102	154
42	0.109/12	16	12	48	80	126	189
48	0.109/12	16	12	54	86	150	224
54	0.109/12	16	12	60	92	173	260
60	0.109/12	16	12	66	98	197	295


PARALLEL DRAINAGE
END SECTION


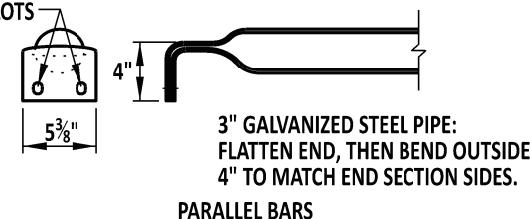
CROSS DRAINAGE END SECTION



SECTION B-B



LONGITUDINAL DRAINAGE BAR



PARALLEL BARS

SAFETY BAR DETAILS

NOTES:

- 1). USE END SECTIONS ON 1V:4H TO 1V:6H SLOPES ONLY. USE TOE PLATE EXTENSION WHERE SHOWN ON THE PLANS.
- 2). FABRICATE SAFETY AND LONGITUDINAL BARS FROM STEEL PIPE CONFORMING TO ASTM SCHEDULE 40 SPECIFICATIONS. GALVANIZE BARS HOT DIPPED AFTER FABRICATION.
- 3). A LONGITUDINAL BAR IS REQUIRED FOR CROSS DRAINAGE END SECTIONS WHEN THE SPAN IS GREATER THAN 30". USE ADDITIONAL LONGITUDINAL BARS IF SPACING EXCEEDS 30" ON LARGER END SECTIONS.
- 4). 18" DIAMETER SLEEVES HAVE A THICKNESS OF 0.079", ALL OTHERS ARE 0.109".


DELAWARE
DEPARTMENT OF TRANSPORTATION

SAFETY METAL END SECTION

STANDARD NO. D-11 (2018)

SHT. 1 OF 1

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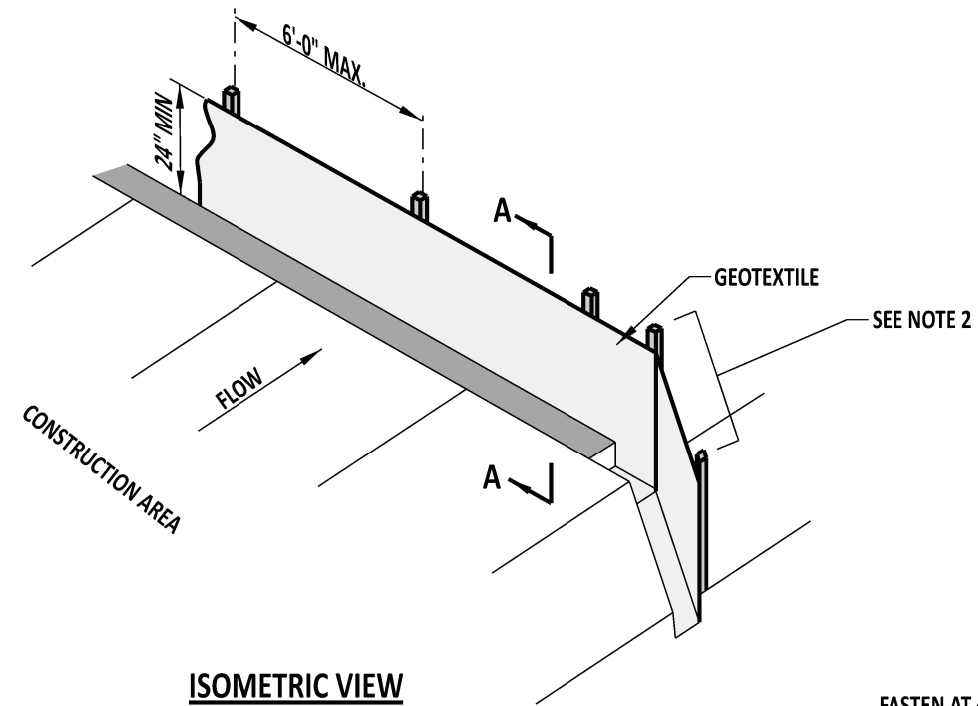
1/04/2019
DATE

RECOMMENDED

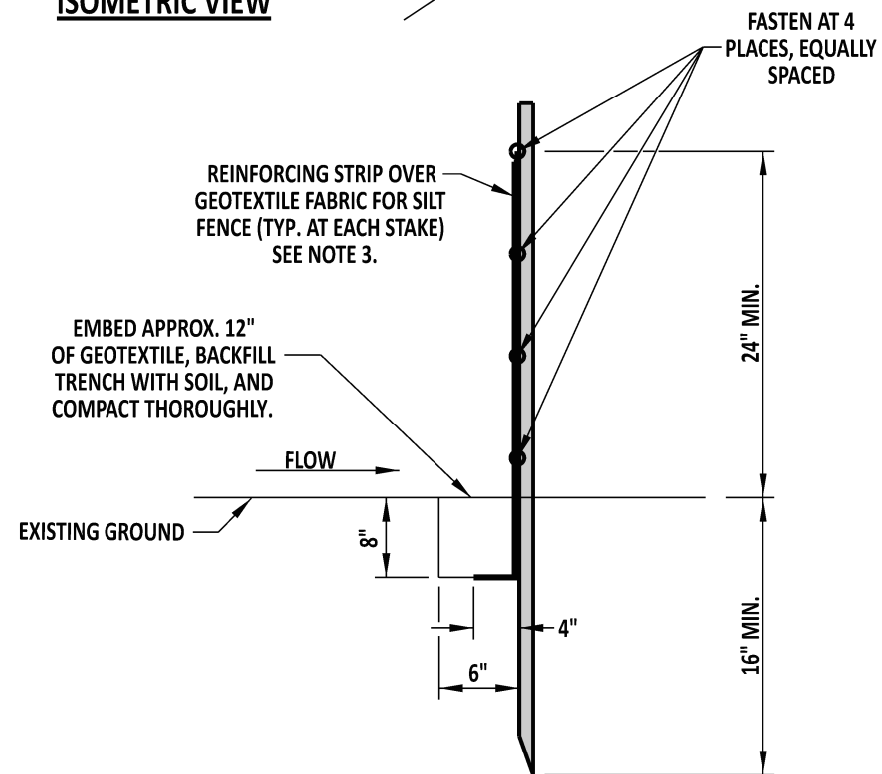
SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2018
DATE

- 1). A PREFABRICATED CONCRETE WASHOUT UNIT MAY BE USED IN LIEU OF THE DESIGN SHOWN ON THIS DETAIL. THE DIMENSIONS ARE 4'-0" x 4'-0" x 1'-0" DEEP WITH A 4 MIL POLYETHYLENE PLASTIC LINER. FOLLOW THE DIMENSIONS IN THIS DETAIL FOR CONSTRUCTED CONCRETE WASHOUT AREAS.
- 2). THE LINER MUST BE FREE OF TEARS OR HOLES AND PLACED OVER SMOOTH SURFACES TO PREVENT PUNCTURING. FOR EXCAVATED WASHOUTS, ANCHOR THE LINER UNDERNEATH THE BERM OR OVERTOP WITH SANDBAGS OR CONCRETE BLOCKS TO HOLD IN PLACE, AS DIRECTED ON THIS DETAIL.
- 3). ALLOW WASHED OUT CONCRETE MIXTURE TO HARDEN THROUGH EVAPORATION OF THE WASTEWATER. ONCE THE FACILITY HAS REACHED 75% OF ITS CAPACITY, REMOVE THE HARDENED CONCRETE BY REUSING THE BROKEN AGGREGATE ON SITE, RECYCLING, OR DISPOSING OFFSITE. THE HARDENED MATERIAL CAN BE BURIED ON SITE WITH A MINIMUM OF 1'-0" OF CLEAN, COMPACTED FILL.
- 4). APPLY A NEW LINER BEFORE REUSING THE STATION FOR ADDITIONAL WASHOUTS AFTER MAINTENANCE HAS OCCURRED.



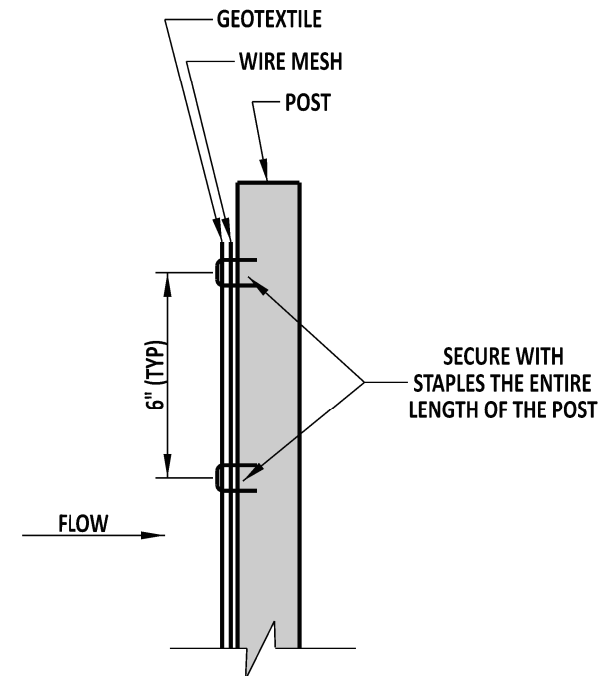
ISOMETRIC VIEW



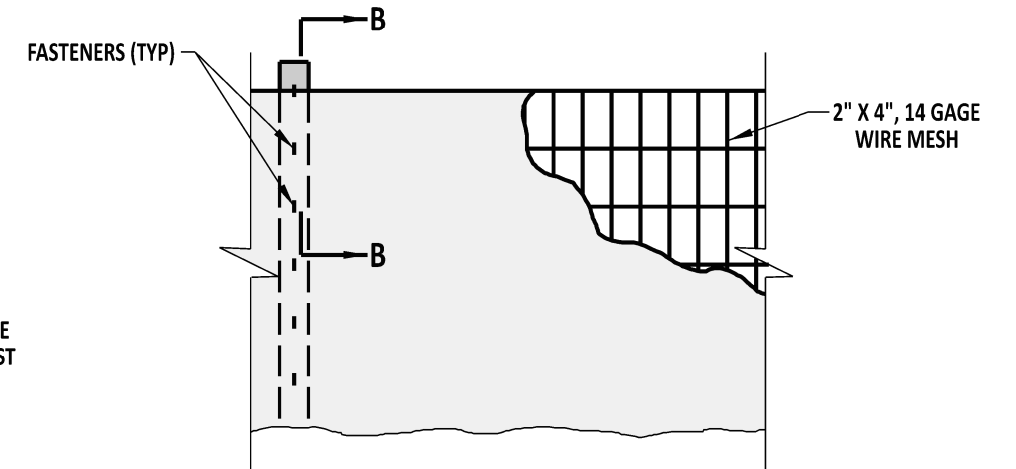
SECTION A-A

NOTES:

- 1). THIS DEVICE IS INTENDED TO CONTROL SHEET FLOW ONLY AND IS NOT TO BE USED IN AREAS OF CONCENTRATED FLOW.
- 2). TURN ENDS OF SILT FENCE UPSLOPE TO CONTAIN RUNOFF.
- 3). REINFORCING STRIP IS TO BE ONE COMPLETE STRIP COVERING ALL GEOTEXTILE FABRIC AT POST.

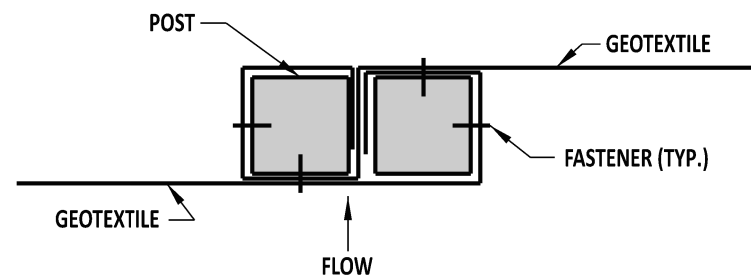


SECTION B-B

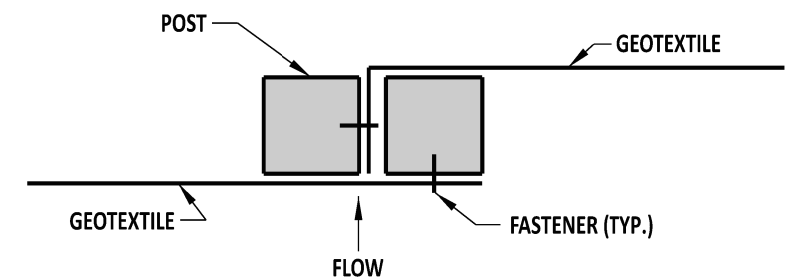


ELEVATION

**WIRE MESH DETAIL
(REINFORCED SILT FENCE ONLY)**



**SILT FENCE
CONNECTON DETAIL**



**REINFORCED SILT FENCE
CONNECTON DETAIL**



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

SILT FENCE
STANDARD NO. E-2 (2018)

SHT. 1 OF 2

APPROVED

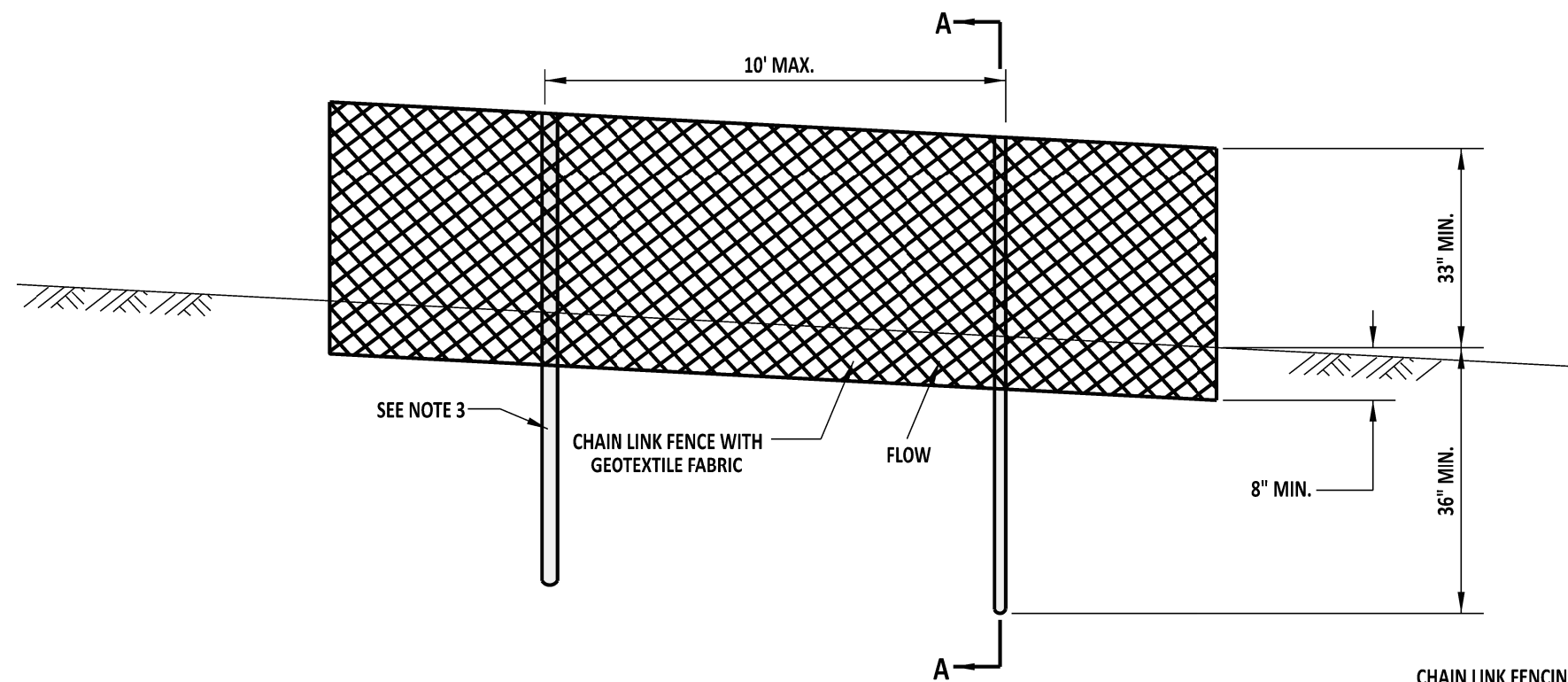
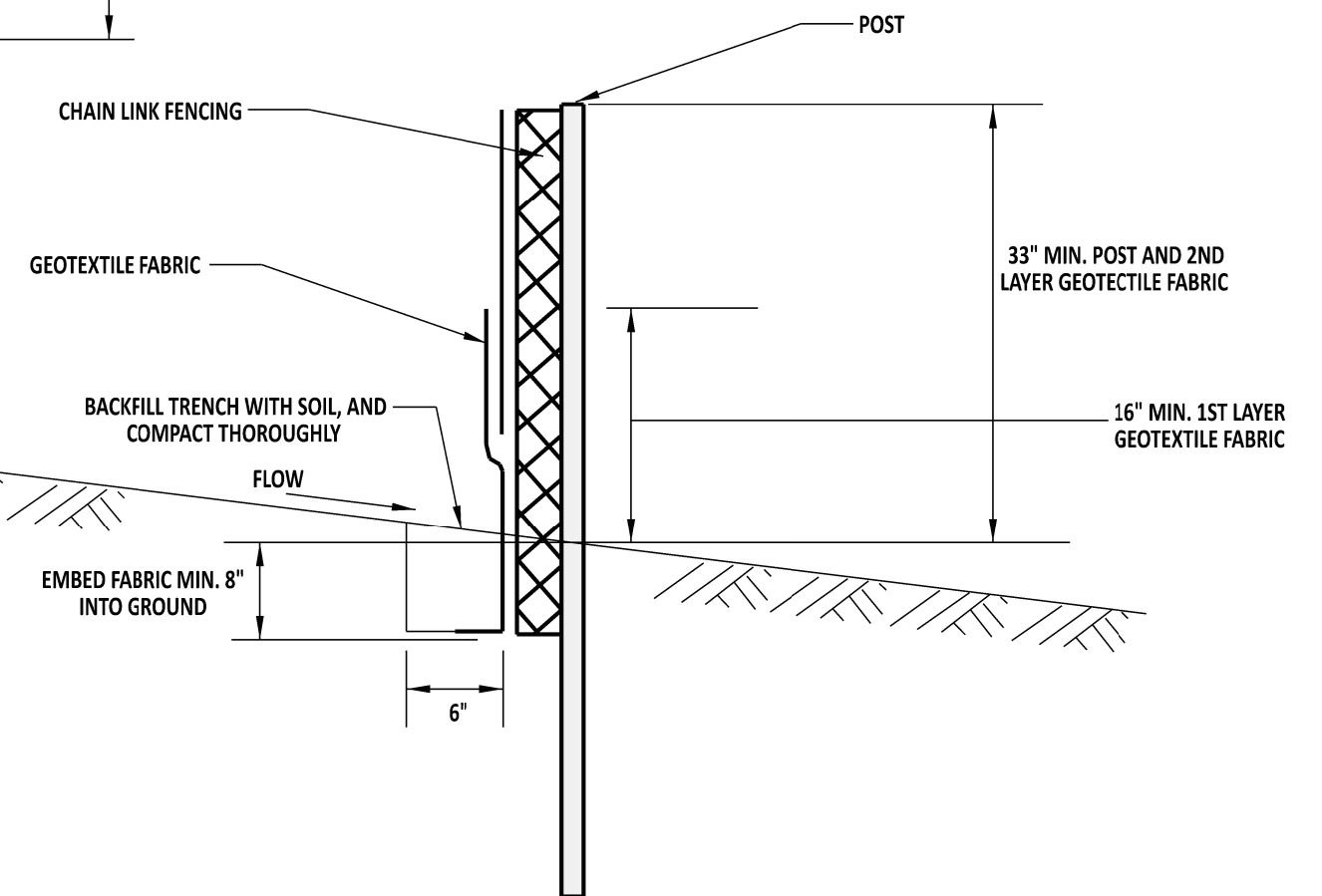
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CHIEF ENGINEER

1/04/2019
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2018
DATE

**SUPER SILT FENCE CONSTRUCTION DETAIL****SECTION A-A****NOTES:**

- 1). THIS DEVICE IS INTENDED TO CONTROL SHEET FLOW ONLY AND IS NOT TO BE USED IN AREAS OF CONCENTRATED FLOW.
- 2). TURN ENDS OF SILT FENCE UPSLOPE TO CONTAIN RUNOFF.
- 3). 2½" DIAMETER GALVANIZED OR ALUMINUM POSTS. POSTS DO NOT NEED TO BE SET IN CONCRETE.
- 4). FASTEN CHAIN LINK FENCE SECURELY TO FENCE POSTS WITH WIRE TIES.
- 5). FASTEN GEOTEXTILE FABRIC SECURELY TO THE CHAIN LINK FENCE WITH TIES SPACED EVERY 24" AT THE TOP AND MID SECTION.
- 6). WHEN TWO SECTIONS OF GEOTEXTILE FABRIC ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.



DELAWARE
DEPARTMENT OF TRANSPORTATION

SUPER SILT FENCE

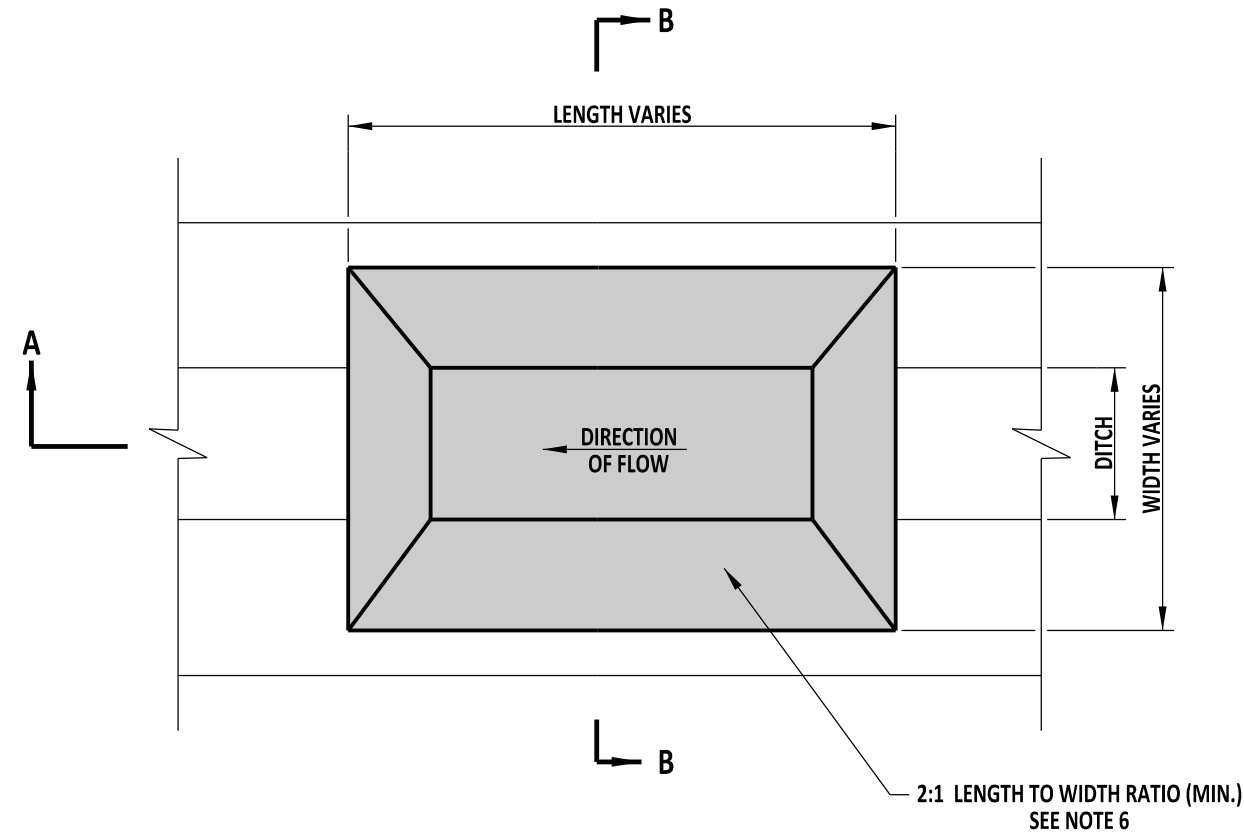
STANDARD NO.

E-2 (2018)

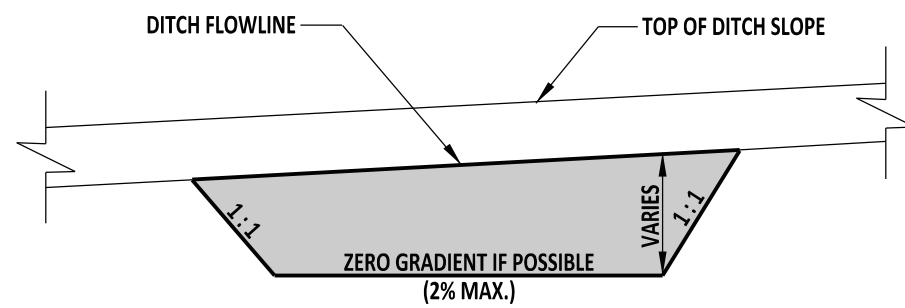
SHT. 2

OF 2

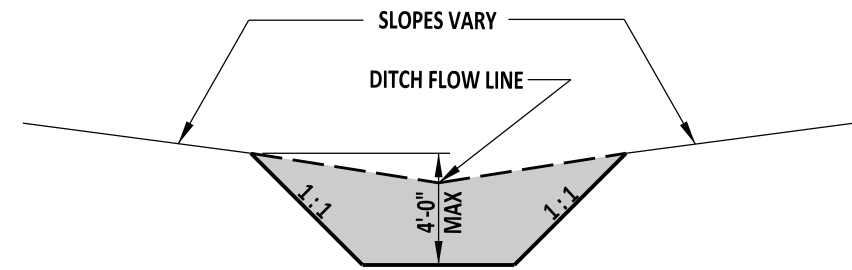
APPROVEDSIGNATURE ON FILE
CHIEF ENGINEER1/04/2019
DATE**RECOMMENDED**SIGNATURE ON FILE
DESIGN ENGINEER12/20/2018
DATE



PLAN



SECTION A-A



SECTION B-B

NOTES:

- 1). SEDIMENT TRAPS ARE INTENDED FOR USE IN EXISTING, PROPOSED, AND TEMPORARY DITCHES OF ALL TYPES WITH A MAXIMUM DRAINAGE AREA OF 15 ACRES, AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.
- 2). STABILIZE SIDE SLOPES WITH TEMPORARY GRASS SEEDING AS PER SPECIFICATIONS.
- 3). AN OUTLET STRUCTURE IS REQUIRED AND IS NOTED ON THE PLANS.
- 4). FOR SIZE, LOCATION, ETC. OF SEDIMENT TRAP, SEE PLANS.
- 5). ALL FILL SLOPES ARE TO HAVE A SLOPE OF 2:1.
- 6). THE SEDIMENT TRAP LENGTH TO WIDTH RATIO IS TO BE 2:1. SPECIAL DESIGNS ARE PERMITTED TO INCREASE THE FLOW TIME AFTER APPROVAL BY THE STORMWATER ENGINEER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

SEDIMENT TRAP

STANDARD NO.

E-3 (2014)

SHT. 1

OF 1

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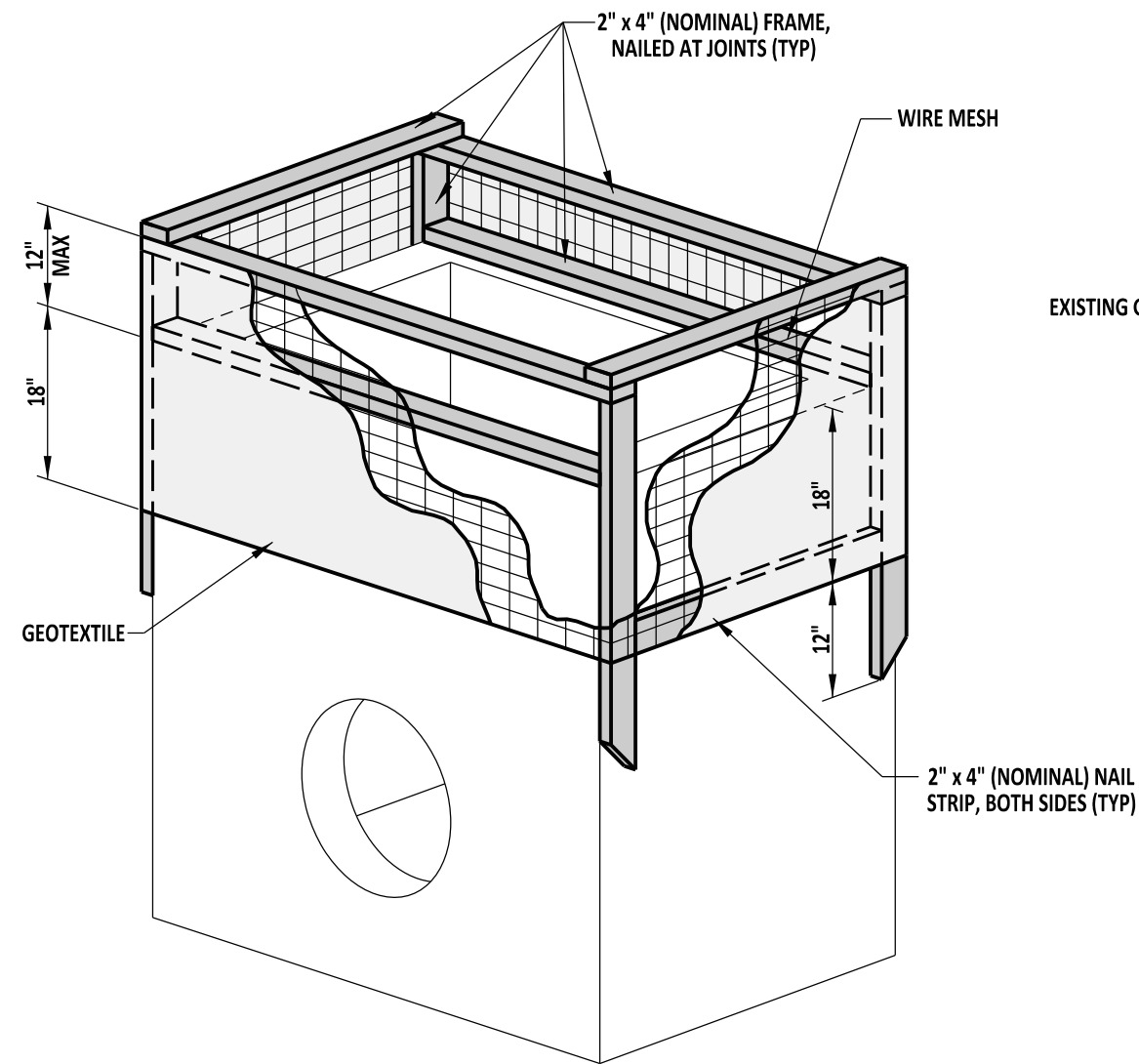
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CHIEF ENGINEER

12/30/2014
DATE

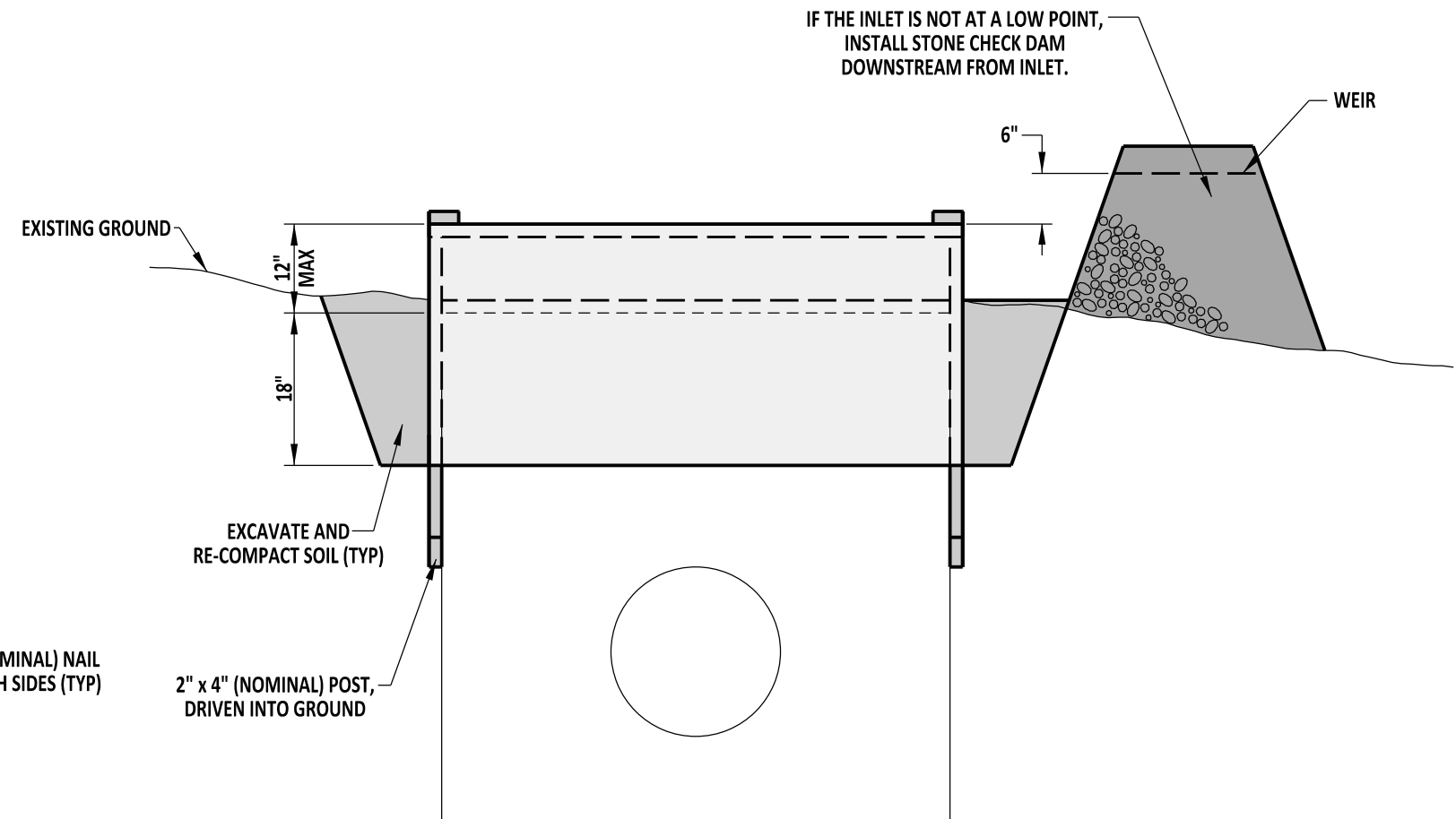
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DESIGN ENGINEER

12/11/2014
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ISOMETRIC VIEW



ELEVATION VIEW



DELAWARE
DEPARTMENT OF TRANSPORTATION

INLET SEDIMENT CONTROL, DRAINAGE INLET

STANDARD NO. E-4 (2014)

SHT. 1 OF 1

APPROVED

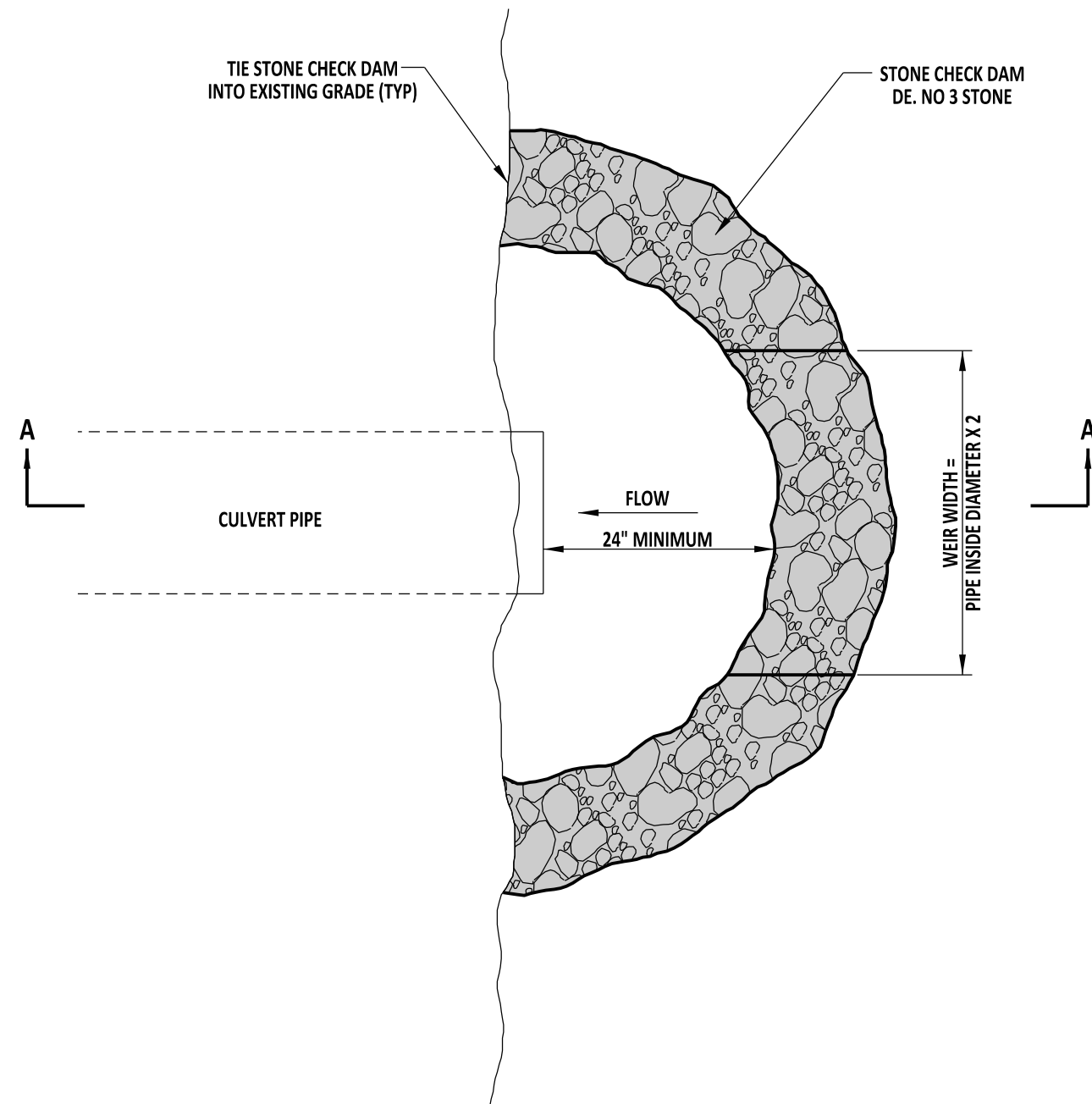
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DATE

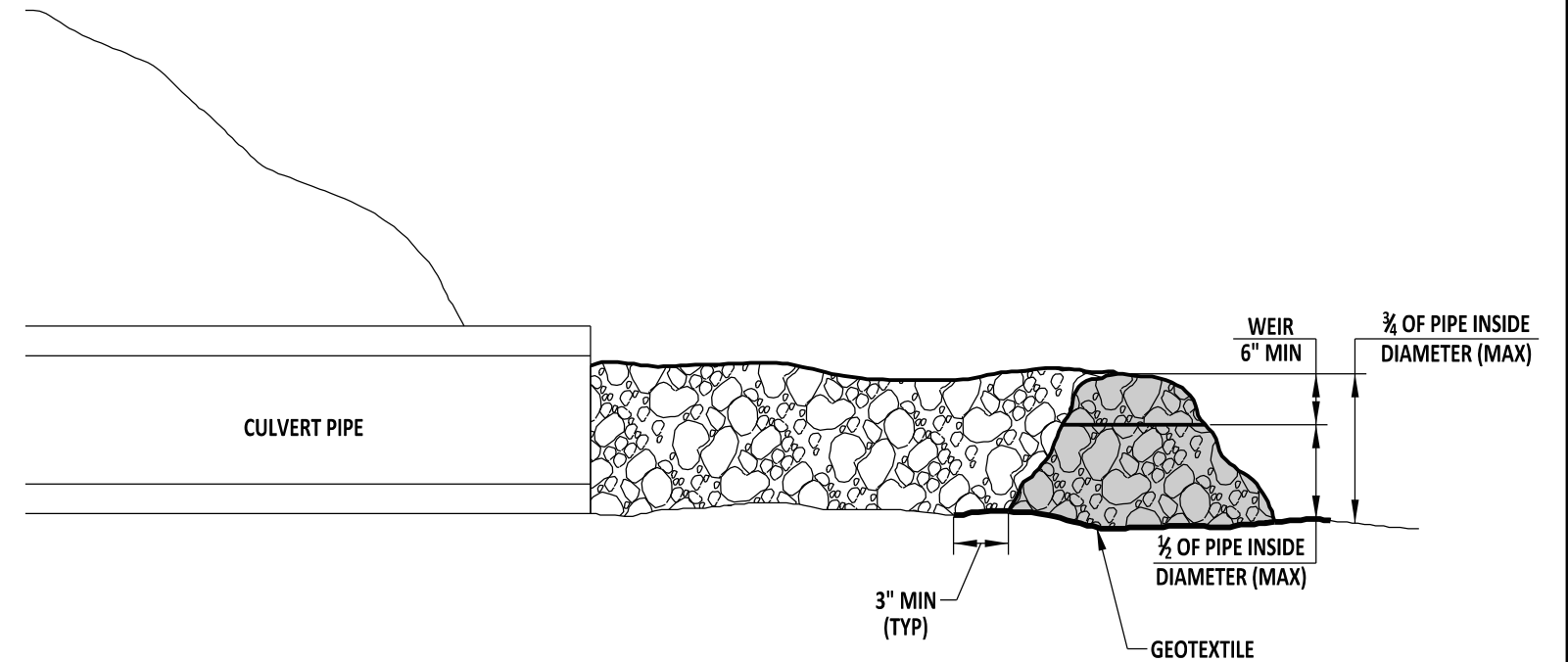
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DESIGN ENGINEER

12/11/2014
DATE



PLAN VIEW



SECTION A-A

NOTE:

- 1). THE ENGINEER WILL ADAPT SIZE AND SHAPE OF THE STONE CHECK DAM TO MEET FIELD CONDITIONS. INTERCEPTING SWALES AND GRADES NEED TO BE CONSIDERED AS WELL.



DELAWARE
DEPARTMENT OF TRANSPORTATION

INLET SEDIMENT CONTROL, CULVERT INLET

STANDARD NO. E-5 (2014)

SHT. 1 OF 1

APPROVED

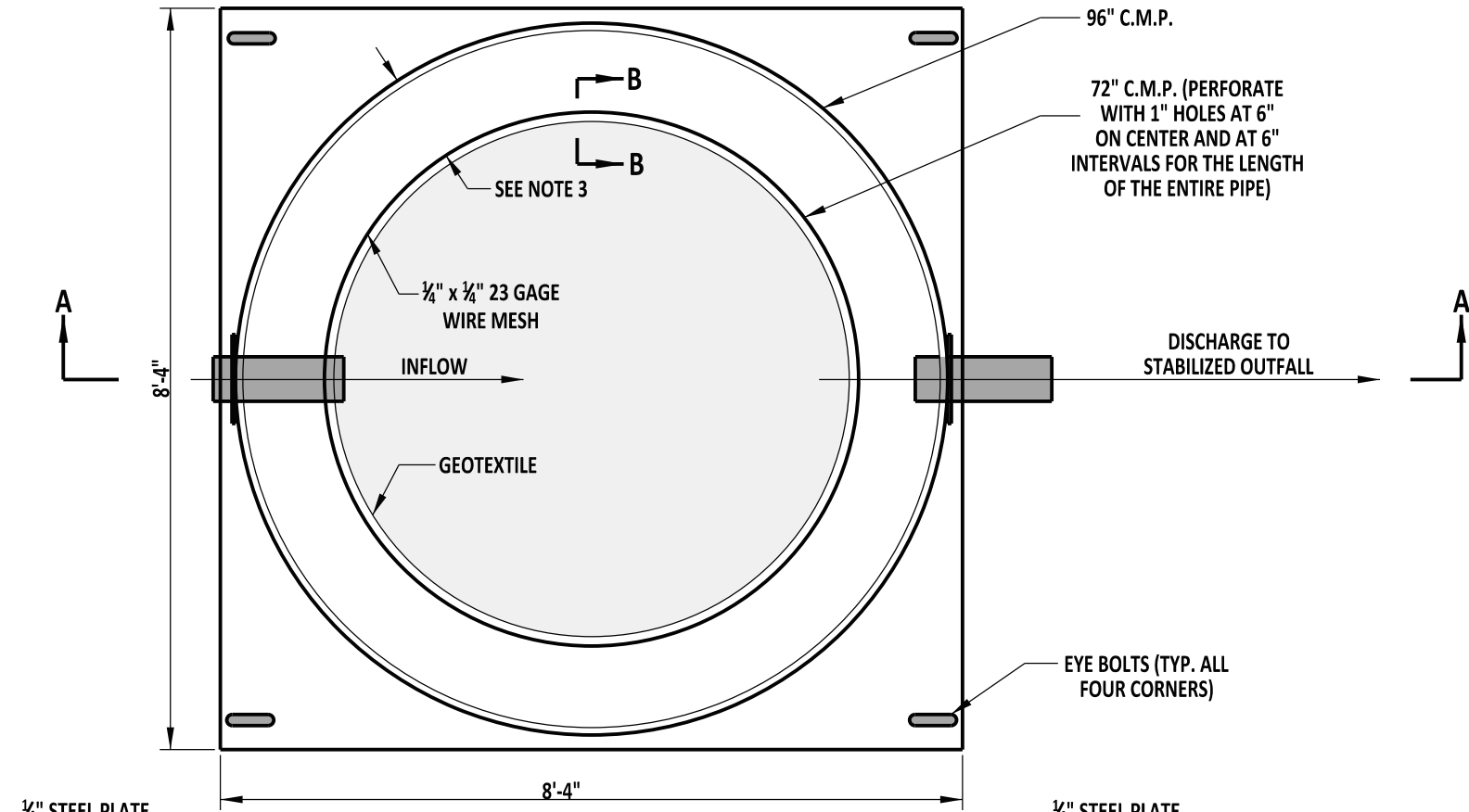
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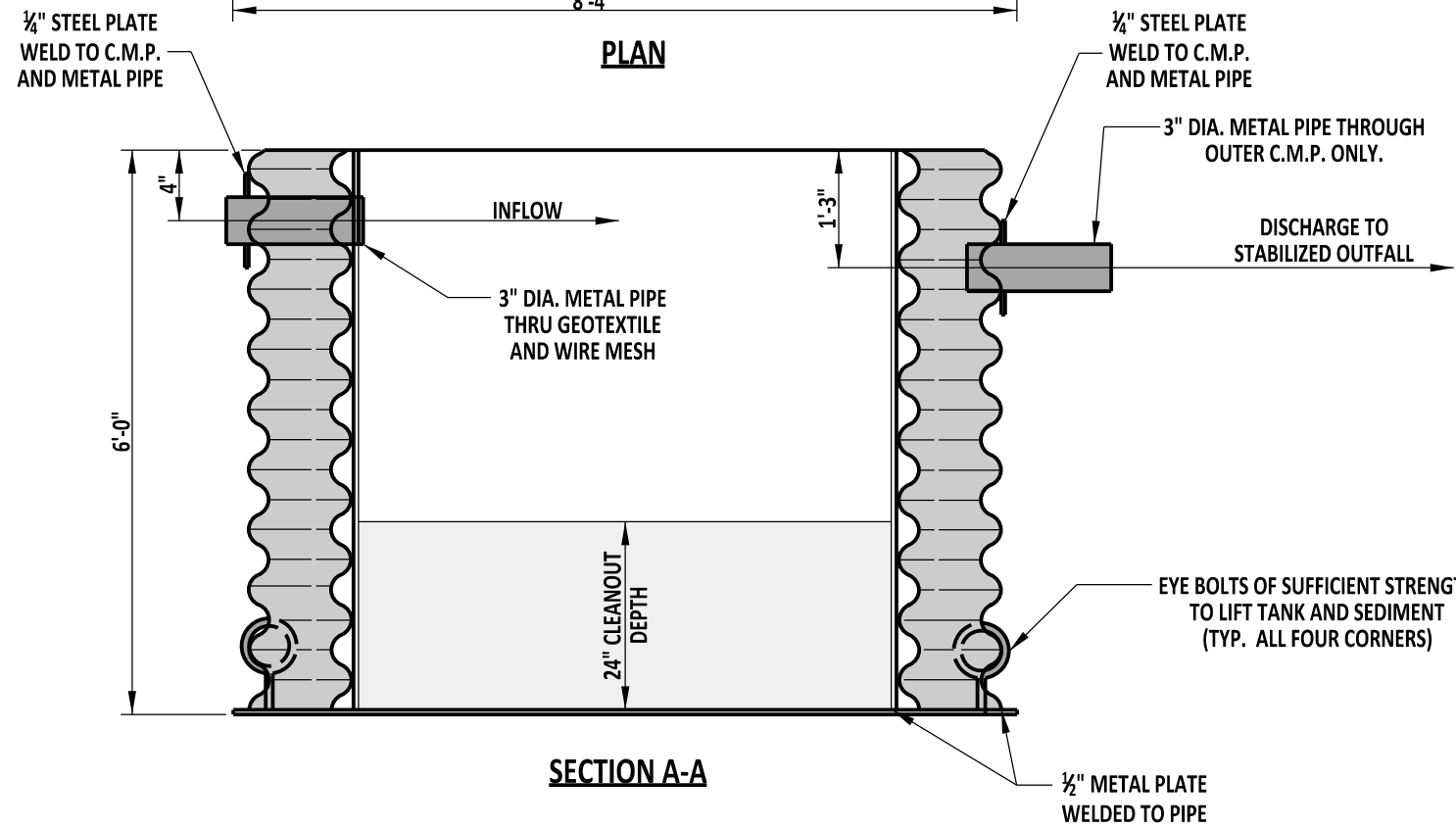
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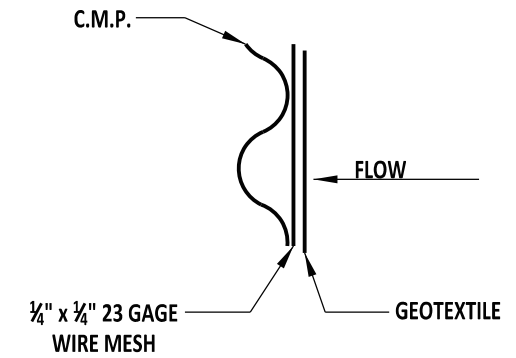
12/11/2014
DATE



PLAN



SECTION A-A



SECTION B-B

NOTES:

- 1). THE MAXIMUM PUMP DISCHARGE IN THIS TYPICAL PORTABLE SEDIMENT TANK IS 125 GALLONS PER MINUTE. REPLACE THE GEOTEXTILE WHEN THE PORTABLE SEDIMENT TANK CAN NO LONGER ALLOW THIS FLOW RATE, WHEN THERE IS A TEAR, OR WHEN DIRECTED BY THE ENGINEER.
- 2). SEVERAL UNCONNECTED OR CONNECTED IN PARALLEL PORTABLE SEDIMENT TANKS MAY BE USED WHEN A HIGHER FLOW RATE IS NEEDED TO DEWATER THE JOB.
- 3). PLACE 72" C.M.P. SO THAT IT IS CENTERED IN THE 96" C.M.P. AND THERE IS AN EQUAL AMOUNT OF SPACE BETWEEN THE TWO PIPES.



DELAWARE
DEPARTMENT OF TRANSPORTATION

PORTABLE SEDIMENT TANK

STANDARD NO.

E-6 (2014)

SHT. 1

OF 1

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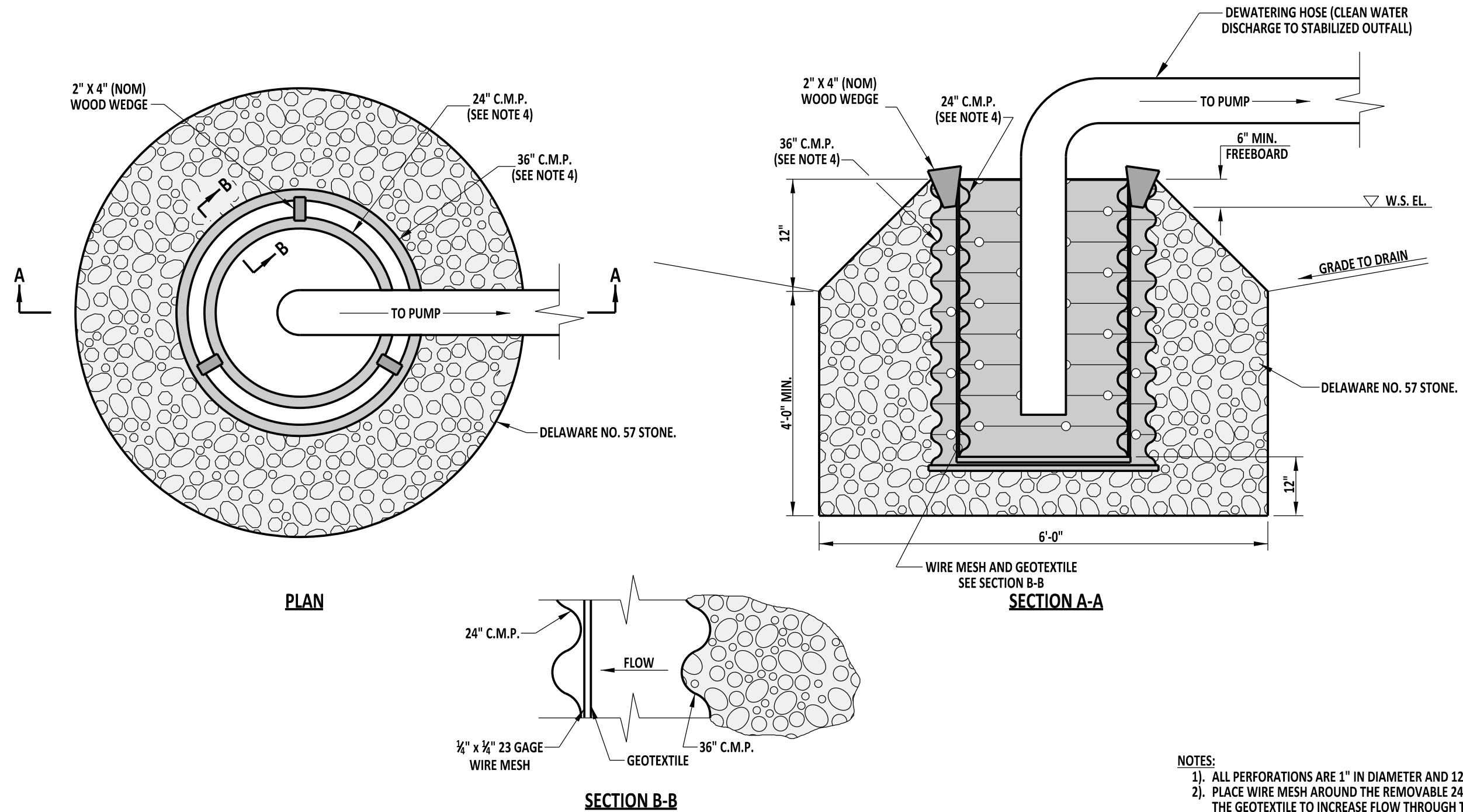
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12/30/2014
DATE

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12/11/2014
DATE



DELAWARE
DEPARTMENT OF TRANSPORTATION

SUMP PIT

STANDARD NO. E-7 (2014)

SHT. 1 OF 1

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CHIEF ENGINEER

12/30/2014
DATE

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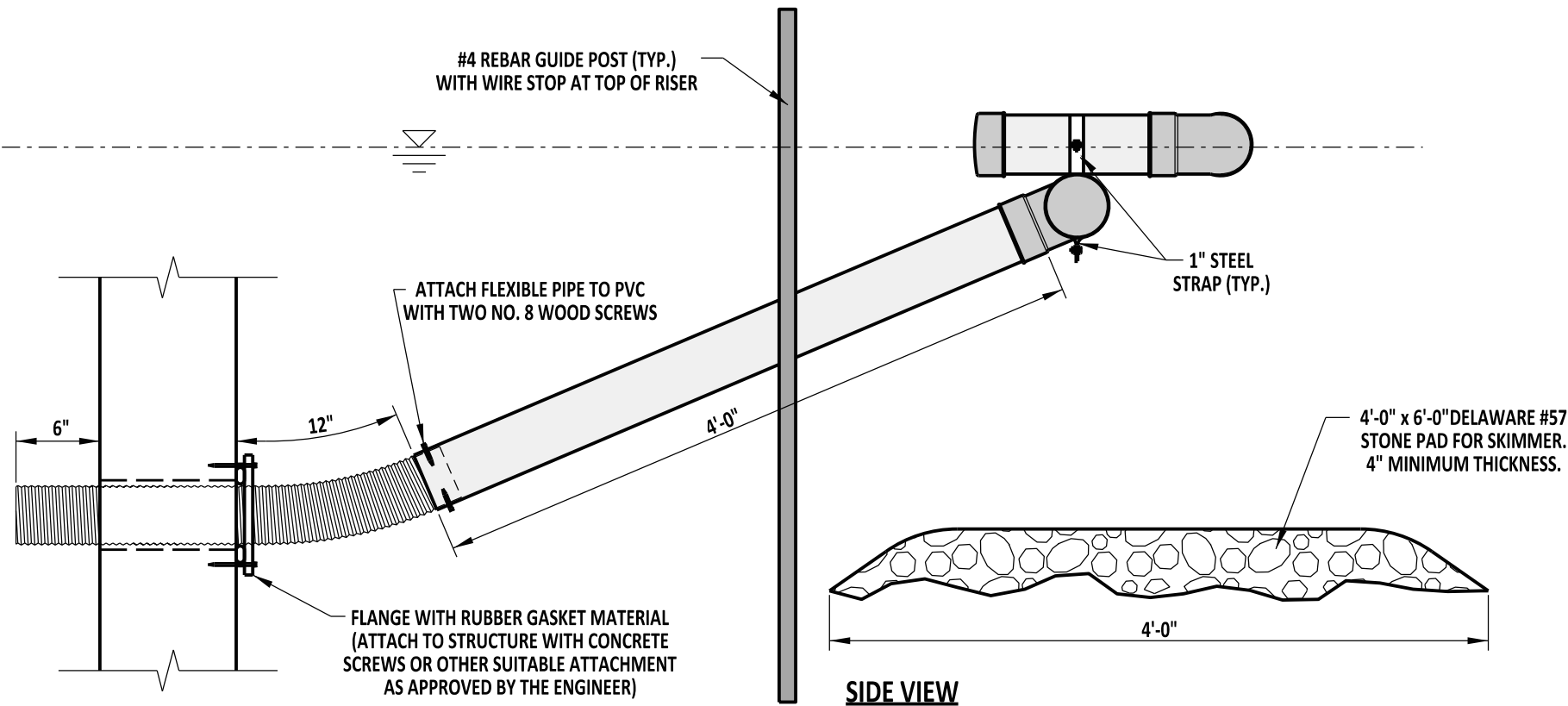
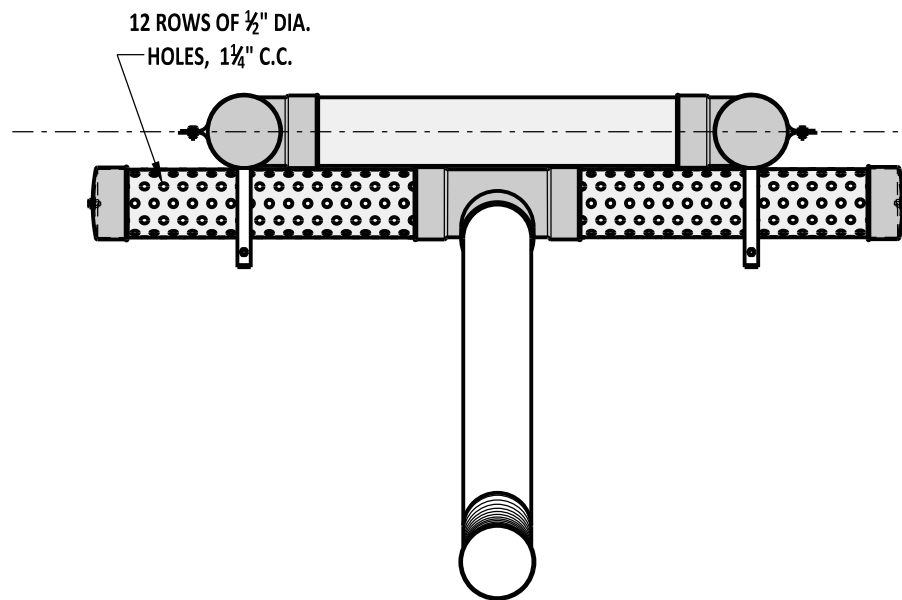
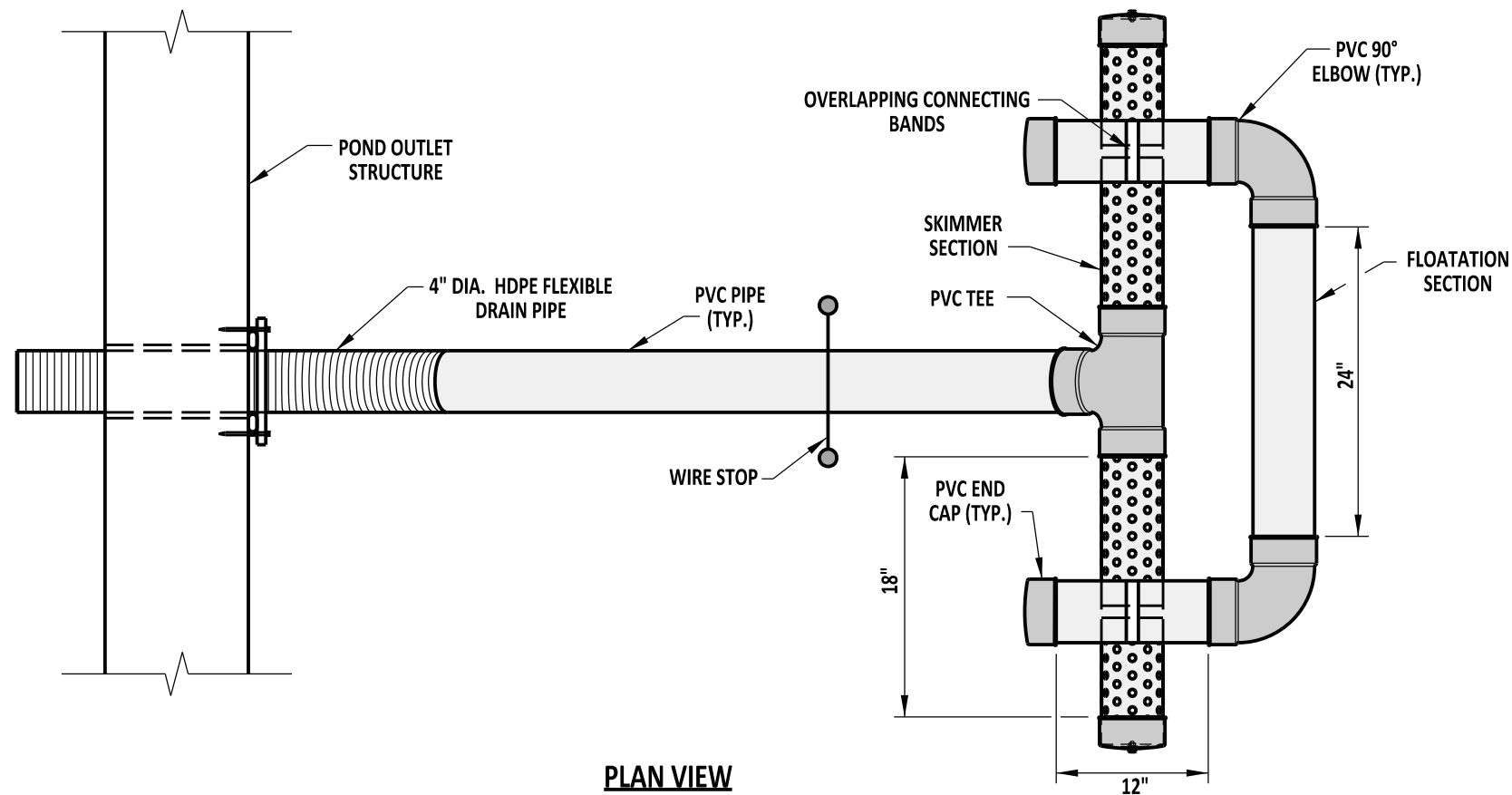
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DESIGN ENGINEER

12/11/2014
DATE

NOTES:

- 1). ALL PVC PIPES ARE 4" I.D., SCHEDULE 40.
- 2). SOLVENT WELD ALL JOINTS OF THE FLOTATION SECTION..
- 3). ATTACH A 4" HDPE FLEXIBLE DRAIN PIPE TO THE POND OUTLET STRUCTURE USING WATER TIGHT CONNECTIONS.

SCALE : NTS



DELAWARE
DEPARTMENT OF TRANSPORTATION

SKIMMER DEWATERING DEVICE

STANDARD NO.

E-8 (2014)

SHT.

1

OF

1

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER

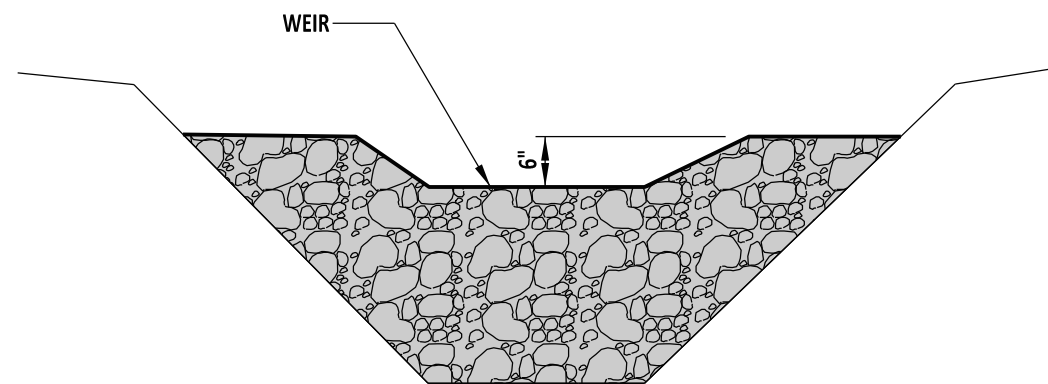
12/30/2014
DATE

RECOMMENDED

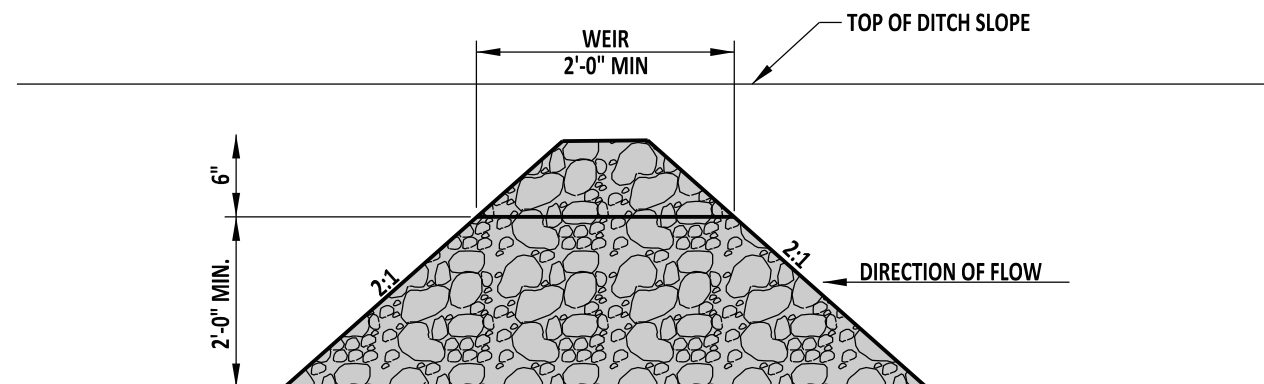
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DESIGN ENGINEER

12/11/2014
DATE

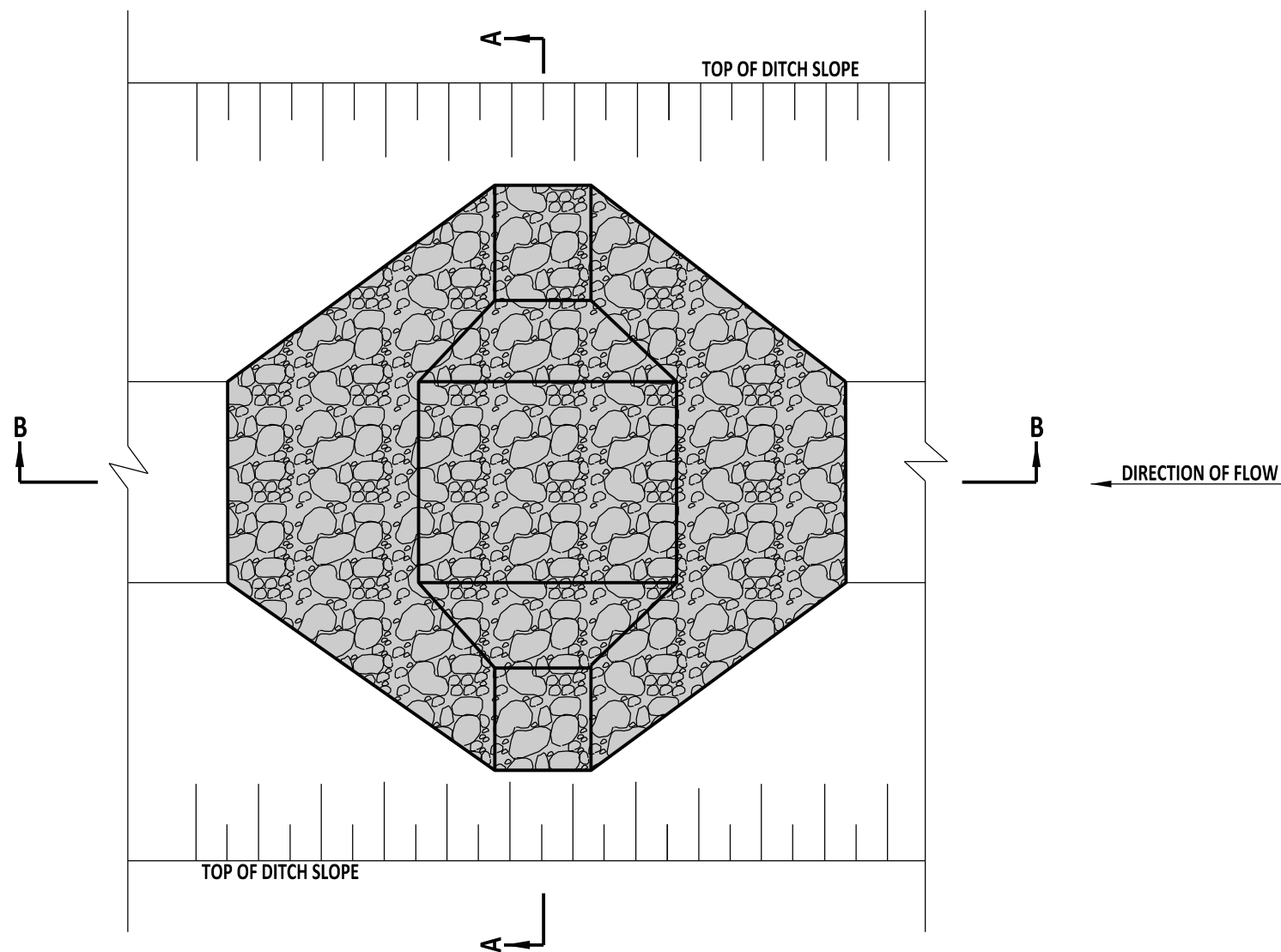
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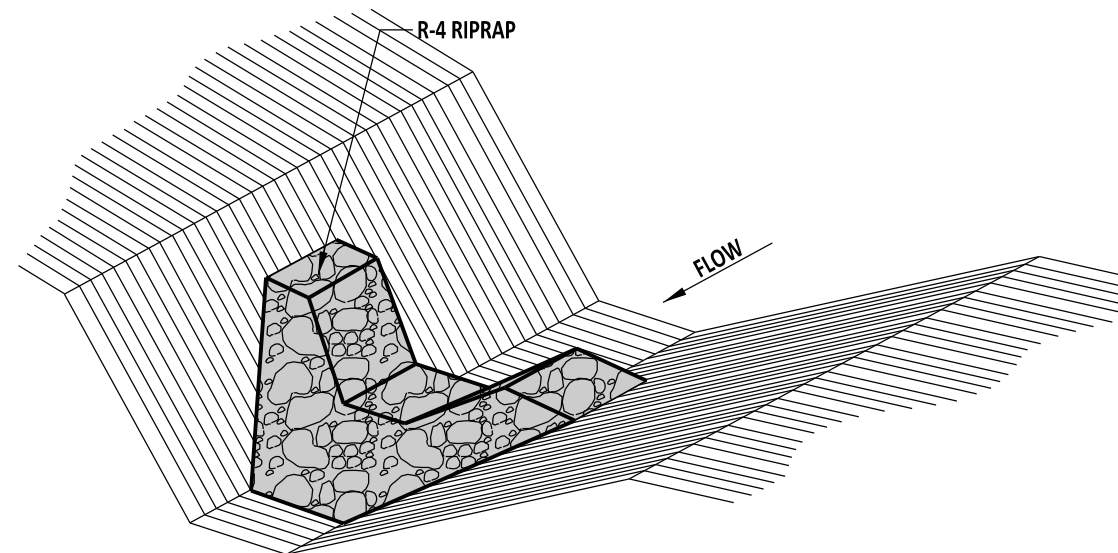
SECTION A-A



SECTION B-B



PLAN



ISOMETRIC VIEW

NOTES:

- 1). THE MAXIMUM HEIGHT OF THE CHECK DAM IS 2'-0" AT THE CENTER OF THE WEIR.
- 2). CONSTRUCT CHECK DAM SO THAT THE CENTER OF THE DAM IS 6" LOWER THAN THE OUTER EDGES, FORMING A WEIR THAT WATER CAN FLOW ACROSS.
- 3). INSTALL GEOTEXTILE FABRIC UNDERNEATH RIPRAP ON PERMANENT CHECK DAMS ONLY.
- 4). SPACE DAMS SO THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE WIER OF THE DOWNSTREAM DAM. PLACE DAMS NO FURTHER THAN 200'-0" APART WHEN THE SLOPE IS LESS THAN 1%.



DELAWARE
DEPARTMENT OF TRANSPORTATION

STONE CHECK DAM

STANDARD NO.

