THE STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION

STANDARD CONSTRUCTION DETAILS

DESIGN VALUES ARE PRESENTED IN THIS DOCUMENT IN BOTH METRIC AND U.S. CUSTOMARY UNITS AND WERE DEVELOPED INDEPENDENTLY WITHIN EACH SYSTEM. THE RELATIONSHIP BETWEEN THE METRIC AND U.S. CUSTOMARY VALUES IS NEITHER AN EXACT (SOFT) CONVERSION NOR A COMPLETELY RATIONALIZED (HARD) CONVERSION. THE METRIC VALUES ARE THOSE THAT WOULD HAVE BEEN USED HAD THIS DOCUMENT BEEN PRESENTED EXCLUSIVELY IN METRIC UNITS; THE U.S. CUSTOMARY VALUES ARE THOSE THAT WOULD HAVE BEEN USED IF THIS DOCUMENT HAD BEEN PRESENTED EXCLUSIVELY IN U.S. CUSTOMARY UNITS. THEREFORE, THE USER IS ADVISED TO WORK COMPLETELY IN ONE SYSTEM AND NOT ATTEMPT TO CONVERT DIRECTLY BETWEEN THE TWO.
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DELAWARE
DEPARTMENT OF TRANSPORTATION
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DELTA DELAWARE DEPARTMENT OF TRANSPORTATION
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06/05/2006
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<td>W-BEAM</td>
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<tr>
<td>2</td>
<td>W6 X 9 (W50 x 13.5) STEEL POST</td>
</tr>
<tr>
<td>3</td>
<td>WOOD OFFSET BLOCK</td>
</tr>
<tr>
<td>4</td>
<td>SPLICE - REQUIRES EIGHT (8) ¾&quot; (16) GUARDRAIL BOLTS (L=1/2&quot; (35)) WITH RECESS NUTS, AND ONE (1) ¾&quot; (16) GUARDRAIL BOLT (L=10&quot; (255)) WITH RECESS NUT.</td>
</tr>
<tr>
<td>5</td>
<td>W-BEAM TERMINAL CONNECTOR</td>
</tr>
<tr>
<td>6</td>
<td>¾&quot; (16) GUARDRAIL BOLT (L=1/2&quot; (35)) AND RECESS NUT</td>
</tr>
<tr>
<td>7</td>
<td>¾&quot; (16) GUARDRAIL BOLT (L=10&quot; (255)) AND RECESS NUT</td>
</tr>
<tr>
<td>8</td>
<td>¾&quot; (16) GUARDRAIL BOLT (L=10&quot; (255)), STEEL WASHER, AND RECESS NUT</td>
</tr>
<tr>
<td>9</td>
<td>½&quot; (12) HIGH STRENGTH STRUCTURAL HEX BOLT (L=VARIABLES) AND HEX NUT</td>
</tr>
<tr>
<td>10</td>
<td>½&quot; (16) CARRIAGE BOLT (L=VARIABLES), STEEL WASHER, AND HEX NUT</td>
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<tr>
<td>11</td>
<td>BEARING PLATE</td>
</tr>
</tbody>
</table>
**Type 1 Guardrail Placement**

- Post spacing 6'-3" (1905)
- Required clearance: 4' (1200) minimum

**Type 2 Guardrail Placement**

- Post spacing 3'-9" (1195.5)

**Type 3 Guardrail Placement**

- Post spacing 6'-3" (1905)

**Typical Guardrail Treatment**

- When the required 4' (1200) clearance to obstruction is available

**Notes:**
1. The distance from the edge of the travel lane or shoulder to the face of guardrail should be maximized. This area shall be graded 10:1 or flatter.
2. Place guardrail reflector every fifth post.
NOTE: OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.
GUARDRAIL SECTION
(RURAL SHOULDER APPLICATION)

<table>
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<th>TYPE</th>
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<th>CLEAR AREA BEHIND POST</th>
<th>DESIGN SPEED</th>
<th>D</th>
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<tr>
<td>1</td>
<td>6' (3 1/8 ft)</td>
<td>4' (1200 min)</td>
<td>≤ 50 MPH (80 km/h)</td>
<td>6' (1800)</td>
</tr>
<tr>
<td>2</td>
<td>3' 1/2 (952.5 ft)</td>
<td>2' (1600 min)</td>
<td>&gt; 50 MPH (80 km/h)</td>
<td>10' (3000)</td>
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GUARDRAIL SECTION
(MEDIAN APPLICATION)

GUARDRAIL SECTION
(URBAN SHOULDER APPLICATION)

NOTE:
- Curb shall be used only when indicated on the plans.
- No fixed objects or obstructions are allowed.
- See Table below for specifications.
- Additional pavement as indicated on the plans.
- Hinge point and 4' (1200) minimum radius for rounding.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

STANDARD NO. B-1 (2002)
SHT. 3 OF 6
APPROVED: 9/04
RECOMMENDED: 9/04
01/31/2002
1. Flare the end treatment at 25'(beginning 50' (15 m) from the end of the impact head, unless the construction plans or specifications specify a smaller flare.
2. This detail was solely created to show the grading required for this type of attenuator.
3. The guardrail end treatment attenuator shall be installed as per the manufacturer's and the Department of Transportation's specifications.
4. If curb is present, depress the curb to a maximum height of 2" (50) within the limits of the end treatment and throughout the length of the taper grading.
NOTES:
1. FLARE SHALL BE 4' (1200) UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE. FLARE MAY BE PARABOLIC OR STRAIGHT BASED ON MANUFACTURER'S SPECIFICATIONS.
2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.
3. IF CURB IS PRESENT, DEPRESS THE CURB TO A MAXIMUM HEIGHT OF 2" (50) WITHIN THE LIMITS OF THE END TREATMENT AND THROUGHOUT THE LENGTH OF THE TAPER GRADING.
1. This detail was solely created to show the grading required for this type of attenuator.

