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

**B-1 (2010)** – BARRIER LEGEND

**B-2** – GRADING FOR GUARDRAIL END TREATMENTS (TYPES 1, 2, AND 3).

**B-3** – GUARDRAIL OVER CULVERTS (TYPES 1-31, 2-31, AND 3-31).


**B-5** – GUARDRAIL TO BARRIER CONNECTION (TYPES 1-31, 2-31, AND EXIT TYPE 31).

**B-6** – BRIDGE RAIL RETROFIT (TYPES 1, 2, 3, AND 4).

**B-7 (2010)** – W-BEAM, TYPE 1-27 TO TYPE 1-31 TRANSITION SECTION.

**B-8** – RESERVED

**B-9** – RESERVED

**B-10** – RESERVED

**B-11** – RESERVED

**B-12** – RESERVED

**B-13** – HARDWARE.

**B-14** – CONCRETE SAFETY BARRIER (F SHAPE).


---

**DELAWARE DEPARTMENT OF TRANSPORTATION**

INDEX OF SHEETS (2013) | SHEET 1 OF 5

---

3/13/2014
### 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></td>
<td>[2013] - 1 GUARDRAIL OVER CULVERTS, TYPE 1-27.</td>
</tr>
<tr>
<td></td>
<td>[2013] - 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-20</td>
<td>BURIED END SECTION.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 1 BURIED END SECTION, SINGLE RAIL.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 2 BURIED END SECTION, DOUBLE RAIL.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 3 POST, CONCRETE BLOCK, AND RUBRAIL 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></td>
<td>[2010] - 1 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-27.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 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-1</td>
<td>P.C.C. CURB AND INTEGRAL P.C.C. CURB &amp; GUTTER.</td>
</tr>
<tr>
<td></td>
<td>[2013] - 1 P.C.C. CURB, TYPICAL CURB SECTION, AND TYPICAL TAPER SECTION AT NOSE OF MEDIANS.</td>
</tr>
<tr>
<td></td>
<td>[2012] - 2 INTEGRAL P.C.C. CURB &amp; GUTTER.</td>
</tr>
<tr>
<td>C-2</td>
<td>CURB RAMPS.</td>
</tr>
<tr>
<td></td>
<td>[2013] - 1 TYPE 1.</td>
</tr>
<tr>
<td></td>
<td>[2013] - 3 TYPE 5.</td>
</tr>
<tr>
<td>C-3 (2012)</td>
<td>ENTRANCES.</td>
</tr>
<tr>
<td>C-4 (2012)</td>
<td>CURB OPENING DETAILS.</td>
</tr>
<tr>
<td>C-5 (2011)</td>
<td>CURB OPENING WITH SIDEWALK DETAIL.</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>6:1 SAFETY END STRUCTURE.</td>
</tr>
<tr>
<td></td>
<td>[2002] - 1 DETAIL VIEWS.</td>
</tr>
<tr>
<td></td>
<td>[2001] - 2 SCHEDULES.</td>
</tr>
<tr>
<td>D-2</td>
<td>10:1 SAFETY END STRUCTURE.</td>
</tr>
<tr>
<td></td>
<td>[2001] - 1 DETAIL VIEWS.</td>
</tr>
<tr>
<td></td>
<td>[2001] - 2 SCHEDULES.</td>
</tr>
<tr>
<td>D-3</td>
<td>SAFETY GRATES.</td>
</tr>
<tr>
<td></td>
<td>[2005] - 1 SAFETY END STRUCTURE GRATE AND ASSEMBLY DETAIL.</td>
</tr>
<tr>
<td></td>
<td>[2007] - 2 PERSONNEL SAFETY GRATE FOR PIPE INLET DETAIL.</td>
</tr>
<tr>
<td>D-R (2012)</td>
<td>DRAINAGE INLET REFERENCE SHEET.</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></td>
<td>[2010] - 1 DRAINAGE INLET ASSEMBLY.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 2 DRAINAGE INLET FRAME AND GRATIS.</td>
</tr>
<tr>
<td></td>
<td>[2012] - 3 DRAINAGE INLET TOP UNITS.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 4 DRAINAGE INLET COVER SLAB DETAILS.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 5 DOUBLE INLET COVER SLAB DETAILS.</td>
</tr>
<tr>
<td></td>
<td>[2012] - 6 34&quot; x 24&quot; DRAINAGE INLET AND COVER SLAB DETAILS.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 7 34&quot; x 18&quot; DRAINAGE INLET DETAILS.</td>
</tr>
<tr>
<td></td>
<td>[2010] - 9 DOGHOUSE INLET BOX.</td>
</tr>
</tbody>
</table>
### SECTION III - DRAINAGE (CONT'D)

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-6</td>
<td>1 MAHOLE DETAILS</td>
</tr>
<tr>
<td></td>
<td>2 BOX MANHOLE ASSEMBLY</td>
</tr>
<tr>
<td></td>
<td>3 ROUND MANHOLE ASSEMBLY</td>
</tr>
<tr>
<td></td>
<td>4 MANHOLE TOP UNIT, FRAME AND COVER</td>
</tr>
<tr>
<td></td>
<td>5 BOX MANHOLE COVER SLAB</td>
</tr>
<tr>
<td>D-7</td>
<td>1 JUNCTION BOX DETAILS</td>
</tr>
<tr>
<td></td>
<td>2 JUNCTION BOX ASSEMBLY</td>
</tr>
<tr>
<td></td>
<td>3 JUNCTION BOX COVER SLAB</td>
</tr>
<tr>
<td>D-8 (2010)</td>
<td>PIPE BEDDING</td>
</tr>
<tr>
<td>D-9 (2008)</td>
<td>PERFORATED PIPE UNDERDRAIN</td>
</tr>
<tr>
<td>D-10 (2011)</td>
<td>PIPE PLUGGING DETAIL</td>
</tr>
</tbody>
</table>

### SECTION IV - EROSION

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1 (2001)</td>
<td>INCREMENTAL STABILIZATION</td>
</tr>
<tr>
<td>E-2 (2006)</td>
<td>SILT FENCE</td>
</tr>
<tr>
<td>E-3 (2005)</td>
<td>DRAINAGE INLET SEDIMENT CONTROL</td>
</tr>
<tr>
<td>E-4</td>
<td>RESERVED</td>
</tr>
<tr>
<td>E-5 (2006)</td>
<td>STONE CHECK DAM</td>
</tr>
<tr>
<td>E-6 (2005)</td>
<td>SEDIMENT TRAP</td>
</tr>
<tr>
<td>E-7 (2005)</td>
<td>SEDIMENT TRAP, USING DRAINAGE INLET AS OUTLET</td>
</tr>
<tr>
<td>E-8</td>
<td>RISER PIPE ASSEMBLY FOR SEDIMENT TRAP</td>
</tr>
<tr>
<td></td>
<td>1 ELEVATION</td>
</tr>
<tr>
<td></td>
<td>2 TRASH HOOK DETAILS</td>
</tr>
<tr>
<td>E-9 (2005)</td>
<td>EROSION CONTROL BLANKET APPLICATIONS</td>
</tr>
<tr>
<td>E-10 (2005)</td>
<td>RIPRAP DITCH</td>
</tr>
<tr>
<td>E-11 (2005)</td>
<td>TEMPORARY SWALE</td>
</tr>
<tr>
<td>E-12 (2005)</td>
<td>PERIMETER DIKE/SWALE</td>
</tr>
<tr>
<td>E-13 (2005)</td>
<td>EARTH DIKE</td>
</tr>
<tr>
<td>E-14 (2005)</td>
<td>TEMPORARY SLOPE DRAIN</td>
</tr>
<tr>
<td>E-15 (2005)</td>
<td>STILLING WELL</td>
</tr>
<tr>
<td>E-16 (2005)</td>
<td>SUMP PIT, TYPES 1 AND 2</td>
</tr>
<tr>
<td>E-17 (2005)</td>
<td>DEWATERING BASIN</td>
</tr>
<tr>
<td>E-18 (2005)</td>
<td>GEOTEXTILE-LINED CHANNEL DIVERSION</td>
</tr>
<tr>
<td>E-19 (2005)</td>
<td>SANDBAG DIVERSION</td>
</tr>
<tr>
<td>E-20 (2005)</td>
<td>SANDBAG DIKE</td>
</tr>
<tr>
<td>E-21 (2005)</td>
<td>STABILIZED CONSTRUCTION ENTRANCE</td>
</tr>
<tr>
<td>E-22 (2012)</td>
<td>SKIMMER DEWATERING DEVICE</td>
</tr>
<tr>
<td>E-23</td>
<td>TURBIDITY CURTAIN</td>
</tr>
<tr>
<td></td>
<td>1 FLOATING TURBIDITY CURTAIN</td>
</tr>
<tr>
<td></td>
<td>2 STAKED TURBIDITY CURTAIN</td>
</tr>
<tr>
<td>E-24 (2005)</td>
<td>PORTABLE SEDIMENT TANK</td>
</tr>
<tr>
<td>E-25 (2005)</td>
<td>TURF REINFORCEMENT MAT APPLICATIONS</td>
</tr>
<tr>
<td>E-26 (2006)</td>
<td>RIPRAP ENERGY DISSIPATOR DETAIL</td>
</tr>
</tbody>
</table>
SECTION V - LANDSCAPING

L-1 - PLANTING DETAILS
   [2006] - 1. ROADSIDE SHRUB PLANTING DETAIL
   [2006] - 2. TREE PLANTING DETAIL
   [2006] - 3. PERENNIAL/GROUND COVER PLANTING DETAIL

SECTION VI - MISCELLANEOUS

M-1 (2001) - RIGHT-OF-WAY FENCE
M-2 (2011) - RIGHT-OF-WAY MONUMENTATION
M-3 (2013) - SHARED-USE PATH & SIDEWALK DETAILS
M-4 (2011) - BIKE RACK LAYOUT DETAILS
M-5 (2004) - WOOD RAIL FENCE
M-6 (2011) - PATTERNED HOT-MIX OR CONCRETE & BRICK PAVER DETAILS
M-7 (2006) - CHAIN LINK FENCE DETAILS
M-8 (2007) - P.C.C. PARKING BUMPER
M-9 (2013) - 1. BUS STOP PAD DETAILS, TYPES 1, 2, & 3
    (2013) - 2. BUS STOP PAD WITH SHELTER DETAILS, TYPES 1 & 2

SECTION VII - PAVEMENT

P-1 - P.C.C. PAVEMENT
   [2001] - 1. SLAB PLAN [WITH DWELL AND TIE LOCATIONS]
   [2004] - 2. JOINT AND SEALANT DETAILS
   [2001] - 4. DWELL SUPPORT BASKET
   [2001] - 5. DWELL AND TIE BAR PLACEMENT TOLERANCES

P-2 - P.C.C. PAVEMENT PATCHING
   [2008] - 1. FULL DEPTH PATCH, PLAN VIEW
   [2008] - 2. FULL DEPTH PATCH, SECTION VIEWS
   [2004] - 3. FULL DEPTH PATCH, SEALANT DETAILS, GROUT RETENTION DISK, AND DWELL BAR
   [2001] - 4. FULL DEPTH PATCH, DWELL AND TIE BAR PLACEMENT TOLERANCES
   [2001] - 5. PARTIAL DEPTH PATCH, PLAN AND SECTION VIEWS

P-3 (2012) - BUTT JOINTS
P-4 (2013) - PERMANENT CROSS-ROAD PATCH OVER PIPE TRENCH DETAIL
<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>CONDUIT JUNCTION WELLS.</td>
</tr>
<tr>
<td>T-2 (2011)</td>
<td>JUNCTION WELL, GROUNDING &amp; BONDING FOR STEEL FRAMES &amp; LIDS.</td>
</tr>
<tr>
<td>T-3</td>
<td>CONDUIT JUNCTION WELLS.</td>
</tr>
<tr>
<td>T-4</td>
<td>CABINET BASES.</td>
</tr>
<tr>
<td>T-5</td>
<td>POLE BASES.</td>
</tr>
<tr>
<td>T-6 (2011)</td>
<td>SPECIAL POLE BASE.</td>
</tr>
<tr>
<td>T-7 (2005)</td>
<td>SIGN FOUNDATION.</td>
</tr>
<tr>
<td>T-8</td>
<td>LOOP DETECTOR LEAD-IN WIRE INSTALLATION.</td>
</tr>
<tr>
<td>T-9</td>
<td>LOOP DETECTOR INSTALLATION.</td>
</tr>
<tr>
<td>T-10</td>
<td><strong>DETAIL REMOVED IN 2012 REVISION</strong></td>
</tr>
<tr>
<td>T-11</td>
<td>MESSEREN WIRE ATTACHMENT.</td>
</tr>
<tr>
<td>T-12</td>
<td>MESSEREN WIRE ATTACHMENT.</td>
</tr>
<tr>
<td>T-14</td>
<td>EMERGENCY PREEMPTION RECEIVER.</td>
</tr>
<tr>
<td>T-15 (2013)</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>T-17 (2013)</td>
<td>ELECTRICAL SERVICE PEDESTAL - LIGHTING, SIGNAL &amp; ITMS' COMPONENT INSTALLATIONS.</td>
</tr>
</tbody>
</table>
## BARRIER LEGEND

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<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        | SPLICE - REQUIRES EIGHT (8) 5/8" (16) GUARDRAIL BOLTS (L=1¼" (35)) WITH RECESS NUTS |
| 5        | W-BEAM TERMINAL CONNECTOR |
| 6        | 5/8" (16) GUARDRAIL BOLT (L=1¼" (35)) AND RECESS NUT |
| 7A 7B    | 7A - 5/8" (16) GUARDRAIL BOLT (L=14" (455)) AND RECESS NUT  
            7B - 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        | 5/8" (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 3-31 GUARDRAIL

TYPICAL GUARDRAIL TREATMENT

NOTES:
1. THE DISTANCE FROM THE EDGE OF THE TRAVEL LANE OR SHOULDER TO THE FACE OF GUARDRAIL SHOULD BE MAXIMIZED. THIS AREA SHALL BE GRADED TO RELEASE FLATTER.
2. PLACE GUARDRAIL DELEMITATORS AT THE INTERVAL SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

DELTA GUARDRAIL FLARE RATE

EDGE OF TRAVEL LANE

FLARE RATES

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>FLARE RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 MPH (110 km/h)</td>
<td>15/1</td>
</tr>
<tr>
<td>60 MPH (100 km/h)</td>
<td>14/1</td>
</tr>
<tr>
<td>55 MPH (90 km/h)</td>
<td>12/1</td>
</tr>
<tr>
<td>50 MPH (80 km/h)</td>
<td>11/1</td>
</tr>
<tr>
<td>45 MPH (70 km/h)</td>
<td>10/1</td>
</tr>
<tr>
<td>40 MPH (60 km/h)</td>
<td>9/1</td>
</tr>
<tr>
<td>30 MPH (50 km/h)</td>
<td>7/1</td>
</tr>
</tbody>
</table>

NOTE: SEE NOTE 1
NOTE: OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.
NOTE:

1. FLARE THE END TREATMENT AT 25:1 BEGINNING 50'-0" FROM THE END OF THE IMPACT HEAD, UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE.