E-9 (2014)

SHT. 1

OF 1

APPROVED

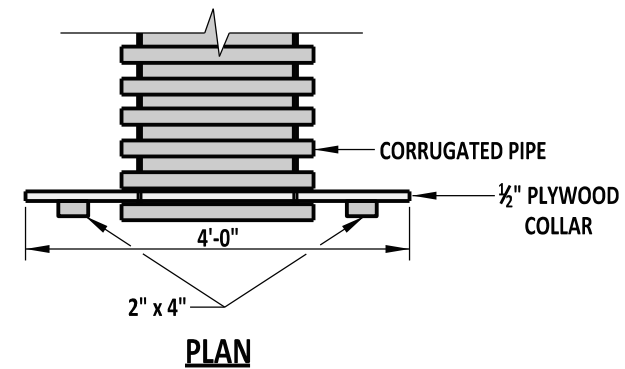
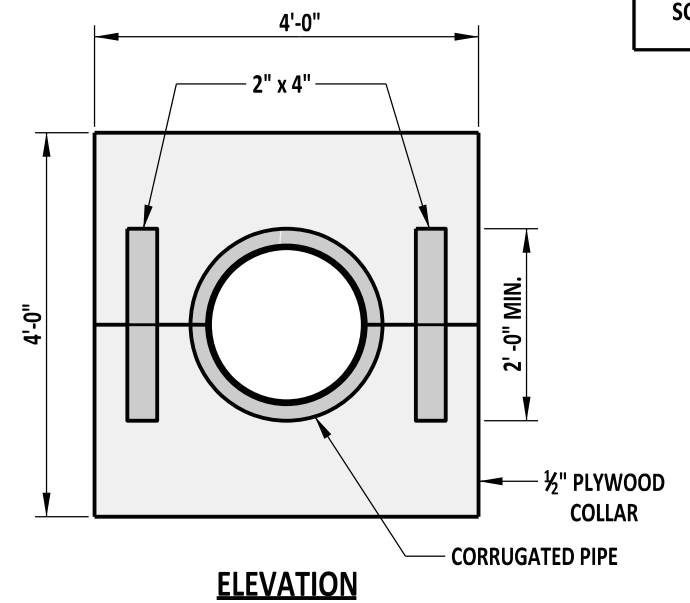
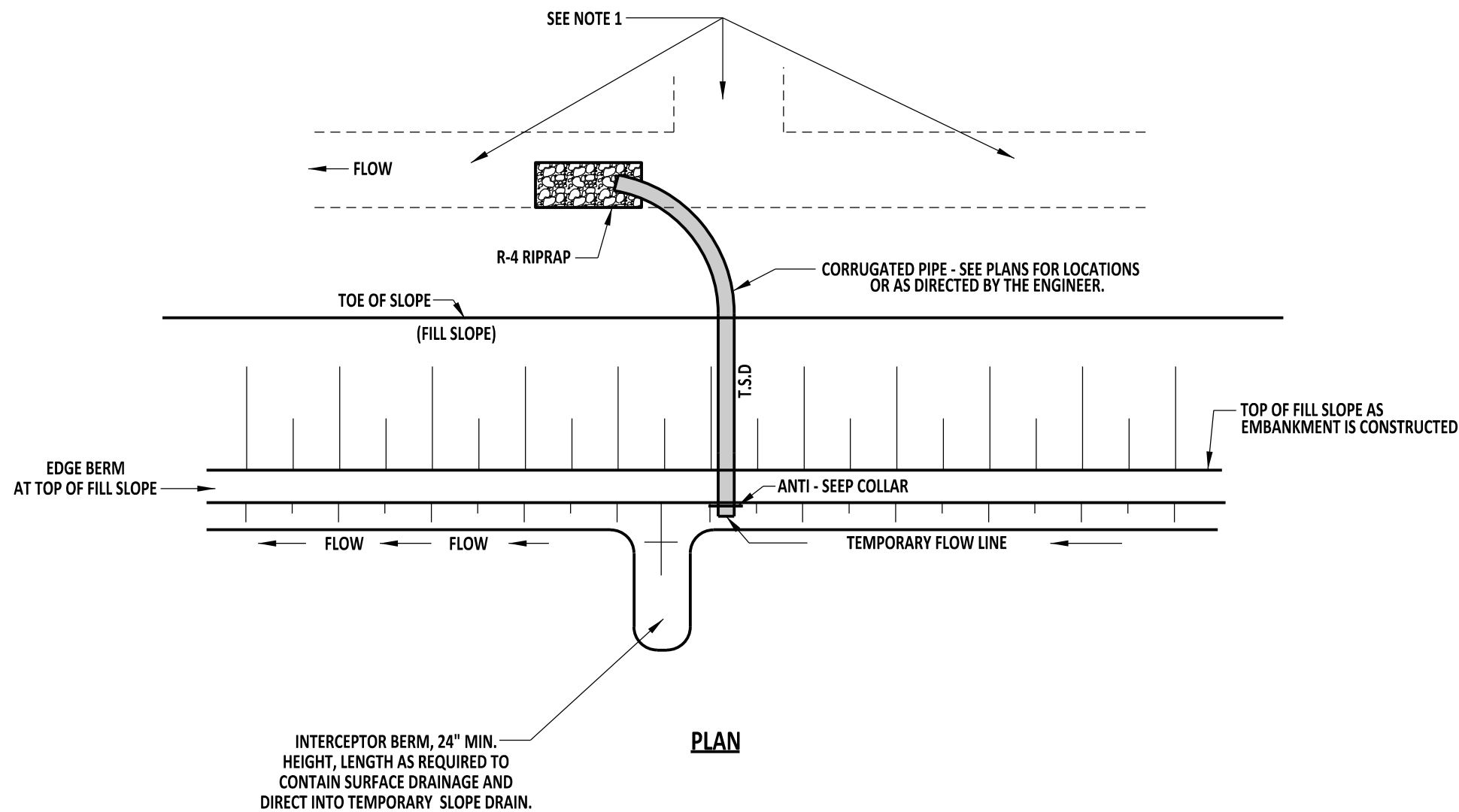
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CHIEF ENGINEER

12/30/2014
DATE

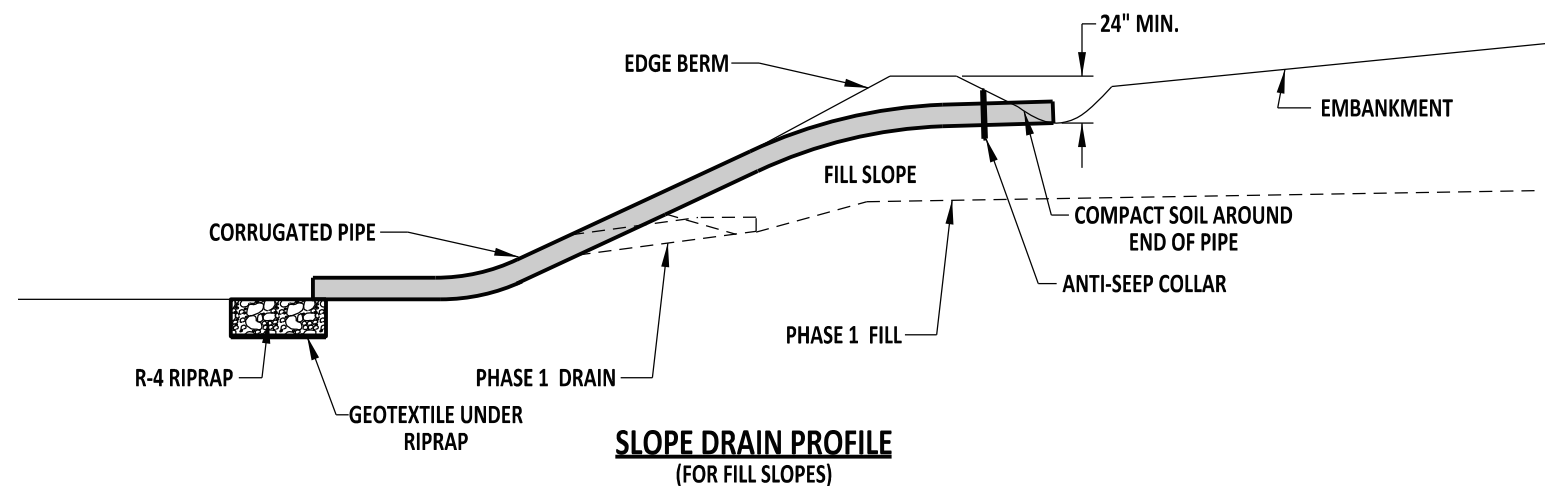
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DESIGN ENGINEER

12/11/2014
DATE



ANTI-SEEP COLLAR

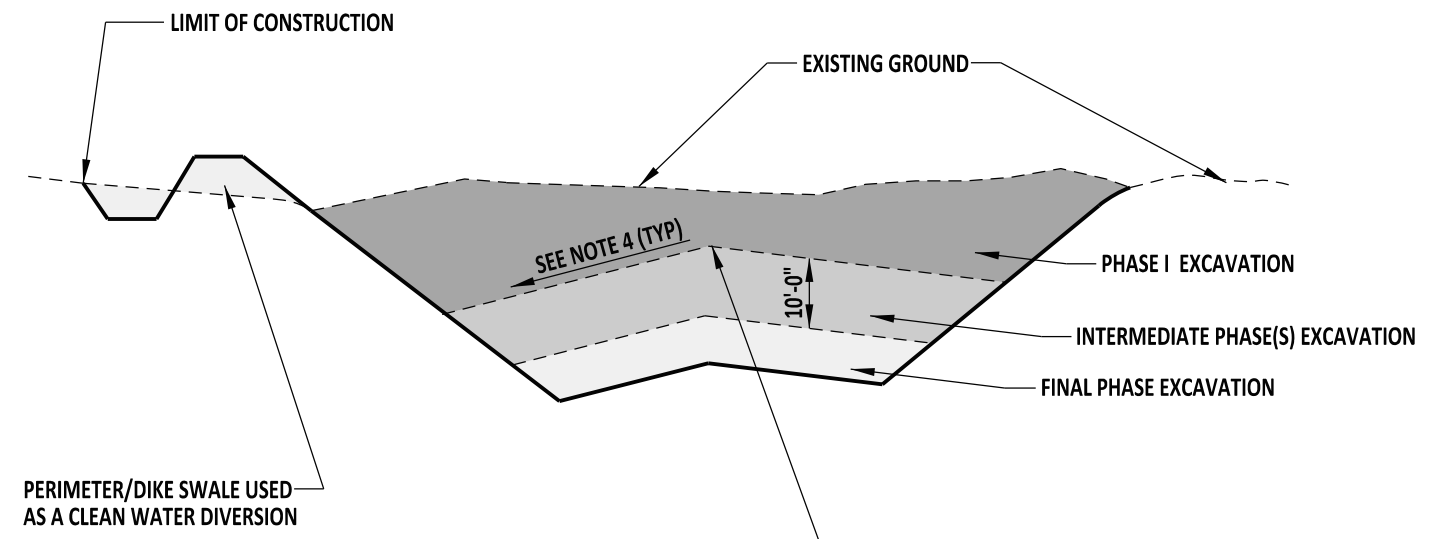


- NOTES:**
- 1). DISCHARGE ALL TEMPORARY SLOPE DRAINS ONTO A STABILIZED OUTFALL AND THEN INTO A SEDIMENT TRAPPING DEVICE.
 - 2). USE TEMPORARY SLOPE DRAINS AT THE TOP OF FILL SLOPES AS EMBANKMENT IS CONSTRUCTED TO PREVENT EXCESSIVE EROSION UNTIL SHOULDERS ARE CONSTRUCTED AND THE SLOPES ARE SEEDD AS PER SPECIFICATIONS.
 - 3). RESTRICT MOVEMENT OF SLOPE DRAINS TO THE SLOPE BY A METHOD APPROVED BY THE ENGINEER.

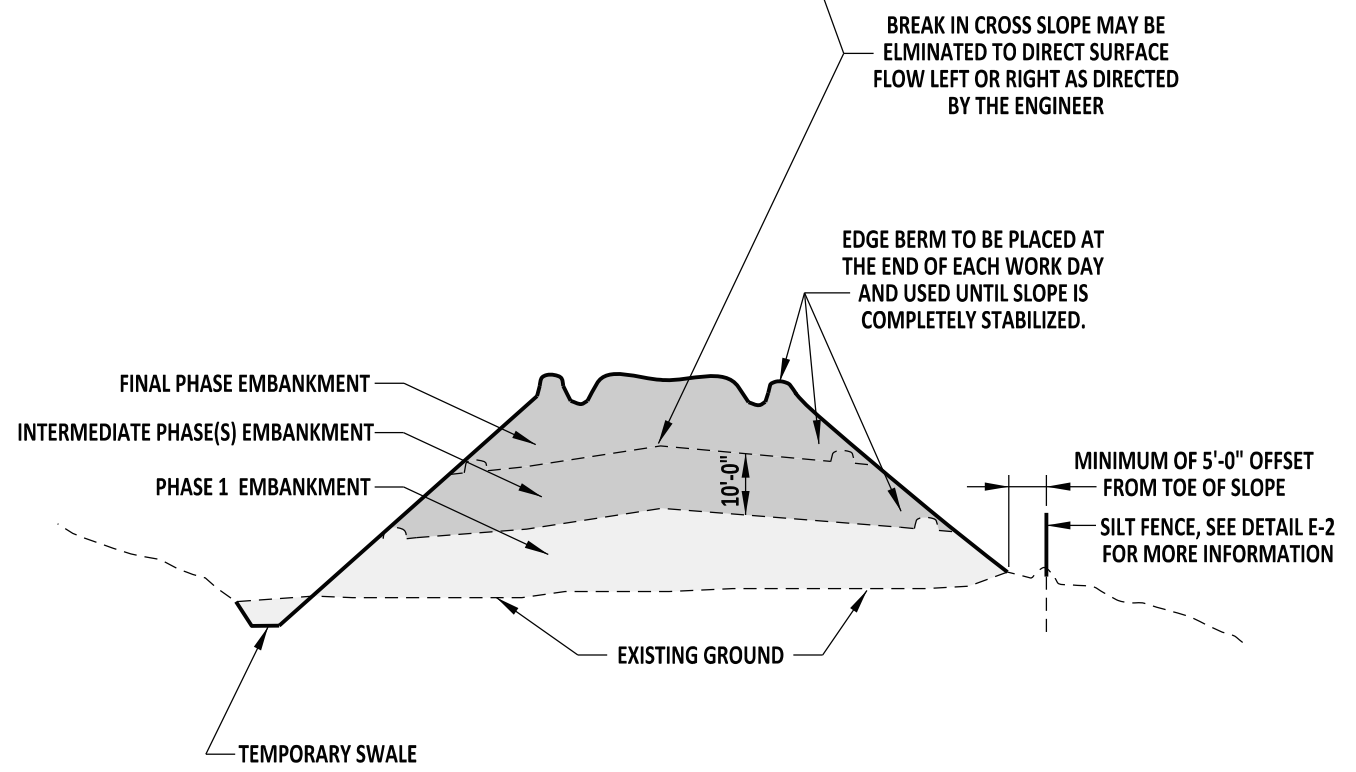


DELAWARE
DEPARTMENT OF TRANSPORTATION

TEMPORARY SLOPE DRAIN				APPROVED	SIGNATURE ON FILE	12/30/2014
					CHIEF ENGINEER	DATE
STANDARD NO.	E-10 (2014)	SHT.	1 OF 1	RECOMMENDED	SIGNATURE ON FILE	12/11/2014
					DESIGN ENGINEER	DATE




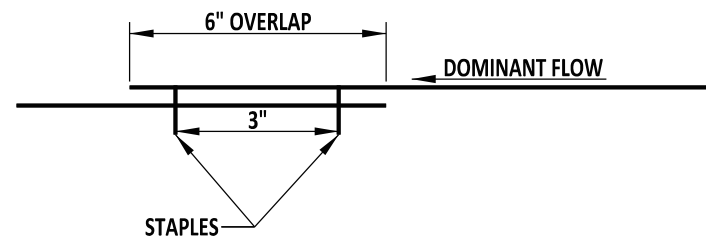
CUT SECTION



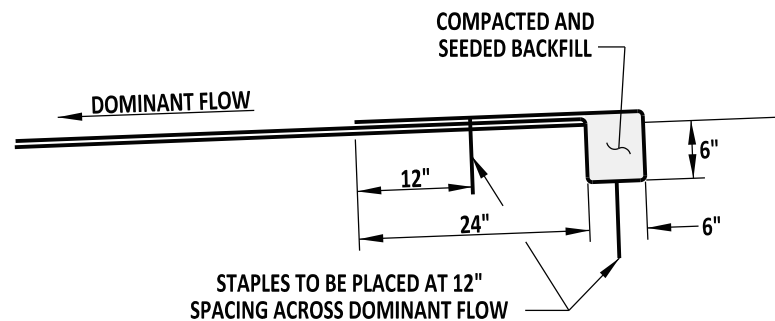
FILL SECTION

- NOTES:**
- 1). CONSTRUCT EDGE BERMS AND TEMPORARY SLOPE DRAINS ALONG THE TOP OF ALL SLOPES TO INTERCEPT RUNOFF AND CONVEY IT DOWN THE SLOPE FACES WITHOUT CREATING GULLIES OR WASHOUTS.
 - 2). TRACK SLOPE FACES WITH CLEATED EQUIPMENT SUCH THAT THE CLEAT MARKS ARE ORIENTED HORIZONTALLY.
 - 3). STABILIZE ALL CUT AND FILL SLOPES OF THE HIGHWAY EMBANKMENT WITH TEMPORARY OR PERMANENT SEED AS WORK PROGRESSES IN INCREMENTS NOT TO EXCEED 10'-0" OF EMBANKMENT HEIGHT.
 - 4). CONSTRUCT EMBANKMENT CROSS SLOPES SO THAT THEY ARE NO FLATTER THAN 2% AND NO STEEPER THAN 6%.

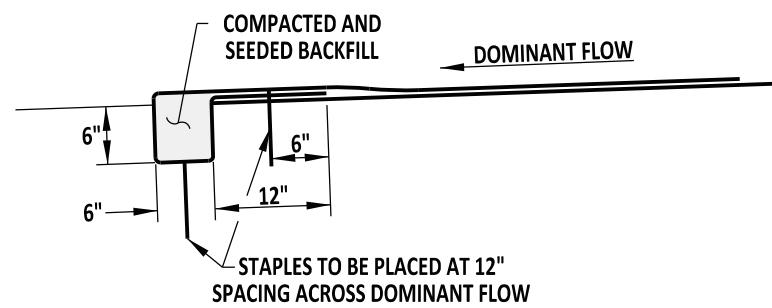
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	STANDARD NO.	E-11 (2014)	SHT.	1 OF 1	RECOMMENDED	SIGNATURE ON FILE	12/11/2014



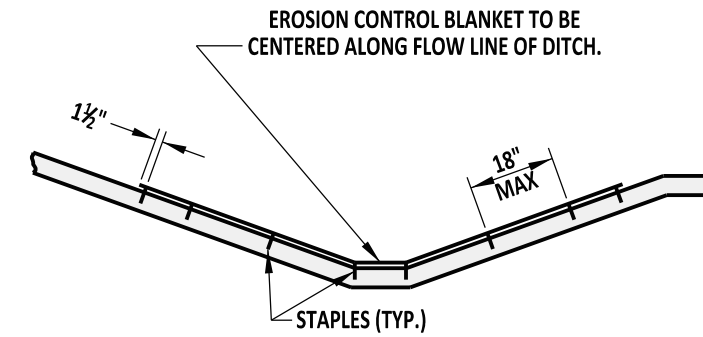
OVERLAP DETAIL
STAPLES TO BE STAGGERED AT 6" SPACING.



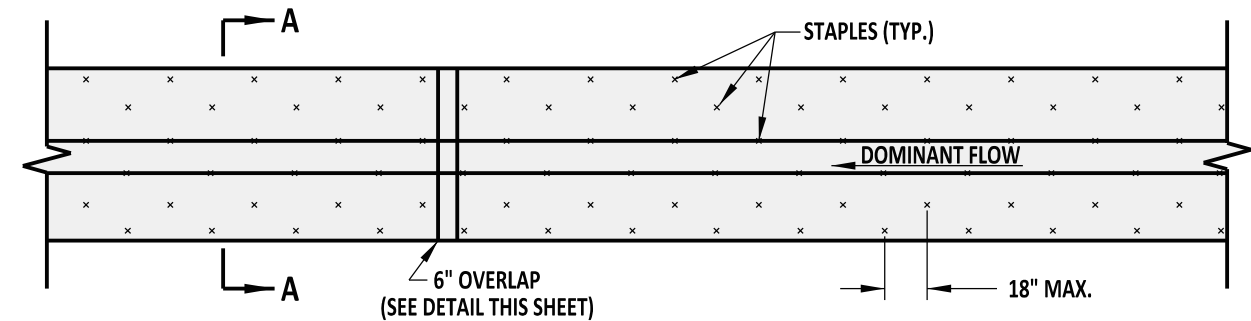
TERMINAL TRENCH ANCHOR DETAIL
APPLIED AT THE UPSTREAM END OF DITCH



INITIAL TRENCH ANCHOR DETAIL
APPLIED AT THE DOWNSTREAM END OF DITCH



SECTION A-A



PLAN

STABILIZATION OF DITCHES

NOTES:

- 1). TRACK AND SEED TOPSOIL UNDER EROSION CONTROL BLANKET.
- 2). ADDITIONAL STAPLES ARE REQUIRED AT OVERLAPS. SEE OVERLAP DETAIL ON THIS SHEET FOR STAPLE PLACEMENT.
- 3). STAGGER ALL STAPLES ACROSS EROSION CONTROL BLANKET AS SHOWN.



DELAWARE
DEPARTMENT OF TRANSPORTATION

EROSION CONTROL BLANKET APPLICATIONS

STANDARD NO. E-12 (2014)

SHT. 1 OF 1

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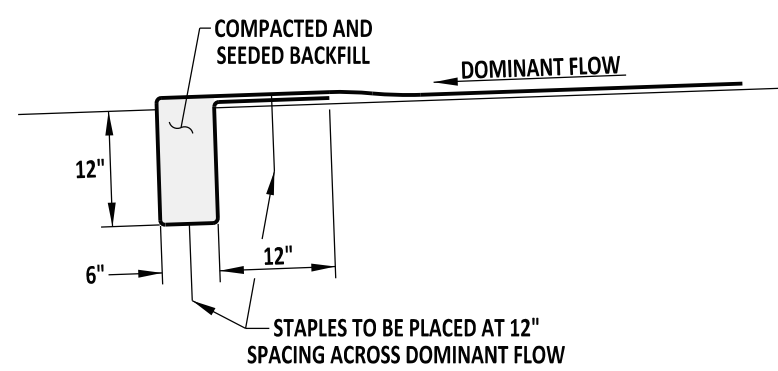
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12/30/2014
DATE

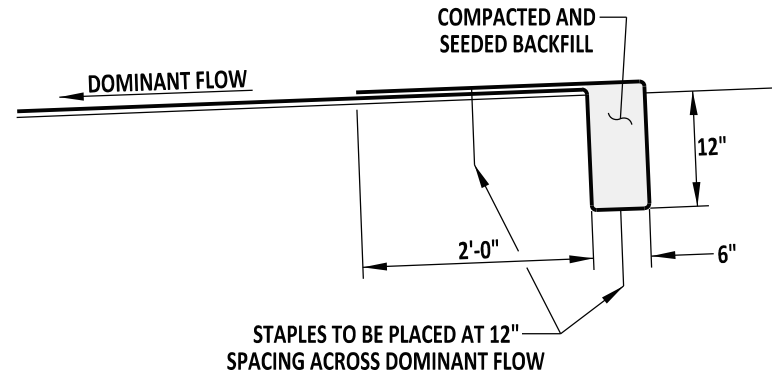
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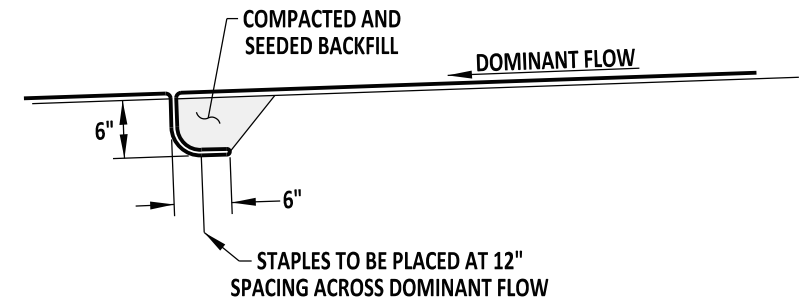
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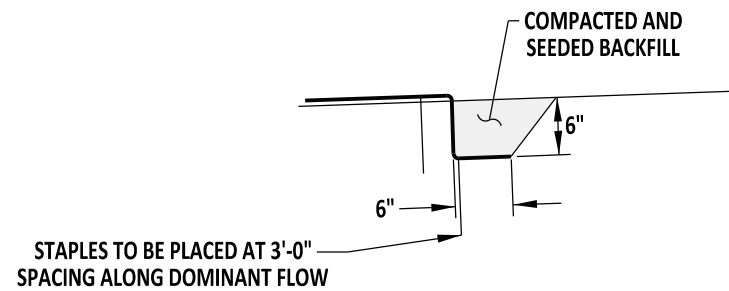
INITIAL TRENCH ANCHOR DETAIL
APPLIED AT THE DOWNSTREAM END OF DITCH



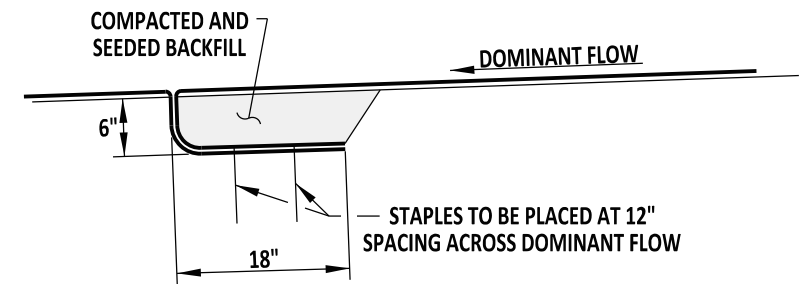
TERMINAL TRENCH ANCHOR DETAIL
APPLIED AT THE UPSTREAM END OF DITCH



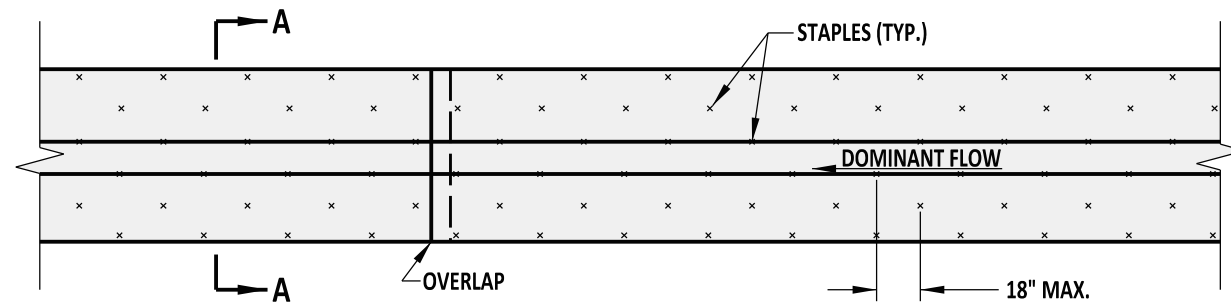
CHECK SLOT DETAIL
(PLACE AS PER MANUFACTURER)



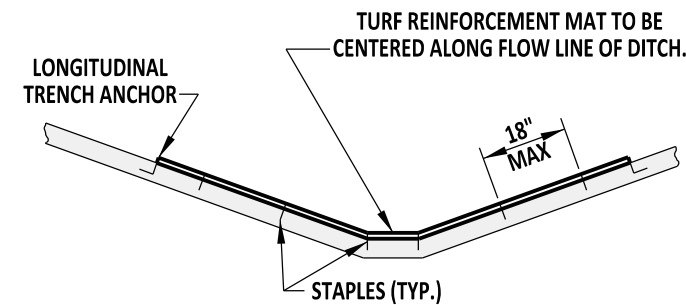
LONGITUDINAL TRENCH ANCHOR DETAIL



OVERLAP DETAIL



**STABILIZATION OF DITCHES
PLAN**



**STABILIZATION OF DITCHES
SECTION A-A**

DESIGN SHEAR STRESS	
TYPE 1	GREATER THAN 2 lb/sf BUT LESS THAN 6 lb/sf
TYPE 2	GREATER THAN 6 lb/sf BUT LESS THAN 8 lb/sf

NOTES:

- 1). TRACK AND SEED TOPSOIL UNDER TURF REINFORCEMENT.
- 2). ADDITIONAL STAPLES ARE REQUIRED AT OVERLAPS, ENDS, CHECK SLOTS, AND EDGES AS DETAILED ON THIS SHEET.
- 3). STAGGER ALL STAPLES AS SHOWN ON THIS SHEET.



DELAWARE
DEPARTMENT OF TRANSPORTATION

TURF REINFORCEMENT MAT APPLICATIONS

STANDARD NO. E-13 (2014)

SHT. 1 OF 1

APPROVED

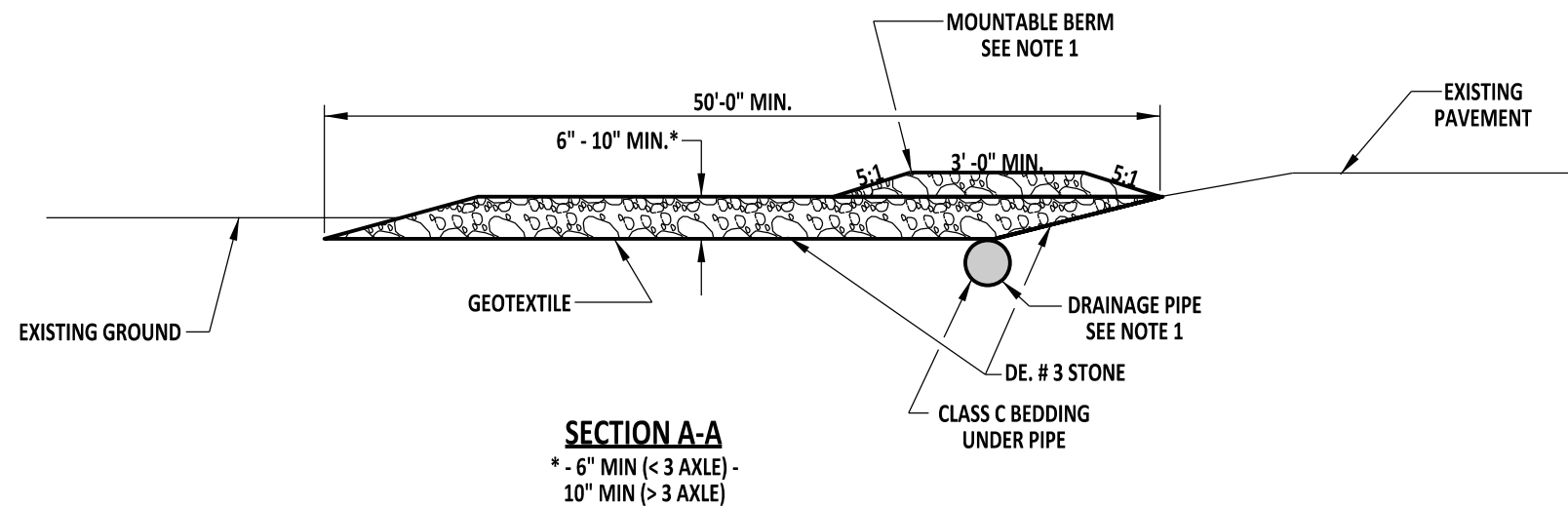
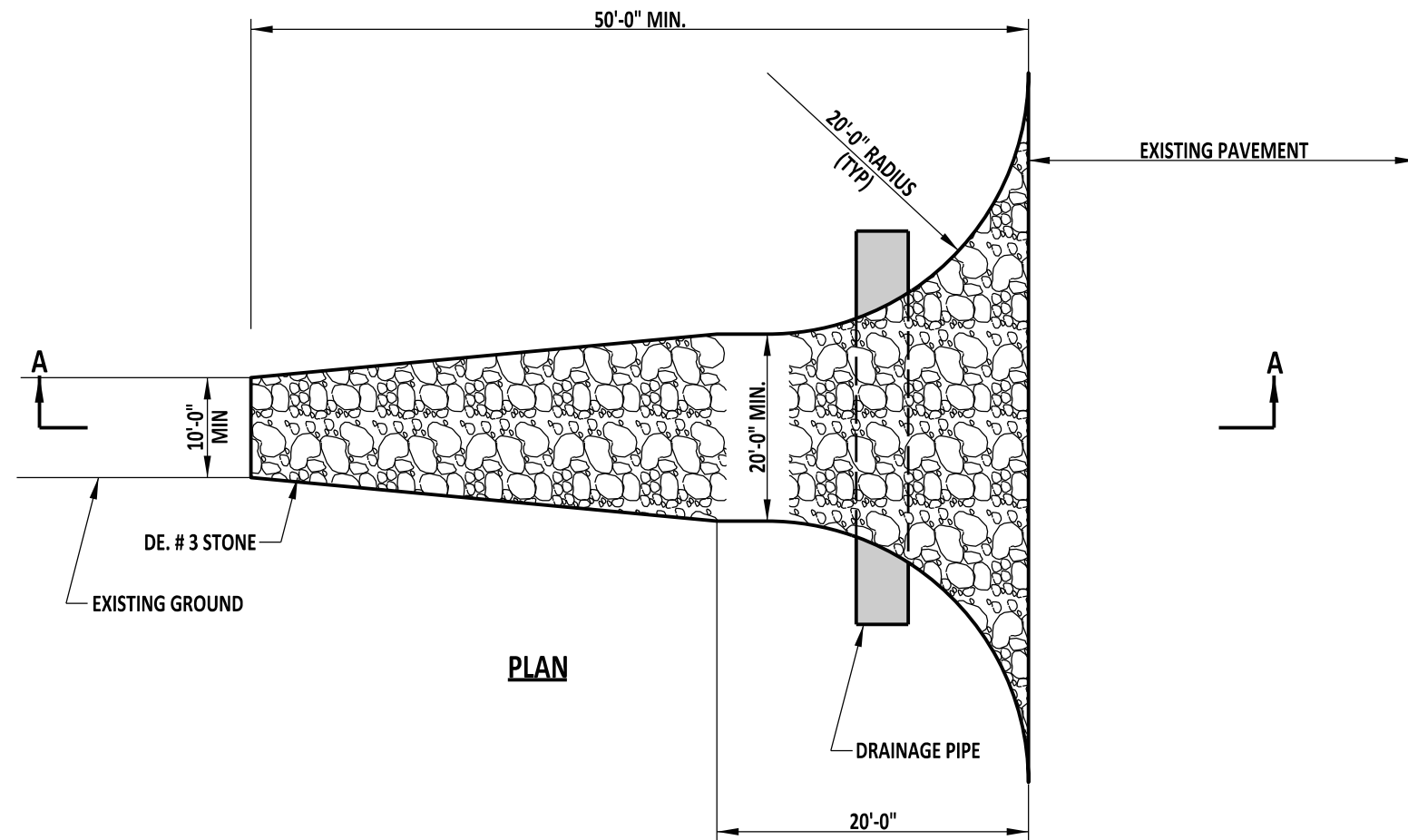
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CHIEF ENGINEER

12/30/2014
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/11/2014
DATE



NOTES:

- 1). PIPE ALL SURFACE WATER THAT IS FLOWING OR DIVERTED TOWARDS THE CONSTRUCTION ENTRANCE UNDER THE ENTRANCE. A MOUNTABLE BERM AS SHOWN ON THIS DETAIL, IS PERMITTED TO FACILITATE PLACEMENT OF PIPES IN SHALLOW CONDITIONS.
- 2). SEE PLANS FOR LOCATION AND NUMBER OF STABILIZED CONSTRUCTION ENTRANCES. PRIOR APPROVAL BY THE ENGINEER IS REQUIRED FOR ANY CHANGE IN LOCATION OR NUMBER OF ENTRANCES.
- 3). REMOVE AND REPLACE TOP 2" OF STONE WITH 2" OF CLEAN STONE WHEN VOIDS ARE FILLED OR AS DIRECTED BY THE ENGINEER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

STABILIZED CONSTRUCTION ENTRANCE

STANDARD NO. E-14 (2014)

SHT. 1 OF 1

APPROVED

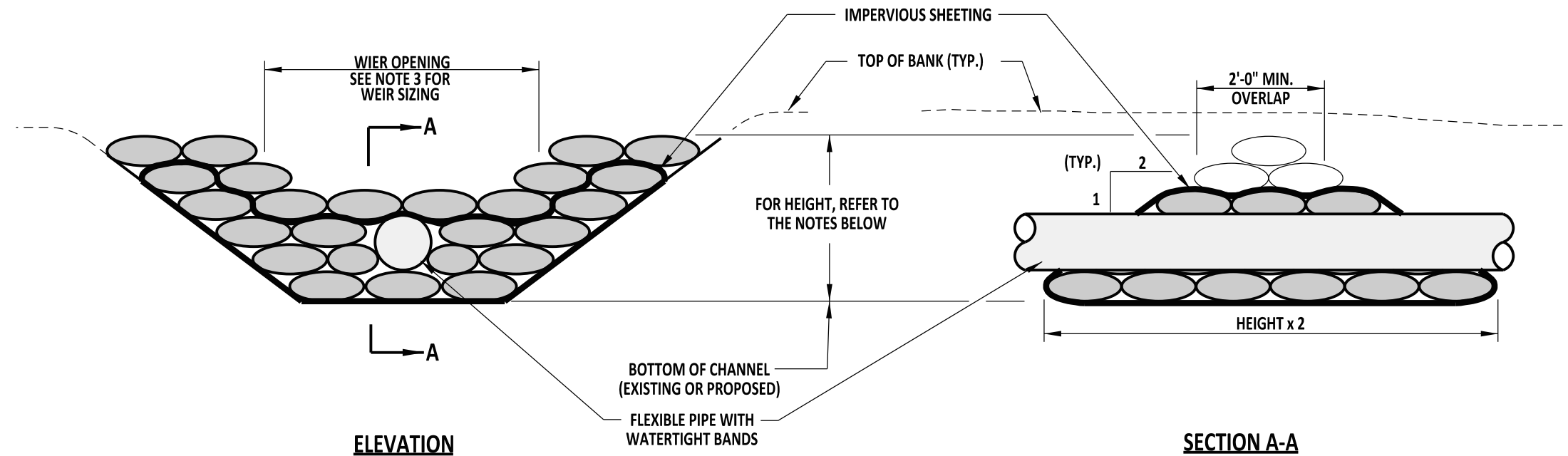
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CHIEF ENGINEER

12/30/2014
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/11/2014
DATE



NOTES:

- 1). INSTALL SANDBAG DIKE IN UPSTREAM LOCATION FIRST.
- 2). CONSTRUCT SANDBAG DIKE SUCH THAT THE HEIGHT IS 1'-0" ABOVE THE PEAK ELEVATION OF THE 1 YEAR STORM, OR 1'-0" BELOW THE TOP OF THE BANK, WHICHEVER IS LESS. SEE PLANS FOR MORE INFORMATION.
- 3). CONSTRUCT WEIR SUCH THAT IT WILL PASS A 1 YEAR STORM EVENT PEAK FLOW. SEE PLANS FOR MORE INFORMATION.
- 4). SIZE THE PIPE SUCH THAT IT WILL ALLOW PASSAGE OF THE STREAM BASE FLOW.



DELAWARE
DEPARTMENT OF TRANSPORTATION

SANDBAG DIKE

STANDARD NO.

E-15 (2014)

SHT. 1

OF 1

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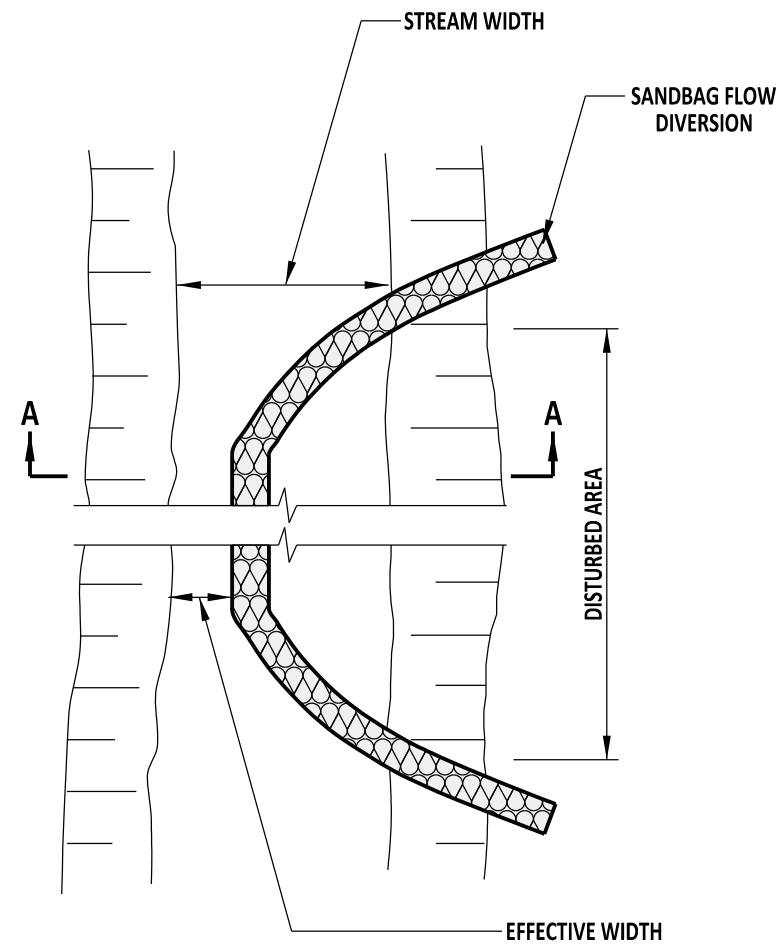
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12/30/2014
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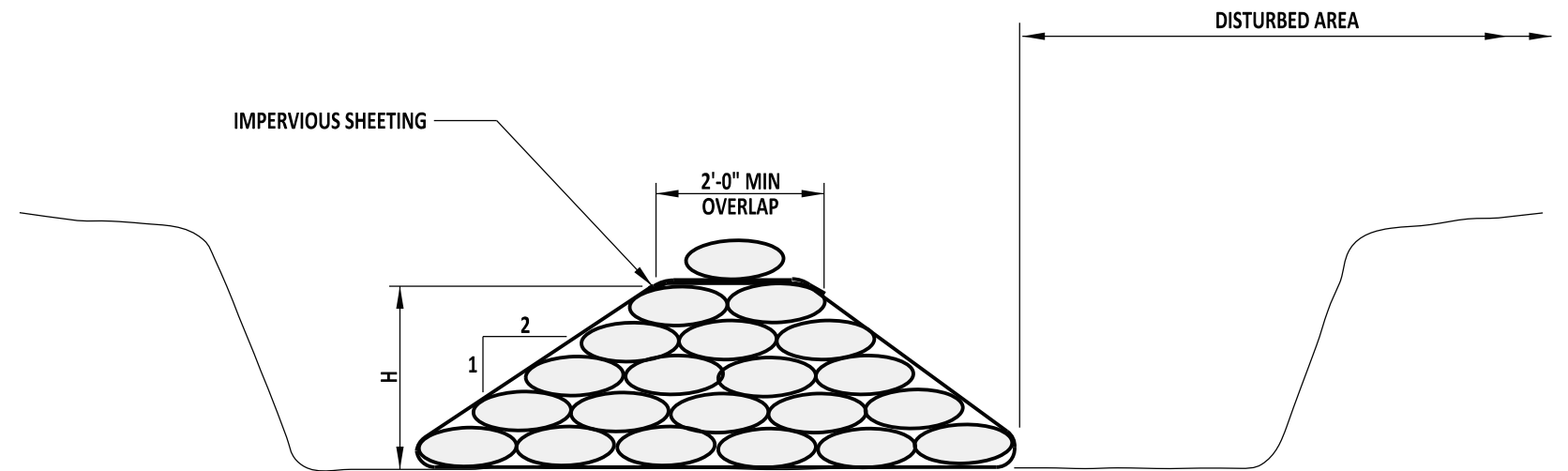
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SIGNATURE ON FILE
DESIGN ENGINEER

12/11/2014
DATE



PLAN



SECTION A-A

NOTES:

- 1). INSTALL DIVERSION STRUCTURE FROM UPSTREAM TO DOWNSTREAM.
- 2). SIZE EFFECTIVE CHANNEL WIDTH SO THAT IT WILL PASS A 1 YEAR STORM EVENT PEAK FLOW, OR $\frac{1}{2}$ OF STREAM WIDTH, WHICHEVER IS GREATER.
- 3). CONSTRUCT SANDBAG DIVERSION HEIGHT SUCH THAT TOP OF THE DIVERSION STRUCTURE IS 1'-0" ABOVE THE 1 YEAR STORM PEAK ELEVATION.



DELAWARE
DEPARTMENT OF TRANSPORTATION

SANDBAG DIVERSION

STANDARD NO.

E-16 (2014)

SHT. 1

OF 1

APPROVED

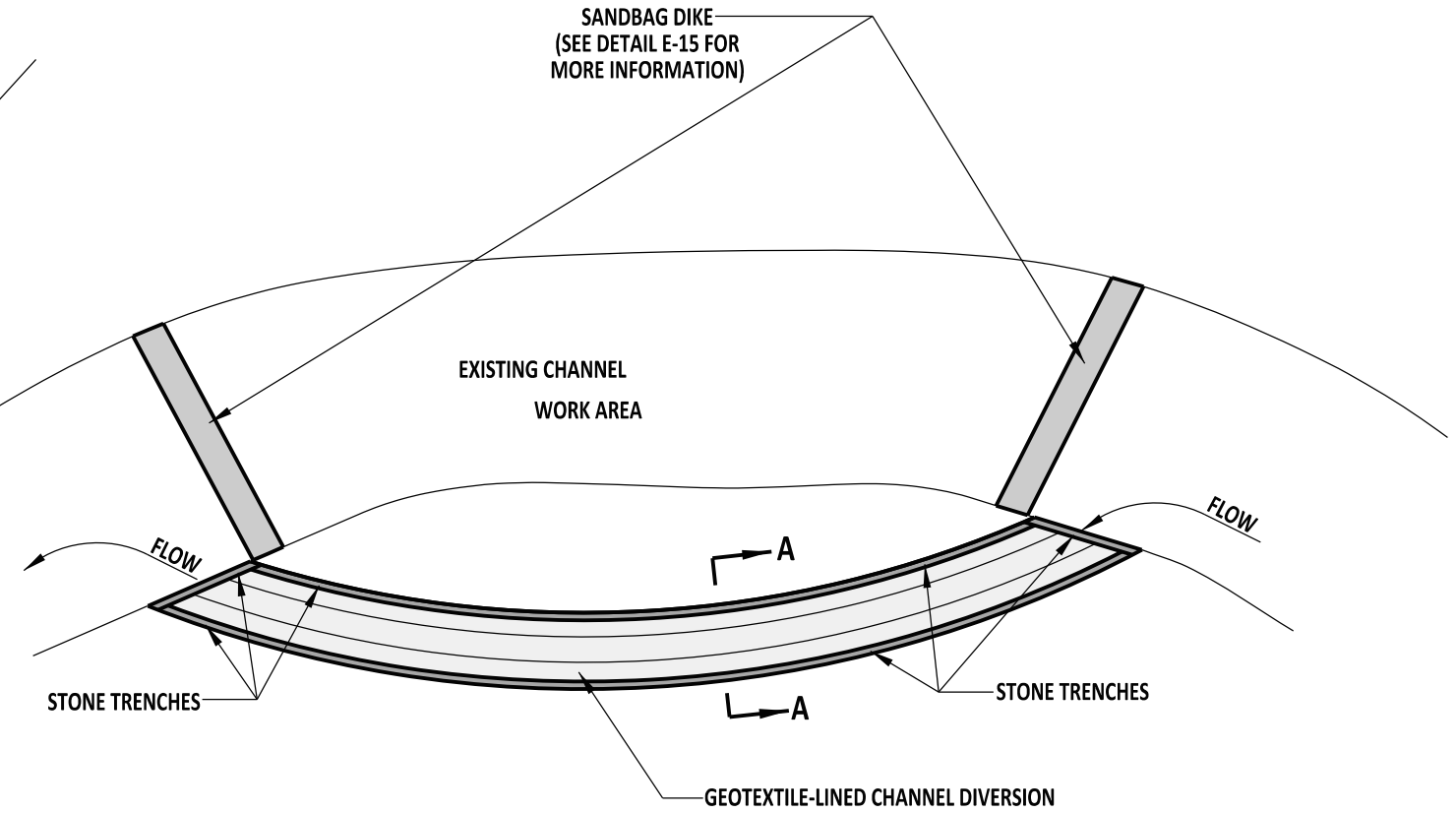
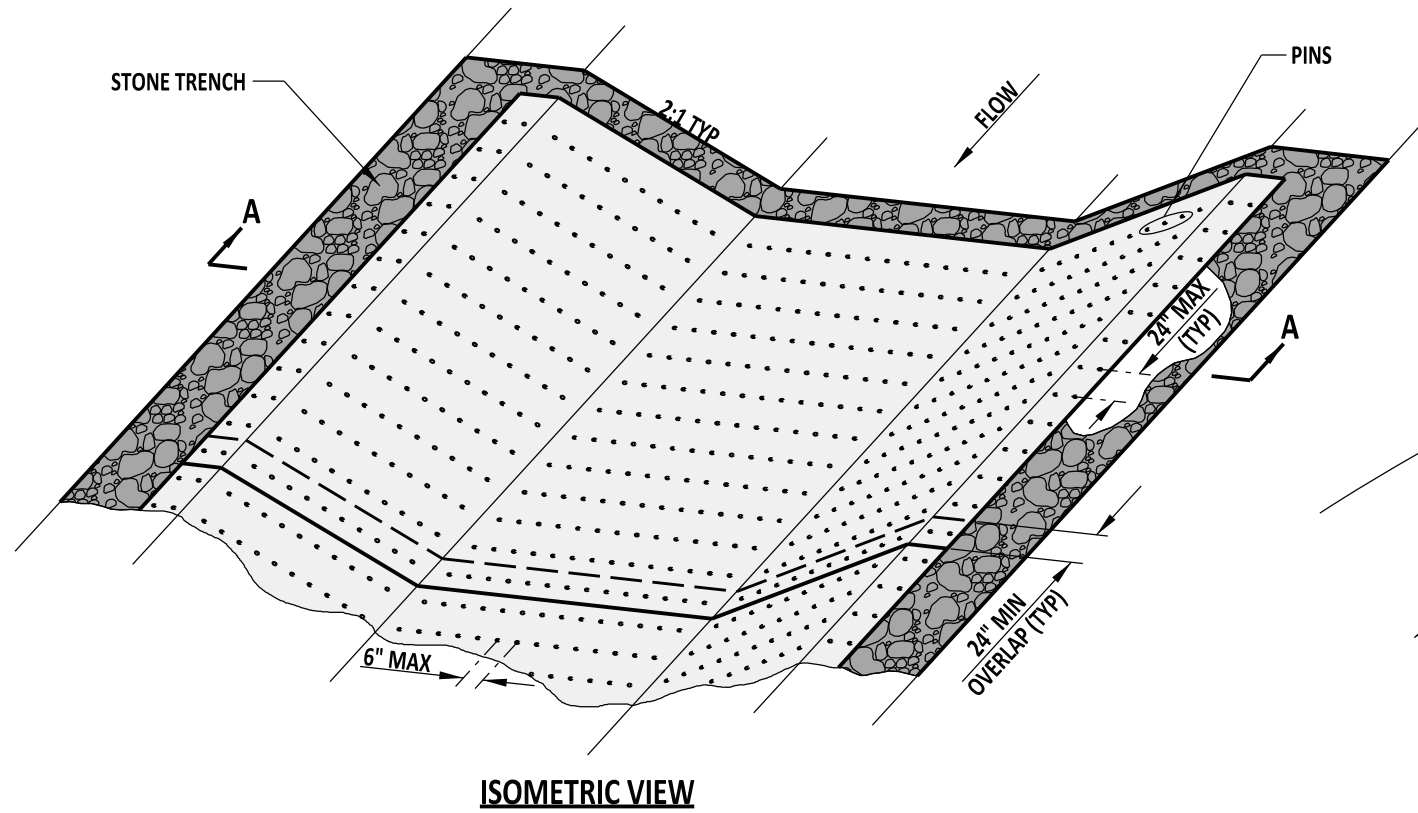
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12/30/2014
DATE

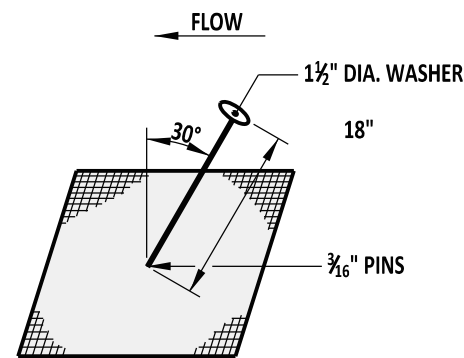
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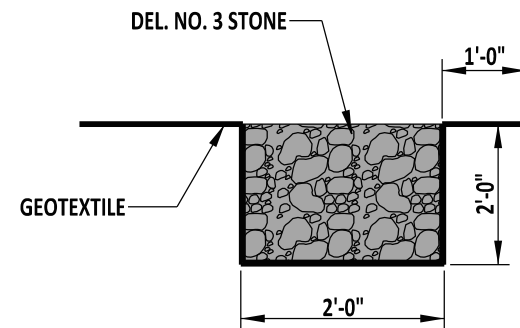
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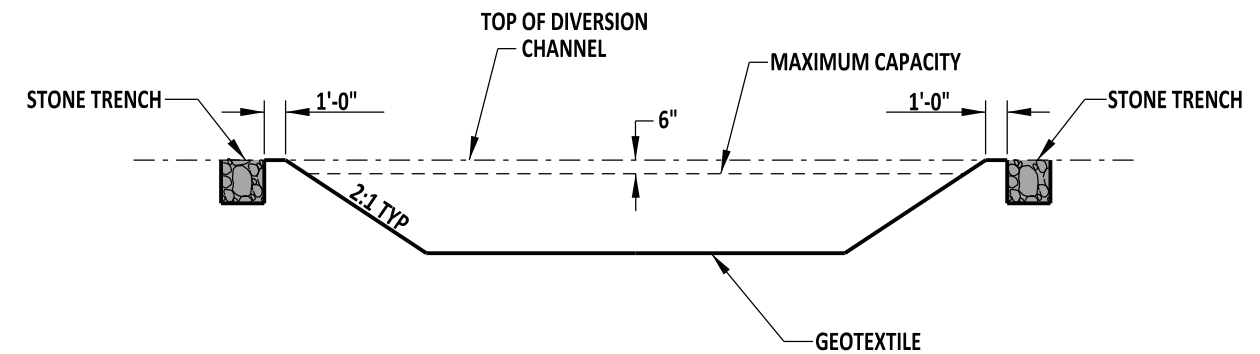
PLAN



FASTENING DETAIL



TRENCHING DETAIL



SECTION A-A

NOTE:
SEE PLANS FOR LOCATION, DIMENSIONS, GRADES, ETC.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GEOTEXTILE-LINED CHANNEL DIVERSION

STANDARD NO. E-17 (2014)

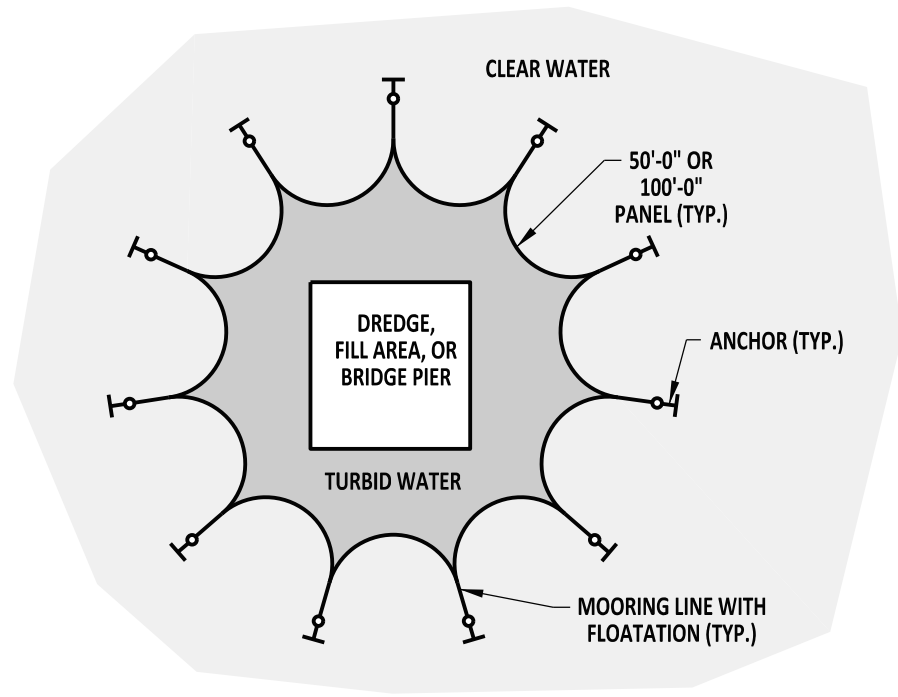
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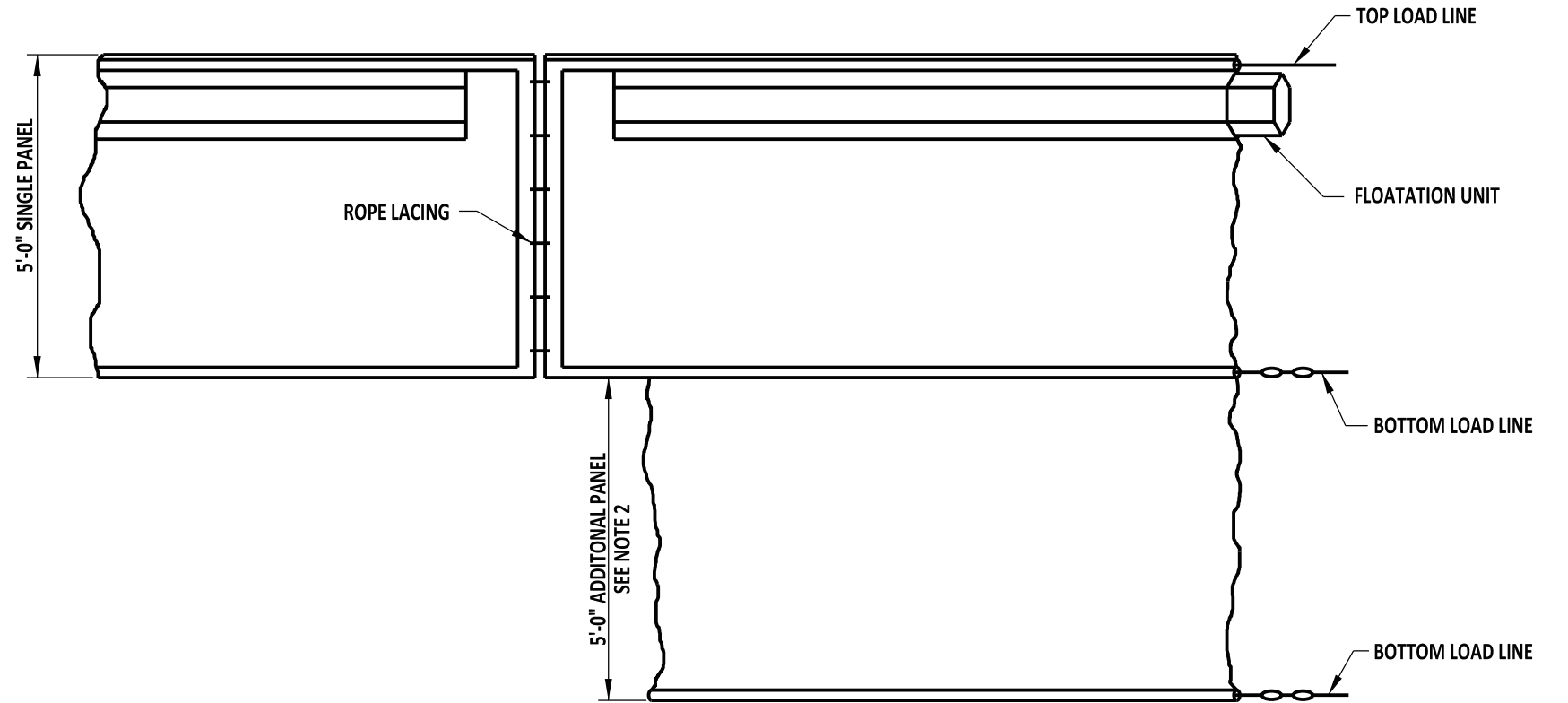
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DATE

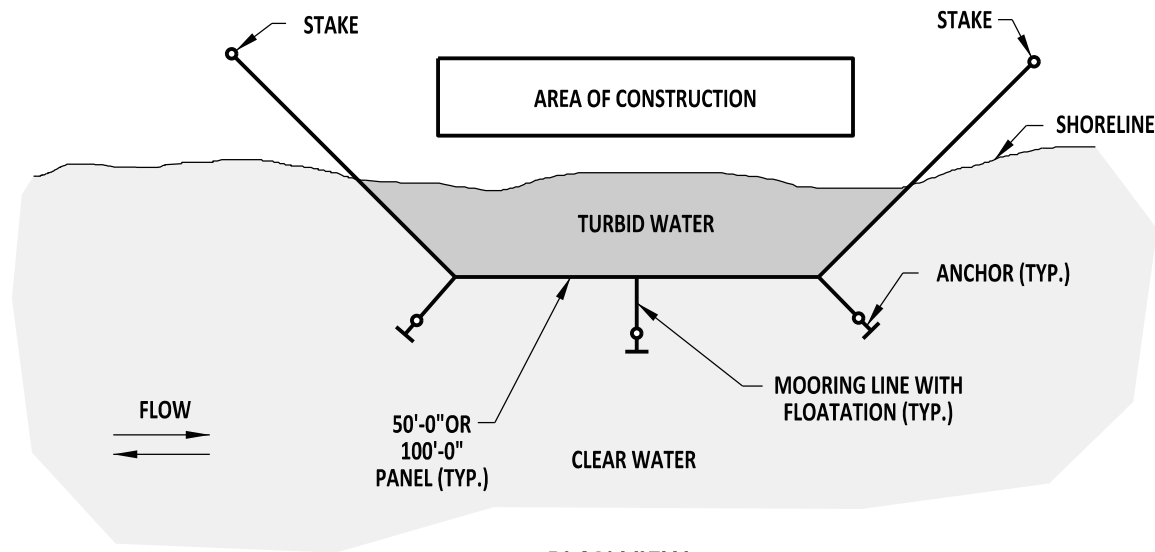


PLAN VIEW
OPEN WATER APPLICATION



ELEVATION

FLOATING TURBIDITY CURTAIN



PLAN VIEW
SHORELINE APPLICATION

NOTE:

- 1). ADDITIONAL PANEL REQUIRED FOR DEPTHS GREATER THAN 5'-0".
- 2). USE 2 TURBIDITY CURTAIN PANELS TO REACH BOTTOM DEPTHS OF 10'-0". SPECIAL DEPTH TURBIDITY CURTAIN PANELS ARE REQUIRED FOR DEPTHS GREATER THAN 10'-0" AND THEIR USE WITH BE CALLED OUT IN THE PLANS OR DIRECTED BY THE ENGINEER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

TURBIDITY CURTAIN

STANDARD NO.

E-18 (2014)

SHT. 1

OF 1

APPROVED

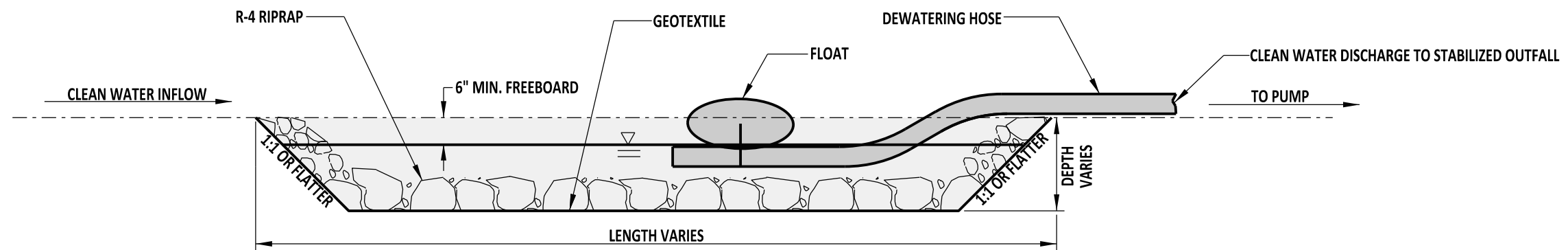
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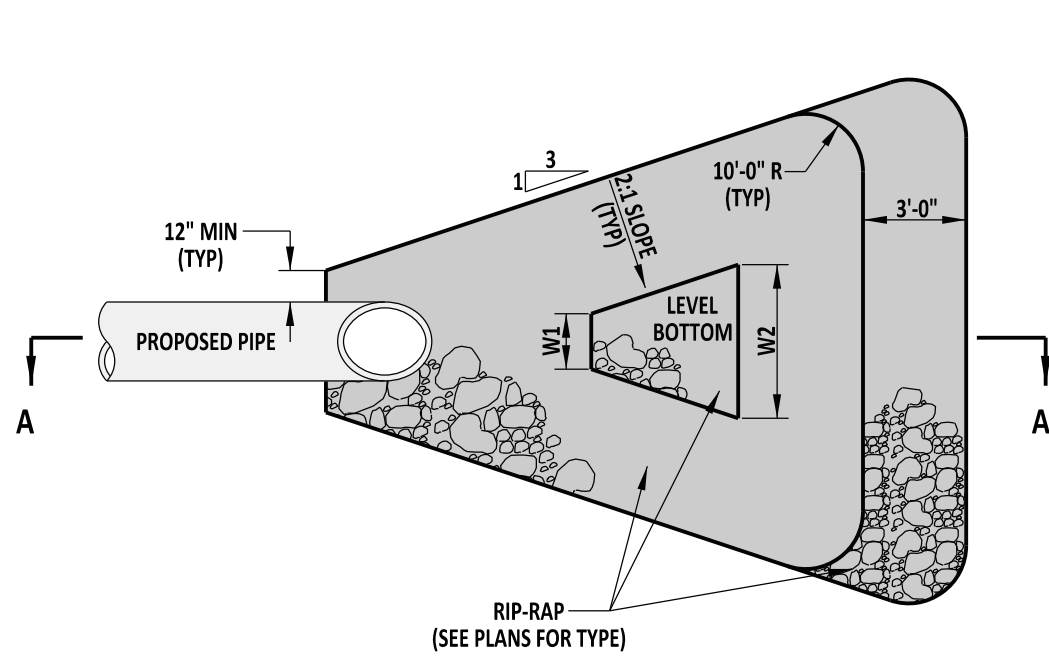
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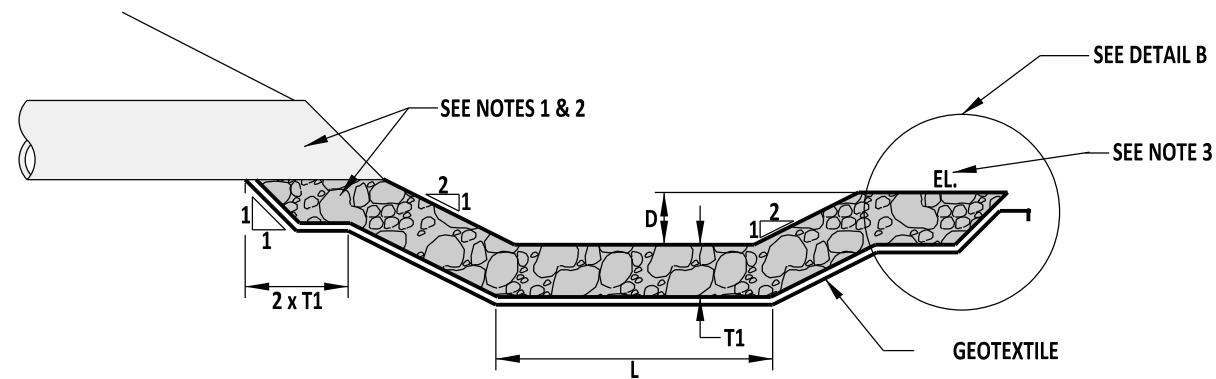
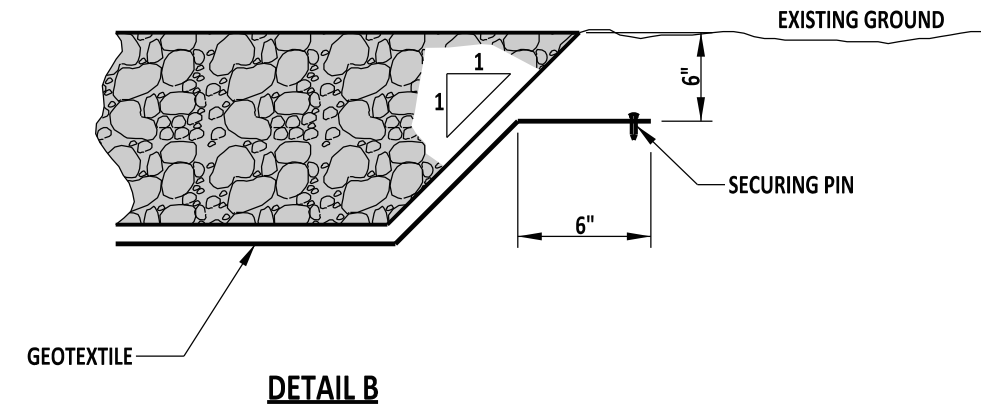


NOTE:
THE DIMENSIONS OF THE STILLING WELL ARE SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER. THE MINIMUM SIZE OF THE STILLING WELL IS 5'-0" x 5'-0".

 DELAWARE DEPARTMENT OF TRANSPORTATION	STILLING WELL			APPROVED	SIGNATURE ON FILE <small>CHIEF ENGINEER</small>	12/30/2014 <small>DATE</small>
	STANDARD NO.	E-19 (2014)	SHT. 1 OF 1	RECOMMENDED	SIGNATURE ON FILE <small>DESIGN ENGINEER</small>	12/11/2014 <small>DATE</small>



PLAN VIEW



SECTION A-A

NOTES:

- 1). PLACE RIPRAP PRIOR TO PLACING PIPE.
- 2). PLACE DELAWARE NO. 3 STONE UNDER PIPE.
- 3). CONSTRUCT DISSIPATOR SUCH THAT THE ELEVATION (EL.) IS LOWER THAN PIPE INVERT.
- 4). REFER TO THE PIPE ENERGY DISSIPATOR SCHEDULE ON THE PLANS FOR THE VALUE OF DIMENSION VARIABLES.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

RIPRAP ENERGY DISSIPATOR

STANDARD NO.