2. 6:1 or flatter grading is allowable when the barrier is located 12' (3650 mm) or more from the outside edge of the shoulder.

3. This end treatment can also be used in ramp gores or other areas where 2 rails of W-beam come together and terminate with one end treatment.

4. When opposing roadways have equal elevations the traffic barrier system should be placed on the opposite side of the ditch line from approaching traffic.

5. The guardrail end treatment attenuator shall be installed as per the manufacturer's and the Department of Transportation's specifications.

6. If curb is present, depress the curb to a maximum height of 2" (50) within the limits of the end treatment and throughout the length of the taper grading.

**NOTES:**

- **NORMAL DOUBLE FACE W-BEAM BARRIER**
- **OR TRANSITION TO CONCRETE BARRIER**
- **50' HS LIMIT OF PAYMENT**
- **DIRECTION OF TRAFFIC**
- **SHOULDER**
- **TRANSITION GRADING SHOWN ON PLANS (IF REQUIRED)**
- **MEDIAN DITCH**
- **10' (3000) MIN**
- **NORMAL DOUBLE FACE W-BEAM BARRIER**
- **OR TRANSITION TO CONCRETE BARRIER**
- **50' HS LIMIT OF PAYMENT**
- **DIRECTION OF TRAFFIC**
- **SHOULDER**
- **TRANSITION GRADING SHOWN ON PLANS (IF REQUIRED)**
- **MEDIAN DITCH**
- **10' (3000) MIN**
- **MEDIAN GRADING**
- **BEGINNING OF TRANSITION**

**PLAN VIEW**

1. **1:300 mm OFFSET FROM FLOW LINE**
2. **SHOULDER**
3. **POST**
4. **VARIATES**
5. **6:1 OR FLATTER SLOPE**
6. **SEE NOTE 2**

**SECTION A-A**

**GRADING FOR END TREATMENT ATTENUATOR, TYPE 3**

---

**NOTES:**

1. This detail was solely created to show the grading required for this type of attenuator.

2. 6:1 or flatter grading is allowable when the barrier is located 12' (3650 mm) or more from the outside edge of the shoulder.

3. This end treatment can also be used in ramp gores or other areas where 2 rails of W-beam come together and terminate with one end treatment.

4. When opposing roadways have equal elevations the traffic barrier system should be placed on the opposite side of the ditch line from approaching traffic.

5. The guardrail end treatment attenuator shall be installed as per the manufacturer's and the Department of Transportation's specifications.

6. If curb is present, depress the curb to a maximum height of 2" (50) within the limits of the end treatment and throughout the length of the taper grading.
TYPE 1 GUARDRAIL OR APPROPRIATE END TREATMENT

26'-3" (7940) LIMIT OF PAYMENT

REAR BEAM (NESTED W-BEAM)
REAR BEAM (NESTED W-BEAM)

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

SINCE NO POST OR OFFSET BLOCK IS PRESENT AT THIS LOCATION, 
1/4" (16) GUARDRAIL BOLT (L=40" (1015)) IS NOT REQUIRED.

1. ALL W-BEAMS ARE 12'-6" (3810) IN LENGTH.
2. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.

NOTES:

GROUND LINE

ELEVATION

2'-6" (600) MIN. TO CULVERT (TYP.)

NOTES:

CHIEF ENGINEER
DESIGN ENGINEER

DELAWARE DEPARTMENT OF TRANSPORTATION

DELAWARE DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE I


SHT. 1 OF 1

APPROVED

RECOMMENDED

11/10/05

11/10/05
Type 1 Guardrail or
Appropriate End Treatment

Elevation

Three sections of W-beam, one nested inside the other

Ground Line

Direction of Travel

Notes:
1. All W-beams are 12'-1" (3650) in length.
2. Place guardrail reflector every fifth post.
### Curved Guardrail Section

#### Notes:
1. No washers are used on the rail side of the long wood breakaway posts.
2. The curved guardrail section shall be shop bent.
3. Place guardrail reflector every fifth post.
4. If curb is used in conjunction with curved guardrail section, the curb cannot be higher than 2" (50).
5. On the 8'-6" (2600) radius system only, the rail is not to be bolted to the center post.