2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.

3. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.

4. IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2" WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.

DELaware DEPARTMENT OF TRANSPORTATION

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1

APPROVED

SIGNATURE ON FILE 2/14/2014

RECOMMENDED

SIGNATURE ON FILE 2/14/2014

1/9/2014
NOTES:

1. FLARE SHALL BE 4'-0" UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE. FLARE MAY BE PARABOLIC OR STRAIGHT BASED ON MANUFACTURER’S SPECIFICATIONS.

2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.

3. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER’S AND THE DEPARTMENT OF TRANSPORTATION’S SPECIFICATIONS.

4. IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2" WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.

DEPARTMENT OF TRANSPORTATION
DELAWARE

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2

STANDARD NO. B-2 (2013) SHT. 2 OF 3

APPROVED SIGNATURE ON FILE 02/14/2014

RECOMMENDED SIGNATURE ON FILE 01/14/2014

1/9/2014
NOTES:
1. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR AND IS APPLICABLE REGARDLESS OF THE HEIGHT OF THE GUARDRAIL SYSTEM.
2. 61 OR FLATTER GRADING IS ALLOWABLE WHEN THE BARBER IS LOCATED 12' (3.65m) OR MORE FROM THE OUTSIDE EDGE OF THE SHOULDER.
3. THIS END TREATMENT CAN ALSO BE USED IN RAMPS AND OTHER AREAS WHERE TWO RAILS OF W-BEAM CAN COME TOGETHER AND TERMINATE WITH ONE END TREATMENT.
4. WHEN OPPOSING ROADS 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" (50) WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.

SECTION A-A
GRADING FOR END TREATMENT ATTENUATOR, TYPE 3

DELAWARE
DEPARTMENT OF TRANSPORTATION

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3

APPROVED
SIGNED on file: 12/28/2010

RECOMMENDED
SIGNED on file: 12/27/2010

09/01/2010
NOTES:
1. ALL W-BEAMS ARE 13' 6" IN LENGTH.
2. PLACE GUARDRAIL DELINERATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. POSTS 1 THROUGH 6 ARE TO BE TYPE 31 LONG, WOOD BREAKAWAY POSTS. POST 7 IS TO BE A W6x9 STEEL POST.
4. THE RAIL SHALL BE ATTACHED AT POSTS 1 THROUGH 6 WITH A 1/4" x 22" GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.
5. CULVERT HEADWALL SHALL NOT EXTEND MORE THAN 2" ABOVE GRADE.
6. THERE SHALL BE A MINIMUM OF 8" FROM THE BACK OF POST TO THE CULVERT WINGWALLS.
NOTES:
1. ALL W-BEAMS ARE 13'-6" IN LENGTH.
2. PLACE GUARDAIR DELINATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. POSTS 1 & 8 ARE TO BE W6x9 STEEL POSTS. POSTS 2 THROUGH 6 ARE TO BE TYPE 31 LONG, WOOD BREAKAWAY POSTS.
4. THE RAIL SHALL BE ATTACHED AT POSTS 2 THROUGH 7 WITH A \( \frac{3}{4}" \times 22" \) GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.
5. CULVERT HEADWALL SHALL NOT EXTEND MORE THAN 2" ABOVE GRADE.
6. THERE SHALL BE A MINIMUM OF 8" FROM THE BACK OF POST TO THE CULVERT WINGWALL.
NOTES:

1. ALL W-BEAMS ARE 13'-6" IN LENGTH.
2. PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. POSTS 1, 2, 9, & 10 ARE TO BE W8x9 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 ⅜" x 22" GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.
5. CULVERT HEADWALL SHALL NOT EXTEND MORE THAN 2" ABOVE GRADE.
6. THERE SHALL BE A MINIMUM OF 8" FROM THE BACK OF POST TO THE CULVERT WINGWALLS.
NOTES:

1. ADDITIONAL HOLES FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING. (SEE STANDARD HARDWARE SHEET FOR HOLE SPACING INFORMATION).
2. CONTRACTOR HAS THE OPTION OF USING A 6'-0" STEEL TUBE WITHOUT A SOIL PLATE OR A 5'-0" STEEL TUBE WITH A SOIL PLATE.
3. PLACE A 3'-0" WIDE PLASTIC RETAINING TIE STRAP AROUND THE SHORT TIMBER BREAKAWAY POST AND TIMBER BEARING PLATE TO ENSURE THE PROPER ORIENTATION OF THE TIMBER BEARING PLATE.
4. REFER TO DETAIL B-13, SHEET 8 OF 10 FOR PROPER TIMBER BEARING PLATE ORIENTATION.
Rub Rail Offset Blocks

**Rub Rail Offset Blocks (7" (175) x 4" (100))**

<table>
<thead>
<tr>
<th>POST NO.</th>
<th>THICKNESS</th>
<th>BOLT LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 1/4&quot; (108)</td>
<td>5&quot; (150)</td>
</tr>
<tr>
<td>2</td>
<td>3 1/2&quot; (83)</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.
CUT FLANGE, BEND AND WELD

PLAN
SCALE: 1" = 1'-0"

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

ELEVATION
SCALE: 1" = 1'-0"

NOTE:
ALL HARDWARE ON THIS DETAIL IS COMPATIBLE WITH GUARDRAIL TO BARRIER CONNECTION TYPES 1-31 AND 1-27.
NOTES:
1. CURB SHALL NOT BE USED AT THE FACE OF RAIL WITHIN THE LIMITS OF THIS INSTALLATION.
2. POSTS 1, 2, 3, 4, AND 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH OFFSET BLOCKS AND/OR BENT RAIL.
3. DO NOT ATTACH RAILS TO POSTS 1, 2, 3, 5, OR 7.
4. POSTS 1 AND 2 ARE W8x13, 7'-6" LONG. ALL OTHER POSTS IN TRANSITION ARE W6x9, 6'-0" LONG.
5. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
6. BENT RAIL MAY BE SHOP BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.
7. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.
8. PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
9. FOR INSTALLATIONS WHERE CURB EXISTS, IF THE EXISTING CURB IS 8" (200) OR HIGHER AND CANNOT BE REMOVED, THE BOTTOM RAIL CAN BE ELIMINATED.
10. A 6" x 6" x 14" OFFSET BLOCK IS USED AT POSTS 1 THROUGH 6 AND A 6" x 12" x 14" OFFSET BLOCK IS USED AT POSTS 7 THROUGH 9.
BENT RAIL

THICKNESS VARIES (SEE TABLE)

BENT RAIL OFFSET BLOCKS

<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>

BENT RAIL OFFSET BLOCKS
1'-2" (360) x 4'6" (115)

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

SYMMETRIC W-BEAM TO
THREE BEAM TRANSITION SECTION

LIMIT OF PAYMENT

SYMMETRIC W-BEAM TO
THREE BEAM TRANSITION SECTION

TRANSITION TO TYPE 1-27 GUARDRAIL

OR APPROPRIATE END TREATMENT

EXIT END APPLICATION

27" GUARDRAIL

ENTRANCE END APPLICATION

TRANSITION TO TYPE 1-31 GUARDRAIL

OR APPROPRIATE END TREATMENT

ASYMMETRIC W-BEAM TO
THREE BEAM TRANSITION SECTION

LIMIT OF PAYMENT

ASYMMETRIC W-BEAM TO
THREE BEAM TRANSITION SECTION

TRANSITION TO TYPE 1-31 GUARDRAIL

OR APPROPRIATE END TREATMENT

EXIT END APPLICATION

31" GUARDRAIL

ENTRANCE END APPLICATION

NOTES:
1. POSTS 1, 2, 8, & 9 ARE W6 x 9, 6'-0" LONG, STEEL POSTS AND POSTS 3 THRU 7 ARE 10" x 10" x 6'-6" TIMBER POSTS.
2. POSTS 2 THRU 8 HAVE STANDARD THREE BEAM OFFSET BLOCKS. POSTS 1 & 9 HAVE STANDARD W-BEAM OFFSET BLOCKS.
3. SEE DETAIL B-6, SHEETS 4 AND 5 FOR NOTES PERTAINING TO THE BRIDGE RAIL RETROFIT SECTIONS.
4. THE EXIT END APPLICATION SHALL BE USED ONLY ON DIVIDED HIGHWAYS. FOR ALL OTHER CONDITIONS, THE EXIT END APPLICATION SHALL BE USED ON BOTH ENDS OF THE BRIDGE PARAPET.
5. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (FOR 5" BOLT) BETWEEN BOLT HEADS AND RUBRAIL.
6. PLACE P.C.C. CURB, TYPE 1-8, STARTING AT PARAPET WALL AND TERMINATING AFTER POST 5. TAPER CURB TO FLUSH AT A 1:1 RATIO.
TYPE 1-27 OR TYPE 1-31 GUARDRAIL, PLACEMENT OR APPROPRIATE END TREATMENT

GUARDRAIL TO BARRIER CONNECTION

LIMIT OF PAYMENT

END OF SIDEWALK

TAPER END OF WALL TO TOP OF GUARDRAIL AT A SLOPE OF 4:1 OR FLATTER

DIRECTION OF TRAVEL

12" LEAD IN MAX.

EXISTING BRIDGE RAIL

CONTRACTION JOINTS

BRIDGE BARRIER

15" (375) (TYPICAL BAR SPACING)

15" (375) (TYPICAL BAR SPACING)

END OF SIDEWALK

TAPER END OF WALL TO TOP OF GUARDRAIL AT A SLOPE OF 4:1 OR FLATTER

PLAN

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.

EXISTING RAIL - DO NOT DISTURB

2" (50) MIN. COVER

TYP.

4" (100) MIN.

1/4" (20) CHAMFER (TYP.)

3/8" (25)

1/16" (1.5)

2" (50) DIA. HOLE, FULL WITH HIGH STRENGTH, NON-SHRINK GROUT

4/6 " (15) BAR SPACED 15" (375) LONGITUDINALLY. FRONT AND BACK ROWS SHALL BE STAGGERED.

DELAWARE
DEPARTMENT OF TRANSPORTATION

BRIDGE RAIL RETROFIT, TYPE 3

STANDARD NO. B-6 (M60)

SHT. 4 OF 5

APPROVED

12/28/2010

SIGNATURE ON FILE

12/27/2010

RECOMMENDED

12/06/2010
NOTES:
1. BRIDGE RAIL RETROFIT, TYPE 4 SHALL BE USED WHEN THE EXISTING PARAPET HEIGHT IS BETWEEN 22" (5500) AND 25" (6600).
2. USE A THREE-BEAM EXPANSION ELEMENT AT BRIDGE EXPANSION JOINTS.
3. PLACE GUARDIAN ELIMINATORS 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 3/8" HD BOLT) BETWEEN BOLT HEADS AND RUBBER.
7. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
W-BEAM ELEVATION

W-BEAM SECTION

NOTE:
B. FOUR ADDITIONAL ¾" (20) x 2½" (65) SLOTS SHALL BE PROVIDED AT 3½" (89) SPACING FOR A 20-½" (518) BEAM LENGTH.
THREE BEAM STEEL POST AND OFFSET BLOCK

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

NOTE:
2 ALL HOLES SHALL BE 3/8" (20) 1/4A BOLT HOLE
PATTERN IS SYMMETRICAL, WITH RESPECT TO THE VERTICAL AXIS OF THE POST.

DELWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE
STANDARD NO. B-13 (2010) SHT. 5 OF 10

APPROVED
SIGNATURE ON FILE 12/28/2010

RECOMMENDED
SIGNATURE ON FILE 12/27/2010
**SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY**

- **SWAGE CONNECTION SLEEVE**
  - $\frac{3}{8}''$ Dia. (6x19) SWAGE CONNECTED GALVANIZED CABLE
  - $\frac{3}{8}''$ Dia. Hole (Typ.)
  - ANCHOR PLATE
- **POST SLEEVE**
  - $\frac{3}{8}''$ Dia. Hole (Typ.)
  - ANCHOR PLATE
  - Weld End Plate to Anchor Plate
- **END PLATE**
  - $\frac{3}{16}''$ Diameter - Hex Bolts and Nuts
  - Drill 4 Holes - $\frac{3}{16}''$ Dia. @ 4'' O.C.
  - $\frac{3}{16}''$ Diameter Hex Nut
- **SECTION A-A**
  - Drill 4 Holes - $\frac{3}{16}''$ Dia. @ 4'' O.C.
  - $\frac{3}{16}''$ Diameter Steel Washer
- **SWAGED CABLE ASSEMBLY**
  - This application for use in end anchorage only
  - $\frac{1}{2}''$ Wide Galvanized Retaining Tie Strap Around the Short Timber Breakaway Post
  - Place a $\frac{3}{8}''$ Wide Galvanized Retaining Tie Strap Around the Short Timber Breakaway Post and Timber Bearing Plate to Ensure Proper Orientation of the Timber Bearing Plate.
  - Tighten Assembly Until Cable is Taut.
  - All Holes shall be Drilled Prior to Galvanizing.