E-20 (2014)

SHT. 1

OF 1

APPROVED

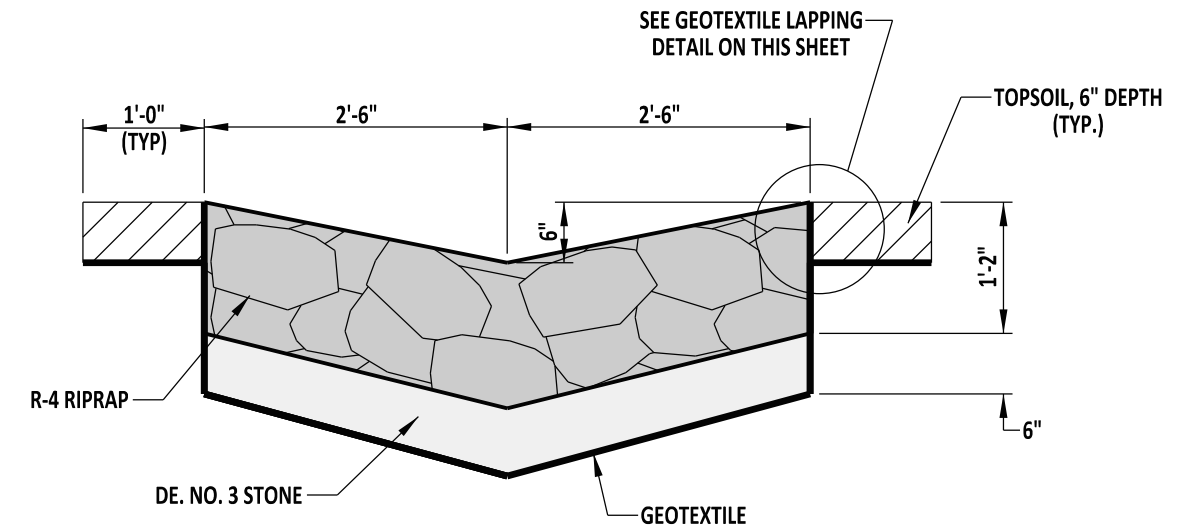
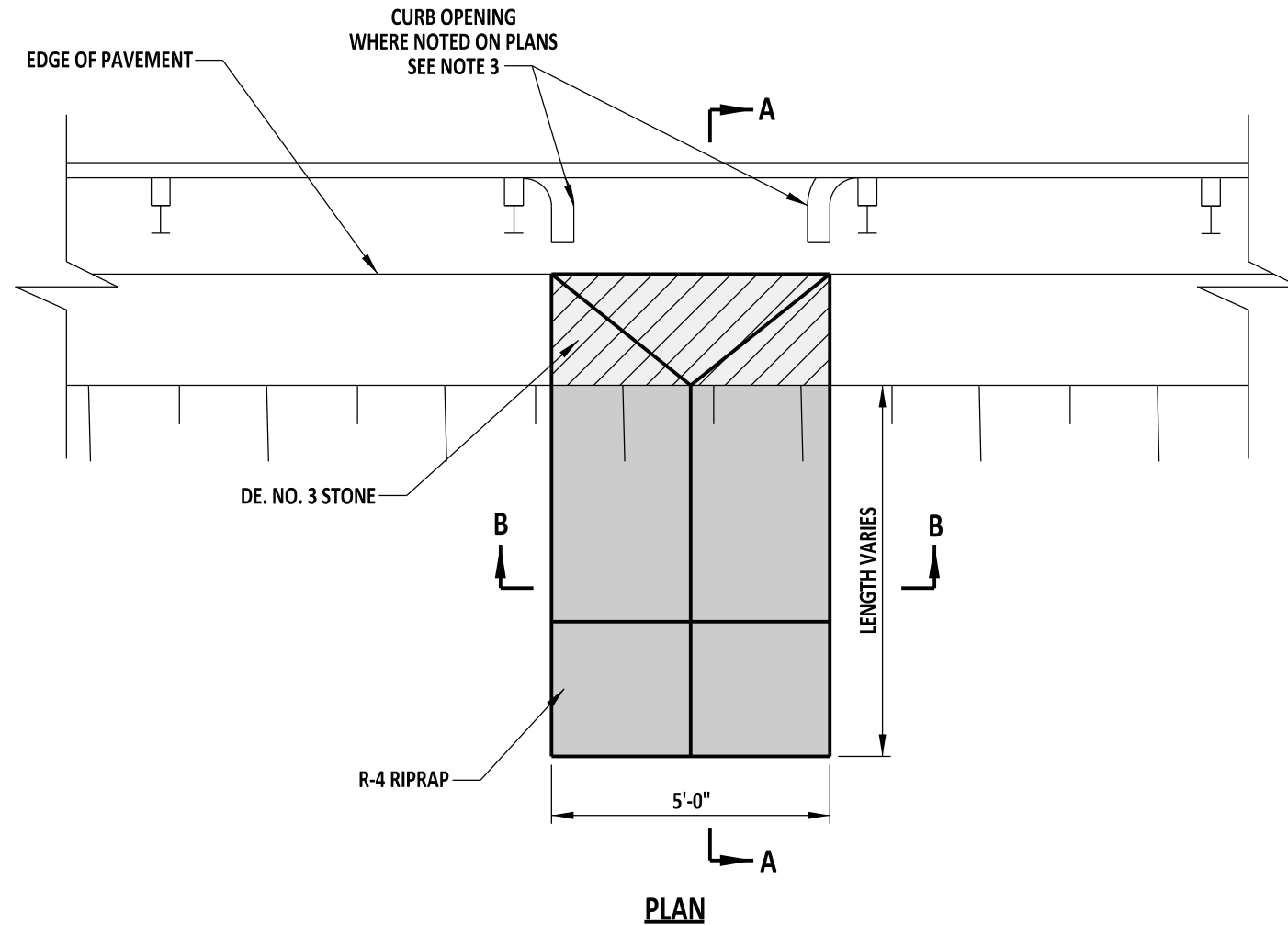
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12/30/2014
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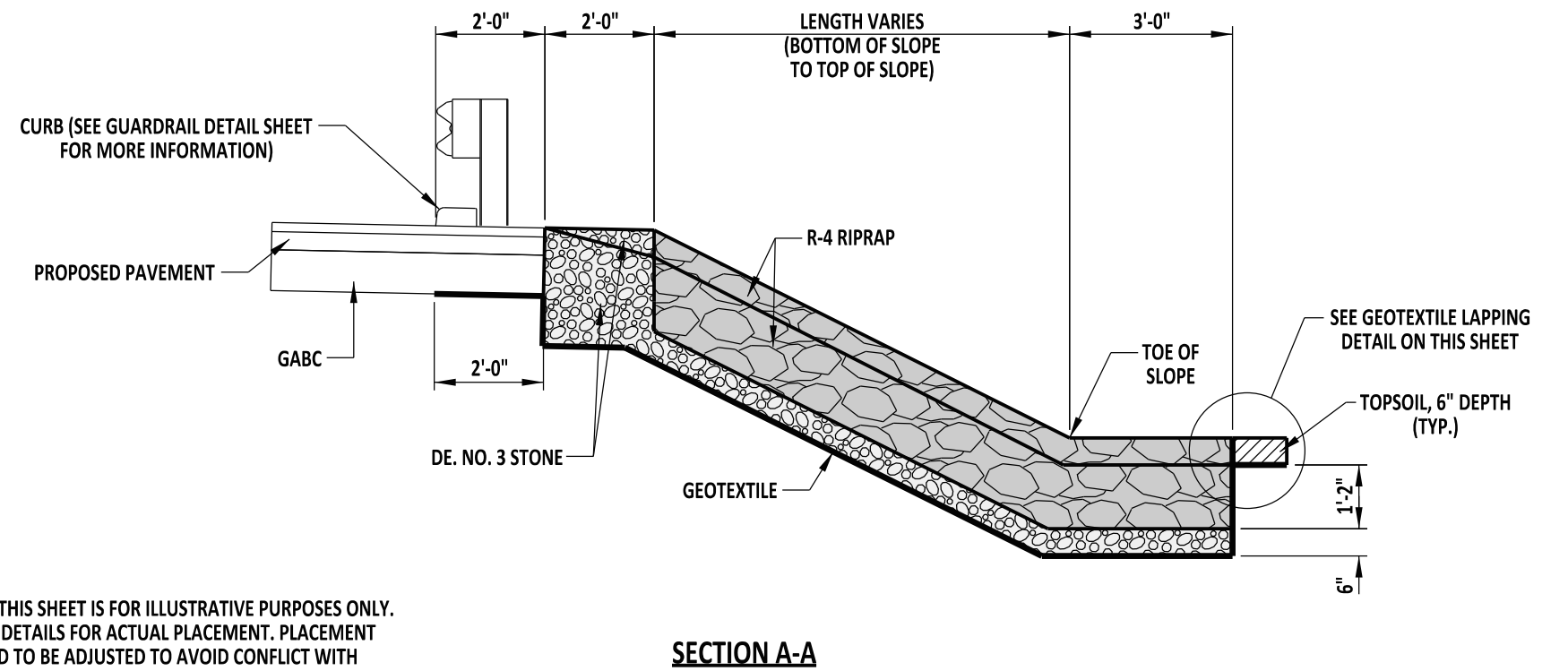
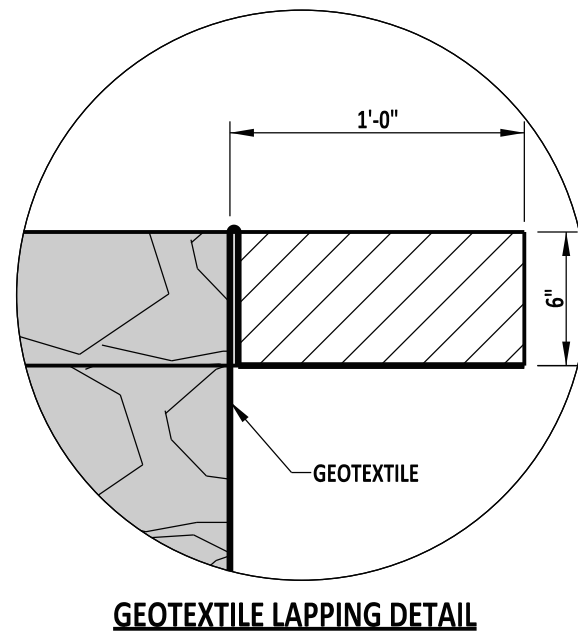
RECOMMENDED

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DESIGN ENGINEER

12/11/2014
DATE



SECTION B-B



SECTION A-A

NOTES:

- 1). GUARDRAIL DEPICTED ON THIS SHEET IS FOR ILLUSTRATIVE PURPOSES ONLY. REFER TO THE GUARDRAIL DETAILS FOR ACTUAL PLACEMENT. PLACEMENT OF SLOPE DRAIN MAY NEED TO BE ADJUSTED TO AVOID CONFLICT WITH GUARDRAIL POSTS.
- 2). PLACE CURB OPENING AT EACH SLOPE DRAIN LOCATION.
- 3). SEE DETAILS C-4 AND C-5 FOR MORE INFORMATION.



DELAWARE
DEPARTMENT OF TRANSPORTATION

STONE OUTLET DETAIL

STANDARD NO.

E-21 (2014)

SHT. 1

OF 1

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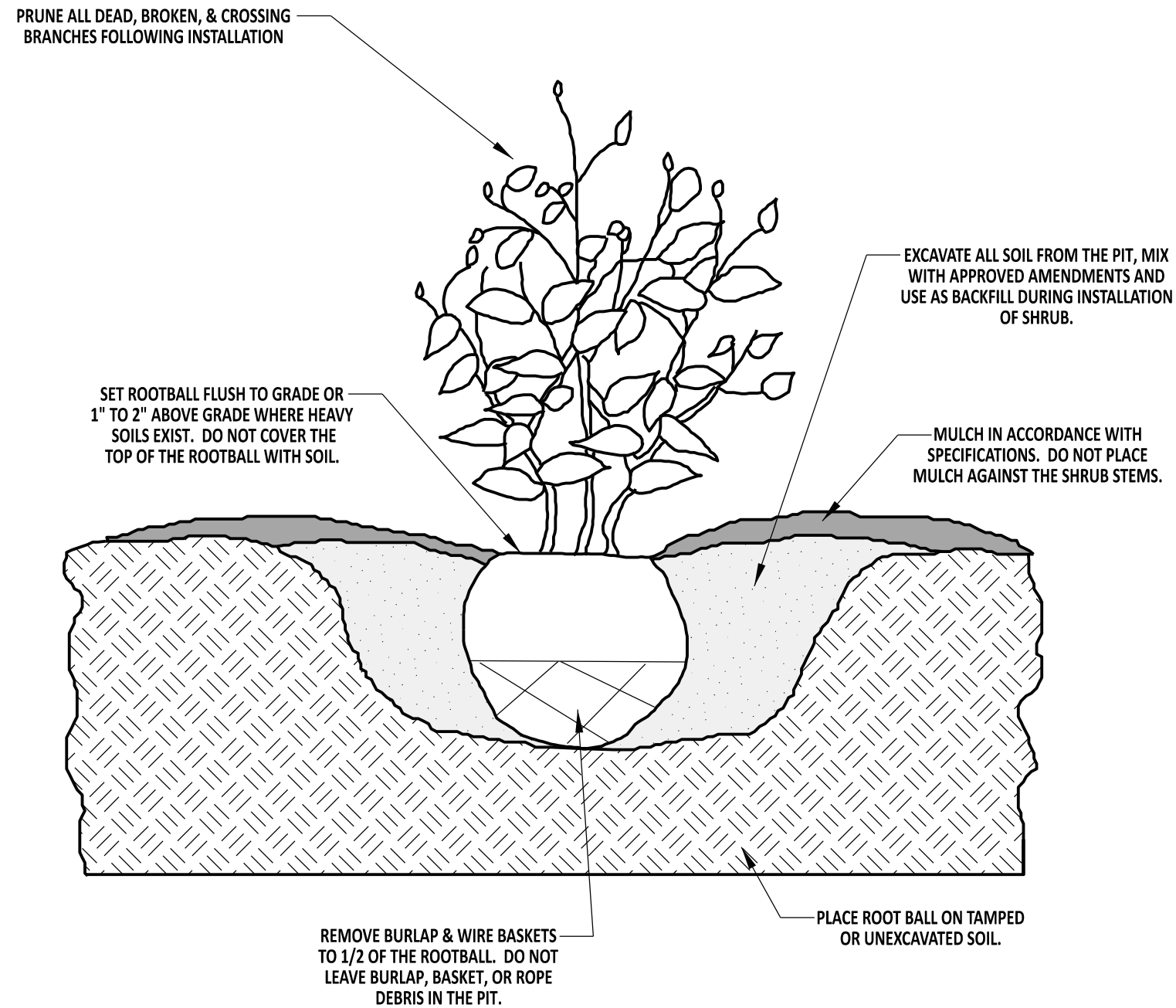
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CHIEF ENGINEER

12/30/2014
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/11/2014
DATE



NOTES:

- 1). DIG BASE OF PLANTING PIT A MINIMUM OF TWO AND A MAXIMUM OF THREE TIMES THE SIZE OF THE ROOT BALL.
- 2). INSTALL SHRUBS IN MASSES OF NO LESS THAN 3 PLANTS. A MINIMUM OF 3'-0" IS REQUIRED FROM MIDDLE OF SHRUB TO ANY PERMANENT STRUCTURE (I.E. CURB, SIDEWALK, BUILDING, ETC...)
- 3). SHRUB PRUNING IS TO BE PERFORMED BY AN I.S.A. CERTIFIED ARBORIST, CERTIFIED NURSERY PROFESSIONAL, OR UNDER THE DIRECTION THEREOF. DO NOT HEAVILY PRUNE SHRUBS AT PLANTING.
- 4). HAND DIG AUGERED HOLES TO FINAL WIDTH AND DEPTH TO ELIMINATE GLAZING.
- 5). MULCH ALL SHRUB MASSES IN ONE CONTINUOUS BED.

ROADSIDE SHRUB PLANTING DETAIL



DELAWARE
DEPARTMENT OF TRANSPORTATION

PLANTING DETAILS

STANDARD NO.

L-1 (2017)

SHT. 1

OF 3

APPROVED

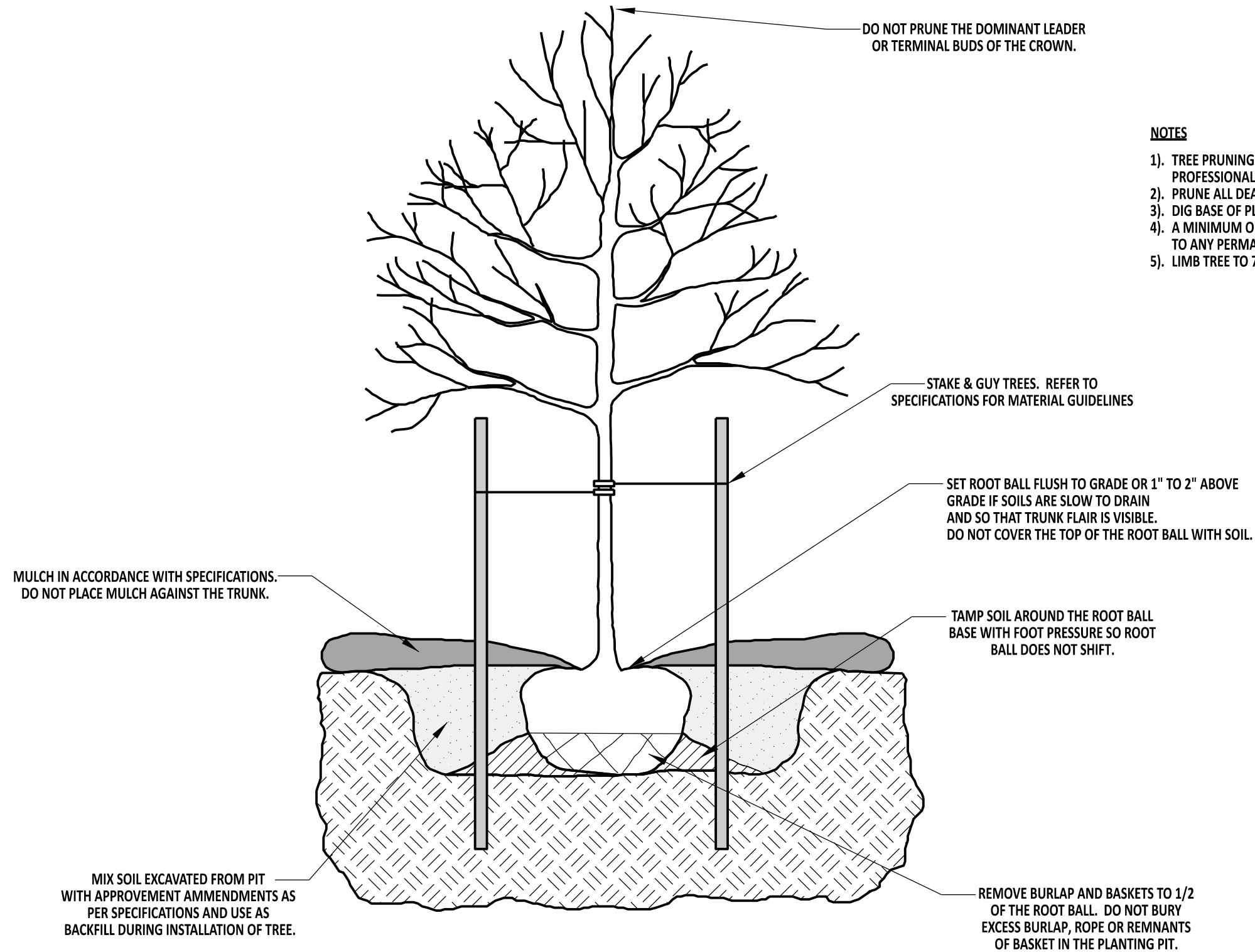
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CHIEF ENGINEER

5/31/2017
DATE

RECOMMENDED

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DESIGN ENGINEER

5/18/2017
DATE



NOTES

- 1). TREE PRUNING IS TO BE PERFORMED BY AN I.S.A. CERTIFIED ARBORIST, CERTIFIED NURSERY PROFESSIONAL, OR UNDER THE DIRECTION THEREOF. DO NOT HEAVILY PRUNE TREES AT PLANTING.
- 2). PRUNE ALL DEAD, BROKEN, & CROSSING BRANCHES FOLLOWING INSTALLATION.
- 3). DIG BASE OF PLANTING PIT A MINIMUM OF TWO AND A MAXIMUM THREE TIMES THE SIZE OF THE ROOT BALL.
- 4). A MINIMUM OF 3'-0" IS REQUIRED FROM THE MIDDLE OF THE TREE TO ANY PERMANENT STRUCTURE (I.E. CURB, SIDEWALK, BUILDING, ETC...)
- 5). LIMB TREE TO 7'-0" FOR PEDESTRIAN CLEARANCE WHEN PLANTING ADJACENT TO SIDEWALKS.

TREE PLANTING DETAIL



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

PLANTING DETAILS

STANDARD NO.

L-1 (2017)

SHT.

2

OF

3

APPROVED

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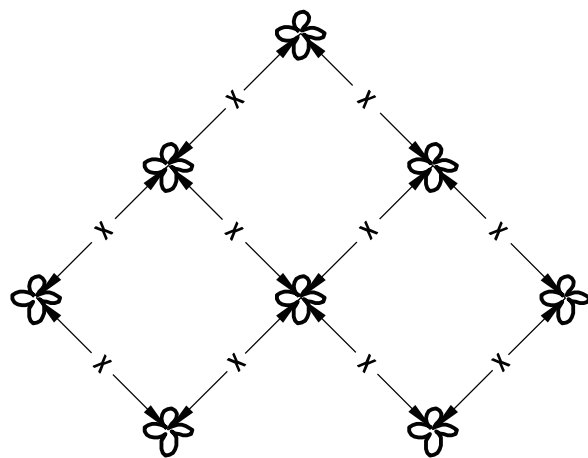
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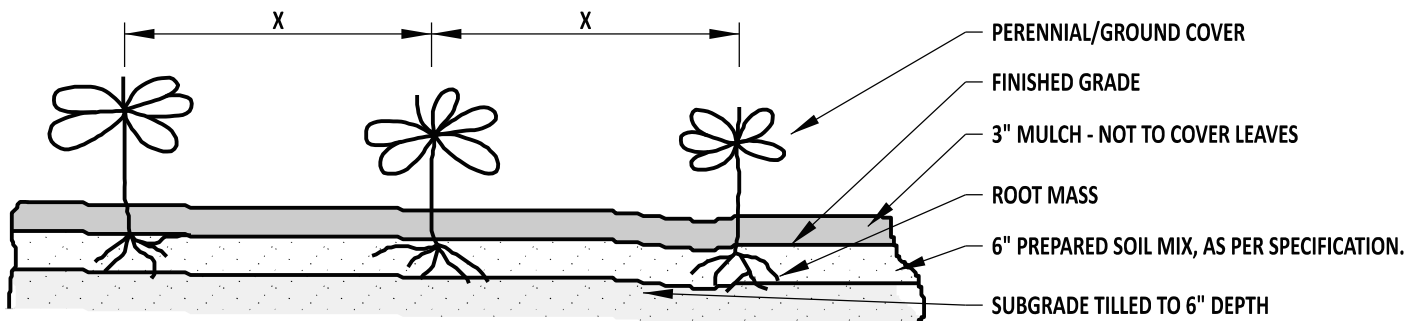
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5/18/2017
DATE

NOTE:
1). SEE PLANT LIST FOR SPACING (X).



PLAN VIEW



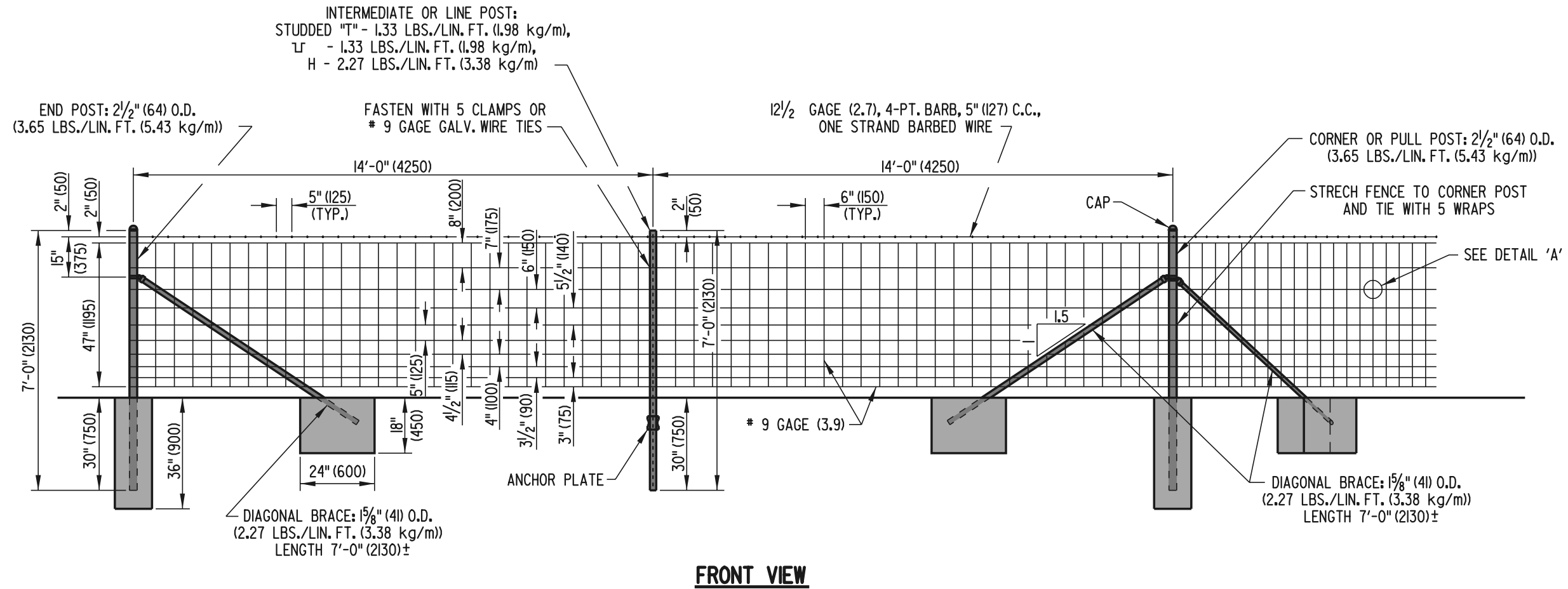
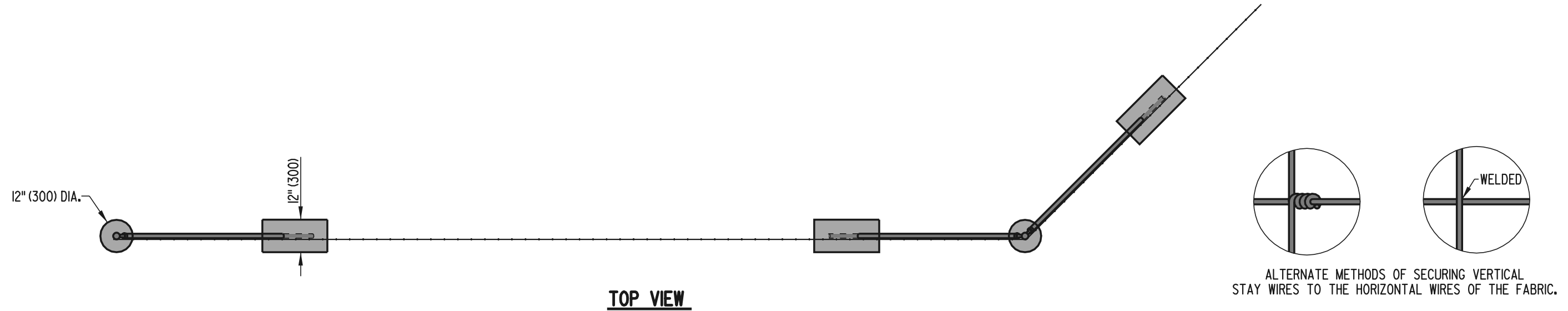
SECTION VIEW

PERENNIAL/GROUNDCOVER PLANTING DETAIL



DELAWARE
DEPARTMENT OF TRANSPORTATION

PLANTING DETAILS				APPROVED	SIGNATURE ON FILE	5/31/2017
					CHIEF ENGINEER	DATE
STANDARD NO.	L-1 (2017)	SHT.	3	OF	3	RECOMMENDED
					SIGNATURE ON FILE	5/18/2017
					DESIGN ENGINEER	DATE



DELAWARE
DEPARTMENT OF TRANSPORTATION

RIGHT-OF-WAY FENCE

STANDARD NO.

M-1 (2001)

SHT. 1

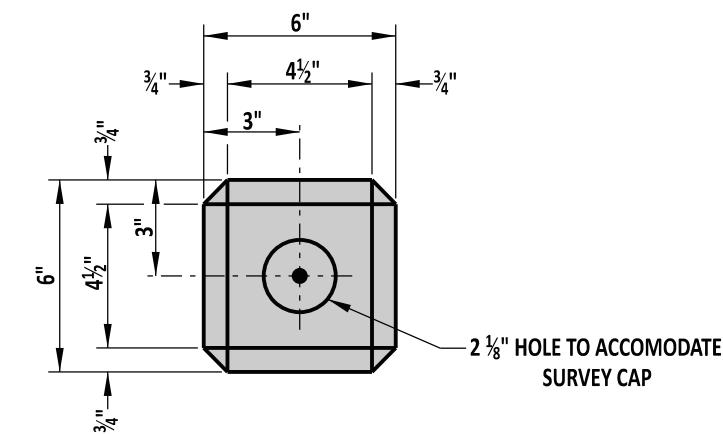
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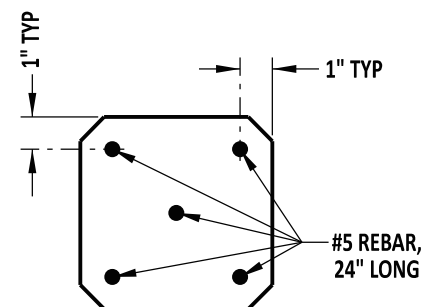
Ryan M. Harkness 6/18/01
 CHIEF ENGINEER DATE

RECOMMENDED

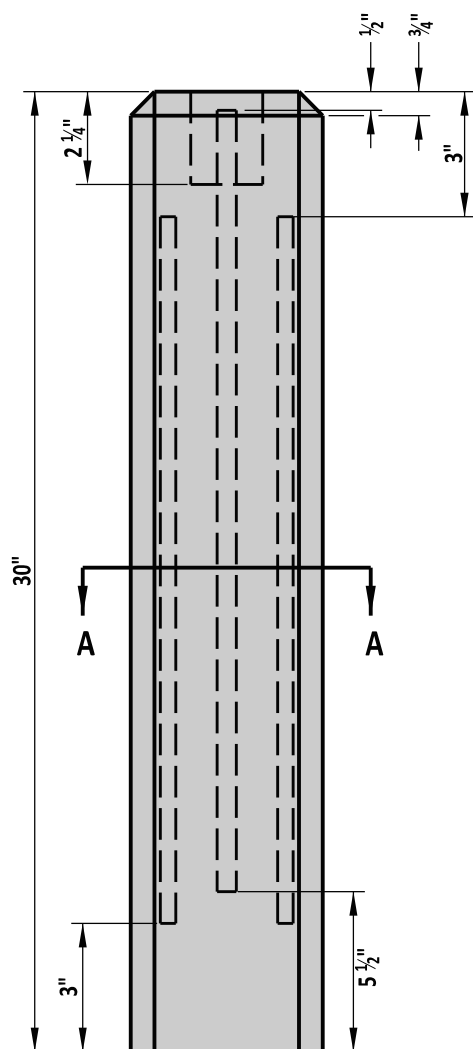
Michael J. Galt 6/18/01
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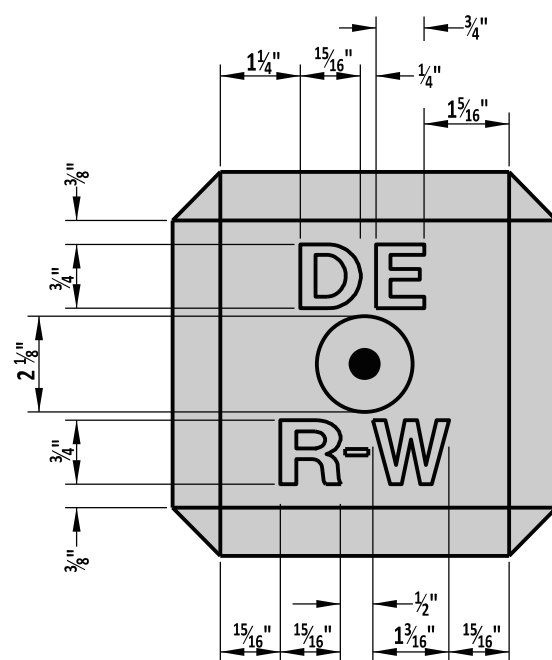
TOP



SECTION A-A



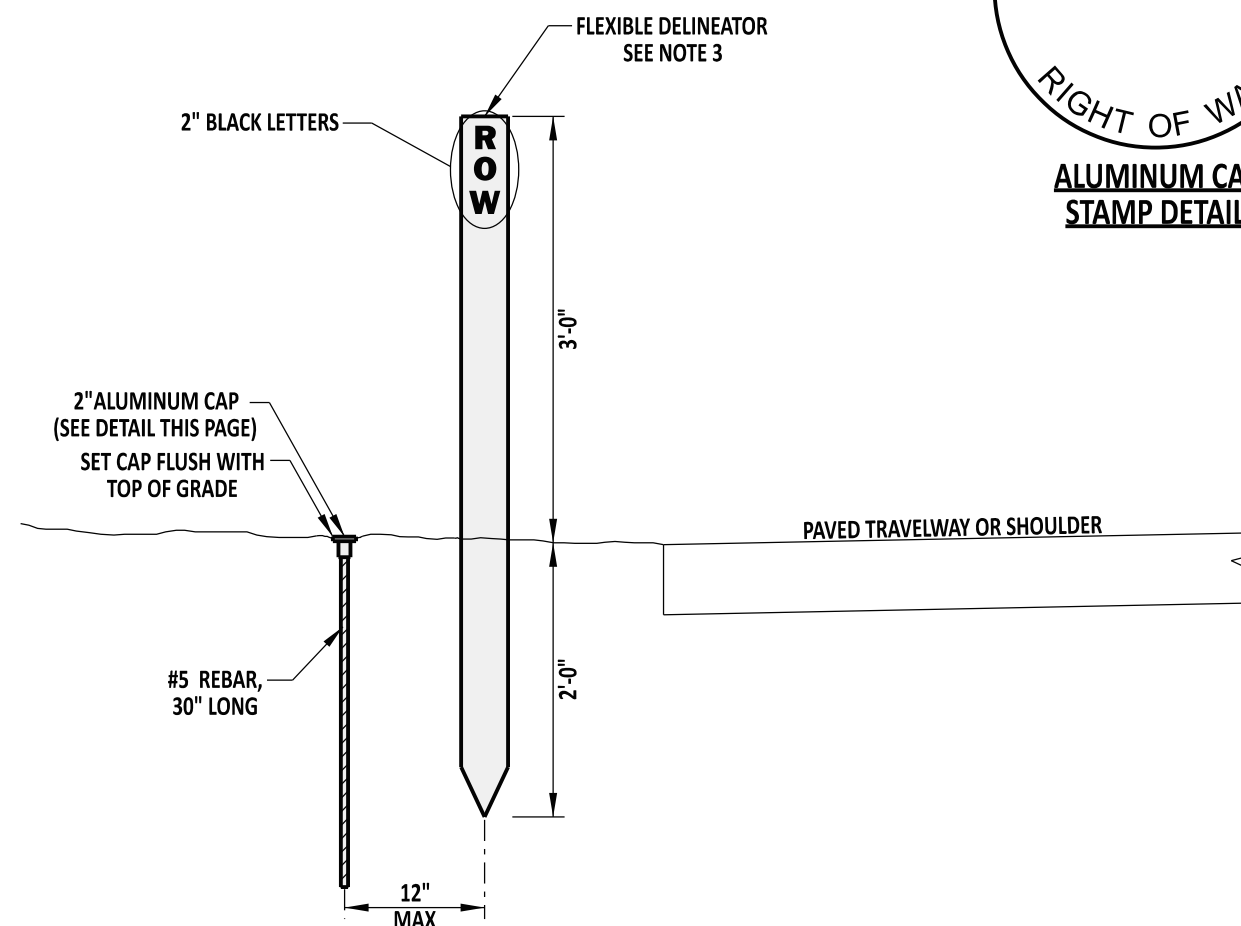
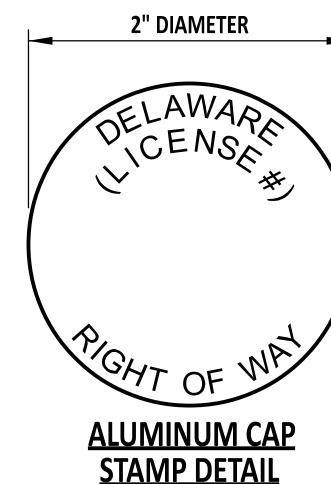
ELEVATION



TOP DETAIL

- NOTES :
- 1). LONGITUDINAL STEEL SHALL BE HELD IN PLACE BY CRADLES.
 - 2). LETTERS ON CONCRETE MONUMENT TO BE COUNTERSUNK IN TOP OF MARKER $\frac{1}{4}$ ".
 - 3). FLEXIBLE DELINEATORS ARE ONLY TO BE USED ON ROADS WITH A SPECIFIED DENIAL OF ACCESS OR CLASSIFIED AS MINOR ARTERIALS OR HIGHER. ON ALL OTHER ROAD CLASSIFICATIONS, A WOODEN STAKE SHALL BE PLACED WITH "ROW" HANDWRITTEN VERTICALLY IN 1" TALL LETTERS.
 - 4). PLACE CAP ON CONCRETE MONUMENT SO THAT TOP OF CAP IS FLUSH WITH THE TOP OF THE CONCRETE MONUMENT.
 - 5). IN HOT-MIX OR CONCRETE, PLACE A CONCRETE SURVEY MARKER IN LIEU OF A REBAR AND CAP. SEE REBAR AND CAP ITEM SPECIFICATION FOR MORE INFORMATION.

SCALE : NTS



REBAR AND CAP WITH FLEXIBLE DELINEATOR DETAIL



DELAWARE
DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY MONUMENTATION

STANDARD NO.

M-2 (2017)

SHT. 1

OF 1

APPROVED

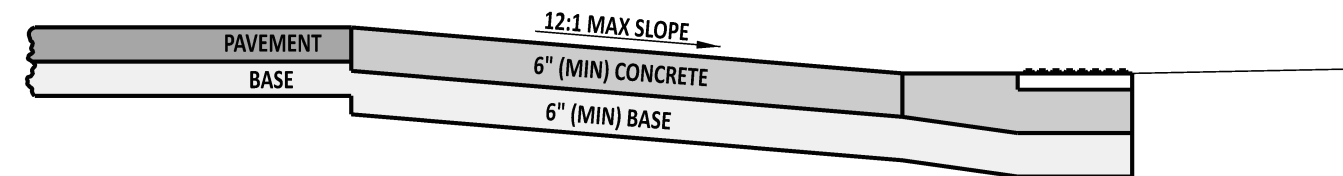
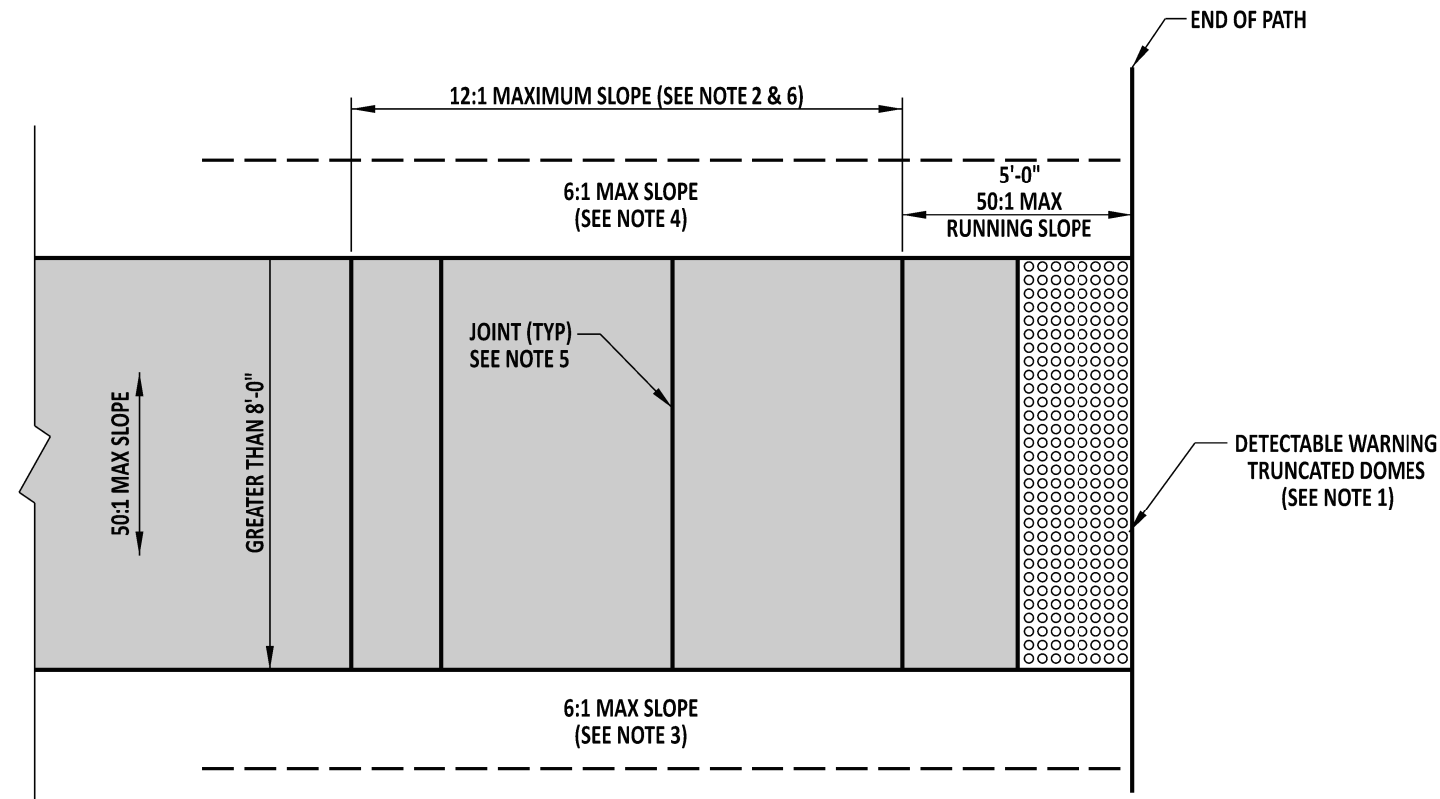
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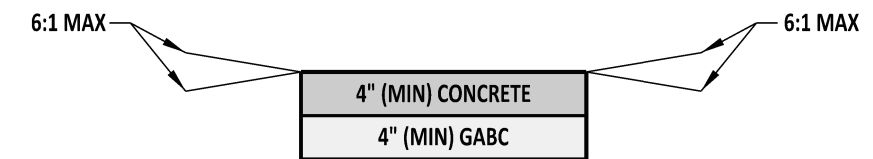
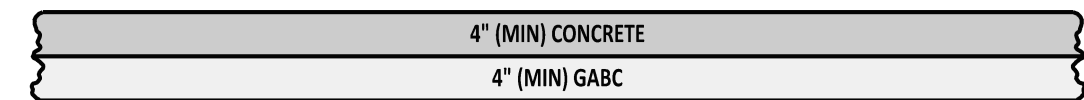
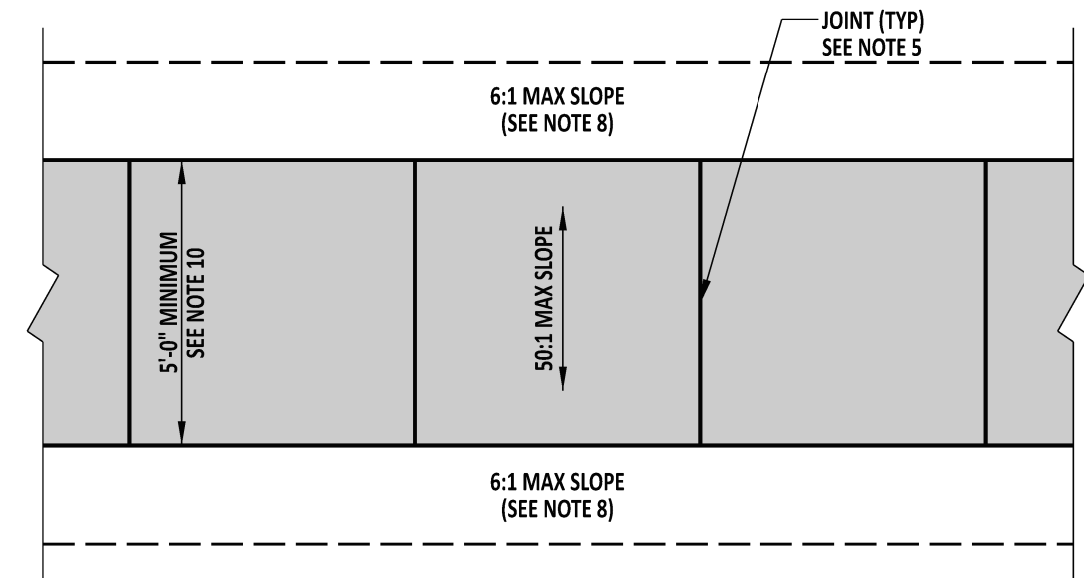
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SHARED-USE PATH

NOTES:

- 1). IF THE SHARED-USE PATH ENDS AT A ROADWAY OR RAILROAD CROSSING, THEN DETECTABLE WARNING TRUNCATED DOMES 24" LONG AND THE FULL WIDTH OF THE PATH SHALL BE INSTALLED. SEE DETAIL C-2.
- 2). FOR ALTERATIONS WHERE THE MAXIMUM ALLOWABLE 12:1 RUNNING SLOPE WILL NOT MEET THE EXISTING SIDEWALK OR SHARED USE PATH GRADE WITHIN A LENGTH OF 15'-0", THE SLOPED SEGMENT OF THE PEDESTRIAN CONNECTION MAY BE LIMITED TO 15'-0" AT A CONSTANT SLOPE, AND ALLOWED TO EXCEED THE 12:1 MAXIMUM SLOPE.
- 3). A 6:1 MAX SLOPE IS REQUIRED FOR 2'-0" ON BOTH SIDES OF THE SHARED-USE PATH.
- 4). TOPSOIL, SEED, & MULCH ANY DISTURBED AREA ADJACENT TO THE SHARED-USE PATH UP TO A MAXIMUM OF 2'-0".
- 5). FOR SIDEWALKS AND CONCRETE SHARED-USE PATHS, CONSTRUCTION JOINTS SHALL BE PLACED EVERY 10'-0" AND EXPANSION MATERIAL EVERY 20'-0". HOWEVER, EXPANSION MATERIAL SHALL NOT BE USED IN THE SLOPED SECTION.
- 6). IF THE RUNNING SLOPE IS LESS THAN 20:1 (5%) THEN THE 50:1 (2%) LANDING CAN BE OMITTED. DETECTABLE WARNING SYSTEM MUST STILL BE PLACED.



SIDEWALK

- 7). SEE DETAIL C-2, SHEETS 1, 2 OR 3 FOR PEDESTRIAN CONNECTION TREATMENTS WHEN THE SIDEWALK OR SHARED-USE PATH INTERSECTS WITH A TRAVELWAY.
- 8). A 6:1 MAX SLOPE IS REQUIRED FOR 2'-0" ON BOTH SIDES OF THE SIDEWALK.
- 9). TOPSOIL, SEED, & MULCH ANY DISTURBED AREA ADJACENT TO THE SIDEWALK UP TO A MAXIMUM OF 2'-0".
- 10). ON REHABILITATION PROJECTS, WHEN EXISTING OBSTRUCTIONS (FIRE HYDRANT, UTILITY POLE, ETC...) ARE LOCATED IN THE SIDEWALK, THE SIDEWALK PATH SHALL NOT BE LESS THAN 34" WIDE FOR NO MORE THEN 24".



DELAWARE
DEPARTMENT OF TRANSPORTATION

SHARED-USE PATH & SIDEWALK DETAILS

STANDARD NO.

M-3 (2018)

SHT. 1

OF 1

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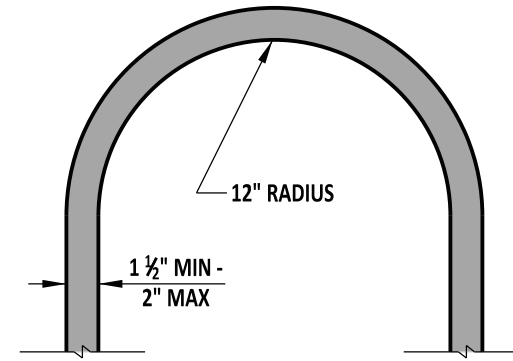
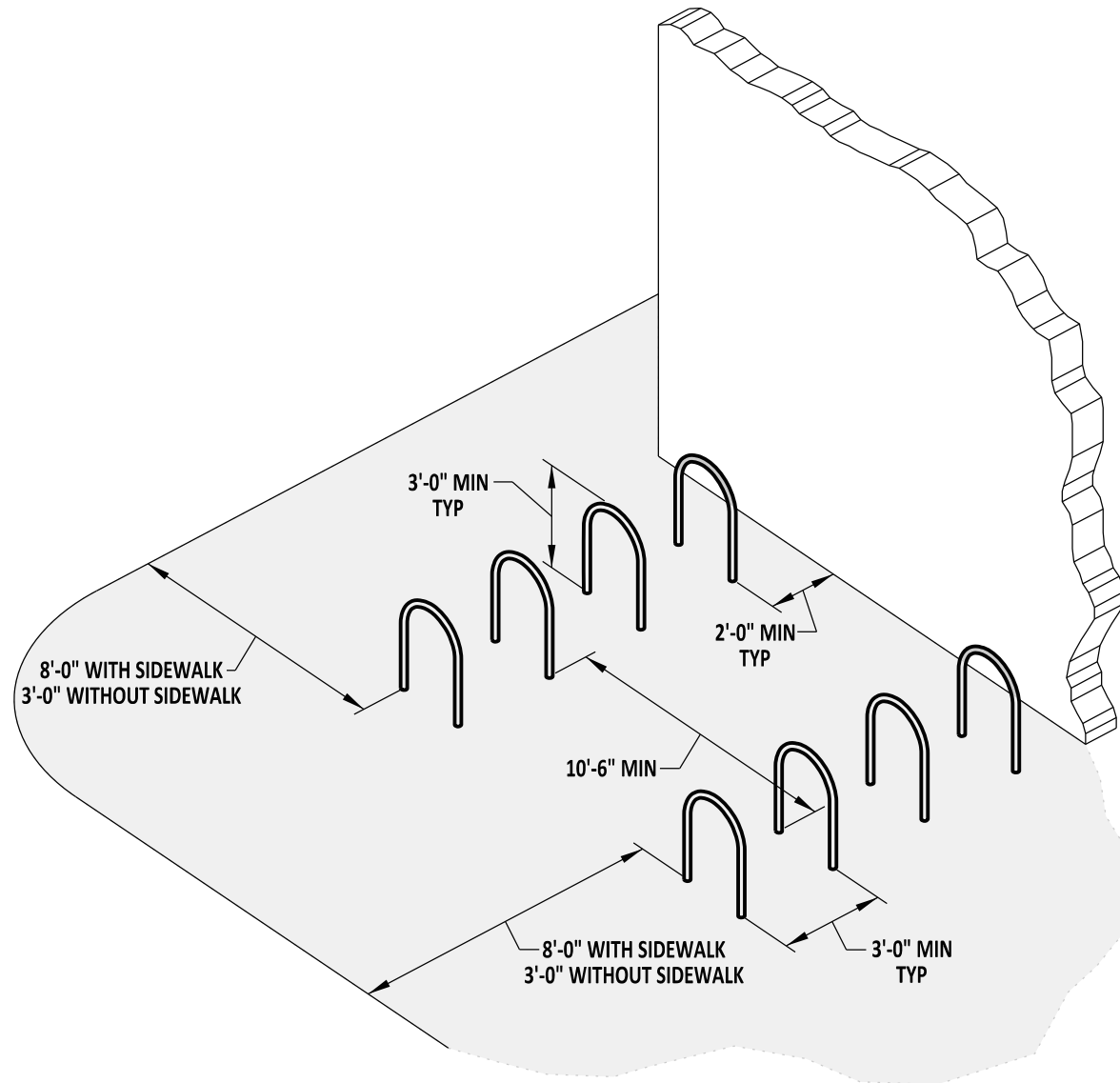
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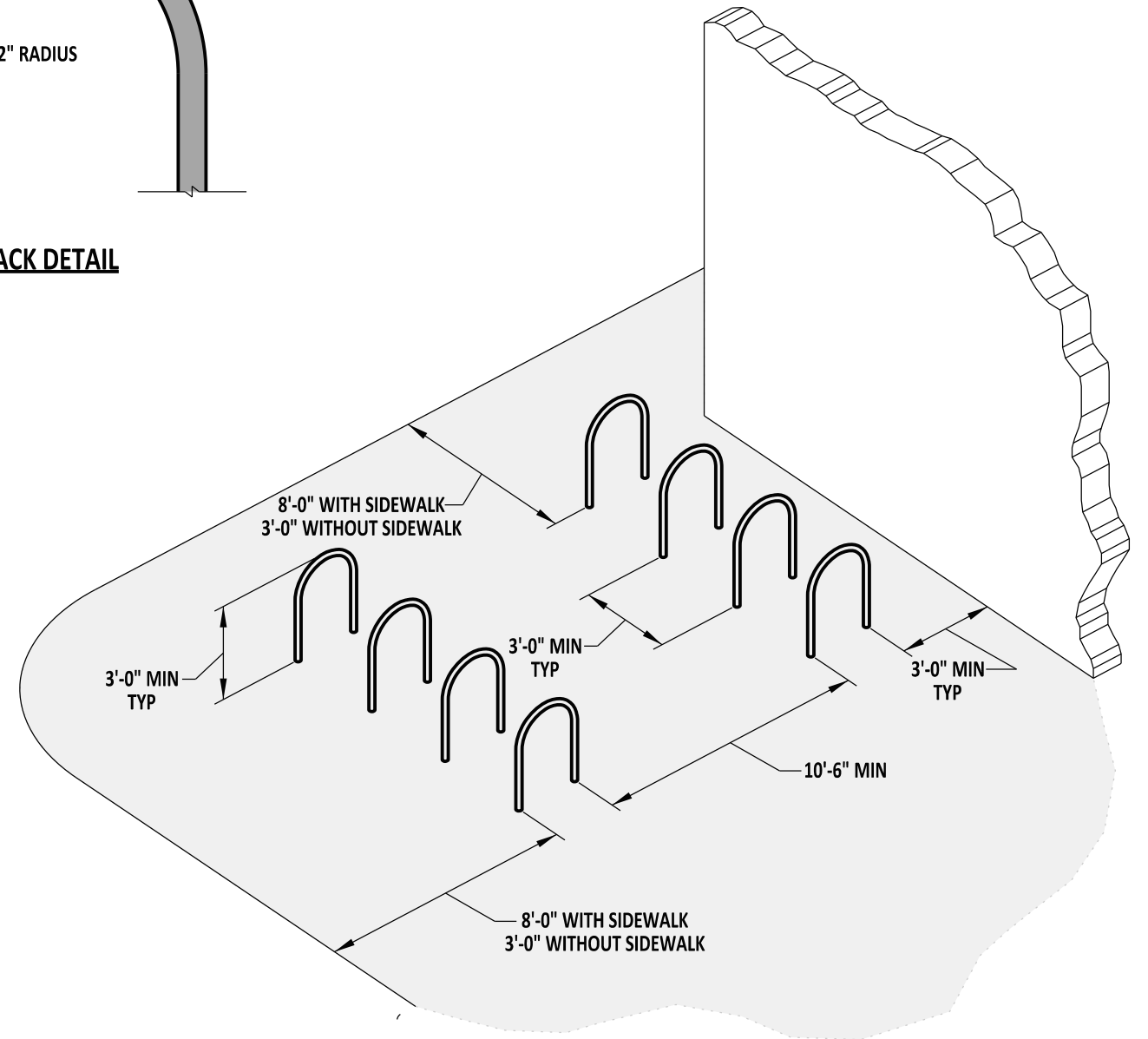
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DESIGN ENGINEER

12/20/2018
DATE



BIKE RACK DETAIL



NOTES:

- 1). BIKE RACK SHALL BE ANCHORED AS PER MANUFACTURER'S RECOMMENDATIONS AFTER APPROVAL FROM ENGINEER IN THE FIELD.
- 2). DETAIL SHOWN WITH P.C.C. CURB TYPE 1-8, HOWEVER ACTUAL CURB VARIES AND SHOULD BE PLACED AS SHOWN ON PLANS.
- 3). SPECIAL CONSIDERATIONS SHOULD BE TAKEN WHEN PLACING BIKE RACKS NEAR CURB RAMPS AND MAY REQUIRE A DETAIL ON THE PLANS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

BIKE RACK LAYOUT DETAILS

STANDARD NO.

M-4 (2011)

SHT. 1

OF 1

APPROVED

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CHIEF ENGINEER

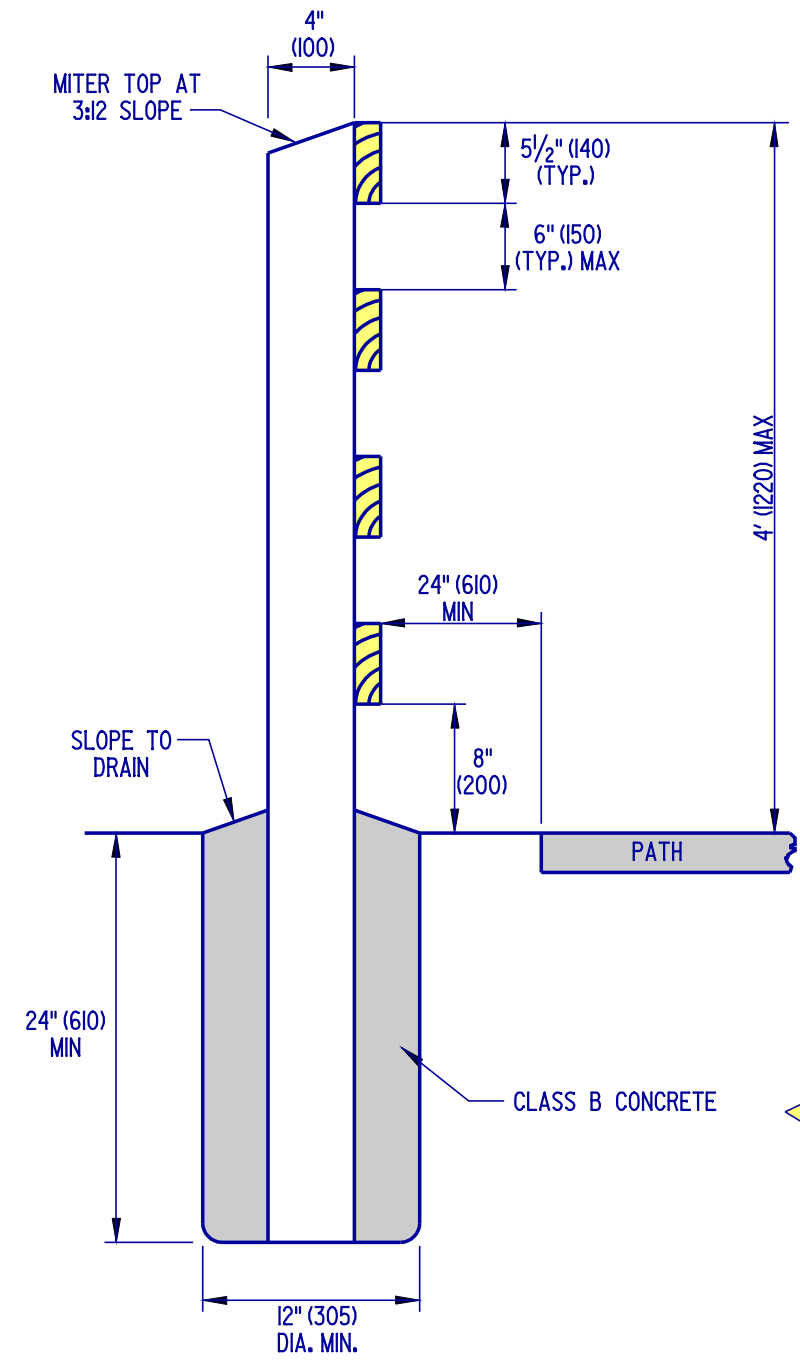
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RECOMMENDED

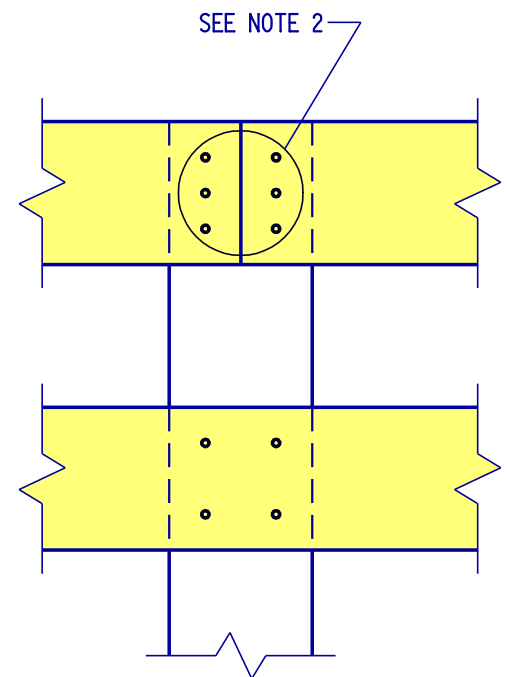
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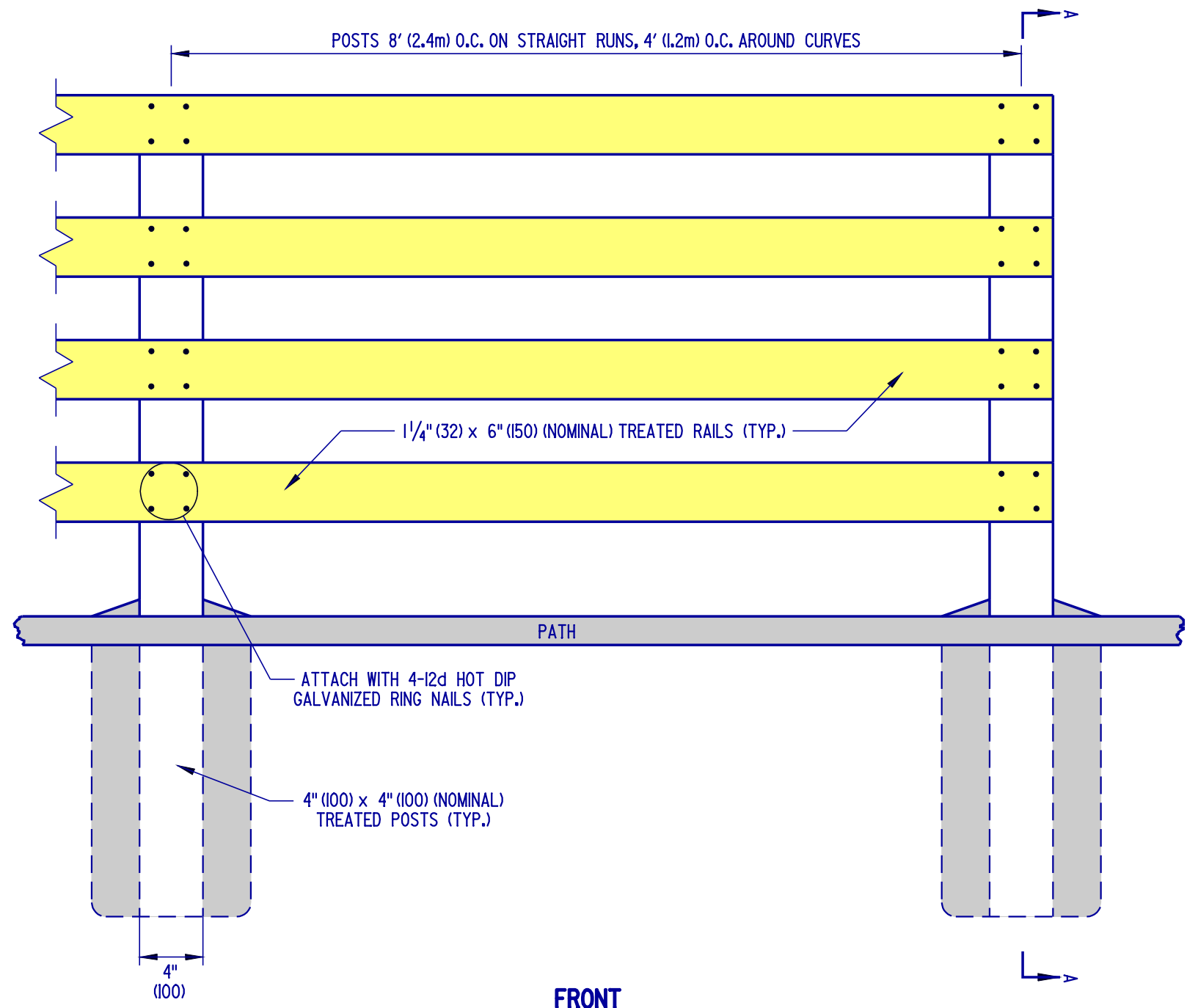
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SECTION A-A



TYPICAL JOINT DETAIL



FRONT

- NOTES:
1. ALL RAIL JOINTS SHALL BE CENTERED AT THE POSTS.
 2. ALL JOINTS SHALL BE ATTACHED WITH 3 - 12d NAILS AND TWO ADJACENT RAILS SHALL NOT END ON THE SAME POST.
 3. RAILS SHALL BE FLUSH TO THE POSTS AT THE END POSTS.

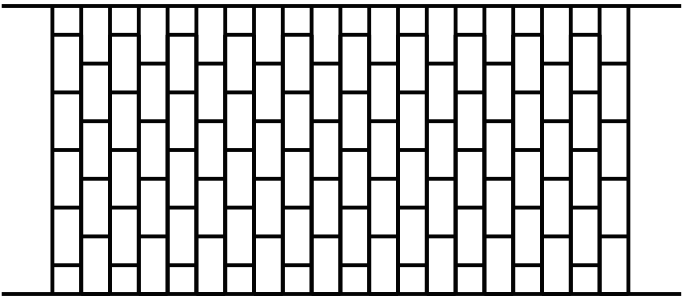


DELAWARE
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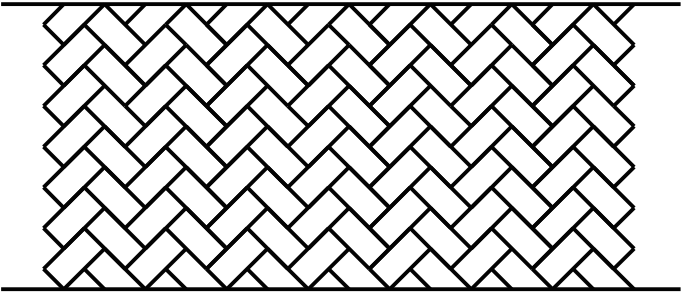
WOOD RAIL FENCE DETAILS

STANDARD NO. M-5 (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

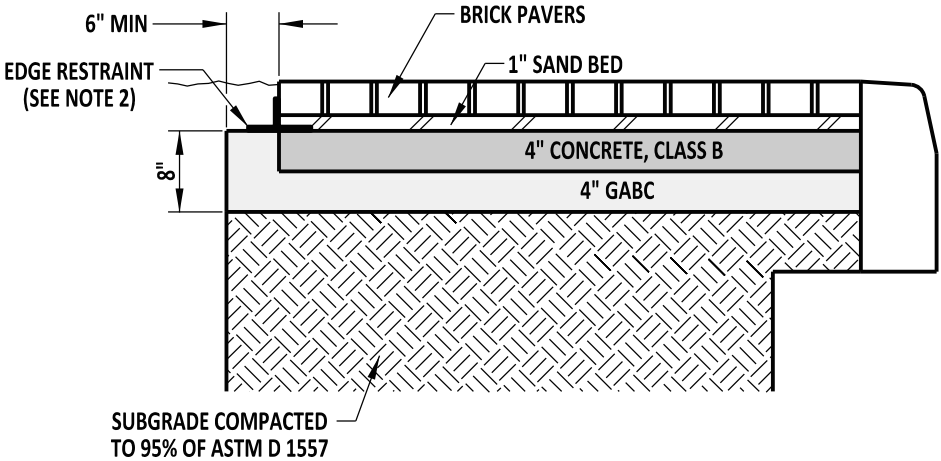


4" x 8" RUNNING BOND PATTERN



4" x 8" HERRINGBONE PATTERN

- NOTES:**
- 1. ACTUAL PATTERN TO BE USED SHALL BE SPECIFIED ON THE PLANS. COLOR IS TO BE "BRICK RED" UNLESS OTHERWISE NOTED ON THE PLANS.
 - 2. MATERIALS AND PAVEMENT BOX VARY DEPENDING ON PLANS.
 - 3. FOR CROSSWALK APPLICATIONS, REFER TO THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STRIPING WIDTH.
 - 4. THE PATTERNS ABOVE ARE THE PREFERRED PATTERNS AVAILABLE FOR SIDEWALK OR CROSSWALK APPLICATIONS.



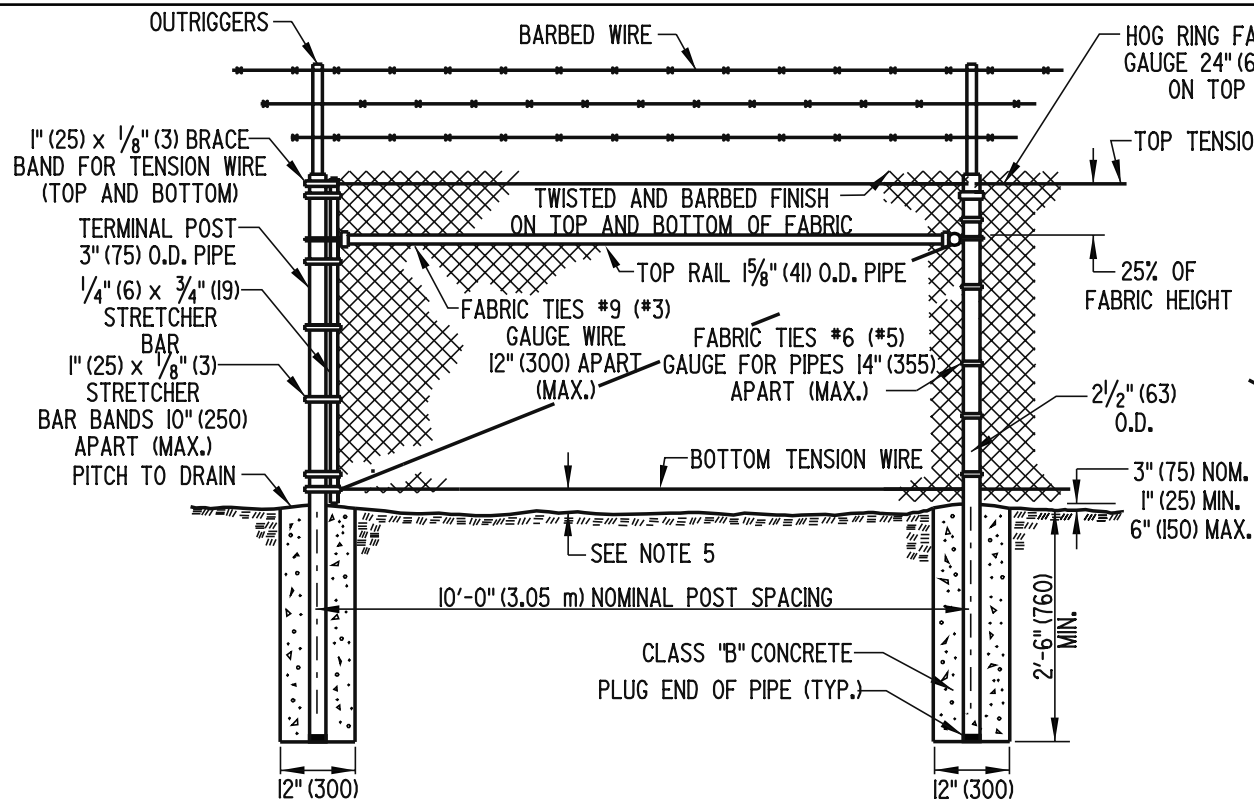
BRICK PAVER SIDEWALK DETAIL

- NOTES:**
- 1. WHEN SIDEWALK IS CONFINED BY A RIGID STRUCTURE ON BOTH SIDES, EXPANSION JOINT MATERIAL SHALL BE USED FROM TOP OF BRICK TO BOTTOM OF CONCRETE BASE ON AT LEAST ONE SIDE OF THE SIDEWALK.
 - 2. EDGE RESTRAINT MUST BE APPROVED BY THE ENGINEER IN THE FIELD AND SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.



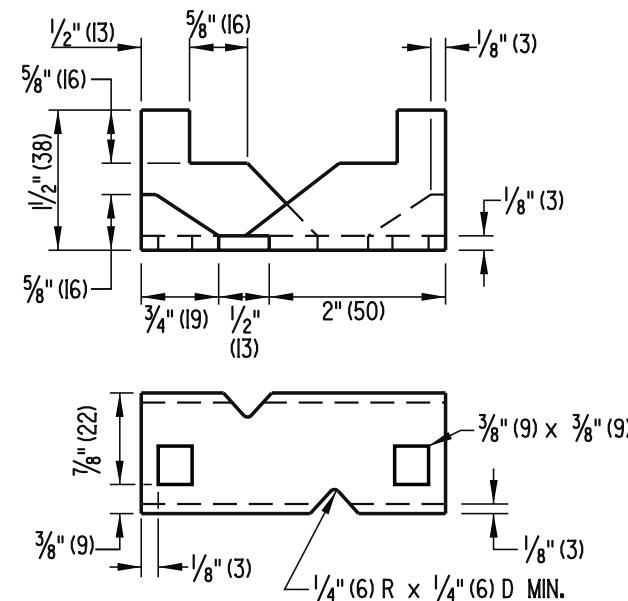
DELAWARE
DEPARTMENT OF TRANSPORTATION

PATTERNED HOT-MIX OR CONCRETE & BRICK PAVER DETAILS				APPROVED	SIGNATURE ON FILE CHIEF ENGINEER	01/17/2012 DATE
STANDARD NO.	M-6 (2011)	SHT.	1	OF	1	RECOMMENDED SIGNATURE ON FILE DESIGN ENGINEER

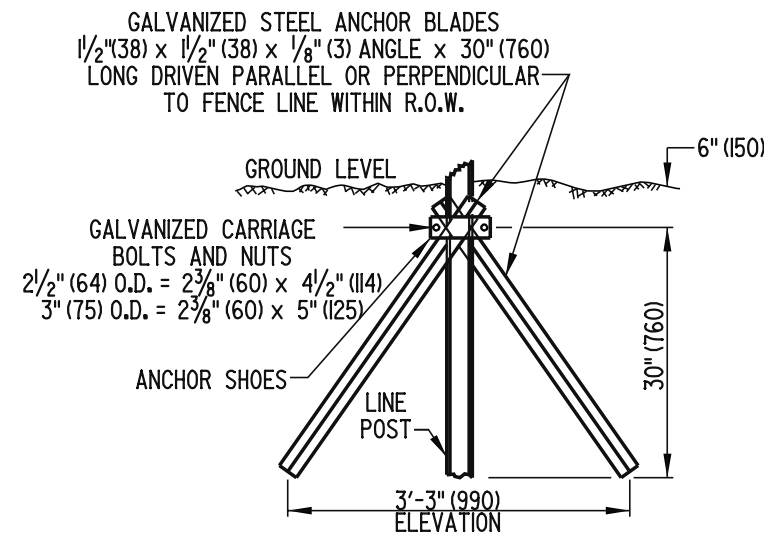


CHAIN-LINK FENCE

TENSION WIRE CONNECTION AT ROUND INTERMEDIATE OR CORNER POST

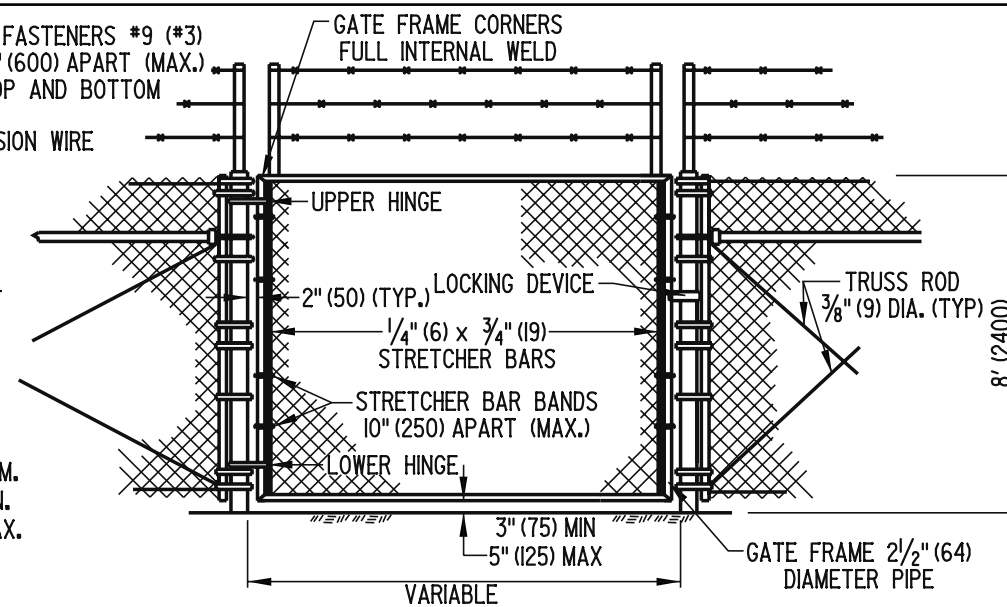


ANCHOR SHOE

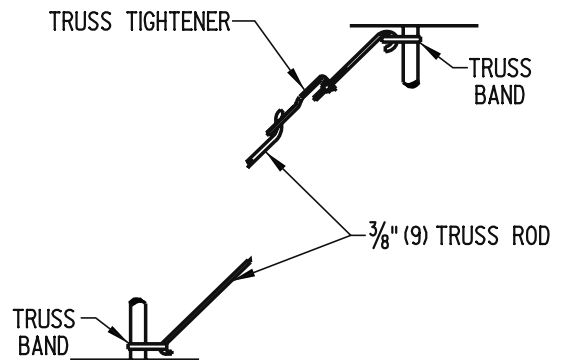


DRIVE ANCHOR SHOE ASSEMBLY

(SEE NOTE 4)



GATES, CHAIN-LINK FENCE



3/8" (9) TRUSS ROD ASSEMBLY

CHAIN-LINK FENCE ASSEMBLIES

GENERAL NOTES

1). POSTS

	TERMINAL, CORNER AND GATE POSTS	LINE POSTS	TOP OR BRACE RAIL
	3" (75) O.D. PIPE	2 1/2" (64) O.D. PIPE	1 5/8" (41) O.D. PIPE
AASHTO TYPE	1 OR II	1 OR II	1 OR II
AASHTO GRADE	1 OR 2	1 OR 2	1 OR 2
MINIMUM LENGTH OF POST:	10'-8" (3250)	10'-8" (3250)	N/A
ACTUAL OUTSIDE DIAMETER	2 7/8" (73)	2 3/8" (60)	1.660" (42)
WALL THICKNESS	GRADE 1 = .203" (5.2) GRADE 2 = .160" (4)	GRADE 1 = .154" (3.9) GRADE 2 = .120" (3)	GRADE 1 = .140" (3.5) GRADE 2 = .111" (2.8)

- THE DEPTH OF CONCRETE FOOTERS IN SOLID ROCK MAY BE REDUCED TO 12" (300) BELOW THE TOP OF ROCK AND THE DIAMETER OF THE HOLE IN ROCK MAY BE REDUCED TO 6" (150).
- BRACE BANDS AND STRETCHER BAR BANDS SHALL BE FURNISHED WITH 3/16" (8) DIA. CARRIAGE BOLTS AND ELASTIC STOP NUTS.
- DRIVE ANCHOR SHOE ASSEMBLY ONLY TO BE USED IN WET AREAS AND WITH PRIOR APPROVAL OF THE ENGINEER.
- THE BOTTOM OF THE FENCE SHALL BE 2" (50) MAX ABOVE HARD GROUND OR PAVEMENT. WHERE THERE IS SOFT GROUND, THE BOTTOM OF THE FENCE SHALL EXTEND INTO THE GROUND IN ORDER TO BE FIRM DUE TO SHIFTING SOIL OR SAND.
- NUTS AND BOLTS SHALL BE TACK WELDED OR BURRED TO PREVENT REMOVAL.
- IF THERE ARE ANY OPENINGS IN THE FENCE LARGER THAN 96 SQ. IN. (620 sq. cm) DUE TO UTILITIES OR GRADED TERRAIN, THE OPENINGS SHALL BE SECURED WITH A METAL GRILL THAT IS LOCKED OR PERMANENTLY WELDED.
- VEGETATION AND PERMANENT STRUCTURES (SUCH AS BUILDINGS, LIGHT POLES, AND UTILITY POLES) SHALL BE AT LEAST 14' (4.2 m) FROM THE FENCE. ANY EXCEPTIONS SHALL REQUIRE THE CONSTRUCTION OF TOP GUARDS.



