



# 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 (2001)	- BARRIER LEGEND
B-1	- GUARDRAIL APPLICATIONS
	(2002) - 1 PLANS - (TYPE 1, TYPE 2, AND TYPE 3)
	(2004) - 2 ELEVATIONS AND SPLICE DETAIL
	(2002) - 3 SECTION VIEWS
	(2007) - 4 GRADING FOR GUARDRAIL END TREATMENT, TYPE 1
	(2007) - 5 GRADING FOR GUARDRAIL END TREATMENT, TYPE 2
	(2007) - 6 GRADING FOR GUARDRAIL END TREATMENT, TYPE 3
B-2 (2002)	- GUARDRAIL OVER CULVERTS, TYPE 1
B-3 (2002)	- GUARDRAIL OVER CULVERTS, TYPE 2
B-4 (2007)	- CURVED GUARDRAIL SECTION
B-5 (2002)	- END ANCHORAGE
B-6	- BURIED END SECTION
	(2002) - 1 BURIED END SECTION
	(2002) - 2 BURIED END SECTION
	(2002) - 3 POST, CONCRETE BLOCK, & RUBRAIL ANCHOR DETAILS
B-7	- GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1
	(2005) - 1 PLAN, ELEVATION, AND SECTIONS
	(2001) - 2 WOOD BLOCKOUT, RUB RAIL WOOD BLOCKS, BEARING PLATE, RUB RAIL TO BARRIER CONNECTION DETAILS
	(2001) - 3 BENT PLATE RUB RAIL DETAILS
B-8	- GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2
	(2005) - 1 PLAN, ELEVATION, AND SECTIONS
	(2001) - 2 NOTES, BENT RAIL DETAILS, BLOCK SCHEDULE
B-9 (2002)	- GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE
B-10 (2002)	- BRIDGE RAIL RETROFIT, TYPE 1
B-11	- BRIDGE RAIL RETROFIT, TYPE 2
	(2002) - 1 PLAN, SECTION A-A, BASE PLATE DETAIL
	(2001) - 2 BASE PLATE DETAIL AND STEEL GUARDRAIL POST
B-12 (2001)	- BRIDGE RAIL RETROFIT, TYPE 3
B-13	- HARDWARE
	(2004) - 1 W-BEAM DETAILS
	(2004) - 2 W-BEAM STEEL POST AND OFFSET BLOCK
	(2004) - 3 W-BEAM TERMINAL CONNECTOR
	(2004) - 4 THRIE BEAM DETAILS
	(2004) - 5 THRIE BEAM STEEL POST AND OFFSET BLOCK
	(2004) - 6 W-THRIE BEAM TRANSITION SECTION
	(2004) - 7 WOOD BLOCK, SOIL PLATE, SHORT WOOD BREAKAWAY POST, STEEL TUBE, LONG WOOD BREAKAWAY POST
	(2004) - 8 SWAGED CABLE AND RELATED HARDWARE ASSEMBLY
	(2004) - 9 REFLECTORIZED WASHER AND BEARING PLATE DETAIL
	(2004) - 10 GUARDRAIL BOLT & RECESSED NUT
	(2004) - 11 5/8" (16) HEX BOLT, HEX NUT, & STEEL WASHER, HIGH-STRENGTH STRUCTURAL HEX BOLT & HEX NUT
	(2004) - 12 15/16" (24) HEX NUT & STEEL WASHER, 5/8" (16) CARRIAGE BOLT, HEX NUT, & STEEL WASHER
	(2005) - 13 GUARDRAIL MOUNTED RAIL •DETAIL ON HOLD•
B-14	- CONCRETE SAFETY BARRIER (F SHAPE)
	(2001) - 1 TYPICAL CAST IN PLACE OR SLIP FORM CONSTRUCTION
	(2001) - 2 TYPICAL PRE-CAST CONSTRUCTION
	(2001) - 3 SLOTTED PLATE CONNECTION DETAILS

SECTION I - BARRIER (CONT'D)

SHEET NO.	NAME
B-15	— PORTABLE CONCRETE SAFETY BARRIER (F SHAPE)
(2001) - 1	PLAN, ELEVATION, AND SECTION VIEW •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 2	CURVE SECTION •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 3	TAPERED END SECTION •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 4	TYPICAL REINFORCEMENT DETAILS •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 4	JOINT CONNECTION DETAILS •DETAIL DELETED - SEE SPECIFICATIONS•

SECTION II - CURB & GUTTER

SHEET NO.	NAME
C-1 (2007)	— P.C.C. CURB, P.C.C. CURB & GUTTER, AND HOT-MIX CURB
C-2	— CURB RAMPS
(2006) - 1	TYPE 1
(2006) - 2	TYPES 2, 3, & 4
(2006) - 3	SECTIONS FOR TYPES 2, 3, & 4
(2006) - 4	TYPE 5
C-3 (2005)	— ENTRANCES
C-4	— CURB OPENINGS
(2001) - 1	TYPES A, B, & C
(2001) - 2	TYPES D & E
(2001) - 3	TYPES F & G

SECTION III - DRAINAGE

SHEET NO.	NAME
D-1	— 6' SAFETY END STRUCTURE
(2001) - 1	DETAIL VIEWS
(2001) - 2	SCHEDULES
D-2	— 10' SAFETY END STRUCTURE
(2001) - 1	DETAIL VIEWS
(2001) - 2	SCHEDULES
D-3	— SAFETY GRATES
(2005) - 1	SAFETY END STRUCTURE GRATE & ASSEMBLY DETAIL
(2007) - 2	PERSONNEL SAFETY GRATE FOR PIPE INLET DETAIL
D-4 (2007)	— INLET BOX DETAILS
D-5	— DRAINAGE INLET DETAILS
(2002) - 1	DRAINAGE INLET ASSEMBLY
(2007) - 2	DRAINAGE INLET FRAME AND GRATES
(2004) - 3	DRAINAGE INLET TOP UNITS
(2006) - 4	DRAINAGE INLET COVER SLAB DETAILS
(2006) - 5	DOUBLE INLET COVER SLAB DETAILS
(2004) - 6	DRAINAGE INLET 34" (865) x 24" (610) DETAILS
(2002) - 7	DRAINAGE INLET 34" (865) x 18" (455) DETAILS
(2002) - 8	LAWN INLET DETAIL



SECTION III - DRAINAGE (CONT'D)

SHEET NO.	NAME
D-6	— MANHOLE DETAILS
	(2007) - 1 BOX MANHOLE ASSEMBLY
	(2000) - 2 ROUND MANHOLE ASSEMBLY
	(2000) - 3 MANHOLE FRAME AND COVER
	(2007) - 4 BOX MANHOLE COVER SLAB
D-7	— JUNCTION BOX DETAILS
	(2007) - 1 JUNCTION BOX ASSEMBLY
	(2007) - 2 JUNCTION BOX COVER SLAB
D-8 (2000)	— PIPE BEDDING
D-9 (2006)	— PERFORATED PIPE UNDERDRAIN
D-10 (2007)	— PIPE PLUGGING DETAIL

SECTION IV - EROSION

SHEET NO.	NAME
E-1 (2000)	— INCREMENTAL STABILIZATION
E-2 (2006)	— SILT FENCE
E-3 (2005)	— DRAINAGE INLET SEDIMENT CONTROL
E-4 (2006)	— CURB INLET SEDIMENT CONTROL
E-5 (2006)	— STONE CHECK DAM
E-6 (2005)	— SEDIMENT TRAP
E-7 (2005)	— SEDIMENT TRAP, USING DRAINAGE INLET AS OUTLET
E-8	— RISER PIPE ASSEMBLY FOR SEDIMENT TRAP
	(2006) - 1 ELEVATION
	(2006) - 2 TRASH HOOD DETAILS
E-9 (2005)	— EROSION CONTROL BLANKET APPLICATIONS
E-10 (2005)	— RIPRAP DITCH
E-11 (2005)	— TEMPORARY SWALE
E-12 (2005)	— PERIMETER DIKE/SWALE
E-13 (2005)	— EARTH DIKE
E-14 (2005)	— TEMPORARY SLOPE DRAIN
E-15 (2005)	— STILLING WELL
E-16 (2005)	— SUMP PIT, TYPE 1 & 2
E-17 (2005)	— DEWATERING BASIN
E-18 (2005)	— GEOTEXTILE-LINED CHANNEL DIVERSION
E-19 (2005)	— SANDBAG DIVERSION
E-20 (2005)	— SANDBAG DIKE
E-21 (2005)	— STABILIZED CONSTRUCTION ENTRANCE
E-22 (2006)	— SKIMMER DEWATERING DEVICE
E-23	— TURBIDITY CURTAIN
	(2005) - 1 FLOATING TURBIDITY CURTAIN
	(2005) - 2 STAKED TURBIDITY CURTAIN
E-24 (2005)	— PORTABLE SEDIMENT TANK
E-25 (2005)	— TURF REINFORCEMENT MAT APPLICATIONS
E-26 (2006)	— RIPRAP ENERGY DISSIPATOR DETAIL





SECTION V - LANDSCAPING

SHEET NO.	NAME
L-1	— PLANTING DETAILS .....
(2006) - 1	ROADSIDE SHRUB PLANTING DETAIL .....
(2006) - 2	TREE PLANTING DETAILS .....
(2006) - 3	PERENNIAL/GROUND COVER PLANTING DETAIL .....

SECTION VI - MISCELLANEOUS

SHEET NO.	NAME
M-1 (2001)	— RIGHT-OF-WAY FENCE .....
M-2 (2001)	— CONCRETE MONUMENT .....
M-3 (2005)	— REMOVABLE BOLLARD .....
M-4 (2007)	— BIKE RACK .....
M-5 (2004)	— WOOD RAIL FENCE .....
M-6 (2004)	— PATTERNED HOT-MIX OR CONCRETE & BRICK PAVER .....
M-7 (2006)	— CHAIN LINK FENCE DETAILS .....
M-8 (2007)	— P.C.C. PARKING BUMPER .....

SECTION VII - PAVEMENT

SHEET NO.	NAME
P-1	— P.C.C. PAVEMENT .....
(2001) - 1	SLAB PLAN (WITH DOWEL AND TIE LOCATIONS) .....
(2004) - 2	JOINT AND SEALANT DETAILS .....
(2001) - 3	W BOLT, HOOK BOLT, DOWEL & TIE BAR .....
(2001) - 4	DOWEL SUPPORT BASKET .....
(2001) - 5	DOWEL & TIE BAR PLACEMENT TOLERANCES .....
P-2	— P.C.C. PAVEMENT PATCHING .....
(2001) - 1	FULL DEPTH PATCH, PLAN VIEW .....
(2004) - 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 BAR PLACEMENT TOLERANCES .....
(2001) - 5	PARTIAL DEPTH PATCH, PLAN AND SECTION VIEWS .....



SECTION VIII - TRAFFIC

SHEET NO.	NAME
T-1 (2005)	— CONDUIT JUNCTION WELL, TYPES 1,2, AND 3
T-2 (2005)	— CONDUIT JUNCTION WELL, TYPE 4
T-3 (2005)	— CONDUIT JUNCTION WELL, TYPE 5
T-4 (2005)	— CABINET BASES (TYPES "M" AND "P")
T-5	— POLE BASES
	(2005) - 1 ROUND BASE, SQUARE BASE
	(2005) - 2 TYPICAL SECTION (BASES 1, 2, 2A, 2B, 3, 3A, 3B, AND 7), TYPICAL SECTION (BASE 4), TYPICAL INSTALLATION (BASES 1, 2, 2A, 2B, 3, 3A, 3B, 4, AND 7)
	(2005) - 3 TYPICAL SECTION (BASES 5 AND 6), ANCHOR BOLT DATA CHART AND DETAILS
T-6 (2005)	— SPECIAL POLE BASE
T-7 (2005)	— SIGN FOUNDATION
T-8 (2005)	— LOOP DETECTOR TO CONDUIT JUNCTION WELL CONNECTION
T-9 (2005)	— TYPE #1 LOOP DETECTOR
T-10 (2005)	— TYPE #2 LOOP DETECTOR
T-11	— MESSENGER WIRE ATTACHMENT
	(2005) - 1 INTERMEDIATE MESSENGER WIRE ATTACHMENT ON WOOD POLES
	(2005) - 2 ANGULAR INTERMEDIATE MESSENGER WIRE ATTACHMENT
T-12	— MESSENGER WIRE ATTACHMENT
	(2005) - 1 SPAN WIRE ATTACHMENT BETWEEN POLES
	(2005) - 2 DEAD END MESSENGER WIRE ATTACHMENT
T-13	— CONDUIT JUNCTION WELLS
	(2005) - 1 TYPE 4
	(2006) - 2 TYPE 7
	(2006) - 3 TYPES 8 & 10
T-14	— EMERGENCY PREEMPTION RECEIVER
	(2006) - 1 UPRIGHT MOUNT
	(2005) - 2 INVERTED MOUNT



BARRIER LEGEND	
ITEM NO.	DESCRIPTION
①	W-BEAM
②	W6 X 9 (W150 x 13.5) STEEL POST
③	WOOD OFFSET BLOCK
④	SPLICE - REQUIRES EIGHT(8) 5/8" (16) GUARDRAIL BOLTS (L=1 1/4" (35)) WITH RECESS NUTS, AND ONE(1) 5/8" (16) GUARDRAIL BOLT (L=10" (255)) WITH RECESS NUT.
⑤	W-BEAM TERMINAL CONNECTOR
⑥	5/8" (16) GUARDRAIL BOLT (L=1 1/4" (35)) AND RECESS NUT
⑦	5/8" (16) GUARDRAIL BOLT (L=10" (255)) AND RECESS NUT
⑧	5/8" (16) GUARDRAIL BOLT (L=10" (255)), STEEL WASHER, AND RECESS NUT
⑨	7/8" (22) HIGH STRENGTH STRUCTURAL HEX BOLT (L=VARIES) AND HEX NUT
⑩	5/8" (16) CARRIAGE BOLT (L=VARIES), STEEL WASHER, AND HEX NUT
⑪	BEARING PLATE



DELAWARE  
DEPARTMENT OF TRANSPORTATION

BARRIER LEGEND

STANDARD NO.

B-L (2001)

SHT.

1

OF

1

APPROVED

*Ryan M. Harkins*  
CHIEF ENGINEER

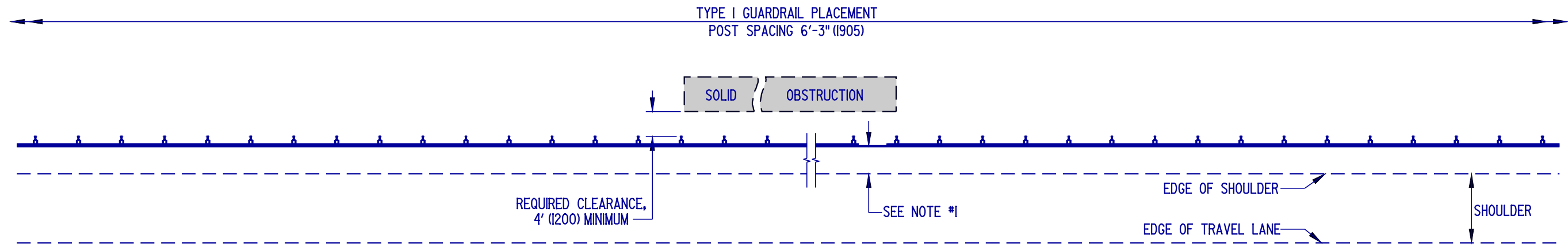
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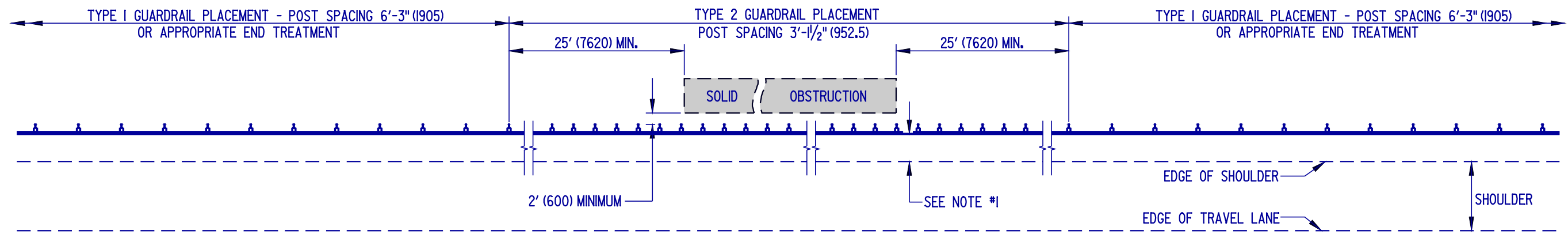
*Muhammad Alghamdi*  
DESIGN ENGINEER

6/18/01  
DATE

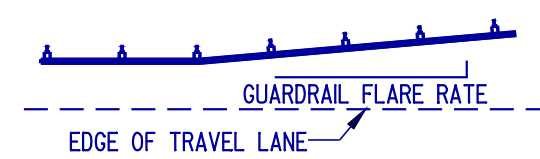
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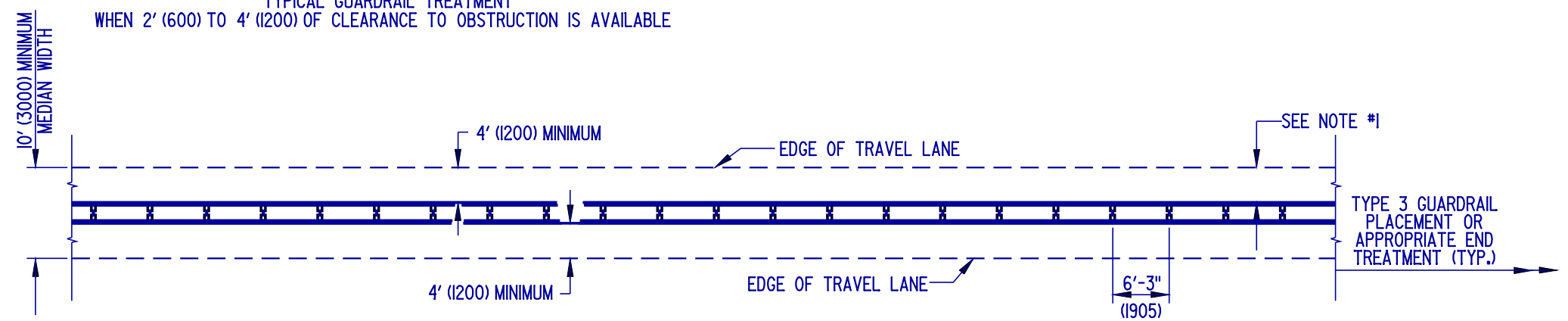
**TYPE 1 GUARDRAIL**  
TYPICAL GUARDRAIL TREATMENT  
WHEN THE REQUIRED 4' (1200) CLEARANCE TO OBSTRUCTION IS AVAILABLE



**TYPE 2 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 GUARDRAIL**  
TYPICAL GUARDRAIL TREATMENT WHEN A MINIMUM OF  
10' (3000) IS AVAILABLE FOR MEDIAN

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 REFLECTOR EVERY FIFTH POST.

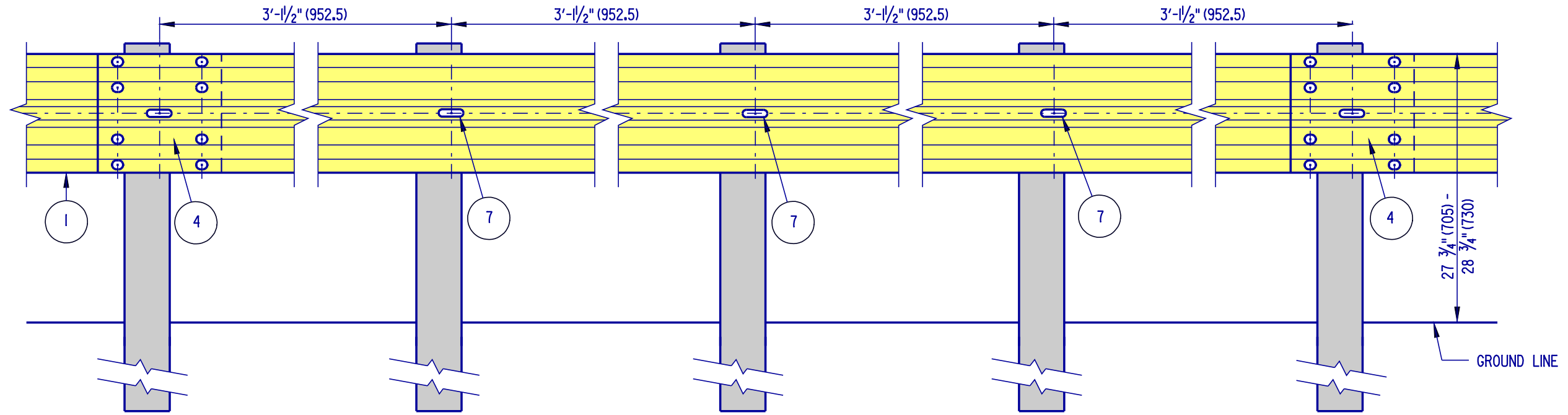


DELAWARE  
DEPARTMENT OF TRANSPORTATION

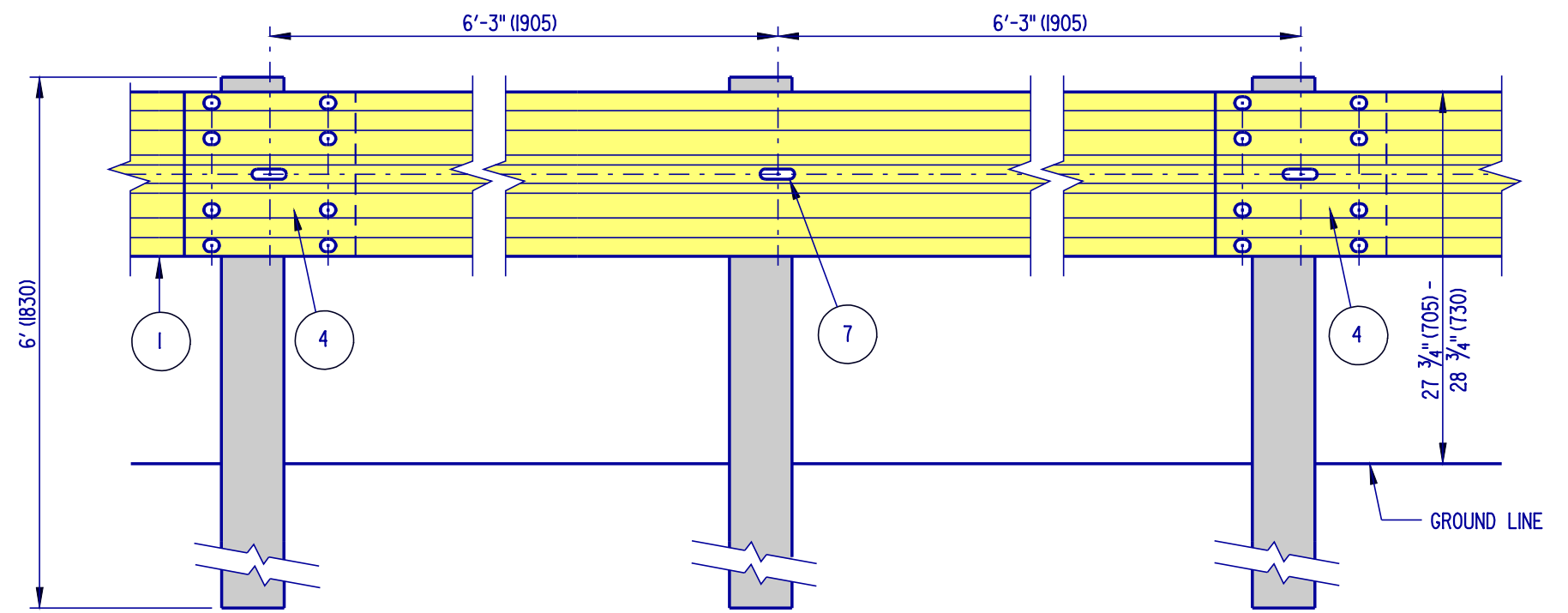
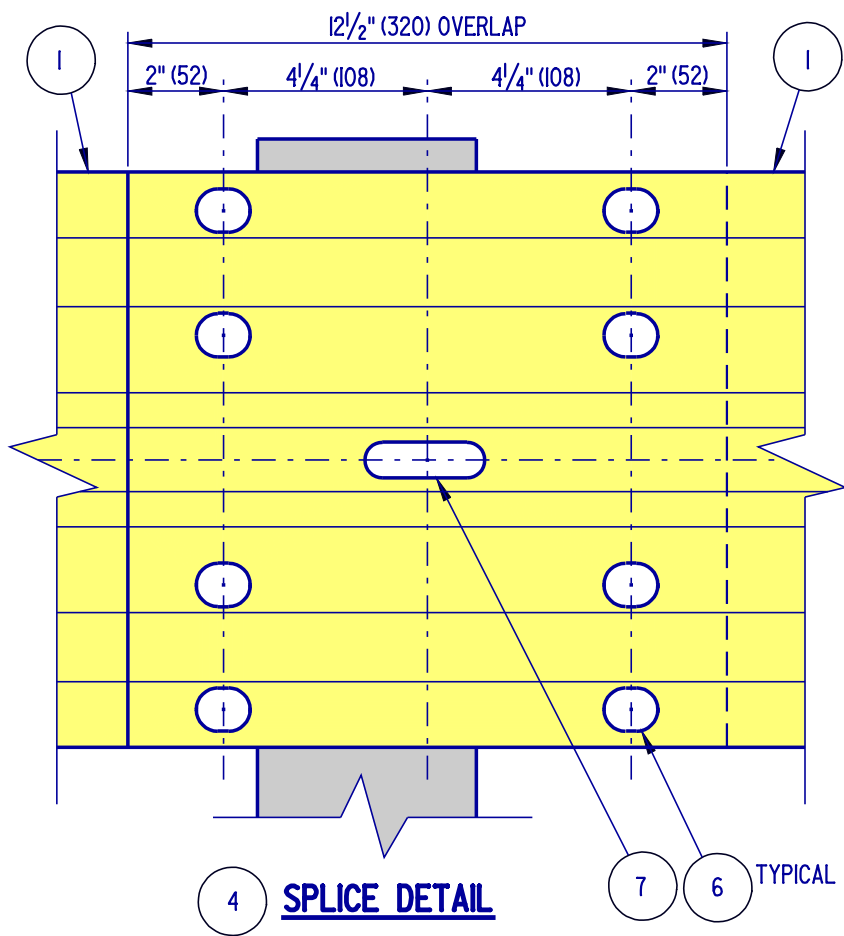
GUARDRAIL APPLICATIONS  
STANDARD NO. B-1 (2004) SHT. 1 OF 6

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

SCALE : N.T.S.

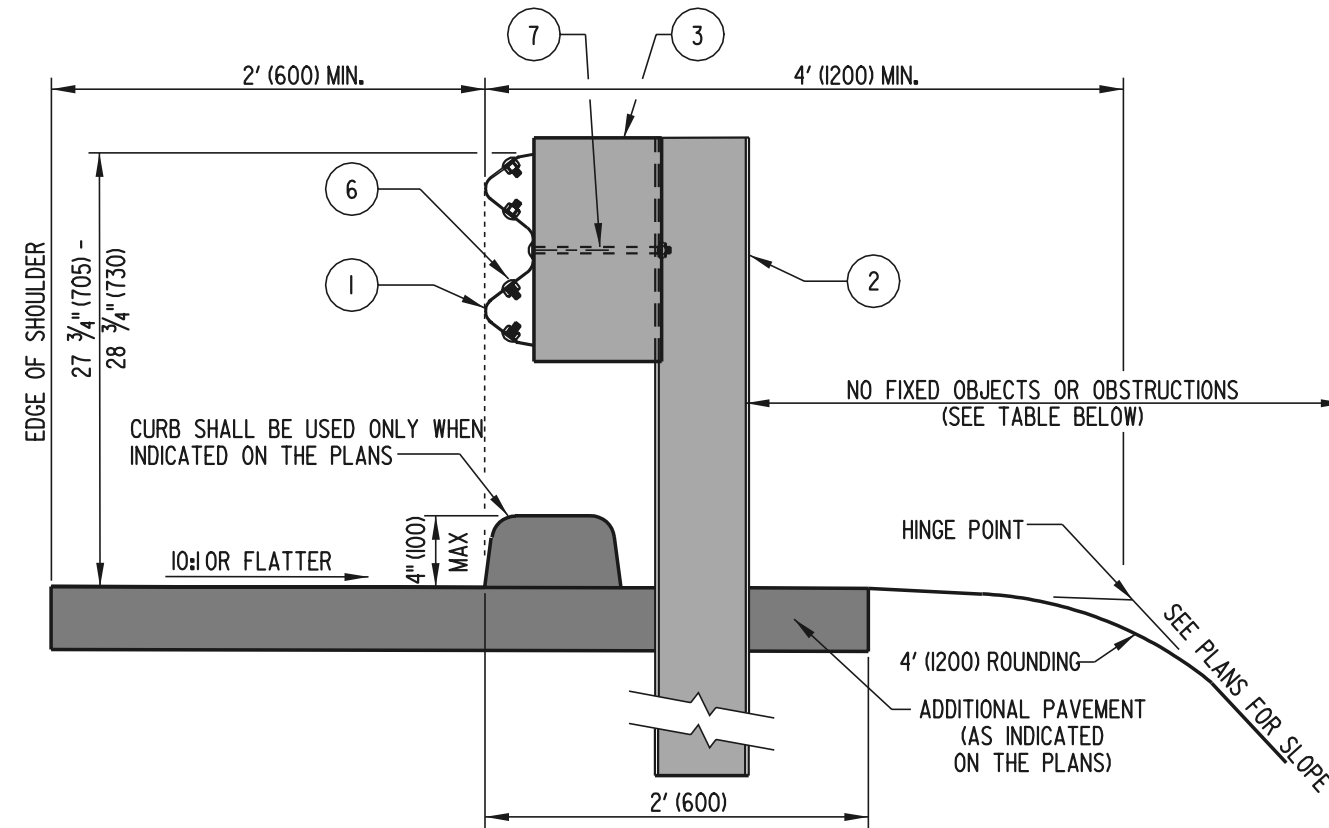


**TYPE 2**



**TYPE 10R 3**

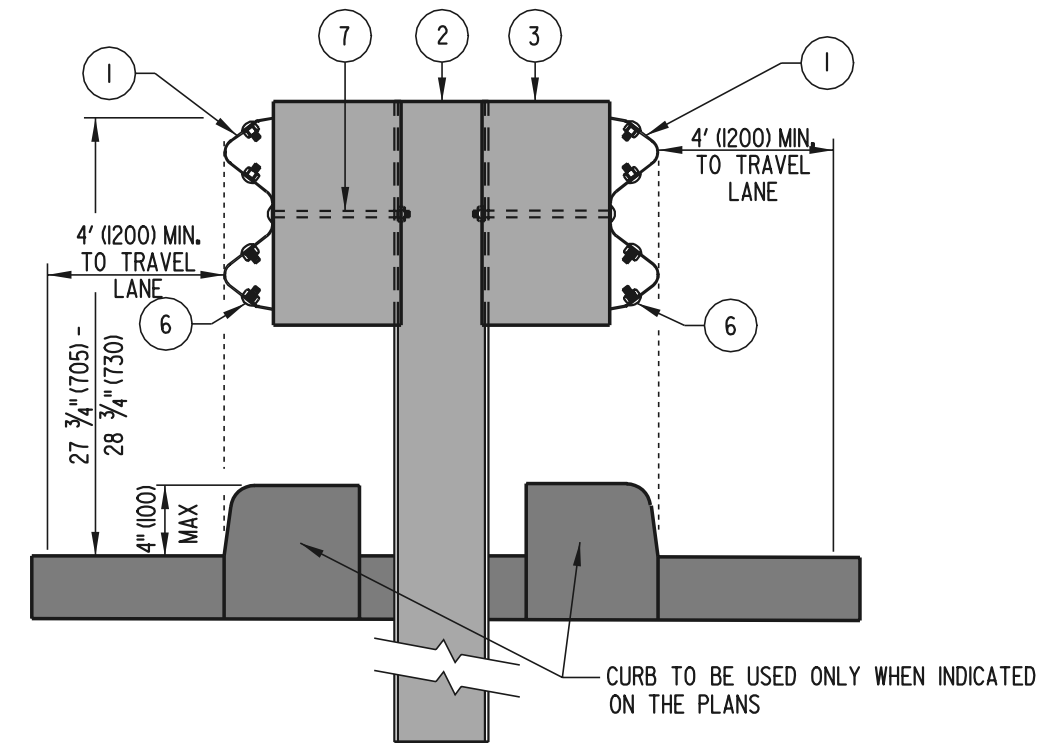
NOTE : OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.



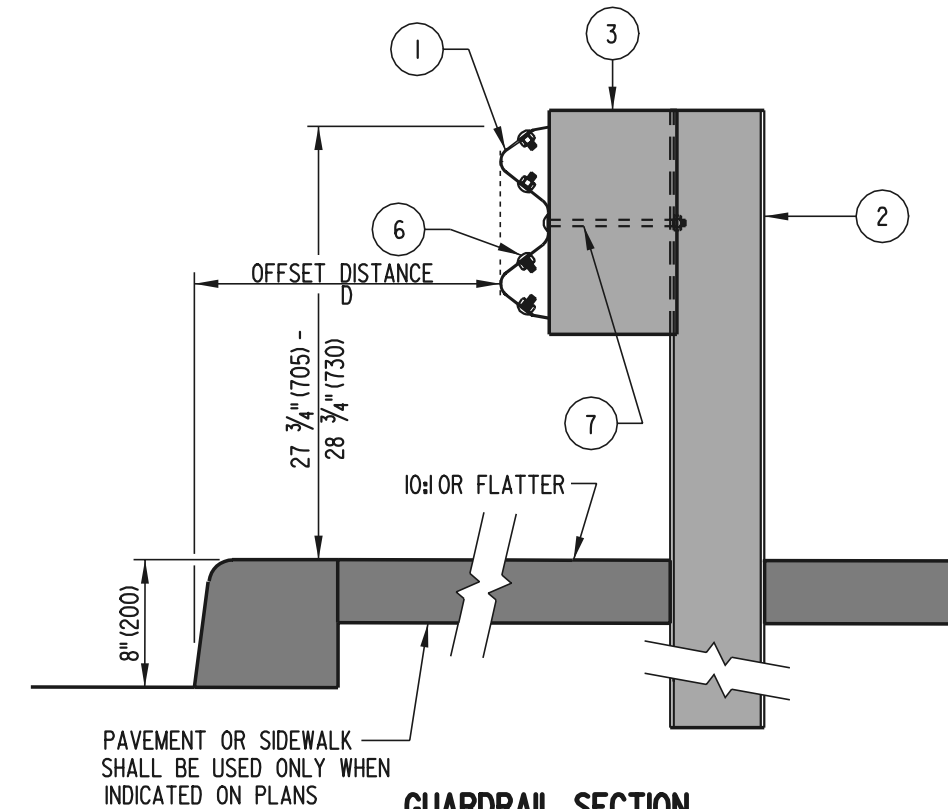
**GUARDRAIL SECTION**  
(RURAL SHOULDER APPLICATION)

TYPE	POST SPACING	CLEAR AREA BEHIND POST
1	6' 3" (1905)	4' (1200) MIN
2	3' 1 1/2" (952.5)	2' (600) MIN

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



**GUARDRAIL SECTION**  
(MEDIAN APPLICATION)



**GUARDRAIL SECTION**  
(URBAN SHOULDER APPLICATION)



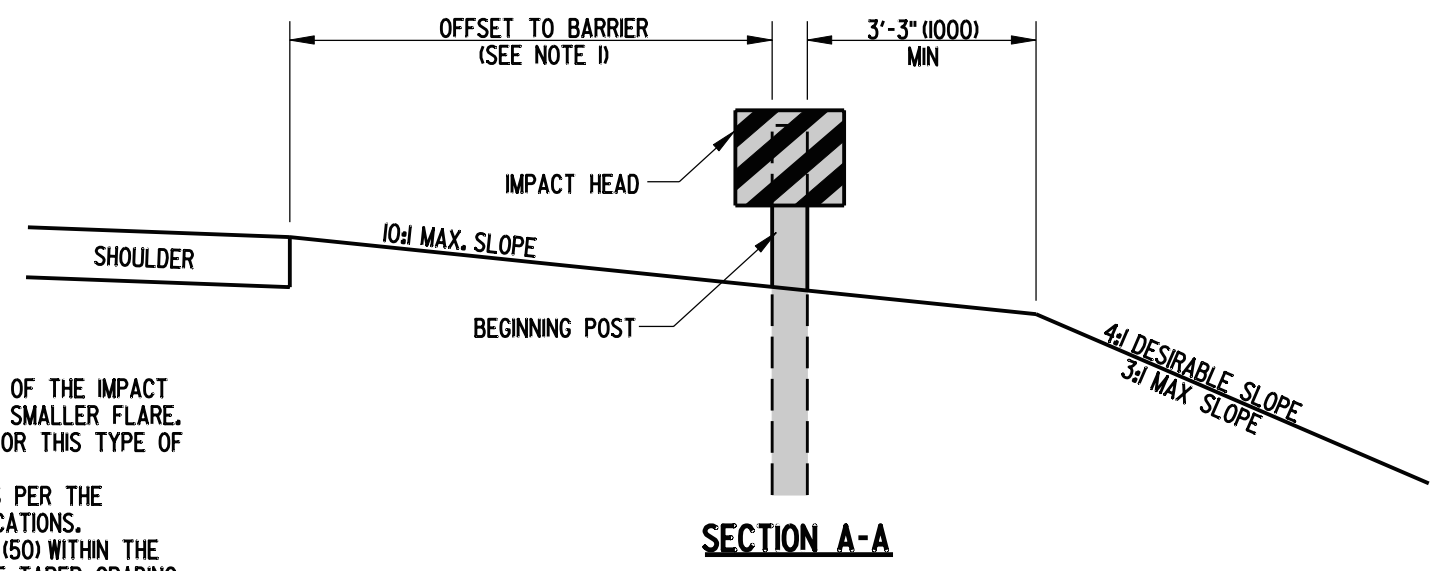
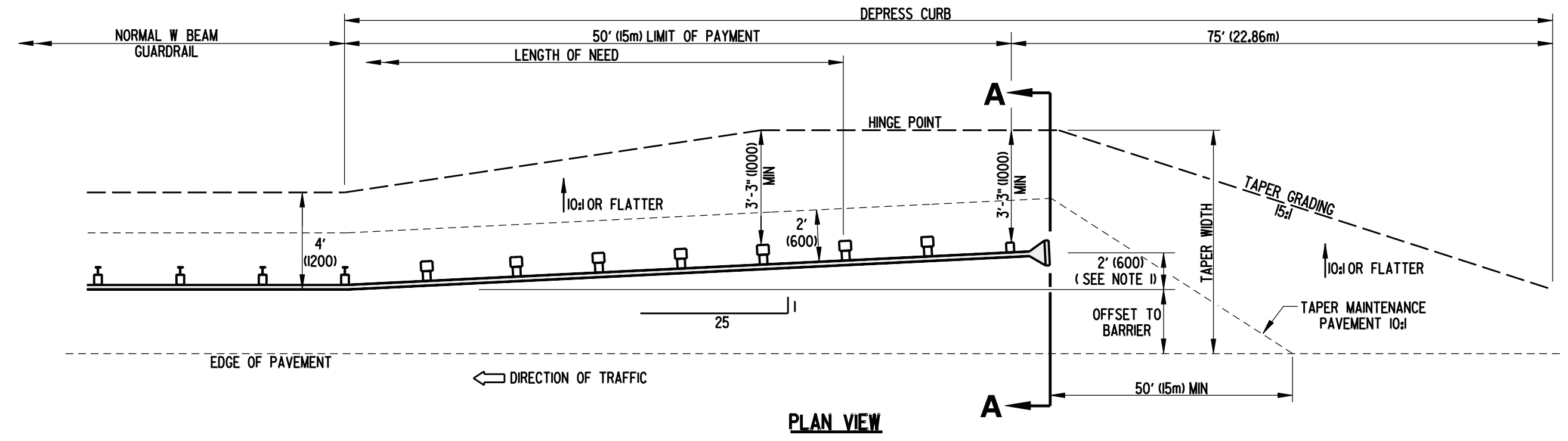
DELAWARE  
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

STANDARD NO. B-1 (2002)

SHT. 3 OF 6


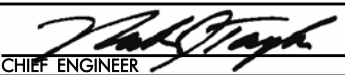

APPROVED *Caution Wicks* 9/6/02  
CHIEF ENGINEER DATE  
RECOMMENDED *Theresa Delph* 8/19/02  
DESIGN ENGINEER DATE

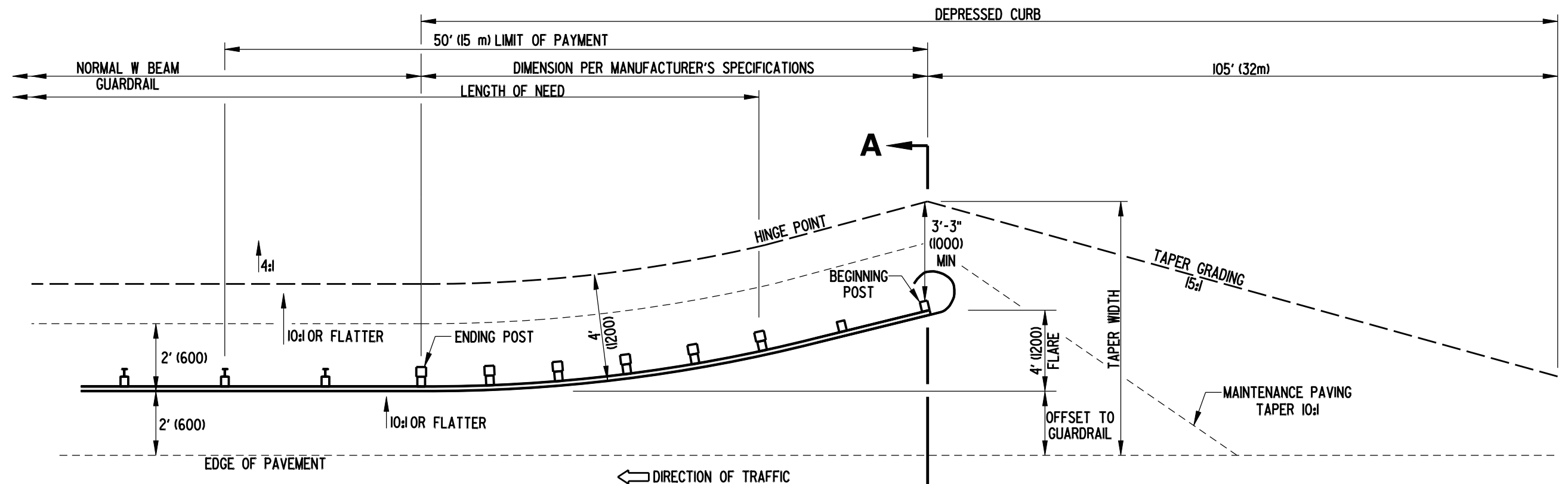


**NOTES:**

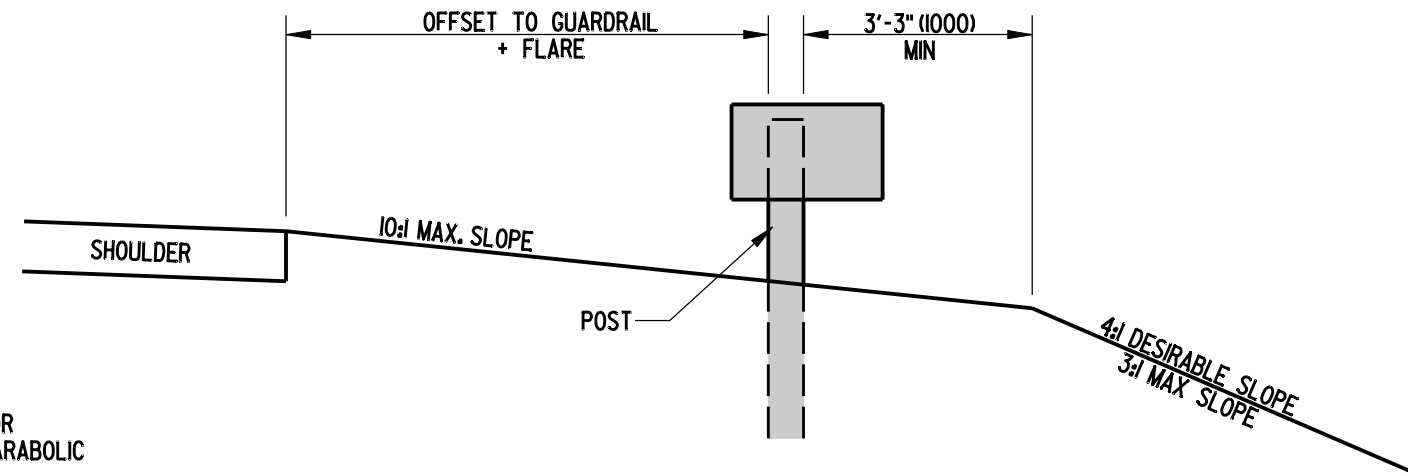
1. FLARE THE END TREATMENT AT 25:1 BEGINNING 50' (15 m) FROM THE END OF THE IMPACT HEAD, UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE.
2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR.
3. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL 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" (50) WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.

**GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE I**

 <b>DELAWARE</b> <b>DEPARTMENT OF TRANSPORTATION</b>	<b>GUARDRAIL APPLICATIONS</b>			<b>APPROVED</b>  <b>10/24/07</b> CHIEF ENGINEER DATE
	<b>STANDARD NO.</b> B-1 (2007)	<b>SHT.</b> 4	<b>OF</b> 6	<b>RECOMMENDED</b>  <b>10/23/07</b> DESIGN ENGINEER DATE



**PLAN VIEW**



**SECTION A-A**

**GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2**

**NOTES:**

1. FLARE SHALL BE 4' (1200) UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE. FLARE MAY BE PARABOLIC OR STRAIGHT BASED ON MANUFACTURE'S SPECIFICATIONS.
2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.
3. 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**

**GUARDRAIL APPLICATIONS**

**STANDARD NO.**

**B-1 (2007)**

**SHT. 5**

**OF 6**

**APPROVED**

*[Signature]*  
CHIEF ENGINEER

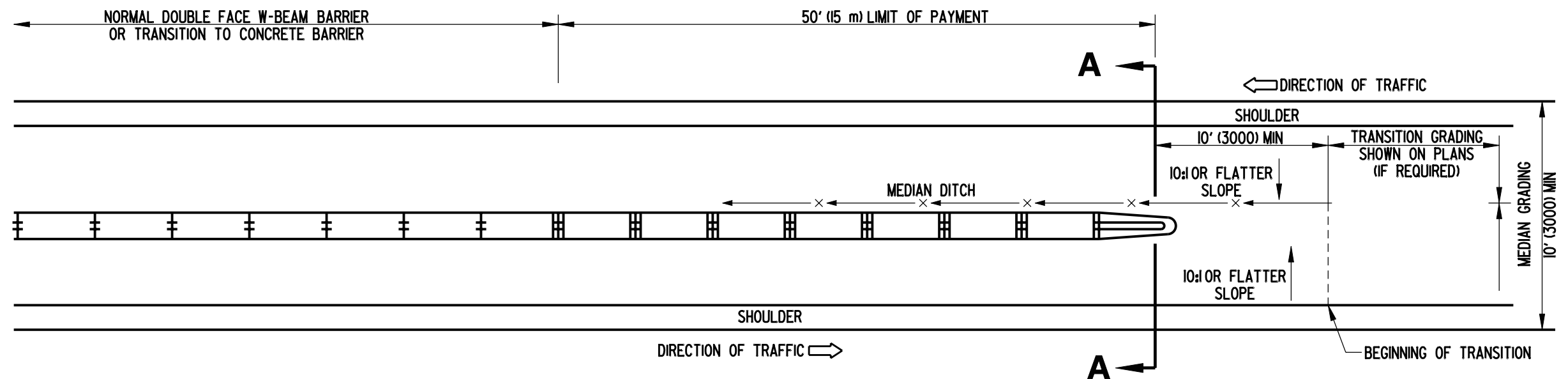
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**RECOMMENDED**

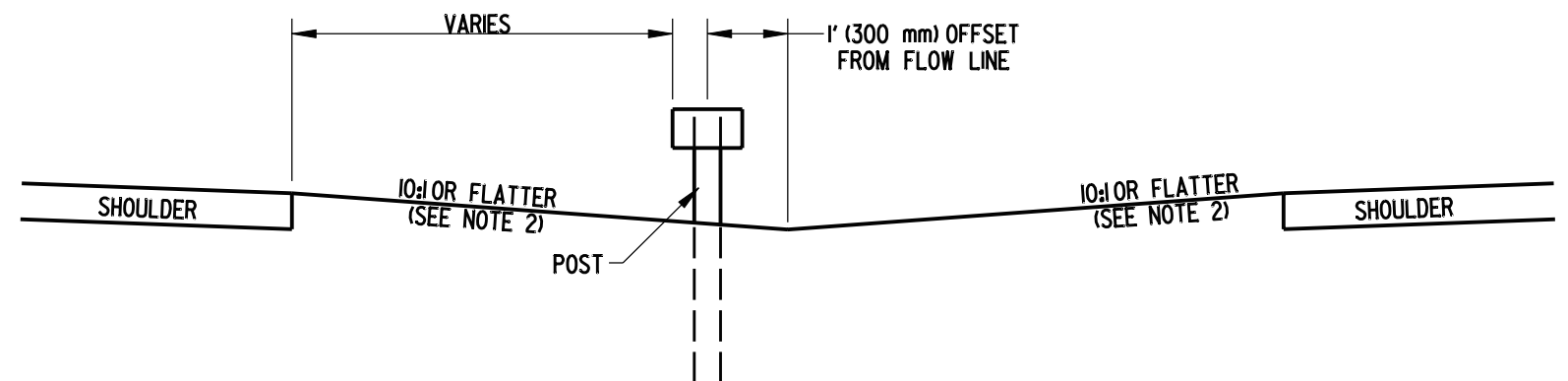
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DESIGN ENGINEER

**10/23/07**  
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.
2. 6:1 OR FLATTER GRADING IS ALLOWABLE WHEN THE BARRIER IS LOCATED 12' (3650 mm) OR MORE FROM THE OUTSIDE EDGE OF THE SHOULDER.
3. THIS END TREATMENT CAN ALSO BE USED IN RAMP GOES OR OTHER AREAS WHERE 2 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

GUARDRAIL APPLICATIONS

STANDARD NO.

B-1 (2007)

SHT. 6

OF 6

APPROVED

*[Signature]*  
CHIEF ENGINEER

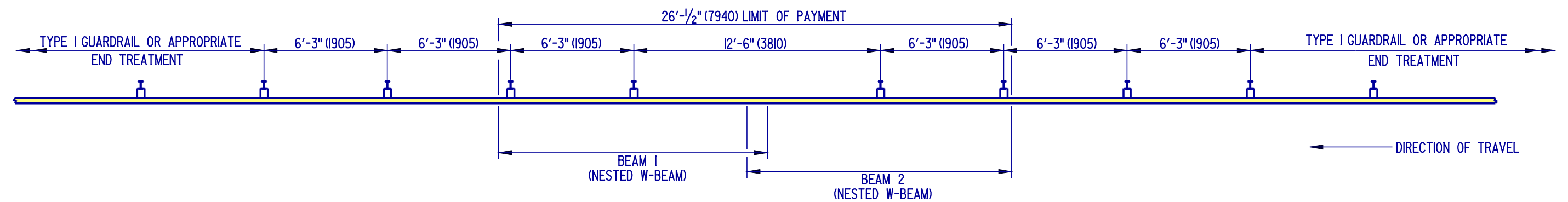
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DATE

RECOMMENDED

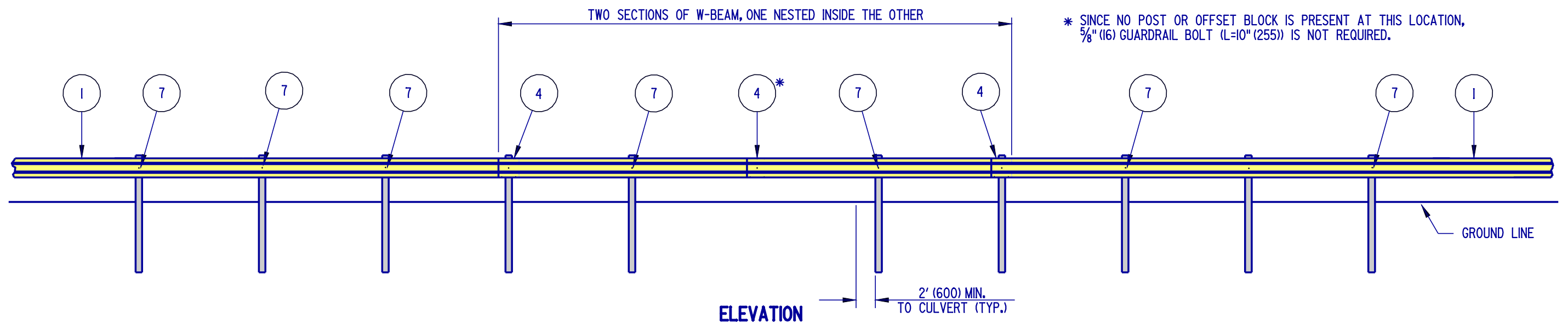
*[Signature]*  
DESIGN ENGINEER

10/23/07  
DATE

SCALE : N.T.S.



**PLAN**



**ELEVATION**

NOTES :1). ALL W-BEAMS ARE 13'-6 1/2" (4130) IN LENGTH.  
2). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 1

STANDARD NO. B-2 (2004)

SHT. 1 OF 1

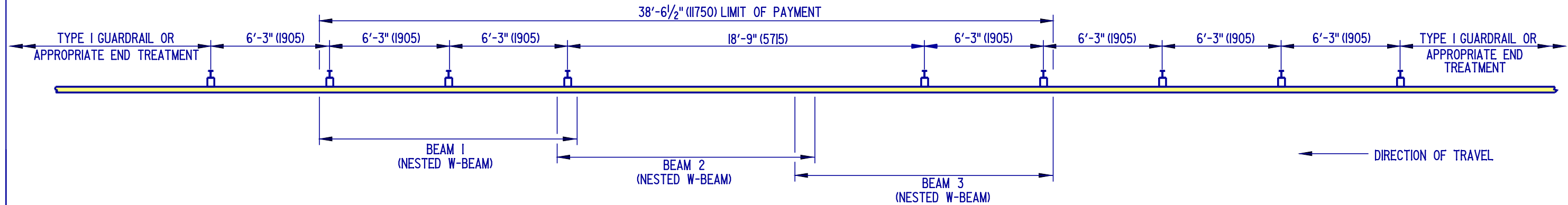
APPROVED

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

RECOMMENDED

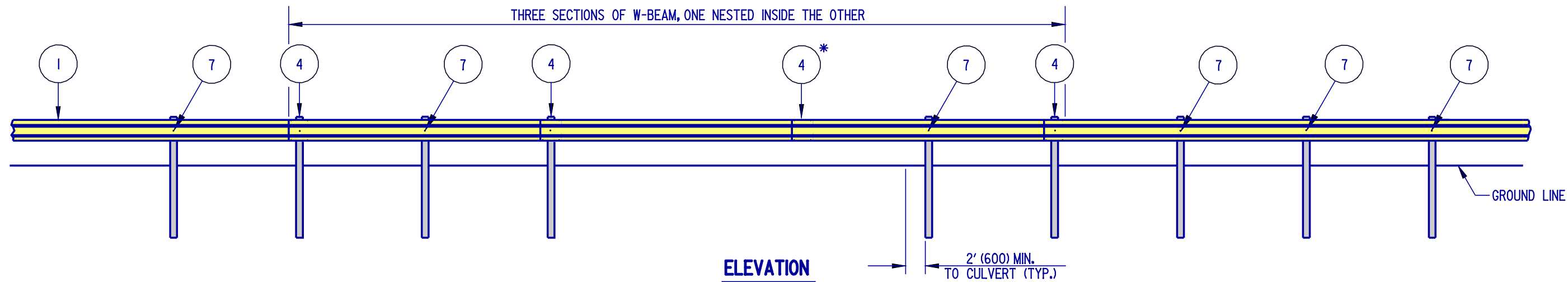
*Dennis M. O'Flaherty*  
DESIGN ENGINEER  
DATE 1/13/05

SCALE : N.T.S.



**PLAN**

\* SINCE NO POST OR OFFSET BLOCK IS PRESENT AT THIS LOCATION, 5/8" (16) GUARDRAIL BOLT (L=10" (255)) IS NOT REQUIRED.



**ELEVATION**

NOTES : 1). ALL W-BEAMS ARE 13'-6 1/2" (4130) IN LENGTH.  
2). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 2

STANDARD NO. B-3 (2004)

SHT. 1 OF 1

APPROVED *Carolann Wicks*  
CHIEF ENGINEER

DATE 1/10/05

RECOMMENDED *Dennis M. O'Flaherty*  
DESIGN ENGINEER

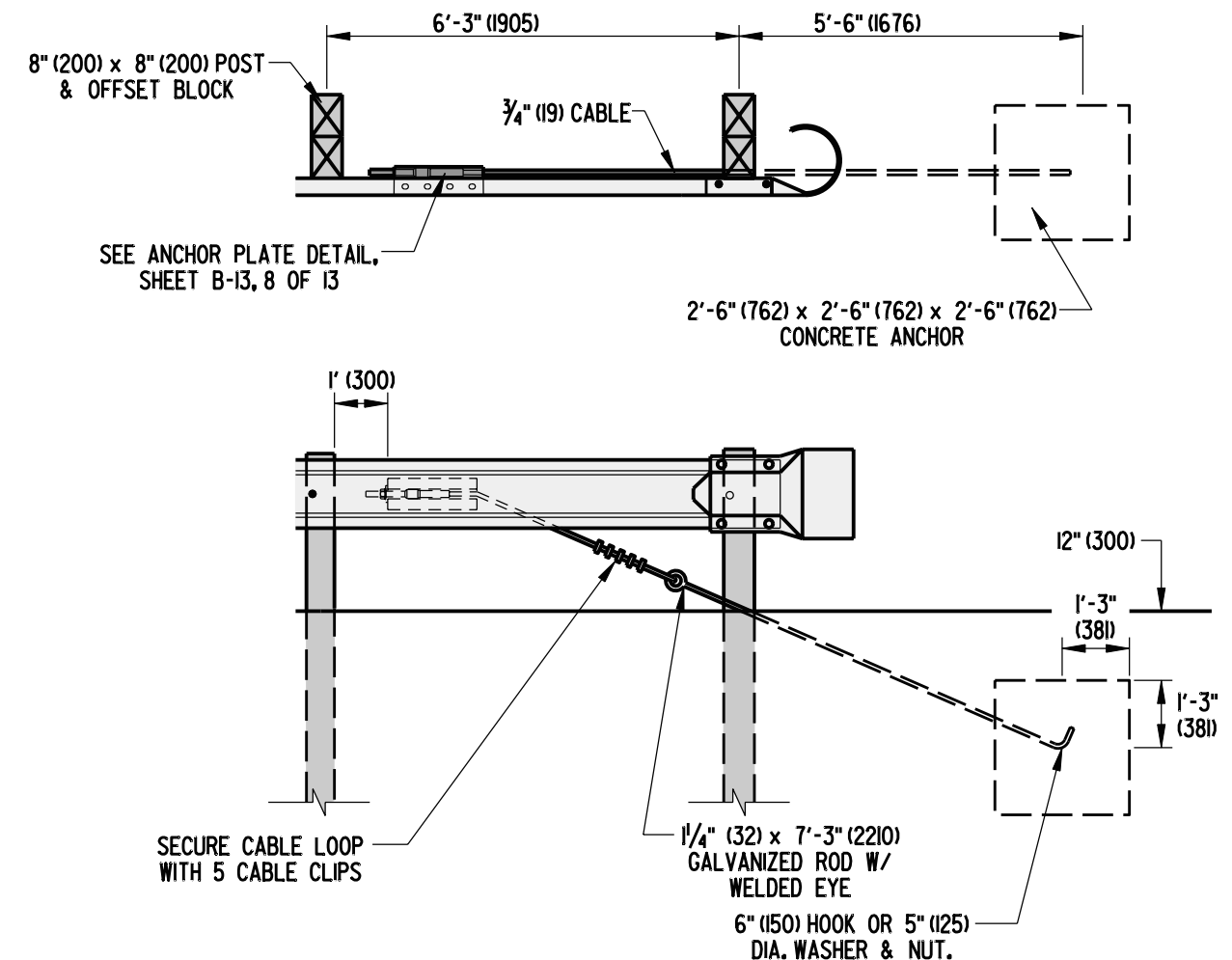
DATE 1/13/05

SCALE : N.T.S.

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

NOTES:

- 1). NO WASHERS ARE USED ON THE RAIL SIDE OF THE LONG WOOD BREAKAWAY POSTS.
- 2). THE CURVED GUARDRAIL SECTION SHALL BE SHOP BENT.
- 3). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
- 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

APPROACH ROADWAY OR DRIVEWAY

TYPE I GUARDRAIL PLACEMENT, APPROPRIATE END TREATMENT, OR ENTRANCE SPECIAL END ANCHORAGE.

PLAN

SECTION A-A

SLOPE = 15% OR FLATTER

2" MAX.

LONG WOOD BREAKAWAY POST

4' (1200)

4' (1200) ROUNDING

6'-3" (1905)

TYPE I GUARDRAIL PLACEMENT OR APPROPRIATE END TREATMENT OR GUARDRAIL TO BARRIER CONNECTION

AREA BEHIND GUARDRAIL TO BE MAINTAINED FREE OF FIXED OBJECTS OR OTHER HAZARDS.

MAIN HIGHWAY



DELAWARE  
DEPARTMENT OF TRANSPORTATION

CURVED GUARDRAIL SECTION

STANDARD NO. B-4 (2007)

SHT. 1 OF 1

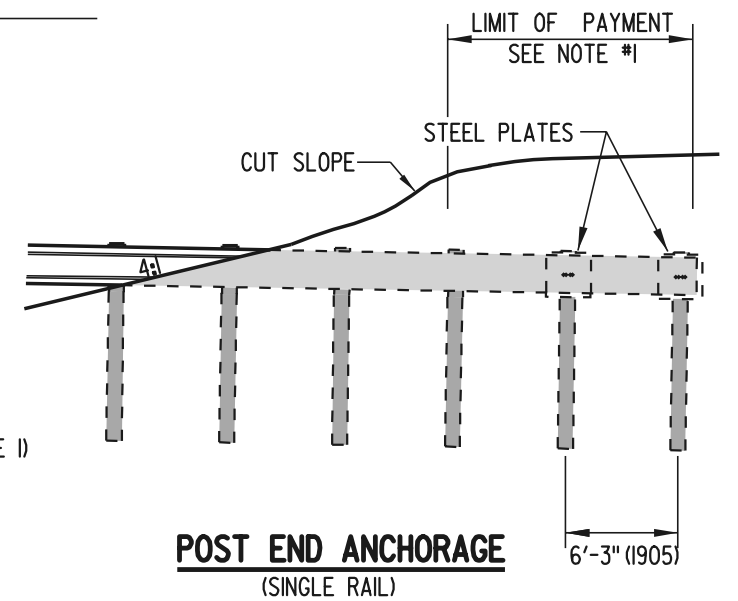
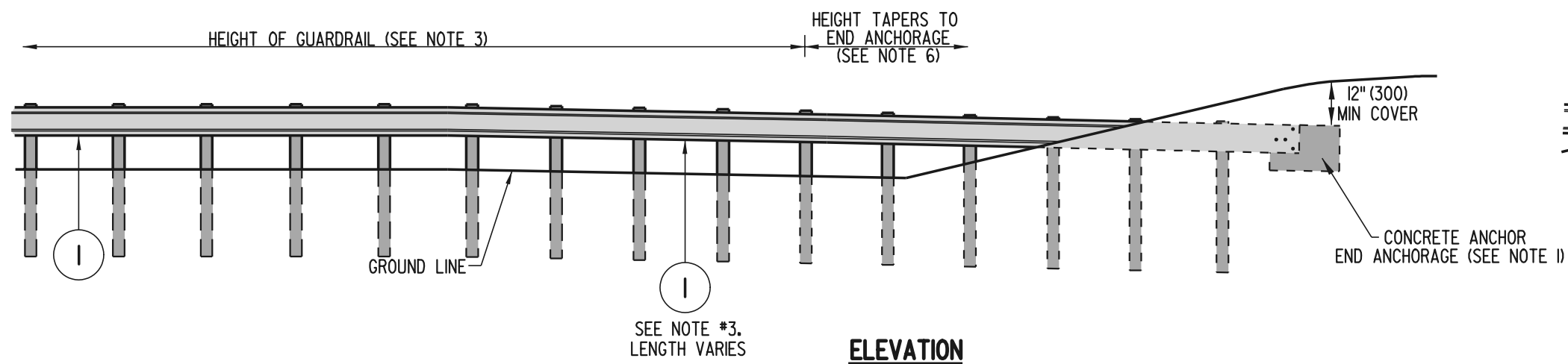
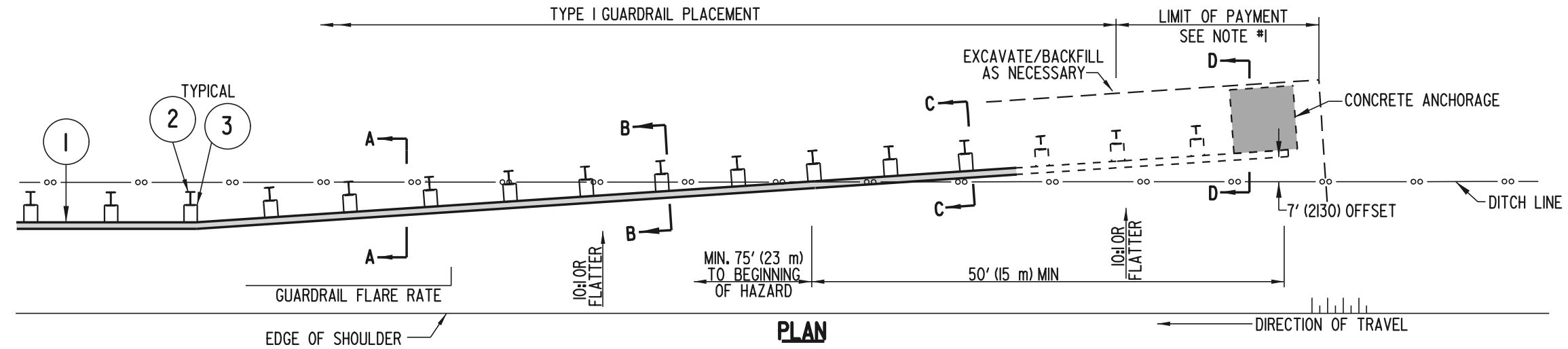
APPROVED  
CHIEF ENGINEER

10/24/07  
DATE

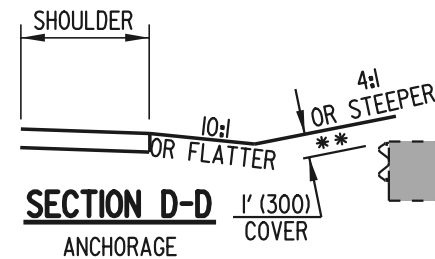
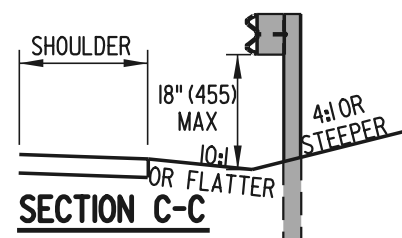
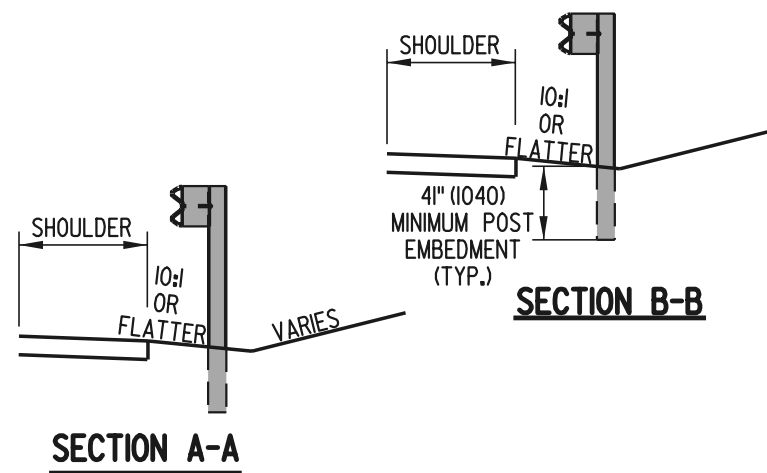
RECOMMENDED  
DESIGN ENGINEER

10/23/07  
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). WHEN PLACING GUARDRAIL ON A 10:1 OR FLATTER SLOPE, THE HEIGHT OF THE GUARDRAIL SHALL BE HELD CONSTANT RELATIVE TO THE GROUND DIRECTLY UNDER THE FACE OF THE GUARDRAIL.
- 4). ALL POSTS SHALL BE 6' (1800) FOR SINGLE RAIL INSTALLATION.
- 5). WHEN USING THE BURIED END SECTION, THE DESIGN MUST PROVIDE A MINIMUM OF 75' (23 m) FROM WHERE THE GUARDRAIL CROSSES THE DITCH LINE TO THE BEGINNING OF THE HAZARD.
- 6). MAINTAIN THE FLARE OF THE GUARDRAIL UNTIL THE 12" (300) COVER HAS BEEN ATTAINED. IF THE 12" (300) COVER CANNOT BE ATTAINED BEFORE THE RAIL IS 7' (2100) BEHIND THE BOTTOM OF THE DITCH, THEN SLOPE THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 7' (2100) BEHIND THE DITCH, SO THAT IT HAS 12" (300) OF COVER.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

STANDARD NO.

B-6 (2002)

SHT. 1

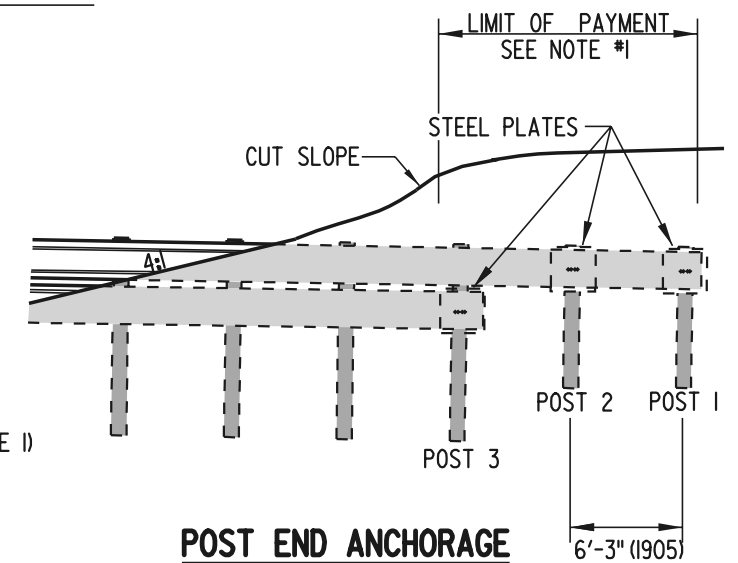
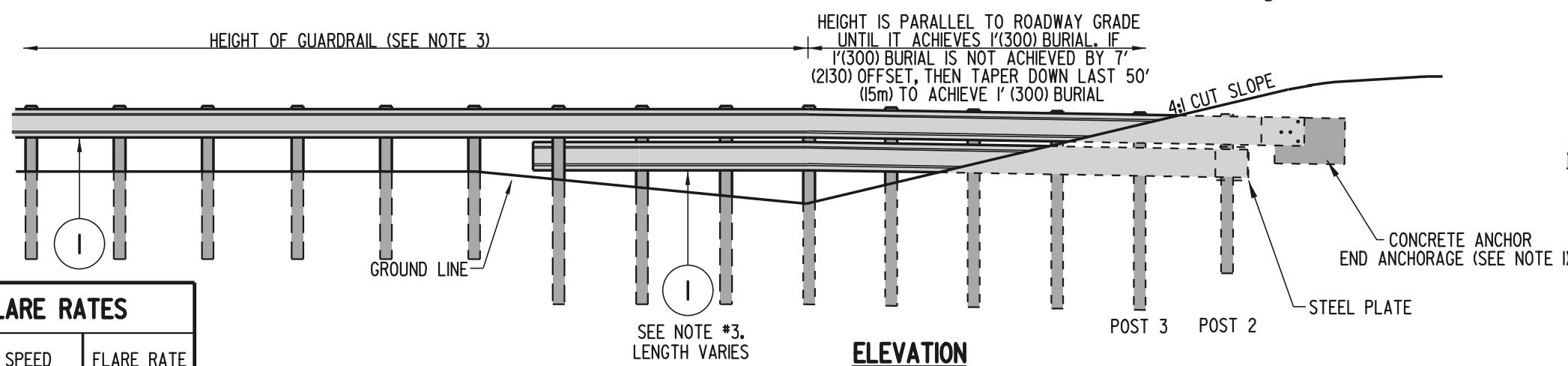
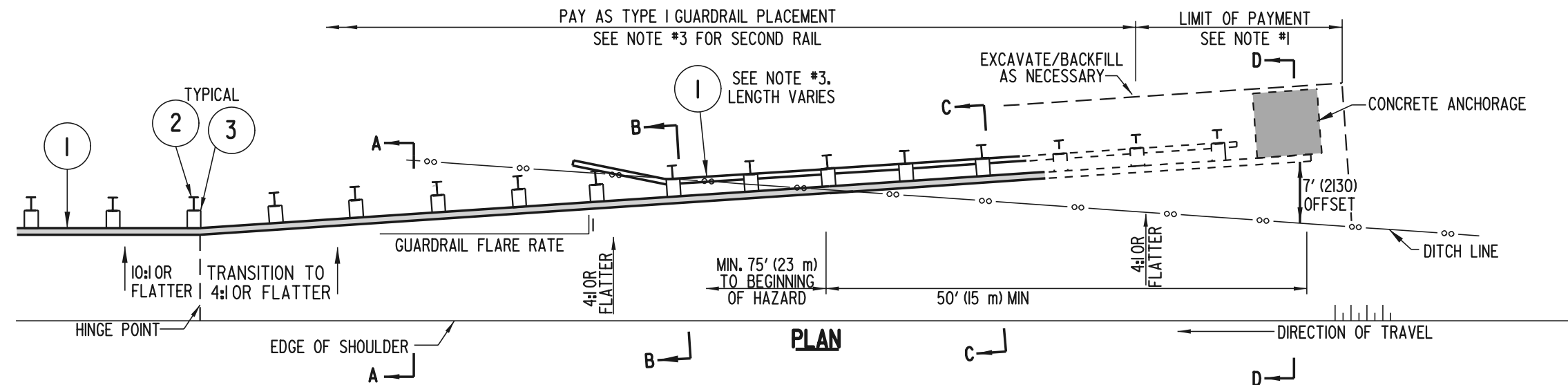
OF 3

APPROVED

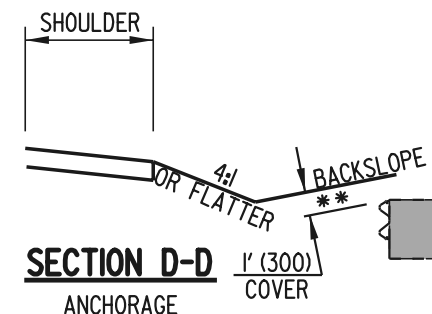
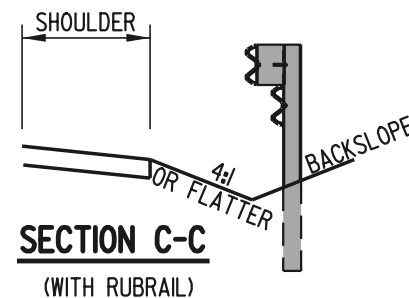
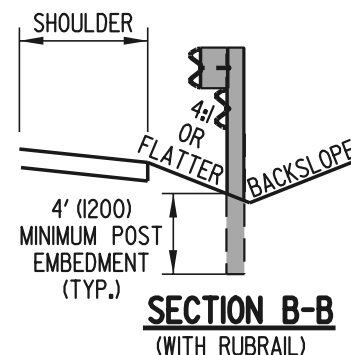
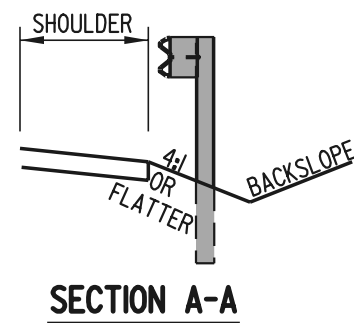
*Carolan Wicks* 9/6/02  
CHIEF ENGINEER DATE

RECOMMENDED

*Theresa Delph* 9/19/02  
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 I GUARDRAIL.
  - 4). WHEN USING A SECOND RAIL, 8' (2400) LONG POSTS ARE REQUIRED. BEHIND THE DITCHLINE, POSTS MUST PROVIDE 4' (1200) MINIMUM EMBEDMENT (20" (510) WHEN ROCK IS ENCOUNTERED). POSTS FOR THE POST ANCHOR SHALL BE 6' (1800) LONG.
  - 5). WHEN USING THE BURIED END SECTION, THE DESIGN MUST PROVIDE A MINIMUM OF 75' (23 m) FROM WHERE THE GUARDRAIL CROSSES THE DITCH LINE TO THE BEGINNING OF THE HAZARD.
  - 6). MAINTAIN THE FLARE OF THE GUARDRAIL UNTIL THE 12" (300) COVER HAS BEEN ATTAINED. IF THE 12" (300) COVER CANNOT BE ATTAINED BEFORE THE RAIL IS 7' (2100) BEHIND THE BOTTOM OF THE DITCH, THEN SLOPE THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 7' (2100) BEHIND THE DITCH, SO THAT IT HAS 12" (300) OF COVER.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

STANDARD NO.

B-6 (2002)

SHT. 2

OF 3

APPROVED

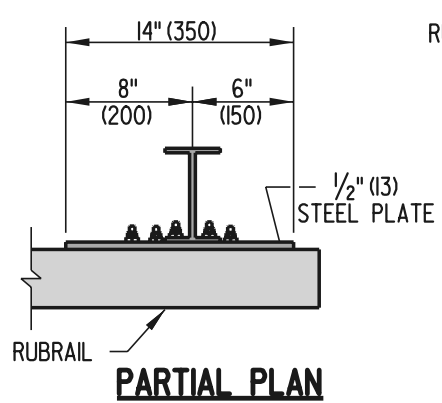
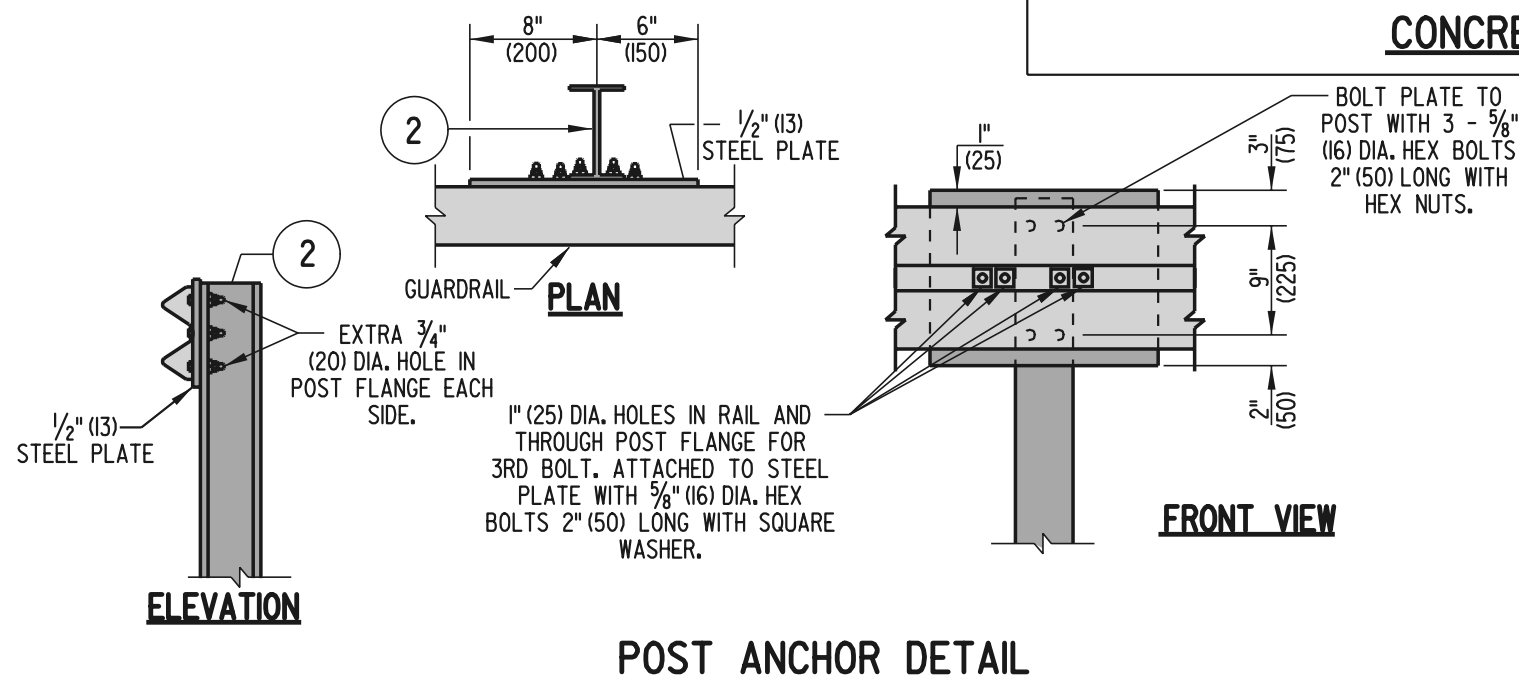
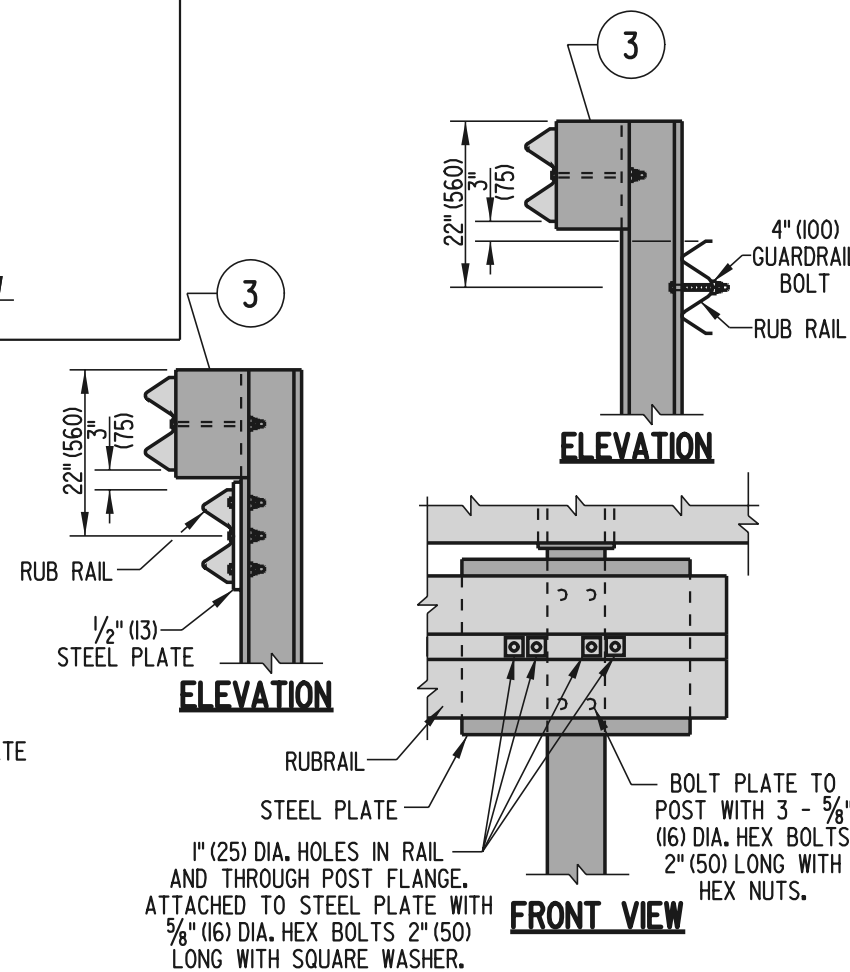
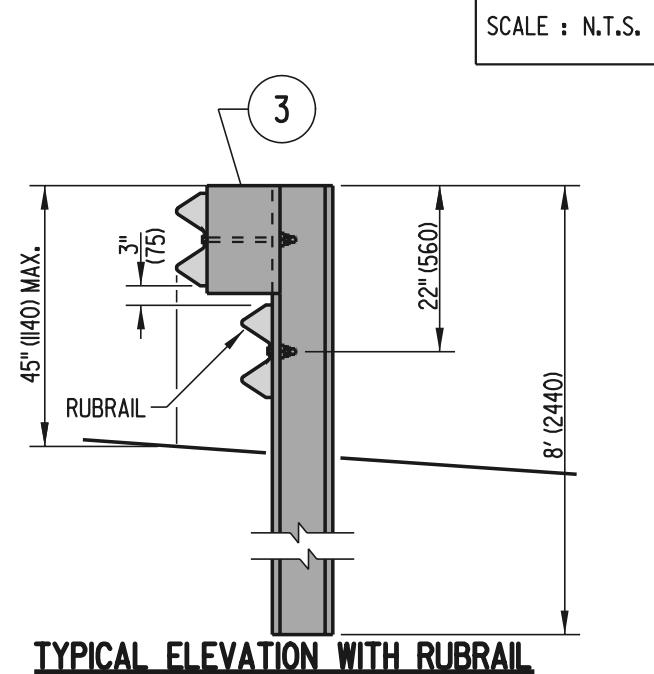
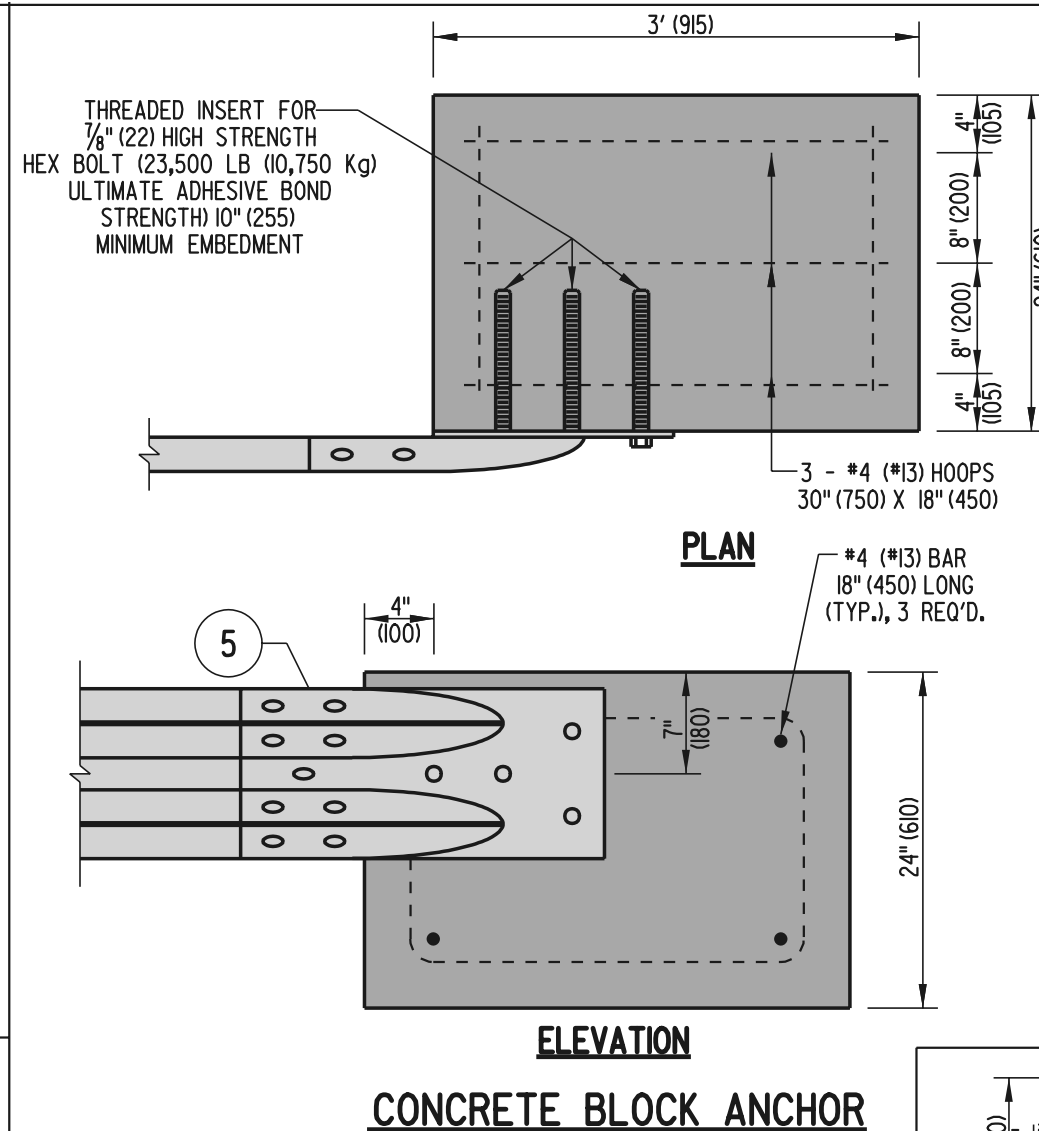
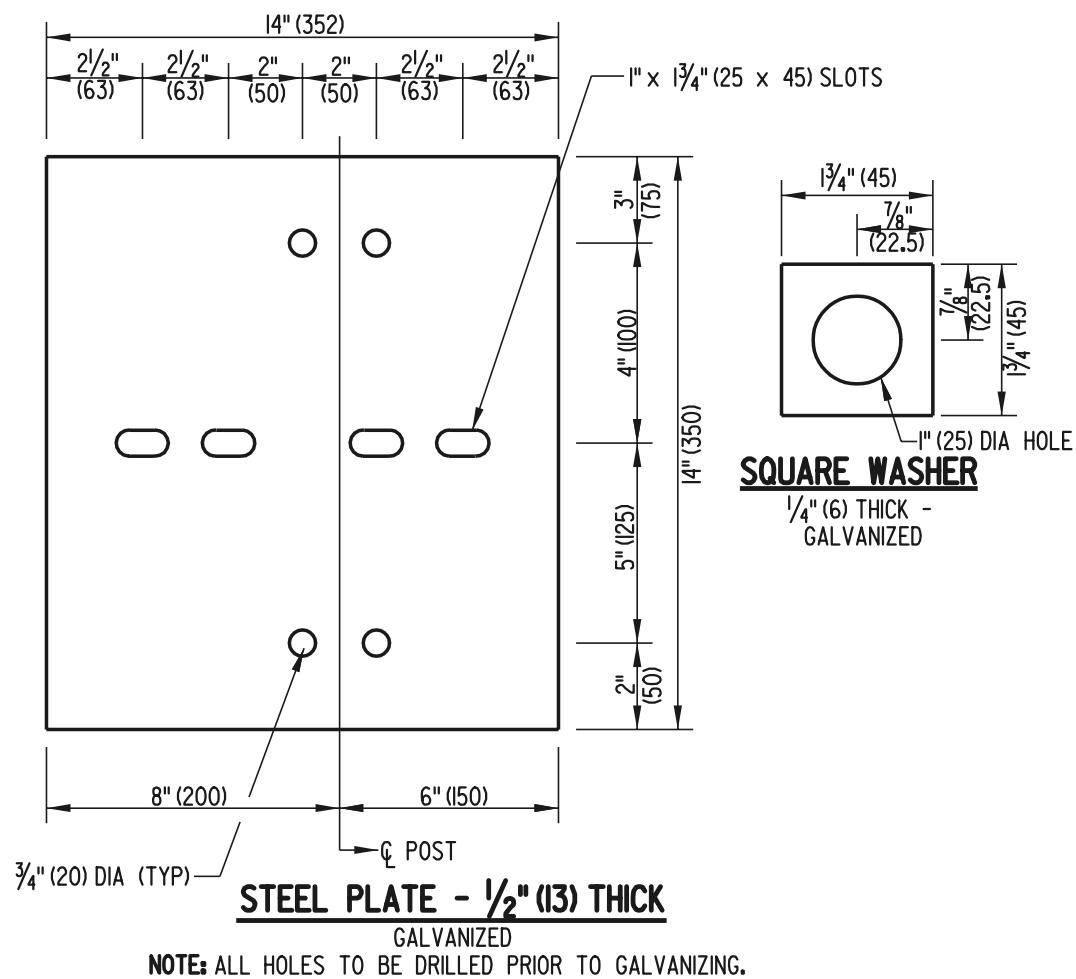
*Caution Wicks*  
CHIEF ENGINEER

9/6/02  
DATE

RECOMMENDED

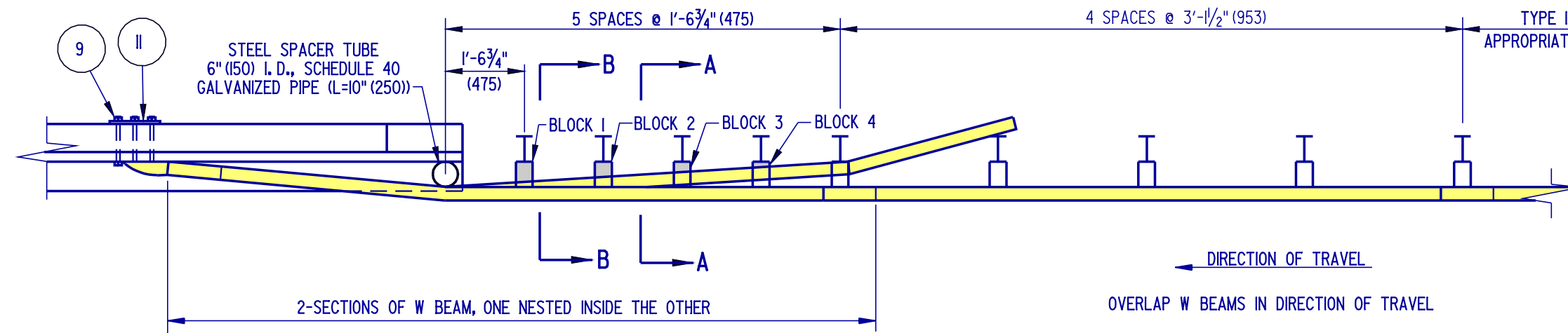
*Theresa Delph*  
DESIGN ENGINEER

8/19/02  
DATE

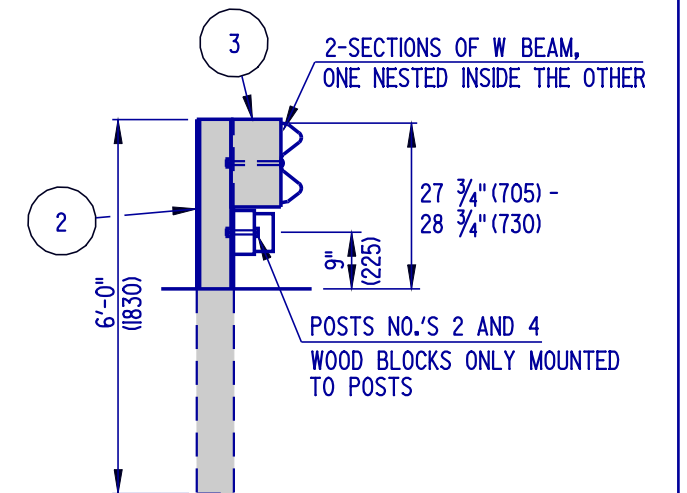


	BURIED END SECTION				APPROVED <i>Caution Wicks</i> 9/6/02 CHIEF ENGINEER DATE
	STANDARD NO.	B-6 (2002)	SHT.	3 OF 3	
DELAWARE DEPARTMENT OF TRANSPORTATION					RECOMMENDED <i>Theresa Delph</i> 8/19/02 DESIGN ENGINEER DATE

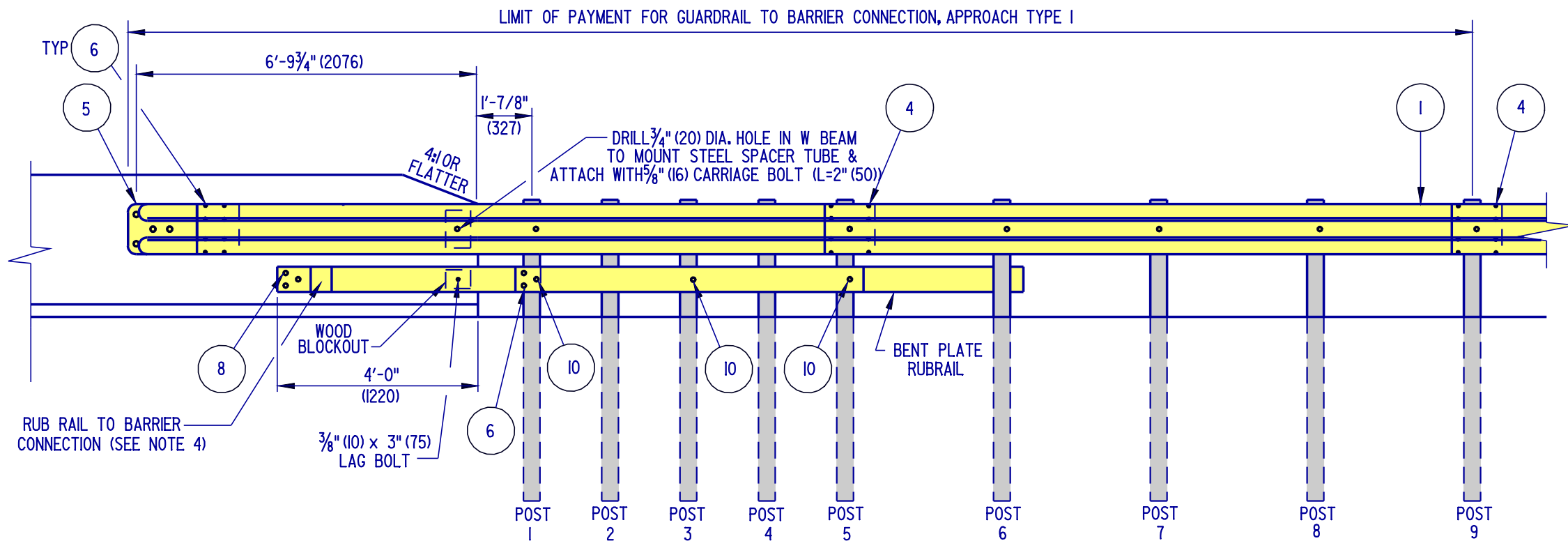




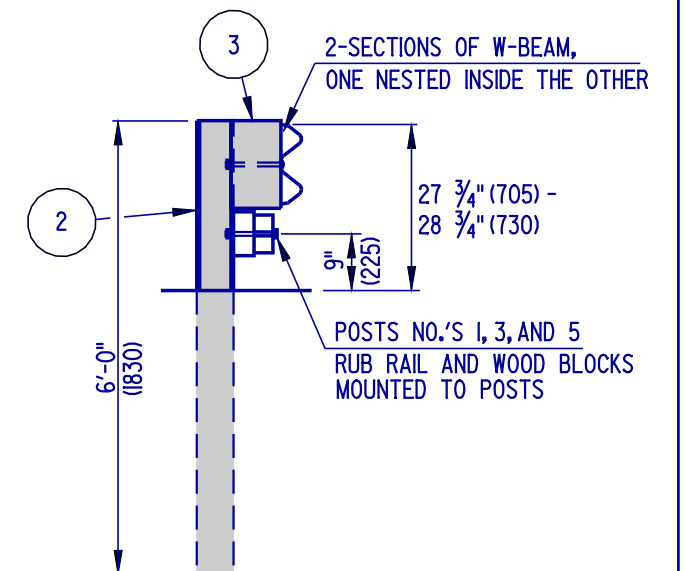
**PLAN**



**SECTION A-A**



**ELEVATION**



**SECTION B-B**

- NOTES: 1). W BEAM IS NOT BOLTED TO POSTS AT POSTS 2 THROUGH 4.  
 2). RUB RAIL IS NOT BOLTED AT POSTS 2 AND 4.  
 3). POSTS 1 THROUGH 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER WOOD 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 5/8" (16) BOLT) BETWEEN BOLT HEADS AND RUB RAIL.

- 5). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.  
 6). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.  
 7). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.