#### Specifications:

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<tr>
<th>Radius</th>
<th>WL Required Area Free of Fixed Objects</th>
</tr>
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</table>
| 8'-6"(2600)| L x W: 25' x 5'  
           | (7600 x 4500) |
| 17'-0"(5200)| 30' x 6'  
           | (9400 x 4500) |
| 25'-6"(7800)| 40' x 20'  
           | (7600 x 6000) |
| 35'-0"(10700)| 50' x 20'  
            | (15200 x 6000) |

#### Dimensions:
- **8" (200) x 8" (200) Post & Offset Block**
- **SEE ANCHOR PLATE DETAIL, SHEET B-13, 8 OF 13**
- **2'-6" (762) x 2'-6" (762) x 2'-6" (762) CONCRETE ANCHOR**
- **12" (300) 1'-3" (381) 1'-3" (381)**
- **1/4" (32) x 7'-3" (220) GALVANIZED ROD W/ WELDED EYE**
- **6" (150) HOOK OR 5" (125) DIA WASHER & NUT.**

#### Details:
- Secure cable loop with 5 cable clips
- See anchor plate detail, sheet B-13, 8 of 13
- 8'-6" (2600) post & offset block
- 2'-6" (762) x 2'-6" (762) x 2'-6" (762) concrete anchor
- 1/4" (32) x 7'-3" (220) galvanized rod w/ welded eye
- 6" (150) hook or 5" (125) dia washer & nut.

**DELaware Department of Transportation**

**Curved Guardrail Section**

**Approved**

**Recommended**

**STANDARD NO. B-4 (2007) SHT. 1 OF 1 DATE 08/14/2006**

**RECOMMENDED**

**DATE 10/23/07**
FLARE RATES

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>FLARE RATES</th>
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<tbody>
<tr>
<td>0 to 40 MPH (0 to 64 km/h)</td>
<td>15d</td>
</tr>
<tr>
<td>41 to 60 MPH (66 to 96 km/h)</td>
<td>14d</td>
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<tr>
<td>61 to 80 MPH (96 to 128 km/h)</td>
<td>13d</td>
</tr>
<tr>
<td>81 to 100 MPH (128 to 160 km/h)</td>
<td>12d</td>
</tr>
<tr>
<td>101 to 120 MPH (160 to 192 km/h)</td>
<td>11d</td>
</tr>
<tr>
<td>121 to 140 MPH (192 to 224 km/h)</td>
<td>10d</td>
</tr>
<tr>
<td>141 to 160 MPH (224 to 256 km/h)</td>
<td>9d</td>
</tr>
<tr>
<td>161 to 180 MPH (256 to 288 km/h)</td>
<td>8d</td>
</tr>
</tbody>
</table>

NOTES:
1. BURIED END SECTION PAYMENTS INCLUDE THE CONCRETE OR POST ANCHORAGE, EXCAVATION, BACKFILL, AND ALL APPLICABLE ITEMS, INCLUDING LABOR NECESSARY TO COMPLETE END ANCHORAGE.
2. THE CONTRACTOR HAS THE OPTION OF USING EITHER A CONCRETE BLOCK ANCHOR OR A POST ANCHOR TO TERMINATE THE BURIED END SECTION.
4. WHEN USING A SECOND RAIL, #2 (1200) LONG POSTS ARE REQUIRED BEHIND THE DITCHLINE. POSTS MUST PROVIDE 1' (305) MINIMUM EMBEDMENT (20' (605) WHEN ROCK IS ENCOUNTERED). POSTS FOR THE POST ANCHOR SHALL BE #4 (1000) LONG.
6. MAINTAIN THE FLARE OF THE GUARDRAIL UNTIL THE 12" (305) COVER HAS BEEN ATTAINED. IF THE 12" (305) COVER CANNOT BE ATTAINED BEFORE THE RAIL IS 12" (305) BEHIND THE BOTTOM OF THE DITCH, THEN SLUMP THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 12" (305) BEHIND THE DITCH, SO THAT IT HAS 12" (305) OF COVER.
STEEL PLATE - 0.120 (3) THICK

NOTE: ALL HOLES TO BE DRILLED PRIOR TO GALVANIZING.

BOLT PLATE TO POST WITH 3 - 0.120 (3) STEEL PLATE 2.5" (64) LONG WITH HEX NUTS.

CONCRETE BLOCK ANCHOR

ELEVATION

ELEVATION

FRONT VIEW

PARTIAL PLAN

RUBRAIL ANCHOR ATTACHMENT

DELWARE
DEPARTMENT OF TRANSPORTATION

STANDARD NO. B-6 (2002) SHT. 3 OF 3

BURIED END SECTION

APPROVED 07/13/02

RECOMMENDED 07/13/02
NOTE: 1. W BEAM IS NOT BOLTED TO POSTS AT POSTS 2 THROUGH 4.
2. RUB RAIL IS NOT BOLTED AT POSTS 2 AND 4.
3. POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER WOOD BLOCKS AND/OR RUBRAIL AND WOOD BLOCK.
4. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
5. PLACE STEEL WASHERS FOR 3/4" BOLT BETWEEN BOLT HEADS AND RUB RAIL.
6. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
7. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
8. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
9. STEEL SPACER TUBE 6" I.D., SCHEDULE 40 GALVANIZED PIPE (L=10"
10. RUBRAIL AND WOOD BLOCKS MOUNTED TO POSTS
11. PLACE STEEL WASHERS FOR 3/4" BOLT BETWEEN BOLT HEADS AND RUB RAIL.
12. DRILL 3/4" DIA HOLE IN W BEAM TO MOUNT STEEL SPACER TUBE & ATTACH WITH 3/4" CARBAGE BOLT (L=6"
13. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
14. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
15. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
16. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
17. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
18. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
19. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
20. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
21. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
22. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
23. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
24. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
25. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
26. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
27. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
28. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
29. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
30. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
31. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
32. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
33. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
34. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
35. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
36. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
37. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
38. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
39. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
40. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
41. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
42. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
43. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
44. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
45. USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE.
46. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
47. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
RUB RAIL TO BARRIER CONNECTION