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CHAIN LINK FENCE DETAILS

STANDARD NO. M-7 (2006)

SHT. 1 OF 1

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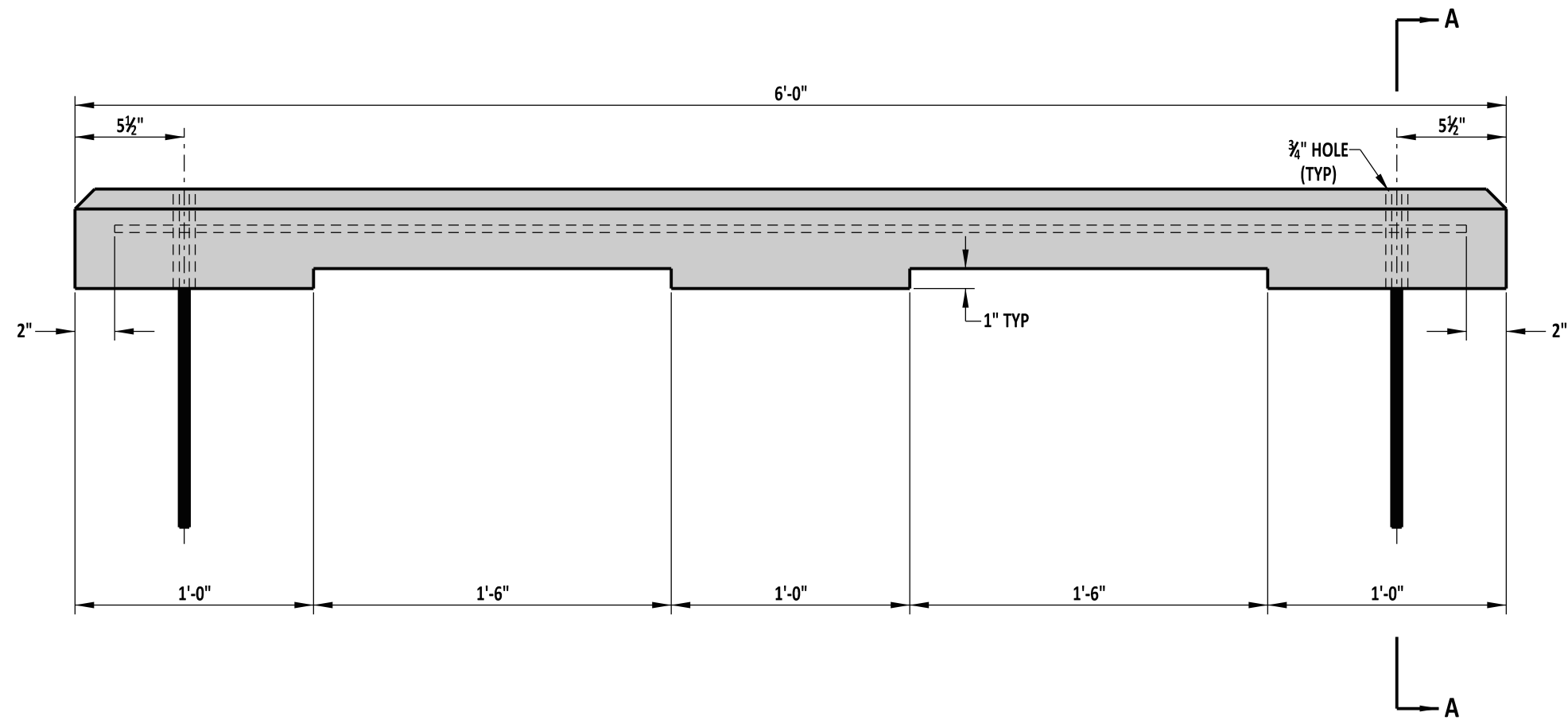
Frank Taylor
CHIEF ENGINEER

10/10/06
DATE

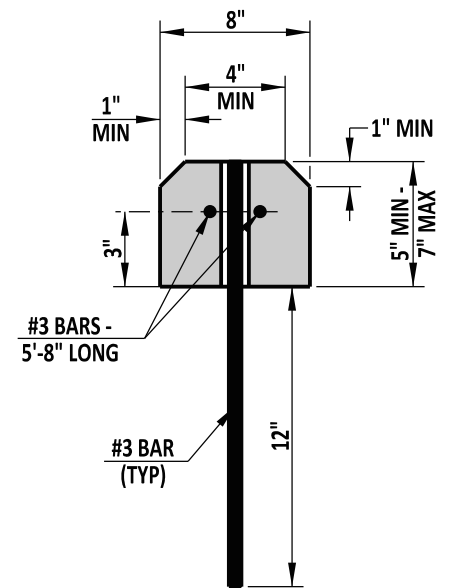
RECOMMENDED

Don Smith
DESIGN ENGINEER

10/13/06
DATE



ELEVATION VIEW



SECTION A-A



DELAWARE
DEPARTMENT OF TRANSPORTATION

P.C.C. PARKING BUMPER

STANDARD NO.

M-8 (2014)

SHT. 1

OF 1

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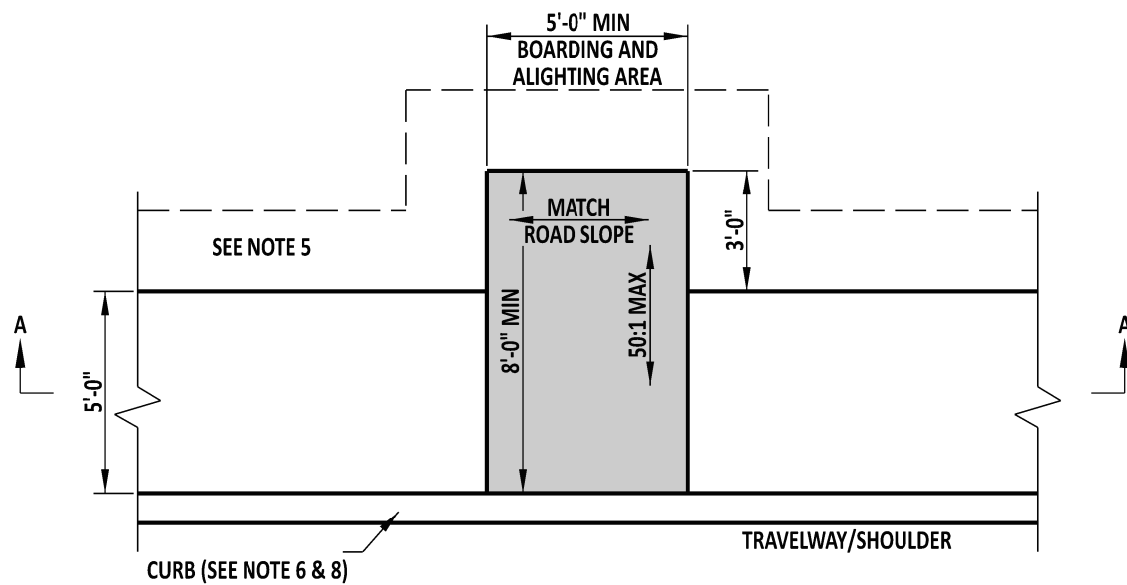
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12/30/2014
DATE

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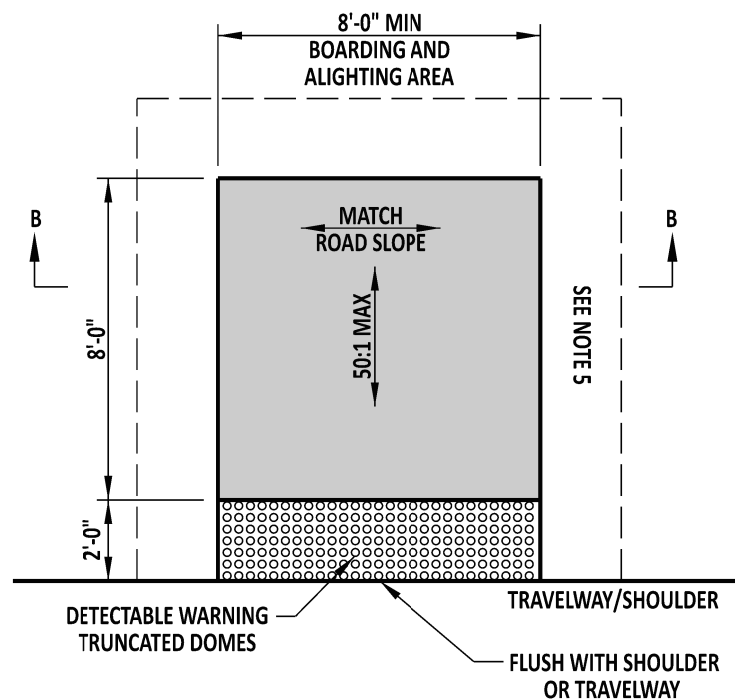
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DESIGN ENGINEER

12/11/2014
DATE



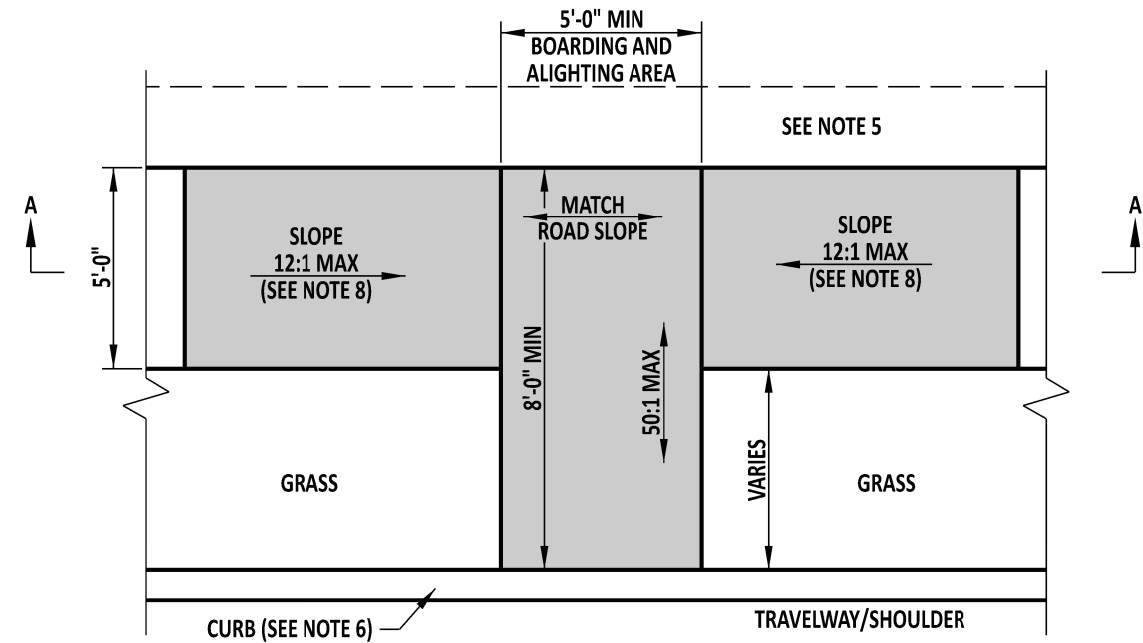
BUS STOP PAD, TYPE 1

*** - TO BE USED WHEN THE PAD IS PLACED BEHIND CURB AND INCLUDES A SIDEWALK WITHOUT A GRASS STRIP**



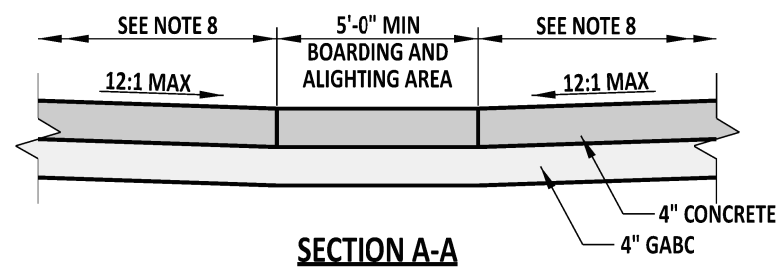
BUS STOP PAD, TYPE 3

* - TO BE USED WHEN THE PAD IS PLACED FLUSH WITH THE TRAVELWAY AND NO CURB OR SIDEWALK IS INCLUDED

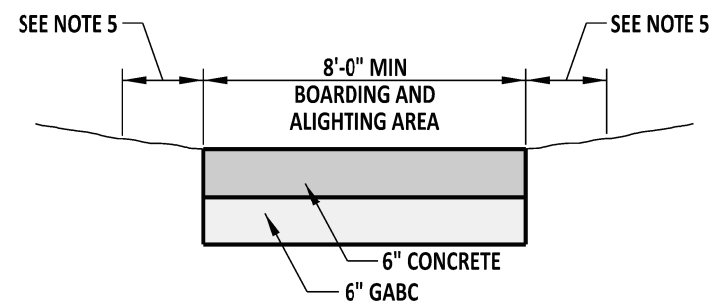


BUS STOP PAD, TYPE 2

*** - TO BE USED WHEN THE PAD IS PLACED BEHIND CURB
AND INCLUDES A SIDEWALK WITH A GRASS STRIP**



SECTION A-A



SECTION B-B

- NOTES:**

- 1). BUS STOP PAD LOCATIONS MUST BE APPROVED BY BOTH DART AND DELDOT PRIOR TO ANY CONSTRUCTION.
- 2). REFERENCE THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR GENERAL INFORMATION ON PLACEMENT OF SIGNS.
- 3). SEE CONSTRUCTION PLAN SIGNING AND STRIPING SHEETS FOR SPECIFIC SIGN AND SIGN LOCATION DETAILS.
- 4). TYPICAL BUS STOP PADS MAY BE USED IN CONJUNCTION WITH BUS STOP SHELTER LOCATIONS IN THE EVENT OF LAND CONSTRAINTS AT THE SHELTER LOCATIONS. AN INTERCONNECTING PEDESTRIAN ACCESS PATH MUST EXIST THAT IS ACCESSIBLE TO BUS STOP ALIGHTING AREAS, SHELTERS, PEDESTRIAN CONNECTIONS, CROSSWALKS, AND SIDEWALKS.
- 5). A 6:1 MAX SLOPE IS REQUIRED FOR 2'-0" ON ALL SIDES OF THE BUS STOP PAD AND APPROACHING SIDEWALK.
- 6). CURB TYPE VARIES, SEE PLANS FOR CORRECT CURB TYPE.
- 7). SEE DETAIL M-3, SHEET 1 OF 1 FOR ADDITIONAL SIDEWALK DETAILS AND REQUIREMENTS.
- 8). THE MAXIMUM RUNNING SLOPE TO TRANSITION THE SIDEWALK TO MEET BUS STOP PAD ELEVATION IS 12:1 (8.3%), HOWEVER, 20:1 (5%) IS PREFERRED.



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BUS STOP PAD DETAILS

STANDARD NO. M-9 (2018)

SHT. 1 OF 2

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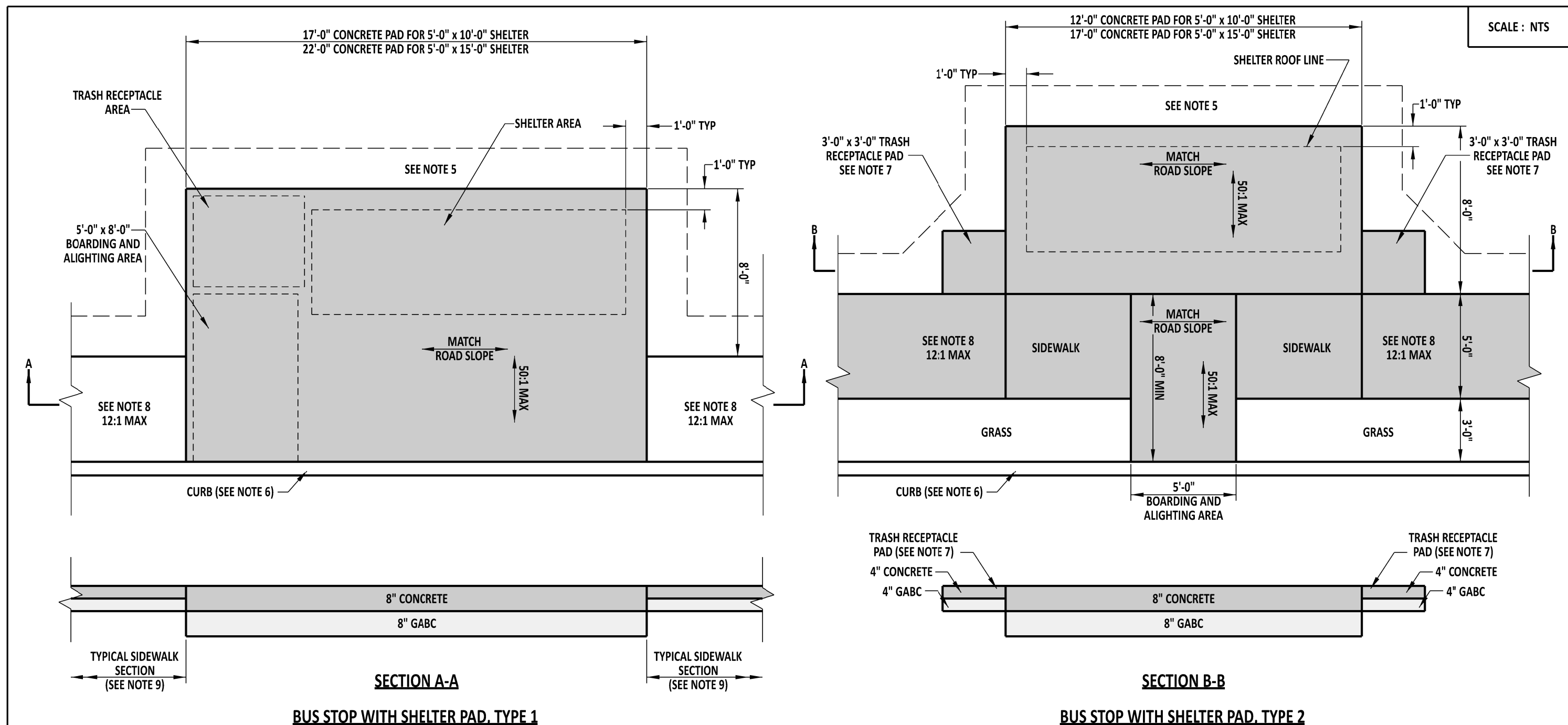
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BUS STOP PAD WITH SHELTER DETAILS

STANDARD NO. M-9 (2018)

SHT. 2 OF 2

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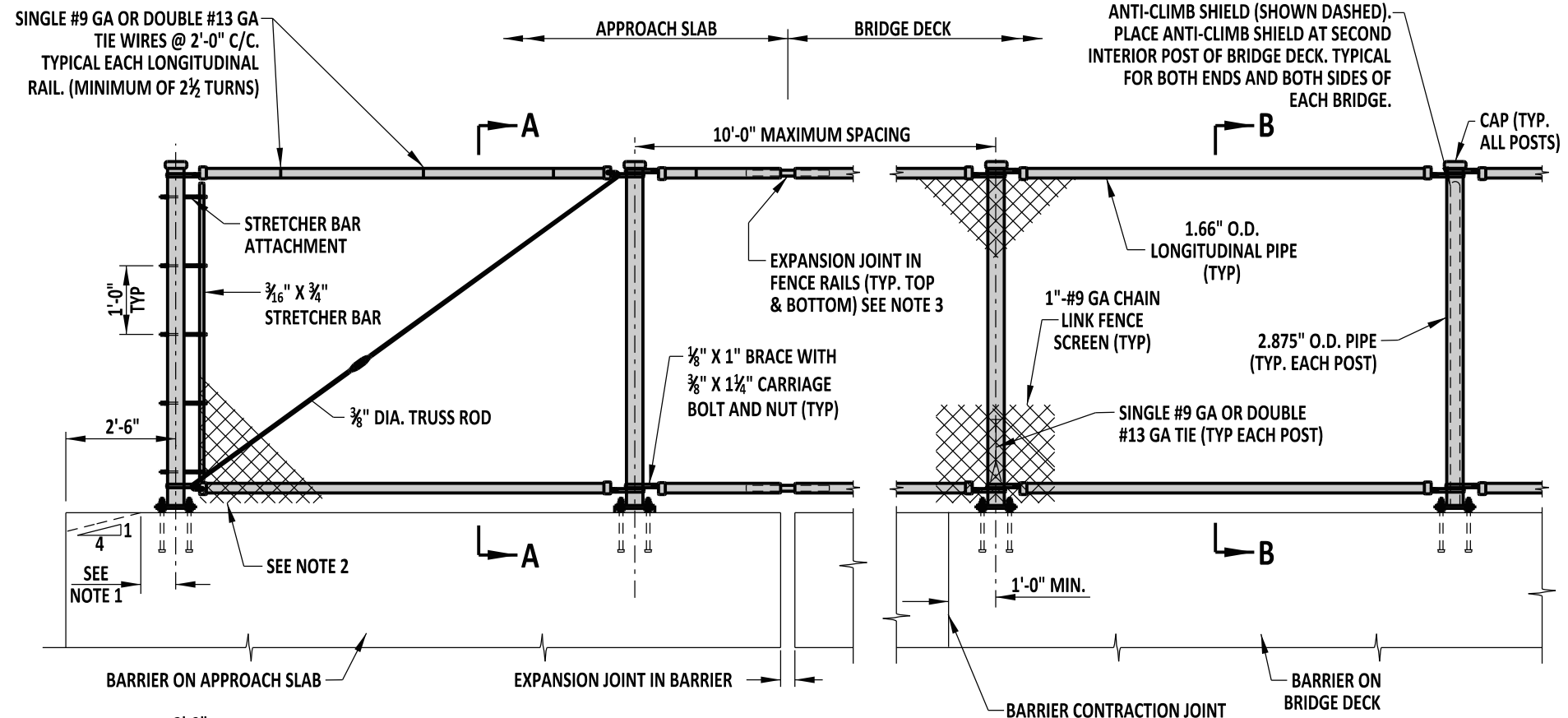
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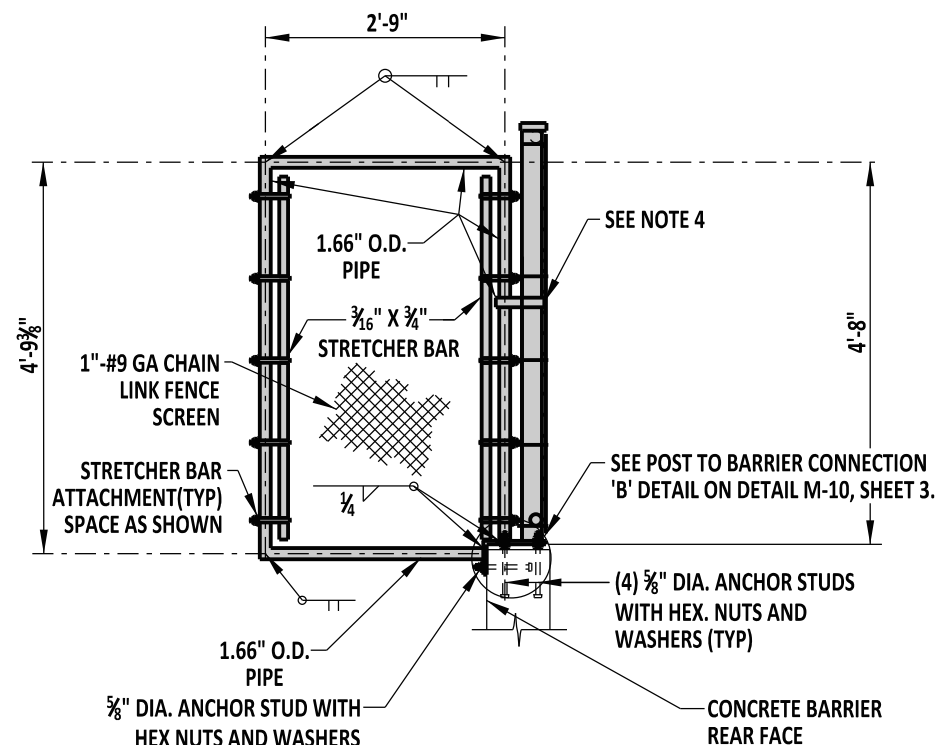
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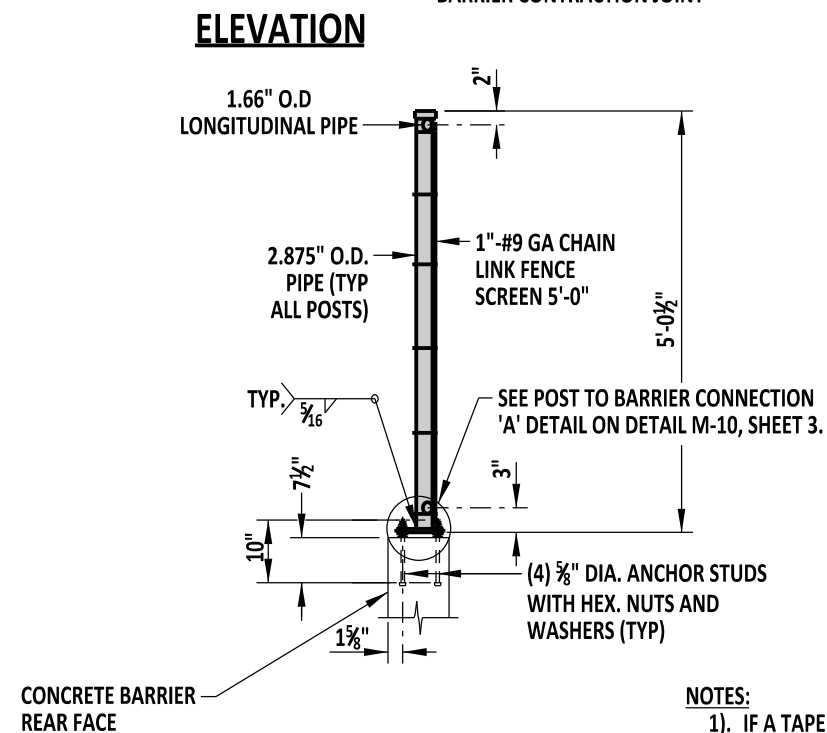
12/20/2018
DATE



SCALE : NTS



SECTION B-B



SECTION A-A

BRIDGE SAFETY FENCE, TYPE 1

NOTES:

- 1). IF A TAPER EXISTS AT THE END OF THE BARRIER, PLACE POST 6" FROM THE TOP OF TAPER.
- 2). MINIMUM 1/2" TO MAXIMUM 1" OF CLEARANCE BETWEEN TOP OF BARRIER AND BOTTOM OF CHAIN LINK FENCE SCREEN.
- 3). LINE UP EXPANSION JOINTS IN TOP AND BOTTOM FENCE RAILS WITH EXPANSION JOINTS IN BARRIER.
- 4). ATTACH ANTI-CLIMB SHIELD TO FENCE POST BY SMALL SECTION OF PIPE TO EACH VERTICAL POST WITH 1/4" FILLET WELD. SHAPE PIPE CONNECTOR TO HAVE FULL CONTACT WITH EACH POST.



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BRIDGE SAFETY FENCE

STANDARD NO.

M-10 (2014)

SHT. 1

OF 3

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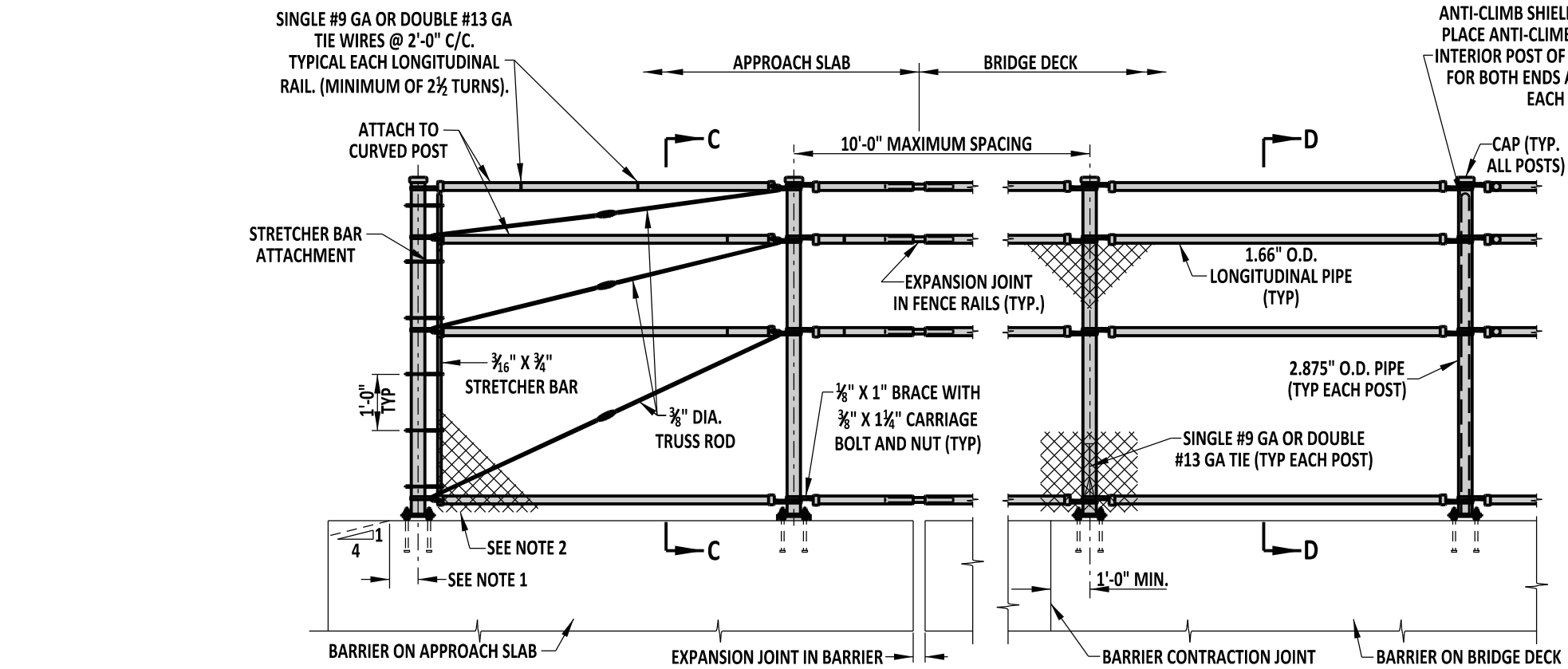
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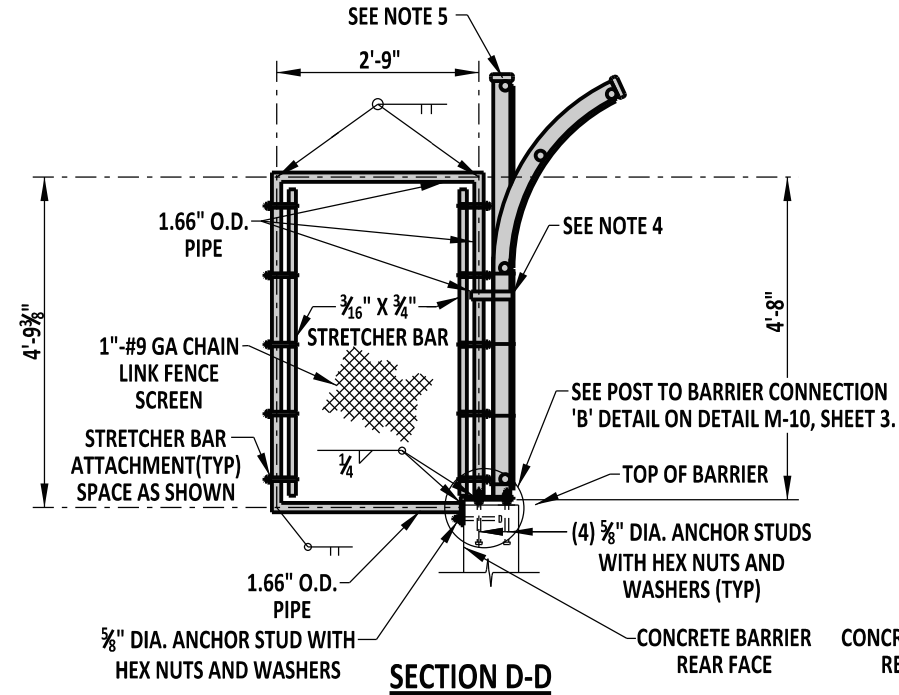
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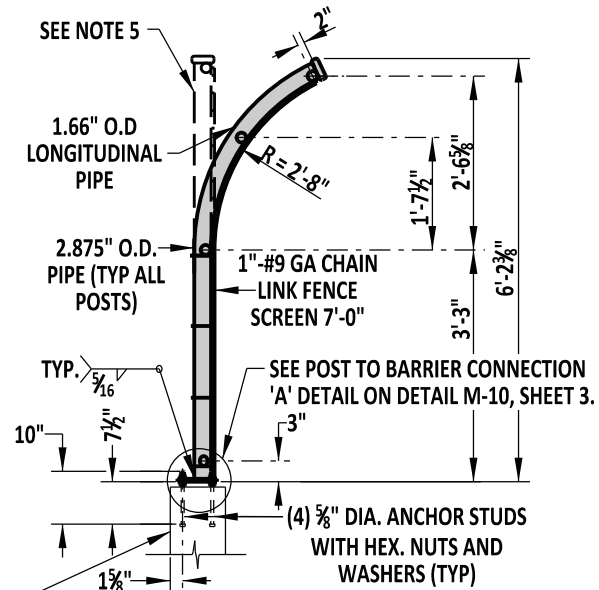
12/11/2014
DATE



ELEVATION



SECTION D-D



SECTION C-C

BRIDGE SAFETY FENCE, TYPE 2

DESIGNER NOTE: BRIDGE SAFETY FENCE, TYPE 2 SHOULD BE USED WHEN A SIDEWALK EXISTS ADJACENT TO THE BARRIER. OTHERWISE, USE BRIDGE SAFETY FENCE, TYPE 1.

NOTES:

- 1). IF A TAPER EXISTS AT THE END OF THE BARRIER, PLACE POST 6" FROM THE TOP OF TAPER.
- 2). MINIMUM 1/2" TO MAXIMUM 1" OF CLEARANCE BETWEEN TOP OF BARRIER AND BOTTOM OF CHAIN LINK FENCE SCREEN.
- 3). LINE UP EXPANSION JOINTS IN TOP AND BOTTOM FENCE RAILS WITH EXPANSION JOINTS IN BARRIER.
- 4). ATTACH ANTI-CLIMB SHIELD TO FENCE POST BY SMALL SECTION OF PIPE TO EACH VERTICAL POST WITH 1/4" FILLET WELD. SHAPE PIPE CONNECTOR TO HAVE FULL CONTACT WITH EACH POST.
- 5). WELD ADDITIONAL STRAIGHT POST TO CURVED POST AT SECOND INTERIOR POST OF MAIN SPAN. (TYPICAL FOR BOTH ENDS OF THE BRIDGE.)



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BRIDGE SAFETY FENCE

STANDARD NO.

M-10 (2014)

SHT. 2

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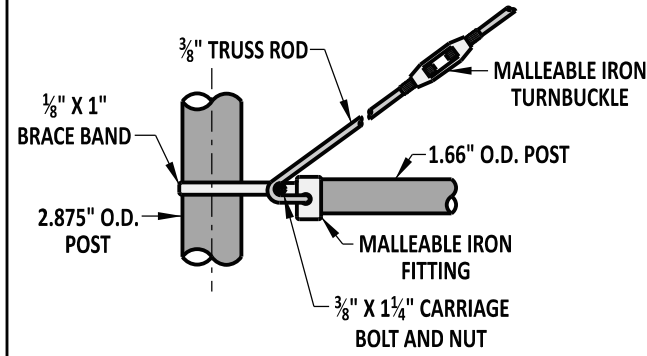
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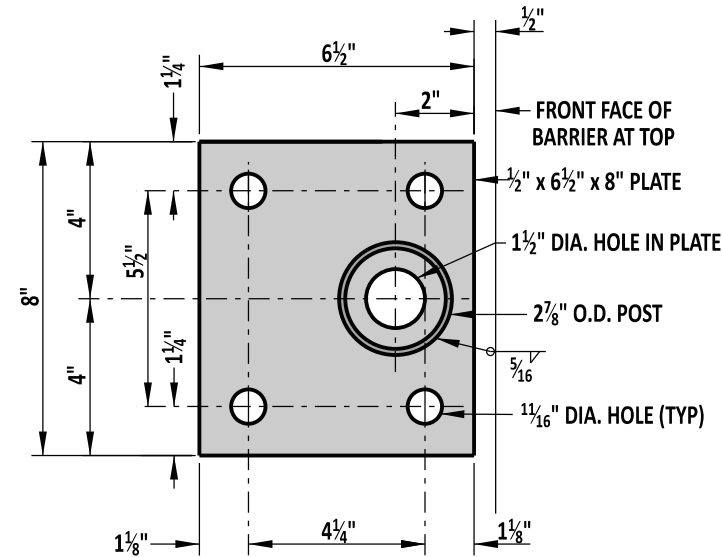
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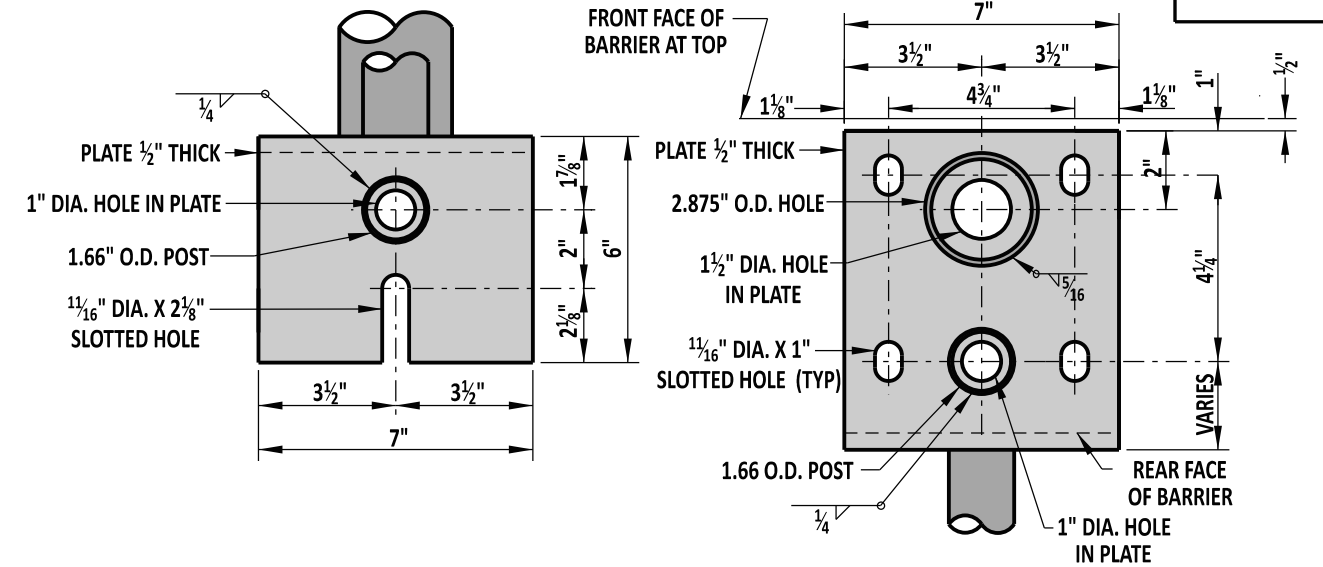
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TRUSS ROD ATTACHMENT

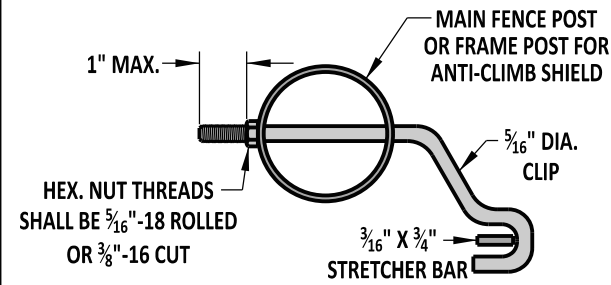


DETAIL 'A'

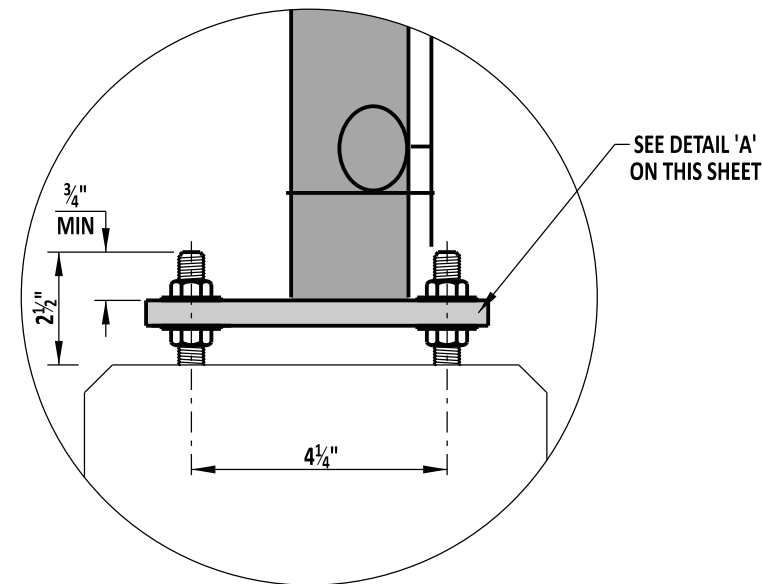


SIDE VIEW

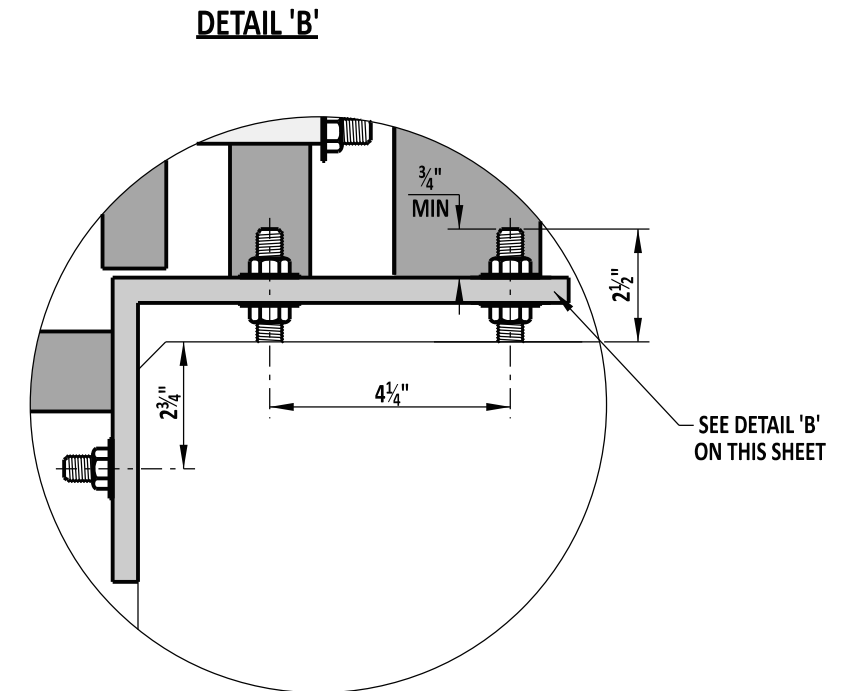
PLAN VIEW



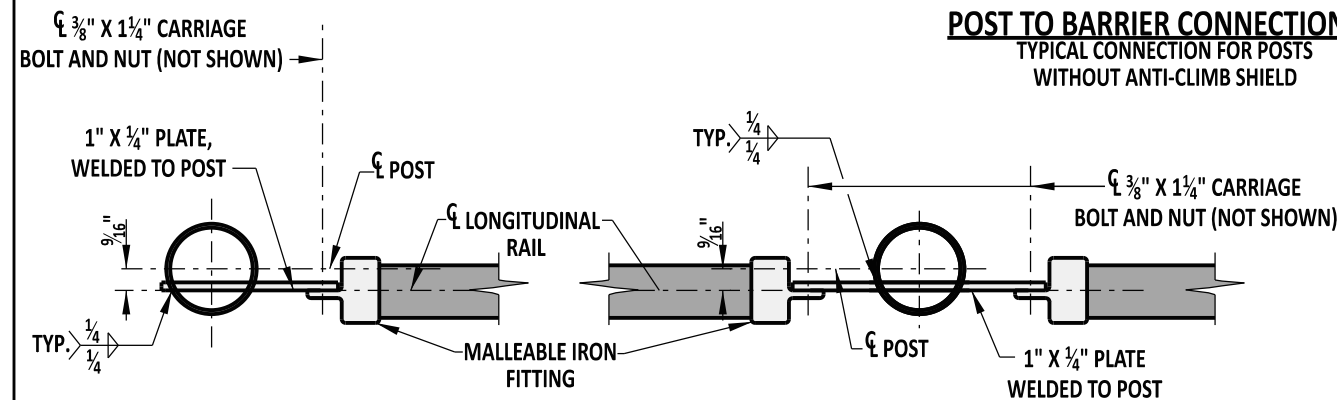
STRETCHER BAR ATTACHMENT



POST TO BARRIER CONNECTION 'A'
TYPICAL CONNECTION FOR POSTS
WITHOUT ANTI-CLIMB SHIELD



POST TO BARRIER CONNECTION 'B'
TYPICAL CONNECTION FOR POSTS
WITH ANTI-CLIMB SHIELD



TOP LONGITUDINAL RAIL-POST ATTACHMENT

NOTES:

- 1). POST SPACING - POST SPACING TO BE DETERMINED BY THE CONTRACTOR AND INCLUDED IN THE WORKING DRAWINGS. EACH POST MUST BE A MINIMUM OF 1'-0" FROM ANY PARAPET JOINT.
- 2). WORKING DRAWINGS - WORKING DRAWINGS WILL BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEER FOR REVIEW



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BRIDGE SAFETY FENCE

STANDARD NO.

M-10 (2017)

SHT. 3

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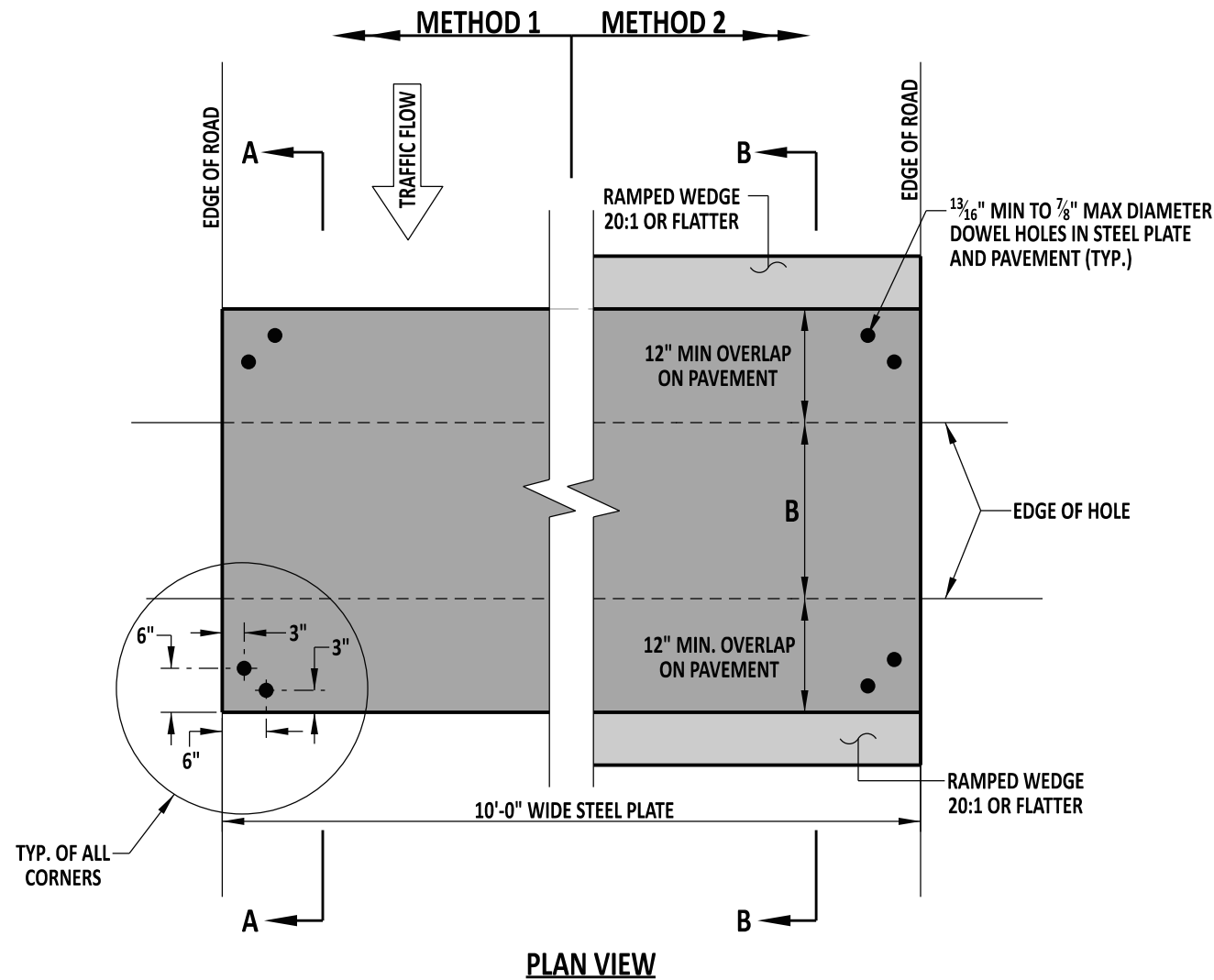
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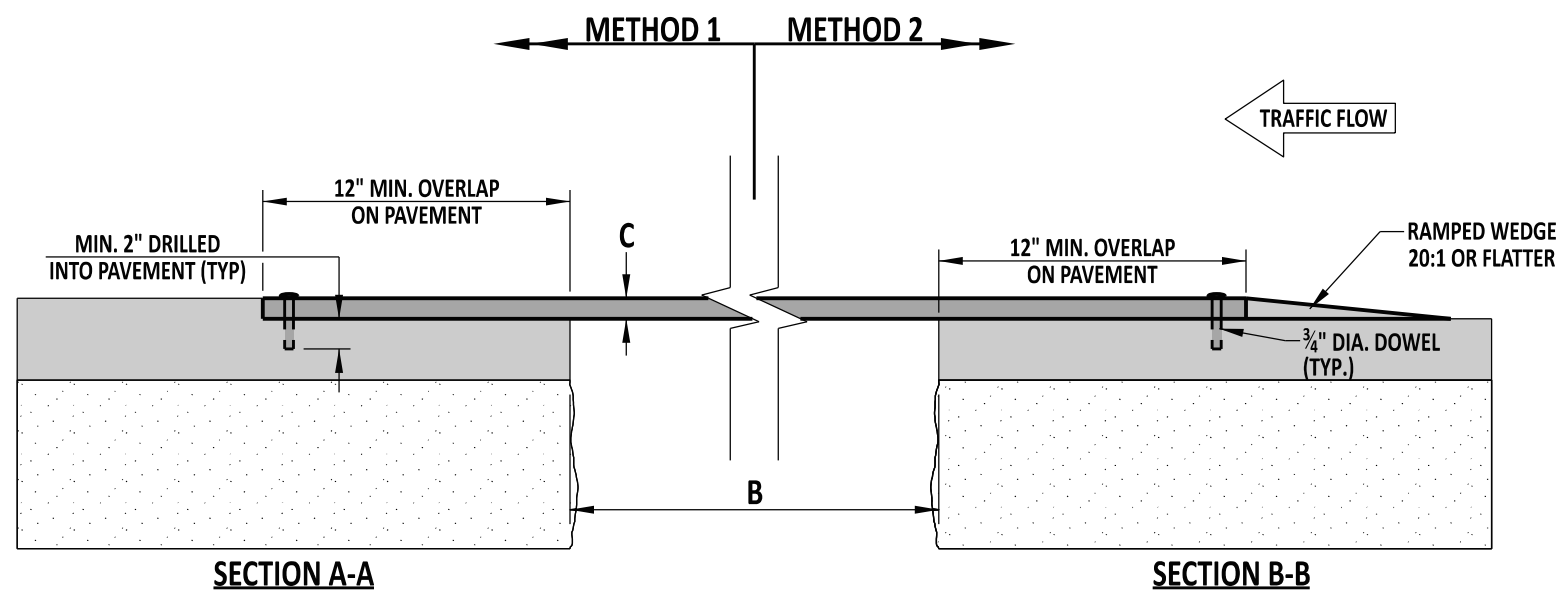
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PLAN VIEW



SECTION A-A

SECTION B-B

B	C
TRENCH WIDTH	MIN. PLATE THICKNESS
1'-0"	1/2"
2'-0"	3/4"
3'-0"	7/8"
4'-0"	1"
5'-0"	1 1/8"
6'-0"	1 1/4"

BASED ON HL-93 TRUCK LOAD

NOTES:

- USE OF STEEL PLATES MUST BE APPROVED BY THE DEPARTMENT AND IS NOT PERMITTED BETWEEN NOVEMBER 1ST AND MARCH 31ST.
- STEEL PLATE BRIDGING ON FREEWAYS AND EXPRESSWAYS IS STRICTLY PROHIBITED.
- STEEL PLATES AND DOWELS WILL CONFORM TO ASTM A36 STANDARDS.
- ADEQUATELY SHORE THE TRENCH IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS TO SUPPORT THE BRIDGING AND TRAFFIC LOADS.
- SECURE BRIDGING AGAINST DISPLACEMENT BY USING ADJUSTABLE CLEATS, SHIMS, OR OTHER DEVICES.
- USE OF STEEL PLATE BRIDGING IS NOT TO EXCEED FOUR (4) CONSECUTIVE WORKING DAYS IN ANY GIVEN WEEK AND NOT LEFT IN PLACE OVER THE WEEKEND, UNLESS DIRECTED BY THE ENGINEER IN THE FIELD.
- THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF STEEL PLATES, SHORING, ASPHALT CONCRETE RAMPS, AND ENSURING THEY MEET ALL MINIMUM SPECIFICATIONS. DEFORMATIONS OF ANY KIND ARE NOT ACCEPTABLE ON STEEL PLATES. EXAMPLES OF DEFORMATIONS COULD BE, BUT NOT LIMITED TO, ANY OF THE FOLLOWING: FREE FROM ANY CLIPS, CHAINS, ATTACHMENTS, WELDMENTS, SURFACE IRREGULARITIES, ETC.
- A STRUCTURE DESIGN IS REQUIRED FOR TRENCH WIDTHS GREATER THAN 6'-0". DESIGN WILL BE APPROVED BY DEPARTMENT PRIOR TO USE.
- INSTALL STEEL PLATE BRIDGING AND SHORING USING EITHER OF THE METHODS BELOW:
METHOD 1: FOR SPEEDS GREATER THAN 45 MPH, MILL THE PAVEMENT TO A DEPTH EQUAL TO THE THICKNESS OF THE PLATE AND TO A WIDTH AND LENGTH EQUAL TO THE DIMENSION OF THE PLATE. BUTT SUBSEQUENT PLATES TO EACH OTHER. ATTACH THE PLATE TO THE ROADWAY BY A MINIMUM OF TWO DOWELS PRE-DRILLED INTO EACH CORNER OF THE PLATE AND DRILLED 2" INTO THE PAVEMENT AS SHOWN ON THIS DETAIL.
METHOD 2: FOR SPEEDS 45 MPH OR LESS, ATTACH THE PLATE TO THE ROADWAY BY A MINIMUM OF TWO DOWELS PRE-DRILLED INTO EACH CORNER OF THE PLATE AND DRILLED 2" INTO THE PAVEMENT AS SHOWN IN ON THIS DETAIL. BUTT SUBSEQUENT PLATES TO EACH OTHER. USE COMPACTED BITUMINOUS TEMPORARY ROADWAY MATERIAL (TRM) TO FORM A RAMPED WEDGE WITH A MAXIMUM SLOPE OF 5% AND A MINIMUM TAPER LENGTH OF 20" TO COVER ALL EDGES OF STEEL PLATES.
- FOR BOTH METHODS, WHEN THE STEEL PLATES ARE REMOVED, BACKFILL THE DOWEL HOLES IN THE PAVEMENT WITH EITHER GRADED FINES OF ASPHALT CONCRETE MIX, CONCRETE SLURRY, OR EQUIVALENT SLURRY TO THE SATISFACTION OF THE ENGINEER.
- STEEL PLATES MUST HAVE A SURFACE THAT IS MANUFACTURED WITH A MINIMUM NOMINAL COEFFICIENT OF FRICTION OF 0.35 AT THE TIME OF PLACEMENT.



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STEEL PLATE

STANDARD NO.

M-11 (2017)

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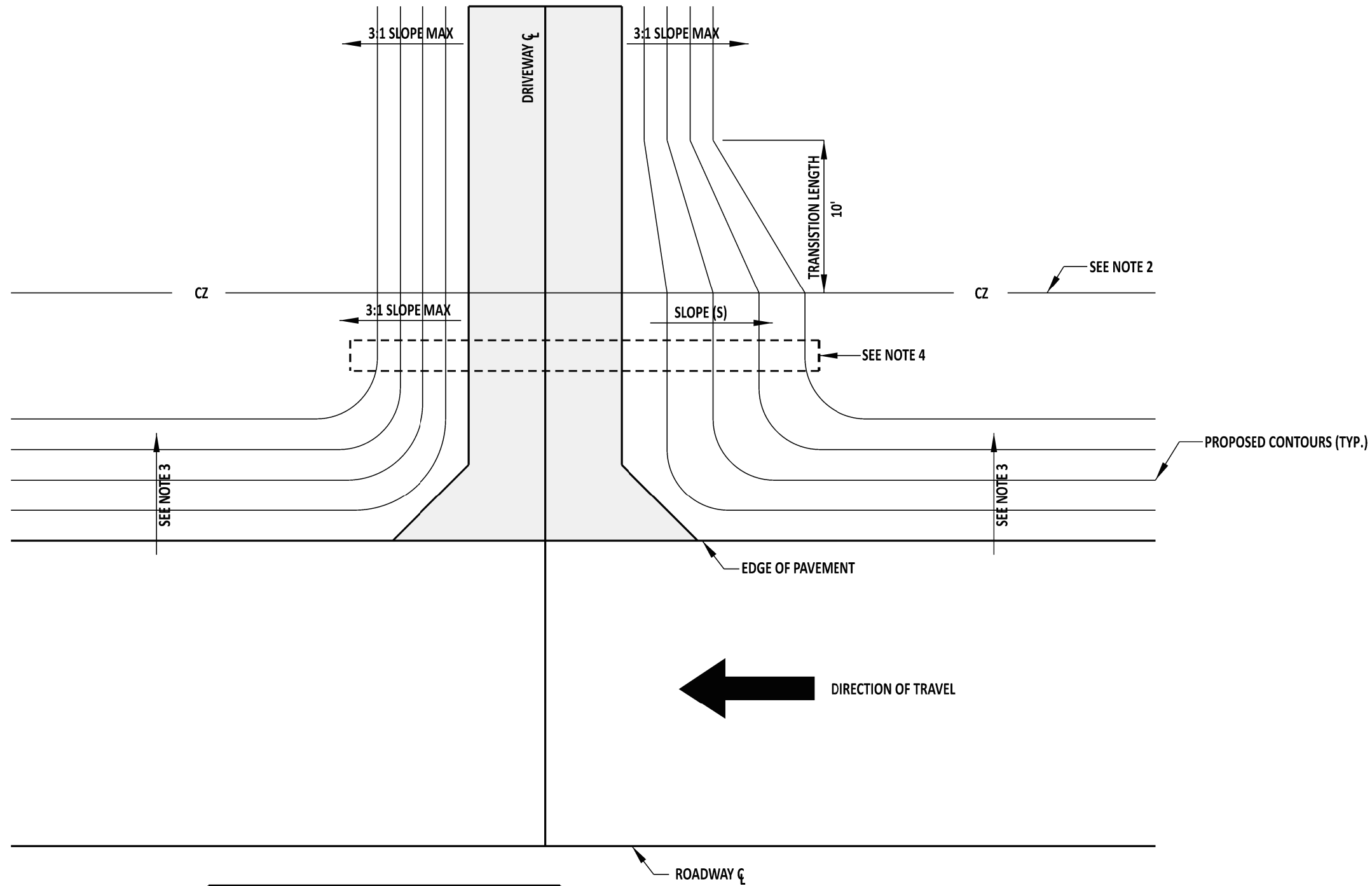
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DESIGN SPEED	S (H:V)
< 50 MPH	4:1
≥ 50 MPH	6:1

- NOTES:**
- 1). REFER TO PLANS AND STANDARD DETAIL C-3 FOR ENTRANCE CONSTRUCTION.
 - 2). REFER TO THE PLANS FOR LOCATION OF THE CLEAR ZONE.
 - 3). REFER TO THE PLANS FOR THE DITCH SIDESLOPE GRADING REQUIREMENTS.
 - 4). REFER TO THE PLANS FOR PIPE END TREATMENTS.



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DRIVEWAY TRANSVERSE SLOPE GRADING

STANDARD NO. M-12 (2018) SHT. 1 OF 1

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RECOMMENDED

SIGNATURE ON FILE 12/20/2018
DESIGN ENGINEER DATE



NOTES:

- 1). TRANSVERSE JOINTS ARE PERPENDICULAR TO THE CENTERLINE OF THE PAVEMENT WHEN THE PAVEMENT IS STRAIGHT.
- 2). TRANSVERSE JOINTS ARE PERPENDICULAR TO A TANGENT LINE TO THE OUTSIDE ARC OF THE PAVEMENT WHEN THE PAVEMENT IS CURVED.
- 3). ALIGN THE TRANSVERSE JOINTS FOR ALL ADJACENT SLABS WITH EACH OTHER.
- 4). ABRUPT CHANGES IN PAVEMENT WIDTH MAY OCCUR ONLY AT THE TRANSVERSE JOINT LINE; LONGITUDINAL JOINTS SHALL BE CONTINUOUS WHENEVER POSSIBLE.
- 5). LONGITUDINAL JOINTS SHOULD NOT BE LOCATED WITHIN PROPOSED WHEEL PATHS. THE WHEEL PATH IS GENERALLY LOCATED 2' (600) INSIDE OF THE LANE EDGELINE OR CENTERLINE.



P.C.C. PAVEMENT

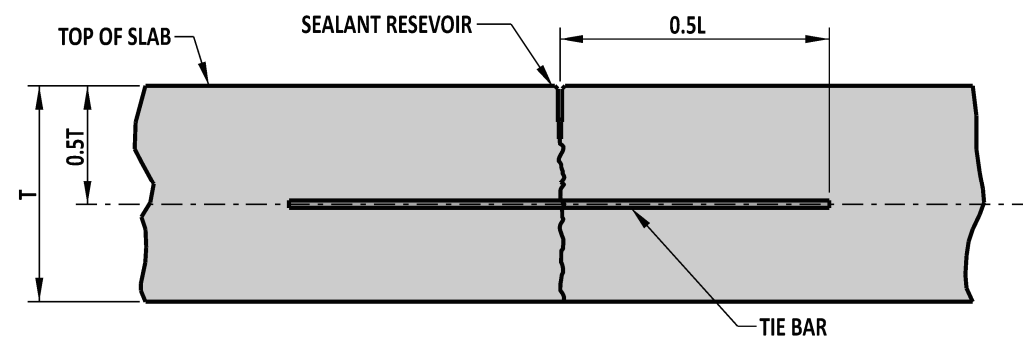
APPROVED

① Raymond M. Harbo 6/18/01
CHIEF ENGINEER DATE

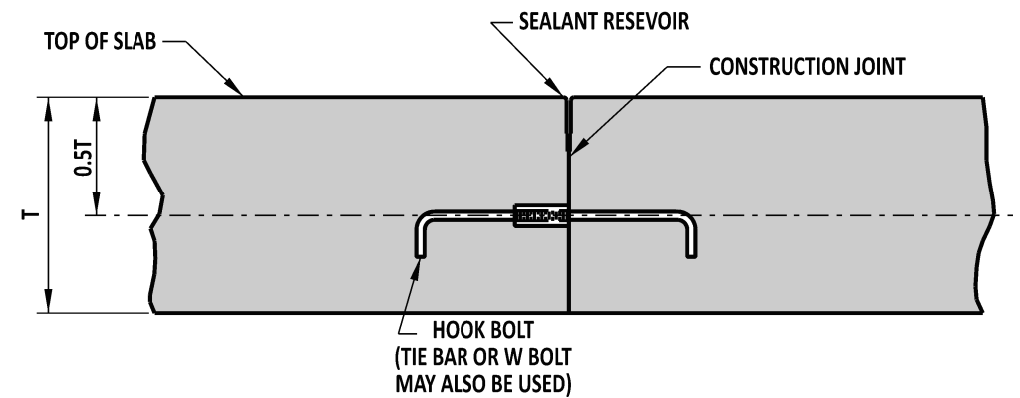
① Michael P. Galt 6/15/01
DESIGN ENGINEER DATE

RECOMMENDED

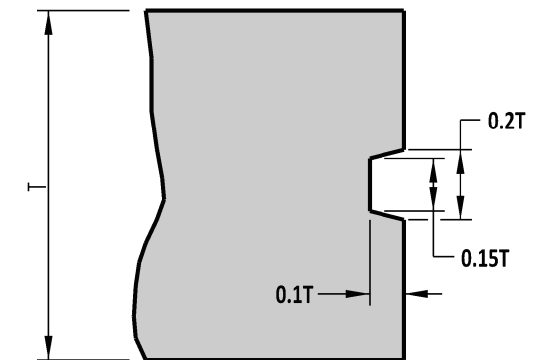
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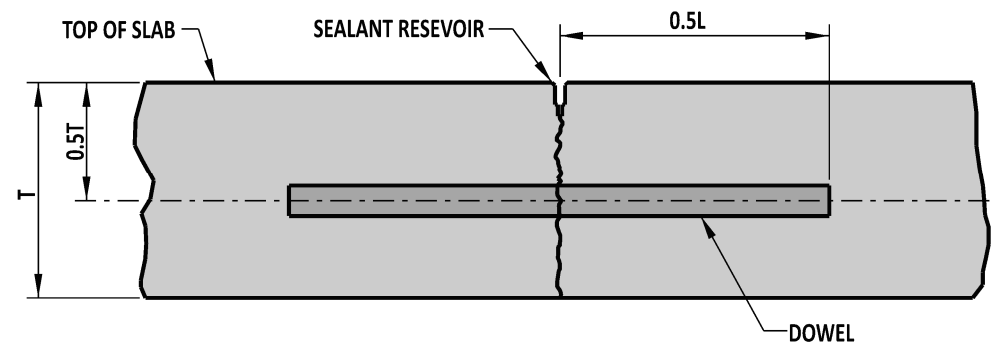
LONGITUDINAL SAW-CUT JOINT DETAIL



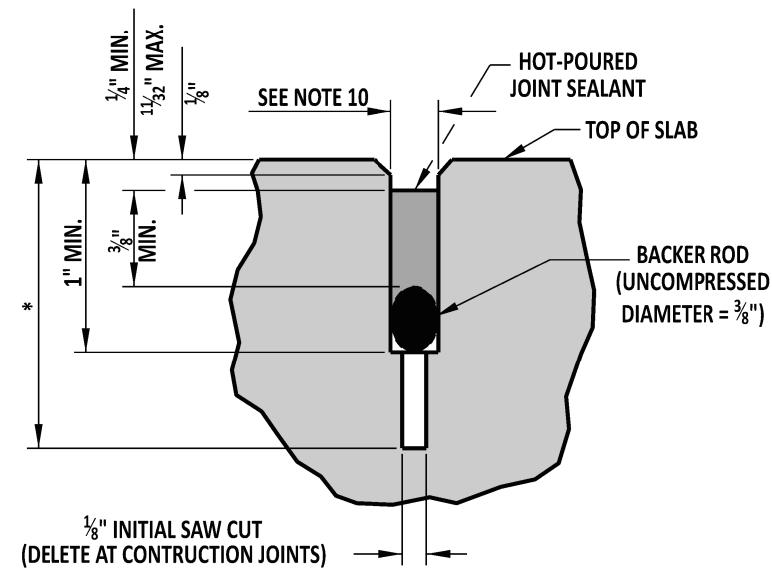
LONGITUDINAL CONSTRUCTION JOINT DETAIL



KEYWAY DETAIL
SEE NOTE 9



TRANSVERSE SAW-CUT JOINT DETAIL



**SEALANT DETAIL-
TRANSVERSE AND LONGITUDINAL JOINT**

* - 0.3T (10" P.C.C. PAVEMENT)
0.4T (12" P.C.C. PAVEMENT)

NOTES:

- 1). AS DIMENSIONED, THE WIDTH OF THE TRANSVERSE SEALANT RESERVOIR IS APPLICABLE WHEN THE TEMPERATURE OF THE PAVEMENT SURFACE IS BETWEEN 60°F AND 80°F. WHEN THE TEMPERATURE IS BELOW 60°F, THE SEALANT RESERVOIR SHALL BE CUT $\frac{1}{16}$ " WIDER. WHEN THE TEMPERATURE IS ABOVE 80°F, THE SEALANT RESERVOIR SHALL BE CUT $\frac{1}{16}$ " NARROWER.
- 2). "T" REFERS TO THE ACTUAL CONSTRUCTED SLAB THICKNESS.
- 3). TOLERANCE ON ALL JOINT SEALANT DETAIL DIMENSIONS SHOWN WITHOUT RANGES SHALL BE PLUS $\frac{1}{16}$ " , MINUS 0".
- 4). THE TOP EDGES OF THE CONTACT SURFACES OF THE SEALANT MATERIAL ON BOTH SIDES OF THE JOINT RESERVOIR SHALL BE AT THE SAME ELEVATION.
- 5). TRANSVERSE JOINT MATERIAL SHALL BE PLACED BEFORE LONGITUDINAL JOINT MATERIAL; THE TRANSVERSE JOINT MATERIAL SHALL BE CONTINUOUS FOR THE FULL WIDTH OF ALL ADJACENT P.C.C. PAVEMENT SLABS.
- 6). LONGITUDINAL JOINT MATERIAL SHALL BE PLACED WITHOUT GAPS WHENEVER INTERRUPTED BY THE TRANSVERSE JOINT MATERIAL.
- 7). TRANSVERSE JOINT SEAL TO BE RECESSED $\frac{3}{16}$ " TO $\frac{5}{16}$ " BELOW THE TOP OF THE SLAB.
- 8). A 45° CHAMFER SHALL BE CUT $\frac{1}{8}$ " TO $\frac{1}{4}$ " DEEP AT THE TOP OF THE SLAB ALONG BOTH SIDES OF THE TRANSVERSE SEALANT RESERVOIR.
- 9). USE KEYWAY WHEN HOOK BOLT, TIE BAR, OR W BOLT IS NOT USED.
- 10). DIMENSION FOR TRANSVERSE JOINTS IS $\frac{3}{8}$ " AND DIMENSION FOR LONGITUDINAL JOINT IS $\frac{1}{4}$ ".