**NOTES:**
1. Place a $\frac{3}{8}''$ wide galvanized retaining tie strap around the short timber breakaway post and timber bearing plate to ensure proper orientation of the timber bearing plate.
2. Tighten assembly until cable is taut.
3. 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 SHORTENED AND DRILLED FOR THE REAL BRACKETS DURING FABRICATION.
5. ALL RAIL SPACERS WILL BE AT RAIL SUPPORT BRACKETS, THE SAME BOLT USED TO ATTACH THE RAIL TO THE BRACKET WILL BE USED TO SECURE THE SPACER TUBE.
6. RAILS SHALL BE INSTALLED ONLY ON STANDARD W-BEAM SECTIONS AND AT LEAST ONE POST AWAY FROM THE PAYMENT LIMITS OF THE END TREATMENT.
**TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION**

**BAR OFFSETS**

<table>
<thead>
<tr>
<th>NOMINAL LENGTH OF BARRIER SECTION (L)</th>
<th>X</th>
<th>NO. REQ'D FOR EACH BARRIER SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20'-0&quot;</td>
<td>5'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>18'-0&quot;</td>
<td>4'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>16'-0&quot;</td>
<td>6'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>14'-0&quot;</td>
<td>3'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>12'-0&quot;</td>
<td>2'-6&quot;</td>
<td>4</td>
</tr>
</tbody>
</table>

**BAR LIST**

<table>
<thead>
<tr>
<th>BAR</th>
<th>SIZE</th>
<th>NUMBER IN EACH SECTION</th>
<th>LENGTH</th>
<th>TYPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>481</td>
<td>4</td>
<td>**</td>
<td>5'-4&quot;</td>
<td>1</td>
<td>7&quot;</td>
<td>305&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>482</td>
<td>4</td>
<td>*</td>
<td>STR.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

* THE LENGTH OF BAR 482 SHALL BE 6" SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.

**NOTES:**

1. CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1 1/2" MIN.
2. FOR SLIP-FORM CONSTRUCTION, THE 482 BARS SHALL BE PLACED AS ONE CONTINUOUS PIECE. THE BARS SHALL OVERLAP A MINIMUM OF 32" IN THIS CASE.
3. FOR SLIP-FORM CONSTRUCTION, A JOINT SHALL BE CUT IN THE BARRIER EVERY 10'-0" AT A MAX DEPTH OF 32".

SEE "BAR OFFSETS" CHART ON THIS SHEET FOR MORE INFORMATION.
TYPICAL PRE-CAST CONSTRUCTION

T-SHAPE BARRIER SECTION

TYPICAL PRE-CAST REINFORCEMENT DETAILS

DELAWARE
DEPARTMENT OF TRANSPORTATION

32" (800) CONCRETE SAFETY BARRIER (T-SHAPE)

APPROVED

SIGNATURE ON FILE: 12/28/2010

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

RECOMMENDED

SIGNATURE ON FILE: 12/27/2010

09/18/2009
SECTION

ELEVATION

<table>
<thead>
<tr>
<th>BAR LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARK</td>
</tr>
<tr>
<td>4B1</td>
</tr>
<tr>
<td>4B2</td>
</tr>
</tbody>
</table>

* THE LENGTH OF BAR 4B2 SHALL BE 6' (1500) SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.

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

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

NOTES:
1. CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1/2" (100) MIN.
2. BARS SHALL BE CUT AT EVERY JOINT IF MADE USING CONTINUOUS SLIP-FORM CONSTRUCTION.

DELWARE
DEPARTMENT OF TRANSPORTATION

45" (1140) CONCRETE BARRIER DETAILS (C-SHAPE)

STANDARD NO. B-14 (2009) SHT. 3 OF 4

APPROVED

signature on file: 12/28/2010

RECOMMENDED

signature on file: 12/27/2010
STEEL CONNECTOR PLATE

SLOT DIMENSIONS
CONCRETE SAFETY BARREL, PRECAST CONSTRUCTION
T-SHAPE BARRIER SECTION

SECTION A-A

SECTION B-B

DELWARE
DEPARTMENT OF TRANSPORTATION

SLOTTED PLATE CONNECTION DETAILS

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

APPROVED

RECOMMENDED

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

09/18/2009
TYPE 1-27 GUARDRAIL

POST SPACING 6'-3" (1905) 1

SOLID [ ] OBSTRUCTION [ ]

REQUIRED CLEARANCE, 4' (1200) MINIMUM

SEE NOTE #1

EDGE OF SHOULDER

SHOULDER

EDGE OF TRAVEL LANE

TYPE 1-27 GUARDRAIL

TYPICAL GUARDRAIL TREATMENT

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

TYPE 1-27 GUARDRAIL

OF APPROPRIATE END TREATMENT

POST SPACING 3'-1½" (925) 1

25' (7620) MIN.

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

FLARE RATES

DESIGN SPEED (Mph) FLARE RATE

EDGE OF TRAVEL LANE

TYPE 2-27 GUARDRAIL

TYPICAL GUARDRAIL TREATMENT

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

TYPE 3-27 GUARDRAIL

TYPICAL MEDIAN GUARDRAIL TREATMENT

NOTES:

1. THE DISTANCE FROM THE EDGE OF THE TRAVEL LANE OR SHOULDER TO THE FACE OF GUARDRAIL SHOULD BE MAXIMIZED. THIS AREA SHALL BE GRADED 1:5 OR FLATTER

2. PLACE GUARDRAIL DELEATOR AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL OR UNIFORM TRAFFIC CONTROL DEVICE.

DELTA-W DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

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

APPROVED

SIGNATURE ON FILE 12/28/2010

RECOMMENDED

SIGNATURE ON FILE 12/27/2010

09/03/2010
TYPE 2-27

NOTE: OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.
NOTES:

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

2. POSTS 1 THRU 4 AND 11 THRU 14 ARE TO BE W6X9 STEEL POSTS. POSTS 5 THRU 10 ARE TO BE 6"x8"x6'-0" BREAKAWAY WOOD POSTS WITH 2 WOOD BLOCKS AT EACH OF THESE 6 POSTS.

3. THE SPLICES AT POSTS 5, 8, 10 ARE TO USE 6" GUARDRAIL BOLT (L=26 warming) 5).

4. TOP OF HEADWALL OR TOP OF BANK SHALL NOT BE CLOSER THAN 5'-0" TO FACE OF GUARDRAIL.

5. TOP OF HEADWALL SHALL NOT EXCEED 2" ABOVE FINISHED GRADE.

6. GUARDRAIL OVER CULVERTS, TYPE 1-27

BEAM 1 (NESTED W-BEAM)
26'-0"  
12'-0"
BEAM 2 (NESTED W-BEAM)
13'-6"
BEAM 3 (NESTED W-BEAM)
13'-6"
BEAM 4 (NESTED W-BEAM)
13'-6"
BEAM 5 (NESTED W-BEAM)
13'-6"
TREATMENT APPROPRIATE END TYPE 1-27 GUARDRAIL OR

BEAM 1 (NESTED W-BEAM) 26'-0"

BEAM 2 (NESTED W-BEAM) 13'-6"

BEAM 3 (NESTED W-BEAM) 13'-6"

BEAM 4 (NESTED W-BEAM) 13'-6"

BEAM 5 (NESTED W-BEAM) 13'-6"

BEAM 6 (NESTED W-BEAM) 26'-0"

TO CULVERT (TYP.) 2'-0" MIN.

SIX SECTIONS OF W-BEAM, ONE NESTED INSIDE THE OTHER

NOTES:

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

2. POSTS 1 THRU 4 AND 11 THRU 15 ARE TO BE W6X9 STEEL POSTS. POSTS 5 THRU 10 ARE TO BE 6"x8"x6'-0" BREAKAWAY WOOD POSTS WITH 2 WOOD BLOCKS AT EACH OF THESE 6 POSTS.

3. THE SPLICES AT POSTS 5, 7, & 9 ARE TO USE 3/4" GUARDRAIL BOLT (L=26")

4. TOP OF HEADWALL SHALL NOT EXCEED 2" ABOVE FINISHED GRADE.

5. TOP OF HEADWALL OR TOP OF BARRIER SHALL NOT BE CLOSER THAN 5'-0" TO FACE OF GUARDRAIL.

SEE NOTE 4

DELAWARE DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 2-27

APPROVED

STANDARD NO. B-16 (2013) SHT. 2 OF 3 RECOMMENDED

SIGNATURE ON FILE 02/14/2014

SIGNATURE ON FILE 01/14/2014

1/9/2014
NOTES:

1. PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
2. POSTS 1 THRU 4 AND 11 THRU 14 ARE TO BE W6X9 STEEL POSTS. POSTS 5 THRU 10 ARE TO BE 6"x8"x6'-0" BREAKAWAY WOOD POSTS WITH 2 WOOD BLOCKS AT EACH OF THESE 6 POSTS.
3. THE SPLICES AT POSTS 5, 7, 8, & 10 ARE TO USE GUARDRAIL BOLT (L=26").
4. TOP OF HEADWALL SHALL NOT EXCEED 2" ABOVE FINISHED GRADE.
5. TOP OF HEADWALL OR TOP OF BANK SHALL NOT BE CLOSER THAN 5'-0" TO FACE OF GUARDRAIL.

SEE NOTE 4
BOUND "W" BEAM END SECTION

END POST

ONE 12'-8" (3750) BEAMリアル SECTI ONSHAPED TO A 38' (11000) RADIUS

PLATE WASHER DETAIL

PLAN

LIMIT OF RIGHTWAY

12" (3000)

6'-3" (1905)

ANCHOR PLATE

SWAGED CABLE ASSEMBLY

5/8" (16) HEX BOLT

6'-8" (2030) STEEL WASHER, AND NUT

2" (50)

SOIL PLATE

6'-8" (2030) STEEL WASHER, AND NUT

ELEVATION

TAPER BEARING PLATE

TYPE 27 SHORT WOOD BREAKAWAY POST

NOTES:

1. ADDITIONAL HOLES IN W-BEAM FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING. SEE DETAIL B-33, SHEET B OF 1 FOR HOLE SPACING INFORMATION.

2. CONTRACTOR HAS THE OPTION OF USING A 6'-10" (2030) STEEL PLATE WITHOUT A SOIL PLATE OR A 5'-10" (1780) 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 KPH) OR LESS.
**END ANCHORAGE, TYPE 27**

**NOTES:**
1. ADDITIONAL HOLES FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING.
   (SEE STANDARD HARDWARE SHEET FOR HOLE SPACING INFORMATION).
2. CONTRACTOR HAS THE OPTION OF USING A 6'-0" STEEL TUBE WITHOUT A SOIL PLATE
   ON A 5'-0" STEEL TUBE WITH A SOIL PLATE.
3. PLACE A 3'-0" WIDE PLASTIC RETAINING TIE STRAP AROUND THE SHORT TIMBER
   BREAKAWAY POST AND TIMBER BEARING PLATE TO ENSURE THE PROPER ORIENTATION
   OF THE TIMBER BEARING PLATE.
4. REFER TO DETAIL B-13, SHEET 8 OF 10 FOR PROPER TIMBER BEARING PLATE ORIENTATION.

**DEL AWARE**
DEPARTMENT OF TRANSPORTATION

<table>
<thead>
<tr>
<th>STANDARD NO.</th>
<th>END ANCHORAGE, TYPE 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-19 (2012)</td>
<td></td>
</tr>
</tbody>
</table>

**APPROVED**

<table>
<thead>
<tr>
<th>SIGNATURE ON FILE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SCALE : NTS**

---

**END SECTION PLAN**

**END SECTION ELEVATION**
FLARE RATES

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>FLARE RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 MPH (112 km/h)</td>
<td>15:1</td>
</tr>
<tr>
<td>60 MPH (96 km/h)</td>
<td>14:1</td>
</tr>
<tr>
<td>55 MPH (89 km/h)</td>
<td>12:1</td>
</tr>
<tr>
<td>50 MPH (80 km/h)</td>
<td>11:1</td>
</tr>
<tr>
<td>45 MPH (72 km/h)</td>
<td>10:1</td>
</tr>
<tr>
<td>40 MPH (64 km/h)</td>
<td>9:1</td>
</tr>
<tr>
<td>30 MPH (48 km/h)</td>
<td>7:1</td>
</tr>
</tbody>
</table>

NOTES:
11. BURIED END SECTION PAYMENT INCLUDES THE CONCRETE OR POST ANCHORAGE, EXCAVATION, BACKFILL, AND ALL APPLICABLE ITEMS INCLUDING LABOR NEEDED TO COMPLETE END ANCHORAGE.
21. THE CONTRACTOR HAS THE OPTION OF USING EITHER A CONCRETE BLOCK ANCHOR OR A POST ANCHOR TO TERMINATE THE BURIED END SECTION.
31. WHEN PLACING GUARDRAIL ON A 10% OR FLATTER SLOPE, THE HEIGHT OF THE GUARDRAIL SHALL BE HELD CONSTANT RELATIVE TO THE GROUND DIRECTLY UNDER THE FACE OF THE GUARDRAIL.
41. ALL POSTS SHALL BE 6' (1800) FOR SINGLE RAIL INSTALLATION.
51. WHEN USING THE BURIED END SECTION, THE DESIGN MUST PROVIDE A MINIMUM OF 72 INCHES (1826) DITCH TO THE BEGINNING OF THE GUARDRAIL.
61. 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'-12" (2190) BEHIND THE BOTTOM OF THE DITCH, THEN SLOPE THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 7'-12" (2190) BEHIND THE DITCH, SO THAT IT HAS 12" (300) OF COVER.