NOTES:
1. THE RUB RAIL TO BARRIER CONNECTION END MUST BE ATTACHED FLUSH WITH THE SLOPED TOP 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" OD (2.82 OD) X 3" ID (2.29 OD)

DELWARE DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1

STANDARD NO. B-7 (2001) SHT. 2 OF 3

APPROVED

RECOMMENDED

04/05/2001
NOTES:
1. CURB SHALL NOT BE USED AT THE FACE OF RAIL WITHIN THE LIMITS OF THIS INSTALLATION.
2. POSTS 1, 2, 3, 4, AND 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH WOOD BLOCKS AND/OR BENT RAIL.
3. DO NOT ATTACH RAILS TO POSTS 1, 2, 3, 5, OR 7.
4. OVERLAP BEAMS IN DIRECTION OF TRAVEL.
5. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
6. BENT RAIL MAY BE SHOP BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.
7. APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.
8. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
9. WHEN PLACED OVER CURB (MIN 8" (200) HIGH), BOTTOM RAIL CAN BE ELIMINATED.
10. BENT RAIL MAY BE SHOP BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.
NOTES:
6. Concrete inserts may be used in new construction to attach terminal connector to parapet.
2l. Guardrail section and terminal connectors shall be overlapped in the direction of travel.
3l. Installation shown above with an 'F-Type' barrier face. Guardrail section of barrier connection shall be adjusted horizontally in order to meet flush against various types of walls and barriers.
THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

END OF SIDEWALK

8" x 8" (200) x 8" (200) TIMBER BLOCKS

EXISTING BRIDGE PARAPET

END OF SIDEWALK

EXIT END APPLICATION

SEE NOTE

DIRECTION OF TRAVEL

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

3" (75)

6'-3" (1905)

6'-3" (1905)

6'-3" (1905)

6'-3" (1905)

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)

THREE BEAM GUARDRAIL WITH WOOD POSTS SPACED AT 6'-3" (1905)
SEE NOTE

2'-6" (75)

3'-4" (953)

3'-4" (953)

3'-4" (953)

3'-4" (953)

2'-6" (75)
**NOTES:**
1. THIS INSTALLATION SHALL BE USED WHEN THE EXISTING SIDEWALK IS 18" (450) OR WIDER, AND DEAD LOAD CONSIDERATIONS ARE A CONCERN WHEN USING BRIDGE RAIL RETROFIT, TYPE 3.
2. ADHESIVE ANCHORS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS AND SHALL BE GALVANIZED.
3. USE A THREE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.
4. PLACE GUARDRAIL REFLECTOR IN THE UPPER VALLEY OF THE THRE BEAM EVERY FIFTH POST.
5. THE EXIT END APPLICATION SHALL BE USED ONLY ON DIVIDED HIGHWAYS. FOR ALL OTHER SITUATIONS, THE ENTRANCE END APPLICATION SHALL BE USED ON BOTH ENDS OF THE BRIDGE PARAPET.
6. SPACING OF STEEL POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.
W6 x 15 (W150 x 22) STEEL GUARDRAIL POST

BASE PLATE DETAIL

POST 7 1/2"

1/4" (120) DIA.

5/8" (150) DIA.

1/4" (60) DIA.

BASE PLATE DETAIL

WELD ALL AROUND INCLUDING EXTERIOR FLANGE SURFACE

SIDE

FRONT

SECTION B-B

PLAN

TRAFFIC FACE
NOTES: B. TWO ADDITIONAL 3/4\(\times\)2\(\times\)1\(\frac{3}{4}\) (6\(\times\)5\(\times\)3\(\frac{3}{4}\)) SLOTS SHALL BE PROVIDED AT 6-3\(\times\)9\(\times\)5\(\frac{3}{4}\) SPACING FOR BEAM LENGTH OF 26-12\(\frac{3}{4}\) (7940).
NOTE:
WHERE CONDITIONS REQUIRE ALTERNATE LENGTHS IN INCREMENTS OF 6" (150) MAY BE USED.

W-BEAM STEEL POST AND WOOD OFFSET BLOCK

NOTE:
ALL HOLES SHALL BE 3/8" (10 mm) BOLT
HOLE PATTERN IS SYMMETRICAL WITH RESPECT TO THE VERTICAL AXIS OF THE POST.
SHT. 3 OF 13

**W-BEAM TERMINAL CONNECTOR**

- **HARDWARE**
  - B-13 (2004)
  - 3/8" (100)
  - 3/4" (100)
  - 3/4" (100)
  - 3/4" (100)
  - 3/4" (100)
  - 1" (100)

- **DIMENSIONS**
  - 3'-0" (900)
  - 4'-0" (1200)
  - 4'-0" (1200)
  - 4'-0" (1200)
  - 2'-0" (600)
  - 2'-0" (600)
  - 3'-0" (900)
  - 2'-6" (760)
  - 1'-10" (550)
  - 7' (2134)

- **NOTES**
  - 3/4" (100) SLOTS
  - 3/8" (100) x 3/4" (100) SLOTS
  - 1-1/4" (32)

- **ELEVATION**

- **PLAN**

**DELWARE DEPARTMENT OF TRANSPORTATION**

**HARDWARE**

**APPROVED**

**RECOMMENDED**

**DATE**

**SCALE**

---

**RECOMMENDED**

**DATE**

---

**DATE**

---

**DATE**

---
THREE BEAM ELEVATION

THREE BEAM EXPANSION ELEMENT

THREE BEAM SECTION
NOTE: WHERE CONDITIONS REQUIRE, USE ALTERNATE LENGTHS IN INCREMENTS OF 6' (1800).