**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

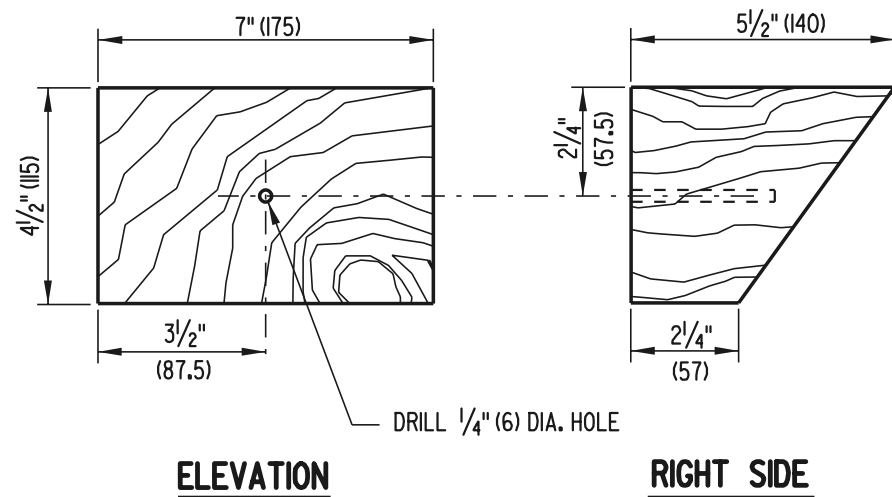
**GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1**

STANDARD NO. **B-7 (2004)**

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

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

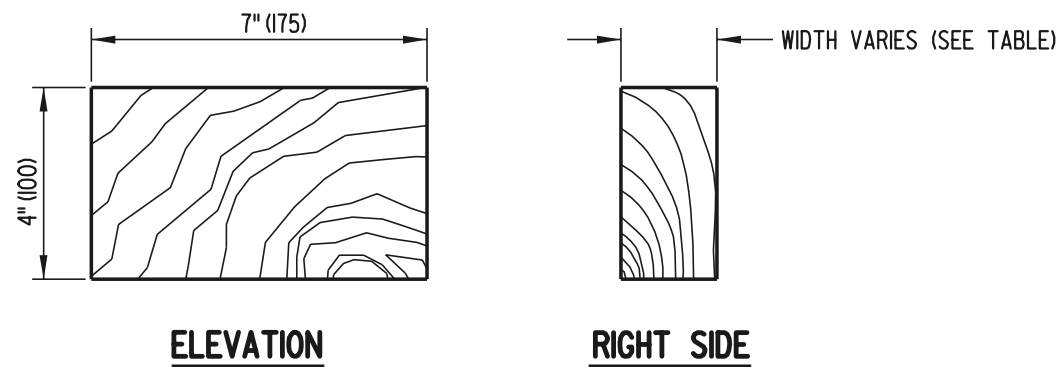
RECOMMENDED *Dennis M. O'Flaherty* **1/13/05**  
 DESIGN ENGINEER DATE



ELEVATION

RIGHT SIDE

WOOD BLOCKOUT DETAIL

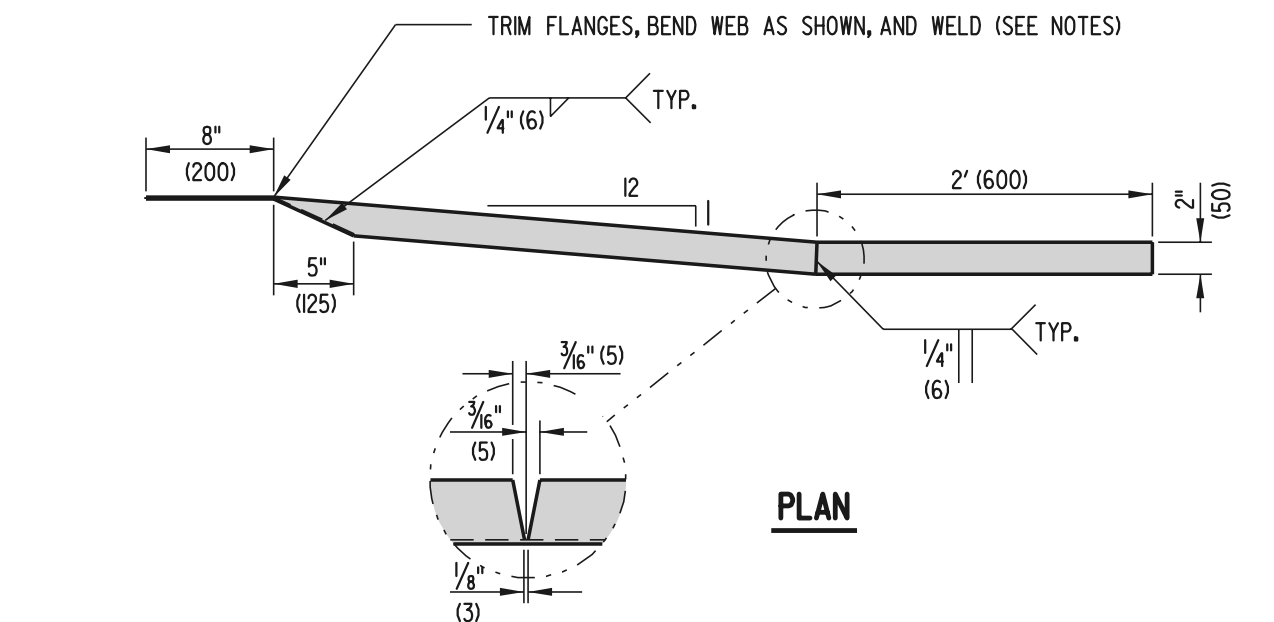


ELEVATION

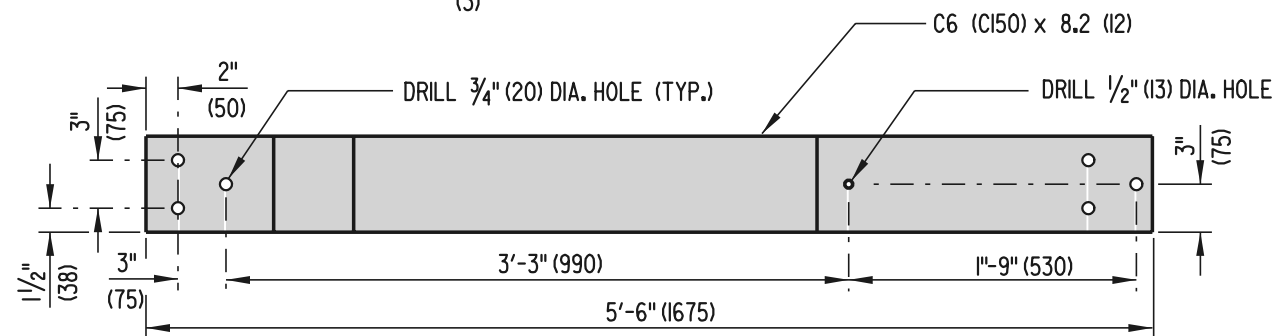
RIGHT SIDE

RUB RAIL WOOD BLOCKS

RUB RAIL WOOD BLOCKS (7" (175) x 4" (100))		
POST NO.	WIDTH	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)



PLAN



ELEVATION

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" (152) (I.D.) x 9" (229)



DELAWARE  
DEPARTMENT OF TRANSPORTATION

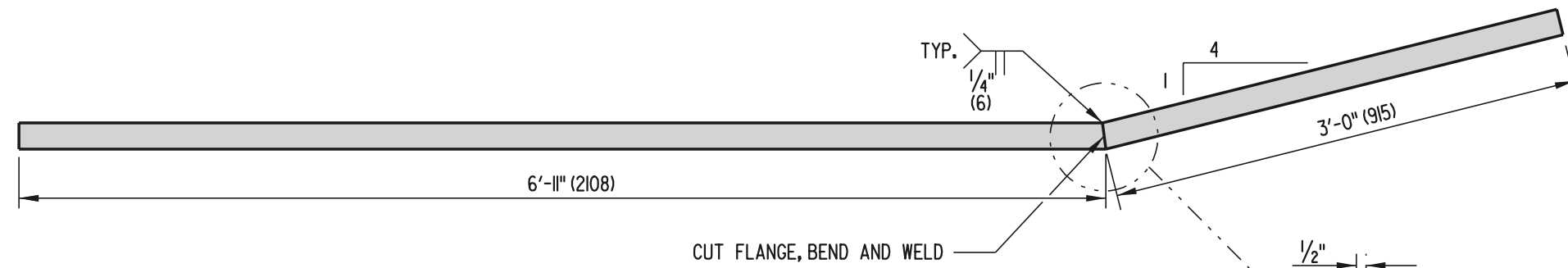
GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1

STANDARD NO. B-7 (2001)

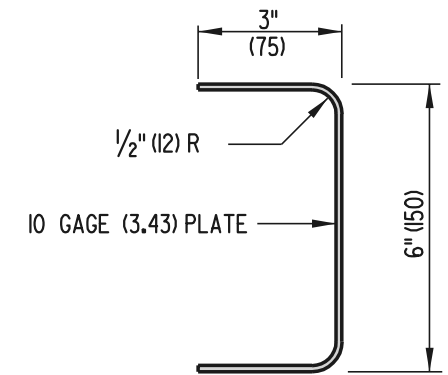
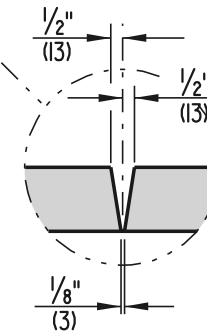
SHT. 2 OF 3

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

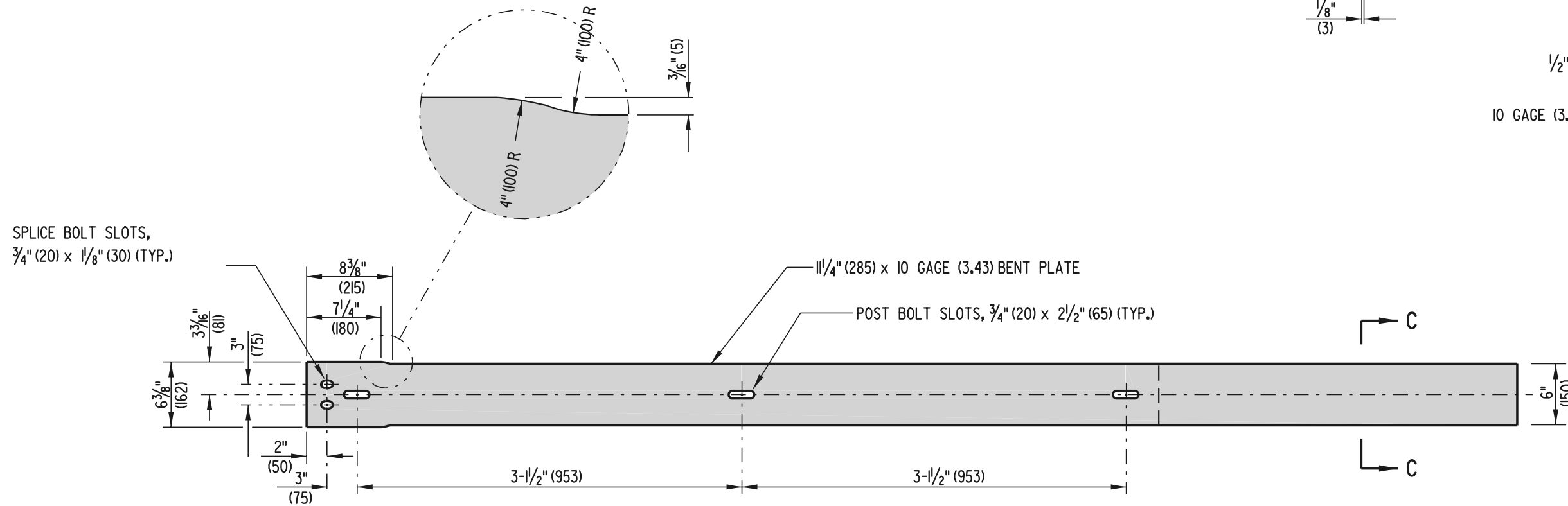
RECOMMENDED *Michael P. Gotsch* 6/18/01  
DESIGN ENGINEER DATE



**PLAN**



**SECTION C-C**



**ELEVATION**

**BENT PLATE RUB RAIL**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

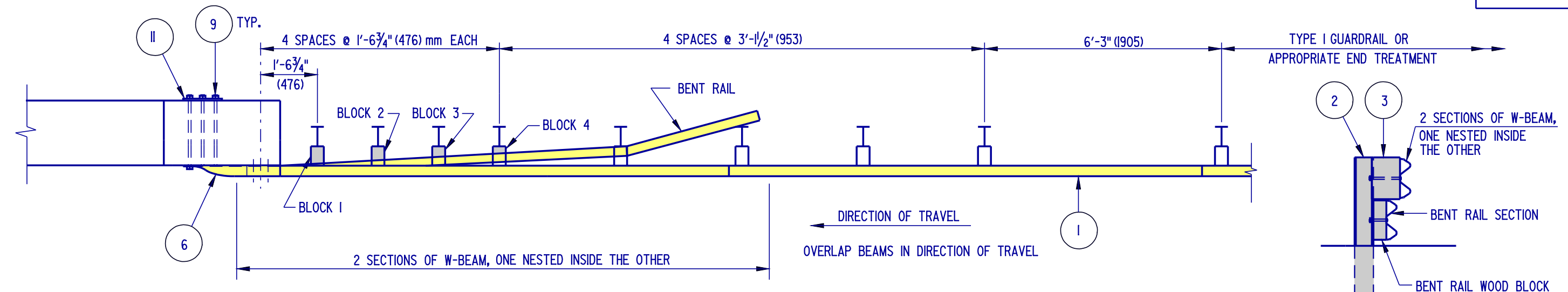
GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1

STANDARD NO. B-7 (2001)

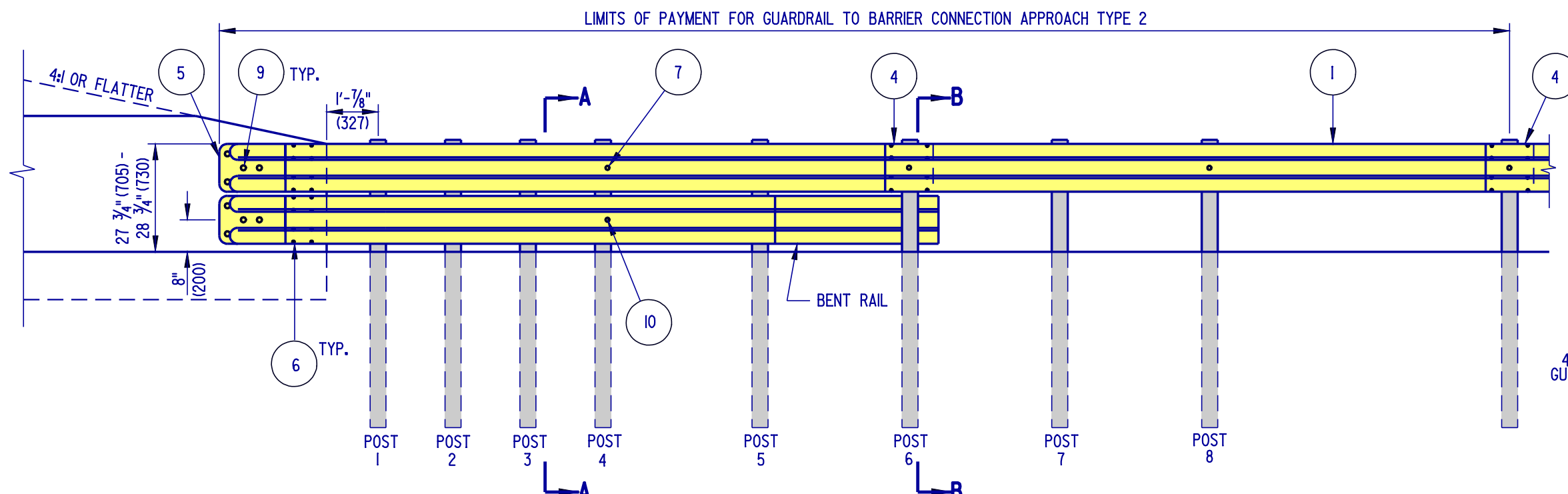
SHT. 3 OF 3

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

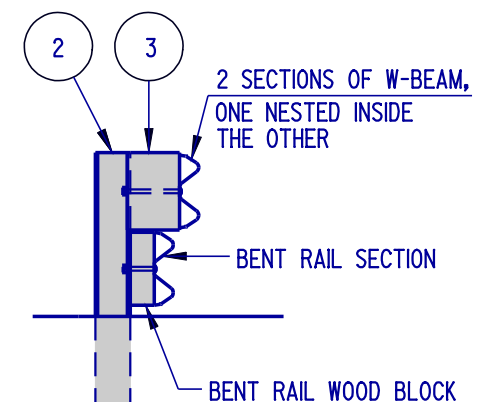
RECOMMENDED *Michael P. Gotsch* 6/18/01  
DESIGN ENGINEER DATE



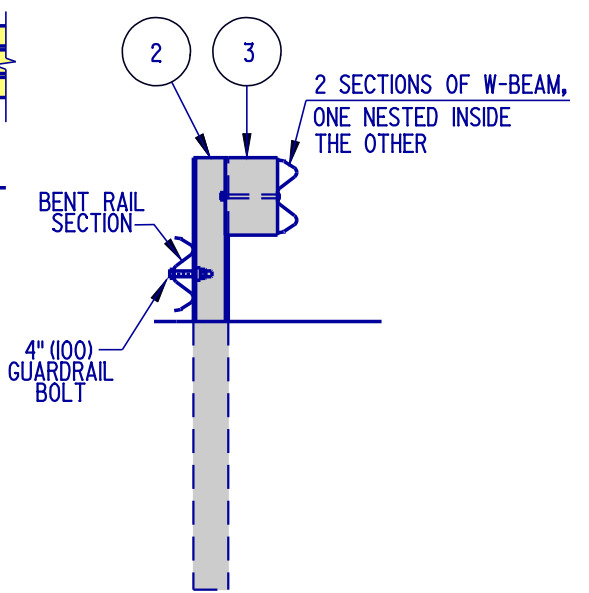
PLAN



ELEVATION

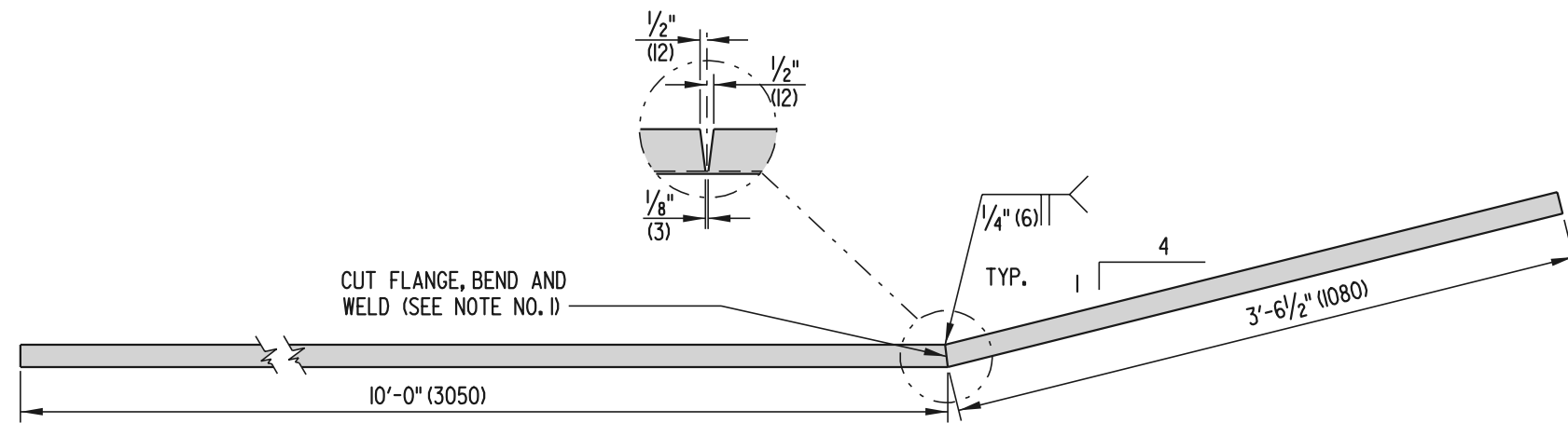


SECTION A-A

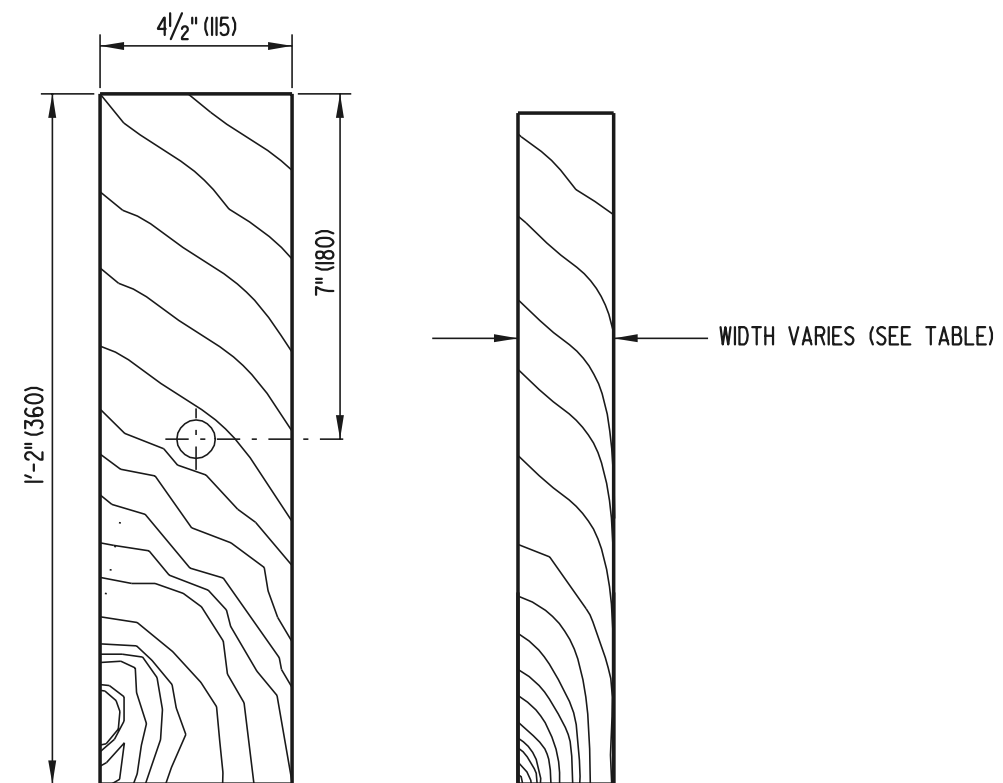


SECTION B-B

- 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). CURB SHALL NOT BE USED AT THE FACE OF RAIL WITHIN THE LIMITS OF THIS INSTALLATION.
  - 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 REFLECTOR EVERY FIFTH POST.
  - 9). WHEN PLACED OVER CURB (MIN 8" (200) HIGH), BOTTOM RAIL CAN BE ELIMINATED.



**BENT RAIL**



**ELEVATION**

**RIGHT SIDE**

**BENT RAIL WOOD BLOCKS**

BENT RAIL WOOD BLOCKS 1'-2" (360) x 4 1/2" (115)		
BLOCK	WIDTH	BOLT LENGTH
1	5" (125)	8" (200)
2	4" (100)	6" (150)
3	3" (75)	6" (150)
4	2" (50)	4" (100)

**NOTE:** BOTTOM WOOD BLOCKS LOCATED ON POSTS 1-4 ARE OFFSET DRILLED TO SIT SQUARELY ON THE POST FLANGE AND SECURED WITH 5/8" (16) CARRIAGE BOLTS (L VARIES), SEE BENT RAIL WOOD BLOCKS TABLE.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

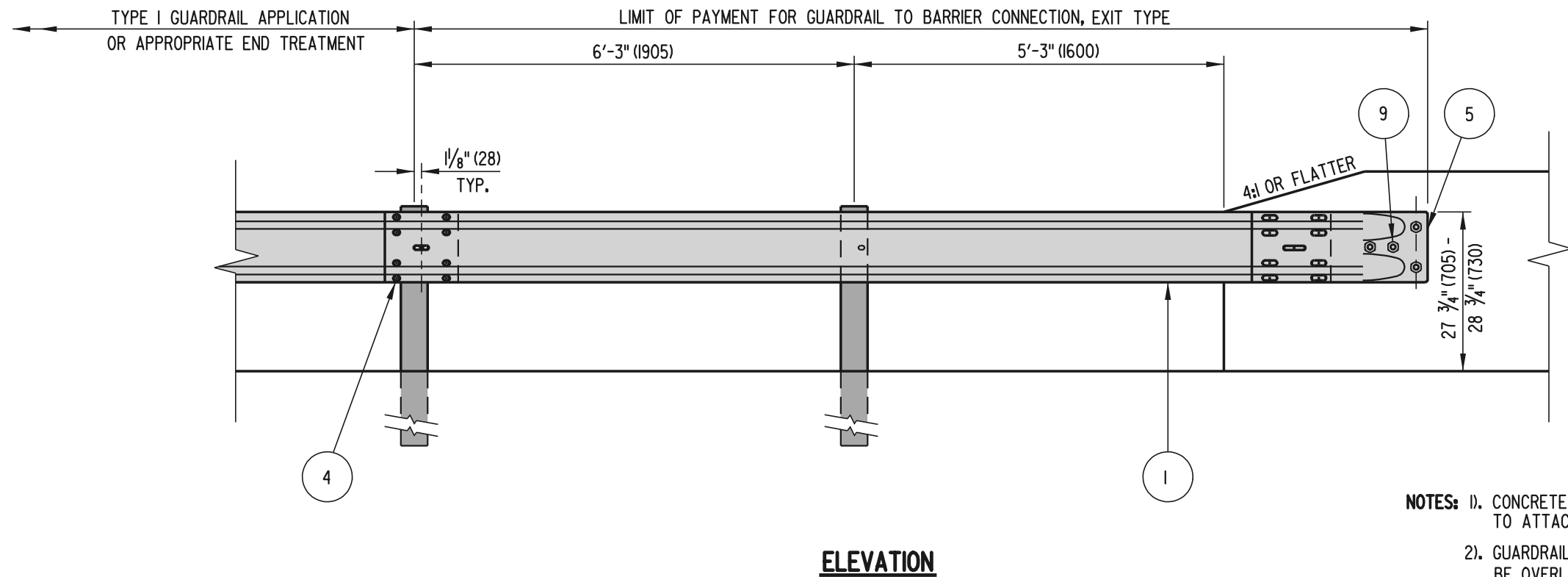
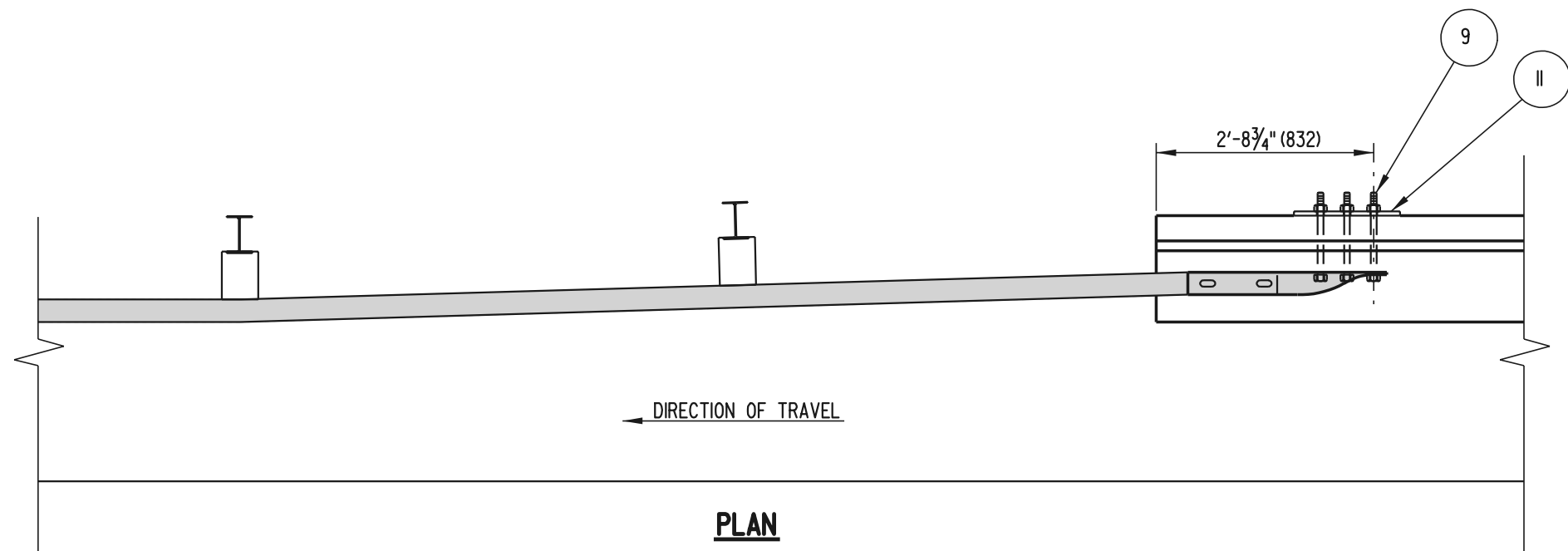
GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2

STANDARD NO. B-8 (2001)

SHT. 2 OF 2

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

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



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



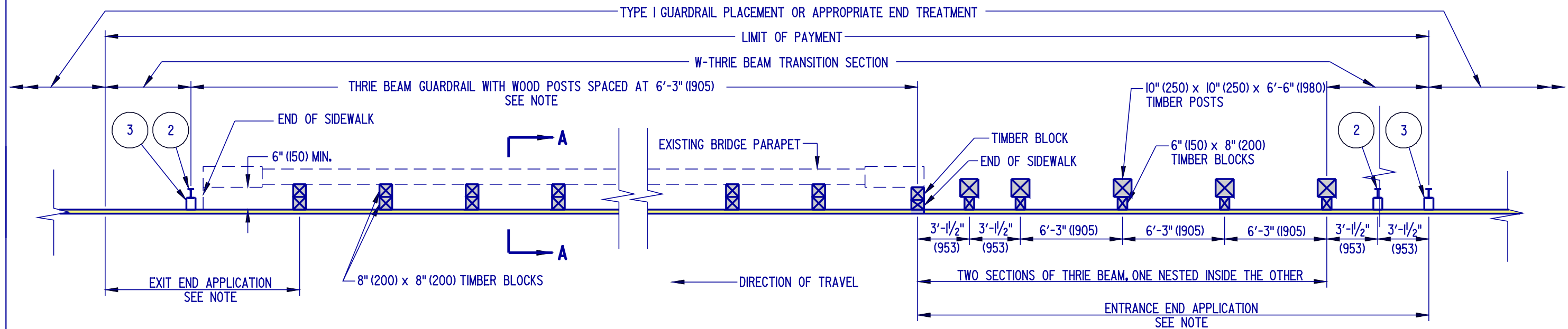
DELAWARE  
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE

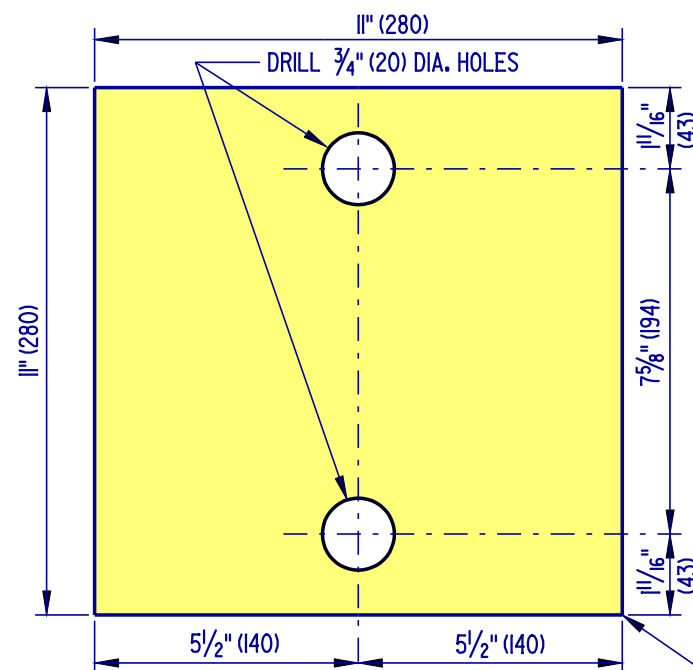
STANDARD NO.	B-9 (2002)	SHT.	1	OF	1
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APPROVED *Caudam Wicks* 9/6/02  
CHIEF ENGINEER DATE

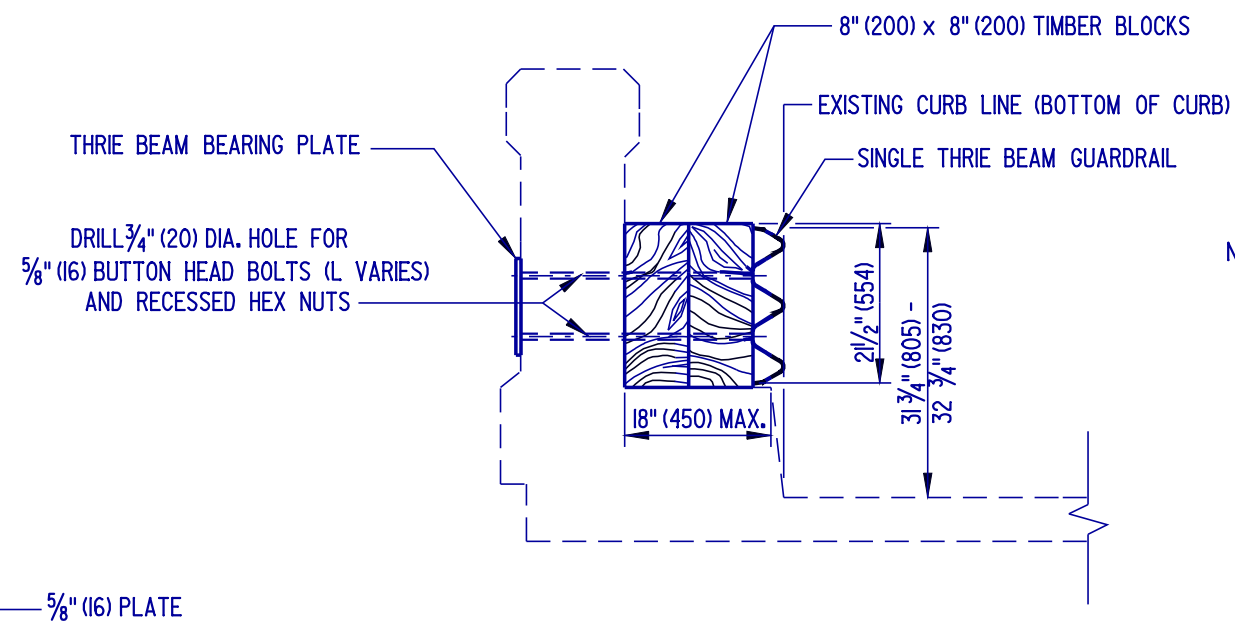
RECOMMENDED *Theresa Delph* 8/19/02  
DESIGN ENGINEER DATE



**PLAN**



**THRIE BEAM BEARING PLATE DETAIL**



**SECTION A-A**

- NOTES: 1). THIS INSTALLATION SHALL BE USED WHEN THE EXISTING SIDEWALK IS 18" (450) OR LESS.  
 2). USE A THRIE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.  
 3). PLACE GUARDRAIL REFLECTOR IN THE UPPER VALLEY OF THE THRIE BEAM EVERY FIFTH POST.  
 4). TIMBER BLOCK THICKNESS SHALL BE ADJUSTED TO ALLOW FACE OF THE THRIE BEAM TO BE FLUSH WITH BOTTOM OF CURB (MINIMUM THICKNESS SHALL BE 4" (100)).  
 5). THE EXIT END APPLICATION SHALL BE USED ONLY ON DIVIDED HIGHWAYS. FOR ALL OTHER SITUATIONS, THE ENTRANCE END APPLICATION SHALL BE USED ON BOTH ENDS OF THE BRIDGE PARAPET.  
 6). SPACING OF WOOD POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

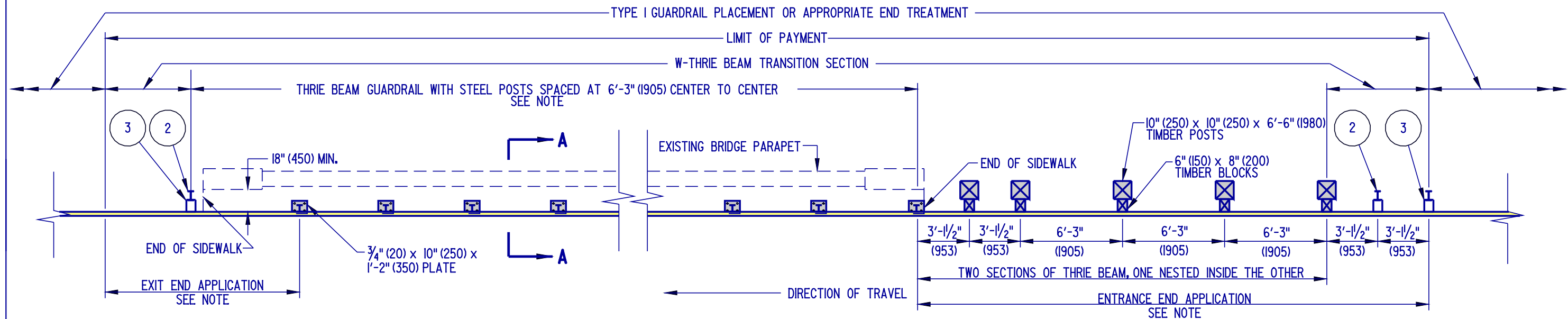
BRIDGE RAIL RETROFIT, TYPE 1

STANDARD NO. B-10 (2004)

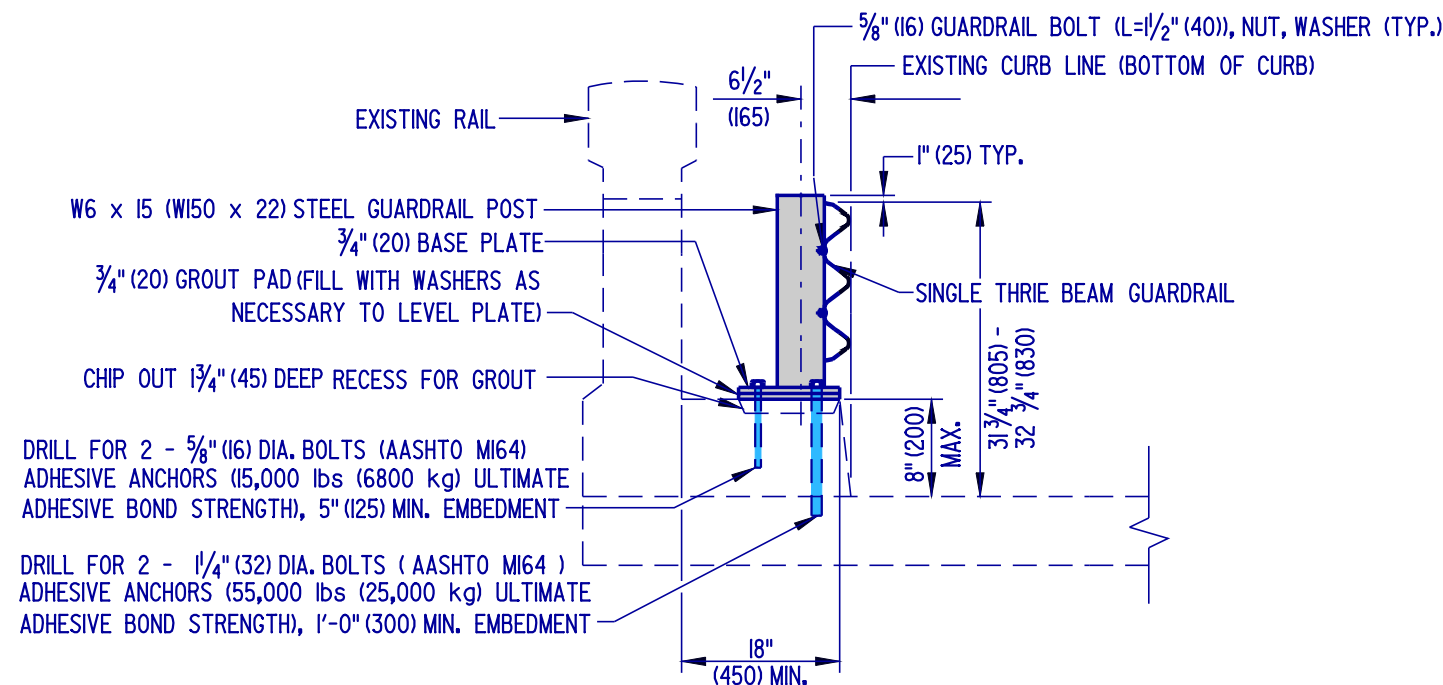
SHT. 1 OF 1

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

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



**PLAN**



**SECTION A-A**

- NOTES: 1). THIS INSTALLATION SHALL BE USED WHEN THE EXISTING SIDEWALK IS 18" (450) OR WIDER, AND DEAD LOAD CONSIDERATIONS ARE A CONCERN WHEN USING BRIDGE RAIL RETROFIT, TYPE 3.  
 2). ADHESIVE ANCHORS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS AND SHALL BE GALVANIZED.  
 3). USE A THRIE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.  
 4). PLACE GUARDRAIL REFLECTOR IN THE UPPER VALLEY OF THE THRIE BEAM EVERY FIFTH POST.  
 5). THE EXIT END APPLICATION SHALL BE USED ONLY ON DIVIDED HIGHWAYS. FOR ALL OTHER SITUATIONS, THE ENTRANCE END APPLICATION SHALL BE USED ON BOTH ENDS OF THE BRIDGE PARAPET.  
 6). SPACING OF STEEL POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**BRIDGE RAIL RETROFIT, TYPE 2**

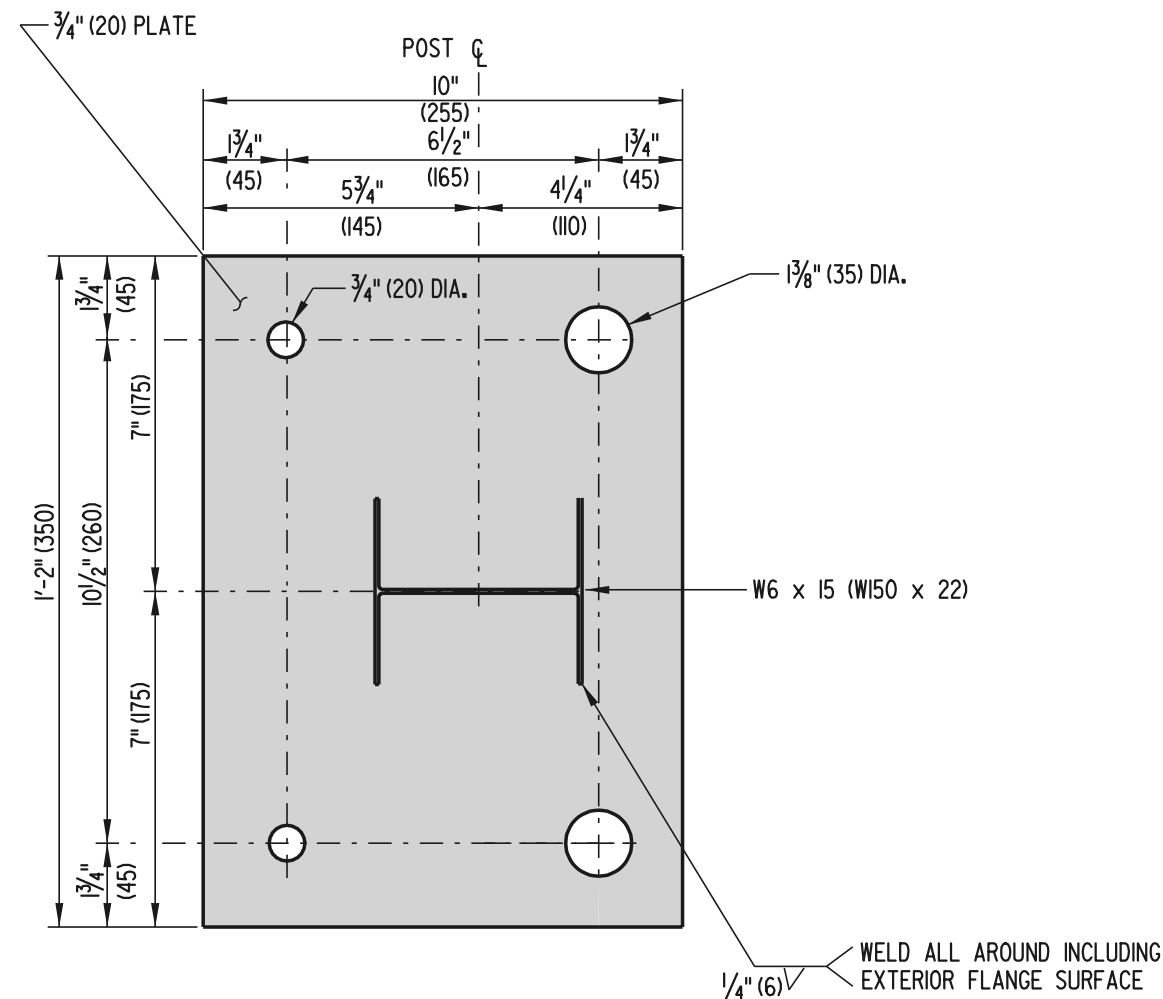
STANDARD NO. **B-11 (2004)**

SHT. **1** OF **4**

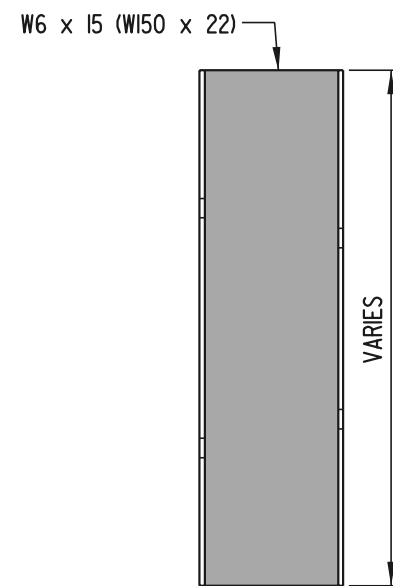
APPROVED *Carolann Wicks* **1/10/05**  
CHIEF ENGINEER DATE

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

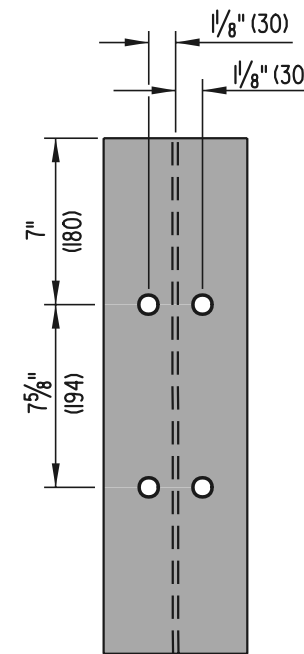




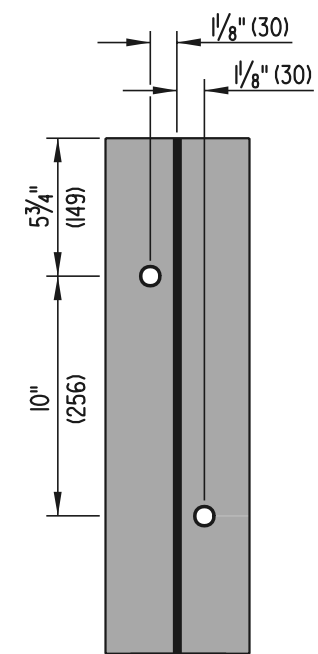
**BASE PLATE DETAIL**



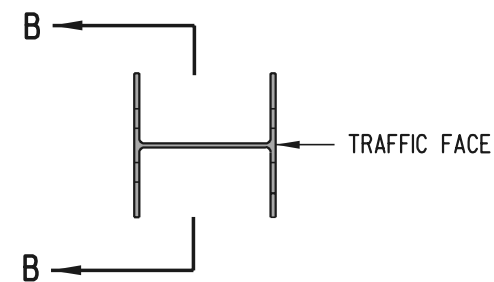
**SIDE**



**FRONT**



**SECTION B-B**



**PLAN**

**W6 x 15 (W150 x 22) STEEL GUARDRAIL POST**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**BRIDGE RAIL RETROFIT, TYPE 2**

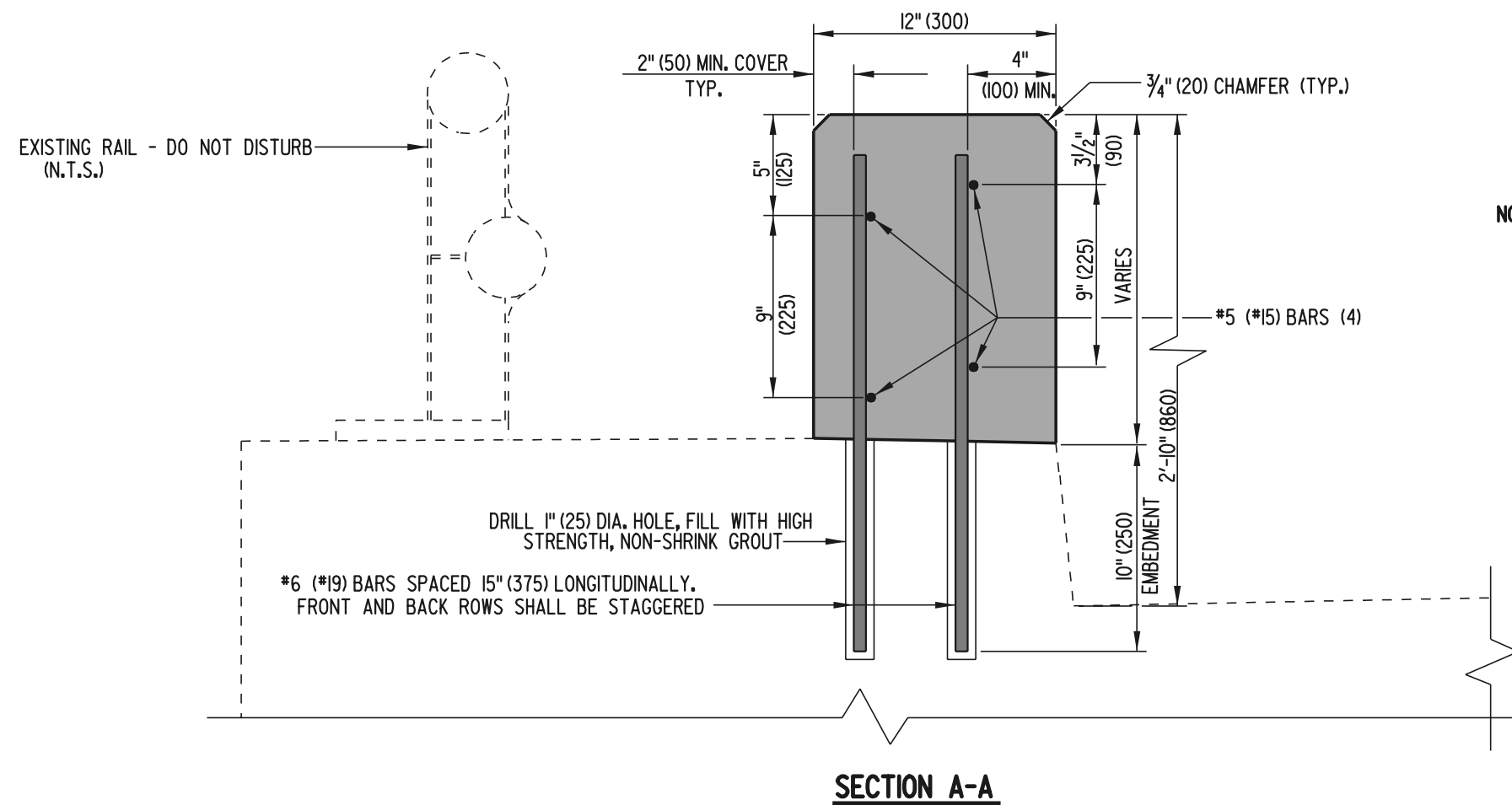
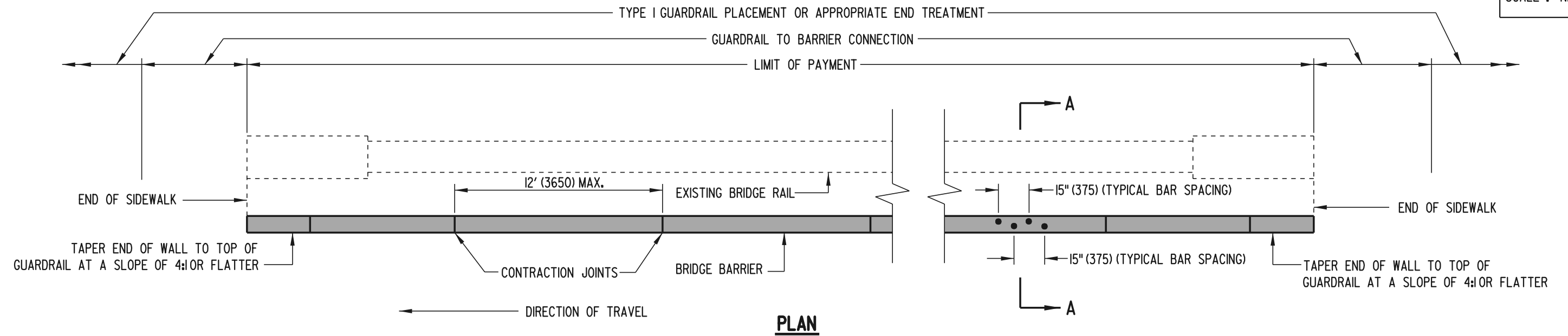
**STANDARD NO. B-11 (2001)**

**SHT. 2 OF 2**

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

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



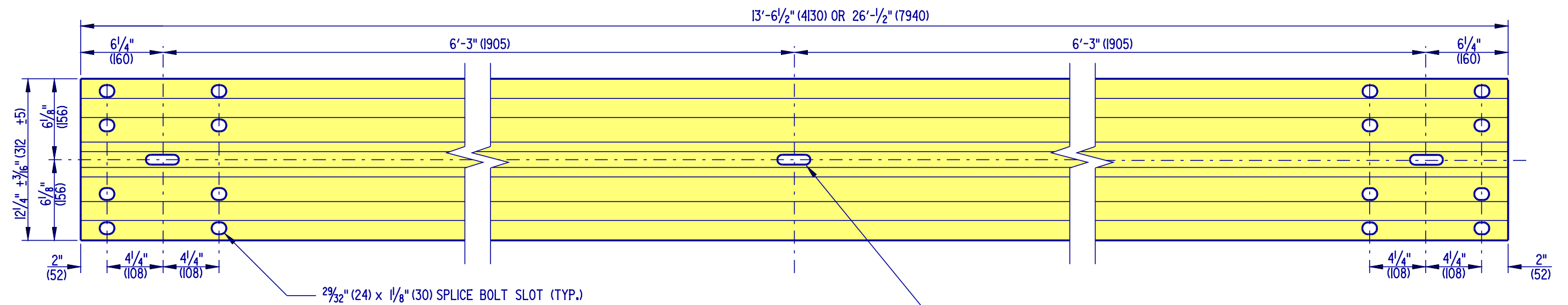
DELAWARE  
DEPARTMENT OF TRANSPORTATION

### BRIDGE RAIL RETROFIT, TYPE 3

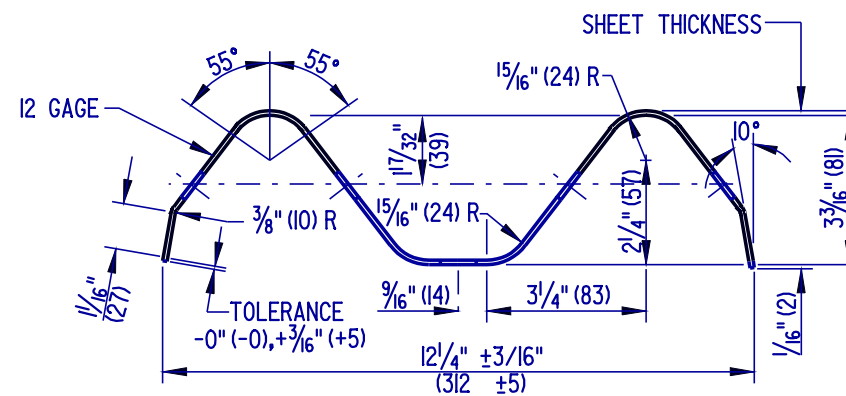
STANDARD NO. B-12 (2001)

SHT. 1 OF 1

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



W-BEAM ELEVATION



W-BEAM SECTION

NOTES: 1). TWO ADDITIONAL 3/4" (20) x 2 1/2" (65) SLOTS SHALL BE PROVIDED AT 6'-3" (1905) SPACING FOR BEAM LENGTH OF 26'-1/2" (7940).



DELAWARE  
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

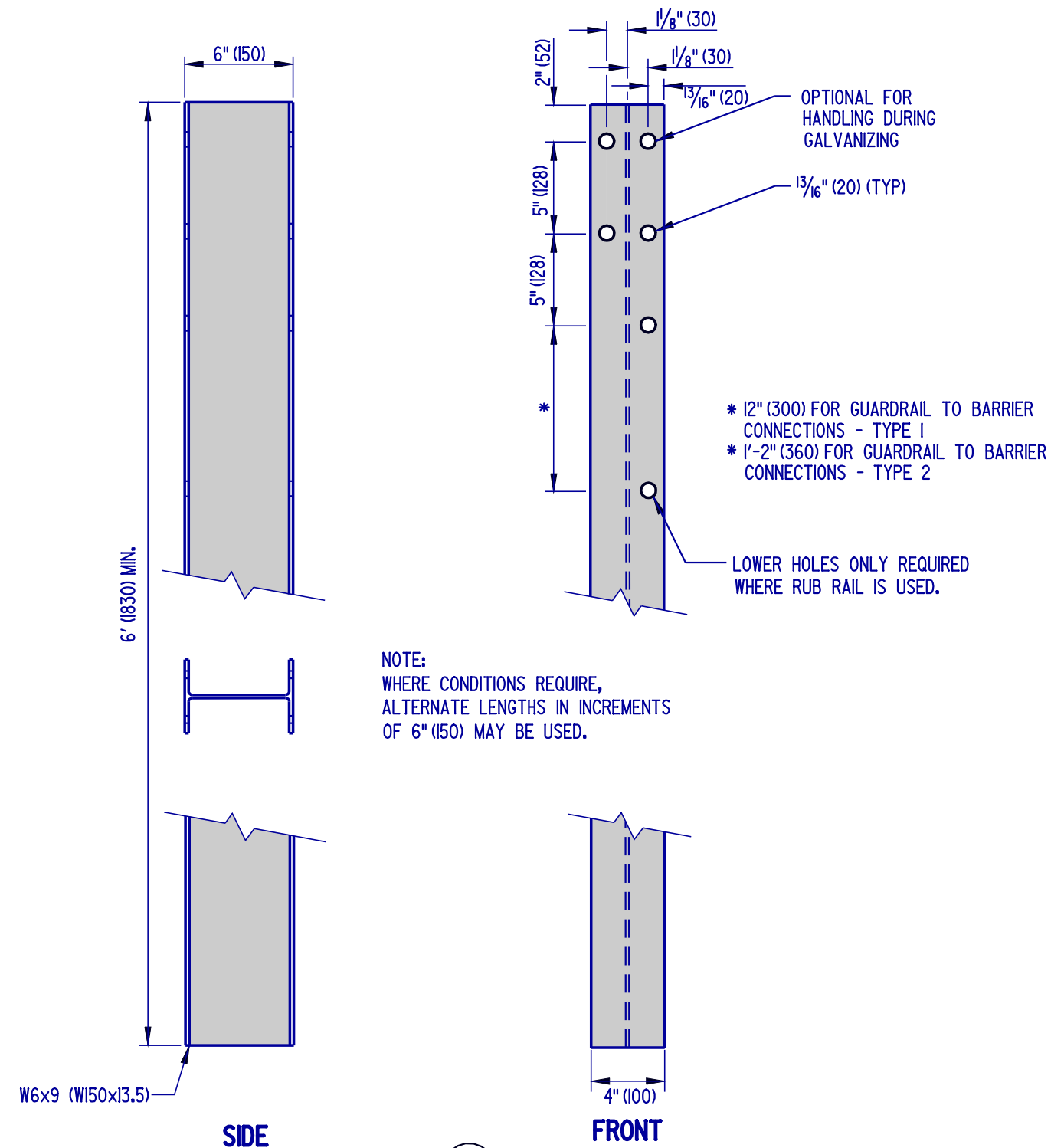
SHT. 1 OF 13

APPROVED

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

RECOMMENDED

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



NOTE:  
WHERE CONDITIONS REQUIRE,  
ALTERNATE LENGTHS IN INCREMENTS  
OF 6" (150) MAY BE USED.

OFFSET BLOCK

3

NOTE : ALL HOLES SHALL BE 13/16" (20) DIA. BOLT  
HOLE PATTERN IS SYMMETRICAL WITH RESPECT  
TO THE VERTICAL AXIS OF THE POST.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

SHT. 2 OF 13

APPROVED

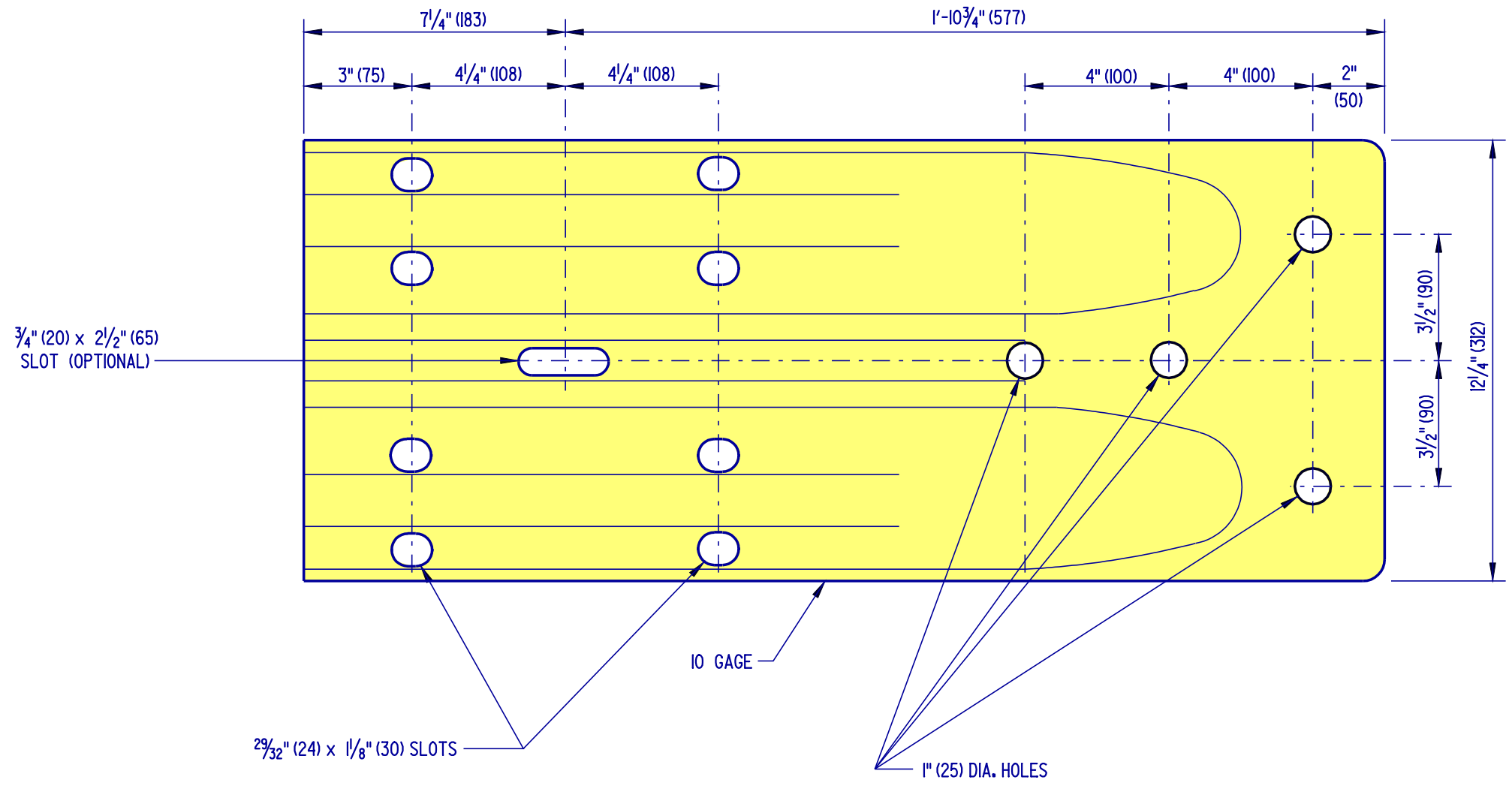
*Carolann Wicks*  
CHIEF ENGINEER

1/10/05  
DATE

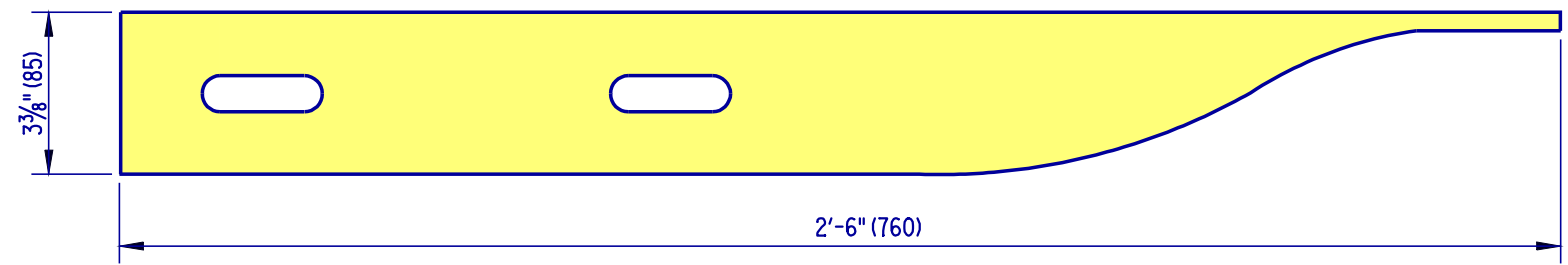
RECOMMENDED

*Dennis M. O'Flaherty*  
DESIGN ENGINEER

1/13/05  
DATE



**ELEVATION**



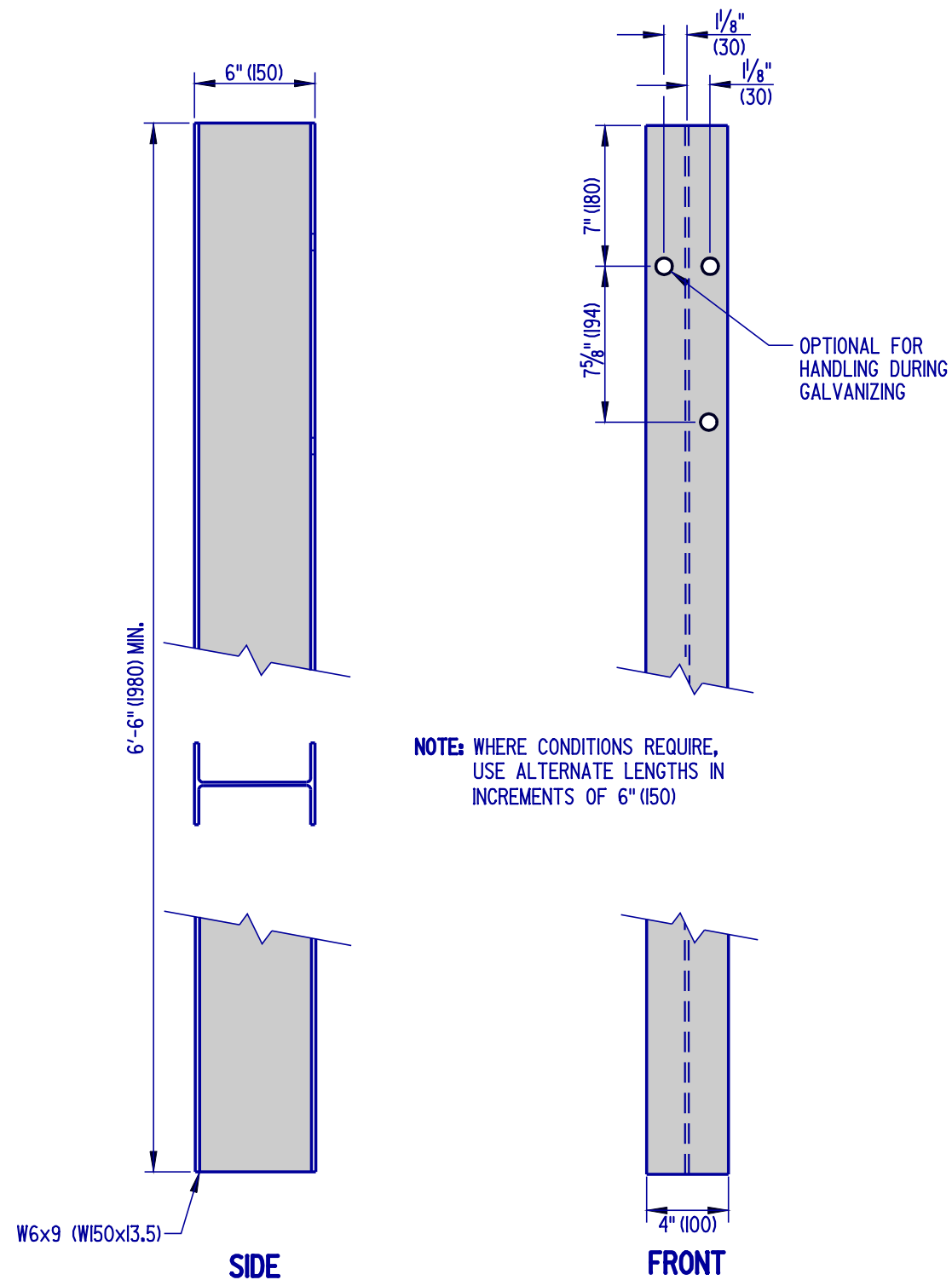
**PLAN**

**W-BEAM TERMINAL CONNECTOR**

5

 DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE			APPROVED <i>Carolann Wicks</i> 1/10/05 CHIEF ENGINEER DATE
	STANDARD NO. B-13 (2004)	SHT. 3	OF 13	RECOMMENDED <i>Dennis M. O'Flaherty</i> 1/3/05 DESIGN ENGINEER DATE

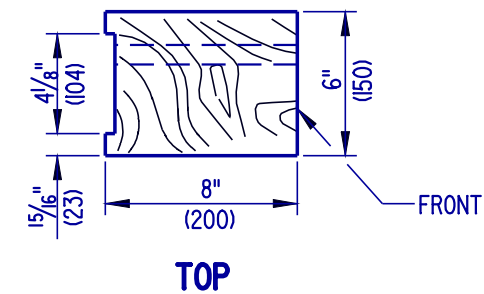




NOTE: WHERE CONDITIONS REQUIRE,  
USE ALTERNATE LENGTHS IN  
INCREMENTS OF 6" (150)

POST 2

THRIE BEAM STEEL POST AND WOOD OFFSET BLOCK



SIDE

FRONT

OFFSET BLOCK

3

NOTE :  
ALL HOLES SHALL BE 13/16" (20) DIA. BOLT HOLE  
PATTERN IS SYMMETRICAL WITH RESPECT TO THE  
VERTICAL AXIS OF THE POST.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

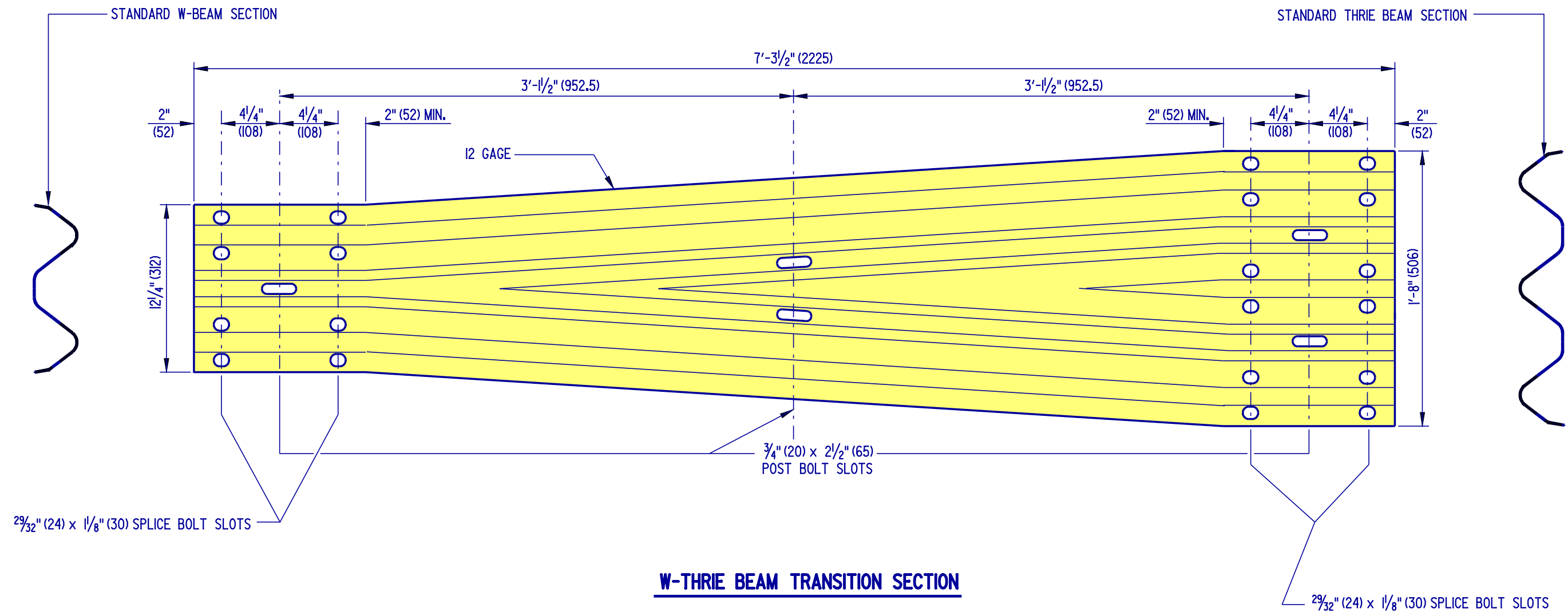
HARDWARE

STANDARD NO. B-13 (2004)

SHT. 5 OF 13

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

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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

SHT. 6 OF 13

APPROVED

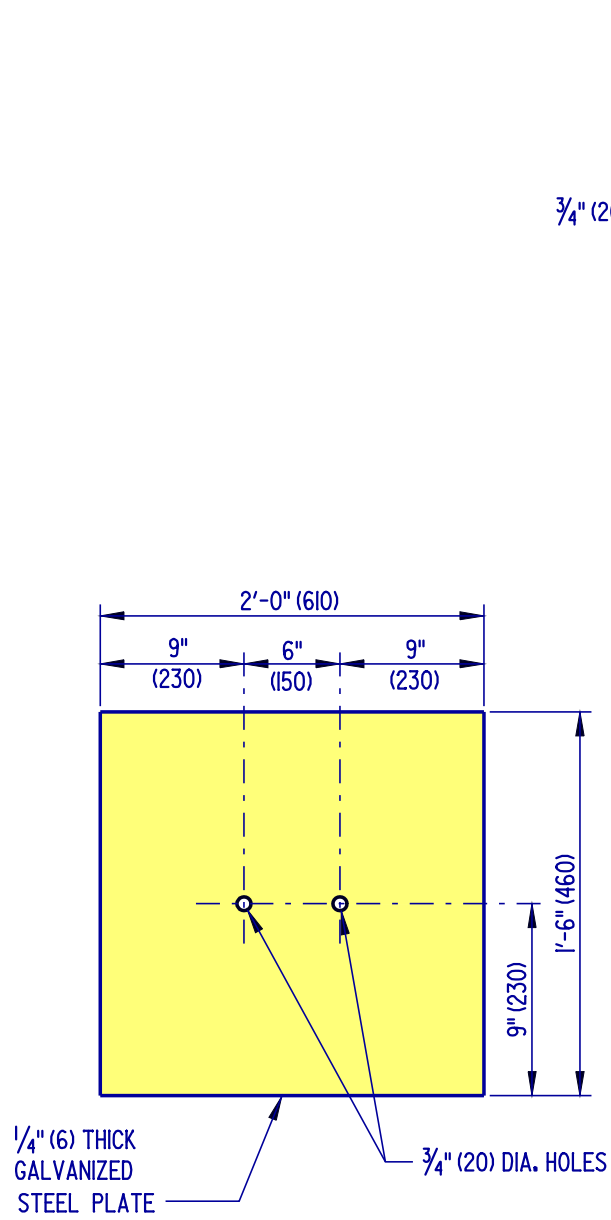
*Carolann Wicks*  
CHIEF ENGINEER 1/10/05

RECOMMENDED

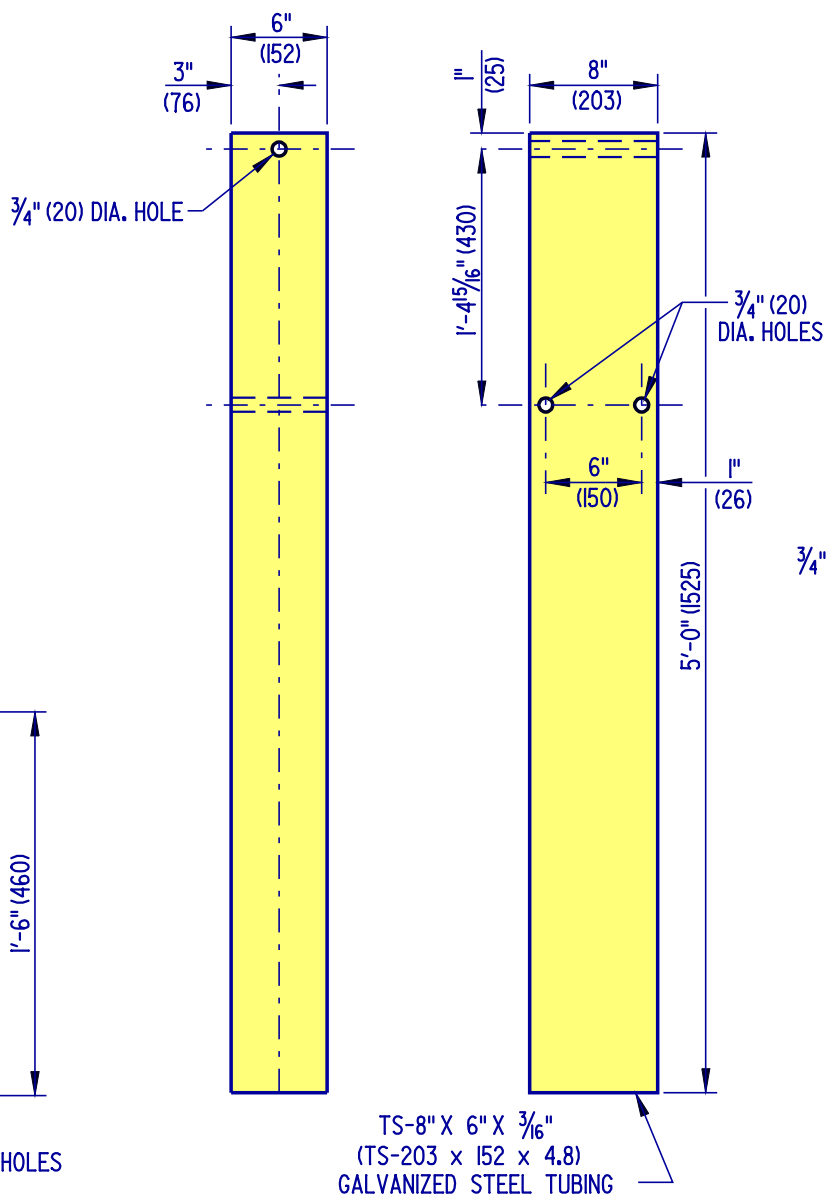
*Dennis M. O'Flaherty*  
DESIGN ENGINEER 1/3/05



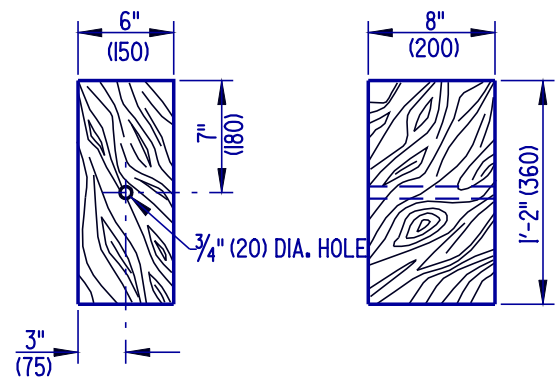
**NOTES :** 1). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.  
2). ALL WOOD SIZES ARE NOMINAL DIMENSIONS.



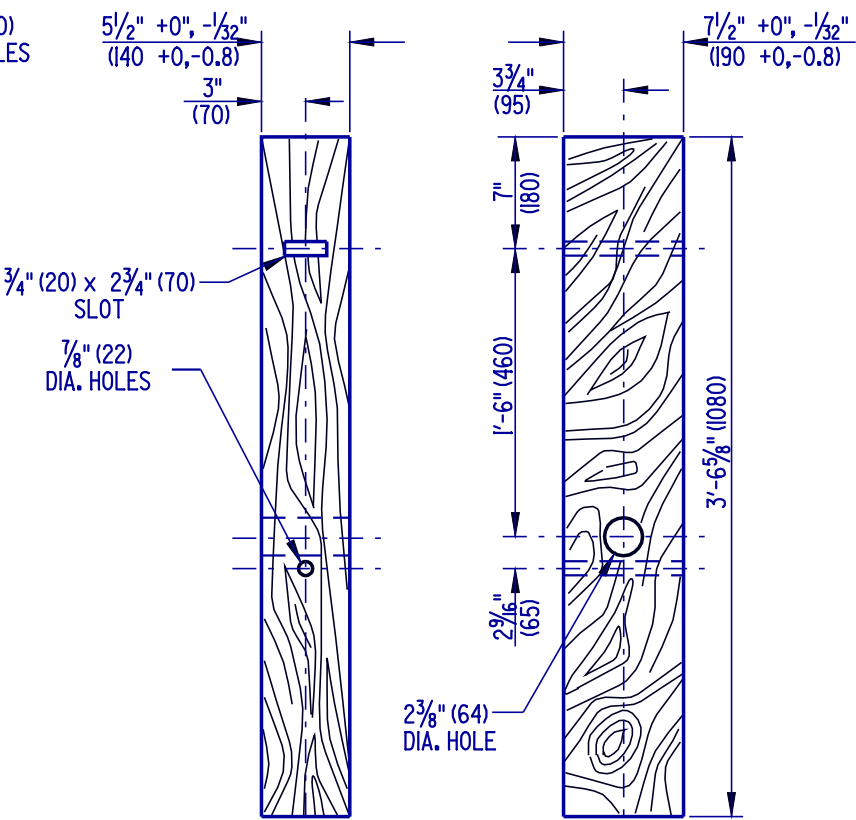
**SOIL PLATE**



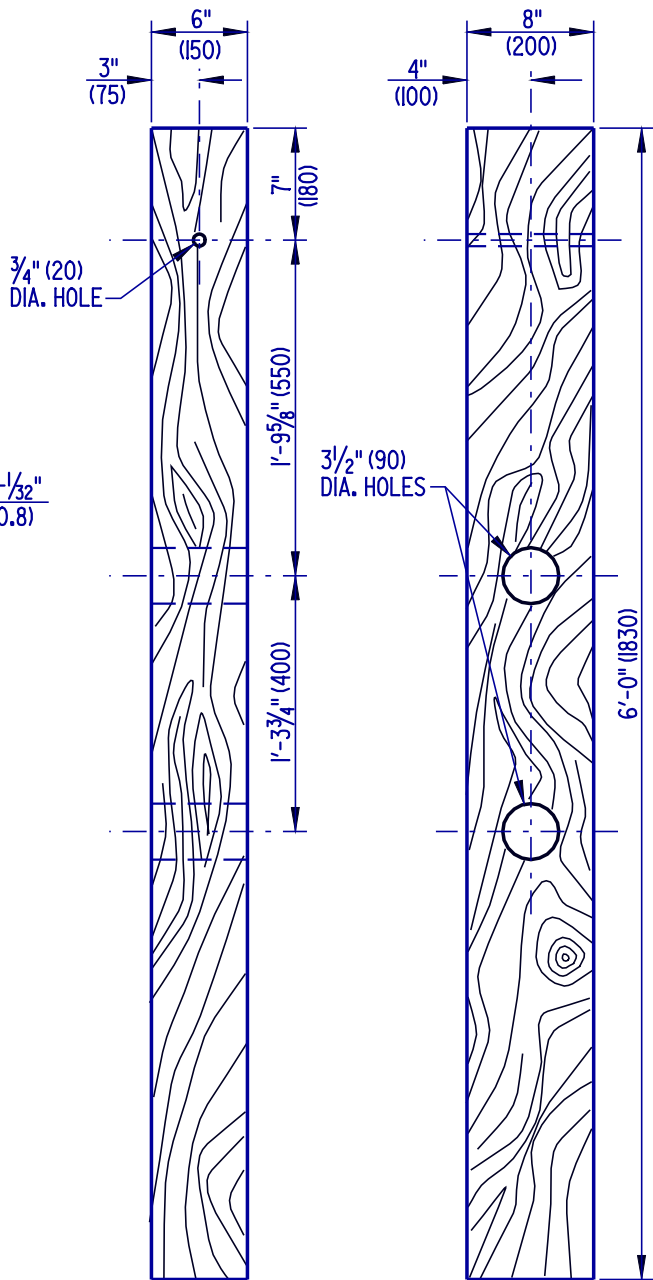
**STEEL TUBE**



**WOOD BLOCK**



**SHORT WOOD BREAKAWAY POST**



**LONG WOOD BREAKAWAY POST**



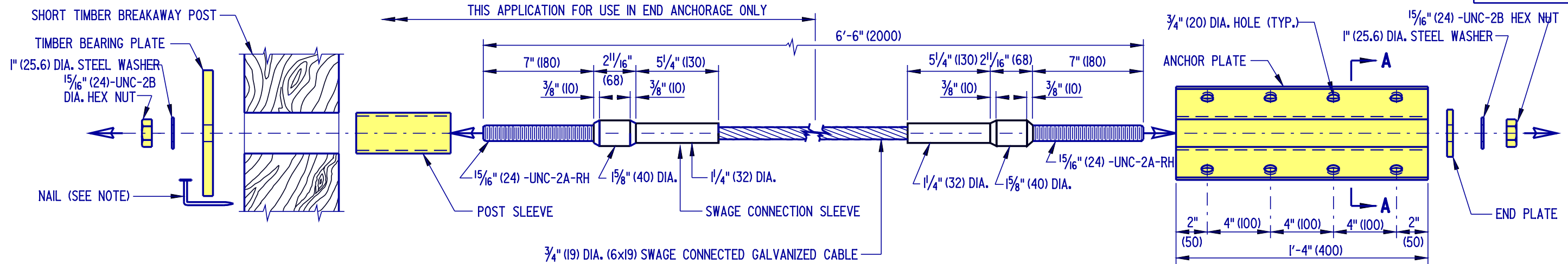
**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

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

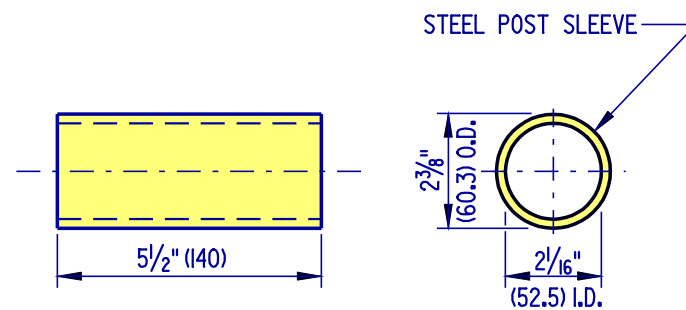
**HARDWARE  
SHT. 7 OF 13**

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

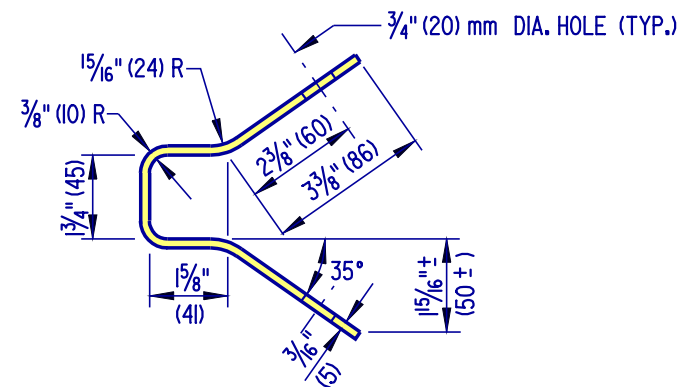
SCALE : N.T.S.



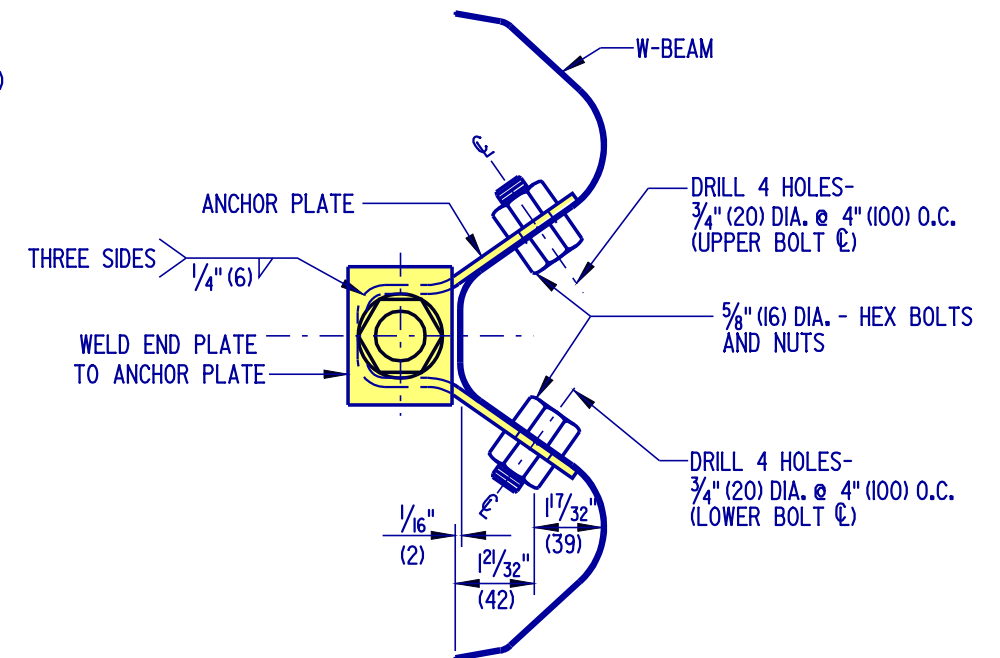
### SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY



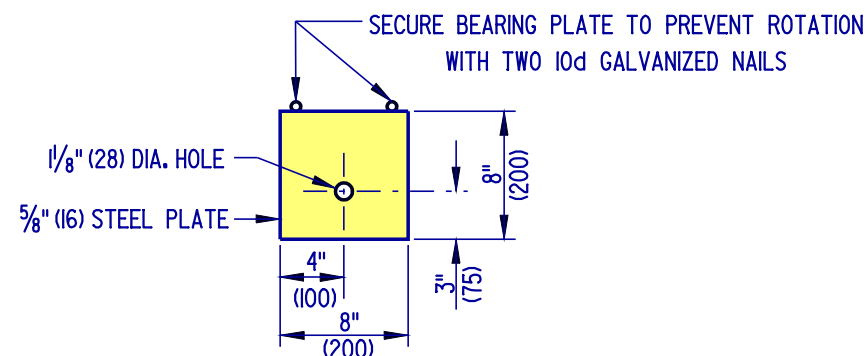
POST SLEEVE



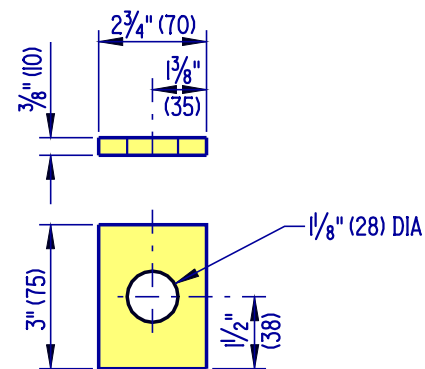
SECTION A-A



ANCHOR PLATE TO W-BEAM CONNECTION DETAIL



TIMBER BEARING PLATE



END PLATE

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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

STANDARD NO. B-13 (2004)

HARDWARE

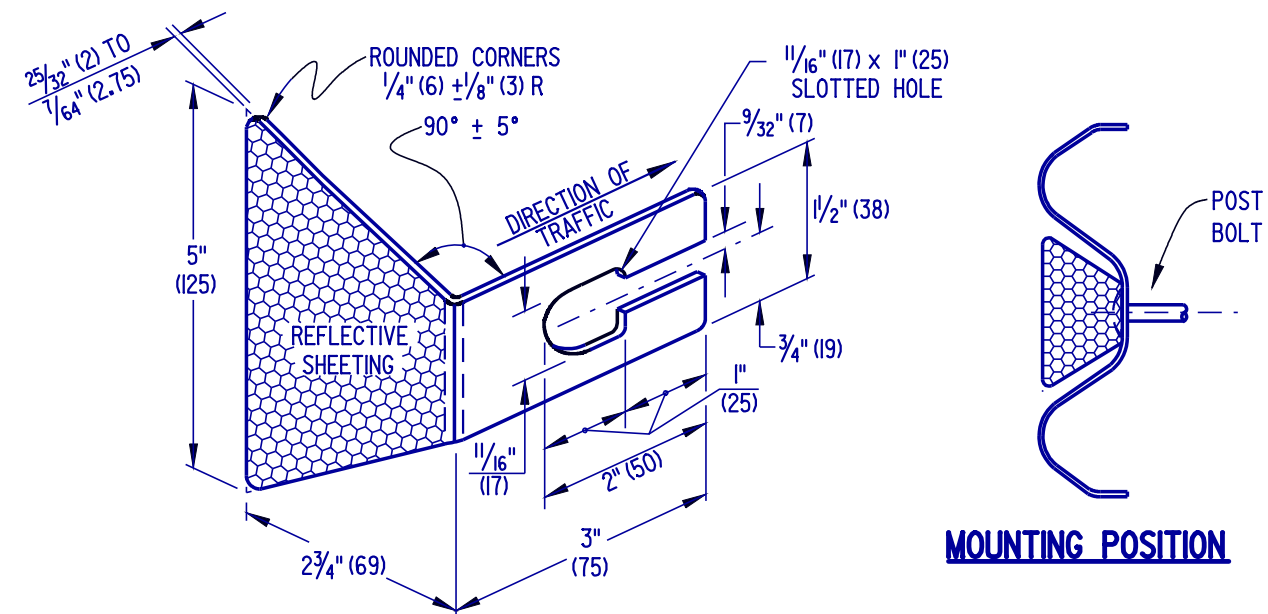
SHT. 8 OF 13

APPROVED

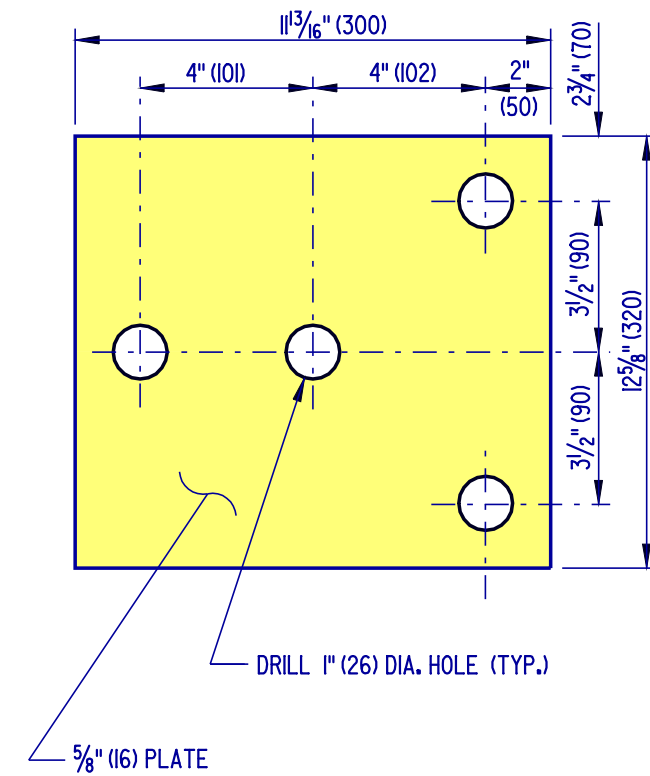
Carolann Wicks 1/10/05  
CHIEF ENGINEER DATE

RECOMMENDED

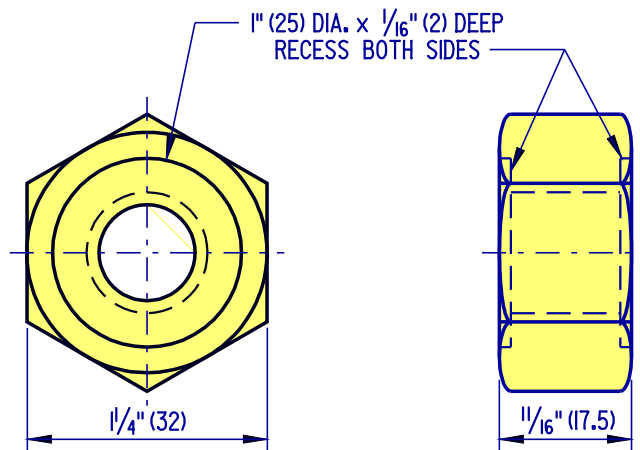
Dennis M. O'Flaherty 1/13/05  
DESIGN ENGINEER DATE



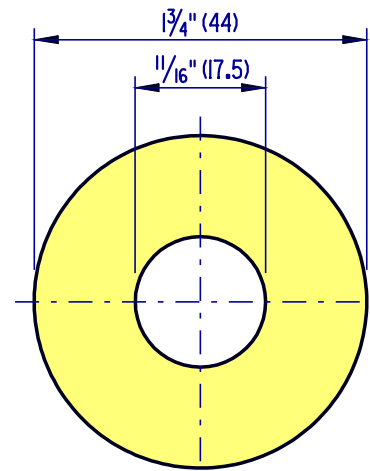
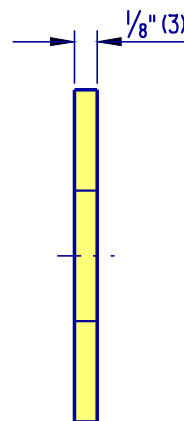
## GUARDRAIL REFLECTOR



## BEARING PLATE DETAIL

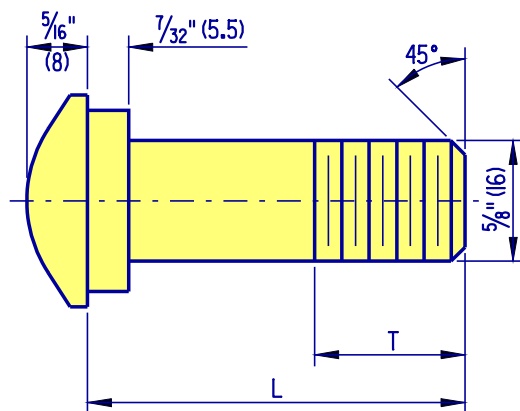


**RECESSED NUT**  
**(FOR 5/8\" (16) GUARDRAIL BOLT)**

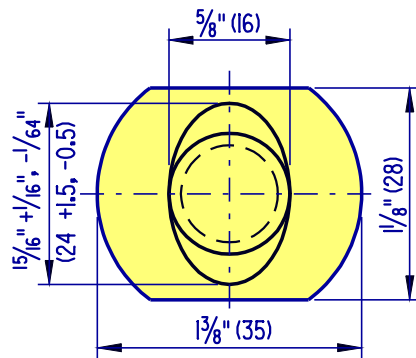


**STEEL WASHER (FOR 5/8\" (16) GUARDRAIL BOLT)**

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



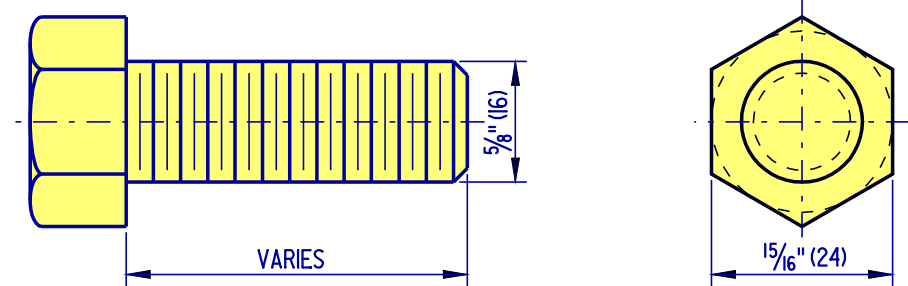
**GUARDRAIL BOLT**



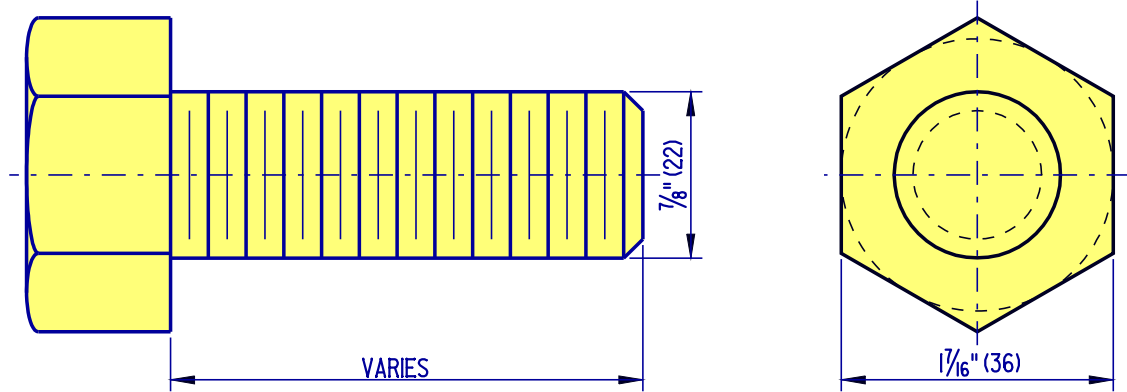
L	T (MIN.)
1 1/4\" (35)	FULL THREAD LENGTH
2\" (50)	FULL THREAD LENGTH
4\" (100)	FULL THREAD LENGTH
10\" (255)	4\" (100) THREAD LENGTH
18\" (460)	4\" (100) THREAD LENGTH

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

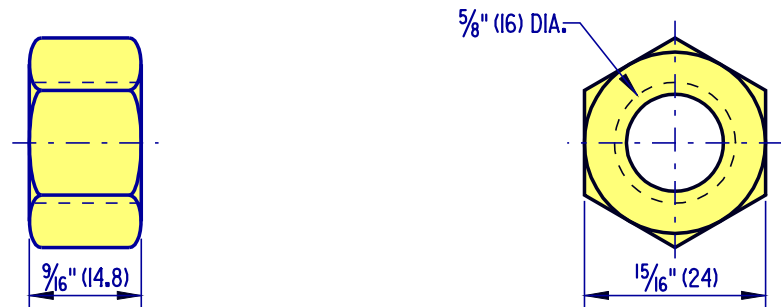




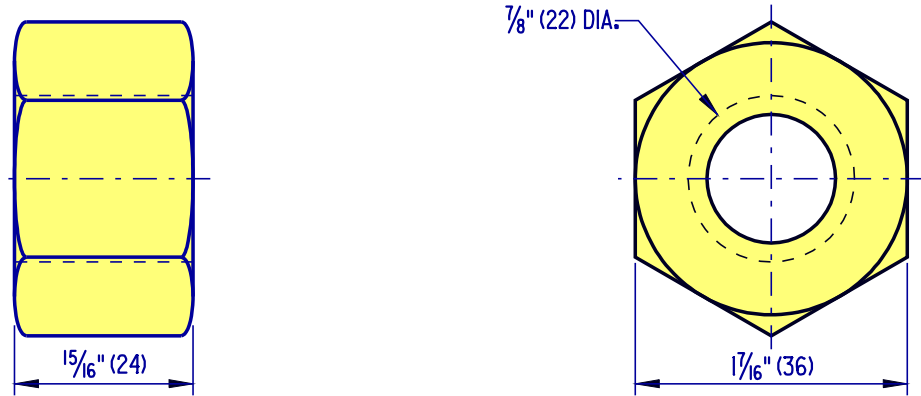
5/8" (16) HEX BOLT



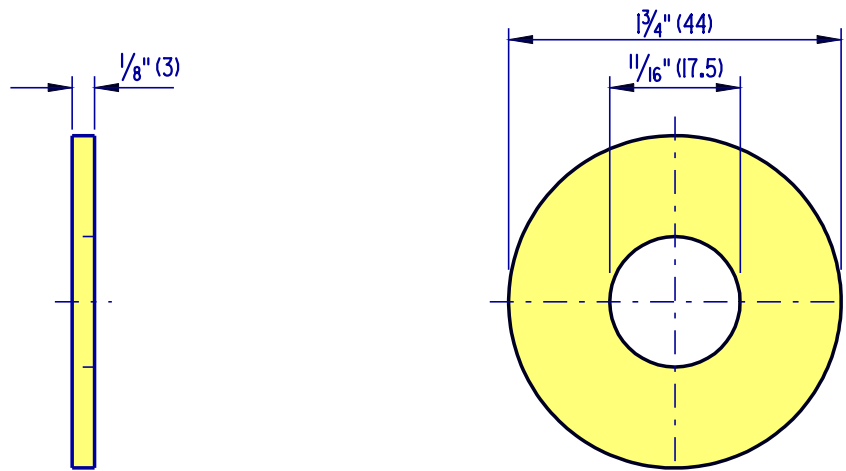
HIGH-STRENGTH STRUCTURAL HEX BOLT



5/8" (16) HEX NUT



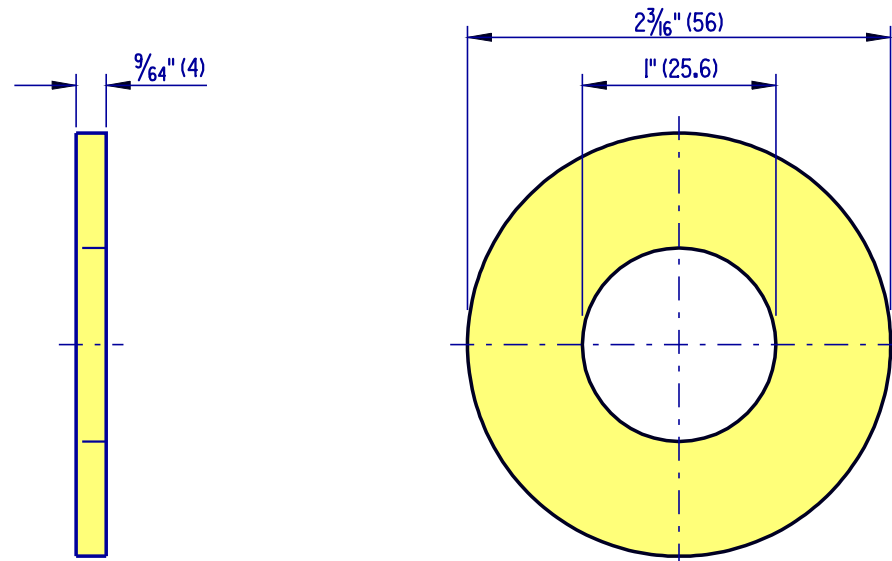
HIGH-STRENGTH STRUCTURAL HEX NUT



5/8" (16) STEEL WASHER

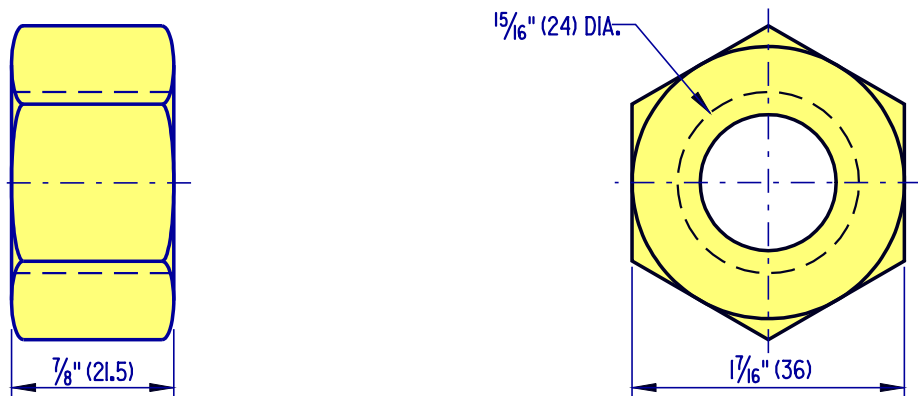
NOTE : DIMENSION FOR WASHER THICKNESS IS APPROXIMATE BASE METAL THICKNESS.





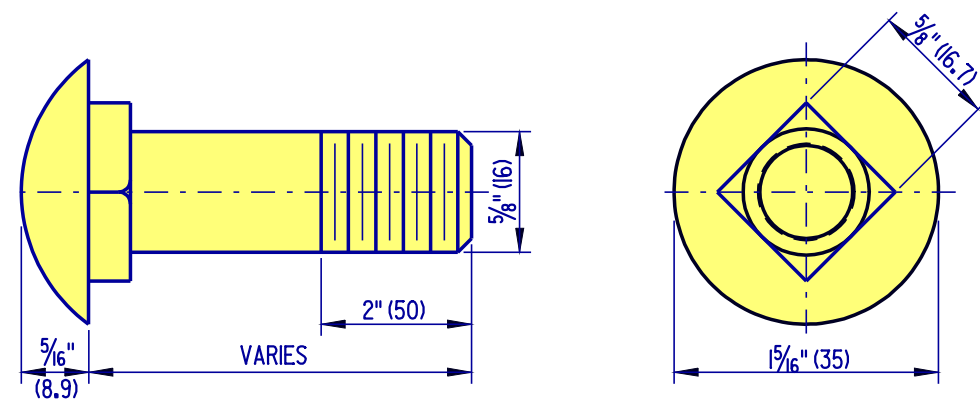
**STEEL WASHER**

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



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

NOTE : FOR USE WITH SWAGED CABLE ASSEMBLAGE.



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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**HARDWARE**

STANDARD NO.

B-13 (2004)

SHT.

12

OF

13

APPROVED

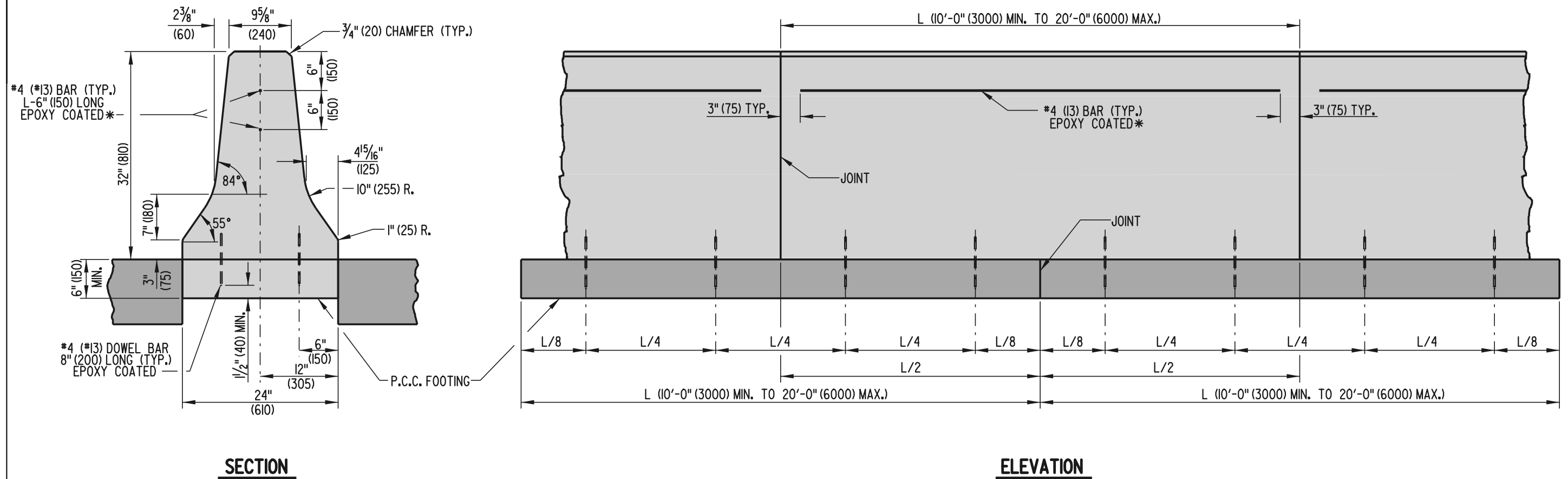
*Carolann Wicks*  
CHIEF ENGINEER

1/10/05  
DATE

RECOMMENDED

*Dennis M. O'Flaherty*  
DESIGN ENGINEER

1/3/05  
DATE



**TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION**

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



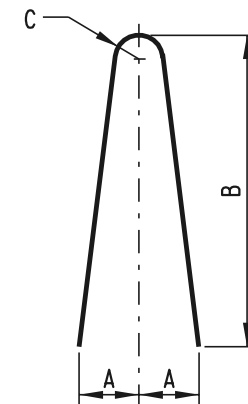
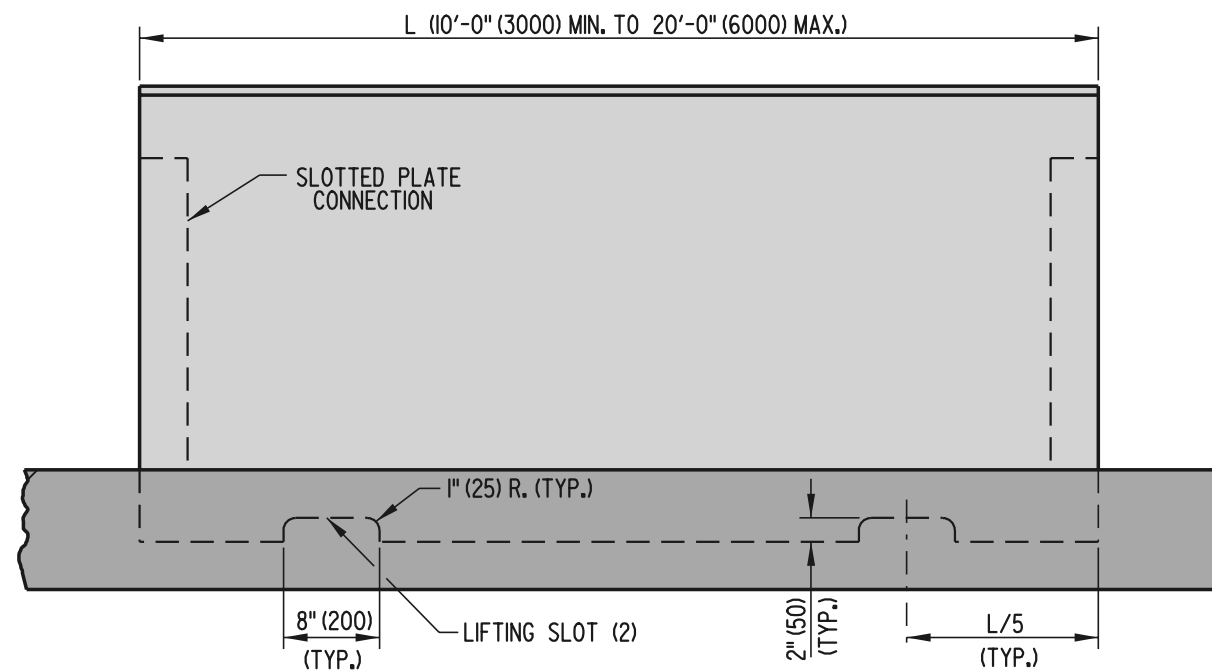
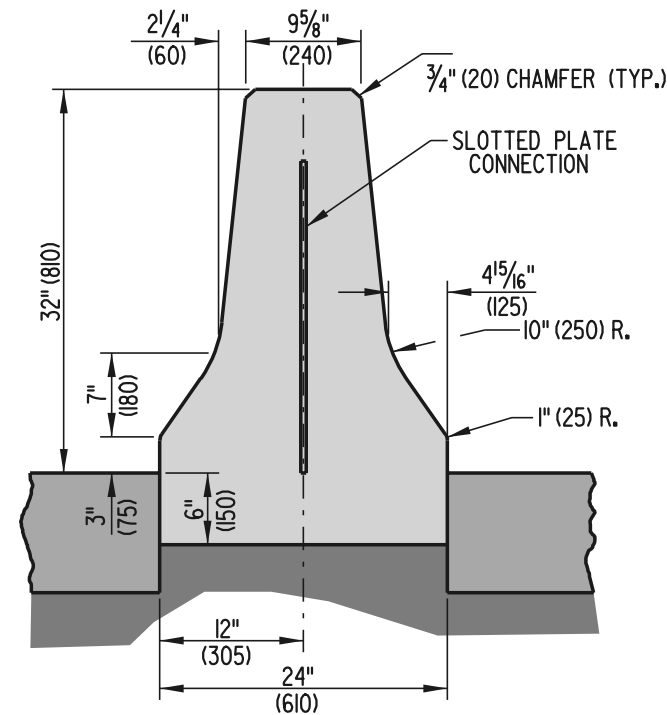
DELAWARE  
DEPARTMENT OF TRANSPORTATION

CONCRETE SAFETY BARRIER (F SHAPE)

STANDARD NO. B-14 (2001)

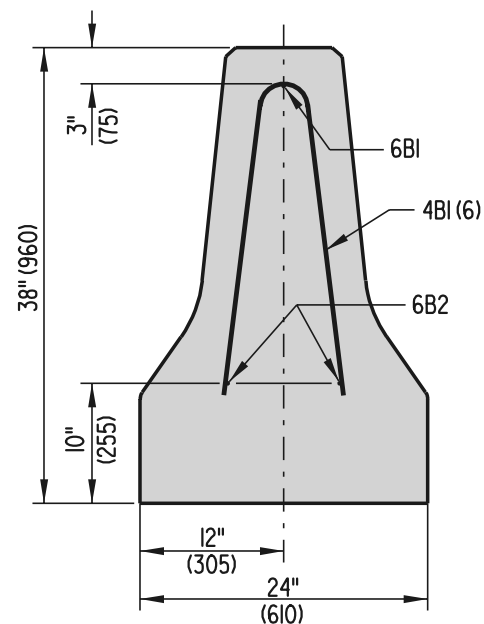
SHT. 1 OF 3

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

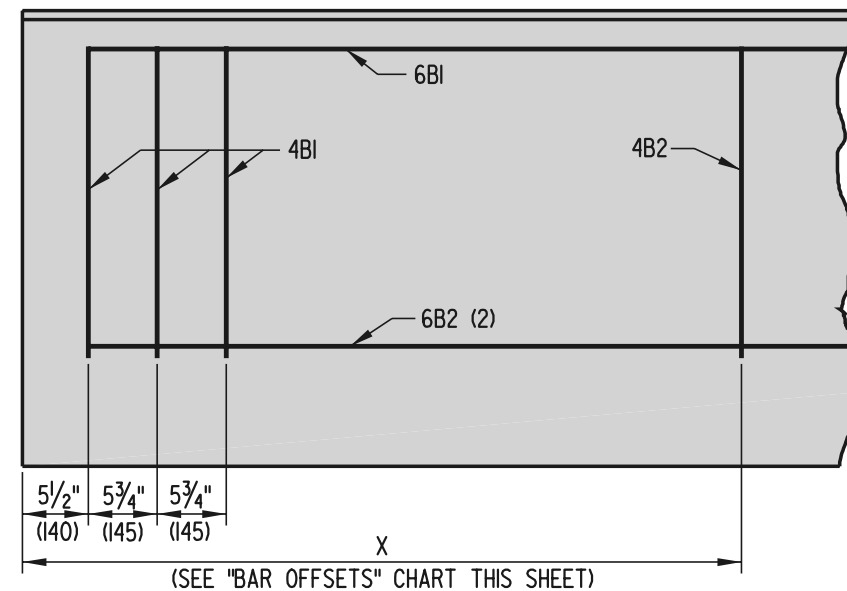


TYPE 'I' BAR

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



F' SHAPE BARRIER SECTION



ELEVATION

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

\* THE LENGTH OF BARS 6B1 AND 6B2 SHALL BE 11" (280) SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.  
\*\* SEE "BAR OFFSETS" CHART ON THIS SHEET FOR MORE INFORMATION.