JOINT AND SEALANT DETAILS



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

P.C.C. PAVEMENT

STANDARD NO. P-1 (2018)

SHT. 2 OF 5

APPROVED

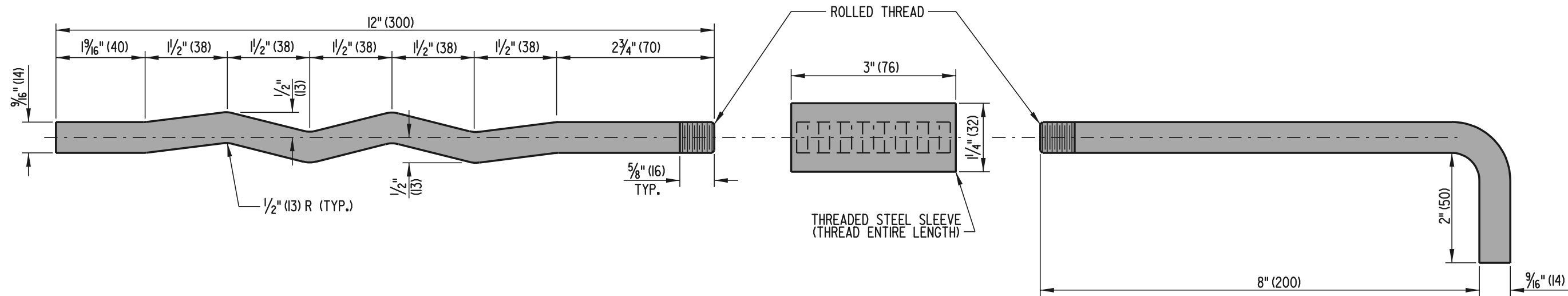
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CHIEF ENGINEER

1/04/2019
DATE

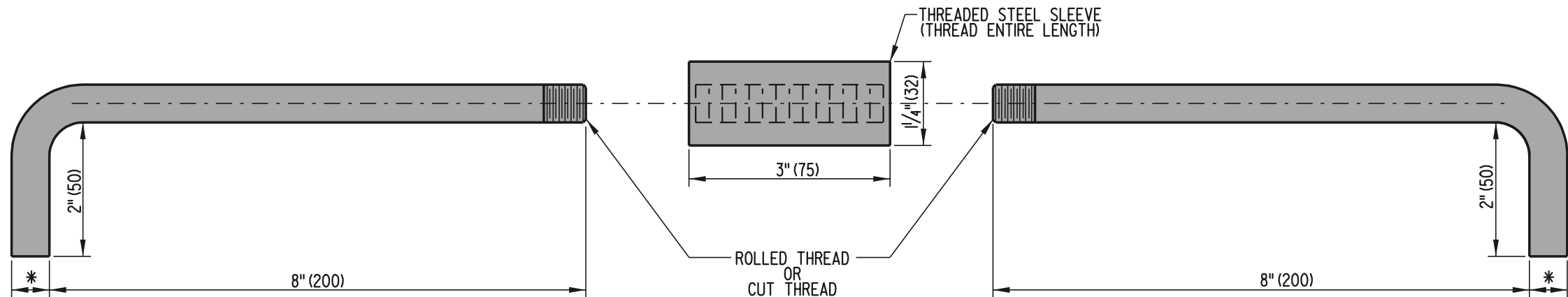
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DATE

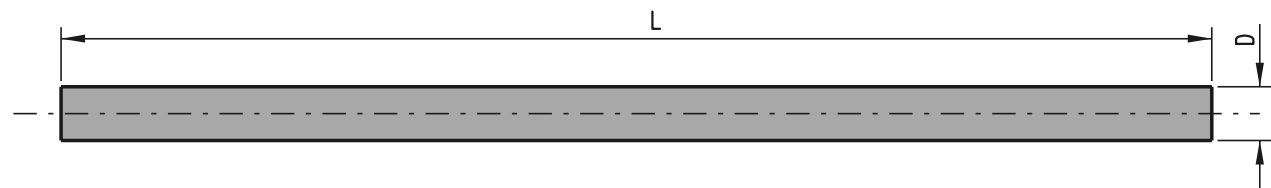


W BOLT



HOOK BOLT

* -1 1/16" (17) ROLLED THREADS
3/4" (19) CUT THREADS



DOWEL & TIE BAR

DOWEL & TIE BAR CHART				
SLAB THICKNESS	DOWEL		TIE BAR	
	D	L	D	L
10" (250)	1 1/4" (32)	18" (450)	5/8" (16)	30" (750)
12" (300)	1 1/2" (38)	20" (500)	5/8" (16)	30" (750)



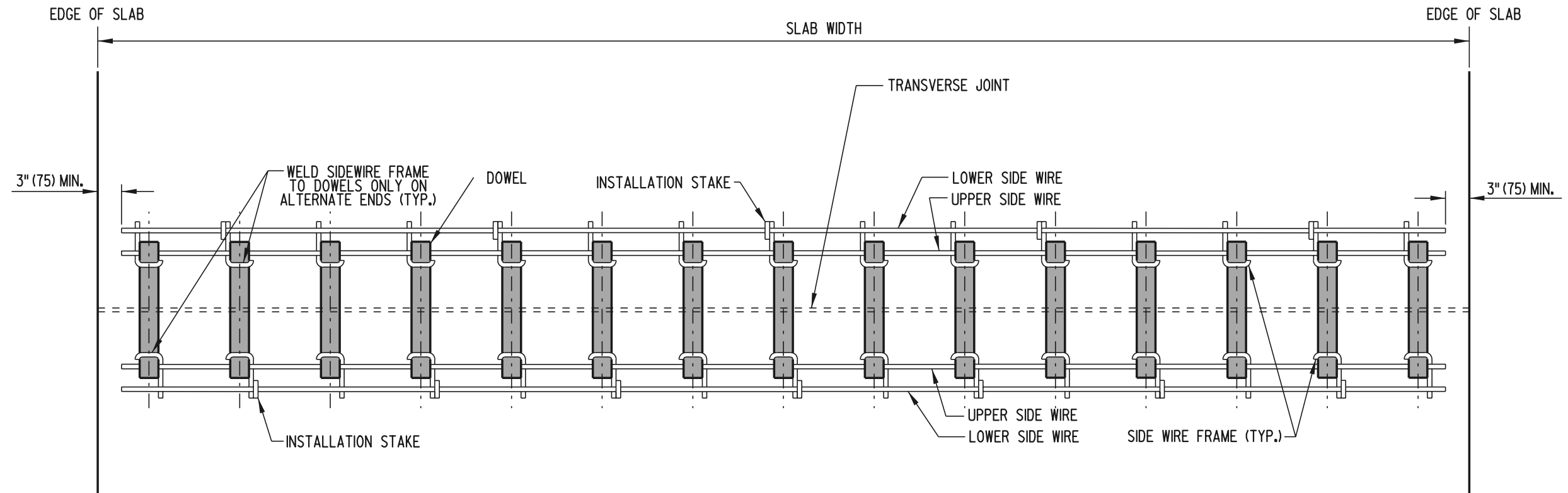
DELAWARE
DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT
STANDARD NO. P-1 (2001)

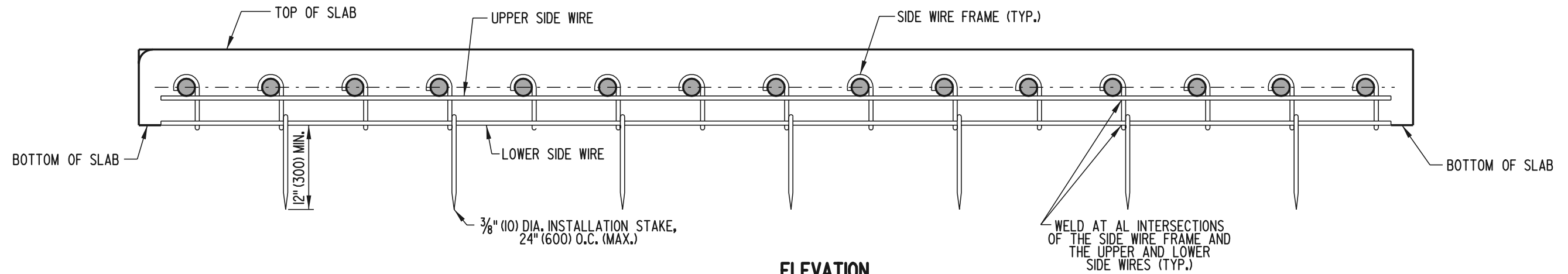
SHT. 3 OF 5

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

SCALE : N.T.S.



PLAN



ELEVATION

DOWEL SUPPORT BASKET



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

P.C.C. PAVEMENT

STANDARD NO. P-1 (2001)

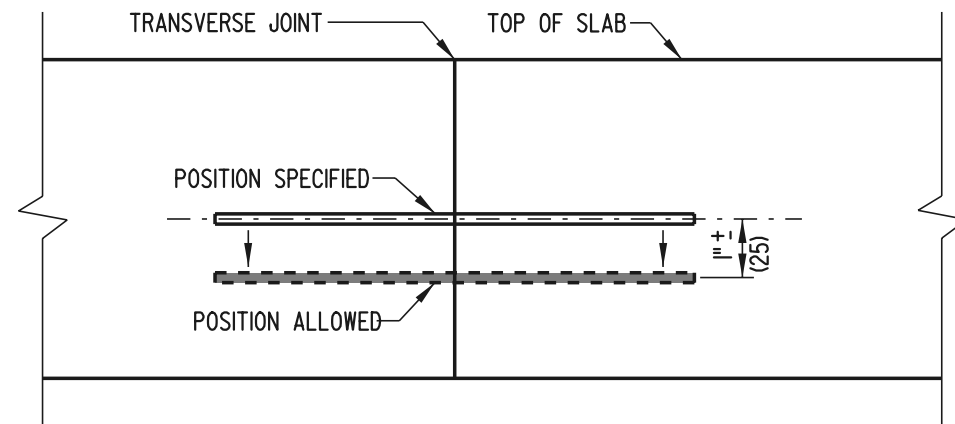
SHT. 4 OF 5

APPROVED

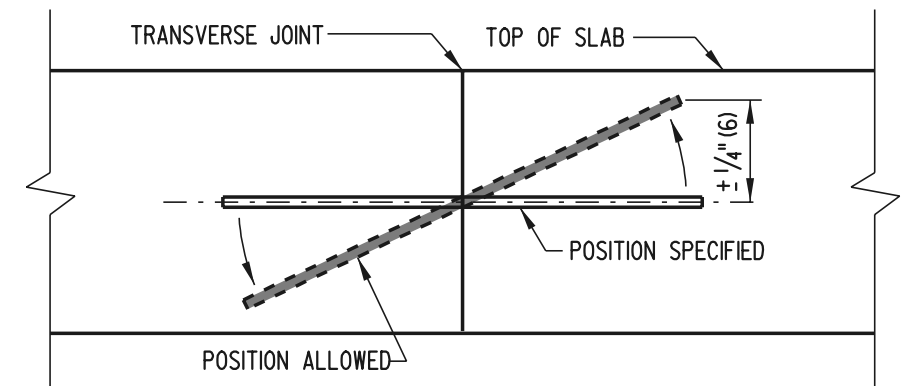
Ryan M. Harkness **6/18/01**
CHIEF ENGINEER DATE

RECOMMENDED

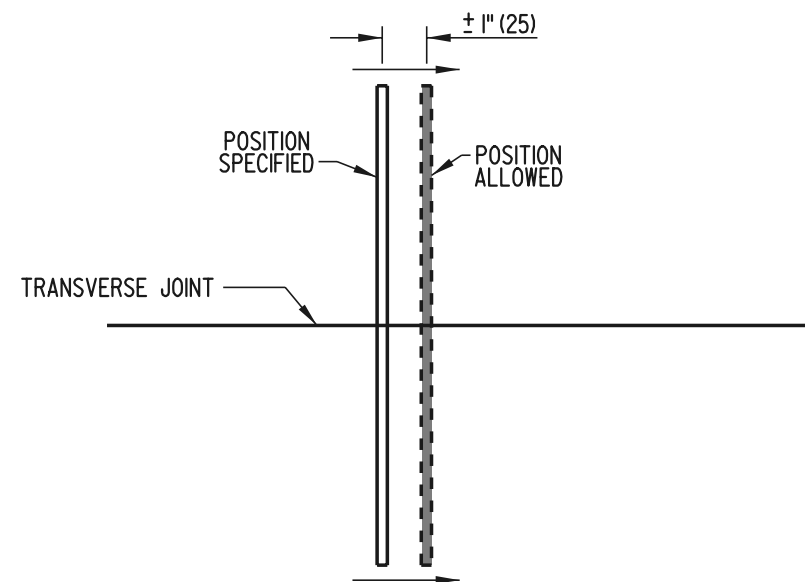
Mehal Alghamdi **6/18/01**
DESIGN ENGINEER DATE



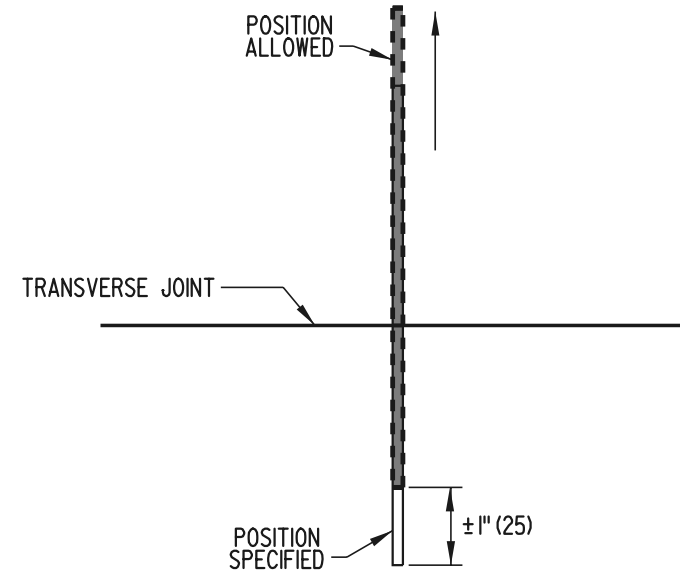
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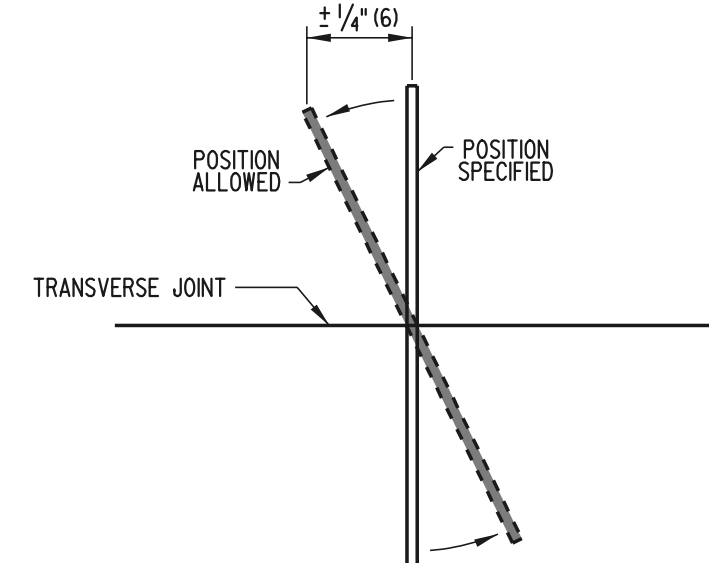
VERTICAL ROTATION



HORIZONTAL TRANSLATION



LONGITUDINAL TRANSLATION



HORIZONTAL ROTATION

DOWEL & TIE BAR PLACEMENT TOLERANCES



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

P.C.C. PAVEMENT

STANDARD NO. P-1 (2001)

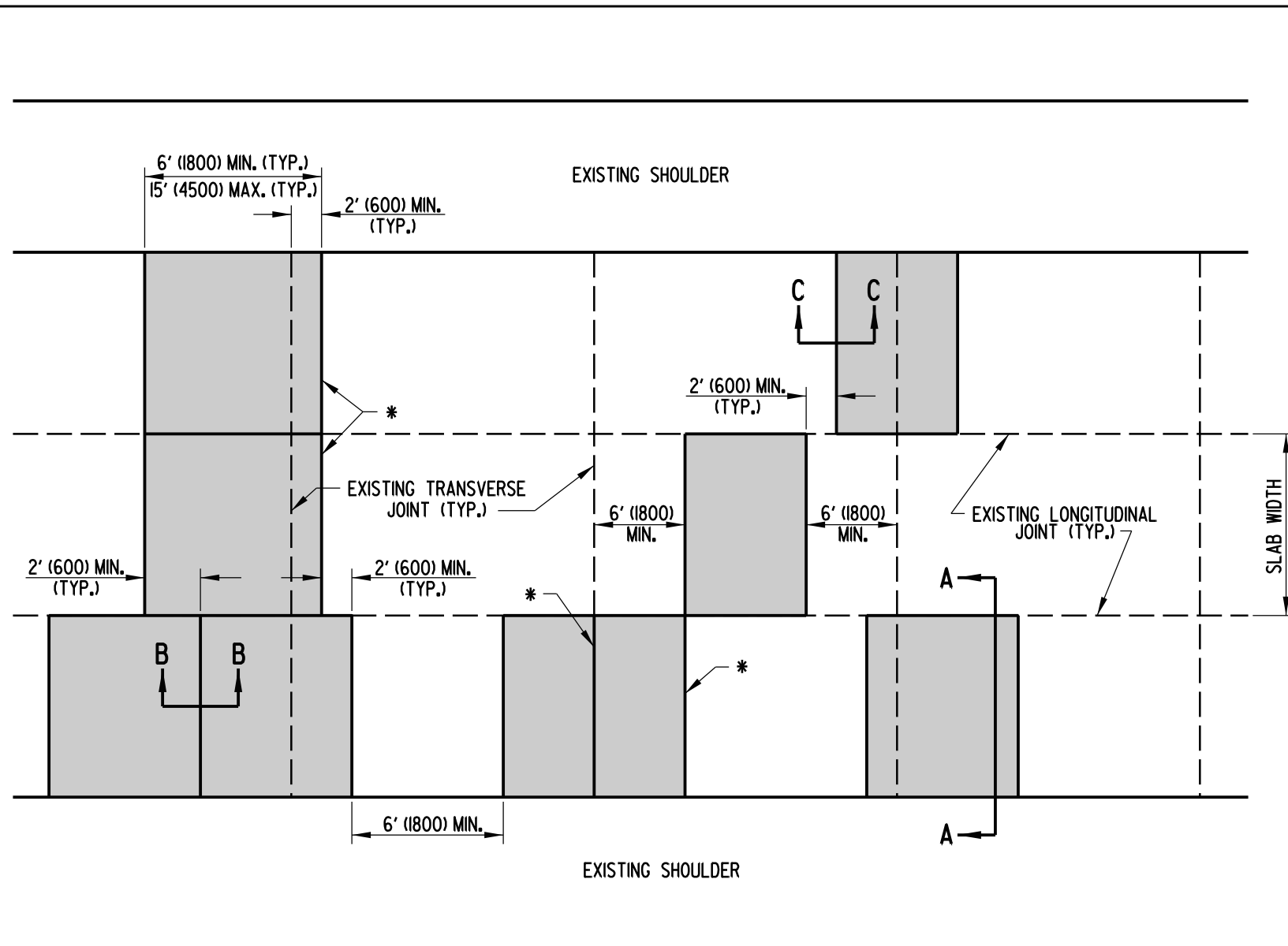
SHT. 5 OF 5

APPROVED

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

RECOMMENDED

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



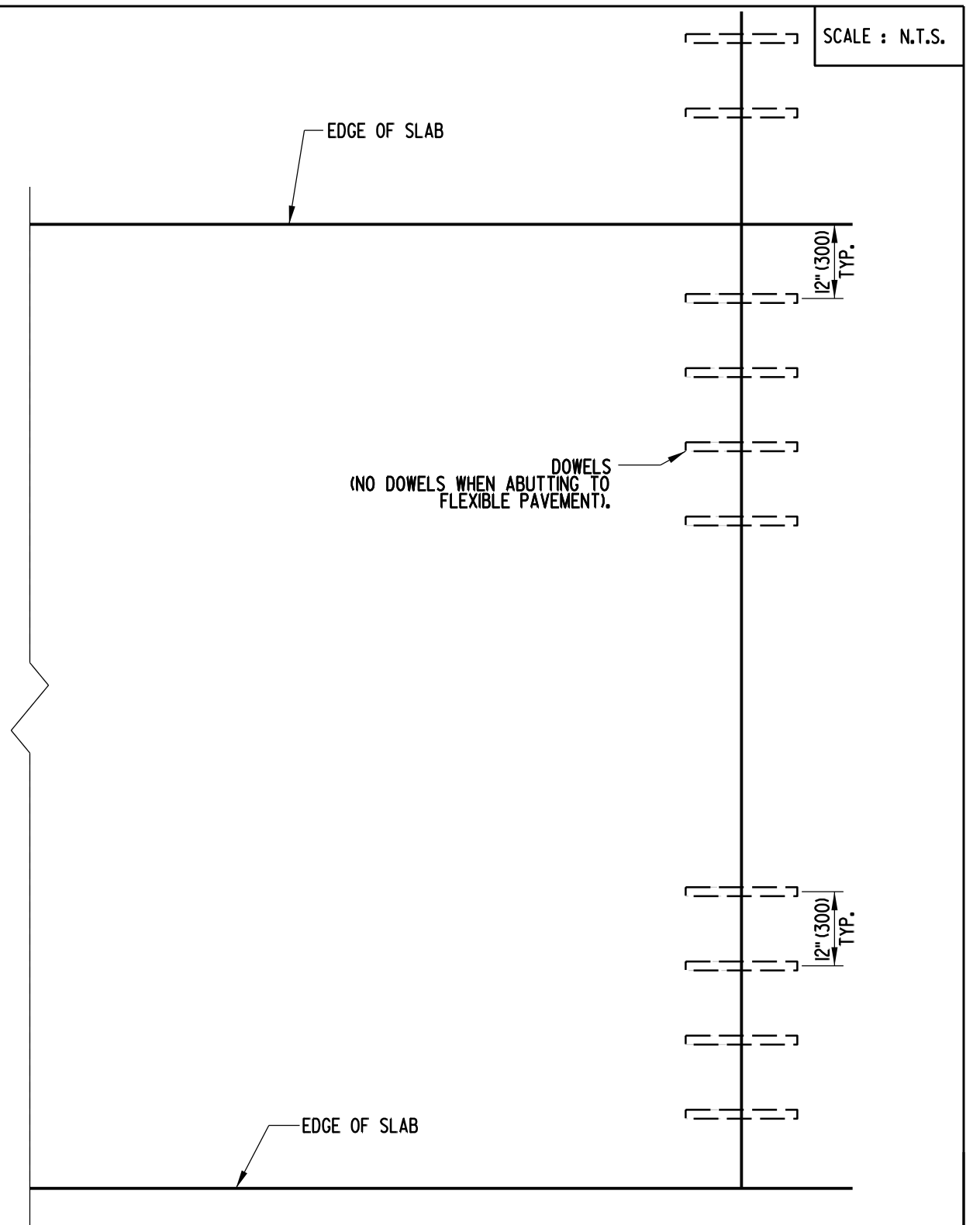
PLAN

* - PROPOSED LOCATIONS FOR TRANSVERSE JOINTS SHALL EXACTLY MATCH THE ALIGNMENT OF THE FINAL (EXISTING OR RELOCATED) TRANSVERSE JOINTS IN ALL IMMEDIATELY ADJACENT LANES.

NOTES:

1. WHEN REPAIRING EXISTING TRANSVERSE JOINTS, THE PATCH SHALL EXTEND A MINIMUM OF 24" (600) THROUGH THE EXISTING JOINT, WHICH WILL RELOCATE THE JOINT.
2. PROPOSED LOCATIONS FOR TRANSVERSE JOINTS, WHEN NOT ALIGNED WITH THE FINAL EXPECTED TRANSVERSE JOINT LOCATIONS IN THE IMMEDIATELY ADJACENT LANES, SHALL BE OFFSET A MINIMUM OF 2' (600) FROM THE AFFORMENTIONED JOINTS.
3. THE LONGITUDINAL JOINT ALIGNMENT SHALL BE STRAIGHT AND CONTINUOUS THROUGH THE REPAIRED AREA.

FULL DEPTH PATCH



SLAB PLAN (WITH DOWEL AND TIE LOCATIONS)



DELAWARE
DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2008)

SHT. 1 OF 5

APPROVED

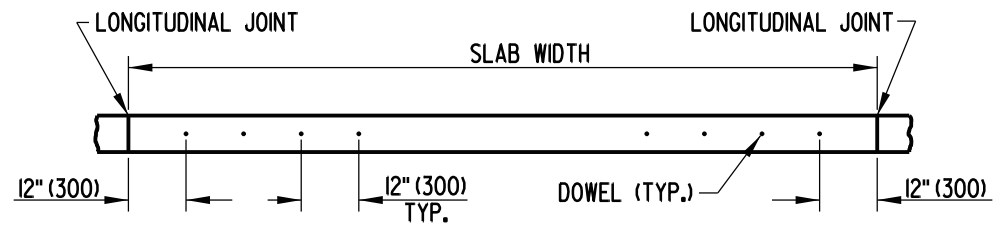
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CHIEF ENGINEER

11/18/08
DATE

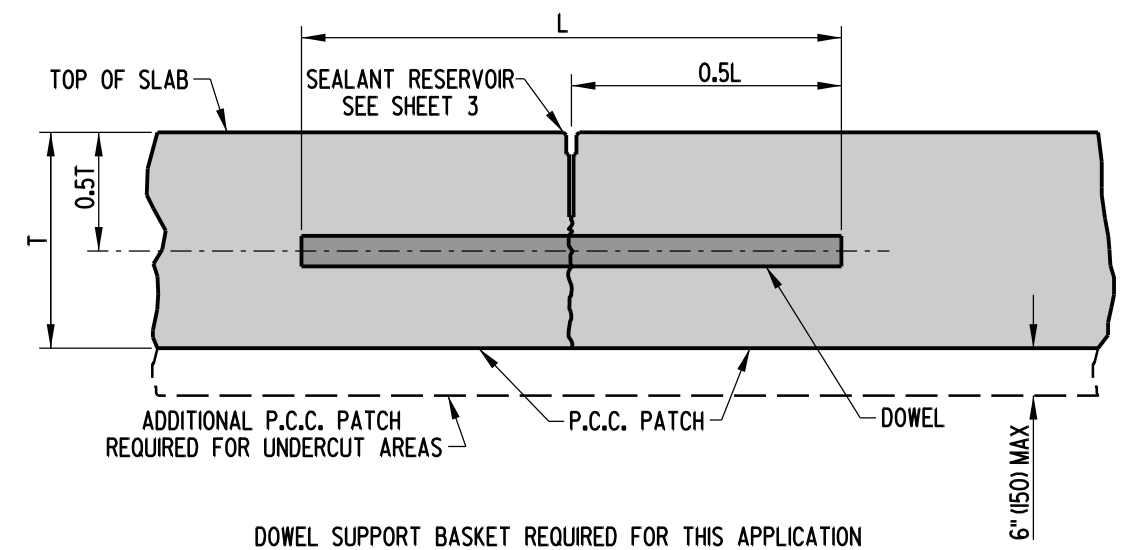
RECOMMENDED

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DESIGN ENGINEER

11/17/08
DATE



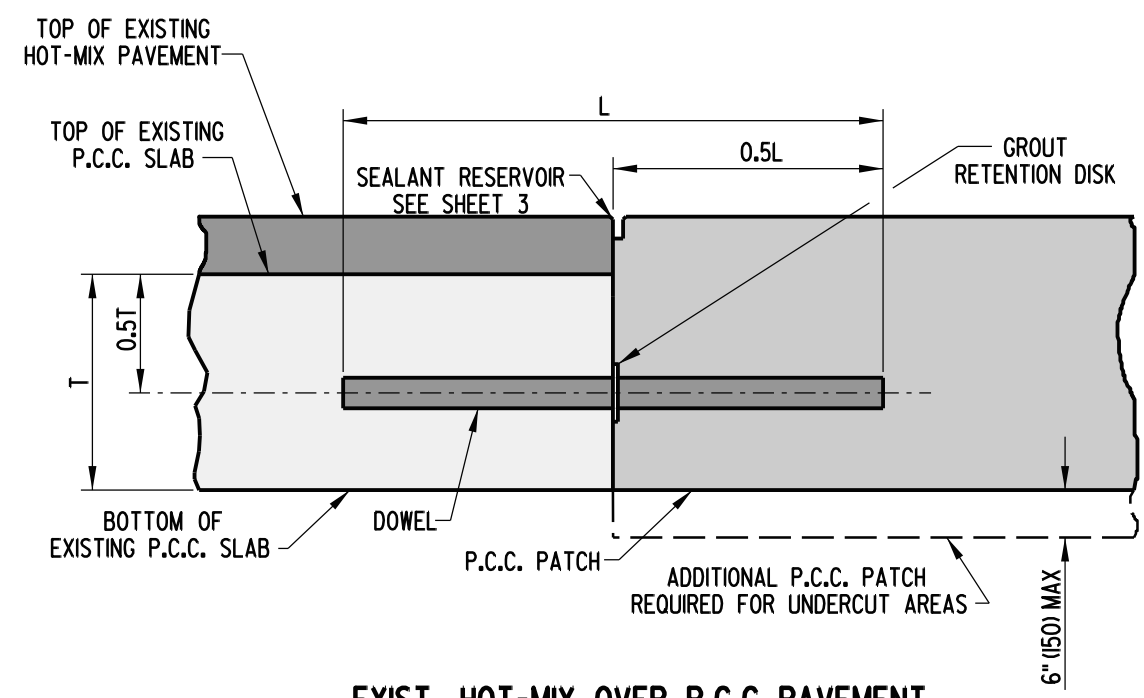
SECTION A-A



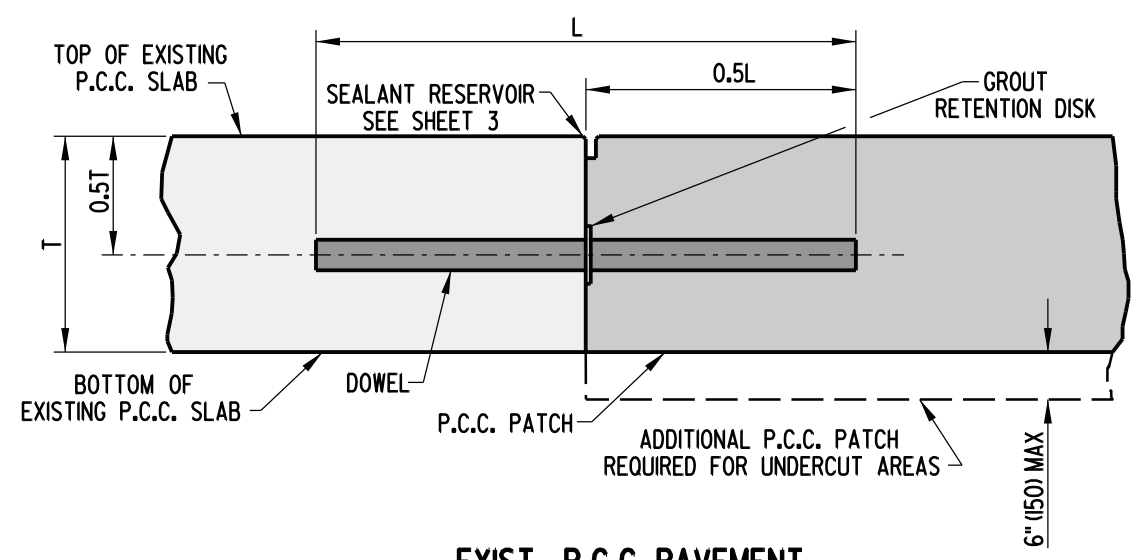
DOWEL SUPPORT BASKET REQUIRED FOR THIS APPLICATION
(REFER TO STANDARD CONSTRUCTION DETAIL FOR P.C.C. PAVEMENT.)

SECTION B-B

TRANSVERSE SAW-CUT USED FOR
JOINTS LOCATED WITHIN THE PATCH



EXIST. HOT-MIX OVER P.C.C. PAVEMENT






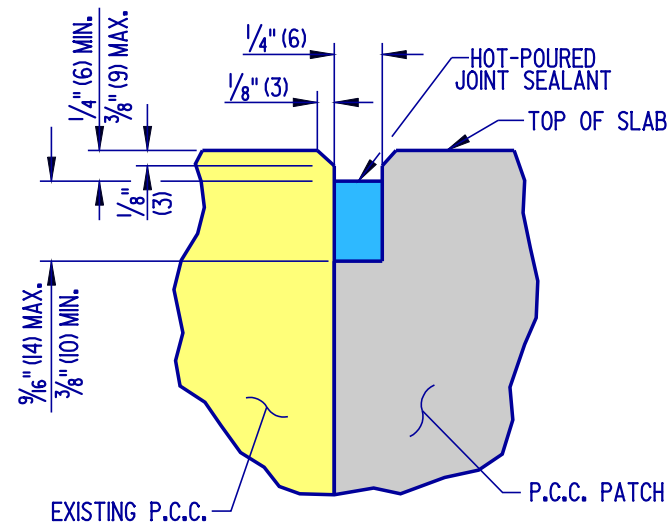
EXIST. P.C.C. PAVEMENT

SECTION C-C

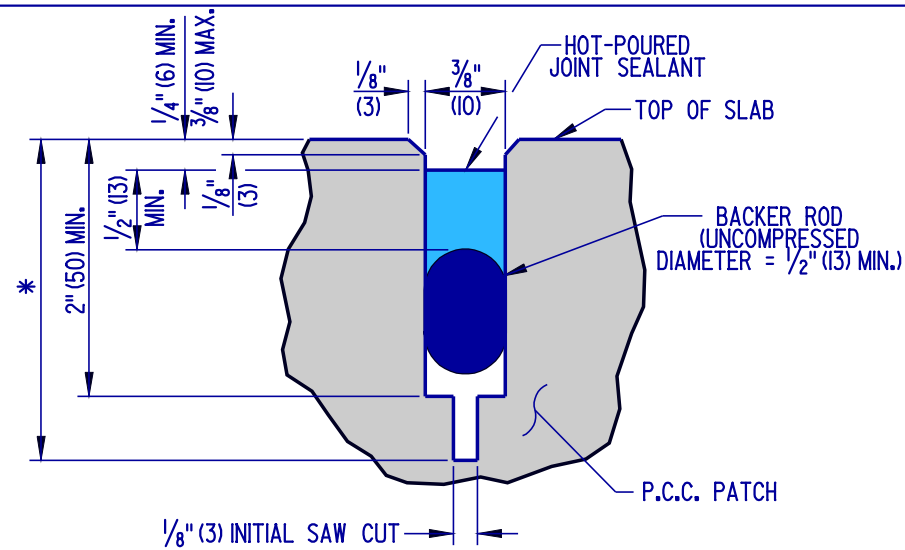
TRANSVERSE CONSTRUCTION JOINT USED ON
JOINTS BETWEEN EXISTING PAVEMENT AND PATCH

FULL DEPTH PATCH

 DELAWARE DEPARTMENT OF TRANSPORTATION	P.C.C.PAVEMENT PATCHING			APPROVED  11/18/08 CHIEF ENGINEER DATE
	STANDARD NO. P-2 (2008)	SHT. 2 OF 5		RECOMMENDED  11/17/08 DESIGN ENGINEER DATE

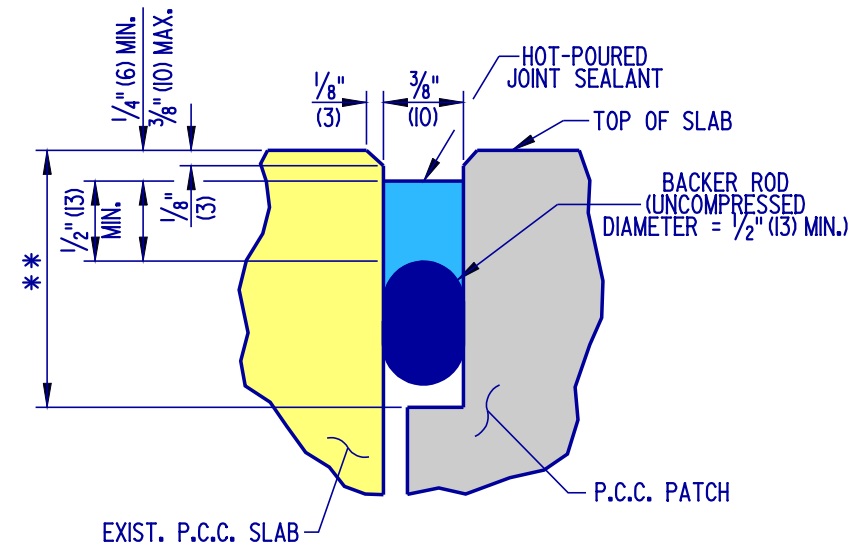


**SEALANT DETAIL-
LONGITUDINAL JOINT**



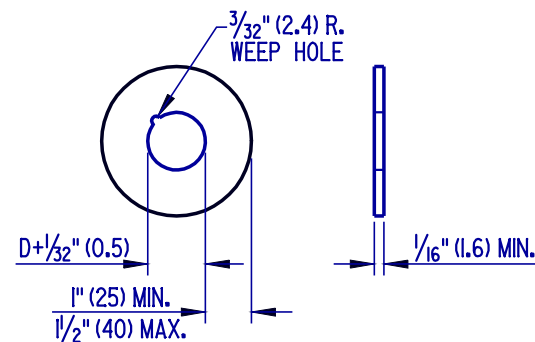
* - 0.3T (T < 10" (250) P.C.C. PAVEMENT)
0.4T (T > 10" (250) P.C.C. PAVEMENT)

**SEALANT DETAIL-
TRANSVERSE SAW-CUT JOINT**



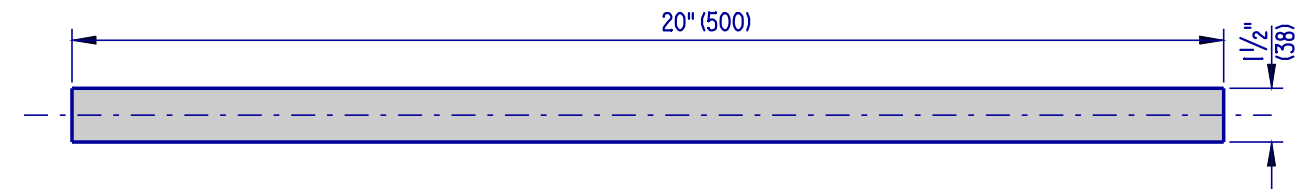
** - 2" (50) MIN. WITH BACKER ROD
5/8" (16) MIN. WITH BOND BREAKER TAPE

**SEALANT DETAIL-
TRANSVERSE CONSTRUCTION JOINT**



D - DOWEL DIAMETER (INCLUDING
PROTECTING COATINGS, IF ANY.)

GROUT RETENTION DISK



DOWEL BAR

NOTES:

1. AS DIMENSIONED, THE WIDTH OF THE TRANSVERSE SEALANT RESERVOIR IS APPLICABLE WHEN THE TEMPERATURE OF THE PAVEMENT SURFACE IS BETWEEN 60°F (16°C) AND 80°F (27°C). WHEN THE TEMPERATURE IS BELOW 60°F (16°C), THE SEALANT RESERVOIR SHALL BE CUT 1/16" (2) WIDER. WHEN THE TEMPERATURE IS ABOVE 80°F (27°C), THE SEALANT RESERVOIR SHALL BE CUT 1/16" (2) NARROWER.
2. "T" REFERS TO THE EXISTING "AS-BUILT" SLAB THICKNESS.
3. TOLERANCE ON ALL JOINT SEALANT DETAIL DIMENSIONS SHOWN WITHOUT RANGES SHALL BE PLUS 1/16" (2), MINUS 0" (0).
4. THE TOP EDGES OF THE CONTACT SURFACES OF THE SEALANT MATERIAL ON BOTH SIDES OF THE JOINT RESERVOIR SHALL BE AT THE SAME ELEVATION.

FULL DEPTH PATCH



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

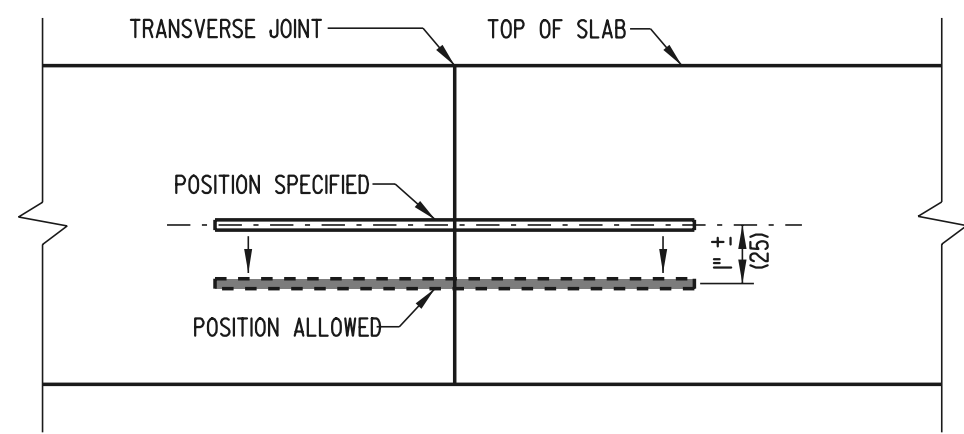
P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2004)

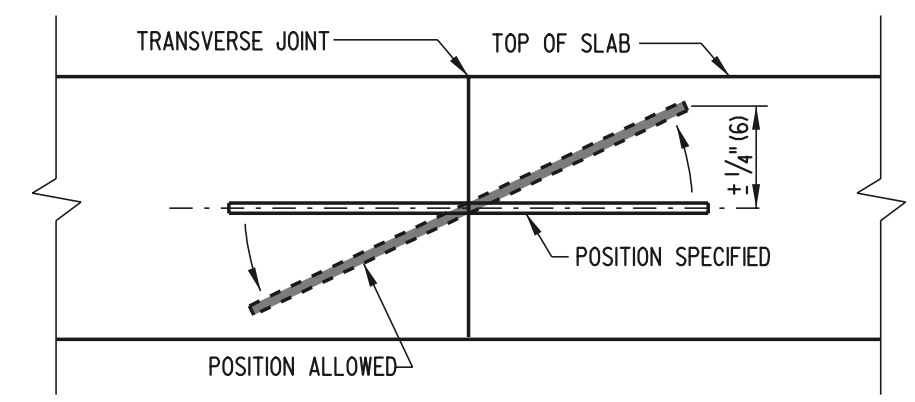
SHT. 3 OF 5

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

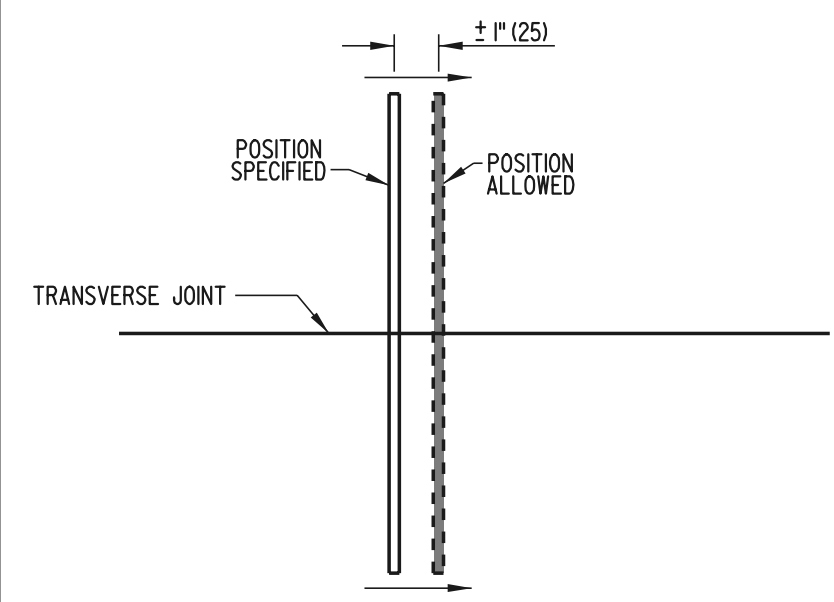
RECOMMENDED *Dennis M. O'Flaherty* **1/13/05**
DESIGN ENGINEER DATE



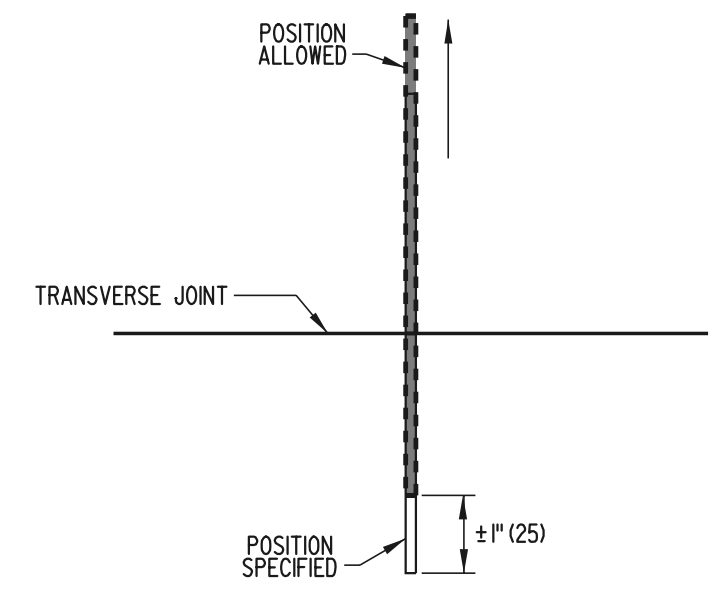
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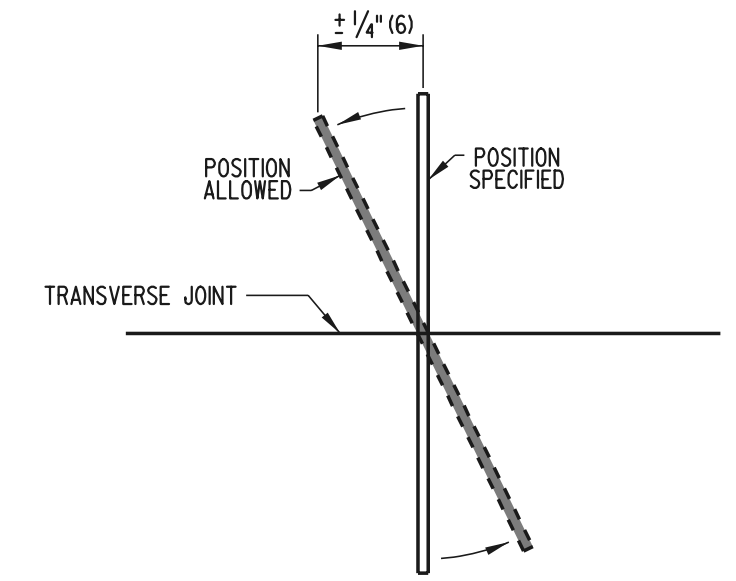
VERTICAL ROTATION



HORIZONTAL TRANSLATION




LONGITUDINAL TRANSLATION

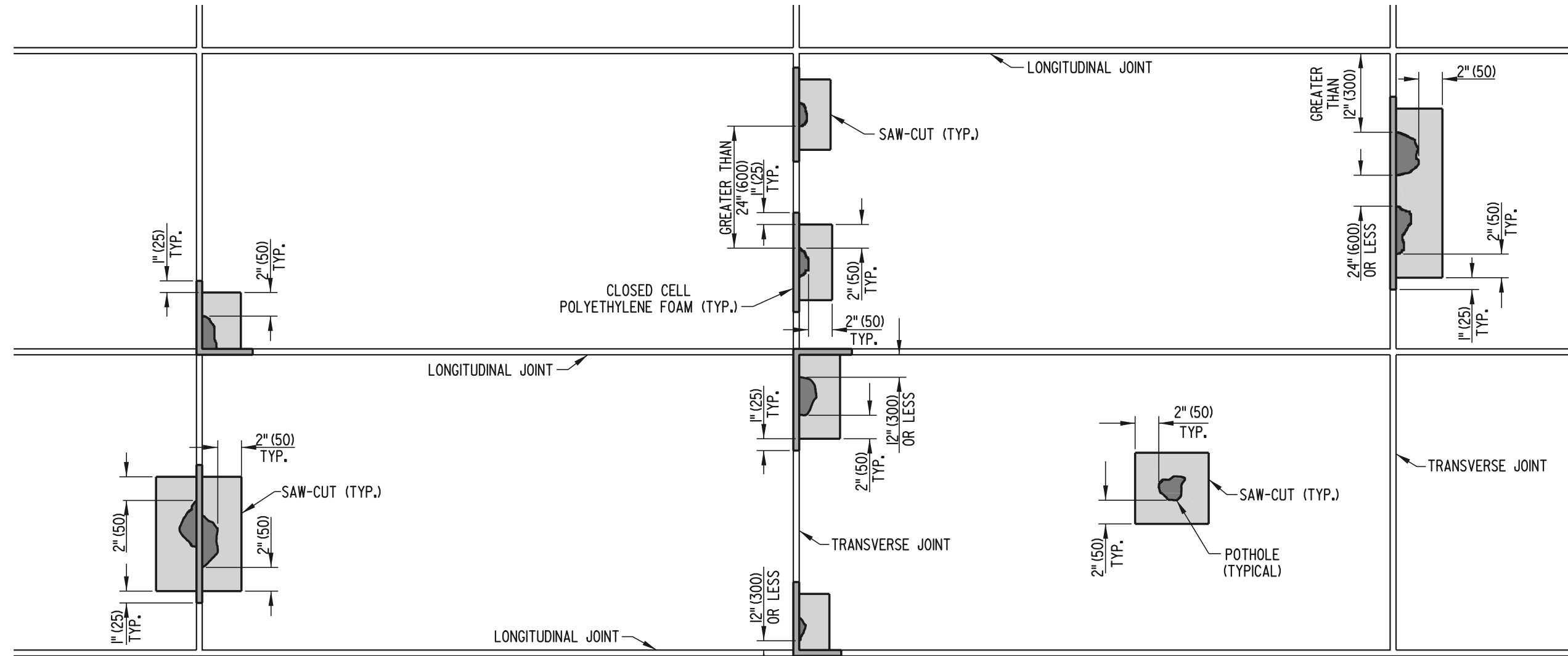


HORIZONTAL ROTATION

DOWEL & TIE BAR PLACEMENT TOLERANCES

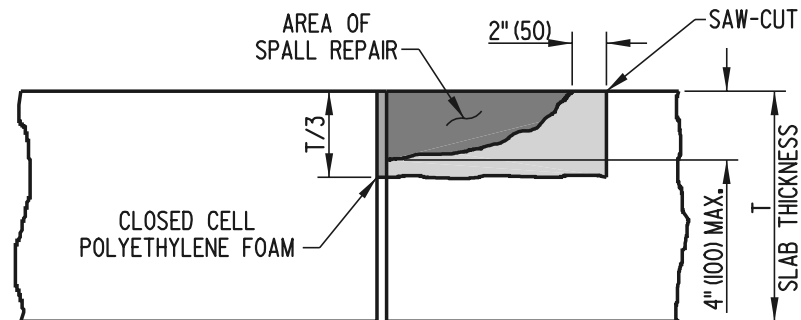
FULL DEPTH PATCH

 DELAWARE DEPARTMENT OF TRANSPORTATION	P.C.C. PAVEMENT PATCHING			APPROVED <i>Ryan M. Harkness</i> <u>6/18/01</u> <small>CHIEF ENGINEER DATE</small>
	STANDARD NO. P-2 (2001)	SHT. 4	OF 5	RECOMMENDED <i>Michael P. Gotsch</i> <u>6/18/01</u> <small>DESIGN ENGINEER DATE</small>

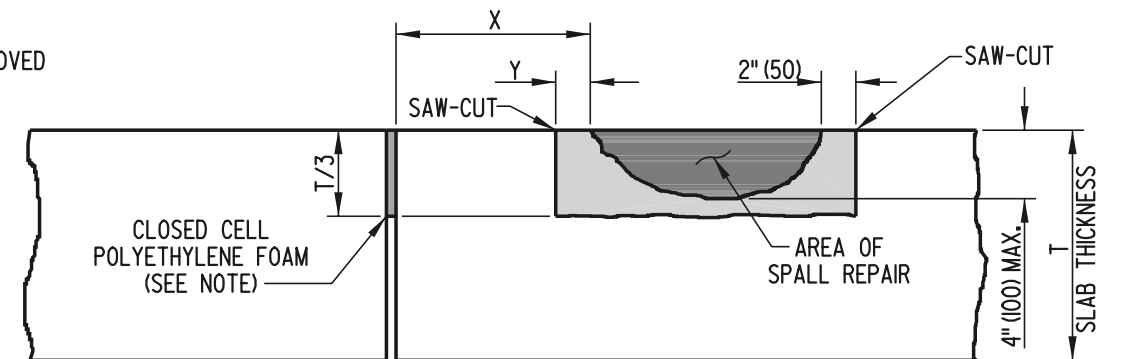


PLAN

NOTE: CLOSED CELL POLYETHYLENE FOAM SHALL BE THE SAME WIDTH AS THE JOINT AND 5" (125) IN DEPTH. AFTER THE CONCRETE IN THE REPAIR AREA HAS ACHIEVED THE SPECIFIED STRENGTH, THE FOAM SHALL BE REMOVED AND REPLACED WITH BACKER ROD AND HOT-POUR SEALANT MEETING ALL APPLICABLE STANDARD DETAILS AND SPECIFICATIONS.



SECTION WITH SPALL ADJACENT TO JOINT



SECTION WITH SPALL NOT ADJACENT TO JOINT

NOTE: WHEN $X > 12" (300)$, THEN $Y=1" (25)$ AND POLYETHYLENE FOAM IS NOT USED. WHEN $X \leq 12" (300)$, THEN $Y=X$ AND POLYETHYLENE FOAM IS USED.

PARTIAL DEPTH PATCH



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

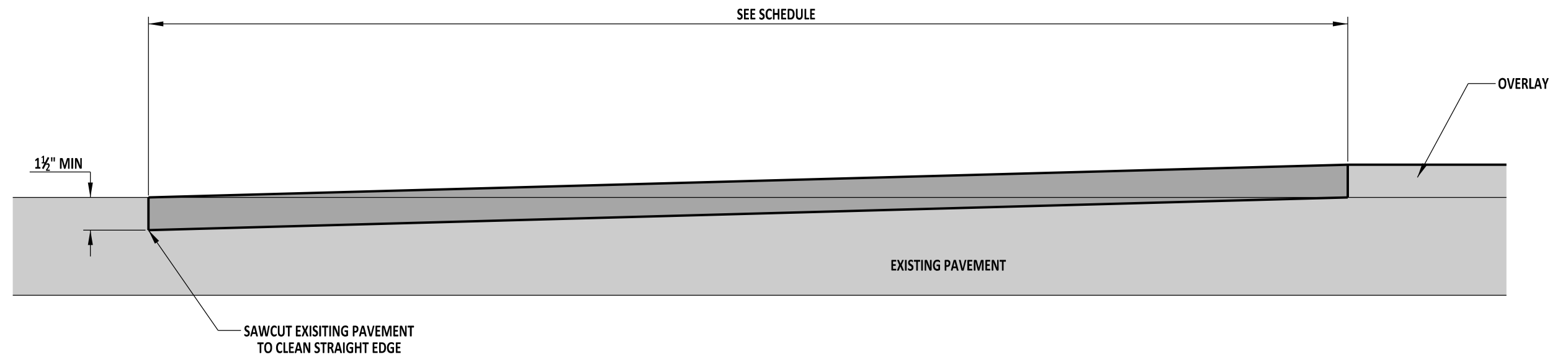
P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2001)

SHT. 5 OF 5

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

RECOMMENDED *Michael J. Glick* **6/18/01**
DESIGN ENGINEER DATE



NOTES:

- 1). ADJUST THE PROFILE OF THE OVERLAY PAVING TO ASSURE A SMOOTH TRANSITION THROUGH THE BUTT JOINT.
- 2). CRACK SEAL THE JOINT BETWEEN THE BUTT JOINT AND THE EXISTING PAVEMENT.

CONDITION	SLOPE FEET:INCHES
GREATER THAN OR EQUAL TO 55 MPH	40:1
LESS THAN 55MPH	30:1
STOP CONTROLLED INTERSECTION	15:1



DELAWARE
DEPARTMENT OF TRANSPORTATION

BUTT JOINTS

STANDARD NO. P-3 (2014)

SHT. 1 OF 1

APPROVED

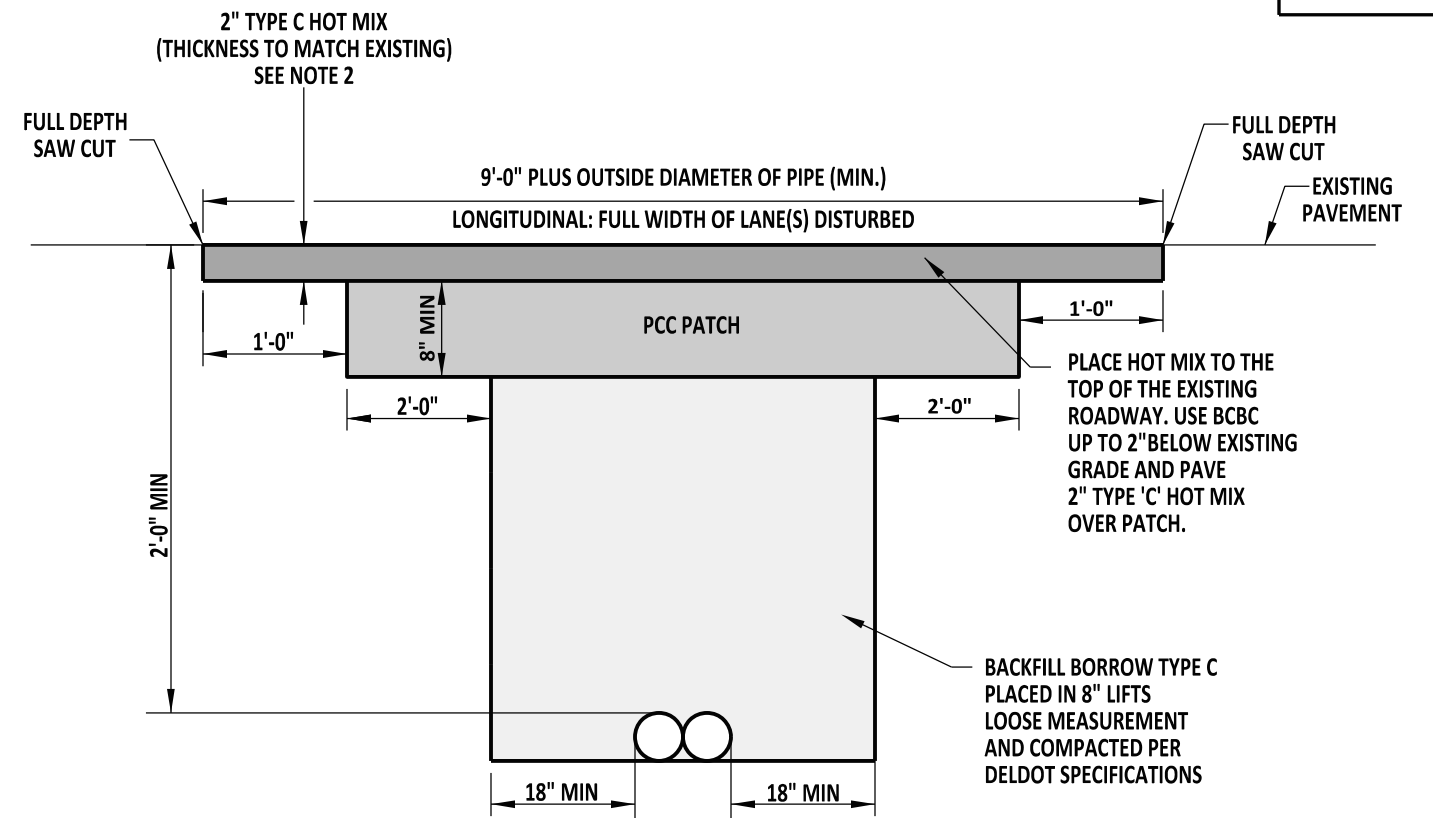
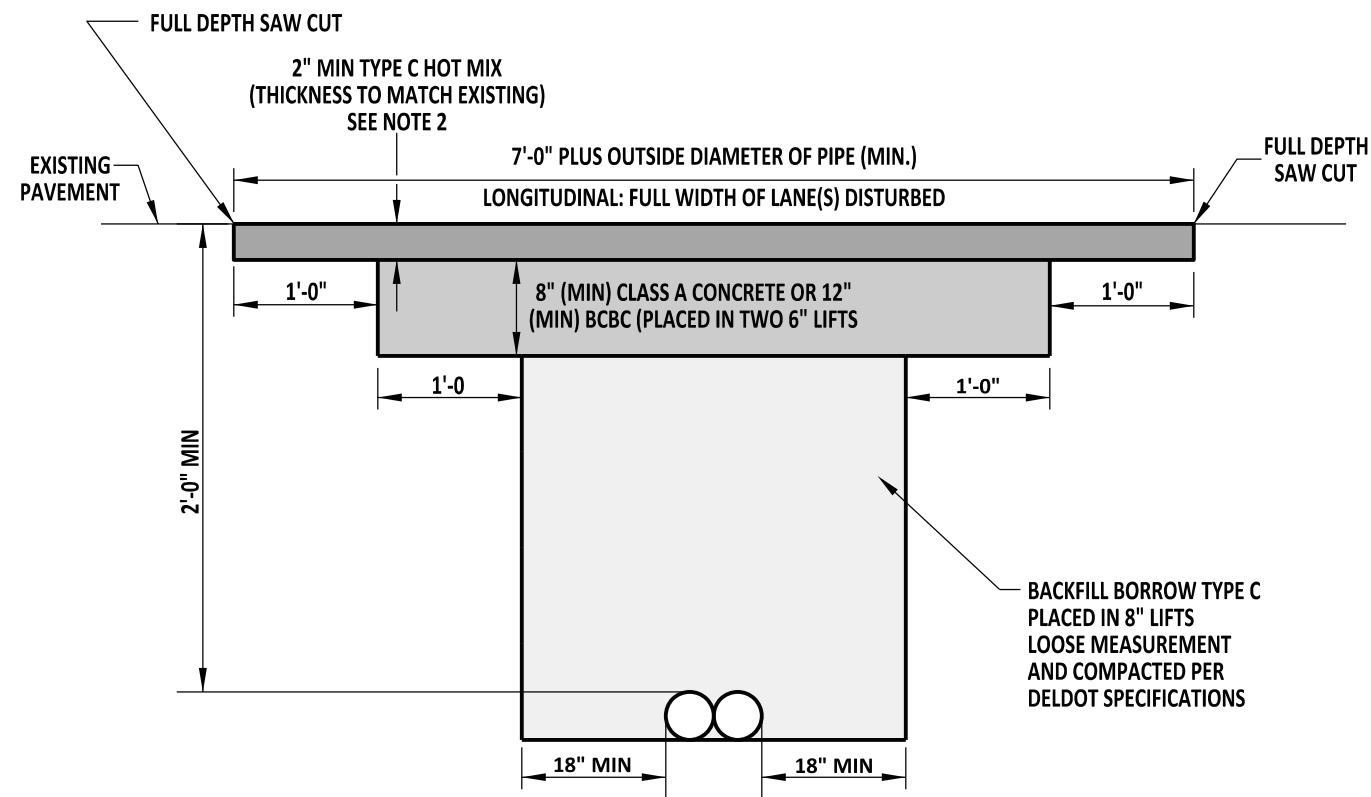
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12/30/2014
DATE

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DESIGN ENGINEER

12/11/2014
DATE



PERMANENT CROSS-ROAD OR LONGITUDINAL PATCH DETAIL

PERMANENT CROSS-ROAD OR LONGITUDINAL PATCH DETAIL

* EXISTING CONCRETE PAVEMENT OVERLAYED WITH HOTMIX LOCATIONS

NOTES:

- 1). PATCH WIDTHS ARE MEASURED ALONG THE ROADWAY CENTERLINE AND SHALL BE THE FULL WIDTH OF THE LANE OR LANES DISTURBED.
- 2). THIS IS A MINIMUM PATCH. IF THE EXISTING ROADWAY HAS A HEAVIER CROSS SECTION THAN SHOWN HERE, IT WILL BE REPLACED WITH THAT CROSS SECTION, OR AS DIRECTED BY THE ENGINEER.
- 3). SEE DETAIL D-8, SHEET 1 FOR PIPE BEDDING DETAILS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

PERMANENT CROSS-ROAD PATCH OVER PIPE TRENCH DETAIL

STANDARD NO. P-4 (2013)

SHT. 1 OF 1

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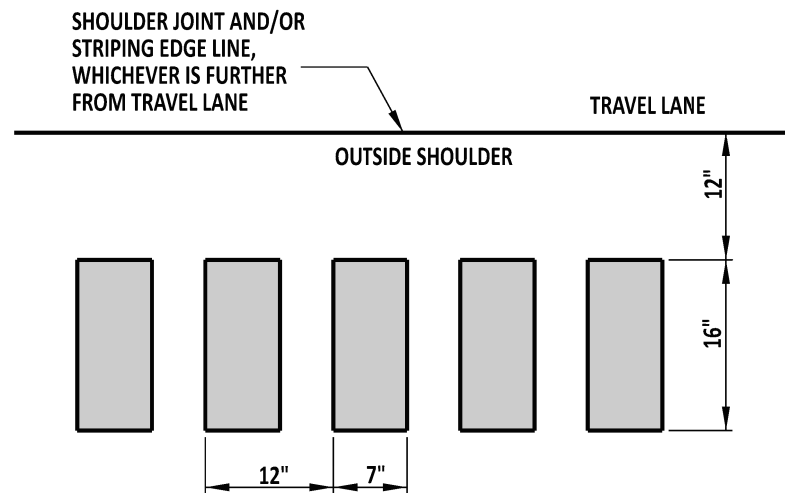
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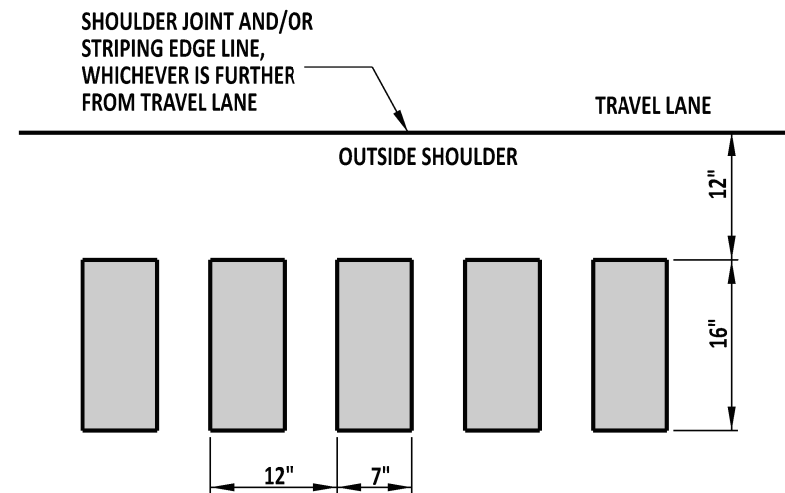
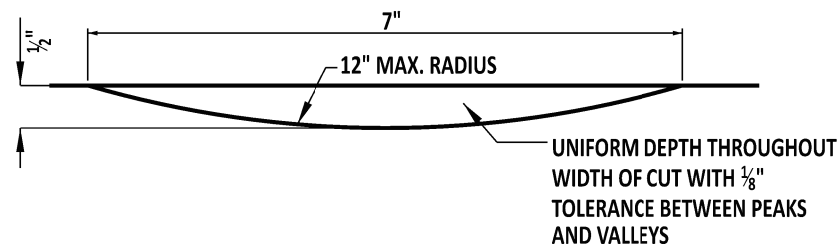
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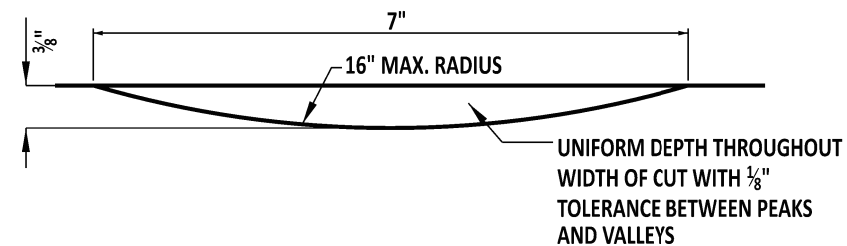
01/14/2014
DATE



CONTINUOUS EDGELINE RUMBLE STRIP



CONTINUOUS SHALLOW DEPTH RUMBLE STRIP



NOTES :

- 1). RUMBLE STRIPS SHALL BE PLACED ON SHOULDERS IN LOCATIONS DESCRIBED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- 2). WHERE RUMBLE STRIPS ARE SHOWN ON THE PLANS TO BE ON BRIDGE DECKS, ONLY USE CONTINUOUS SHALLOW DEPTH RUMBLE STRIPS.
- 3). RUMBLE STRIPS ARE TO BE BROKEN FOR ALL INTERSECTIONS AND DRIVEWAY ENTRANCES WHERE THE EDGELINE PAVEMENT MARKINGS TIE INTO DRIVEWAY ENTRANCE OR WHERE THE EDGELINE PAVEMENT MARKINGS ARE BROKEN. THE INSTALLATION OF RUMBLE STRIPS SHOULD BE STOPPED 25' PRIOR TO THE POINT OF CURVATURE (PC) AND RESTARTED 25' AFTER THE POINT OF TANGENCY (PT).
- 4). RUMBLE STRIPS SHOULD NOT BE INSTALLED ON ACCELERATION, DECELERATION LANES, DECELERATION OR BYPASS LANES, OR TWO-WAY LEFT TURN LANES. INSTALLATION SHOULD STOP 150' PRIOR TO THE DIVERGE POINT OF A DECELERATION LANE AND SHOULD NOT COMMENCE UNTIL 150' DOWNSTREAM OF THE MERGE POINT FOR AN ACCELERATION LANE.



DELAWARE
DEPARTMENT OF TRANSPORTATION

RUMBLE STRIPS

STANDARD NO. P-5 (2018)

SHT. 1 OF 2

APPROVED

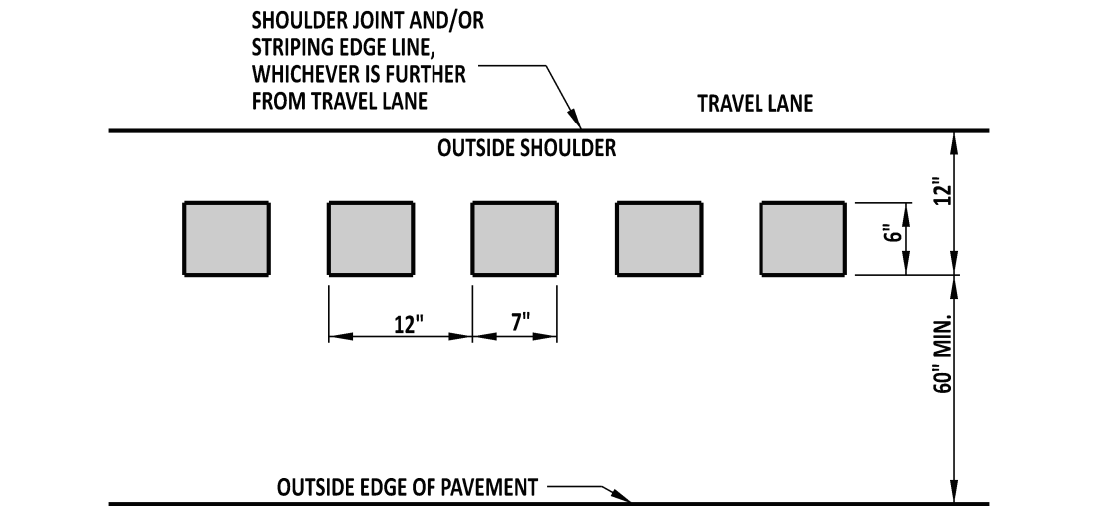
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1/04/2019
DATE

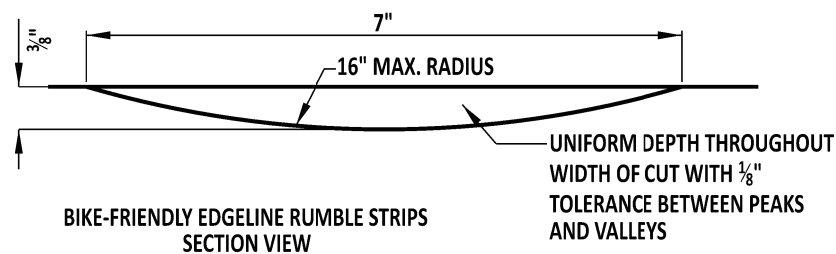
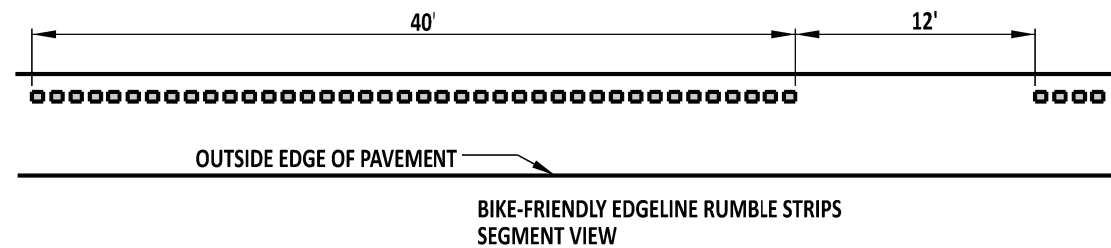
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12/20/2018
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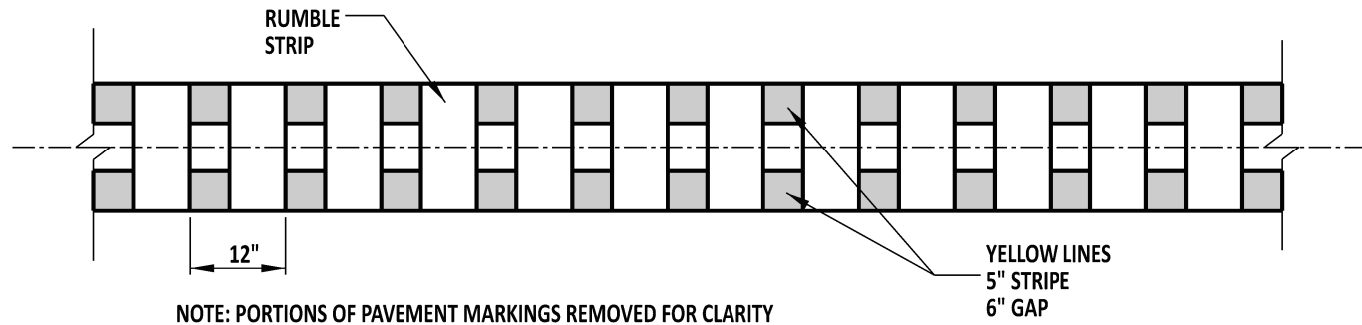


BIKE-FRIENDLY EDGELINE RUMBLE STRIPS

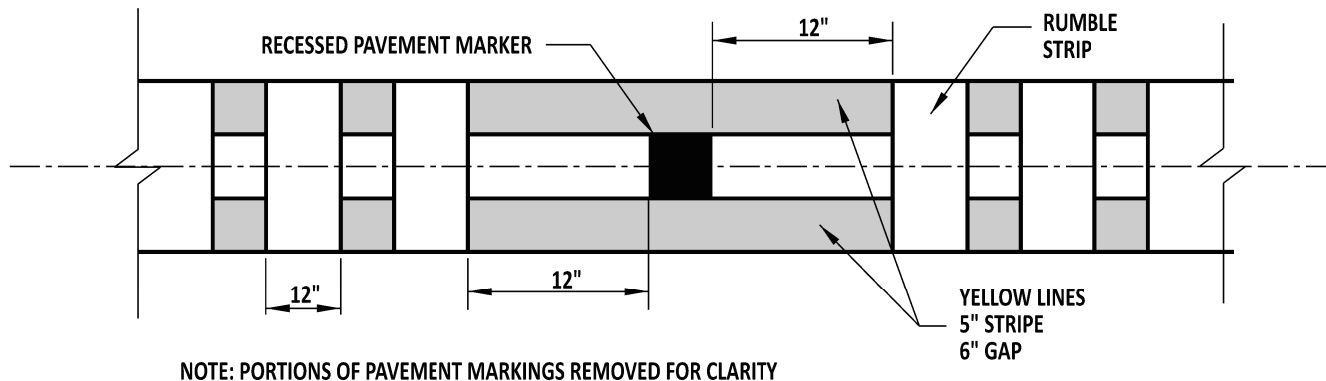


NOTES :

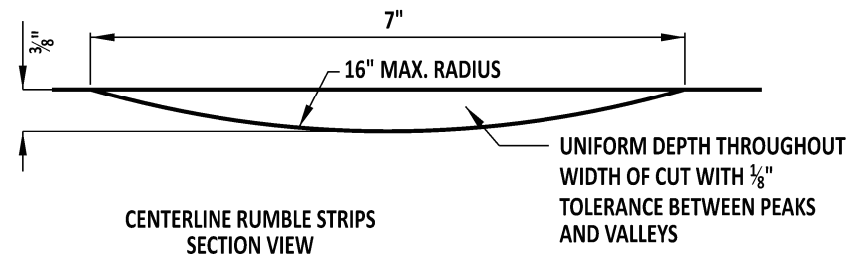
- 1). RUMBLE STRIPS SHALL BE PLACED ON SHOULDERS IN LOCATIONS DESCRIBED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- 2). RUMBLE STRIPS ARE TO BE BROKEN FOR ALL INTERSECTIONS AND DRIVEWAY ENTRANCES WHERE THE EDGELINE PAVEMENT MARKINGS TIE INTO DRIVEWAY ENTRANCE OR WHERE THE EDGELINE PAVEMENT MARKINGS ARE BROKEN. THE INSTALLATION OF RUMBLE STRIPS SHOULD BE STOPPED 25' PRIOR TO THE POINT OF CURVATURE (PC) AND RESTARTED 25' AFTER THE POINT OF TANGENCY (PT).
- 3). RUMBLE STRIPS SHOULD NOT BE INSTALLED ON ACCELERATION, DECELERATION LANES, DECELERATION OR BYPASS LANES, OR TWO-WAY LEFT TURN LANES. INSTALLATION SHOULD STOP 150' PRIOR TO THE DIVERGE POINT OF A DECELERATION LANE AND SHOULD NOT COMMENCE UNTIL 150' DOWNSTREAM OF THE MERGE POINT FOR AN ACCELERATION LANE.
- 4). BICYCLE-FRIENDLY RUMBLE STRIPS SHOULD BE DISCONTINUED 50' BEFORE AND STARTED 50' AFTER WHEN ADJACENT TO GUARDRAIL WHERE THERE IS LESS THAN 5' BETWEEN THE OUTSIDE EDGE OF THE RUMBLE STRIP AND THE FACE OF THE GUARDRAIL.