THREE BEAM STEEL POST AND WOOD OFFSET BLOCK

OPTIONAL FOR HANDLING DURING GALVANIZING

NOTE: ALL HOLES SHALL BE 5/6" (20) DIA. BOLT HOLE PATTERN IS SYMMETRICAL WITH RESPECT TO THE VERTICAL AXIS OF THE POST.

SIDE

FRONT

POST

SIDE

FRONT

OFFSET BLOCK

NOTE:

ALL HOLES SHALL BE 5/6" (20) DIA. BOLT HOLE PATTERN IS SYMMETRICAL WITH RESPECT TO THE VERTICAL AXIS OF THE POST.
W-THRIE BEAM TRANSITION SECTION

HARDWARE

%" (24) x %" (30) SPlice BOLT SLOTS

%" (20) x %" (30) POST BOLT SLOTS

DELAWARE
DEPARTMENT OF TRANSPORTATION
NOTES:
1. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
2. ALL WOOD SIZES ARE NOMINAL DIMENSIONS.

1/4" x 1201 DIA HOLE
1/4" (16)

2" (50)

STEEL PLATE

WOOD BLOCK

SLOT

WOOD PLATE

STEEL TUBE

SHORT WOOD BREAKAWAY POST

LONG WOOD BREAKAWAY POST

1/4" (6) THICK GALVANIZED STEEL PLATE

1/4" (16) DIA HOLE

TS-8" x 6" x 1/4"
(TS-203 x 152 x 4.8) GALVANIZED STEEL TUBING

1/4" x 1201 DIA HOLE

1/4" (16)

6" (150)

8" (203)

1/4" (16) DIA HOLE

1'-3" (360)

3'-6" (100)

1'-4"

8" (203)

1" (26)

5'-0" (1525)

9" (230)

1'-6" (460)

7" (180)

6" (150)

1'-2" (360)

3" (75)

9" (230)

1'-9"

4" (100)

6" (150)

6" (150)

6" (150)

8" (200)

3" (75)

9" (230)

1" (26)

5'-0" (1525)

9" (230)

STEEL TUBE

SHORT WOOD BREAKAWAY POST

LONG WOOD BREAKAWAY POST

1/4" x 1201 DIA HOLE

1/4" (16)
ANCHOR PLATE TO W-BEAM CONNECTION DETAIL

NOTES:
1. TO ENSURE THAT THE TIMBER BEARING PLATE REMAINS IN POSITION, WELD END PLATE TO ANCHOR PLATE WITH THREE SIDES AND NUTS.
2. DRILL 4 HOLES:\n   - 1/4\times20\text{ DIA.}\times4\text{ IN.}\text{ O.C.}(UPPER BOLT L)
   - 1/4\times16\text{ DIA.}\times4\text{ IN.}\text{ O.C.}(LOWER BOLT L)

SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY

2. 10D GALVANIZED STEEL NAILS SHALL BE DRIVEN IN THE ANCHOR PLATE.
3. ALL HOLES SHALL BE DRILLED PRIOR TO GALLVANIZING.
GUARDRAIL REFLECTOR

MOUNTING POSITION

BEARING PLATE DETAIL

GUARDRAIL REFLECTOR

MOUNTING POSITION

BEARING PLATE DETAIL

GUARDRAIL REFLECTOR

MOUNTING POSITION

BEARING PLATE DETAIL
RECOMMENDED
APPROVED

DATE

DELAWARE
DEPARTMENT OF TRANSPORTATION

FULL THREAD LENGTH

GUARDRAIL BOLT

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

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

NOTES:

1. ALL FILLETS SHALL HAVE A MINIMUM RADIUS OF 1/4" RADIUS.
2. IF THE BOLT EXTENDS MORE THAN 1/4" BEYOND THE NUT, THE BOLT SHALL BE TRIMMED BACK AS PER THE DEPARTMENT'S SPECIFICATIONS.

GUARDRAIL BOLT

HARDWARE


APPROVED

Date

09/27/2004
NOTE: DIMENSION FOR WASHER THICKNESS IS APPROXIMATE BASE METAL THICKNESS.
STEEL WASHER

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

1/2" (12.7)

5/16" (0.8)

1/4" (6.3)

3/16" (4.8)

HARDWARE B-13 (2004)

NOTE: FOR USE WITH SWAGED CABLE ASSEMBLAGE.
TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

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

SLOT DIMENSIONS
CONCRETE SAFETY BARRIER, PRECAST CONSTRUCTION
9" SHAPE BARRIER SECTION

SECTION A-A

SECTION B-B

DELTAPE
DEPARTMENT OF TRANSPORTATION

SLOTTED PLATE CONNECTION DETAILS

STANDARD NO. B-14 (2001) SHT. 3 OF 3 APPROVED

RECOMMENDED

04/17/2001
NOTES:

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

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

3. DEPRESS CURB FLUSH WITH PAVEMENT AT CURB RAMPS. MAXIMUM SLOPE OF CURB AT CURB RAMPS IS 20:1 IN THE DIRECTION OF PEDESTRIAN TRAVEL. SEE STANDARD NO C-2-1 OF 4.

4. DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT NOSE OF ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 12:1.

DATE: 06/12/2007
DETECTABLE WARNING TRUNCATED DOME DETAILS

NOTES:
1. The area of detectable warning truncated domes shall be
24"x16000 long and the full width of the ramp or depressed curb.
2. See specification for additional information.

SAMPLE LAYOUT OF DETECTABLE WARNING TRUNCATED DOMES ALONG A CURB RADIUS

NOTES:
1. Where a curb ramp will not meet the sidewalk grade within a
   length of 18 (4570) due to steep adjacent roadway, the ramp length may be
   limited to 15 (3810) and allowed to exceed 24 (6100).
2. Ramp width shall be 4 (1000) minimum, however, 5 (1250) is preferred.
3. If grading will be steeper than 6%, then a type 1 curb or retaining wall
   should be used to eliminate the need for the steep slope.
4. The maximum difference in grade between the curb ramp or modified curb and the
   pavement shall be 5% (1250) or less. However, 3% is preferred.
5. If the width of the fully depressed curb at the street is 5 (1250) or less, then
   a rectangular piece of detectable warning truncated domes may be used.

DELTA RAMP, TYPE 1 AND SECTIONS

CURB RAMP, TYPE 1 AND SECTIONS

MAXIMUM DIFFERENCE IN GRADE

FOR EXAMPLE, IF THE CURB RAMP AND DEPRESSED CURB SLOPE 0.01 IS 8% AND THE PAVEMENT SLOPE (X) IS 4%, then TO DETERMINE THE DIFFERENCE IN GRADE, ADD X + Y TO GET 12%, WHICH IS GREATER THAN THE MAXIMUM BUT LESS THAN THE 15% MAXIMUM.
TYPE F
INTEGRAL P.C.C. CURB AND GUTTER, TYPE 3

SECTION F-F

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

SECTION G-G
Plan View
Shown without grate

Section A-A

Front View

Note: 61 SAFETY END STRUCTURE TO BE PRECAST
### Dimensions

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; (150)</td>
<td>9&quot; - 6&quot; (228.6)</td>
<td>2&quot; - 5&quot; (127)</td>
<td>8&quot; - 4&quot; (203)</td>
</tr>
<tr>
<td>8&quot; (203)</td>
<td>9&quot; - 8&quot; (228.6)</td>
<td>2&quot; - 9&quot; (228.6)</td>
<td>10&quot; - 3&quot; (254)</td>
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<tr>
<td>2&quot; (51)</td>
<td>14&quot; - 26&quot; (355.6)</td>
<td>14&quot; - 2&quot; (508)</td>
<td>10&quot; - 6&quot; (248.9)</td>
</tr>
</tbody>
</table>

### Approximate Quantities

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Concrete, ft³(11)</th>
<th>Reinforced Steel, lbs(89)</th>
<th>No. of Grates</th>
<th>Length to Be Cut from 1 Grate</th>
<th>Weight of Full Size Grate, lbs(89)</th>
<th>Weight of Cut Grate, lbs(89)</th>
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</thead>
<tbody>
<tr>
<td>6&quot; (150)</td>
<td>25 (0.708)</td>
<td>155.43 (44.94)</td>
<td>2</td>
<td>2&quot; - 1' (60)</td>
<td>270.92 (76.891)</td>
<td>270.92 (76.891)</td>
</tr>
<tr>
<td>8&quot; (203)</td>
<td>36.5 (0.897)</td>
<td>122.07 (34.968)</td>
<td>3</td>
<td>2&quot; - 1' (60)</td>
<td>270.92 (76.891)</td>
<td>270.92 (76.891)</td>
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<tr>
<td>2&quot; (51)</td>
<td>60.75 (1.67)</td>
<td>59.8 (1.691)</td>
<td>3</td>
<td>2&quot; - 1' (60)</td>
<td>270.92 (76.891)</td>
<td>270.92 (76.891)</td>
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</tbody>
</table>

### Schedule of Reinforcing Steel

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>A-Bars</th>
<th>B-Bars</th>
<th>C-Bars</th>
<th>D-Bars</th>
<th>G-Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; (150)</td>
<td>4&quot;</td>
<td>2</td>
<td>8&quot;</td>
<td>12&quot; x 1830</td>
<td>4&quot;</td>
</tr>
<tr>
<td>8&quot; (203)</td>
<td>4&quot;</td>
<td>2</td>
<td>8&quot;</td>
<td>12&quot; x 1830</td>
<td>4&quot;</td>
</tr>
<tr>
<td>2&quot; (51)</td>
<td>4&quot;</td>
<td>2</td>
<td>8&quot;</td>
<td>12&quot; x 1830</td>
<td>4&quot;</td>
</tr>
</tbody>
</table>

### Bending Diagram

- **Pipe Size**: X
  - 6", 2" (150, 51)
  - 2" (51)