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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

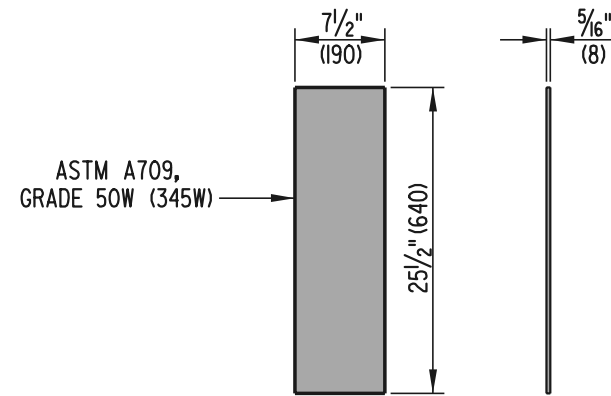
CONCRETE SAFETY BARRIER (F SHAPE)

STANDARD NO. B-14 (2001)

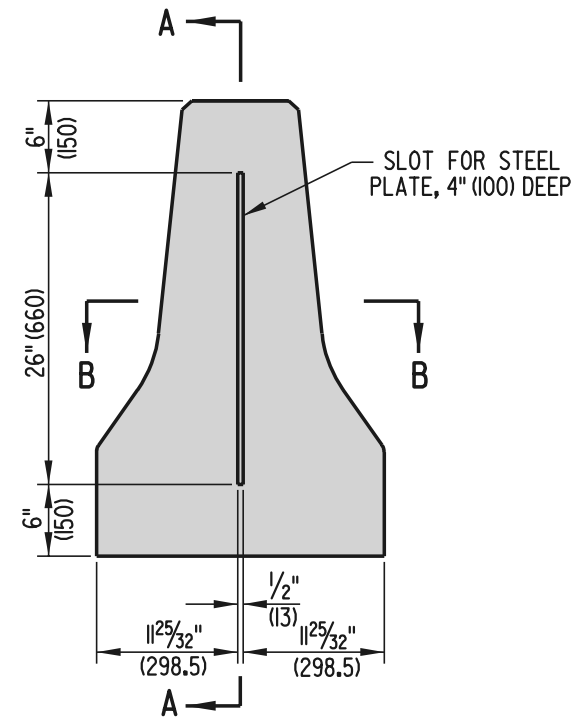
SHT. 2 OF 3

APPROVED *Ryan M. Hershman* 6/18/01  
RECOMMENDED *Michael P. Gotsch* 6/18/01



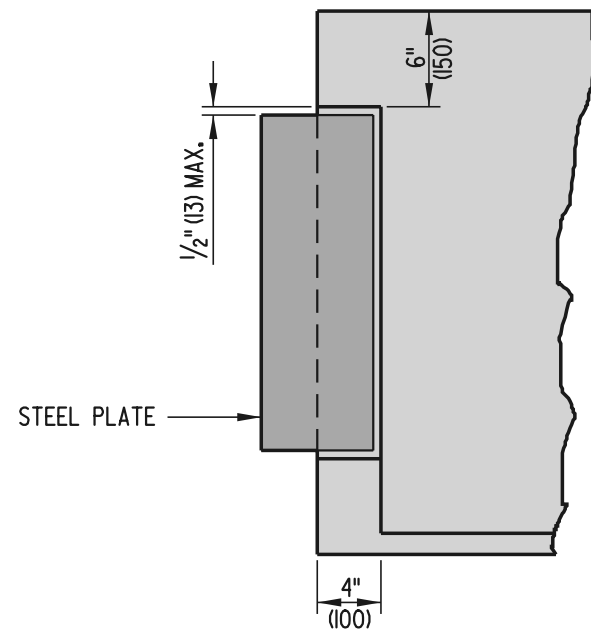


**STEEL CONNECTOR PLATE**

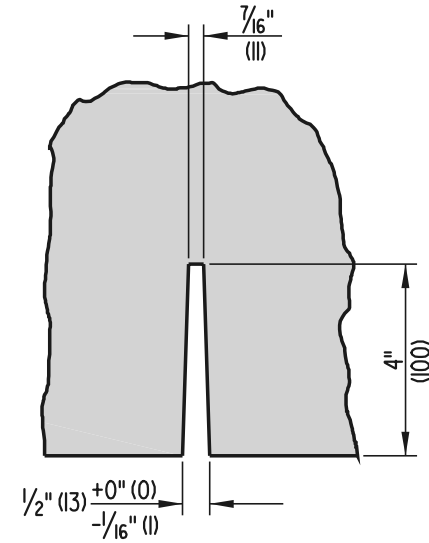


**SLOT DIMENSIONS**

CONCRETE SAFETY BARRIER, PRECAST CONSTRUCTION  
F' SHAPE BARRIER SECTION



**SECTION A-A**



**SECTION B-B**



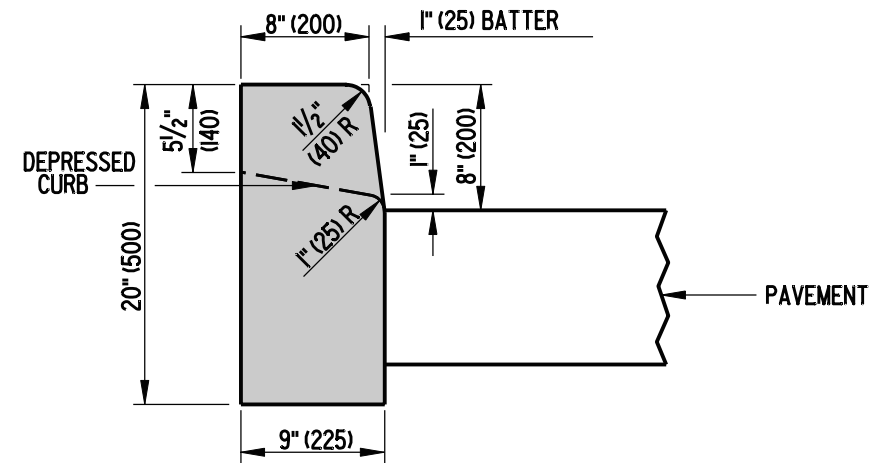
DELAWARE  
DEPARTMENT OF TRANSPORTATION

**SLOTTED PLATE CONNECTION DETAILS**

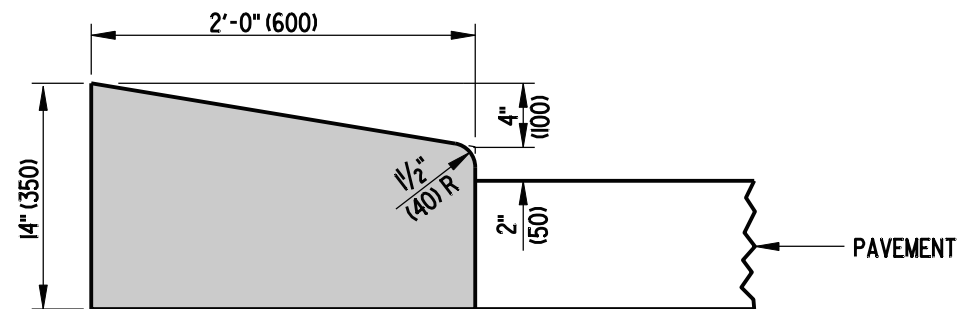
STANDARD NO. B-14 (2001)

SHT. 3 OF 3

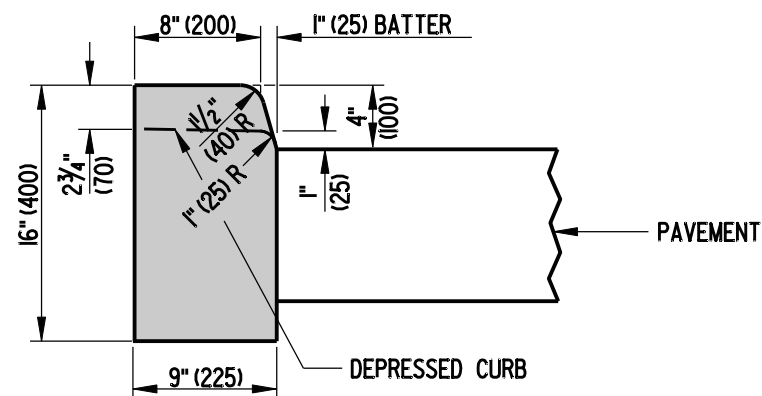
APPROVED *Ryan M. Harkins* 6/18/01  
CHIEF ENGINEER DATE  
RECOMMENDED *Michael P. Gotsch* 6/18/01  
DESIGN ENGINEER DATE



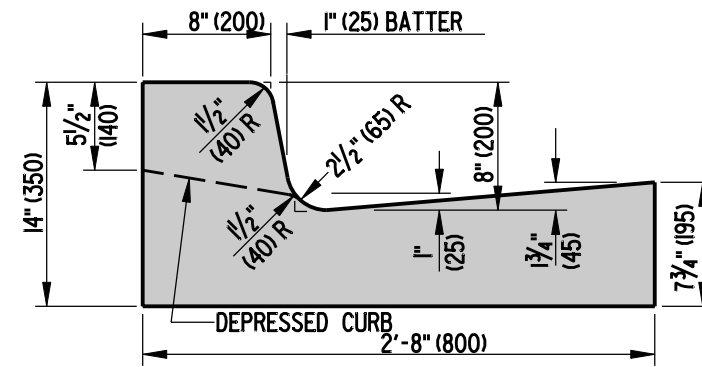
**P.C.C. CURB**  
TYPE 1



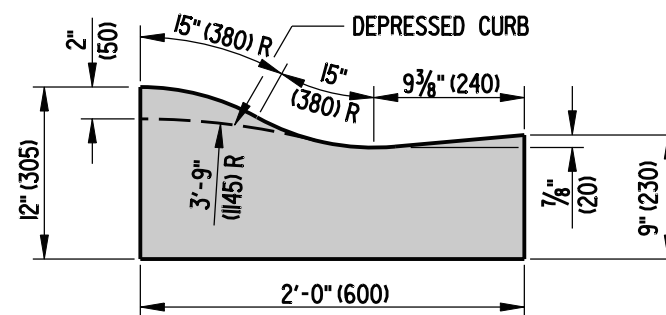
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TYPE 2



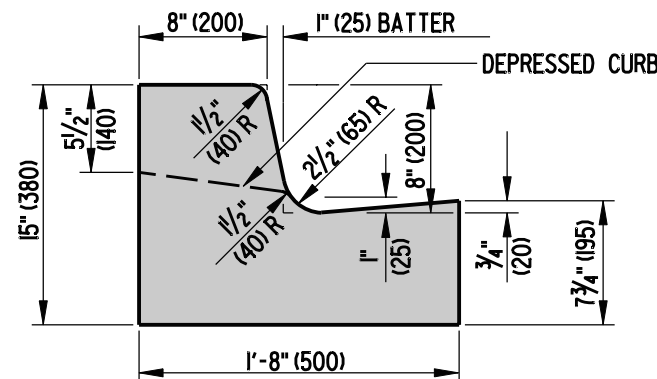
**P.C.C. CURB**  
TYPE 3



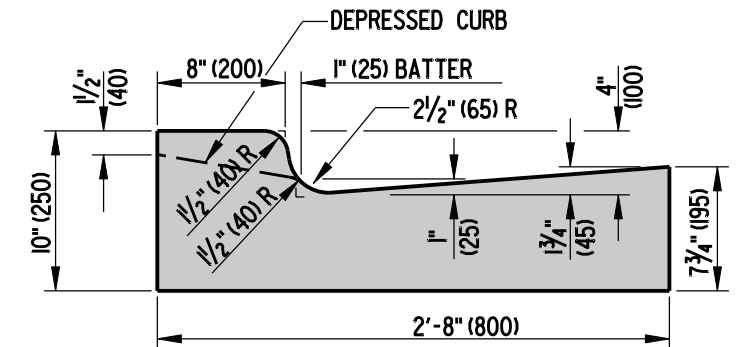
**INTEGRAL P.C.C. CURB AND GUTTER**  
TYPE 1



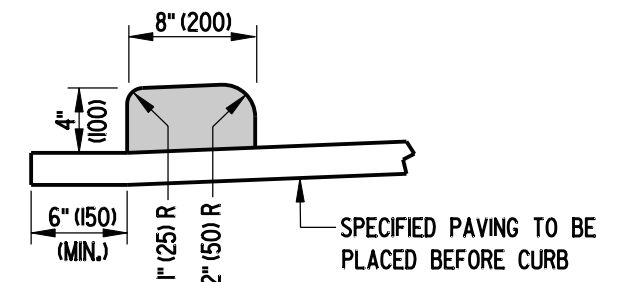
**INTEGRAL P.C.C. CURB AND GUTTER**  
TYPE 2



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



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



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

**NOTES:**

1. WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON STANDARD P-2, SHEET 3 OF 5. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
2. DEPRESS CURB AT ENTRANCES AS DETAILED ON THIS SHEET.
3. DEPRESS CURB FLUSH WITH PAVEMENT AT CURB RAMPS. MAXIMUM SLOPE OF CURB AT CURB RAMPS IS 20:1 IN THE DIRECTION OF PEDESTRIAN TRAVEL. SEE STANDARD NO C-2, 1 OF 4.
4. DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT NOSE OF ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 12:1.



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

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

**STANDARD NO. C-1 (2007)**

**SHT. 1 OF 1**

**APPROVED**

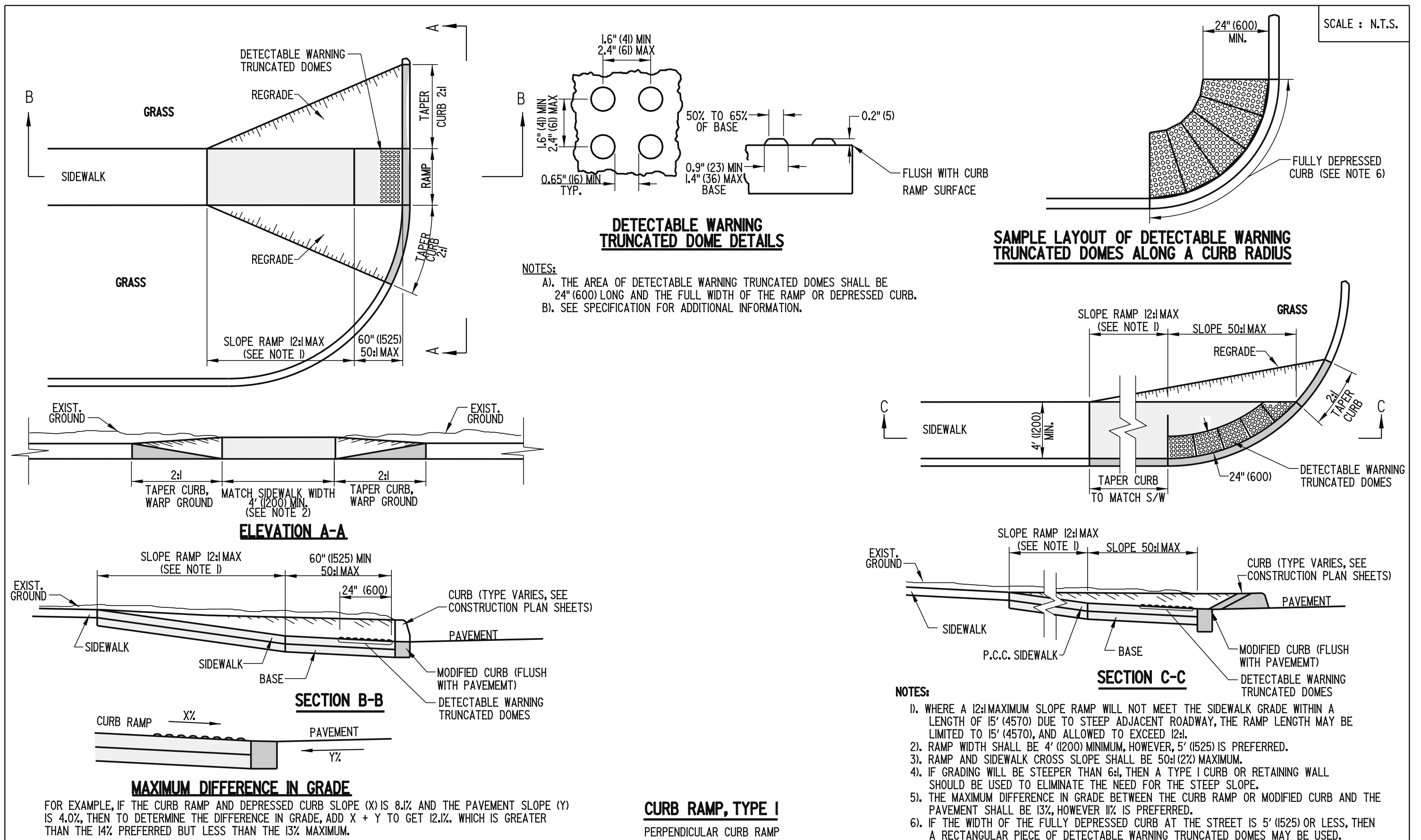
*[Signature]*  
CHIEF ENGINEER

**10/24/07**  
DATE

**RECOMMENDED**

*[Signature]*  
DESIGN ENGINEER

**10/23/07**  
DATE



DELAWARE  
DEPARTMENT OF TRANSPORTATION

# CURB RAMP, TYPE 1 AND SECTIONS

STANDARD NO. C-2 (2006)

SHT. 1 OF 4

APPROVED

*[Signature]*  
CHIEF ENGINEER

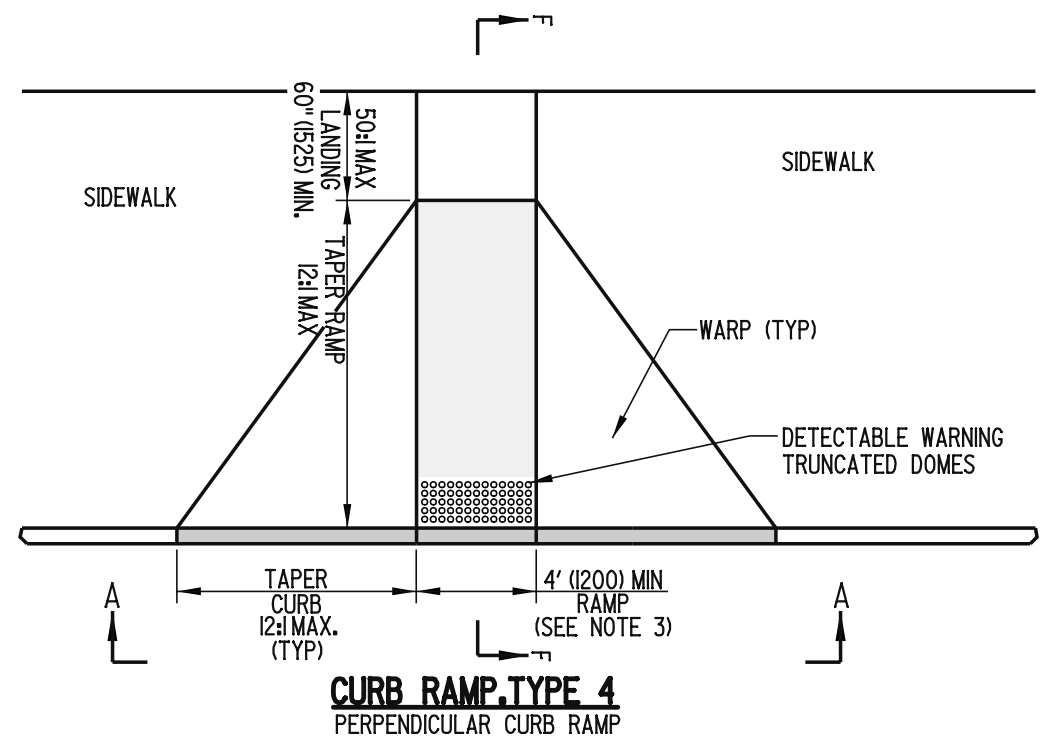
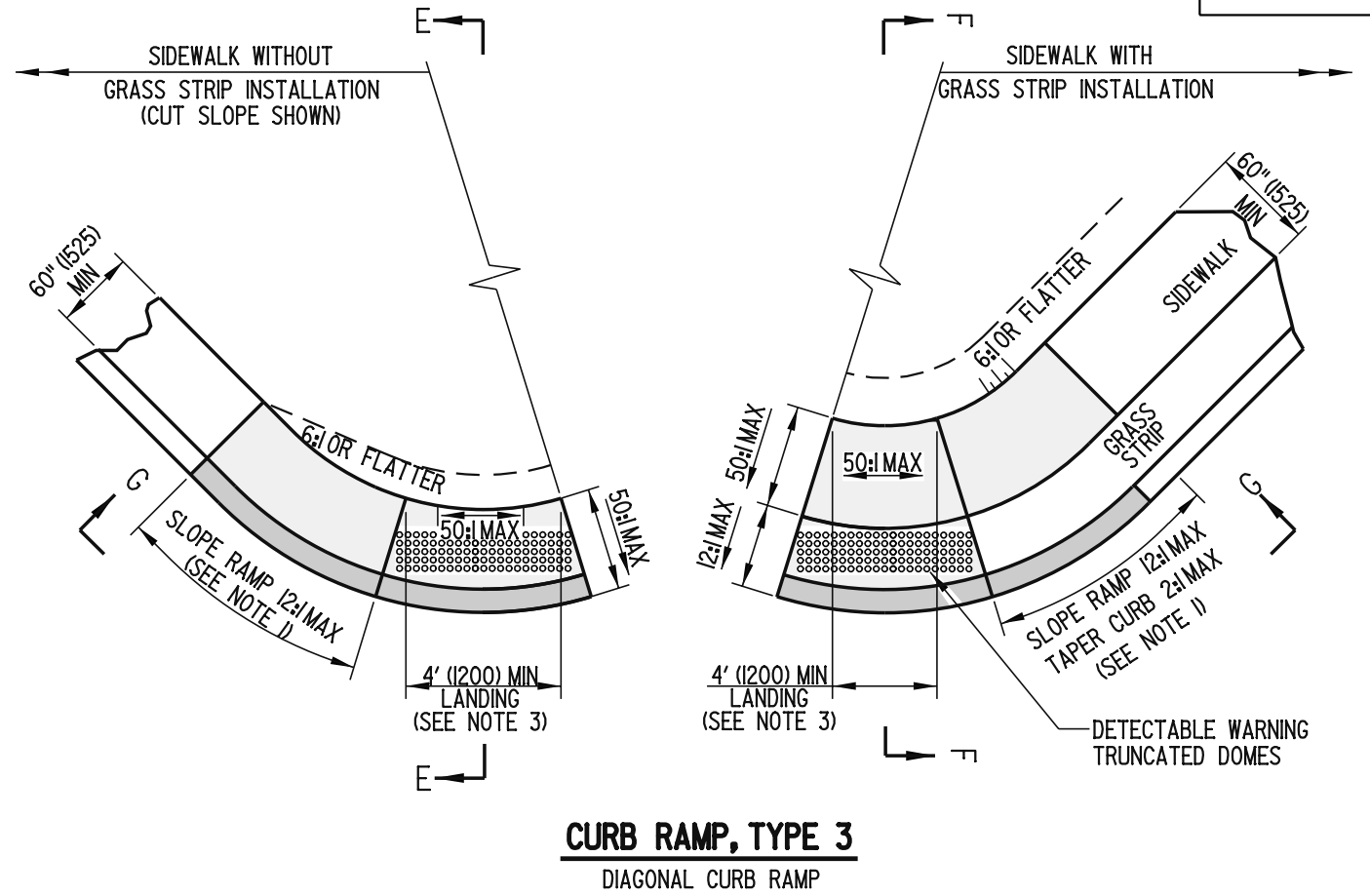
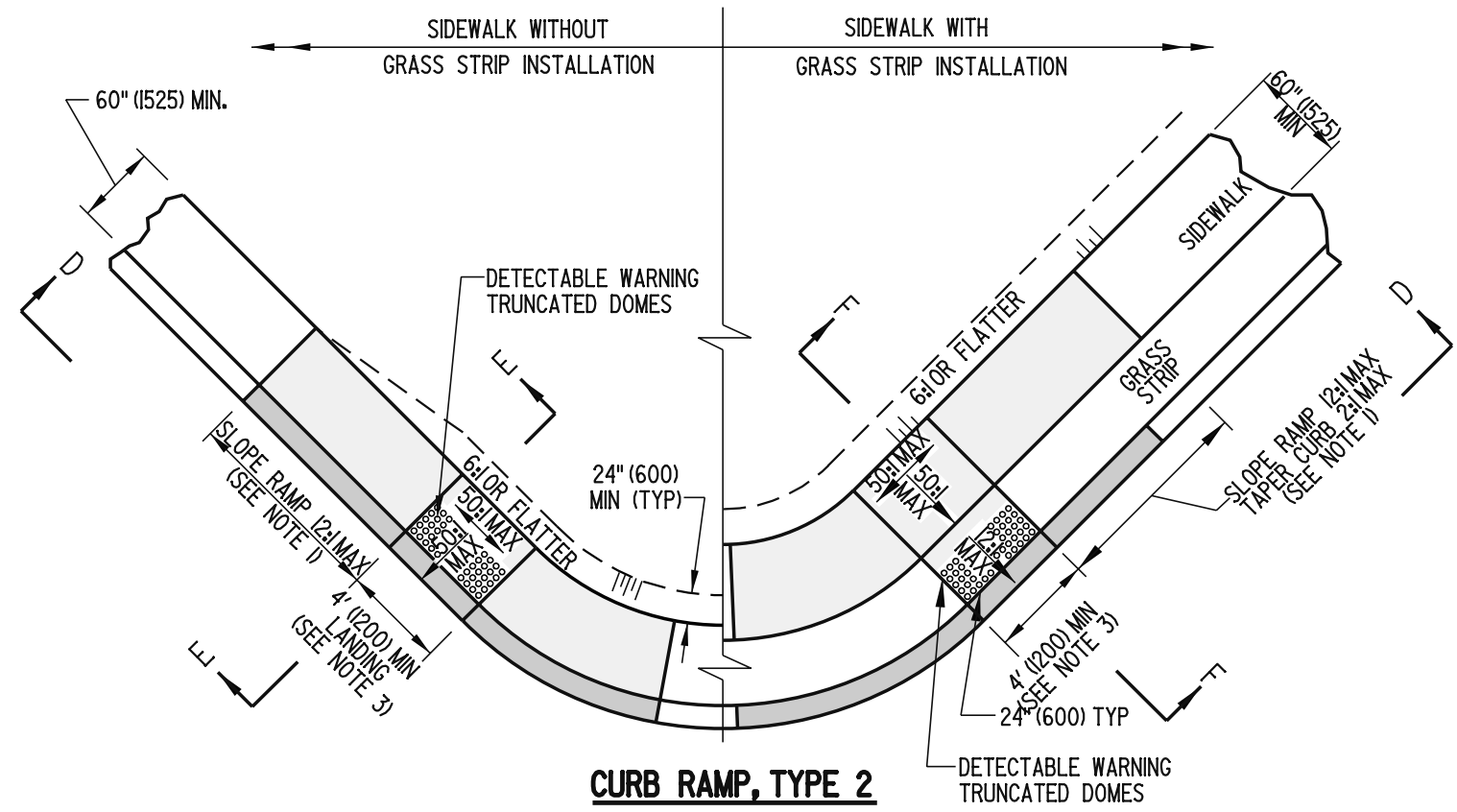
10/10/06  
DATE

RECOMMENDED

*[Signature]*  
DESIGN ENGINEER




10/13/06  
DATE

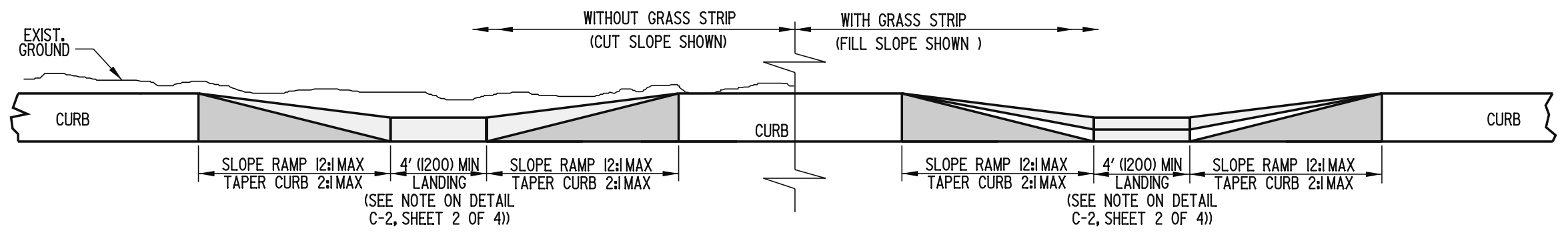
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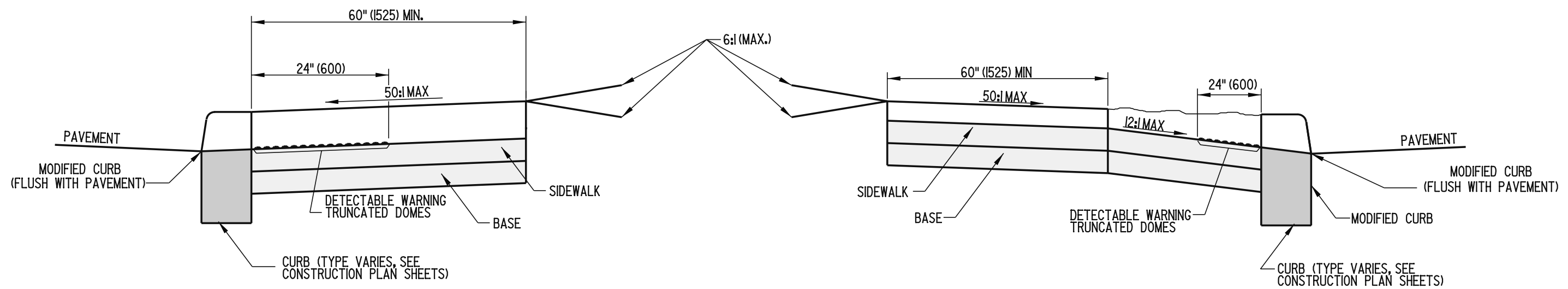
**NOTES:**

- 1). WHERE A 12:1 MAXIMUM SLOPE RAMP WILL NOT MEET THE SIDEWALK GRADE WITHIN A LENGTH OF 15' (4570), DUE TO STEEP ADJACENT ROADWAY, THE RAMP LENGTH MAY BE LIMITED TO 15' (4570), AND THE RAMP SLOPE ALLOWED TO EXCEED 12:1.
- 2). TRANSITION TO EXISTING SIDEWALK WIDTH OVER THE LENGTH OF THE RAMP.
- 3). RAMP OR LANDING WIDTH SHALL BE 4' (1200) MINIMUM, HOWEVER, 5' (1525) IS PREFERRED.
- 4). RAMP AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM.
- 5). IF GRADING WILL BE STEEPER THAN 6:1 ADJACENT TO THE CURB RAMP OR SIDEWALK, THEN A TYPE 1 CURB OR RETAINING WALL SHOULD BE USED TO ELIMINATE THE NEED FOR THE STEEP SLOPE.
- 6). FOR THE CURB RAMP, TYPE 3, IF THE WIDTH OF THE FULLY DEPRESSED CURB AT THE STREET IS MORE THAN 5' (1525), THE DETECTABLE WARNING TRUNCATED DOMES SHALL FOLLOW THE RADIUS OF THE CURB CONTINUOUSLY WITHOUT GAPS FOR THE ENTIRE LENGTH OF DEPRESSED CURB. SEE STANDARD NO. C-2, SHEET 1 OF 4.
- 7). THE MAXIMUM DIFFERENCE IN GRADE BETWEEN THE SIDEWALK OR CURB AND THE PAVEMENT SHALL BE 13:1, HOWEVER 11:1 IS PREFERRED. SEE STANDARD NO. C-2, SHEET 1 OF 4.

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

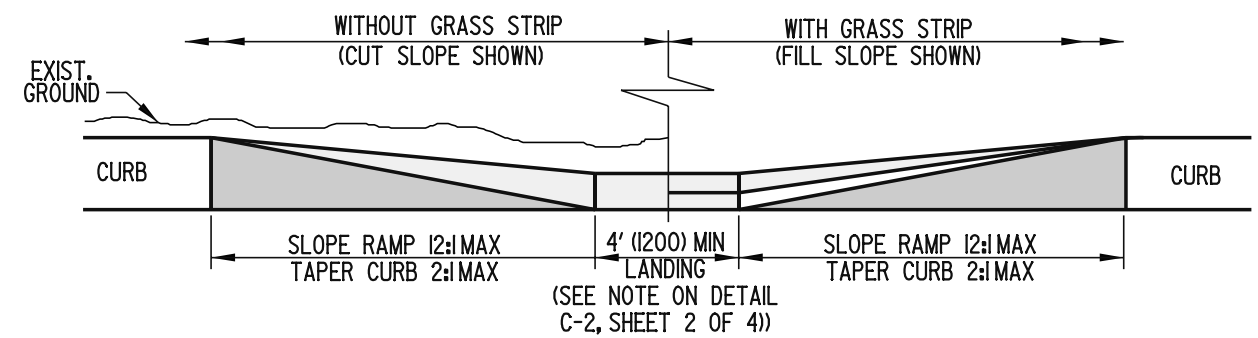


ELEVATION D-D






SECTION E-E

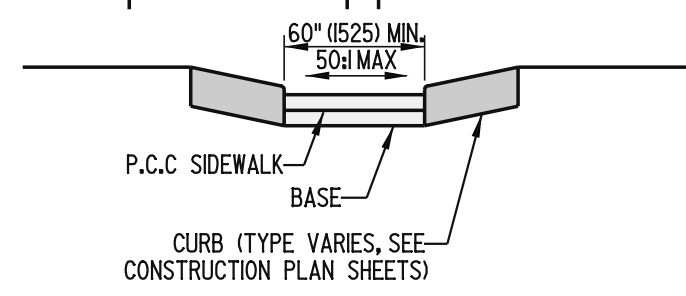
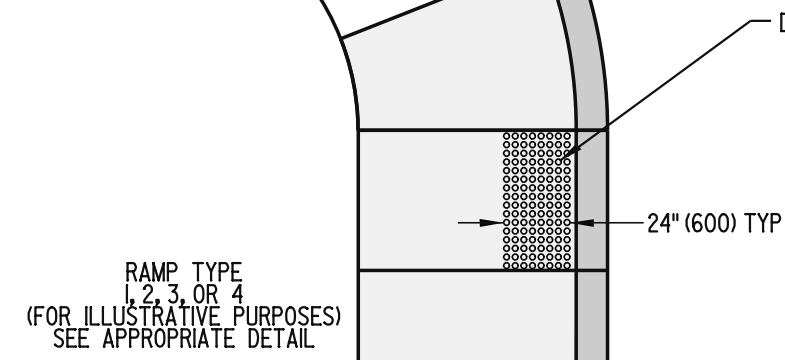
SECTION F-F



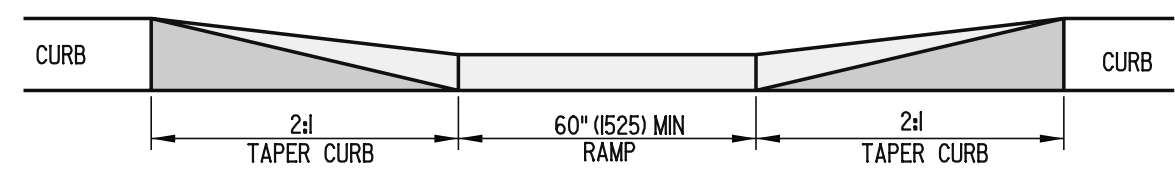
ELEVATION G-G

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

SCALE : N.T.S.



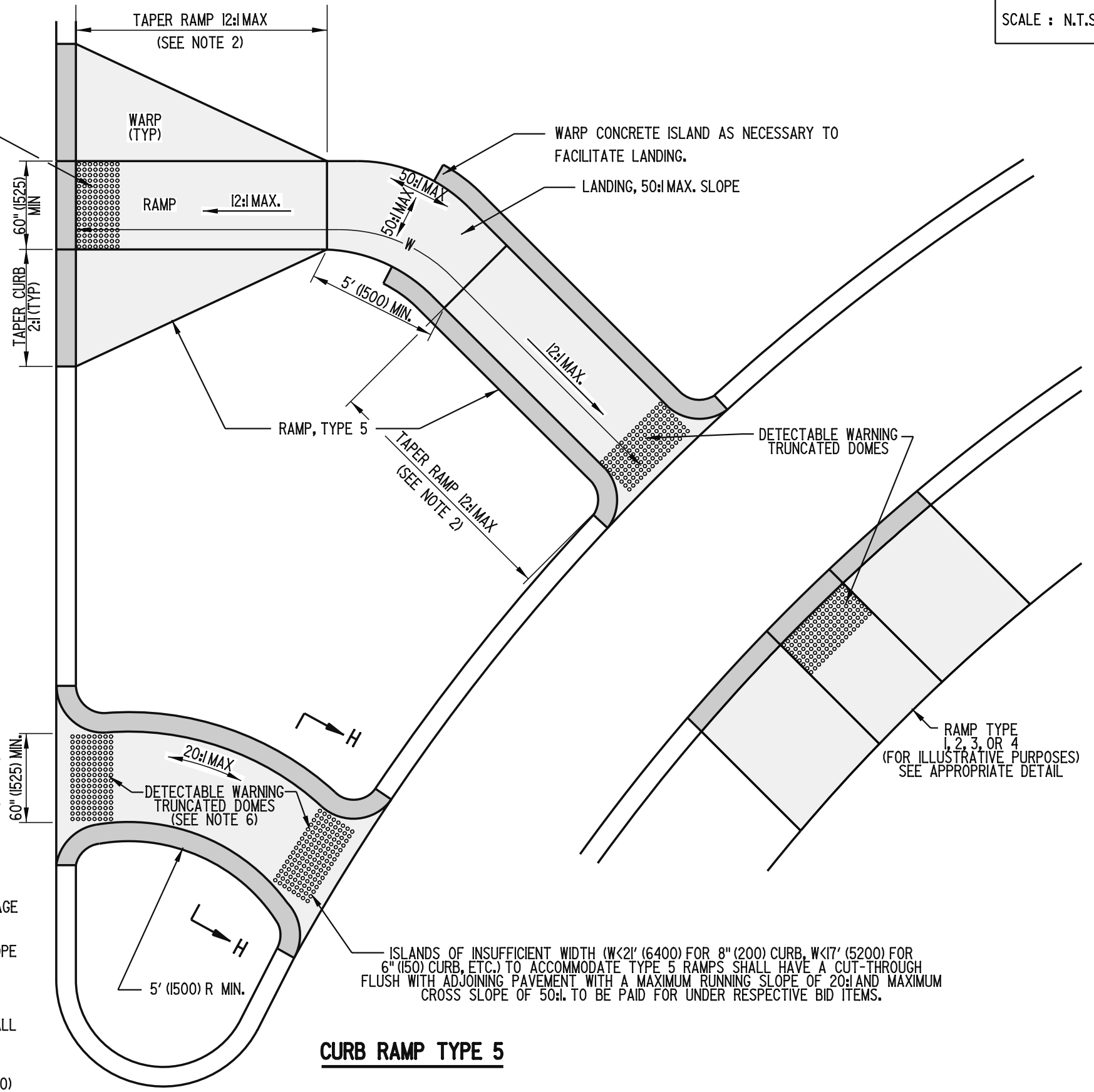
SECTION H-H



ELEVATION I-I

NOTES:

- 1). A CUT-THROUGH LEVEL WITH THE STREET IS THE PREFERRED TREATMENT FOR ISLANDS, ALTHOUGH, RAMPS CAN BE USED WHERE THE ISLAND WIDTH IS SUFFICIENT TO ACCOMMODATE THEM. POSITIVE SURFACE DRAINAGE MUST BE PROVIDED FOR EITHER TREATMENT. EITHER TREATMENT IS ACCEPTABLE.
- 2). WHERE A 12:1 MAXIMUM SLOPE RAMP WILL NOT MEET THE SIDEWALK GRADE WITHIN A LENGTH OF 15' (4570) DUE TO STEEP ADJACENT ROADWAY, THE RAMP LENGTH MAY BE LIMITED TO 15' (4570), AND THE RAMP SLOPE ALLOWED TO EXCEED 12:1.
- 3). A CONTINUOUS PATH MUST BE PROVIDED BETWEEN ADJACENT CURB RAMPS IN ISLANDS AND MEDIANS, WITH A MAXIMUM RUNNING SLOPE OF 20:1.
- 4). RAMP AND SIDEWALK CROSS SLOPE SHALL BE 50:1 (2%) MAXIMUM.
- 5). WHERE THERE IS NO DEPRESSED CURB AT A CUT-THROUGH OR CURB RAMP, THE DETECTABLE WARNING SHALL BE INSTALLED 3" (75) FROM THE ROADWAY PAVEMENT.
- 6). IF THE MINIMUM CLEAR SPACE BETWEEN DETECTABLE WARNINGS IS LESS THAN 2' (600), THEN THE ENTIRE MEDIAN CURB RAMP AREA SHALL BE COVERED WITH DETECTABLE WARNINGS.
- 7). PEDESTRIAN SIGNALS SHALL BE ACCESSIBLE WITH A LEVEL LANDING, WHOSE EDGE IS NO MORE THAN 10" (250) FROM ALL PEDESTRIAN PUSH BUTTONS.



CURB RAMP TYPE 5



DELAWARE  
DEPARTMENT OF TRANSPORTATION

CURB RAMP TYPE 5 & SECTIONS

STANDARD NO. C-2 (2006)

SHT. 4 OF 4

APPROVED

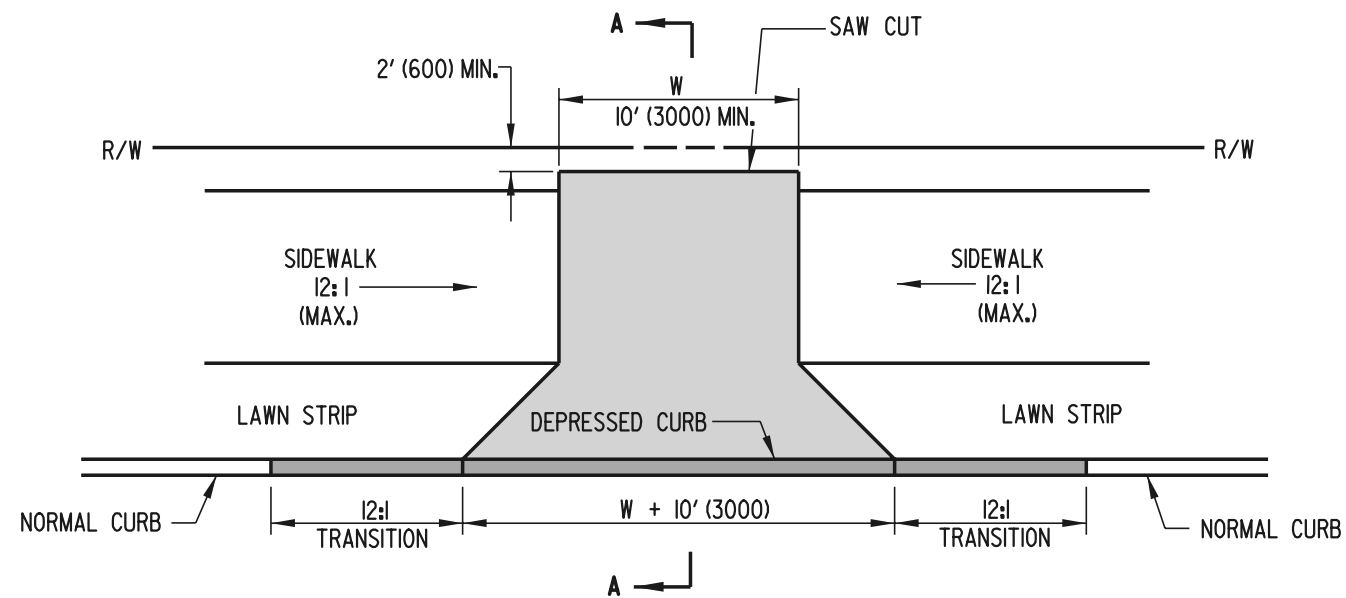
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

RECOMMENDED

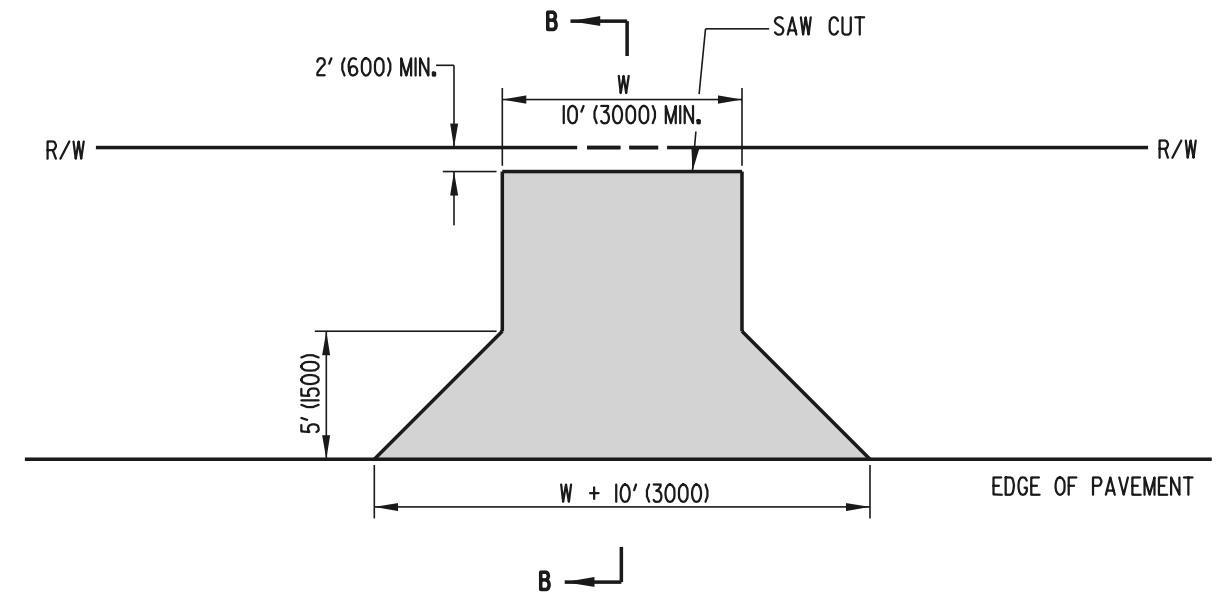
*Don Smith*  
DESIGN ENGINEER

10/13/06  
DATE



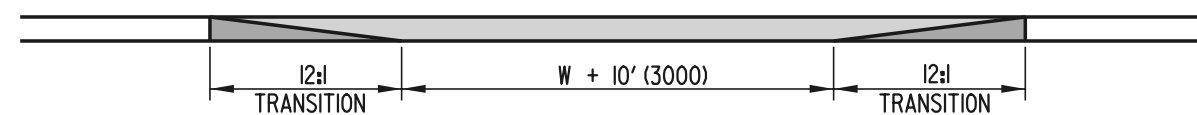
## PLAN

## URBAN APPLICATION

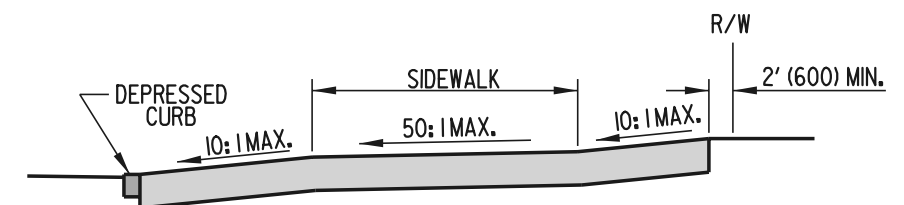


## PLAN

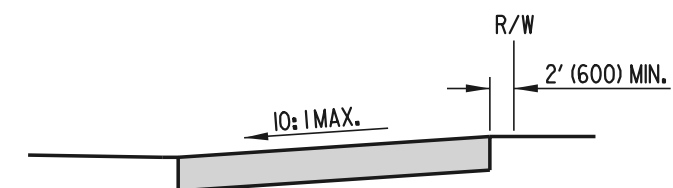
## RURAL APPLICATION



### ELEVATION



**SECTION A-A**



## SECTION B-B



DELAWARE  
DEPARTMENT OF TRANSPORTATION

## ENTRANCES

STANDARD NO. C-3 (2001)

**SHT. 1 OF 1**

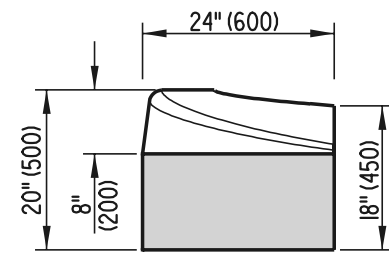
**APPROVED**

1) Raymond M. Harkness 6/18/01  
CHIEF ENGINEER DATE

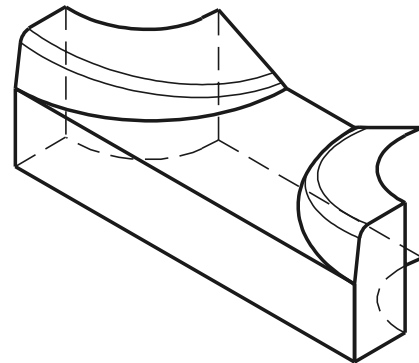
2) Michael P. Gotsch 6/15/01  
DESIGN ENGINEER DATE

RECOMMENDED

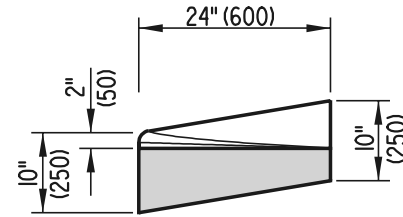
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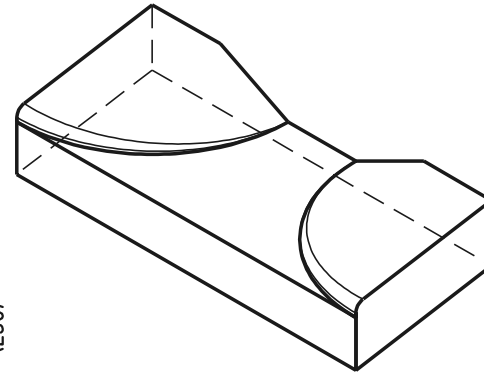
**SECTION A-A**



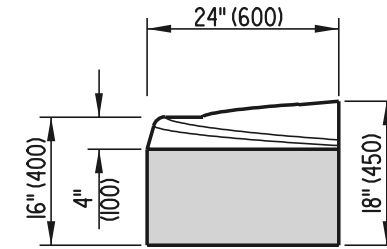
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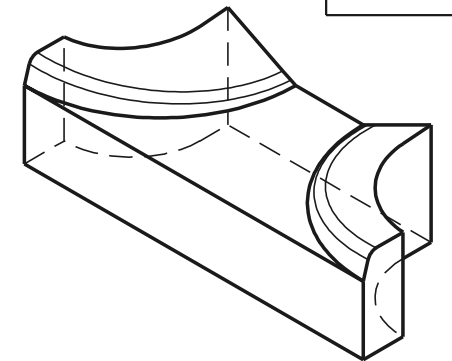
**SECTION B-B**



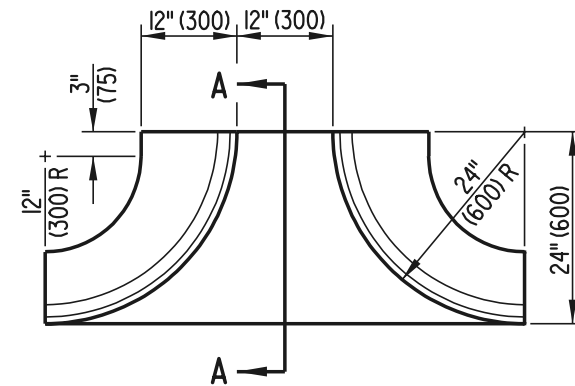
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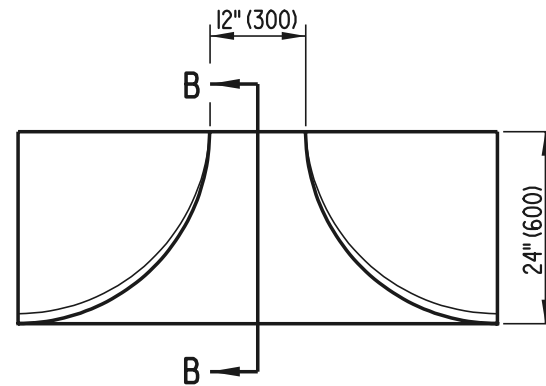
**SECTION C-C**



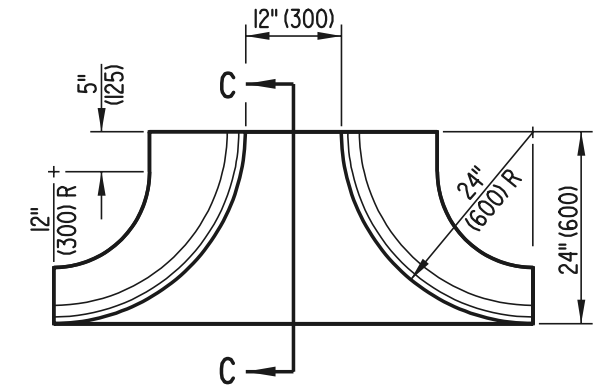
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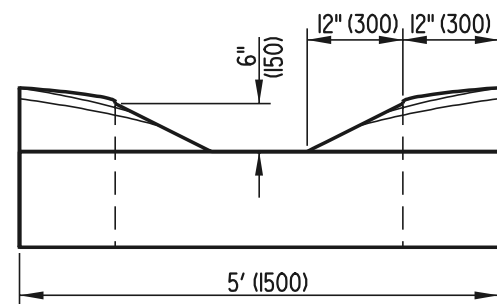
**TOP VIEW**



**TOP VIEW**

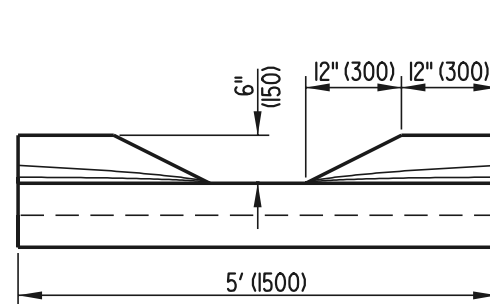


**TOP VIEW**



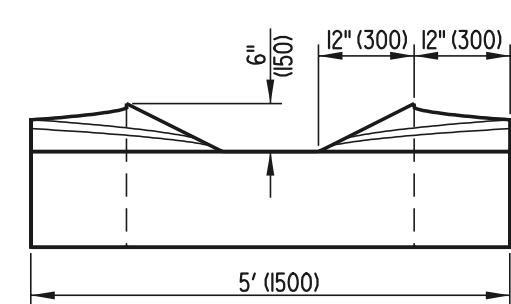
**FRONT VIEW**

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



**FRONT VIEW**

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



**FRONT VIEW**

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



**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

**CURB OPENINGS**

STANDARD NO.

C-4 (2001)

SHT.

1

OF

3

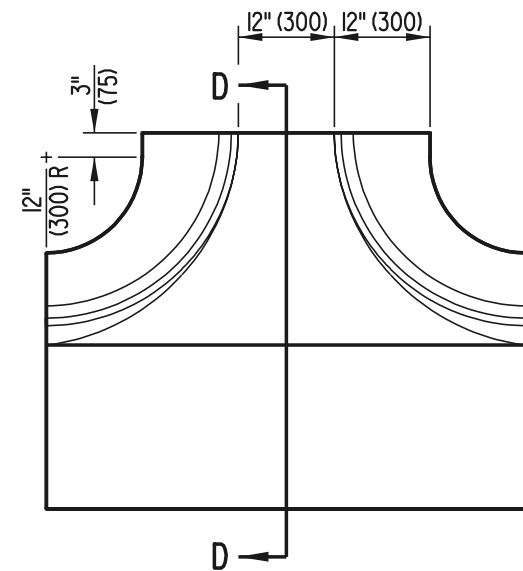
APPROVED

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

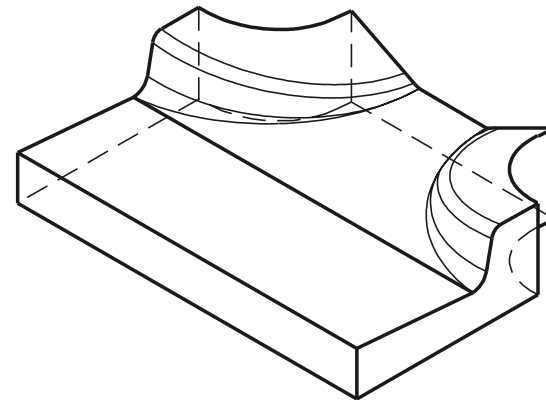
RECOMMENDED

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

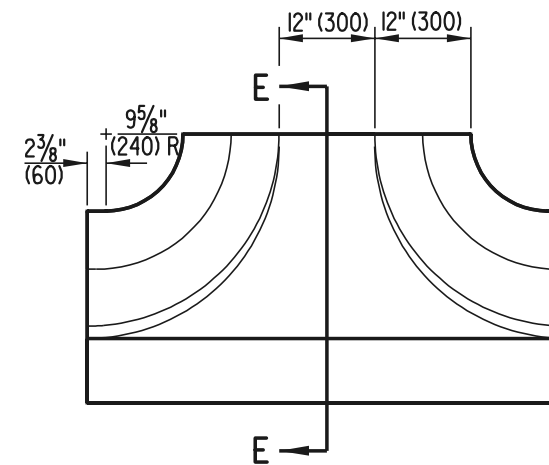




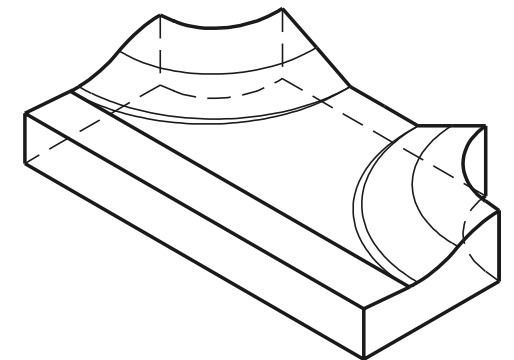
TOP VIEW



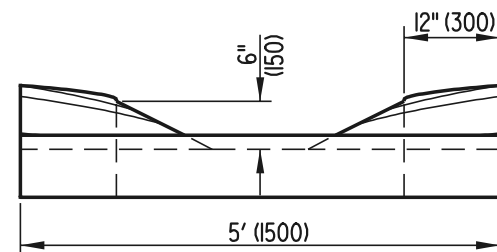
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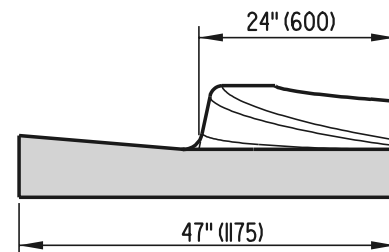
TOP VIEW



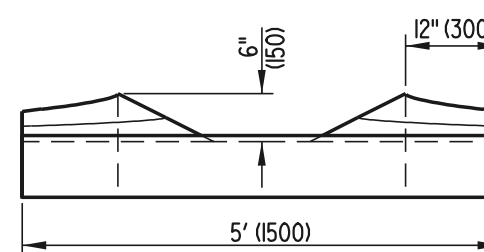
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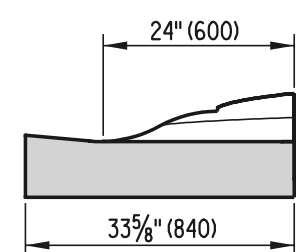
FRONT VIEW



SECTION D-D



FRONT VIEW



SECTION E-E

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

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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

CURB OPENINGS

STANDARD NO.

C-4 (2001)

SHT.

2

OF

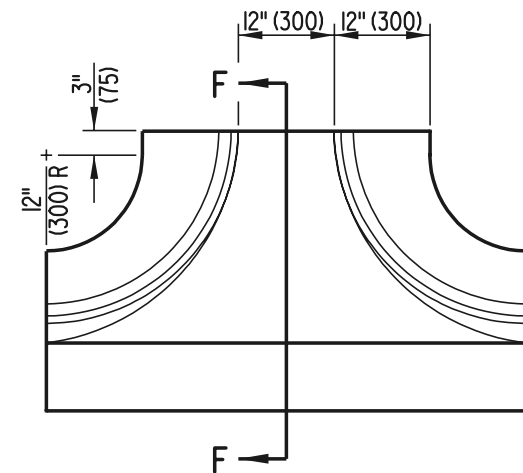
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APPROVED

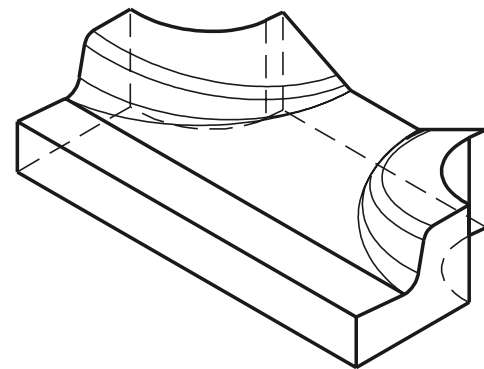
*Ryan M. Harkness* 6/18/01  
CHIEF ENGINEER DATE

RECOMMENDED

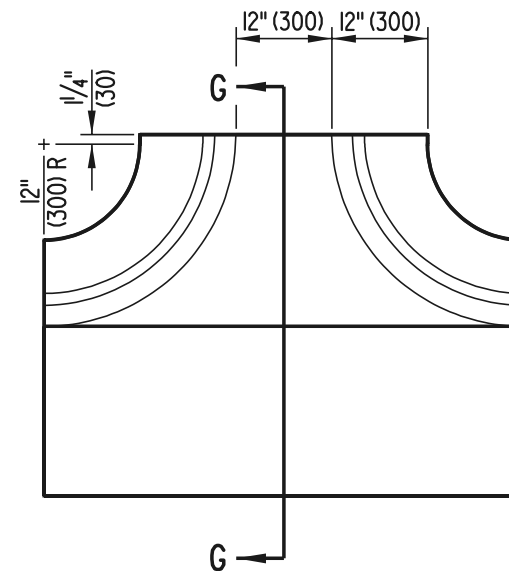
*Mehal Akbar* 6/18/01  
DESIGN ENGINEER DATE



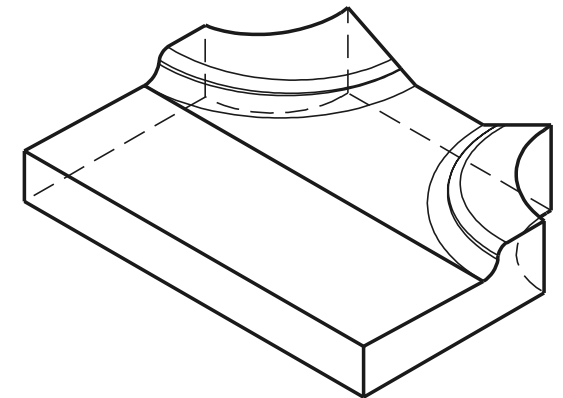
TOP VIEW



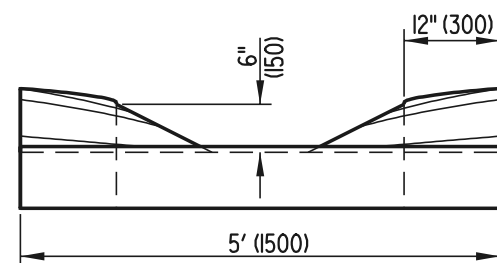
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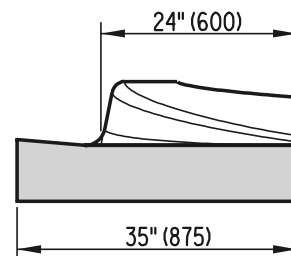
TOP VIEW



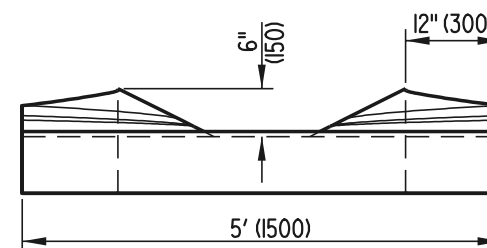
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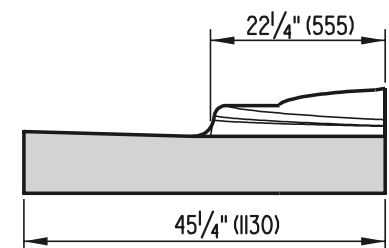
FRONT VIEW



SECTION F-F



FRONT VIEW



SECTION G-G

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

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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

CURB OPENINGS

STANDARD NO.

C-4 (2001)

SHT.

3

OF

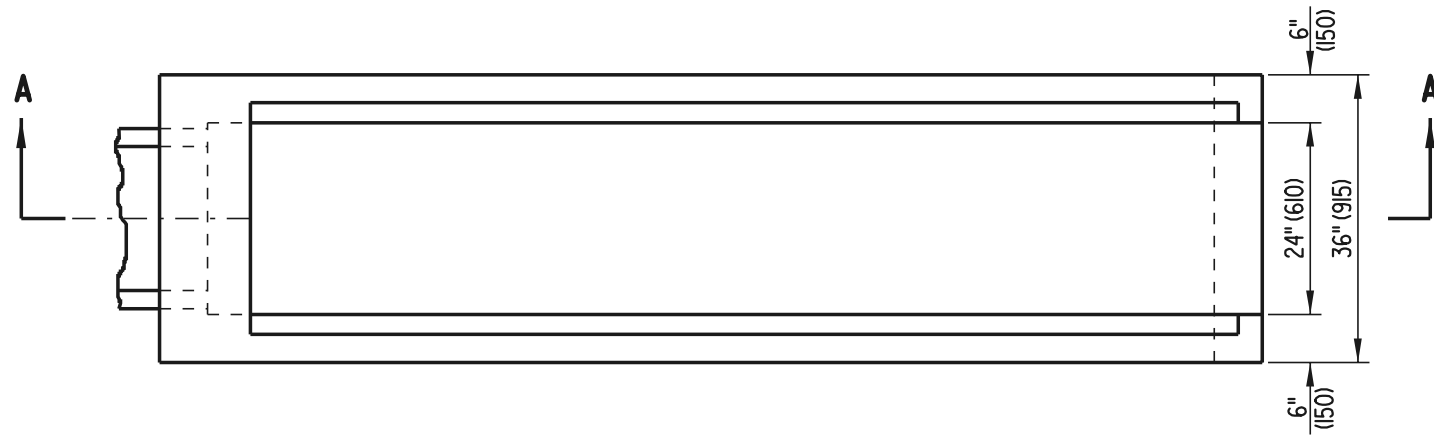
3

APPROVED

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

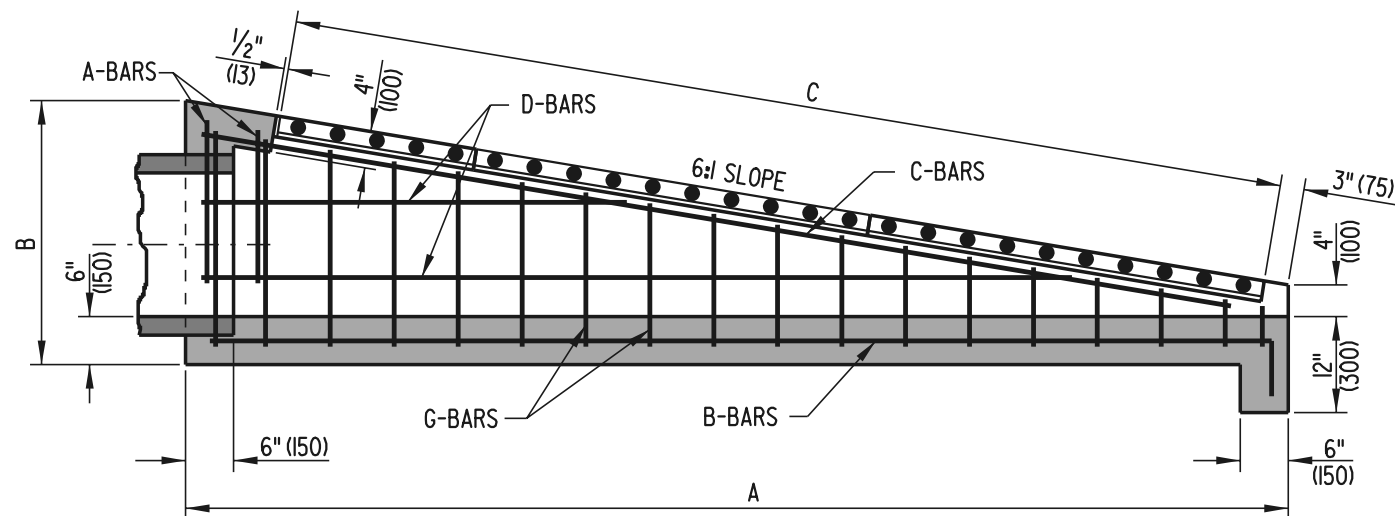
RECOMMENDED

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

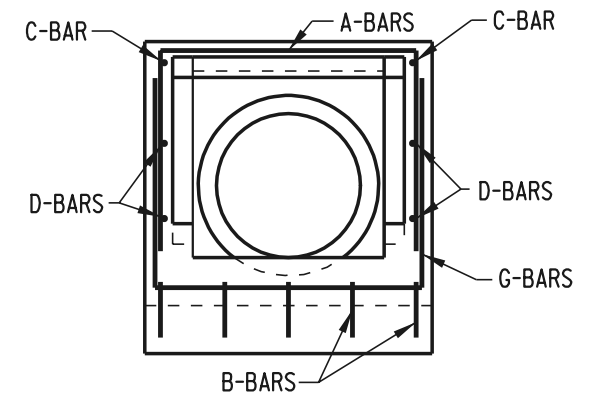


**PLAN VIEW**  
SHOWN WITHOUT GRATE

**NOTE:** 6:1 SAFETY END STRUCTURE TO BE PRECAST



**SECTION A-A**



**FRONT VIEW**



**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

**6:1 SAFETY END STRUCTURE**

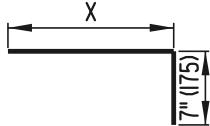
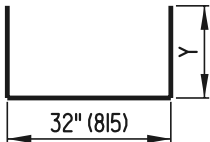
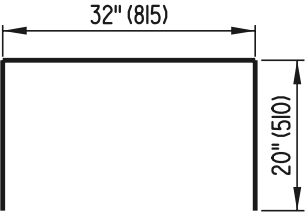
**STANDARD NO. D-1 (2001)**

**SHT. 1 OF 2**

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

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

APPROXIMATE QUANTITIES							
PIPE SIZE	CONCRETE FT³ (m³)		REINF. STEEL LBS. (kg)	NO. OF GRATES	LENGTH TO BE CUT FROM 1 GRATE	WEIGHT OF FULL SIZE GRATE LBS. (kg)	WEIGHT OF CUT GRATE LBS. (kg)
	CONC. PIPE	C.M. PIPE					
15" (375)	25 (0.708)	25.43 (0.720)	121.12 (54.94)	2	--	270.92 (122.89)	--
18" (450)	31.5 (0.892)	32.07 (0.908)	156.7 (71.08)	3	2'-1" (635)	270.92 (122.89)	135.47 (61.45)
21" (525) OR 24" (600)	40.75 (1.154)	39.87 (1.129)	194.0 (88.00)	3	--	270.92 (122.89)	--

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

SCHEDULE OF REINFORCING STEEL																				
PIPE SIZE	A-BARS				B-BARS				C-BARS				D-BARS				G-BARS			
	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH
15" (375)	#4 (#13)	2	8" (200)	72" (1830)	#4 (#13)	5	8" (200)	9'-9" (2970)	#4 (#13)	2	-	9'-3" (2820)	#4 (#13)	4	8" (200)	VARIES 50" (1270) TO 100" (2540)	#4 (#13)	15	8" (200)	VARIES 40" (1015) TO 82" (2085)
18" (450)	#4 (#13)	2	8" (200)	72" (1830)	#4 (#13)	5	8" (200)	11'-9" (3580)	#4 (#13)	2	-	11'-5" (3480)	#4 (#13)	6	8" (200)	VARIES 43½" (1105) TO 130½" (3315)	#4 (#13)	18	8" (200)	VARIES 40" (1015) TO 90" (2285)
21" (525) OR 24" (600)	#4 (#13)	2	8" (200)	72" (1830)	#4 (#13)	5	8" (200)	14'-7" (4445)	#4 (#13)	2	-	14'-3" (4345)	#4 (#13)	6	8" (200)	VARIES 51" (1295) TO 153" (3885)	#4 (#13)	22	8" (200)	VARIES 40" (1015) TO 100" (2540)

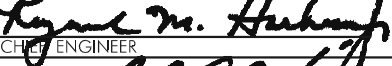



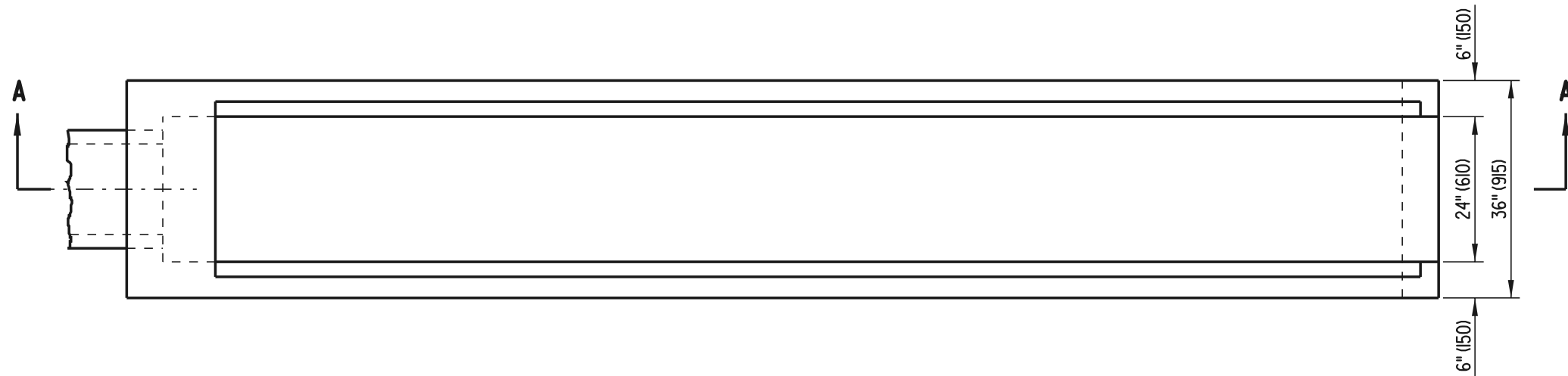
DELAWARE  
DEPARTMENT OF TRANSPORTATION

6:1 SAFETY END STRUCTURE

STANDARD NO. D-1 (2001)

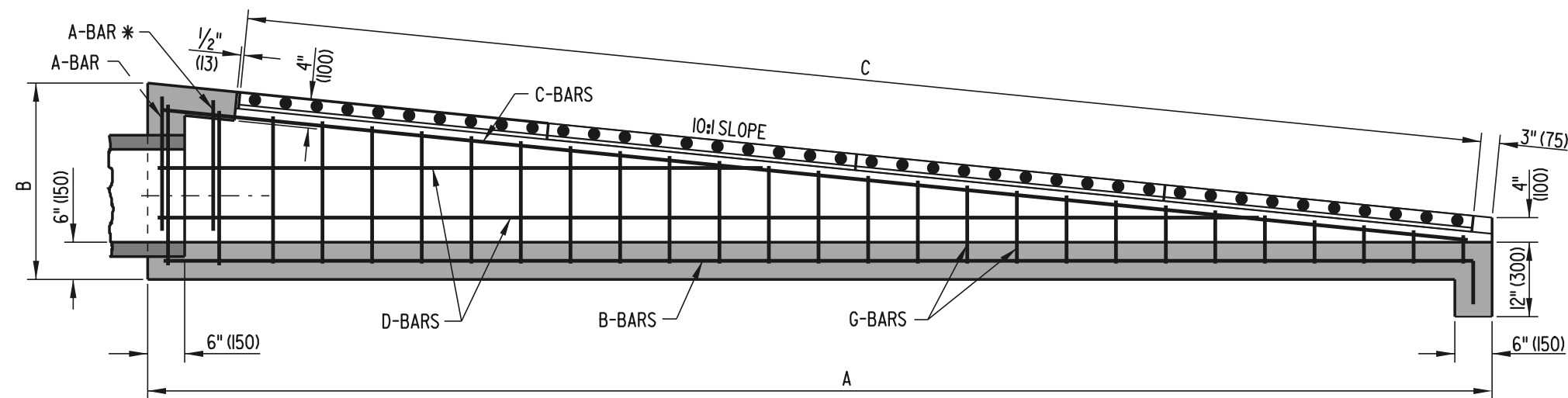
SHT. 2 OF 2

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



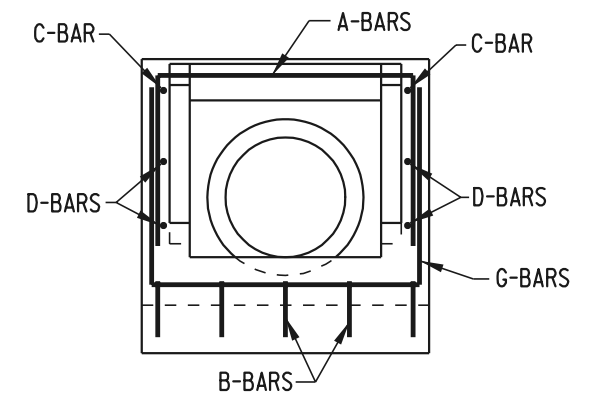
**PLAN VIEW**  
SHOWN WITHOUT GRATE

**NOTE:** 10:1 SAFETY END STRUCTURE TO BE PRECAST



**SECTION A-A**

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



**FRONT VIEW**



**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

**10:1 SAFETY END STRUCTURE**

STANDARD NO. **D-2 (2001)**

SHT. **1** OF **2**

**APPROVED**

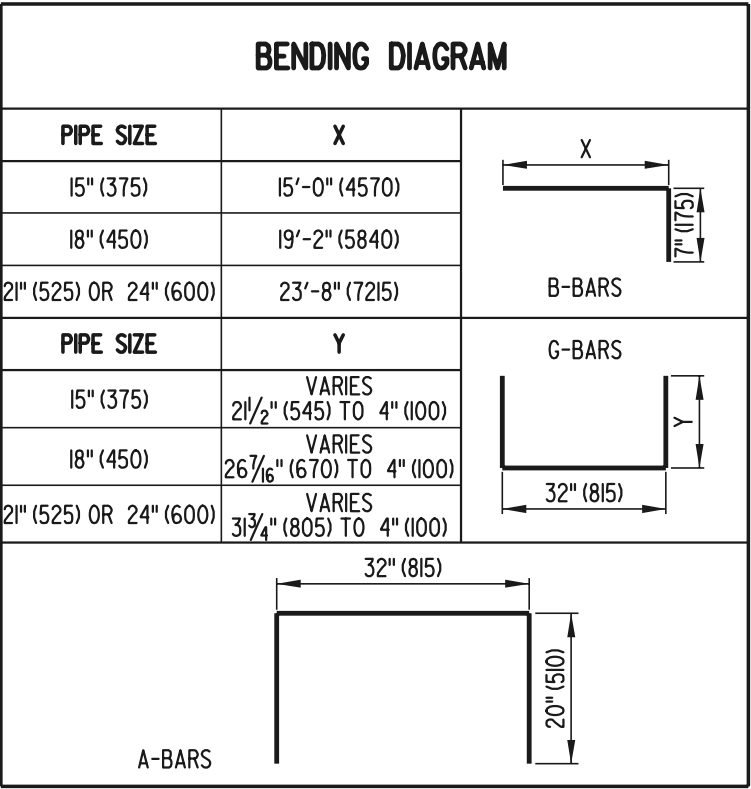
*Ryan M. Harkness*  
CHIEF ENGINEER  
DATE **6/18/01**

**RECOMMENDED**

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

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

APPROXIMATE QUANTITIES							
PIPE SIZE	CONCRETE FT³ (m³)		REINF. STEEL LBS. (kg)	NO. OF GRATES	LENGTH TO BE CUT FROM 1 GRATE	WEIGHT OF FULL SIZE GRATE LBS. (kg)	WEIGHT OF CUT GRATE LBS. (kg)
	CONC. PIPE	C.M. PIPE					
15" (375)	41.35 (1.171)	41.78 (1.183)	175.0 (79.38)	4	2'-1" (635)	270.92 (122.89)	135.47 (61.45)
18" (450)	50.11 (1.419)	50.68 (1.435)	227.0 (102.98)	5	2'-1" (635)	270.92 (122.89)	135.47 (61.45)
21" (525) OR 24" (600)	69.43 (1.966)	70.31 (1.991)	310.4 (140.79)	6	2'-1" (635)	270.92 (122.89)	135.47 (61.45)



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

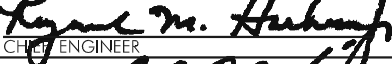



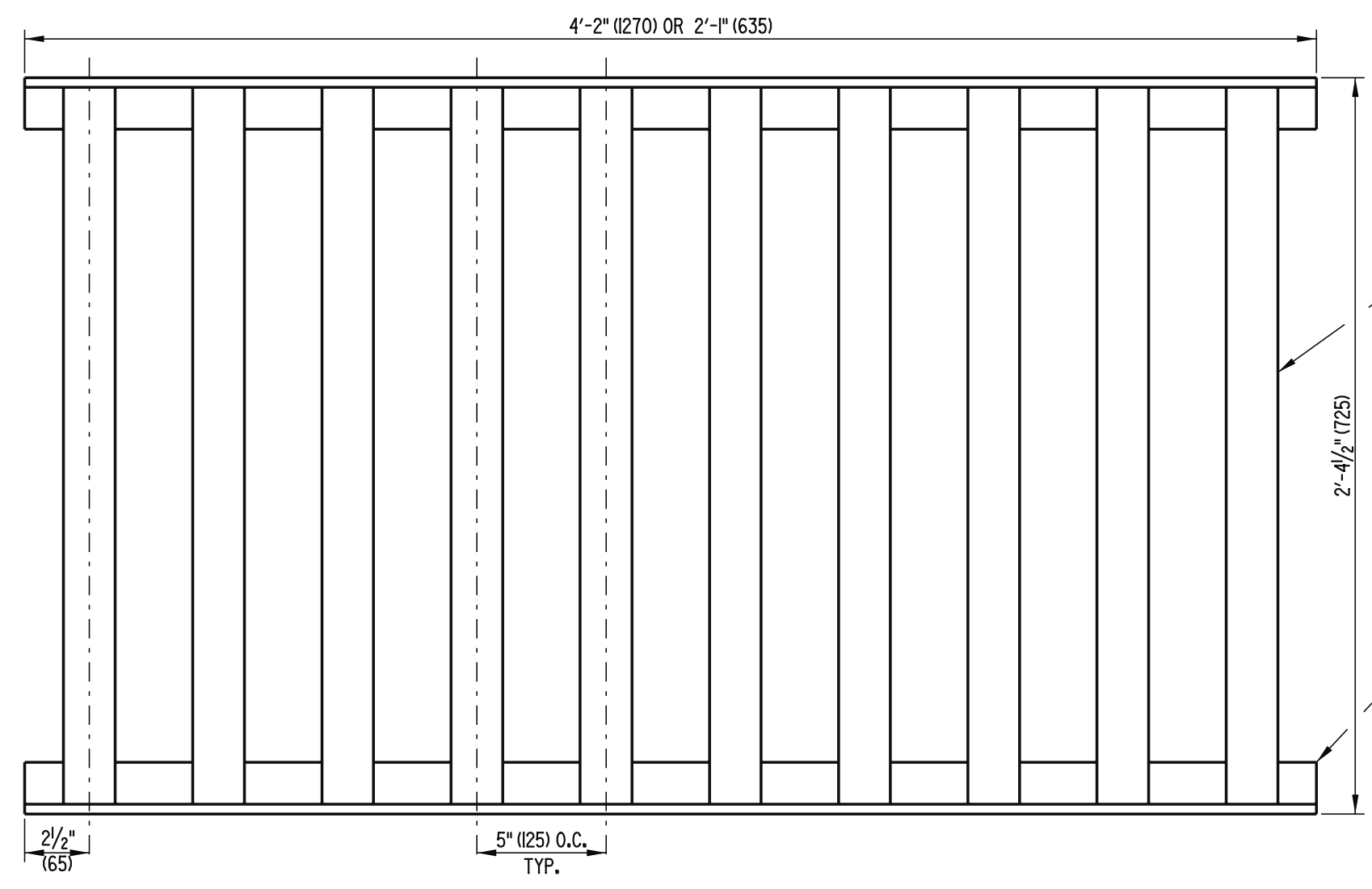
DELAWARE  
DEPARTMENT OF TRANSPORTATION

10:1 SAFETY END STRUCTURE

STANDARD NO. D-2 (2001)

SHT. 2 OF 2

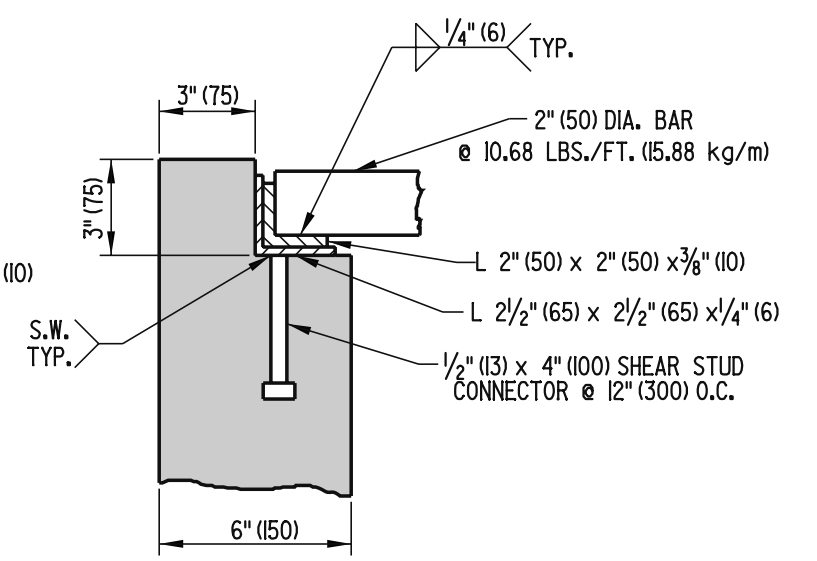
APPROVED  6/18/01  
CHIEF ENGINEER DATE  
RECOMMENDED  6/18/01  
DESIGN ENGINEER DATE



**GRATE DETAIL**

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

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



**FRAME & GRATE ASSEMBLY DETAIL**



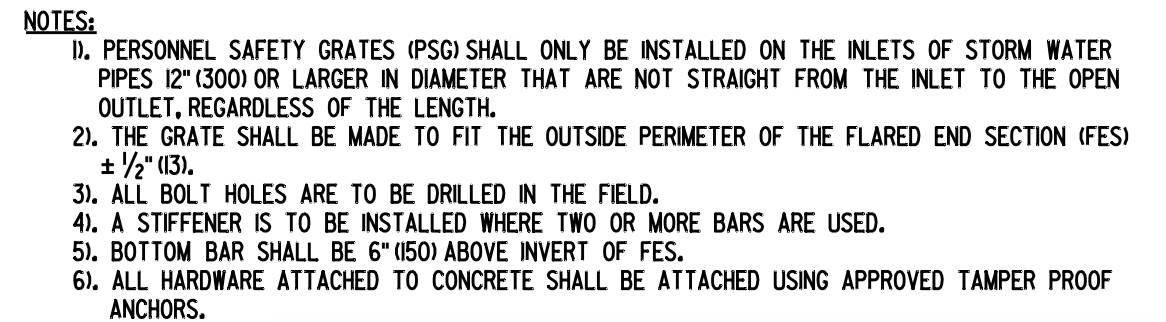
DELAWARE  
DEPARTMENT OF TRANSPORTATION




**SAFETY GRATES**

STANDARD NO. D-3 (2005)

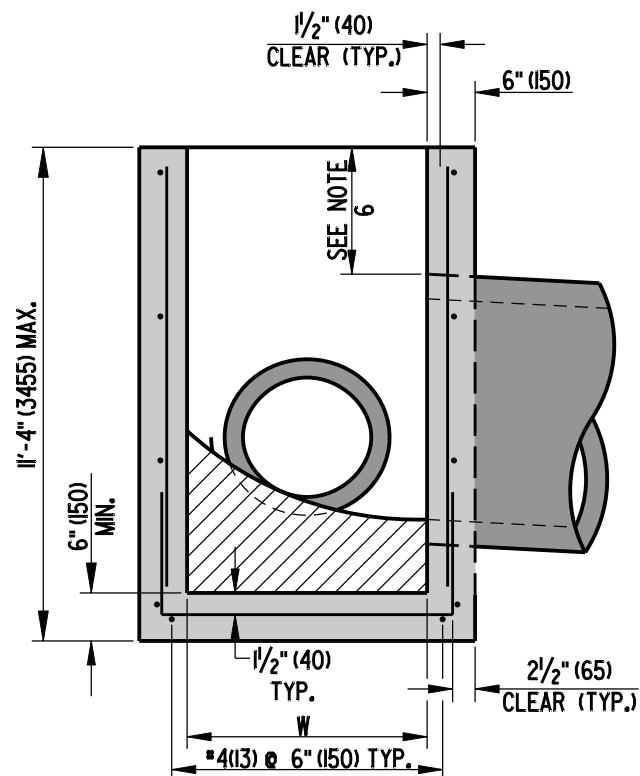
SHT. 1 OF 2

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

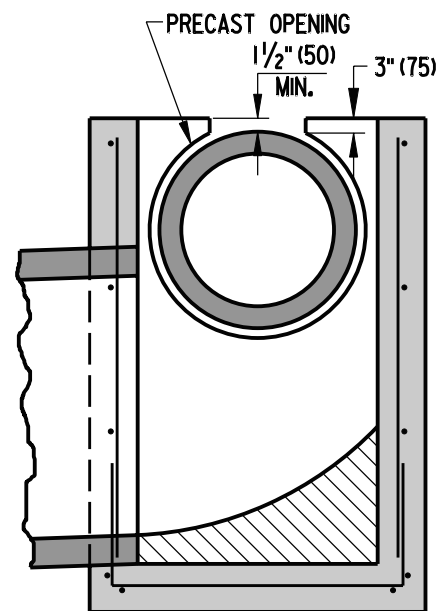


 <div>DELAWARE DEPARTMENT OF TRANSPORTATION</div>	SAFETY GRATES				APPROVED  CHIEF ENGINEER	10/24/07 DATE	
	STANDARD NO.	D-3 (2007)	SHT.	2	OF	2	RECOMMENDED  DESIGN ENGINEER





SECTION A-A

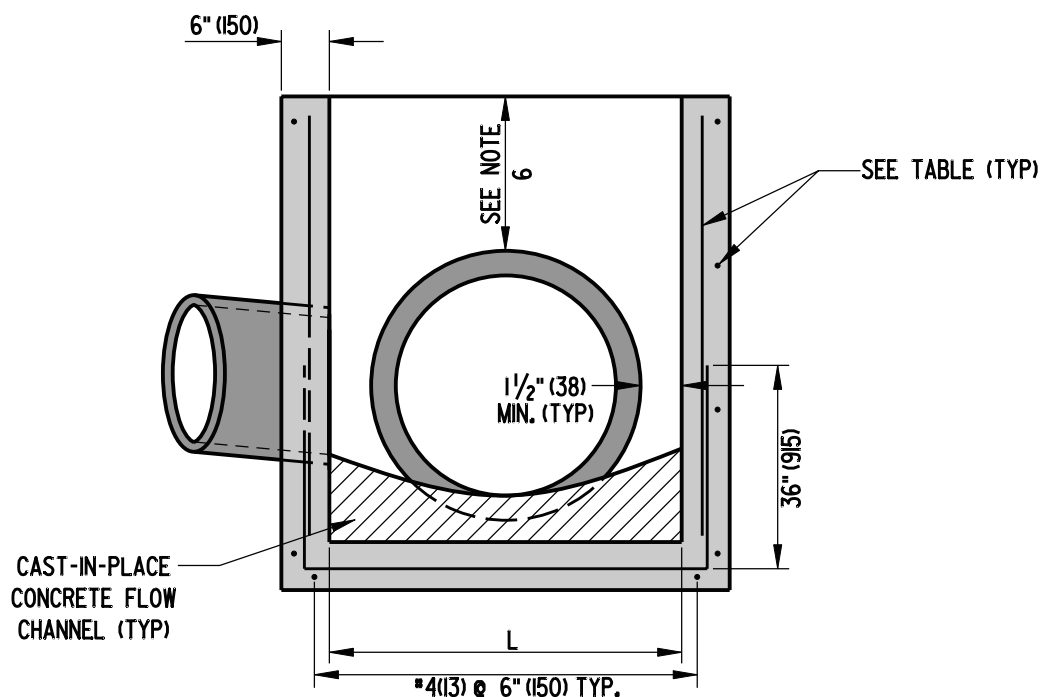


OPTIONAL PIPE OPENING DETAIL

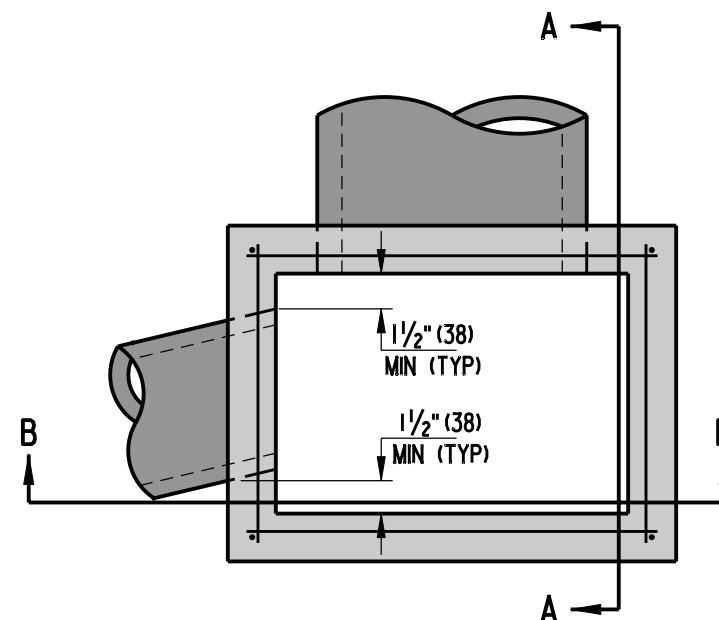
SEE NOTE 6

INLET BOX SCHEDULE		
L	W	FABRICATION TOLERANCE
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)

WALL REINFORCEMENT SCHEDULE		
INTERIOR WALL DIMENSION	AREA OF HORIZONTAL REINFORCEMENT PER FOOT (mm <sup>2</sup> )	AREA OF VERTICAL REINFORCEMENT PER FOOT (mm <sup>2</sup> )
	IN <sup>2</sup> (mm <sup>2</sup> )	IN <sup>2</sup> (mm <sup>2</sup> )
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)



SECTION B-B



TOP VIEW

NOTES:

- 1). INLET BOXES SHALL BE PRE-CAST 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.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

INLET BOX DETAILS

STANDARD NO. D-4 (2007)

SHT. 1 OF 1

APPROVED

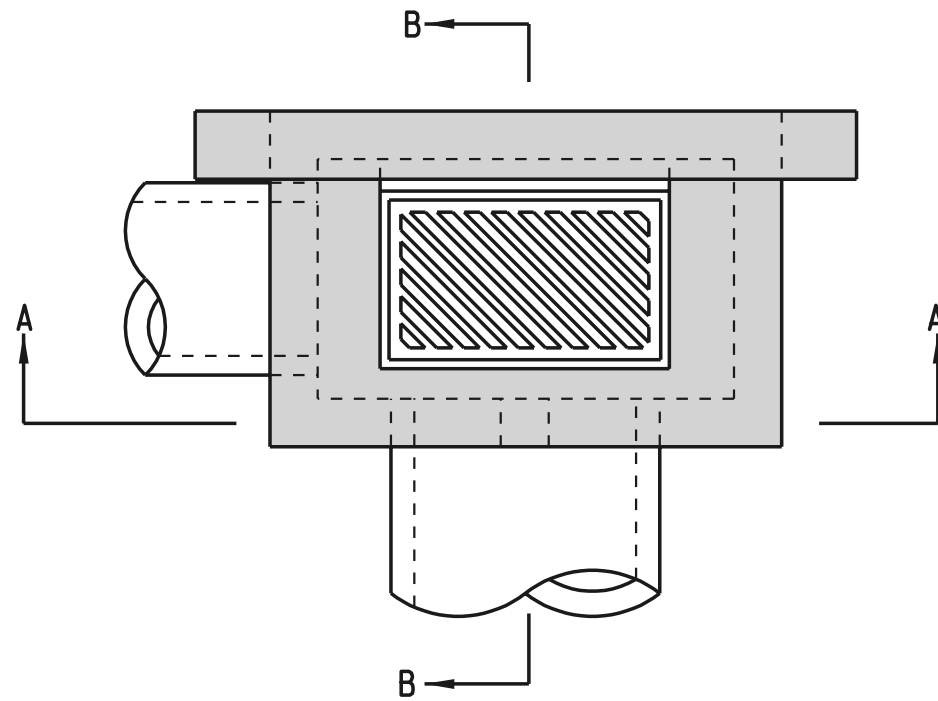
CHIEF ENGINEER

10/24/07  
DATE

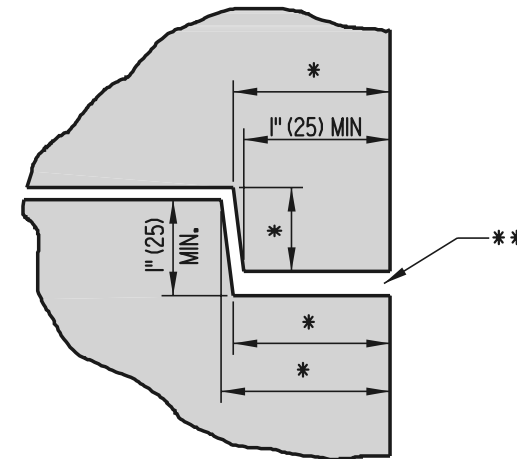
RECOMMENDED

DESIGN ENGINEER

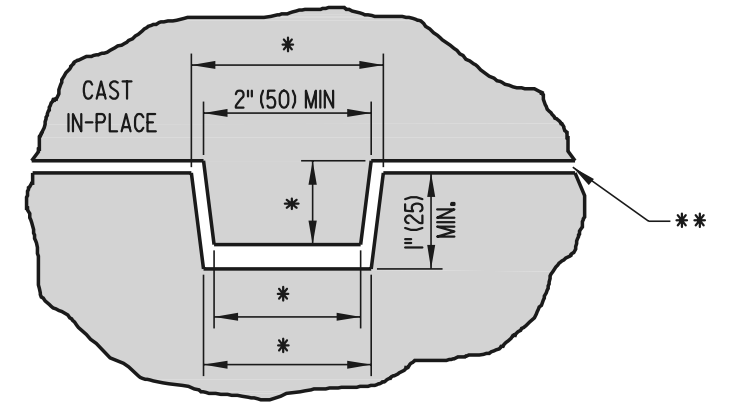
10/23/07  
DATE



PLAN

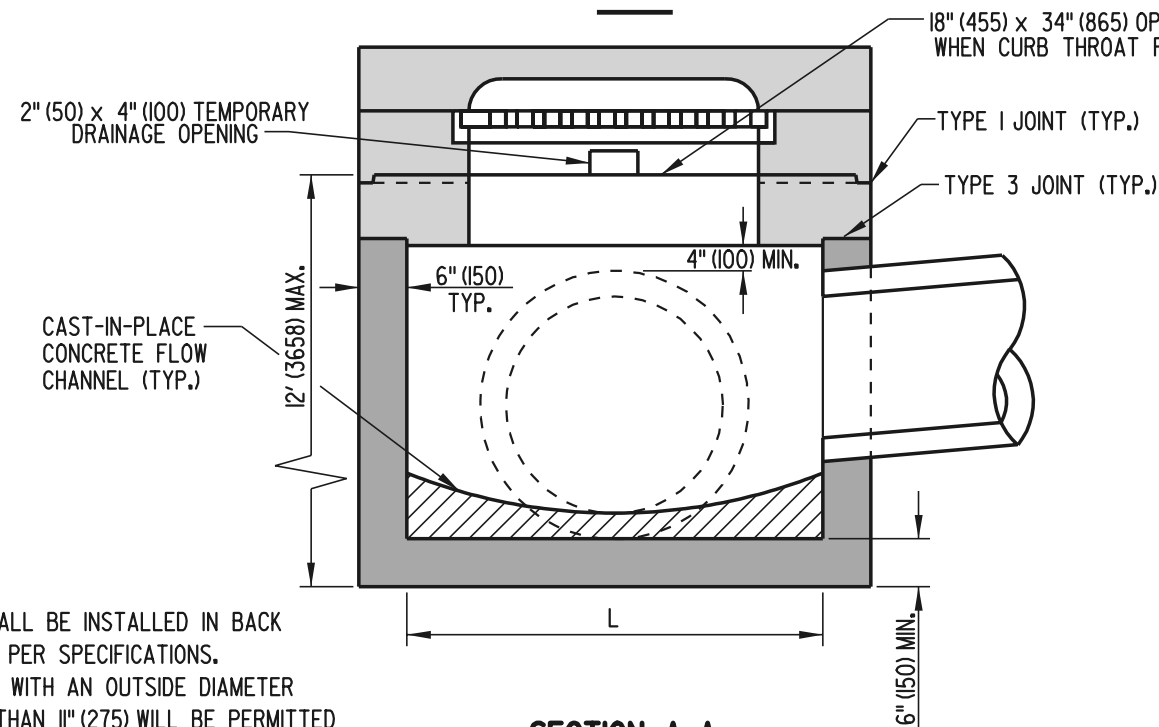


TYPE 1 JOINT DETAIL

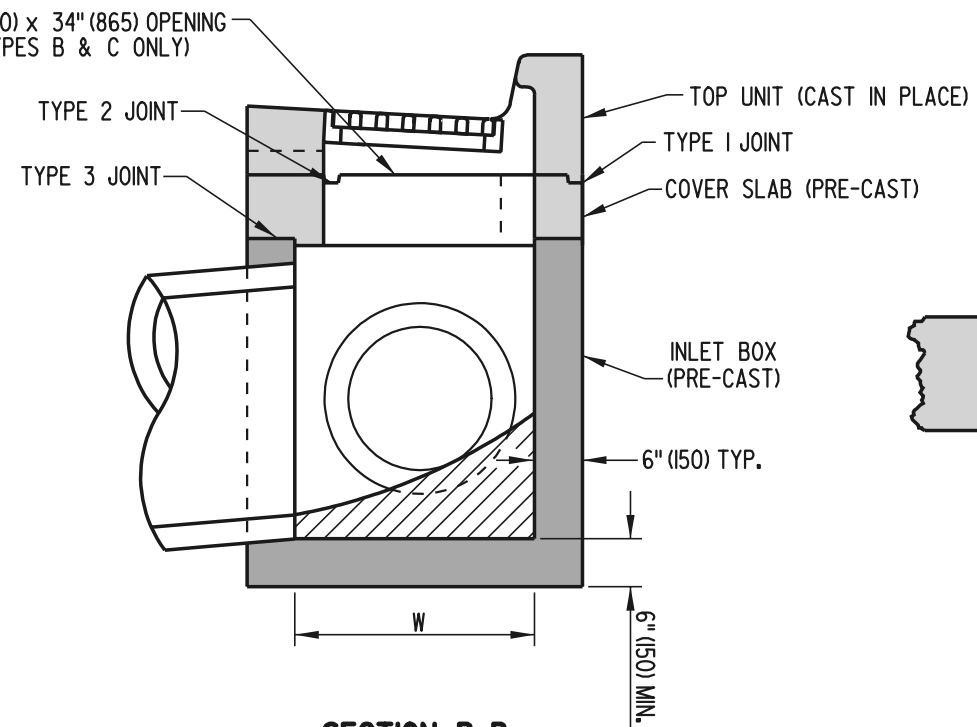


TYPE 2 JOINT DETAIL

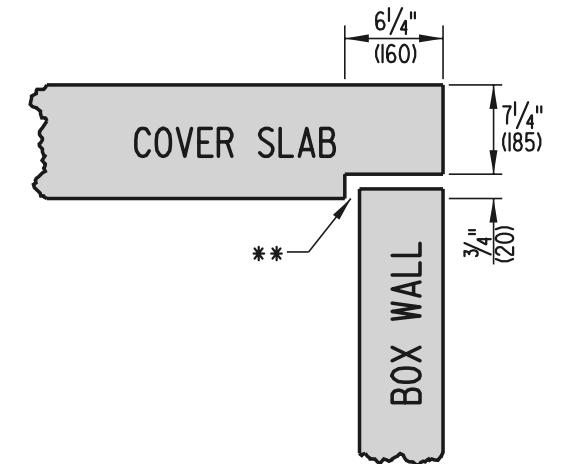
\* DIMENSIONS WILL VARY  
\*\* JOINT SEALANT AS PER SPECIFICATIONS



SECTION A-A



SECTION B-B



TYPE 3 JOINT DETAIL

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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO.

D-5 (2002)

SHT. 1

OF 8

APPROVED

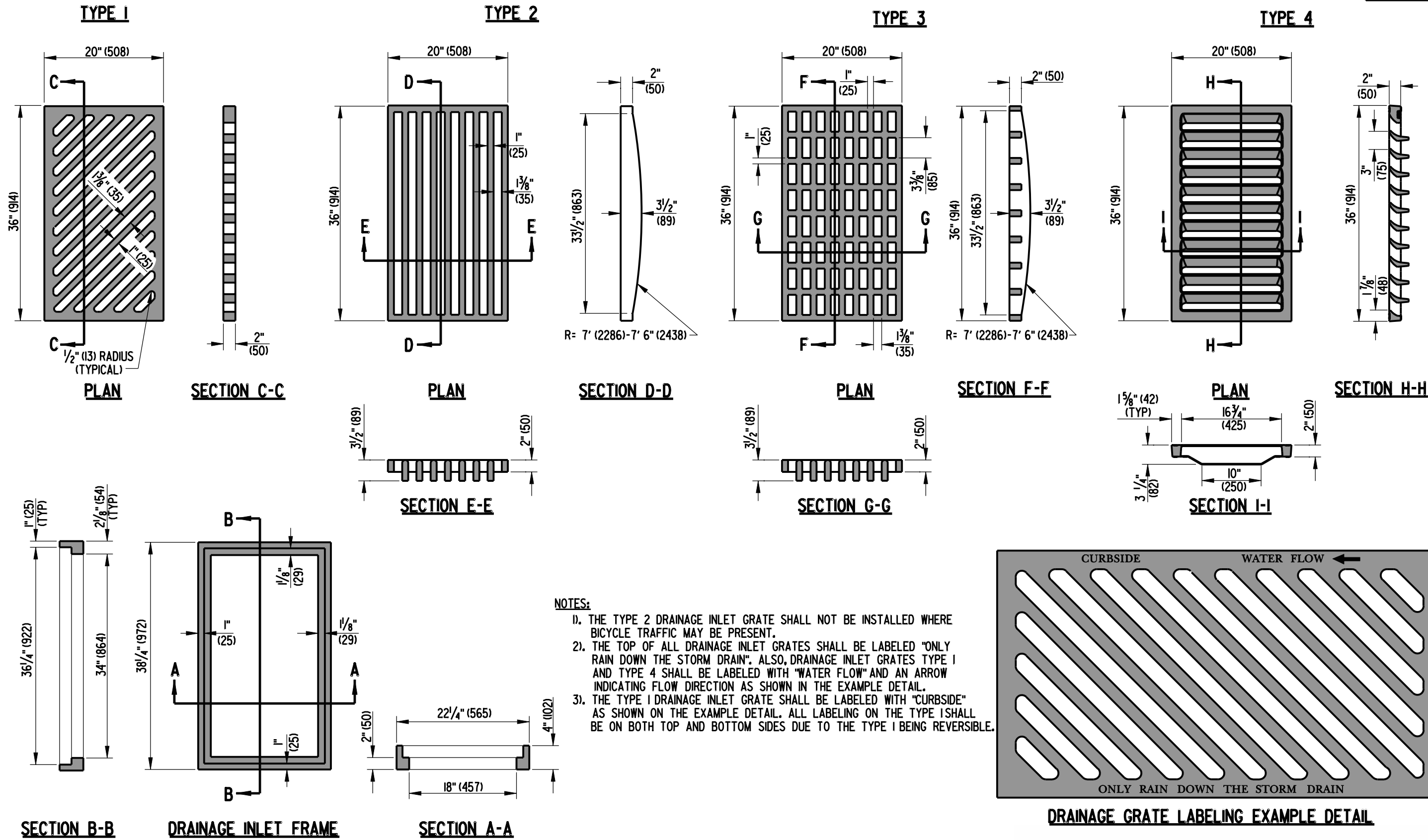
*Caroleen Wicks* 9/6/02  
CHIEF ENGINEER DATE

RECOMMENDED

*Theresa Delph* 8/19/02  
DESIGN ENGINEER DATE

DRAINAGE INLET FRAME AND GRATES

SCALE : N.T.S.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO. D-5 (2007)

SHT. 2 OF 9

APPROVED

CHIEF ENGINEER

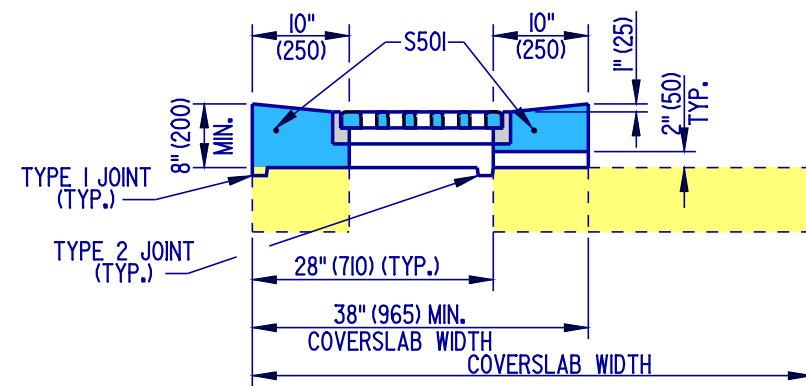
10/24/07  
DATE

RECOMMENDED

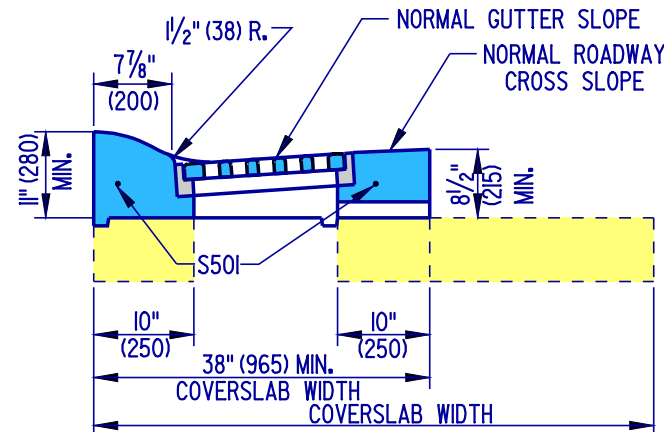
DESIGN ENGINEER

10/23/07  
DATE

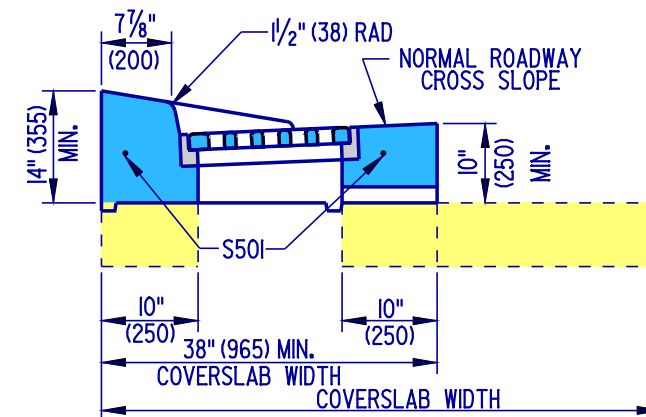
SCALE : N.T.S.



