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 1 - BARRIER

INDEX OF SHEETS (GICD)
## SECTION I - BARRIER (CONT'D)

<table>
<thead>
<tr>
<th>Sheet No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-16</td>
<td>- GUARDRAIL OVER CULVERTS (TYPES 1-27, 2-27, AND 3-27)</td>
</tr>
<tr>
<td>0010</td>
<td>1 GUARDRAIL OVER CULVERTS, TYPE 1-27</td>
</tr>
<tr>
<td>0020</td>
<td>2 GUARDRAIL OVER CULVERTS, TYPE 2-27</td>
</tr>
<tr>
<td>0030</td>
<td>3 GUARDRAIL OVER CULVERTS, TYPE 3-27</td>
</tr>
<tr>
<td>B-17 (2010)</td>
<td>GUARDRAIL END TREATMENT, TYPE 4-27</td>
</tr>
<tr>
<td>B-18 (2010)</td>
<td>CURVED GUARDRAIL SECTION</td>
</tr>
<tr>
<td>B-19 (2010)</td>
<td>END ANCHORAGE, TYPE 27</td>
</tr>
<tr>
<td>B-20</td>
<td>- BURIED END SECTION</td>
</tr>
<tr>
<td>0010</td>
<td>1 BURIED END SECTION - SINGLE RAM</td>
</tr>
<tr>
<td>0020</td>
<td>2 BURIED END SECTION - DOUBLE RAM</td>
</tr>
<tr>
<td>0030</td>
<td>3 POST, CONCRETE BLOCK, AND RURAL DETAILS</td>
</tr>
<tr>
<td>B-21</td>
<td>- GUARDRAIL TO BARRIER CONNECTION (TYPES 1-27, 2-27, AND EXIT TYPE 27)</td>
</tr>
<tr>
<td>0010</td>
<td>1 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-27</td>
</tr>
<tr>
<td>0020</td>
<td>2 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-27</td>
</tr>
<tr>
<td>0030</td>
<td>3 GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE 27</td>
</tr>
</tbody>
</table>

## SECTION II - CURB & GUTTER

<table>
<thead>
<tr>
<th>Sheet No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-2</td>
<td>- CURB RAMPS</td>
</tr>
<tr>
<td>0010</td>
<td>1 TYPE</td>
</tr>
<tr>
<td>0020</td>
<td>2 TYPE 2, 3, AND 4</td>
</tr>
<tr>
<td>0030</td>
<td>3 SECTIONS FOR TYPES 2, 3, AND 4</td>
</tr>
<tr>
<td>0040</td>
<td>4 TYPE 5</td>
</tr>
<tr>
<td>C-3 (2010)</td>
<td>ENTRANCES</td>
</tr>
<tr>
<td>C-4 (2010)</td>
<td>CURB OPENING DETAILS</td>
</tr>
</tbody>
</table>

## SECTION III - DRAINAGE

<table>
<thead>
<tr>
<th>Sheet No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-1</td>
<td>- B/Y SAFETY END STRUCTURE</td>
</tr>
<tr>
<td>0010</td>
<td>1 DETAIL VIEWS</td>
</tr>
<tr>
<td>0020</td>
<td>2 SCHEDULES</td>
</tr>
<tr>
<td>D-2</td>
<td>- TD/Y SAFETY END STRUCTURE</td>
</tr>
<tr>
<td>0010</td>
<td>1 DETAIL VIEWS</td>
</tr>
<tr>
<td>0020</td>
<td>2 SCHEDULES</td>
</tr>
<tr>
<td>D-3</td>
<td>- SAFETY GRATES</td>
</tr>
<tr>
<td>0030</td>
<td>1 SAFETY END STRUCTURE AND ASSEMBLY DETAIL</td>
</tr>
<tr>
<td>0040</td>
<td>2 PERSONAL SAFETY GRATE FOR PIPE INLET DETAIL</td>
</tr>
<tr>
<td>D-4 (2009)</td>
<td>INLET BOX DETAILS</td>
</tr>
<tr>
<td>D-5</td>
<td>- DRAINAGE INLET DETAILS</td>
</tr>
<tr>
<td>0030</td>
<td>1 DRAINAGE INLET ASSEMBLY</td>
</tr>
<tr>
<td>0040</td>
<td>2 DRAINAGE INLET FRAME AND GRATES</td>
</tr>
<tr>
<td>0050</td>
<td>3 DRAINAGE INLET TOP UNITS</td>
</tr>
<tr>
<td>0060</td>
<td>4 DRAINAGE INLET COVER SLAB DETAILS</td>
</tr>
<tr>
<td>0070</td>
<td>5 DOUBLE INLET COVER SLAB DETAILS</td>
</tr>
<tr>
<td>0080</td>
<td>6 3/4&quot; (65) x 24&quot; (65) DRAINAGE INLET AND COVER SLAB DETAILS</td>
</tr>
<tr>
<td>0090</td>
<td>7 3/4&quot; (65) x 24&quot; (65) DRAINAGE INLET DETAILS</td>
</tr>
<tr>
<td>0100</td>
<td>8 DRAINAGE INLET TOP UNIT, TYPE 6</td>
</tr>
<tr>
<td>0110</td>
<td>9 DRAINAGE INLET BOX</td>
</tr>
</tbody>
</table>
SECTION III - DRAINAGE (CONT'D)

0-6 - MANHOLE DETAILS
  (2009) - 1 BOX MANHOLE ASSEMBLY
  (2009) - 2 ROUND MANHOLE ASSEMBLY
  (2009) - 3 MANHOLE, TOP, UNIT, FRAME AND COVER
  (2007) - 4 BOX MANHOLE COVER SLAB

0-7 - JUNCTION BOX DETAILS
  (2009) - 1 JUNCTION BOX ASSEMBLY
  (2007) - 2 JUNCTION BOX COVER SLAB

0-8 (2008) - PIPE BENDING

0-9 (2008) - PERFORATED PIPE UNDERGROUND

0-10 (2007) - PIPE PLACING DETAIL

SECTION IV - EROSION

E-1 (2008) - INCREMENTAL STABILIZATION

E-2 (2008) - SILT FENCE

E-3 (2008) - DRAINAGE INLET SEGMENT CONTROL

E-4 (2006) - CURB INLET SEGMENT CONTROL - ** DETAIL REMOVED - SEE SPECIFICATIONS **

E-5 (2006) - STONE CHECK DAM

E-6 (2005) - SEGMENT TRAP

E-7 (2005) - SEGMENT TRAP USING DRAINAGE INLET AS OUTLET

E-8 - RISER PIPE ASSEMBLY FOR SEGMENT TRAP
  (2006) - 1 ELEVATION
  (2006) - 2 TANK HOOD DETAILS

E-9 (2005) - EROSION CONTROL BLANKET APPLICATIONS

E-10 (2005) - RIPRAP DITCH

E-11 (2005) - TEMPORARY SWALE

E-12 (2005) - PERIMETER Ditch/ SWALE

E-13 (2005) - EARTH DRAIN..." ..." EARTH DRAIN...

E-14 (2005) - TEMPORARY SLOPE DRAIN

E-15 (2005) - STILLING WELL

E-16 (2005) - SUMP PIT, TYPES 1 AND 2

E-17 (2003) - DEWATERING BASIN

E-18 (2003) - CLOTH BAND/channel diversion

E-19 (2005) - SAND BAG DIVERSION

E-20 (2005) - SAND BAG DRAIN

E-21 (2000) - STABILIZED CONSTRUCTION ENTRANCE

E-22 (2000) - SKIMMER DEWATERING DEVICE

E-23 - TURBIDITY CURTAIN
  (2005) - 1 FLOATING TURBIDITY CURTAIN
  (2005) - 2 STAB TURBIDITY CURTAIN

E-24 (2005) - PORTABLE SEDIMENT TANK

E-25 (2005) - TURF REINFORCEMENT MAT APPLICATIONS

E-26 (2000) - RIPRAP ENERGY DISPOSAL DETAIL
### SECTION V - LANDSCAPING

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-1</td>
<td>PLANTING DETAILS</td>
</tr>
<tr>
<td>(2006)</td>
<td>1. ROSEBUSH SHARP PLANTING DETAIL</td>
</tr>
<tr>
<td>(2006)</td>
<td>2. TREE PLANTING DETAIL</td>
</tr>
<tr>
<td>(2006)</td>
<td>3. PERENNIAL/GROUND COVER PLANTING DETAIL</td>
</tr>
</tbody>
</table>

### SECTION VI - MISCELLANEOUS

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1(2000)</td>
<td>RIGHT-OF-WAY FENCE</td>
</tr>
<tr>
<td>M-2(2000)</td>
<td>CONCRETE MONUMENT</td>
</tr>
<tr>
<td>M-3(2000)</td>
<td>BOLLARD AND SHARED-USE PATH DETAILS</td>
</tr>
<tr>
<td>M-4(2007)</td>
<td>BIKE RACK</td>
</tr>
<tr>
<td>M-5(2004)</td>
<td>WOOD RAIL FENCE</td>
</tr>
<tr>
<td>M-6(2004)</td>
<td>PATTERNED HOT-MIX OR CONCRETE &amp; BRICK PAVER</td>
</tr>
<tr>
<td>M-7(2000)</td>
<td>CHAIN LINK FENCE DETAILS</td>
</tr>
<tr>
<td>M-8(2007)</td>
<td>P.C.C. PARKING BUMPER</td>
</tr>
</tbody>
</table>