- **Pipe Size**: Y
  - Varies
  - 25" - 30" (635 - 762)

### DELAWARE DEPARTMENT OF TRANSPORTATION

**61 SAFETY END STRUCTURE**

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

**APPROVED**

**RECOMMENDED**

**SHT. 2 OF 2**

**D-1 (2001)**

**04/17/2001**
PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 101 SAFETY END STRUCTURE TO BE PRECAST

SECTION A-A
* REQUIRED ONLY FOR PPE SIZE OF 2" (525) OR 24" (600)

FRONT VIEW
1. Personnel safety grates (PSG) shall only be installed on the inlets of storm water pipes (2"-1300) 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) ± ¼".
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" above invert of FES.
6. All hardware attached to concrete shall be attached using approved tamper proof anchors.
1. Inlet boxes shall be pre-cast or cast-in-place.
2. Pipes shall not be installed through any corner of the inlet box.
3. Riser sections may be used for deep inlet boxes.
4. Pipes may be installed near or through joints for riser sections.
5. When the cover above the pipe is less than 4" (100) to the cover slab or top unit opening, the portion of box wall above the pipe may be removed as shown in the optional pipe opening detail. The area above the pipe shall then be formed and filled with high-strength, non-shrink grout mixed with coarse aggregate in a 1:1 ratio by weight.
6. Concrete flow channel shall be warped for positive drainage.
7. When inlet box is pre-cast, pipe opening shall be between 3" (75) and 4" (100) larger than outside diameter of pipe and shall not encroach on adjacent wall.

**SECTION A-A**

**SECTION B-B**

**TOP VIEW**

**OPTIONAL PIPE OPENING DETAIL**

See Note 6
NOTES:
1) STEPS SHALL BE INSTALLED IN BACK WALL AS PER SPECIFICATIONS.
2) NO PIPES WITH AN OUTSIDE DIAMETER LARGER THAN 8" (203MM) WILL BE PERMITTED TO ENTER THE BACK WALL OF A DRAINAGE INLET, IF IT IMPEDES THE INSTALLATION OF STEPS IN THE BACK WALL.
3) IF NECESSARY, A LARGER BOX MAY BE USED IN ORDER TO FIT THE STEPS AND A LARGER PIPE IN THE BACK WALL.
1. The Type 2 drainage inlet grate shall not be installed where bicycle traffic may be present.
2. The top of all drainage inlet grates shall be labeled "Only Rain Down the Storm Drain." Also, drainage inlet grates Type 1 and Type 4 shall be labeled with "Water Flow" and an arrow indicating flow direction as shown in the example detail.
3. The Type 1 drainage inlet grate shall be labeled with "Curbside" as shown on the example detail. All labeling on the Type 1 shall be on both top and bottom sides due to the Type 1 being reversible.
DRAINAGE INLET DETAILS

INLET TOP UNIT APPLICATIONS

<table>
<thead>
<tr>
<th>TOP UNIT</th>
<th>CURB</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE A</td>
<td>USE IN DRAINAGE SWALE</td>
</tr>
<tr>
<td>TYPE B</td>
<td>INTEGRAL PCC CURB &amp; GUTTER, TYPE 1 &amp; 3, PCC CURB TYPE 1</td>
</tr>
<tr>
<td>TYPE C</td>
<td>INTEGRAL PCC CURB &amp; GUTTER, TYPE 4, PCC CURB TYPE 3</td>
</tr>
<tr>
<td>TYPE D</td>
<td>PCC CURB TYPE 2</td>
</tr>
</tbody>
</table>

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

TYPE A
- USE IN DRAINAGE SWALE
- NORMAL GUTTER SLOPE
- NORMAL ROADWAY CROSS SLOPE

TYPE B
- NORMAL GUTTER SLOPE
- NORMAL ROADWAY CROSS SLOPE

TYPE C
- NORMAL GUTTER SLOPE
- NORMAL ROADWAY CROSS SLOPE

TYPE D
- NORMAL GUTTER SLOPE
- NORMAL ROADWAY CROSS SLOPE

TYPE E
- NORMAL GUTTER SLOPE
- NORMAL ROADWAY CROSS SLOPE

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

SS501 BENDING DIAGRAM
SS501 IS NOT REQUIRED TO BE ONE CONTINUOUS BAR. IF MORE THAN ONE BAR IS USED, THERE MUST BE A 12" (300) OVERLAP BETWEEN BARS.

#4 (#13) REBAR
90° (2285) LONG (TYP.)

SHT. 3 OF 8
DELTA ENGINEERING
DEPARTMENT OF TRANSPORTATION

APPROVED
CAPTAIN WITH 11/10/05
RECOMMENDED
NOTE:
1. 4" (100 mm) THROAT IS FOR TYPES B AND C TOP UNITS ONLY.
2. RELOCATE ENCROACHING REINFORCING BARS WHEN USING TYPES B & C TOP UNITS.
3. COVER SLABS SHALL BE PRE-CAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
4. ALL BARS ARE TO BE #5 (6.5 mm) SPACED @ 6" (152 mm) UNLESS NOTED OTHERWISE.
5. MINIMUM BAR COVER = 1/2" (38 mm).

* - DIMENSIONS TO WATCH FOR PROPER fit of INLET BOX.