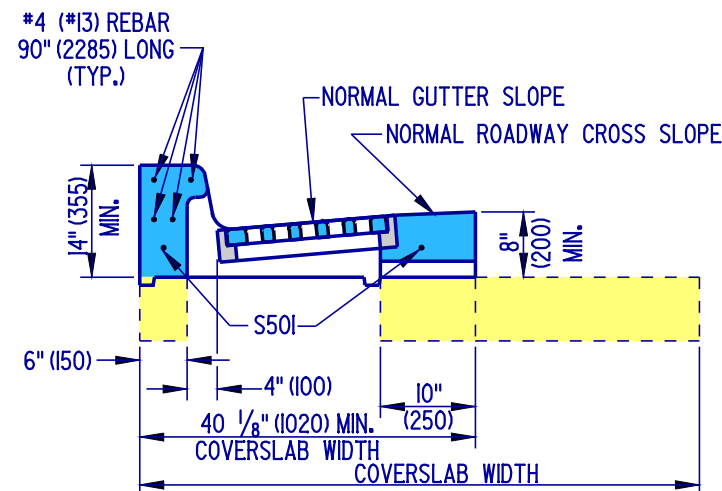
**TYPE A**



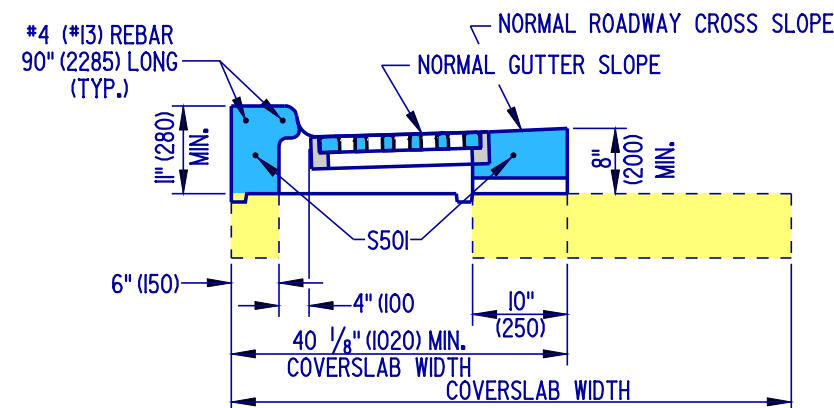
**TYPE D**



**TYPE E**

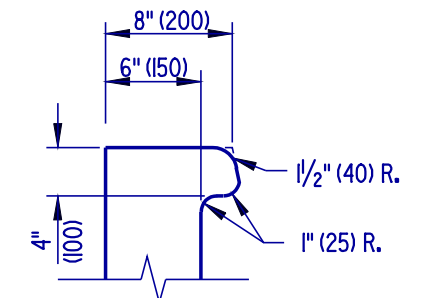


**TYPE B**

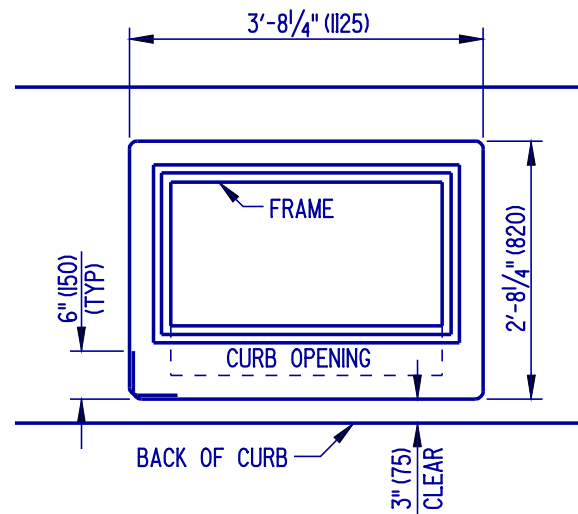


**TYPE C**

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



**CURB OPENING DETAIL**

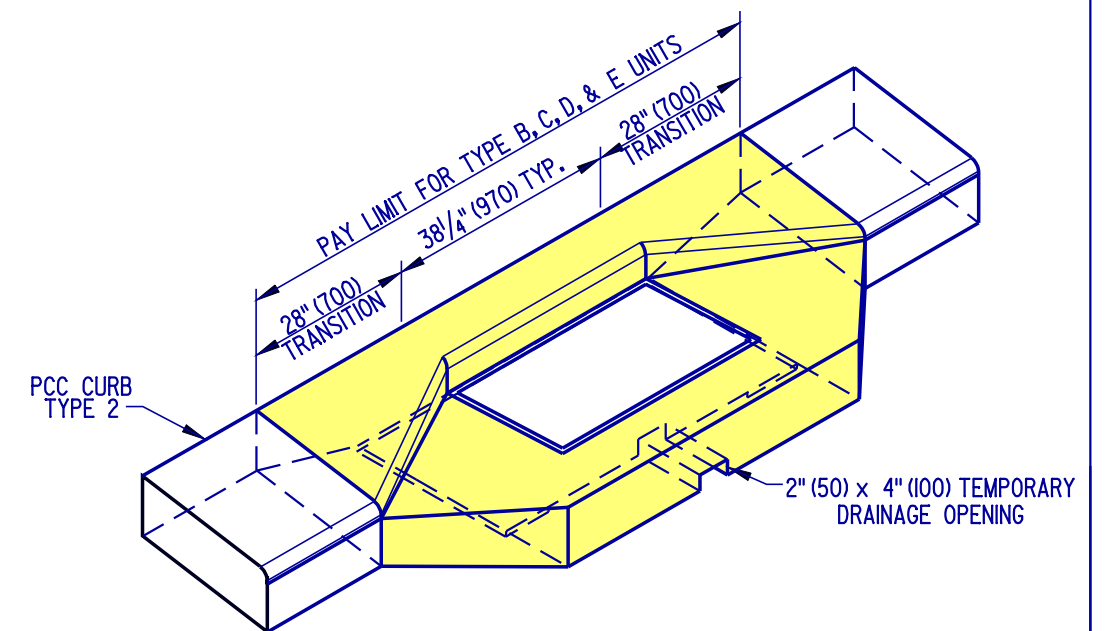


**S501 BENDING DIAGRAM**

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

**DRAINAGE INLET TOP UNITS**

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



**ISOMETRIC VIEW**

TYPE E UNIT SHOWN



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**DRAINAGE INLET DETAILS**

STANDARD NO. D-5 (2004)

SHT. 3 OF 8

APPROVED

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

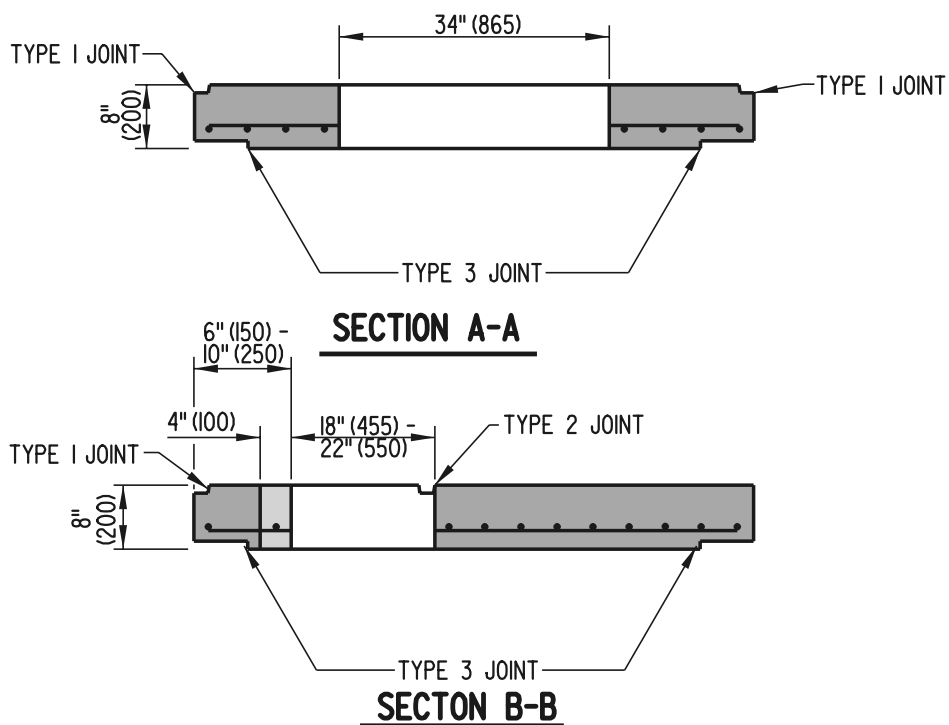
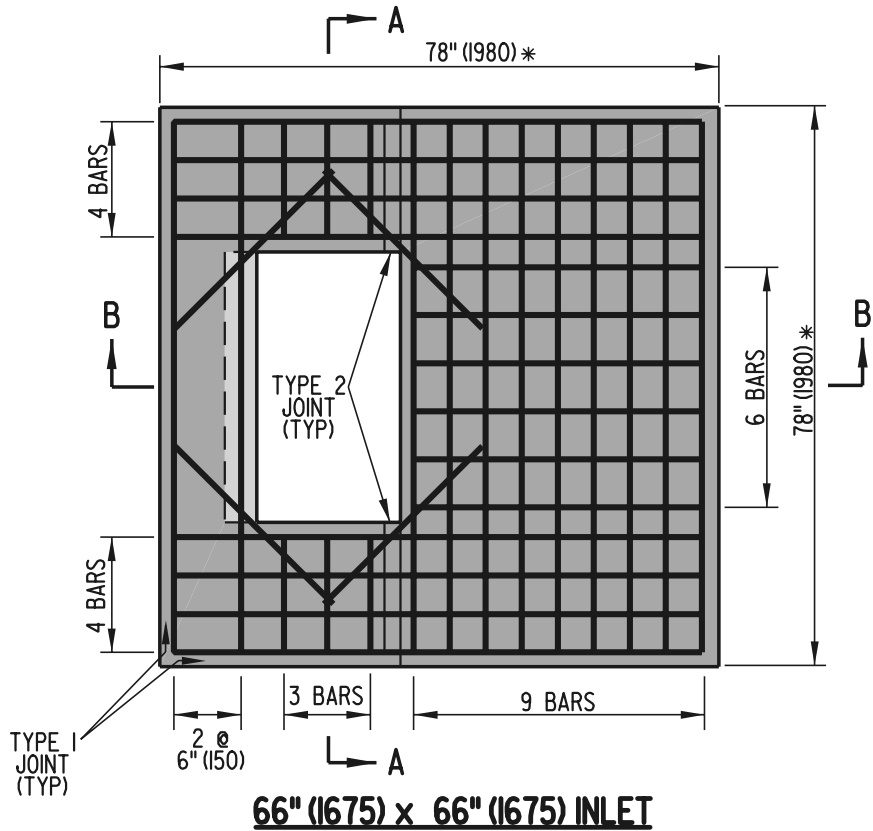
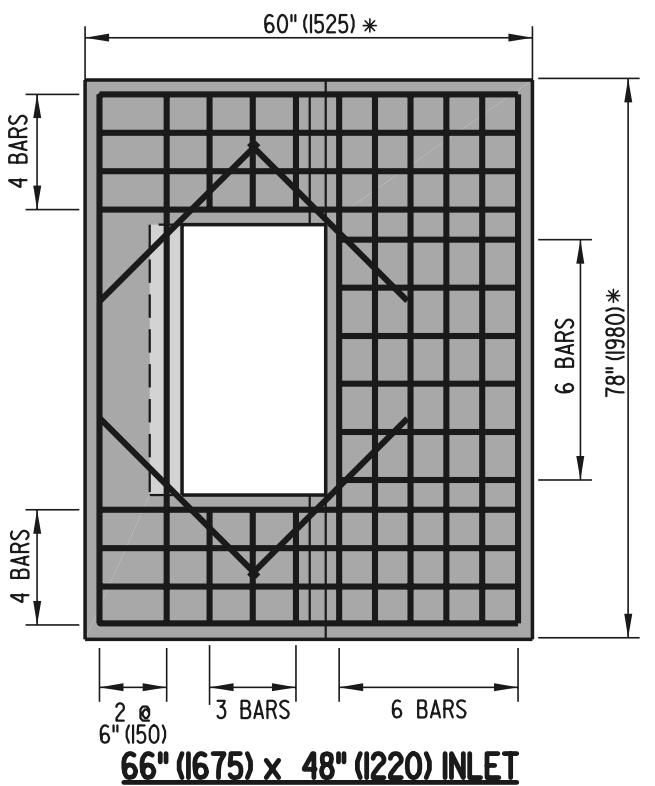
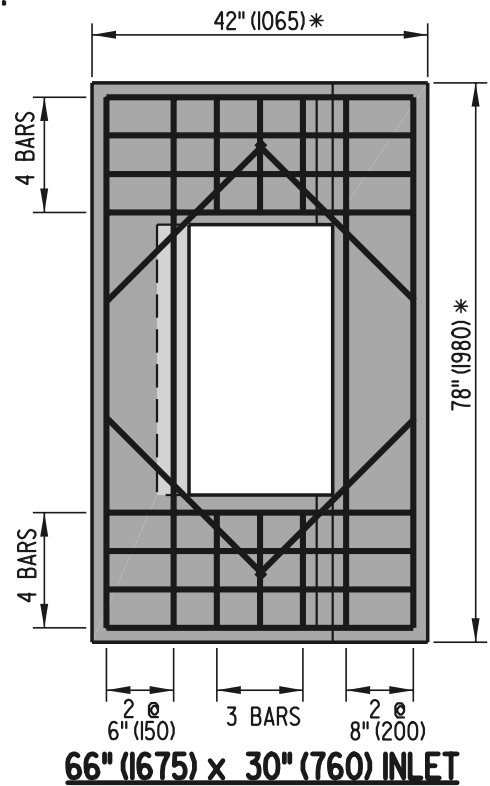
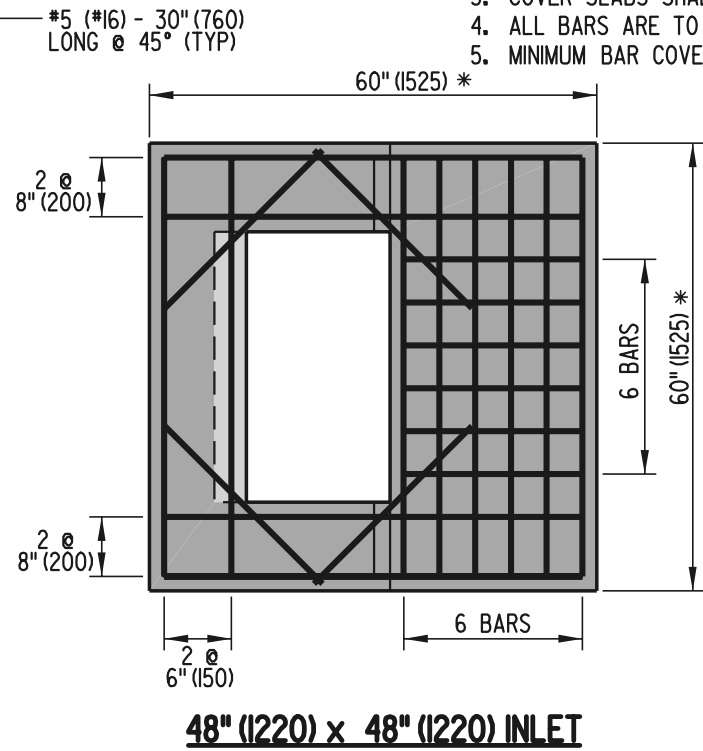
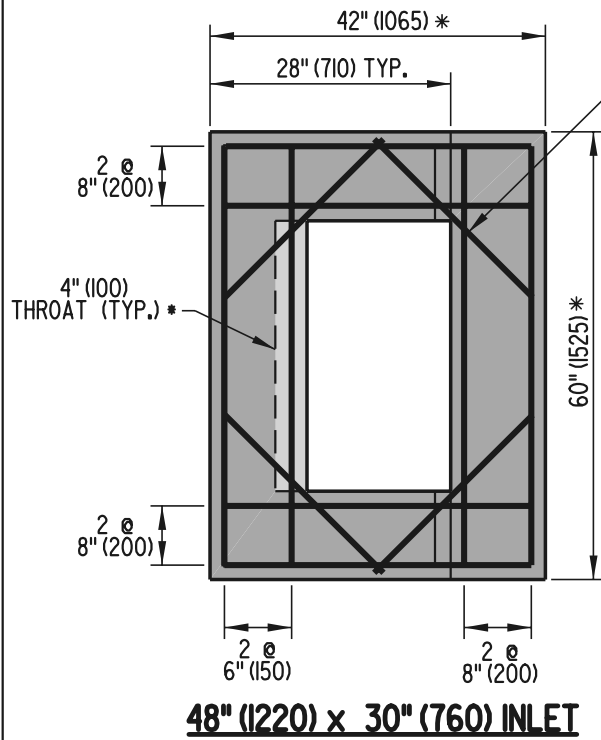
RECOMMENDED

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


SCALE : N.T.S.

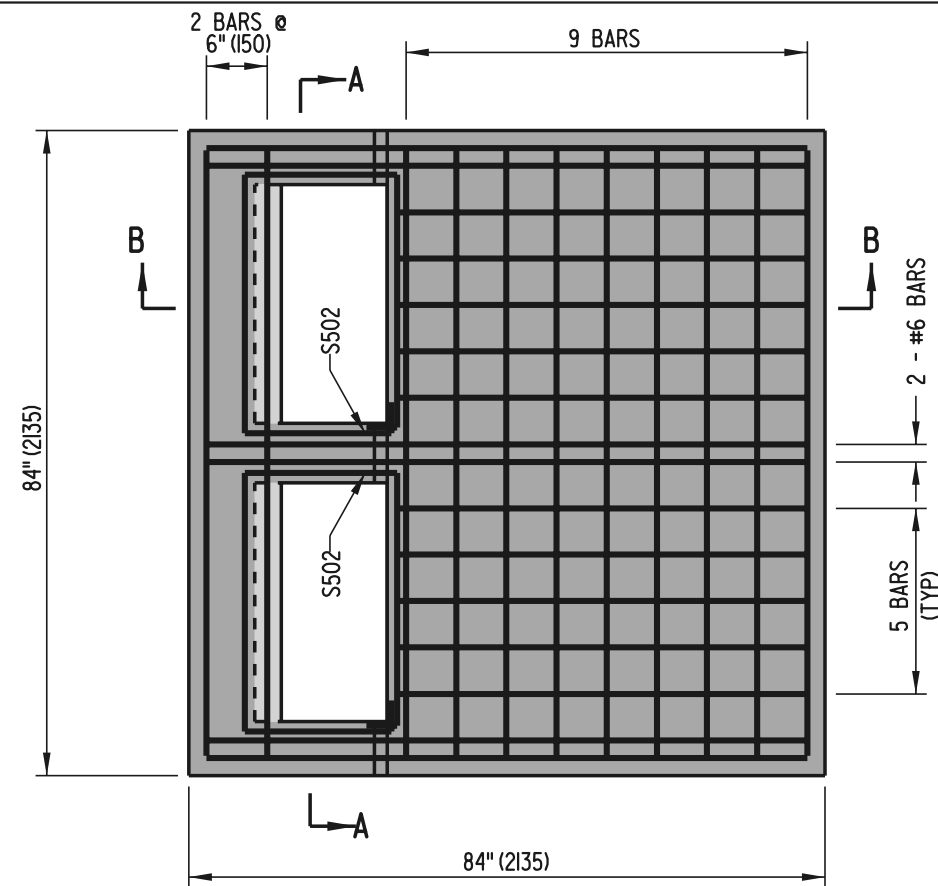
- NOTE :**
1. 4" (100) THROAT IS FOR TYPES B AND C TOP UNITS.
  2. RELOCATE ENCROACHING REINFORCING BARS WHEN USING TYPES B & C TOP UNITS.
  3. COVER SLABS SHALL BE PRE-CAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
  4. ALL BARS ARE TO BE #5 (#16) SPACED @ 6" (150) ± UNLESS NOTED OTHERWISE.
  5.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

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

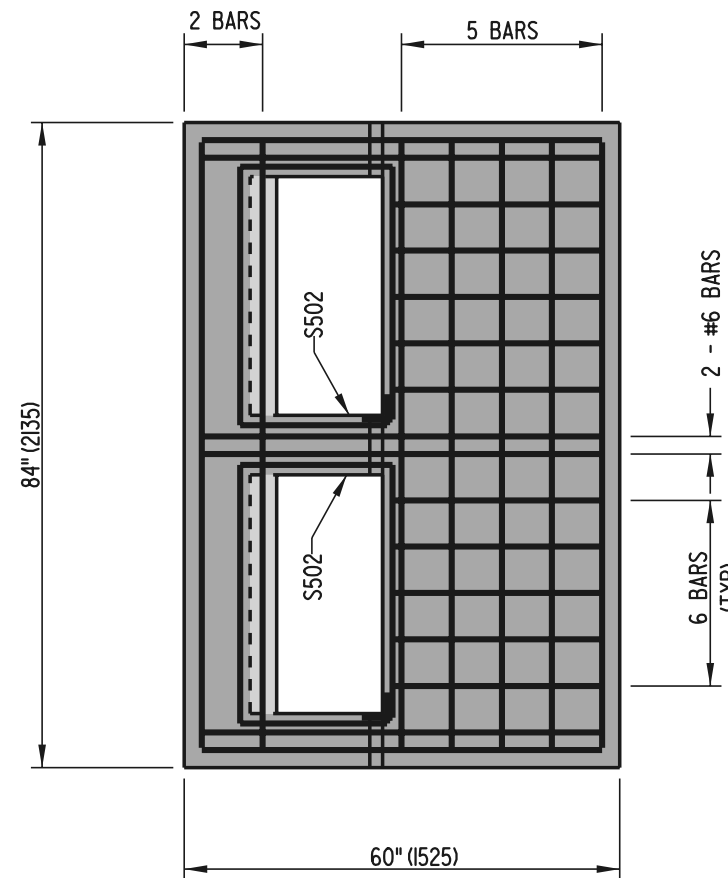


**DRAINAGE INLET COVER SLAB DETAILS**

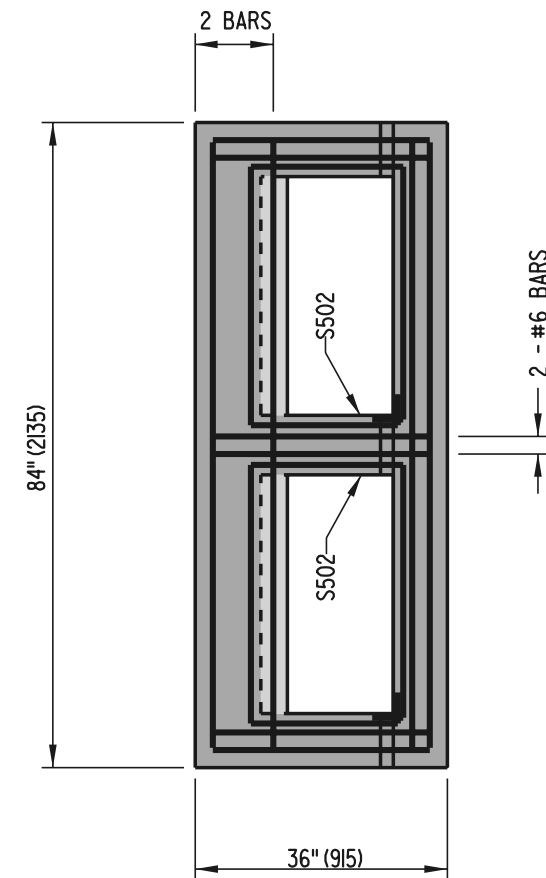
 <b>DELAWARE DEPARTMENT OF TRANSPORTATION</b>	<b>DRAINAGE INLET DETAILS</b>			<b>APPROVED</b> <i>Caution Wicks</i> <b>9/6/02</b> CHIEF ENGINEER DATE
	<b>STANDARD NO.</b> D-5 (2002)	<b>SHT.</b> 4	<b>OF</b> 8	<b>RECOMMENDED</b> <i>Thurman Phelps</i> <b>8/19/02</b> DESIGN ENGINEER DATE



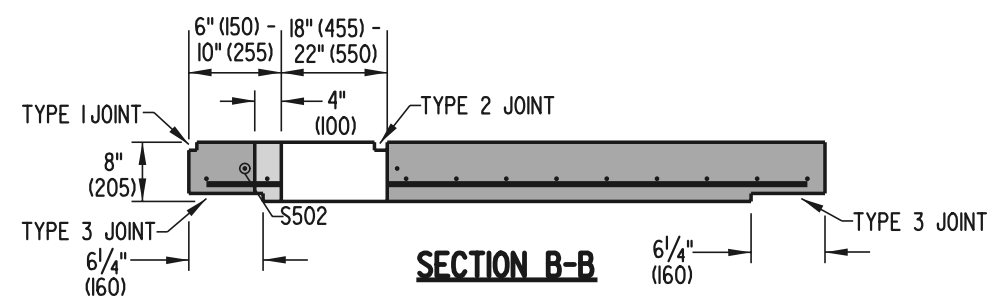
**72" (1830) x 72" (1830) INLET**



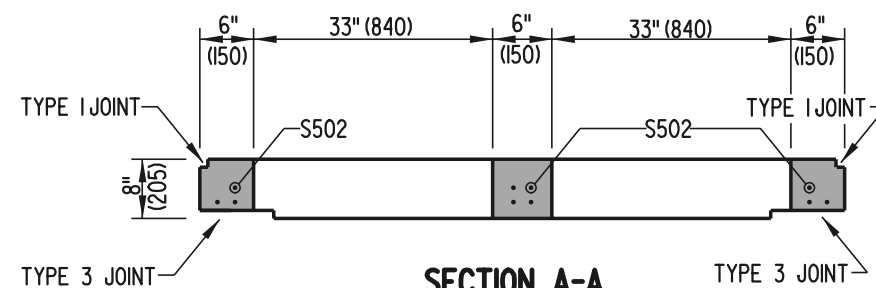
**72" (1830) x 48" (1220) INLET**



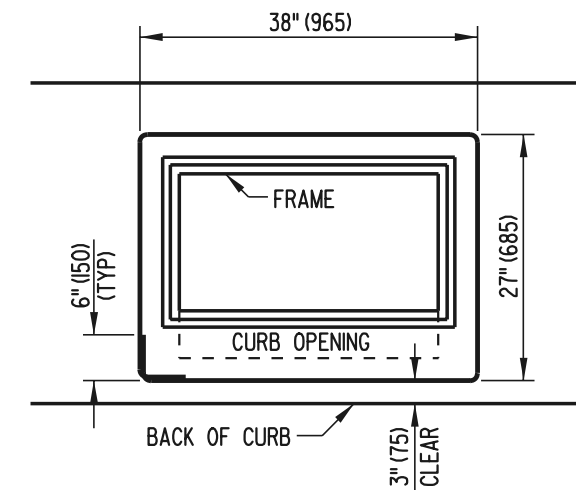
**72" (1830) x 24" (610) INLET**



**SECTION B-B**



**SECTION A-A**



**S502 BENDING DIAGRAM**

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

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



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**DOUBLE INLET COVER SLAB DETAILS**

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

**SHT. 5 OF 8**

**APPROVED**

*Caroleen Wicks*  
CHIEF ENGINEER

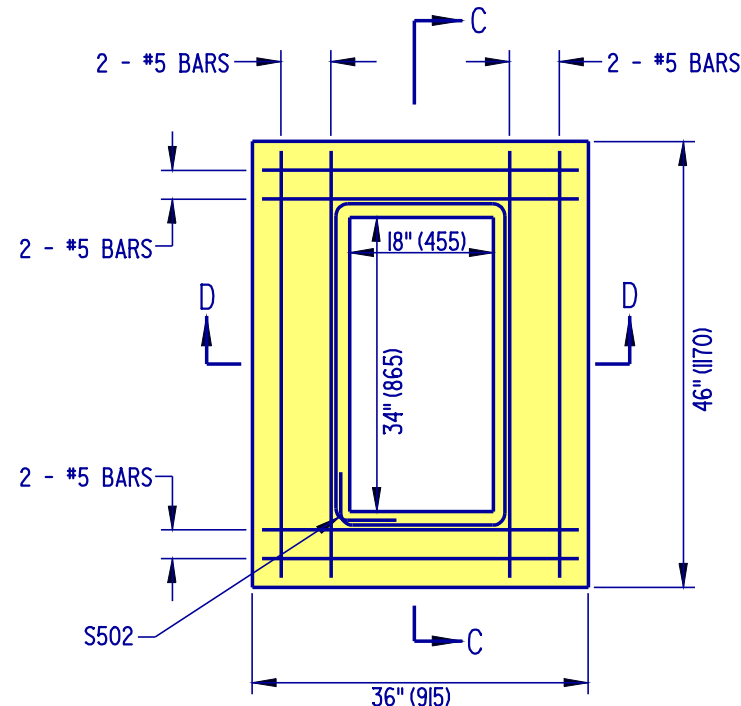
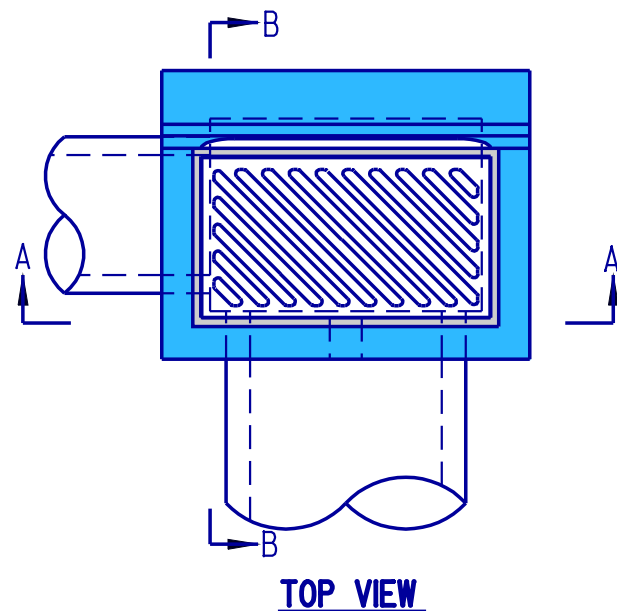
*9/6/02*  
DATE

**RECOMMENDED**

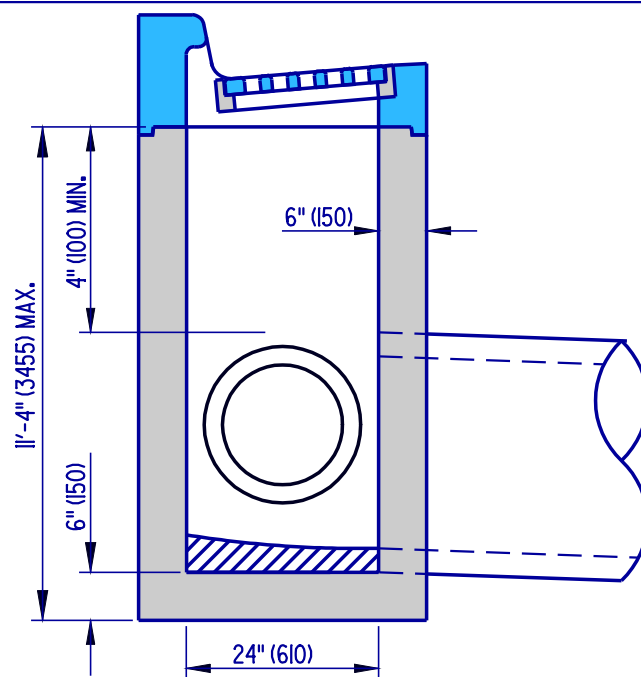
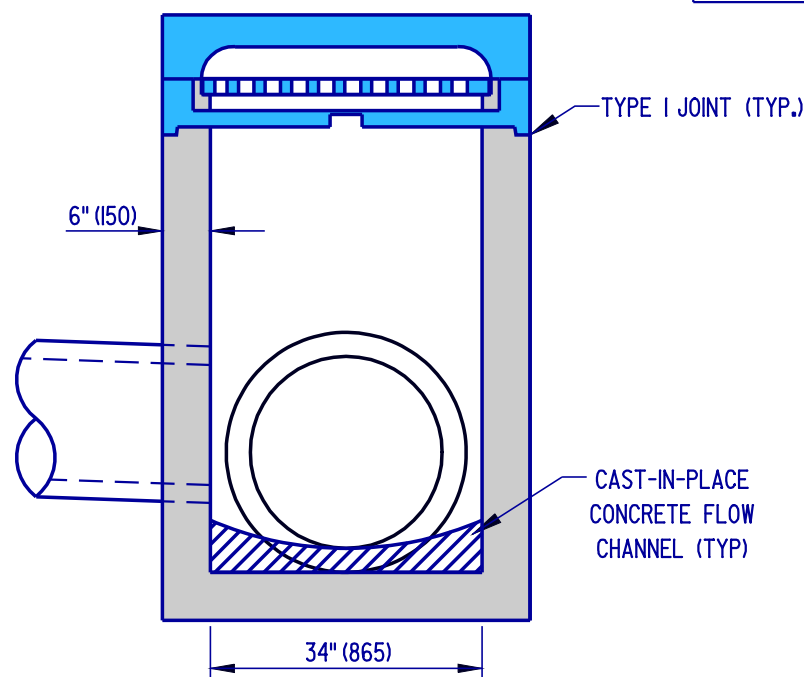
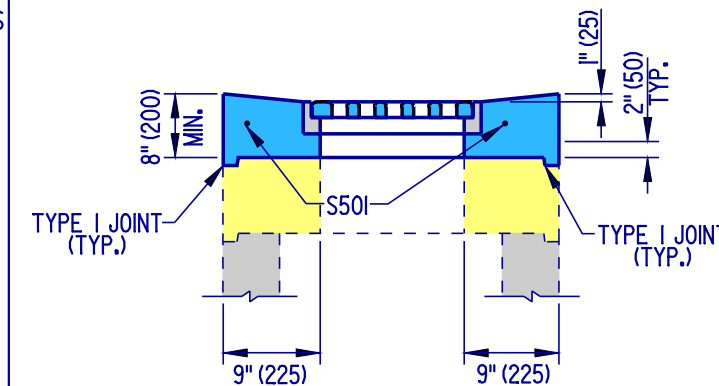
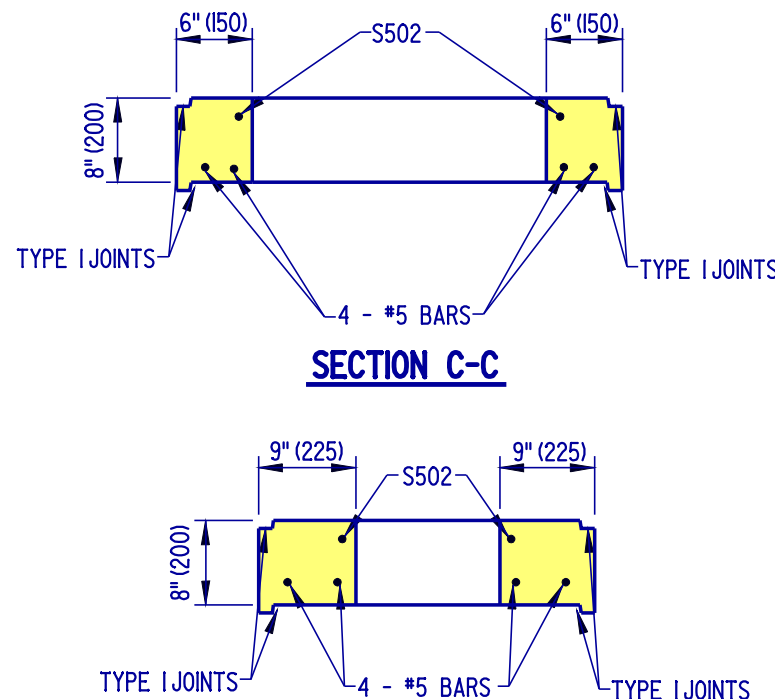
*Theresa Delgado*  
DESIGN ENGINEER

*8/19/02*  
DATE

SCALE : N.T.S.

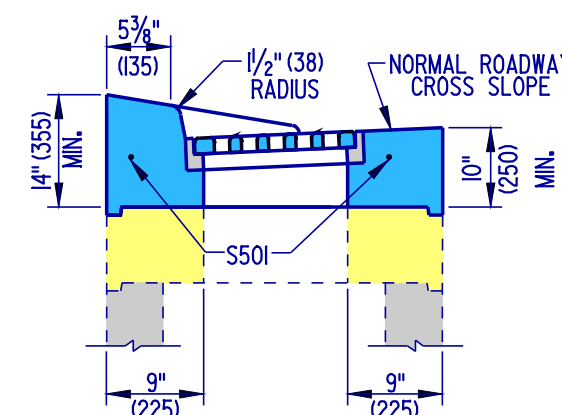
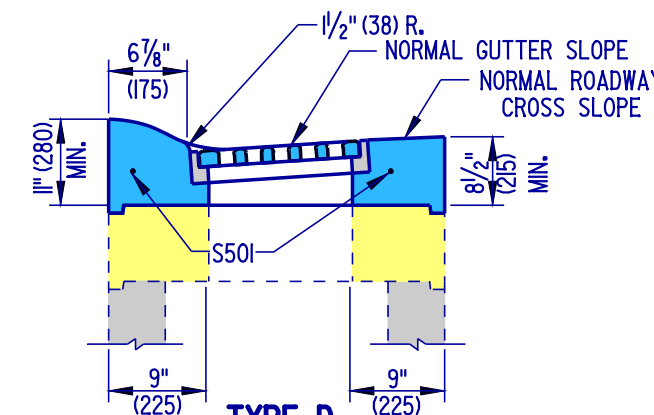
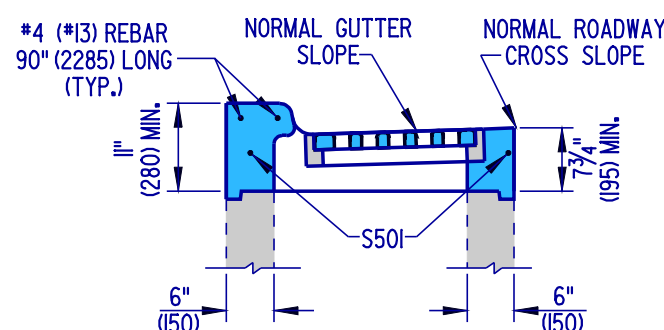
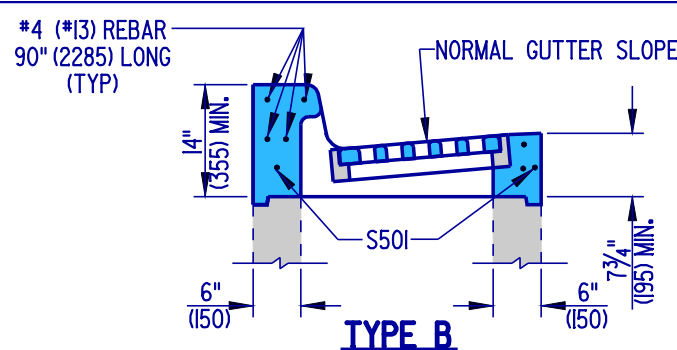


**COVER SLAB DETAILS**



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

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS



**TOP UNIT DETAILS**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**DRAINAGE INLET DETAILS**

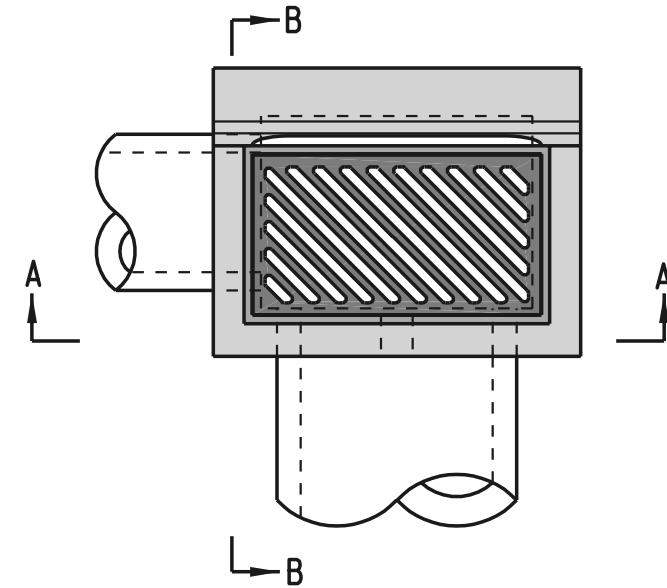
STANDARD NO. D-5 (2004)

SHT. 6 OF 8

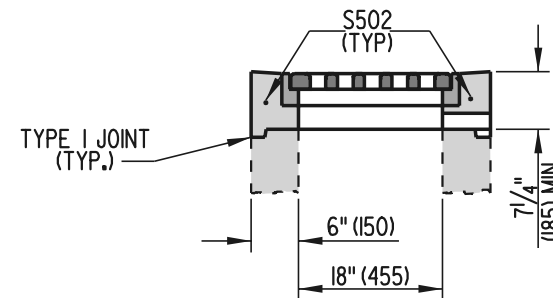
APPROVED *Carolann Wicks* 1/10/05  
CHIEF ENGINEER DATE

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

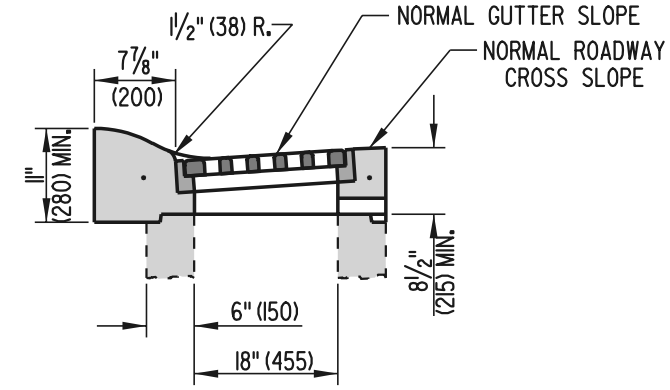
09/27/2004



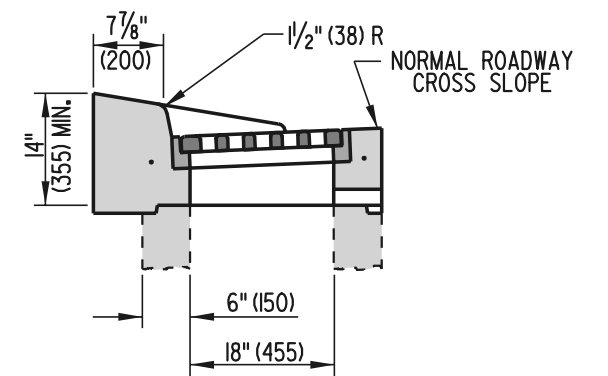
TOP VIEW



TYPE A

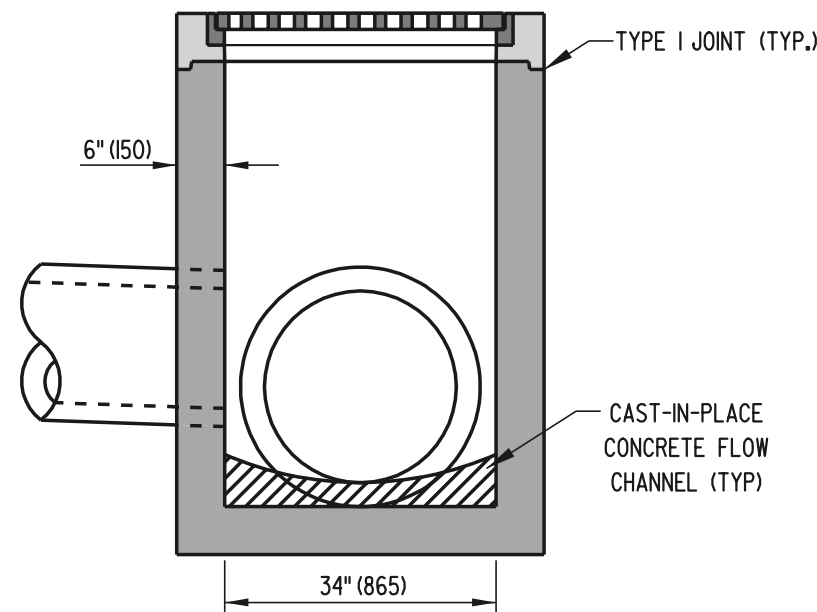


TYPE D

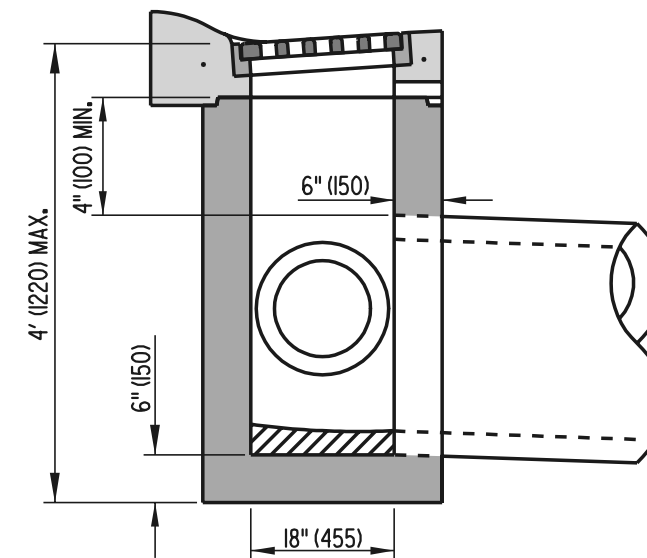


TYPE E

TOP UNIT DETAILS



SECTION A-A



SECTION B-B

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

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



DELAWARE  
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO.

D-5 (2002)

SHT. 7

OF 8

APPROVED

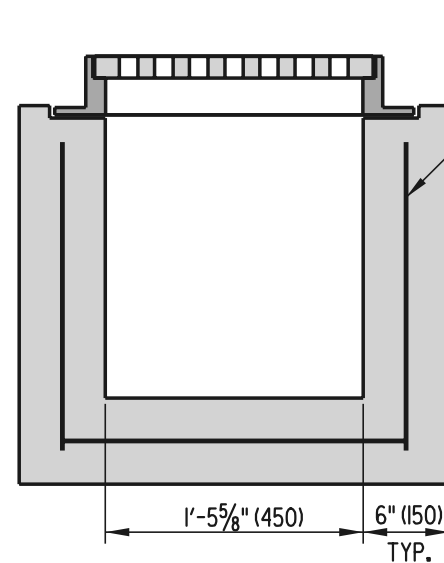
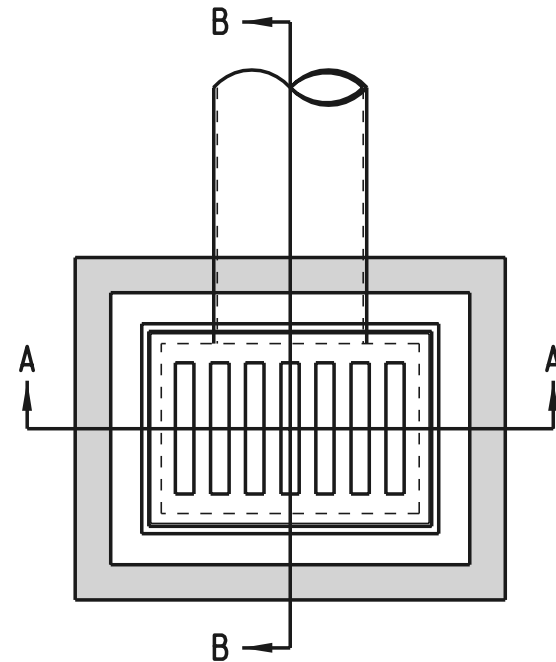
*Caution Wicks*  
CHIEF ENGINEER  
DATE 9/6/02

RECOMMENDED

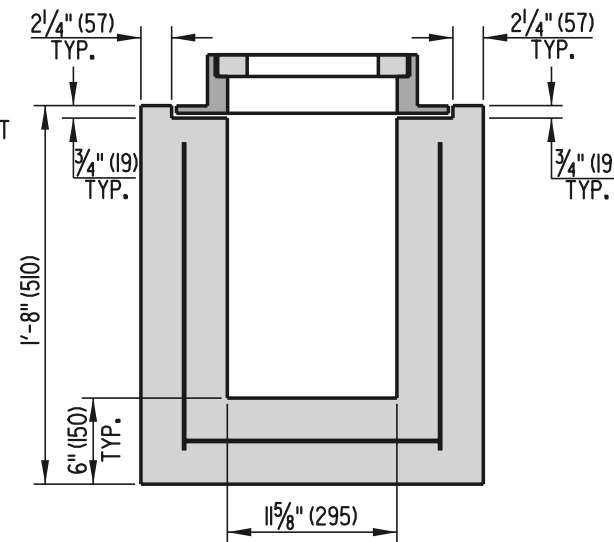
*Theresa Delph*  
DESIGN ENGINEER  
DATE 8/19/02



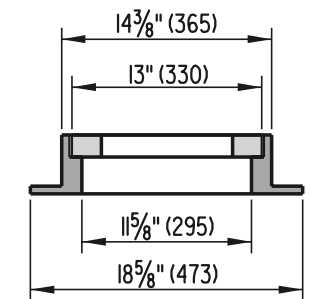
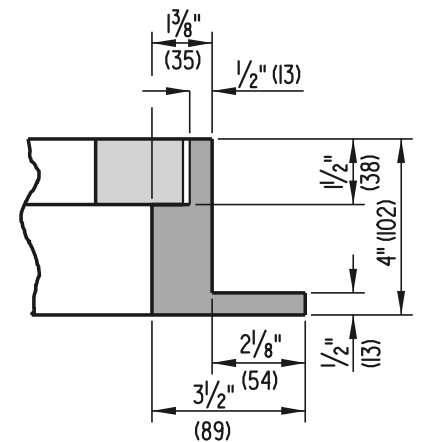
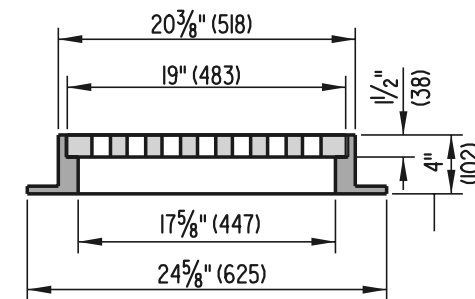
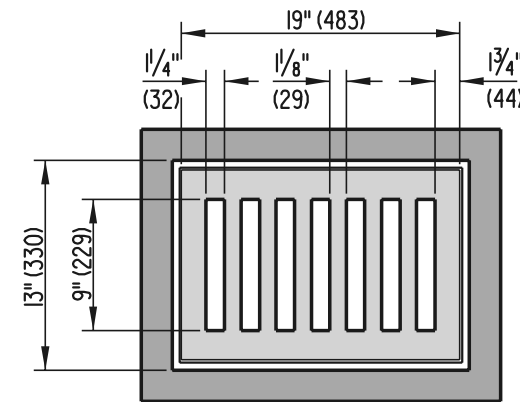
- NOTE:** 1. REINFORCEMENT SHALL BE 4" (102) X 4" (102) W4 X W4 (W26 X W26)  
2. INLET BOXES ARE TO BE PRE-CAST OR CAST-IN-PLACE.



SECTION A-A



SECTION B-B



DELAWARE  
DEPARTMENT OF TRANSPORTATION

LAWN INLET

STANDARD NO.

D-5 (2002)

SHT.

8

OF

8

APPROVED

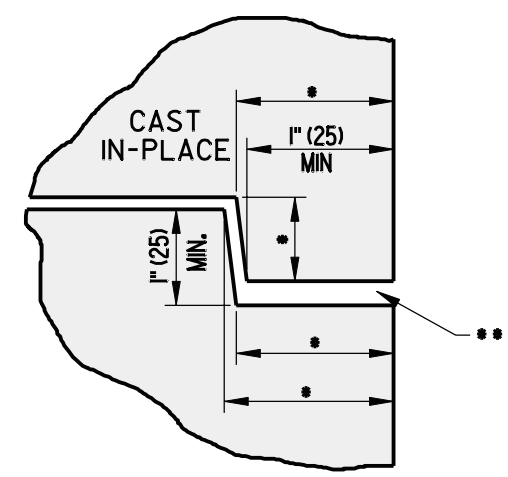
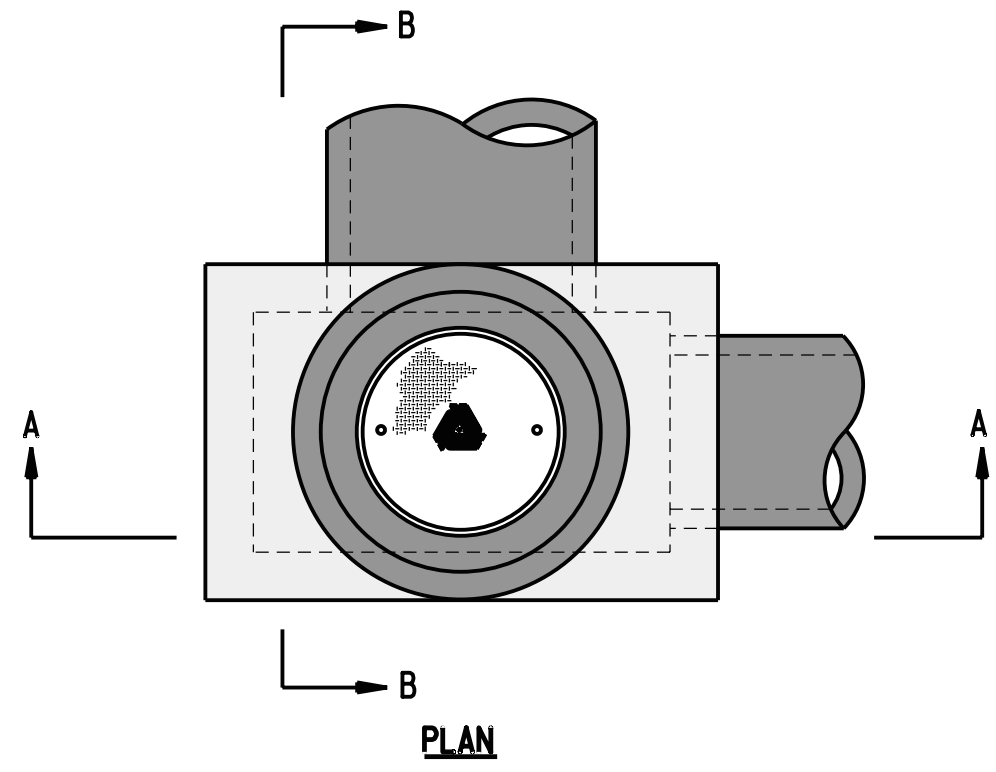
*Caroleen Wicks*  
CHIEF ENGINEER

9/6/02  
DATE

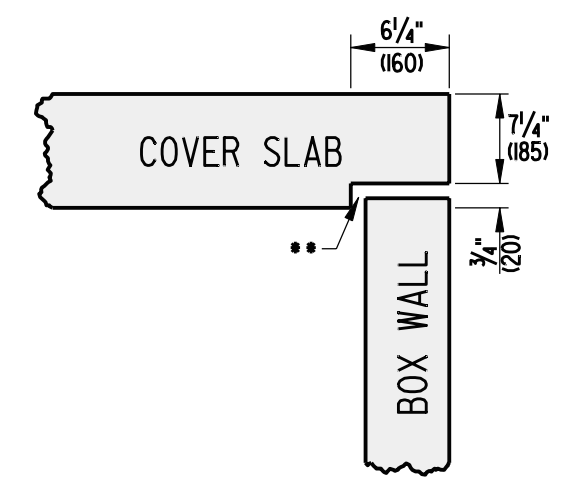
RECOMMENDED

*Theresa Delph*  
DESIGN ENGINEER

9/19/02  
DATE

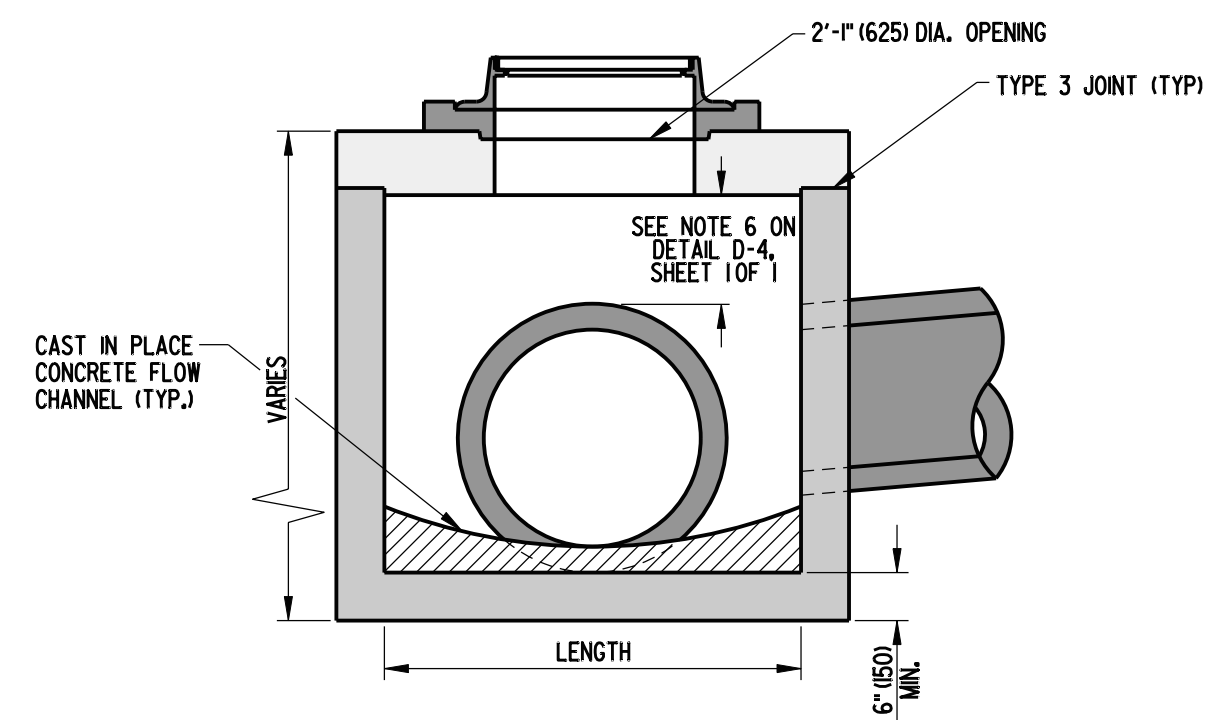


TYPE 1 JOINT DETAIL

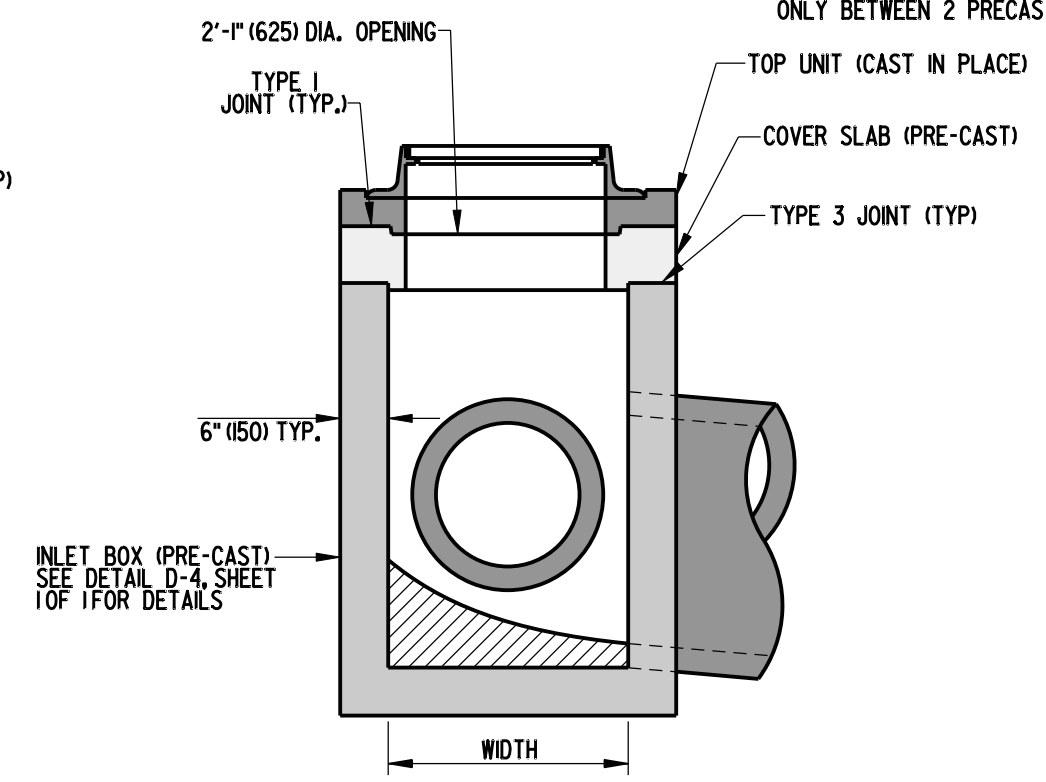


TYPE 3 JOINT DETAIL

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




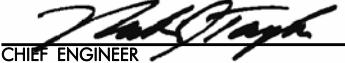

SECTION A-A

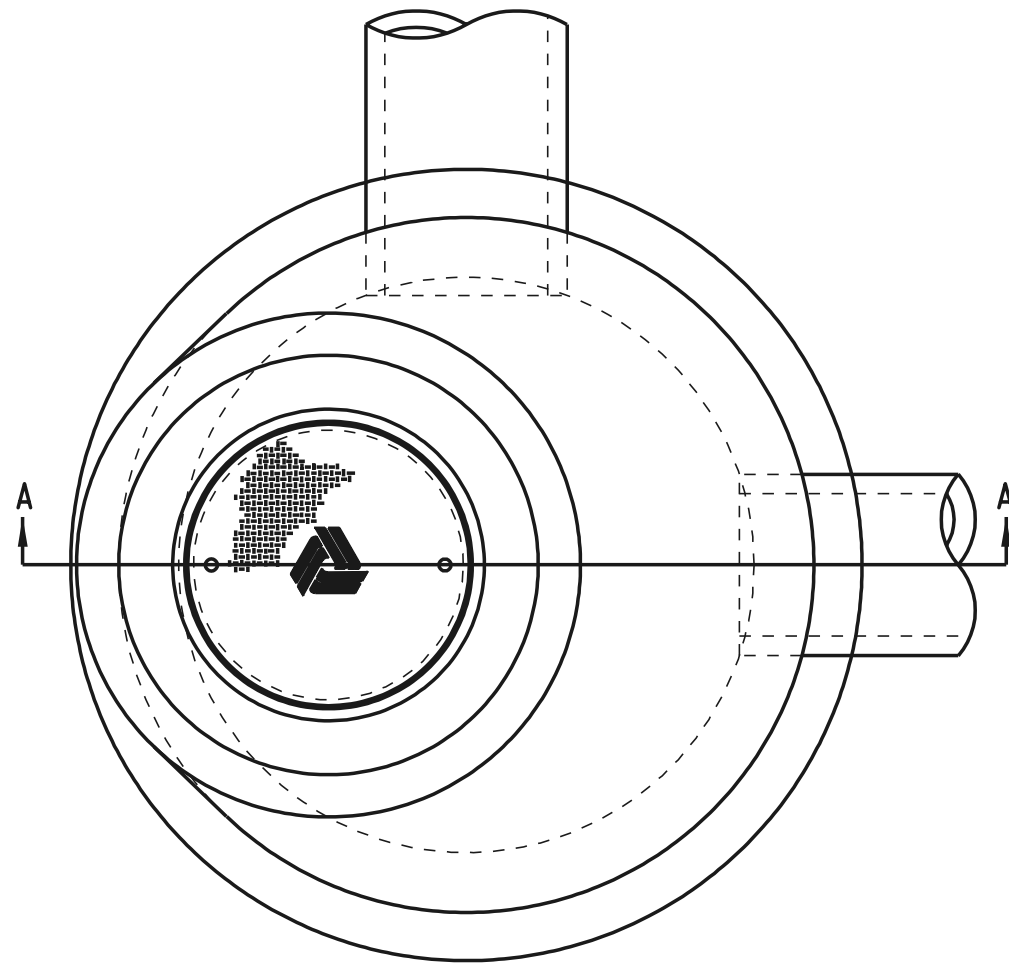


SECTION B-B

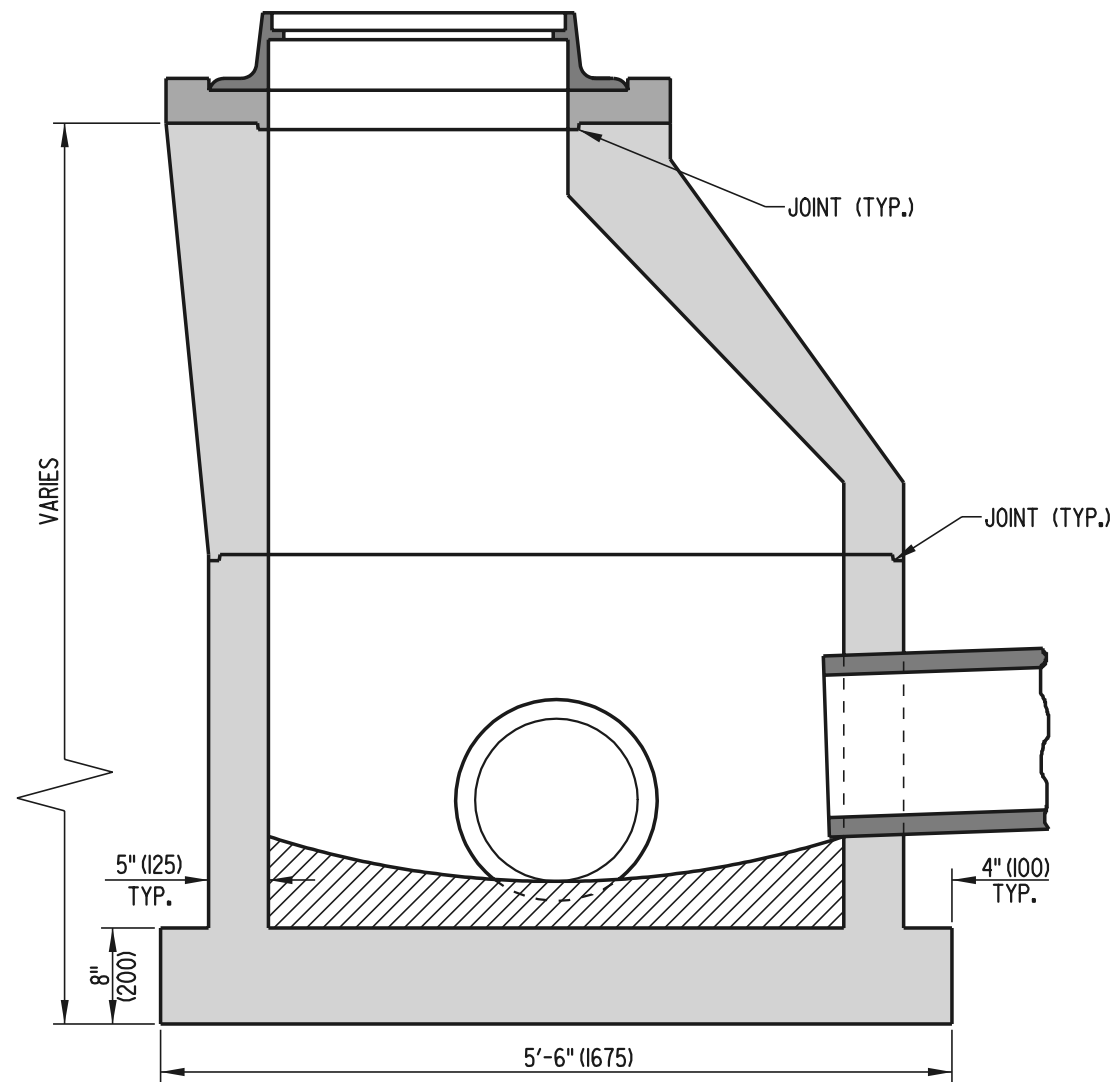
• - SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD D-4, SHEET 1 OF 1.

BOX MANHOLE ASSEMBLY

 DELAWARE DEPARTMENT OF TRANSPORTATION	MANHOLE DETAILS			APPROVED  10/24/07 CHIEF ENGINEER DATE
	STANDARD NO. D-6 (2007)	SHT. 1	OF 4	RECOMMENDED  10/23/07 DESIGN ENGINEER 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

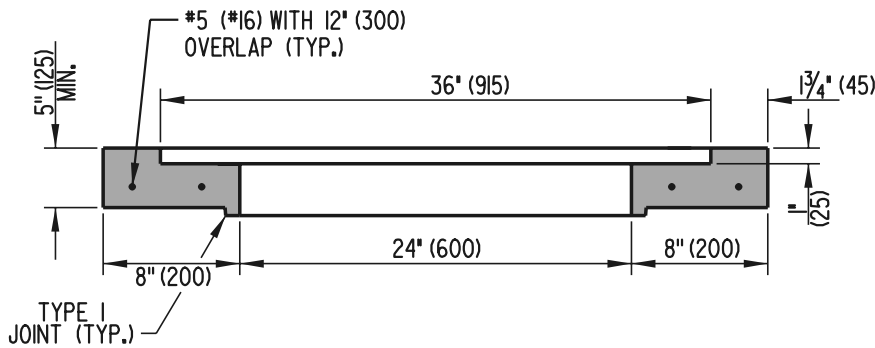
APPROVED

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

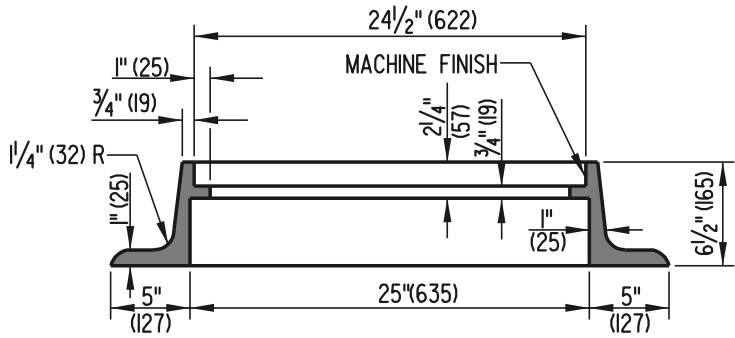
RECOMMENDED

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

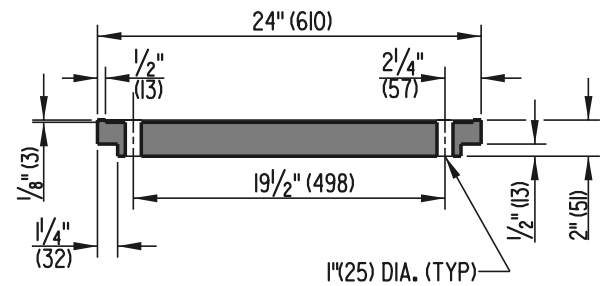
**NOTE:** TOP UNIT IS TO BE CAST IN PLACE TO GRADE AS SPECIFIED ON PLAN SHEETS OR AS DIRECTED BY ENGINEER.



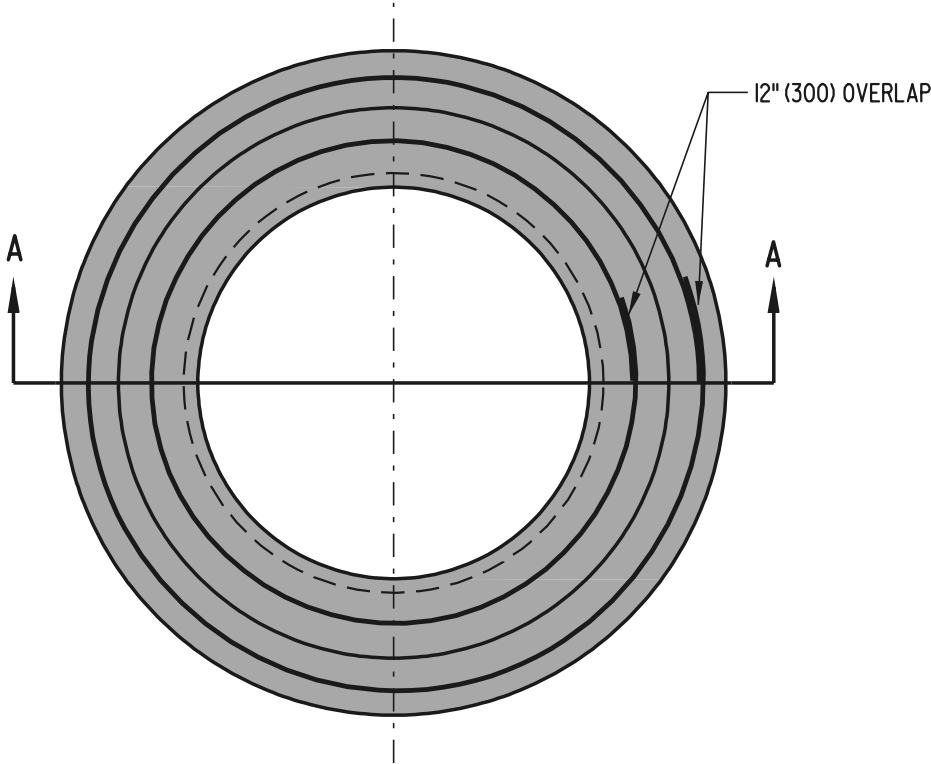
**SECTION A-A**



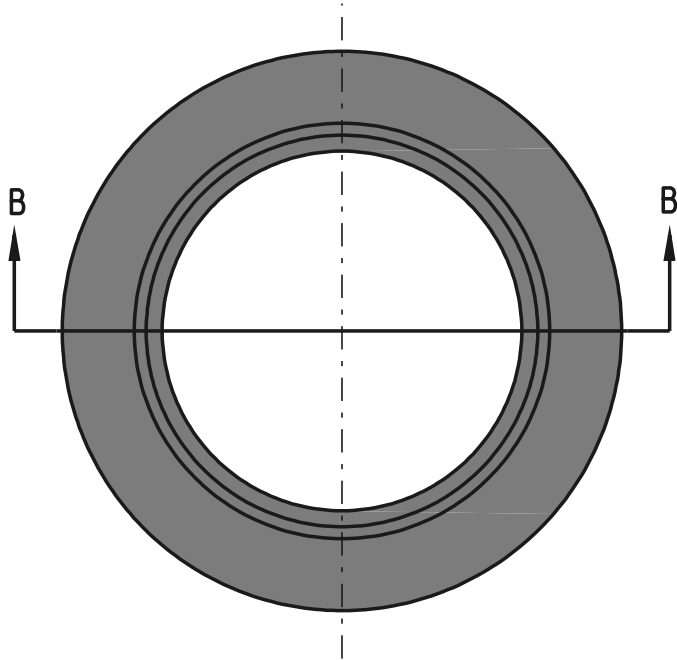
**SECTION B-B**



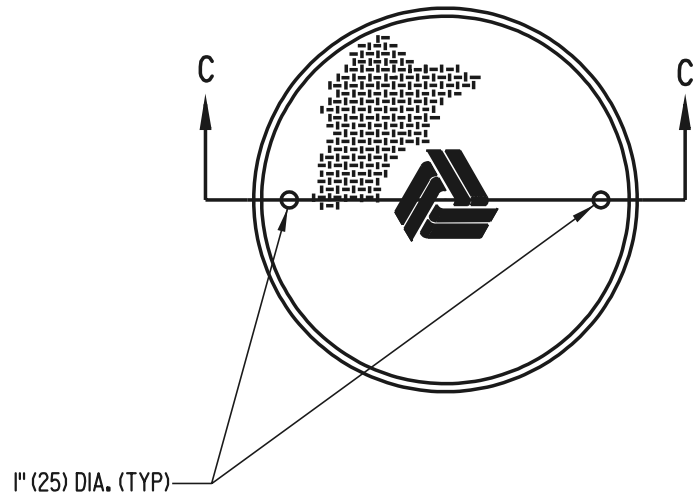
**SECTION C-C**



**TOP UNIT**



**FRAME**



**COVER**



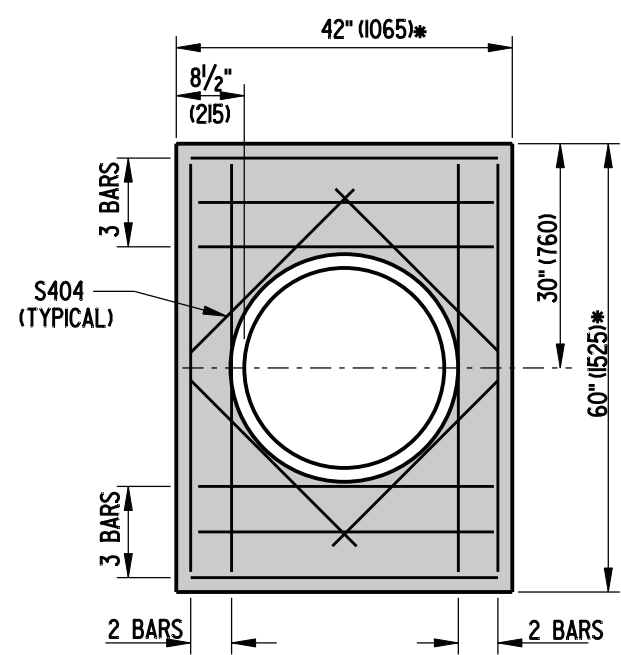
**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**MANHOLE DETAILS**

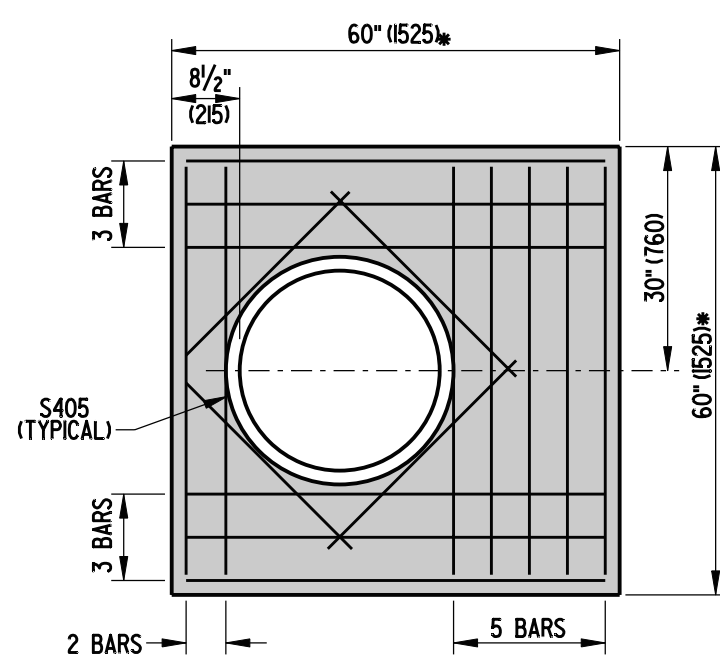
STANDARD NO. D-6 (2001) SHT. 3 OF 4

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

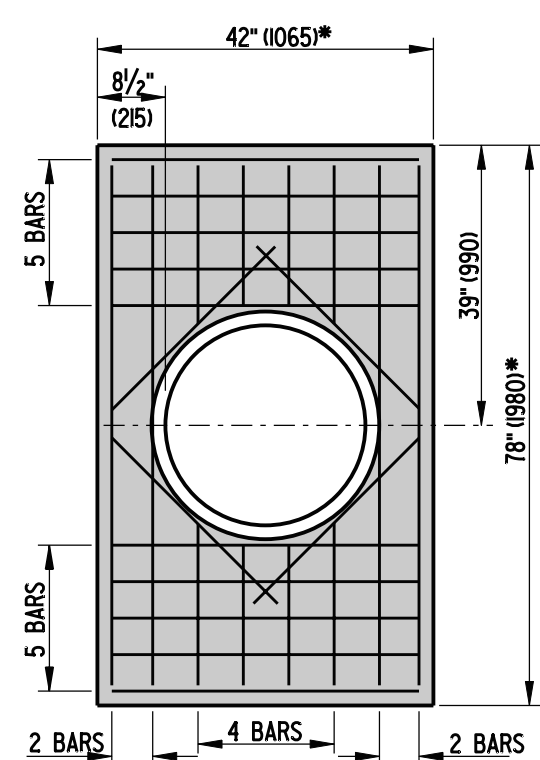
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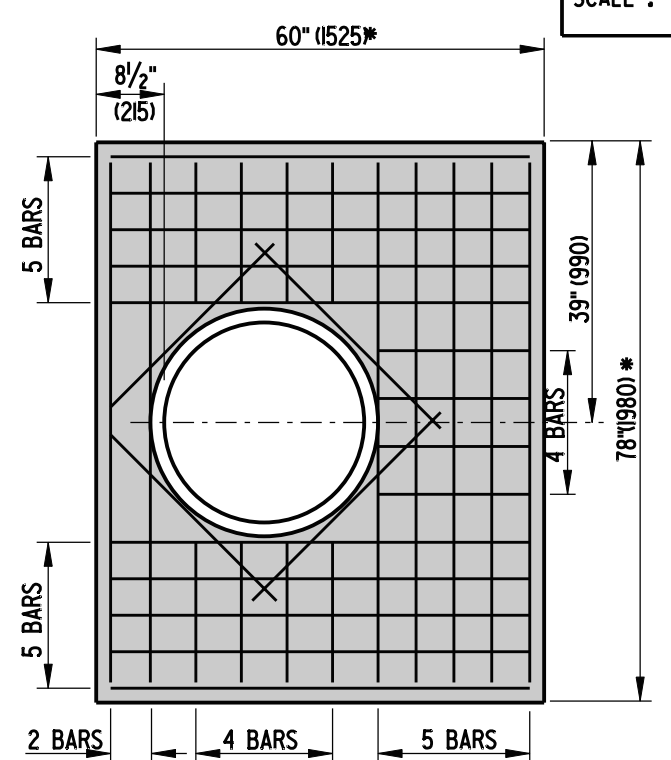
48" (1220) X 30" (760) MANHOLE



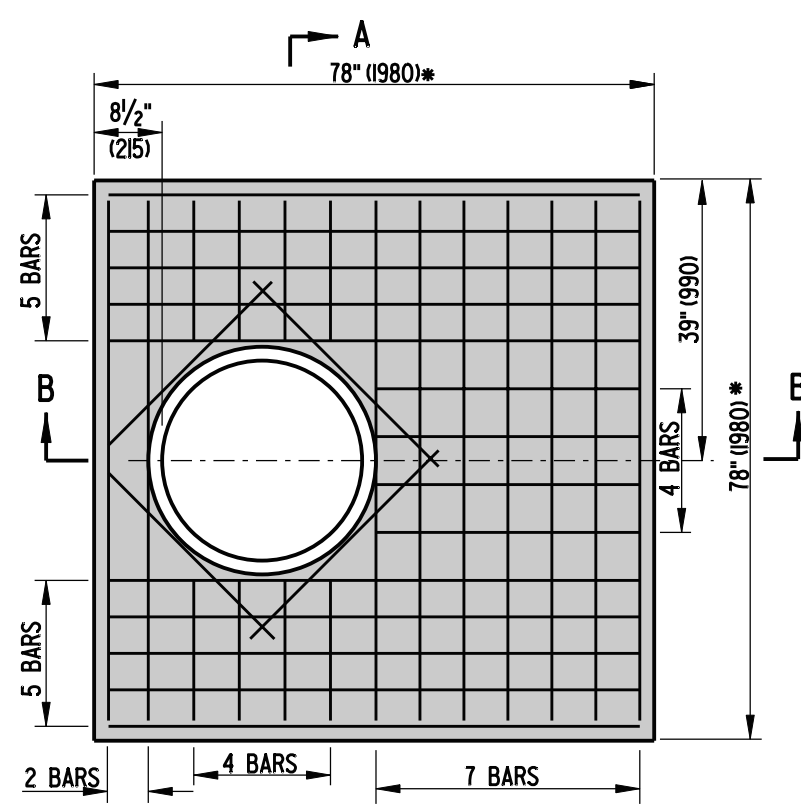
48" (1220) X 48" (1220) MANHOLE



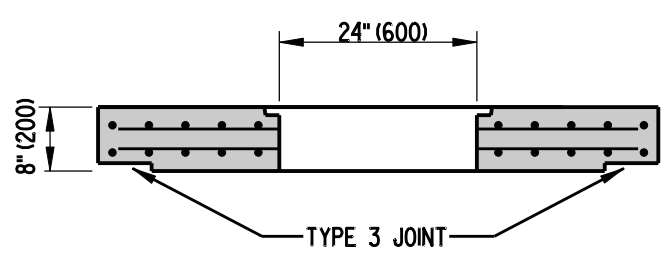
66" (1675) X 30" (760) MANHOLE



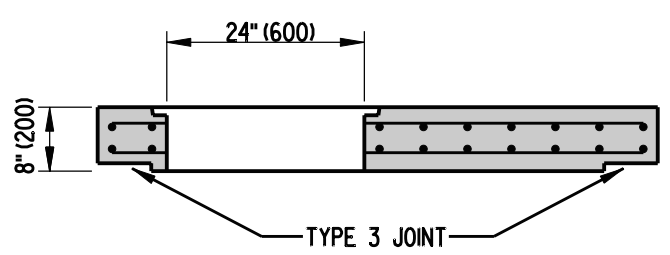
66" (1675) X 48" (1220) MANHOLE



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.



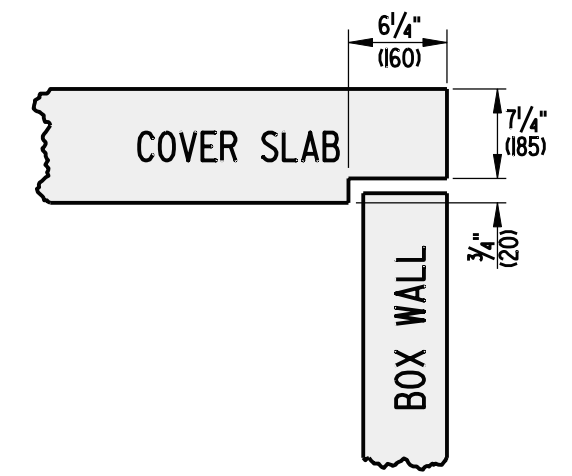
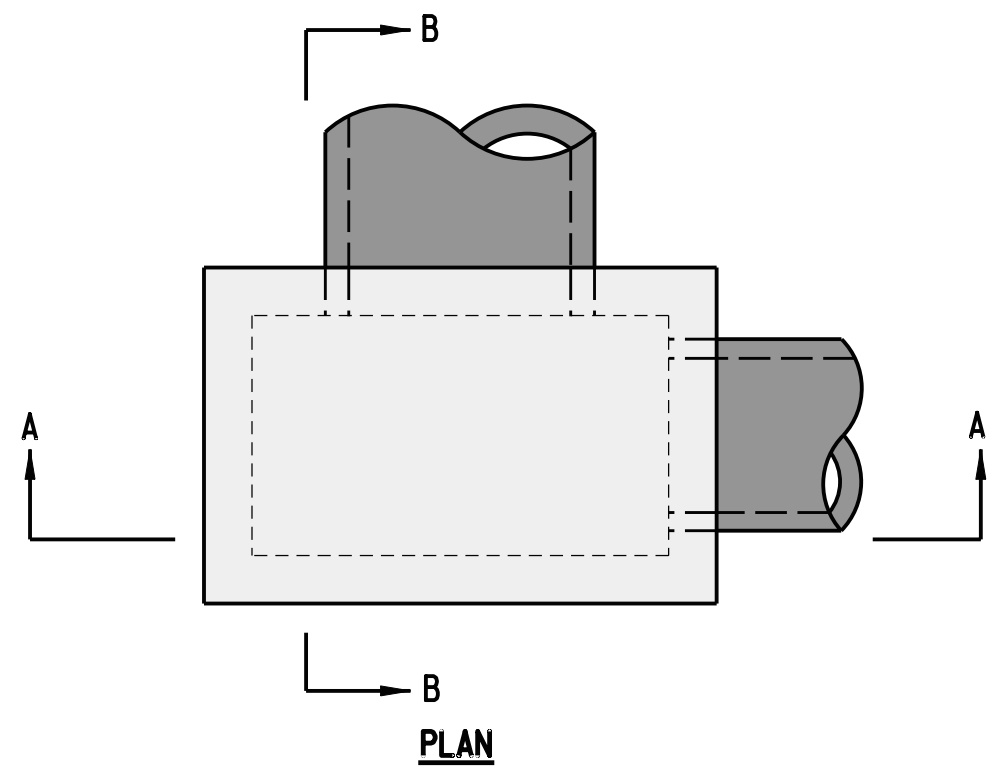
DELAWARE  
DEPARTMENT OF TRANSPORTATION

MANHOLE DETAILS

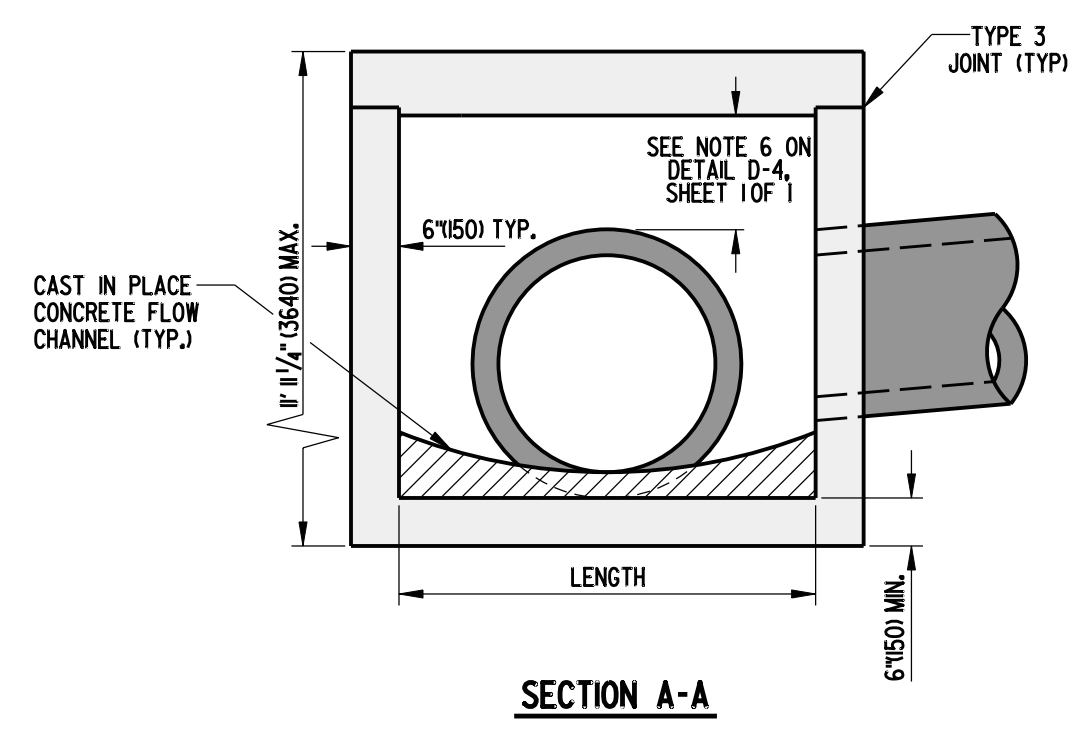
STANDARD NO. D-6 (2007)

SHT. 4 OF 4

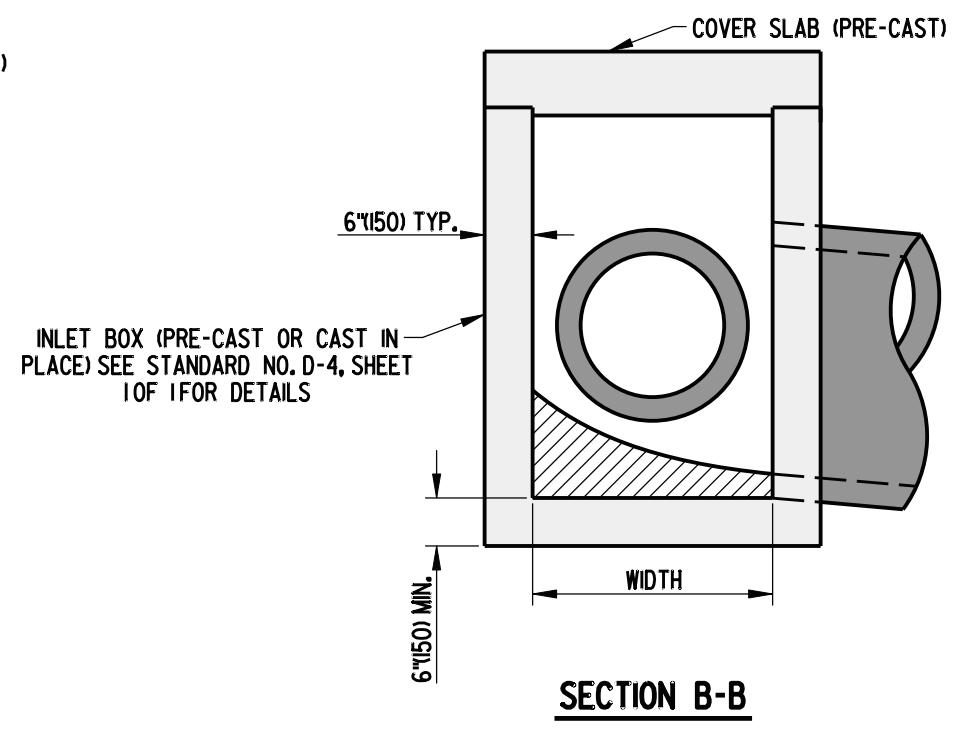
APPROVED *[Signature]* 10/24/07  
CHIEF ENGINEER DATE  
RECOMMENDED *[Signature]* 10/23/07  
DESIGN ENGINEER DATE



**TYPE 3 JOINT DETAIL**



**SECTION A-A**



**SECTION B-B**

• - 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 (2007)**

SHT. **1** OF **2**

**APPROVED**

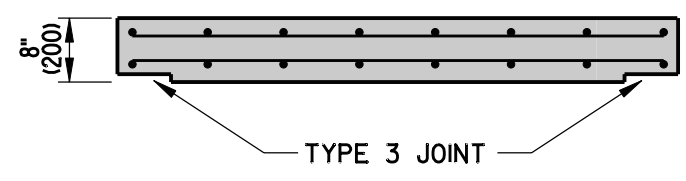
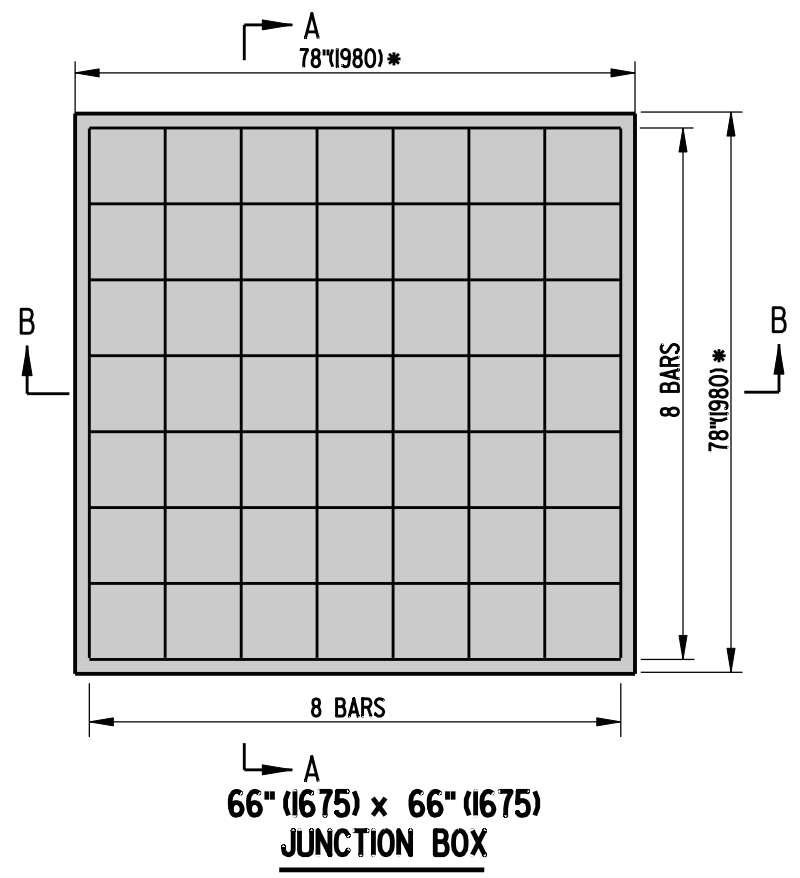
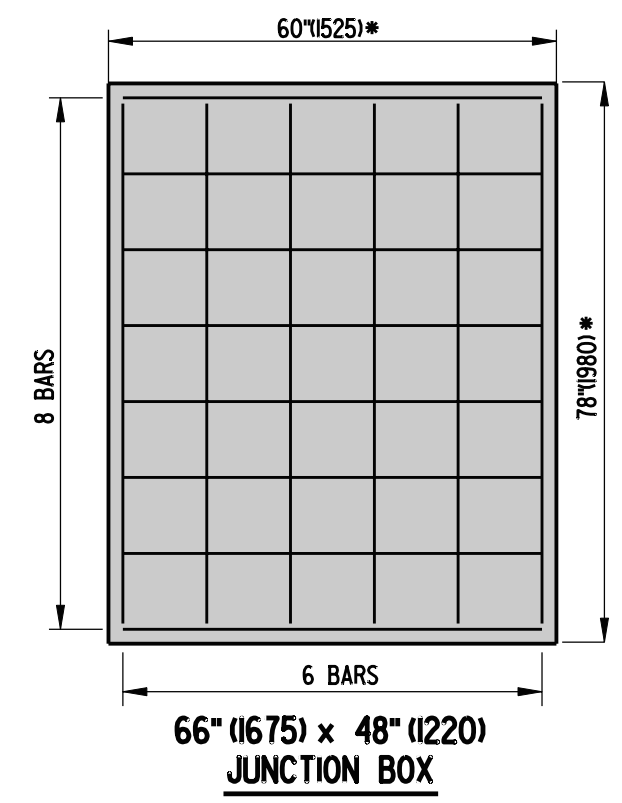
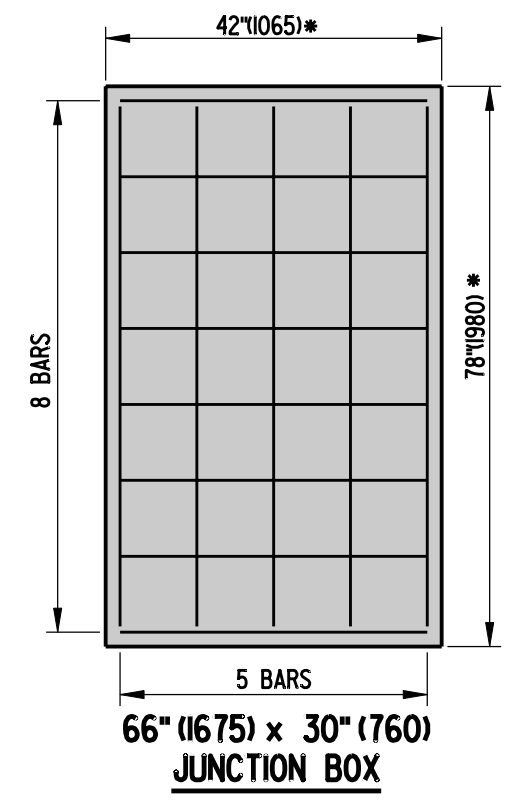
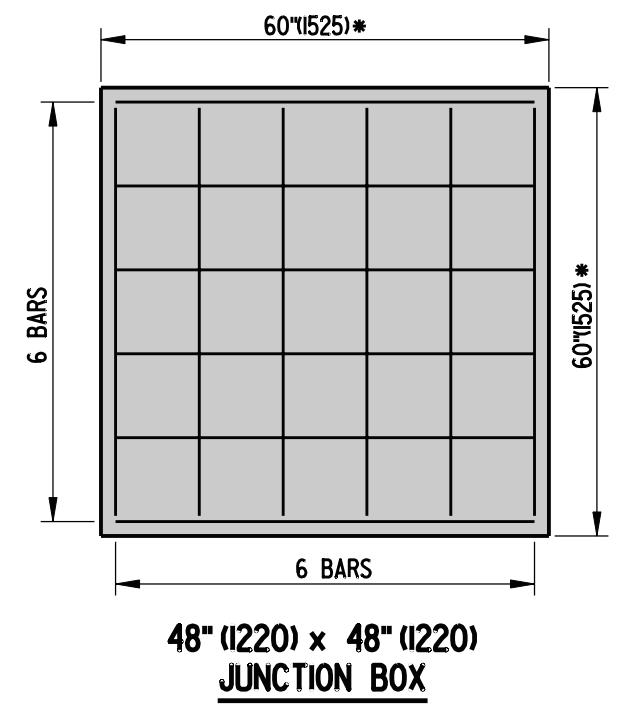
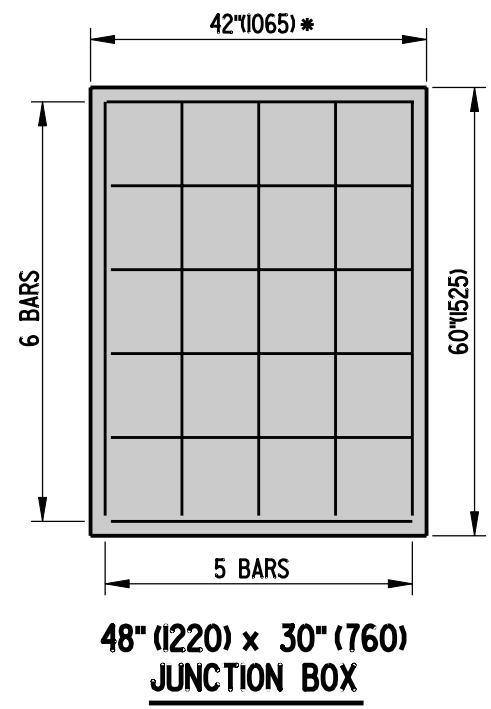
*[Signature]*  
CHIEF ENGINEER

**10/24/07**  
DATE

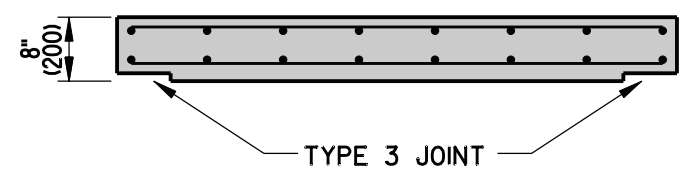
**RECOMMENDED**

*[Signature]*  
DESIGN ENGINEER

**10/23/07**  
DATE




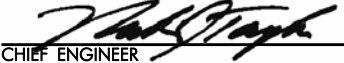

SECTION A-A

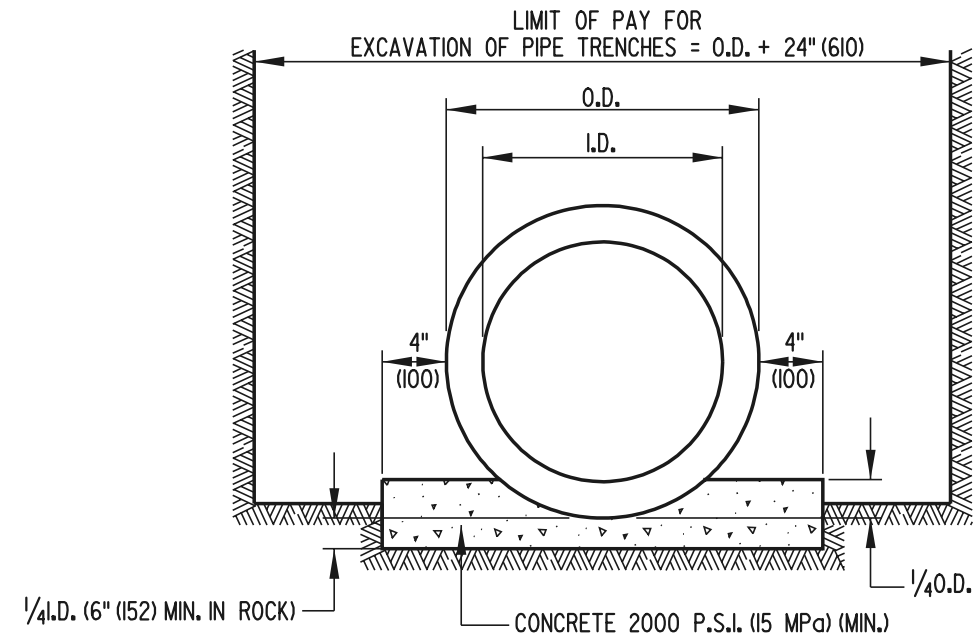


SECTION B-B

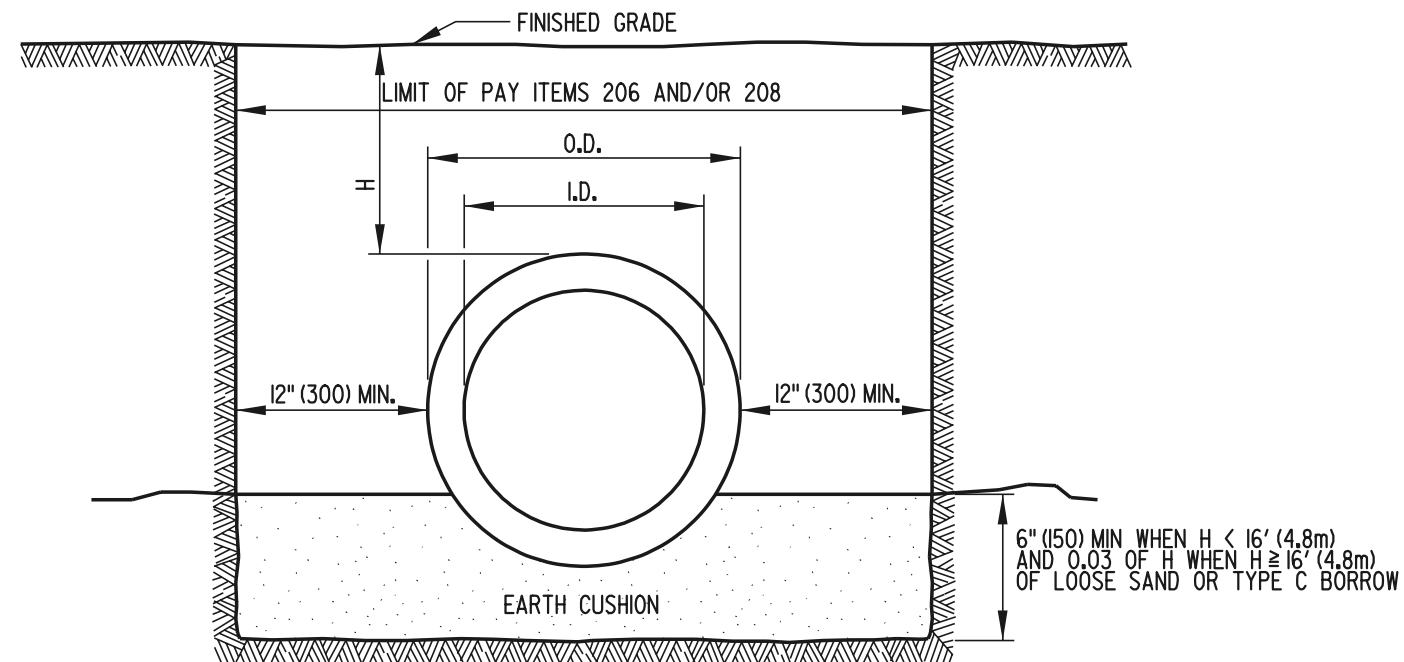
JUNCTION BOX COVER SLAB DETAILS

- 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: USE CLASS C BEDDING UNLESS OTHERWISE INDICATED



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**PIPE BEDDING**

STANDARD NO.

D-8 (2001)

SHT. 1

OF 1

APPROVED

*Ryan M. Harkness*  
CHIEF ENGINEER

6/18/01  
DATE

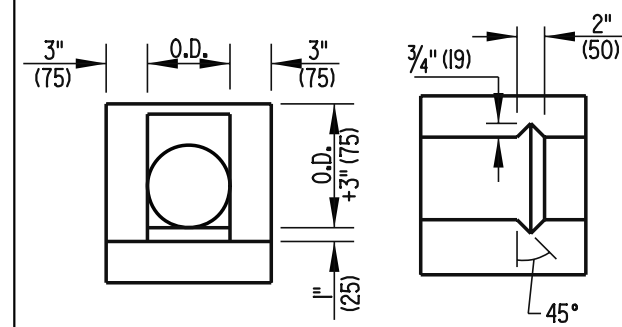
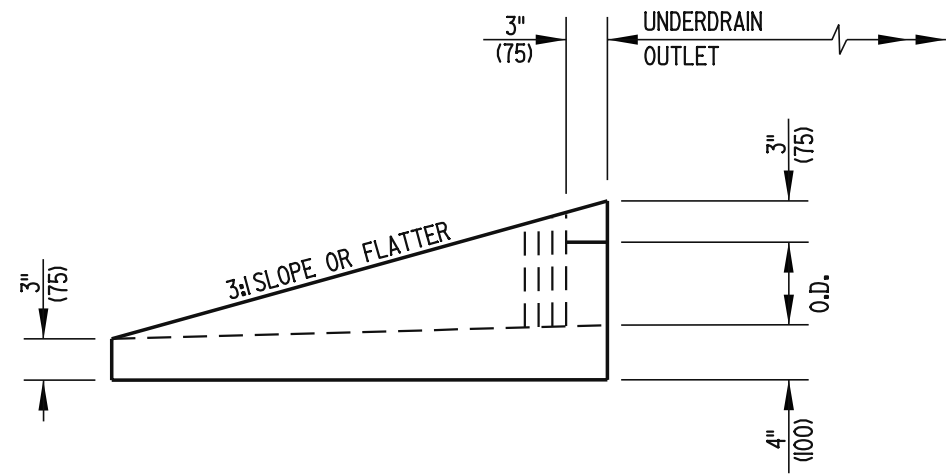
RECOMMENDED

*Michael J. Gotsch*  
DESIGN ENGINEER

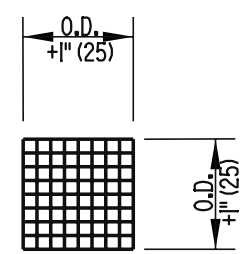
6/18/01  
DATE



SCALE : N.T.S.