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

OVERLAP W BEAMS IN DIRECTION OF TRAVEL

LIMIT OF PAYMENT FOR GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-27

4 6'2" (1830) PLATTER

B B

2-SECTIONS OF W BEAM, ONE NESTED INSIDE THE OTHER

RUB RAIL TO BARRIER CONNECTION (SEE NOTE 4)

3/8" (9) X 3" (75) LAG BOLT

ELEVATION

NOTES:

1. THE W-BEAM AND RUB RAIL ARE NOT BOLTED TO POSTS AT POSTS 2 THROUGH 4.
2. POSTS 1 THROUGH 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER WOOD BLOCKS AND/OR RUBBLE AND WOOD BLOCK
3. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE, PLACE STEEL WASHERS FOR 3/8" (9) BOLT BETWEEN HEADS AND RUB RAIL
4. ALL HOLES SHALL BE DRILLED PRIOR TO CEMENTING.

5. PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
6. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET
7. POSTS 1 & 2 ARE W16X33 (W50X13.5), 7'-6" (2.28m) LONG. ALL OTHER POSTS IN TRANSITION ARE W16X8 (W50X3.5), 5'-0" (1.52m) LONG
8. SEE DETAIL 0-5, SHEETS 2 AND 3 FOR HARDWARE DETAILS.

DELAWARE DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-27

STANDARD NO. B-21 (2010)

SHT. 1 OF 3

RECOMMENDED

APPROVED

SIGNATURE ON FILE

12/28/2010

SIGNATURE ON FILE

12/27/2010

09/22/2010
NOTES:
1. CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.
2. GUARDRAIL SECTION AND TERMINAL CONNECTORS SHALL BE OVERLAPPED IN THE DIRECTION OF TRAVEL.
3. INSTALLATION SHOWN ABOVE WITH A T-TYPE BARRIER FACE. GUARDRAIL SECTION OF BARRIER CONNECTION SHALL BE ADJUSTED HORIZONTALLY IN ORDER TO MEET FLUSH AGAINST VARIOUS TYPES OF WALLETS AND BARRIERS.
NOTES:

1. WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON DETAIL P-2, SHEET 3 OF 5. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.

2. DEPRESS CURB AT ENTRANCES AS DETAILED ON THIS SHEET.

3. DEPRESS CURB FLUSH WITH PAVEMENT AT CURB RAMPS. MAXIMUM SLOPE OF CURB AT CURB RAMPS IS 20:1 IN THE DIRECTION OF PEDESTRIAN TRAVEL. SEE DETAIL C-2, SHEET 1 OF 4.

4. DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 4:1.

5. DEPRESS END OF CURB RUNS NOT PART OF AN ISLAND OR MEDIAN FLUSH WITH PAVEMENT OR ADJACENT AREA AT A SLOPE OF 12:1.

6. FOR SUBDIVISION APPLICATIONS, A MINIMUM OF 6" OF STONE IS REQUIRED.

TYPICAL CURB SECTION

TYPICAL TAPER SECTION AT NOSE OF MEDIANS

TYPE 1-8 CURB SHOWN

10'-0" MIN

NO SIGNS OR OTHER OBSTRUCTIONS

4" MIN

SEE NOTE 6
INTEGRAL P.C.C. CURB AND GUTTER

TYPE 1-2

INTEGRAL P.C.C. CURB AND GUTTER

TYPE 1-6

INTEGRAL P.C.C. CURB AND GUTTER

TYPE 1-4

INTEGRAL P.C.C. CURB AND GUTTER

TYPE 1-8

INTEGRAL P.C.C. CURB AND GUTTER

TYPE 3-6

INTEGRAL P.C.C. CURB AND GUTTER

TYPE 3-4

INTEGRAL P.C.C. CURB AND GUTTER

TYPE 3-2

NOTES:

1. DEPRESS END OF CURB RUNS NOT PART OF AN ISLAND OR MEDIAN FLUSH WITH

PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF CURB RAMPS. MAXIMUM SLOPE OF CURB

AT CURB RAMPS IS 20:1 IN THE DIRECTION OF PEDESTRIAN TRAVEL. SEE DETAIL C-2,

SHEET 1 OF 4.

2. DEPRESS CURB AT ENTRANCES AS DETAILED ON THIS SHEET.

3. DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF

TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 4:1. SEE DETAIL

C-1, SHEET 1 OF 2 FOR TYPICAL SECTION OF TAPER AT NOSE OF MEDIAN ISLANDS.

4. WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO

PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE

LONGITUDINAL JOINT SEALANT DETAIL ON DETAIL P-2, SHEET 3 OF 5. USE APPROVED

JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.

5. 4" OF GABC, TYPE B SHALL BE PLACED UNDER ALL P.C.C. CURB AND P.C.C. CURB AND

GUTTER. SEE DETAIL C-1, SHEET 1 OF 2 FOR TYPICAL SECTION OF TAPER AT NOSE OF MEDIAN ISLANDS.

6. DEPRESS END OF CURB RUNS NOT PART OF AN ISLAND OR MEDIAN FLUSH WITH

PAVEMENT OR ADJACENT AREA AT A SLOPE OF 12:1.
Landings, slope 50:1 max. in all directions.

Intermediate landing, slope 50:1 max. in all directions. (See Note 10)

Curb, ramp type 5 & sections

See appropriate detail

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. For alterations without a grass strip or where the existing road profile is steeper than 7% and a 12:1 maximum slope ramp will not meet the sidewalk grade within a length of 15'-0", the ramp length may be limited to 15'-0" at a constant slope, and 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. For rehabilitation work, the ramp cross slope shall match the slope of the adjacent roadway.

5. Where there is no depressed curb at a cut-through or curb ramp, the detectable warning shall be installed 3" from the roadway pavement.

6. Detectable warning shall be installed when the length w in the direction of pedestrian travel is 5'-0" or greater.

7. Pedestrian signals shall be accessible with a level landing, whose edge is no more than 10" from all pedestrian push buttons.

8. Landing area shall be extended 18" min beyond pedestrian push button for all curb ramp types. When no pedestrian push button exists, the 18" extension can be omitted.

9. Landing area shall be clearly delineated with joints.

10. Intermediate landing is only required when the two ramps intersect before reaching the full height.

11. Construction joints are required on ramp at the interval specified in Note 5 on Detail M-3, Sheet 1 of 1. However, expansion material shall not be used in the ramp section.
R/W

DEPRESSED CURB

NORMAL CURB

GRASS STRIP

4:1 TRANSITION
NORMAL CURB

DEPRESSED CURB

NORMAL CURB

4:1 TRANSITION
NORMAL CURB

ENTRANCE WITH SIDEWALK AND GRASS STRIP

* - JOINT

** - EXPANSION MATERIAL

SECTION A-A

DEPRESSED CURB

SIDEWALK

10:1 MAX.

6" CONCRETE

6" GABC

SECTION B-B

DEPRESSED CURB

SIDEWALK

10:1 MAX.

6" CONCRETE

6" GABC

SECTION C-C

NOTE:

IF WIDTH OF DRIVEWAY IS 15'-0" OR GREATER, THE FLARE AND EXTENSIONS CAN BE OMITTED.

ENTRANCE WITHOUT SIDEWALK

ENTRANCE WITH SIDEWALK AND NO GRASS STRIP

* - JOINT

** - EXPANSION MATERIAL

ENTRANCE WITH SIDEWALK AND GRASS STRIP

* - JOINT

** - EXPANSION MATERIAL

ENTRANCE WITHOUT SIDEWALK

ENTRANCE WITH SIDEWALK AND NO GRASS STRIP

* - JOINT

** - EXPANSION MATERIAL

ENTRANCE WITHOUT SIDEWALK
APPROPRIATE SRBM OR RIPRAP

15% SLOPE CURB TYPE VARIES

APPROPRIATE SRBM OR RIPRAP

4% SLOPE OR NORMAL GUTTER, SHOULDER, ROADWAY, OR NORMAL PAVEMENT SLOPE

SECTION A-A

SECTION C-C

ISOMETRIC VIEW

SHOWN WITH INTEGRAL CURB & GUTTER, TYPE 1-8

4'-0" RADIUS (TYP)

CURB TYPE VARIES

4'-0" MIN

PLAN VIEW

IN SUMP LOCATION

PLAN VIEW

ON GRADE OR SLOPE

6" TYP

SHOULDER, ROADWAY, OR NORMAL PAVEMENT SLOPE

5% SLOPE

4% SLOPE

3' -0"

2'-0"

7'-0" RAD

6" TYP

3" TYP

15% SLOPE

SECTION A-A

CURB OPENING DETAILS

SHOWN WITH INTEGRAL CURB & GUTTER, TYPE 1-8

6" TYP

ISOMETRIC VIEW

SHOWN WITH INTEGRAL CURB & GUTTER, TYPE 1-8

6" TYP

SECTION C-C

APPROPRIATE SRBM OR RIPRAP

7'-0" MIN

2'-0"

10'-0"

C-4 (2012)

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

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

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; x 1350</td>
<td>9'-6&quot;</td>
<td>2'-5&quot;</td>
<td>8'-4&quot;</td>
</tr>
<tr>
<td>8&quot; x 1450</td>
<td>8'-0&quot;</td>
<td>2'-9&quot;</td>
<td>10'-3&quot;</td>
</tr>
<tr>
<td>2&quot; x 1520 or 24&quot; x 1600</td>
<td>1'-4&quot;</td>
<td>3'-2&quot;</td>
<td>12'-6&quot;</td>
</tr>
</tbody>
</table>

**APPROXIMATE QUANTITIES**

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>CONCRETE FT³</th>
<th>RENG 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; x 1350</td>
<td>25 (0.70)</td>
<td>105.43 (0.72)</td>
<td>2</td>
<td>--</td>
<td>215.92</td>
<td>222.89</td>
</tr>
<tr>
<td>8&quot; x 1450</td>
<td>35.5 (0.89)</td>
<td>122.07 (0.90)</td>
<td>3</td>
<td>2'-1&quot; x 1350</td>
<td>215.92</td>
<td>222.89</td>
</tr>
<tr>
<td>2&quot; x 1520 or 24&quot; x 1600</td>
<td>60.75 (1.64)</td>
<td>198.81 (1.52)</td>
<td>3</td>
<td>--</td>
<td>215.92</td>
<td>222.89</td>
</tr>
</tbody>
</table>

**SCHEDULE OF REINFORCING STEEL**

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A-BARS NO.</th>
<th>A-BARS SPA.</th>
<th>A-BARS LENGTH</th>
<th>B-BARS NO.</th>
<th>B-BARS SPA.</th>
<th>B-BARS LENGTH</th>
<th>C-BARS NO.</th>
<th>C-BARS SPA.</th>
<th>C-BARS LENGTH</th>
<th>D-BARS NO.</th>
<th>D-BARS SPA.</th>
<th>D-BARS LENGTH</th>
<th>C-BARS NO.</th>
<th>C-BARS SPA.</th>
<th>C-BARS LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; x 1350</td>
<td>1</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>2</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
</tr>
<tr>
<td>8&quot; x 1450</td>
<td>1</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>2</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
</tr>
<tr>
<td>2&quot; x 1520 or 24&quot; x 1600</td>
<td>1</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>2</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
<td>4</td>
<td>8'-0&quot; (200)</td>
<td>1'-2&quot; x 1350</td>
</tr>
</tbody>
</table>

DELAWARE DEPARTMENT OF TRANSPORTATION

61 SAFETY END STRUCTURE

STANDARD NO. D-1 (2001)

SHT. 2 OF 2

APPROVED

RECOMMENDED

04/17/2001
NOTE: 10'6" SAFETY END STRUCTURE TO BE PRECAST

SECTION A-A
* REQUIRED ONLY FOR PPE SIZE OF 2'6" (752) OR 3'6" (1066)

DELAWARE
DEPARTMENT OF TRANSPORTATION

101 SAFETY END STRUCTURE

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

APPROVED

RECOMMENDED

04/17/2001
1. Personnel safety grates (PSG) shall only be installed on the inlets of storm water pipes (2\*1200) 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) ±\( \frac{1}{16} \) (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\( \times \) (150) above invert of FES.

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

NOTES:

1. Personnel safety grates (PSG) shall only be installed on the inlets of storm water pipes (2\*1200) 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) ±\( \frac{1}{16} \) (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\( \times \) (150) above invert of FES.