### SECTION VII - PAVEMENT

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-1</td>
<td>P.C.C. PAVEMENT</td>
</tr>
<tr>
<td>(2006)</td>
<td>1. SLAB PLAN (WITH BOWEL AND TE LOCATIONS)</td>
</tr>
<tr>
<td>(2006)</td>
<td>2. JOINT AND SEALANT DETAILS</td>
</tr>
<tr>
<td>(2006)</td>
<td>3. BOWEL, HOOK BOLT, BOWEL AND TE BAR DETAILS</td>
</tr>
<tr>
<td>(2009)</td>
<td>4. BOWEL SUPPORT BASKET</td>
</tr>
<tr>
<td>(2009)</td>
<td>5. BOWEL AND TE BAR PLACEMENT TOLERANCES</td>
</tr>
<tr>
<td>P-2</td>
<td>P.C.C. PAVEMENT PATCHING</td>
</tr>
<tr>
<td>(2008)</td>
<td>1. FULL GETH PATCH PLAN VIEW</td>
</tr>
<tr>
<td>(2008)</td>
<td>2. FULL GETH PATCH, SECTION VIEWS</td>
</tr>
<tr>
<td>(2009)</td>
<td>3. FULL GETH PATCH, SEALANT DETAILS, DOWN RETENTION BAR, AND BOWEL BAR</td>
</tr>
<tr>
<td>(2009)</td>
<td>4. FULL GETH PATCH, BOWEL AND TE BAR PLACEMENT TOLERANCES</td>
</tr>
<tr>
<td>(2009)</td>
<td>5. FULL GETH PATCH, PLAN AND SECTION VIEWS</td>
</tr>
<tr>
<td>P-3</td>
<td>BUTT JOINT DETAILS</td>
</tr>
<tr>
<td>SHEET NO.</td>
<td>NAME</td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
</tr>
<tr>
<td>T-1 (2005)</td>
<td>CONDUIT JUNCTION WELL, TYPES 1, 2, AND 3.</td>
</tr>
<tr>
<td>T-3 (2005)</td>
<td>CONDUIT JUNCTION WELL, TYPE 5.</td>
</tr>
<tr>
<td>T-4 (2005)</td>
<td>CABINET BASES, TYPES W AND P.</td>
</tr>
<tr>
<td>T-5</td>
<td>POLE BASES.</td>
</tr>
<tr>
<td>(2005)</td>
<td>1 ROUND BASE, SQUARE BASE.</td>
</tr>
<tr>
<td>(2005)</td>
<td>3 TYPICAL SECTION (BASES 5 AND 6) AND POLE BASE DATA CHART.</td>
</tr>
<tr>
<td>T-6 (2006)</td>
<td>SPECIAL POLE BASE.</td>
</tr>
<tr>
<td>T-7 (2005)</td>
<td>SIGN FOUNDATION.</td>
</tr>
<tr>
<td>T-8 (2005)</td>
<td>LOOP DETECTOR TO CONDUIT JUNCTION WELL CONNECTION.</td>
</tr>
<tr>
<td>T-9 (2005)</td>
<td>TYPE &quot;A&quot; LOOP DETECTOR.</td>
</tr>
<tr>
<td>T-10 (2005)</td>
<td>TYPE &quot;B&quot; LOOP DETECTOR.</td>
</tr>
<tr>
<td>T-11</td>
<td>MESSENGER WIRE ATTACHMENT.</td>
</tr>
<tr>
<td>(2005)</td>
<td>1 MIDDLE MESS WIRE ATTACHMENT ON WOOD POLES.</td>
</tr>
<tr>
<td>(2005)</td>
<td>2 ANGLE UP MESS WIRE ATTACHMENT.</td>
</tr>
<tr>
<td>T-12</td>
<td>MESSENGER WIRE ATTACHMENT.</td>
</tr>
<tr>
<td>(2005)</td>
<td>1 SPAN WIRE ATTACHMENT BETWEEN POLES.</td>
</tr>
<tr>
<td>(2005)</td>
<td>2 DEAD END MESS WIRE ATTACHMENT.</td>
</tr>
<tr>
<td>T-13</td>
<td>CONDUIT JUNCTION WELLS.</td>
</tr>
<tr>
<td>(2005)</td>
<td>1 TYPE A.</td>
</tr>
<tr>
<td>T-14</td>
<td>EMERGENCY PRECAUTION RECEIVER.</td>
</tr>
<tr>
<td>(2006)</td>
<td>1 UPRIGHT MOUNT.</td>
</tr>
<tr>
<td>(2005)</td>
<td>2 MOUNT MOUNT.</td>
</tr>
<tr>
<td>T-15 (2005)</td>
<td>BREAKAWAY SIGN POST AND PIN ASSEMBLY DETAILS.</td>
</tr>
<tr>
<td>T-16 (2010)</td>
<td>WOOD BARRICADE DETAILS.</td>
</tr>
<tr>
<td>ITEM NO.</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>1</td>
<td>W-BEAM</td>
</tr>
<tr>
<td>2</td>
<td>W6 x 9 (W150 x 13.5) STEEL POST</td>
</tr>
</tbody>
</table>
| 3A 3B   | 3A - 6" (150) x 12" (300) x 14" (350) OFFSET BLOCK  
|         | 3B - 6" (150) x 8" (200) x 14" (350) OFFSET BLOCK |
| 4       | SPICE - REQUIRES EIGHT (8) 5/8" (16) GUARDRAIL BOLTS (L=1¼" (35)) WITH RECESS NUTS |
| 5       | W-BEAM TERMINAL CONNECTOR |
| 6       | 3/8" (16) GUARDRAIL BOLT (L=1¼" (35)) AND RECESS NUT |
| 7A 7B   | 7A - 3/8" (16) GUARDRAIL BOLT (L=1¼" (455)) AND RECESS NUT  
|         | 7B - 3/8" (16) GUARDRAIL BOLT (L=1¾" (255)) AND RECESS NUT |
| 8       | 5/8" (16) GUARDRAIL BOLT (L=1¾" (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 |
TYPE 1-31 GUARDRAIL
POST SPACING 6'-3" (19005)

SOLID / OBSTRUCTION

REQUIRED CLEARANCE
2'-0" (600) MIN.

SEE NOTE #1

EDGE OF SHOULDER —
SHOULDER

EDGE OF TRAVEL LANE —

EDGE OF TRAVEL LANE

TYPE 2-31 GUARDRAIL
POST SPACING 3'-10.5" (952.5)

SOLID / OBSTRUCTION

25'(7620) MIN.

SEE NOTE #1

EDGE OF SHOULDER —
SHOULDER

EDGE OF TRAVEL LANE —

TYPE 3-31 GUARDRAIL
POST SPACING 4'-0" (1200)

SOLID / OBSTRUCTION

4'(1200) MIN.

SEE NOTE #1

EDGE OF TRAVEL LANE

DELWARE
DEPARTMENT OF TRANSPORTATION

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

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

APPROVED SIGNATURE ON FILE 12/28/2010

RECOMMENDED SIGNATURE ON FILE 12/27/2010

NOTE:
1) THE DISTANCE FROM THE EDGE OF THE TRAVEL LANE OR SHOULDER TO THE FACE OF GUARDRAIL SHOULD BE MAINTAINED. THIS AREA SHALL BE GRADED 10° OR FLATTER.
2) PLACE GUARDRAIL ELEMENATIOUS AT THE INTERVALS SPECIFIED IN THE DELWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
NOTE: OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.
GUARDRAIL SECTION
RURAL SHOULDER APPLICATION

GUARDRAIL SECTION
MEDIUM APPLICATION

GUARDRAIL SECTION
URBAN SHOULDER APPLICATION

<table>
<thead>
<tr>
<th>TYPE</th>
<th>POST SPACING</th>
<th>CLEAR AREA BEHIND POST</th>
<th>DESIGN SPEED</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6'-3&quot; (1905)</td>
<td>3'-0&quot; (900) MIN</td>
<td>60 MPH (96 km/h)</td>
<td>6'-3&quot; (1905)</td>
</tr>
<tr>
<td>2</td>
<td>3'-11½ (952.5)</td>
<td>2'-0&quot; (600) MIN</td>
<td>50 MPH (80 km/h)</td>
<td>3'-0&quot; (900)</td>
</tr>
</tbody>
</table>

Curb shall be used only when indicated on plans.
No fixed objects or obstructions (see table below).
4" (1000) rounding.
Additional pavement (as indicated on plans).

Curb to be used only when indicated on plans.

Pavement shall be used only when indicated on plans.
NOTES:
1. FLARE THE END TREATMENT AT 25:1 BEGGINING 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 AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.
3. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.
4. IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2" (50) WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.

DELAWARE DEPARTMENT OF TRANSPORTATION

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1

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

APPROVED SIGNATURE ON FILE 12/28/2010

RECOMMENDED SIGNATURE ON FILE 12/27/2010

SCALE: 1" = 1'-0"
NOTE:
1. FLARE SHALL BE 4' (1200) UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE. FLARE MAY BE PARABOLIC OR STRAIGHT BASED ON MANUFACTURER'S SPECIFICATIONS.
2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.
3. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.
4. IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2' (600) WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2

STANDARD NO. B-2-2010
SHT. 2 OF 3

APPROVED SIGNATURE ON FILE 12/28/2010

RECOMMENDED SIGNATURE ON FILE 12/27/2010

SCALE: 1" = 1'-0"
NOTE:
1. This detail was solely created to show the grading required for this type of attenuator and is applicable regardless of the height of the guardrail system.
2. 610 or flatter grading is allowable when the barrier is located 12' (3.65m) or more from the outside edge of the shoulder.
3. This end treatment can also be used in ramp coding or other areas where two rails of W-beam come together and terminate with one end treatment.
4. When opposing roadways have equal elevations, the traffic barrier system should be placed on the opposite side of the ditch line from approaching traffic.
5. The guardrail end treatment attenuator shall be installed as per the manufacturer's and the Department of Transportation's specifications.
6. If curb is present, express the curb to a maximum height of 2" (50mm) within the limits of the end treatment and throughout the length of the taper grading.

DELAWARE DEPARTMENT OF TRANSPORTATION

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3

APPROVED

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

RECOMMENDED

SIGNATURE ON FILE 12/28/2010

SIGNATURE ON FILE 12/27/2010

09/21/2010
GUARDRAIL OVER CULVERTS, TYPE 1-31

NOTES:
3. ALL \( \text{BEAMS} \) ARE 13'-6" (4130) IN LENGTH.
2. PLACE GUARDRAIL DELINIATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. POSTS 1, 3, 5, 8, AND 10 ARE TO BE W16x9 (W16x13.5) STEEL POSTS. POSTS 3 THROUGH 8 ARE TO BE TYPE 31 LONG WOOD BREAKAWAY POSTS.
4. THE RAIL SHALL BE ATTACHED AT POSTS 3 THROUGH 8 WITH A \( \frac{3}{8} \) (16) x 2" (56) GUARDRAIL BOLT, STEEL WASHER, AND DESS NUT.

DELWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 1-31

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

APPROVED
SIGNATURE ON FILE 12/28/2010

RECOMMENDED
SIGNATURE ON FILE 12/27/2010
NOTES:
1. ALL W-BEAMS ARE 12'-6½" (4.35m) IN LENGTH.
2. PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. POSTS 1, 2, 5, 6, 10 ARE TO BE 6"x6" x 13½" (150x150x340) STEEL POSTS. POSTS 3 THROUGH 8 ARE TO BE TYPE 31 LONG WOOD BREAKAWAY POSTS.
4. THE RAIL SHALL BE ATTACHED AT POSTS 3 THROUGH 8 WITH A ¾" (16) x 22" (560) GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.
STEEL SPACER TUBE
6" (150) I.D., SCHEDULE 40
CALVANIZED PIPE 6'-0" (1220) (Z951)

2 SECTIONS OF W BEAM, ONE NESTED INSIDE THE OTHER

PLAN

LIMIT OF PAYMENT FOR GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31

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

GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-11

ELEVATION

6. PLACE GUARDRAIL REFLECTOR AS PER THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
7. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAMETER.
8. POSTS 1 & 2 ARE W30x13 (2000x49.3), 7'-6" (2.3m) LONG. ALL OTHER POSTS IN TRANSITION ARE W8x8 (160x19.1), 6'-0" (1828) LONG.
9. A 6" (150) x 8" (200) x 14" (350) OFFSET BLOCK IS USED AT POSTS 1 THROUGH 6 AND A 6" (150) x 9" (2286) x 14" (350) OFFSET BLOCK IS USED AT POSTS 7 THROUGH 9.

APPROVED

DELWARE DEPARTMENT OF TRANSPORTATION

STANDARD NO. B-6 CM00
SHT. 1 OF 6

RECOMMENDED
**RUB RAIL OFFSET BLOCKS**

<table>
<thead>
<tr>
<th>POST NO.</th>
<th>THICKNESS</th>
<th>BOLT LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 1/2&quot; (108)</td>
<td>5&quot; (150)</td>
</tr>
<tr>
<td>2</td>
<td>3 1/2&quot; (88)</td>
<td>4&quot; (100)</td>
</tr>
<tr>
<td>3</td>
<td>2&quot; (50)</td>
<td>4&quot; (100)</td>
</tr>
<tr>
<td>4</td>
<td>1&quot; (25)</td>
<td>2&quot; (50)</td>
</tr>
</tbody>
</table>

**NOTES:**

1. The rub rail to barrier connection end must be attached flush with the sloped toe of the safety barrier. Installation can be simplified by fabricating or shop twisting the rub rail end to be consistent with the slope of the barrier, however, field bending using heat is permitted.
2. Steel spacer tube is schedule 40 galvanized pipe, 6" (150) x 9" (225).
3. All hardware on this detail is compatible with guardrail to barrier connection, types 1-31 and 1-27.

---

**DELAWARE**

DEPARTMENT OF TRANSPORTATION

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

STANDARD NO. B-5 (2010)  SHT. 2 OF 6  APPROVED  RECOMMENDED

SIGNATURE ON FILE  12/28/2010  SIGNATURE ON FILE  12/27/2010

12/06/2010
PLANT

LIMITS OF PAYMENT FOR GUARDRLA TO BARRIER CONNECTION APPROACH, TYPE 2-31

ELEVATION

NOTES:
11. CURB SHALL NOT BE USED AT THE FACE OF RAIL WITHIN THE LIMITS OF THIS INSTALLATION.
20. POSTS 1, 2, 3, 4, AND 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH OFFSET BLOCKS FOR/OR/BENT RAIL.
31. DO NOT ATTACH RAILS TO POSTS 1, 2, 3, 5, OR 7.
41. POSTS 1 AND 2 ARE 9"x12" [300x303.5], 7'-6" [228cm] LONG. ALL OTHER POSTS IN TRANSITION ARE 9"x9" [228x228], 6'-0" [182cm] LONG.
51. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
61. BENT RAIL MAY BE SHOWN BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.

DELWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH, TYPE 2-31

STANDARD NO. B-6 (1040) SHT. 4 OF 6

APPROVED

RECOMMENDED
### Bent Rail Offset Blocks

**Scale:** 1" = 1'-0"  
**Thickness Varies (See Table)**

#### Bent Rail Offset Blocks

**Scale:** 3" = 1'-0"

<table>
<thead>
<tr>
<th>Block</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5&quot; (125)</td>
</tr>
<tr>
<td>2</td>
<td>4&quot; (100)</td>
</tr>
<tr>
<td>3</td>
<td>3&quot; (75)</td>
</tr>
<tr>
<td>4</td>
<td>2&quot; (50)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Block</th>
<th>Bolt Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8&quot; (200)</td>
</tr>
<tr>
<td>2</td>
<td>6&quot; (150)</td>
</tr>
<tr>
<td>3</td>
<td>6&quot; (150)</td>
</tr>
<tr>
<td>4</td>
<td>4&quot; (100)</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Bottom offset blocks located on posts 1-4 are offset drilled to 5/8" squarely on the post flange and secured with 3/8" bolt carriage bolts. See bent rail offset block table for bolt length.
2. All hardware on this detail is compatible with guardrail to barrier connection, types 2-31 and 2-27.
1. Concrete inserts may be used in new construction to attach terminal connector to parapet.
2. Guardrail section and terminal connections shall be overlapped in the direction of travel.
3. Installation shown above with an T-type barrier face. Guardrail section of barrier connection shall be adjusted horizontally in order to meet flush against various types of walls and barriers.
BRIDGE RAIL RETROFIT, TYPE 1

NOTES:
1. BRIDGE RAIL RETROFIT, TYPE 1 SHALL BE USED WHEN THE PARAPET MONOLITHIC CURB IS 8" (1450) OR LESS.
2. BRIDGE RAIL RETROFIT, TYPE 2 SHALL BE USED WHEN THE PARAPET MONOLITHIC CURB IS 8" (1450) OR WIDER,
   AND DEAD LOAD CONSIDERATIONS ARE A CONCERN WHEN USING BRIDGE RAIL RETROFIT, TYPE 3 (SEE DETAIL
   B-6, SHEET 4 OF 5 FOR DETAILS).
3. ADHESIVE ANCHORS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS AND SHALL BE GALVANIZED.
4. OFFSET BLOCK THICKNESS SHALL BE ADJUSTED TO ALLOW THE FACE OF THE THRE BEAM TO BE FLUSH WITH
   THE BOTTOM OF THE CURB MINIMUM THICKNESS SHALL BE 4" (1000).
5. SEE DETAIL B-6, SHEET 3 OF 5 FOR BRIDGE RAIL RETROFIT, TYPE 2 HARDWARE DETAILS.
6. TYPICAL LATERAL SPACING OF OFFSET BLOCKS OR STEEL POSTS THROUGHOUT THE BRIDGE RAIL
   SECTION SHALL BE 8' - 3" (1005). HOWEVER, SPACING MAY NEED TO BE REDUCED TO ACCOMMODATE
   LINING UP BLOCKS OR POSTS AT THE END OF THE PARAPET.
7. USE A THRE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.
8. PLACE GUARDRAIL DELEINATORS IN THE LOWER VALLEY OF THE THRE BEAM AT THE INTERVALS
   SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
9. SEE DETAIL B-6, SHEET 10 OF 5 FOR ENTRANCE AND ENTH APPLICATION DETAILS.

DELTA RAIL RETROFIT, TYPES 1 & 2
Type I-27 or Type I-31 Guardrail Placement or Appropriate End Treatment

Guardrail to Barrier Connection

Limit of Payment

End of Sidewalk

12" (300) max.

Existing Bridge Rail

Contraction Joints

Bridge Barrier

Direction of Travel

Taper End of Wall to Top of Guardrail at a slope of 4:1 or flatter

15" (375) (typical bar spacing)

A

15" (375) (typical bar spacing)

Taper End of Wall to Top of Guardrail at a slope of 4:1 or flatter

Plan

Existing Rail - Do Not Disturb

2" (50) min. cover

Typ.

4" (100) min.

1/2" (12.7) chamfer (typ.)

Drill 1" (25) dia. hole, fill with high strength, non-shrink grout

4.5 lbs. spaced 15" (375) longitudinally, front and back rows shall be staggered

Section A-A

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-6 (M010)

SHT. 4 OF 5

Recommended

Approved

Signature on file 12/28/2010

12/06/2010
NOTES:
1. BRIDGE RAIL RETROFIT, TYPE 4 SHALL BE USED WHEN THE EXISTING PARAPET HEIGHT IS BETWEEN 22" (5500) AND 25" (6400).
2. USE A THREE-BEAM EXPANSION ELEMENT AT BRIDGE EXPANSION JOINTS.
3. PLACE GUARDRAIL DECKING IN THE UPPER VALLEY OF THE THREE-BEAM AT THE INTERVAL SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
4. SEE DETAIL D-5, SHEET 1 OF 5 FOR ENTRANCE AND EXIT APPLICATION DETAILS AND NOTES.
5. SPACING OF WOOD POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.
6. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (for 5/8" HD BOLT) BETWEEN BOLT HEADS AND Rubber.
7. ALL HOLEs SHALL BE DRILLED PRIOR TO GALVANIZING.
W-Beam Elevation

W-Beam Section

NOTE:
1. Four additional 3/4" (20 x 2 1/4" (50) slots shall be provided at 3'1 1/8" (952) spacing for a 20' 1/16" (610) beam length.

DELWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

APPROVED

STANDARD NO. B-15 (2010) SHT. 1 OF 10

12/28/2010

SIGNATURE ON FILE

12/27/2010

SIGNATURE ON FILE
W-BEAM STEEL POST AND OFFSET BLOCK

POST

NOTE:
1. ALL HOLES SHALL BE 5/8" (20 GA. BOL) HOLE PATTERN IS SYMMETRICAL WITH RESPECT TO THE VERTICAL AXIS OF THE POST.
2. WHERE CONDITIONS REQUIRE, ALTERNATE POST LENGTHS IN INCREMENTS OF 6" (1500) MAY BE USED.
3. THE RUB RAIL HOLE OFFSET DISTANCE IS 12" (3000) FOR GUARDRAIL TO BARRIER CONNECTION, TYPE 2-27 AND 3-31, 1-2" (160) FOR GUARDRAIL TO BARRIER CONNECTION, TYPE 2-3.

DELaware DEPARTMENT OF TRANSPORTATION

HARDWARE

APPROVED

STANDARD NO. B-13 (2010) SHT. 2 OF 10 RBCOMMENDED

SIGNATURE ON FILE 12/28/2010 SIGNATURE ON FILE 12/27/2010

08/23/2010
THREE BEAM ELEVATION

THREE BEAM EXPANSION ELEMENT

THREE BEAM SECTION
THREE BEAM STEEL POST AND OFFSET BLOCK

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

OFFSET BLOCK

NOTE:
ALL HOLES SHALL BE 3/8" (20)Dia BOLT HOLE PATTERN IS SYMMETRICAL WITH RESPECT TO THE VERTICAL AXIS OF THE POST.
SYMmetric W-Beam TO THRee Beam Transition SECTioN

ASYmetric W-Beam TO THRee Beam Transition SECTioN

DELWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

APPROVED

STANDARD NO. B-13 (2010) SHT. 6 OF 10

SIGNATURE ON FILE 12/28/2010

RECOMMENDED

SIGNATURE ON FILE 12/27/2010

03/17/2010
SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY

POST SLEEVE

SECURE BEARING PLATE TO PREVENT ROTATION WITH TWO 10D GALVANIZED NAILS

TIMBER BEARING PLATE

END PLATE

ANCHOR PLATE TO W-BEAM CONNECTION DETAIL

NOTES:
1. TO ENSURE THAT THE TIMBER BEARING PLATE REMAINS IN POSITION,
2. 10D GALVANIZED STEEL NAILS SHALL BE Driven IN THE
3. SHORT TIMBER BREAKAWAY POST, AND BENT OVER BEARING PLATE.
4. TIGHTEN ASSEMBLY UNTIL CABLE IS TIGHT.
5. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
NOTES:
1. Rail shall be mounted on guardrail adjacent to a bikeway or sidewalk.
2. All components of the rail shall be shop fabricated. All cutting and drilling shall be done in the shop.
3. All exposed threaded hardware shall be buried.
4. Guardrail posts upon which rail is to be installed shall be shop drilled for the rail brackets during fabrication.
5. Rail splices will be at rail support brackets. The same bolt used to attach the rail to the bracket will be used to secure the splice tube.
6. Rails shall be installed only on standard beam sections and at least one post away from the payment limits of the end treatment.

DELTA
DEPARTMENT OF TRANSPORTATION

GUARDRAIL MOUNTED RAIL

STANDARD NO. B-15 (2010) SHT. 10 OF 10 RECOMMENDED

APPROVED
SIGNATURE ON FILE 12/28/2010

SCALE: 1/8" = 1'-0"

SECTION A-A AT RAIL SPlice

SIDE VIEW WITH START & END SECTION

ISOMETRIC VIEW WITH START & END SECTION

SIDE VIEW

REAR VIEW WITH START & END SECTION
TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

<table>
<thead>
<tr>
<th>NOMINAL LENGTH</th>
<th>BAR OFFSETS</th>
<th>NO. REQD FOR EACH BARRIER SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20' (6000)</td>
<td>3'-0&quot; (9000)</td>
<td>4</td>
</tr>
<tr>
<td>14' (4200)</td>
<td>3'-0&quot; (9000)</td>
<td>4</td>
</tr>
<tr>
<td>8' (2400)</td>
<td>3'-0&quot; (9000)</td>
<td>4</td>
</tr>
<tr>
<td>6' (1800)</td>
<td>4'-0&quot; (1200)</td>
<td>4</td>
</tr>
<tr>
<td>16' (4800)</td>
<td>2'-6&quot; (7800)</td>
<td>4</td>
</tr>
</tbody>
</table>

**NOTE**: CONCRETE COVER FOR REINFORCING BARS SHALL BE 1/2" (12) MIN. 2). BARS SHALL BE CUT AT EVERY JOINT IF MADE USING CONTINUOUS SLIP-FORM CONSTRUCTION.