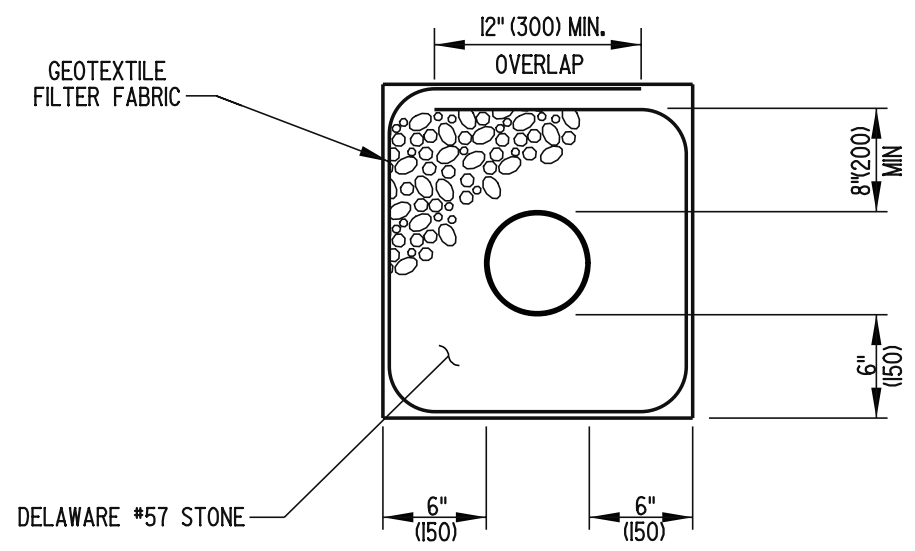
**FRONT VIEW**  
**TOP VIEW**  
**SLOTTED HEADWALL DETAIL**



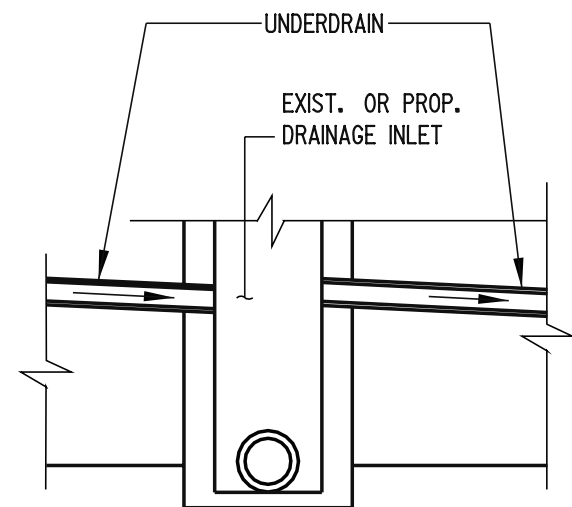
**FRONT VIEW**  
**RODENT SCREEN**

**DOWNSPOUT SPLASH APRON FOR UNDERDRAIN OUTLET**  
NOT TO SCALE

- 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' (900) 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 4' (1200) FLEXIBLE DELINEATOR SHALL BE FURNISHED AND INSTALLED AT THE DIRECTION OF THE ENGINEER TO MARK THE LOCATION OF THE CONCRETE HEADWALL. COST INCIDENTAL TO DOWNSPOUT SPLASH APRONS ITEM.
  - 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.






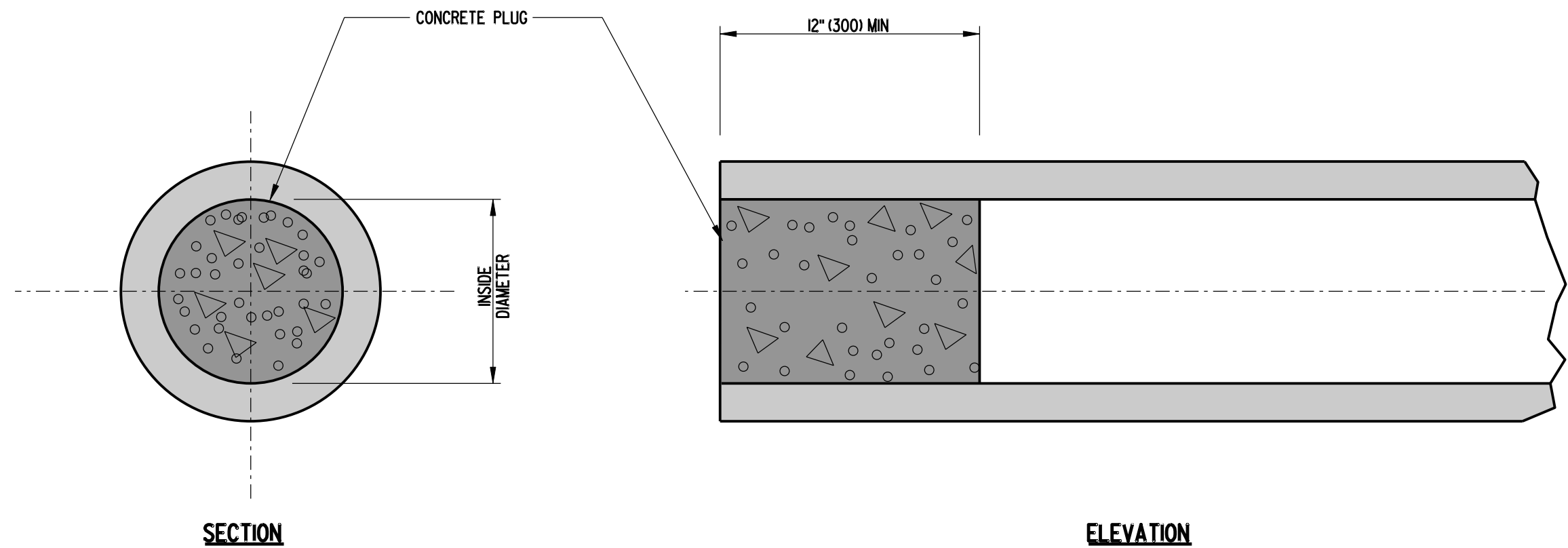
**SECTION**



**ELEVATION**

**PERFORATED PIPE UNDERDRAIN**  
NOT TO SCALE

 <b>DELAWARE</b> <b>DEPARTMENT OF TRANSPORTATION</b>	<b>PERFORATED PIPE UNDERDRAIN DETAIL</b>			<b>APPROVED</b>  <b>10/10/06</b>
	<b>STANDARD NO.</b> <b>D-9 (2006)</b>	<b>SHT.</b> <b>1</b>	<b>OF</b> <b>1</b>	<b>RECOMMENDED</b>  <b>10/13/06</b>



**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 (2007) **SHT.** 1 **OF** 1

**APPROVED**

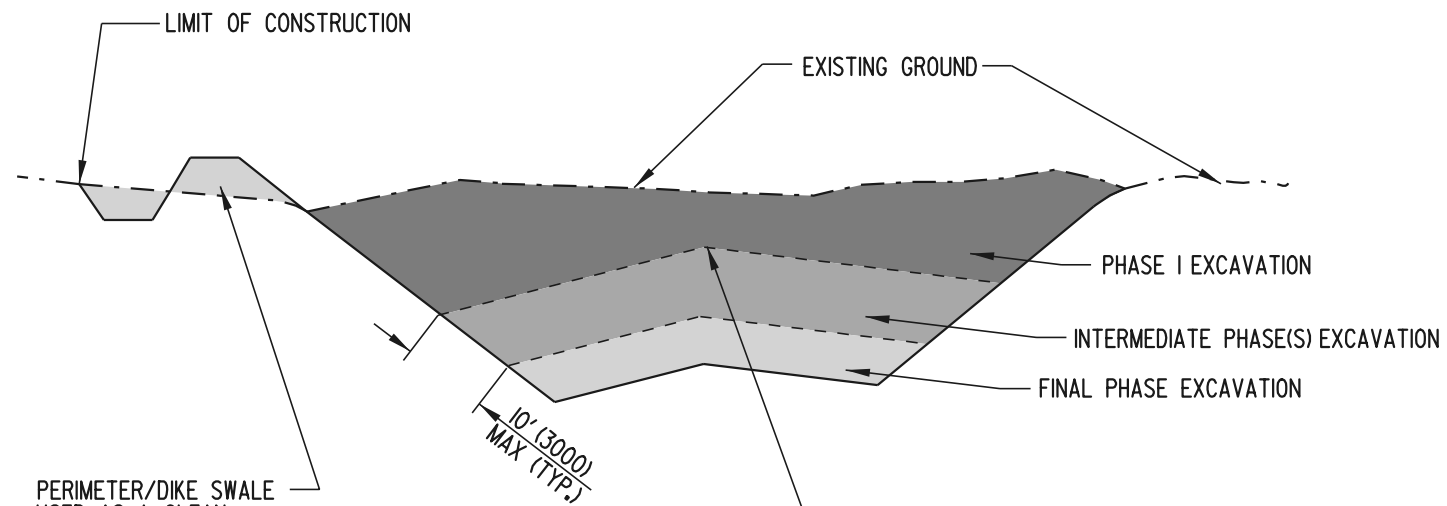
*[Signature]*  
CHIEF ENGINEER

10/24/07  
DATE

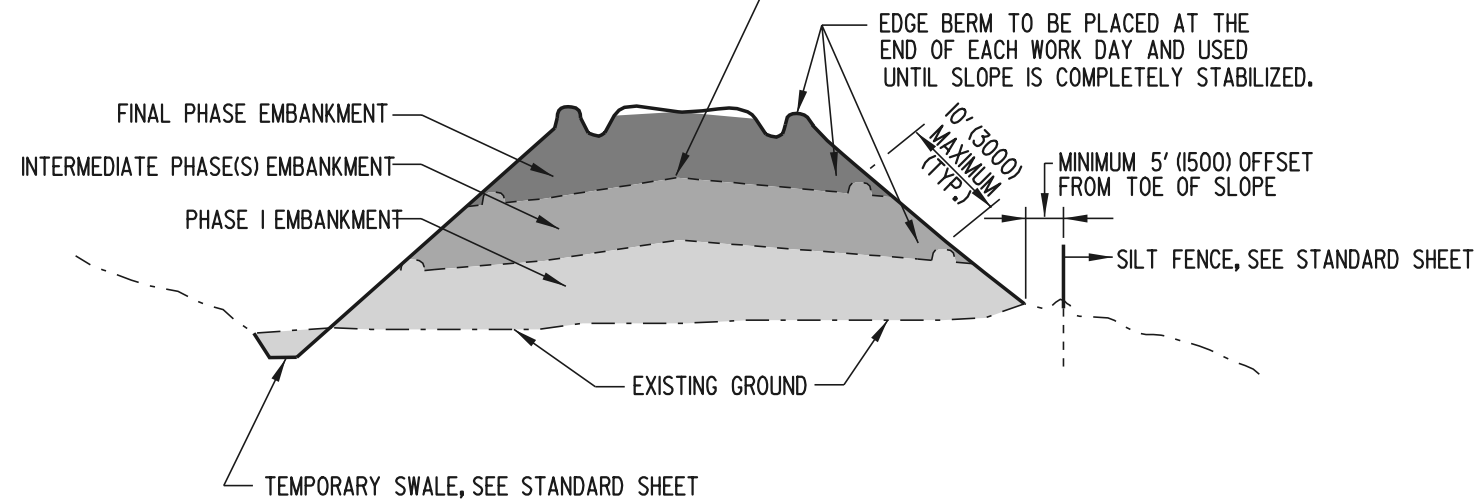
**RECOMMENDED**

*[Signature]*  
DESIGN ENGINEER

10/23/07  
DATE



**CUT SECTION**



**FILL SECTION**

- NOTES:**
- 1.) EDGE BERMS AND TEMPORARY SLOPE DRAINS SHALL BE CONSTRUCTED ALONG THE TOP OF ALL SLOPES TO INTERCEPT RUNOFF AND CONVEY IT DOWN THE SLOPE FACES WITHOUT CREATING GULLIES OR WASHOUTS.
  - 2.) SLOPE FACES SHALL BE TRACKED WITH CLEATED EQUIPMENT SUCH THAT THE CLEAT MARKS ARE ORIENTED HORIZONTALLY.
  - 3.) ALL CUT AND FILL SLOPES OF THE HIGHWAY EMBANKMENT SHALL BE PERMANENTLY STABILIZED AS THE WORK PROGRESSES IN INCREMENTS NOT TO EXCEED 10' (3000) MEASURED ALONG THE SLOPE.
  - 4.) CROSS SLOPES SHALL BE 2% MINIMUM, 6% MAXIMUM.



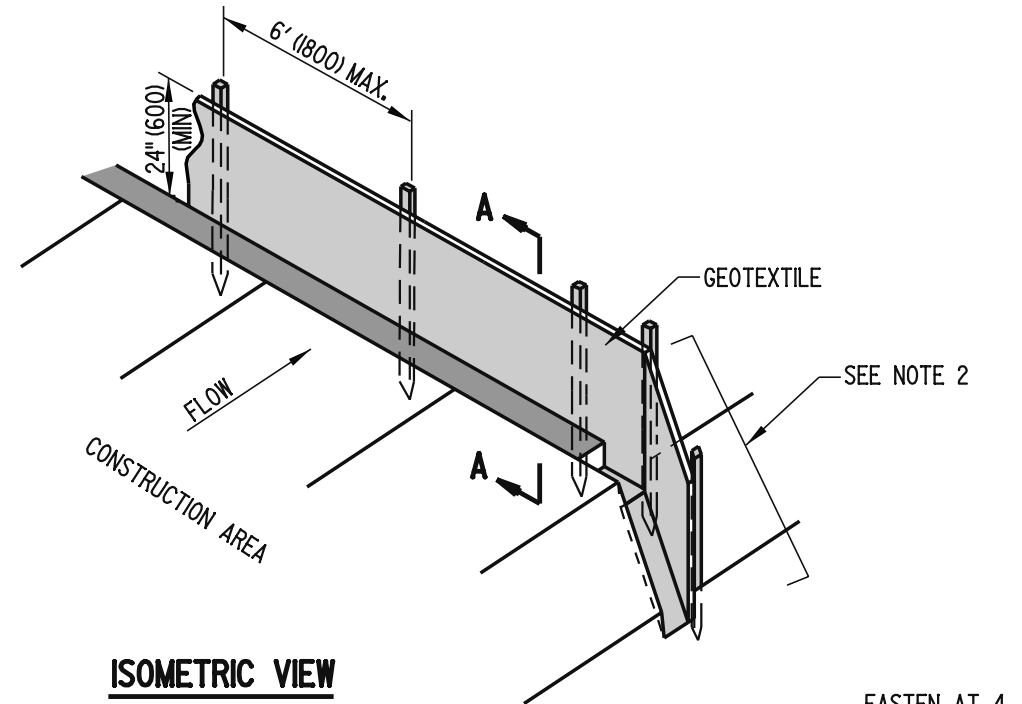
**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**INCREMENTAL STABILIZATION**

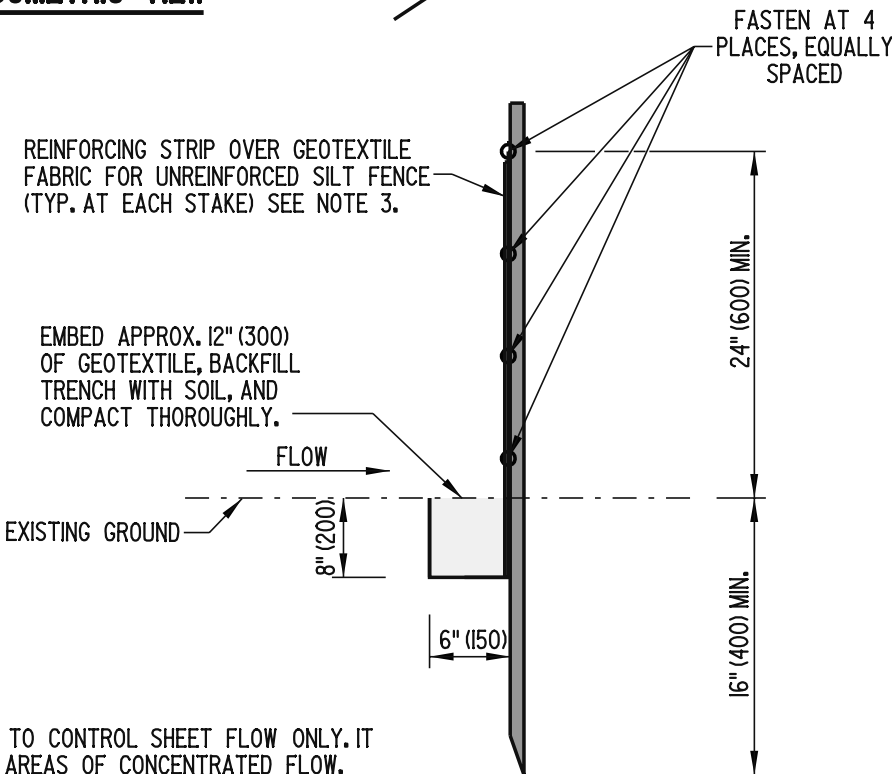
STANDARD NO. **E-1 (2001)** SHT. **1** OF **1**

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

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



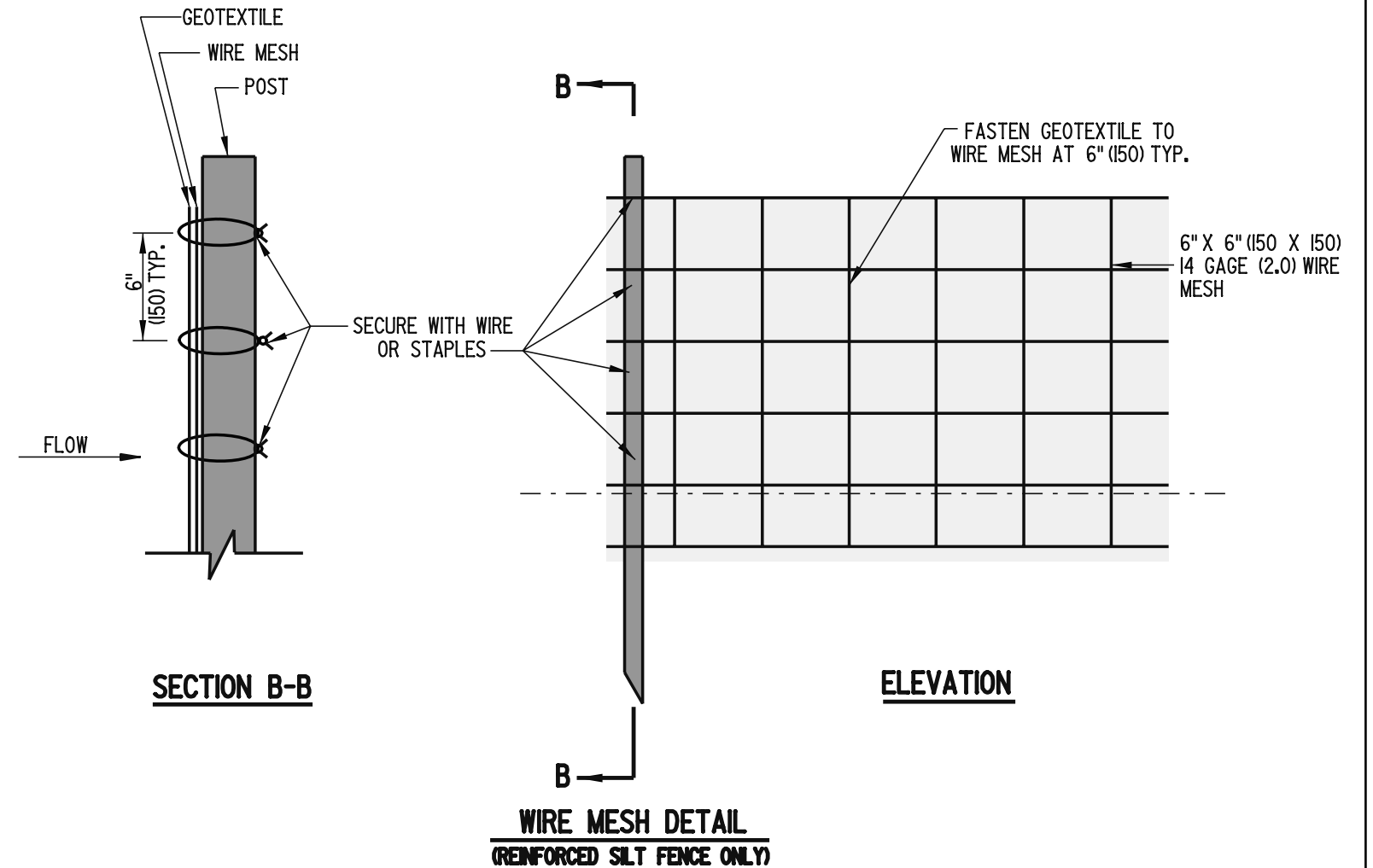
**ISOMETRIC VIEW**



**SECTION A-A**

**NOTES:**

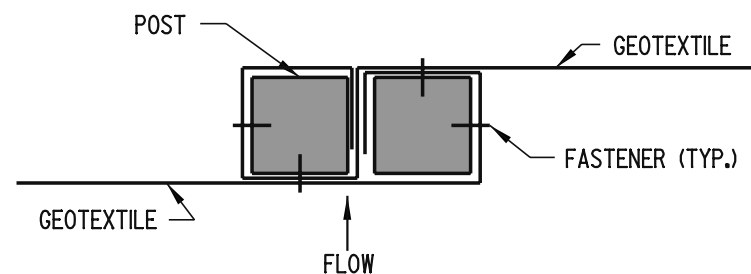
- 1). THIS DEVICE IS INTENDED TO CONTROL SHEET FLOW ONLY. IT SHALL NOT BE USED IN AREAS OF CONCENTRATED FLOW.
- 2). SILT FENCE ENDS SHALL BE TURNED UPSLOPE TO CONTAIN RUNOFF.
- 3). REINFORCING STRIP IS TO BE ONE COMPLETE STRIP COVERING ALL GEOTEXTILE FABRIC AT POST.



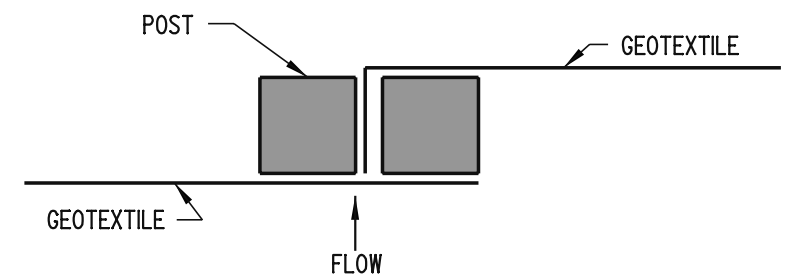
**SECTION B-B**

**ELEVATION**

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



**UNREINFORCED SILT FENCE  
CONNECTION DETAIL**



**REINFORCED SILT FENCE  
CONNECTION DETAIL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**SILT FENCE**  
STANDARD NO. E-2 (2006)

SHT. 1 OF 1

APPROVED

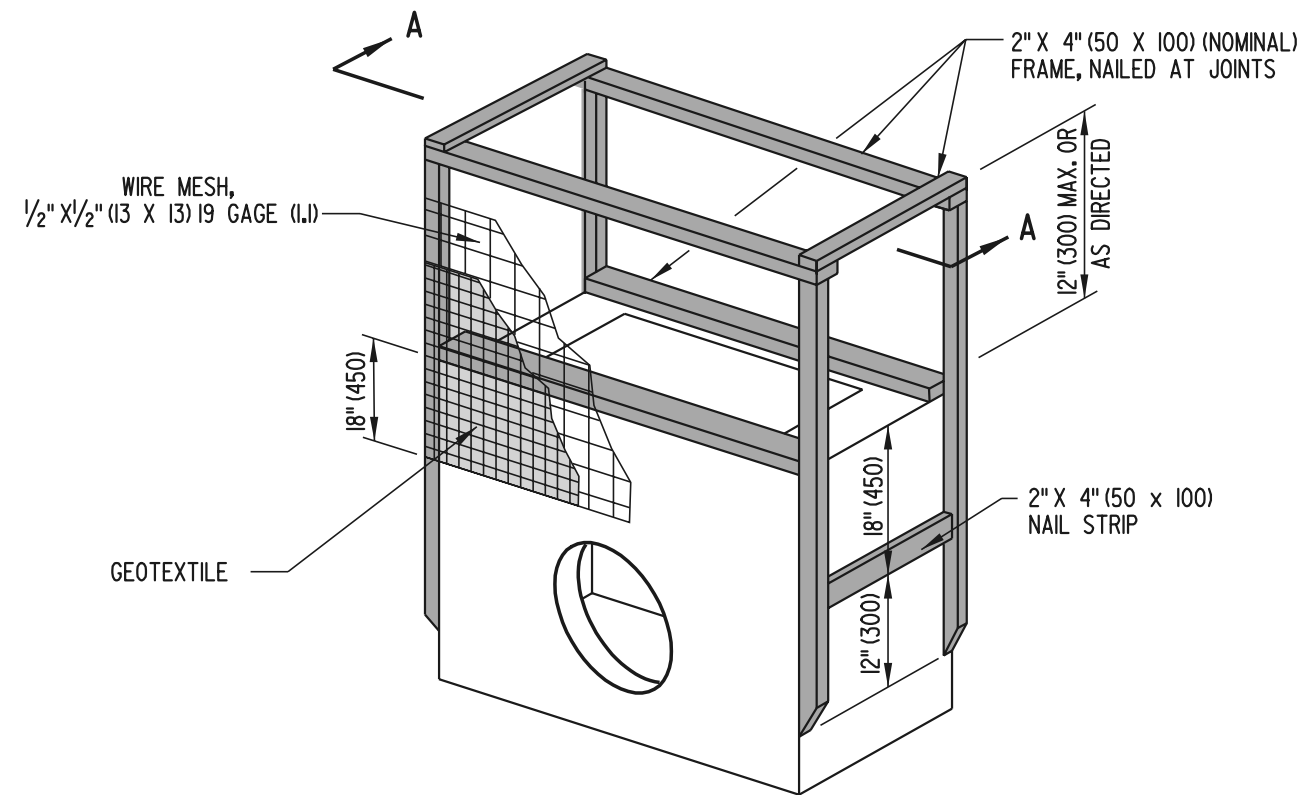
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

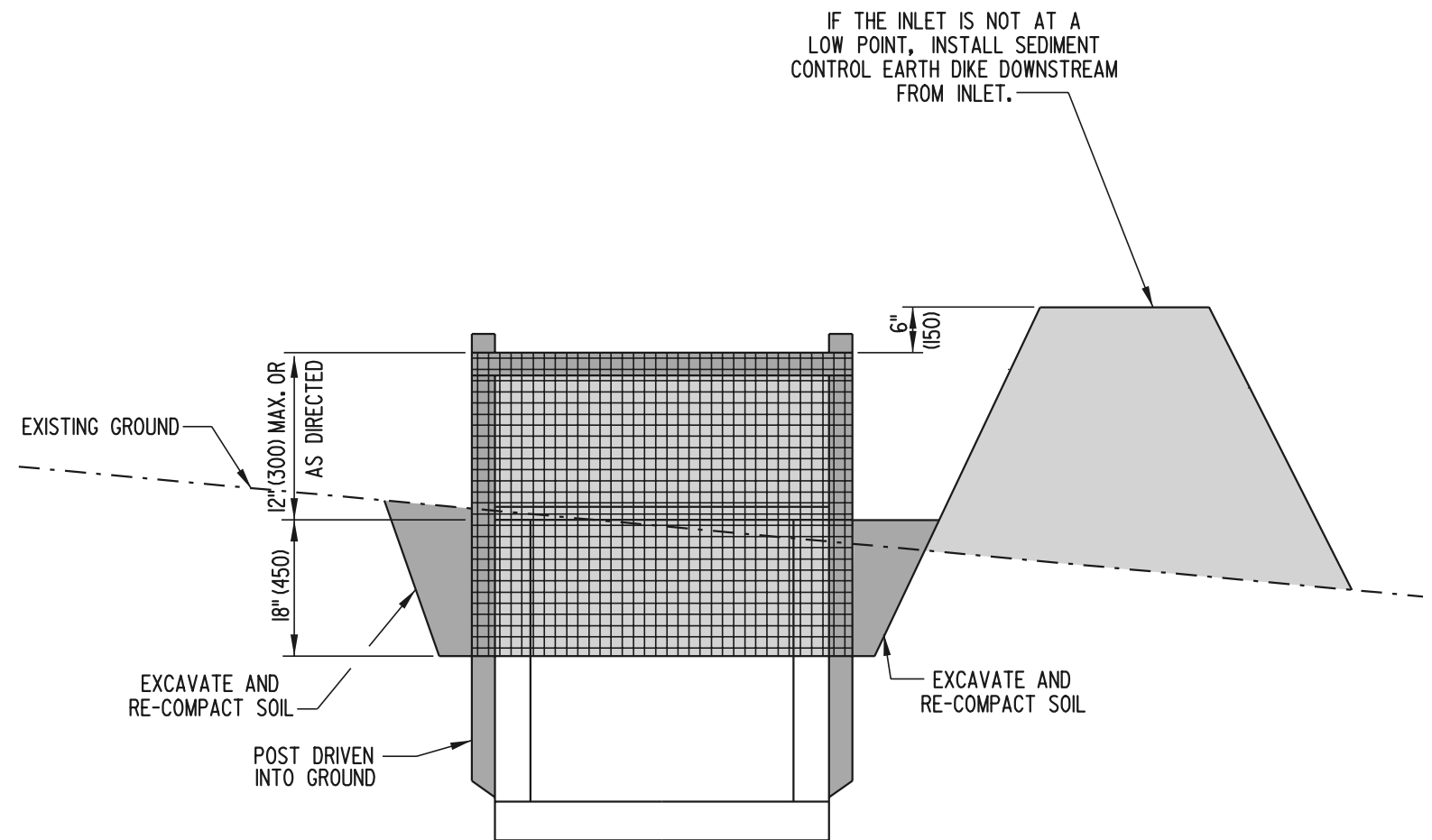
RECOMMENDED

*Don Smith*  
DESIGN ENGINEER

10/13/06  
DATE



**ISOMETRIC VIEW**



**SECTION A-A**

**NOTE:** IF THE INLET IS NOT IN A LOW POINT, CONSTRUCT A SEDIMENT CONTROL EARTH DIKE IN THE DITCHLINE DOWNSTREAM FROM IT. SEE STANDARD SHEET FOR ADDITIONAL INFORMATION.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**DRAINAGE INLET SEDIMENT CONTROL**

**STANDARD NO.**

**E-3 (2001)**

**SHT.**

**1**

**OF**

**1**

**APPROVED**

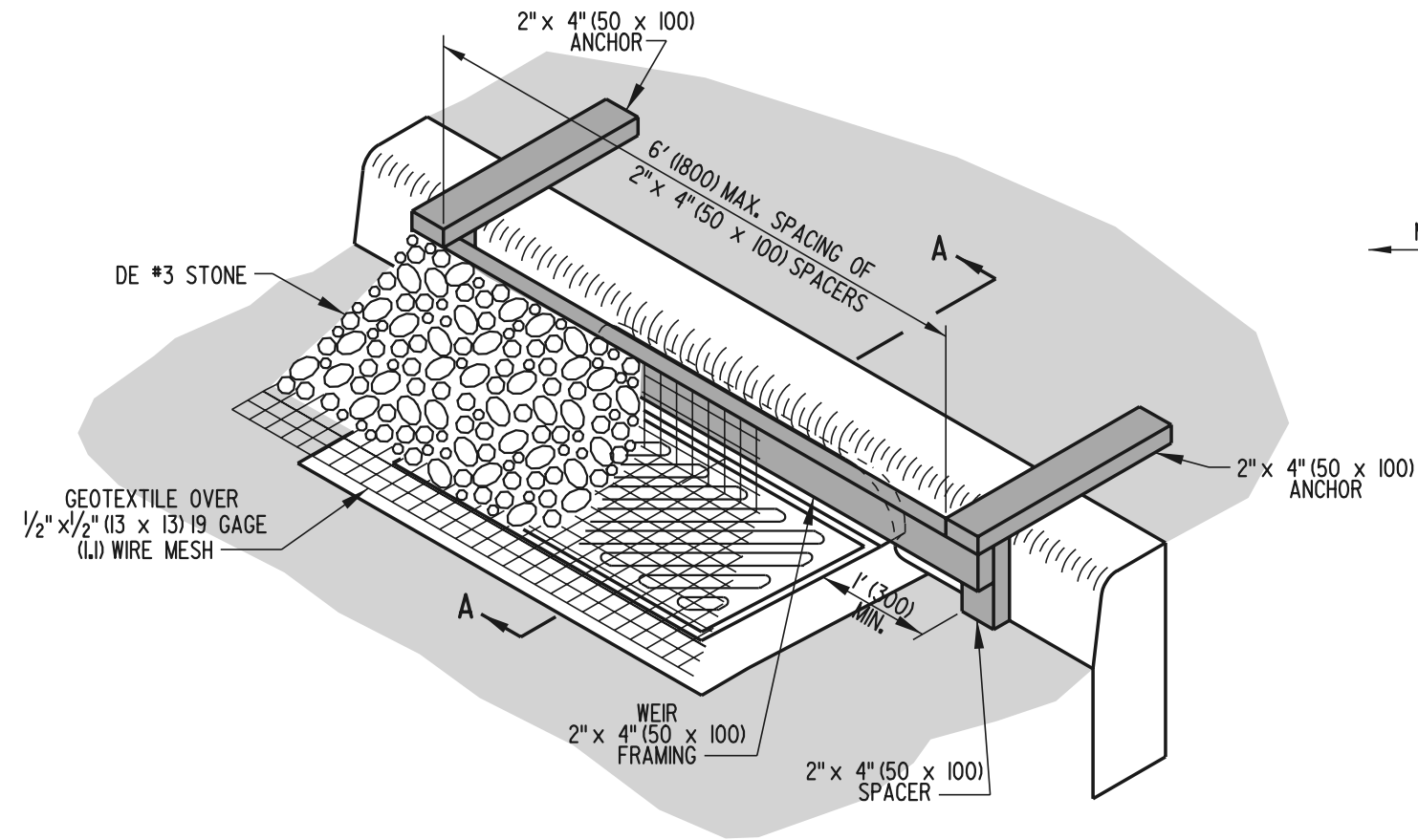
*Ryan M. Harkness*  
CHIEF ENGINEER

**DATE** 6/18/01

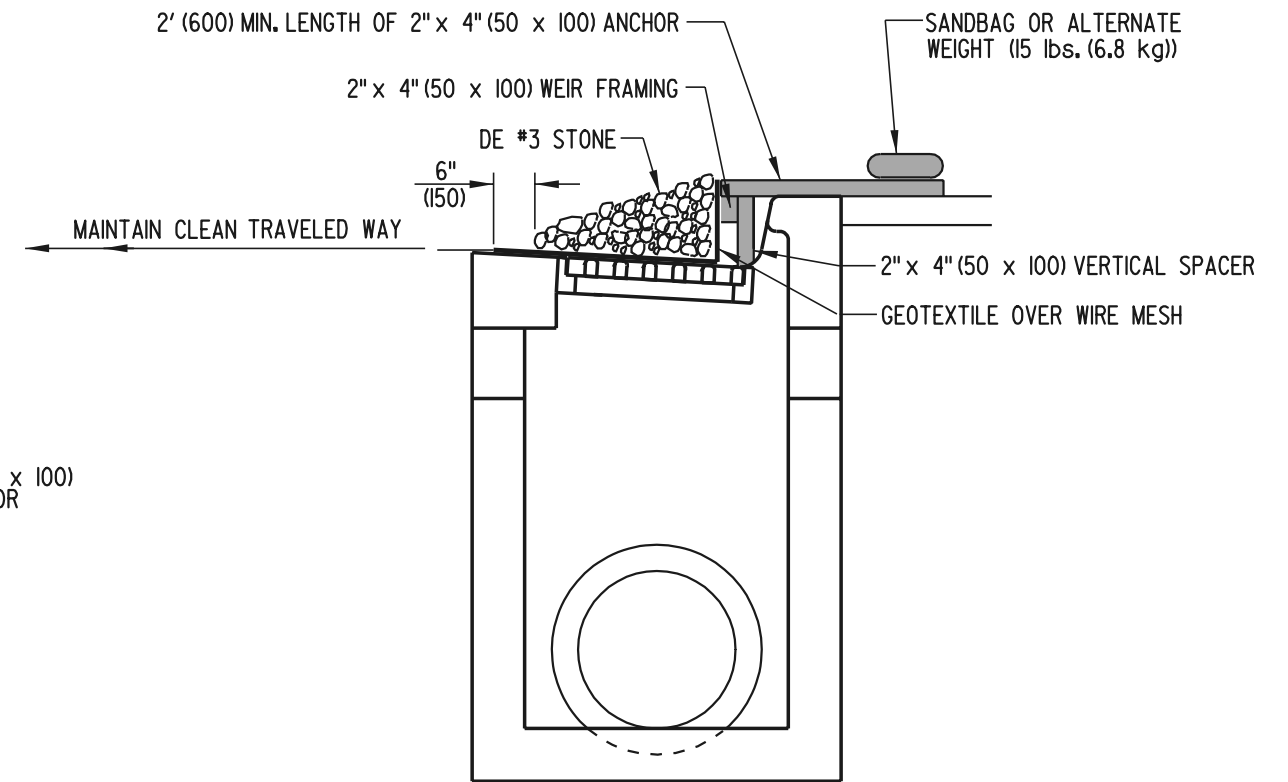
**RECOMMENDED**

*Michael P. Gotsch*  
DESIGN ENGINEER

**DATE** 6/18/01



**ISOMETRIC VIEW**



**SECTION A-A**

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

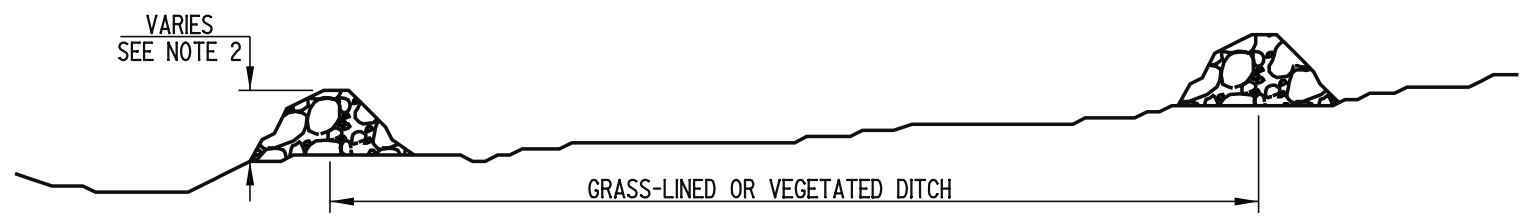
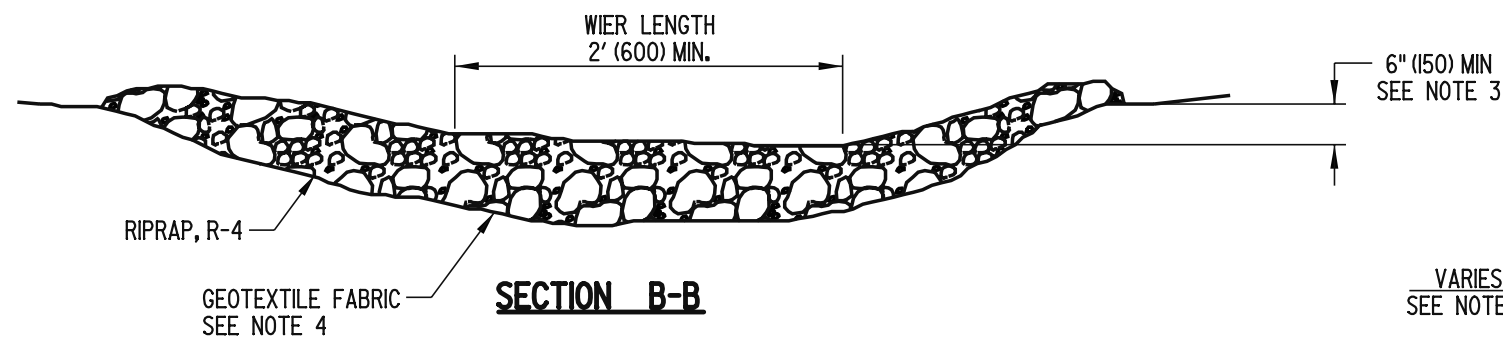
**CURB INLET SEDIMENT CONTROL**

**STANDARD NO. E-4 (2001)**

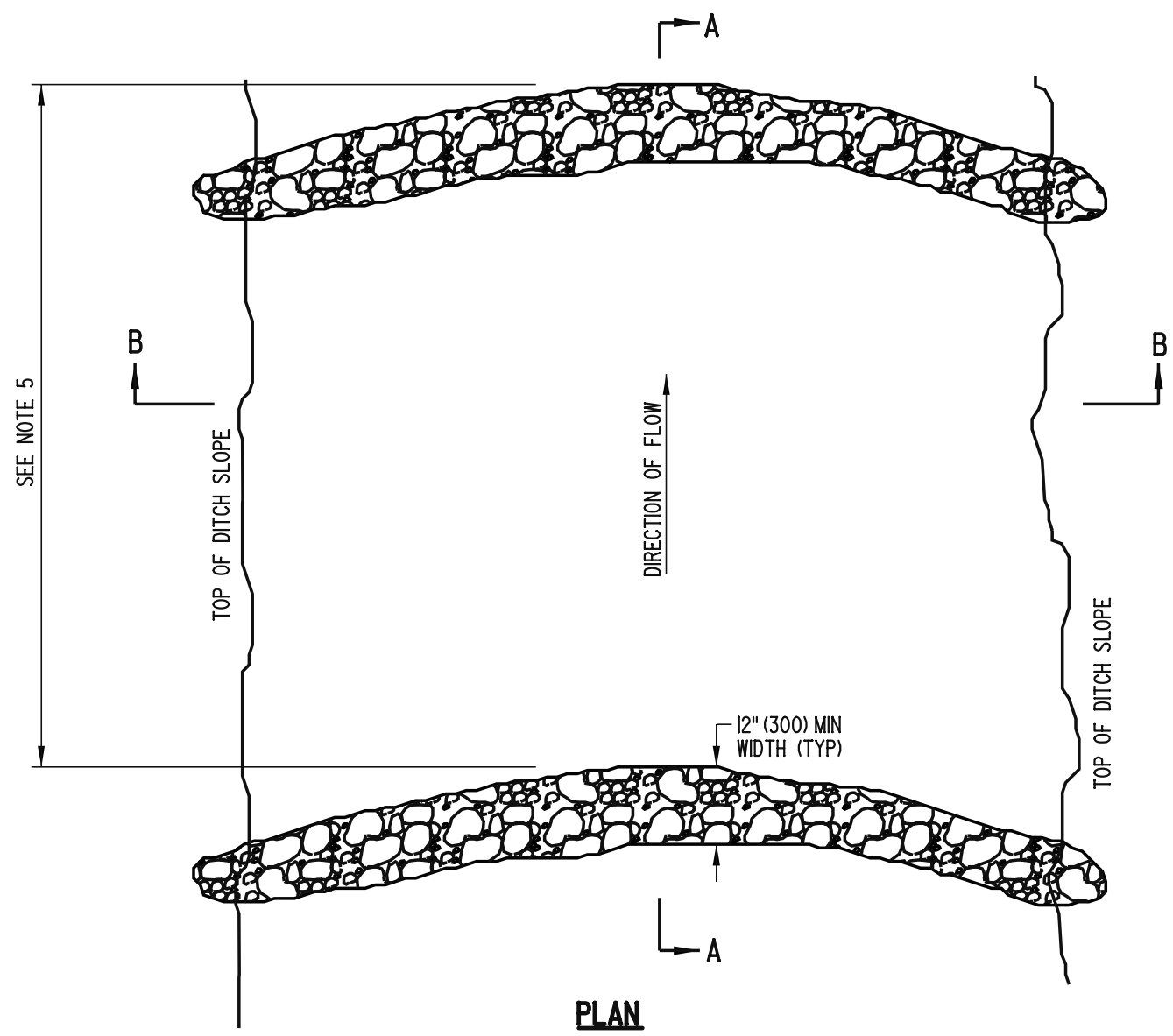
**SHT. 1 OF 1**

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

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



**SECTION A-A**



**PLAN**

**NOTES:**

- 1). FOR DITCHES LESS THAN 30" (750) IN DEPTH, PLACE DAM AS DIRECTED BY THE ENGINEER.
- 2). THE CHECK DAM HEIGHT MUST NOT EXCEED 2' (600) AT THE CENTER OF THE WEIR.
- 3). THE CHECK DAM IS TO BE CONSTRUCTED SO THAT THE CENTER IS 6" (150) MIN. LOWER THAN THE OUTER EDGES, FORMING A WEIR THAT WATER CAN FLOW ACROSS.
- 4). GEOTEXTILE FABRIC IS TO BE INSTALLED UNDERNEATH RIPRAP ON PERMANENT CHECK DAMS ONLY.
- 5). THE MAXIMUM SPACING BETWEEN DAMS SHALL BE THE DISTANCE IN THE DITCH WHERE THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM AT THE CENTER OF THE WEIR.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**STONE CHECK DAM**

STANDARD NO. E-5 (2006)

SHT. 1 OF 1

APPROVED

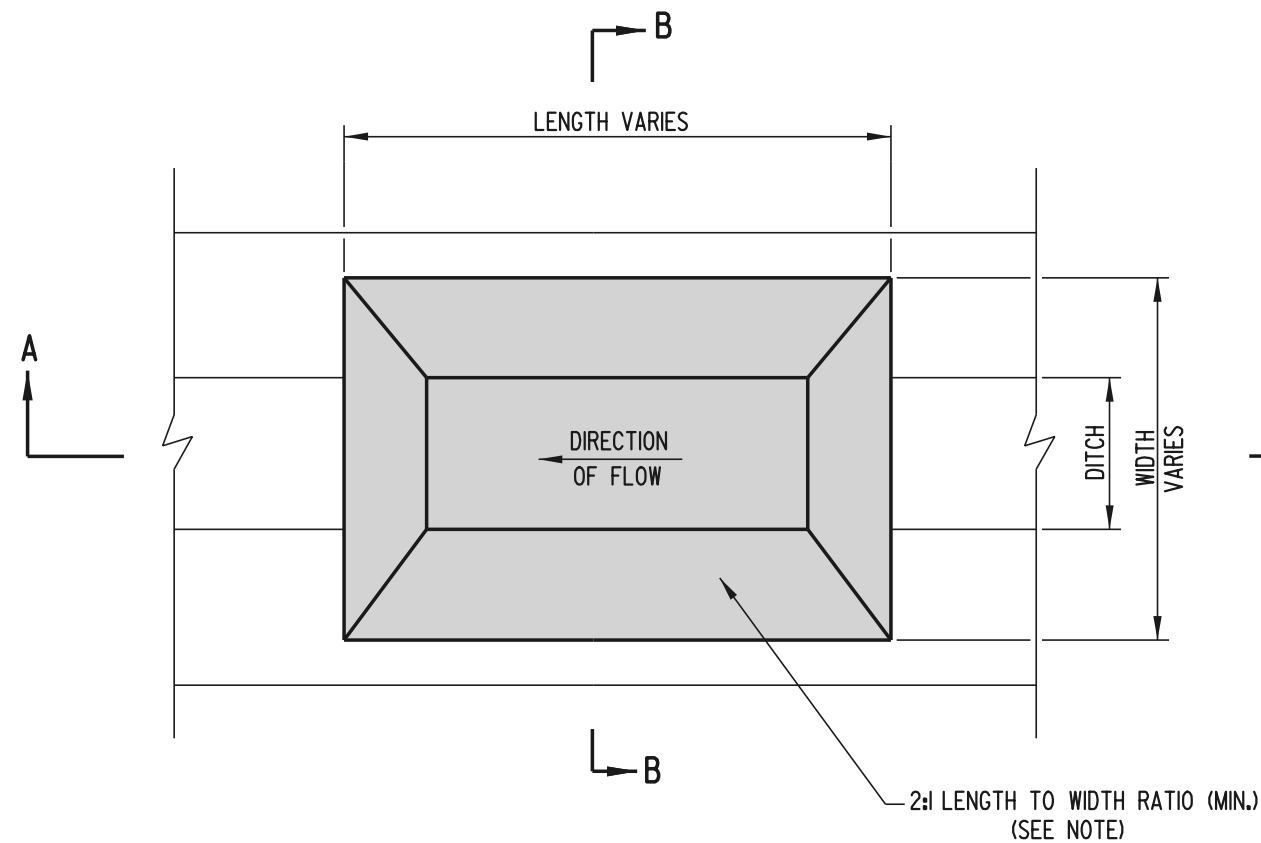
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

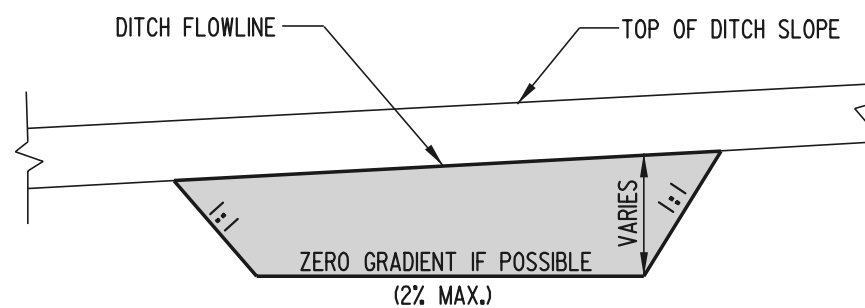
RECOMMENDED

*Dan Smith*  
DESIGN ENGINEER

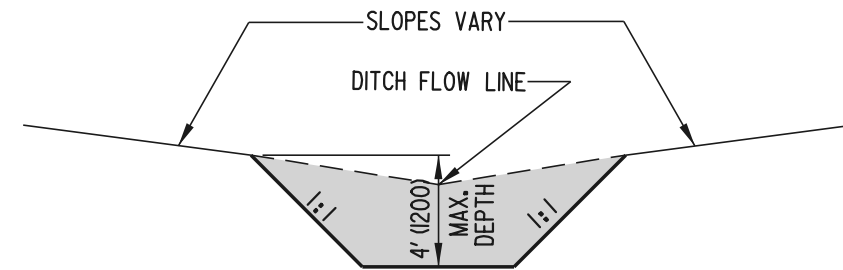
10/13/06  
DATE



**PLAN**



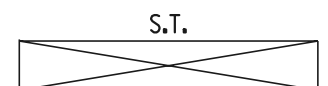
**SECTION A-A**



**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 (6 HECTARES), AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.
  - 2). SIDE SLOPES SHALL BE STABILIZED WITH "TEMPORARY GRASS SEEDING, DRY GROUND" AND STRAW MULCH.
  - 3). AN OUTLET STRUCTURE IS REQUIRED. STONE CHECK DAMS, PERFORATED RISER PIPES, SKIMMER DEWATERING DEVICES, OR DRAINAGE INLETS MAY BE USED. SEE APPROPRIATE STANDARD SHEET FOR ADDITIONAL INFORMATION.
  - 4). FOR SIZE, LOCATION, ETC. OF SEDIMENT TRAP, SEE CONSTRUCTION PHASING, M.O.T., AND EROSION CONTROL PLANS.
  - 5). ALL FILL SLOPES SHALL BE 2:1.
  - 6). A 2:1 LENGTH TO WIDTH RATIO SHOULD BE ACHIEVED WHERE POSSIBLE. IF THIS IS NOT POSSIBLE, THE USE OF BAFFLES OR OTHER SPECIAL DESIGNS SHOULD BE INCORPORATED TO INCREASE FLOW TIME.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**SEDIMENT TRAP**

**STANDARD NO.**

**E-6 (2001)**

**SHT.**

**1**

**OF**

**1**

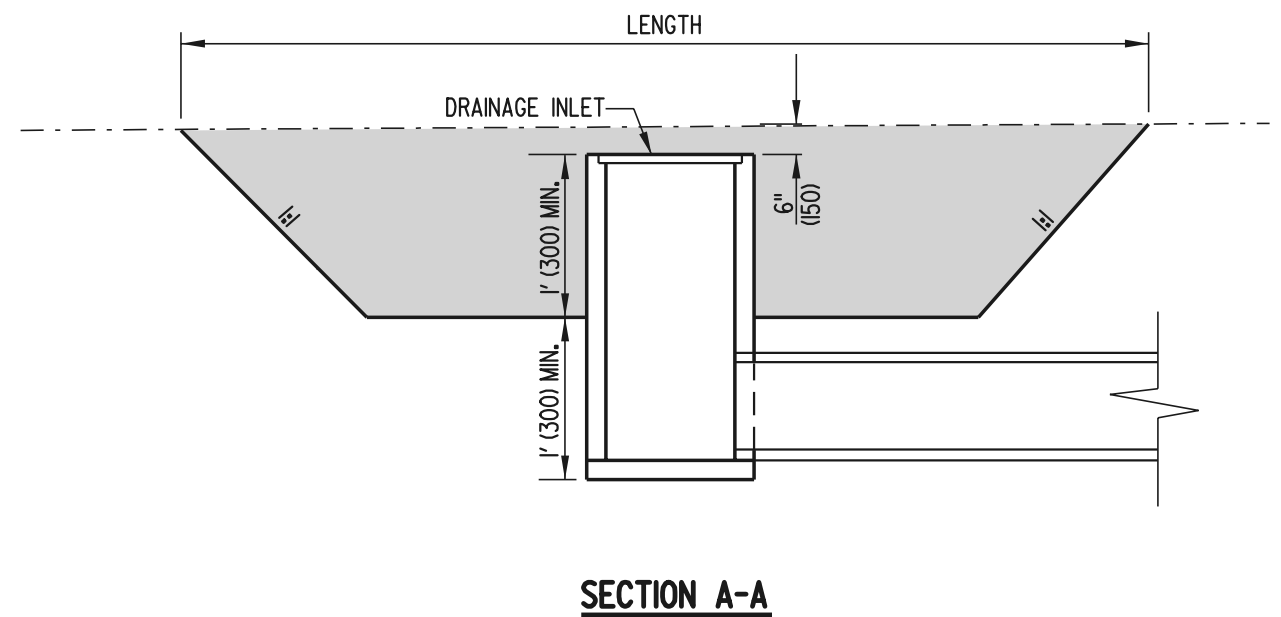
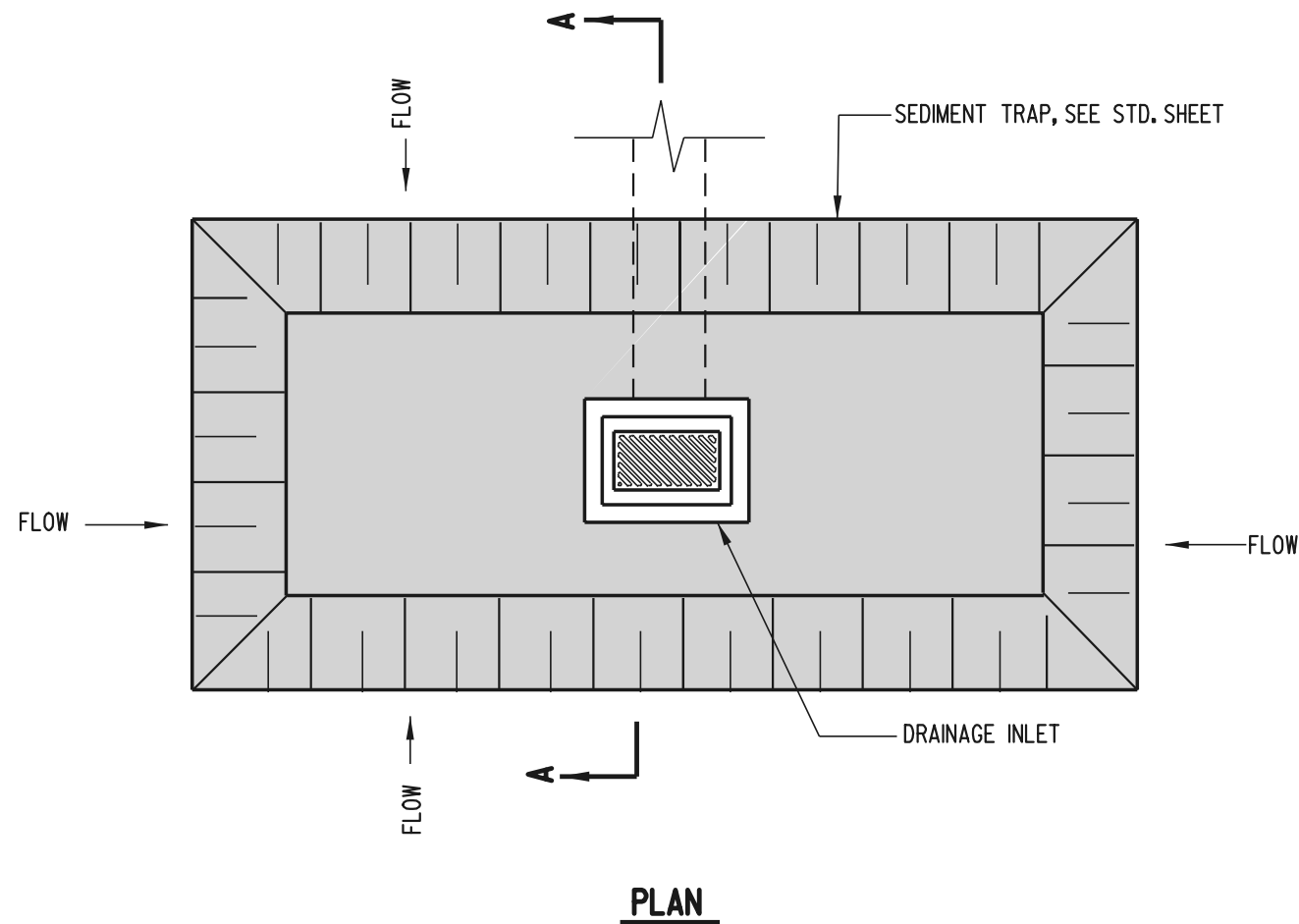
**APPROVED**

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

**RECOMMENDED**

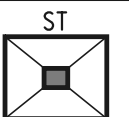
*Michael P. Gotsch* **6/18/01**  
DESIGN ENGINEER DATE





- NOTES:**
- 1). THE WORK SHALL CONSIST OF THE CONSTRUCTION OF A SEDIMENT TRAP AROUND A DRAINAGE INLET TO ALLOW SEDIMENTATION TO OCCUR BEFORE RUNOFF ENTERS THE DRAINAGE INLET.
  - 2). DRAINAGE INLET SEDIMENT TRAPS SHALL BE LIMITED TO A THREE (3) ACRE (1.2 HECTARE) MAXIMUM DRAINAGE AREA.
  - 3). THE DIMENSIONS OF THE DRAINAGE INLET SEDIMENT TRAP ARE TO BE AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

**PLAN SYMBOL**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

SEDIMENT TRAP, USING DRAINAGE INLET AS OUTLET

STANDARD NO. E-7 (2001)

SHT. 1 OF 1

APPROVED

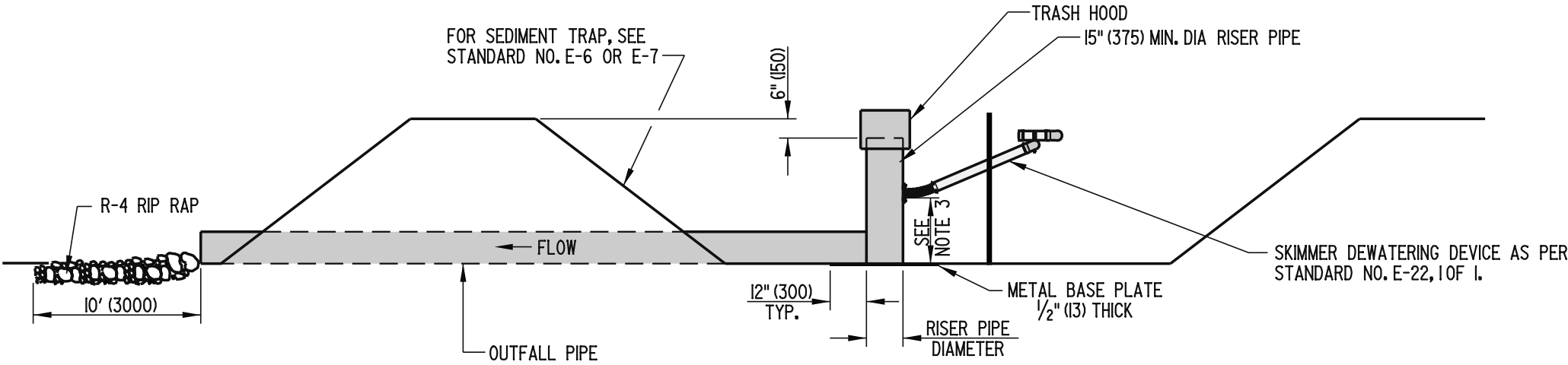
*Ryan M. Harkness*  
CHIEF ENGINEER  
DATE 6/18/01

RECOMMENDED

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

MIN. * OUTFALL PIPE DIA.	MIN. RISER DIA.	MAX. DRAINAGE AREA ACRES (ha)
12" (300)	15" (375)	1 (0.4)
15" (375)	18" (450)	2 (0.8)
18" (450)	21" (525)	3 (1.2)
21" (525)	24" (600)	4 (1.6)
24" (600)	27" (675)	5 (2.0)

\* OUTFALL PIPE DIAMETER MAY BE SAME SIZE AS RISER DIAMETER.



- NOTES:**
- 1). THIS DEVICE IS INTENDED TO BE USED AS AN OUTLET FOR SEDIMENT TRAPS.
  - 2). THE PIPE OUTLET SHOWN SHALL ONLY BE USED WITH SEDIMENT TRAPS WITH DRAINAGE AREAS OF 5 ACRES (2.0 HECTARES) OR LESS. LARGER DRAINAGE AREAS REQUIRE AN ENGINEERED DESIGN.
  - 3). THE HEIGHT OF THE SKIMMER DEWATERING DEVICE SHALL BE SPECIFIED BY THE ENGINEER IN THE FIELD.



DELAWARE  
DEPARTMENT OF TRANSPORTATION

RISER PIPE ASSEMBLY FOR SEDIMENT TRAP

STANDARD NO. E-8 (2006)

SHT. 1 OF 2

APPROVED

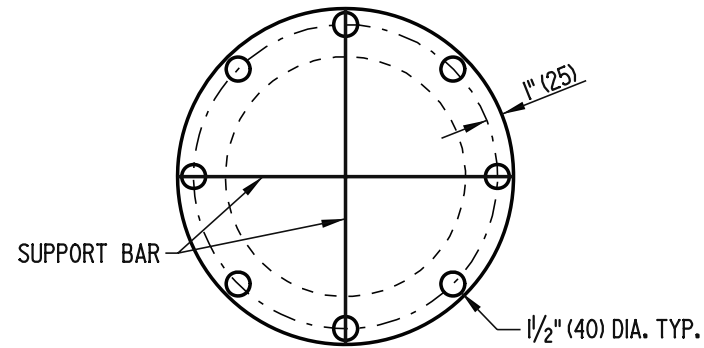
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

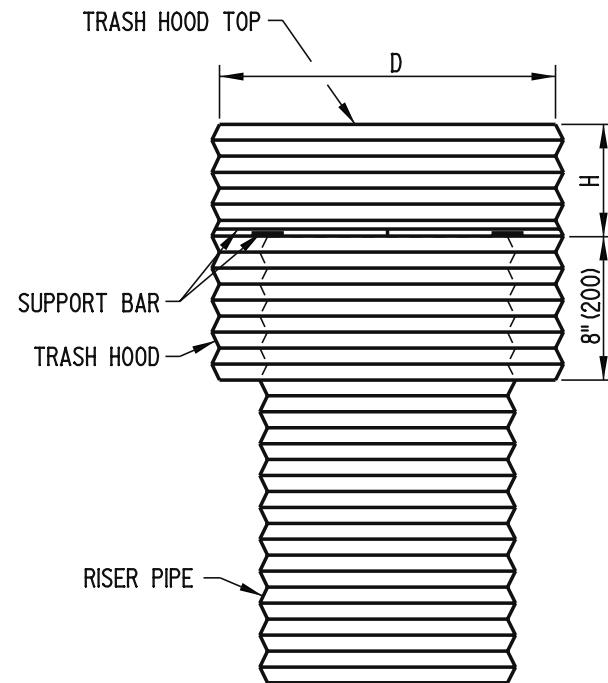
RECOMMENDED

*Dan Smith*  
DESIGN ENGINEER

10/13/06  
DATE

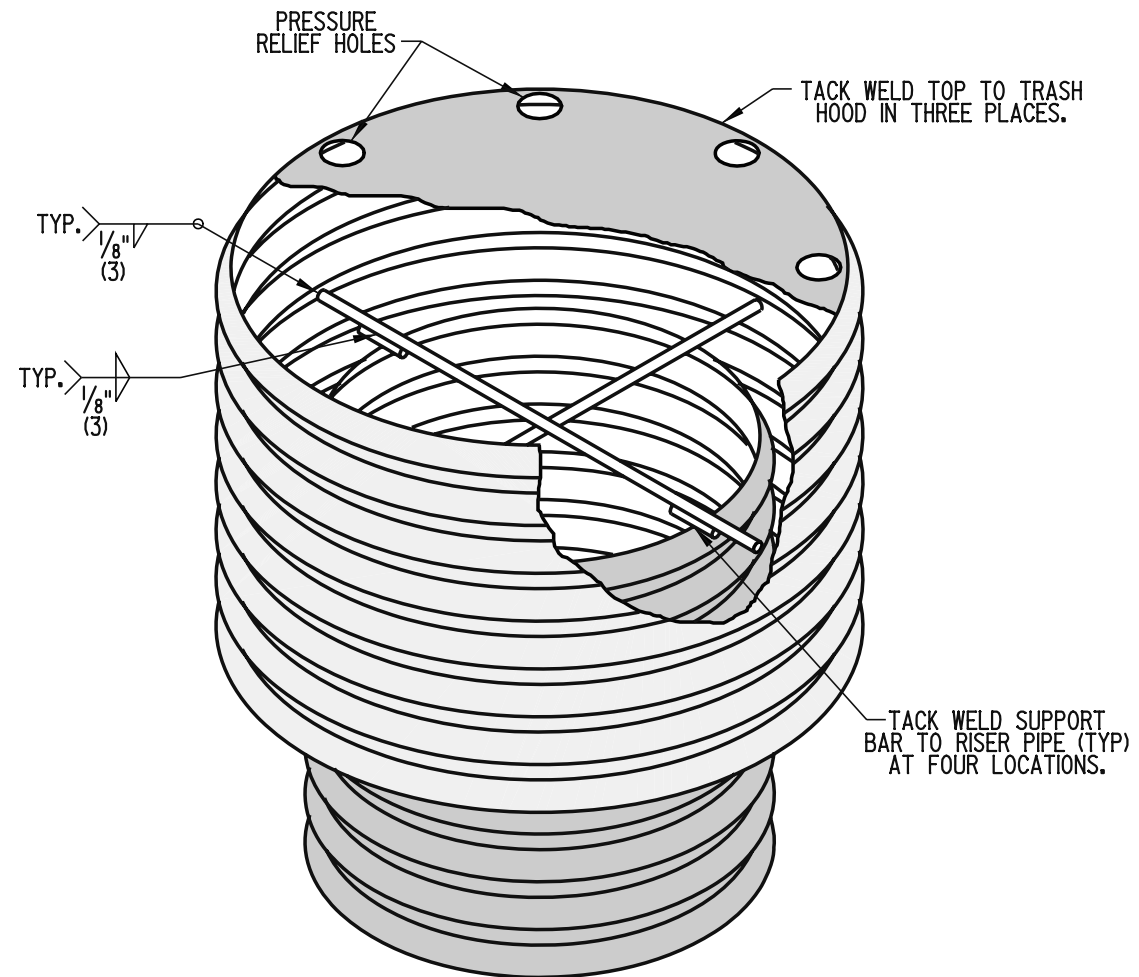


**PLAN**



**FRONT**

TRASH HOOD CHART					
RISER PIPE DIAMETER	D	H	TRASH HOOD THICK. (GAGE)	MINIMUM SIZE SUPPORT BAR	MINIMUM TOP THICK. (GAGE)
15" (375)	21" (525)	7" (175)	16 (1.6)	#6 (#19) REBAR	16 (1.6)
18" (450)	27" (675)	8" (200)	16 (1.6)	#6 (#19) REBAR	16 (1.6)
21" (525)	30" (750)	11" (275)	16 (1.6)	#6 (#19) REBAR	16 (1.6)
24" (600)	36" (900)	13" (330)	16 (1.6)	#6 (#19) REBAR	14 (2.0)
27" (675)	42" (1050)	15" (380)	16 (1.6)	#6 (#19) REBAR	14 (2.0)
36" (900)	54" (1350)	17" (430)	14 (2.0)	#8 (#25) REBAR	12 (2.7)



**ISOMETRIC VIEW**

**TRASH HOOD DETAILS**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

RISER PIPE ASSEMBLY FOR SEDIMENT TRAP

STANDARD NO. E-8 (2006)

SHT. 2 OF 2

APPROVED

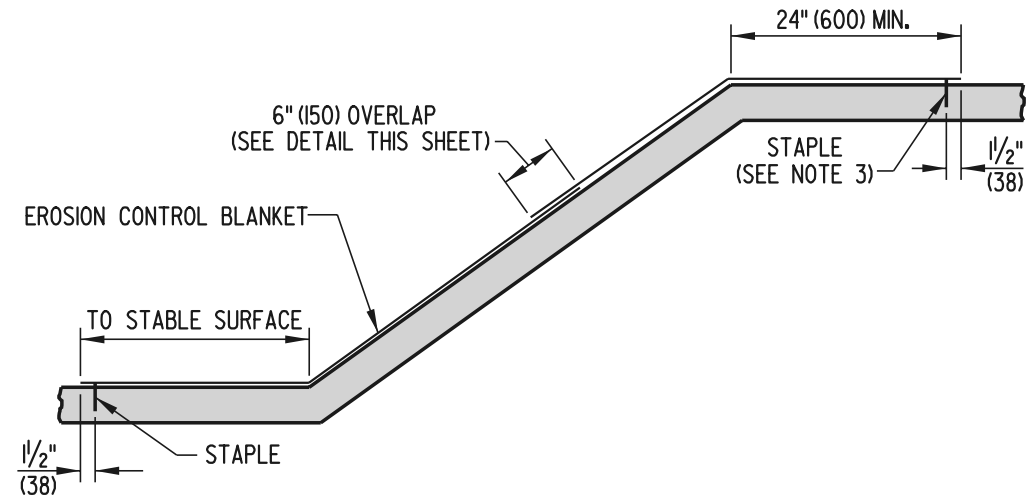
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

RECOMMENDED

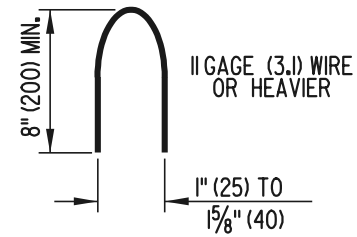
*Don Smith*  
DESIGN ENGINEER

10/13/06  
DATE

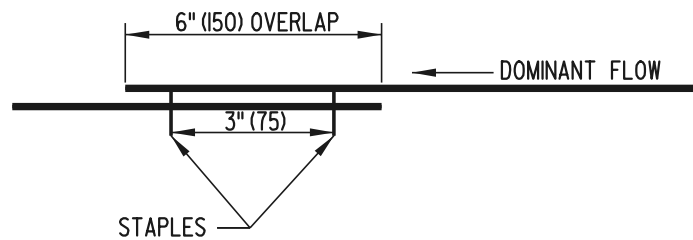


### STABILIZATION OF EMBANKMENTS

- NOTES:**
1. STAPLES TO BE STAGGERED AT 18" (450) SPACING.
  2. TOPSOIL UNDER EROSION CONTROL BLANKET IS TO BE TRACKED AND SEEDDED.
  3. WHEN OFFSITE RUNOFF OCCURS, ADDITIONAL MEASURES AS DIRECTED BY THE ENGINEER SHALL BE USED TO ENSURE STABILITY OF EMBANKMENT.

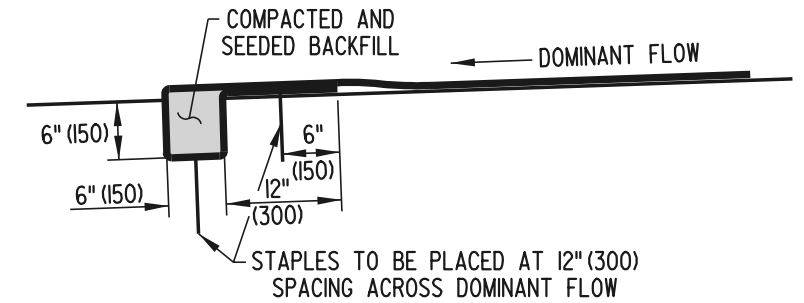


### STAPLE DETAIL



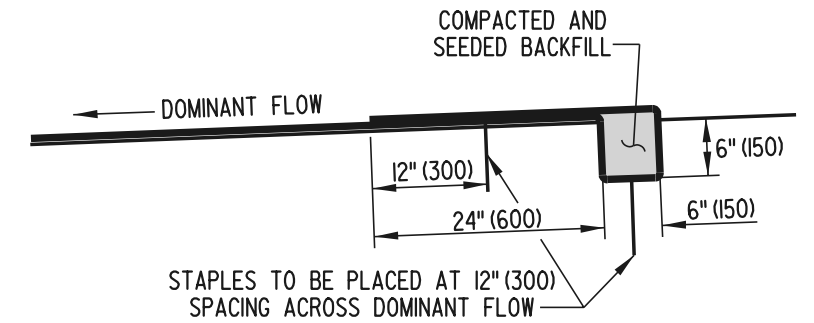
### OVERLAP DETAIL

STAPLES TO BE STAGGERED AT 6" (150) SPACING.



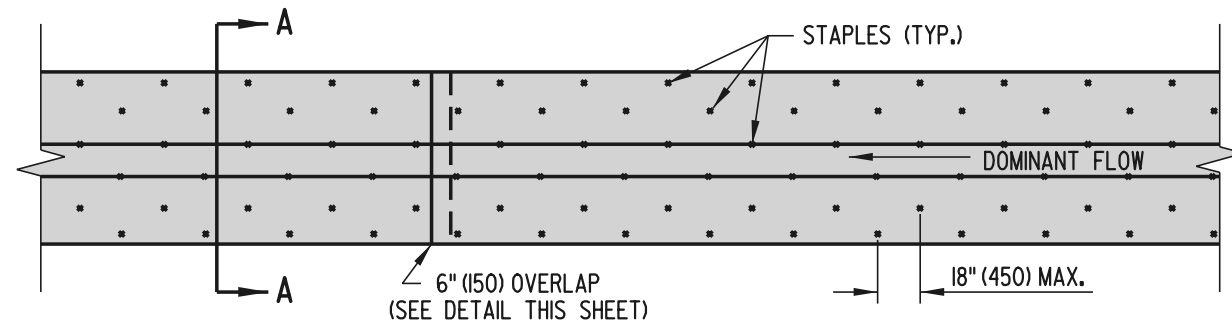
### INITIAL TRENCH ANCHOR DETAIL

APPLIED AT THE DOWNSTREAM END OF DITCH



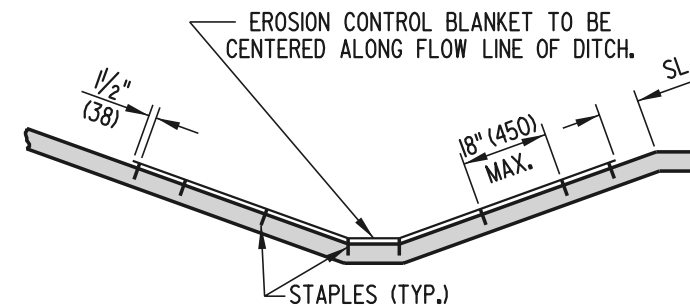
### TERMINAL TRENCH ANCHOR DETAIL

APPLIED AT THE UPSTREAM END OF DITCH



### STABILIZATION OF DITCHES PLAN

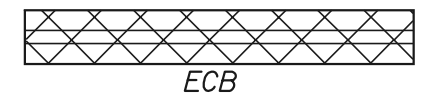
- NOTES:**
1. ADDITIONAL STAPLES NOT SHOWN ARE REQUIRED AT OVERLAPS. SEE OVERLAP DETAIL FOR STAPLE PLACEMENT.
  2. STAPLES ARE TO BE STAGGERED.
  3. TOPSOIL UNDER EROSION CONTROL BLANKET IS TO BE TRACKED AND SEEDDED.



### STABILIZATION OF DITCHES SECTION A-A

STAPLES ALONG LONGITUDINAL EDGES SHALL BE SPACED AS FOLLOWS:  
18" (450) WHEN SL ≤ 20' (6000)  
9" (225) WHEN SL > 20' (6000)

### PLAN SYMBOL

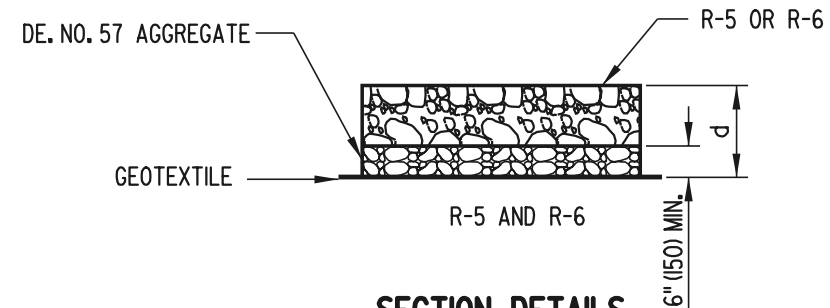
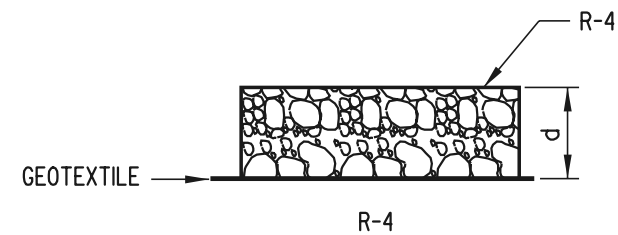
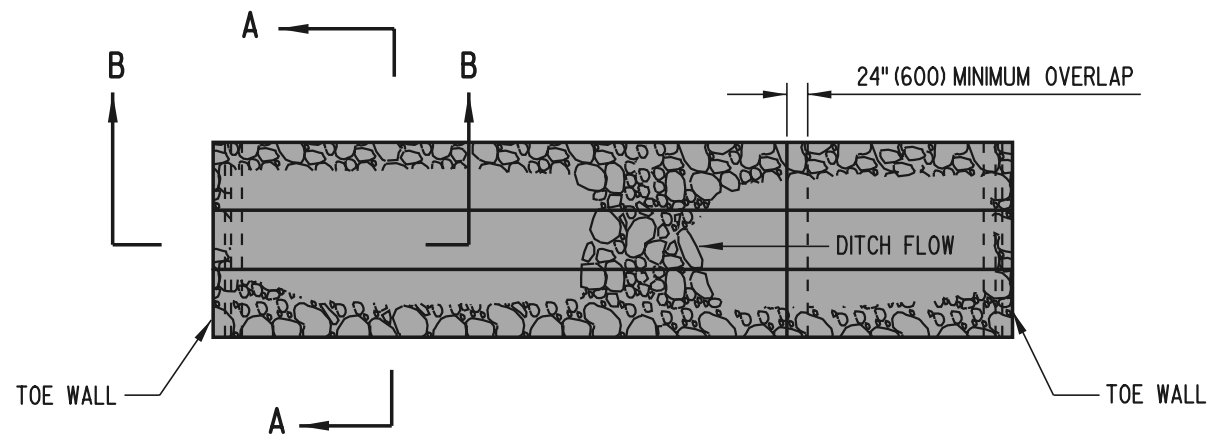
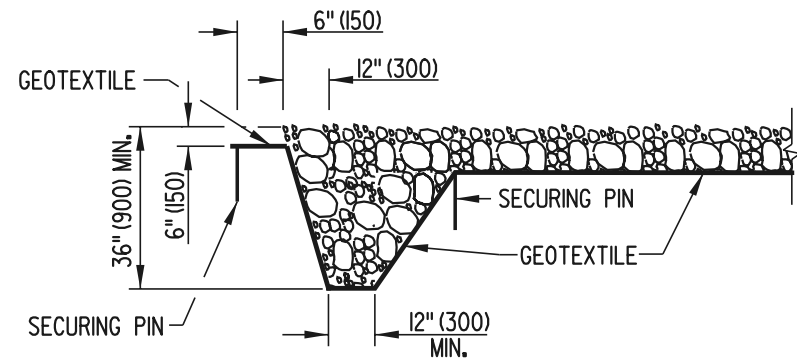
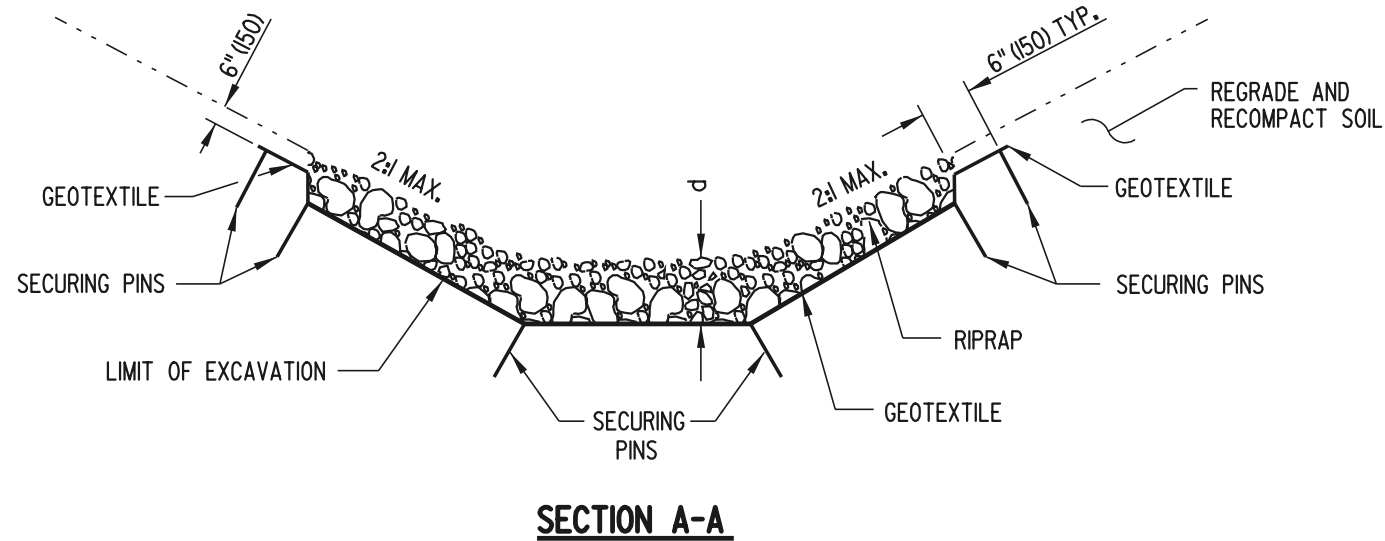


**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

### EROSION CONTROL BLANKET APPLICATIONS

STANDARD NO. E-9 (2001) SHT. 1 OF 1

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

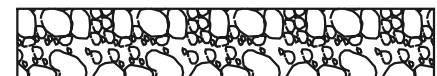


**CLASS RIPRAP**

- R-4 d = 14" (350) MIN.
- R-5 d = 26" (650) MIN.
- R-6 d = 34" (850) MIN.

- NOTES:**
- 1). SECURING PINS ARE TO BE PLACED AT LOCATIONS SHOWN AND AT 24" (600) LONGITUDINAL AND LATERAL SPACING.
  - 2). SEE PLANS FOR LOCATION, DIMENSIONS, GRADES, ETC.
  - 3). USE OF R-7 RIPRAP WILL REQUIRE A SEPARATE PROFESSIONAL ENGINEERING DESIGN FOR SIGHT SPECIFIC CONDITIONS.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**RIPRAP DITCH**

**STANDARD NO.**

**E-10 (2001)**

**SHT.**

**1**

**OF**

**1**

**APPROVED**

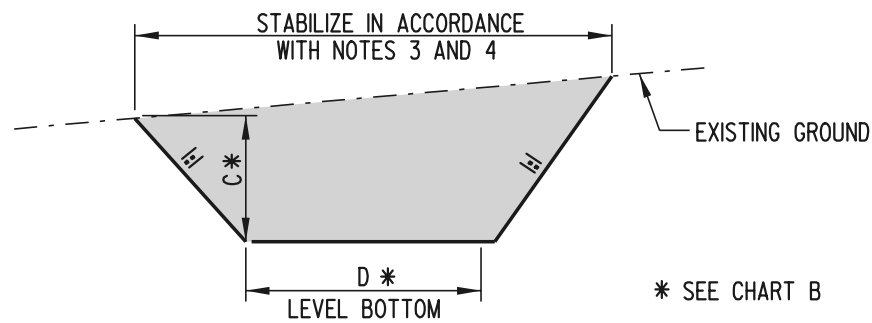
*Ryan M. Hershman*  
CHIEF ENGINEER

6/18/01  
DATE

**RECOMMENDED**

*Michael P. Gotsch*  
DESIGN ENGINEER

6/18/01  
DATE



SECTION A-A

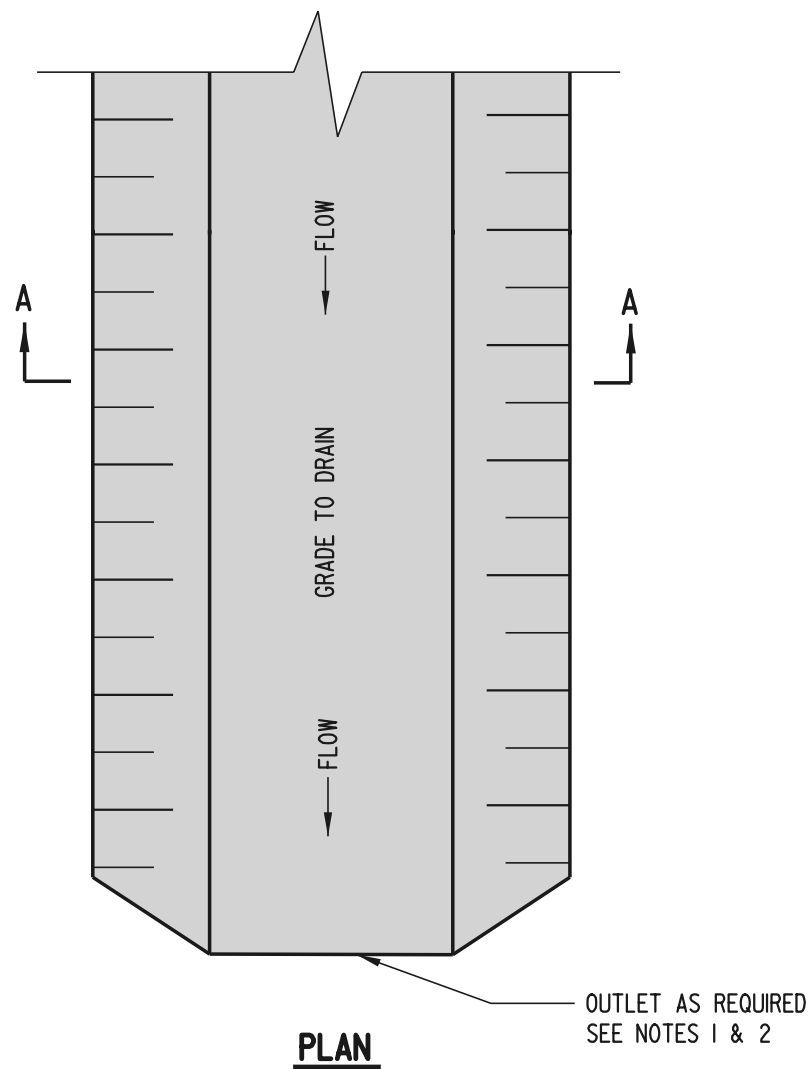


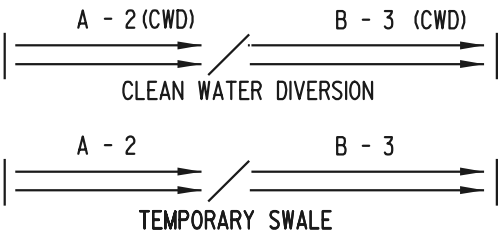
CHART A - STABILIZATION			
SYMBOL	SWALE GRADE	TYPE OF TREATMENT	
		DRAINAGE AREA A (5 AC (2 ha) OR LESS)	DRAINAGE AREA B (5 AC - 10 AC (2 ha - 4 ha))
1	0.5-2.0%	SEED USED WITH EROSION CONTROL BLANKET	SEED USED WITH EROSION CONTROL BL.
2	2.1-8.0%	R-4 RIRRAP	R-4 RIRRAP
3	8.1-20%	ENGINEERED DESIGN	ENGINEERED DESIGN

CHART B - SWALE DIMENSIONS		
SYMBOL	SWALE A	SWALE B
C	1' (300) MIN.	1' (300) MIN.
D	4' (1200) MIN.	6' (1800) MIN.

SEE SECTION A - A

- NOTES:**
- DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
  - DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
  - IF TEMPORARY SWALES OR CLEAN WATER DIVERSIONS ARE TO BE OPERATIONAL FOR MORE THAN 14 DAYS, THEY SHALL BE STABILIZED IN ACCORDANCE WITH CHART A PRIOR TO BECOMING OPERATIONAL.
  - IF TEMPORARY SWALES OR CLEAN WATER DIVERSIONS ARE TO BE OPERATIONAL FOR LESS THAN 14 DAYS, THEY SHALL BE STABILIZED WITH GEOTEXTILE IN ACCORDANCE WITH THE STANDARD DETAIL, "GEOTEXTILE-LINED CHANNEL DIVERSION".

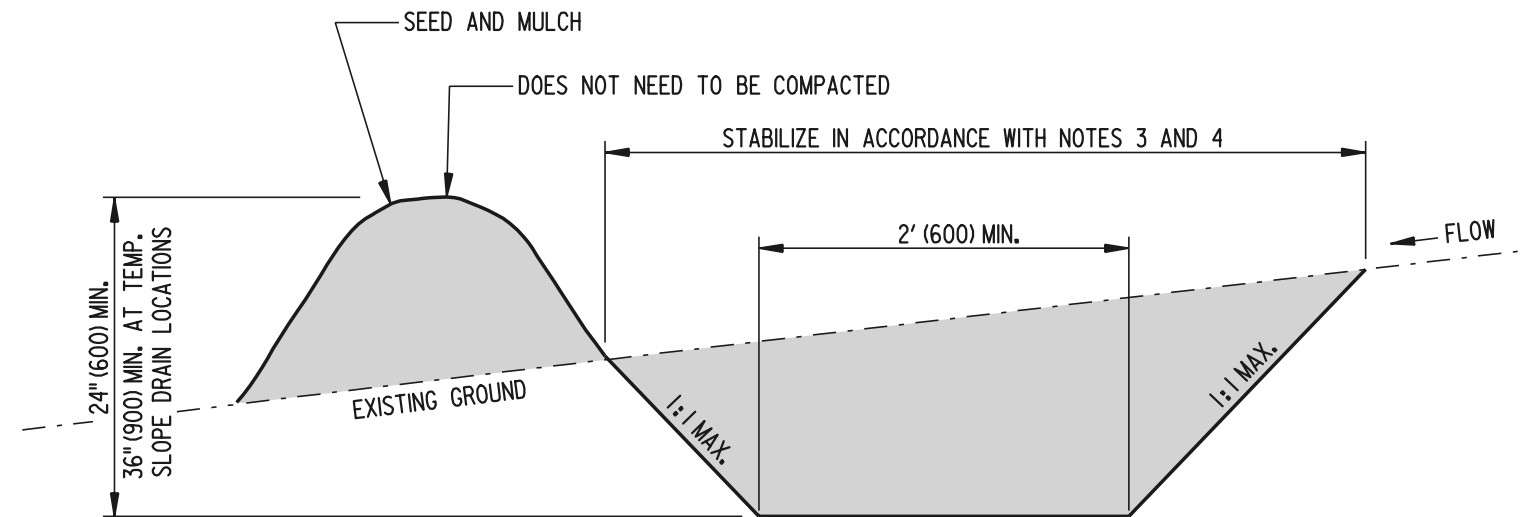
PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

TEMPORARY SWALE				
STANDARD NO.	E-11 (2001)	SHT.	1	OF 1

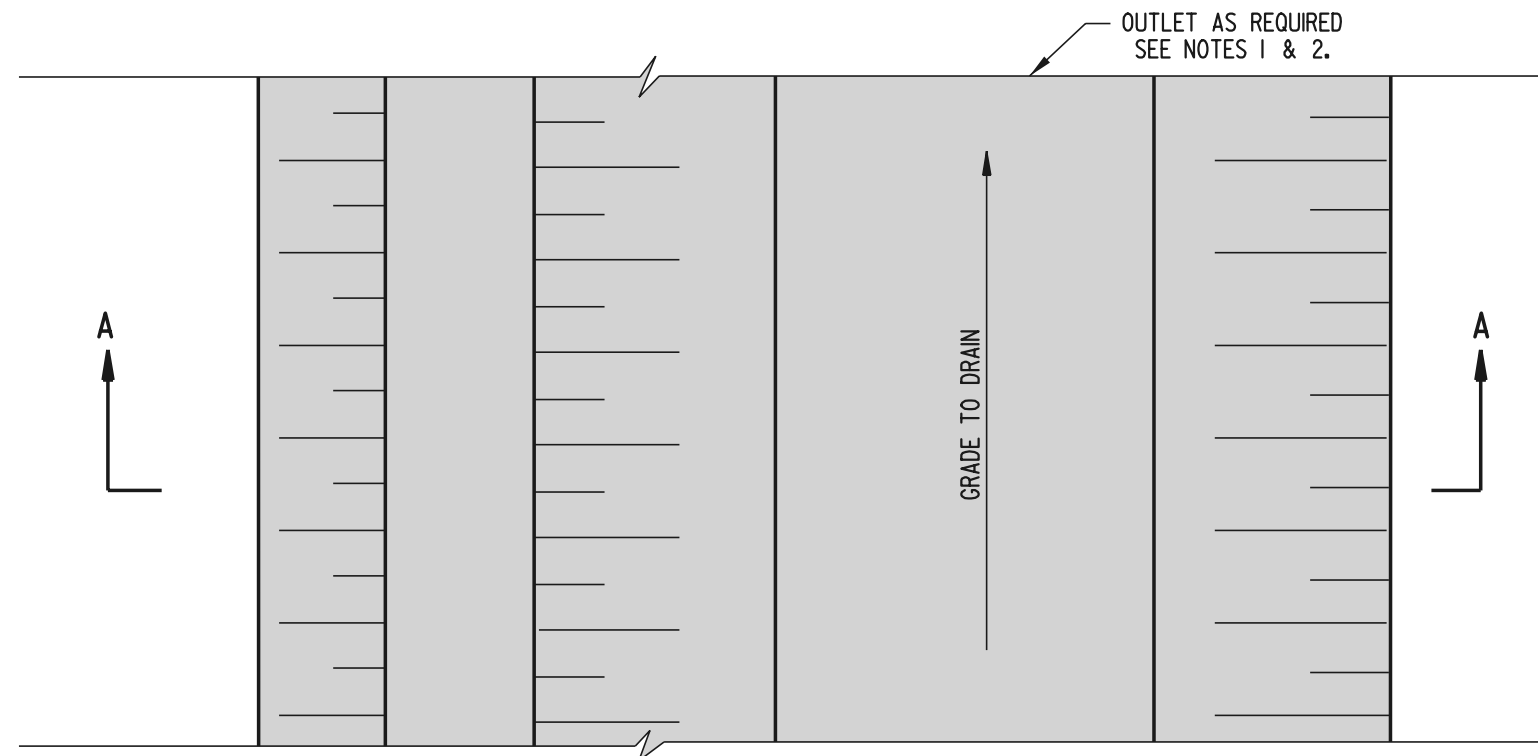
APPROVED	<i>Ryan M. Harkins</i>	6/18/01
RECOMMENDED	<i>Michael J. Gotsch</i>	6/18/01



SECTION A-A

CHART A - SWALE STABILIZATION		
SYMBOL	SWALE GRADE	TYPE OF TREATMENT
A-1	0.5-2.0%	SEED AND EROSION CONTROL BLANKET
A-2	2.1-8.0%	LINED R-4 RIPRAP
A-3	8.1-20%	ENGINEERED DESIGN

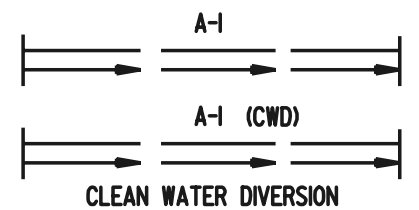
MAXIMUM DRAINAGE AREA: 2 ACRES (0.8 ha)



PLAN

- NOTES:**
- 1). DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
  - 2). DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
  - 3). IF PERIMETER DIKE SWALES ARE TO BE OPERATIONAL FOR MORE THAN 14 DAYS, THEY SHALL BE STABILIZED IN ACCORDANCE WITH CHART A PRIOR TO BECOMING OPERATIONAL.
  - 4). IF TEMPORARY SWALES OR CLEAN WATER DIVERSIONS ARE TO BE OPERATIONAL FOR LESS THAN 14 DAYS, THEY SHALL BE STABILIZED WITH GEOTEXTILE IN ACCORDANCE WITH THE STANDARD DETAIL, "GEOTEXTILE-LINED CHANNEL DIVERSION".

**PLAN SYMBOL**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

PERIMETER DIKE / SWALE

STANDARD NO. E-12 (2001) SHT. 1 OF 1

APPROVED *Ryan M. Hershman* 6/18/01  
CHIEF ENGINEER DATE  
RECOMMENDED *Mehmet C. Gokhan* 6/18/01  
DESIGN ENGINEER DATE

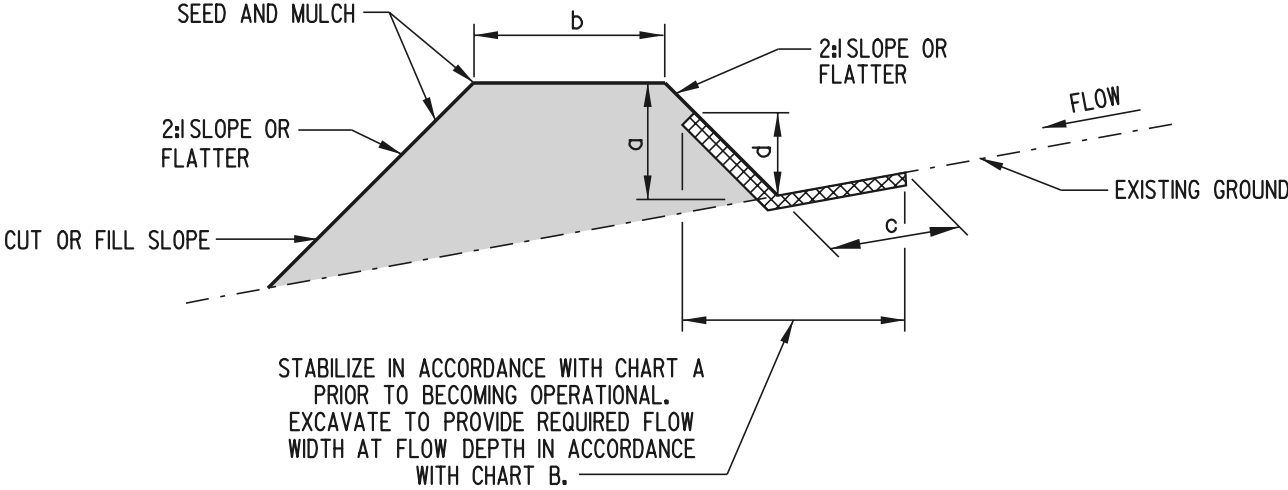


CHART A - FLOW CHANNEL STABILIZATION

TYPE	CHANNEL GRADE	TYPE OF TREATMENT
1	0.5-2.0%	SEED AND EROSION CONTROL BLANKET
2	2.1-8.0%	R-4 RIPRAP
3	8.1-20%	ENGINEERED DESIGN

SECTION A-A

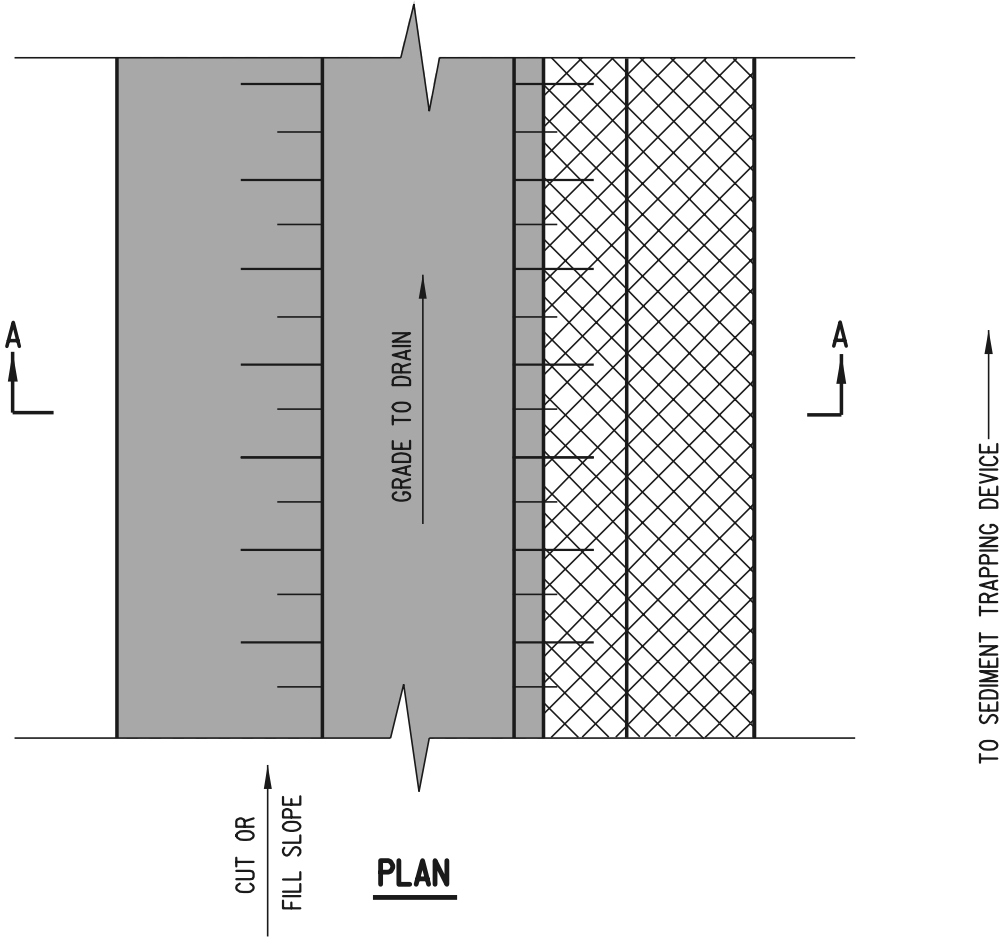
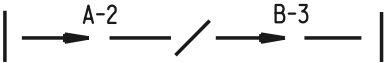


CHART B - EARTH DIKE DIMENSIONS

SYMBOL	DIKE A (5 ac (2 ha) or less)	DIKE B (5-10ac(2-4 ha))
a-DIKE HEIGHT	12" (300)	18" (450)
b-DIKE WIDTH	12" (300)	24" (600)
c-FLOW WIDTH	48" (1200)	72" (1800)
d-FLOW DEPTH	14" (350)	27" (680)

- NOTES:
- 1). IF DESIRED, TOP WIDTH MAY BE WIDER AND SIDE SLOPES MAY BE FLATTER TO FACILITATE CROSSING BY CONSTRUCTION TRAFFIC.
  - 2). FIELD LOCATION SHOULD BE ADJUSTED AS NEEDED TO INSURE A STABILIZED OUTFALL.

PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

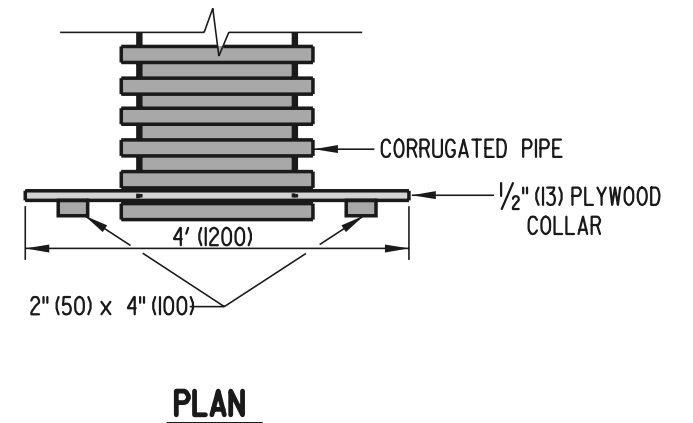
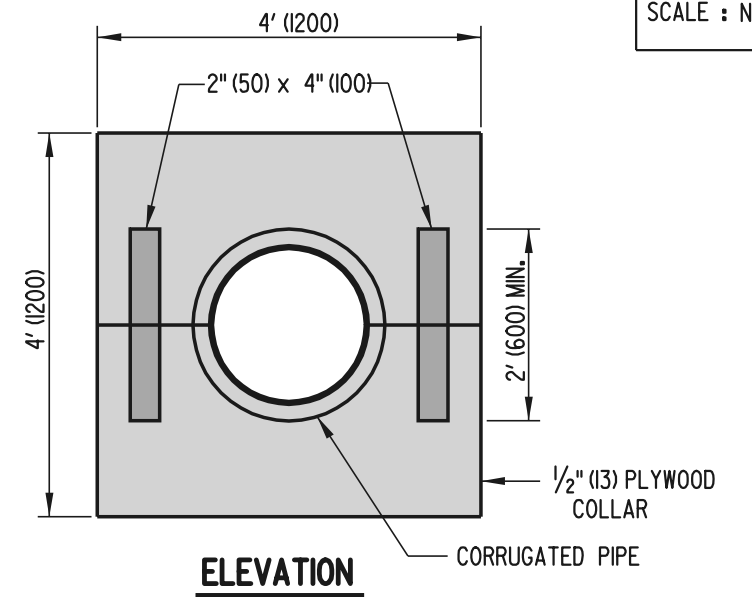
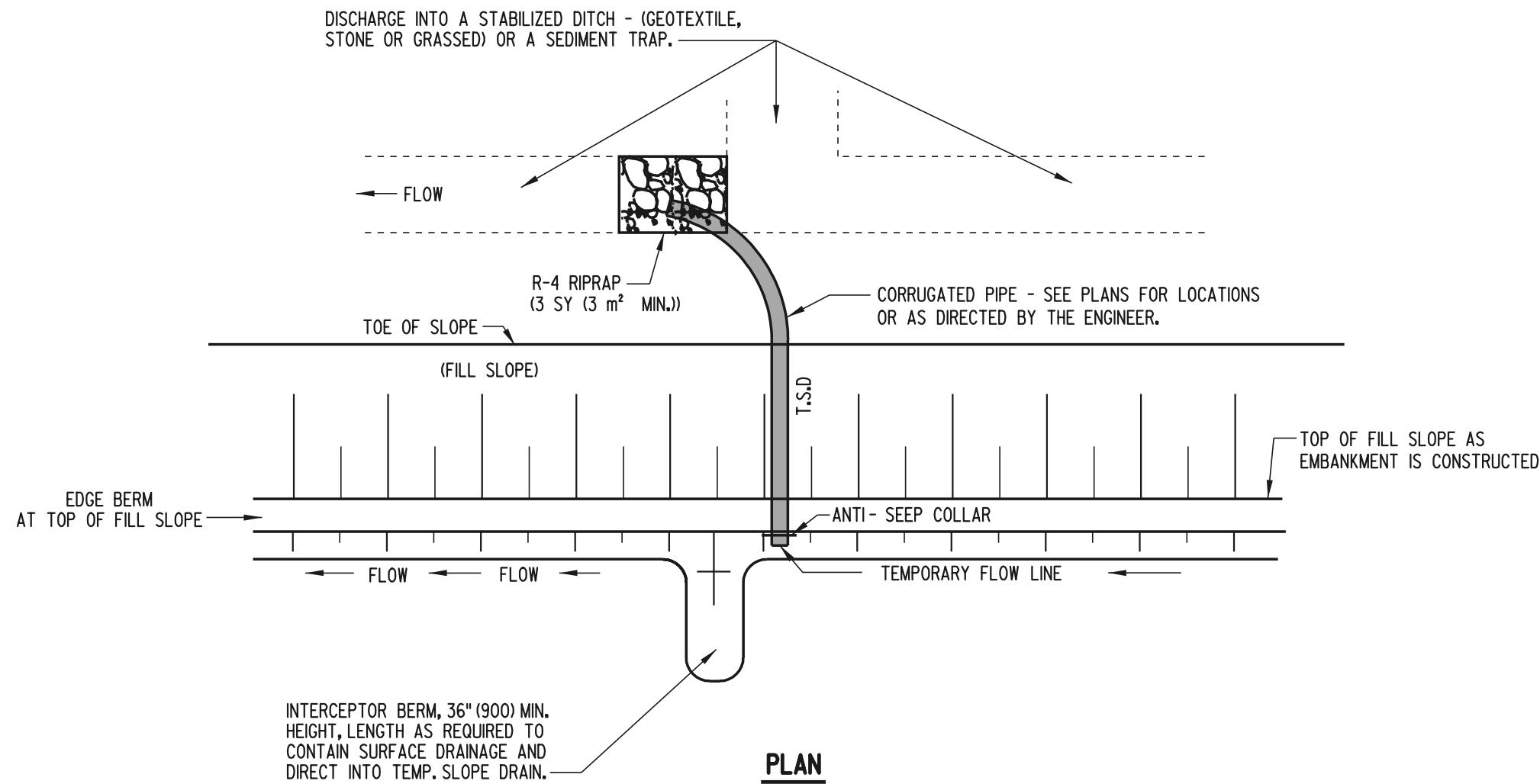
EARTH DIKE

STANDARD NO. E-13 (2001) SHT. 1 OF 1

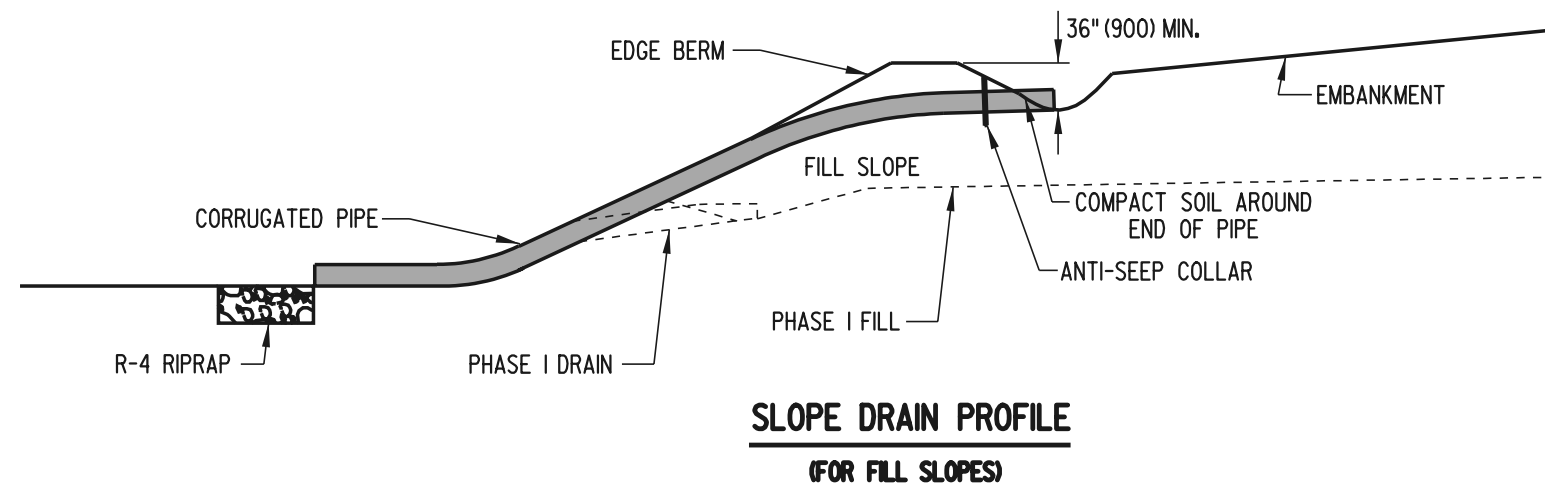
APPROVED *Ryan M. Hershman* 6/18/01  
CHIEF ENGINEER DATE  
RECOMMENDED *Michael P. Gotsch* 6/18/01  
DESIGN ENGINEER DATE



SCALE : N.T.S.