CENTERLINE RUMBLE STRIP



CENTERLINE RUMBLE STRIP AT RECESSED PAVEMENT MARKER



- 5). IN AREAS WHERE THE CENTER LINE LEADS INTO A RAISED CONCRETE ISLAND, THE CENTERLINE RUMBLE STRIPS SHOULD BE DISCONTINUED 25' IN ADVANCE OF THESE ISLANDS.
- 6). IN AREAS WHERE THE CENTER LINE SPLITS TO CREATE, FOR EXAMPLE A TURN LANE, THE RUMBLE STRIPS SHOULD BE PLACED ONLY ALONG THE DOUBLE YELLOW CENTER LINE THAT IS NOT FORMING THE LEFT TURN LANE.
- 7). ON ROADS WITH RECESSED PAVEMENT MARKERS (RPMs), CENTER LINE RUMBLE STRIPS SHOULD BEGIN 1' DOWNSTREAM OF THE RPM HOUSING AND TERMINATE 1' UPSTREAM OF THE RPM HOUSING.
- 8). DO NOT INSTALL CENTERLINE RUMBLE STRIPS UNLESS THE DISTANCE BETWEEN THE EDGE OF THE PAVEMENT TO THE EDGE OF THE CENTER STRIPE IS GREATER THAN 10'.



DELAWARE
DEPARTMENT OF TRANSPORTATION

STANDARD NO.

P-5 (2018)

RUMBLE STRIPS

SHT.

2

OF

2

APPROVED

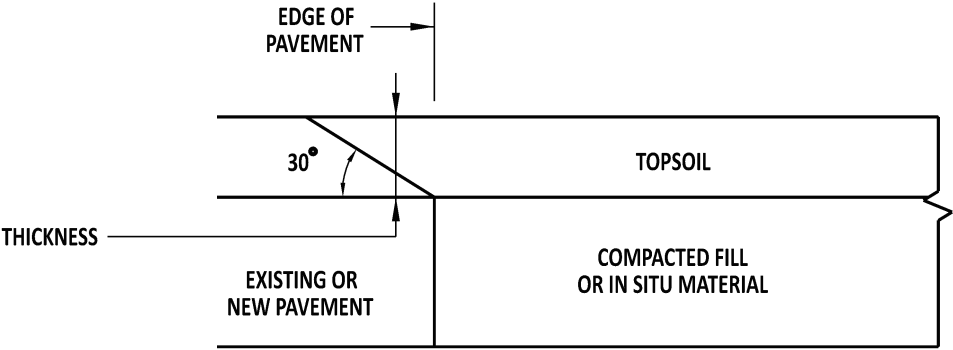
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1/04/2019
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12/20/2018
DATE



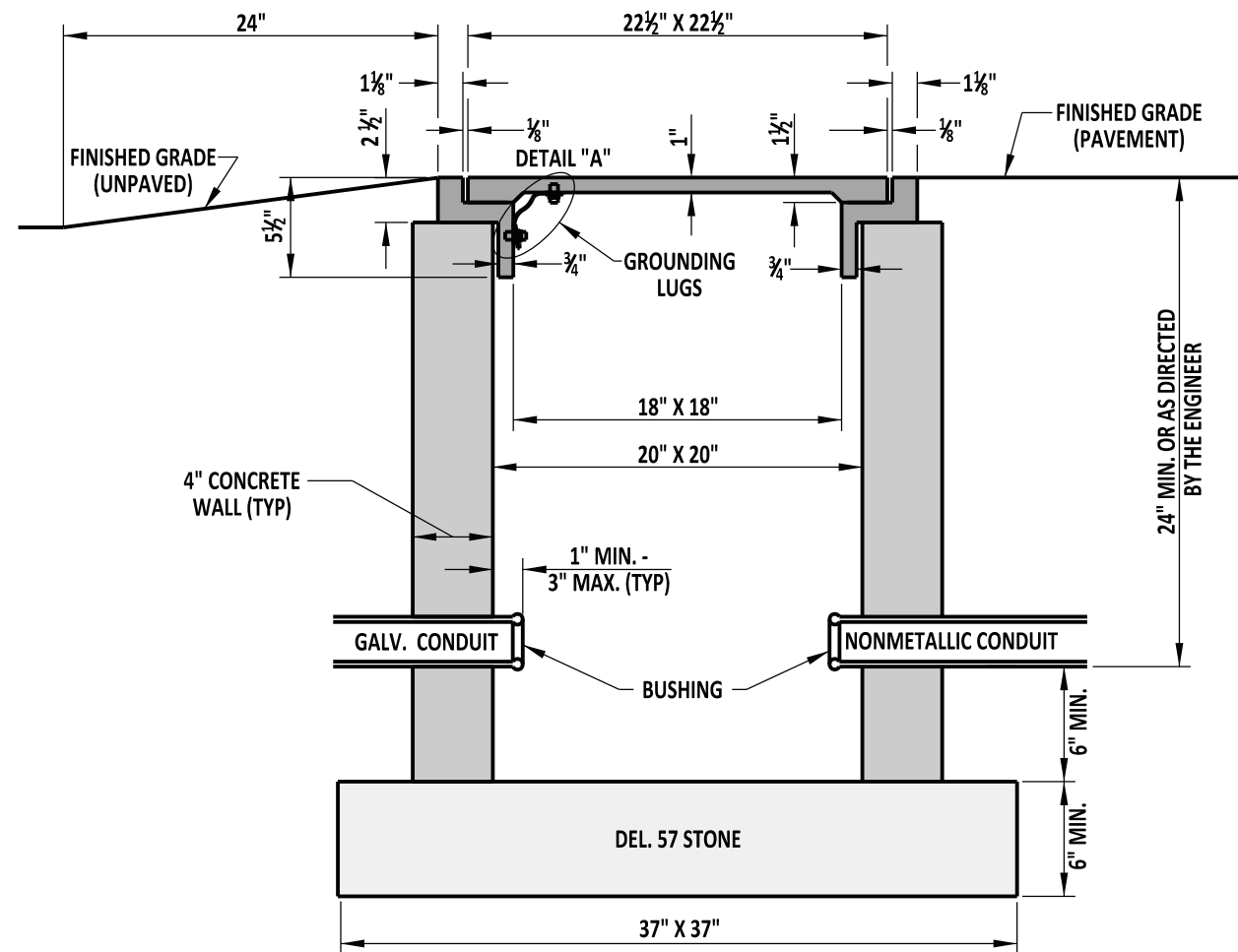
THICKNESS OF SAFETY EDGE	
CONCRETE PAVEMENT	3"
BITUMINOUS CONCRETE PAVEMENT	HEIGHT OF THE FINAL LIFT OF THE TOP WEARING COURSE

NOTES:
1). FOR ROADWAYS WHERE THE COMBINED TRAVEL LANE WIDTH AND SHOULDER WIDTH IS 11' OR LESS, THE SAFETY EDGE SHAL OVERLAP THE COMPACTED FILL OR IN-SITU MATERIAL. COMPACTED FILL OR IN-SITU MATERIAL SHALL BE LEVEL WITH THE ROADWAY PRIOR TO FINAL BITUMINOUS CONCRETE PAVING LIFT.



DELAWARE
DEPARTMENT OF TRANSPORTATION

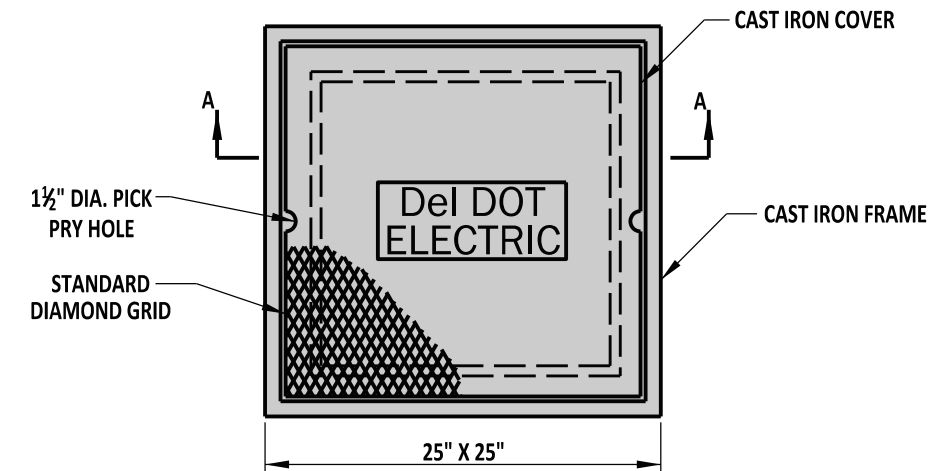
PAVEMENT SAFETY EDGE				APPROVED	SIGNATURE ON FILE	1/04/2019
					CHIEF ENGINEER	DATE
STANDARD NO.	P-6 (2018)	SHT.	1	OF	1	RECOMMENDED
					SIGNATURE ON FILE	12/20/2018
					DESIGN ENGINEER	DATE



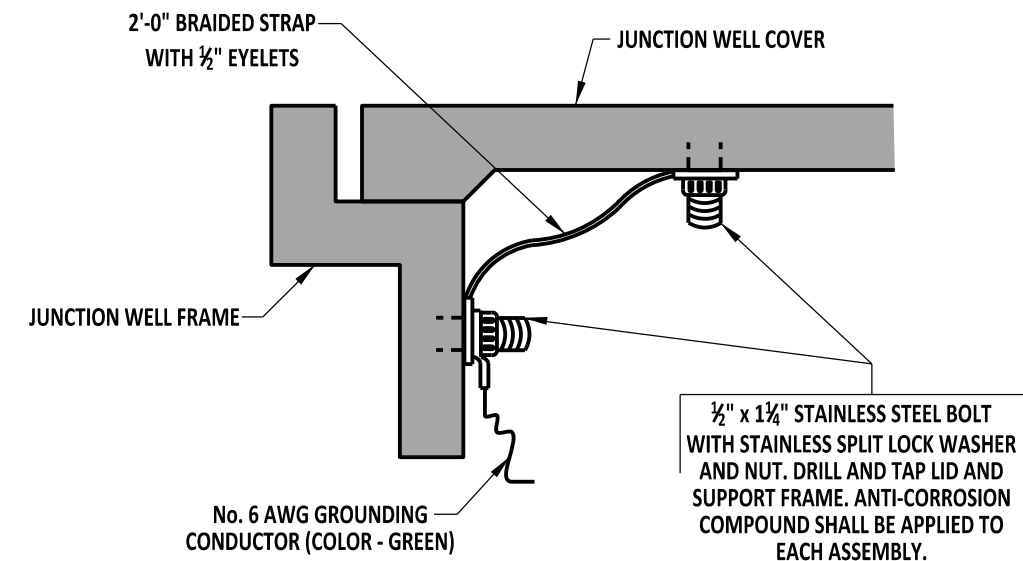
SECTION A-A

NOTES:

- 1). TYPE 1 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
- 2). CONDUIT JUNCTION WELLS SHALL NOT BE PLACED UNDER A TRAVELWAY.
- 3). ALL CONDUIT JUNCTION WELLS PLACED IN PAVED AREAS SHALL BE CONSTRUCTED FLUSH WITH THE FINISHED GRADE. ALL CONDUIT JUNCTION WELLS PLACED IN UNPAVED AREAS SHALL BE CONSTRUCTED ABOVE FINISHED GRADE AND GRADED TO DRAIN AWAY FROM THE WELL, AS DETAILED.
- 4). ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.



PLAN VIEW



DETAIL "A"



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

CONDUIT JUNCTION WELL, TYPE 1

STANDARD NO.

T-1 (2013)

SHT. 1

OF 3

APPROVED

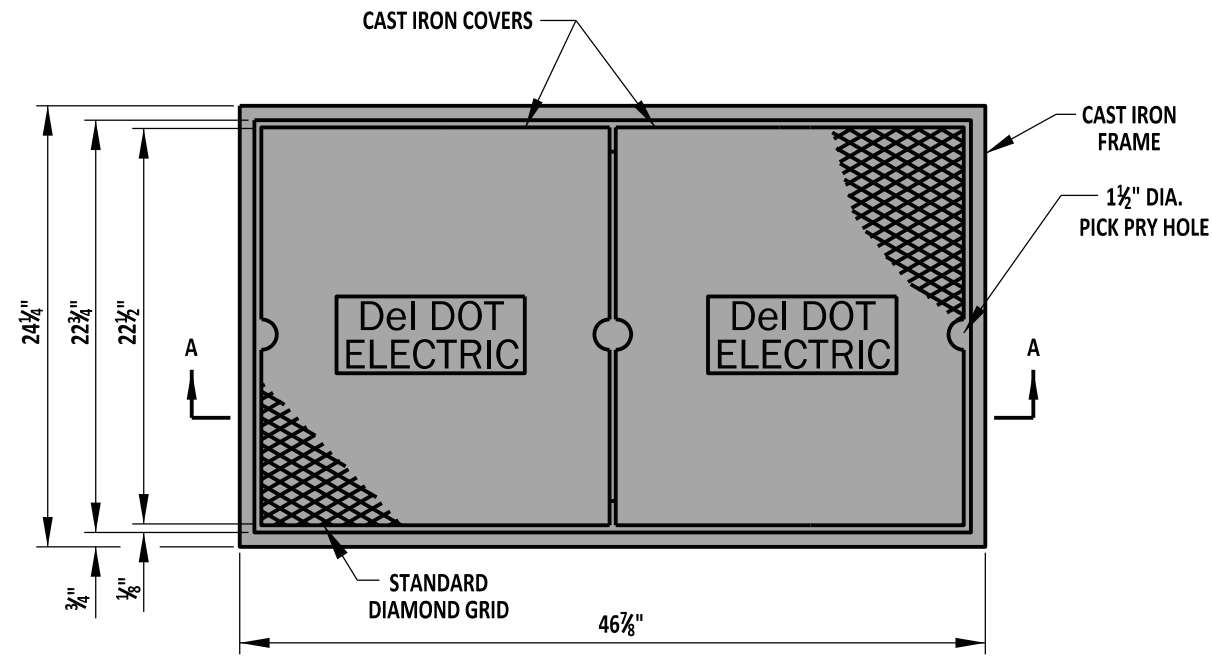
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02/14/2014
DATE

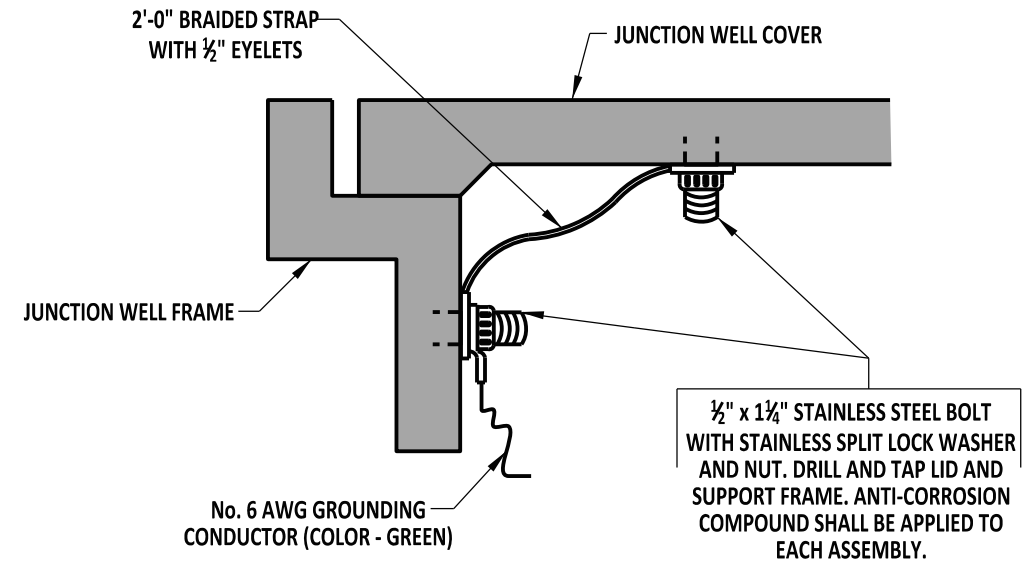
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DESIGN ENGINEER

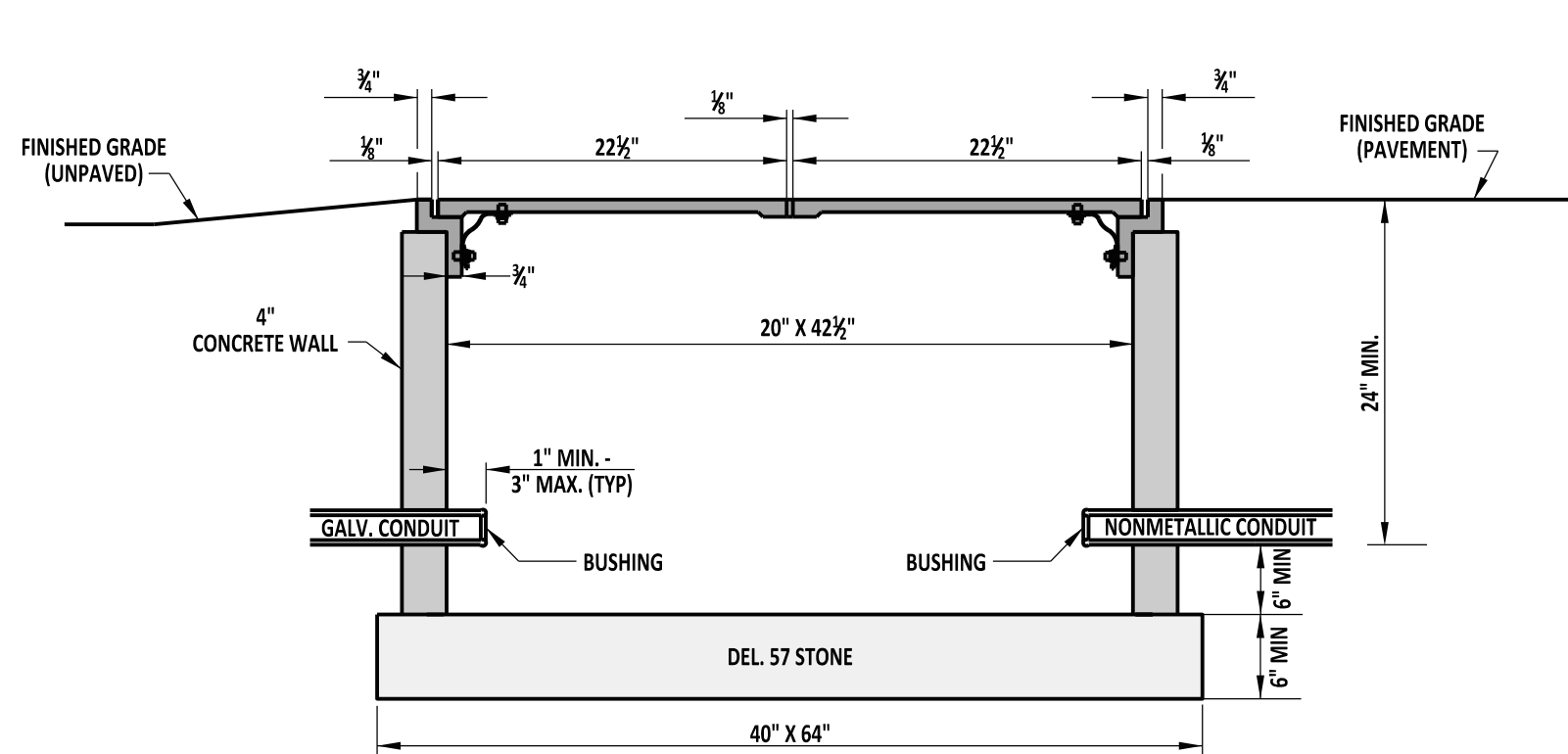
01/14/2014
DATE



PLAN VIEW



DETAIL "A"



SECTION A-A

NOTES:

- 1). TYPE 4 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
- 2). ALL CONDUIT JUNCTION WELLS PLACED IN PAVED AREAS SHALL BE CONSTRUCTED FLUSH WITH THE FINISHED GRADE. ALL CONDUIT JUNCTION WELLS PLACED IN UNPAVED AREAS SHALL BE CONSTRUCTED ABOVE FINISHED GRADE, AND GRADED TO DRAIN AWAY FROM THE WELL, AS DETAILED.
- 3). ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.



DELAWARE
DEPARTMENT OF TRANSPORTATION

CONDUIT JUNCTION WELL, TYPE 4

STANDARD NO.

T-1 (2013)

SHT. 2

OF 3

APPROVED

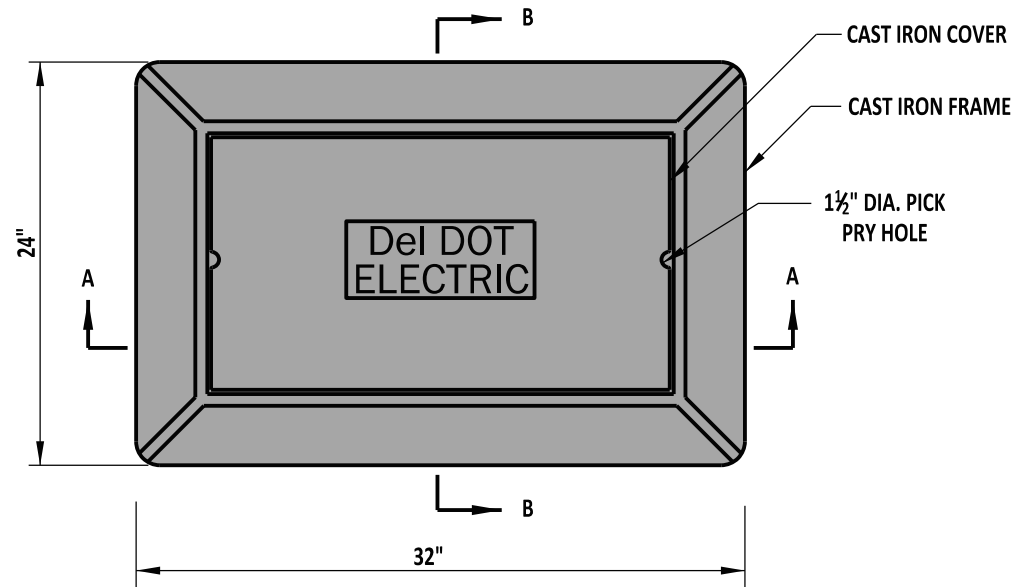
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02/14/2014
DATE

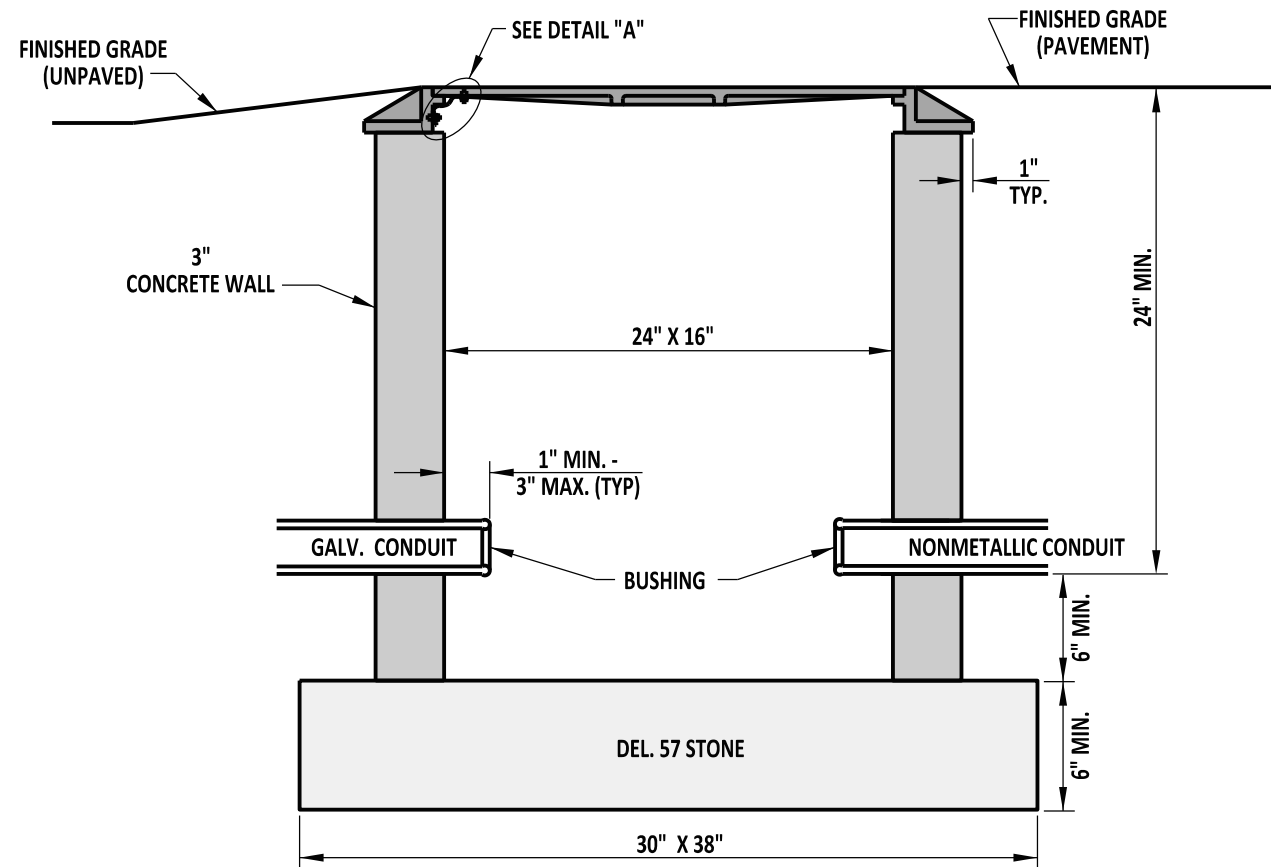
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SIGNATURE ON FILE
DESIGN ENGINEER

01/14/2014
DATE



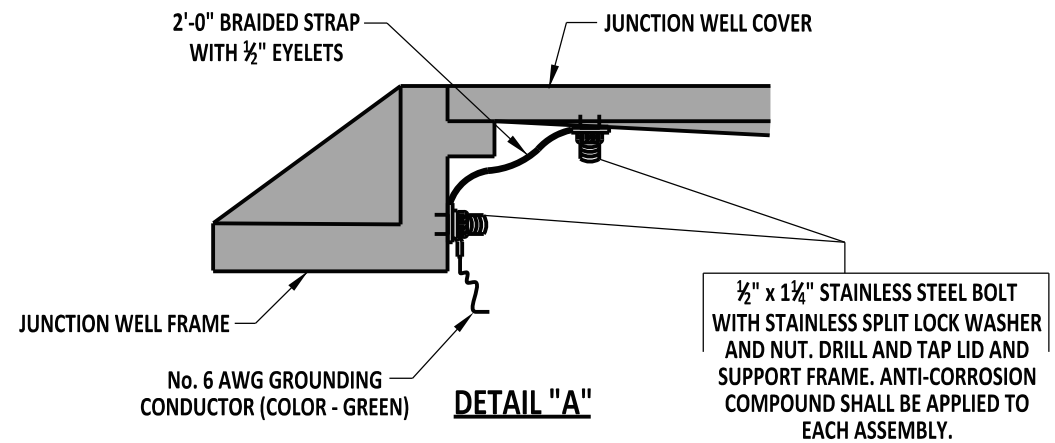
PLAN VIEW



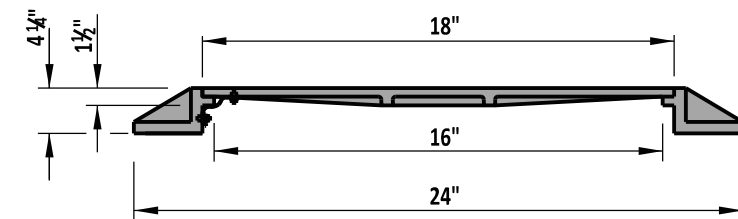
SECTION A-A

NOTES:

- 1). TYPE 5 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
- 2). ALL CONDUIT JUNCTION WELLS PLACED IN PAVED AREAS SHALL BE CONSTRUCTED FLUSH WITH THE FINISHED GRADE. ALL CONDUIT JUNCTION WELLS PLACED IN UNPAVED AREAS SHALL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE WELL, AS DETAILED.
- 3). ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.



DETAIL "A"



SECTION B-B



DELAWARE
DEPARTMENT OF TRANSPORTATION

CONDUIT JUNCTION WELL, TYPE 5

STANDARD NO.

T-1 (2013)

SHT. 3

OF 3

APPROVED

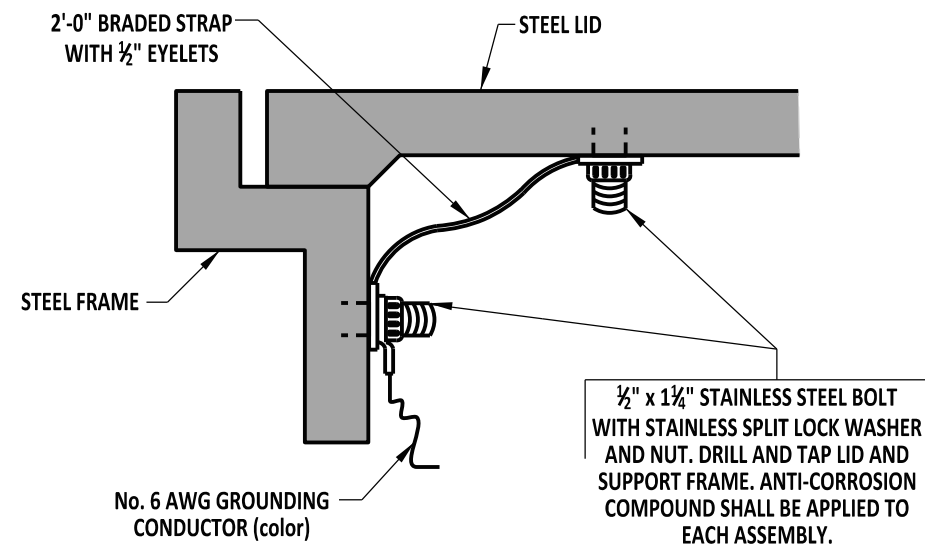
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02/14/2014
DATE

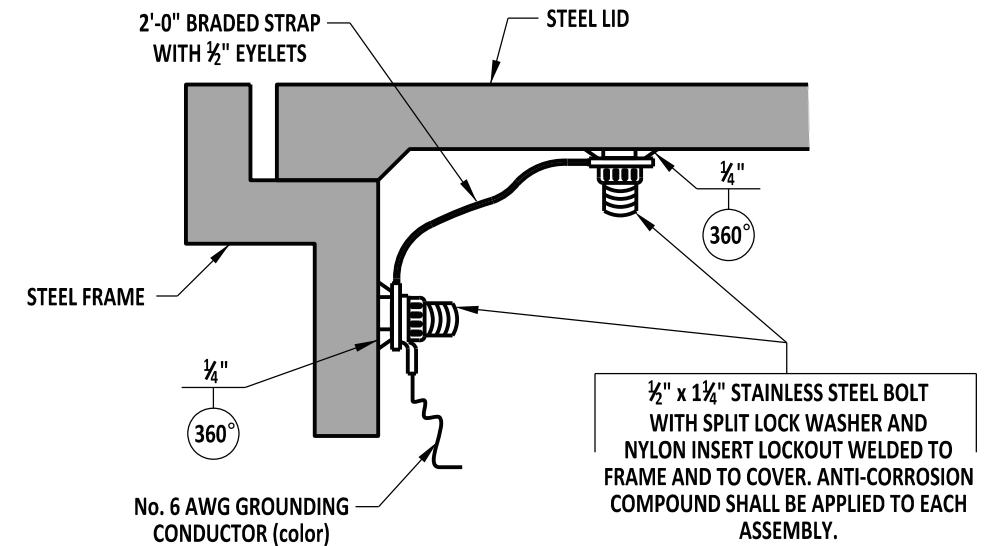
RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

01/14/2014
DATE

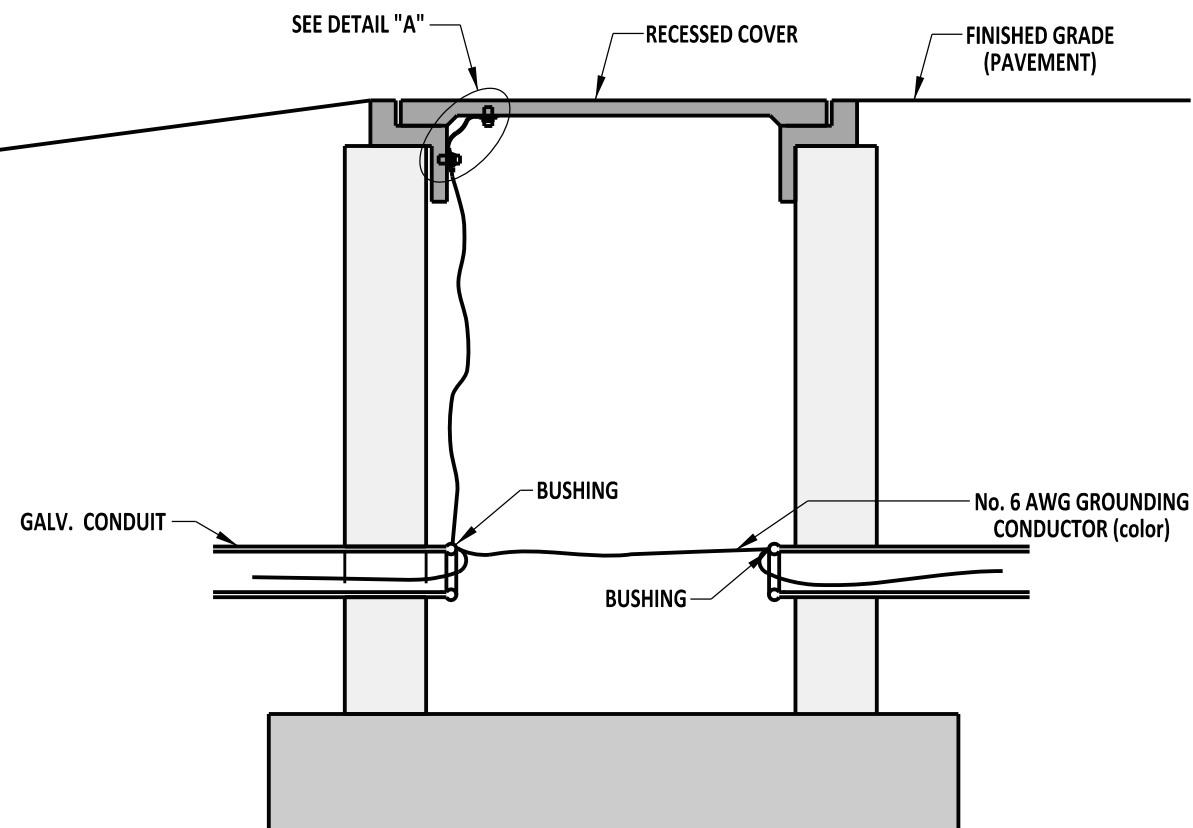


DETAIL "A"

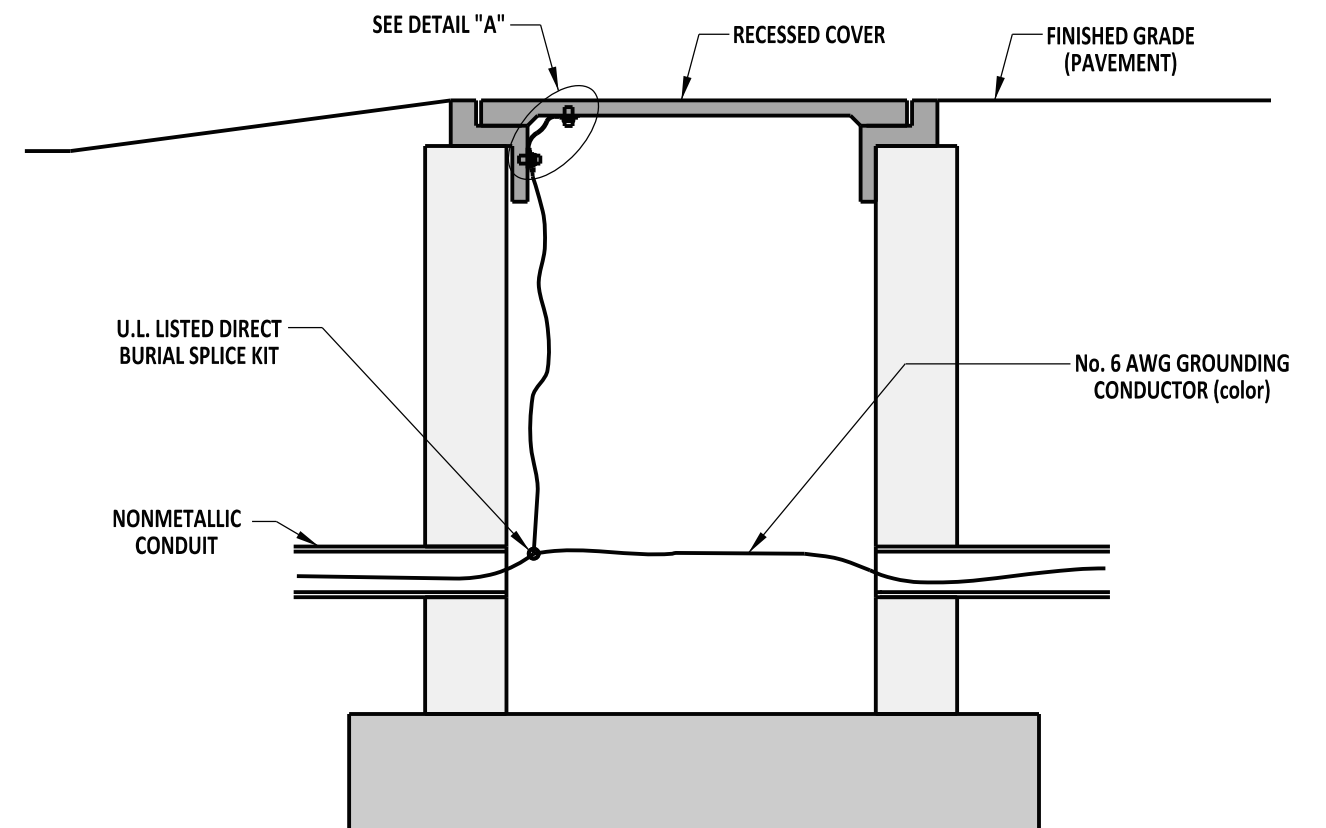


BONDING AN EXISTING JUNCTION WELL COVER & FRAME

SCALE : NTS



JUNCTION WELL BONDING GALVANIZED TO GALVANIZED



JUNCTION WELL BONDING NONMETALLIC CONDUIT



DELAWARE
DEPARTMENT OF TRANSPORTATION

JUNCTION WELL, GROUNDING & BONDING FOR STEEL FRAMES & LIDS

STANDARD NO. T-2 (2011)

SHT. 1 OF 1

APPROVED

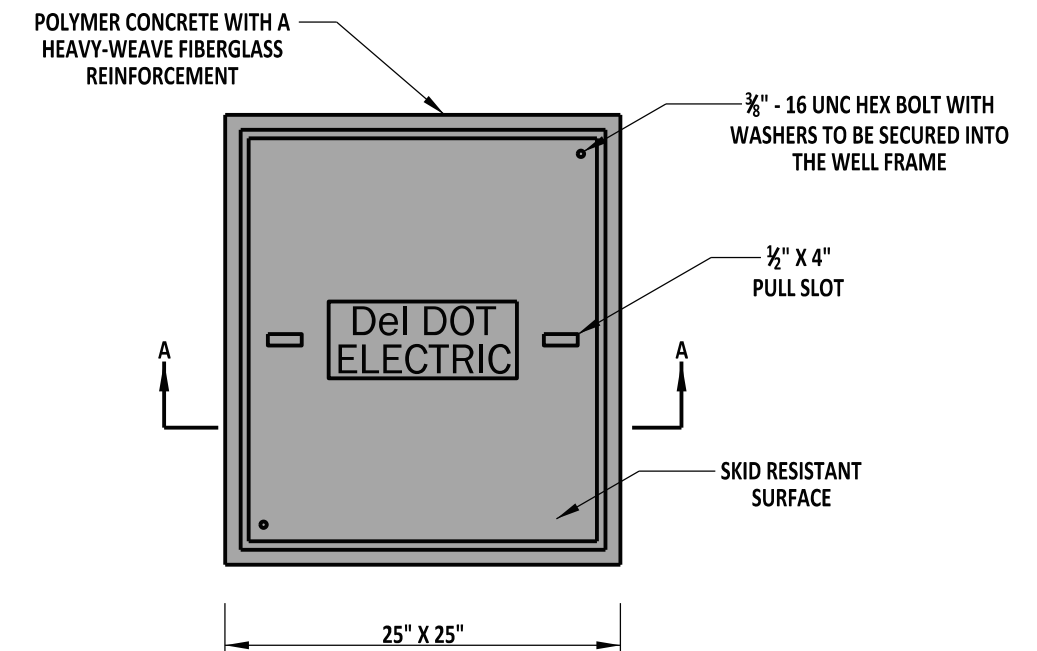
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CHIEF ENGINEER

12/22/2011
DATE

RECOMMENDED

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DESIGN ENGINEER

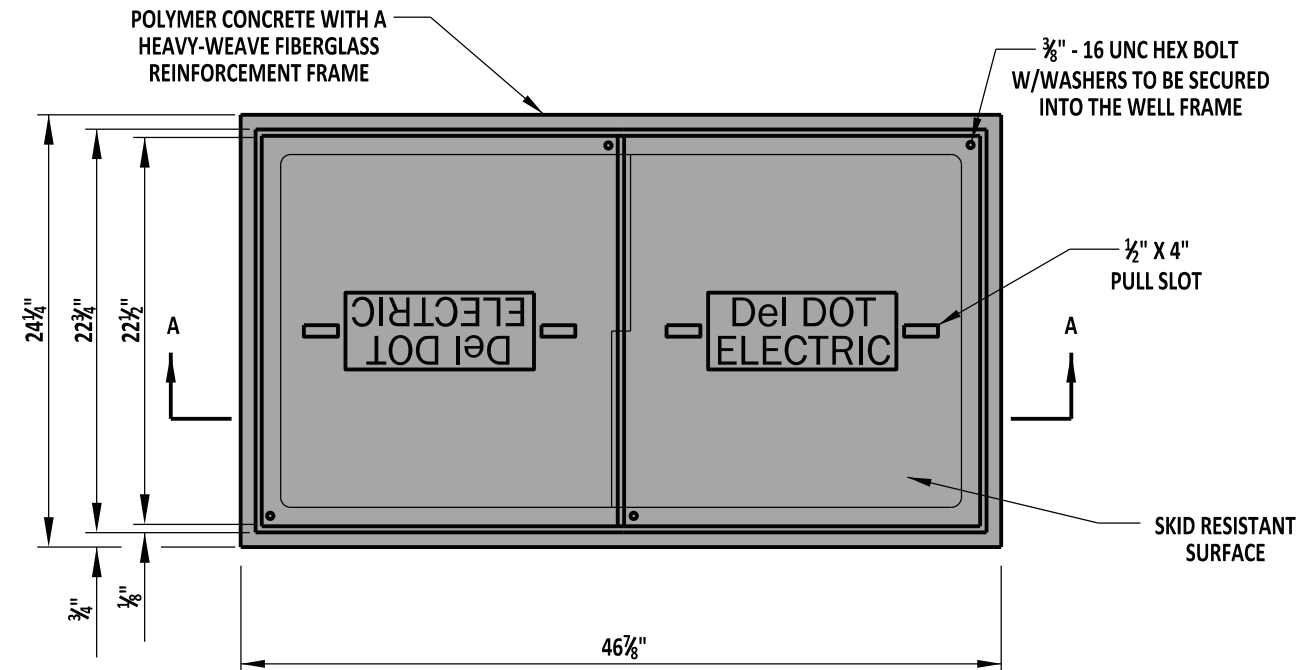
12/21/2011
DATE



PLAN VIEW

SECTION A-A

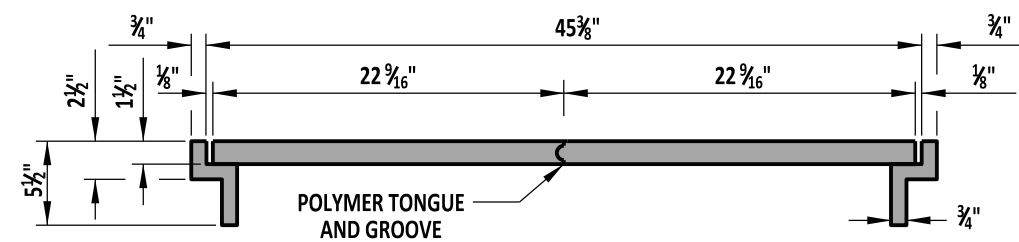
- NOTES:**
- 1). TYPE 11 CONDUIT JUNCTION WELL LID SHALL BE PRECAST POLYMER CONCRETE WITH A HEAVY-WEAVE FIBERGLASS FRAME. INSTALLED ON A PRECAST CONCRETE WELL.
 - 2). TYPE 11 CONDUIT JUNCTION WELL BODY SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
 - 3). ALL CONDUIT JUNCTION WELLS PLACED IN PAVED AREAS SHALL BE CONSTRUCTED FLUSH WITH THE FINISHED GRADE. ALL CONDUIT JUNCTION WELLS PLACED IN UNPAVED AREAS SHALL BE CONSTRUCTED ABOVE FINISHED GRADE AND GRADED TO DRAIN AWAY FROM THE WELL, AS DETAILED.
 - 4). ALL CRACKS, GAPS, OR OPENING IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.



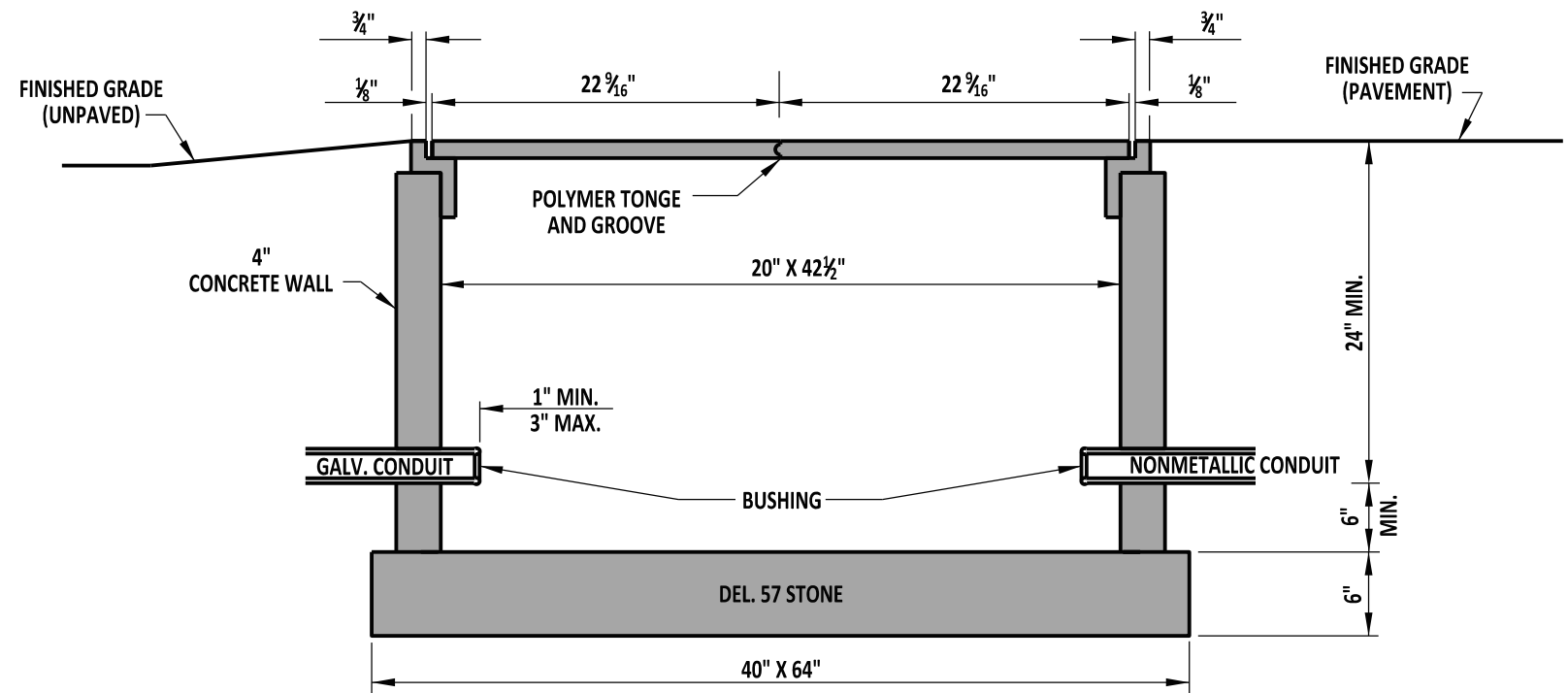
PLAN VIEW

NOTES:

- 1). TYPE 14 CONDUIT JUNCTION WELL LID SHALL BE PRECAST POLYMER CONCRETE WITH A HEAVY-WEAVE FIBERGLASS FRAME. INSTALLED ON A PRECAST CONCRETE WELL.
- 2). TYPE 14 CONDUIT JUNCTION WELL BODY SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
- 3). TYPE 14 CONDUIT JUNCTION WELLS SHALL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE CONDUIT JUNCTION WELL.
- 4). ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.



SECTION A-A



SECTION A-A



DELAWARE
DEPARTMENT OF TRANSPORTATION

CONDUIT JUNCTION WELL, TYPE 14

STANDARD NO.

T-3 (2012)

SHT. 2

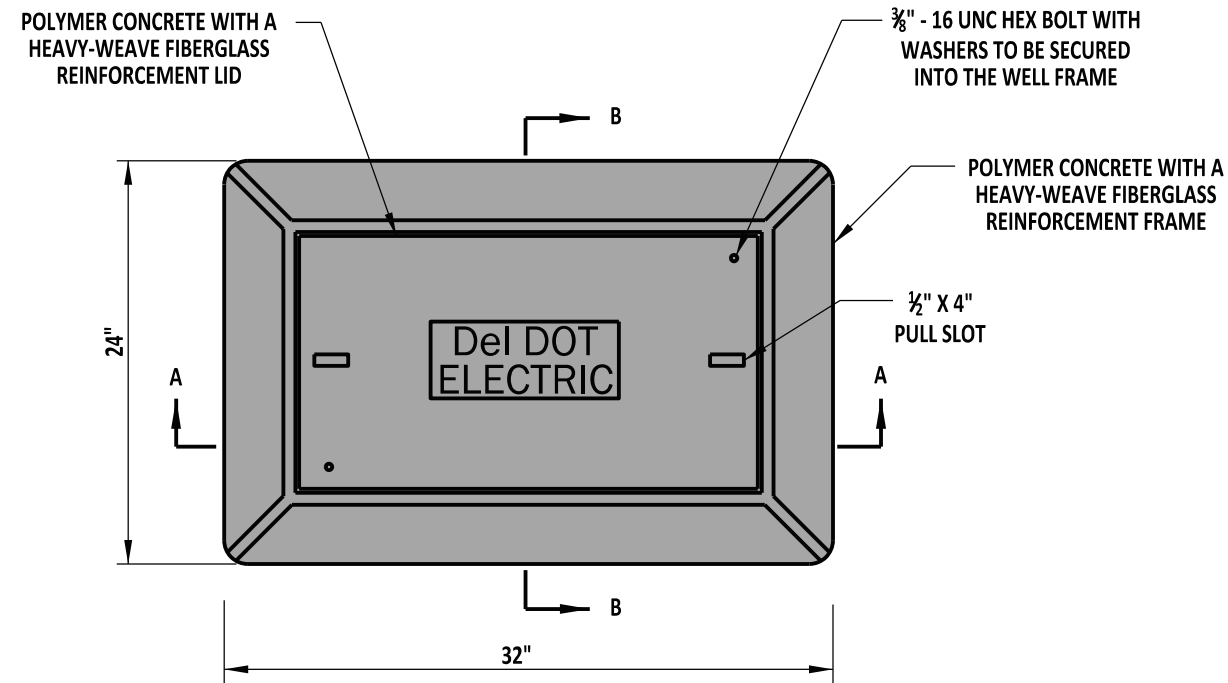
OF 3

APPROVED

SIGNATURE ON FILE
CHIEF ENGINEER01/07/2013
DATE

RECOMMENDED

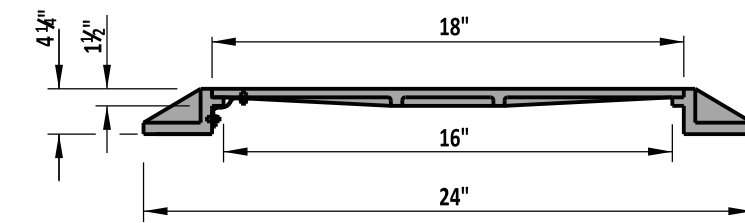
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DESIGN ENGINEER12/20/2012
DATE



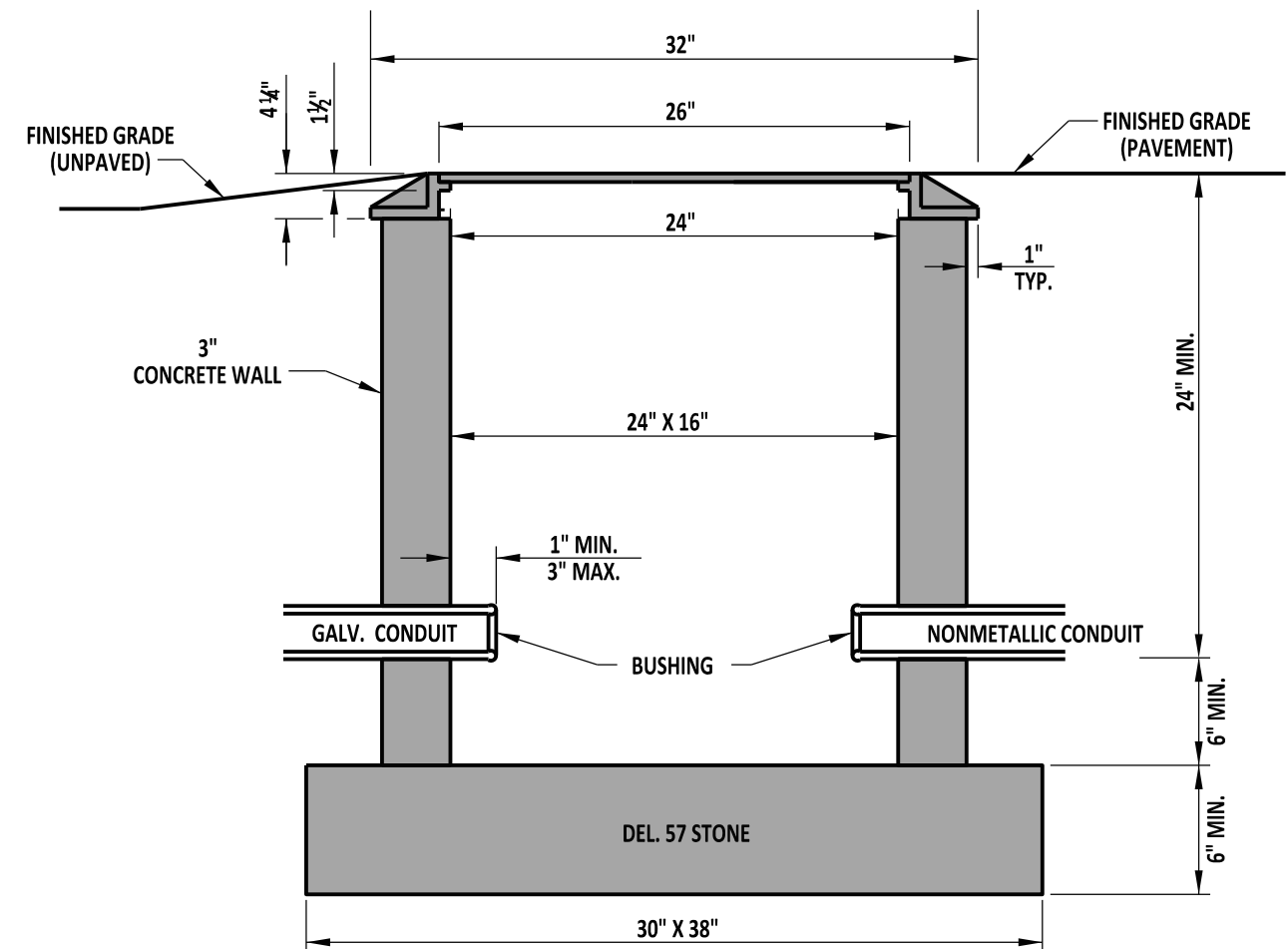
PLAN VIEW

NOTES:

- 1). TYPE 15 CONDUIT JUNCTION WELL LID SHALL BE PRECAST POLYMER CONCRETE WITH A HEAVY-WEAVE FIBERGLASS FRAME. INSTALLED ON A PRECAST CONCRETE WELL.
- 2). TYPE 15 CONDUIT JUNCTION WELL BODY SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
- 3). TYPE 15 CONDUIT JUNCTION WELLS SHALL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE CONDUIT JUNCTION WELL.
- 4). ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.



SECTION B-B



SECTION A-A



DELAWARE
DEPARTMENT OF TRANSPORTATION

CONDUIT JUNCTION WELL, TYPE 15

STANDARD NO.

T-3 (2012)

SHT. 3

OF 3

APPROVED

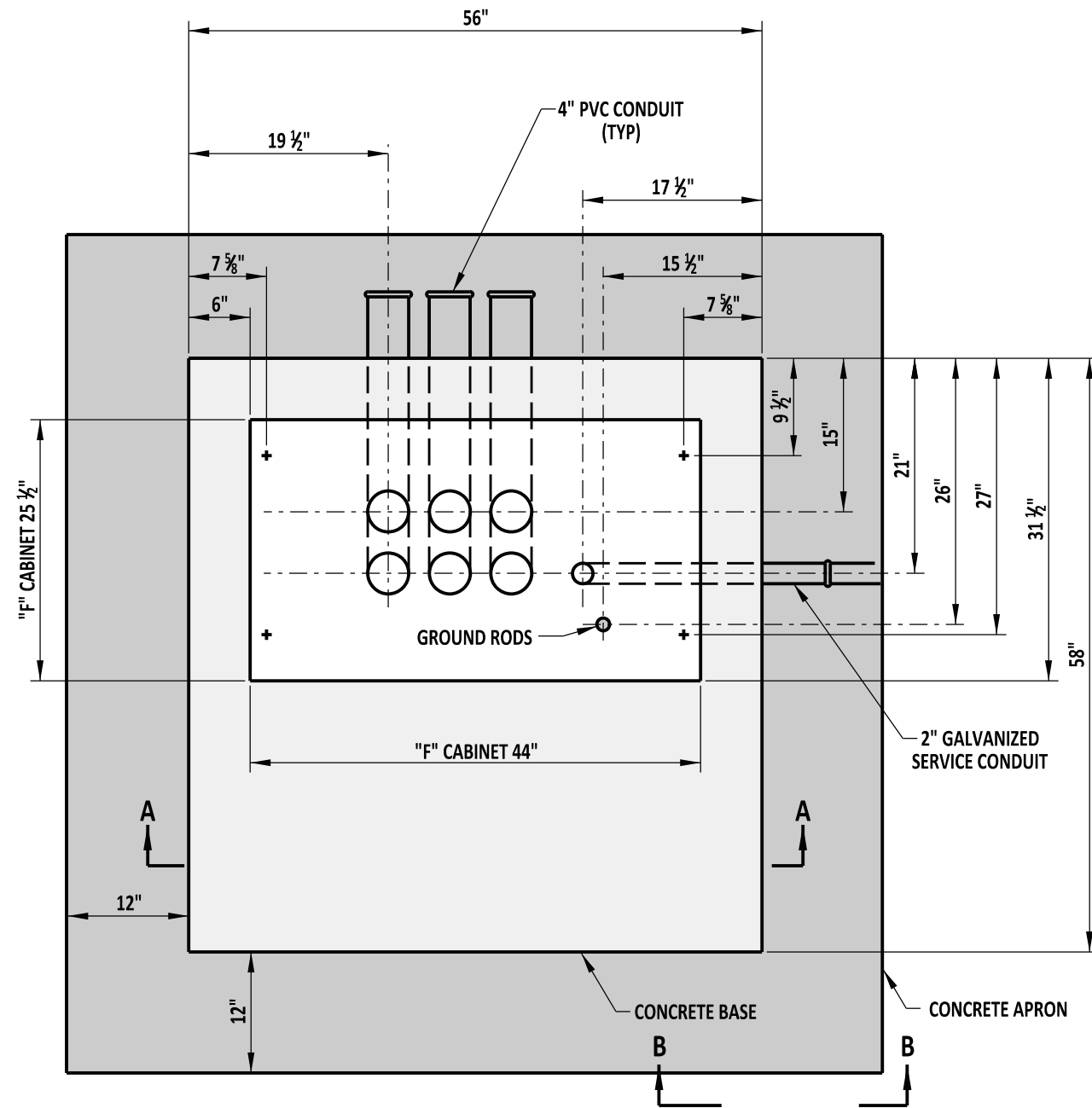
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CHIEF ENGINEER

01/07/2013
DATE

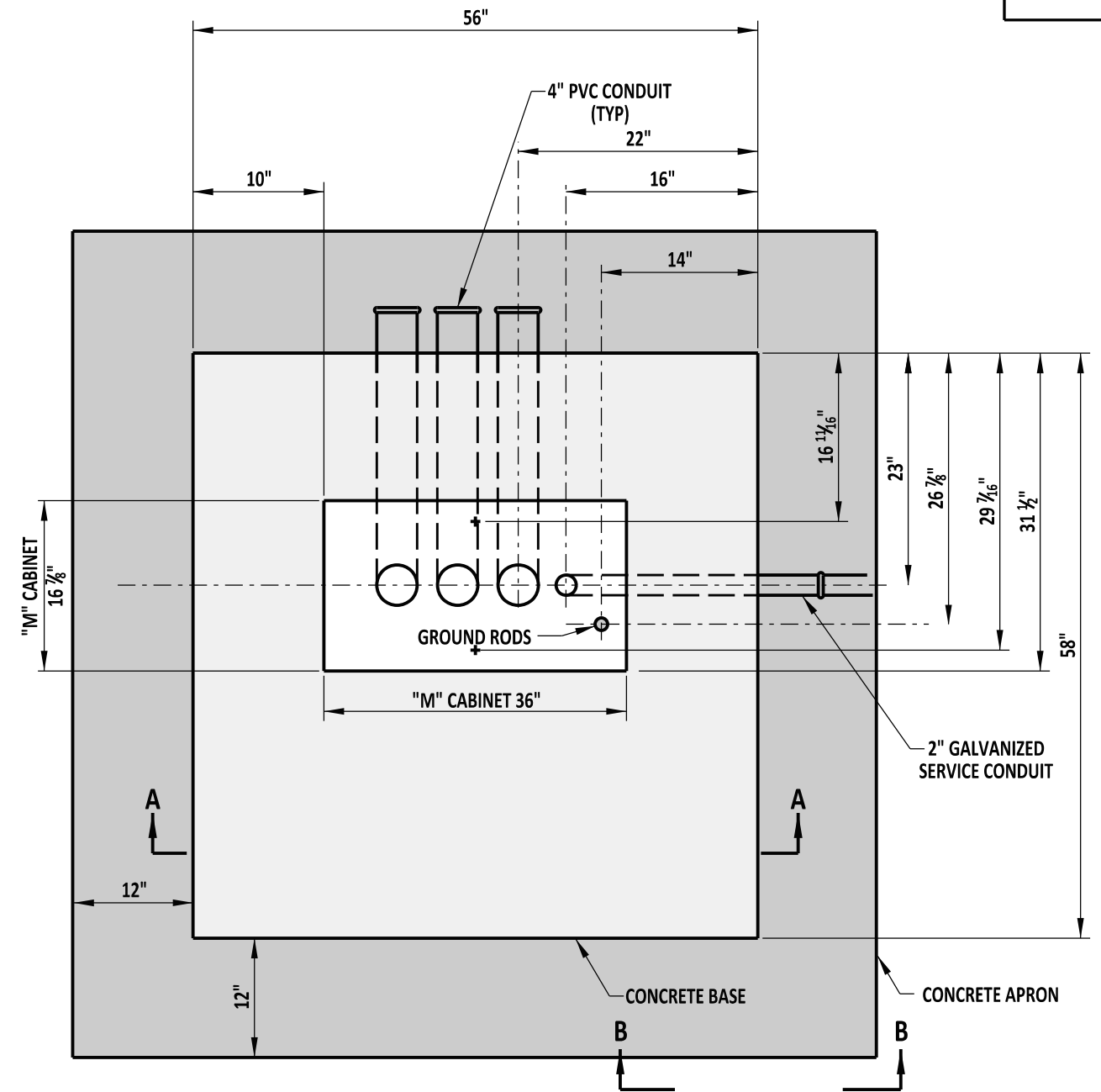
RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

12/20/2012
DATE



**"F" CABINET
PLAN VIEW**



**"M" CABINET
PLAN VIEW**

NOTE:

- 1). CONCRETE APRON IS REQUIRED ONLY WHEN CABINET BASE IS INSTALLED IN UNPAVED AREAS OR AS DIRECTED ON PLAN.
- 2). CONDUITS SHALL BE EVENLY SPACED, WITH MINIMUM 2" WIDTH SPACING ESTABLISHED BETWEEN ALL CONDUITS.
- 3). FOR VIEW OF SECTION A-A AND SECTION B-B, SEE DETAIL T-4, SHEET 2 OF 2.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

CABINET BASES, TYPES M & F

STANDARD NO. T-4 (2013)

SHT. 1 OF 2

APPROVED

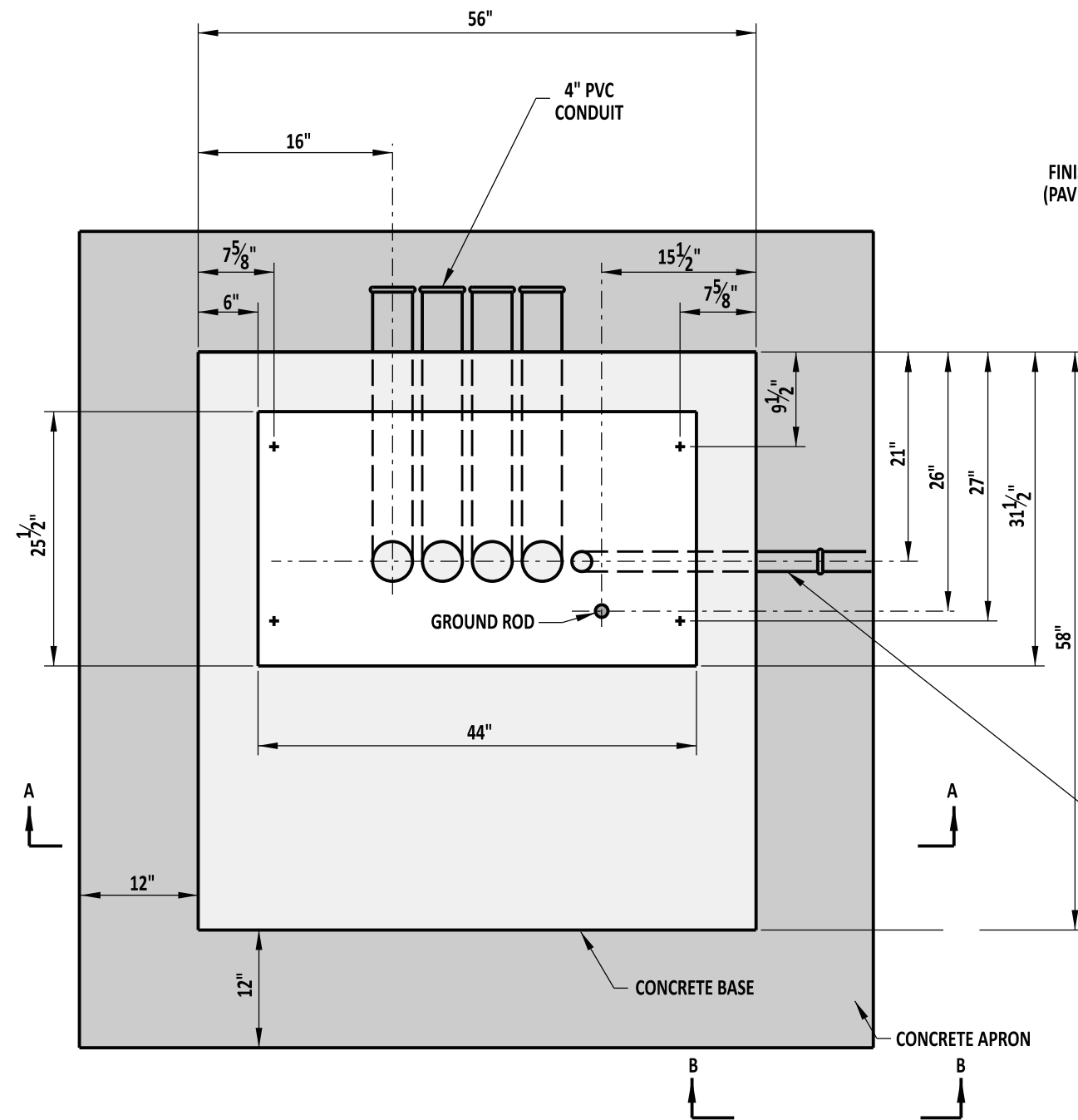
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CHIEF ENGINEER

02/14/2014
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

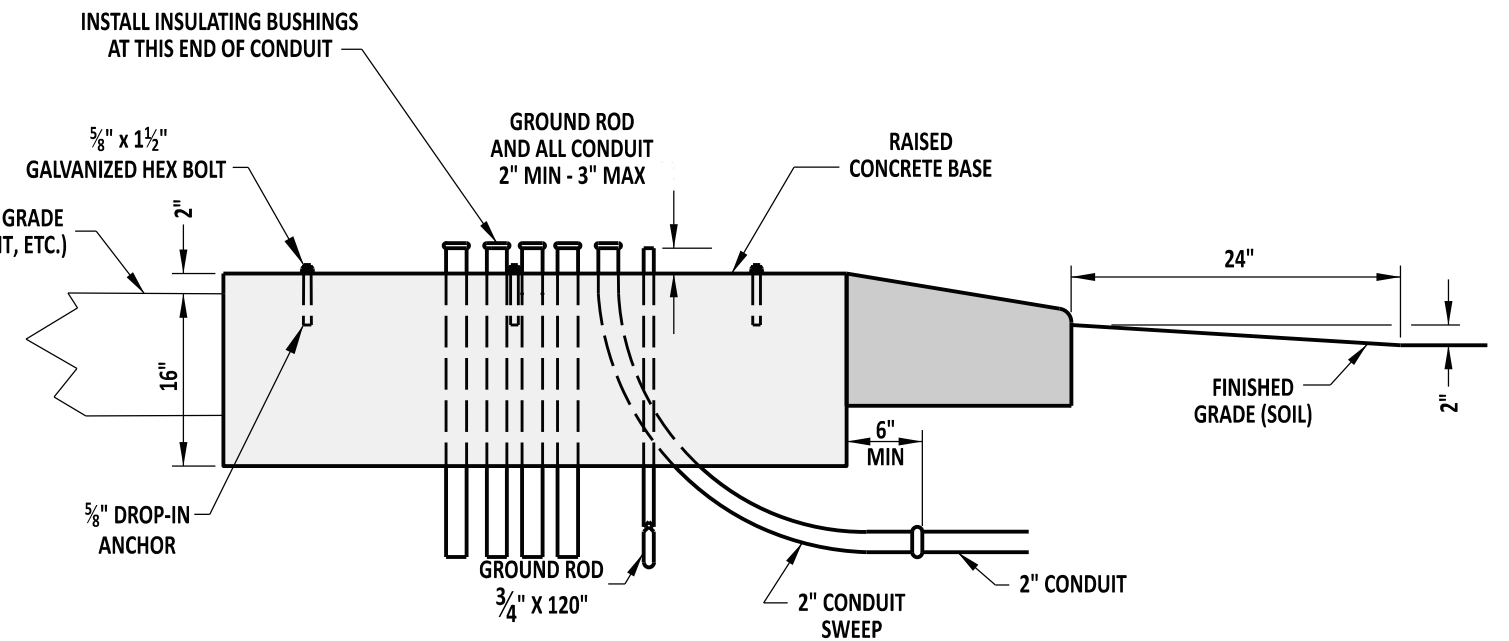
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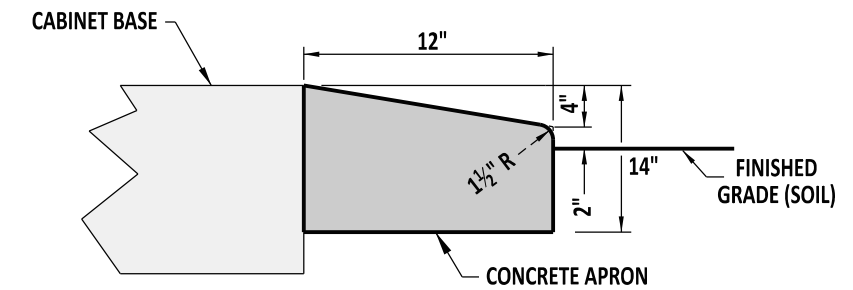
**"P & R" CABINET
PLAN VIEW**

NOTE:

- 1). CONCRETE APRON IS REQUIRED ONLY WHEN CABINET BASE IS INSTALLED IN EARTH AREAS OR AS DIRECTED ON PLAN.
- 2). CONDUITS SHALL BE EVENLY SPACED, WITH MINIMUM 2" WIDTH ESTABLISHED BETWEEN ALL CONDUITS.