**BAR LIST**

- **481**: 4 (13) 5'-4" (1625) 1 7'-175 (2305) 2'-0" (600) 4
- **482**: 4 (13) 4 5'-10" (1525) 1 7'-175 (2305) 2'-0" (600) 4

* THE LENGTH OF BAR 482 SHALL BE 6'-0" (1800) 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.**
CURB SHALL BE USED ONLY WHEN INDICATED ON THE PLANS

NO FIXED OBJECTS OR OBSTRUCTIONS

SEE TABLE BELOW

HINGE POINT

GUARDRAIL SECTION
RURAL SHOULDER APPLICATION

<table>
<thead>
<tr>
<th>TYPE</th>
<th>POST SPACING</th>
<th>CLEAR AREA BEHIND POST</th>
<th>DESIGN SPEED</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6'-3&quot; (1905)</td>
<td>4'-0&quot; (1220) MIN</td>
<td>60-0&quot; (1800)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3'-1½&quot; (952.5)</td>
<td>2'-0&quot; (600) MIN</td>
<td>30-0&quot; (900)</td>
<td></td>
</tr>
</tbody>
</table>

PAVING OR SIDEWALK
SHALL BE USED ONLY WHEN INDICATED ON PLANS

GUARDRAIL SECTION
URBAN SHOULDER APPLICATION

CURB TO BE USED ONLY WHEN INDICATED ON THE PLANS

DELaware
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

SHT. 3 OF 3

APPROVED

SIGNATURE ON FILE 12/28/2010

RECOMMENDED

SIGNATURE ON FILE 12/27/2010

01/22/2010
NOTES:

1) ALL W-BEAMS ARE 13'-6½" (4130) IN LENGTH
2) PLACE GUARDRAIL DELINERATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
NOTES:
1. ALL W-BEAMS ARE 13'-6 1/4" (4130) IN LENGTH.
2. PLACE GUARDRAIL DELINERATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
PLATE WASHER DETAIL

PLAN

LIMIT OF PAYMENT

SWAGED CABLE ASSEMBLY

5/8" (16 M) HEX BOLT - 2 1/4" (57.2mm) STEEL WASHER, AND NUT

2" (50mm) SOIL PLATE

ANCHOR PLATE

ELEVATION

NOTE:

1. ADDITIONAL HOLES IN "H" BEAM FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING. SEE DETAIL B-43, SHEET B OF 10 FOR HOLE SPACING INFORMATION.

2. CONTRACTOR HAS THE OPTION OF USING A 6"-10" (150-250mm) STEEL PLATE WITHOUT A SOIL PLATE OR A 5/8" (16mm) STEEL PLATE WITH A SOIL PLATE.

3. PLATE WASHERS SHALL BE INSTALLED AT POSTS 3 & 4 ONLY.

4. THE END TREATMENT SHALL ONLY BE USED ON TRAVEL WAYS WITH A POSTED SPEED LIMIT OF 40 MPH (64 KMPH) OR LESS.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL END TREATMENT, TYPE 4-27

APPROVED

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

SIGNATURE ON FILE 12/28/2010

SIGNATURE ON FILE 12/27/2010

09/30/2010
END SECTION PLAN

END SECTION ELEVATION

NOTES:
1. ADDITIONAL HOLES FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING (SEE STANDARD HARDWARE SHEET FOR HOLE SPACING INFORMATION).
2. CONTRACTOR HAS THE OPTION OF USING A 8" x 10\(\text{in.}\) STEEL TUBE WITHOUT A SOIL PLATE OR A 6" x 10\(\text{in.}\) STEEL TUBE WITH A SOIL PLATE.

DELTA WICKE, TYPE 27

DELAWARE DEPARTMENT OF TRANSPORTATION

END ANCHORAGE, TYPE 27

STANDARD NO. B-19 (2010)  SHT. 1 OF 1

APPROVED  SIGNATURE ON FILE
12/28/2010

RECOMMENDED  SIGNATURE ON FILE
12/27/2010
NOTES:

1. CURB SHALL NOT BE USED AT THE FACE OF RAIL WITHIN THE LIMITS OF THIS INSTALLATION.
2. POSTS 1, 2, 3, 4, AND 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH WOOD BLOCKS AND/OR BENT RAIL.
3. DO NOT ATTACH RAILS TO POSTS 1, 2, 3, 5, OR 7.
4. POSTS 1 AND 2 ARE W8x13 (W200x19.3), 7'-6" (2.28m) LONG. ALL OTHER POSTS IN TRANSITION ARE W6x9 (W150x13.5), 6'-0" (1.82m) LONG.
5. BENT RAIL MAY BE SHOP BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.
6. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.

ELEVATION:

7. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
8. PLACE GUARDRAIL DELINERATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
9. FOR INSTALLATIONS WHERE CURB EXISTS, IF THE EXISTING CURB IS 8" (200) OR HIGHER AND CANNOT BE REMOVED, THE BOTTOM RAIL CAN BE ELIMINATED.
10. SEE DETAIL B-5, SHEET 5 OF 6 FOR HARDWARE DETAILS.
11. BENT RAIL SHALL BE BOLTED TO THE BACK OF POST 6 WITH A 3" (76) GUARDRAIL BOLT. 4" (1200) LONG, WASHED, AND NUT.
DETECTABLE WARNING TRUNCATED DOME DETAILS

NOTES:
A. THE AREA OF DETECTABLE WARNING TRUNCATED DOMES SHALL BE
24"x1600" long and the full width of the ramp or depressed curb.
B. SEE SPECIFICATION FOR ADDITIONAL INFORMATION.

ELEVATION A-A

SECTION B-B

MAXIMUM DIFFERENCE IN GRADE
FOR EXAMPLE, IF THE CURB RAMP AND DEPRESSED CURB SLOPE (x) IS 1/15, AND THE PAVEMENT SLOPE (y) IS 1/20, THEN TO DETERMINE THE DIFFERENCE IN GRADE, ADD X + Y TO GET Z, WHICH IS GREATER THAN THE 1% PREFERRABLE BUT LESS THAN THE 1/2% MAXIMUM.

CURB RAMP, TYPE I
PERPENDICULAR CURB RAMP

DETAILED DESIGN

DEPARTMENT OF TRANSPORTATION

APPROVED

STANDARD NO. C-2 (2006) SHT. 1 OF 4

D/8/2008
NOTES:

1. Where a 12\% maximum slope ramp will not meet the sidewalk grade within a length of 5' (1.5m) due to steep adjacent roadway, the ramp length may be limited to 5' (1.5m), and the ramp slope allowed to exceed 6\%.

2. Transition to existing sidewalk width over the length of the ramp.

3. Ramp and sidewalk cross slope shall be 5\% maximum.

4. If grading will be steeper than 6\% adjacent to the curb ramp or sidewalk, then a Type I curb or retaining wall should be used to eliminate the need for the deep slope.

5. For the curb ramp, type 3' wide, the width of the fully depressed curb at the street is more than 5' (1.5m), the the detectable warning truncated domes shall follow the radius of the curb continuously without gaps for the entire length of depressed curb.

6. The maximum difference in grade between the sidewalk or curb and the pavement shall be 12\%, however it is preferred. See Standard No. C-2; Sheet 1 of 4.

7. If the width of the fully depressed curved curb at the street is 5' (1.5m) or less, then a rectangular piece of detectable warning truncated domes may be used.
**Dimensions**

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; (152)</td>
<td>9&quot; *</td>
<td>6&quot; *</td>
<td>3&quot; *</td>
</tr>
<tr>
<td>8&quot; (152)</td>
<td>8&quot;</td>
<td>9&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>10&quot; (152)</td>
<td>8&quot;</td>
<td>9&quot;</td>
<td>3&quot;</td>
</tr>
</tbody>
</table>

**Approximate Quantities**

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Concrete FT³</th>
<th>Reinf. Steel LBS.</th>
<th>No. of Grates</th>
<th>Length to Be Cut from 1 Grate</th>
<th>Weight of Full Size Grate LBS.</th>
<th>Weight of Cut Grate LBS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; (152)</td>
<td>25.70</td>
<td>18.43</td>
<td>2</td>
<td>215.92</td>
<td>422.89</td>
<td></td>
</tr>
<tr>
<td>8&quot; (152)</td>
<td>83.50</td>
<td>52.07</td>
<td>3</td>
<td>275.92</td>
<td>422.89</td>
<td>(514.70, 516.60)</td>
</tr>
<tr>
<td>10&quot; (152)</td>
<td>83.70</td>
<td>52.07</td>
<td>3</td>
<td>--</td>
<td>215.92</td>
<td>(411.50)</td>
</tr>
</tbody>
</table>

**Bending Diagram**

**Schedule of Reinforcing Steel**

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>A-Bars</th>
<th>B-Bars</th>
<th>C-Bars</th>
<th>D-Bars</th>
<th>G-Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Size</td>
<td>Size</td>
<td>Length</td>
<td>Size</td>
<td>Size</td>
</tr>
<tr>
<td>6&quot; (152)</td>
<td>8&quot; (200)</td>
<td>2&quot; (400)</td>
<td>12&quot; (300)</td>
<td>2&quot; (400)</td>
<td>6&quot; (152)</td>
</tr>
<tr>
<td>8&quot; (152)</td>
<td>8&quot; (200)</td>
<td>2&quot; (400)</td>
<td>12&quot; (300)</td>
<td>2&quot; (400)</td>
<td>6&quot; (152)</td>
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<td>10&quot; (152)</td>
<td>8&quot; (200)</td>
<td>2&quot; (400)</td>
<td>12&quot; (300)</td>
<td>2&quot; (400)</td>
<td>6&quot; (152)</td>
</tr>
</tbody>
</table>

**Delaware Department of Transportation**

**61 Safety End Structure**

**Standard No.** D-1 (2001)

**Sht. 2 of 2**

**Recommended**

*Signature*

04/17/2001
PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 10\% SAFETY END STRUCTURE TO BE PRECAST

SECTION A-A
* REQUIRED ONLY FOR PPE SIZE OF 24" x 20" OR 24" x 60"

FRONT VIEW

DELAWARE
DEPARTMENT OF TRANSPORTATION

161 SAFETY END STRUCTURE

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

APPROVED  
RECOMMENDED  

04/17/2001
DELWARE DEPARTMENT OF TRANSPORTATION

SAFETY GRATES

STANDARD NO. D-3 (2005) SHT. 1 OF 2

APPROVED 

RECOMMENDED

FRAME & GRATE ASSEMBLY DETAIL

4X2' (1270) OR 2X1' (635)

2" (50) EA. BAR @ 10.68 LBS./FT. (5.88 kg/m)

5" (125) O.C. TYP.

2" X 4" (102) TYP.

2" (50) EA. BAR @ 10.68 LBS./FT. (5.88 kg/m)

L 2" (50) x 2" (50) x 3/4" (10)

L 2 1/2" x 1/4" (65) x 3/4" (10)

1/2" (13) x 4" (102) SHEAR STUD CONNECTOR @ 2" (50) O.C.
1. Personnel safety grates (PSG) shall only be installed on the inlets of storm water pipes 12" (300) or larger in diameter that are not straight from the inlet to the open outlet, regardless of the length.

2. The grate shall be made to fit the outside perimeter of the flared end section (FES) ± 0-0.13.

3. All bolt holes are to be drilled in the field.

4. A stiffener is to be installed where two or more bars are used.

5. Bottom bar shall be 6" (150) above invert of FES.

6. All hardware attached to concrete shall be attached using approved tamper proof anchors.

See note 4.
**Type A**

- **Match Flowline**
- **Match Proposed Pavement Grade**
- **Coverslab Width**

**Type B**

- **Match Flowline**
- **Match Proposed Pavement Grade**
- **Coverslab Width**

**Type C**

- **Match Flowline**
- **Match Proposed Pavement Grade**
- **Coverslab Width**

---

**Inlet Top Unit Applications**

**Top Unit**

<table>
<thead>
<tr>
<th>Top Unit</th>
<th>Curb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>Use in drainage swale</td>
</tr>
<tr>
<td>Type B</td>
<td>Integral PCC Curb &amp; Gutter, Type 1 &amp; 3, PCC Curb Type 1</td>
</tr>
<tr>
<td>Type C</td>
<td>Integral PCC Curb &amp; Gutter, Type 4, PCC Curb Type 3</td>
</tr>
<tr>
<td>Type D</td>
<td>Integral PCC Curb &amp; Gutter, Type 2</td>
</tr>
<tr>
<td>Type E</td>
<td>PCC Curb Type 3</td>
</tr>
</tbody>
</table>

---

**SS01 Bending Diagram**

- SS01 is not required to be one continuous bar. If more than one bar is used, there must be a 12" (300) overlap between bars.