**ANTI-SEEP COLLAR**



- NOTES:** 1). ALL TEMPORARY SLOPE DRAINS SHALL DISCHARGE INTO THE BACK OF SEDIMENT TRAPS, INTO SEDIMENT BASINS OR DITCHES DISCHARGING INTO TRAPS OR BASINS.
- 2). TEMPORARY SLOPE DRAINS SHALL BE USED AT THE TOP OF FILL SLOPES AS EMBANKMENT IS CONSTRUCTED, TO PREVENT EXCESSIVE EROSION UNTIL SHOULDERS ARE CONSTRUCTED AND THE SLOPES ARE SEEDED AND MULCHED.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

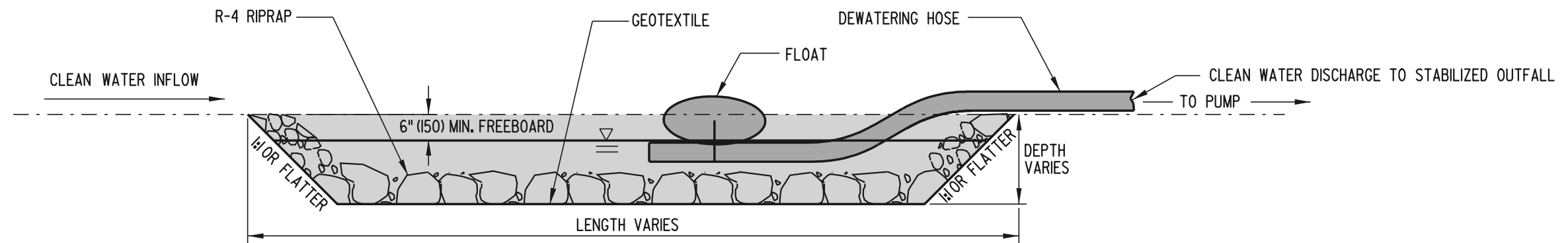
**TEMPORARY SLOPE DRAIN**

STANDARD NO. E-14 (2001)

SHT. 1 OF 1

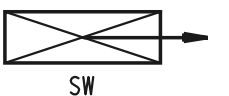
APPROVED *Ryan M. Hershman* 6/18/01  
CHIEF ENGINEER DATE

RECOMMENDED *Michael P. Galt* 6/18/01  
DESIGN ENGINEER DATE



- NOTES:**
- 1). THE WORK SHALL CONSIST OF CONSTRUCTING A STILLING WELL FOR THE PURPOSE OF PUMPING CLEAN WATER AROUND A DISTURBED CONSTRUCTION AREA TO A STABILIZED OUTFALL.
  - 2). THE DIMENSIONS OF THE STILLING WELL SHALL BE AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

**PLAN SYMBOL**



SW



**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

**STILLING WELL**

STANDARD NO.

**E-15 (2001)**

SHT.

**1**

OF

**1**

APPROVED

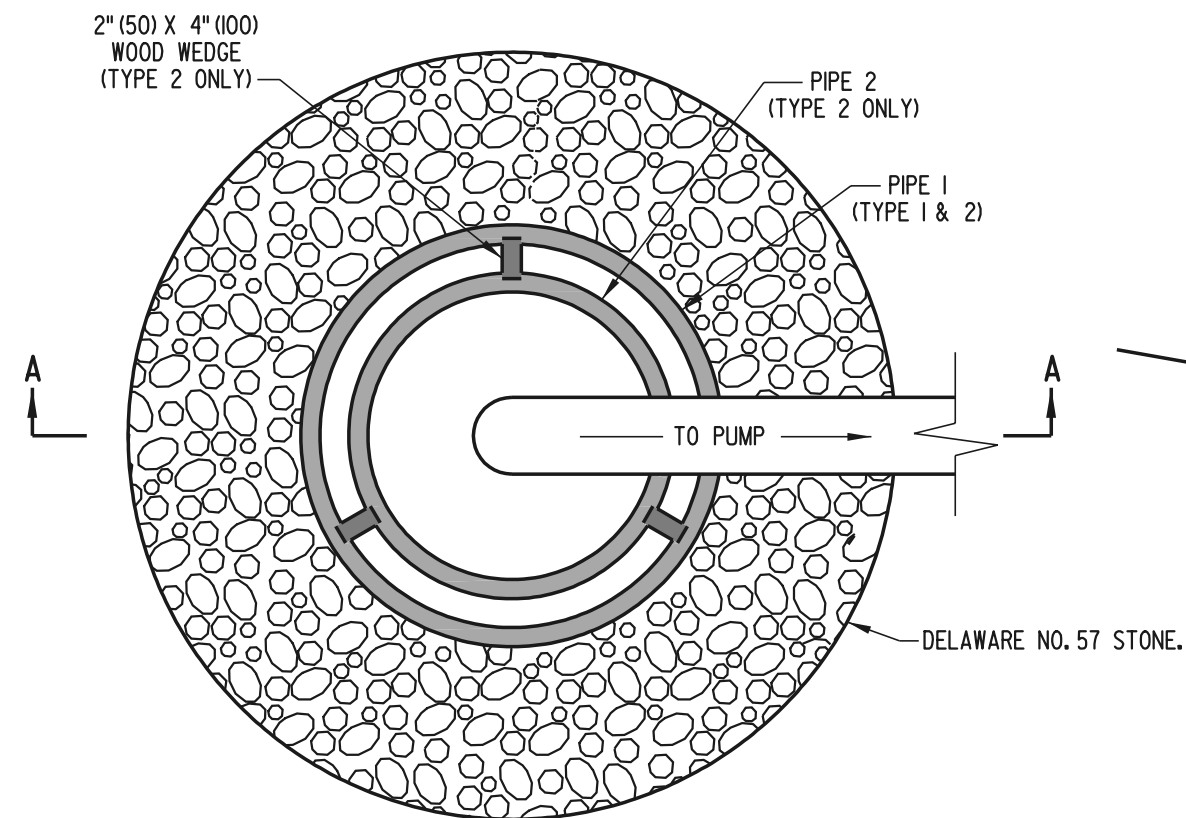
*Ryan M. Harkness*  
CHIEF ENGINEER

6/18/01  
DATE

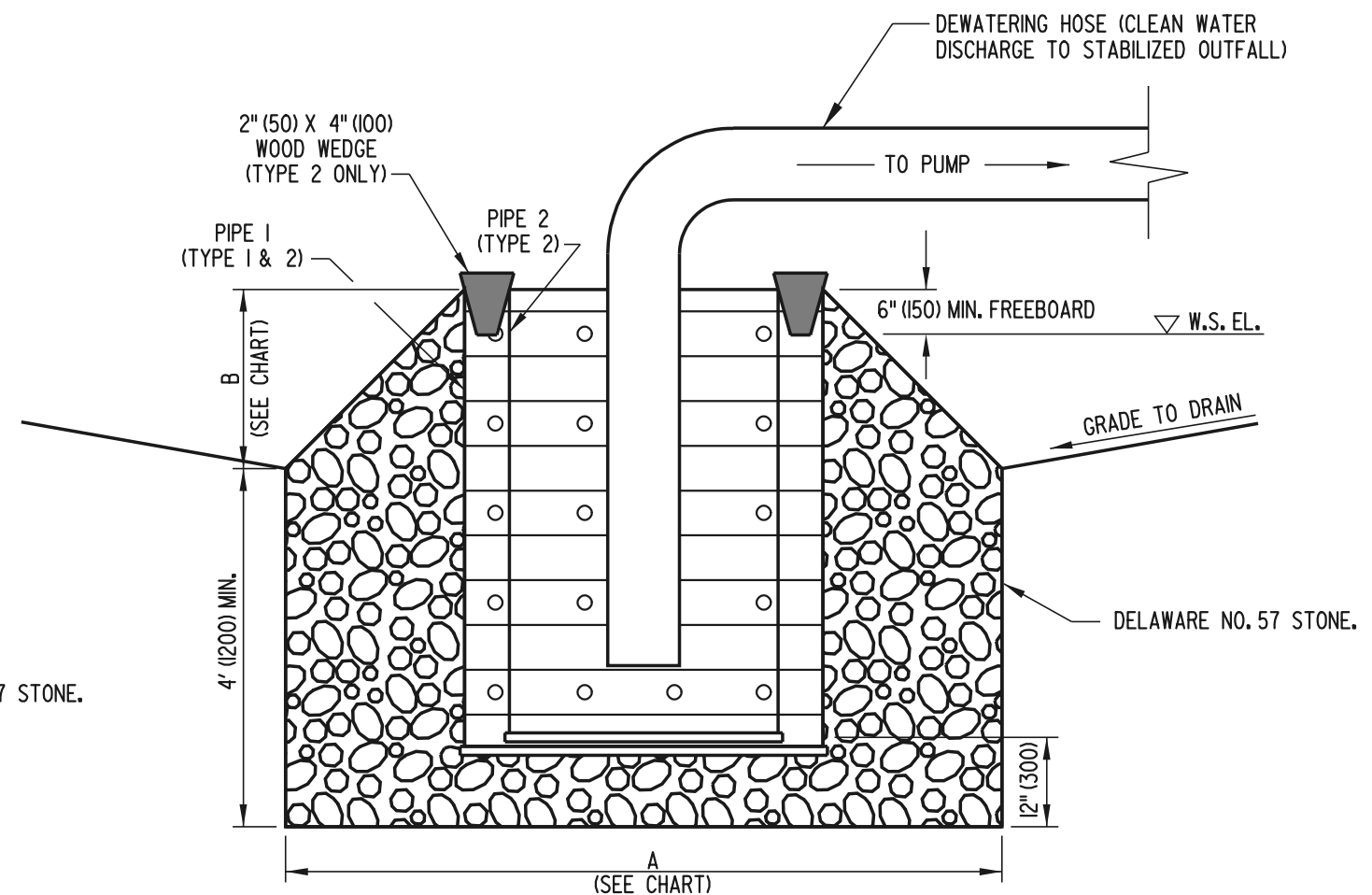
RECOMMENDED

*Mehal Alghamdi*  
DESIGN ENGINEER

6/18/01  
DATE



**PLAN**

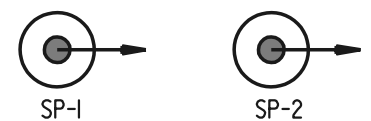


**SECTION A-A**

- NOTES:**
- 1). THE WORK SHALL CONSIST OF CONSTRUCTING A SUMP PIT FOR THE PURPOSE OF FILTERING AND PUMPING WATER TO A STABILIZED OUTFALL.
  - 2). GEOTEXTILE FOR THE 36" (900) CMP SHALL BE REPLACED WHEN CLOGGED WITH SEDIMENT.
  - 3).  $\frac{1}{2}$ " x  $\frac{1}{2}$ " (13 x 13) 19 GAGE (1.1) WIRE MESH SHALL BE PLACED AROUND THE REMOVABLE 36" (900) CMP BEFORE ATTACHING THE GEOTEXTILE TO INCREASE FLOW THROUGH THE GEOTEXTILE.
  - 4). ALL PERFORATIONS SHALL BE 1" (25) IN DIAMETER AND 12" (300) ON CENTER IN ALL DIRECTIONS.
  - 5). TYPE I SUMP PIT SHALL BE USED ONLY WHEN PUMPING IS NEEDED FOR LESS THAN 7 DAYS.

SUMP PIT CHART				
TYPE	PIPE 1	PIPE 2	A	B
1	PERFORATED 24" (600) CMP WITH PERFORATED CAP WELDED ON BOTTOM AND COMPLETELY WRAPPED WITH GEOTEXTILE.	N/A	4' (1200) MIN.	12" (300)
2	PERFORATED 48" (1200) CMP WITH PERFORATED CAP WELDED ON BOTTOM	REMOVABLE PERFORATED 36" (900) CMP WITH PERFORATED CAP WELDED ON BOTTOM AND COMPLETELY WRAPPED WITH GEOTEXTILE.	8' (2400) MIN.	24" (600)

**PLAN SYMBOL**



**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

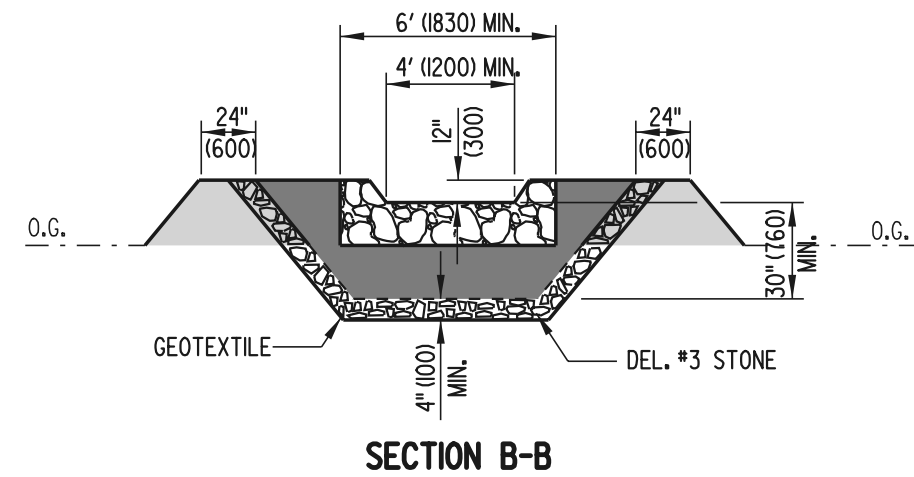
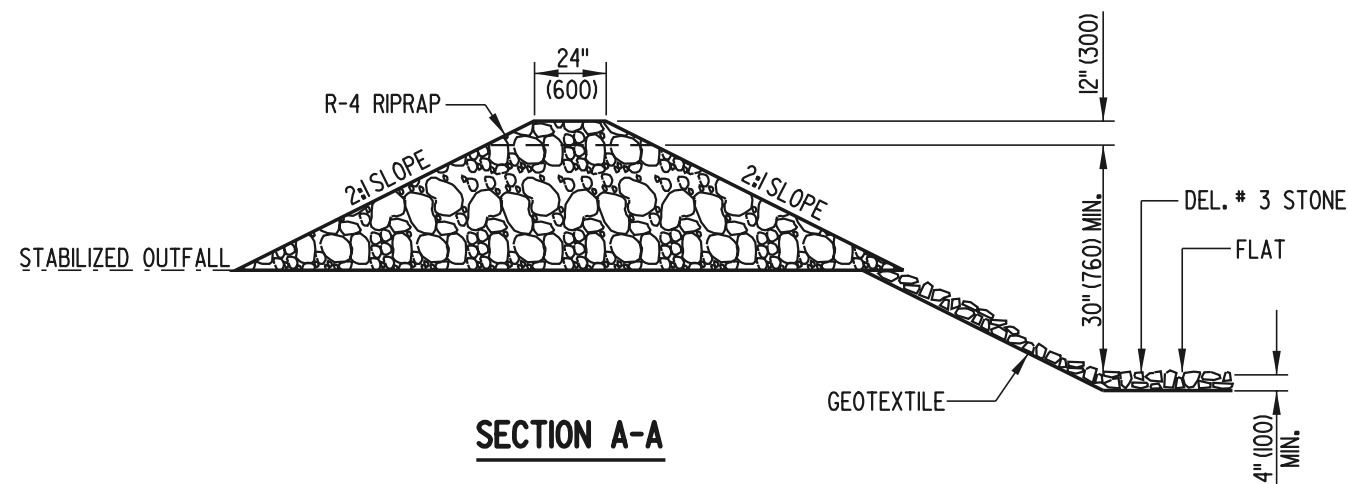
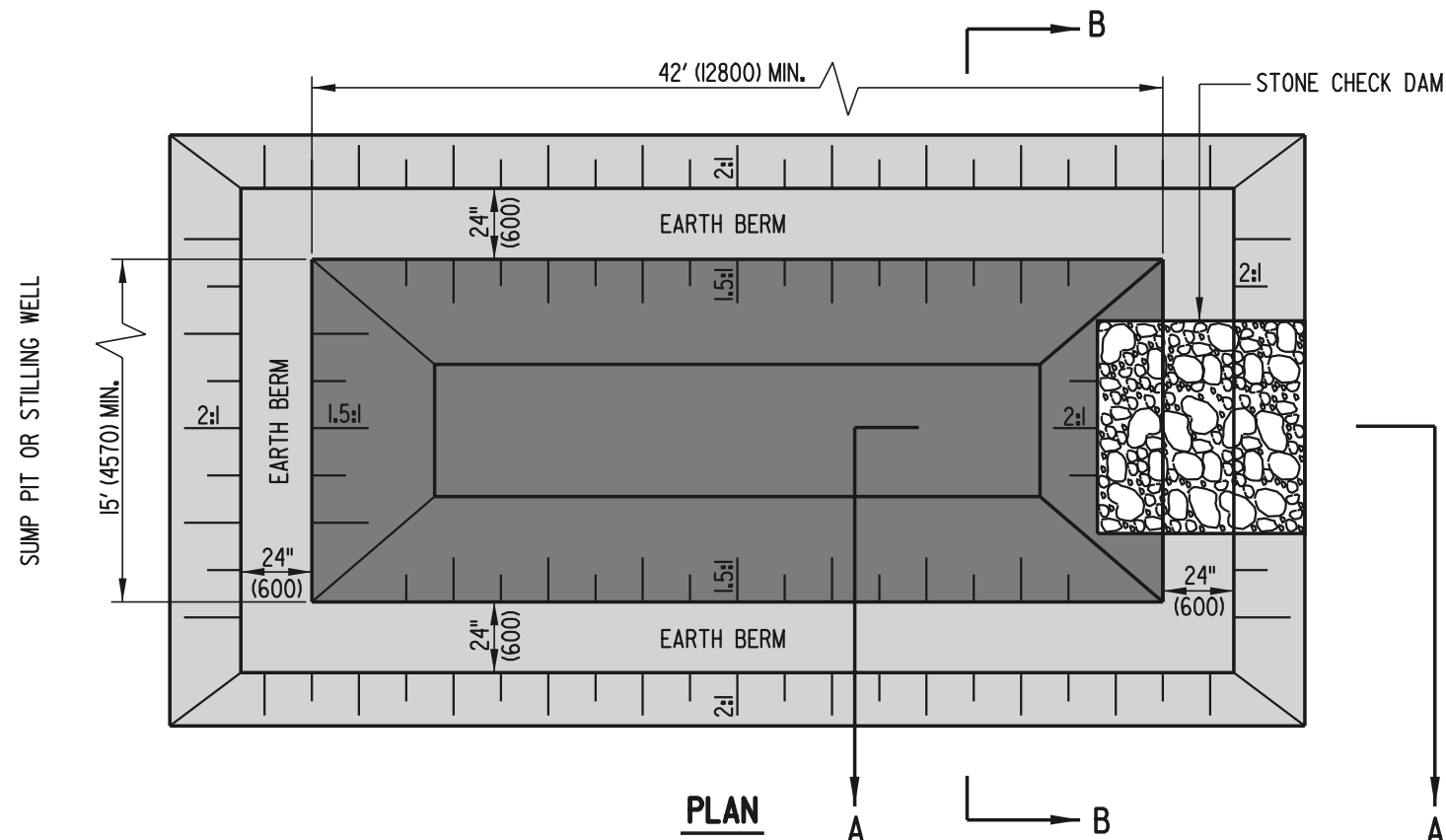
**SUMP PIT, TYPE 1 & 2**

**STANDARD NO.** E-16 (2001)

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

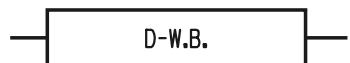
**APPROVED** *Ryan M. Harkness* **6/18/01**  
CHIEF ENGINEER DATE

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



- NOTES:**
- 1.) A DEWATERING BASIN (DWB) IS USED TO REMOVE SEDIMENT FROM SEDIMENT-LADEN WATER PUMPED FROM A CONSTRUCTION SITE BEFORE THE WATER RE-ENTERS THE WATERWAY. THE DWB SHALL HAVE A MINIMUM TOP WIDTH OF 15' (4570) AND A MINIMUM DEPTH OF 3.5' (1065). THE MINIMUM TOP LENGTH SHOWN IN THE PLAN IS USED ONLY FOR QUANTITY CALCULATIONS BY THE ENGINEER. THE ACTUAL TOP LENGTH IN THE FIELD SHALL BE CALCULATED BY THE EQUATION:  
 US CUSTOMARY : TOP LENGTH (FEET) = 26' + .01 x Y  
 METRIC : TOP LENGTH (mm) = 7930 + 48300 x Y  
 WHERE Y IS THE MAXIMUM CAPACITY IN GALLONS PER MINUTE (CUBIC METERS PER SECOND) OF THE DEWATERING PUMP.
  - 2.) THE OUTFALL FROM THE BASIN TO THE RECEIVING WATERS SHALL BE STABILIZED. PUMPING INTO THE DWB SHALL CEASE WHEN THE EFFLUENT FROM THE BASIN BECOMES SEDIMENT-LADEN.
  - 3.) A SUMP PIT OR STILLING WELL (SEE STANDARD SHEETS) SHALL BE USED IN CONJUNCTION WITH A DWB. THE BASIN MAY BE BYPASSED INTO THE STABILIZED OUTFALL IF THE WATER BEING PUMPED IS NON-SEDIMENT-LADEN. DIRECT DISCHARGE TO THE RECEIVING WATERS SHALL CEASE AND BE REDIRECTED TO THE DWB WHEN EFFLUENT FROM THE PUMP BECOMES SEDIMENT-LADEN.
  - 4.) MAINTENANCE MUST BE PERFORMED IN ORDER FOR THE DWB TO FUNCTION PROPERLY. ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED DISPOSAL AREA WHEN THE BASIN IS FILLED TO WITHIN 12" (300) FROM THE CREST.
  - 5.) WHEN USED IN CONJUNCTION WITH A COFFERDAM, DEWATERING SHALL BEGIN NO SOONER THAN 12 HOURS AFTER COFFERDAM INSTALLATION IN ORDER TO ALLOW SEDIMENT PRODUCED DURING INSTALLATION TO SETTLE COMPLETELY.

**PLAN SYMBOL**

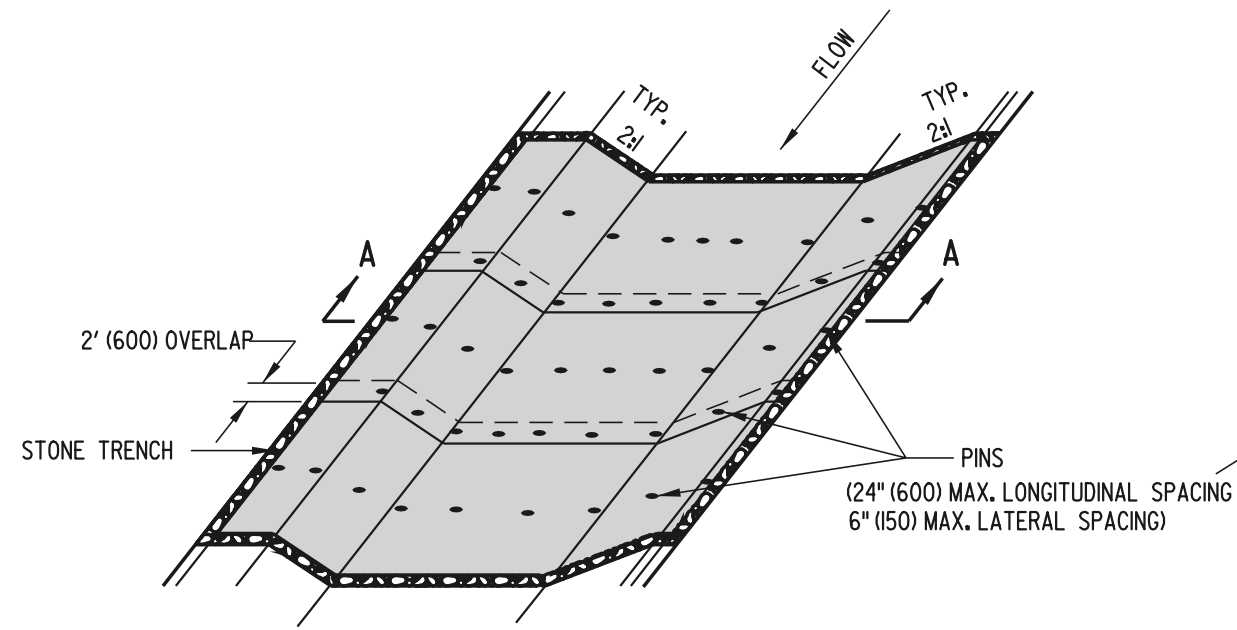


**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

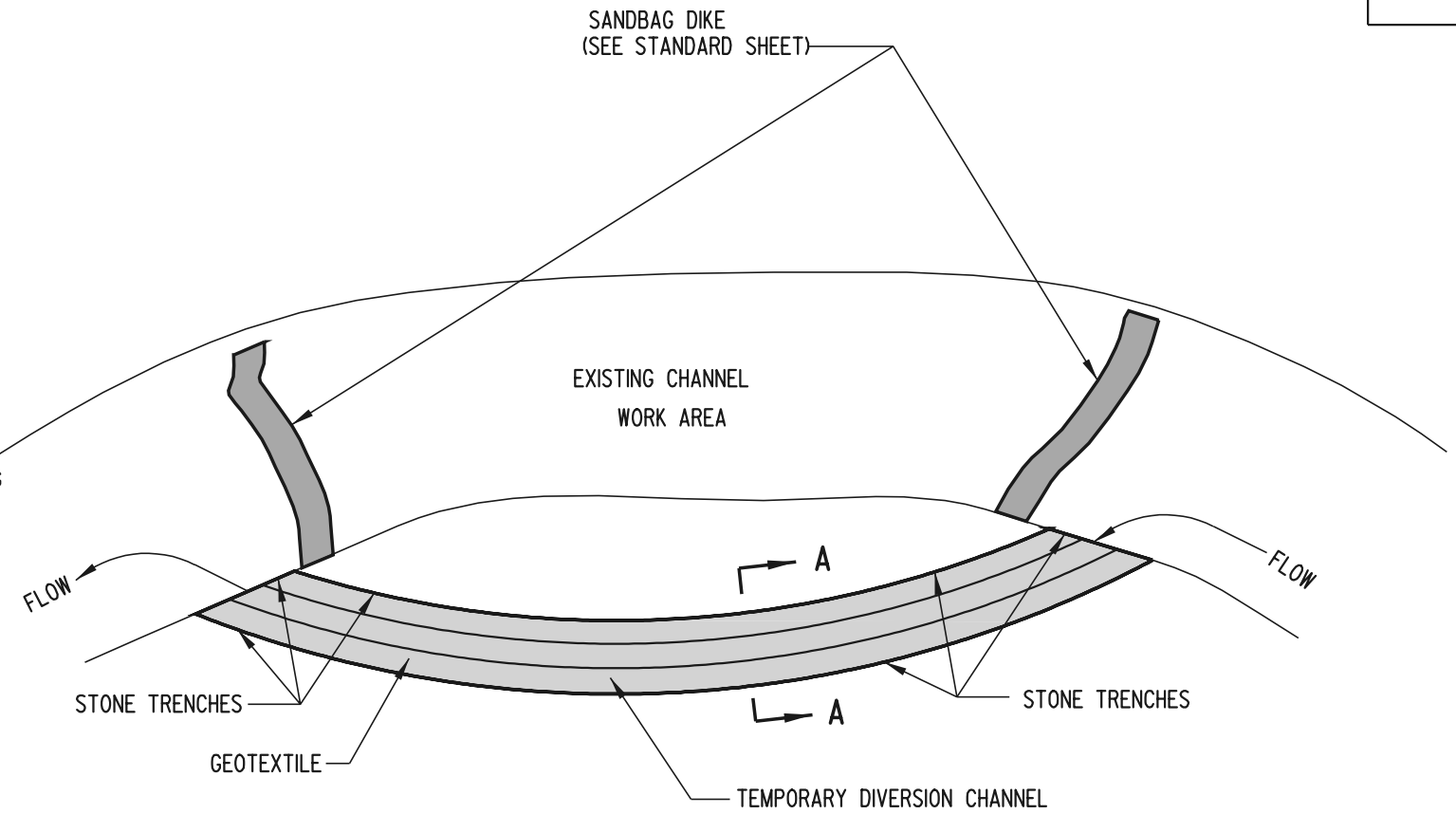
**DEWATERING BASIN**

STANDARD NO. E-17 (2001) SHT. 1 OF 1

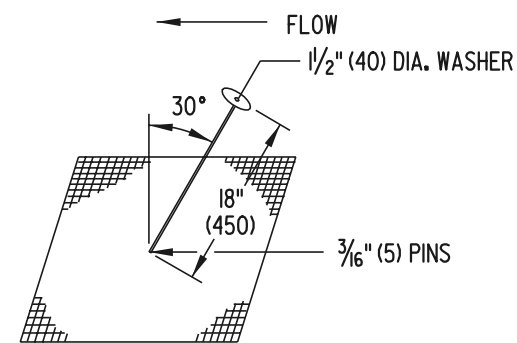
APPROVED *Ryan M. Harkness* 6/18/01  
 RECOMMENDED *Michael P. Gotsch* 6/18/01  
CHIEF ENGINEER DATE  
DESIGN ENGINEER DATE



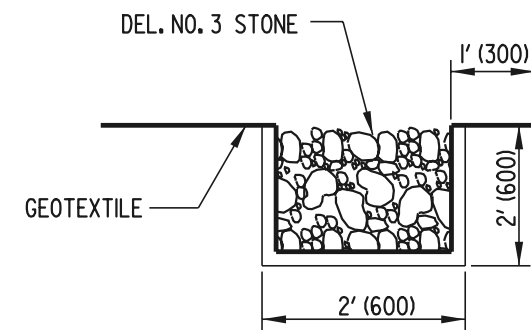
**OBLIQUE VIEW**



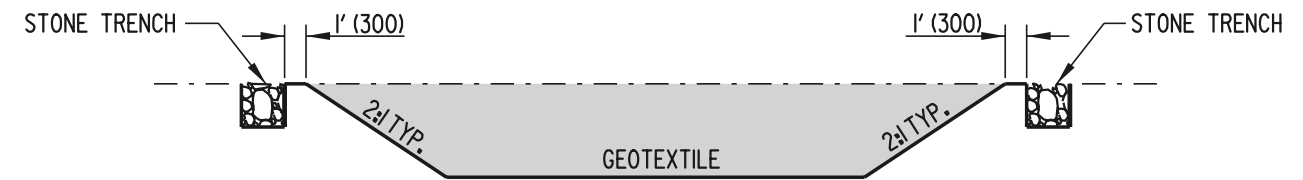
**PLAN**



**FASTENING DETAIL**



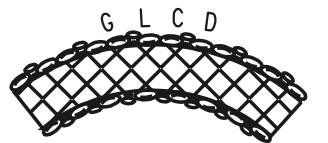
**TRENCHING DETAIL**



**SECTION A-A**

**PLAN SYMBOL**

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

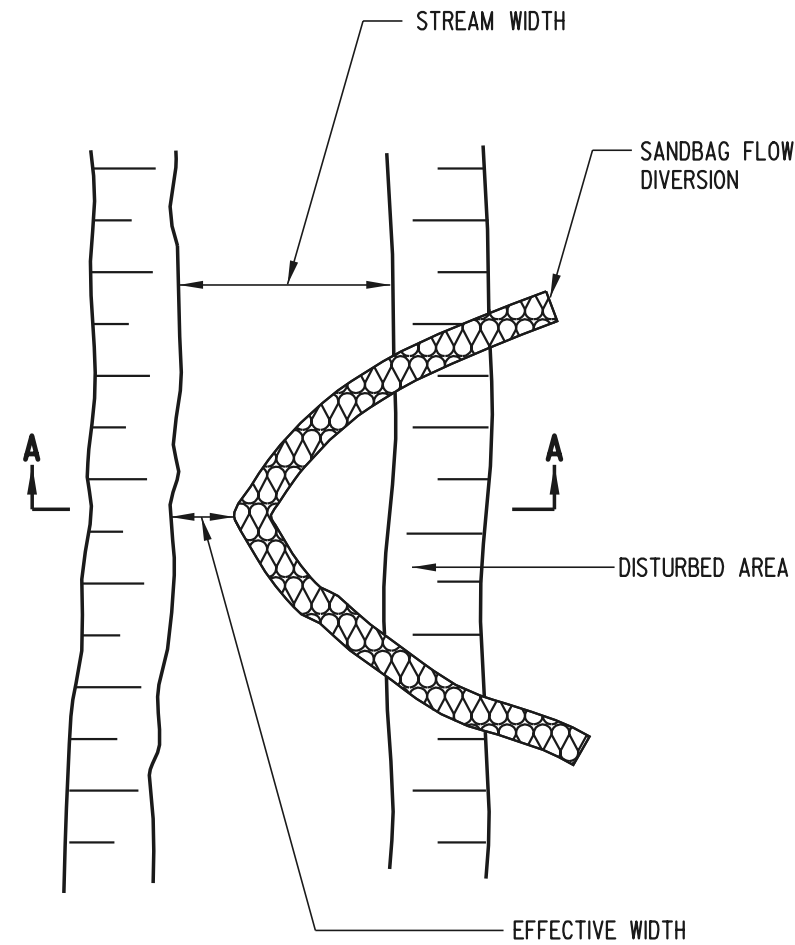


**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

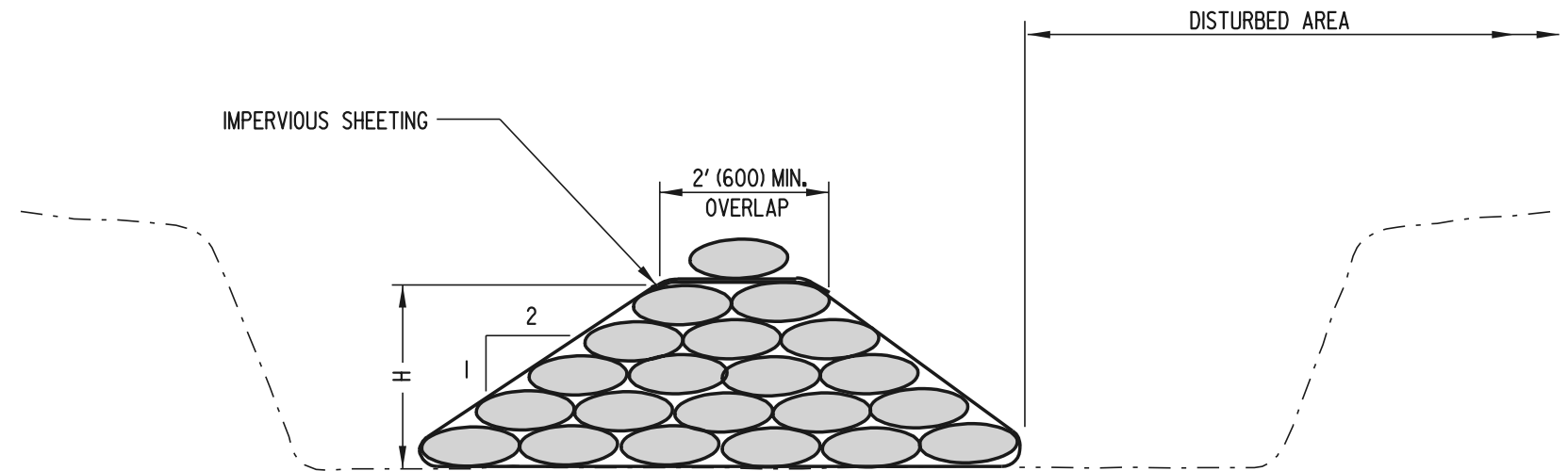
**GEOTEXTILE-LINED CHANNEL DIVERSION**

STANDARD NO. E-18 (2001) SHT. 1 OF 1

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



**PLAN**



**SECTION A-A**

- NOTES:**
- 1). THE WORK SHALL CONSIST OF INSTALLING FLOW DIVERSIONS FOR THE PURPOSE OF EROSION CONTROL WHEN CONSTRUCTION ACTIVITIES TAKE PLACE WITHIN THE STREAM CHANNEL SUCH AS BANK STABILIZATION OR BRIDGE ABUTMENT CONSTRUCTION.
  - 2). THE DIVERSION STRUCTURE SHALL BE INSTALLED FROM UPSTREAM TO DOWNSTREAM.
  - 3). THE EFFECTIVE CHANNEL WIDTH SHALL BE SIZED TO PASS A ONE YEAR STORM EVENT PEAK FLOW, OR 1/3 OF STREAM WIDTH, WHICHEVER IS GREATER.
  - 4). THE SANDBAG DIVERSION HEIGHT (H) SHALL BE 1' (300) ABOVE THE PEAK ELEVATION OF THE ONE YEAR STORM.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**SANDBAG DIVERSION**

STANDARD NO.

E-19 (2001)

SHT.

1

OF

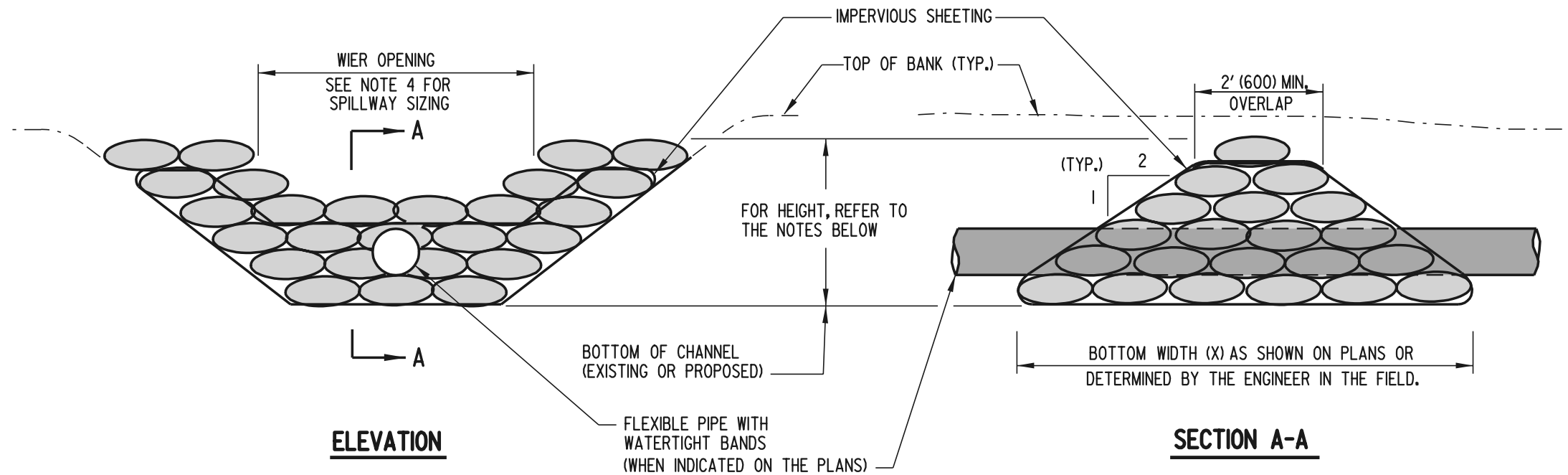
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APPROVED

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

RECOMMENDED

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



- NOTES:** 1). THE WORK SHALL CONSIST OF INSTALLING A SANDBAG DIKE FOR THE PURPOSE OF EROSION CONTROL WHEN CONSTRUCTION ACTIVITIES TAKE PLACE WITHIN THE STREAM CHANNEL SUCH AS BANK STABILIZATION OR BRIDGE ABUTMENT CONSTRUCTION.
- 2). THE SANDBAG DIKE SHALL BE INSTALLED AT THE UPSTREAM LOCATION FIRST.
- 3). THE HEIGHT OF THE SANDBAG DIKE SHALL BE 1' (300) ABOVE THE PEAK ELEVATION OF THE ONE YEAR STORM, OR EQUAL WITH THE TOP OF BANK, WHICHEVER IS LESS. SEE PLANS FOR INFORMATION.
- 4). THE SPILLWAY SHALL BE SIZED TO PASS A (1) ONE YEAR STORM EVENT PEAK FLOW, SEE PLANS.
- 5). THE PIPE, WHEN UTILIZED, SHALL BE SIZED TO PASS THE STREAM BASE FLOW.

**PLAN SYMBOL**

SBD



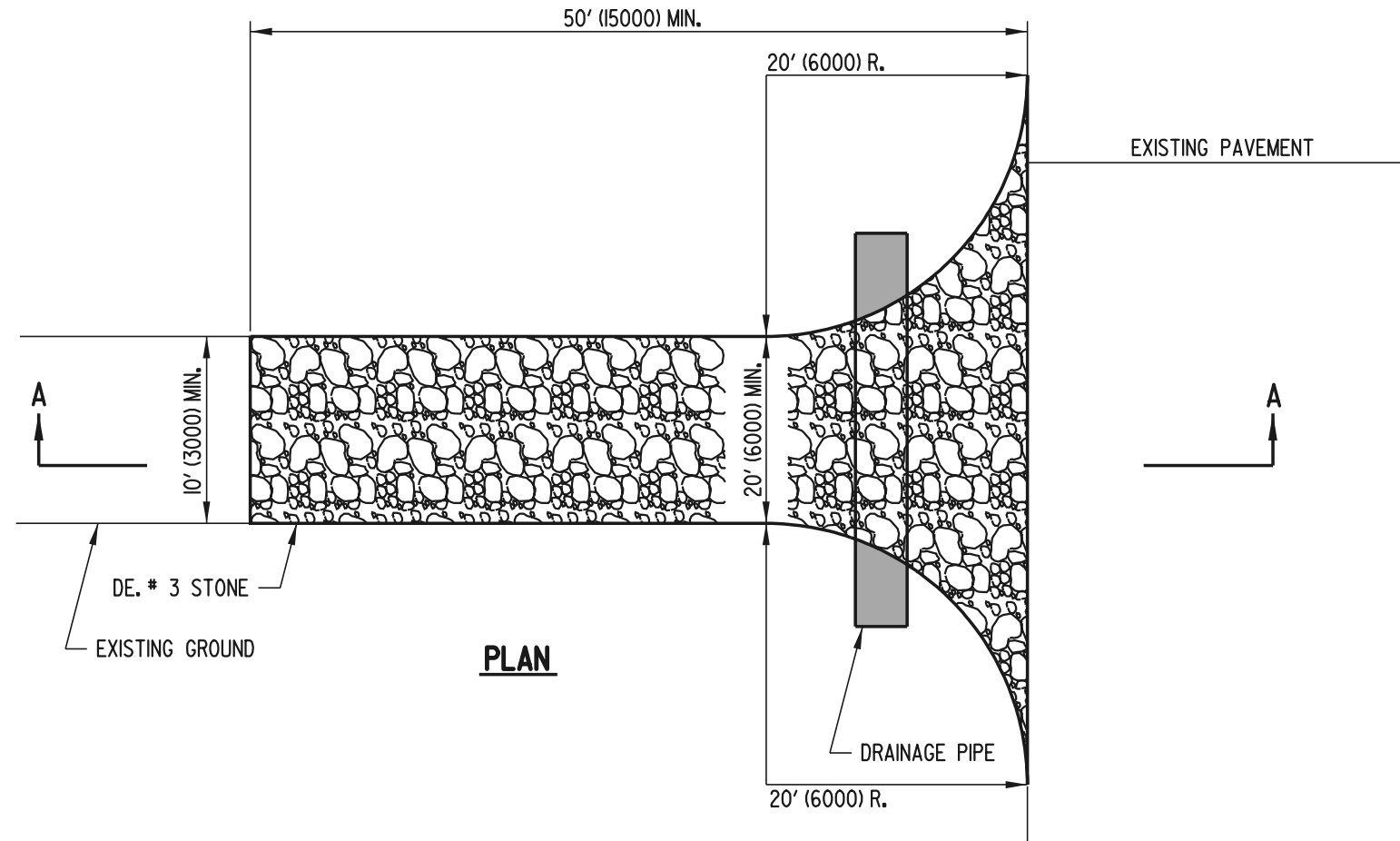
DELAWARE  
DEPARTMENT OF TRANSPORTATION

**SANDBAG DIKE**

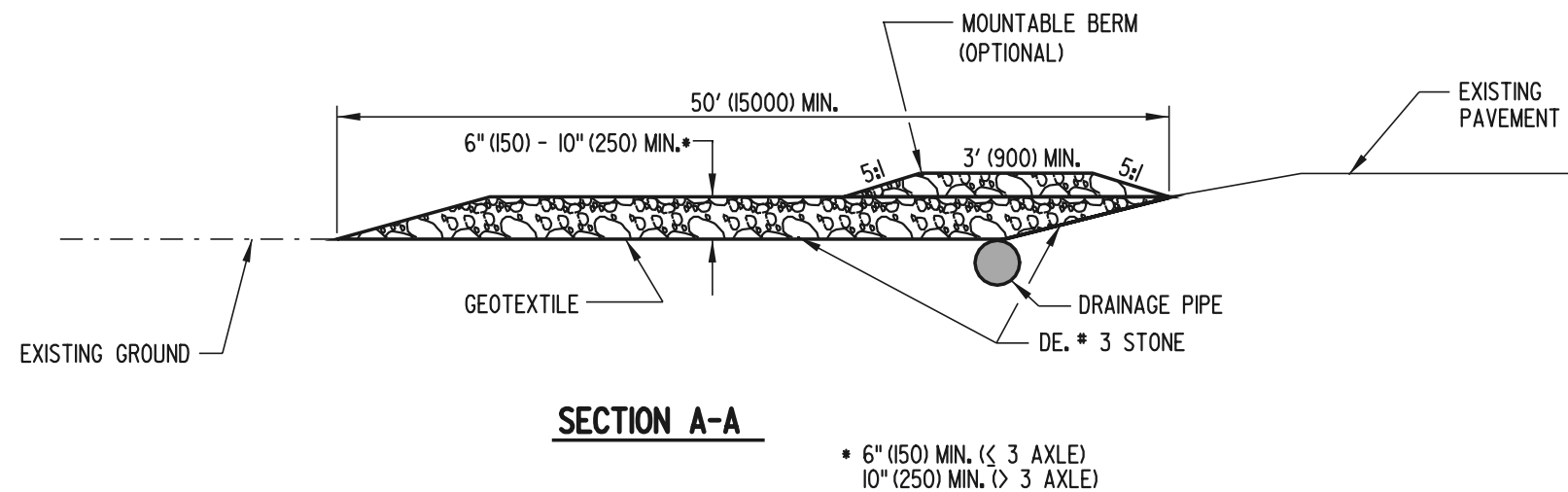
STANDARD NO. E-20 (2001) SHT. 1 OF 1

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

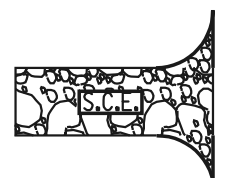
RECOMMENDED *Michael P. Gotsch* 6/18/01  
DESIGN ENGINEER DATE



- NOTES:**
- 1). ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED UNDER THE ENTRANCE. IF NECESSARY, A MOUNTABLE BERM WITH 5:1 SLOPES SHALL BE ALLOWED TO FACILITATE PLACEMENT OF PIPES IN SHALLOW CONDITIONS.
  - 2). THE LOCATION AND NUMBER OF STABILIZED CONSTRUCTION ENTRANCES SHALL BE AS INDICATED ON THE PLANS. ANY CHANGE IN LOCATION, ADDITION, OR DELETION OF AN ENTRANCE SHALL BE APPROVED IN ADVANCE BY THE ENGINEER.
  - 3). DRAINAGE PIPE, IF UTILIZED, SHALL BE PAID FOR SEPARATELY UNDER THE APPROPRIATE BID ITEM.
  - 4). THE TOP 2" (50) OF STONE SHALL BE REMOVED AND REPLACED WITH 2" (50) OF CLEAN STONE WHEN VOIDS ARE FILLED OR AS DIRECTED BY THE ENGINEER.



**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

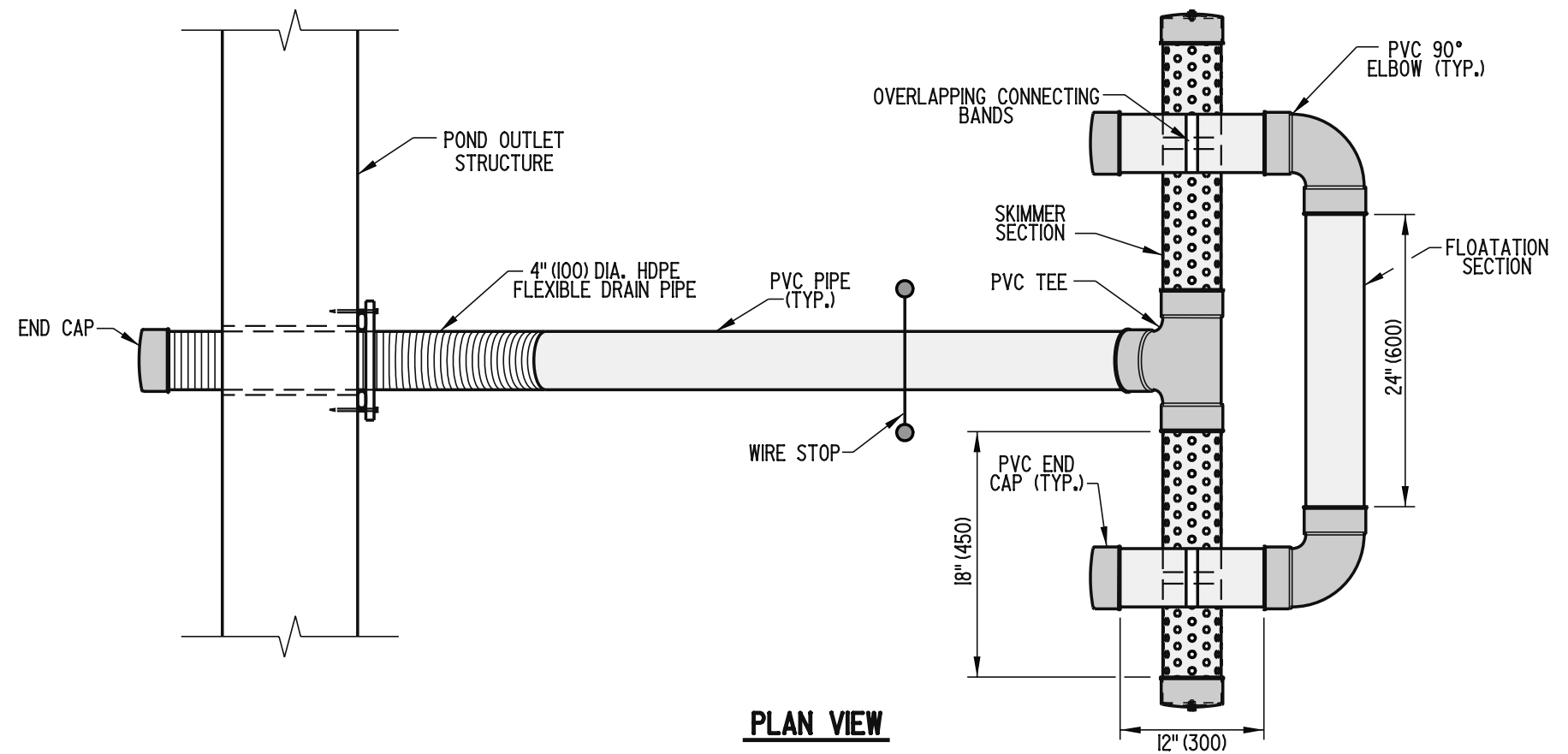
**STABILIZED CONSTRUCTION ENTRANCE**

STANDARD NO. **E-21 (2001)** SHT. **1** OF **1**

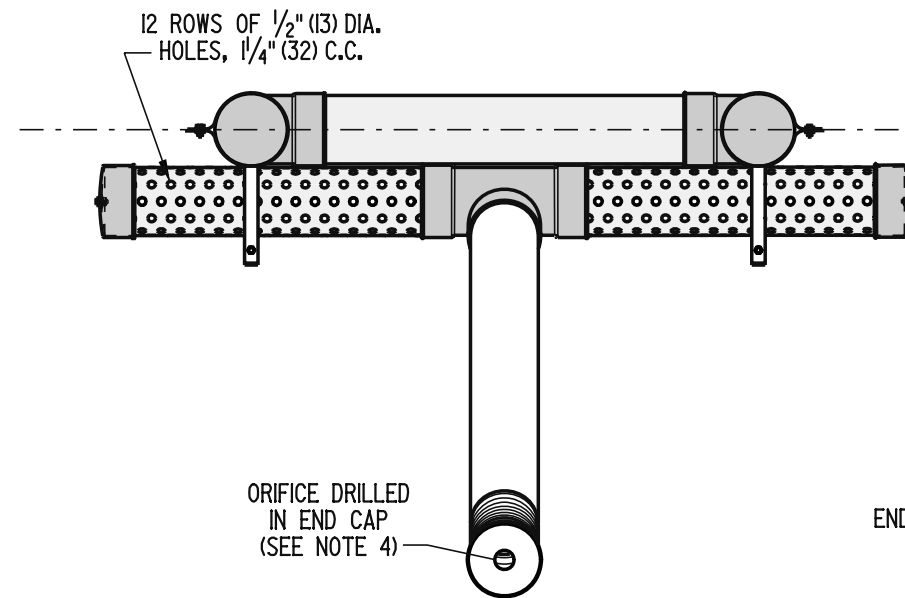
APPROVED *Ryan M. Harkins* **6/18/01**  
CHIEF ENGINEER DATE  
RECOMMENDED *Michael P. Gotsch* **6/18/01**  
DESIGN ENGINEER DATE



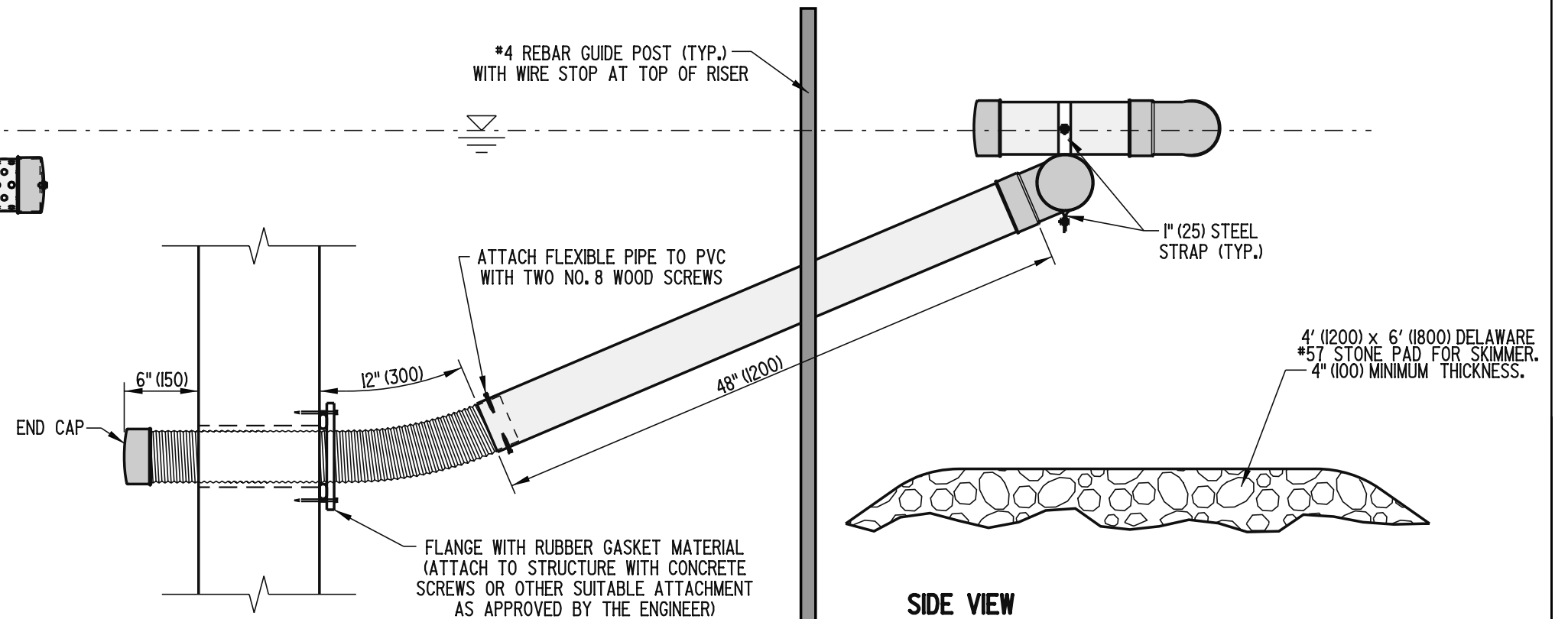
- NOTES:**
- 1). ALL P.V.C. PIPES ARE TO BE 4" (100) I.D., SCHEDULE 40
  - 2). ALL JOINTS OF THE FLOATATION SECTION SHALL BE SOLVENT WELDED. JOINTS OF SKIMMER SECTION NEED NOT BE WATER-TIGHT.
  - 3). 4" (100) HDPE FLEXIBLE DRAIN PIPE IS TO BE ATTACHED TO THE POND OUTLET STRUCTURE WITH WATER-TIGHT CONNECTIONS.
  - 4). ORIFICE IS TO BE SIZED ACCORDING TO STORAGE VOLUME AND TO SLOWLY RELEASE 1" (25) RUNOFF FOR AT LEAST 24-HOURS.



**PLAN VIEW**



**FRONT VIEW**



**SIDE VIEW**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**SKIMMER DEWATERING DEVICE**

STANDARD NO.

E-22 (2006)

SHT. 1

OF 1

APPROVED

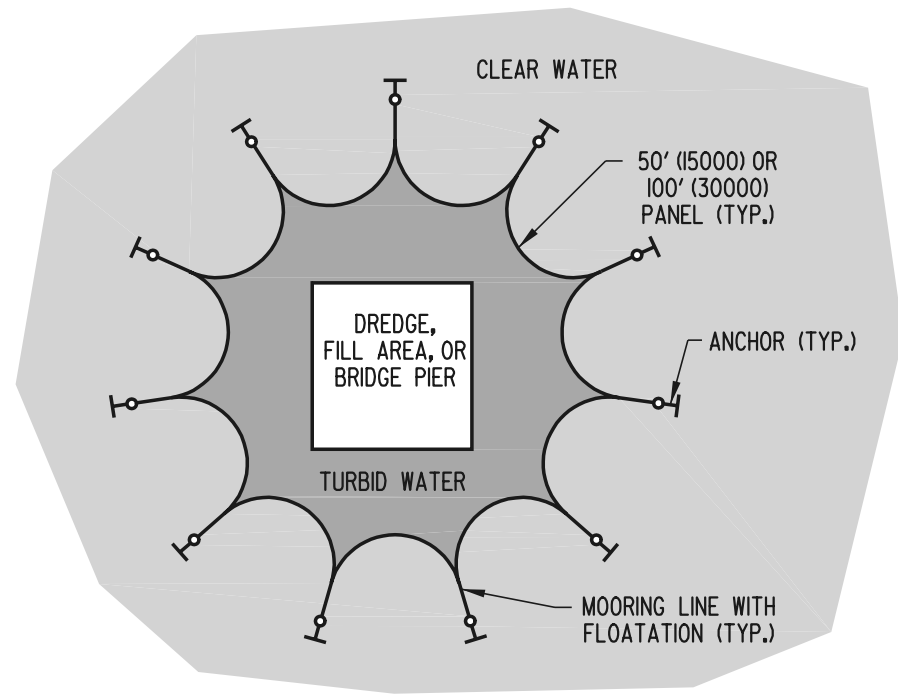
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

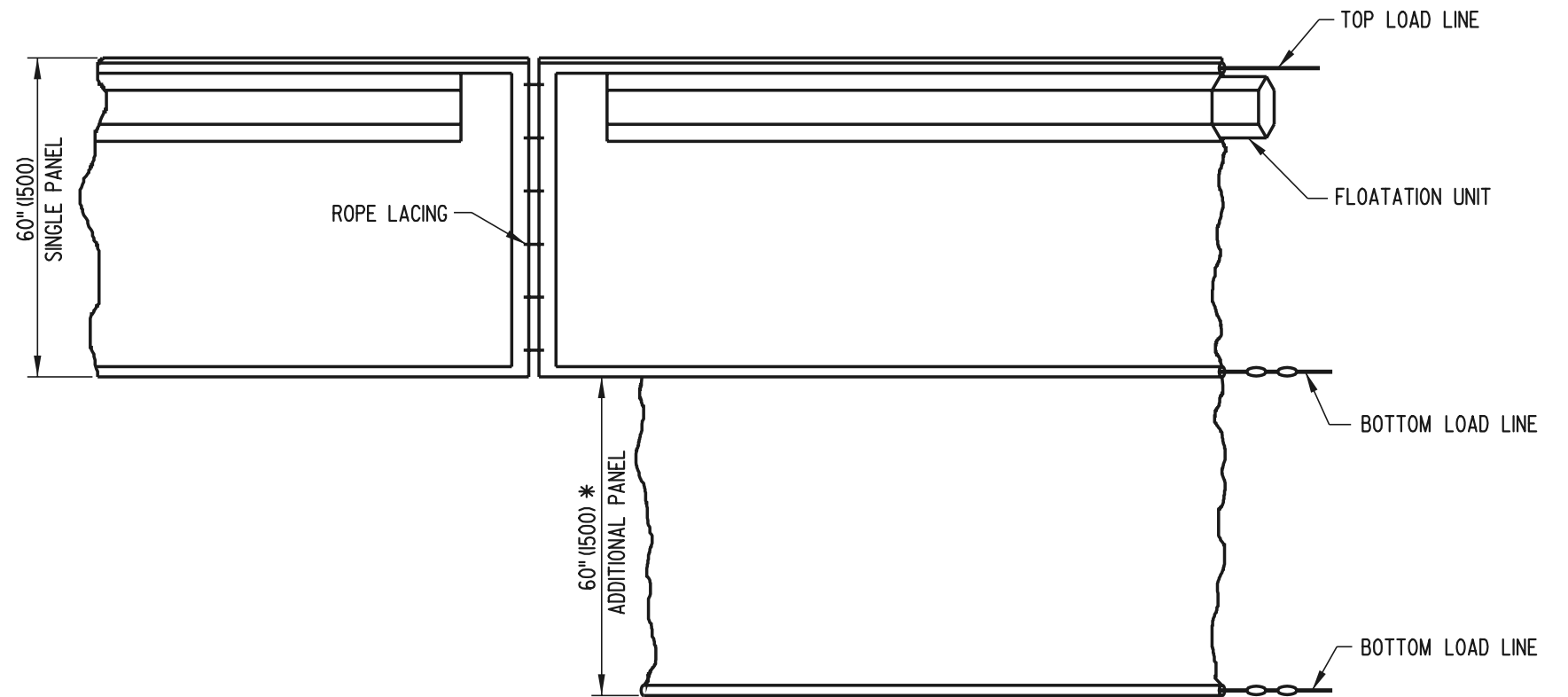
RECOMMENDED

*Don Smith*  
DESIGN ENGINEER

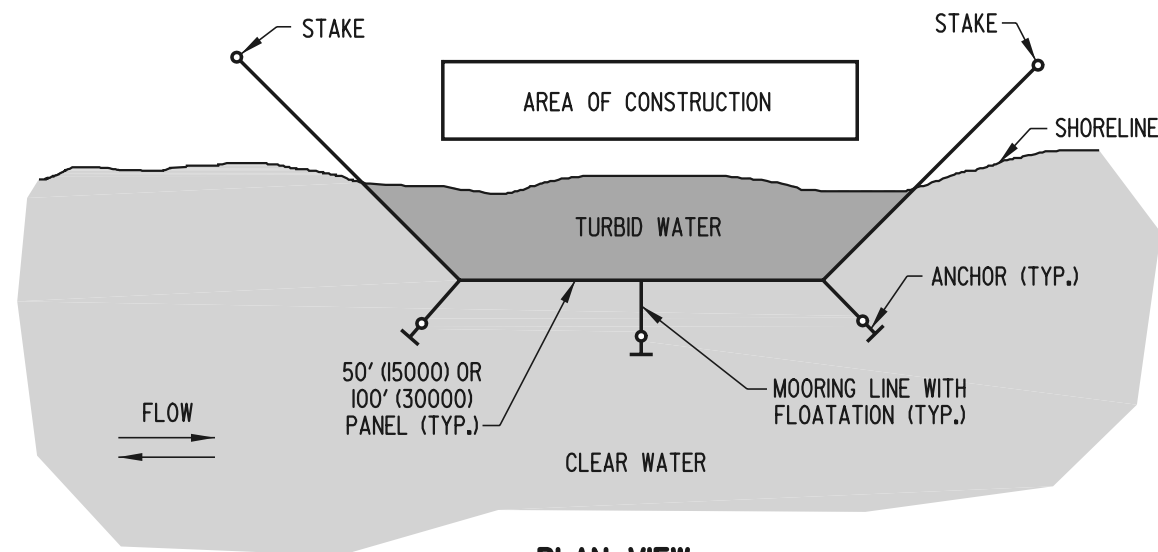
10/13/06  
DATE



**PLAN VIEW**  
OPEN WATER APPLICATION



**ELEVATION**



**PLAN VIEW**  
SHORELINE APPLICATION

**FLOATING TURBIDITY CURTAIN**

- NOTE:** 1.) ADDITIONAL PANEL REQUIRED FOR DEPTHS GREATER THAN 5' (1500).  
2.) FLOATING TURBIDITY CURTAIN SHALL REACH BOTTOM UP TO DEPTHS OF 10' (3000) BY USING TWO PANELS. DEPTHS GREATER THAN 10' (3000) SHALL REQUIRE SPECIAL DEPTH CURTAINS SPECIFICALLY CALLED FOR IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

**PLAN SYMBOL**

— FTC —



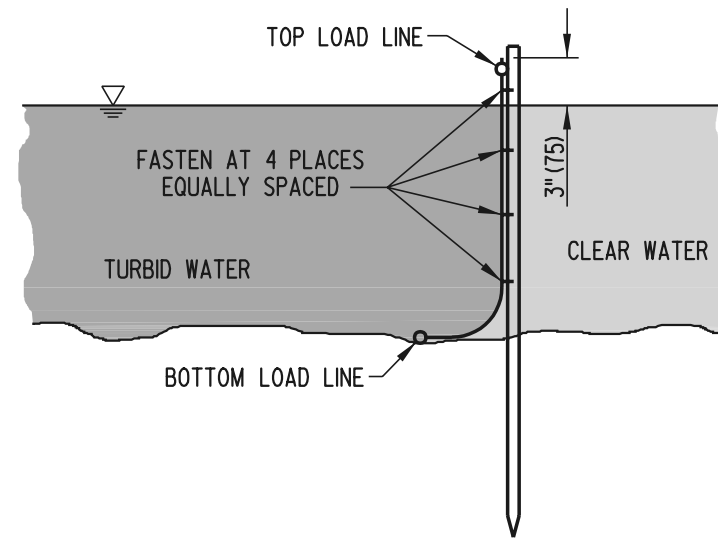
**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

**TURBIDITY CURTAIN**

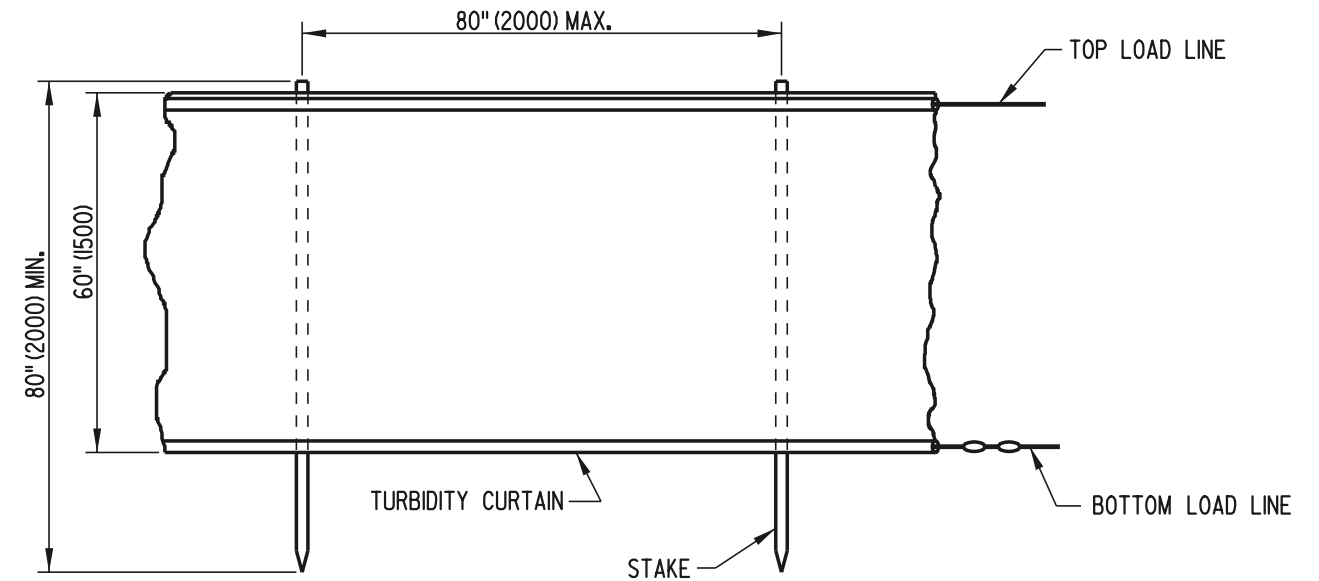
STANDARD NO. E-23 (2001)

SHT. 1 OF 2

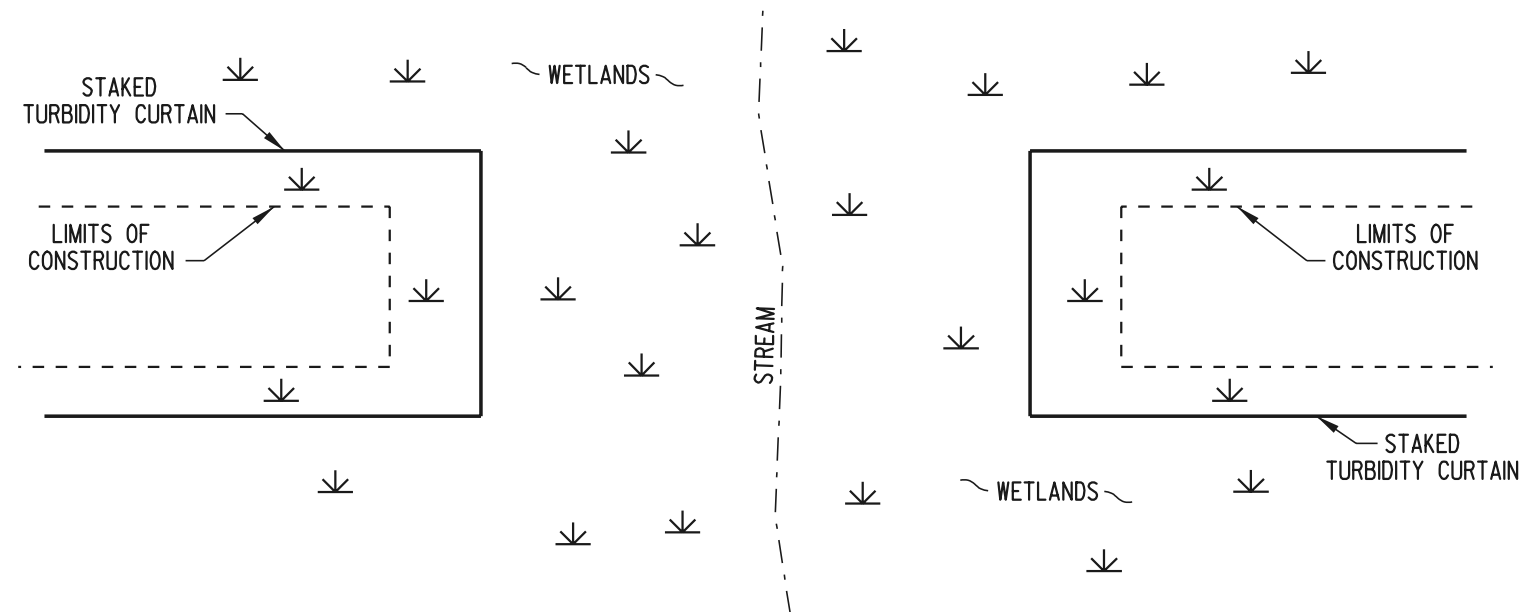
APPROVED *Ryan M. Harkness* 6/18/01  
CHIEF ENGINEER DATE  
RECOMMENDED *Michael P. Gotsch* 6/18/01  
DESIGN ENGINEER DATE



**SECTION**



**ELEVATION**



**PLAN VIEW**  
SHALLOW WATER/MARSH APPLICATION

**PLAN SYMBOL**

— STC —

**STAKED TURBIDITY CURTAIN**



**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

**TURBIDITY CURTAIN**

STANDARD NO.

E-23 (2001)

SHT.

2

OF

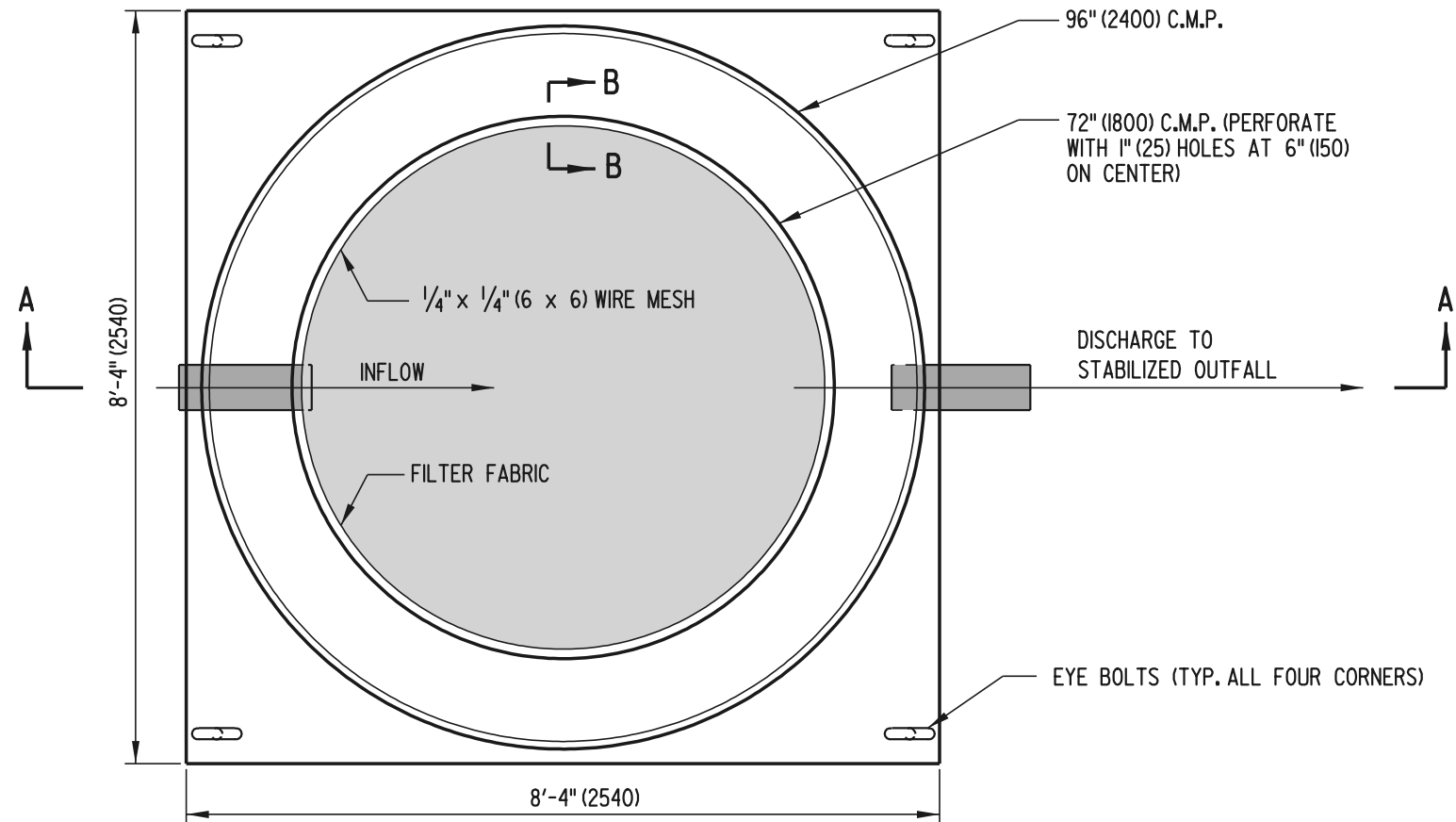
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APPROVED

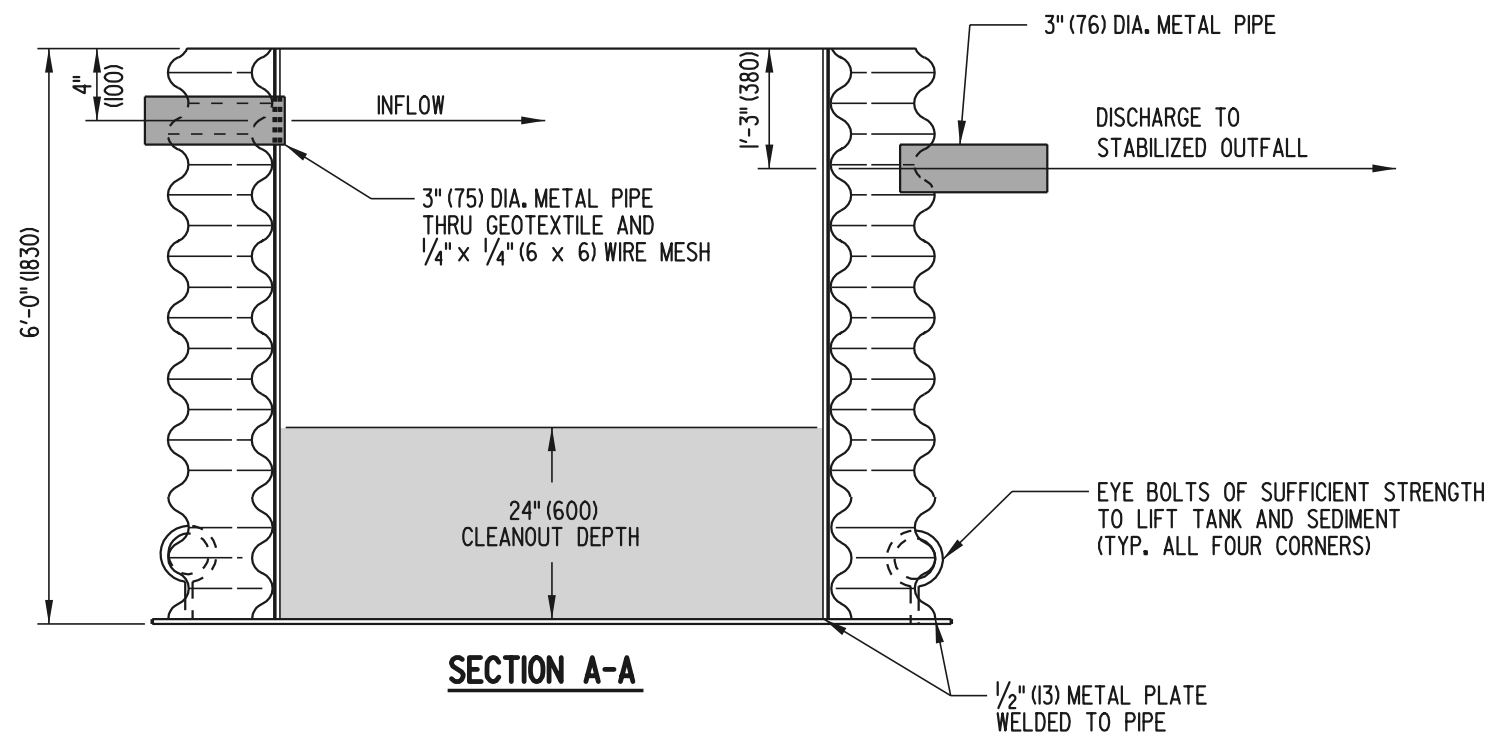
*Ryan M. Harkness*  
CHIEF ENGINEER  
DATE 6/18/01

RECOMMENDED

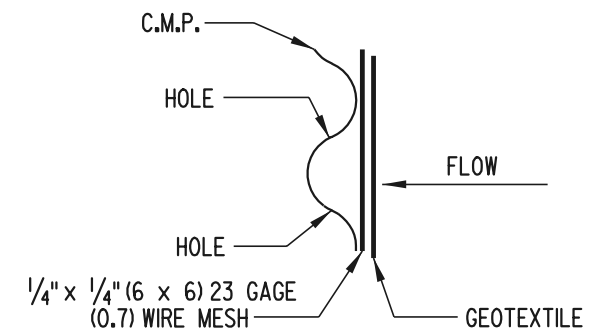
*Michael P. Gotsch*  
DESIGN ENGINEER  
DATE 6/15/01



**PLAN**



**SECTION A-A**



**SECTION B-B**

- NOTES:**
- 1). THE PORTABLE SEDIMENT TANK SHOWN MAY BE USED IN SITES WHERE SPACE IS LIMITED TO CONSTRUCT A DEWATERING BASIN.
  - 2). THE MAXIMUM PUMP DISCHARGE INTO THIS TYPICAL PORTABLE SEDIMENT TANK SHALL BE 425 GALLONS PER MINUTE (26 LITERS PER SECOND). THE FILTER FABRIC SHALL BE REPLACED WHEN THE PORTABLE SEDIMENT TANK CAN NO LONGER ALLOW THIS FLOW RATE, WHEN THERE IS A TEAR, OR WHEN DIRECTED BY THE ENGINEER.
  - 3). SEVERAL UN-CONNECTED OR CONNECTED IN PARALLEL PORTABLE SEDIMENT TANKS MAY BE USED WHEN A HIGHER FLOW RATE IS NEEDED TO DE-WATER THE JOB.
  - 4). OTHER DESIGNS MAY BE USED PROVIDED THE HYDRAULIC DESIGN IS SUBMITTED TO AND APPROVED BY THE STORMWATER ENGINEER.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**PORTABLE SEDIMENT TANK**

**STANDARD NO.**

**E-24 (2001)**

**SHT.**

**1**

**OF**

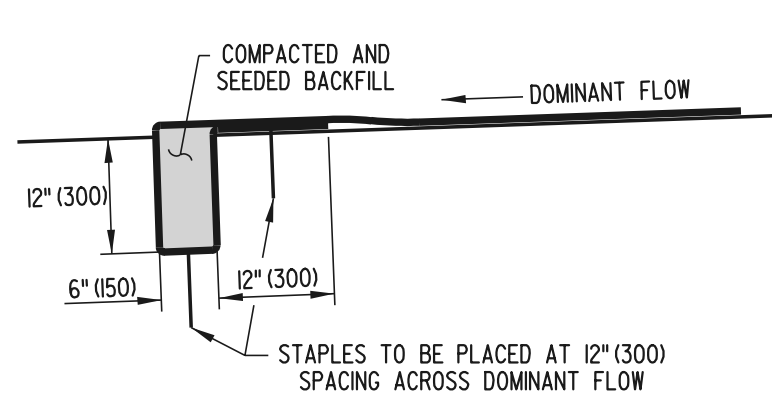
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**APPROVED**

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

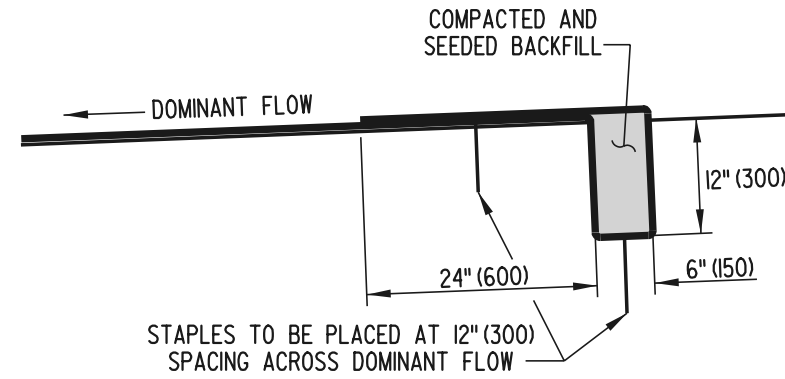
**RECOMMENDED**

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



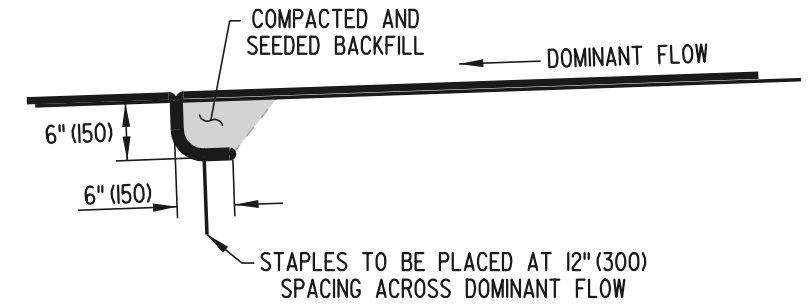
### INITIAL TRENCH ANCHOR DETAIL

APPLIED AT THE DOWNSTREAM END OF DITCH



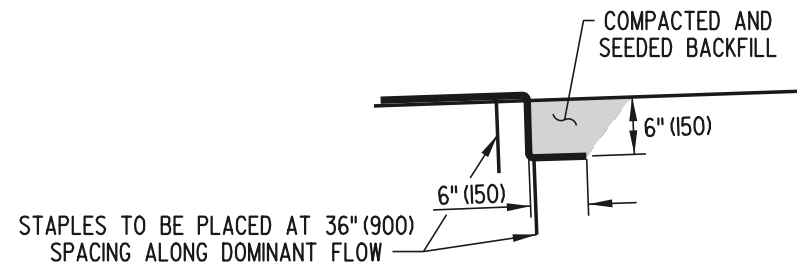
### TERMINAL TRENCH ANCHOR DETAIL

APPLIED AT THE UPSTREAM END OF DITCH

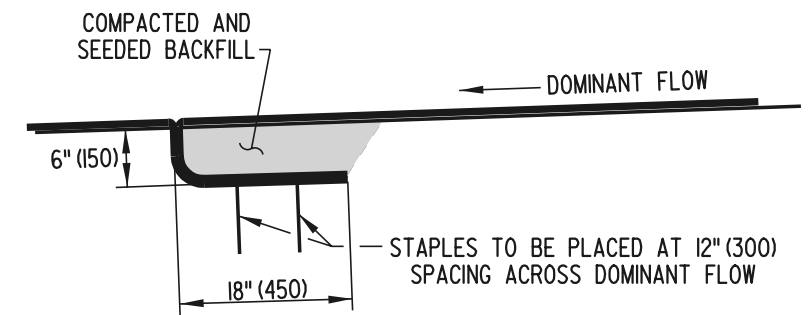


### CHECK SLOT DETAIL

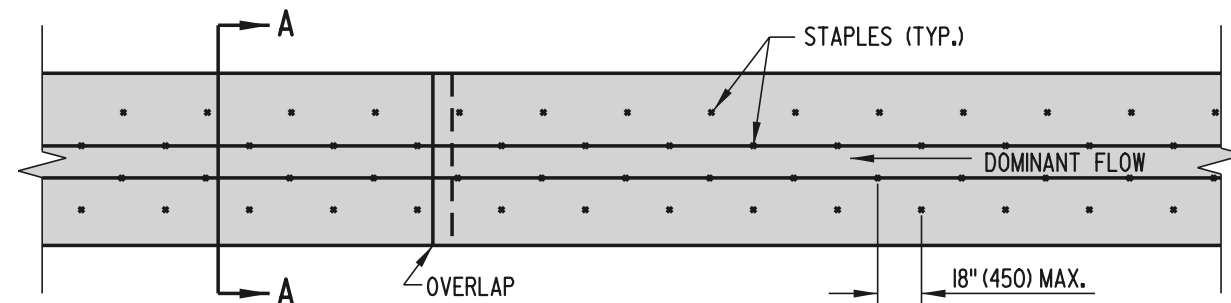
(AS NEEDED PER PLANS)



### LONGITUDINAL TRENCH ANCHOR DETAIL

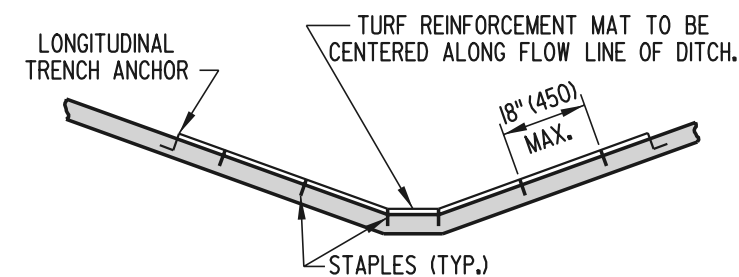


### OVERLAP DETAIL

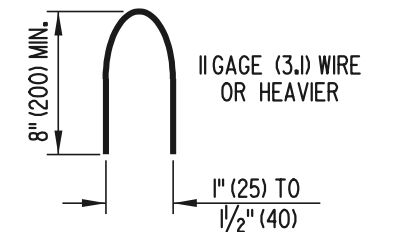


### STABILIZATION OF DITCHES PLAN

- NOTES: 1. ADDITIONAL STAPLES NOT SHOWN ARE REQUIRED AT OVERLAPS, ENDS, CHECK SLOTS AND EDGES. SEE APPROPRIATE DETAILS FOR STAPLE PLACEMENT.
2. STAPLES ARE TO BE STAGGERED.
3. TOPSOIL UNDER TURF REINFORCEMENT MAT IS TO BE TRACKED AND SEEDDED.

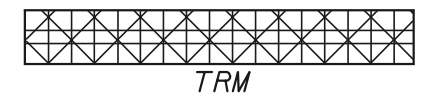


### STABILIZATION OF DITCHES SECTION A-A



### STAPLE DETAIL

### PLAN SYMBOL

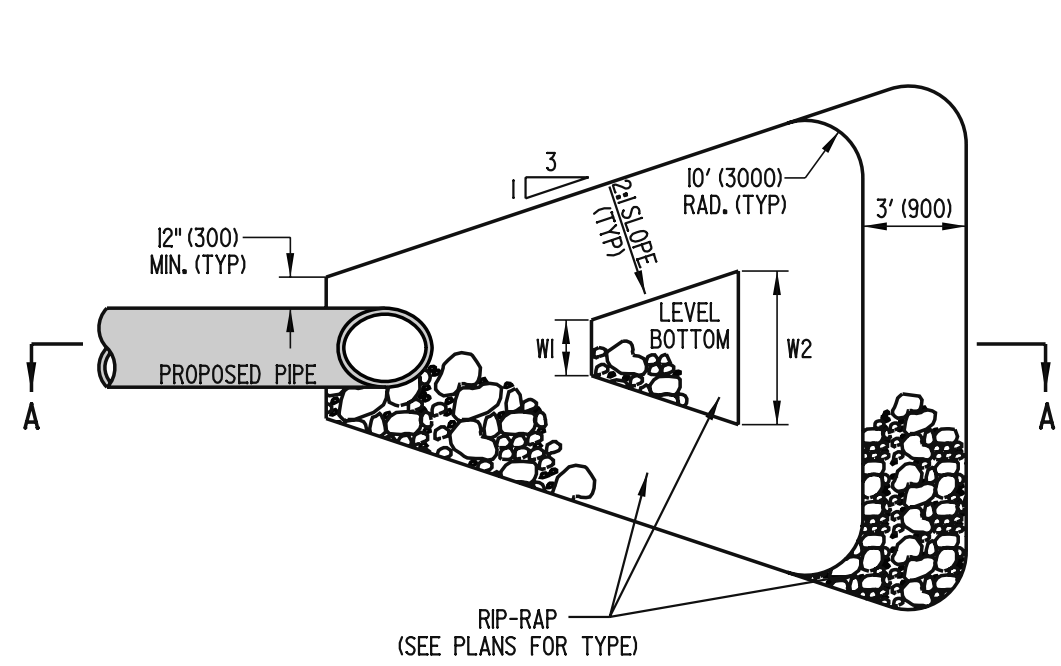


DELAWARE  
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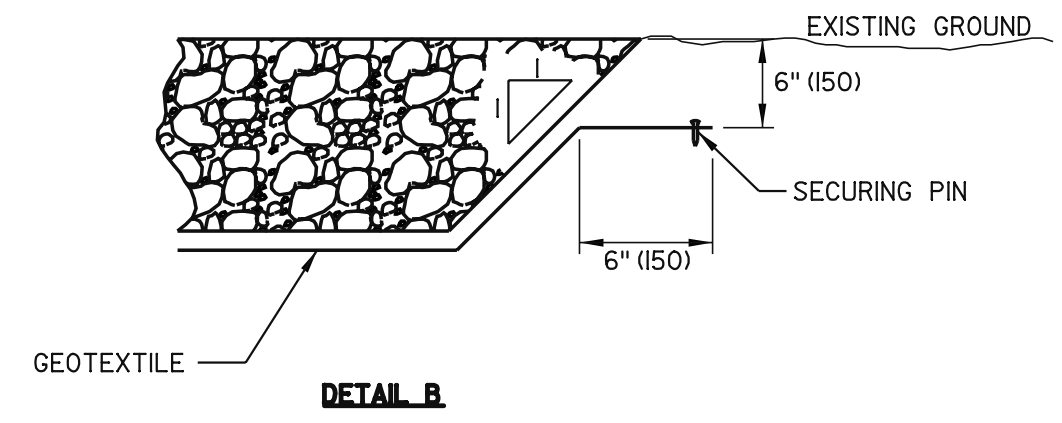
### TURF REINFORCEMENT MAT APPLICATIONS

STANDARD NO. E-25 (2001) SHT. 1 OF 1

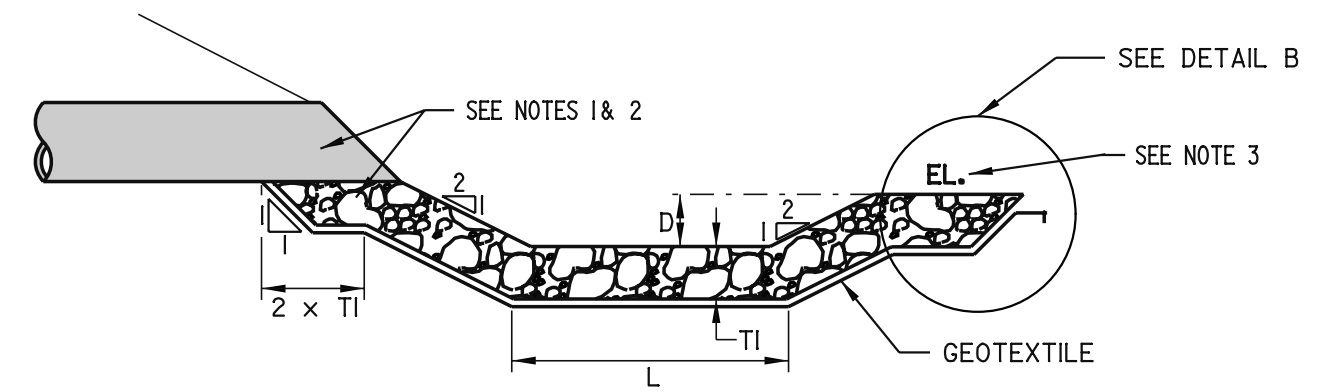
APPROVED *Ryan M. Hershman* 6/18/01  
CHIEF ENGINEER DATE  
RECOMMENDED *Michael P. Gotsch* 6/18/01  
DESIGN ENGINEER DATE



PLAN VIEW



DETAIL B



SECTION A-A

- NOTES:
1. RIPRAP IS TO BE PLACED PRIOR TO PLACING PIPE.
  2. PLACE DELAWARE NO. 3 STONE UNDER PIPE.
  3. ELEVATION (EL.) SHOULD NOT BE HIGHER THAN PIPE INVERT.
  4. REFER TO THE PIPE ENERGY DISSIPATOR SCHEDULE ON THE CONSTRUCTION PLANS FOR THE VALUE OF DIMENSION VARIABLES.



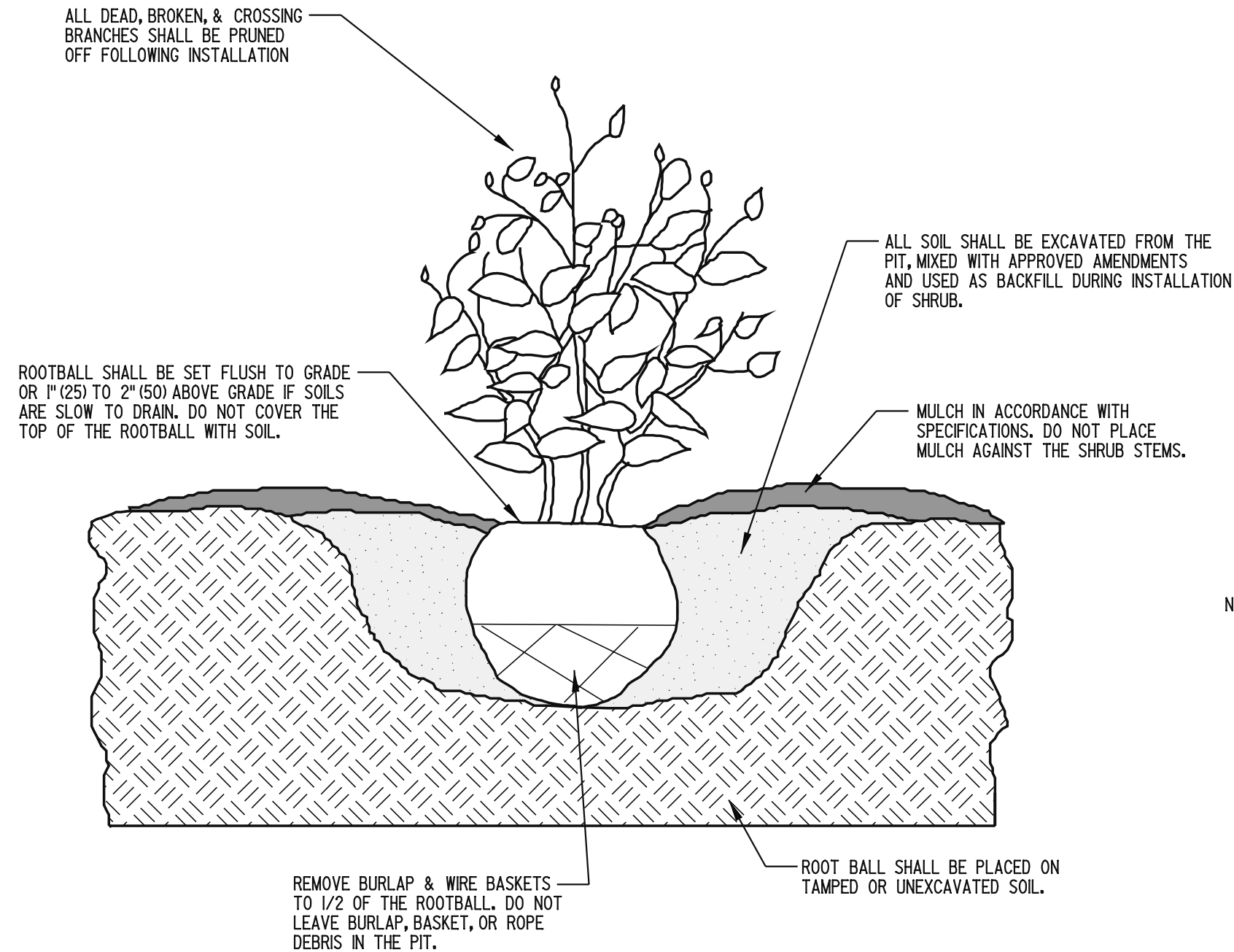
DELAWARE  
DEPARTMENT OF TRANSPORTATION

RIPRAP ENERGY DISSIPATOR DETAIL

STANDARD NO. E-26 (2006)

SHT. 1 OF 1

APPROVED *[Signature]* 10/10/06  
CHIEF ENGINEER DATE  
RECOMMENDED *[Signature]* 10/13/06  
DESIGN ENGINEER DATE



NOTES:

- 1). BASE OF PLANTING PIT SHALL BE A MINIMUM WIDTH OF TWICE THE ROOT BALL SIZE AND A MAXIMUM OF THREE TIMES THE ROOT BALL SIZE.
- 2). SHRUBS SHALL BE INSTALLED IN MASSES OF NO LESS THAN 3 PLANTS. A MINIMUM OF 6' (1800) WIDTH IS REQUIRED FROM THE BACK OF CURB TO THE EDGE OF SIDEWALK FOR INSTALLATION OF SHRUBS.
- 3). ALL PRUNING SHALL BE DONE BY AN I.S.A. CERTIFIED ARBORIST, CERTIFIED NURSERY PROFESSIONAL, OR UNDER THE DIRECTION THEREOF. DO NOT HEAVILY PRUNE SHRUBS AT PLANTING.
- 4). AUGERED HOLES SHALL BE HAND DUG TO FINAL WIDTH AND TO ELIMINATE GLAZING.
- 5). ALL SHRUB MASSES SHALL BE MULCHED AS ONE CONTINUOUS BED.

**ROADSIDE SHRUB PLANTING DETAIL**



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PLANTING DETAILS

STANDARD NO. L-1 (2006)

SHT. 1 OF 3

APPROVED

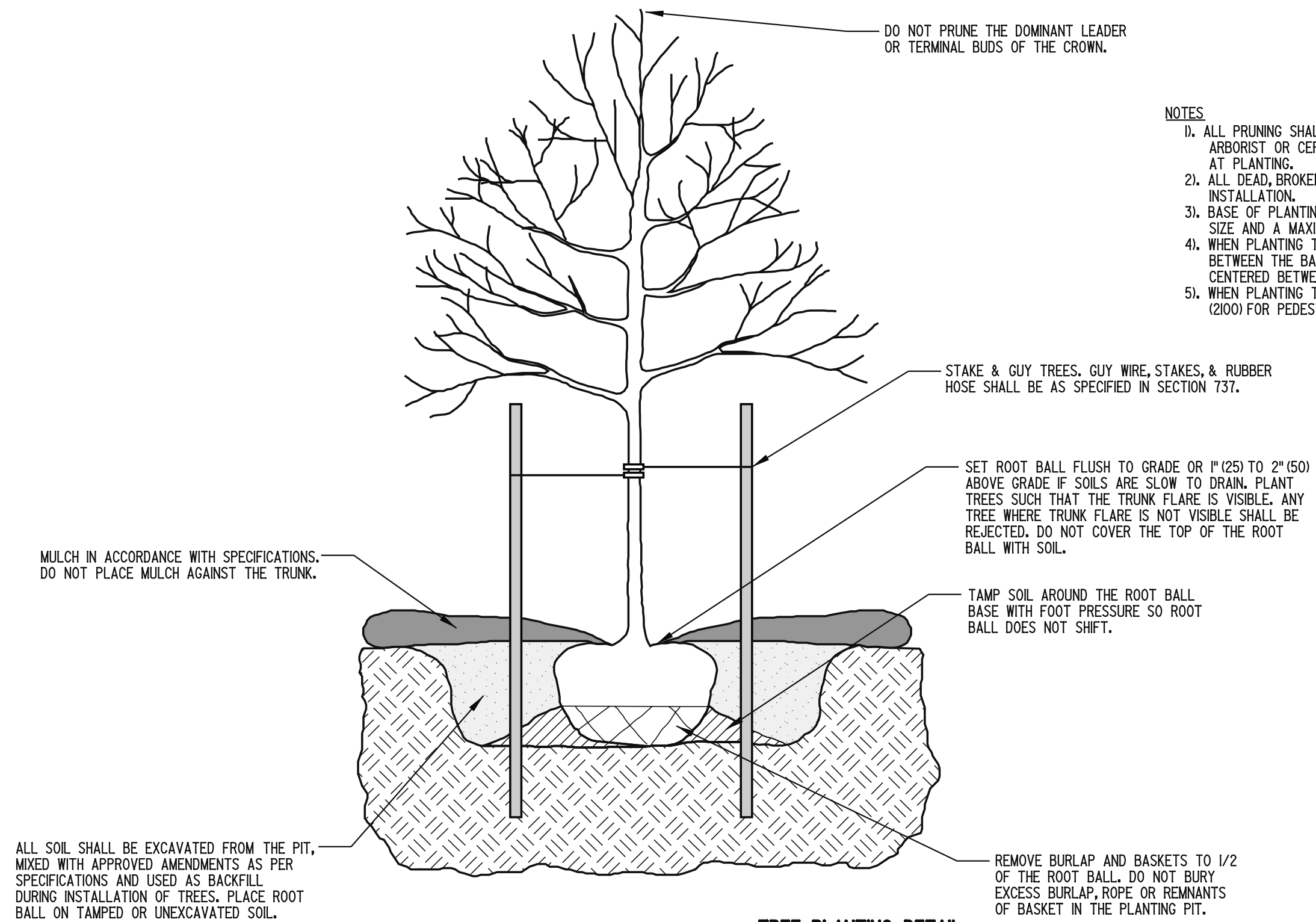
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

RECOMMENDED



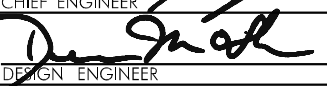
*Dan Smith*  
DESIGN ENGINEER

10/13/06  
DATE



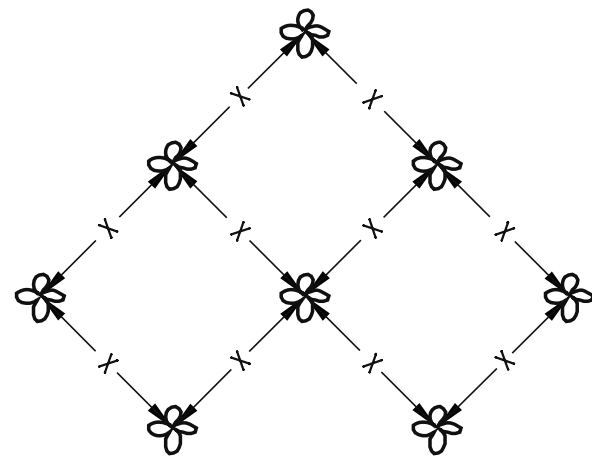
- NOTES**
- 1). ALL PRUNING SHALL BE DONE BY OR UNDER THE DIRECTION OF, AN I.S.A. CERTIFIED ARBORIST OR CERTIFIED NURSERY PROFESSIONAL. DO NOT HEAVILY PRUNE TREES AT PLANTING.
  - 2). ALL DEAD, BROKEN, & CROSSING BRANCHES SHALL BE PRUNED OFF FOLLOWING INSTALLATION.
  - 3). BASE OF PLANTING PIT SIZE SHALL BE A MINIMUM WIDTH OF TWICE THE ROOT BALL SIZE AND A MAXIMUM OF THREE TIMES THE ROOT BALL SIZE.
  - 4). WHEN PLANTING TREES ALONG STREETS, THERE MUST BE A MINIMUM OF 6' (1800) BETWEEN THE BACK OF CURB AND THE EDGE OF SIDEWALK AND SHALL BE CENTERED BETWEEN THE BACK OF CURB AND THE EDGE OF SIDEWALK.
  - 5). WHEN PLANTING TREES ALONG SIDEWALKS, THE TREE SHALL BE LIMBED TO 7' (2100) FOR PEDESTRIAN CLEARANCE.