SECTION A-A



SECTION B-B



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

CABINET BASES, TYPES P & R

STANDARD NO. T-4 (2017)

SHT. 2 OF 2

APPROVED

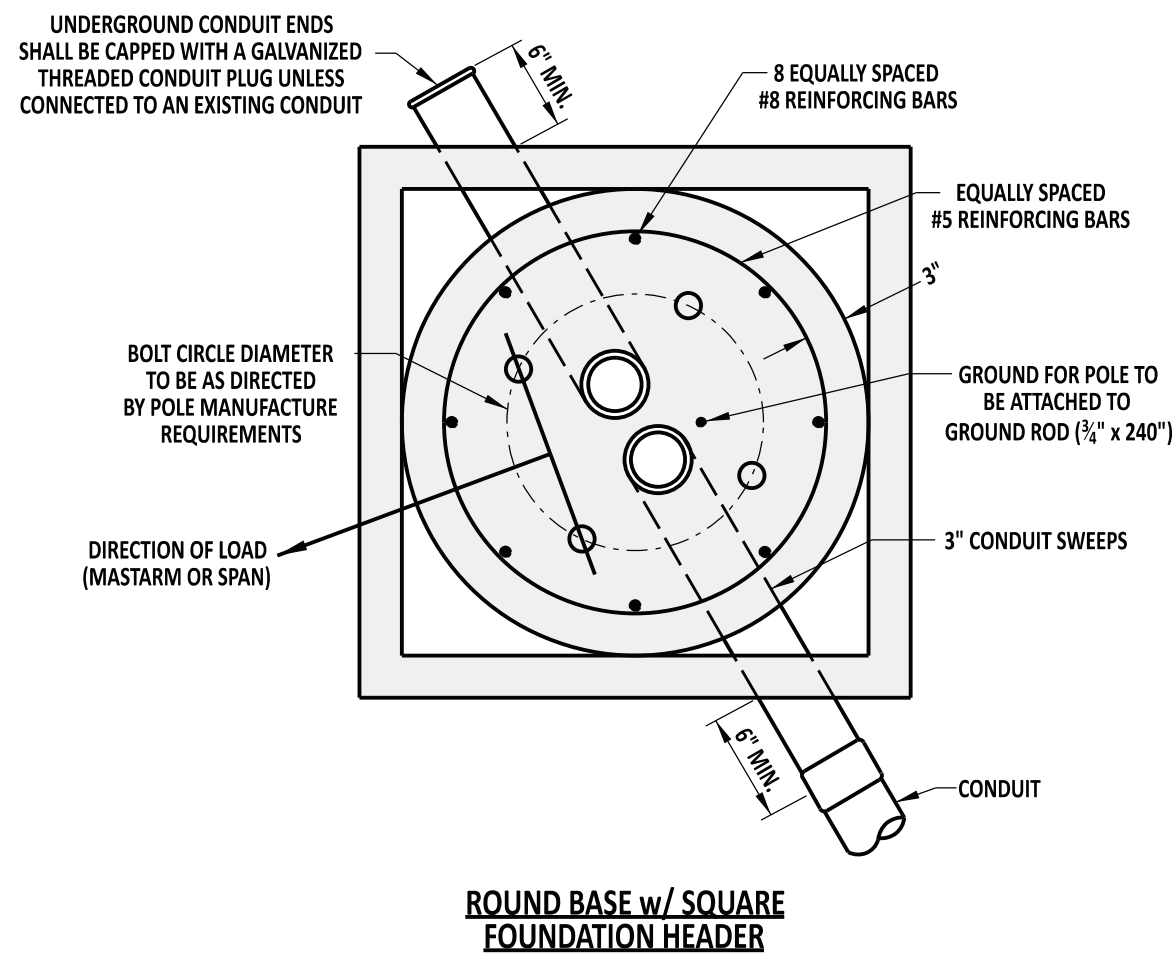
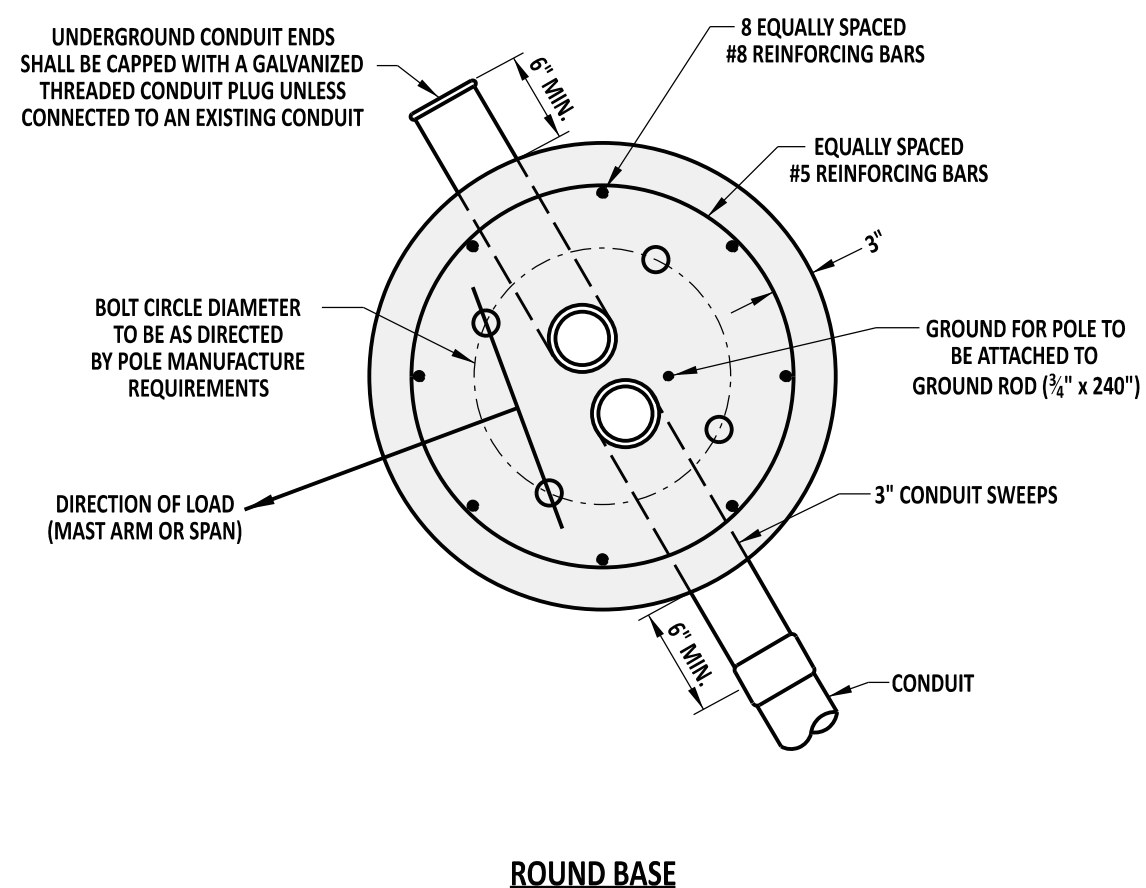
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CHIEF ENGINEER

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5/18/2017
DATE



NOTE: SQUARE FOUNDATION HEADER SHALL HAVE A 6" MINIMUM DEPTH.



DELAWARE
DEPARTMENT OF TRANSPORTATION

POLE BASES

STANDARD NO. T-5 (2017)

SHT. 1 OF 4

APPROVED

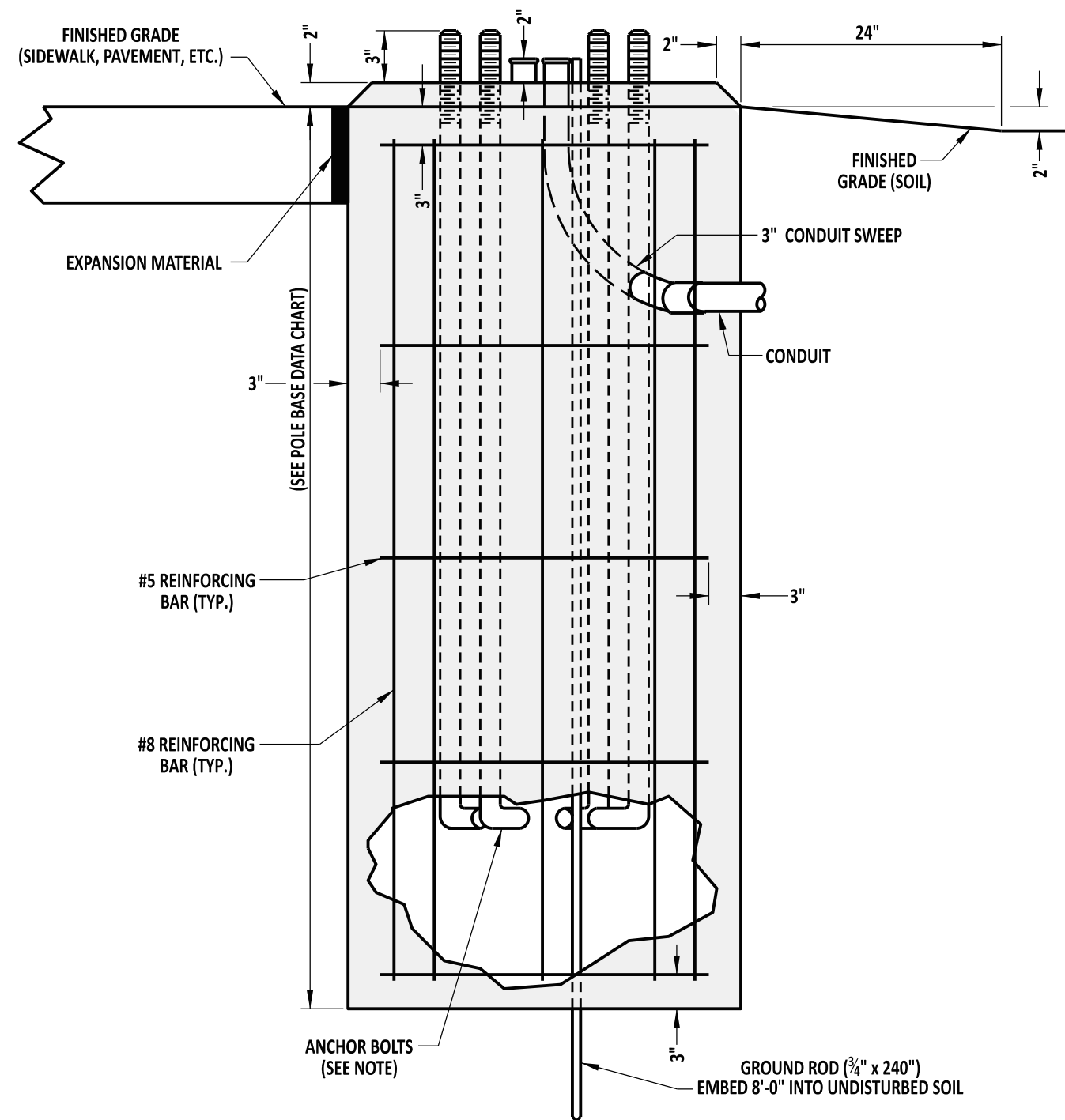
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CHIEF ENGINEER

5/31/2017
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

5/18/2017
DATE



TYPICAL SECTION (BASE 6)

NOTE:
ANCHOR BOLTS AND BOLT PATTERN FOR TYPES 5, 6, & 7 POLE BASES TO BE PROVIDED BY THE MANUFACTURER.

POLE BASE DATA CHART					
POLE BASE TYPE #	DIAMETER	DEPTH	#5 HORIZONTAL REINFORCING BARS	#8 VERTICAL REINFORCING BARS	CONDUITS
1	36"	7'-0"	5	8	2 - 3"
2	36"	10'-0"	6	8	2 - 3"
2A	48"	8'-0"	5	8	2 - 3"
2B	60"	7'-0"	5	8	2 - 3"
3	48"	10'-0"	14	17	2 - 3"
3A	48"	12'-0"	17	17	2 - 3"
3B	48"	15'-0"	21	17	2 - 3"
3C	48"	20'-0"	27	17	2 - 3"
4A & 4B	24"	2'-4"	NONE	NONE	2 - 2.5"
6	24"	6'-0"	4	8	2 - 3"



DELAWARE
DEPARTMENT OF TRANSPORTATION

POLE BASES

STANDARD NO. T-5 (2017)

SHT. 3 OF 4

APPROVED

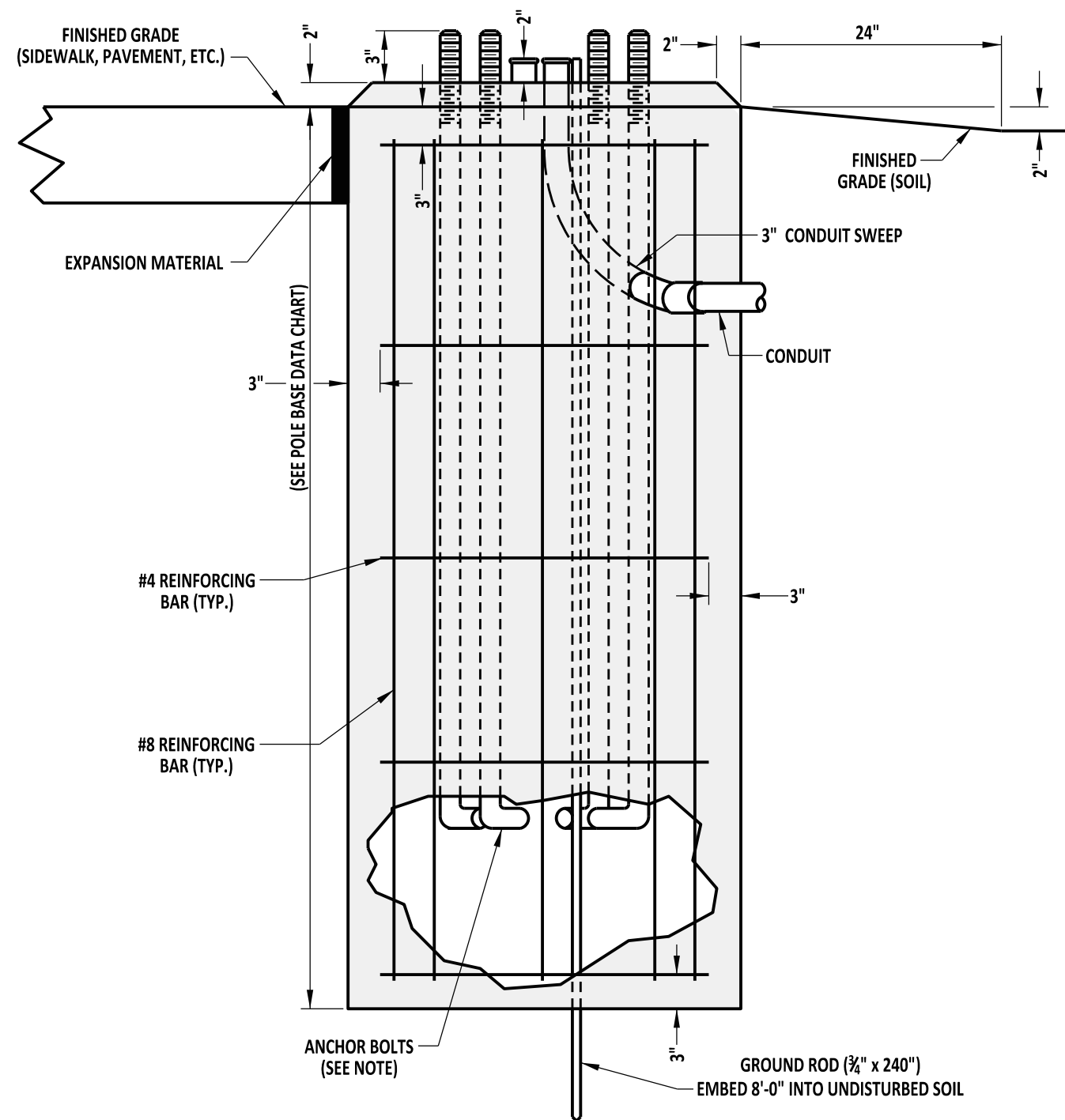
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CHIEF ENGINEER

5/31/2017
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

5/18/2017
DATE



TYPICAL SECTION (BASE 6)

POLE BASE DATA CHART

POLE BASE TYPE #	DIAMETER	DEPTH	#4 HORIZONTAL REINFORCING BARS	#8 VERTICAL REINFORCING BARS	CONDUITS
1	36"	7'-0"	5	8	2 - 3"
2	36"	10'-0"	6	8	2 - 3"
2A	48"	8'-0"	5	8	2 - 3"
2B	60"	7'-0"	5	8	2 - 3"
3	48"	10'-0"	14	17	2 - 3"
3A	48"	12'-0"	17	17	2 - 3"
3B	48"	15'-0"	21	17	2 - 3"
3C	48"	20'-0"	27	17	2 - 3"
4A & 4B	24"	2'-4"	NONE	NONE	2 - 2.5"
6	24"	6'-0"	4	8	2 - 3"

NOTE:
ANCHOR BOLTS AND BOLT PATTERN FOR TYPES 5, 6, & 7 POLE BASES TO BE PROVIDED BY THE MANUFACTURER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

POLE BASES

STANDARD NO. T-5 (2014)

SHT. 3 OF 4

APPROVED

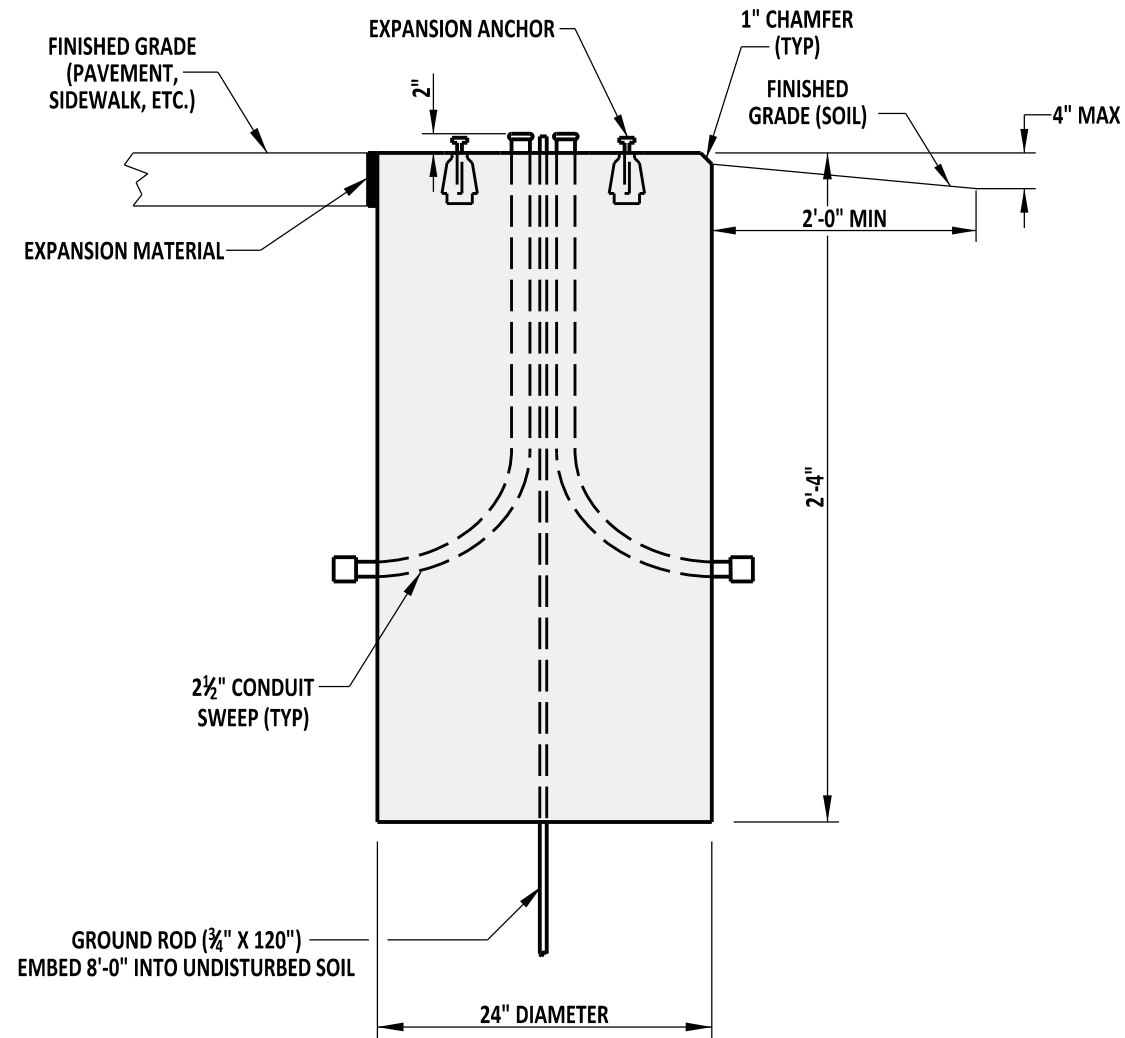
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12/30/2014
DATE

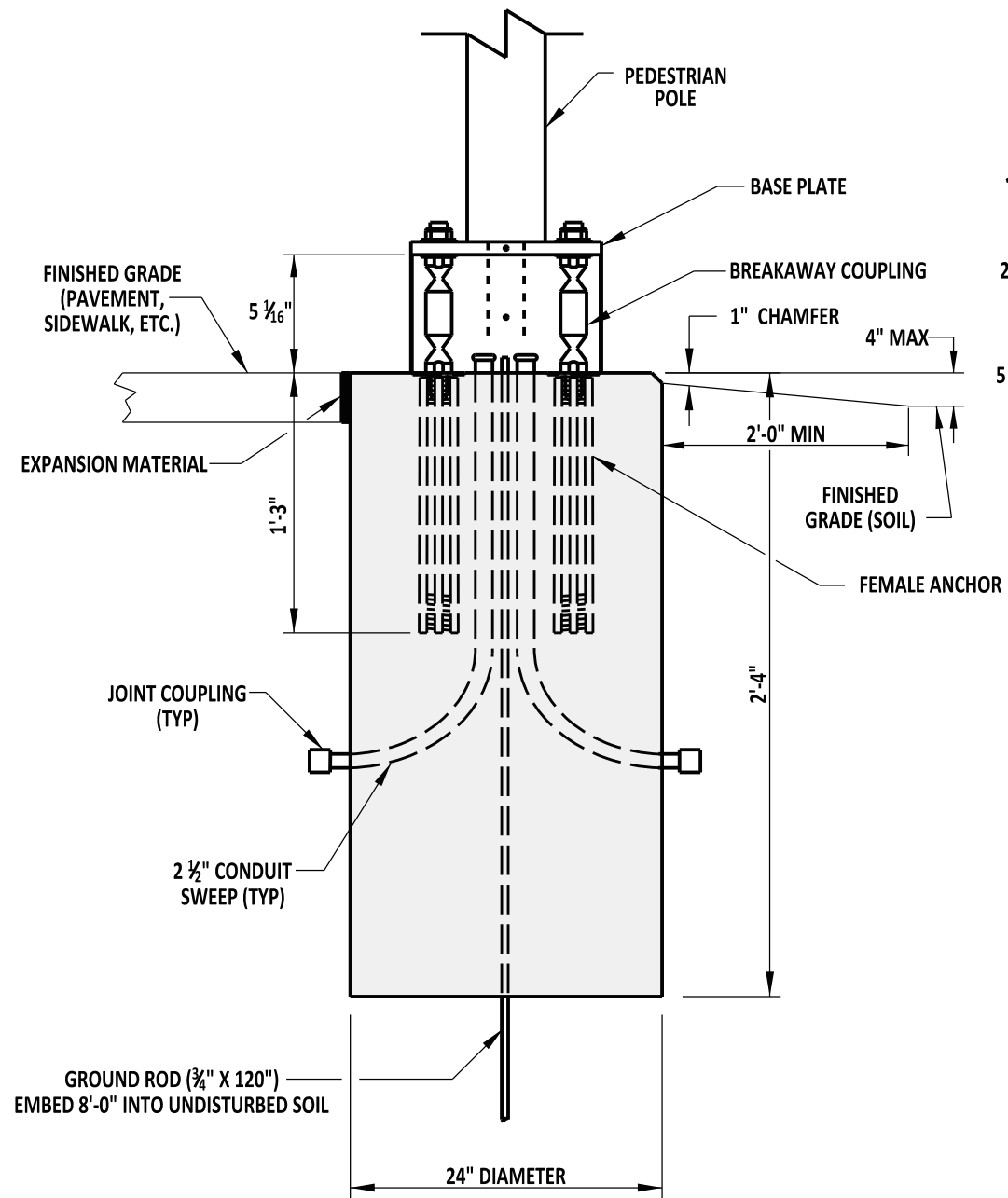
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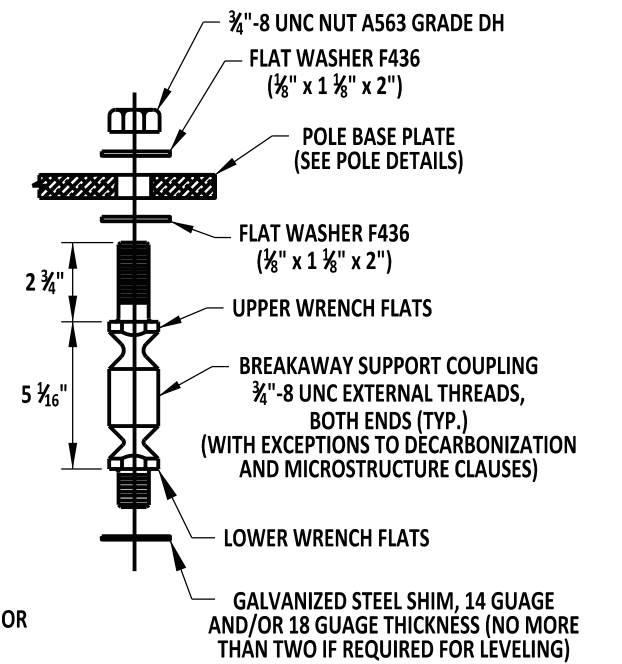
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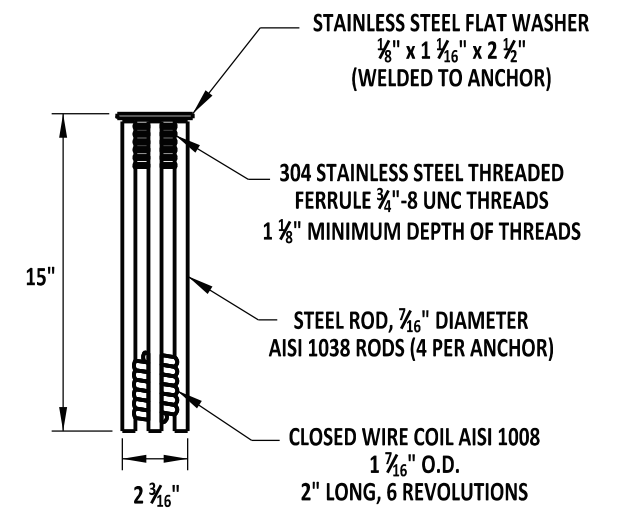
TYPICAL SECTION (BASE 4A)



TYPICAL SECTION (BASE 4B)



BREAKAWAY COUPLING DETAIL



ANCHOR DETAIL

NOTE:
BOLT PATTERN TO BE PROVIDED BY DELDOT'S SIGNAL CONSTRUCTION INSPECTOR.

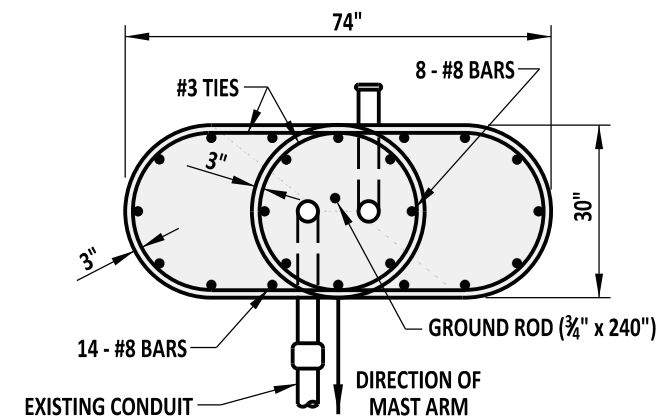
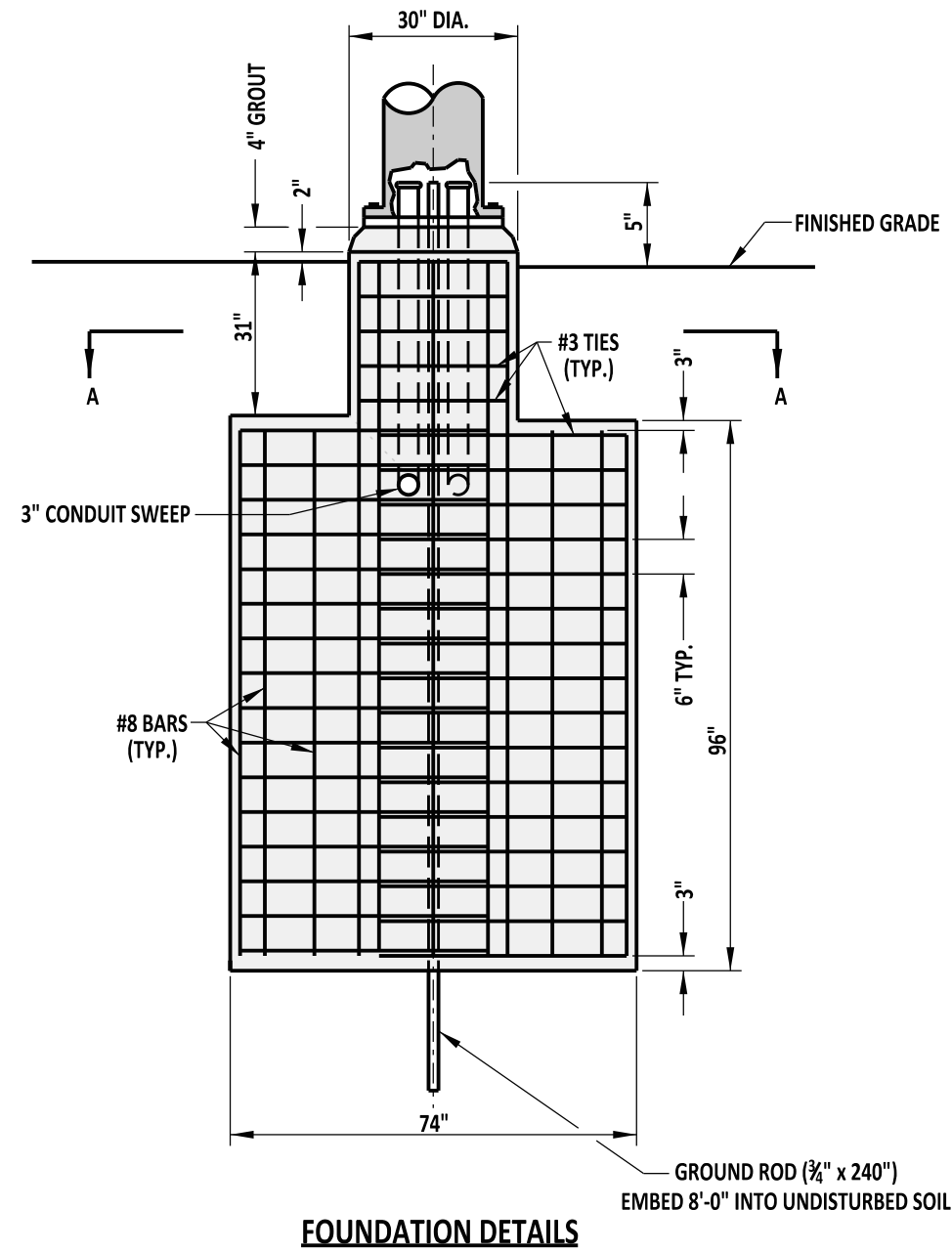
NOTE:
BOLT PATTERN TO BE PROVIDED BY DELDOT'S SIGNAL CONSTRUCTION INSPECTOR.



DELAWARE
DEPARTMENT OF TRANSPORTATION

POLE BASES				
STANDARD NO.	T-5 (2014)	SHT.	4	OF 4

APPROVED	SIGNATURE ON FILE	12/30/2014
	CHIEF ENGINEER	DATE
RECOMMENDED	SIGNATURE ON FILE	12/11/2014
	DESIGN ENGINEER	DATE

**NOTES:**

- 1). UNDERGROUND CONDUIT ENDS SHALL BE CAPPED WITH A GALVANIZED THREADED CONDUIT PLUG UNLESS CONNECTED TO AN EXISTING CONDUIT.
- 2). PLACE 2 EACH 6" x 1/2" P.V.C., SCHEDULE 40 (TYP) VENTS IN THE GROUT AS DIRECTED IN THE FIELD BY THE ENGINEER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

SPECIAL POLE BASE

STANDARD NO.

T-6 (2011)

SHT. 1

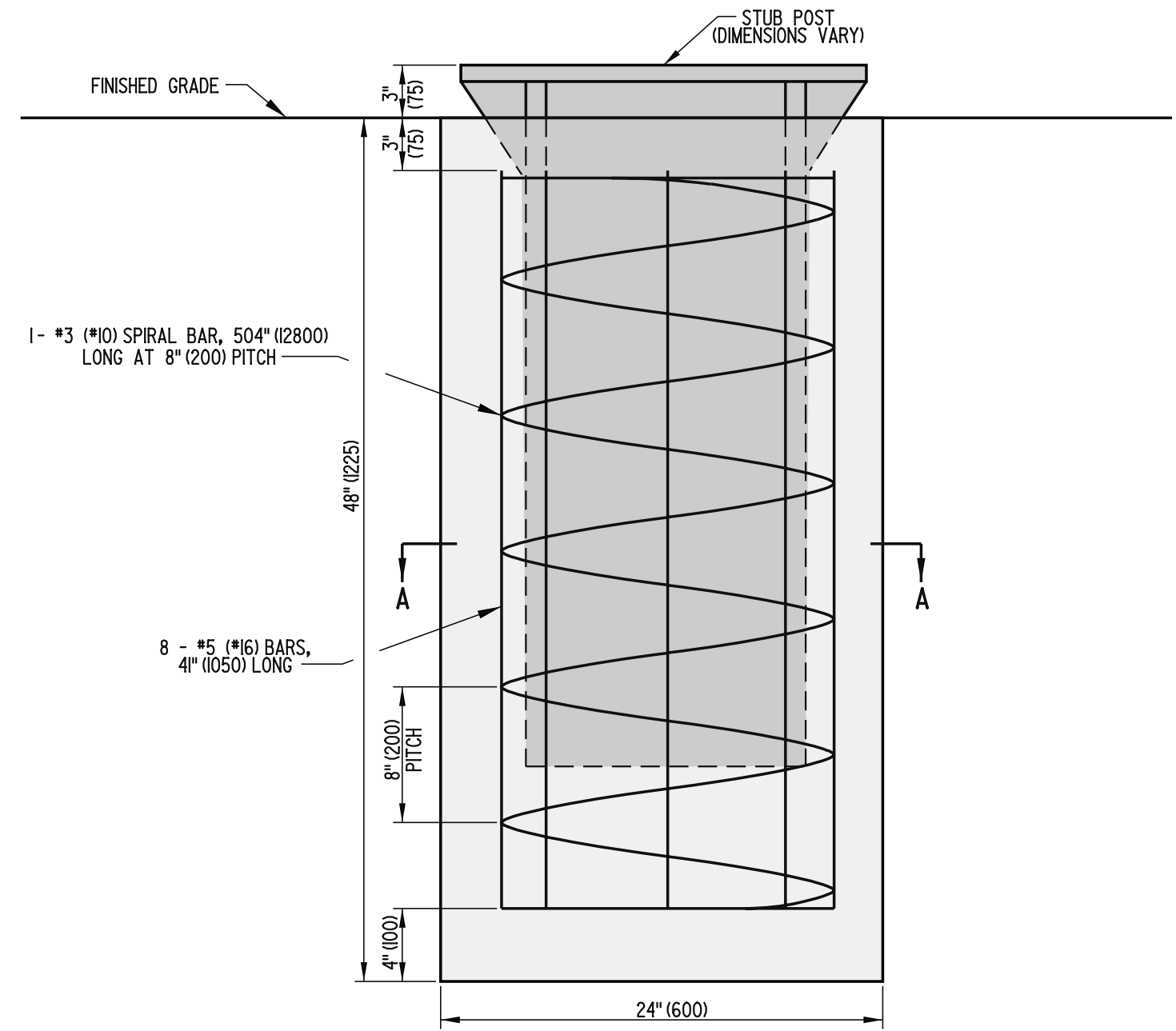
OF 1

APPROVED

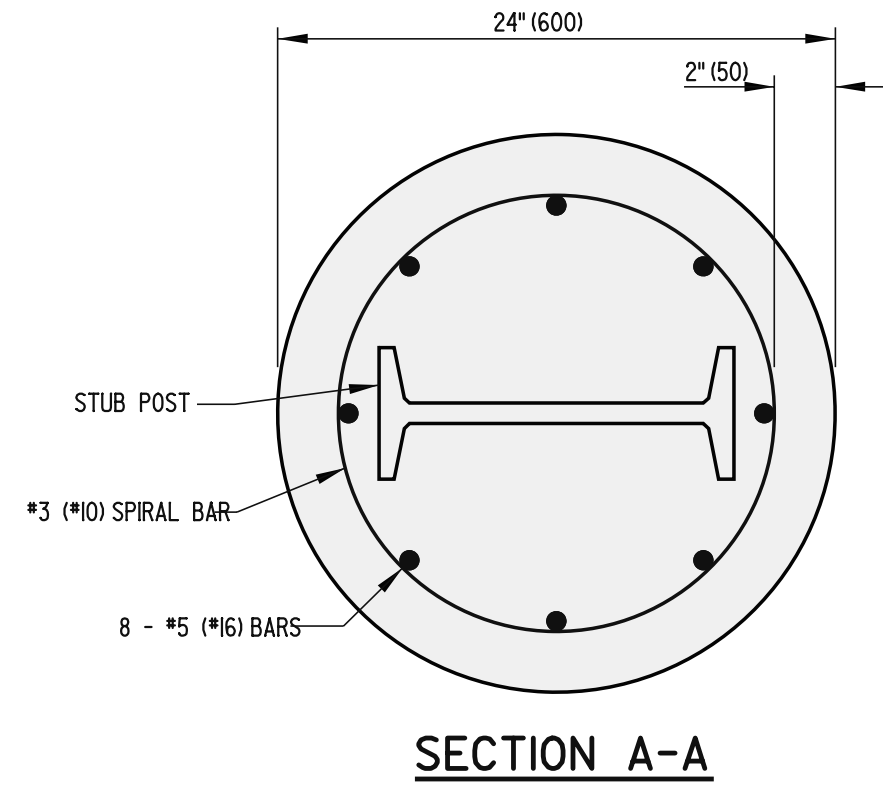
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CHIEF ENGINEER12/22/2011
DATE


RECOMMENDED

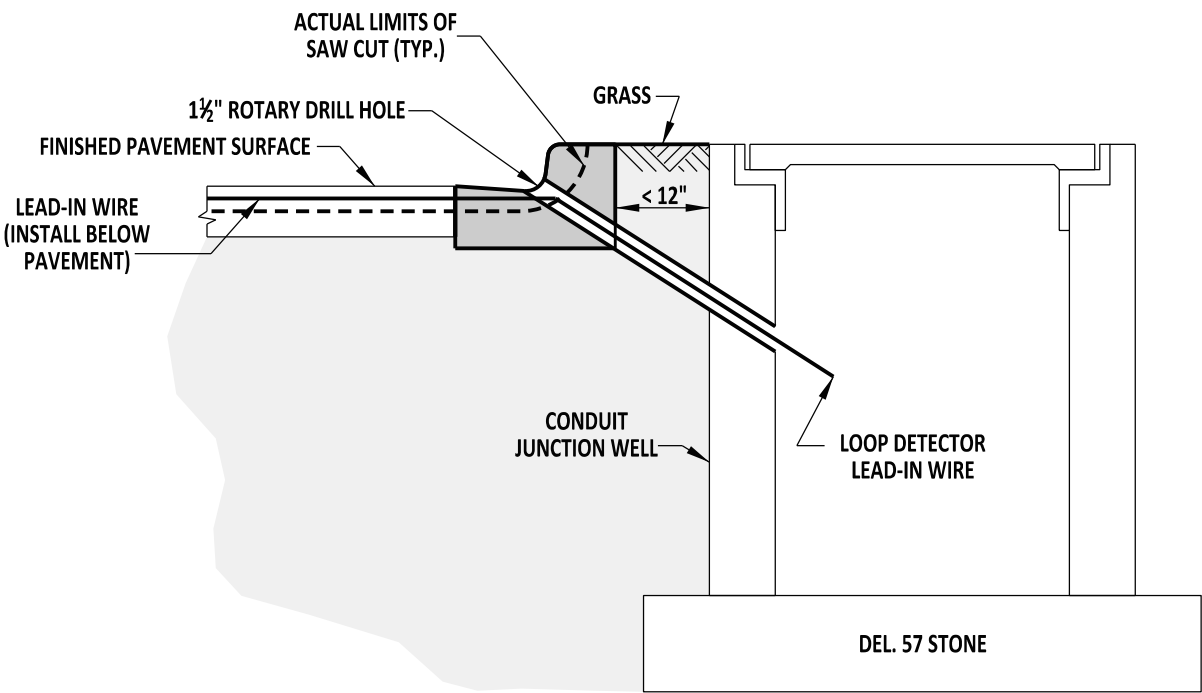
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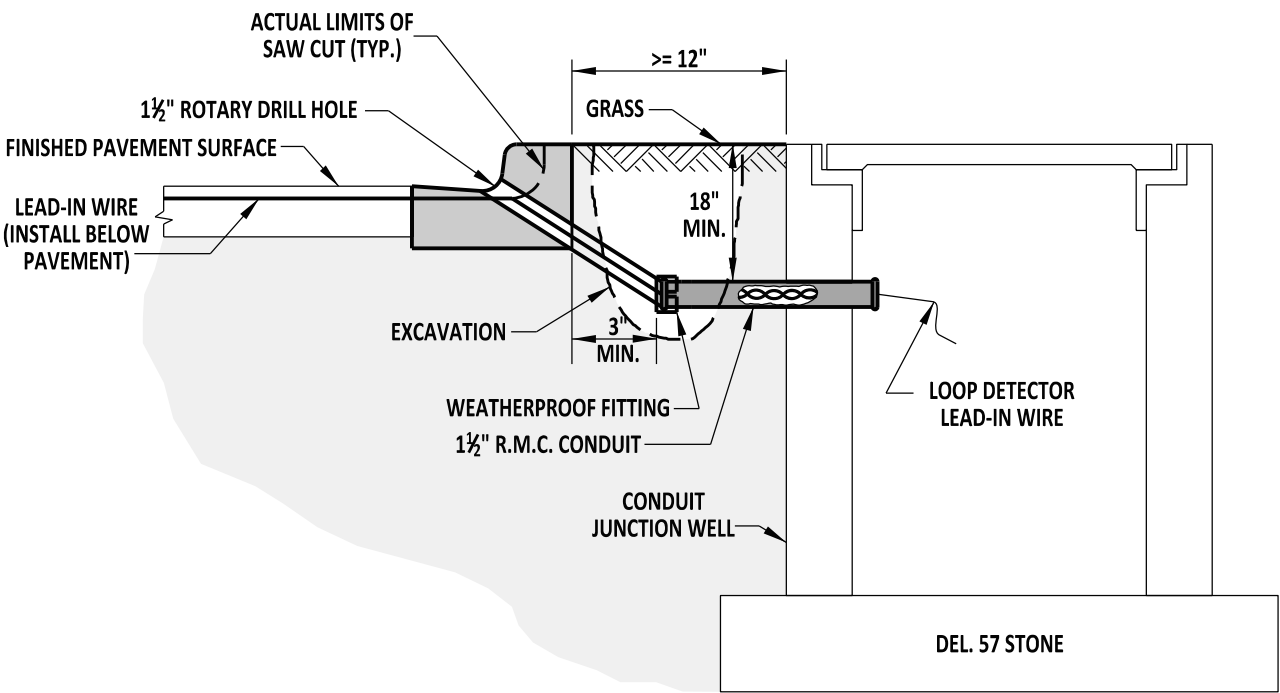
NOTES: 1). STUB POST TO BE SUPPLIED BY THE DEPARTMENTS TRAFFIC, ENGINEERING, AND MANAGEMENT SECTION.



 DELAWARE DEPARTMENT OF TRANSPORTATION	SIGN FOUNDATION			APPROVED <i>Carolann Wick</i> 12/5/05 CHIEF ENGINEER DATE
	STANDARD NO. T-7 (2005)	SHT. 1	OF 1	RECOMMENDED <i>James M. O'Brien</i> 11/29/05 DESIGN ENGINEER DATE



**LOOP DETECTOR
LEAD-IN WIRE INSTALLATION**



**LOOP DETECTOR
LEAD-IN WIRE INSTALLATION**

NOTES:

- 1). ALL SAWCUTS SHALL BE A DEPTH OF 3 1/2" ON ALL SURFACES.
- 2). CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE CURB JOINT.
- 3). ALL SAWCUTS SHALL BE PATCHED WITH NON-SHRINK CONCRETE CAULK.
- 4). CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3 1/2".
- 5). CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.
- 6). CONTRACTOR SHALL INSTALL DETECTABLE WARNING TAPE IN TRENCH FOR LEAD-IN CONDUIT.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

LOOP DETECTOR LEAD-IN WIRE INSTALLATION

STANDARD NO.

T-8 (2013)

SHT. 1

OF 4

APPROVED

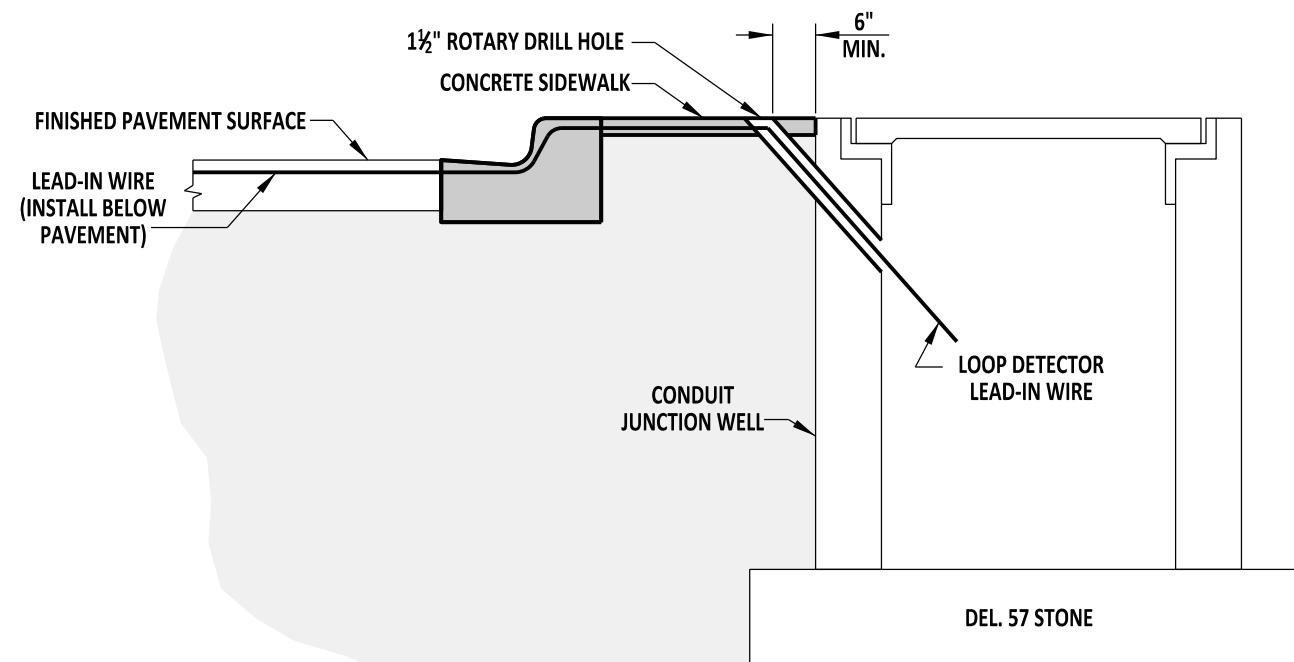
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CHIEF ENGINEER

02/14/2014
DATE

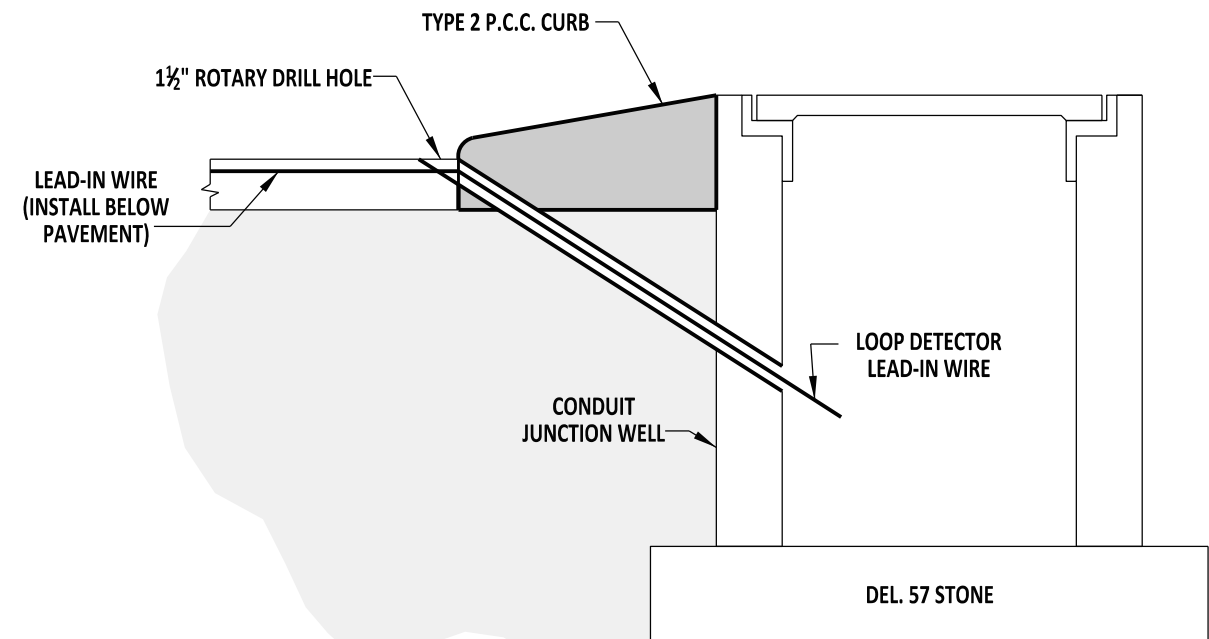
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DESIGN ENGINEER

01/14/2014
DATE



**LOOP DETECTOR
LEAD-IN WIRE INSTALLATION**



**LOOP DETECTOR
LEAD-IN WIRE INSTALLATION**

NOTES:

- 1). ALL SAWCUTS SHALL BE A DEPTH OF 3 1/2" ON ALL SURFACES.
- 2). CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE CURB JOINT.
- 3). ALL SAWCUTS SHALL BE PATCHED WITH NON-SHRINK CONCRETE CAULK.
- 4). CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3 1/2".
- 5). CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.



DELAWARE
DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR LEAD-IN WIRE INSTALLATION

STANDARD NO. T-8 (2013)

SHT. 2 OF 4

APPROVED

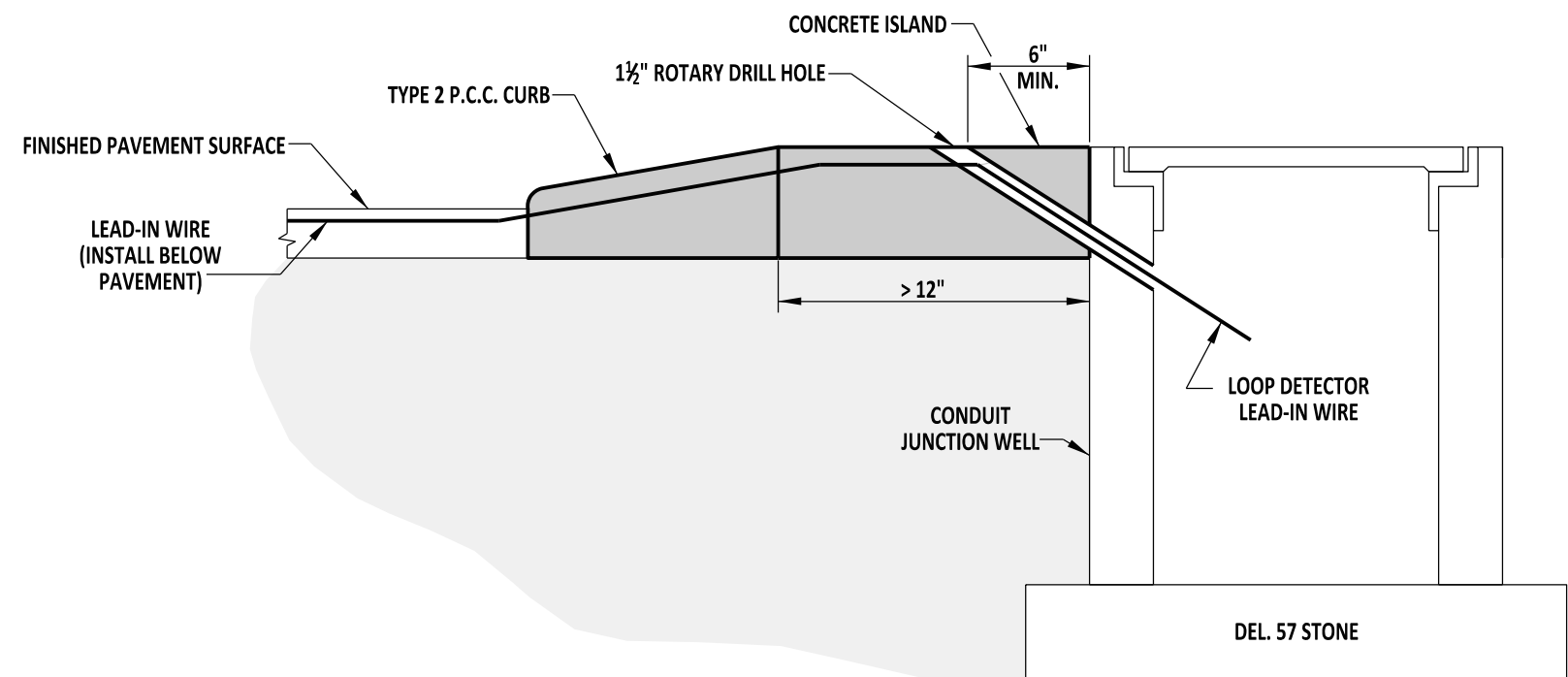
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CHIEF ENGINEER

02/14/2014
DATE

RECOMMENDED

SIGNATURE ON FILE
DESIGN ENGINEER

01/14/2014
DATE



**LOOP DETECTOR
LEAD-IN WIRE INSTALLATION**

NOTES:

- 1). ALL SAWCUTS SHALL BE A DEPTH OF 3 1/2" ON ALL SURFACES.
- 2). CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE CURB JOINT.
- 3). ALL SAWCUTS SHALL BE PATCHED WITH NON-SHRINK CONCRETE CAULK.
- 4). CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3 1/2".
- 5). CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.



DELAWARE
DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR LEAD-IN WIRE INSTALLATION

STANDARD NO.

T-8 (2013)

SHT. 3

OF 4

APPROVED

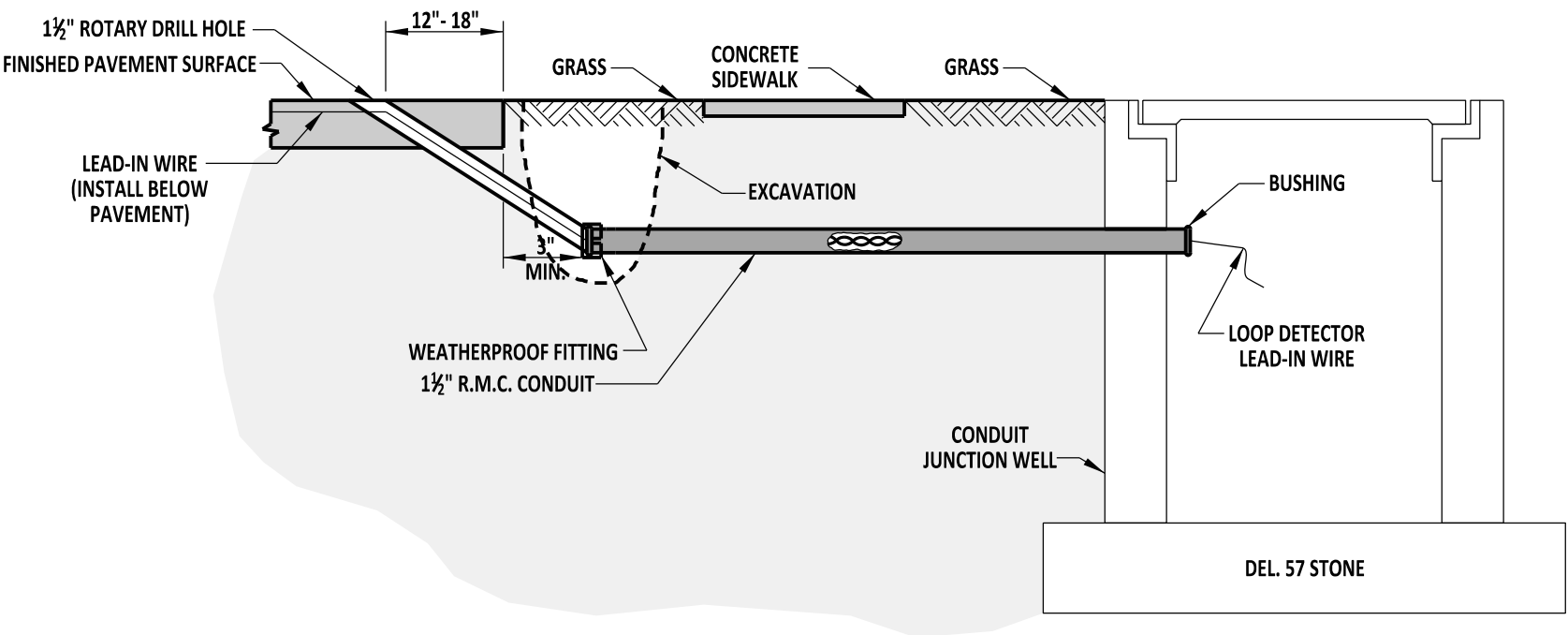
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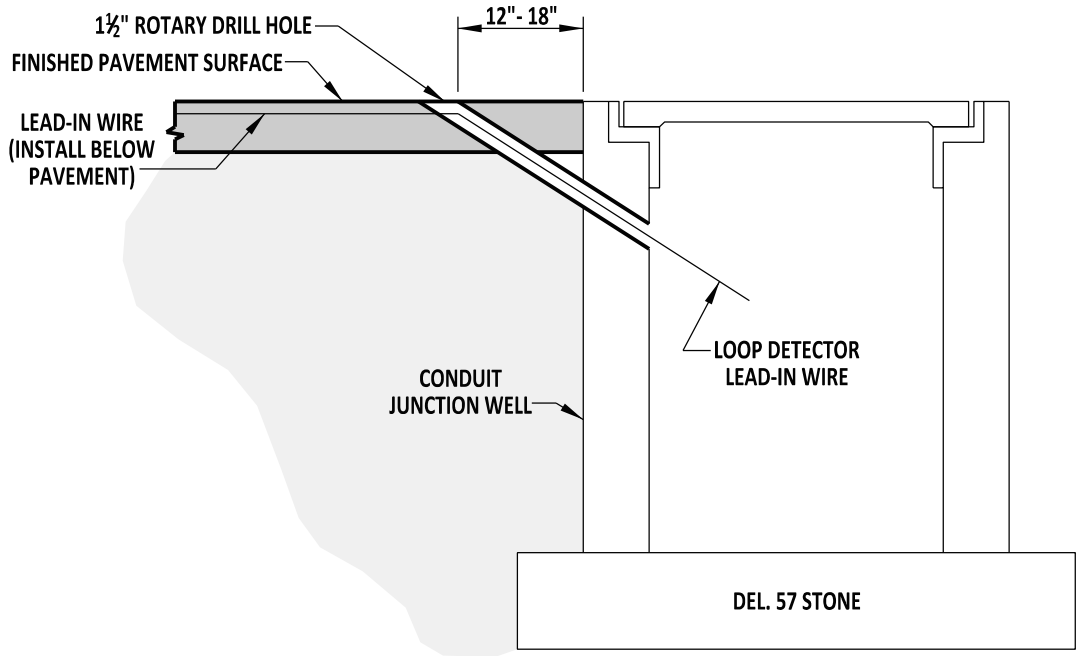
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01/14/2014
DATE



**LOOP DETECTOR
LEAD-IN WIRE INSTALLATION**



**LOOP DETECTOR
LEAD-IN WIRE INSTALLATION**

- NOTES:**
- 1). ALL SAWCUTS SHALL BE A DEPTH OF 3 1/2" ON ALL SURFACES.
 - 2). CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE CURB JOINT.
 - 3). ALL SAWCUTS SHALL BE SEALED WITH AN APPROVED LOOP DETECTOR SEALANT.
 - 4). CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3 1/2".
 - 5). CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.
 - 6). CONTRACTOR SHALL INSTALL DETECTABLE WARNING TAPE IN TRENCH FOR LEAD-IN CONDUIT.



DELAWARE
DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR LEAD-IN WIRE INSTALLATION

STANDARD NO. T-8 (2013) SHT. 4 OF 4

APPROVED

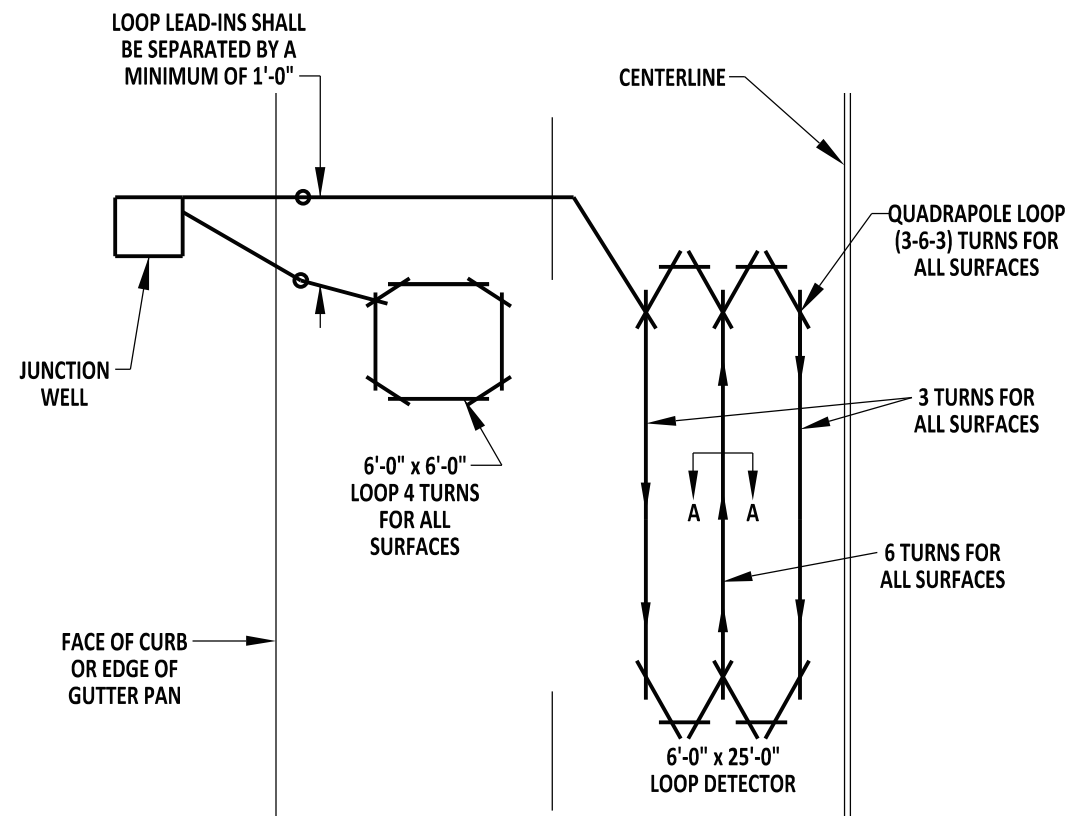
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02/14/2014
DATE

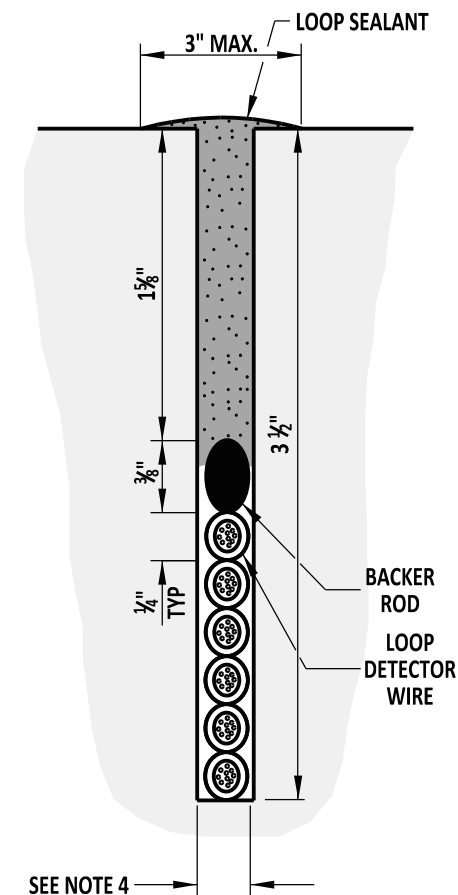
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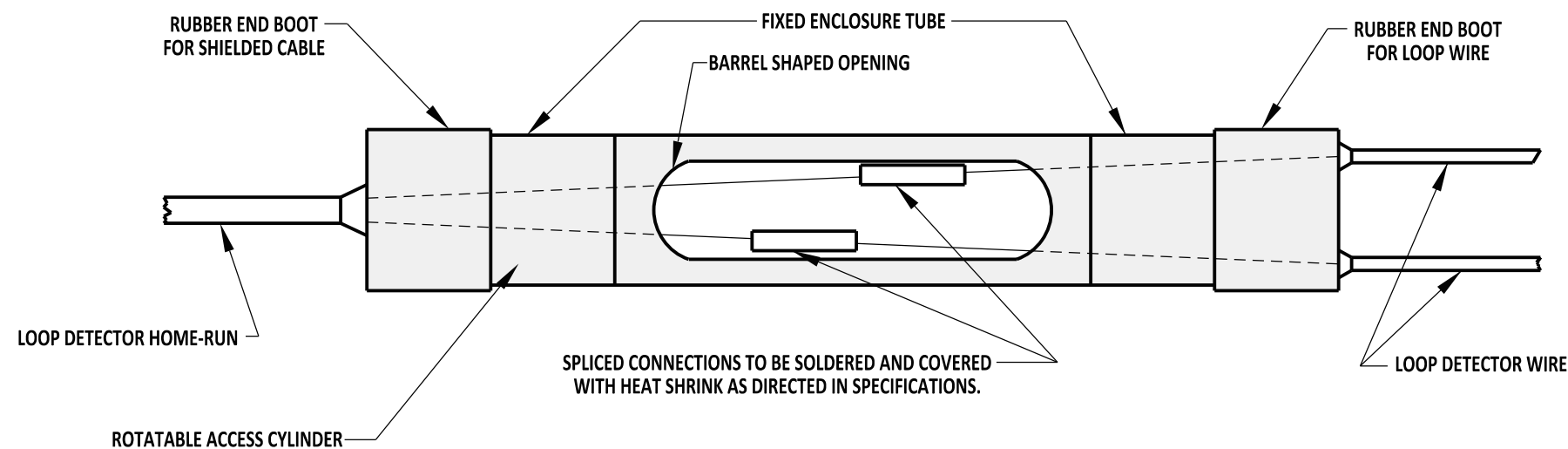
01/14/2014
DATE



LOOP DETECTOR SAWCUT TYPICAL
REFER TO DETAIL T-8, SHEETS 1 THROUGH 4 FOR LOOP DETECTOR LEAD-IN INSTALLATION REQUIREMENTS.



SECTION A-A
HOT-MIX SURFACE



NOTES:

- 1). WHEN A PROPOSED LOOP DETECTOR SAWCUT CROSSES A LATERAL ROADWAY JOINT OR OTHER OBSTRUCTION (VALVE COVER, MANHOLE, JUNCTION WELL, ETC.), LOOP DETECTOR INSTALLATION SHALL BE MODIFIED INTO TWO SEPARATE LOOP DETECTORS WHICH SHALL NOT TRAVERSE JOINTS OR OBSTRUCTION.
- 2). THE LOOPS SHALL BE PLACED IN THE CENTER OF THE LANE UNLESS NOTED OTHERWISE ON PLANS.
- 3). PRESENCE LOOP DETECTORS ARE TO BE PLACED 12" BEHIND THE EXISTING OR PROPOSED STOP LINE.
- 4). LOOP DETECTOR AND LEAD-IN SAWCUTS SHALL BE 5/8" WIDE.



DELAWARE
DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR INSTALLATION & SPLICE KIT

STANDARD NO. T-9 (2013)

SHT. 1 OF 3

APPROVED

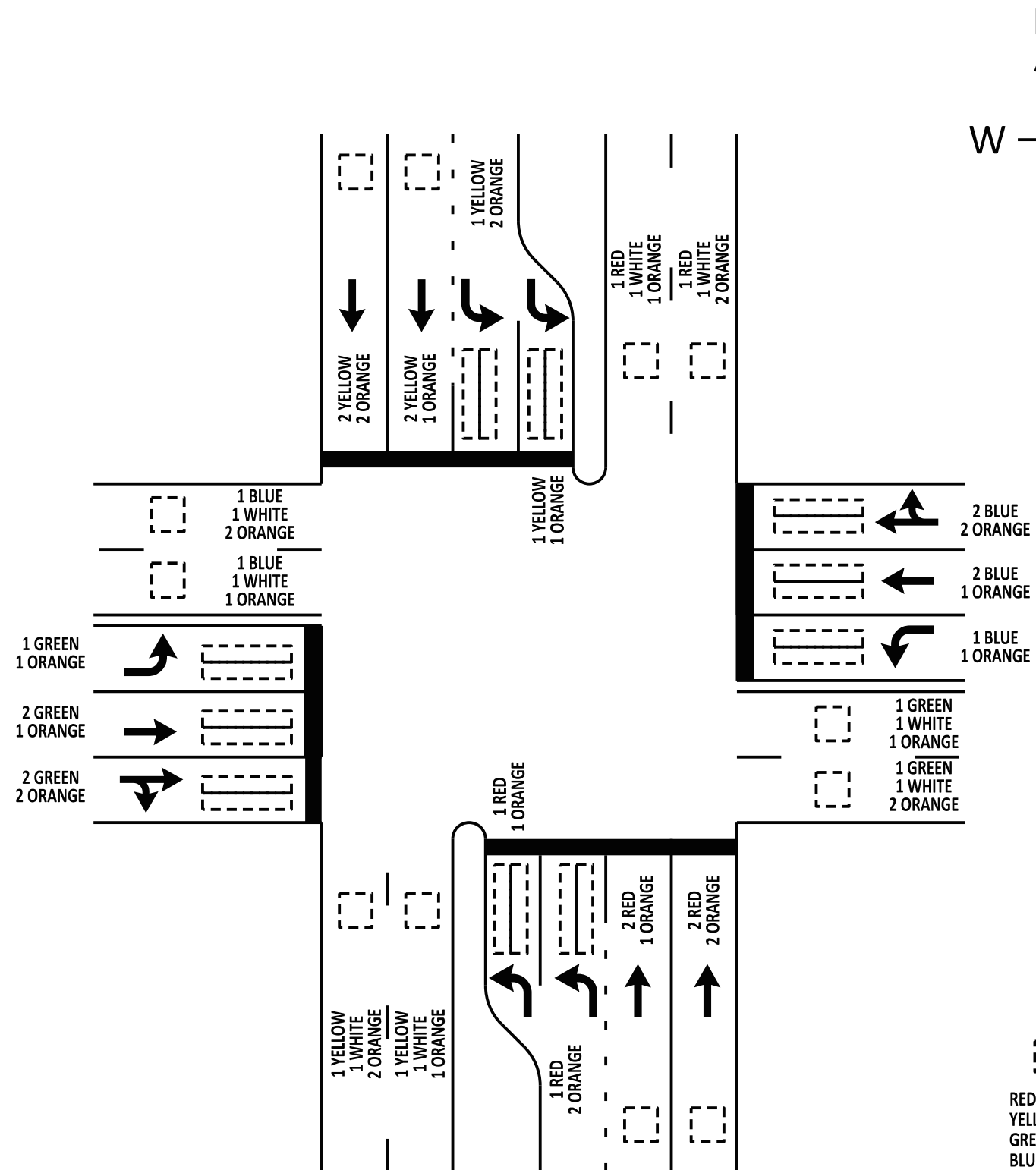
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DESIGN ENGINEER

01/14/2014
DATE



NOTES

- 1). ORANGE BANDS SHALL DESIGNATE THE LANE ASSIGNMENT. ALL LANES SHALL BE DESIGNATED FROM LEFT TO RIGHT IN THE DIRECTION OF TRAVEL. EXAMPLE: FOR A DOUBLE LEFT TURN WITH 2 THRU LANES FOR NORTHBOUND, THE CABLES WILL BE IDENTIFIED AS 1-RED W/ 1-ORANGE (LT LANE 1) 1-RED W/ 2-ORANGE (LT LANE 2), 2-RED W/ 1-ORANGE (THRU LANE 1) AND 2-RED W/ 2-ORANGE (THRU LANE 2). THIS CODE IS THEN FOLLOWED FOR THE REMAINING APPROACHES TO THE INTERSECTION.
- 2). THE OPTICAL PRE-EMPTION DETECTOR "HOME RUN" CABLE(S) SHALL BE IDENTIFIED WITHIN THE CONTROL CABINET BY A VIOLET BAND PLUS A COLOR BAND, AS NOTED TO DENOTE THE DIRECTION OF THE DETECTOR.