6. All hardware attached to concrete shall be attached using approved tamper proof anchors.
<table>
<thead>
<tr>
<th>INLET BOX SIZE</th>
<th>COVER SLAB SIZE (L x W)</th>
<th>DRAINAGE INLET TOP UNIT</th>
<th>INLET TOP UNIT REBAR LENGTH</th>
<th>INLET TOP UNIT LIMIT OF PAYMENT</th>
<th>INLET TOP UNIT BAR BENDING DIAGRAM</th>
<th>FRAME &amp; GRATE (FOUND ON DETAIL D-5, SHEET 2)</th>
<th>MAXIMUM PIPE SIZE (SEE NOTE 1)</th>
<th>MAXIMUM HEIGHT (TO TOP OF BOX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 5/8' x 17 5/8'</td>
<td>NO COVER SLAB</td>
<td>TYPE 5 (FRAME &amp; GRATE COMBO)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>TYPE 5 (FRAME &amp; GRATE COMBO)</td>
<td>N/A</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>24' x 24'</td>
<td>NO COVER SLAB</td>
<td>TYPE 6 (FRAME &amp; GRATE COMBO)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>TYPE 6 (FRAME &amp; GRATE COMBO)</td>
<td>15&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td>34&quot; x 18&quot;</td>
<td>NO COVER SLAB</td>
<td>TYPES A, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>79&quot;</td>
<td>82&quot;</td>
<td>S504 (DETAIL D-5, SHEET 3)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>34&quot; x 24&quot;</td>
<td>NO COVER SLAB</td>
<td>TYPES A, B, C, D, &amp; F (DETAIL D-5, SHEET 6)</td>
<td>79&quot;</td>
<td>82&quot;</td>
<td>S503 (DETAIL D-5, SHEET 6)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>24&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td>48&quot; x 30&quot;</td>
<td>60&quot; x 42&quot; (DETAIL D-5, SHEET 4)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>93&quot;</td>
<td>96&quot;</td>
<td>S501 (DETAIL D-5, SHEET 3)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>36&quot;</td>
<td>21&quot;</td>
</tr>
<tr>
<td>48&quot; x 48&quot;</td>
<td>60&quot; x 60&quot; (DETAIL D-5, SHEET 4)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>93&quot;</td>
<td>96&quot;</td>
<td>S501 (DETAIL D-5, SHEET 3)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>36&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>66&quot; x 30&quot;</td>
<td>78&quot; x 42&quot; (DETAIL D-5, SHEET 4)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>113&quot;</td>
<td>114&quot;</td>
<td>S501 (DETAIL D-5, SHEET 3)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>48&quot;</td>
<td>21&quot;</td>
</tr>
<tr>
<td>66&quot; x 48&quot;</td>
<td>78&quot; x 60&quot; (DETAIL D-5, SHEET 4)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>113&quot;</td>
<td>114&quot;</td>
<td>S501 (DETAIL D-5, SHEET 3)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>48&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>66&quot; x 66&quot;</td>
<td>78&quot; x 78&quot; (DETAIL D-5, SHEET 4)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>113&quot;</td>
<td>114&quot;</td>
<td>S501 (DETAIL D-5, SHEET 3)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>48&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>72&quot; x 24&quot;</td>
<td>84&quot; x 36&quot; (DETAIL D-5, SHEET 5)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>113&quot;</td>
<td>120&quot;</td>
<td>S502 (DETAIL D-5, SHEET 5)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>54&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td>72&quot; x 48&quot;</td>
<td>84&quot; x 60&quot; (DETAIL D-5, SHEET 5)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>113&quot;</td>
<td>120&quot;</td>
<td>S502 (DETAIL D-5, SHEET 5)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>54&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>72&quot; x 72&quot;</td>
<td>84&quot; x 84&quot; (DETAIL D-5, SHEET 5)</td>
<td>TYPES A, B, C, D, &amp; E (DETAIL D-5, SHEET 3)</td>
<td>113&quot;</td>
<td>120&quot;</td>
<td>S502 (DETAIL D-5, SHEET 5)</td>
<td>TYPES 1 THRU 4 GRATE</td>
<td>54&quot;</td>
<td>54&quot;</td>
</tr>
</tbody>
</table>

**Notes:**
1. Maximum pipe sizes are calculated using reinforced concrete pipe perpendicular to the box wall. For other pipe sizes, types, and skew angles other than perpendicular, see chart on DelDOT Design Resource Center.
2. Steps are required on all boxes whose depth is greater than 4'-0" (1219).
3. See Detail D-4 or appropriate detail sheet for additional notes.
**Type 1 Joint Detail**
- Dimensions will vary
- Joint sealant as per specifications only between 2 precast units

**Type 2 Joint Detail**

**Type 3 Joint Detail**

---

**Double Inlet Section**
- Cast-in-place concrete flow channel (Typ.)
- Form and pour concrete to support frames
- Gutter flow line
- 2" (50) x 4" (100) temporary drainage opening

**Section A-A**
- Type 1 Joint (Typ.)
- Type 3 Joint (Typ.)
- Type 1 Joint (Typ.)

**Section B-B**
- Type 1 Joint (Typ.)
- Type 3 Joint (Typ.)
- Cast-in-place concrete flow channel (Typ.)
- Inlet box (pre-cast)
- Cover slab (pre-cast)

---

**Delaware Department of Transportation**

**DRAINAGE INLET ASSEMBLY**

**STANDARD NO.** D-6 (2010)  
**SHT.** 1  
**OF** 9  
**APPROVED**

**Signature on File**  
12/28/2010

**Recommended**

**Signature on File**  
12/27/2010

10/28/22 |
Throat opening type: See Note 1

48" (1220) x 30" (760) Inlet

66" (1675) x 66" (1675) Inlet

Type 2 Joint (Typ)

Type 1 Joint (Typ)

Type 3 Joint (Typ)

Reinforcing bars placement:
- Relocate encroaching reinforcing bars when using Type B unit.
- Cover slabs shall be precast and must be sized to fit inlet box dimensions.
- All bars are to be 45° spaced @ 6" (150). Unless noted otherwise, top reinforcement shall be 0.11 in²/ft² (170 mm²). Horizontal reinforcement per foot in both directions.
- Minimum bar cover ± 1.5" (38).
NOTE: SEE DETAIL D-5, SHEET 3 OF 9 FOR INLET TOP UNIT APPLICATIONS.

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS

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

DRAINAGE INLET DETAILS

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS

* - SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD NO. D-4, SHEET 1 OF 1
NOTES:
1. REFER TO PREVIOUS SHEETS FOR REINFORCEMENT REQUIREMENTS.
2. THE HEIGHT OF THE INLET IS LIMITED TO 4' (1220) MAXIMUM THEREFORE STEPS WILL NOT BE REQUIRED AND SHOULD NOT BE INSTALLED ON THIS INLET.
3. REFER TO DETAIL D-5, SHEET 3 OF 9 FOR Pier TOP UNIT APPLICATION.

S504 BENDING DIAGRAM
S504 IS NOT REQUIRED TO BE ONE CONTINUOUS BAR. IF MORE THAN ONE BAR IS USED, THERE MUST BE A 12" (3050) OVERLAP BETWEEN BARS.
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

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

SECTION A-A

SECTION B-B

BOX MANHOLE COVER SLAB DETAILS

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.
JUNCTION BOX 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 = 1/2" (13).
4. DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.

SECTION A-A

SECTION B-B
NOTE:
1. USE CLASS C BEDDING UNLESS OTHERWISE INDICATED.
2. FOR CLASS A BEDDING, WYEDE PIV IN CONCRETE 6" (152) FOR PIPES SMALLER THAN 24" (600) AND 10" (250) FOR PIPES 24" (600) TO 60" (1525) AND FOR PIPES LARGER THAN 60" (1525) SEE PROJECT DETAILS.
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 RUNWAY 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 UP FITTING TIGHT TO THE BOTTOM FLOW LINE.

6. A 4'-1200F FLEXIBLE DELINEATOR SHALL BE FURNISHED AND INSTALLED AT THE DIRECTION OF THE ENGINEER TO MARK THE LOCATION OF THE CONCRETE HEADWALL.

7. WHEN TWO LINES OF PIPE UNDERDRAIN DRAW 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.
CONCRETE PLUG DIAMETER INSIDE DRAINAGE PIPES WITH CONCRETE AS DIRECTED BY THE ENGINEER.

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

NOTE:

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

- Limit of Construction
- Existing Ground
- Phase 1 Excavation
- Intermediate Phase Excavation
- Final Phase Excavation

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

FILL SECTION

- Edge Berm to be placed at the end of each work day and used until slope is completely stabilized.
- Minimum 5' (1500) offset from toe of slope
- Silt fence, see standard sheet

Temporary Swale, see standard sheet

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.
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.
NOTES:
1. FOR DITCHES LESS THAN 30'-0" (750) IN DEPTH, PLACE DAM AS DIRECTED BY THE ENGINEER.
2. THE CHECK DAM HEIGHT MUST NOT EXCEED 2'-0" (600) AT THE CENTER OF THE WER.
3. THE CHECK DAM IS TO BE CONSTRUCTED SO THAT THE CENTER IS 6'-0" MIN.
4. GEOTEXTILE FABRIC IS TO BE INSTALLED UNDERNEATH RIPRAP ON PERMANENT CHECK DAMS ONLY.
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 STANDARDS SHEET FOR ADDITIONAL INFORMATION.
4. FOR SIZE, LOCATION, ETC. OF SEDIMENT TRAP, SEE CONSTRUCTION PHASING, M.O.T., AND EROSION CONTROL PLANS.
5. ALL FILM 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.
NOTES:
1. THE WORK SHALL CONSIST OF THE CONSTRUCTION OF A SEDIMENT TRAP AROUND A DRAINAGE INLET TO ALLOW SEGMENTATION TO OCCUR BEFORE RUNOFF ENTERS THE DRAINAGE INLET.
2. DRAINAGE INLET SEDIMENT TRAPS SHALL BE LIMITED TO A THREE (3) ACRE (0.2 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.
ELEVATION

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 (20 HECTARES) OR LESS. LARGER DRAINAGE AREAS REQUIRE AN ENGINEERED DESIGN.
3. THE HEIGHT OF THE SKINNED Dewatering DEVICE SHALL BE SPECIFIED BY THE ENGINEER IN THE FIELD.
**Stabilization of Embankments**

**Notes:**
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**

**Notes:**
1. Additional staples not shown are required at overlaps.
2. See overlap detail for staple placement.
3. Staples are to be staggered.
4. Topsoil under erosion control blanket is to be tracked and seeded.

---

**Erosion Control Blanket Applications**

**Standard No.:** E-9 (2006)

**Approved:**

**Recommended:**

---

**Scale:** 1 in = 1 ft

**Terminal Trench Anchor Detail**

Applied at the upstream end of ditch

**Initial Trench Anchor Detail**

Applied at the downstream end of ditch

---

**Delaware Department of Transportation**

**Standard No.:** E-9 (2006)

**Sht. 1 of 1**

**Recommended:**

**Approved:**

---

**Date:** 08/30/2005
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 SITE SPECIFIC CONDITIONS.

DELAWARE DEPARTMENT OF TRANSPORTATION

RIPRAP DITCH

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

RECOMMENDED

APPROVED

08/10/2005
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>0.5-2.0%</td>
<td>SEED USED WITH EROSION CONTROL BLANKET</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DRAINAGE AREA A (5 AC 1/2 HO OR LESS)</td>
</tr>
<tr>
<td>2</td>
<td>2.5-8.0%</td>
<td>R-4 RRRAPI</td>
</tr>
<tr>
<td>3</td>
<td>8.1-20%</td>
<td>ENGINEERED DESIGN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DRAINAGE AREA B (5 AC - 10 AC) (2 HO - 4 PUD)</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>1' 1200 MIN</td>
<td>1' 1200 MIN</td>
</tr>
<tr>
<td>D</td>
<td>4' 42000 MIN</td>
<td>6' 96000 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."
**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 RRRAPI</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 4 months, 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 4 months, 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**

**RECOMMENDED**

**SIGNED**

12/5/05

09/02/06
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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blanket</td>
</tr>
<tr>
<td>2</td>
<td>2.1-8.0%</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 oc/2 hcl or less)</th>
<th>Dike B (5-10 oc/2-4 hcl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>c-dike height</td>
<td>12&quot; (300)</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>b-dike width</td>
<td>2&quot; (50)</td>
<td>24&quot; (600)</td>
</tr>
<tr>
<td>c-flow width</td>
<td>48&quot; (1200)</td>
<td>72&quot; (1800)</td>
</tr>
<tr>
<td>c-flow depth</td>
<td>44&quot; (1100)</td>
<td>27&quot; (680)</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.
DISCHARGE INTO A STABILIZED DITCH - (GEOTEXTILE, STONE OR GRASSED) OR A SEDIMENT TRAP.

TOE OF SLOPE

R-4 RIFFRAP

(3' ST (3 m³ MLW)

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

TOP OF FILL SLOPE AS EMBANKMENT IS CONSTRUCTED

FLOW

FILL SLOPE

TOE OF SLOPE

INTERCEPTOR BERM, 3'-6" (1000) MIN.
HEIGHT, LENGTH AS REQUIRED TO CONTAIN SURFACE DRAINAGE AND DIRECT INTO TEMP SLOPE DRAIN.

PLAN

EDGE BERM AT TOP OF FILL SLOPE

ANTI-SEEP COLLAR

TEMPORARY FLOW LINE

2'-150 x 4' (1800)

ELEVATION

CORRUGATED PIPE

1/4" (30) PLYWOOD COLLAR

PLAN

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.

SLOPE DRAIN PROFILE

FOR FILL SLOPES

DELAWARE
DEPARTMENT OF TRANSPORTATION

TEMPORARY SLOPE DRAIN

STANDARD NO.   E-14 (2000)  SHT.  1 OF 1  APPROVED

RECOMMENDED

09/02/2005

12/05/05

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.
SUMP PIT CHART

<table>
<thead>
<tr>
<th>TYPE</th>
<th>PIPE 1</th>
<th>PIPE 2</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PERFORATED 2&quot;(50) CMP WITH PERFORATED CAP WELDED ON BOTTOM AND COMPLETELY WRAPPED WITH GEOTEXTILE.</td>
<td>N/A</td>
<td>4&quot; (100) MIN.</td>
<td>12&quot; (300)</td>
</tr>
<tr>
<td>2</td>
<td>PERFORATED 4&quot;(100) CMP WITH PERFORATED CAP WELDED ON BOTTOM</td>
<td>REMOVABLE PERFORATED 36&quot;(900) CMP WITH PERFORATED CAP WELDED ON BOTTOM AND COMPLETELY WRAPPED WITH GEOTEXTILE.</td>
<td>8&quot; (200) MIN.</td>
<td>24&quot; (600)</td>
</tr>
</tbody>
</table>

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 SEDEMENT.