**TREE PLANTING DETAIL**

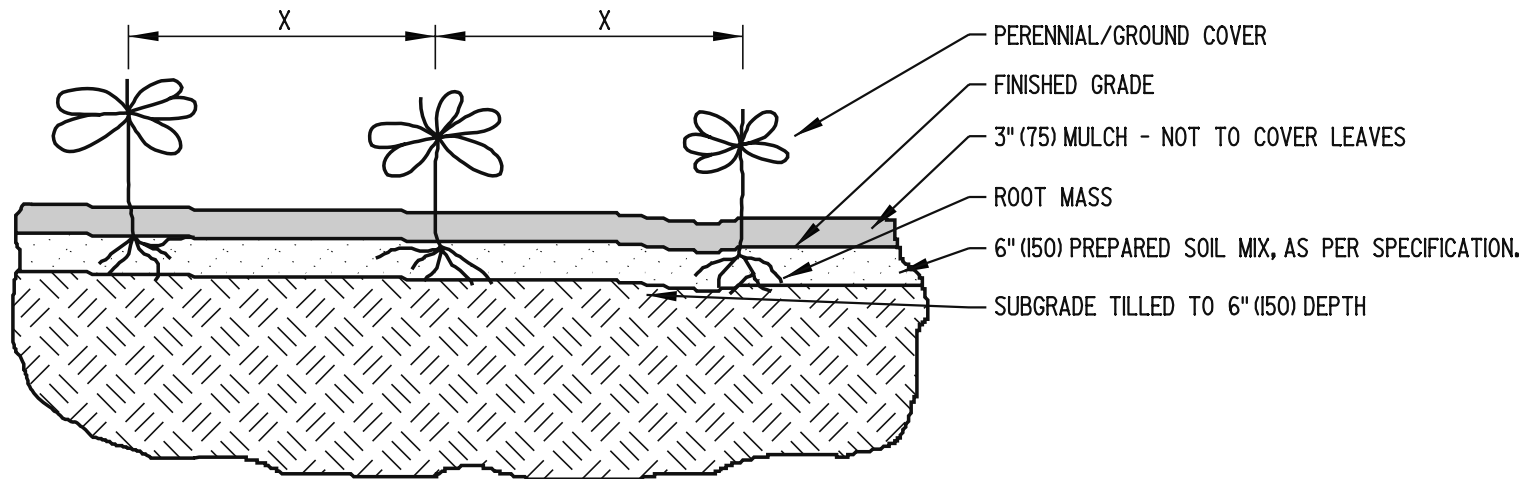
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	<b>STANDARD NO.</b> L-1 (2006)	<b>SHT.</b> 2	<b>OF</b> 3	<b>RECOMMENDED</b>  <b>10/13/06</b> <small>DESIGN ENGINEER DATE</small>



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






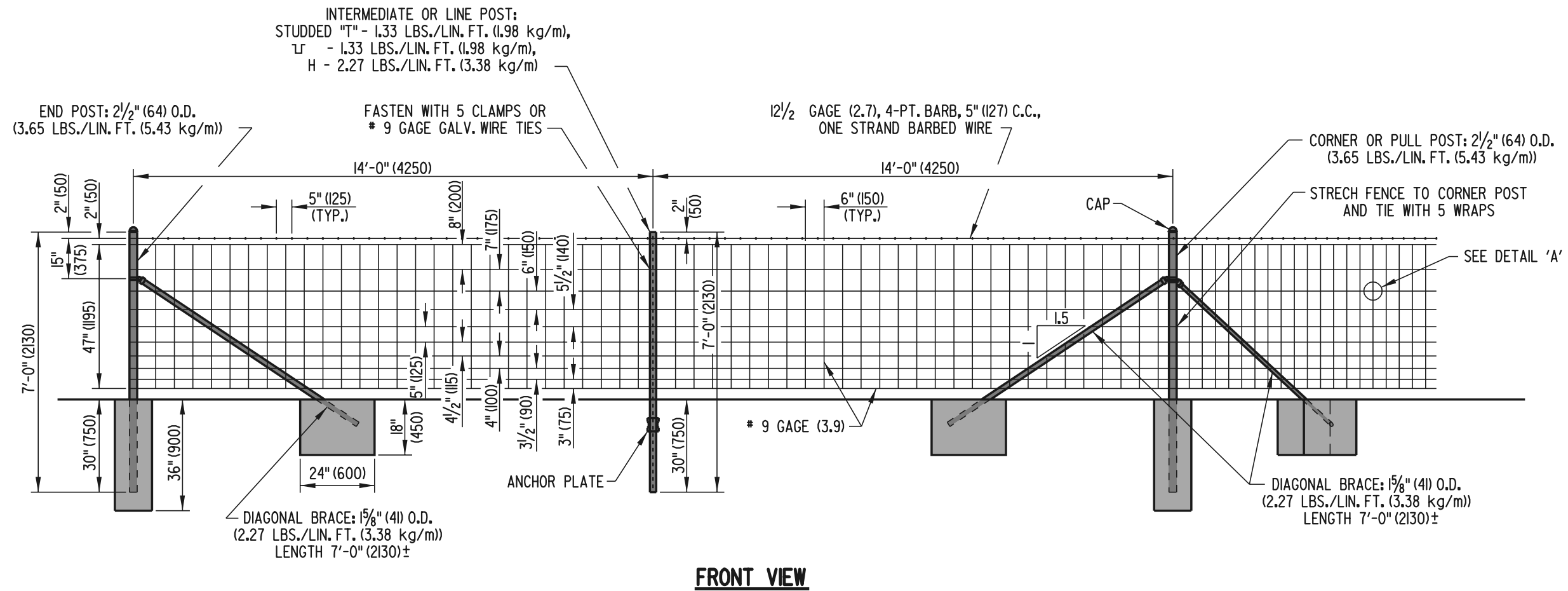
PLAN VIEW

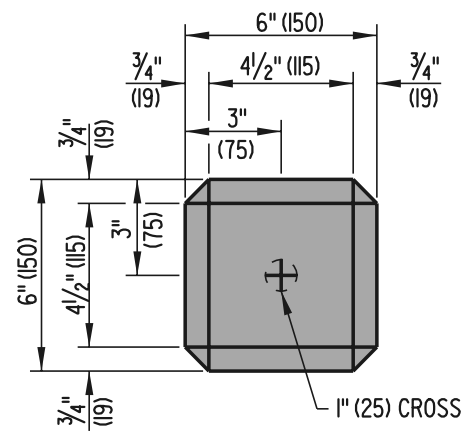


SECTION VIEW

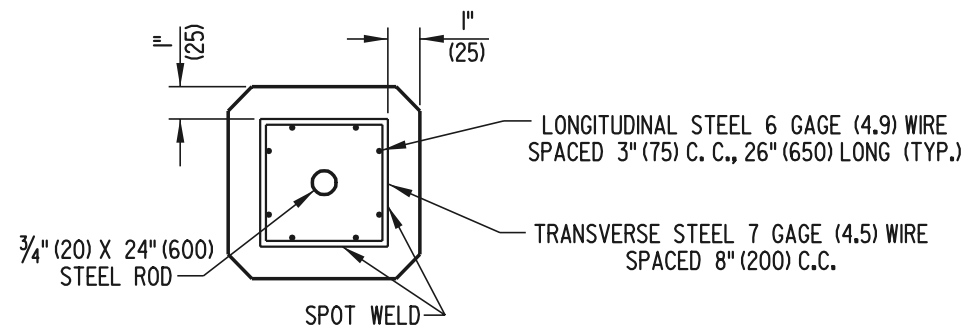
PERENNIAL/GROUNDCOVER PLANTING DETAIL

 DELAWARE DEPARTMENT OF TRANSPORTATION	PLANTING DETAILS			APPROVED  <u>10/10/06</u>
	STANDARD NO. L-1 (2006)	SHT. 3	OF 3	RECOMMENDED  <u>10/13/06</u>

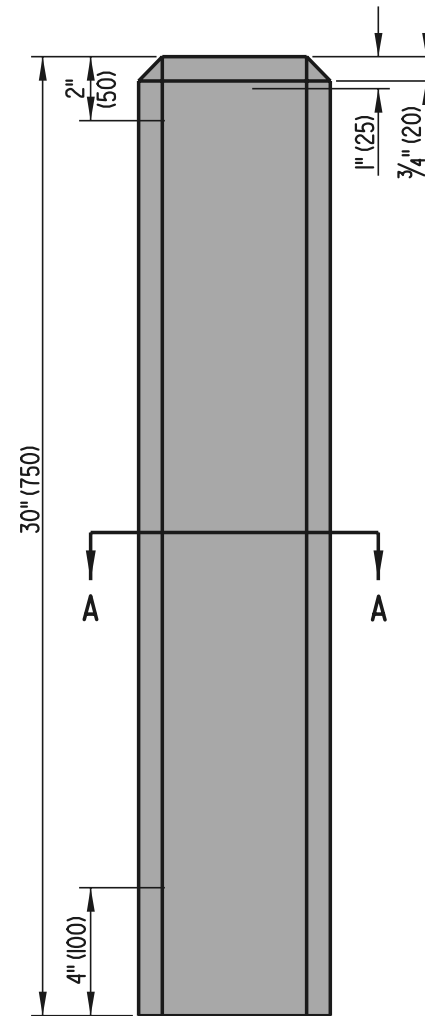




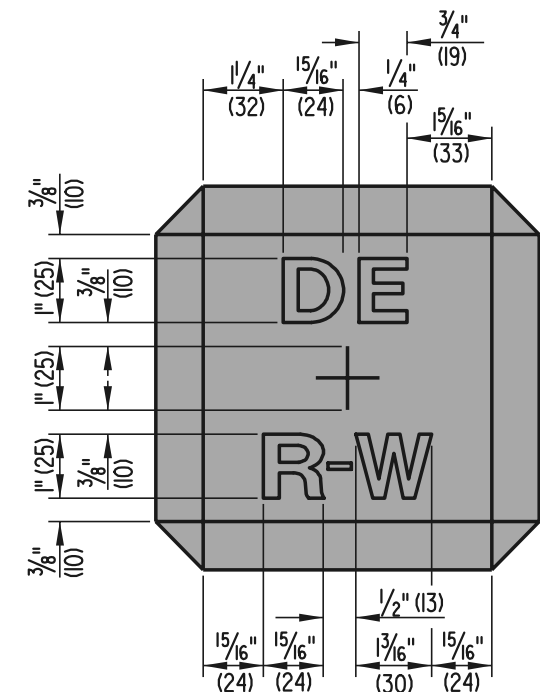
**TOP**



**SECTION A-A**



**ELEVATION**



**TOP DETAIL**

- NOTES :** 1. LONGITUDINAL STEEL SHALL BE HELD IN PLACE BY CRADLES.  
2. LETTERS AND CROSS TO BE COUNTERSUNK IN TOP OF MARKER 1/4" (6).



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DEPARTMENT OF TRANSPORTATION

CONCRETE MONUMENT

STANDARD NO.

M-2 (2001)

SHT. 1

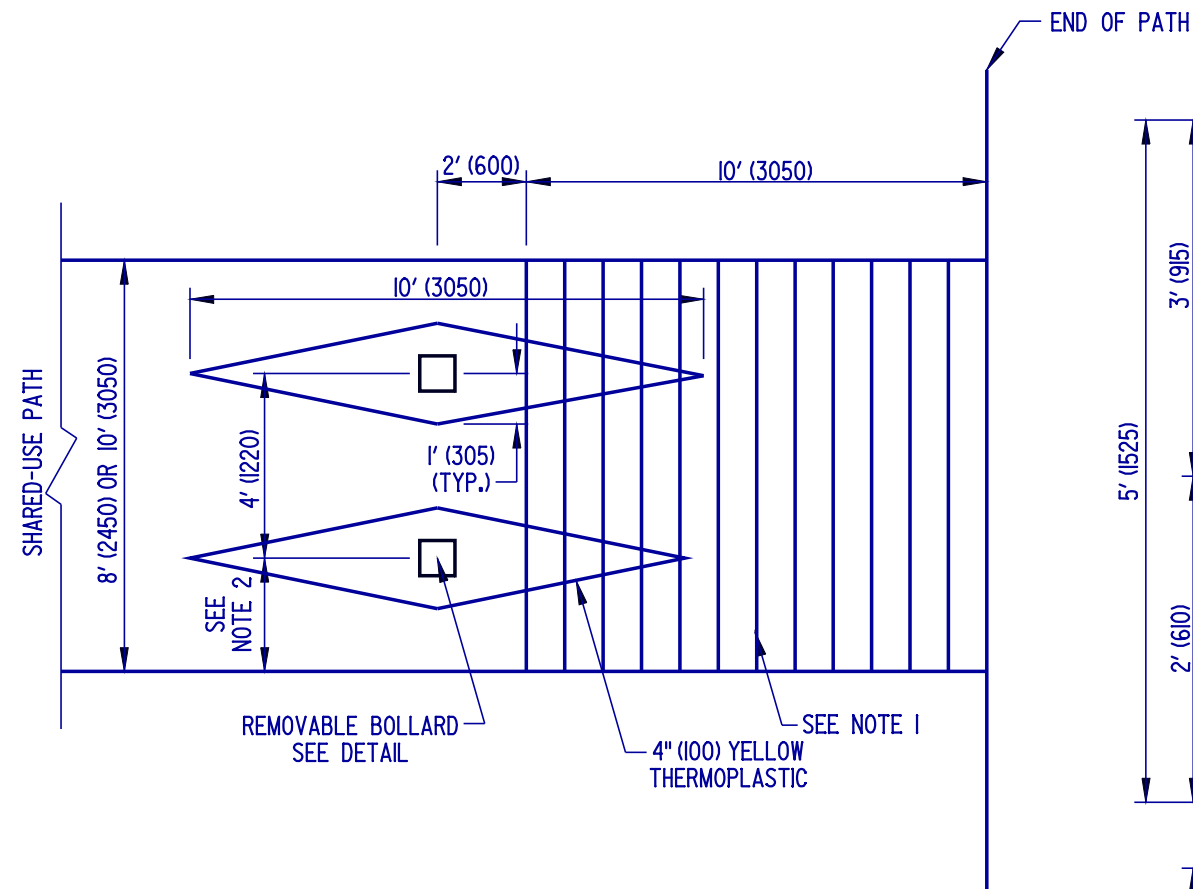
OF 1

APPROVED

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

RECOMMENDED

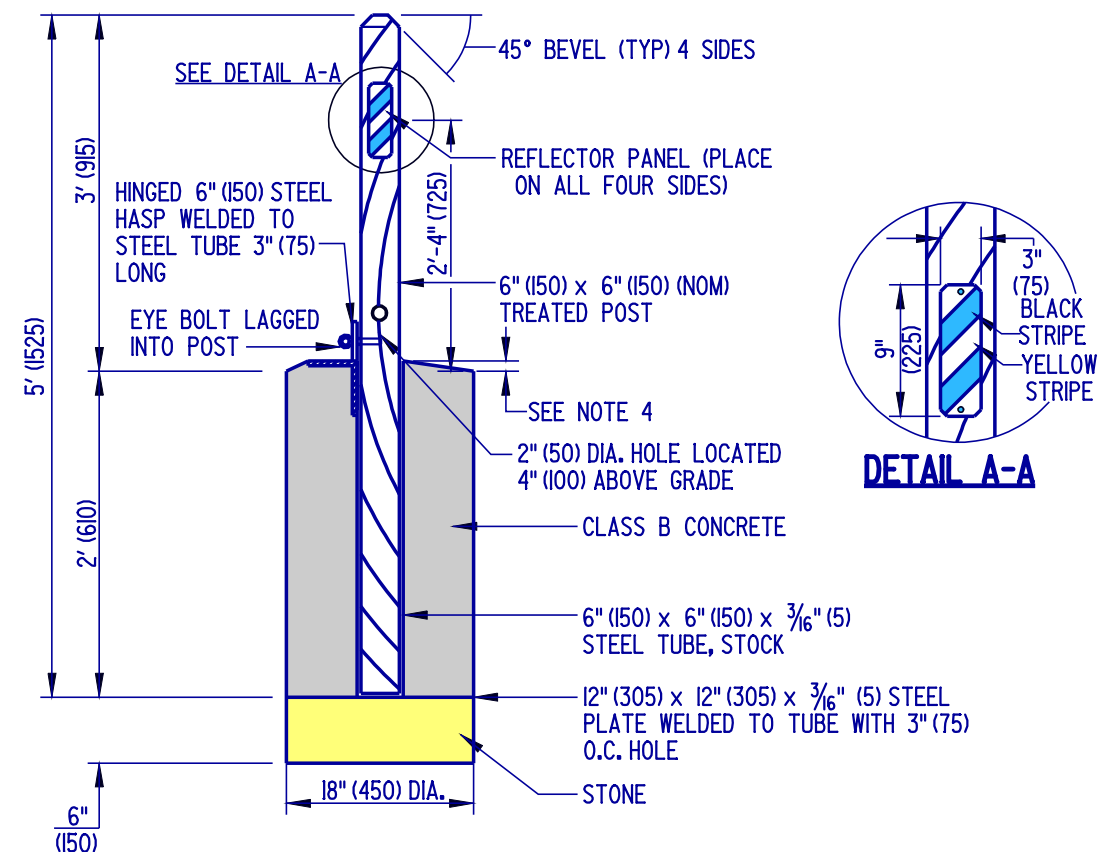
*Michael R. Galt* 6/18/01  
DESIGN ENGINEER DATE



### SHARED USE PATH INTERSECTION

**NOTES:**

1. THE 4" (100) CONCRETE SHARED-USE PATH SHALL BE FINISHED TO INCLUDE A TEXTURED WARNING SURFACE BY USING A JOINT STRIKE TO PRODUCE A 1/2" (12) DEEP V-JOINT AT 6" (150) O.C. PAYMENT FOR INSTALLING THE GROOVED FINISH SHALL BE INCIDENTAL TO THE SIDEWALK CONSTRUCTION.
2. FOR 8' (2450) AND 10' (3050) PATH WIDTH, THE OUTSIDE DIMENSION FROM CENTER OF BOLLARD TO EDGE OF PATH SHALL BE 2' (610) AND 3' (915) RESPECTIVELY.
3. IF THE SHARED USE PATH ENDS AT A ROADWAY, THEN DETECTABLE WARNING TRUNCATED DOMES 24" (600) LONG AND THE FULL WIDTH OF THE PATH SHALL BE INSTALLED. SEE SHEET C-2.
4. STEEL TUBE TO EXTEND 1/2" (13) ABOVE GROUND WITH CONCRETE TO SLOPE AWAY FROM TUBE TO KEEP WATER AND SEDIMENT FROM DRAINING INTO TUBE.



### REMOVABLE BOLLARD



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### BOLLARD DETAILS

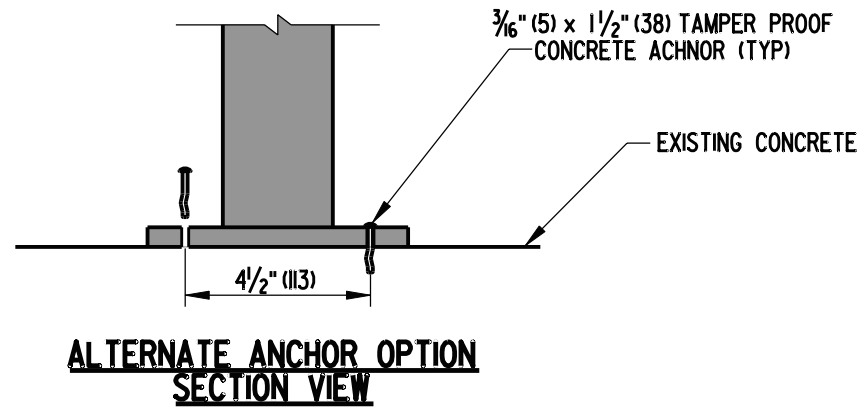
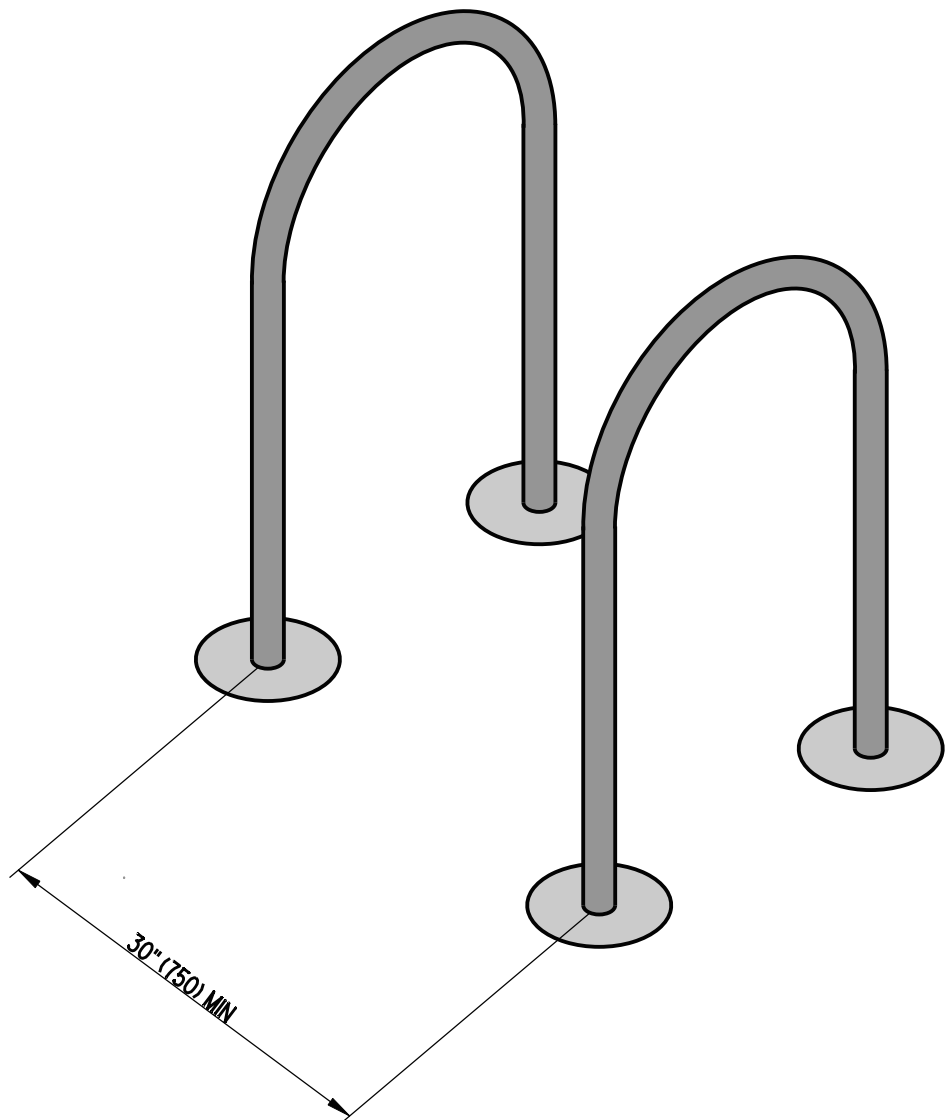
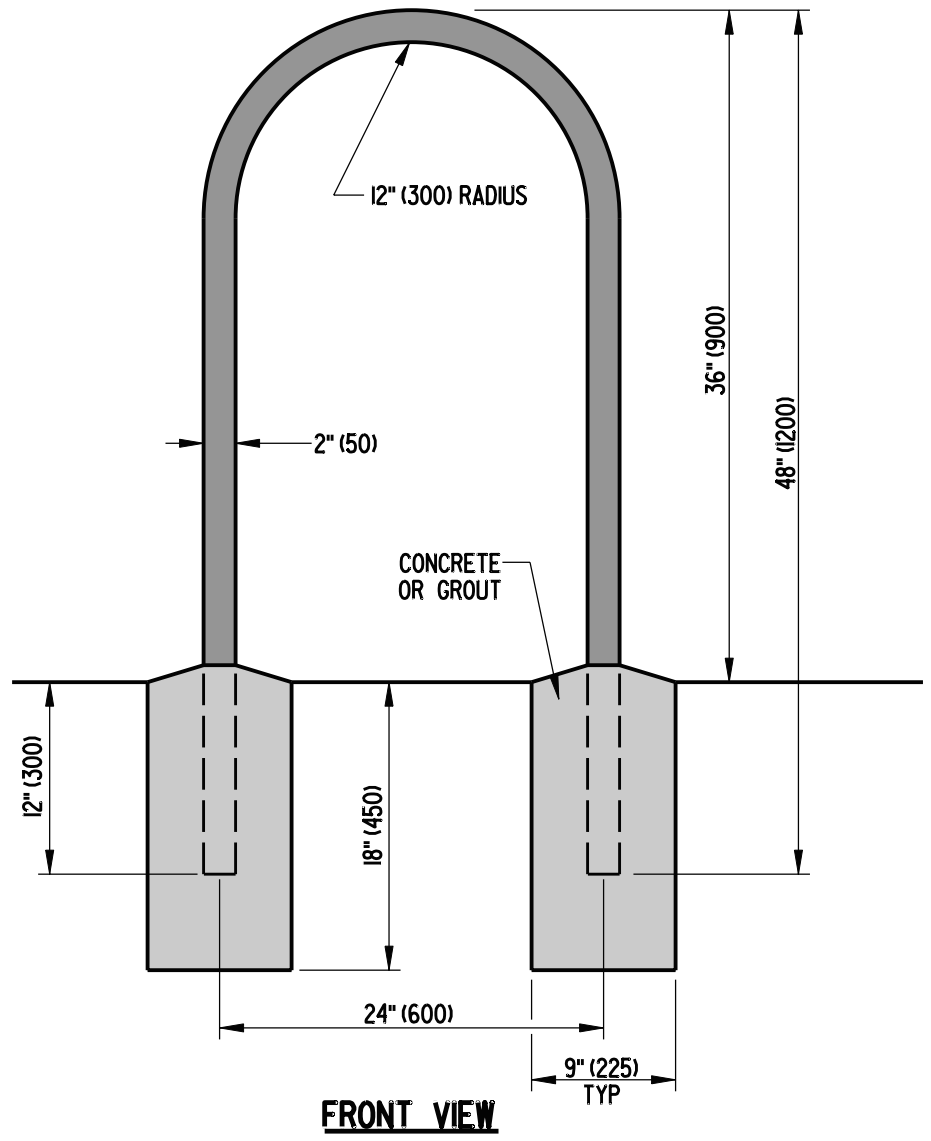
STANDARD NO. M-3 (2004)




SHT. 1 OF 1

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

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

SCALE : N.T.S.



 <b>DELAWARE DEPARTMENT OF TRANSPORTATION</b>	<b>BIKE RACK DETAILS</b>			<b>APPROVED</b>  <b>10/24/07</b> CHIEF ENGINEER DATE
	<b>STANDARD NO.</b> M-4 (2007)	<b>SHT.</b> 1	<b>OF</b> 1	<b>RECOMMENDED</b>  <b>10/23/07</b> DESIGN ENGINEER DATE

SCALE : N.T.S.



**SECTION A-A**



## TYPICAL JOINT DETAIL



PATH

— ATTACH WITH 4-12d HOT DIP GALVANIZED RING NAILS (TYP.)

4" (100) x 4" (100) (NOMINAL)  
TREATED POSTS (TYP.)

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.



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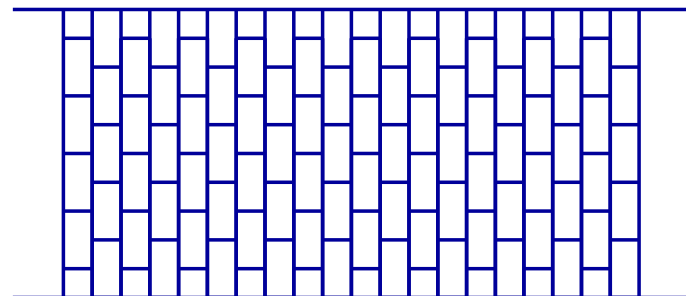
## WOOD RAIL FENCE DETAILS

STANDARD NO. M-5 (2004)

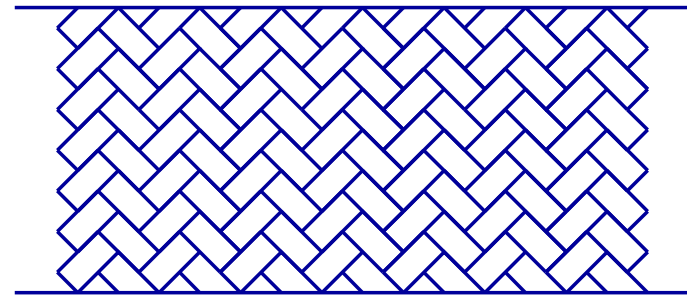
**SHT. 1 OF 1**

APPROVED Carolann Wicks 1/10/05  
CHIEF ENGINEER DATE

RECOMMENDED	<i>Dennis M. O'Hea</i>	1/13/05
	DESIGN ENGINEER	DATE



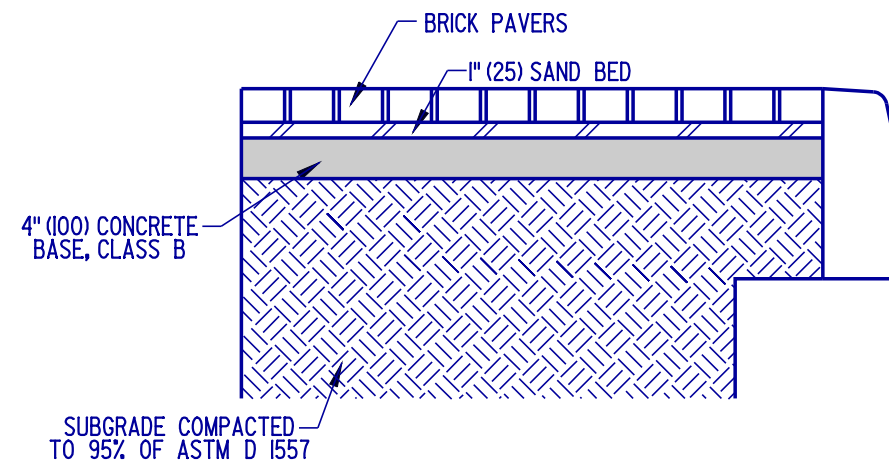
**4" (100) x 8" (200) RUNNING BOND PATTERN**



**4" (100) x 8" (200) 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, 8" (200) WHITE LINES SHOULD BE PLACED ON BOTH SIDES.
4. THE PATTERNS ABOVE ARE THE PREFERRED PATTERNS AVAILABLE FOR SIDEWALK OR CROSSWALK APPLICATIONS.



**BRICK PAVER SIDEWALK DETAIL**

**NOTES:**

1. ALL PAVERS ARE TO BE "BRICK RED" UNLESS OTHERWISE SPECIFIED ON THE PLANS. THE PATTERN SHALL BE SPECIFIED ON THE PLANS.
2. EXPANSION JOINT MAY BE NEEDED ON NON-CURB SIDE OF BRICK PAVER SIDEWALK IF THAT SIDE IS AGAINST BUILDING OR OTHER CONFINING FEATURE.



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**PATTERNED HOT-MIX OR CONCRETE & BRICK PAVER DETAILS**

STANDARD NO. M-6 (2004)

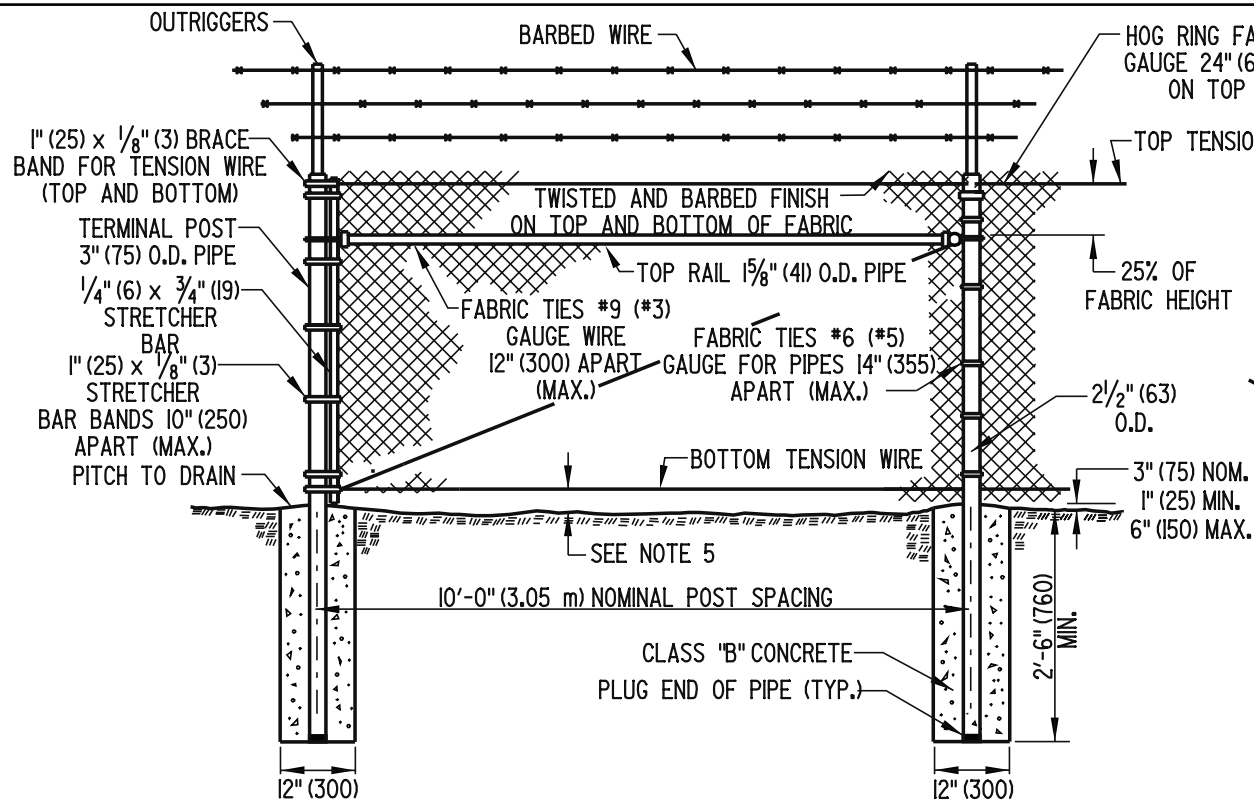
SHT. 1 OF 1

APPROVED

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

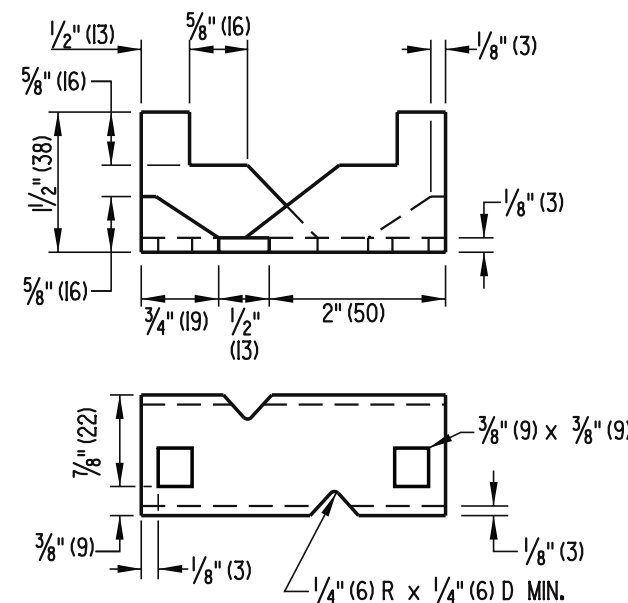
RECOMMENDED

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

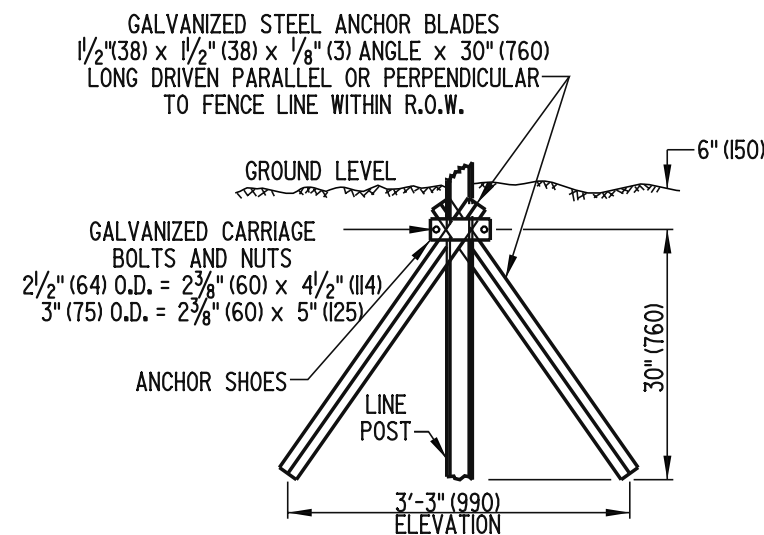


**CHAIN-LINK FENCE**

**TENSION WIRE CONNECTION AT ROUND INTERMEDIATE OR CORNER POST**

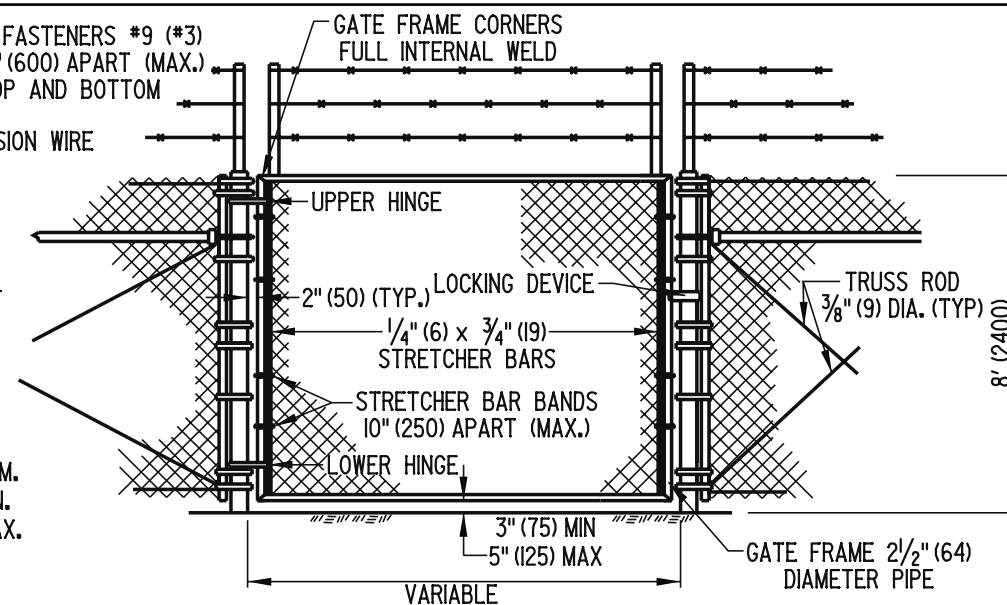


**ANCHOR SHOE**

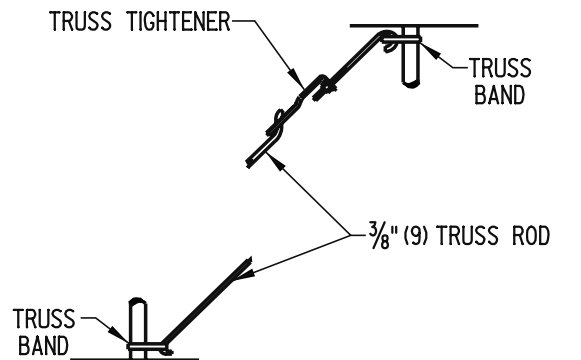


**DRIVE ANCHOR SHOE ASSEMBLY**

(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.



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**CHAIN LINK FENCE DETAILS**

**STANDARD NO.**

**M-7 (2006)**

**SHT.**

**1**

**OF**

**1**

**APPROVED**

*Frank Taylor*  
CHIEF ENGINEER

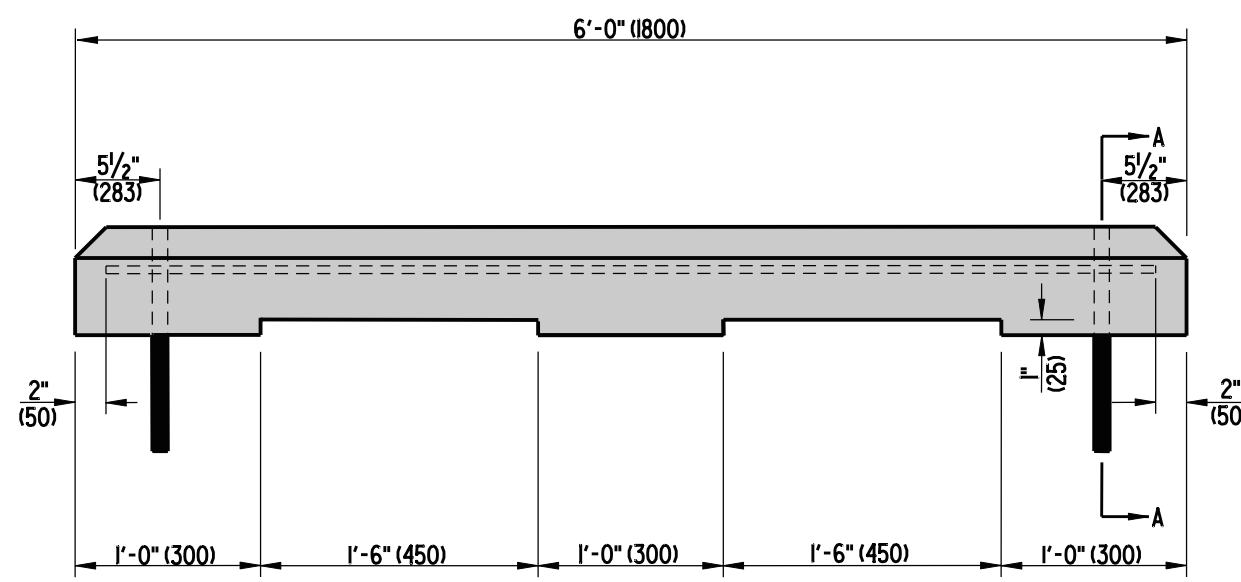
10/10/06  
DATE

**RECOMMENDED**

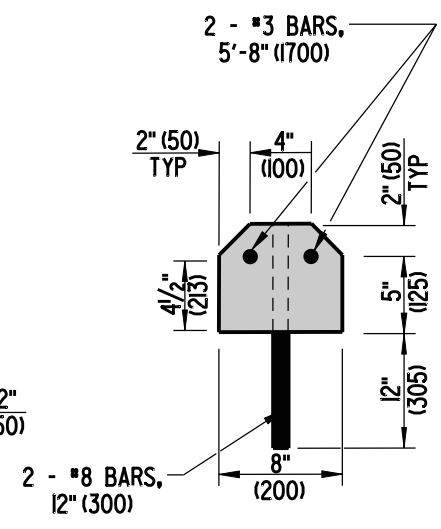
*Don Smith*  
DESIGN ENGINEER

10/13/06  
DATE








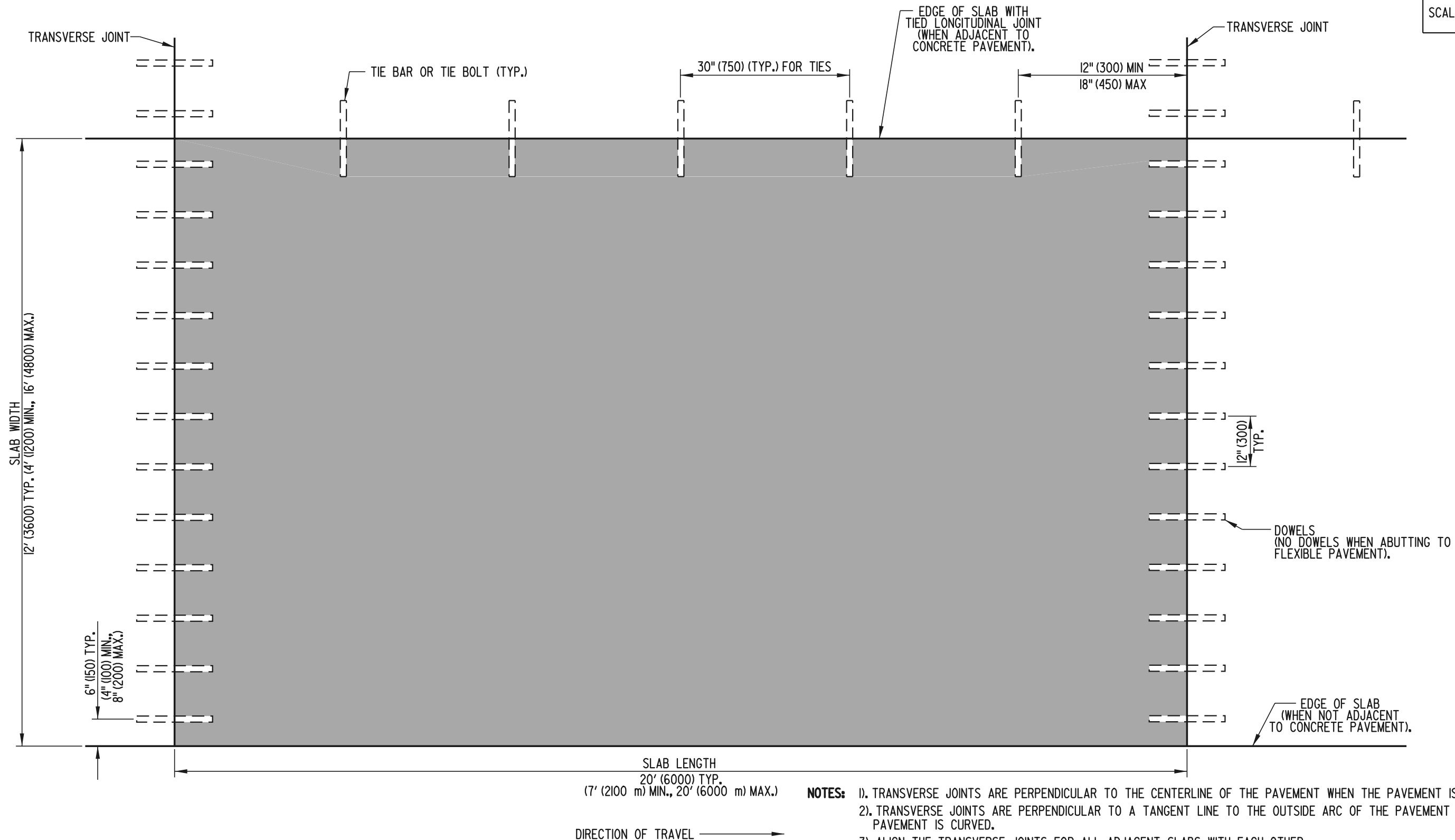
ELEVATION



SECTION A-A


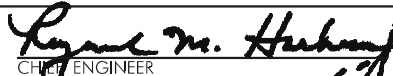

 DELAWARE DEPARTMENT OF TRANSPORTATION	P.C.C. PARKING BUMPER			APPROVED  10/24/07 CHIEF ENGINEER DATE
	STANDARD NO. M-8 (2007)	SHT. 1	OF 1	RECOMMENDED  10/23/07 DESIGN ENGINEER DATE

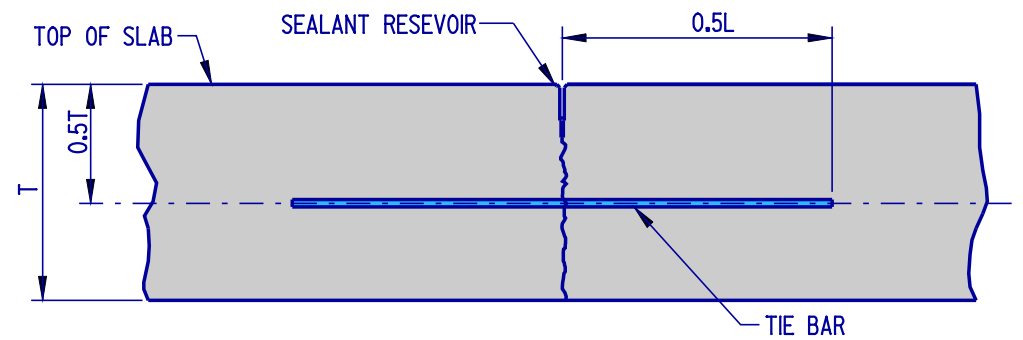
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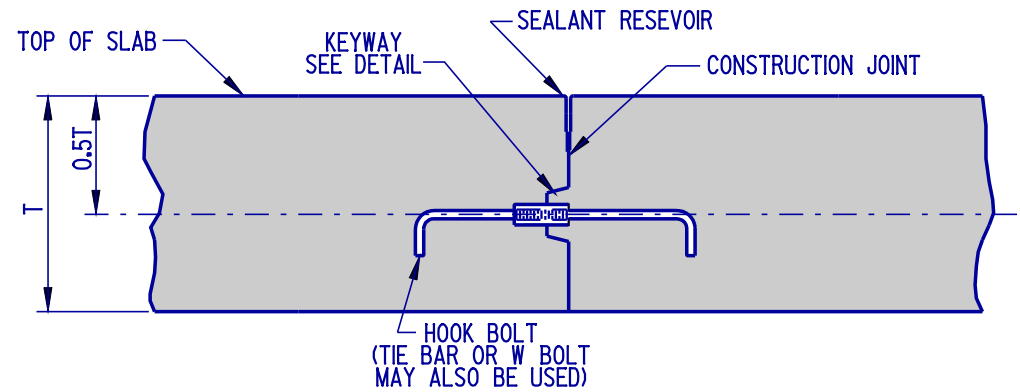
- NOTES:**
- 1). TRANSVERSE JOINTS ARE PERPENDICULAR TO THE CENTERLINE OF THE PAVEMENT WHEN THE PAVEMENT IS STRAIGHT.
  - 2). TRANSVERSE JOINTS ARE PERPENDICULAR TO A TANGENT LINE TO THE OUTSIDE ARC OF THE PAVEMENT WHEN THE PAVEMENT IS CURVED.
  - 3). ALIGN THE TRANSVERSE JOINTS FOR ALL ADJACENT SLABS 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 EDGE LINE OR CENTERLINE.

**SLAB PLAN (WITH DOWEL AND TIE LOCATIONS)**

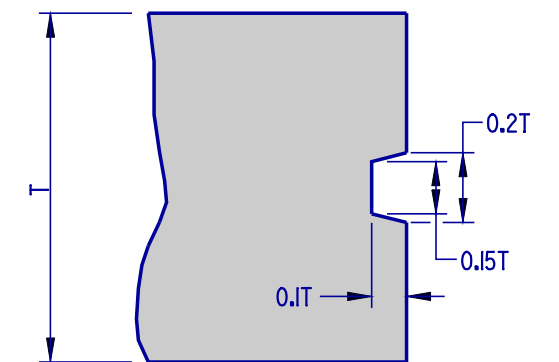
 <b>DELAWARE</b> <b>DEPARTMENT OF TRANSPORTATION</b>	<b>P.C.C. PAVEMENT</b>			<b>APPROVED</b>  <b>6/18/01</b> CHIEF ENGINEER DATE
	<b>STANDARD NO. P-1 (2001)</b>	<b>SHT. 1</b>	<b>OF 5</b>	<b>RECOMMENDED</b>  <b>6/18/01</b> DESIGN ENGINEER DATE



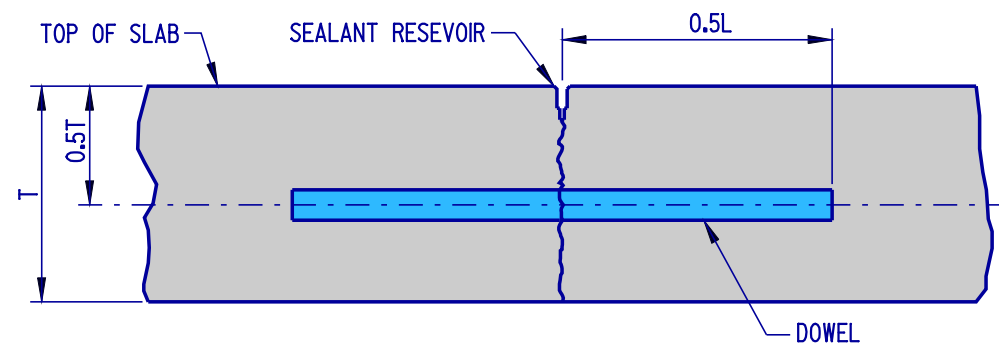
**LONGITUDINAL SAW-CUT JOINT DETAIL**



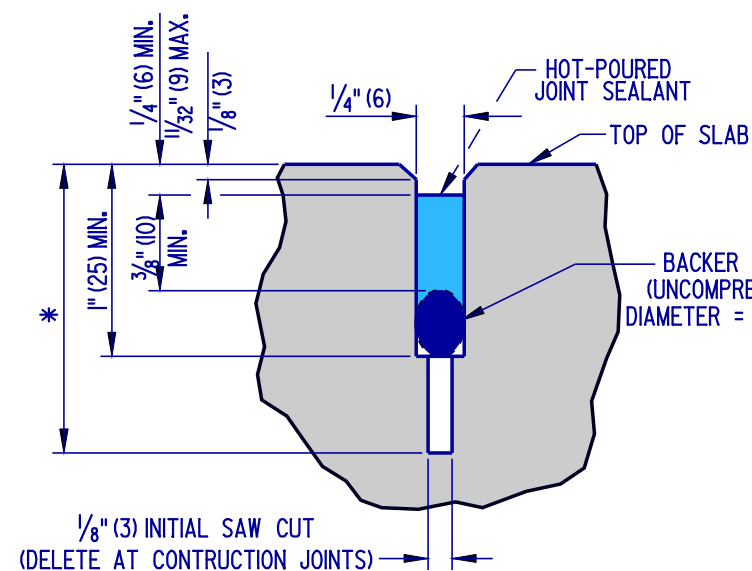
**LONGITUDINAL CONSTRUCTION JOINT DETAIL**



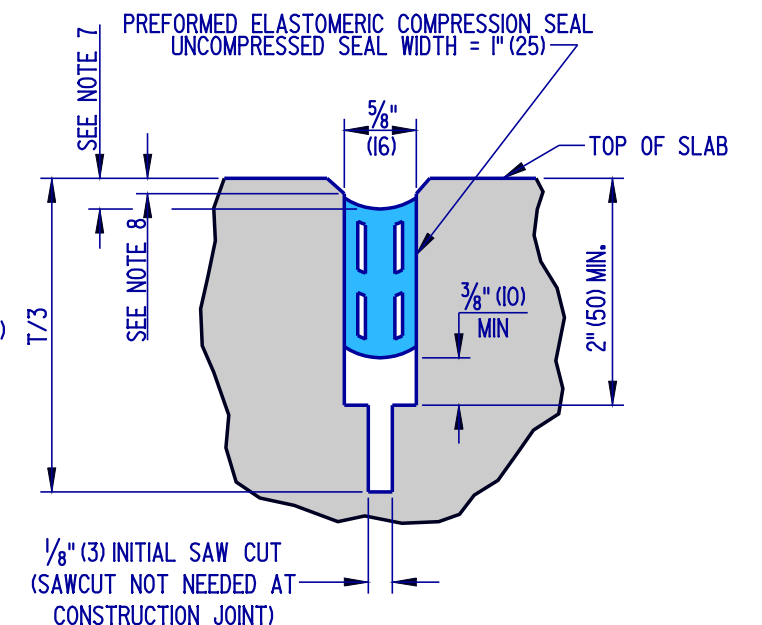
**KEYWAY DETAIL**



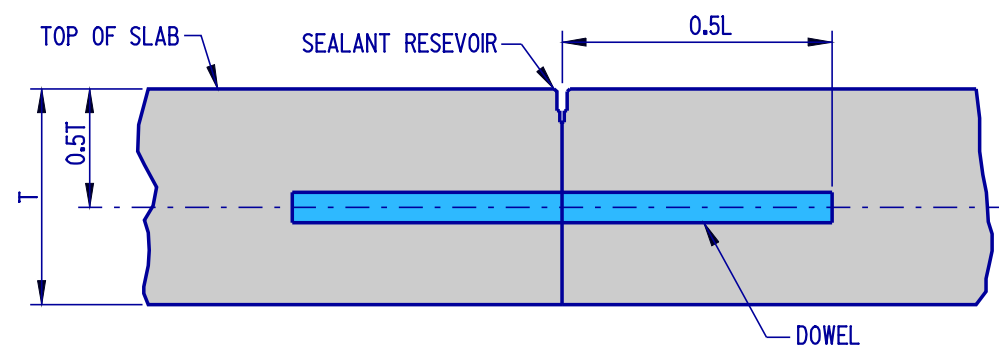
**TRANSVERSE SAW-CUT JOINT DETAIL**



**SEALANT DETAIL-  
LONGITUDINAL JOINT**



**SEALANT DETAIL-  
TRANSVERSE JOINT**



**TRANSVERSE CONSTRUCTION JOINT DETAIL**

\* - 0.3T (10\"/>

**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\"/>

**JOINT AND SEALANT DETAILS**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

STANDARD NO. P-1 (2004)

**P.C.C. PAVEMENT**

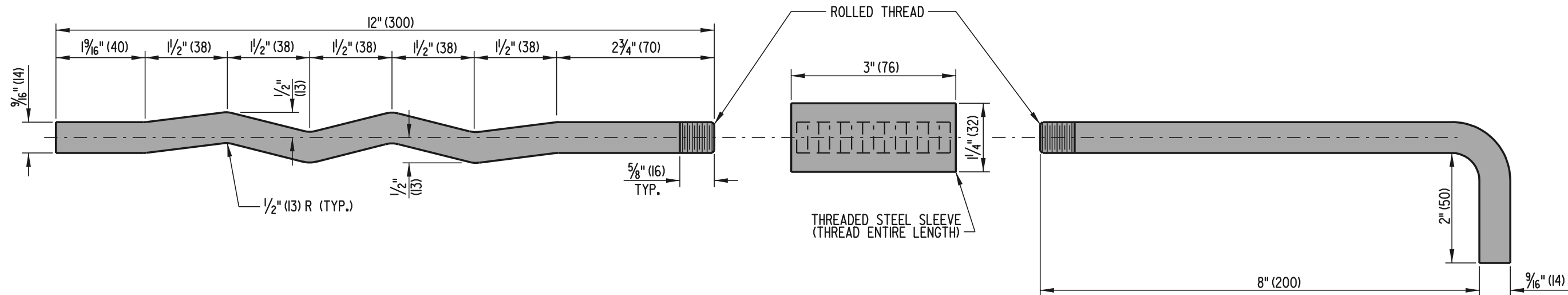
SHT. 2 OF 5

**APPROVED**

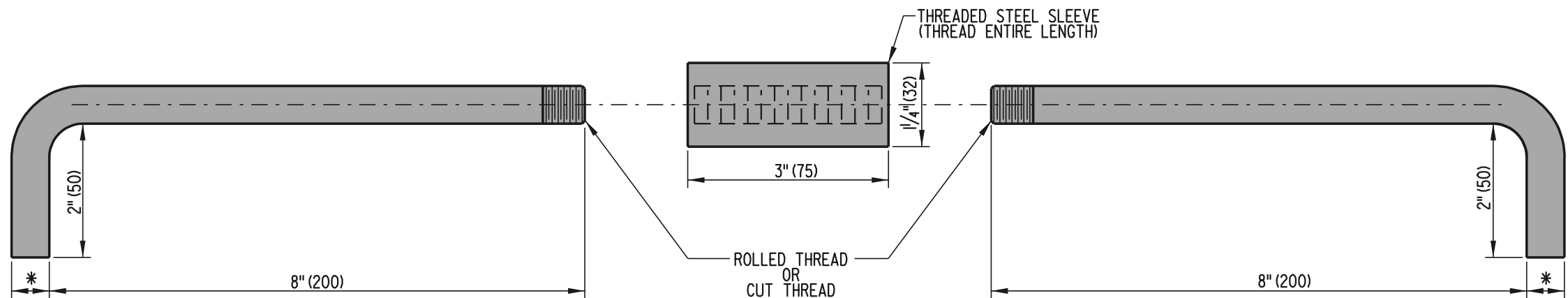
*Carolann Wick* 1/10/05  
CHIEF ENGINEER DATE

**RECOMMENDED**

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

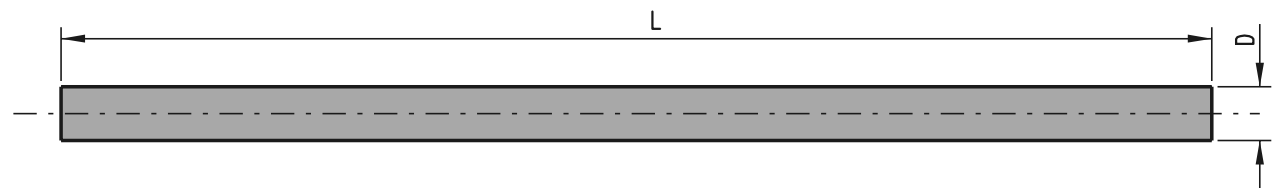


**W BOLT**



**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

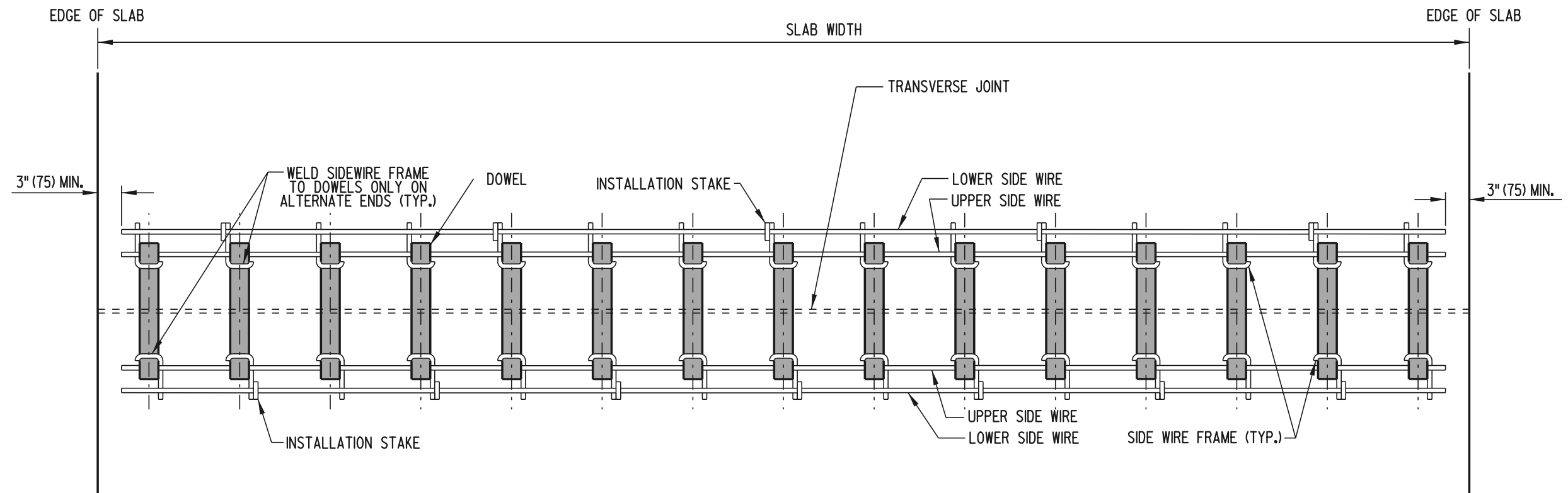
STANDARD NO. P-1 (2001)

SHT. 3 OF 5

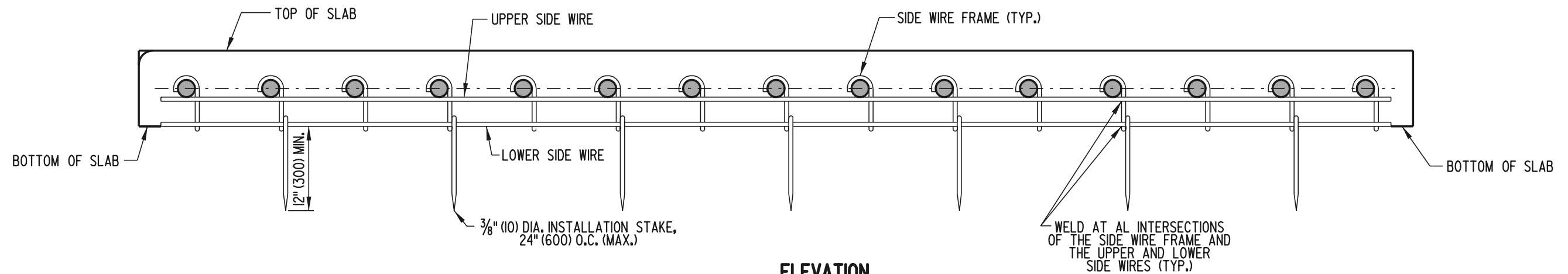
APPROVED *Ryan M. Harkins* 6/18/01  
CHIEF ENGINEER DATE

RECOMMENDED *Michael R. 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)

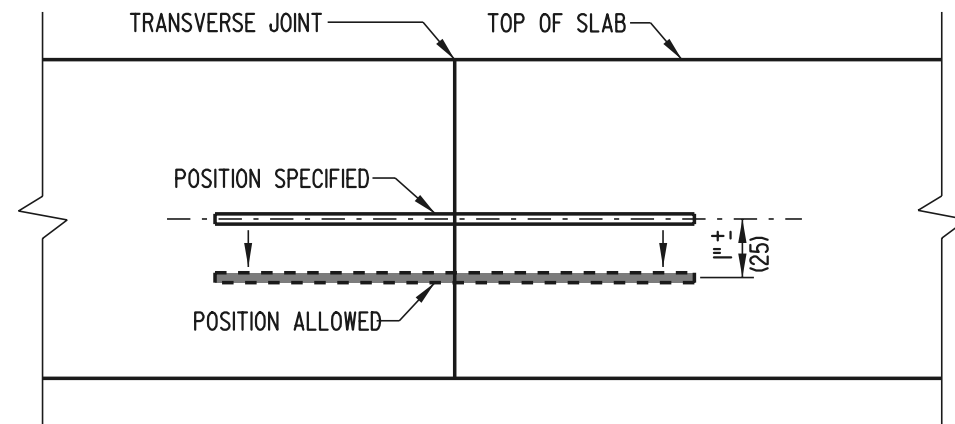
SHT. 4 OF 5

APPROVED

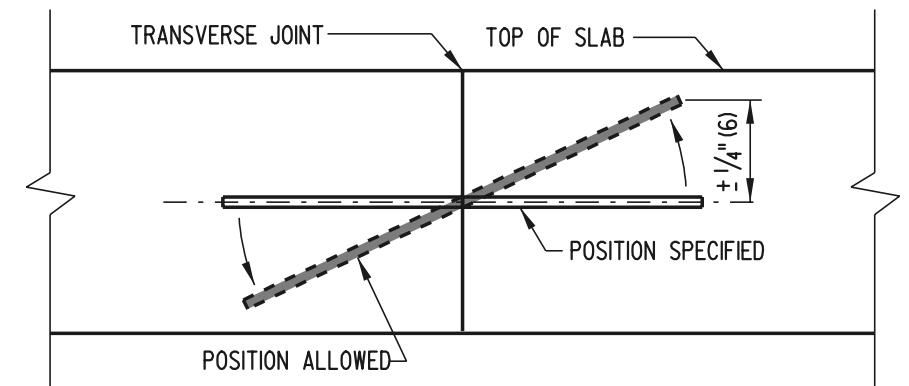
*Ryan M. Harkness*  
CHIEF ENGINEER  
DATE 6/18/01

RECOMMENDED

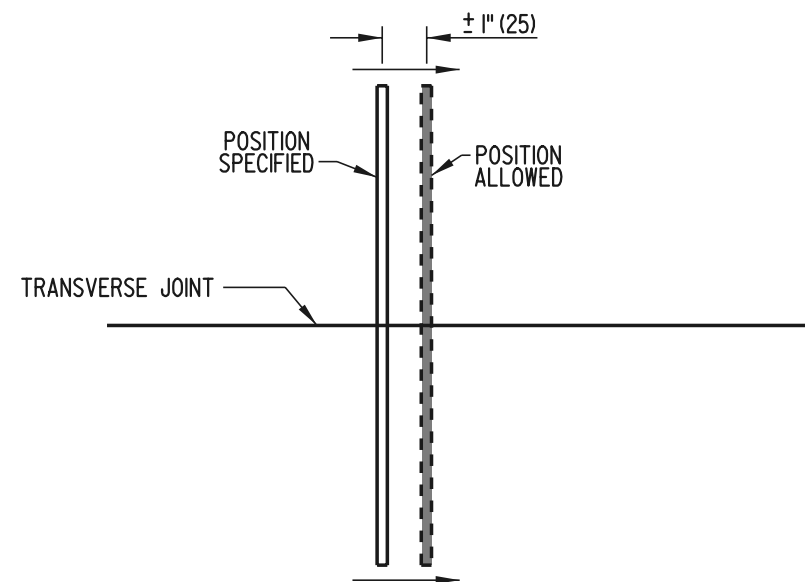
*Mehal Alghamdi*  
DESIGN ENGINEER  
DATE 6/18/01



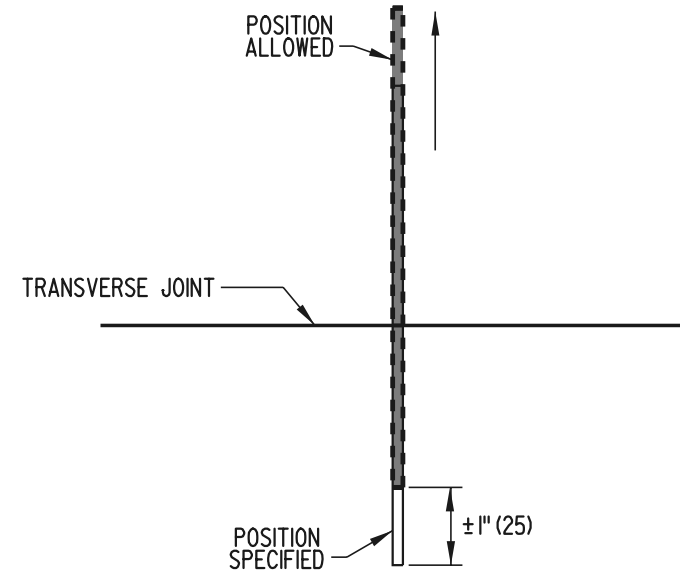
**VERTICAL TRANSLATION**



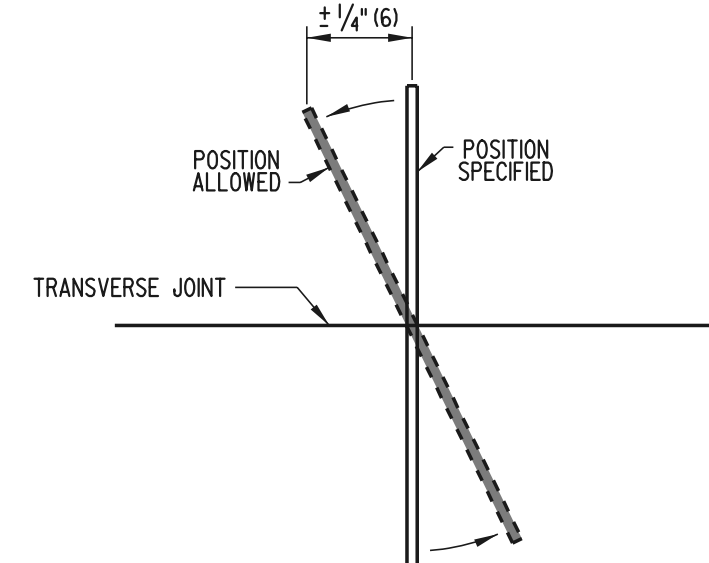
**VERTICAL ROTATION**



**HORIZONTAL TRANSLATION**



**LONGITUDINAL TRANSLATION**



**HORIZONTAL ROTATION**

**DOWEL & TIE BAR PLACEMENT TOLERANCES**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**P.C.C. PAVEMENT**

**STANDARD NO. P-1 (2001)**

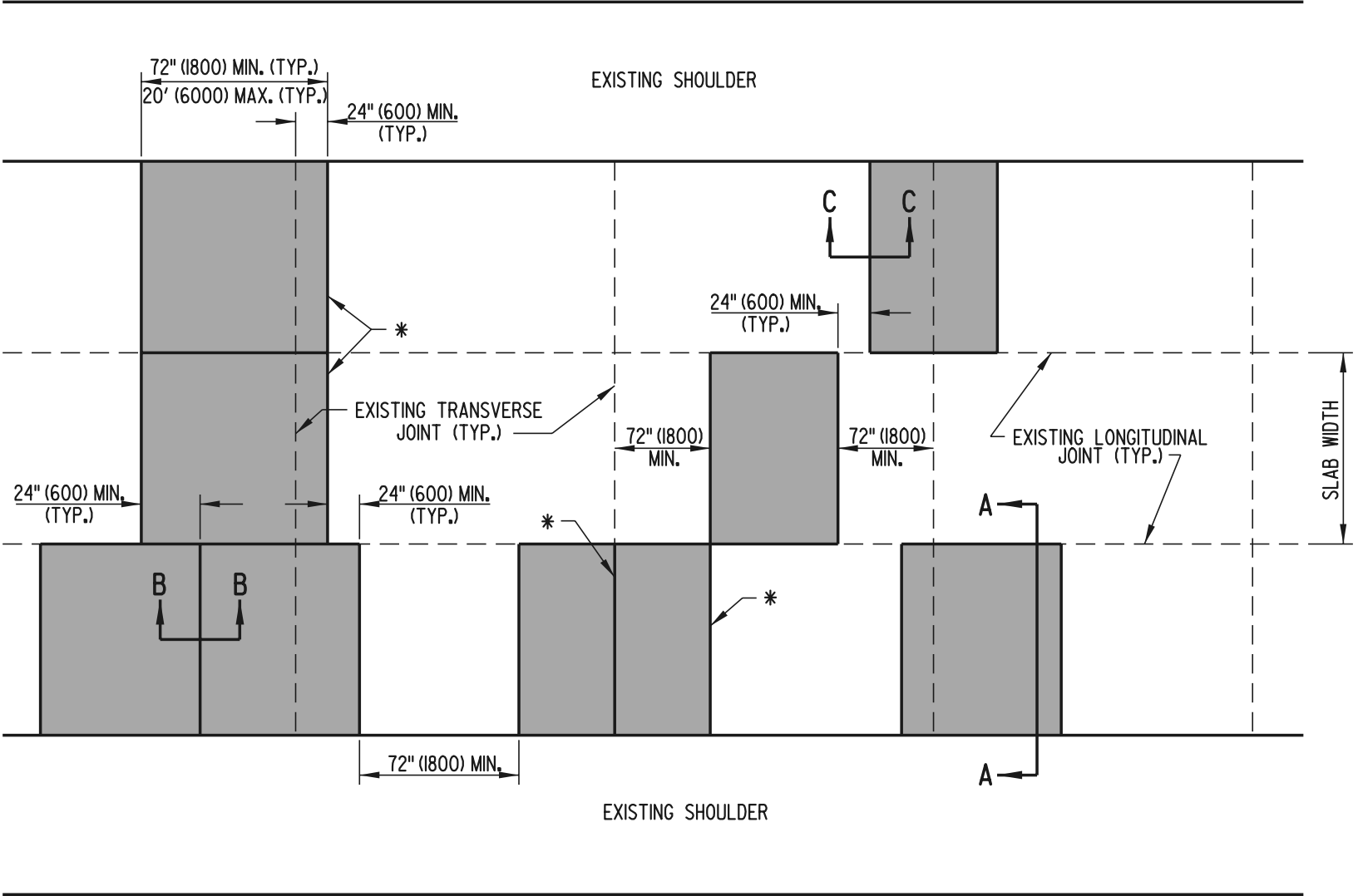
**SHT. 5 OF 5**

**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 24" (600) FROM THE AFOREMENTIONED JOINTS.
  - 3). THE LONGITUDINAL JOINT ALIGNMENT SHALL BE STRAIGHT AND CONTINUOUS THROUGH THE REPAIRED AREA.

**FULL DEPTH PATCH**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

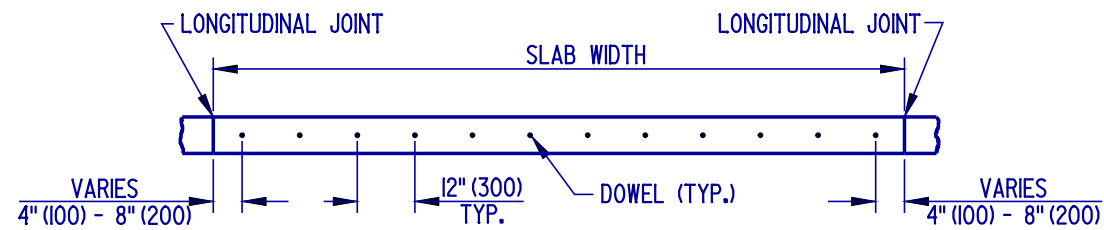
P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2001)

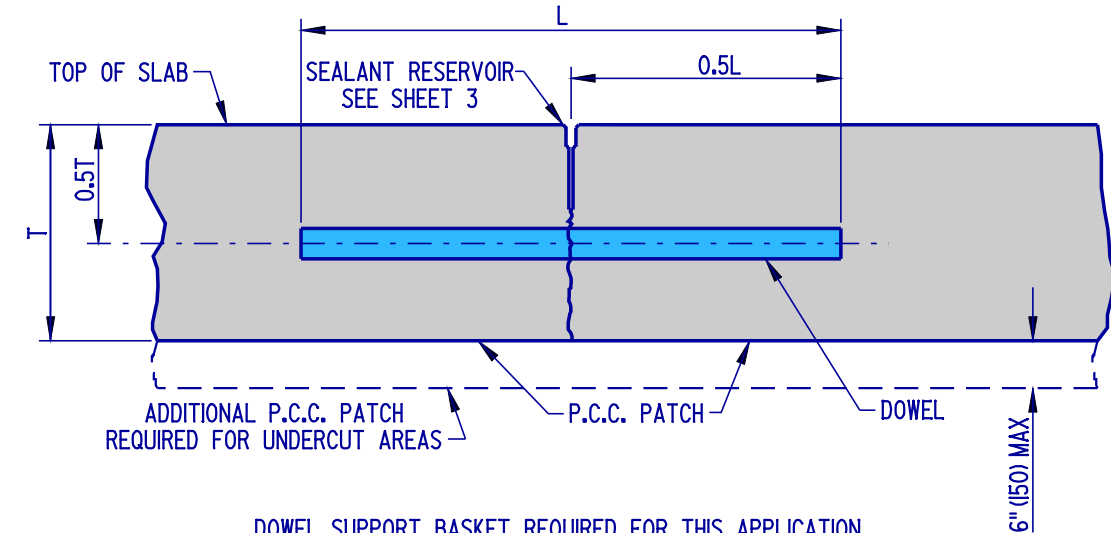
SHT. 1 OF 5

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

RECOMMENDED *Muhammad Alghamdi* 6/18/01  
DESIGN ENGINEER DATE



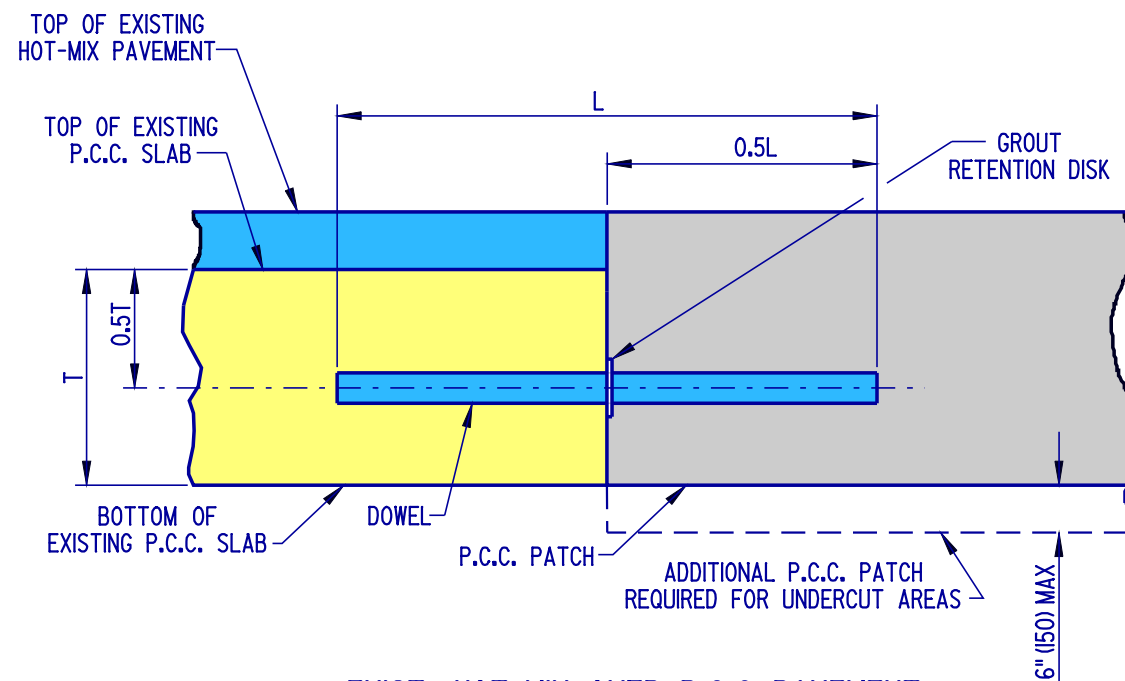
**SECTION A-A**



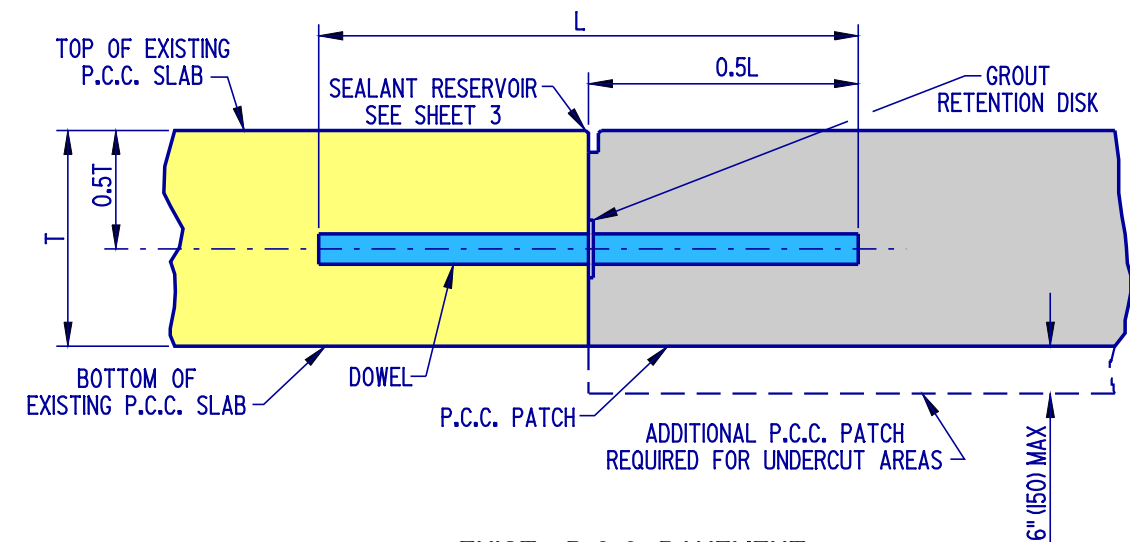
DOWEL SUPPORT BASKET REQUIRED FOR THIS APPLICATION  
(REFER TO STANDARD CONSTRUCTION DETAIL FOR P.C.C. PAVEMENT.)

**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

STANDARD NO. P-2 (2004)

SHT. 2 OF 5

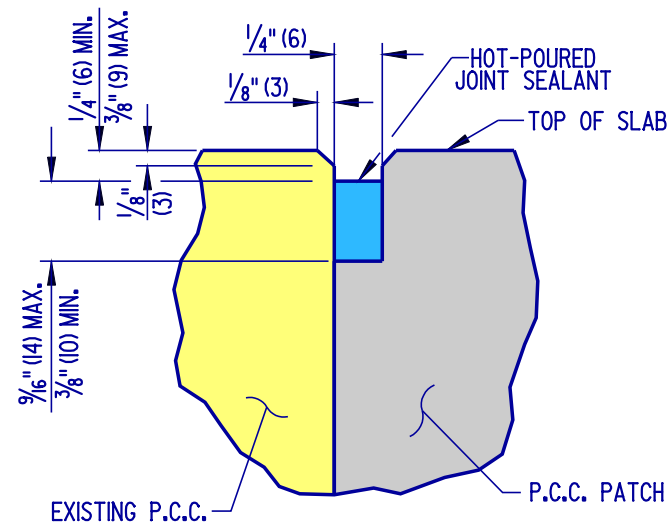
APPROVED

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

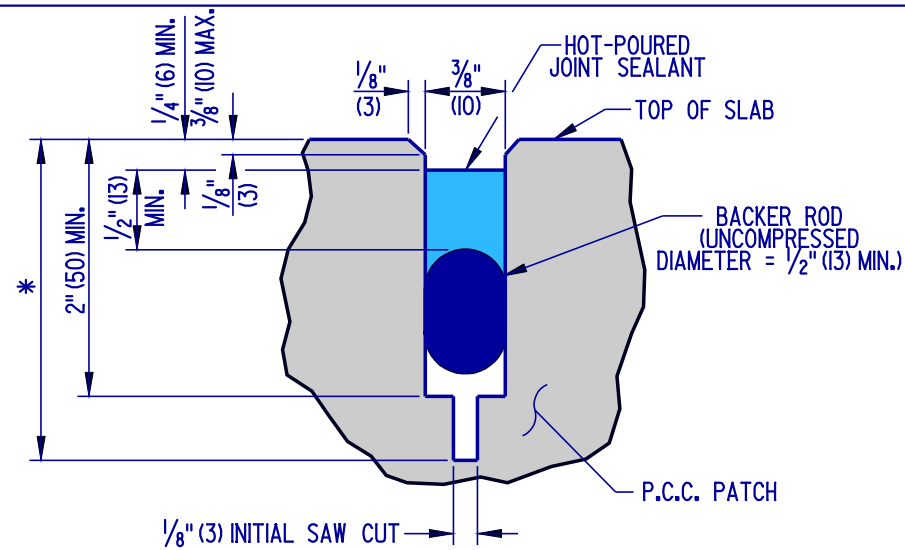
RECOMMENDED

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



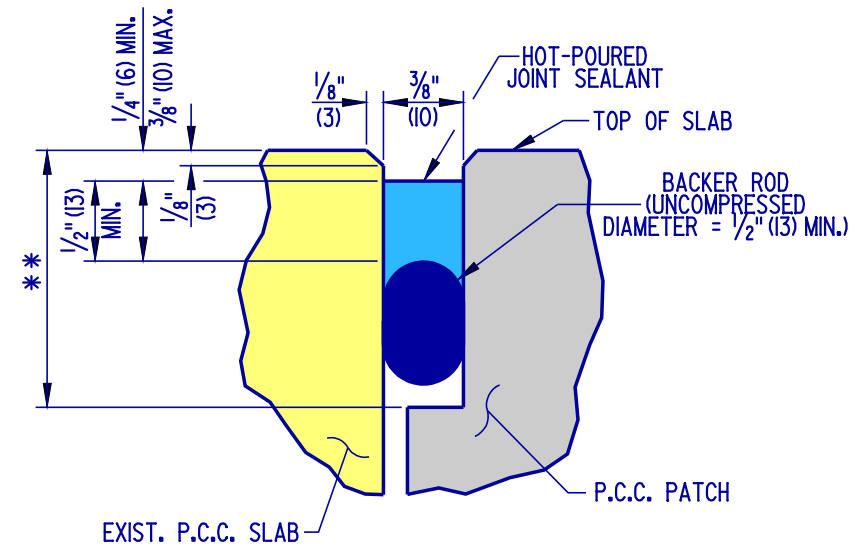


**SEALANT DETAIL-  
LONGITUDINAL JOINT**



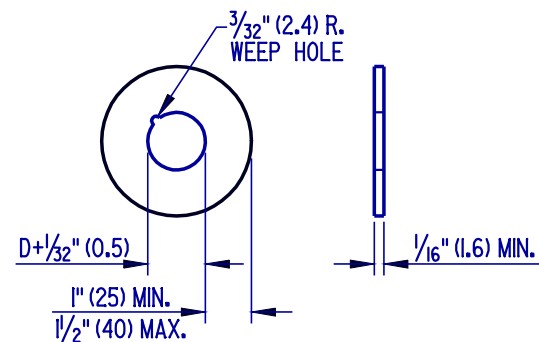
\* - 0.3T (T < 10" (250) P.C.C. PAVEMENT)  
0.4T (T > 10" (250) P.C.C. PAVEMENT)

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



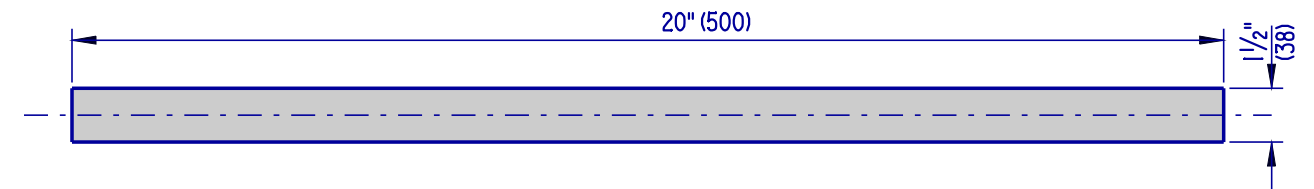
\*\* - 2" (50) MIN. WITH BACKER ROD  
5/8" (16) MIN. WITH BOND BREAKER TAPE

**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**

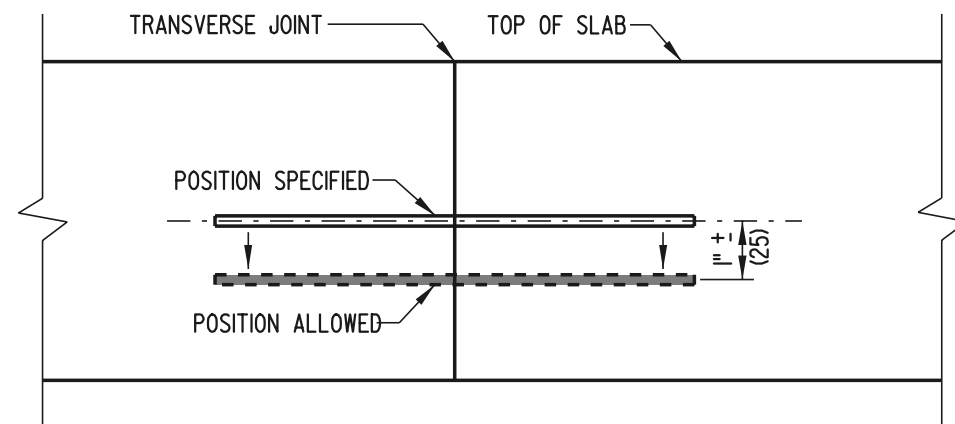
**P.C.C. PAVEMENT PATCHING**

**STANDARD NO. P-2 (2004)**

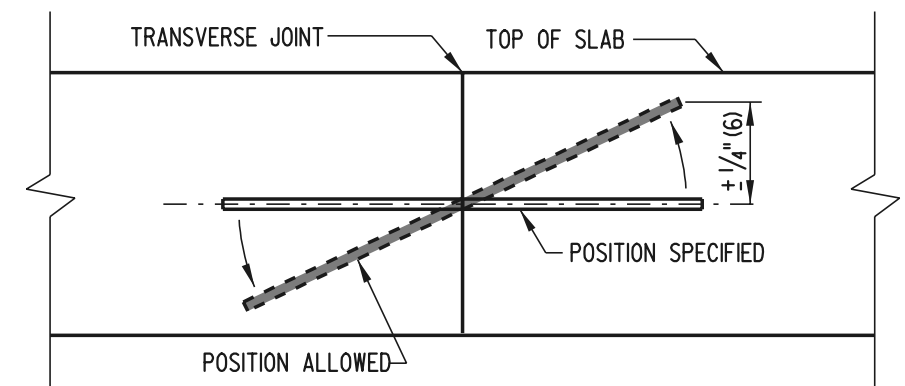
**SHT. 3 OF 5**

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

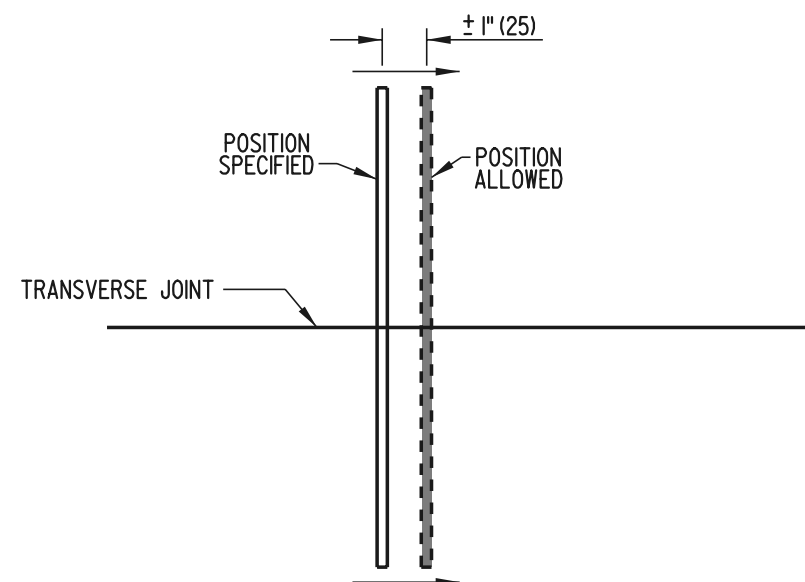
**RECOMMENDED** *Dennis M. O'Flaherty* **1/13/05**  
DESIGN ENGINEER DATE



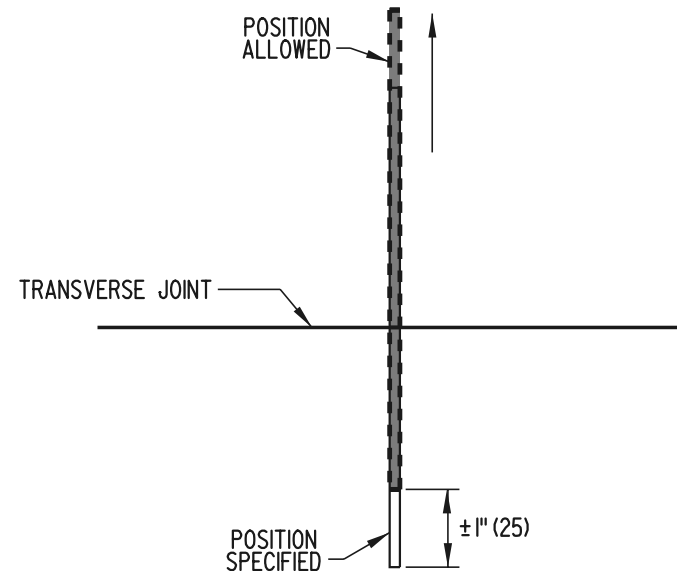
VERTICAL TRANSLATION



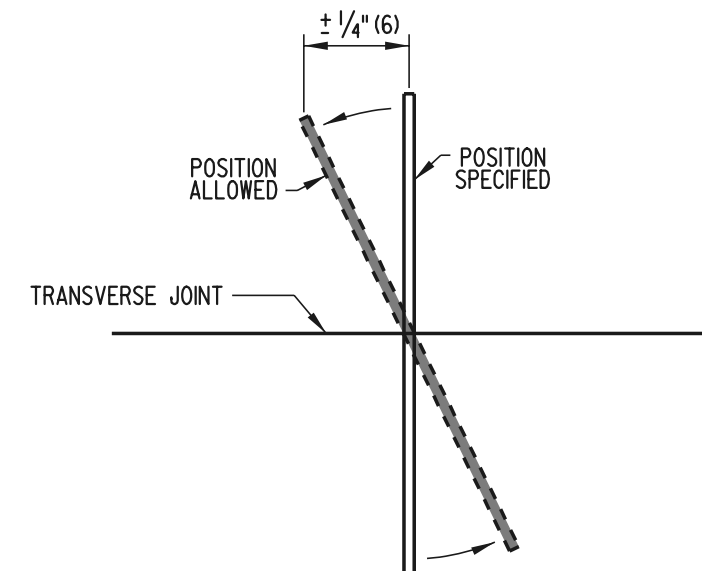
VERTICAL ROTATION



HORIZONTAL TRANSLATION



LONGITUDINAL TRANSLATION



HORIZONTAL ROTATION

DOWEL & TIE BAR PLACEMENT TOLERANCES

FULL DEPTH PATCH



DELAWARE  
DEPARTMENT OF TRANSPORTATION

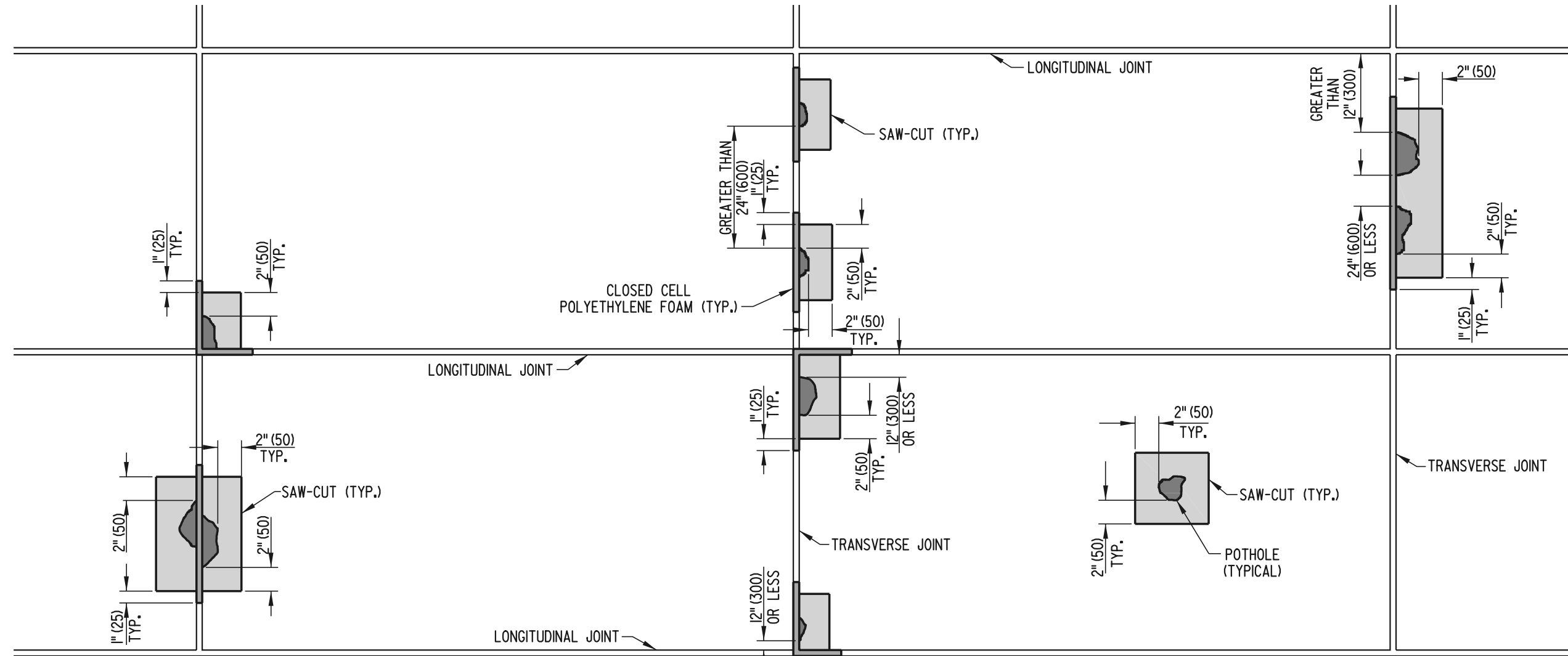
P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2001)

SHT. 4 OF 5

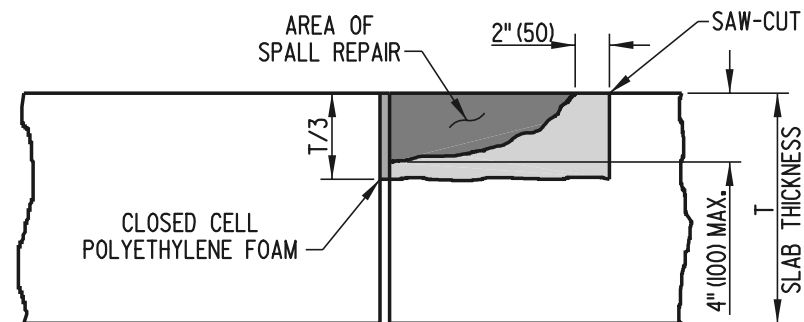
APPROVED *Ryan M. Harkness* 6/18/01  
CHIEF ENGINEER DATE

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

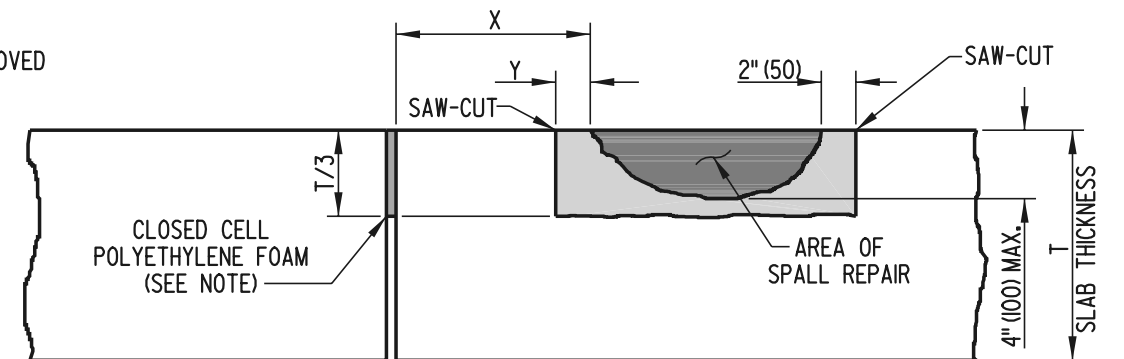


**PLAN**

**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**



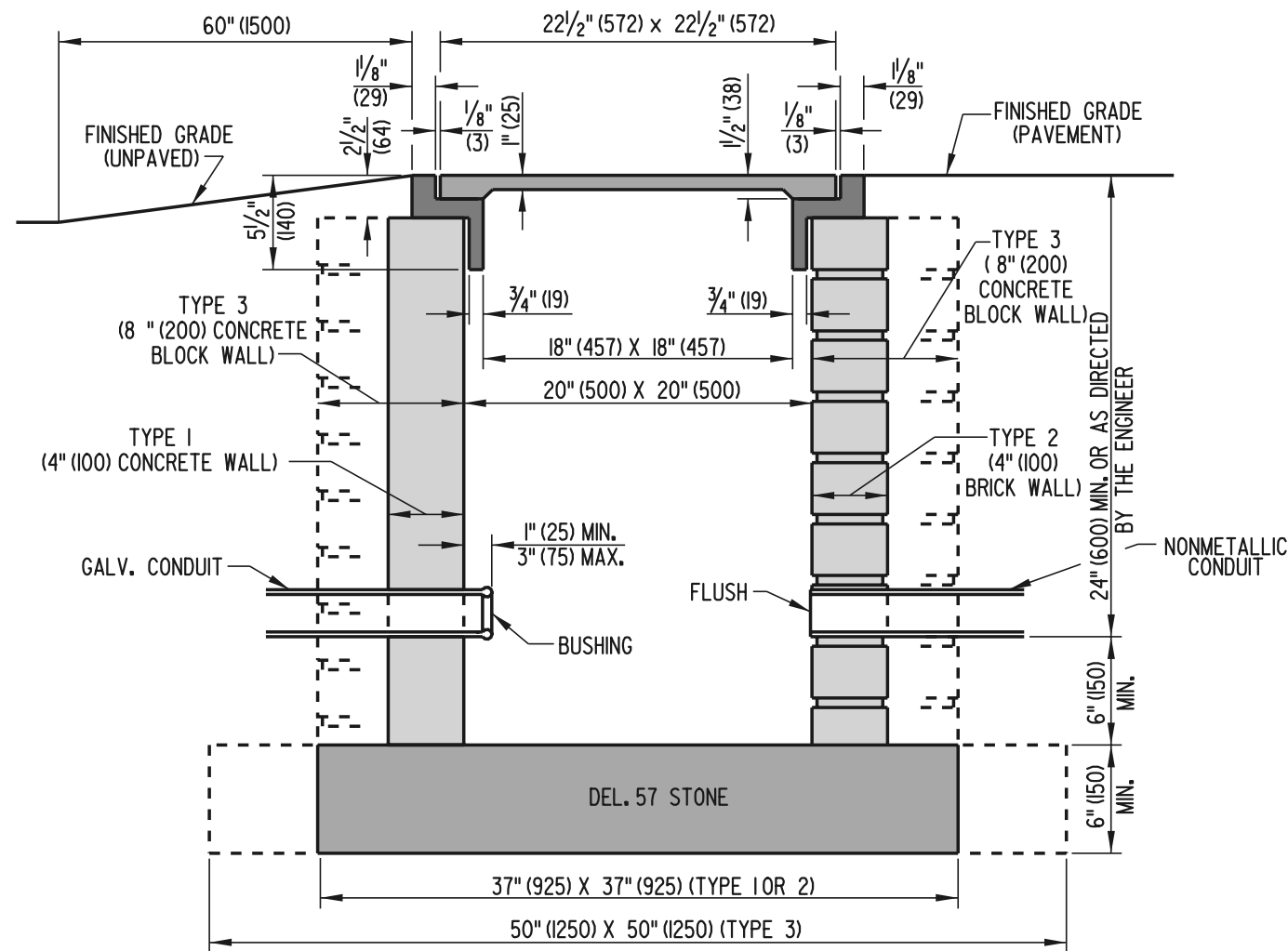
**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**P.C.C. PAVEMENT PATCHING**

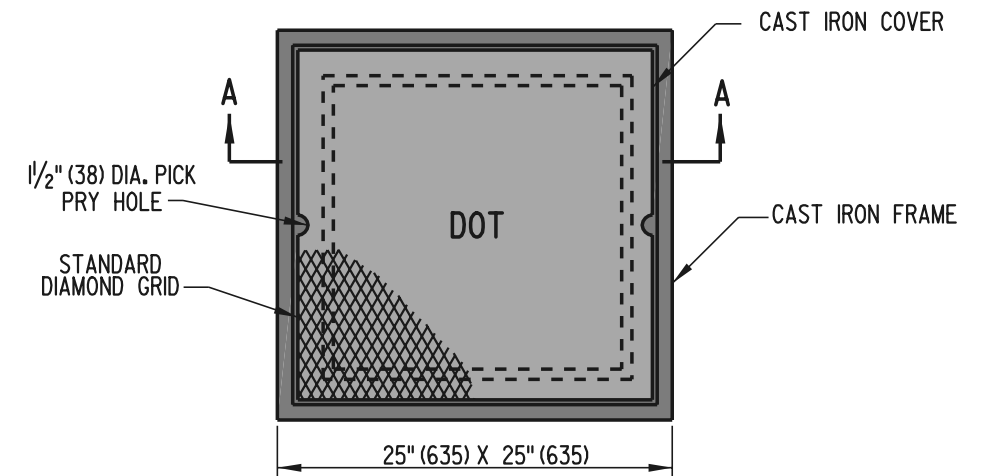
**STANDARD NO. P-2 (2001)**

**SHT. 5 OF 5**

**APPROVED** *Ryan M. Hershman* **6/18/01**  
CHIEF ENGINEER DATE  
**RECOMMENDED** *Michael P. Gotsch* **6/15/01**  
DESIGN ENGINEER DATE



**SECTION A-A**



**PLAN VIEW**

- NOTES:**
- 1). TYPE 1 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" (125) DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
  - 2). TYPE 2 AND TYPE 3 CONDUIT JUNCTION WELLS SHALL BE BRICK AND WILL CONFORM TO STANDARD SPECIFICATIONS FOR BRICK MASONRY. JOINTS SHALL BE CONCAVE TYPE. TYPE 2 WALLS WILL BE A NOMINAL 4" (100) THICK. TYPE 3 WALL WILL BE A NOMINAL 8" (200) THICK.
  - 3). TYPE 2 AND TYPE 3 CONDUIT JUNCTION WELLS SHALL NOT BE PLACED UNDER ANY TYPE OF PAVEMENT.
  - 4). 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 CONDUIT JUNCTION WELL.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

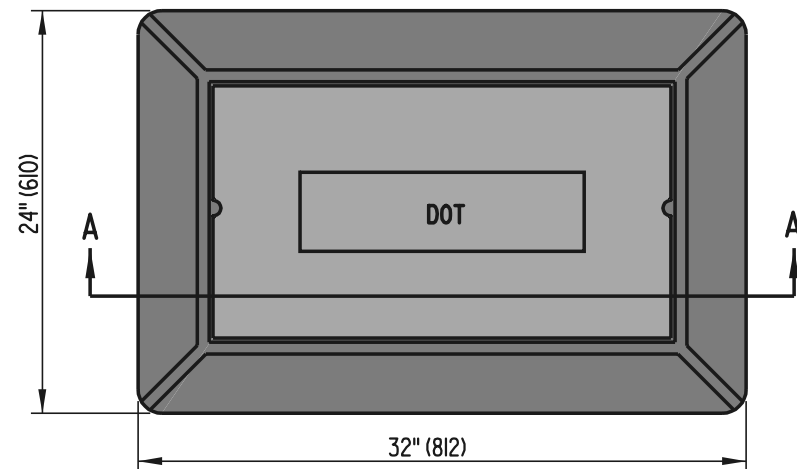
**CONDUIT JUNCTION WELL, TYPES 1, 2, AND 3**

**STANDARD NO. T-1 (2002)**

**SHT. 1 OF 1**

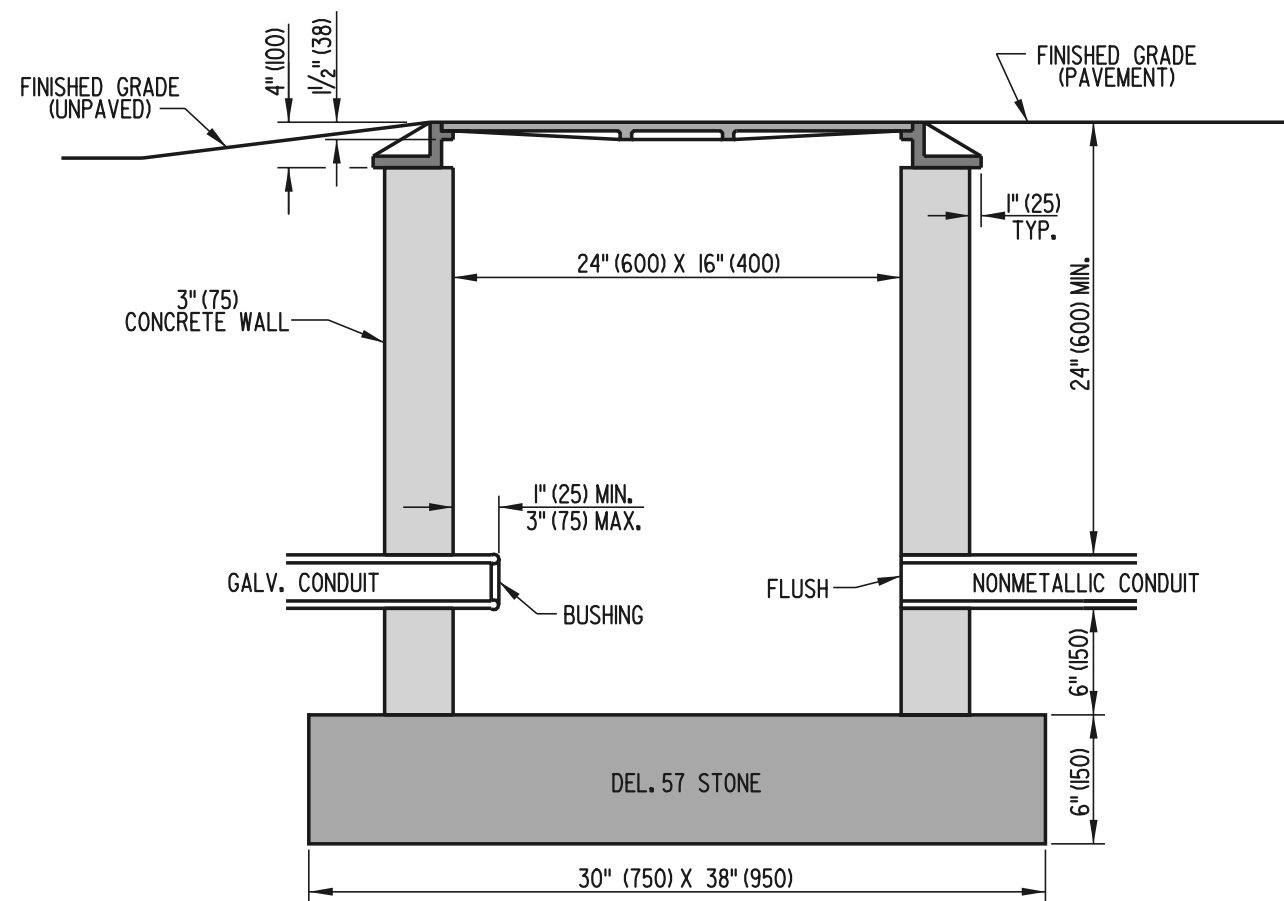
**APPROVED** *Caution Wicks* *9/6/02*  
CHIEF ENGINEER DATE  
**RECOMMENDED** *Theresa Delph* *8/19/02*  
DESIGN ENGINEER DATE





PLAN VIEW

- NOTES: 1). TYPE 5 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" (125) DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
- 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 CONDUIT JUNCTION WELL.