---

**Isometric View**

**Type D Unit Shown**

- 2" (50) x 4" (100) temporary drainage opening

---

**Delaware Department of Transportation**

**Drainage Inlet Top Units**

<table>
<thead>
<tr>
<th>Standard No.</th>
<th>D-6 (2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sht.</td>
<td>3</td>
</tr>
<tr>
<td>Of 9</td>
<td></td>
</tr>
</tbody>
</table>

**Recommended**

**Signature on file**

- 12/28/2010
### Notes:
1. Refer to previous sheets for reinforcement requirements.
2. The height of this inlet is limited to 4' (120) maximum. Therefore, steps will not be required and should not be installed on this inlet.
3. Refer to detail D-5, sheet 3 of 9 for related top unit application.

**SECTION A-A**
- Cast-in-place concrete flow channel (Typ)
- Top unit details

**SECTION B-B**
- Top view

**SS04 BENDING DIAGRAM**
SS04 is not required to be one continuous bar. If more than one bar is used, there must be a 12" (300) overlap between bars.

---

**DELAWARE DEPARTMENT OF TRANSPORTATION**

**STANDARD NO.**
D-6 (2010)

**SHT.**
7

**OF 9**

**APPROVED**

**SIGNATURE ON FILE**
12/28/2010

**RECOMMENDED**

**SIGNATURE ON FILE**
12/27/2010
ROUND MANHOLE ASSEMBLY

NOTE: ROUND MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.
NOTE: TOP UNIT IS TO BE CAST IN PLACE TO GRADE AS SPECIFIED ON PLAN SHEETS OR AS DIRECTED BY ENGINEER.
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" (38).

- DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.

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" (38).

- DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.
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 ¾ (1/4") (38).
4. DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.
NOTE:
1. USE CLASS C BEDDING UNLESS OTHERWISE INDICATED.
2. FOR CLASS A BEDDING, WHEELED PIPE IN CONCRETE 6" (152) FOR PIPES SMALLER THAN 24" (610) OR 10" (250) FOR PIPES 24" (610) TO 60" (1525), AND FOR PIPES LARGER THAN 60" (1525) SEE PROJECT DETAILS.
NOTES:
0. THE PERFORATED PIPE UNDERDRAIN SHALL BE LOCATED AS SHOWN ON THE TYPICAL SECTIONS OF THE CONSTRUCTION PLANS.
1. GEOTEXTILE FILTER FABRIC SHALL BE PLACED ENTIRELY OVER THE TOP OF UNDERDRAIN TRENCH AND LAPPED AS SHOWN.
2. SLOPE OF UNDERDRAINS SHALL MATCH ROADWAY GRADE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
3. 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.
4. ROODENT SCREEN SHALL SNUGLY FIT THE PROVIDED SLOT WITH THE SCREEN UP FITTING TIGHT TO THE BOTTOM FLOW LINE.
6. WHEN TWO LINES OF PIPE UNDERDRAIN DRAIN TO A LOW POINT, EACH PIPE MUST HAVE ITS OWN OUTLET.
7. PERFORATED PIPE UNDERDRAIN SHALL NOT BE PLACED UNDER GUARDRAIL, IN ORDER TO AVOID PUNCTURING.
The contractor shall furnish material and plug abandoned drainage pipes with concrete as directed by the engineer.

NOTE:

PIPE PLUGGING DETAIL

CONCRETE PLUG

SECTION

ELEVATION

2" (300) MIN

IN SIDE DIAMETER

DELTAW ARE DEPARTMENT OF TRANSPORTATION

PIPE PLUGGING DETAIL

STANDARD NO. D-10 (2007) SHT. 1 OF 1

APPROVED

RECOMMENDED

04/17/2007

04/17/2007

04/17/2007
LIMIT OF CONSTRUCTION

EXISTING GROUND

PHASE 1 EXCAVATION

INTERMEDIATE PHASES EXCAVATION

FINAL PHASE EXCAVATION

PERIMETER/ONE SMALLE
USED AS A CLEAN
WATER DIVERSION,
SEE STANDARD SHEET

CUT SECTION

BREAK IN CROSS SLOPE MAY BE
ELIMINATED TO DIRECT SURFACE
FLOW LEFT OR RIGHT OR AS
DIRECTED BY THE ENGINEER.

FINAL PHASE EMBANKMENT

INTERMEDIATE PHASES EMBANKMENT

PHASE 1 EMBANKMENT

EXISTING GROUND

TEMPORARY SMALLE, SEE STANDARD SHEET

FILL SECTION

EDGE BERM TO BE PLACED AT THE
END OF EACH WORK DAY AND LEFT
UNTIL SLOPE IS COMPLETELY STABILIZED.

MINIMUM 5' (1500) OFFSET FROM TOE OF SLOPE

SILT FENCE, SEE STANDARD SHEET

NOTES:
1) EDGE BERRMS AND TEMPORARY SLOPE DRANS SHALL BE CONSTRUCTED ALONG
THE TOP OF ALL SLOPES TO INTERCEPT RUNOFF AND CONVEY IT DOWN THE
SLOPE FACES WITHOUT CREATING GULLIES OR NASHOUTS.

2) SLOPE FACES SHALL BE TRACED 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 2:1 MINIMUM, 6:1 MAXIMUM.

DELAWARE
DEPARTMENT OF TRANSPORTATION

INCREMENTAL STABILIZATION

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

APPROVED

05/30/2001

RECOMMENDED
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 TURBED U/SLOP E TO CONTAIN RUNOFF.
3. REINFORCING STRIP IS TO BE ONE COMPLETE STRIP COVERING ALL GROTEXILE FABRIC AT POST.

DELWARE
DEPARTMENT OF TRANSPORTATION

STANDARD NO. E-2 (2006) SHT. 1 OF 1

APPROVED

10/02/2006
2" x 4" (50 X 100) NOMINAL FRAME, NAILED AT JOINTS

2" x 4" 1/2" X 1/8" X 3-1/8 CASE (3)

GEO-TEXILE

EXISTING GROUND

EXCAVATE AND RE-COMPACTION

POST DRIVEN INTO GROUND

IF THE INLET IS NOT AT A LOW POINT, INSTALL SEDIMENT CONTROL EARTH Dike DOWNSTREAM FROM INLET.
**DE**

**DEPARTMENT OF TRANSPORTATION**

**CURB INLET SEDIMENT CONTROL**

**STANDARD NO.** E-4 (2001) **SHT.** 1 **OF** 1

**APPROVED**

**RECOMMENDED**

**PLAN SYMBOL**

**SECTION A-A**

**ISOMETRIC VIEW**

- 2" x 4" (50 x 100) ANCHOR
- 2" x 4" (50 x 100) SPACER
- DE #3 STONE
- GEOFABRIC OVER 1/2" x 1/2" (13 mm) MESH
- 2" x 4" (50 x 100) FRAME

**SCALE:** 1:10

**MATERIALS:**
- SAND BAG OR ALTERNATE WEIGHT (15 lbs. 16.3 kg)
- GEOFABRIC OVER WIRE MESH

**INSTRUCTIONS:**
- MAINTAIN CLEAN TRAVELED WAY
- 2" (50 mm) MIN. LENGTH OF 2" x 4" (50 x 100) ANCHOR

**DATE:** 05/2/2001

**RECOMMENDED BY:**

**APPROVED BY:**

- **Signature:**
- **Date:** 05/12/01
PLAN

SECTION A-A

-DIRECTION OF FLOW

-2:1 LENGTH TO WIDTH RATIO (MIN.) (SEE NOTE)

-DITCH FLOWLINE
-Top of Ditch Slope
-ZERO GRADIENT IF POSSIBLE (1:2 MAX.)

SECTION B-B

-SLOPES VARY
-DITCH FLOW LINE

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, SEWER 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 FALL 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 BARRIERS OR OTHER SPECIAL DESIGNS SHOULD BE INCORPORATED TO INCREASE FLOW TIME.
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 (0.2 hectares) 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.

DELaware
Department of Transportation

Sediment Trap, Using Drainage Inlet as Outlet


Approved

Recommended

01/01/05

12/12/05
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 DEMATERING DEVICE SHALL BE SPECIFIED BY THE ENGINEER IN THE FIELD.

FOR SEDIMENT TRAP, SEE STANDARD NO. E-6 OR E-7

TRASH HOOD
5" (125) MIN. DIAM RISER PIPE

METAL BASE PLATE
1/2" (13) THICK

RISER PIPE DIAMETER

ELEVATION

DELTA WATERSHED
STABILIZATION OF EMBANKMENTS

1. STAPLES TO BE STAGGERED AT 8" (450) SPACING.
2. TOPSOIL UNDER EROSION CONTROL BLANKET IS TO BE TRACKED AND SEEDED.
3. WHEN OFFSITE RUNOFF OCCURS, ADDITIONAL MEASURES AS DIRECTED BY THE ENGINEER SHALL BE USED TO ENSURE STABILITY OF EMBANKMENT.

STABILIZATION OF DITCHES

PLAN

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

EROSION CONTROL BLANKET APPLICATIONS

DELTA 1.000" MAX.

STAPLES (TYP.)

TERMINAL TRENCH ANCHOR DETAIL

APPLIED AT THE UPSTREAM END OF DITCH

LOCALIZED SEEPAGE OR HEAVIER

SCALE: 1:250

STAPLES TO BE PLACED AT 8" (450) SPACING ACROSS DOMINANT FLOW

COMPACTED AND SEEDED BACKFILL

INITIAL TRENCH ANCHOR DETAIL

APPLIED AT THE DOWNSTREAM END OF DITCH

STAPLES TO BE PLACED AT 6" (150) SPACING ACROSS DOMINANT FLOW

COMPACTED AND SEEDED BACKFILL

EROSION CONTROL BLANKET TO BE CENTERED ALONG FLOW LINE OF DITCH.

STAPLES (TYP.)

SECTION A-A

STAPLES ALONG LONGITUDINAL EDGES SHALL BE SPACED AS FOLLOWS:
8" (450) WHEN SL < 20' (6000)
9" (225) WHEN SL > 20' (6000)
SECTION A-A

SECTION B-B

PLAN

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 specific conditions.

DELTAERW
DEPARTMENT OF TRANSPORTATION

RIPRAP DITCH

STANDARD NO. E-10 (2005) SHT. 1 OF 1

APPROVED

RECOMMENDED

08/10/2005
STABILIZE IN ACCORDANCE WITH NOTES 3 AND 4

EXISTING GROUND

SECTION A-A

CHART A - STABILIZATION

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>SWALE GRADE</th>
<th>TYPE OF TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5-2.0X</td>
<td>DRAINAGE AREA A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 AC (2 ho or less)</td>
</tr>
<tr>
<td>2</td>
<td>2.0-8.0X</td>
<td>DRAINAGE AREA B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 AC - 10 AC (2 ho - 4 ft)</td>
</tr>
<tr>
<td>3</td>
<td>8.0-20X</td>
<td>SEED USED WITH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EROSION CONTROL BLANKET</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>SEED USED WITH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EROSION CONTROL BL.</td>
</tr>
</tbody>
</table>

CHART B - SWALE DIMENSIONS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>SWALE A</th>
<th>SWALE B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>5' 5000 MIN.</td>
<td>5' 5000 MIN.</td>
</tr>
<tr>
<td>D</td>
<td>4' 10000 MIN.</td>
<td>6' 10000 MIN.</td>
</tr>
</tbody>
</table>

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 DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-ERODIBLE VELOCITY.

3. 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.

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".

OUTLET AS REQUIRED SEE NOTES 1 & 2

DELaware DEPARTMENT OF TRANSPORTATION

TEMPORARY SWALE


SHT. 1 OF 1

APPROVED

RECOMMENDED

[Signatures and dates]
SECTION A-A

OUTLET AS REQUIRED SEE NOTES 1 & 2.

CHART A - SWALE STABILIZATION

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>SWALE GRADE</th>
<th>TYPE OF TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>0.5-2.0%</td>
<td>SEED AND EROSION CONTROL BLANKET</td>
</tr>
<tr>
<td>A-2</td>
<td>2.0-8.0%</td>
<td>LINED R-4 RIPRAP</td>
</tr>
<tr>
<td>A-3</td>
<td>8.0-20%</td>
<td>ENGINEERED DESIGN</td>
</tr>
</tbody>
</table>

MAXIMUM DRAINAGE AREA: 2 ACRES (0.8 ha)

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".