3. 1/4" x 1/2" x 10" x 12" GAGE 0.00 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 1 SUMP PIT SHALL BE USED ONLY WHEN PUMPING IS NEEDED FOR LESS THAN 7 DAYS.

DELAWARE DEPARTMENT OF TRANSPORTATION

SUMP PIT, TYPE 1 & 2

STANDARD NO. E-16 (2005)  SHT. 1 OF 1

APPROVED  

RECOMMENDED  

02/01/2005
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 WATERWAY. THE DWB SHALL HAVE A MINIMUM TOP WIDTH OF 12' (3.65M) AND A MINIMUM DEPTH OF 3.5' (1.06M). 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' + 0.21 x Y
METRIC: TOP LENGTH (METERS) = 7.930 + 4.8300 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 STIRRING 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 REJECTED 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' (3.65M) 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' ABOVE THE PEAK ELEVATION OF THE ONE YEAR STORM.
NOTES:
0. 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.

1. THE SANDBAG Dike SHALL BE INSTALLED AT THE UPSTREAM LOCATION FIRST.

2. THE HEIGHT OF THE SANDBAG Dike SHALL BE FLOOR ABOVE THE PEAK ELEVATION OF THE ONE YEAR STORM, OR EQUAL WITH THE TOP OF BANK, WHICHEVER IS LESS, SEE PLANS FOR INFORMATION.

3. THE SPILLWAY SHALL BE SIZED TO PASS A 1 Year Storm Event Peak Flow, See Plans.

4. 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' (600) OF STONE SHALL BE REMOVED AND REPLACED WITH 2'-1500 OF CLEAN STONE WHEN Voids ARE FILLED OR AS DIRECTED BY THE ENGINEER.
NOTES:
1. All P.V.C. pipes are to be 4" I.D., Schedule 40.
2. All joints of the Floatation Section shall be solvent welded.
3. 4" HoPc flexible drain pipe is to be attached to the Pond outlet structure with water tight connections.

DELWARE DEPARTMENT OF TRANSPORTATION

SKINNER DEWATERING DEVICE

STANDARD NO. E-22 (2012)  SIGNATURE ON FILE  12/20/2012

APPROVED  SIGNATURE ON FILE  01/07/2013

RECOMMENDED  SIGNATURE ON FILE  12/4/2012
FLOATING TURBIDITY CURTAIN

NOTE: 1. AN 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 DE-WATER THE JOB.

4. OTHER DESIGNS MAY BE USED PROVIDED THE HYDRAULIC DESIGN IS SUBMITTED TO AND APPROVED BY THE STORMWATER ENGINEER.
**INITIAL TRENCH ANCHOR DETAIL**
Applied at the downstream end of ditch

**TERMINAL TRENCH ANCHOR DETAIL**
Applied at the upstream end of ditch

**LONGITUDINAL TRENCH ANCHOR DETAIL**

**OVERLAP DETAIL**

**STABILIZATION OF DITCHES PLAN**

**STABILIZATION OF DITCHES SECTION A-A**

**TURF REINFORCEMENT MAT APPLICATIONS**

**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. Topples under turf reinforcement mat is to be tracked and seeded.

**DELAWARE DEPARTMENT OF TRANSPORTATION**

**STANDARD NO.** E-25 (2006)  **SH. T.** 1  **OF** 1  **APPROVED**

CONSTRUCTION: 12/5/05

RECOMMENDED: 11/2/05

09/09/2005
NOTES:
1. RIPRAP IS TO BE PLACED PRIOR TO PLACING PPE.
2. PLACE DELAWARE NO. 3 STONE UNDER PPE.
3. ELEVATION (EL) SHOULD NOT BE HIGHER THAN PPE INVERT.
4. REFER TO THE PPE ENERGY DISSIPATOR SCHEDULE ON THE CONSTRUCTION PLANS FOR THE VALUE OF DIMENSION VARIABLES.
ALL DEAD, BROKEN, & CROSSING BRANCHES SHALL BE PRUNED OFF FOLLOWING INSTALLATION.

ALL SOIL SHALL BE EXCAVATED FROM THE PIT, MIXED WITH APPROVED AMENDMENTS AND USED AS BACKFILL DURING INSTALLATION OF SHRUB.

MULCH IN ACCORDANCE WITH SPECIFICATIONS, DO NOT PLACE MULCH AGAINST THE SHRUB STEMS.

NOTE:
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 6'10" 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 ICLC 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

DELAWARE DEPARTMENT OF TRANSPORTATION

PLANTING DETAILS

STANDARD NO. L-1 (2006)  SHT. 1  OF 1

APPROVED  RECOMMENDED

08/04/2006
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 an L.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 limited to 7' (2100) for pedestrian clearance.

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

SET ROOT BALL FLUSH TO GRADE OR *±5" TO 2" (50) ABOVE 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 TAMPERED 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.

TREE PLANTING DETAIL
NOTES:
1. SEE PLANT LIST FOR SPACING CO.

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

PLAN VIEW

SECTION VIEW

PERENNIAL/GROUNDCOVER PLANTING DETAIL
DETAILED 'A'

INTERMEDIATE OR LINE POST:
STUDDED T-S - 333 LBS./LIN. FT. 0.098 kg/m,
H - 257 LBS./LIN. FT. 0.08 kg/m

END POST: 2 1/2" (64) O.D.
1.65 LBS./LIN. FT. 0.43 kg/m

FASTEN WITH 5 CLAMPS OR
* 9 GAGE GALV. WIRE TIES

1/2" CAGE (2.7") 4 PT. BARB, 5" (127) C.C.,
ONE STRAND BARBED WIRE

CORNER OR PULL POST: 2 1/2" (64) O.D.
1.65 LBS./LIN. FT. 0.43 kg/m

STRETCH FENCE TO CORNER POST
AND TIE WITH 5 WRAPS

SEE DETAIL 'A'

DIAGONAL BRACES: 1/2" (140) O.D.
0.27 LBS./LIN. FT. 0.078 kg/m
LENGTH 7'-0" (2130)
NOTES:
1. LONGITUDINAL STEEL SHALL BE HELD IN PLACE BY CRADLES.
2. LETTERS ON CONCRETE MONUMENT TO BE COUNTERSUNK IN TOP OF MARKER 1/2".
3. FLEXIBLE DELINEATORS ARE ONLY TO BE USED ON ROADS WITH A SPECIFIED DENIAL OF ACCESS OR CLASSIFIED AS MINOR ARTERIALS OR HIGHER. ON ALL OTHER ROAD CLASSIFICATIONS, A WOODEN STAKE SHALL BE PLACED WITH "ROW" HANDWRITTEN VERTICALLY IN 1" TALL LETTERS.
4. PLACE CAP ON CONCRETE MONUMENT SO THAT TOP OF CAP IS FLUSH WITH THE TOP OF THE CONCRETE MONUMENT.

DELAWARE DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY MONUMENTATION

STANDARD NO. M-2 (2011) SHT. 1 OF 1

APPROVED

SIGNATURE ON FILE 12/22/2011

RECOMMENDED

SIGNATURE ON FILE 12/21/2011

12/12/2011
SHARED-USE PATH & SIDEWALK DETAILS

NOTES:
2. THE LANDING SECTION SHALL BE A MINIMUM OF 5'-0" IN LENGTH AND SHALL HAVE A MAXIMUM CROSS SLOPE AND RUNNING SLOPE OF 2%. THE ENTIRE LANDING SECTION MUST ALSO BE CONCRETE.
3. THE RAMP SECTION SHALL HAVE A MAXIMUM CROSS SLOPE OF 2% AND A MAXIMUM RUNNING SLOPE OF 12:1. HOWEVER, IF A 12:1 RUNNING SLOPE DOES NOT ALLOW THE RAMP TO MEET EXISTING GRADE WITHIN 15'-0", THE RUNNING SLOPE MAY EXCEED 12:1.
4. A 6:1 MAX SLOPE IS REQUIRED FOR 2'-0" ON BOTH SIDES OF THE SHARED-USE PATH. WHERE A 6:1 SLOPE CANNOT BE ACHIEVED, AN APPROVED HANDRAIL OR HEADWALL SHALL BE REQUIRED.
5. TOPSOIL, SEED, & MULCH ANY DISTURBED AREA ADJACENT TO THE SHARED-USE PATH UP TO A MAXIMUM OF 2'-0".
6. FOR SIDEWALKS AND CONCRETE SHARED-USE PATHS, CONSTRUCTION JOINTS SHALL BE PLACED EVERY 2'-0" AND EXPANSION MATERIAL EVERY 20'-0". HOWEVER, EXPANSION MATERIAL SHALL NOT BE USED IN THE RAMP SECTION.

SIDEWALK

7. SEE DETAIL C-2, SHEETS 1, 2 OR 3 FOR CURB RAMP TREATMENTS WHEN THE SIDEWALK INTERSECTS WITH A TRAVELWAY.
8. A 6:1 MAX SLOPE IS REQUIRED FOR 2'-0" ON BOTH SIDES OF THE SIDEWALK.
9. TOPSOIL, SEED, & MULCH ANY DISTURBED AREA ADJACENT TO THE SIDEWALK UP TO A MAXIMUM OF 2'-0".
10. ON REHABILITATION PROJECTS, WHEN EXISTING OBSTRUCTIONS (FIRE HYDRANT, UTILITY POLE, ETC...) ARE LOCATED IN THE SIDEWALK, THE SIDEWALK PATH SHALL NOT BE LESS THAN 32" WIDE AND THE OBSTRUCTION SHALL NOT EXTEND FOR MORE THAN 2'-0".

DELAWARE DEPARTMENT OF TRANSPORTATION

SHARED-USE PATH & SIDEWALK DETAILS

STANDARD NO. M-3 (2013) SHIT. 1 OF 1

APPROVED SIGNATURE ON FILE 02/14/2014

RECOMMENDED SIGNATURE ON FILE 01/14/2014

SCALE : NTS
BIKE RACK LAYOUT DETAILS

NOTES:
1. BIKE RACK SHALL BE ANCHORED AS PER MANUFACTURER’S RECOMMENDATIONS AFTER APPROVAL FROM ENGINEER IN THE FIELD.
2. DETAIL SHOWN WITH P.C.C. CURB TYPE 1-8, HOWEVER ACTUAL CURB VARIES AND SHOULD BE PLACED AS SHOWN ON PLANS.
3. SPECIAL CONSIDERATIONS SHOULD BE TAKEN WHEN PLACING BIKE RACKS NEAR Curb RAMPS AND MAY REQUIRE A DETAIL ON THE PLANS.
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.
NOTES:
1. ACTUAL PATTERN TO BE USED SHALL BE SPECIFIED ON THE PLANS. COLOR IS TO BE "BRICK RED" UNLESS OTHERWISE NOTED ON THE PLANS.
2. MATERIALS AND PAVEMENT BOX VARY DEPENDING ON PLANS.
3. FOR CROSSWALK APPLICATIONS, REFER TO THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STRIPING WIDTH.
4. THE PATTERNS ABOVE ARE THE PREFERRED PATTERNS AVAILABLE FOR SIDEWALK OR CROSSWALK APPLICATIONS.

BRICK PAVER SIDEWALK DETAIL

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

- To be used when the pad is placed behind curb and includes a sidewalk without a grass strip.

**BUS STOP PAD, TYPE 2**

- To be used when the pad is placed behind curb and includes a sidewalk with a grass strip.

**BUS STOP PAD, TYPE 3**

- To be used when the pad is placed flush with the travelway and no curb or sidewalk is included.