SECTION A-A

PLAN SYMBOL

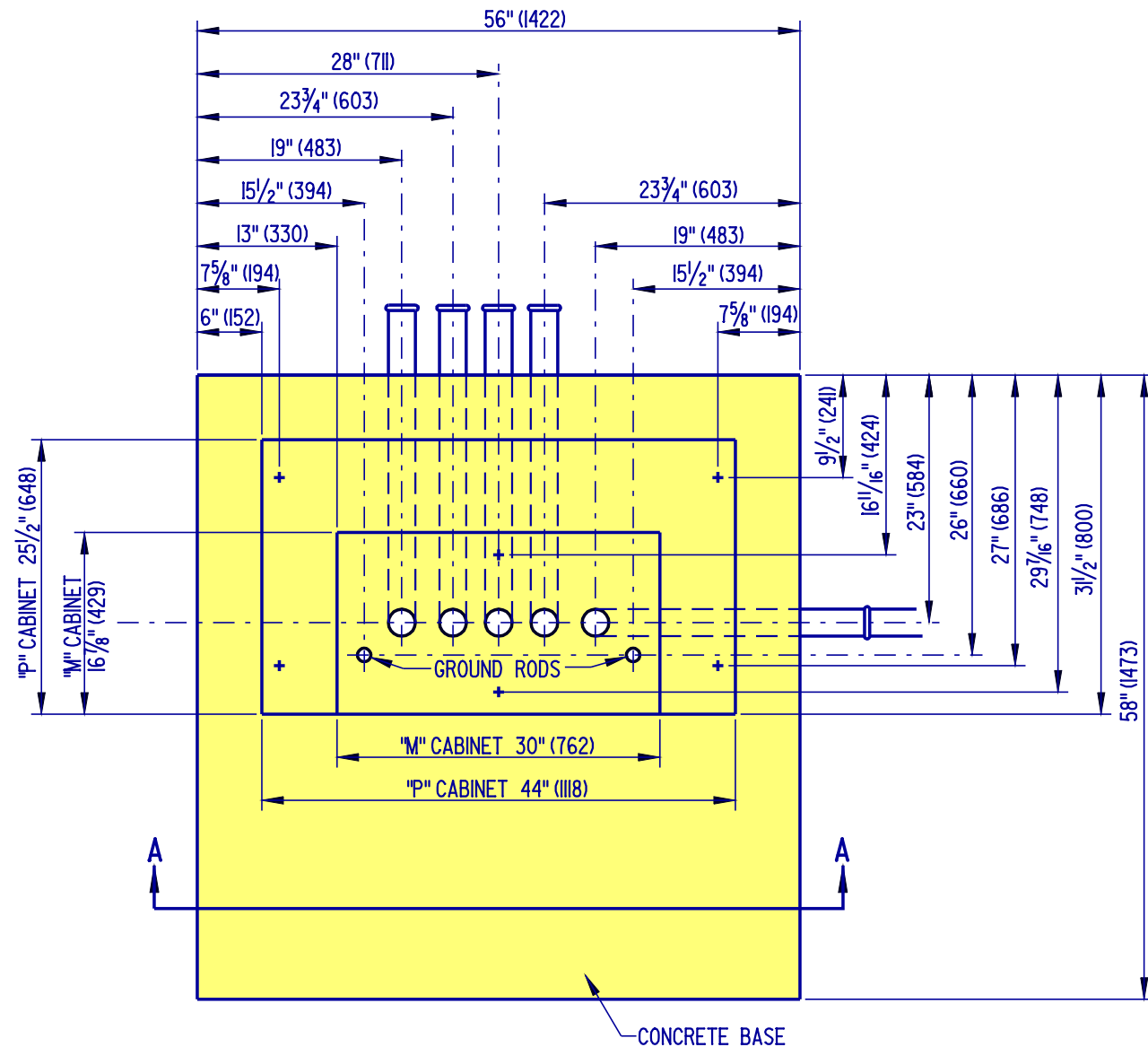


DELAWARE  
DEPARTMENT OF TRANSPORTATION

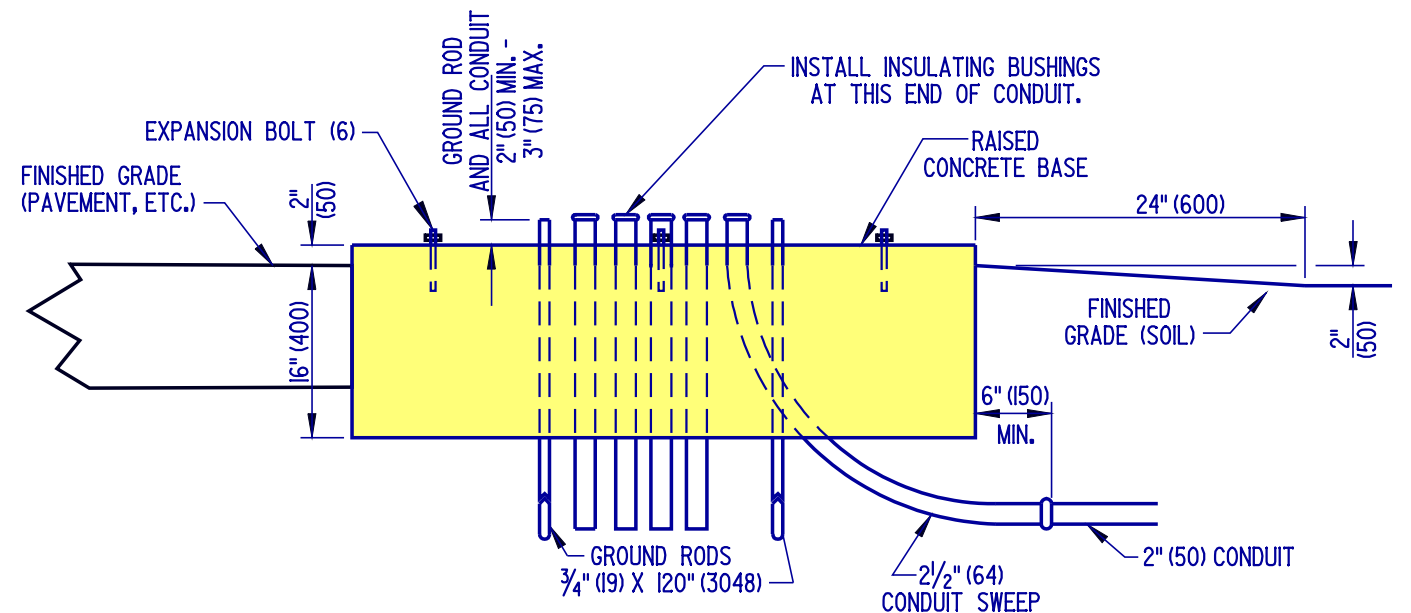
CONDUIT JUNCTION WELL, TYPE 5

STANDARD NO. T-3 (2002) SHT. 1 OF 1

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



PLAN VIEW



SECTION A-A

CONCRETE CABINET BASE

PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

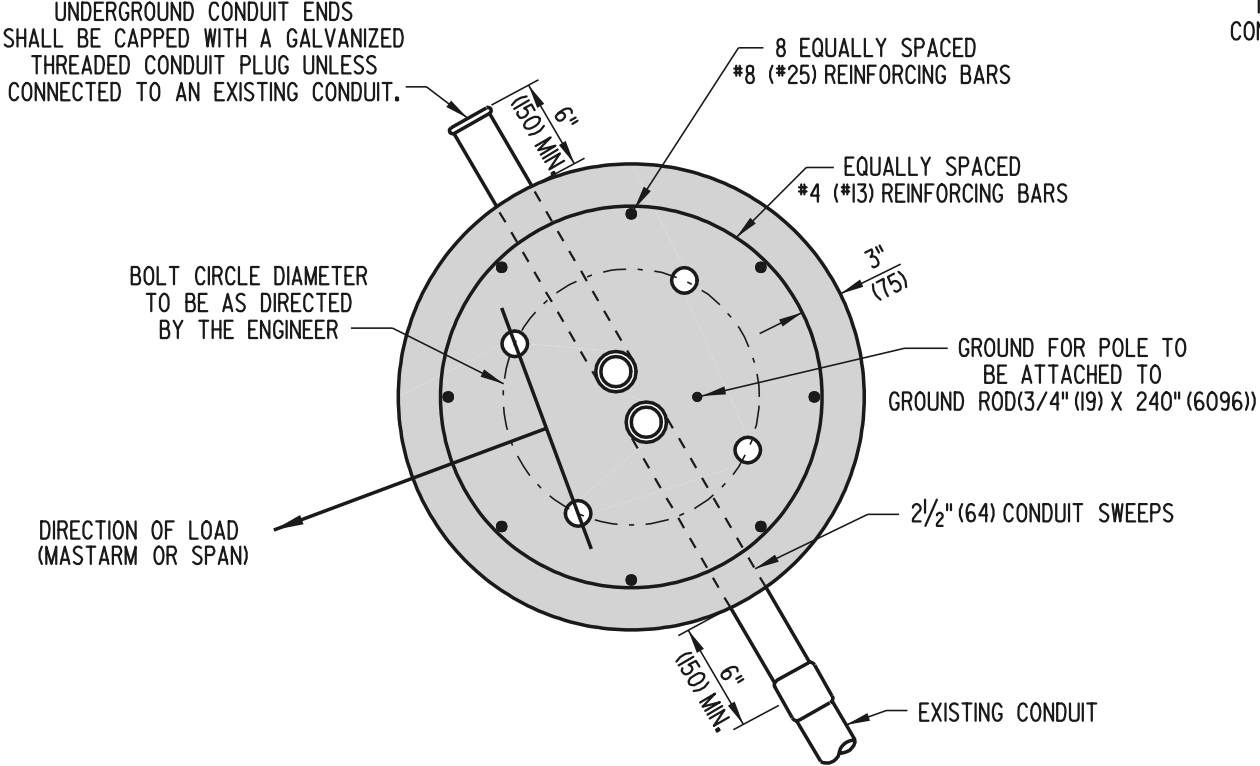
CABINET BASES (TYPES 'M' & 'P')

STANDARD NO. T-4 (2004)

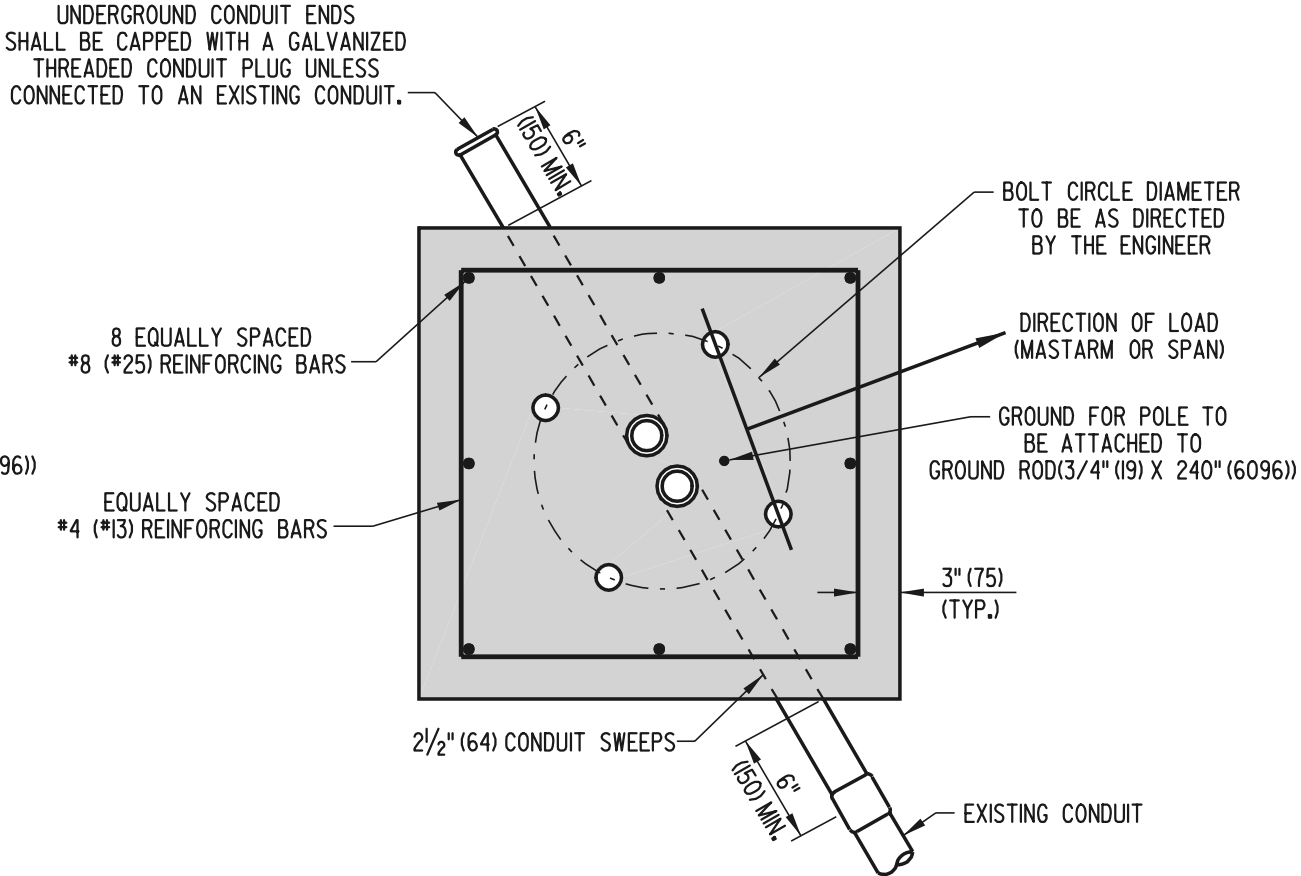
SHT. 1 OF 1

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

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



ROUND BASE



SQUARE BASE

NOTE: BASE DEPENDENT ON POLE AND EQUIPMENT TO BE ATTACHED.

PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

POLE BASES

STANDARD NO. T-5 (2002)

SHT. 1 OF 3

APPROVED

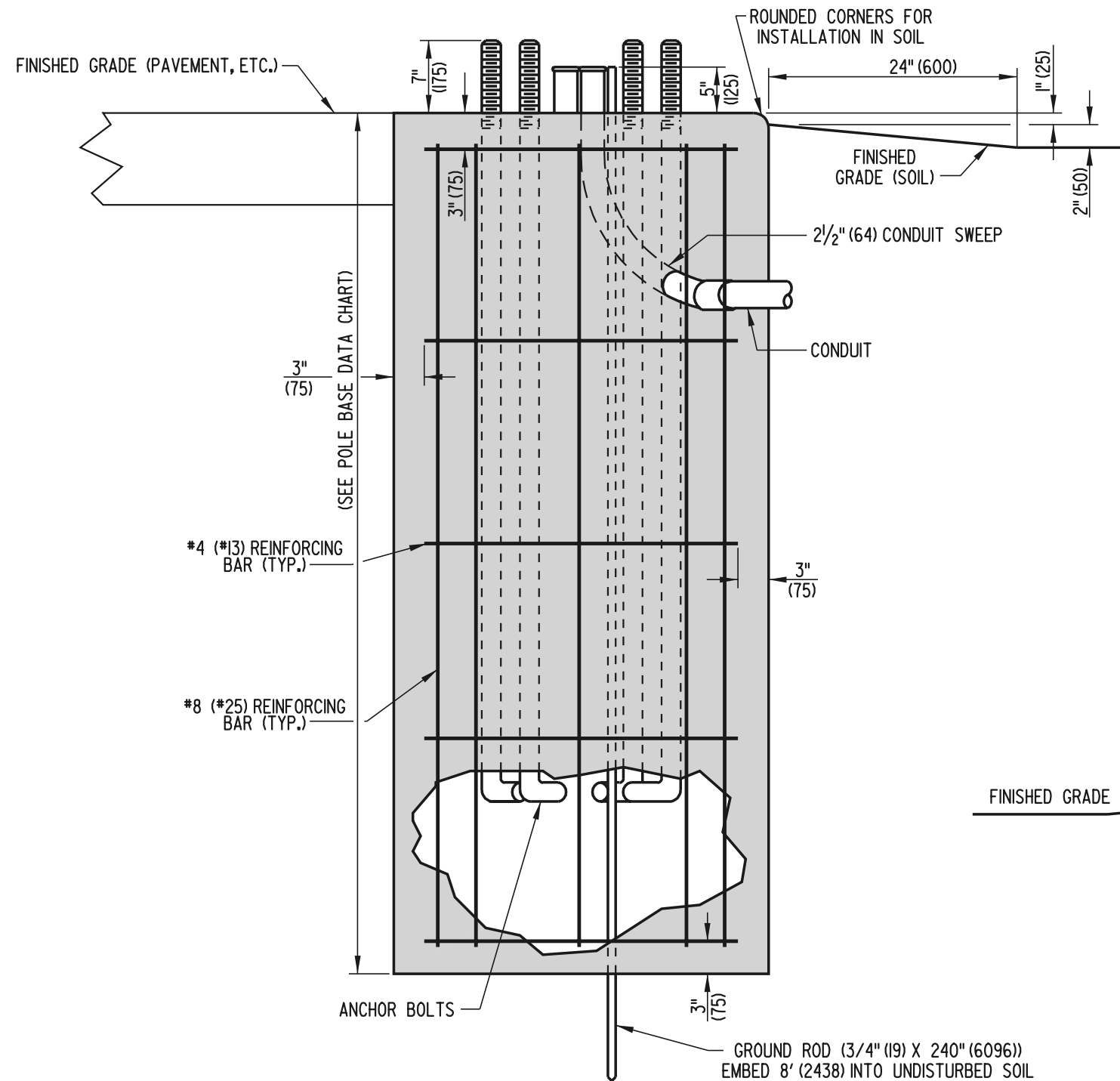
*Caroleen Wicks* 9/6/02  
CHIEF ENGINEER DATE

RECOMMENDED

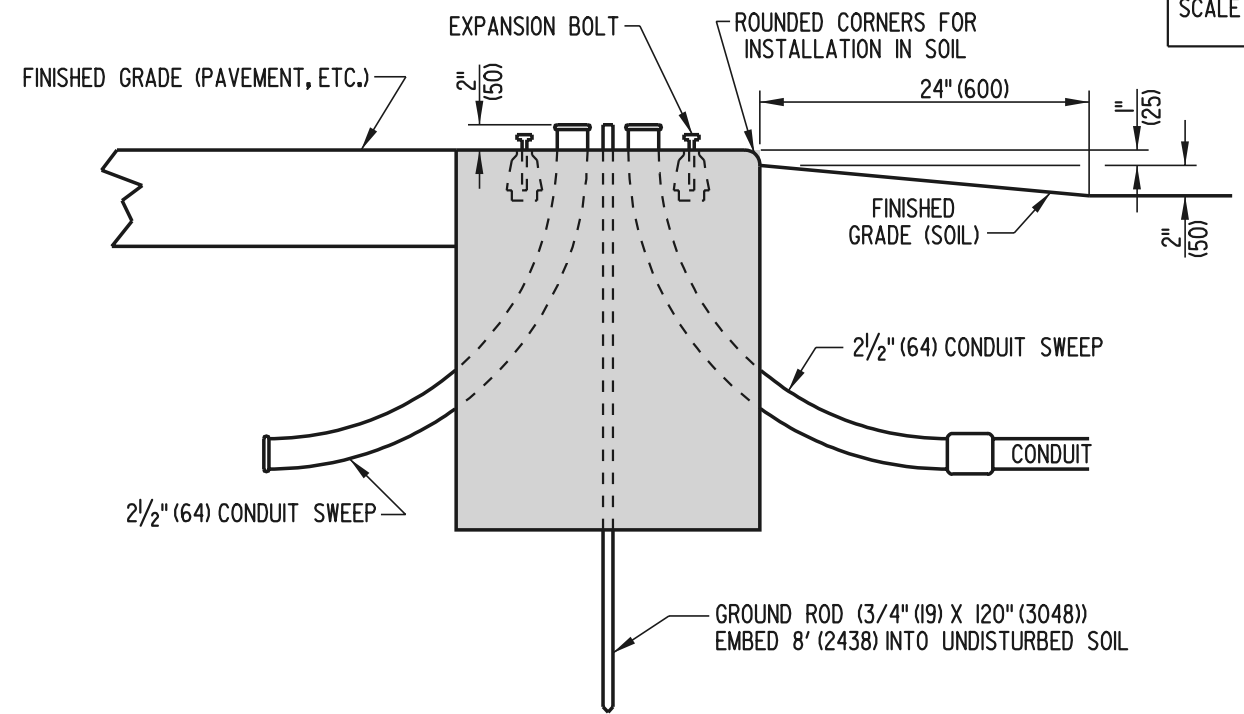
*Theresa Delph* 8/19/02  
DESIGN ENGINEER DATE



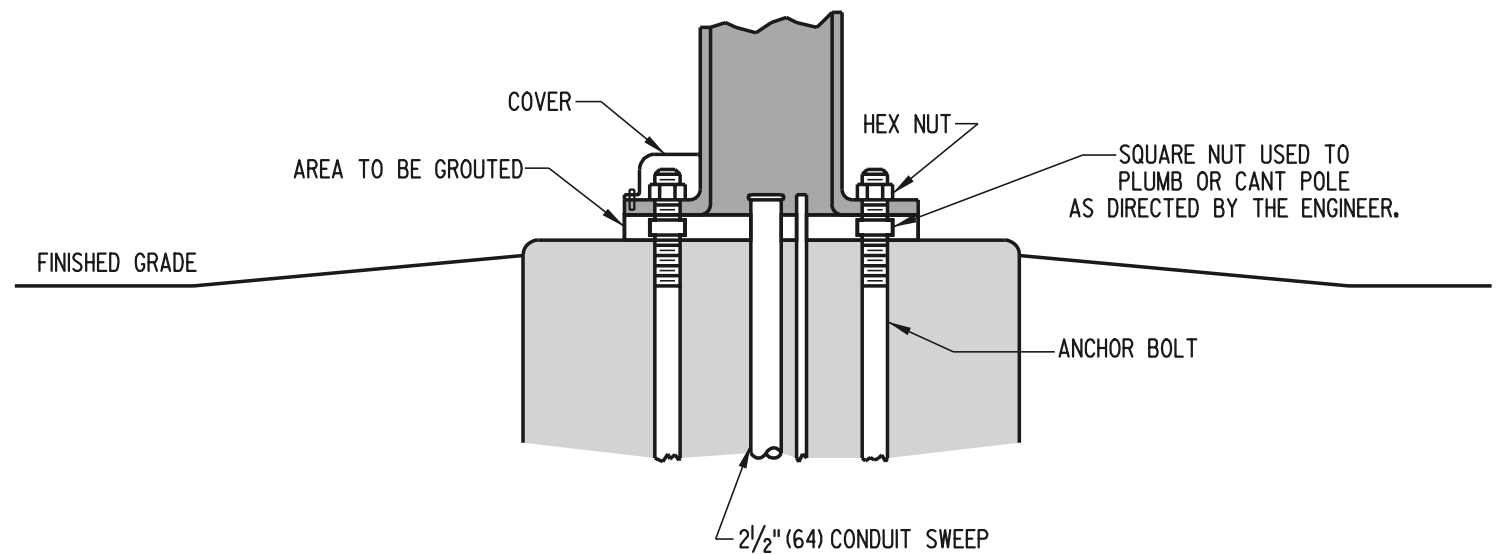
SCALE : N.T.S.



**TYPICAL SECTION (BASES 1,2,2A,2B,3,3A,3B, AND 7)**



**TYPICAL SECTION (BASE 4)**



**TYPICAL INSTALLATION (BASES 1,2,2A,2B,3,3A,3B,4, AND 7)**

**NOTES:**

- 1.) PLACE 2 EACH 6" (150) LONG x 1/2" (13) DIA. P.V.C., SCHEDULE 40 (TYP) VENTS IN THE GROUT AS DIRECTED IN THE FIELD BY ENGINEER.
- 2.) SEE POLE BASE DATA CHART FOR POLE BASE DIMENSIONS.

**PLAN SYMBOL**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**POLE BASES**

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

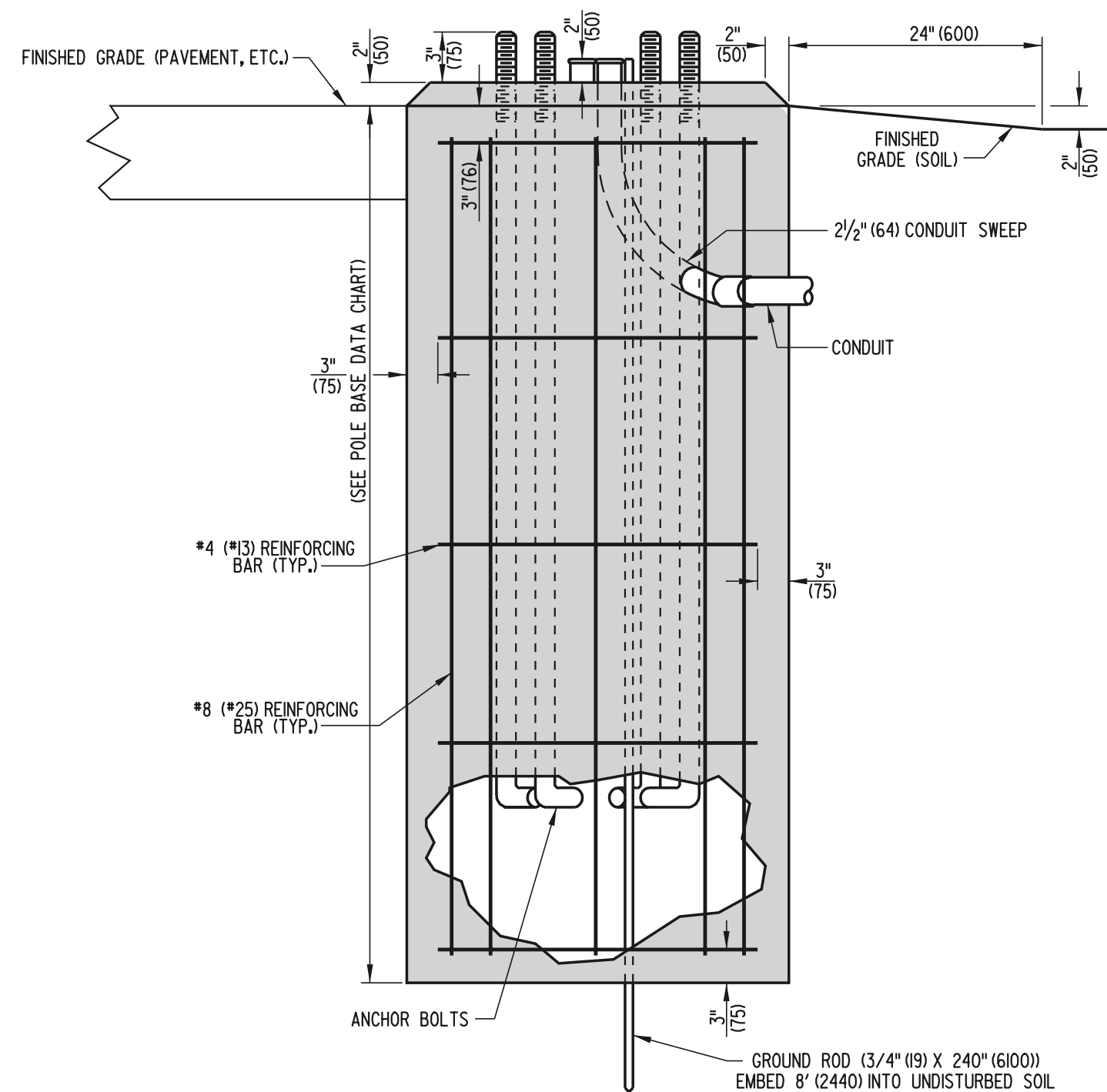
**SHT. 2 OF 3**

**APPROVED** *Caution Wicks*  
CHIEF ENGINEER

*9/6/02*  
DATE

**RECOMMENDED** *Theresa Delph*  
DESIGN ENGINEER

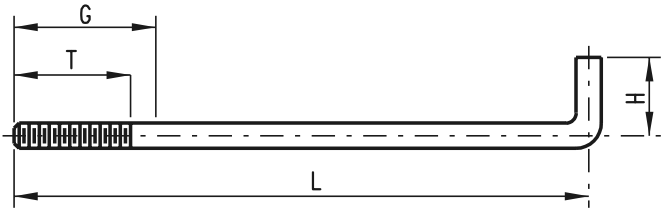
*8/19/02*  
DATE



TYPICAL SECTION (BASES 5 AND 6)

POLE BASE DATA CHART				
POLE BASE TYPE #	DIAMETER	DEPTH *	#4 (*13) HORIZONTAL REINFORCING BARS	#8 (*25) VERTICAL REINFORCING BARS
1	36" (915)	7' (2150)	5	8
2	36" (915)	10' (3050)	6	8
2A	48" (1220)	8' (2450)	5	8
2B	60" (1525)	7' (2150)	5	8
3	48" (1220)	10' (3050)	6	8
3A	60" (1525)	9' (2750)	6	8
3B	72" (1830)	7' (2150)	5	8
4	24" (610)	2'-4" (725)	NONE	NONE
5	36" (915)	4' (1225)	NONE	NONE
6	24" (610)	6' (1850)	4	8
7	48" (1220)	13'-4" (4000)	7	8

\* - ADDITIONAL DEPTH FOR POLE BASE EXTENSION, IF REQUIRED, TO BE DETERMINED BY TRAFFIC ENGINEERING AND MANAGEMENT (TEAM) FIELD REPRESENTATIVE.



G = GALVANIZED PORTION  
T = THREAD LENGTH  
L = LENGTH OF ROD  
H = HEIGHT OF ROD

NOMINAL BOLT SIZE	L	H	T	G
1" (25) X 40" (1025)	36" (925)	4" (100)	6" (150)	8" (200)
1 1/4" (32) X 48" (1225)	42" (1075)	6" (150)	8" (200)	10" (250)
1 1/2" (38) X 60" (1525)	54" (1375)	6" (150)	10" (250)	12" (305)
1 3/4" (45) X 90" (2285)	84" (2135)	6" (150)	10" (250)	20" (500)
2" (51) X 90" (2285)	82" (2085)	8" (200)	8" (200)	18" (455)

ANCHOR BOLT DATA CHART AND DETAILS

NOTE: ANCHOR BOLTS FOR POLE BASE TYPE 7 SHALL CONFORM TO THE CCTV POLE MANUFACTURER'S SPECIFICATIONS.

PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

POLE BASES

STANDARD NO. T-5 (2002)

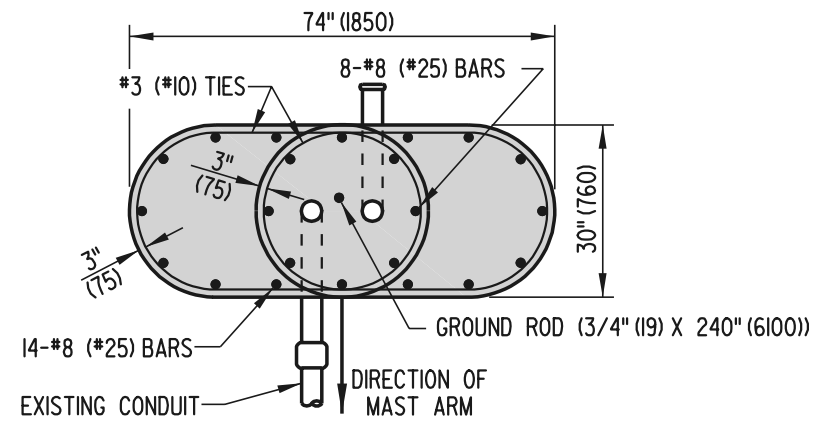
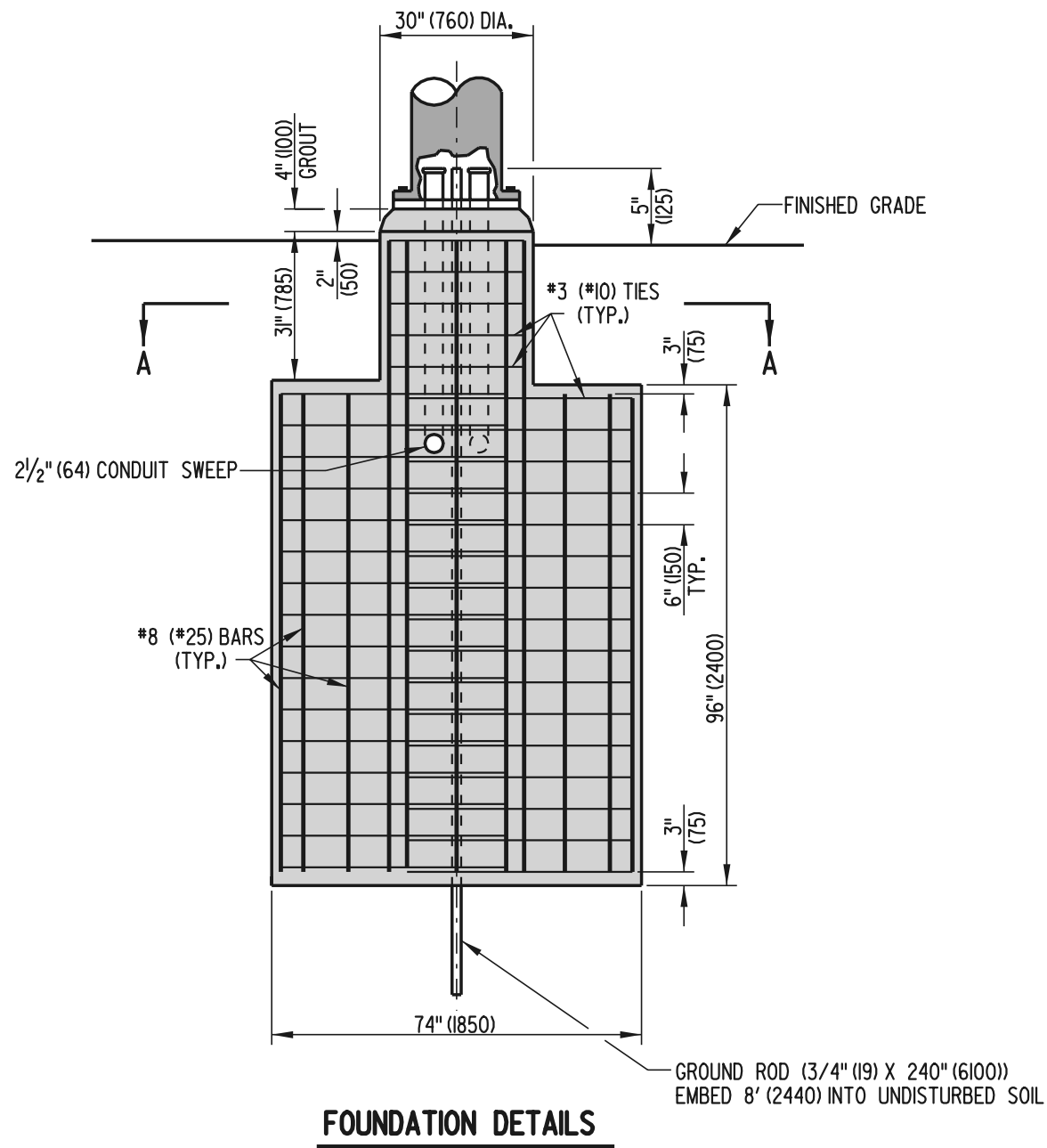
SHT. 3 OF 3

APPROVED

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

RECOMMENDED

*Theresa Delph*  
DESIGN ENGINEER  
DATE 8/19/02



**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" (150) X 1/2" (13) P.V.C., SCHEDULE 40 (TYP) VENTS IN THE GROUT AS DIRECTED IN THE FIELD BY THE ENGINEER.

**PLAN SYMBOL**



(SAME AS NORMAL POLE BASE)



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**SPECIAL POLE BASE**

STANDARD NO. T-6 (2002)

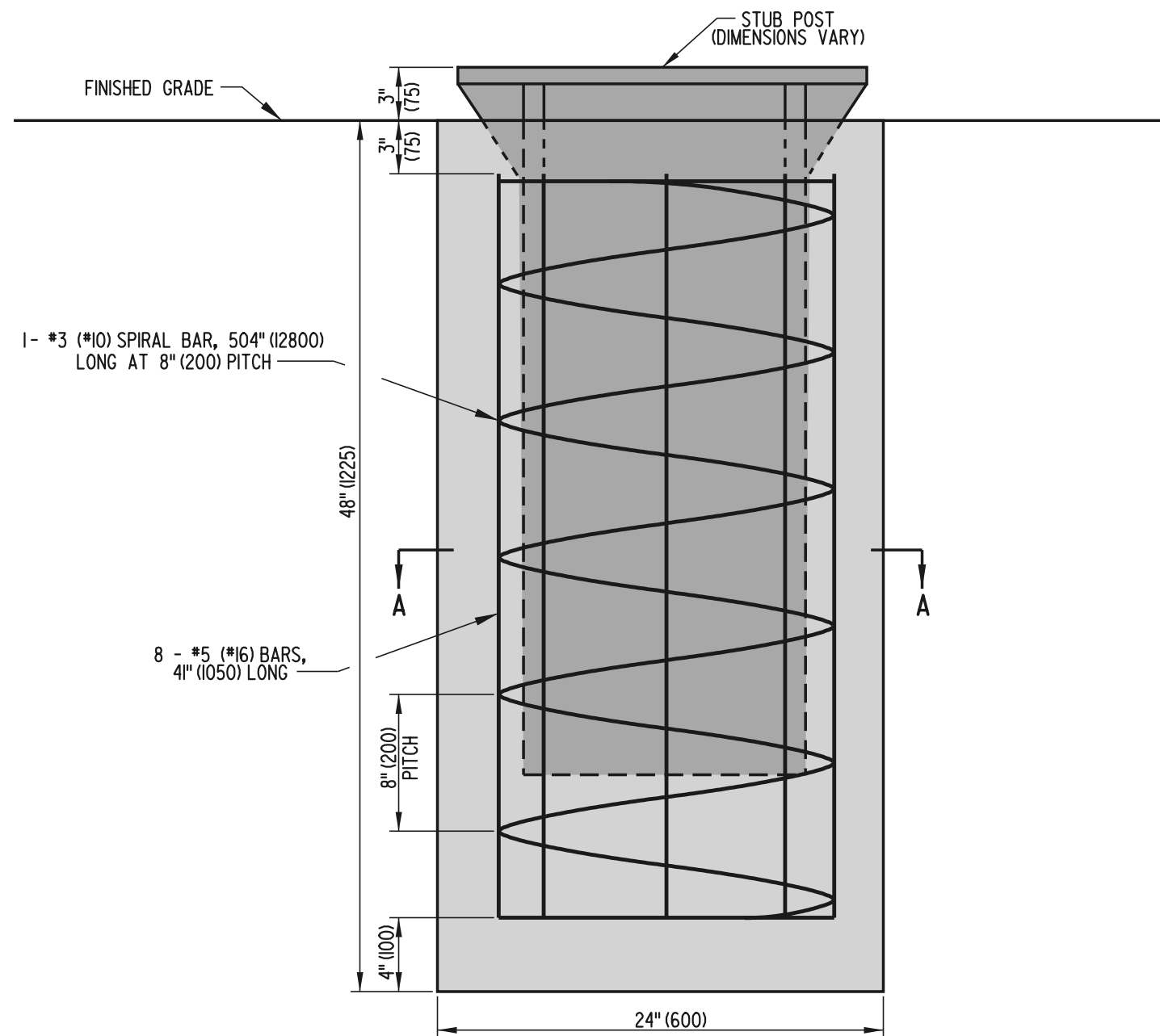
SHT. 1 OF 1

APPROVED

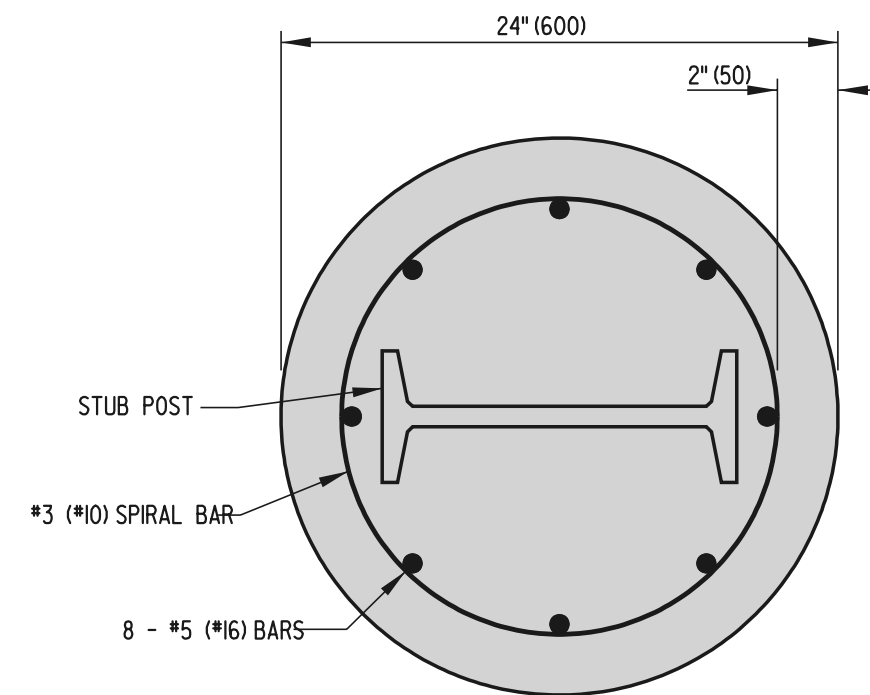
*Caution Wicks*  
CHIEF ENGINEER  
DATE 9/6/02

RECOMMENDED

*Theresa Delph*  
DESIGN ENGINEER  
DATE 8/19/02



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



SECTION A-A

PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

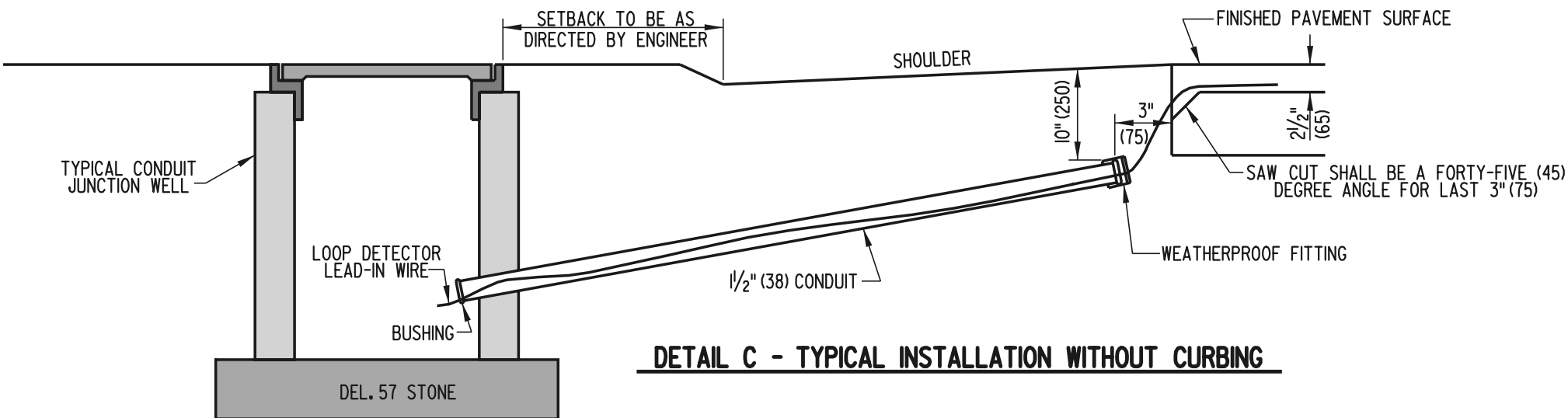
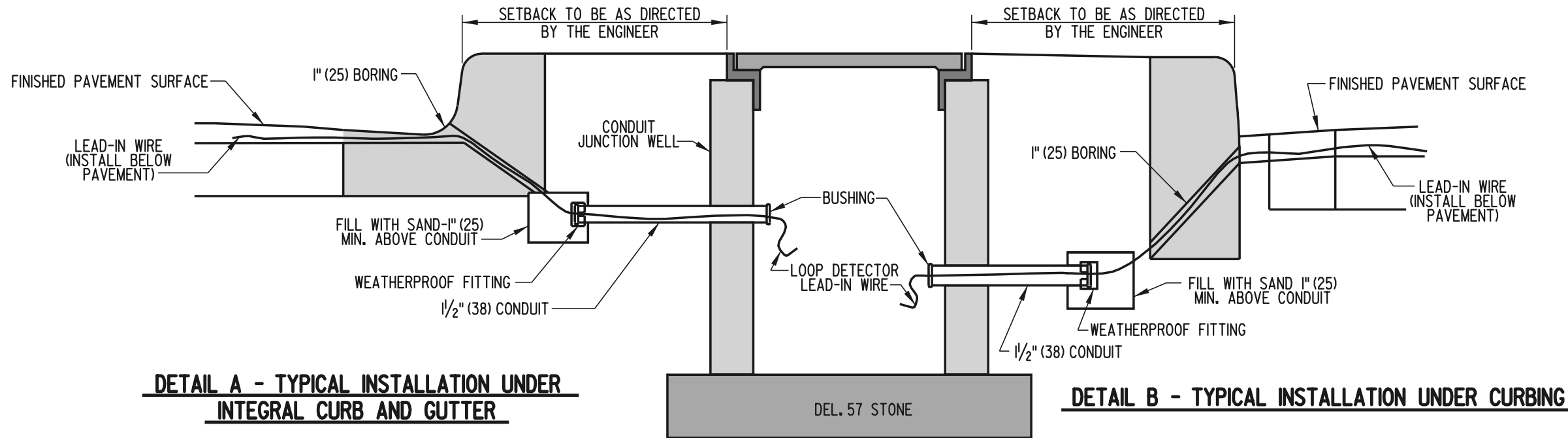
SIGN FOUNDATION

STANDARD NO. T-7 (2002)

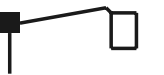
SHT. 1 OF 1

APPROVED *Caution Wicks* 9/6/02  
CHIEF ENGINEER DATE  
RECOMMENDED *Theresa Delph* 8/19/02  
DESIGN ENGINEER DATE

- NOTES:** 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE CONDUIT AGAINST ANY POSSIBLE DAMAGE IN PAVING OPERATIONS.
2. THE WEATHERPROOF FITTING SHALL CONSIST OF A GALVANIZED 1/2" (38) COUPLING CONTAINING A STEEL THREADED REDUCING BUSHING (1/2" (38) TO 3/4" (19)) AND A 3/4" (19) WATERTIGHT CONNECTOR FOR SERVICE ENTRANCE CABLE.
3. THE LEAD-IN WIRE SHALL BE RUN THROUGH THE RUBBER OF THE WEATHERPROOF FITTING.



**PLAN SYMBOL**



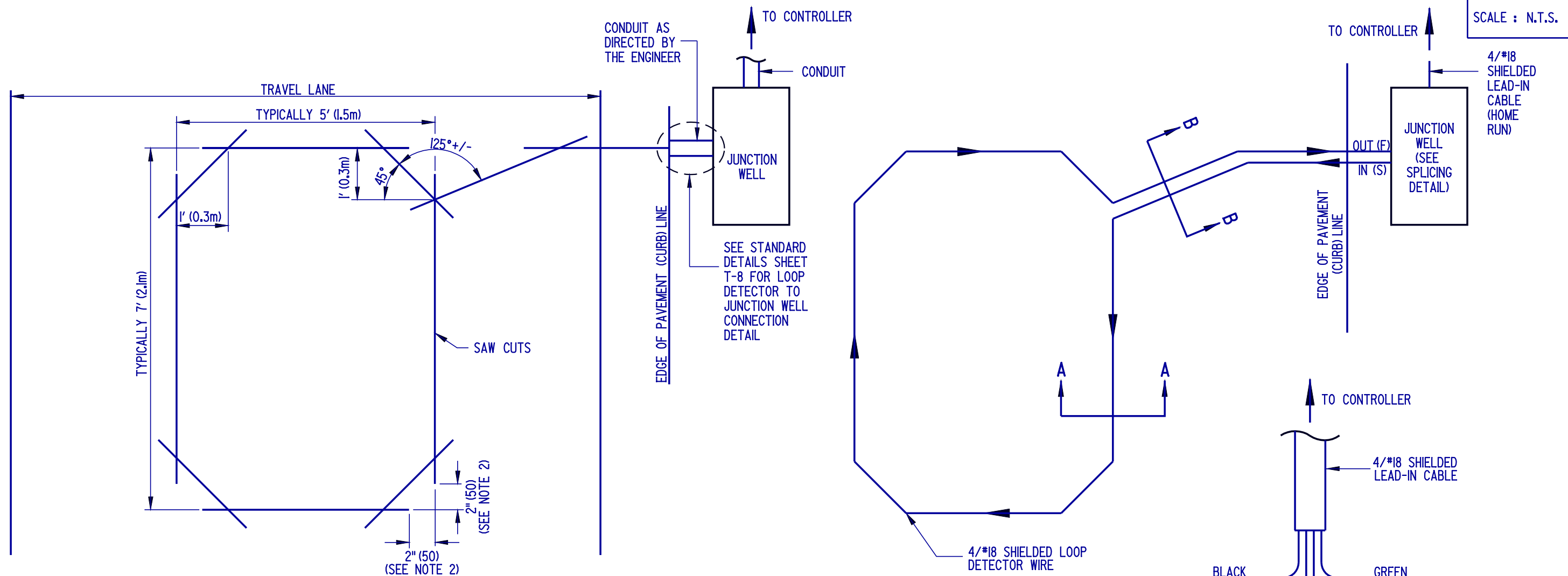
**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

**LOOP DETECTOR TO CONDUIT JUNCTION WELL CONNECTION**

STANDARD NO.	T-8 (2002)	SHT.	1	OF	1
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**APPROVED** *Caudam Wicks* *9/6/02*  
CHIEF ENGINEER DATE

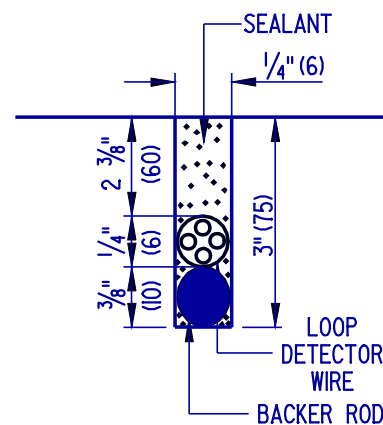
**RECOMMENDED** *Thurman Alpert* *8/19/02*  
DESIGN ENGINEER DATE



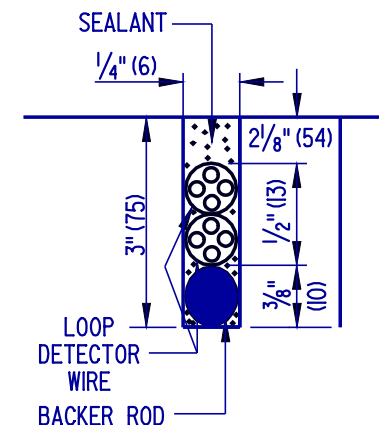
### WIRE SLOT CONSTRUCTION

#### NOTES:

- 1). SAW CUTS FOR WIRE SLOT CONSTRUCTION SHALL BE EXTENDED BEYOND THE CORNERS SO THAT THE SLOT IS FULL DEPTH AT TURN POINTS. A FORTY-FIVE (45) DEGREE ANGLE SHALL BE CUT 12" (300) BACK FROM THE POINT OF THE EXTENDED CORNER.
- 2). THE DIAGONAL CUT SHALL BE STOPPED APPROXIMATELY 2" (50) FROM THE CORNER TO PREVENT THE TRIANGULAR PORTION OF THE PAVEMENT FROM BREAKING.
- 3). A MAXIMUM OF TWO LOOP DETECTORS CAN BE SPLICED TO ONE LEAD-IN CABLE, THE DETAIL ILLUSTRATES THE METHOD OF SPLICING TWO LOOP DETECTORS (LOOP #1 AND LOOP #2) TO A LEAD-IN CABLE.
- 4). LOOP DETECTOR SHALL BE CENTERED IN TRAVEL LANE.



### SECTION A - A



### SECTION B - B

### SPLICING DETAIL (SEE NOTE 3)

### PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

### TYPE #1 LOOP DETECTOR

STANDARD NO. T-9 (2004)

SHT. 1 OF 1

APPROVED

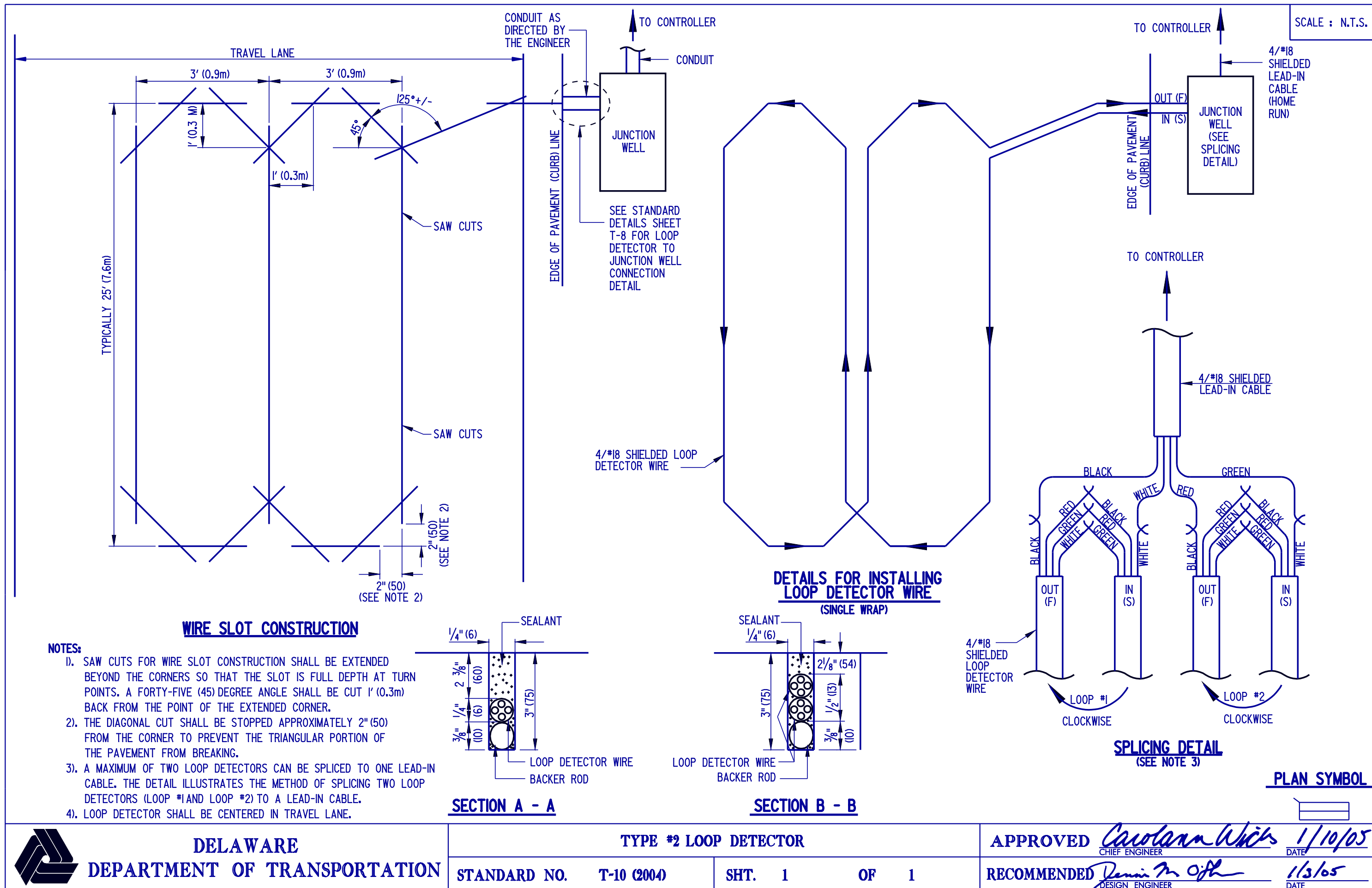
*Carolann Wicks*  
CHIEF ENGINEER

1/10/05  
DATE

RECOMMENDED

*Dennis M. O'Flaherty*  
DESIGN ENGINEER

1/13/05  
DATE



DELAWARE  
DEPARTMENT OF TRANSPORTATION

TYPE #2 LOOP DETECTOR

STANDARD NO.

T-10 (2004)

SHT.

1

OF

1

APPROVED

*Carolann Wicks*  
CHIEF ENGINEER

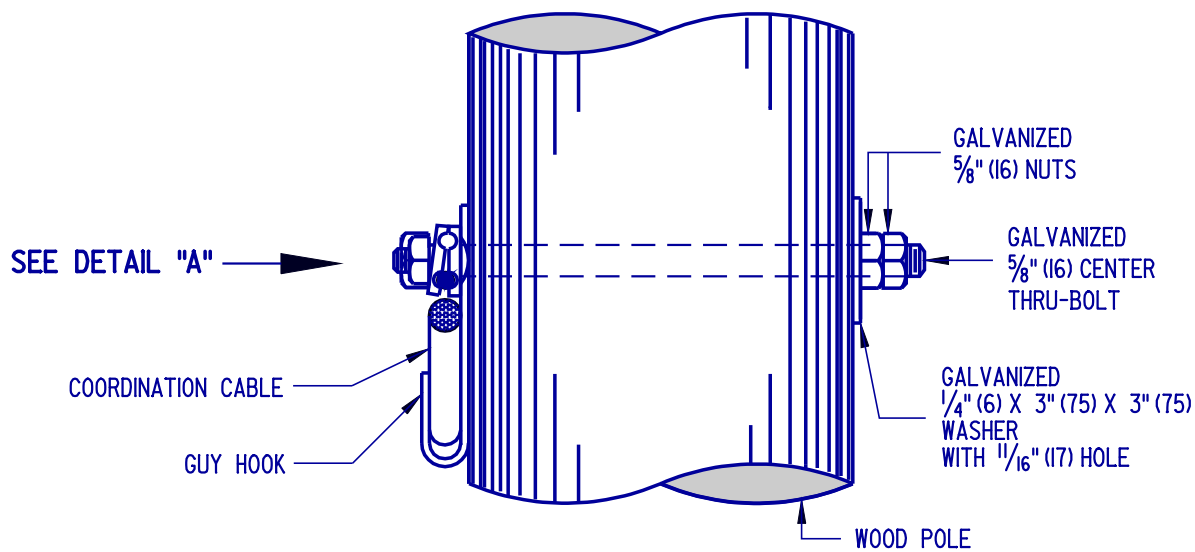
1/10/05  
DATE

RECOMMENDED

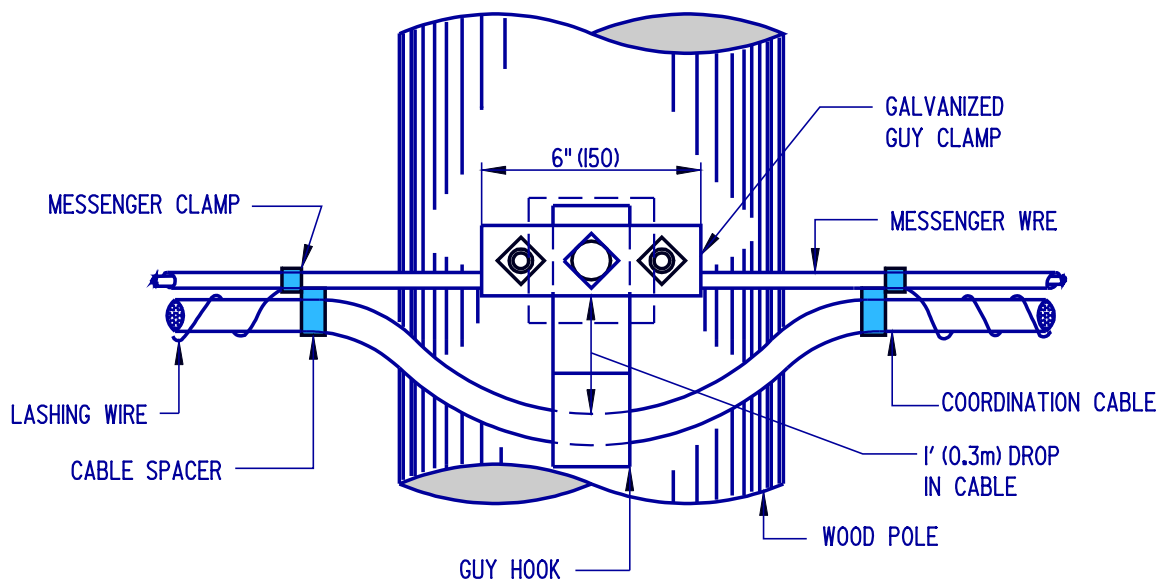
*Dennis M. O'Flaherty*  
DESIGN ENGINEER

1/3/05  
DATE

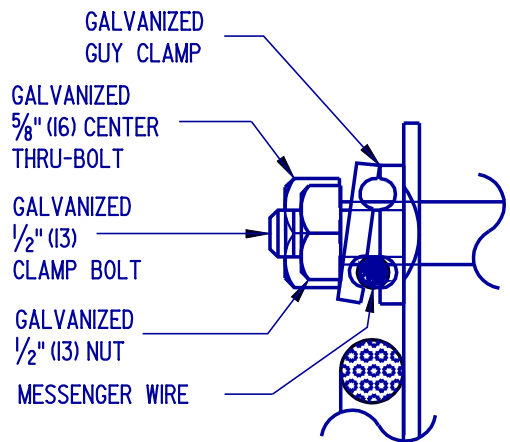
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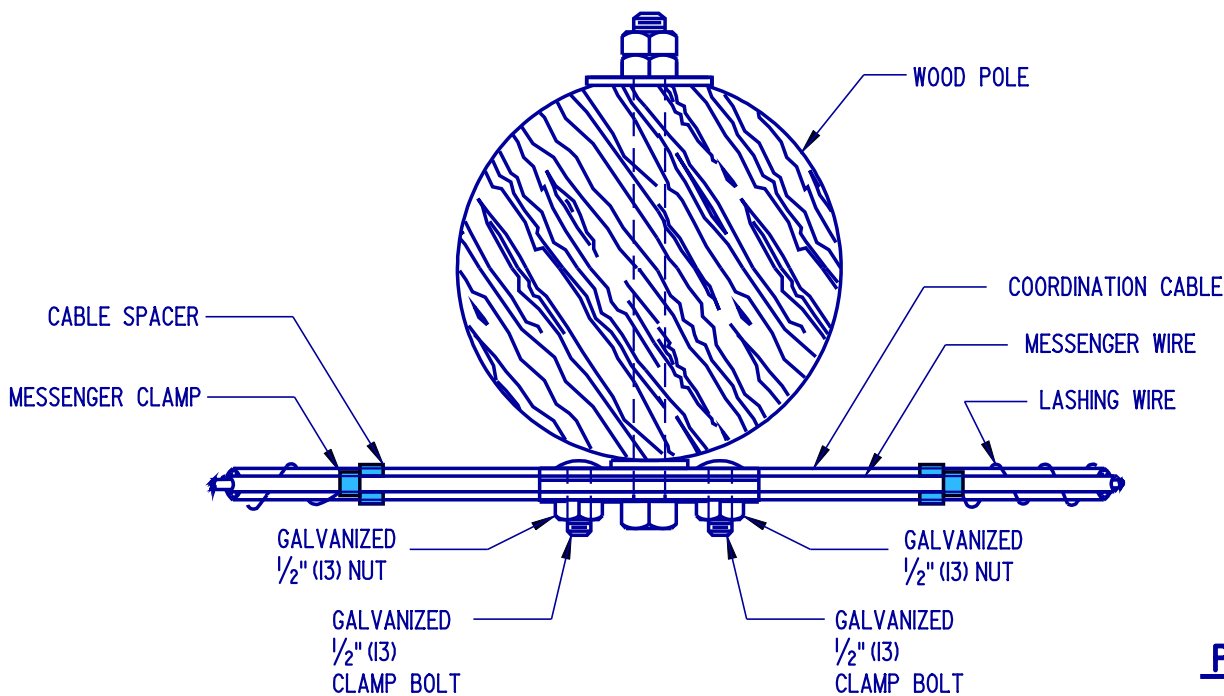
SIDE VIEW



FRONT VIEW



DETAIL "A"



TOP VIEW

PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

INTERMEDIATE MESSENGER WIRE ATTACHMENT ON WOOD POLES

STANDARD NO. T-11 (2004)

SHT. 1 OF 2

APPROVED

*Carolann Wick*  
CHIEF ENGINEER

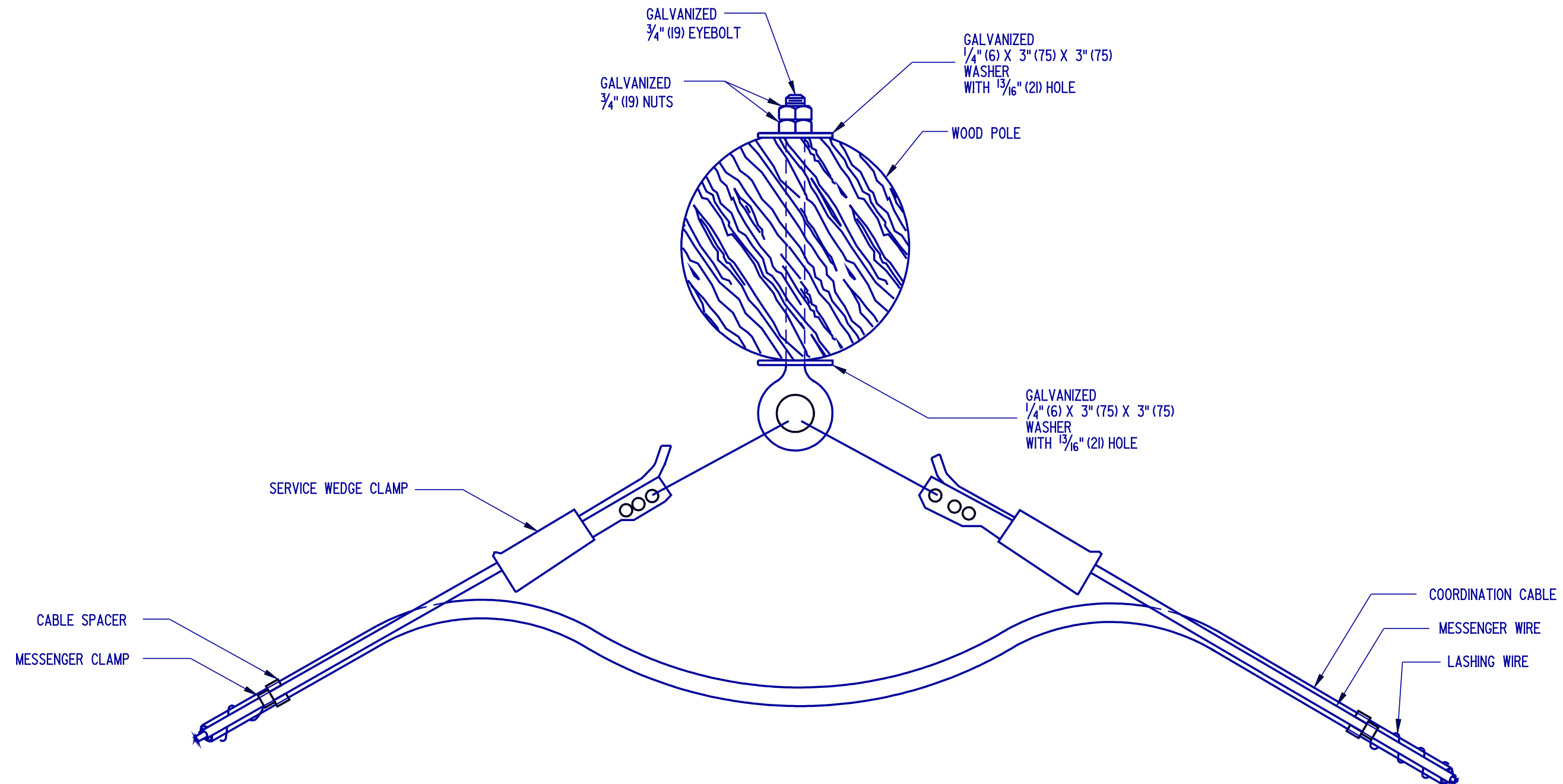
1/10/05  
DATE

RECOMMENDED

*Dennis M. O'Flaherty*  
DESIGN ENGINEER

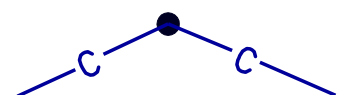
1/13/05  
DATE





TOP VIEW

PLAN SYMBOL



DELAWARE  
DEPARTMENT OF TRANSPORTATION

ANGULAR INTERMEDIATE MESSENGER WIRE ATTACHMENT

STANDARD NO. T-11 (2004)

SHT. 2 OF 2

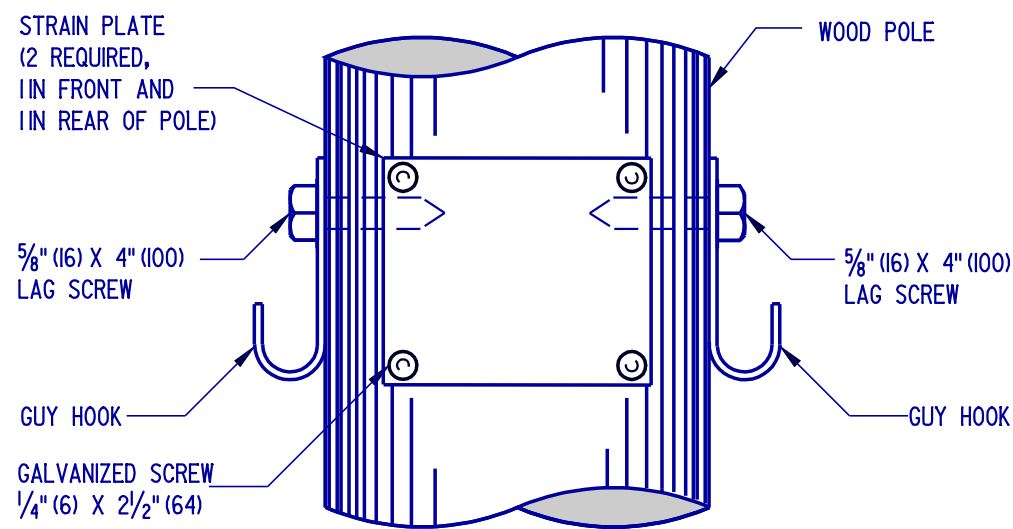
APPROVED

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

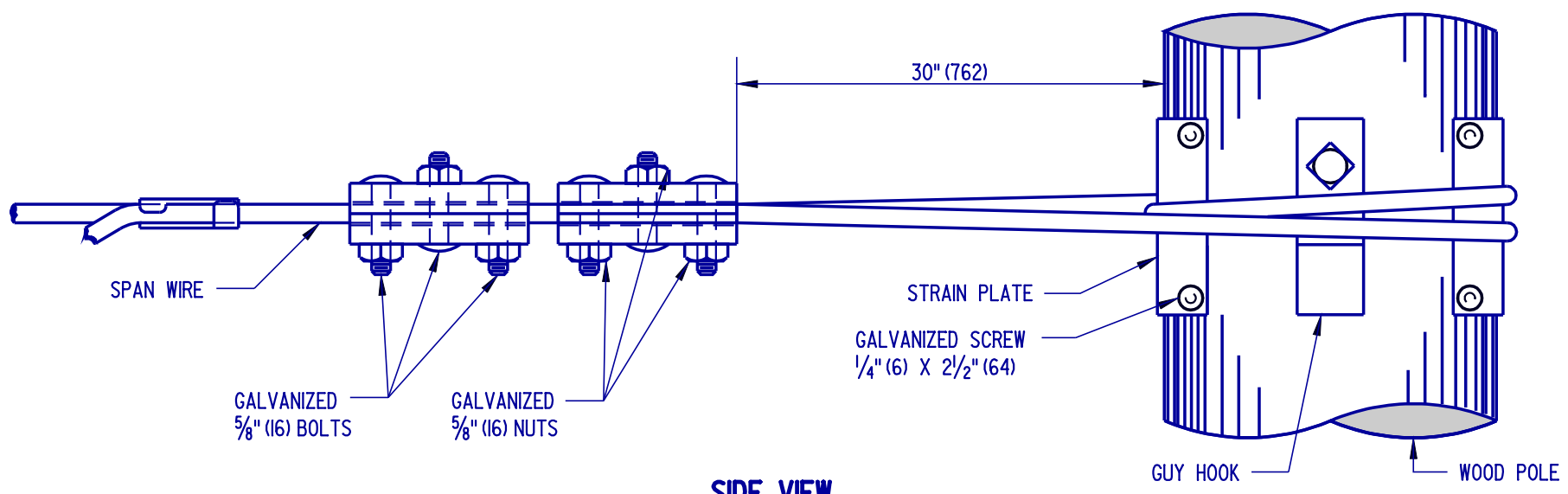
RECOMMENDED

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

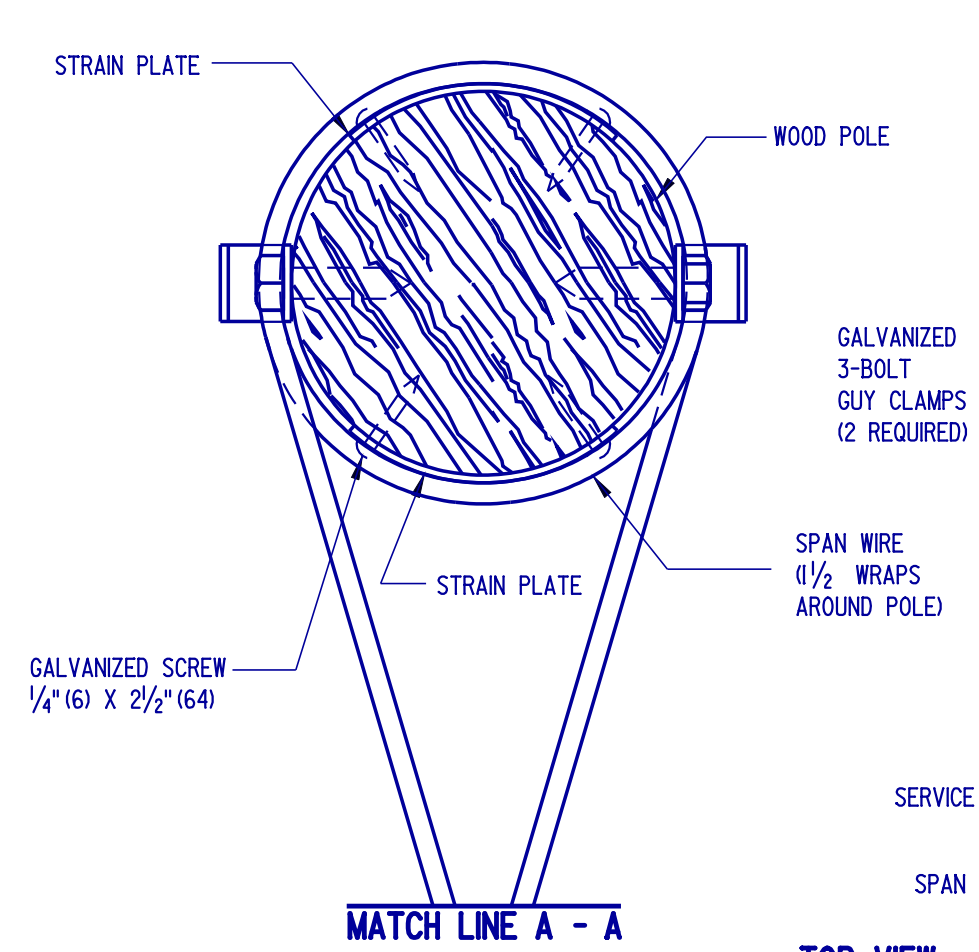
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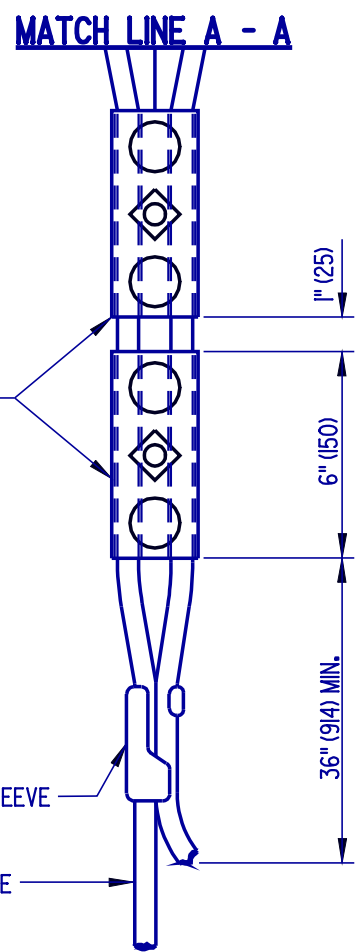
**FRONT VIEW**  
(SPAN WIRE NOT SHOWN)



**SIDE VIEW**

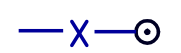


**TOP VIEW**



**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".

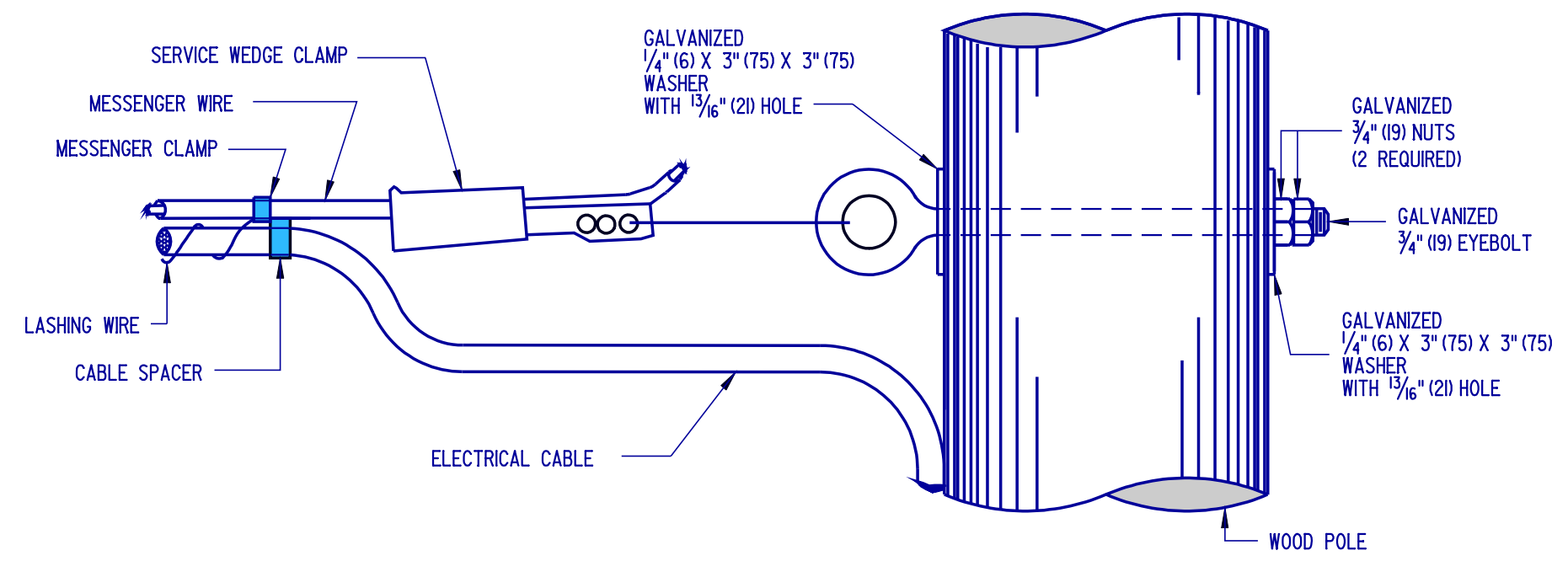
**PLAN SYMBOL**



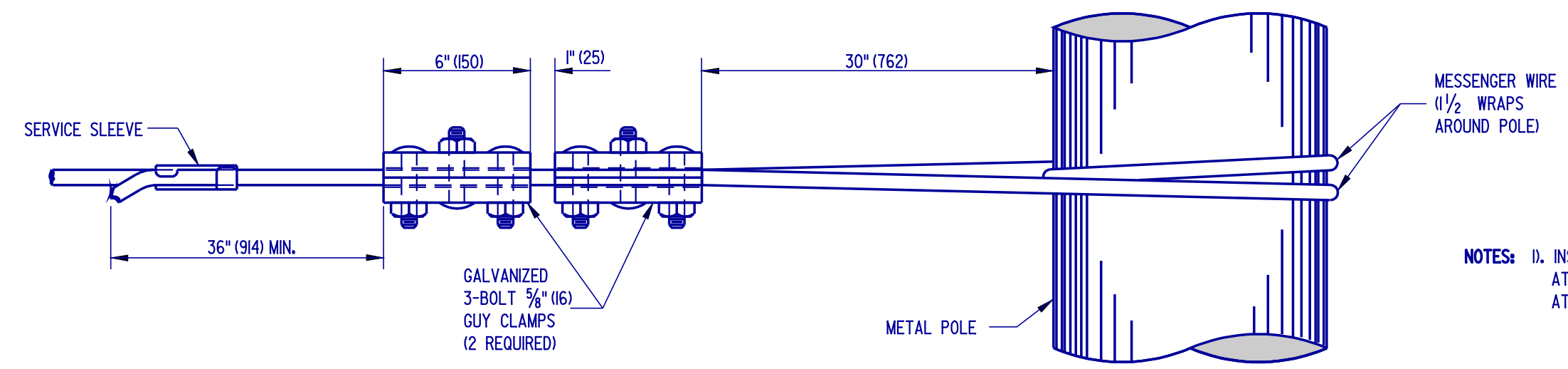
**DELAWARE**  
**DEPARTMENT OF TRANSPORTATION**

SPAN WIRE ATTACHMENT BETWEEN POLES			
STANDARD NO.	T-12 (2004)	SHT.	1 OF 2

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



**WOOD POLES**



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

**PLAN SYMBOL**



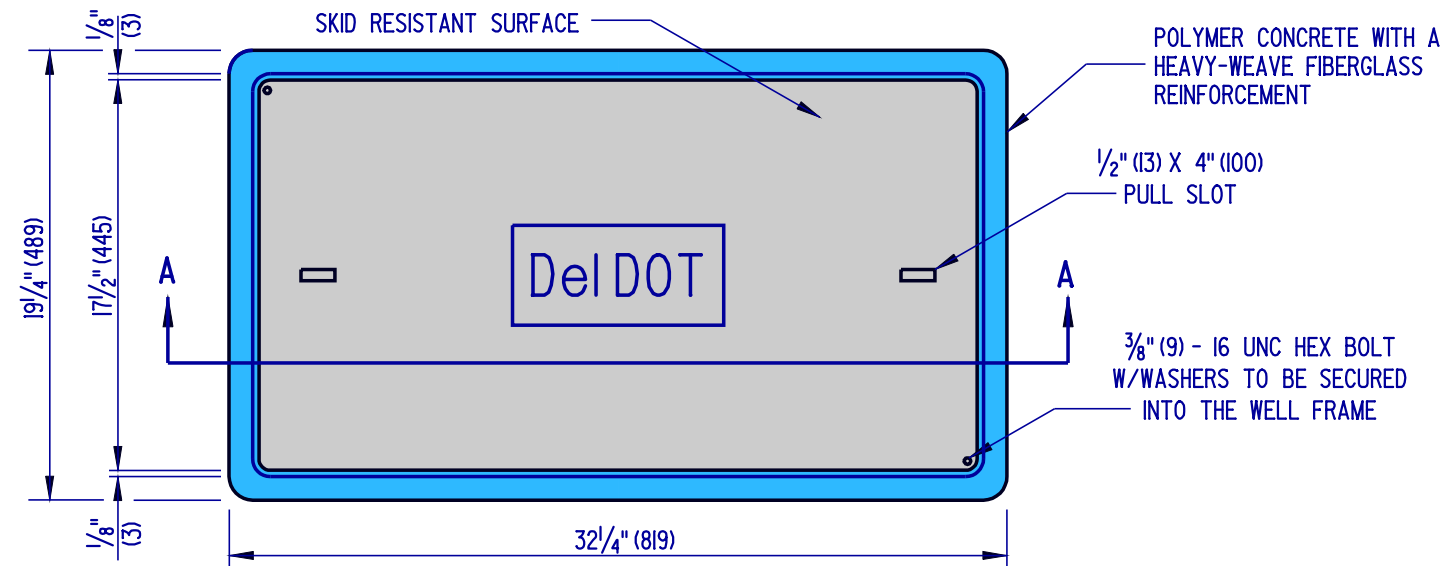
**METAL POLES**



**DELAWARE  
DEPARTMENT OF TRANSPORTATION**

DEAD END MESSENGER WIRE ATTACHMENT				
STANDARD NO.	T-12 (2004)	SHT.	2	OF 2

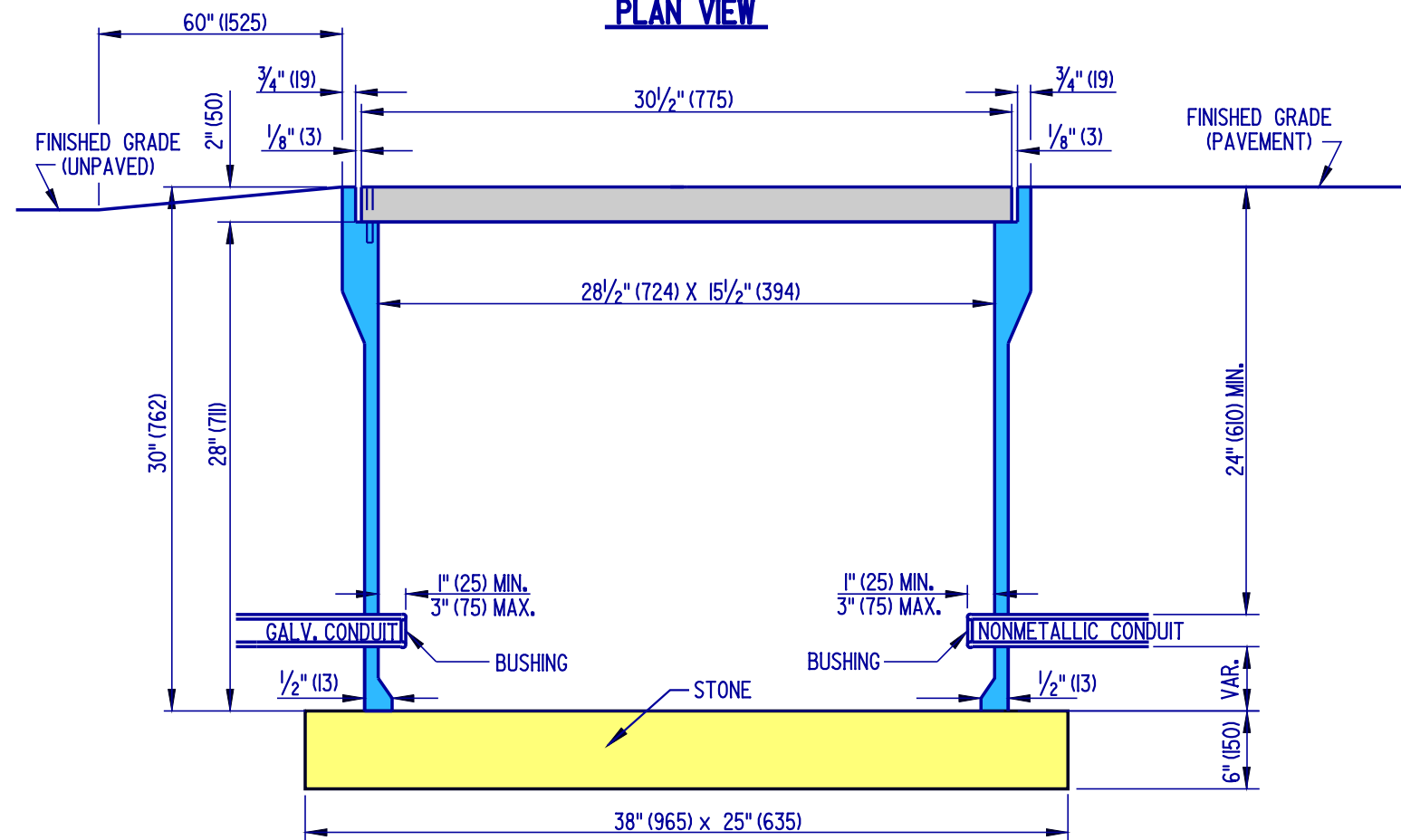
**APPROVED** *Carolann Wicks* 1/10/05  
CHIEF ENGINEER DATE  
**RECOMMENDED** *Dennis M. O'Flaherty* 1/13/05  
DESIGN ENGINEER DATE



**NOTES:**

- 1). TYPE 6 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 (6800 kg) OVER A 10\"/>

**PLAN VIEW**



**SECTION A-A**

**PLAN SYMBOL**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

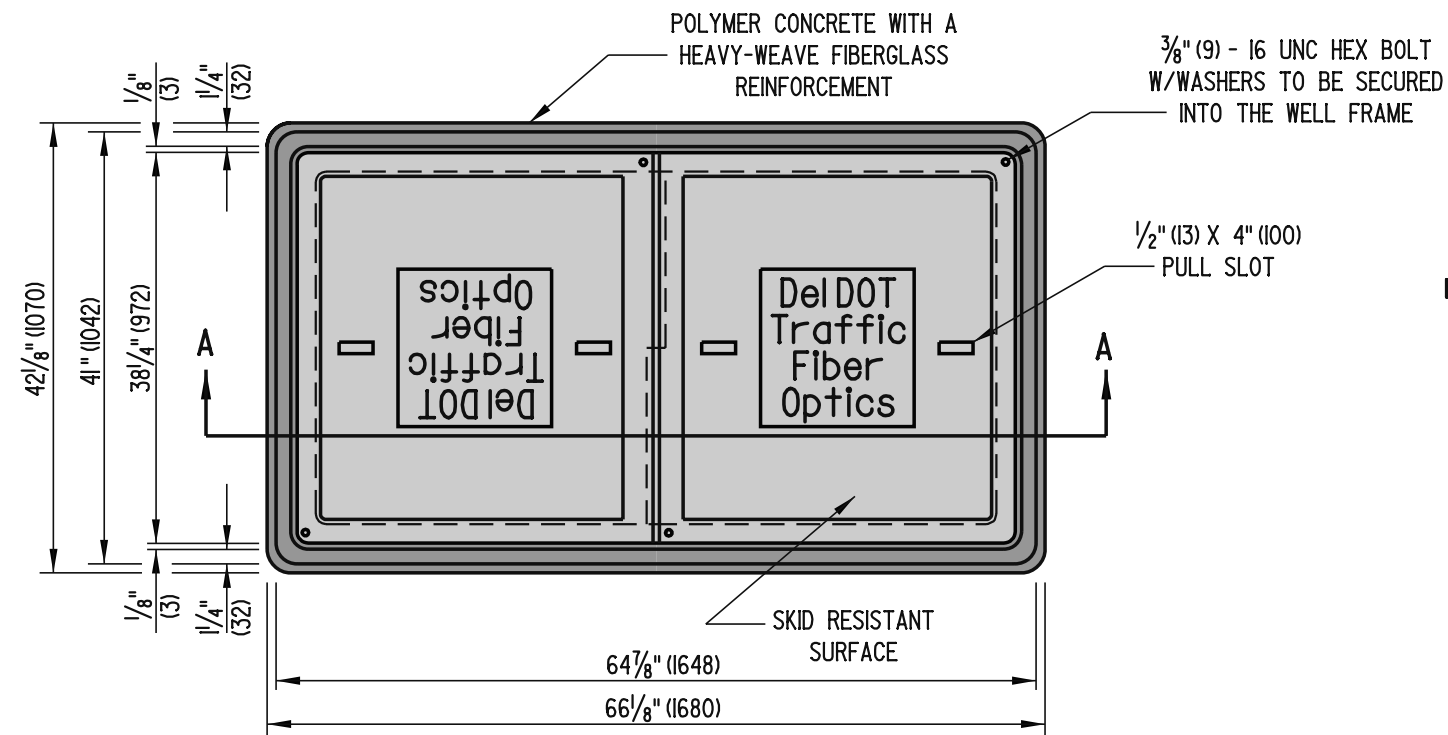
CONDUIT JUNCTION WELL, TYPE 4

STANDARD NO. T-13 (2004)

SHT. 1 OF 3

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

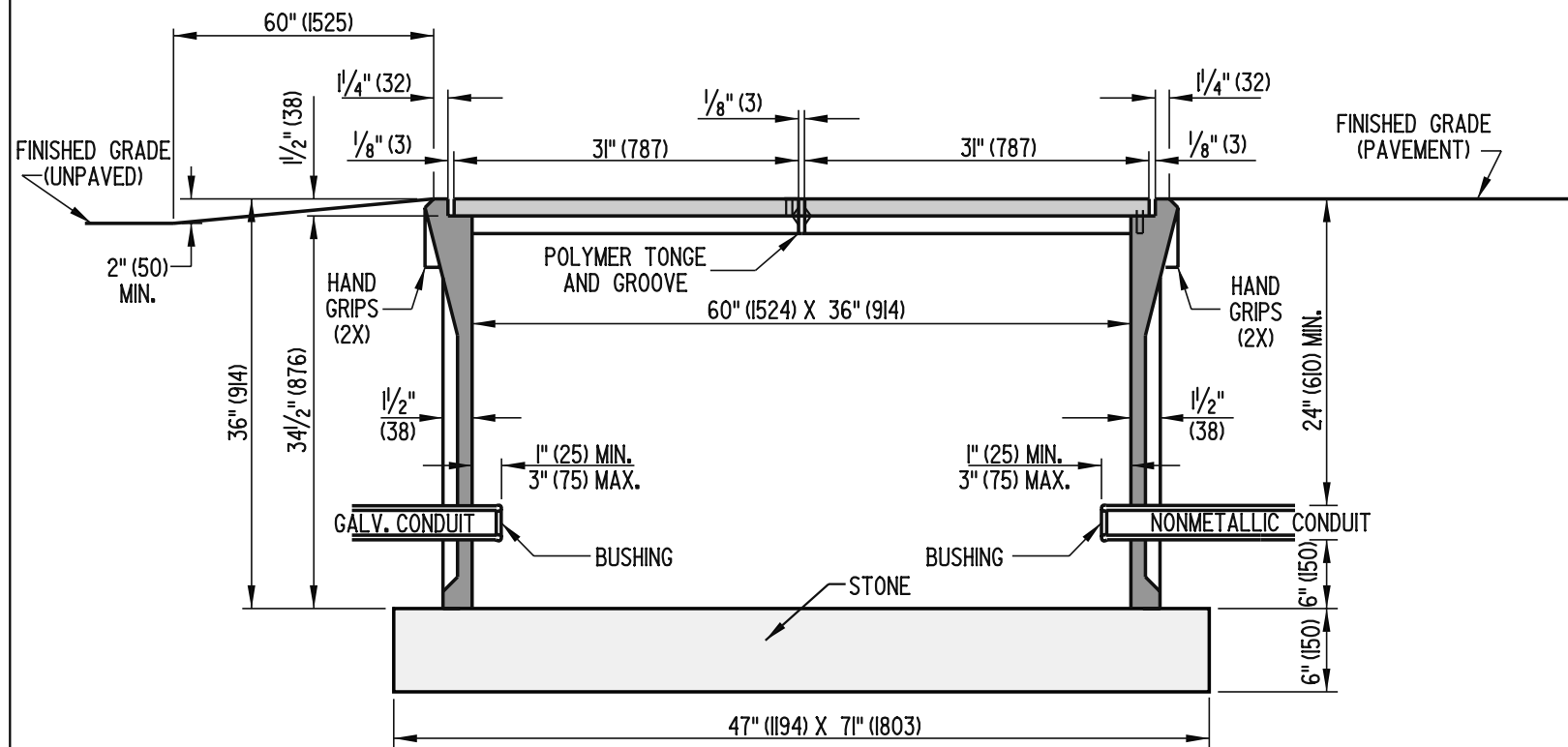
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05  
DESIGN ENGINEER DATE



**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 (6800 kg) OVER A 10" (255) SQUARE.

**PLAN VIEW**



**SECTION A-A**



DELAWARE  
DEPARTMENT OF TRANSPORTATION

**CONDUIT JUNCTION WELL, TYPE 7**

STANDARD NO. T-13 (2006)

SHT. 2 OF 3

APPROVED

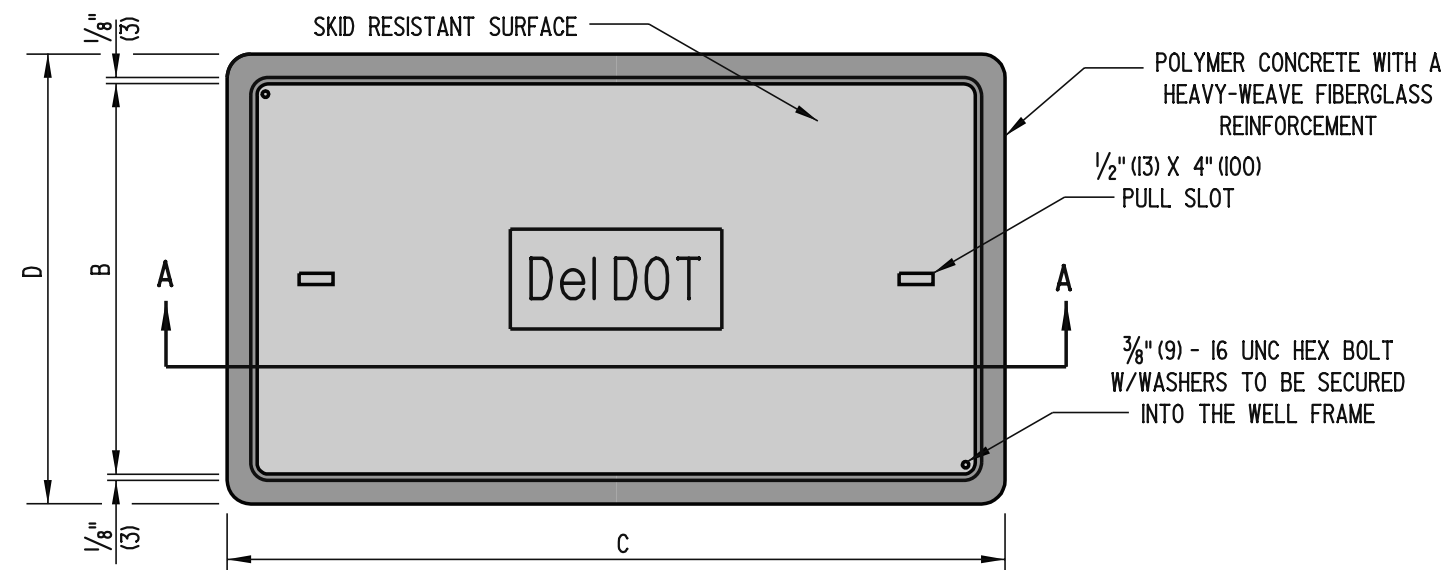
*[Signature]*  
CHIEF ENGINEER

10/10/06  
DATE

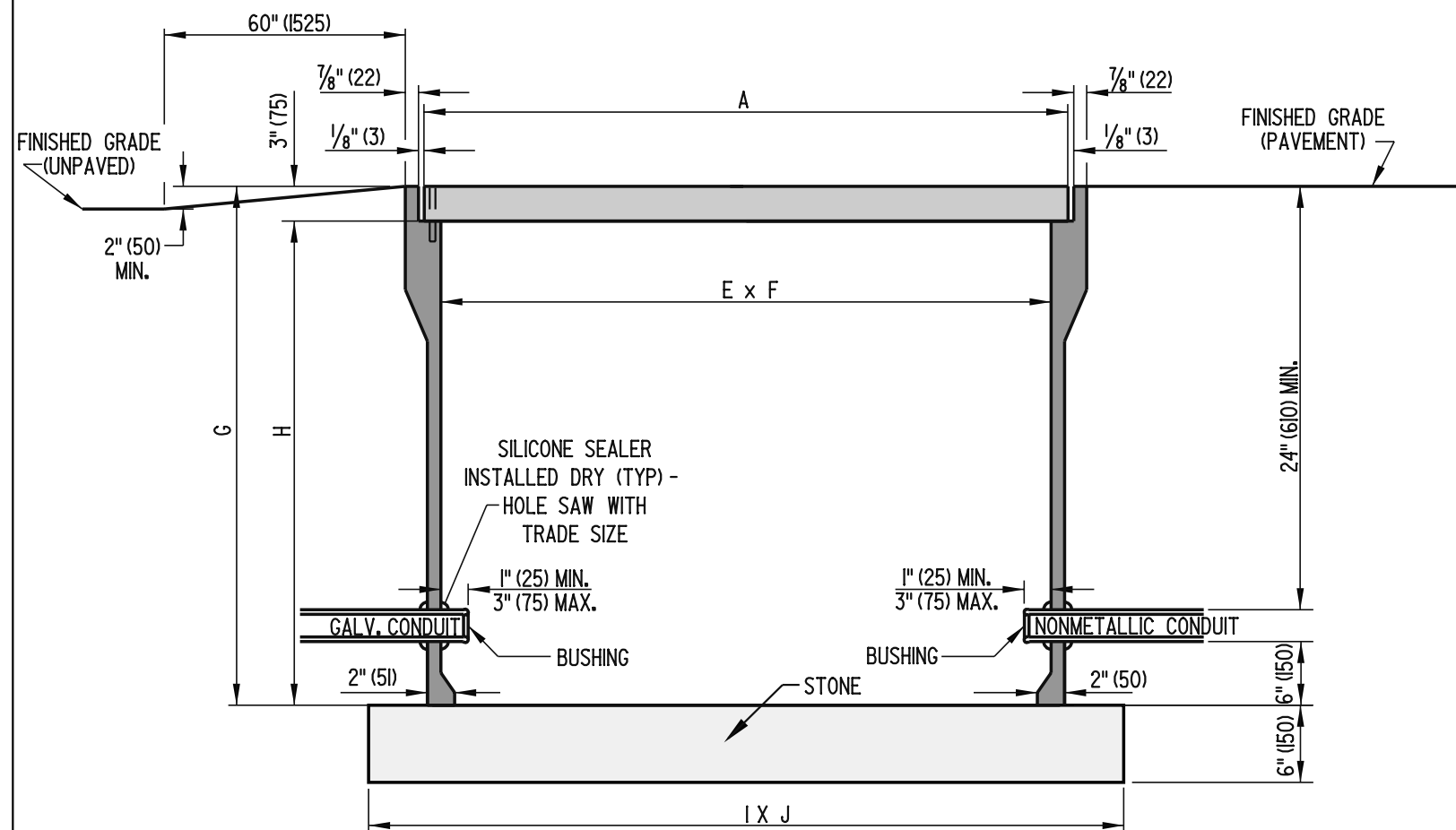
RECOMMENDED

*[Signature]*  
DESIGN ENGINEER

10/13/06  
DATE



**PLAN VIEW**



**SECTION A-A**

**NOTES:**

- 1). TYPES 8 & 10 CONDUIT JUNCTION WELLS 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 (6800 kg) OVER A 10\"/>

DIMENSIONS		TYPE 8	TYPE 10
COVER	A	47 5/8\"/>	35 5/8\"/>
	B	30 1/8\"/>	24\"/>
FRAME	C	49 5/8\"/>	37 5/8\"/>
	D	32 1/8\"/>	26\"/>
	E	45 5/8\"/>	33 7/8\"/>
	F	28 1/8\"/>	22 1/4\"/>
	G	36\"/>	30\"/>
	H	33\"/>	27\"/>
BASE	I	58\"/>	46\"/>
	J	40\"/>	34\"/>



DELAWARE  
DEPARTMENT OF TRANSPORTATION

CONDUIT JUNCTION WELLS, TYPES 8 & 10

STANDARD NO. T-13 (2006)

SHT. 3 OF 3

APPROVED

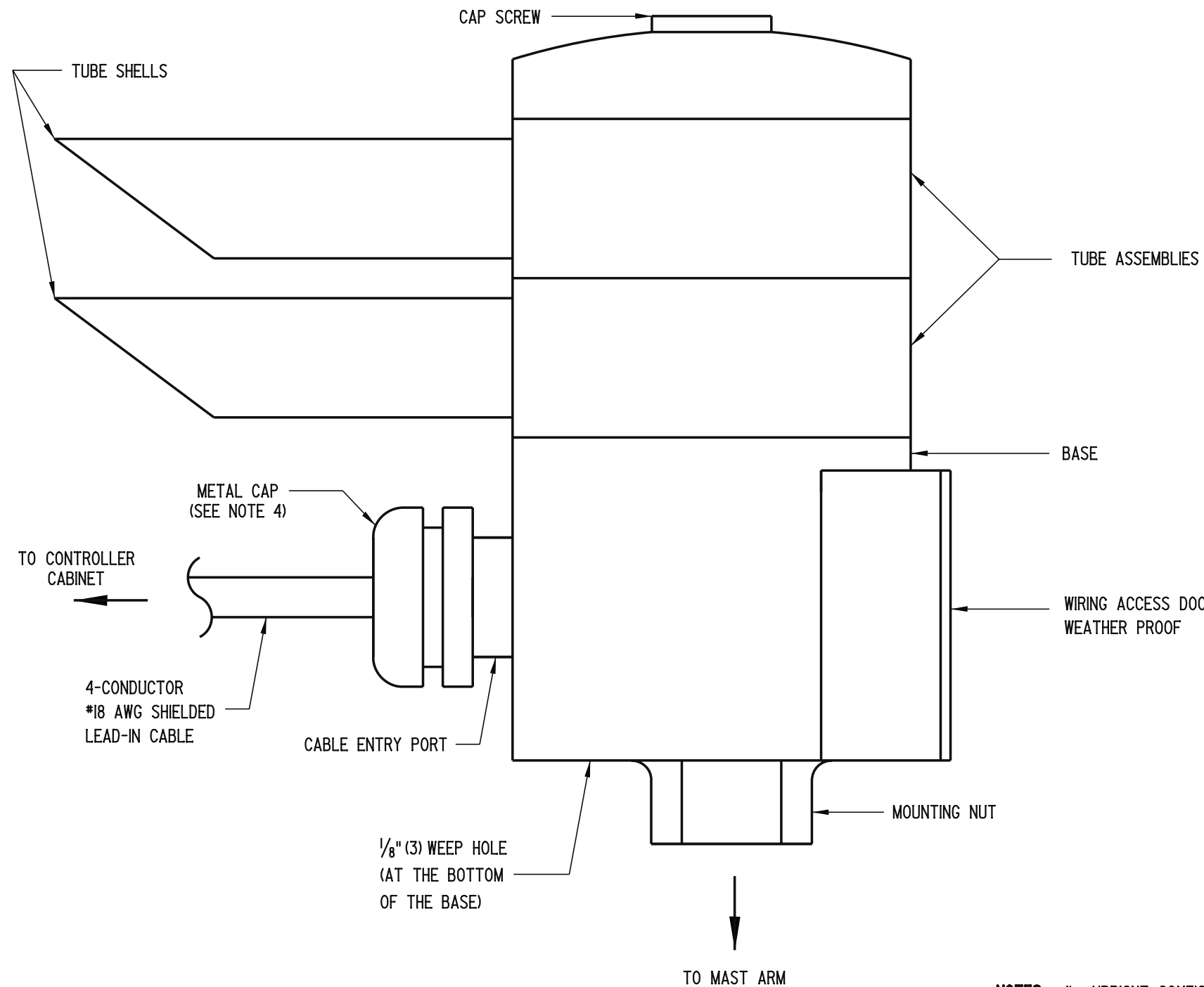
*[Signature]*  
CHIEF ENGINEER

10/10/06  
DATE

RECOMMENDED

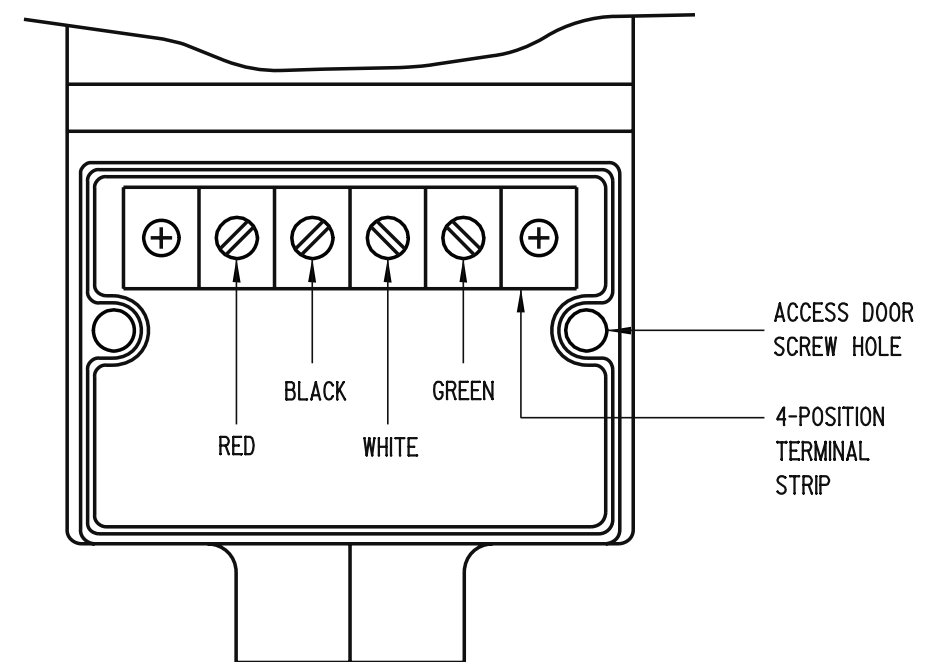
*[Signature]*  
DESIGN ENGINEER

10/13/06  
DATE



**SIDE VIEW**

**CABLE CONNECTIONS  
TO TERMINAL STRIP**



**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

STANDARD NO. T-14 (2006)

SHT. 1 OF 2

APPROVED

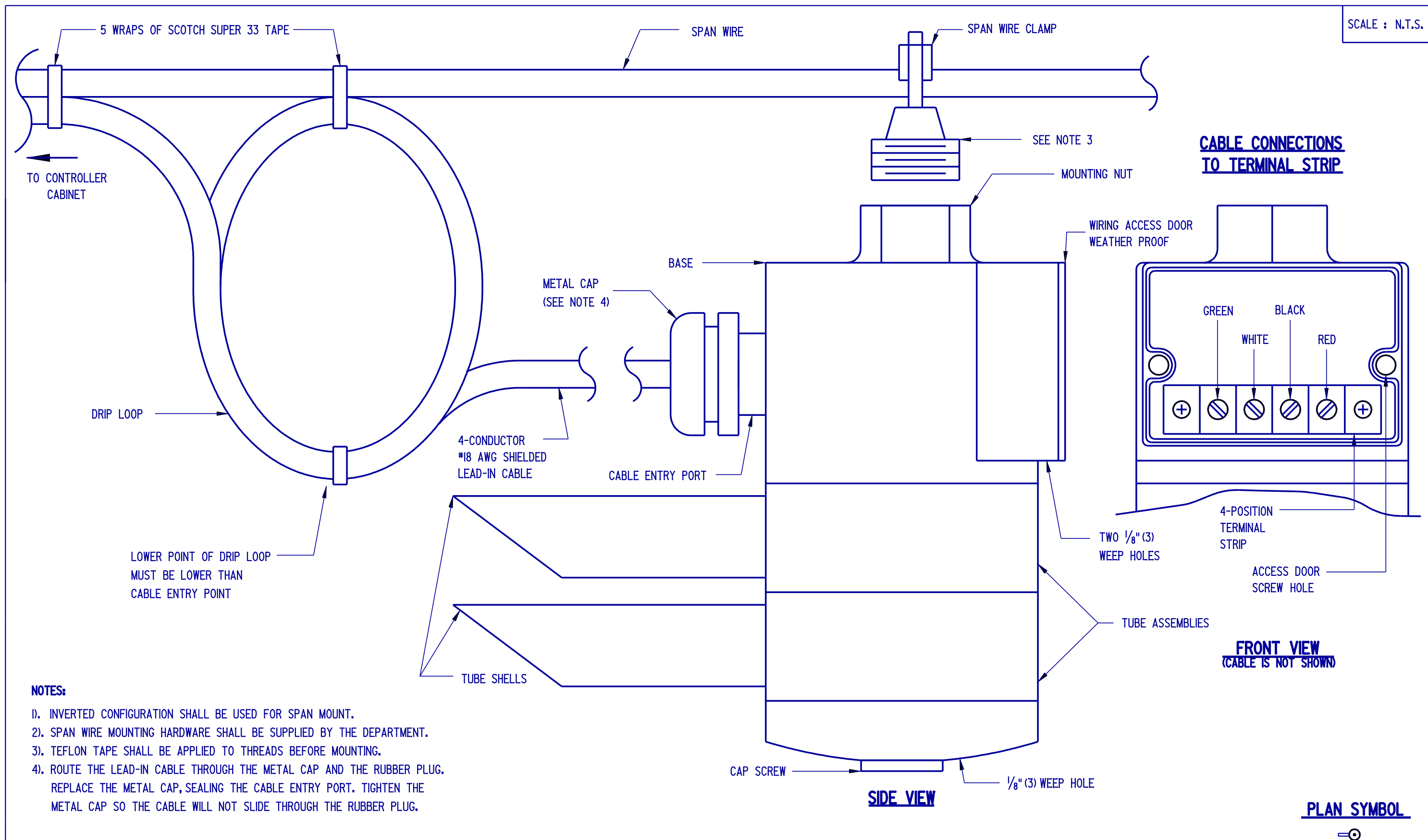
*Frank Taylor*  
CHIEF ENGINEER

10/10/06  
DATE

RECOMMENDED

*Dan Smith*  
DESIGN ENGINEER

10/13/06  
DATE



DELAWARE  
DEPARTMENT OF TRANSPORTATION

EMERGENCY PREEMPTION RECEIVER, INVERTED MOUNT

STANDARD NO. T-14 (2004)

SHT. 2 OF 2

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

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