DELAWARE
DEPARTMENT OF TRANSPORTATION

PERIMETER DIKE / SWALE

STANDARD NO. E-12 (2006) SHT. 1 OF 1

APPROVED: 12/5/05

RECOMMENDED: 11/28/05

09/02/2005
SECTION A-A

STABILIZE IN ACCORDANCE WITH CHART A PRIOR TO BECOMING OPERATIONAL.
EXCAVATE TO PROVIDE REQUIRED FLOW WIDTH AT FLOW DEPTH IN ACCORDANCE
WITH CHART B.

CHART A - FLOW CHANNEL STABILIZATION

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CHANNEL GRADE</th>
<th>TYPE OF TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5-2.0%</td>
<td>SEED AND EROSION CONTROL BLANKET</td>
</tr>
<tr>
<td>2</td>
<td>2.1-6.0%</td>
<td>R-4 RIPRAP</td>
</tr>
<tr>
<td>3</td>
<td>8.1-20%</td>
<td>ENGINEERED DESIGN</td>
</tr>
</tbody>
</table>

CHART B - EARTH DIKE DIMENSIONS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DIKE A (5 to 12 ft or less)</th>
<th>DIKE B (5-6000 to 40 ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>d-DEKE HEIGHT</td>
<td>18' (550)</td>
<td>18' (550)</td>
</tr>
<tr>
<td>b-DEKE WIDTH</td>
<td>24' (730)</td>
<td>24' (730)</td>
</tr>
<tr>
<td>c-FLW WIDTH</td>
<td>72' (2150)</td>
<td>72' (2150)</td>
</tr>
<tr>
<td>c-FLW DEPTH</td>
<td>27' (810)</td>
<td>27' (810)</td>
</tr>
</tbody>
</table>

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.

DELTA DEPARTMENT OF TRANSPORTATION

EARTH DIKE

STANDARD NO. E-13 (2000) SHT. 1 OF 1

APPROVED: 3/2/05

RECOMMENDED: 3/2/05

01/05/05
DISCHARGE INTO A STABILIZED DITCH - GEOTEXTILE, STONE OR GRASSED OR A SEDIMENT TRAP.

TOE OF SLOPE

EDGE BERM AT TOP OF FILL SLOPE

36' (900) MIN.

INTERCEPTOR BERM, 36' x 960' MIN.
HEIGHT, LENGTH AS REQUIRED TO CONTAIN SURFACE DRAINAGE AND DIRECT INTO TEMP. SLOPE DRAIN.

CORRUGATED PIPE - SEE PLANS FOR LOCATIONS OR AS DIRECTED BY THE ENGINEER.

TOP OF FILL SLOPE AS EMBANKMENT IS CONSTRUCTED

PLAN

SLOPE DRAIN PROFILE
(FOR FILL SLOPES)

CORRUGATED PIPE

FILL SLOPE

COMPACT SOIL AROUND END OF PIPE

ANTI-SEEP COLLAR

FLOW

FLOW

2" (508) x 4" (1000)

2" (508) x 4" (1000)

ELEVATION

4" (1000)

CORRUGATED PIPE

TOP OF FILL SLOPE AS EMBANKMENT IS CONSTRUCTED

4" (1000)

PLAN

ANTI-SEEP COLLAR

CORRUGATED PIPE

NOTES:
1. ALL TEMPORARY SLOPE DRAINS SHALL DISCHARGE INTO THE BACK OF SEDIMENT TRAPS, INTO SEDIMENT BASINS OR ENTRAPMENT 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.

DELTA DEPARTMENT OF TRANSPORTATION

TEMPORARY SLOPE DRAIN

STANDARD NO. E-14 (2009)

SHT. 1 OF 1

APPROVED

12/5/05

RECOMMENDED

11/25/05

09/02/2005
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.
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. 1/4" x 1/2" X 19 GAGE 0.8 MM WIRE MESH SHALL BE PLACED AROUND THE REMOVABLE 36" 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.

DELTA DEPARTMENT OF TRANSPORTATION

SUMP PIT, TYPE 1 & 2

STANDARD NO. E-16 (2009) SHT. 1 OF 1

APPROVED

RECOMMENDED

09/01/2005
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 WATERTABLE. THE DWB SHALL HAVE A MINIMUM TOP WIDTH OF 10' (600) AND A MINIMUM DEPTH OF 3.0' (900). 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' + .21 x Y
   METRIC: TOP LENGTH (METERS) = 79.30 + 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 BY-PASSED INTO THE STABILIZED OUTFALL. IF THE WATER BEING PUMPED IS NON-SEDIMENT-LADEN, DIRECT DISCHARGE TO THE RECEIVING WATERS SHALL CEASE AND BE RE-DISTRIBUTED 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.
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' (300mm) ABOVE THE PEAK ELEVATION OF THE ONE YEAR STORM.
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 placed at the peak elevation of the one-year storm, or equal to the top of bank, whichever is less. See plans for information.

4. The spillway shall be sized to pass a 11-year storm event peak flow. See plans.

5. The pipe, when utilized, shall be sized to pass the stream base flow.
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 ELIMINATION OF AN ENTRANCE SHALL BE APPROVED IN ADVANCE BY THE ENGINEER.

3. DRAINAGE PIPE, IF UTILIZED, SHALL BE PAIRED FOR SEPARATELY UNDER THE APPROPRIATE BID ITEM.

4. THE TOP 2" (50MM) OF STONE SHALL BE REMOVED AND REPLACED WITH 2" (50MM) OF CLEAN STONE WHEN Voids ARE FILLED OR AS DIRECTED BY THE ENGINEER.

DELAWARE
DEPARTMENT OF TRANSPORTATION
STABILIZED CONSTRUCTION ENTRANCE
STANDARD NO. E-21 2006
SHT. 1 OF 1
APPROVED
RECOMMENDED

Date: 12/5/05
Date: 12/6/05

09/08/2005
NOTES:
8. ALL PVC PIPES ARE TO BE 4" O.D., SCHEDULE 40
21. ALL JOINTS OF THE FLOATATION SECTION SHALL BE SOLVENT WELDED. JOINTS OF SKIMMER SECTION NEED NOT BE WATER-TIGHT.
31. 4" ID HOPE FLEXIBLE STRAIN PIPE IS TO BE ATTACHED TO THE POND OUTLET STRUCTURE WITH WATER-TIGHT CONNECTIONS.
41. ORIFICE IS TO BE SIZED ACCORDING TO STORAGE VOLUME AND TO SLOWLY RELEASE 72 HR RUNOFF FOR AT LEAST 24 HOURS.

PLAN VIEW

12 ROWS OF 3/8" X 3/16" DIA. HOLE, 1/4" O.D. C.C.
ORIFICE DRILLED IN END CAP (SEE NOTE 41)
*4 REBAR GUIDE POST (1 TP)
WITH WIRE STOP AT TOP OF RISER
ATTACH FLEXIBLE PIPE TO PVC WITH TWO NO. 8 WOOD SCREWS
FLANGE WITH RUBBER GASKET MATERIAL (ATTACH TO STRUCTURE WITH CONCRETE SCREWS OR OTHER SUITABLE ATTACHMENT AS APPROVED BY THE ENGINEER)

SIDE VIEW

4" X 6" (O.D.) DELWARE 6" STONE PAD FOR SKIMMER
4" MINIMUM THICKNESS.
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.
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 (256 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 DEWATER THE JOB.

4. OTHER DESIGNS MAY BE USED PROVIDED THE HYDRAULIC DESIGN IS SUBMITTED TO AND APPROVED BY THE STORMWATER ENGINEER.

DEL A W A R E
DEPARTMENT OF TRANSPORTATION

PORTABLE SEDIMENT TANK

STANDARD NO. E-24 (2005)
SHT. 1 OF 1

APPROVED

RECOMMENDED

09/08/2005

12/15/05

11/07/05
DETAIL:B

EXISTING GROUND
6" (150)

SECURING PIN
6" (150)

GEOTEXTILE

PLAN VIEW

PROPOSED PIPE

2" (50)
MIN. (19)

RIP-RAC
(SEE PLANS FOR TYPE)

LEVEL BOTTOM

W

3'
(900)

W1

3'
(900)

PLAN VIEW

SECTION A-A

SEE DETAIL B

SEE NOTES 1 & 2

SEE NOTE 3

2 x Ti'

GEOTEXTILE

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.
ROADSIDE SHRUB PLANTING DETAIL

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' 18000 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 L.L.A. certified arborist, certified nursery professional, or under the direction thereof. Do not heavily prune shrubs at planting.
4. Aged peas holes shall be hand dug to final width and to eliminate glazing.
5. All shrub masses shall be mulched as one continuous bed.
DO NOT PRUNE THE DOMINANT LEADER OR TERMINAL BUDS OF THE CROWN.

NOTES:
1. ALL PRUNING SHALL BE DONE BY OR UNDER THE DIRECTION OF A LICENSED 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.
5. WHEN PLANTING TREES ALONG SIDEWALKS, THE TREE SHALL BE LIMBED TO 7' (2100) FOR PEDESTRIAN CLEARANCE.

STAKE & GUY TREES, GUY WIRE, STAKES, & RUBBER HOSE SHALL BE AS SPECIFIED IN SECTION 1ST.

SETROOT BALL FLUSH TO GRADE OR +1/2 TO 2'-25/32 AHEAD OF GRADE IF SOILS ARE SLOW TO DRAIN. PLANT TREES SUCH THAT THE TRUNK FLARE IS VISIBLE. ANY TREE WHERE TRUNK FLARE IS NOT VISIBLE SHALL BE REJECTED. DO NOT COVER THE TOP OF THE ROOT BALL WITH SOIL.

TAMP SOIL AROUND THE ROOT BALL BASE WITH FOOT PRESSURE SO ROOT BALL DOES NOT SHIFT.

MULCH IN ACCORDANCE WITH SPECIFICATIONS. DO NOT PLACE MULCH AGAINST THE TRUNK.

ALL SOIL SHALL BE EXCAVATED FROM THE PIT, MIXED WITH APPROVED AMENDMENTS AS PER SPECIFICATIONS AND USED AS BACKFILL. DURING INSTALLATION OF TREES, PLACE ROOT BALL ON TAMPS OR UNEXCAVATED SOIL.

REMOVE BURLAP AND BASKETS TO 1/2 OF THE ROOT BALL. DO NOT BURY EXCESS BURLAP, ROPE OR REMNANTS OF BASKET IN THE PLANTING PIT.
NOTES:
1. SEE PLANT LIST FOR SPACING CO.

PERENNIAL/GROUND COVER
FINISHED GRADE
3" (75MM) MULCH - NOT TO COVER LEAVES
ROOT MASS
6" (150MM) PREPARED SOIL MIX, AS PER SPECIFICATION.
SUBGRADE TILLED TO 6" (150MM) DEPTH

PLAN VIEW

SECTION VIEW

PERENNIAL/GROUNDCOVER PLANTING DETAIL
1 1/8" x 1/4" hole to accommodate survey cap.

Longitudinal steel 6 cage (4.3) wire spaced 3"(76.2) C.C., 26"-1650 long (4-6P).

Transverse steel 7 cage (4.5) wire spaced 8"(203.2) C.C.

Notes:
1. Longitudinal steel shall be held in place by cradles.
2. Letters to be countersunk in top of marker 1"(25.4).
NOTES:


2. STEEL TUBE TO EXTEND 40" ABOVE GROUND WITH CONCRETE TO SLOPE AWAY FROM TUBE TO KEEP WATER AND SEDIMENT FROM DRAINING INTO TUBE.