*Notes:

1. BUS STOP PAD LOCATIONS MUST BE APPROVED BY BOTH DART AND DELDOT PRIOR TO ANY CONSTRUCTION.
2. REFERENCE THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR GENERAL INFORMATION ON PLACEMENT OF SIGNS.
3. SEE CONSTRUCTION PLAN SIGNING AND STRIPING SHEETS FOR SPECIFIC SIGN AND SIGN LOCATION DETAILS.
4. TYPICAL BUS STOP PADS MAY BE USED IN CONJUNCTION WITH BUS STOP SHELTER LOCATIONS IN THE EVENT OF LAND CONSTRAINTS AT THE SHELTER LOCATIONS. AN INTERCONNECTING PEDESTRIAN ACCESS PATH MUST EXIST THAT IS ACCESSIBLE TO BUS STOP ALIGHTING AREAS, SHELTERS, CURB RAMPS, CROSSWALKS, AND SIDEWALKS.
5. A 6:1 MAX SLOPE IS REQUIRED FOR 2'-0" ON ALL SIDES OF THE BUS STOP PAD AND APPROACHING SIDEWALK. WHERE THIS CANNOT BE ACHIEVED, AN APPROVED HANDRAIL OR CURB / HEADWALL IS REQUIRED.
6. CURB TYPE VARIES, SEE PLANS FOR CORRECT CURB TYPE.
7. SEE DETAIL M-8, SHEET 1 OF 1 FOR ADDITIONAL SIDEWALK DETAILS AND REQUIREMENTS.
8. RAMPS ARE ONLY REQUIRED WHEN THE VERTICAL HEIGHT OF THE APPROACHING SIDEWALK DIFFERS FROM THAT OF THE ADJACENT CURB AND THE BUS STOP PAD MUST BE RAISED OR LOWERED TO MATCH THE CURB HEIGHT.
NOTES:
1. BUS STOP SHELTER PAD LOCATIONS MUST BE APPROVED BY DART AND DELDOT PRIOR TO ANY CONSTRUCTION.
2. REFERENCE THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR GENERAL INFORMATION ON
   PLACEMENT OF SIGNS.
3. SEE CONSTRUCTION PLANS SIGNING AND STRIPING SHEETS FOR SPECIFIC SIGN AND SIGN LOCATION DETAILS
4. BUS STOP CONFIGURATIONS MAY VARY DUE TO TOPOGRAPHIC OBSTRUCTIONS OR GRADES. CONSULT DART
   OR DELDOT FOR OPTIONAL PAD DETAILS.
5. A 6:1 MAX SLOPE IS REQUIRED FOR 2'-0" ON ALL SIDES OF THE BUS STOP PAD AND APPROACHING SIDEWALKS.
   WHERE THIS CANNOT BE ACHIEVED, AN APPROVED HANDRAIL OR HEADWALL IS REQUIRED.
6. CURB TYPE VARIES. SEE PLANS FOR CORRECT CURB TYPE.
7. TRASH RECEPTACLE PAD CAN BE PLACED ON EITHER SIDE OF THE SHELTER PAD, AT THE DIRECTION OF THE
   ENGINEER IN THE FIELD.
8. SEE DETAIL M-5, SHEET 1 FOR ADDITIONAL SIDEWALK DETAILS.
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' (600) INSIDE OF THE LANE EDGELINE OR CENTERLINE.
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 ¼" (6) WIDER. WHEN THE TEMPERATURE IS ABOVE 80°F (27°C), THE SEALANT RESERVOIR SHALL BE CUT ³/₈" (9.5) NARROWER.
2. "T" REFERS TO THE ACTUAL CONSTRUCTED SLAB THICKNESS.
3. TOLERANCE ON ALL JOINT SEALANT DETAIL DIMENSIONS SHOWN WITHOUT RANGES SHALL BE PLUS ¼", MINUS 0".
4. THE TOP EDGES OF THE CONTACT SURFACES OF THE SEALANT MATERIAL ON BOTH SIDES OF THE JOINT RESERVOIR SHALL BE AT THE SAME ELEVATION.
5. TRANSVERSE JOINT MATERIAL SHALL BE PLACED BEFORE LONGITUDINAL JOINT MATERIAL. THE TRANSVERSE JOINT MATERIAL SHALL BE CONTINUOUS FOR THE FULL WIDTH OF ALL ADJACENT P.C.C. PAVEMENT SLABS.
6. LONGITUDINAL JOINT MATERIAL SHALL BE PLACED WITHOUT GAPS WHENEVER INTERRUPTED BY THE TRANSVERSE JOINT MATERIAL.
7. TRANSVERSE JOINT SEAL TO BE RECESSED ¾" TO ¾" BELOW THE TOP OF THE SLAB.
8. A 45° CHAMFER SHALL BE CUT ¼" TO ¾" DEEP AT THE TOP OF THE SLAB ALONG BOTH SIDES OF THE TRANSVERSE SEALANT RESERVOIR.
9. THE TOP EDGES OF THE COMPRESSION SEAL SHALL BE IN FULL CONTACT WITH THE SLAB SIDES.
10. THE TOP EDGES OF THE Contact SURFACES OF THE SEALANT MATERIAL ON BOTH SIDES OF THE JOINT RESERVOIR SHALL BE AT THE SAME ELEVATION.

LONGITUDINAL SAW-CUT JOINT DETAIL
- SEALANT RESERVOIR
- TOP OF SLAB
- KEYWAY DETAIL
- LONGITUDINAL CONSTRUCTION JOINT DETAIL
- TRANSVERSE JOINT DETAIL
- TRANSVERSE CONSTRUCTION JOINT DETAIL

TRANSVERSE SAW-CUT JOINT DETAIL
- SEALANT RESERVOIR
- TOP OF SLAB
- DOWEL

TRANSVERSE CONSTRUCTION JOINT DETAIL
- SEALANT RESERVOIR
- TOP OF SLAB
- DOWEL

SEALANT DETAIL - LONGITUDINAL JOINT
- ¾" INITIAL SAW CUT
- DELETE AT CONSTRUCTION JOINTS

SEALANT DETAIL - TRANSVERSE JOINT
- ¾" INITIAL SAW CUT
- DELETE AT CONSTRUCTION JOINT

KEYWAY DETAIL
- THROW BOLT
- SEE DETAIL
- PREFORMED ELASTOMERIC COMPRESSION SEAL
- UNCOMPRESSED SEAL WIDTH = 1"
DOWEL & TIE BAR PLACEMENT TOLERANCES
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" (600mm) 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" (600mm) from the aforementioned joints.
3. The longitudinal joint alignment shall be straight and continuous through the repaired area.

DELaware
DEPARTMENT OF TRANSPORTATION

FULL DEPTH PATCH

P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2006)  SHT. 1 OF 5

APPROVED  1/16/09
RECOMMENDED  1/16/09
SECTION A-A

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

SECTION B-B

TRANVERSE SAW-CUT USED FOR JOINTS LOCATED WITHIN THE PATCH

SECTION C-C

EXIST. P.C.C. PAVEMENT

TRANVERSE CONSTRUCTION JOINT USED ON JOINTS BETWEEN EXISTING PAVEMENT AND PATCH

FULL DEPTH PATCH
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 0.10" 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/0, MINUS
   0.025".
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.
**VERTICAL TRANSLATION**

**HORIZONTAL TRANSLATION**

**LONGITUDINAL TRANSLATION**

**VERTICAL ROTATION**

**HORIZONTAL ROTATION**

**DOWEL & TIE BAR PLACEMENT TOLERANCES**

**FULL DEPTH PATCH**
NOTE: CLOSED CELL POLYETHYLENE FOAM SHALL BE THE SAME WIDTH AS THE JOINT AND 3'-05" 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'-0" (3000), THEN 1'-0" (125) AND POLYETHYLENE FOAM IS NOT USED.
WHEN X ≤ 12'-0" (3000), THEN 1'-X" AND POLYETHYLENE FOAM IS USED.

DELWARE DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT PATCHING

STANDARD NO. P-2 (2001) SHT. 5 OF 5

APPROVED

05/22/2001
NOTE:

THE PROFILE OF THE OVERLAY PAVING SHALL BE ADJUSTED TO ASSURE A SMOOTH TRANSITION THROUGH THE BUTT JOINT.

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

DELAWARE
DEPARTMENT OF TRANSPORTATION

STANDARD NO.  P-3 (2012)  SHT.  1  OF 1  APPROVED  SIGNATURE ON FILE  01/07/2013

RECOMMENDED  SIGNATURE ON FILE  12/20/2012

12/4/2012
LONGITUDINAL: FULL WIDTH OF LANE(S) DISTURBED

[271x602] (MIN) BCBC (PLACED IN TWO 6" LIFTS
[274x612] 8" (MIN) CLASS A CONCRETE OR 12"

[551x657] SAW CUT
[547x667] SAW CUT
[1098x673] SAW CUT
[1098x683] SAW CUT

[1006x449] PLACED IN 8" LIFTS
[1006x459] BACKFILL BORROW TYPE C
[1006x469] DELDOT SPECIFICATIONS
[1006x479] AND COMPACTED PER
[1006x489] LOOSE MEASUREMENT
[1006x499] PLACED IN 8" LIFTS
[1006x509] BACKFILL BORROW TYPE C
[1006x519] DELDOT SPECIFICATIONS
[1006x529] AND COMPACTED PER
[1006x539] LOOSE MEASUREMENT

NOTES:
1) EXISTING CONCRETE PAVEMENT OVERLAYED WITH HOTMIX LOCATIONS
2) 2'-0" 18" MIN
3) 1'-0" 18" MIN

PERMANENT CROSS-ROAD OR LONGITUDINAL PATCH DETAIL

DELAWARE
DEPARTMENT OF TRANSPORTATION

PERMANENT CROSS-ROAD OR LONGITUDINAL PATCH DETAIL

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

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

2. ALL CONDUIT JUNCTION WELLS PLACED IN PAVED AREAS SHALL BE CONSTRUCTED FLUSH WITH THE FINISHED GRADE. ALL CONDUIT JUNCTION WELLS PLACED IN UNPAVED AREAS SHALL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE WELL, AS DETAILED.

3. ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.

DEL. 57 STONE

FINISHED GRADE (PAVEMENT)

FINISHED GRADE (UNPAVED)

CAST IRON COVER

CAST IRON FRAME

1 1/8" DIA. PICK PRY HOLE

2" 0" BRAIDED STRAP WITH 5/8" EYELETS

JUNCTION WELL COVER

JUNCTION WELL FRAME

2-1/2" EYELETS

24" X 38"

30" X 38"

CAST IRON COVER

CAST IRON FRAME

1 1/8" DIA. PICK PRY HOLE

2" 0" BRAIDED STRAP WITH 5/8" EYELETS

JUNCTION WELL COVER

JUNCTION WELL FRAME

2-1/2" EYELETS

24" X 38"

30" X 38"

DEL. 57 STONE

FINISHED GRADE (PAVEMENT)

FINISHED GRADE (UNPAVED)

3" CONCRETE WALL

24" X 16"

2'-0" BRAIDED STRAP WITH 5/8" EYELETS

DETAIL "A"

JUNCTION WELL COVER

JUNCTION WELL FRAME

3" X 13" STAINLESS STEEL BOLT WITH STAINLESS SPLIT LOCK WASHER AND NUT. DRILL AND TAP UP AND SUPPORT FRAME. ANTI-CORROSION COMPOUND SHALL BE APPLIED TO EACH ASSEMBLY.

PLAN VIEW

SECTION A-A

SECCTION B-B
NOTES:
1. TYPE 11 CONDUIT JUNCTION WELL LID SHALL BE PRECAST POLYMER CONCRETE WITH A HEAVY-WEAVE FIBERGLASS FRAME. INSTALLED ON A PRECAST CONCRETE WELL.
2. TYPE 11 CONDUIT JUNCTION WELL BODY SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
3. ALL CONDUIT JUNCTION WELLS PLACED IN PAVED AREAS SHALL BE CONSTRUCTED FLUSH WITH THE FINISHED GRADE. ALL CONDUIT JUNCTION WELLS PLACED IN UNPAVED AREAS SHALL BE CONSTRUCTED ABOVE FINISHED GRADE AND GRADED TO DRAIN AWAY FROM THE WELL, AS DETAILED.
4. ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.
NOTES:
1. TYPE 14 CONDUIT JUNCTION WELL LID SHALL BE PRECAST POLYMER CONCRETE WITH A HEAVY-WEAVE FIBERGLASS FRAME. INSTALLED ON A PRECAST CONCRETE WELL.
2. TYPE 14 CONDUIT JUNCTION WELL BODY SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 3" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
3. TYPE 14 CONDUIT JUNCTION WELLS SHALL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE CONDUIT JUNCTION WELL.
4. ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.
NOTES:

1. TYPE 15 CONDUIT JUNCTION WELL LID SHALL BE PRECAST POLYMER CONCRETE WITH A HEAVY-WEAVE FIBERGLASS FRAME, INSTALLED ON A PRECAST CONCRETE WELL.

2. TYPE 15 CONDUIT JUNCTION WELL BODY SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.

3. TYPE 15 CONDUIT JUNCTION WELLS SHALL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE CONDUIT JUNCTION WELL.

4. ALL CRACKS, GAPS, OR OPENINGS IN JUNCTION WELL WALL SHALL BE SEALED WITH CONCRETE.
NOTE:
1. CONCRETE APRON IS REQUIRED ONLY WHEN CABINET BASE IS INSTALLED IN UNEVEN AREAS OR AS DIRECTED ON PLAN.
2. CONDUITS SHALL BE EVENLY SPACED WITH MINIMUM 2" WIDTH SPACING ESTABLISHED BETWEEN ALL CONDUITS.
"P & R" CABINET
PLAN VIEW

NOTE:
1. CONCRETE APRON IS REQUIRED ONLY WHEN CABINET BASE IS INSTALLED IN EARTH AREAS OR AS DIRECTED ON PLAN.
2. CONDUITS SHALL BE EVENLY SPACED, WITH MINIMUM 2" WIDTH ESTABLISHED BETWEEN ALL CONDUITS.
UNDERGROUND CONDUIT ENDS SHALL BE CAPPED WITH A GALVANIZED THREADED CONDUIT PLUG UNLESS CONNECTED TO AN EXISTING CONDUIT.

8 EQUALLY SPACED #8 REINFORCING BARS

EQUALLY SPACED #4 REINFORCING BARS

GROUND FOR POLE TO BE ATTACHED TO GROUND ROD (6" x 240")

BOLT CIRCLE DIAMETER TO BE AS DIRECTED BY POLE MANUFACTURE REQUIREMENTS

DIRECTION OF LOAD (MAST ARM OR SPAN)

3" CONDUIT SWEEPS

§ 60

ROUND BASE

SQUARE FOUNDATION HEADER

NOTE: SQUARE FOUNDATION HEADER SHALL HAVE A 6" MINIMUM DEPTH.
ANCHOR BOLTS
INSTALLATION IN SOIL
ROUNDED CORNERS FOR AREA TO BE GROUTED
FINISHED GRADE
HEX NUT
ANCHOR BOLT COVER AS DIRECTED BY THE ENGINEER.
PLUMB OR CANT POLE SQUARE NUT USED TO CONDUIT
GRADE (SOIL) FINISHED

7" 3" 5" 24" 1" 2"
3" CONDUIT SWEEP
BAR (TYP.) #4 REINFORCING BAR (TYP.)