DELAWARE
DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR INSTALLATION & SPLICE KIT

STANDARD NO. T-9 (2013) SHT. 2 OF 3

APPROVED

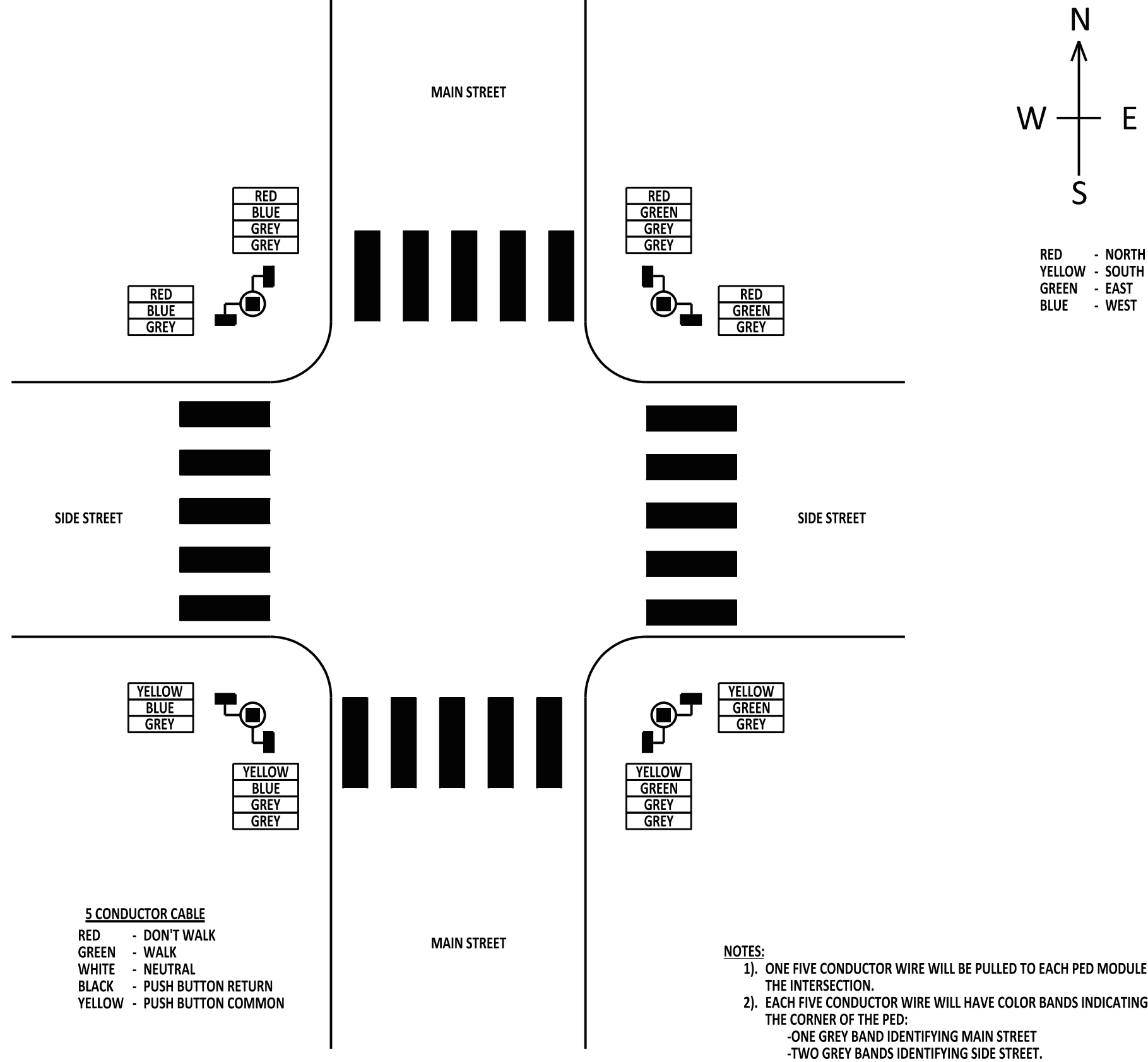
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DELAWARE
DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR INSTALLATION & SPLICE KIT

STANDARD NO.

T-9 (2013)

SHT.

3

OF

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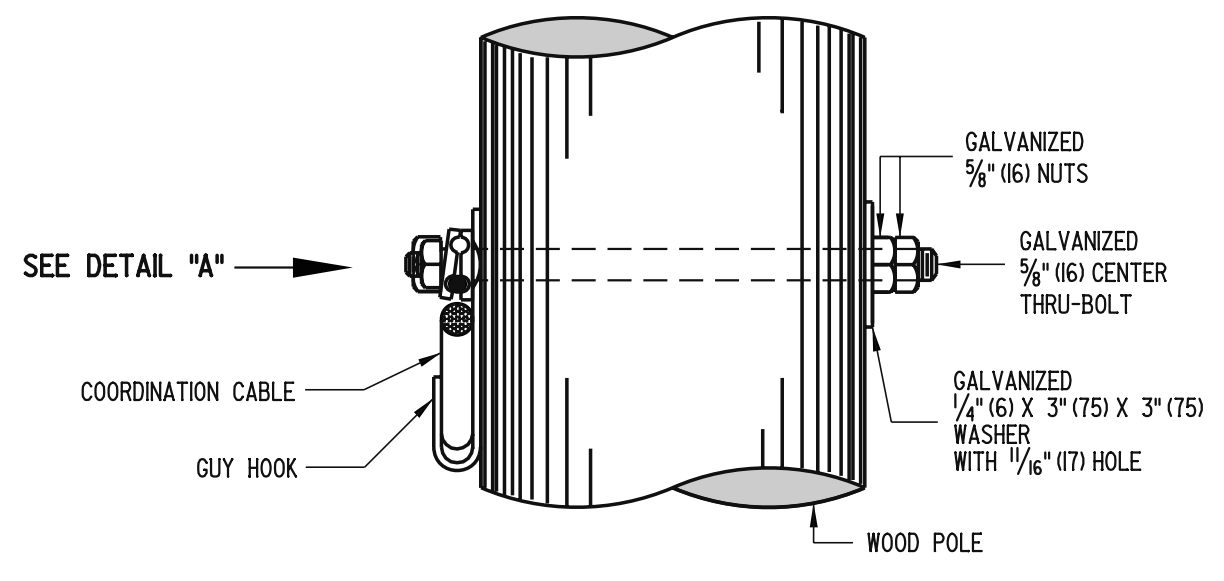
02/14/2014
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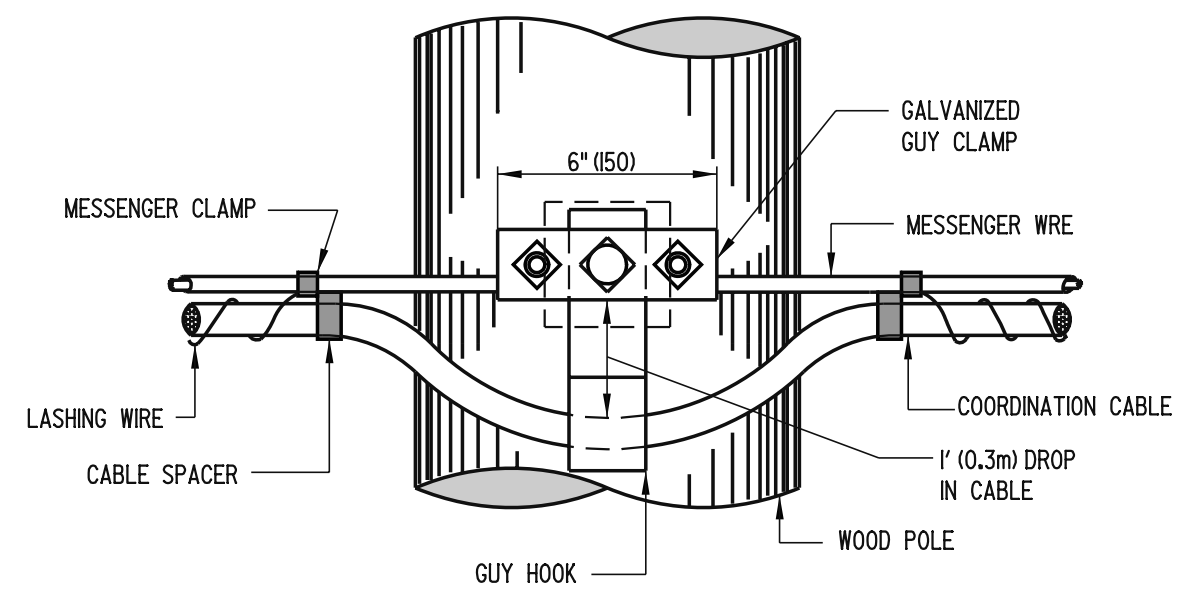
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01/14/2014
DATE

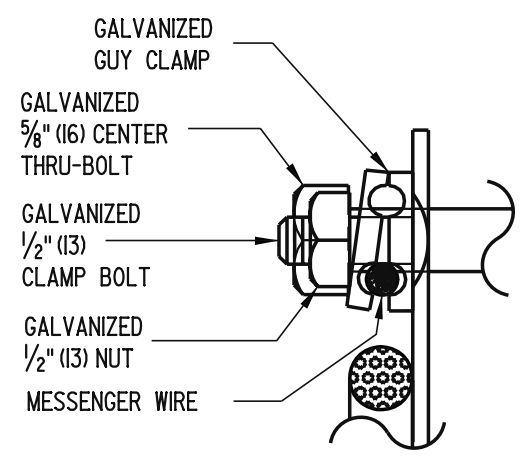
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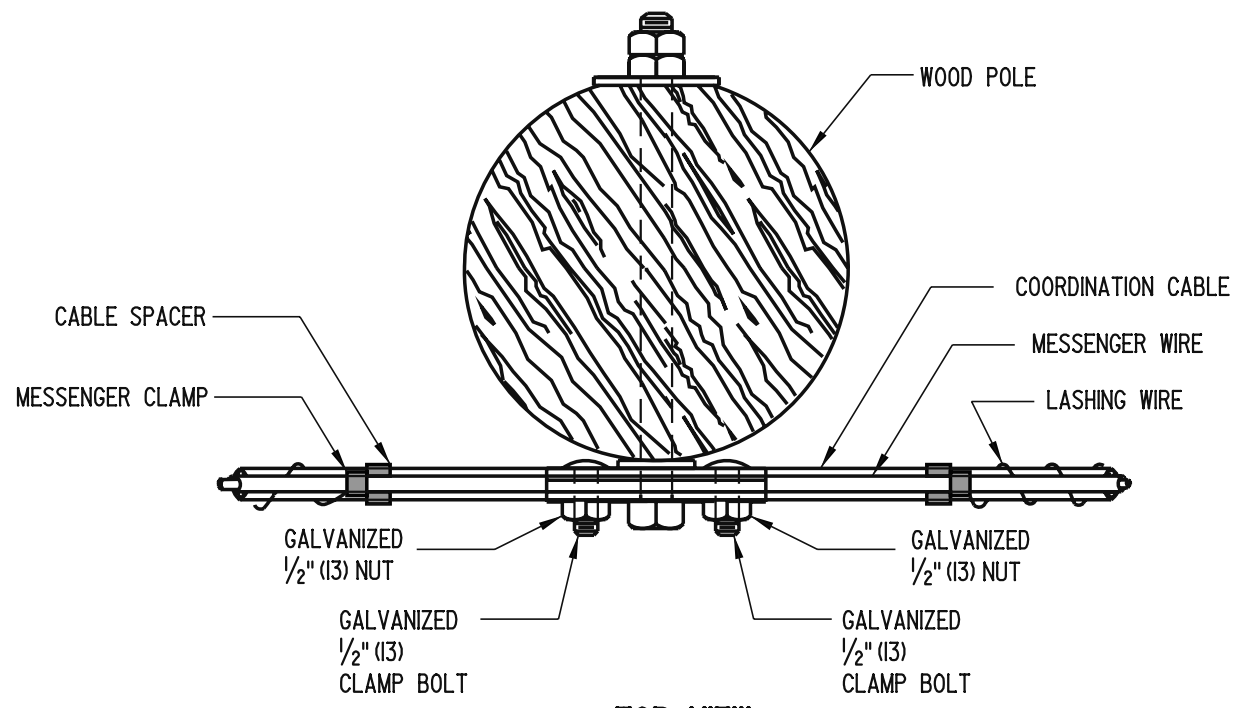
SIDE VIEW



FRONT VIEW



DETAIL "A"



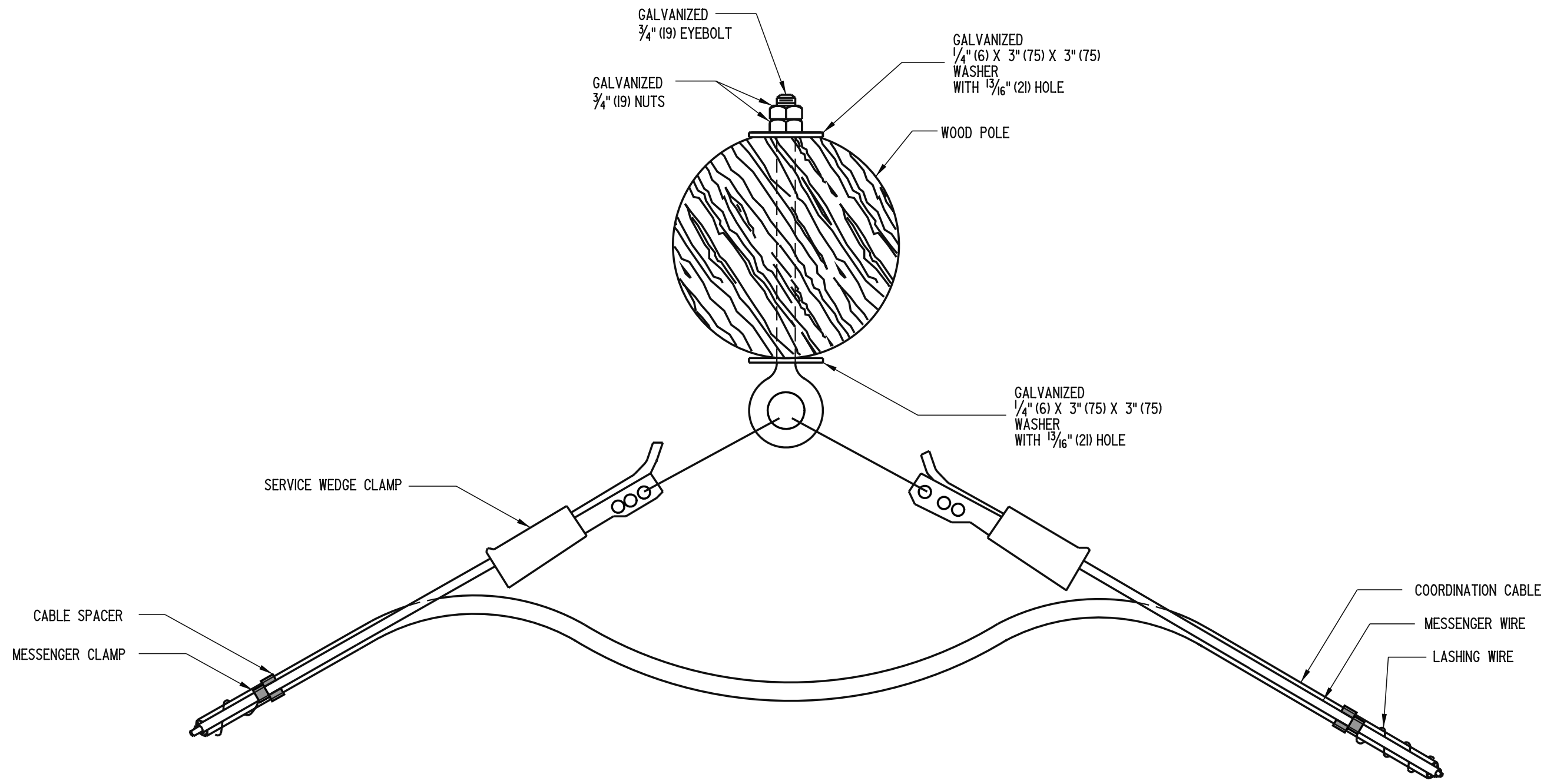
TOP VIEW




DELAWARE
DEPARTMENT OF TRANSPORTATION

INTERMEDIATE MESSENGER WIRE ATTACHMENT ON WOOD POLES			
STANDARD NO.	T-11 (2005)	SHT.	1 OF 2

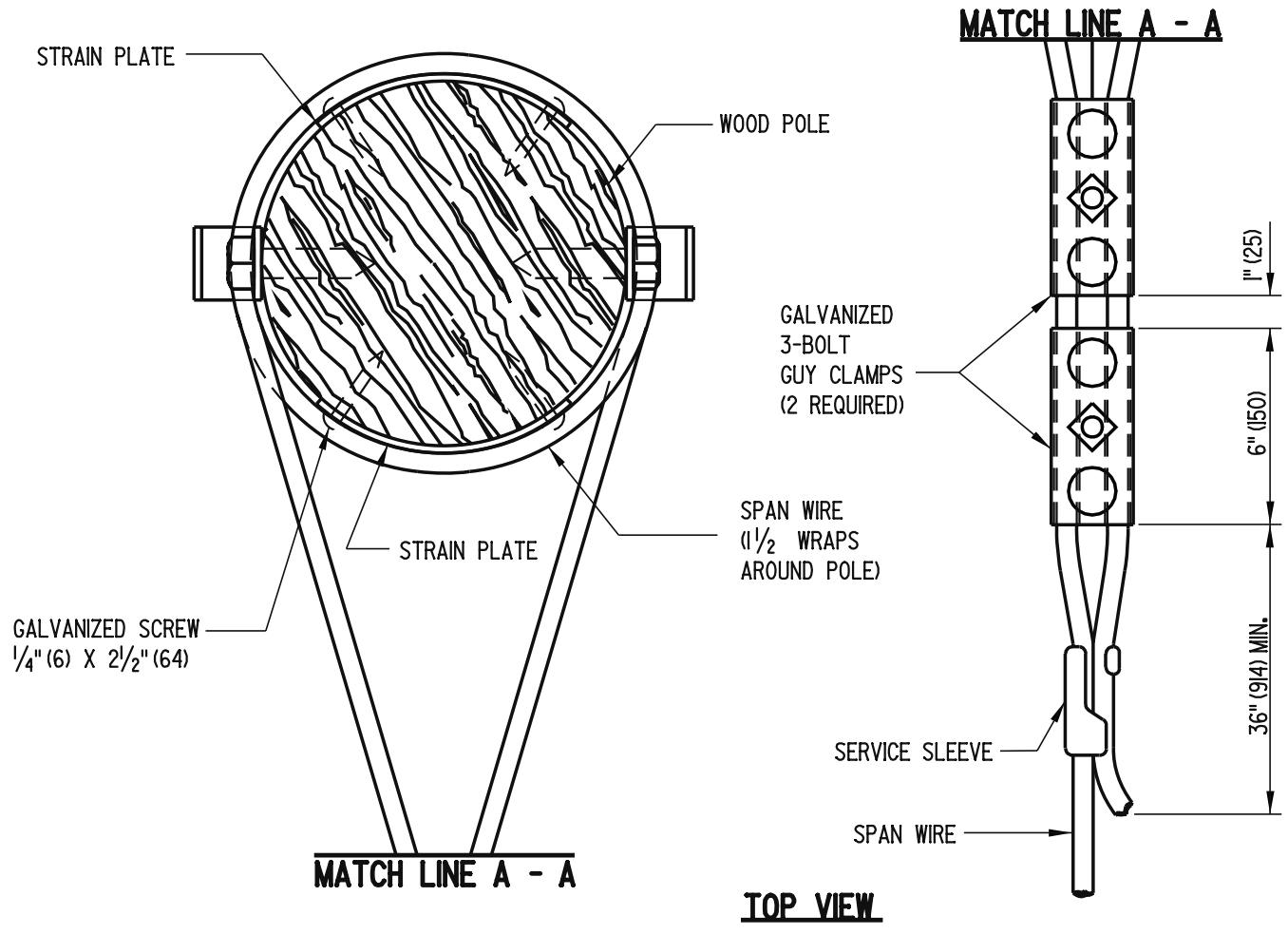
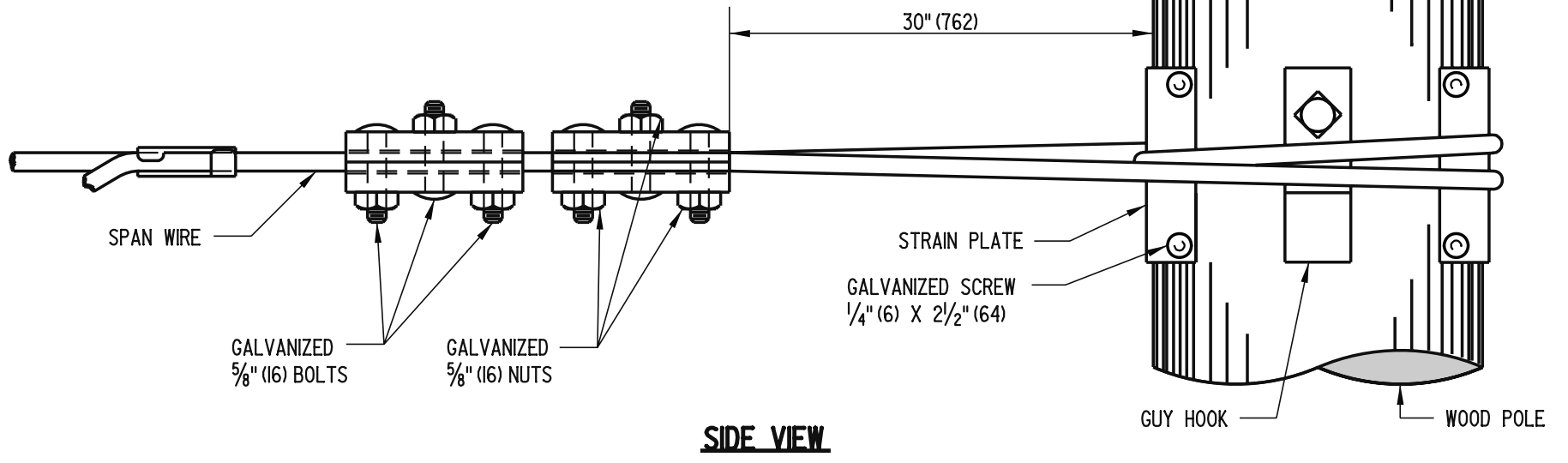
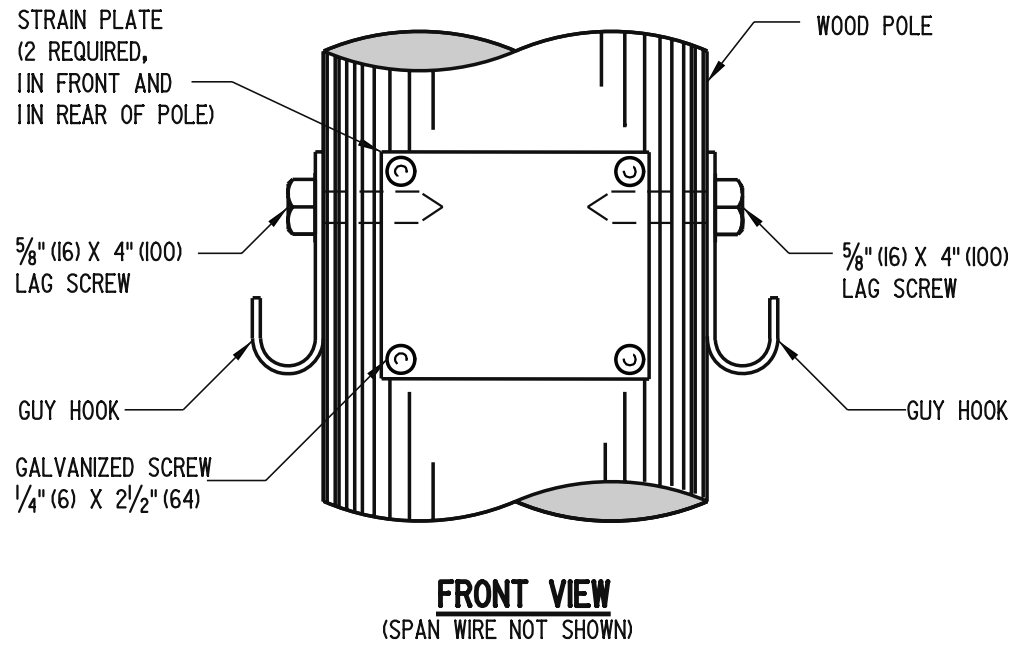
APPROVED *Carolann Wick* 12/5/05
CHIEF ENGINEER DATE
RECOMMENDED *James M. O'Brien* 11/29/05
DESIGN ENGINEER DATE




TOP VIEW

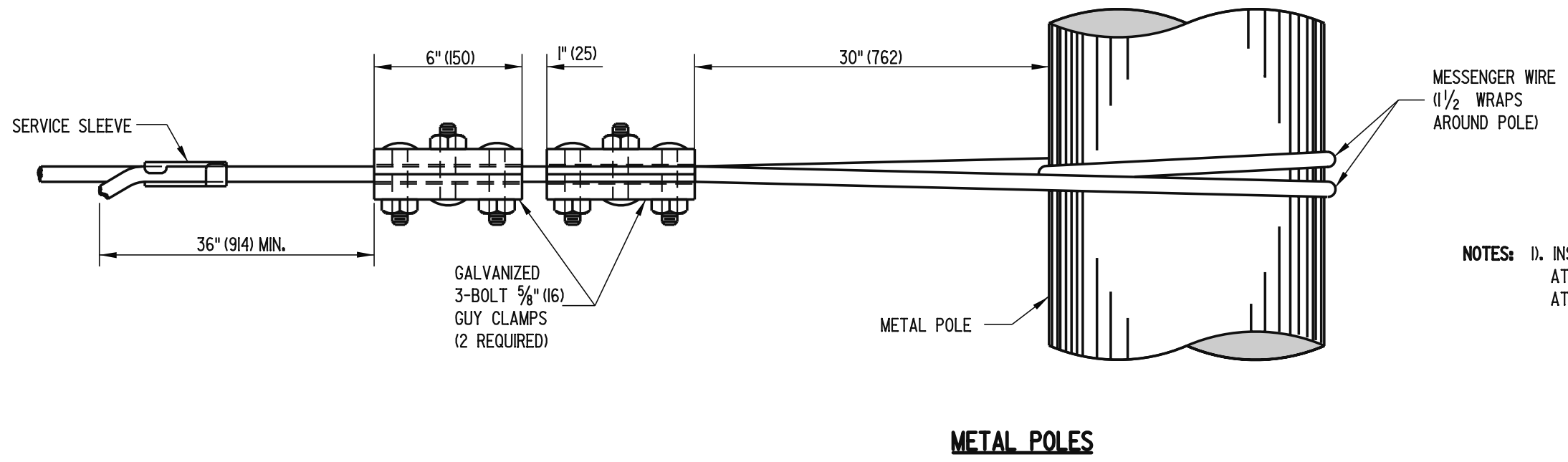
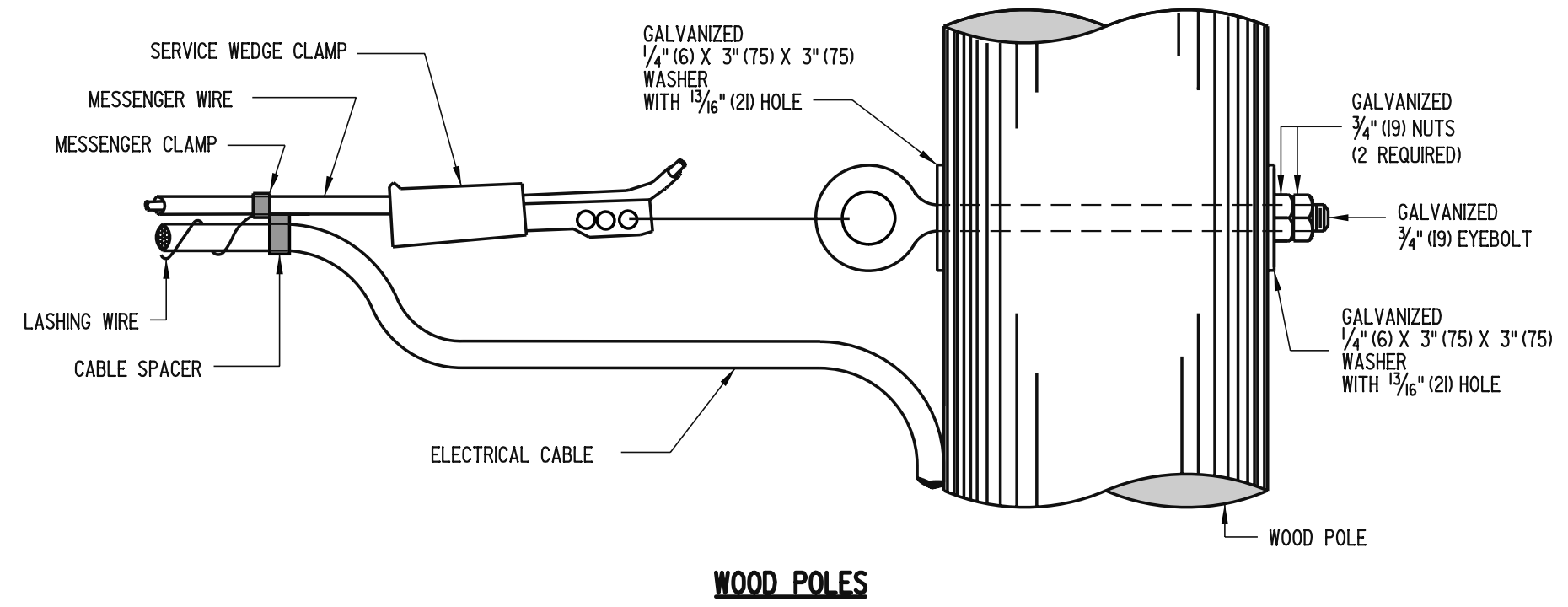
 DELAWARE DEPARTMENT OF TRANSPORTATION	ANGULAR INTERMEDIATE MESSENGER WIRE ATTACHMENT			APPROVED <i>Carolann Wick</i> CHIEF ENGINEER	12/5/05 DATE
	STANDARD NO. T-11 (2005)	SHT. 2	OF 2	RECOMMENDED <i>James M. O'Brien</i> DESIGN ENGINEER	11/29/05 DATE

SCALE : N.T.S.




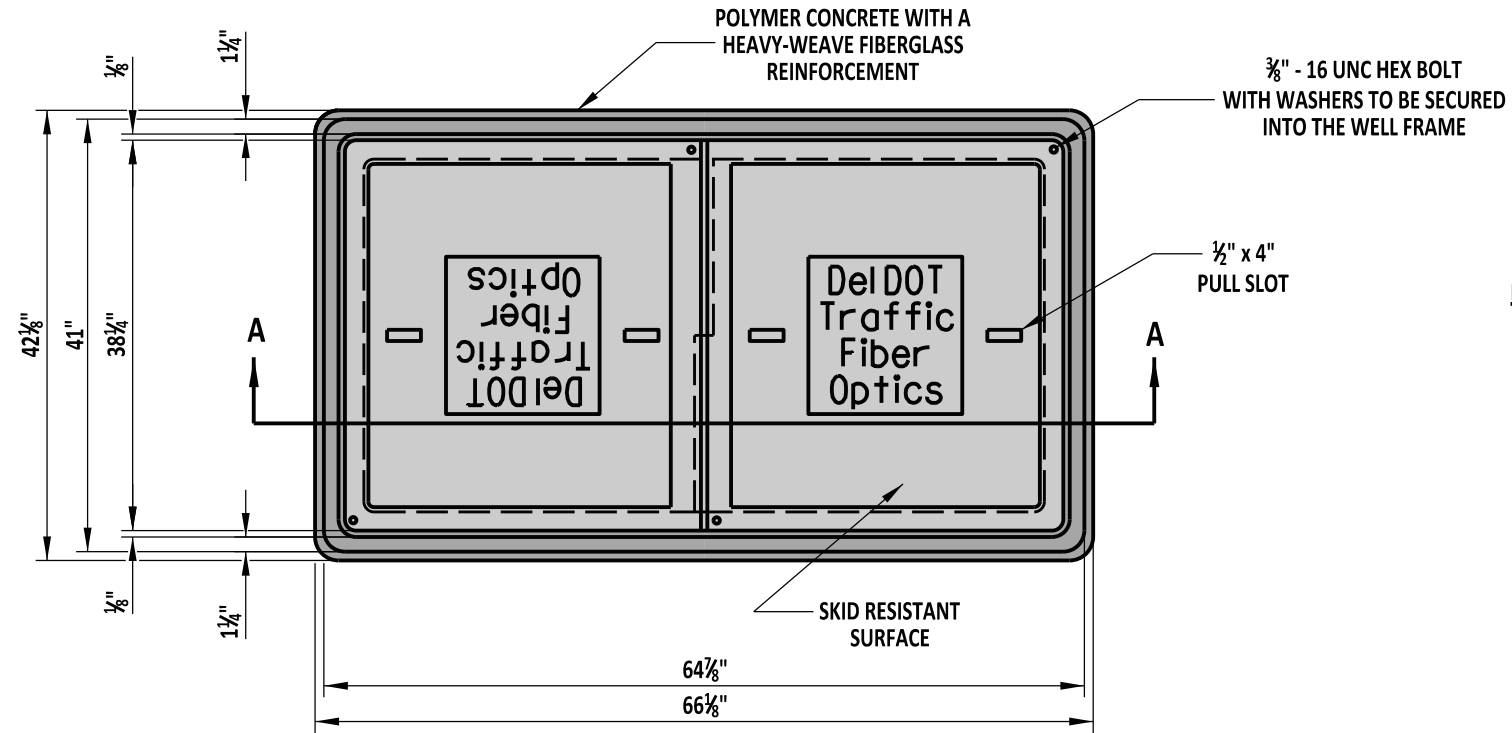
NOTE: SPAN WIRE ATTACHMENT BETWEEN METAL POLES IS THE SAME AS SHOWN FOR WOOD POLES EXCEPT THAT THE STRAIN PLATES AND GUY HOOKS ARE NOT USED. FOR DETAIL SEE T-14 SHEET 2 - "DEAD END MESSENGER WIRE ATTACHMENT, METAL POLES ".

 DELAWARE DEPARTMENT OF TRANSPORTATION	SPAN WIRE ATTACHMENT BETWEEN POLES			APPROVED <i>Carolann Wick</i> 12/5/05 CHIEF ENGINEER DATE
	STANDARD NO. T-12 (2005)	SHT. 1	OF 2	RECOMMENDED <i>James M. O'Brien</i> 11/29/05 DESIGN ENGINEER DATE



NOTES: 1). INSTALLATION METHOD SHOWN FOR DEAD END MESSENGER WIRE ATTACHMENT TO METAL POLES SHALL BE USED FOR SPAN WIRE ATTACHMENT BETWEEN METAL POLES.

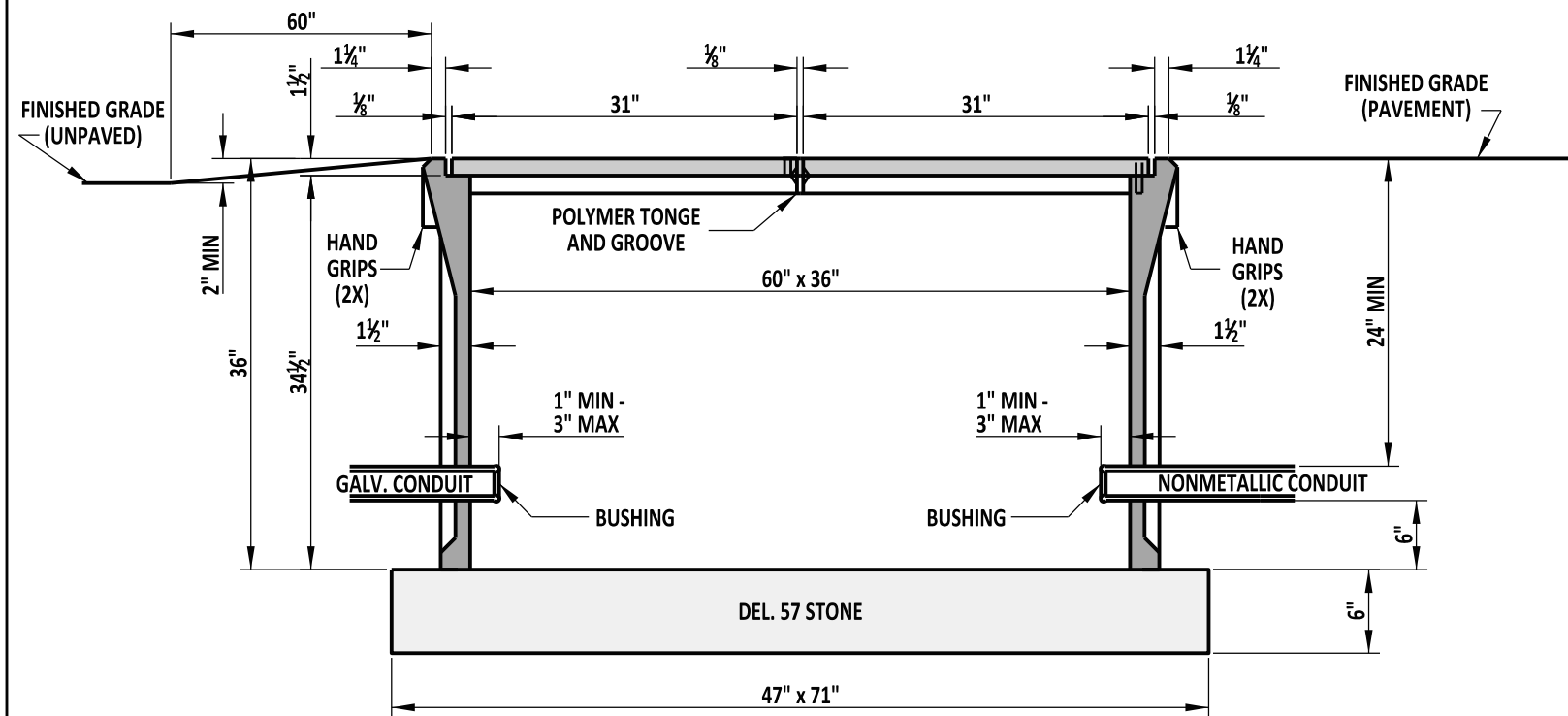
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	STANDARD NO. T-12 (2005)	SHT. 2	OF 2	RECOMMENDED <i>James M. O'Brien</i> 11/29/05 DESIGN ENGINEER DATE



PLAN VIEW

NOTES:

- 1). TYPE 7 CONDUIT JUNCTION WELL SHALL BE PRECAST POLYMER CONCRETE.
- 2). ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC. WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE CONDUIT JUNCTION WELL.
- 3). POLYMER CONCRETE COVERS SHALL BE THE HEAVY DUTY TYPE WITH A DESIGN LOAD OF 15,000 LBS OVER A 10" SQUARE.



SECTION A-A



DELAWARE
DEPARTMENT OF TRANSPORTATION

CONDUIT JUNCTION WELL, TYPE 7

STANDARD NO.

T-13 (2013)

SHT. 1

OF 1

APPROVED

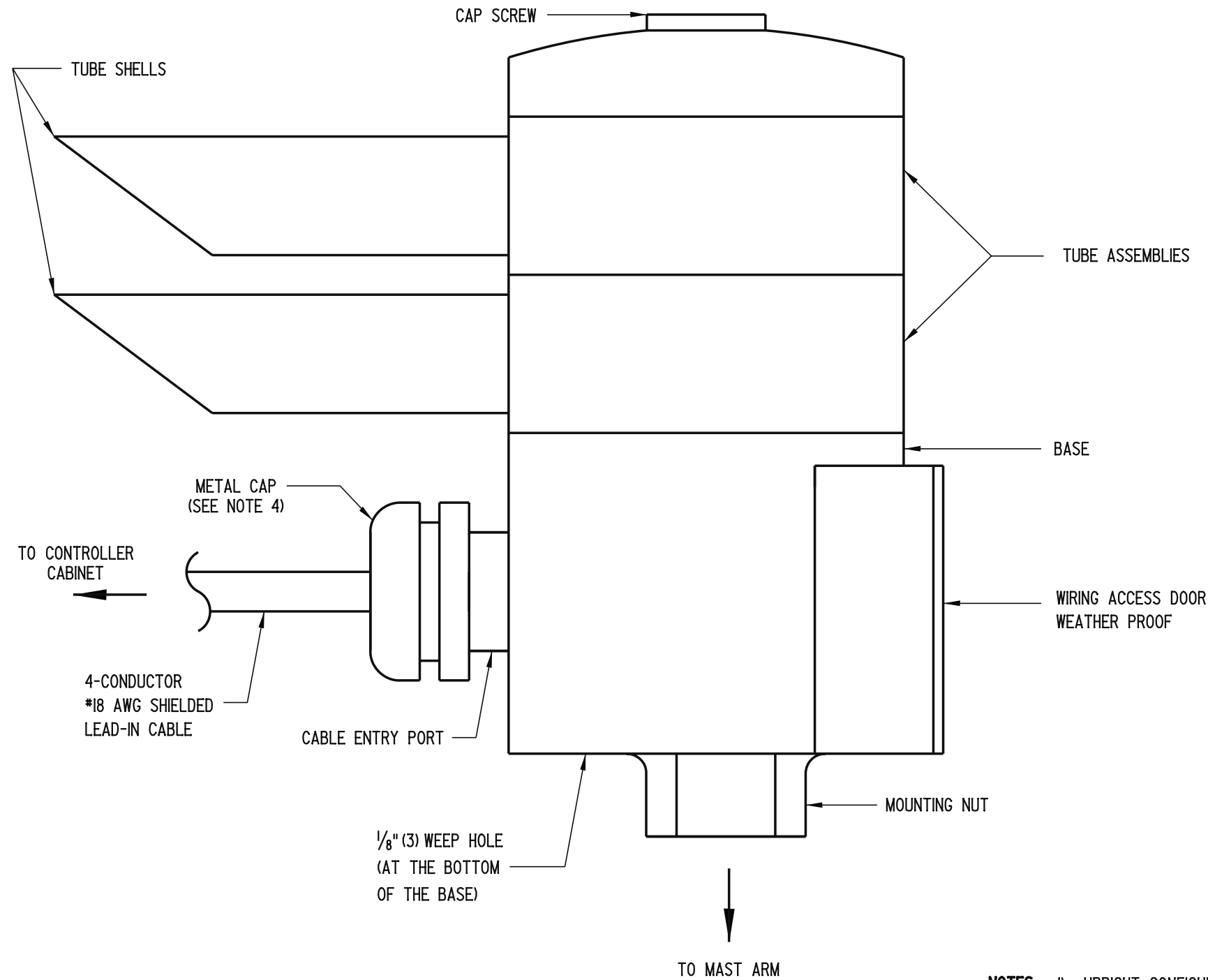
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CHIEF ENGINEER

02/14/2014
DATE

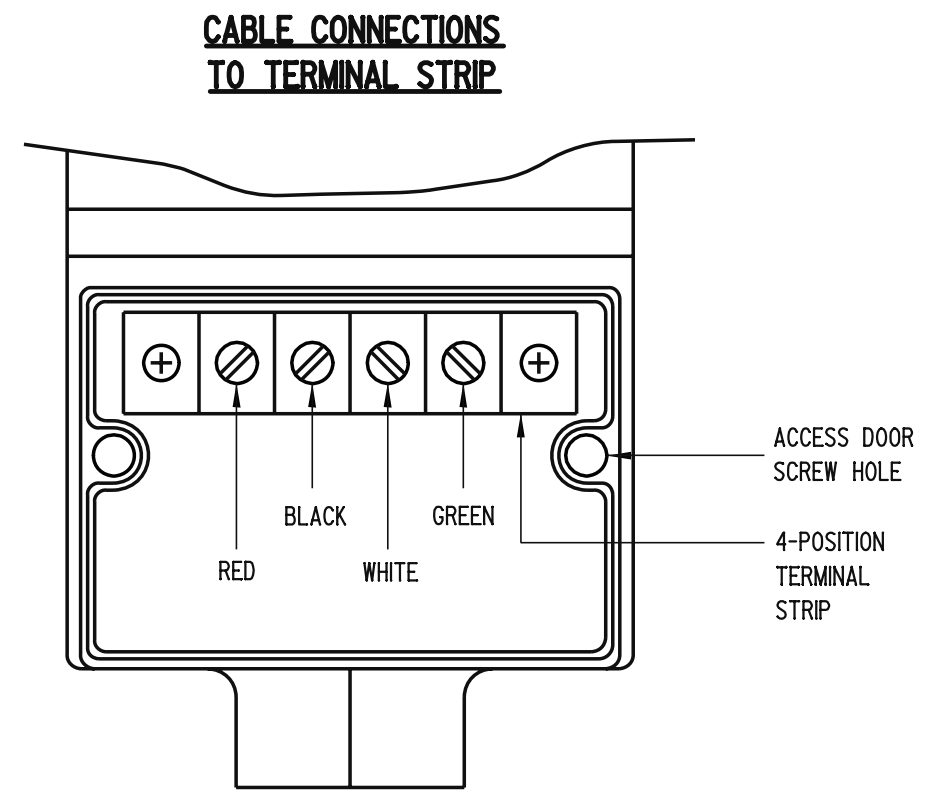
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DESIGN ENGINEER

01/14/2014
DATE






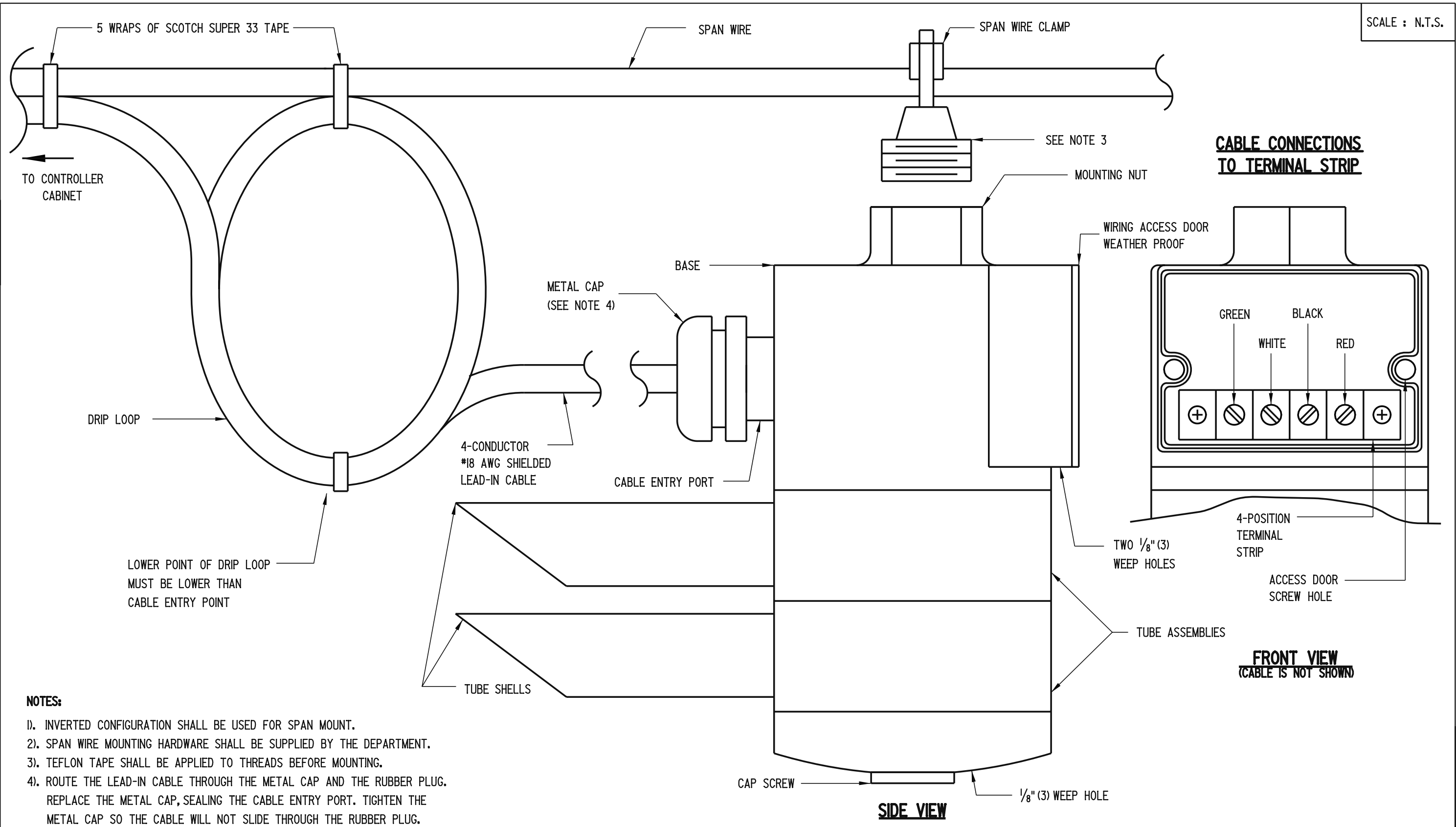
SIDE VIEW



**FRONT VIEW
(CABLE IS NOT SHOWN)**

- NOTES:**
- 1). UPRIGHT CONFIGURATION SHALL BE USED FOR MOUNTING ON MAST ARMS, SIGNAL HEAD FRAMEWORKS AND PEDESTALS.
 - 2). UPRIGHT MOUNTING HARDWARE SHALL BE SUPPLIED BY THE DEPARTMENT.
 - 3). TEFLON TAPE SHALL BE APPLIED TO THREADS BEFORE MOUNTING.
 - 4). ROUTE THE LEAD-IN CABLE THROUGH THE METAL CAP AND THE RUBBER PLUG. REPLACE THE METAL CAP, SEALING THE CABLE ENTRY PORT. TIGHTEN THE METAL CAP SO THE CABLE WILL NOT SLIDE THROUGH THE RUBBER PLUG.

 DELAWARE DEPARTMENT OF TRANSPORTATION	EMERGENCY PREEMPTION RECEIVER, UPRIGHT MOUNT		APPROVED  10/10/06 <small>CHIEF ENGINEER DATE</small>
	STANDARD NO. T-14 (2006)	SHT. 1 OF 2	RECOMMENDED  10/13/06 <small>DESIGN ENGINEER DATE</small>



NOTES:

- 1). INVERTED CONFIGURATION SHALL BE USED FOR SPAN MOUNT.
- 2). SPAN WIRE MOUNTING HARDWARE SHALL BE SUPPLIED BY THE DEPARTMENT.
- 3). TEFLON TAPE SHALL BE APPLIED TO THREADS BEFORE MOUNTING.
- 4). ROUTE THE LEAD-IN CABLE THROUGH THE METAL CAP AND THE RUBBER PLUG. REPLACE THE METAL CAP, SEALING THE CABLE ENTRY PORT. TIGHTEN THE METAL CAP SO THE CABLE WILL NOT SLIDE THROUGH THE RUBBER PLUG.



DELAWARE
DEPARTMENT OF TRANSPORTATION

EMERGENCY PREEMPTION RECEIVER, INVERTED MOUNT

STANDARD NO. T-14 (2005)

SHT. 2 OF 2

APPROVED *Carolann Wick*

CHIEF ENGINEER

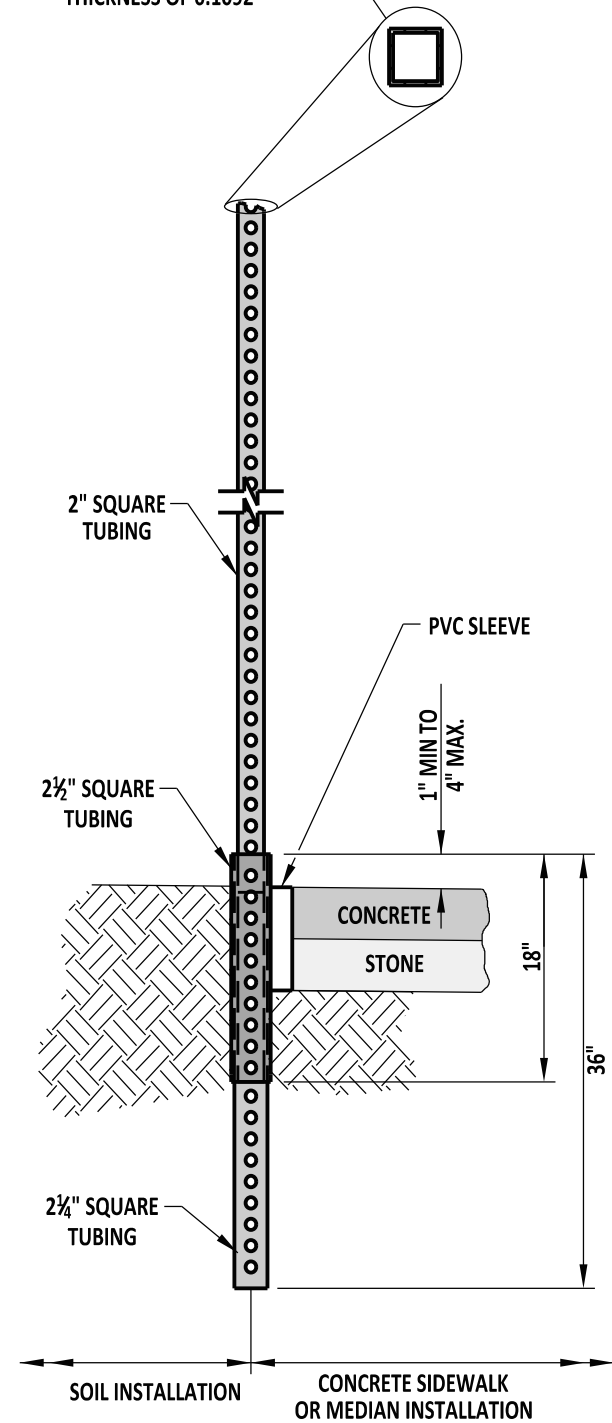
12/5/05
DATE

RECOMMENDED *James M. O'Brien*

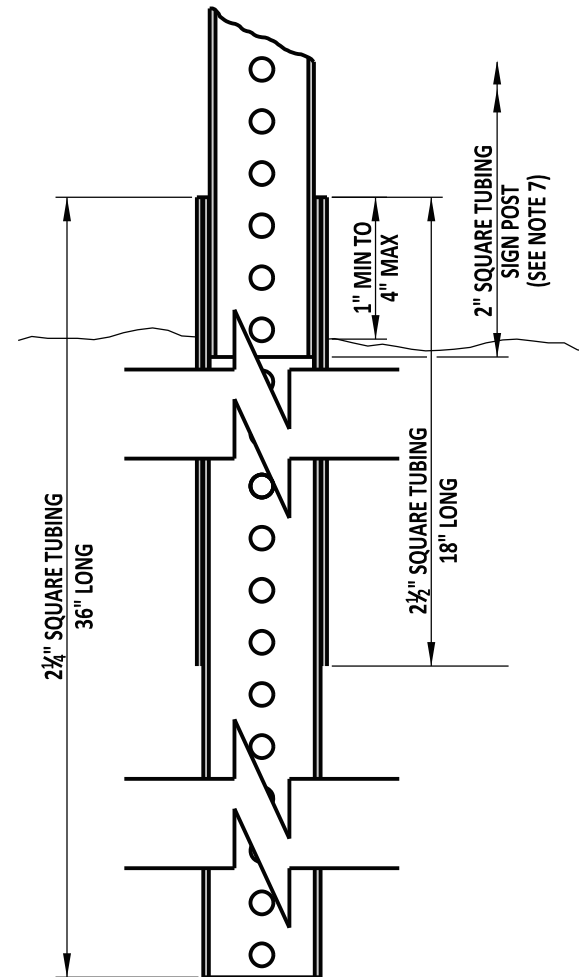
DESIGN ENGINEER

11/29/05
DATE

SQUARE POST SHALL NOT BE LESS THAN 2" x 2" WITH A WALL THICKNESS OF 0.1092"



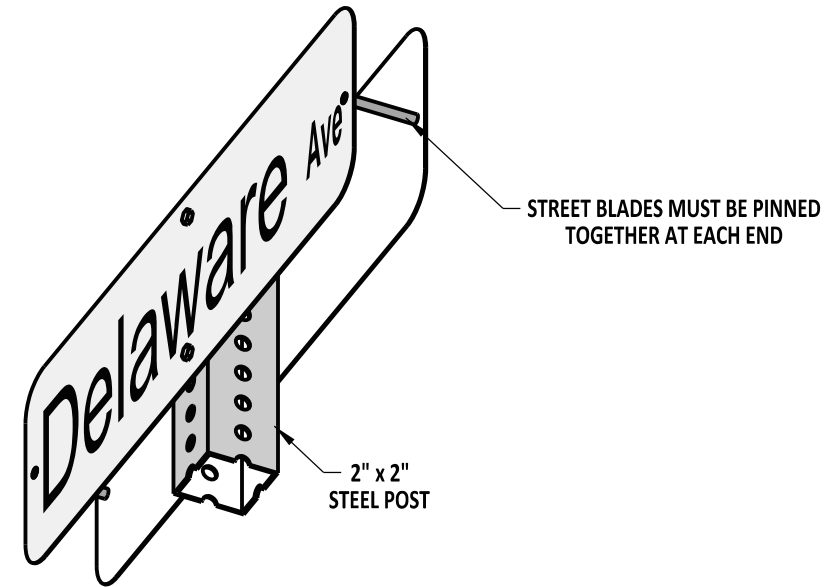
**BREAK-AWAY ASSEMBLY
ELEVATION VIEW**



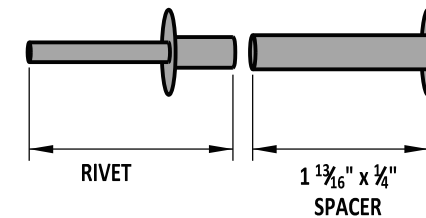
**BREAK-AWAY ASSEMBLY
SECTION VIEW**

NOTES:

- 1). SQUARE TUBES ARE TO BE FORMED FROM GALVANIZED SHEET STRUCTURAL (PHYSICAL) QUALITY, ASTM A 446, GRADE A, COATING DESIGNATION G 90, REGULAR SPANGLE, OR HOT ROLLED CARBON SHEET STEEL STRUCTURAL (PHYSICAL) QUALITY, ASTM A 57, GRADE 33.
- 2). NOMINAL OUTSIDE DIMENSIONS ARE AS FOLLOWS:
A). 2" x 2" +/- 0.008
B). 2 1/4" x 2 1/4" +/- 0.010
C). 2 1/2" x 2 1/2" +/- 0.010
- 3). ALL FOUR SIDES ARE TO HAVE EVENLY SPACED 7/16" DIAMETER HOLES ON 1" CENTERS THE ENTIRE LENGTH OF THE TUBE.
- 4). STANDARD CORNER RADIUS SHALL BE 5/32".
- 5). THE FASTENERS TO BE SUPPLIED UNDER THIS SPECIFICATION SHALL BE 5/16", GRADE 5 UNC CORNER BOLTS WITH CADMIUM OR ZINC PLATING. INSTALLATION OF SIGNS SHALL BE WITH 3/8" x 2 1/2" BOLT WITH LOCKNUT AND WASHER.
- 6). THE CONTRACTOR SHALL PROVIDE AND INSTALL PVC SLEEVES (4" INSIDE DIAMETER MINIMUM, 6" INSIDE DIAMETER MAXIMUM) IN PROPOSED CONCRETE SIDEWALKS, ISLANDS, AND MEDIANS FOR FUTURE TRAFFIC SIGN POSTS AS DIRECTED BY THE ENGINEER. THE LOWER END OF THE SLEEVE SHALL BE SET ON TOP OF THE SOIL.
- 7). THE SIGN POST SHALL EXTEND A MINIMUM OF 4" INTO THE 2 1/2" SQUARE TUBING.



TYPICAL ASSEMBLY



PIN ASSEMBLY

NOTE: THE PIN ASSEMBLY IS TO BE USED WITH THE INSTALLATION OF BACK TO BACK STREET BLADE SIGNS WITH 6" LETTERS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

BREAKWAY SIGN POST AND PIN ASSEMBLY DETAILS

STANDARD NO. T-15 (2013)

SHT. 1 OF 1

APPROVED

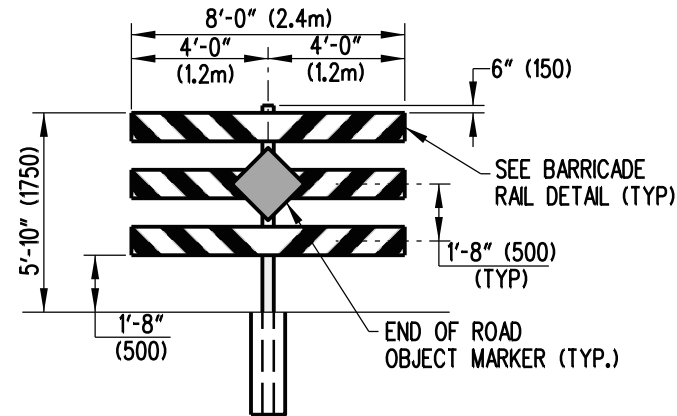
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02/14/2014
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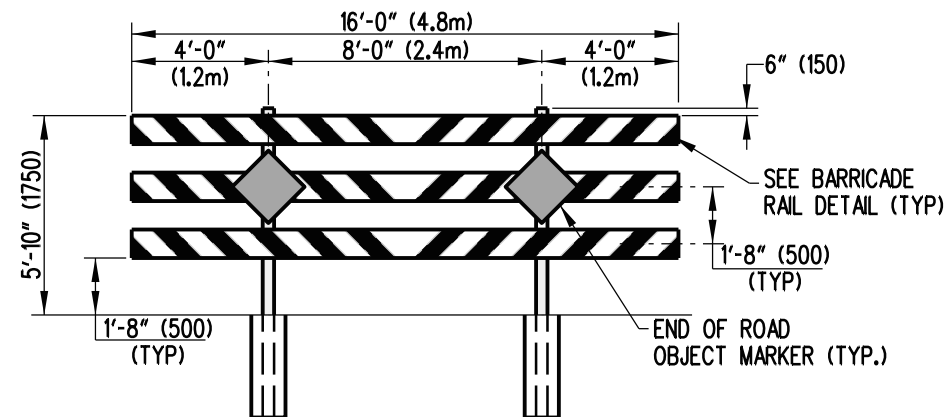
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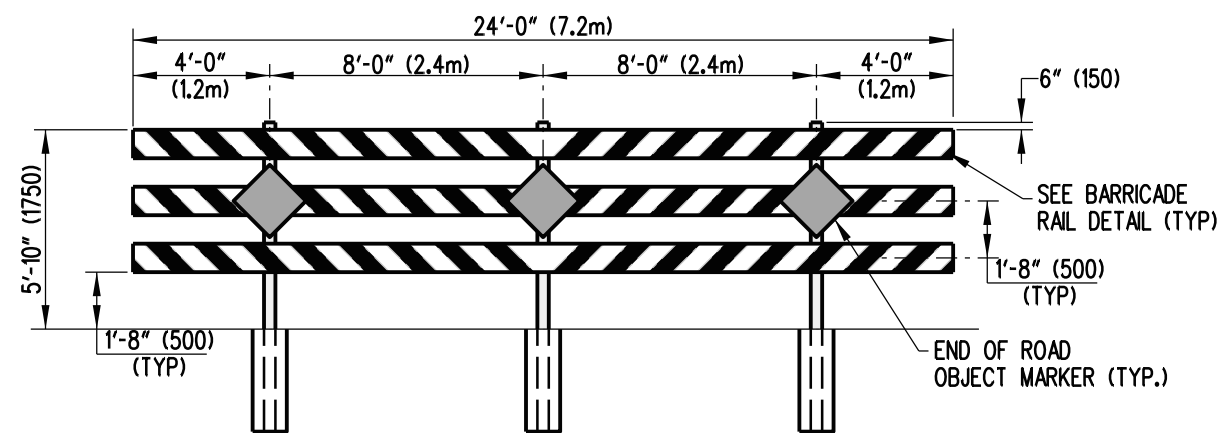
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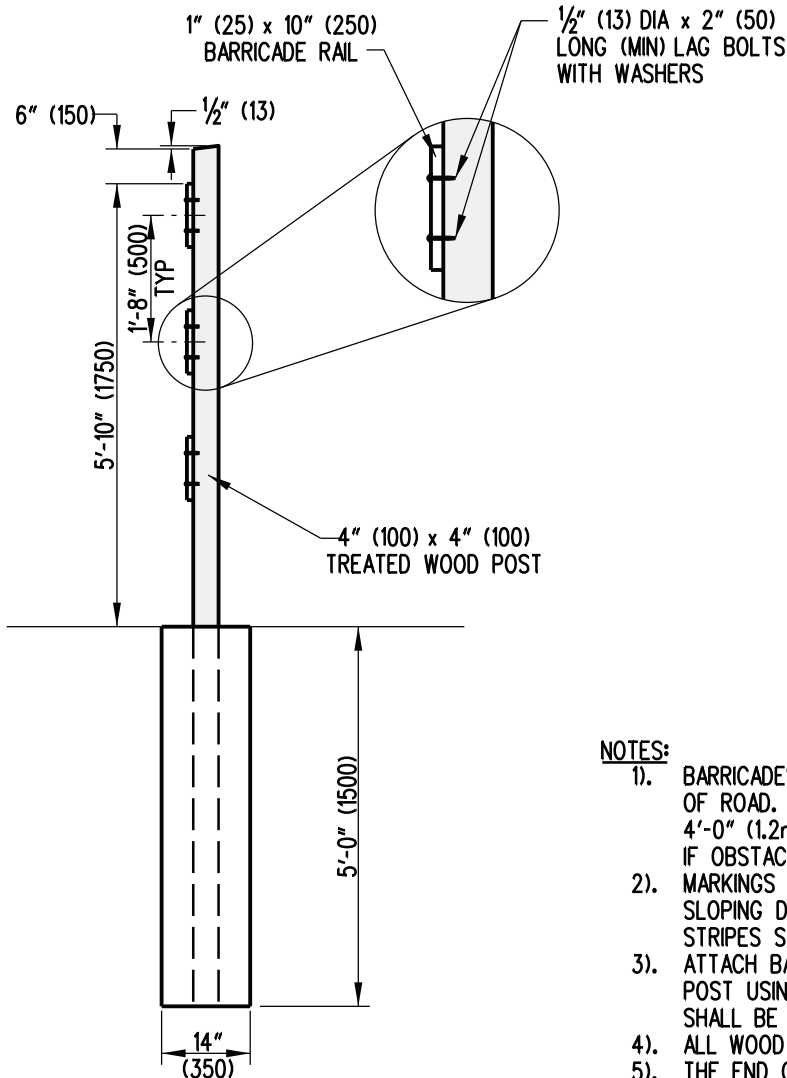
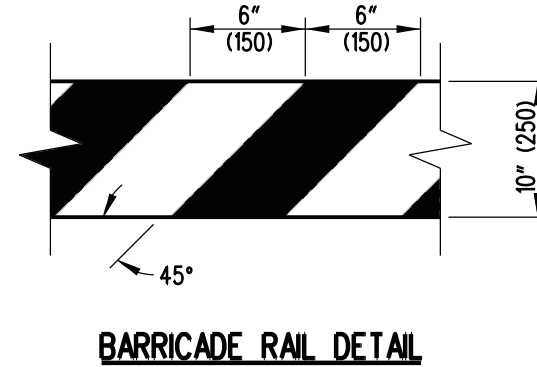
1-POST PERMANENT WOOD BARRICADE DETAIL



2-POST PERMANENT WOOD BARRICADE DETAIL



3-POST PERMANENT WOOD BARRICADE DETAIL



BARRICADE POST DETAIL

WOOD BARRICADE POST CHART

ROADWAY WIDTH	NUMBER OF BARRICADES	TYPE OF POST	OUTSIDE OVERHANG
4'-0" (1.2m)	1	1-POST	2'-0" (600)
6'-0" (1.8m)	1	1-POST	3'-0" (900)
8'-0" (2.4m)	1	1-POST	4'-0" (1.2m)
10'-0" (3m)	1	2-POST	1'-0" (300)
12'-0" (3.6m)	1	2-POST	2'-0" (600)
14'-0" (4.2m)	1	2-POST	3'-0" (900)
16'-0" (4.8m)	1	2-POST	4'-0" (1.2m)
18'-0" (5.4m)	1	3-POST	1'-0" (300)
20'-0" (6m)	1	3-POST	2'-0" (600)
22'-0" (6.6m)	1	3-POST	3'-0" (900)
24'-0" (7.2m)	1	3-POST	4'-0" (1.2m)
26'-0" (7.8m)	2	2-POST	1'-0" (300)
28'-0" (8.4m)	2	2-POST	2'-0" (600)
30'-0" (9m)	2	2-POST	3'-0" (900)
32'-0" (9.6m)	2	2-POST	4'-0" (1.2m)
34'-0" (10.2m)	2	2-POST	1'-0" (300)
36'-0" (10.8m)	2	3-POST	2'-0" (600)
38'-0" (11.4m)	2	3-POST	3'-0" (900)
40'-0" (12m)	2	3-POST	4'-0" (1.2m)
42'-0" (12.6m)	2	3-POST	1'-0" (300)
44'-0" (13.2m)	2	3-POST	2'-0" (600)
46'-0" (13.8m)	2	3-POST	3'-0" (900)
48'-0" (14.4m)	2	3-POST	4'-0" (1.2m)
50'-0" (15m)	3	(2) 2-POST <ENDS> (1) 3-POST <CENTER>	1'-0" (300)

NOTES:

- BARRICADES SHALL BE PLACED COMPLETELY ACROSS THE ROADWAY FROM EDGE OF ROAD TO EDGE OF ROAD. IF NECESSARY, THE BARRICADE OVERHANG BEYOND THE OUTSIDE POSTS (TYPICALLY 4'-0" (1.2m)) MAY BE REDUCED TO THE "OUTSIDE OVERHANG" VALUE INDICATED IN THE TABLE ABOVE IF OBSTACLES ARE PRESENT BEYOND THE ROADWAY EDGE.
- MARKINGS FOR BARRICADE RAILS SHALL BE ALTERNATING FLUORESCENT RED AND WHITE STRIPES, SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES, USING PRISMATIC, RETROREFLECTIVE SHEETING. STRIPES SHALL SLOPE DOWNWARD TOWARDS THE CENTER OF THE CLOSURE.
- ATTACH BARRICADE RAIL AND OBJECT MARKER TO THE 4" (100) x 4" (100) PRESSURE TREATED WOOD POST USING LAG BOLTS (2" (50) LONG, MINIMUM) WITH WASHERS. TWO BOLTS PER RAIL PER POST SHALL BE REQUIRED.
- ALL WOOD SHALL BE PRESSURE TREATED.
- THE END OF ROAD OBJECT MARKER (MUTCD CODE OM4-3) SHALL BE 18" (450) x 18" (450) WITH RED PRISMATIC, RETROREFLECTIVE SHEETING.
- TREATED WOOD POST SHALL BE PLACED IN PRE-DUG HOLE, BACKFILLED USING SUITABLE MATERIAL, AND TAMPED THOROUGHLY TO PROVIDE A RIGID SUB-SURFACE CONDITION AROUND THE POST.
- BARRICADE RAILS MAY BE CONSTRUCTED USING PLASTIC OR WOOD AND SHOULD NOT BE METAL.
- LONGER WIDTH CLOSERS CAN BE ACCOMMODATED BY VARIOUS COMBINATIONS OF 2-POST AND 3-POST BARRICADES.



DELAWARE
DEPARTMENT OF TRANSPORTATION

WOOD BARRICADE DETAIL

STANDARD NO.

T-16 (2010)

SHT. 1

OF 1

APPROVED

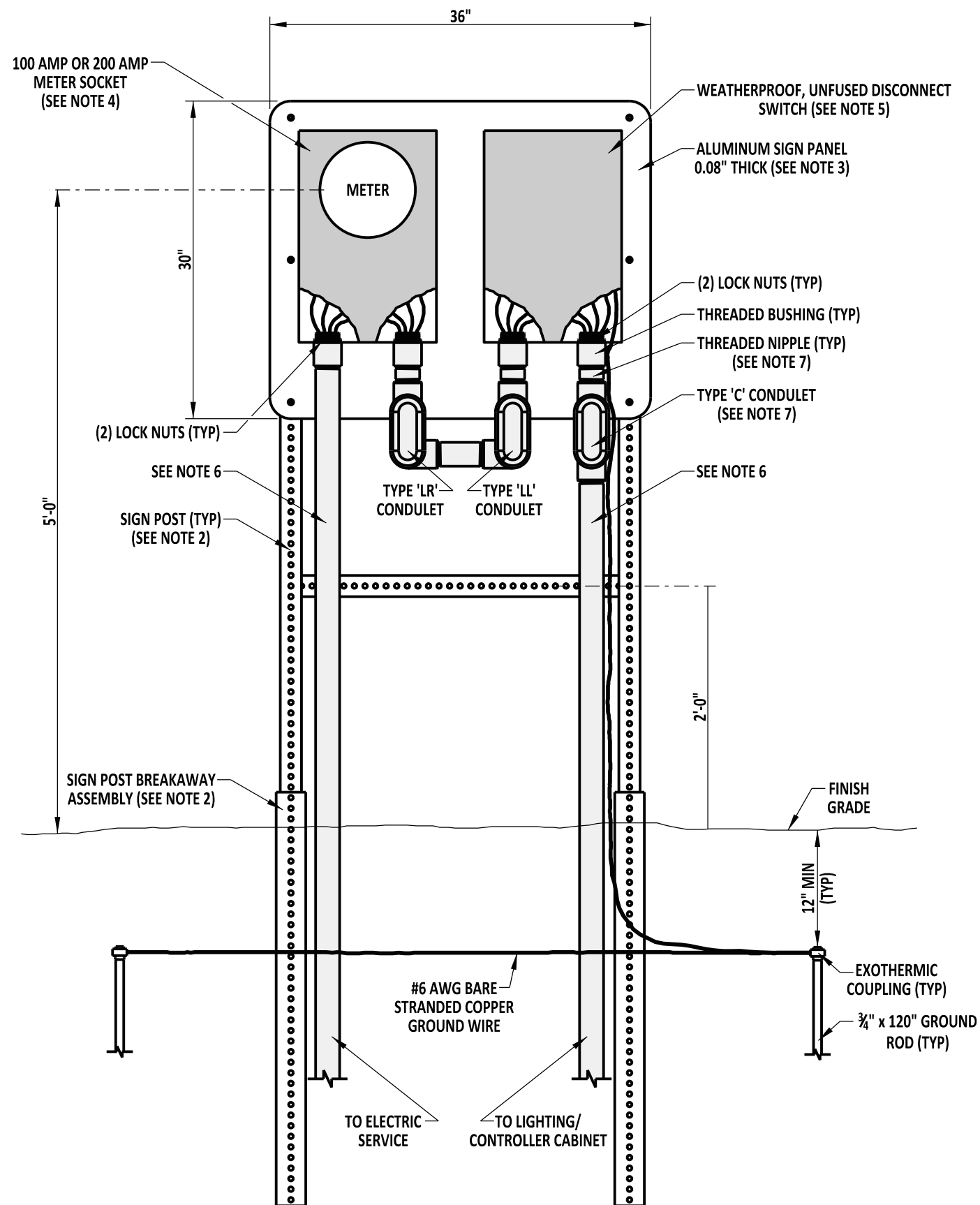
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CHIEF ENGINEER

12/28/2010
DATE

RECOMMENDED


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DESIGN ENGINEER

12/27/2010
DATE



SCALE : NTS

- NOTES:**
- 1). INSTALLATION OF EQUIPMENT BETWEEN SERVICE PEDESTAL AND LIGHTING/CONTROLLER CABINET SHALL BE AS PER CONTRACT DRAWINGS/DETAILS.
 - 2). SEE DETAIL T-15, SHEET 1, FOR SIGN POST AND BREAKAWAY ASSEMBLY DETAILS.
 - 3). ATTACH ALUMINUM PANEL TO SIGN POSTS WITH (6) 5/16" x 2 1/2" LONG GRADE 5 BOLTS, FLAT WASHERS, AND NYLON LOCK NUTS, 3 ON EACH SIDE.
 - 4). MOUNT METER SOCKET TO ALUMINUM PANEL WITH (4) 5/16" x 3/4" STAINLESS STEEL BOLTS AND NYLON LOCK NUTS.
 - 5). MOUNT DISCONNECT SWITCH TO ALUMINUM PANEL WITH (4) 5/16" x 3/4" STAINLESS STEEL BOLTS AND NYLON LOCK NUTS.
 - 6). ALL CONDUIT, CONDULETS AND OTHER ASSOCIATED PIECES SHALL BE 2" GALVANIZED UNLESS SPECIFIED DIFFERENTLY ON THE PLANS OR BY LOCAL UTILITY COMPANY.
 - 7). FOR SIGNAL AND 'ITMS' COMPONENT INSTALLATIONS, TYPE 'C' CONDULET SHALL HOUSE INLINE FUSE KITS FOR EACH DEVICE POWERED.

 DELAWARE DEPARTMENT OF TRANSPORTATION	ELECTRICAL SERVICE PEDESTAL - LIGHTING, SIGNAL & 'ITMS' COMPONENT INSTALLATIONS				APPROVED	SIGNATURE ON FILE	02/14/2014	
	STANDARD NO.	T-17 (2013)	SHT.	1	OF	1	RECOMMENDED	SIGNATURE ON FILE