3. BOLLARDS ARE NOT REQUIRED FOR A SHARED-USE PATH LESS THAN 12'4"500 DIAMETER.

4. THE LANDING SECTION SHALL BE A MINIMUM OF 5'4"500 IN LENGTH AND SHALL HAVE A MAXIMUM CROSS SLOPE AND RUNNING SLOPE OF 22%. THE ENTIRE LANDING SECTION MUST ALSO BE CONCRETE.

5. THE RAMP SECTION SHALL HAVE A MAXIMUM CROSS SLOPE OF 22%, IT SHALL ALSO HAVE A MAXIMUM RUNNING SLOPE OF 12%. HOWEVER, IF A 12% RUNNING SLOPE DOES NOT ALLOW THE RAMP TO MEET EXISTING GRADE WITHIN 12'4"500, THE RUNNING SLOPE MAY EXCEED 12%.

6. STRIPING MATERIAL TO BE DETERMINED BY THE ENGINEER BASED ON THE MATERIAL THAT THE STRIPING IS BEING PLACED ON.

7. THE APPROPRIATE TYPE 3 OBJECT MARKER SHALL BE PLACED ON THE FRONT AND BACK OF EACH BOLLARD AS PER THIS DETAIL.
FRONT VIEW

CONCRETE OR GROUT

EXISTING CONCRETE

ALTERNATE ANCHOR OPTION

SECTION VIEW

3/8" x 1/2" (38 x 13) TAMPER PROOF CONCRETE ANCHOR (TYP)

EXISTING CONCRETE

CONCRETE OR GROUT

SCALE 1: N.T.S.

DELAWARE
DEPARTMENT OF TRANSPORTATION

BIKE RACK DETAILS

APPROVED

STANDARD NO. M-4 (2007) SHT. 1 OF 1 RECOMMENDED

WOOD RAIL FENCE DETAILS

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.

SEE NOTE 2

NOTES:

Class B Concrete

POSTS 8' (2,4m) O.C. ON STRAIGHT RUNS, 4' (1,2m) O.C. AROUND CURVES

SLOPE TO DRAIN

WATER TOP AT 5% SLOPE

SEE NOTE 2

TYPICAL JOINT DETAIL

CLASS B CONCRETE

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

4" (100) X 6" (150) (NOMINAL) TREATED RAILS (TYP.)
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.

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.
SLAB PLAN (WITH DOWEL AND TIE LOCATIONS)

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'-6" (3000 mm) INSIDE OF THE LANE EDGE LINE OR CENTERLINE.

DELAWARE DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT

STANDARD NO. P-1 (2001) SHT. 1 OF 5

APPROVED [Signature] 04/01/04

RECOMMENDED [Signature] 04/01/04
NOTES:
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 1/8" WIDEBR WHEN THE TEMPERATURE IS ABOVE 80°F (27°C), THE SEALANT RESERVOIR SHALL BE CUT 1/8" NARROWER.
2. "T" REFERS TO THE ACTUAL CONSTRUCTED SLAB THICKNESS.
3. TOLERANCE ON ALL JOINT SEALANT DETAIL DIMENSIONS SHOWN WITHOUT RANGES SHALL BE PLUS 1/8", MINUS 0.1/16".
4. THE TOP EDGES OF THE CONTACT SURFACES OF THE SEALANT MATERIAL ON BOTH SIDES OF THE JOINT RESERVOIR SHALL BE AT THE
SAME ELEVATION.
5. TRANSVERSE JOINT MATERIAL SHALL BE PLACED BEFORE LONGITUDINAL JOINT MATERIAL, THE TRANSVERSE JOINT MATERIAL SHALL
BE CONTINUOUS FOR THE FULL WIDTH OF ALL ADJACENT P.C.C. PAVEMENT SLABS.
6. LONGITUDINAL JOINT MATERIAL SHALL BE PLACED WITHOUT GAPS WHENEVER INTERRUPTED BY THE TRANSVERSE JOINT MATERIAL.
7. TRANSVERSE JOINT SEAL TO BE RECEDED 1/8" TO 1/8" DEEP AT THE TOP OF THE SLAB ALONG BOTH SIDES OF THE TRANSVERSE SEALANT
RESERVOIR.
8. THE TOP EDGES OF THE COMPRESSION SEAL SHALL BE IN FULL CONTACT WITH THE SLAB SIDES.
9. THE TOP EDGES OF THE COMPRESSION SEAL SHALL BE IN FULL CONTACT WITH THE SLAB SIDES.
DOVEL & TIE BAR PLACEMENT TOLERANCES
PLAN

1. Proposed locations for transverse joints shall exactly match the alignment of the final existing or relocated transverse joints in all immediately adjacent lanes.

NOTES:

1. When repairing existing transverse joints, the patch shall extend a minimum of 24" (600) through the existing joint, which will relocate the joint.
2. Proposed locations for transverse joints, when not aligned with the final expected transverse joint locations in the immediately adjacent lanes, shall be offset a minimum of 2" (50) from the aforementioned joints.
3. The longitudinal joint alignment shall be straight and continuous through the repaired area.

DELaware
DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2009)
SH.T. 1 OF 5

APPROVED

RECOMMENDED

1/14/2008
SECTION A-A

SECTION B-B
TRANSVERSE SAW-CUT USED FOR JOINTS LOCATED WITHIN THE PATCH

SECTION C-C
FULL DEPTH PATCH
TRANSVERSE CONSTRUCTION JOINT USED ON JOINTS BETWEEN EXISTING PAVEMENT AND PATCH

DELWARE DEPARTMENT OF TRANSPORTATION
P.C.C. PAVEMENT PATCHING
STANDARD NO. P-2 (2009) SHT. 2 OF 5 RECOMMENDED
APPROVED

1/14/2008
SEALANT DETAIL - LONGITUDINAL JOINT

SEALANT DETAIL - TRANSVERSE SAW-CUT JOINT

SEALANT DETAIL - TRANSVERSE CONSTRUCTION JOINT

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 0.3T (T < 10") (250) P.C.C. PAVEMENT) WIDER.
2. "T" REFERS TO THE EXISTING "AS- BUILT" SLAB THICKNESS.
3. TOLERANCE ON ALL JOINT SEALANT DETAIL DIMENSIONS SHOWN WITHOUT RANGES SHALL BE PLUS/(-2") MINUS 0".
4. THE TOP EDGES OF THE CONTACT SURFACES OF THE SEALANT MATERIAL ON BOTH SIDES OF THE JOINT RESERVOIR SHALL BE AT THE SAME ELEVATION.

FULL DEPTH PATCH
NOTE: CLOSED CELL POLYETHYLENE FOAM SHALL BE THE SAME WIDTH AS THE JOURT AND 2" (50) 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

PARTIAL DEPTH PATCH

NOTE: WHEN X > 12" (300), THEN Y -1" (25) AND POLYETHYLENE FOAM IS NOT USED.
WHEN X ≤ 12" (300), THEN Y -X AND POLYETHYLENE FOAM IS USED.
NOTES:
1. THE PROFILE OF THE OVERLAY PAVING SHALL BE ADJUSTED TO ASSURE A SMOOTH TRANSITION THROUGH THE BUTT JOINT.
   THE REMOVAL AND CLEANUP OF THE HOT MIX RESIDUE MESS LEFT FROM THE MILLING OPERATIONS ALONG CORE LINES,
   ADJACENT TO SPEED RAMPS, ACROSS INTERSECTING STREETS, AND AT THE BEGINNING AND ENDING POINTS OF THE BUTT
   JOINT, SHALL BE INCIDENTAL TO THE BUTT JOINT ITEM.

2. THE LENGTH OF THE BUTT JOINT SHALL BE EQUAL TO 30'(900mm) FOR EVERY 1"(25mm) OF OVERLAY DEPTH.
NOTES:
1. TYPE 1 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELL WILL BE OF A 5" ID 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 CONCRETE TYPE. TYPE 2 WALLS WILL BE A NOMINAL 4" THICK. TYPE 3 WALL WILL BE A NOMINAL 8" 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 UNEPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM CONDUIT JUNCTION WELL.
NOTES:

1. TYPE 4 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE, AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 3/4" DIA. DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLE 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.
**NOTES**

II. **TYPE S 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.**

25. ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC. WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE PAVE. INSTALLATION IN UMPIRED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM CONDUIT JUNCTION WELL.

**SECTION A-A**

**CONDUIT JUNCTION WELL, TYPE S**

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**DELaware DEPARTMENT OF TRANSPORTATION**

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**T-5 (2005)**

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**SHt. 1 OF 1**

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**APPROVED**

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**RECOMMENDED**

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09/08/2005
PLAN VIEW

CONCRETE CABINET BASE

DELaware
DEPARTMENT OF TRANSPORTATION

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

STANDARD NO. T-4 (2006) SHT. 1 OF 1

APPROVED

RECOMMENDED

09/09/2005
ROUND BASE

UNDERGROUND CONDUIT ENDS SHALL BE CAPPED WITH A GALVANIZED THREADED CONDUIT PLUG UNLESS CONNECTED TO AN EXISTING CONDUIT.

8 EQUALLY SPACED #8 (25) REINFORCING BARS

EQUALLY SPACED #4 (13) REINFORCING BARS

GROUNDFOR POLE TO BE ATTACHED TO GROUND RODS (4" 1/8 X 240" 0963)

2 1/2" (64) CONDUIT SWEEPS

EXISTING CONDUIT

SQUARE BASE

UNDERGROUND CONDUIT ENDS SHALL BE CAPPED WITH A GALVANIZED THREADED CONDUIT PLUG UNLESS CONNECTED TO AN EXISTING CONDUIT.

BOLT CIRCLE DIAMETER TO BE AS DIRECTED BY THE ENGINEER

8 EQUALLY SPACED #8 (25) REINFORCING BARS

EQUALLY SPACED #4 (13) REINFORCING BARS

GROUND FOR POLE TO BE ATTACHED TO GROUND RODS (4" 1/8 X 240" 0963)

2 1/2" (64) CONDUIT SWEEPS

EXISTING CONDUIT

NOTE: BASE DEPENDENT ON POLE AND EQUIPMENT TO BE ATTACHED.
### Pole Base Data Chart

<table>
<thead>
<tr>
<th>Pole Base Type</th>
<th>Diameter</th>
<th>Depth</th>
<th><em>A</em> (2# Horizontal Rebar)</th>
<th><em>B</em> (2# Vertical Rebar)</th>
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<td>1</td>
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<td>7'</td>
<td>5</td>
<td>8</td>
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<td>5' x 10&quot;</td>
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<td>4'8&quot;</td>
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<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

* - Additional depth for pole base extension, if required, to be determined by traffic engineering and management team/field representative.

### Typical Section (Bases 5 and 6)

- **Note:**
  - See specifications and details from current purchasing contract for anchor bolt dimensions.
  - Ground rod (3/4" x 30") embedded 6' (1.83m) into undisturbed soil.
NOTES:
1. UNDERGROUND CONDUIT ENDS SHALL BE CAPPED WITH A
   GALVANIZED THREADED CONDUIT PLUG UNLESS CONNECTED
   TO AN EXISTING CONDUIT.
2. PLACE 2 EACH 6" X 8" X 5/8" R.V.C., SCHEDULE 40 (TYP)
   VENTS IN THE GROUT AS DIRECTED IN THE FIELD BY THE ENGINEER.
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"x138 BLANK COUPLING CONTAINING A STEEL THREADED REDUCING BUSHING 1/2"x138 TO 3/4"x129 AND A 3/4"x129 WATER-TIGHT CONNECTOR FOR SERVICE ENTRANCE CABLE.
3. THE LEAD-IN WIRE SHALL BE RUN THROUGH THE RUBBER OF THE WEATHERPROOF FITTING.

DETAIL A - TYPICAL INSTALLATION UNDER INTEGRAL CURB AND GUTTER

DETAIL B - TYPICAL INSTALLATION UNDER CURBING

DETAIL C - TYPICAL INSTALLATION WITHOUT CURBING

DEL. STONE

DEL. STONE

DEL. STONE

DELAWARE DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR TO CONDUIT JUNCTION WELL CONNECTION

STANDARD NO. T-8 (2006) SHT. 1 OF 1

APPROVED

RECOMMENDED

05/09/2005

12/05/05
**WARNING**

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" C/O B/E FROM THE POINT OF THE EXTENDED CORNER.