EMBED 8'-0" INTO UNDISTURBED SOIL
GROUND ROD (3/4" X 240")

NOTES:
1) PLACE 2 EACH 6" LONG X 3/4" DIA. P.V.C., SCHEDULE 40 (TYP) VENTS IN THE GROUT AS DIRECTED IN THE FIELD BY ENGINEER.
2) SEE POLE BASE DATA CHART ON DETAIL T-5, SHEET 3 OF 4, FOR POLE BASE DIMENSIONS.
3) ANCHOR BOLTS AND BOLT PATTERN TO BE PROVIDED BY DELDOT'S SIGNAL CONSTRUCTION INSPECTOR UNLESS NOTED OTHERWISE.

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

TYPICAL SECTION (BASES 1, 2, 2A, 2B, 3, 3A, AND 3B)
POLE BASE DATA CHART

<table>
<thead>
<tr>
<th>POLE BASE TYPE</th>
<th>DIAMETER</th>
<th>DEPTH</th>
<th>#4 HORIZONTAL REINFORCING BARS</th>
<th>#8 VERTICAL REINFORCING BARS</th>
<th>CONDUITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>36&quot;</td>
<td>7'-0&quot;</td>
<td>5</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>2</td>
<td>36&quot;</td>
<td>10'-0&quot;</td>
<td>6</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>2A</td>
<td>48&quot;</td>
<td>8'-0&quot;</td>
<td>5</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>2B</td>
<td>60&quot;</td>
<td>7'-0&quot;</td>
<td>5</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>3</td>
<td>48&quot;</td>
<td>10'-0&quot;</td>
<td>6</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>3A</td>
<td>60&quot;</td>
<td>9'-0&quot;</td>
<td>6</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>3B</td>
<td>72&quot;</td>
<td>7'-0&quot;</td>
<td>5</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>4A &amp; 4B</td>
<td>24&quot;</td>
<td>2'-4&quot;</td>
<td>NONE</td>
<td>NONE</td>
<td>2 - 3&quot;</td>
</tr>
<tr>
<td>5</td>
<td>24&quot;</td>
<td>6'-0&quot;</td>
<td>4</td>
<td>8</td>
<td>2 - 3&quot;</td>
</tr>
</tbody>
</table>

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

TYPICAL SECTION (BASE 6)

DELWARE DEPARTMENT OF TRANSPORTATION

APPROVED
STANDARD NO. T-5 (2013) SHT. 3 OF 4 RECOMMENDED

SIGNATURE ON FILE
2/14/2014 1/9/2014

SCALE: NTS

NOTE:
ANCHOR BOLTS AND BOLT PATTERN FOR TYPES 5, 6, & 7 POLE BASES TO BE PROVIDED BY THE MANUFACTURER.
NOTE:
BOLT PATTERN TO BE PROVIDED BY DELDOT'S SIGNAL CONSTRUCTION INSPECTOR.

TYPICAL SECTION (BASE 4A)

TYPICAL SECTION (BASE 4B)

ANCHOR DETAIL

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

DELAWARE
DEPARTMENT OF TRANSPORTATION

POLE BASES

STANDARD NO. T-5 (2013)  SIHT. 4 OF 4  RECOMMENDED

APPROVED  SIGNATURE ON FILE  DATE
02/14/2014

SIGNATURE ON FILE  DATE
01/14/2014

1/9/2014
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 9" P.V.C., SCHEDULE 40 (TYP) VENTS IN THE GROUT AS DIRECTED IN THE FIELD BY THE ENGINEER.

GROUND ROD (6" x 240")
EMBED 6'-0" INTO UNDISTURBED SOIL

SECTION A-A
1 - #3 (M2) SPIRAL BAR, 504' (12800) LONG AT 8" (200) PITCH

8 - #5 (M6) BARS, 4' (12050) LONG

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

SECTION A-A
NOTES:

1. All sawcuts shall be a depth of 3½" on all surfaces.
2. Contractor shall install lead-in wire in the most direct route to the junction well using the closest concrete curb joint.
3. All sawcuts shall be patched with non-shrink concrete caulk.
4. Contractor shall core at full depth of sawcut, 3½".
5. Contractor shall consolidate lead-ins to a single drill hole, whenever feasible.
6. Contractor shall install detectable warning tape in trench for lead-in conduit.

DEL. 57 STONE

LOOP DETECTOR LEAD-IN WIRE INSTALLATION

CONTRACTOR SHALL INSTALL DETECTABLE WARNING TAPE IN TRENCH FOR LEAD-IN CONDUIT.

CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.

ALL SAWCUTS SHALL BE A DEPTH OF 3½" ON ALL SURFACES.

SAW CUT (TYP.)

ACTUAL LIMITS OF SAW CUT (TYP.)

1½" ROTARY DRILL HOLE

FINISHED PAVEMENT SURFACE

LEAD-IN WIRE (INSTALL BELOW PAVEMENT)

CONDUIT WELL

LOOP DETECTOR LEAD-IN WIRE

WEATHERPROOF FITTING

EXCAVATION

MIN. 3" R.M.C. CONDUIT

MIN. 18"

GRASS

FINISHED PAVEMENT SURFACE

LEAD-IN WIRE INSTALLATION

CONDUCT JUNCTION WELL

CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3½".

CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE CURB JOINT.

DEL. 57 STONE

LOOP DETECTOR LEAD-IN WIRE INSTALLATION

SHAPED TO

SCALE: NTS
NOTES:
1) ALL SAWCUTS SHALL BE A DEPTH OF 3/8" ON ALL SURFACES.
2) CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE CURB JOINT.
3) ALL SAWCUTS SHALL BE PATCHED WITH NON-SHRINK CONCRETE CAULK.
4) CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3/8".
5) CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.
CONCRETE ISLAND
TYPE 2 P.C.C. CURB
FINISHED PAVEMENT SURFACE

PAVEMENT)
(INSTALL BELOW
LEAD-IN WIRE
JUNCTION WELL
CONDUIT
LEAD-IN WIRE
LOOP DETECTOR
DEL. 57 STONE

NOTES:
1) ALL SAWCUTS SHALL BE A DEPTH OF 3½" ON ALL SURFACES.
2) CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE CURB
JOINT.
3) ALL SAWCUTS SHALL BE PATCHED WITH NON-SHRINK CONCRETE CAULK.
4) CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3½".
5) CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.
NOTES:
1. ALL SAWCUTS SHALL BE A DEPTH OF 3½" ON ALL SURFACES.
2. CONTRACTOR SHALL INSTALL LEAD-IN WIRE IN THE MOST DIRECT ROUTE TO THE JUNCTION WELL USING THE CLOSEST CONCRETE Curb JOINT.
3. ALL SAWCUTS SHALL BE SEALED WITH AN APPROVED LOOP DETECTOR SEALANT.
4. CONTRACTOR SHALL CORE AT FULL DEPTH OF SAWCUT, 3½".
5. CONTRACTOR SHALL CONSOLIDATE LEAD-INS TO A SINGLE DRILL HOLE, WHENEVER FEASIBLE.
6. CONTRACTOR SHALL INSTALL DETECTABLE WARNING TAPE IN TRENCH FOR LEAD-IN CONDUIT.
LOOP DETECTOR SAWCUT TYPICAL
Refer to detail T-6, sheets 1 through 4 for loop detector lead-in installation requirements.

NOTES:
1. When a proposed loop detector sawcut crosses a lateral roadway joint or other obstruction (valve cover, manhole, junction well, etc.), loop detector installation shall be modified into two separate loop detectors which shall not traverse joints or obstruction.
2. The loops shall be placed in the center of the lane unless noted otherwise on plans.
3. Presence loop detectors are to be placed 12" behind the existing or proposed stop line.
4. Loop detector and lead-in sawcuts shall be 1/2" wide.
NOTES
1. ORANGE BANDS SHALL DESIGNATE THE LANE ASSIGNMENT. ALL LANES SHALL BE DESIGNATED FROM LEFT TO RIGHT IN THE DIRECTION OF TRAVEL. EXAMPLE: FOR A DOUBLE LEFT TURN WITH 2 THRU LANES FOR NORTHBOUND, THE CABLES WILL BE IDENTIFIED AS 1-RED W/ 1-ORANGE (LT LANE 1), 1-RED W/ 2-ORANGE (LT LANE 2), 2-RED W/ 1-ORANGE (THRU LANE 1) AND 2-RED W/ 2-ORANGE (THRU LANE 2). THIS CODE IS THEN FOLLOWED BY THE REMAINING APPROACHES TO THE INTERSECTION.
2. THE OPTICAL PRE-EMPTION DETECTOR "HOME RUN" CABLE(S) SHALL BE IDENTIFIED WITHIN THE CONTROL CABINET BY A VIOLET BAND PLUS A COLOR BAND, AS NOTED TO DENOTE THE DIRECTION OF THE DETECTOR.

DELAWARE
DEPARTMENT OF TRANSPORTATION

LOOP DETECTOR INSTALLATION & SPLICE KIT

STANDARD NO. T-9 (2013)  SHT. 2  OF 3  APPROVED  SIGNATURE ON FILE  02/14/2014

DELTA  CHIEF ENGINEER  1/9/2014

DESIGN ENGINEER  01/14/2014

DEPARTMENT OF TRANSPORTATION

SCALE: NTS

1/9/2014
NOTES:
1. ONE FIVE CONDUCTOR WIRE WILL BE PULLED TO EACH PED MODULE OF THE INTERSECTION.
2. EACH FIVE CONDUCTOR WIRE WILL HAVE COLOR BANDS INDICATING THE CORNER OF THE PED:
   - ONE GREY BAND IDENTIFYING MAIN STREET
   - TWO GREY BANDS IDENTIFYING SIDE STREET.
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".
WOOD POLES

SERVICE WEDGE CLAMP
MESSENGER WIRE
MESSENGER CLAMP
LASHING WIRE
CABLE SPACER
ELECTRICAL CABLE

WOOD POLE

6" (152.4)
1/2" (12.7)
30" (762.0)
36" (914.4) MIN.

METAL POLES

SERVICE SLEEVE
MESSENGER WIRE
0.5" WRAPS AROUND POLE

GALVANIZED 3-BOLT 1/4"-20 GUY CLAMPS (2 REQUIRED)

GALVANIZED 1/4"-19 NUTS (2 REQUIRED)
GALVANIZED 1/4"-19 EYEBOLT
GALVANIZED 1/4"-19 EYEBOLT
GALVANIZED 1/4"-19 EYEBOLT
WASHER
WASHER
WASHER

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

DELAWARE DEPARTMENT OF TRANSPORTATION

DEAD END MESSENGER WIRE ATTACHMENT

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

APPROVED

RECOMMENDED

05/09/2005

12/5/05

11/16/05
NOTES:
1. **CONDUIT JUNCTION WELL** SHALL BE PRECAST POLYMER CONCRETE.
2. ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC. WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE CONDUIT JUNCTION WELL.
3. POLYMER CONCRETE COVERS SHALL BE THE HEAVY DUTY TYPE WITH A DESIGN LOAD OF 15,000 LBS OVER A 10" SQUARE.
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. TEFLOM TAPE SHALL BE APPLIED TO THREADS BEFORE MOUNTING.
NOTES:
0. INVERTED CONFIGURATION SHALL BE USED FOR SPAN MOUNT.
1. SPAN WIRE MOUNTING HARDWARE SHALL BE SUPPLIED BY THE DEPARTMENT.
2. TFELOON TAPE SHALL BE APPLIED TO THREADS BEFORE MOUNTING.
3. 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.
NOTE: THE PIN ASSEMBLY IS TO BE USED WITH THE INSTALLATION OF BACK TO BACK STREET BLADE SIGNS WITH 6" LETTERS.
NOTES:

1. INSTALLATION OF EQUIPMENT BETWEEN SERVICE PEDESTAL AND LIGHTING/CONTROLLER CABINET SHALL BE AS PER CONTRACT DRAWINGS/DETAILS.

2. SEE DETAIL T-15, SHEET 1, FOR SIGN POST AND BREAKAWAY ASSEMBLY DETAILS.

3. ATTACH ALUMINUM PANEL TO SIGN POSTS WITH (4) 3/8" x 2" LONG GRADE 5 BOLTS, FLAT WASHERS, AND NYLON LOCK NUTS, 3 ON EACH SIDE.

4. MOUNT METER SOCKET TO ALUMINUM PANEL WITH (4) 3/8" x 3/4" STAINLESS STEEL BOLTS AND NYLON LOCK NUTS.

5. MOUNT DISCONNECT SWITCH TO ALUMINUM PANEL WITH (4) 3/8" x 3/4" STAINLESS STEEL BOLTS AND NYLON LOCK NUTS.

6. ALL CONDUIT, CONDULETS AND OTHER ASSOCIATED PIECES SHALL BE 2" GALVANIZED UNLESS SPECIFIED DIFFERENTLY ON THE PLANS OR BY LOCAL UTILITY COMPANY.

7. FOR SIGNAL AND TIME'S COMPONENT INSTALLATIONS, TYPE 'C' CONDULET SHALL HOUSE INLINE FUSE KITS FOR EACH DEVICE POWERED.

DELTAWARE DEPARTMENT OF TRANSPORTATION

ELECTRICAL SERVICE PEDESTAL - LIGHTING, SIGNAL & TIMS' COMPONENT INSTALLATIONS

STANDARD NO. T-17 (2013) SHT. 1 OF 1

APPROVED

RECOMMENDED

SIGNATURE ON FILE