2. THE LONGITUDINAL / TRANSVERSE CUT SHALL BE STOPPED APPROXIMATELY 2" ISO 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 0 LOOP #1 AND LOOP #2 TO A LEAD-IN CABLE.

4. LOOP DETECTOR SHALL BE CENTERED IN TRAVEL LANE.

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**Details for Installing Loop Detector Wire**

**Section A - A**

**Section B - B**

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**Splicing Detail** (See Note D)

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**Notes:**

0. 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" C/O B/E FROM THE POINT OF THE EXTENDED CORNER.

1. THE LONGITUDINAL / TRANSVERSE CUT SHALL BE STOPPED APPROXIMATELY 2" ISO FROM THE CORNER TO PREVENT THE TRIANGULAR PORTION OF THE PAVEMENT FROM BREAKING.

2. A MAXIMUM OF TWO LOOP DETECTORS CAN BE SPLICED TO ONE LEAD-IN CABLE. THE DETAIL ILLUSTRATES THE METHOD OF SPLICING TWO LOOP DETECTORS 0 LOOP #1 AND LOOP #2 TO A LEAD-IN CABLE.

3. LOOP DETECTOR SHALL BE CENTERED IN TRAVEL LANE.
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 1' (0.3m) BACK FROM THE POINT OF THE EXTENDED CORNER.
2. THE LONGITUDINAL / TRANSVERSE CUT SHALL BE STOPPED APPROXIMATELY 2'S (S) FROM THE CORNER TO PREVENT THE TRIANGULAR PORTION OF THE PAVEMENT FROM BREAKING.
3. A MAXIMUM OF TWO LOOP DETECTORS CAN BE SPICING TO ONE LEAD-IN CABLE. THE DETAIL ILLUSTRATES THE METHOD OF SPICING 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

DELAWARE
DEPARTMENT OF TRANSPORTATION

TYPE #1 LOOP DETECTOR

STANDARD NO. T-10 (2006)

SHT. 1 OF 1

APPROVED

RECOMMENDED

01/02/2006
SPAN WIRE ATTACHMENT BETWEEN POLES

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 MESSAGER WIRE ATTACHMENT, METAL POLES ".

DELAWARE
DEPARTMENT OF TRANSPORTATION

SPAN WIRE ATTACHMENT BETWEEN POLES

STANDARD NO. T-12 (2006) SHT. 1 OF 2

APPROVED

RECOMMENDED

09/09/2005
WOOD POLES

SERVICE WEDGE CLAMP
MESSENER WIRE
MESSENER CLAMP
LASHING WIRE
CABLE SPACER
ELECTRICAL CABLE
WOOD POLE

GALVANIZED
3/8"-19 NUTS
(2 REQUIRED)
GALVANIZED
3/8"-19 EYEBOLT
GALVANIZED
1 1/2" X 2" X (75) X 3" (75)
WASHER
WITH 3/8" GB HOLE

MATERIALS:
- 3/8"-19 NUTS
- 3/8"-19 EYEBOLT
- 1 1/2" X 2" X (75) X 3" (75) WASHER
- 3/8" GB HOLE

METAL POLES

SERVICE SLEEVE
GALVANIZED
3-BOLT 3/8"-16
GUY CLAMPS
(2 REQUIRED)
METAL POLE

MESSENER WIRE
(1 1/2) WRAPS
AROUND POLE

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

DELAWARE DEPARTMENT OF TRANSPORTATION

DEAD END MESSENER WIRE ATTACHMENT

STANDARD NO. T-12 (2006) SHT. 2 OF 2

APPROVED: 12/5/05
RECOMMENDED: 11/2/05

09/09/2005
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 PAVEMENT 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.
NOTES:

1. TYPE T 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 ORNAMENT AWAY FROM THE CONDUIT JUNCTION WELL.

3. POLYMER CONCRETE COVERS SHALL BE THE HEAVY DUTY TYPE WITH A DESIGN LOAD OF 7,500 LBS (6800 kg) OVER A 0.025 SQUARE.
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 5,000 LBS (6000 kN) OVER A 10" (255) SQUARE.

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>TYPE 8</th>
<th>TYPE 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>47 1/8&quot;(1205)</td>
<td>35 1/8&quot;(915)</td>
</tr>
<tr>
<td>B</td>
<td>30 1/8&quot;(765)</td>
<td>24&quot;(600)</td>
</tr>
<tr>
<td>C</td>
<td>48 1/8&quot;(1220)</td>
<td>37 1/8&quot;(950)</td>
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<tr>
<td>D</td>
<td>32 1/8&quot;(815)</td>
<td>26&quot;(650)</td>
</tr>
<tr>
<td>E</td>
<td>45 1/8&quot;(1150)</td>
<td>33&quot;(835)</td>
</tr>
<tr>
<td>F</td>
<td>28 1/8&quot;(710)</td>
<td>22&quot;(555)</td>
</tr>
<tr>
<td>G</td>
<td>36&quot;(915)</td>
<td>30&quot;(765)</td>
</tr>
<tr>
<td>H</td>
<td>33&quot;(835)</td>
<td>21&quot;(535)</td>
</tr>
<tr>
<td>I</td>
<td>58&quot;(1470)</td>
<td>46&quot;(1165)</td>
</tr>
<tr>
<td>J</td>
<td>46&quot;(1165)</td>
<td>34&quot;(865)</td>
</tr>
</tbody>
</table>

DELAWARE DEPARTMENT OF TRANSPORTATION
CONDUIT JUNCTION WELLS, TYPES 8 & 10
APPROVED
RECOMMENDED 05/13/2006
TUBE SHELLS

CAP SCREW

TUBE ASSEMBLIES

BASE

WIRING ACCESS DOOR WEATHER PROOF

TO CONTROLLER CABINET

4-CONDUCTOR #18 AWG SHIELDED LEAD-IN CABLE

CABLE ENTRY PORT

1/8" VENT HOLE (AT THE BOTTOM OF THE BASE)

MOUNTING NUT

TO MAST ARM

SIDE VIEW

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. TEFON TAPE SHALL BE APPLIED TO THREADS BEFORE MOUNTING.

ACCESS DOOR SCREW HOLE

4-POSITION TERMINAL STRIP

BLACK
GREEN
RED
WHITE

FRONT VIEW (CABLE NOT SHOWN)
TO CONTROLLER CABINET

5 WRAPS OF SCOTCH SUPER 33 TAPE

SPAN WIRE

SPAN WIRE CLAMP

TO TERMINAL STRIP

MOUNTING NUT

WIRING ACCESS DOOR WEATHER PROOF

CABLE CONNECTIONS

GREEN BLACK WHITE RED

TUBE ASSEMBLIES

CAP SCREW 1/4-18X1 WEEP HOLE

SIDE VIEW

4-CONDUCTOR 18 AWG SHIELDED LEAD-IN CABLE

METAL CAP (SEE NOTE 4)

CABLE ENTRY PORT

4-POSITION TERMINAL STRIP

ACCESS DOOR SCREW HOLE

TWO 1/4 X 1 WEEP HOLES

LOWER POINT OF Drip LOOP MUST BE LOWER THAN CABLE ENTRY POINT

TUBE SHELLS

4 POSITION TERMINAL STRIP

NOTE:

0. INVERTED CONFIGURATION SHALL BE USED FOR SPAN MOUNT.

1. SPAN WIRE MOUNTING HARDWARE SHALL BE SUPPLIED BY THE DEPARTMENT.

2. Teflon tape shall be applied to threads before mounting.

3. Route the lead-in cable through the metal cap and the rubber plug.

4. Replace the metal cap, sealing the cable entry port. Tighten the metal cap so the cable will not slide through the rubber plug.
**NOTES:**

1. SQUARE TUBES ARE TO BE FORMED FROM GALVANIZED SHEET STRUCTURAL (PHYSICAL) QUALITY, ASTM A446, GRADE A, COATING DESIGNATION C 90, REGULAR SPANEL, OR HOT ROLLED CARBON SHEET STRUCTURAL (PHYSICAL) QUALITY, ASTM A57, GRADE 33.

2. NOMINAL OUTSIDE DIMENSIONS ARE AS FOLLOWS:
   - 2" (50) x 2.50 (0.03)
   - 2½" (63.5) x 2½ (0.063) +/- 0.00
   - 3½" (88.9) x 3½ (0.089) +/- 0.00

3. ALL FOUR SIDES ARE TO HAVE EVENLY SPACED 7/8" (22) DIAMETER HOLES ON 6"(150) CENTERS THE ENTIRE LENGTH OF THE TUBE.

4. STANDARD CORNER RADIUS SHALL BE 3/16" (5).

5. THE FASTENERS TO BE SUPPLIED UNDER THIS SPECIFICATION SHALL BE 3/8" x 18, GRADE 5 UNC CORNER BOLTS WITH COWANUM OR ZINC PLATING, INSTALLATION OF SIGNS SHALL BE WITH 3/8" x 18 x 1/2" (12.7) BOLT WITH LOCKNUT AND WASHER.

6. THE CONTRACTOR SHALL PROVIDE AND INSTALL PVC SLEEVES 4" (100) INSIDE DIAMETER MINIMUM, 6"(150) INSIDE DIAMETER MAXIMUM IN PROPOSED CONCRETE SIDEWALKS, ISLANDS, AND MEDANS FOR FUTURE TRAFFIC SIGN POSTS AS DIRECTED BY THE ENGINEER, THE LOWER END OF THE SLEEVE SHALL BE SET ON TOP OF THE SOIL.

**TYPICAL ASSEMBLY**

- STREET BLADES MUST BE PINNED TOGETHER AT EACH END

- 2" (50) x 2" (50) STEEL POST

**PIN ASSEMBLY**

- 1½" (38) x ½" (16)
- SPACER

**NOTE:** THE PIN ASSEMBLY IS TO BE USED WITH THE INSTALLATION OF BACK TO BACK STREET BLADE SIGNS WITH 6" (150) LETTERS.
### Wood Barricade Detail

#### Notes:
1. **Barricades shall be placed completely across the roadway from edge of road to edge of road.** If necessary, the barricade overhangs beyond the outside posts typically not more than 4'-0" (1.2m) may be reduced to the "outside overhang value indicated in the table above if obstacles are present beyond the roadway edge.

2. **Markings for barricade rails shall be alternating fluorescent red and white stripes, sloping downward at an angle of 45 degrees, using prismatic retroreflective sheeting.** Stipes shall slope downward towards the center of the closure.

3. **Attach barricade rail and object marker to the 4'-0" (1.2m) x 4'-0" (1.2m) pressure treated wood post using lag bolts (2" (50mm) long, minimum) with washers. Two bolts per rail per post shall be required.**

4. **All wood shall be pressure treated.**

5. **The end of road object marker (1/4" (6mm) NOM) shall be 18" (450mm) x 18" (450mm) with red prismatic retroreflective sheeting.**

6. **Treated wood post shall be placed in pre-dug hole, backfilled using suitable material, and tamp
d the soil around the post.**

7. **Barricade rails may be constructed using plastic or wood and should not be metal.**

8. **Longer width closers can be accommodated by various combinations of 2-post and 3-post barricades.**

#### Wood Barricade Post Chart

<table>
<thead>
<tr>
<th>Width</th>
<th>Number of Barricades</th>
<th>Type of Post</th>
<th>Outside Overhang</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot;</td>
<td>1</td>
<td>1-Post</td>
<td>2'-0&quot; (600mm)</td>
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<tr>
<td>6'-0&quot;</td>
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<td>1-Post</td>
<td>3'-0&quot; (900mm)</td>
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<td>50'-0&quot;</td>
<td>3</td>
<td>3-Post Center (3-Post Center)</td>
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