SCALE: N.T.S.

DELAWARE DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET COVER SLAB DETAILS

SECTION A-A

SECTION B-B

DRAINAGE INLET DETAILS

APPROVED

STANDARD NO.  D-5 (2002)  SHT.  4  OF  8  RECOMMENDED

04/23/2002
NOTE:

1. 4" x 1000 throat is for Types B and C top units only.
2. Relocate embeddage reinforcing bars when using Types B & C top units.
3. Cover slabs are to be pre-cast and must be sized to fit inlet box dimensions.
4. All bars are to be 5" (125mm) spaced @ 6" (150mm) unless noted otherwise.
5. Minimum bar cover = 6" (150mm).

DELWARE DEPARTMENT OF TRANSPORTATION

DOUBLE INLET COVER SLAB DETAILS

STANDARD NO. D-5 (2002) SHT. 5 OP 8

APPROVED

RECOMMENDED

06/1/2002

5502 BENDING DIAGRAM

5502 is NOT required to be one continuous bar. If more than one bar is used, there must be a 12" (300mm) overlap between bars.
34" (865) x 24" (610) DRAINAGE INLET DETAILS
NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS

DELTA 
DEPARTMENT OF TRANSPORTATION
DRAINAGE INLET DETAILS
APPROVED

CIVITIZEN WITH 11/14/05
RECOMMENDED
34" (865) x 18" (455) DRAINAGE INLET DETAILS

NOTES:
1. REFER TO PREVIOUS SHEETS FOR REINFORCEMENT REQUIREMENTS
2. THE WEIGHT OF THE INLET IS LIMITED TO 4' (1200) MAXIMUM, THEREFORE STEPS WILL NOT BE REQUIRED AND SHOULD NOT BE INSTALLED ON THIS INLET.

DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO. D-5 (2002) SHT. 7 OF 8 RECOMMENDED

01/30/2002
NOTE:
1. REINFORCEMENT SHALL BE 4" (100X) X 4" (100X) #4 X #4 (9.52 X 9.52)
2. INLET BOXES ARE TO BE PRECAST OR CAST-IN-PLACE.
MANHOLE DETAILS

SECTION A-A
- SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD D-6, SHEET 1 OF 4

SECTION B-B

BOX MANHOLE ASSEMBLY

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

COVER SLAB

COVER SLAB (PRE-CAST)

INLET BOX (PRE-CAST)

TYPE 1 JOINT DETAIL

TYPE 3 JOINT DETAIL

CAST IN PLACE CONCRETE FLOW CHANNEL (TYP)

LENGTH

WIDTH

SEE NOTE 6 ON DETAIL D-6, SHEET 1 OF 4 FOR DETAILS

TOP UNIT (CAST IN PLACE)

NOTE 6

SEE DETAIL D-6, SHEET 1 OF 4 FOR DETAILS

SHT. 1 OF 4

DELWARE DEPARTMENT OF TRANSPORTATION

MANHOLE DETAILS

STANDARD NO. D-6 (2007)

APPROVED

CHIEF ENGINEER

DESIGN ENGINEER

RECOMMENDED

09/18/2007

03/18/2001

DATE

DATE

10/23/67

DATE

10/23/67

DATE
ROUND MANHOLE ASSEMBLY

NOTE: ROUND MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHO M 195,
NOTE: TOP UNIT IS TO BE CAST IN PLACE TO GRADE AS SPECIFIED ON PLAN SHEETS OR AS DIRECTED BY ENGINEER.

SECTION A-A

SECTION B-B

SECTION C-C

TOP UNIT

FRAME

COVER

DELAWARE
DEPARTMENT OF TRANSPORTATION

MANHOLE DETAILS

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

APPROVED

RECOMMENDED

05/2/2001
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).
4. DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.

NOTES:

SECTION A-A

SECTION B-B

BOX MANHOLE COVER SLAB DETAILS
JUNCTION BOX COVER SLAB DETAILS

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

TYPE 3 JOINT

SECTION A-A

SECTION B-B

DELAWARE
DEPARTMENT OF TRANSPORTATION

JUNCTION BOX DETAILS

STANDARD NO. D-7 (2007) SHT. 2 OF 2

APPROVED
RECOMMENDED

DATE
08/01/07
10/23/07

08/01/2007
CLASS A BEDDING

LIMIT OF PAY FOR EXCAVATION OF PIPE TRENCHES = O.D. + 24" (60)

1/4 (O.D.) 1/8" (20) MIN. IN ROCK

CONCRETE 2000 P.S.I. 15 MPa (MIN.)

CLASS C BEDDING

NOTE: USE CLASS C BEDDING UNLESS OTHERWISE INDICATED

FINISHED GRADE

LIMIT OF PAY ITEMS 206 AND/OR 208

EARTH CUSHION

6" (150) MIN. WHEN H.C. = 48" (1.2m)
AND 0.33 OF H WHEN H.C. = 24" (0.6m)
OF LOOSE SAND OR TYPE C BORROW
NOTES:

1. THE PERFORATED PIPE UNDERDRAIN SHALL BE LOCATED AS ShOWN ON THE TYPICAL SECTIONS OF THE CONSTRUCTION PLANS.
2. GEOTEXTILE FILTER FABRIC SHALL BE PLACED ENTIRELY OVER THE TOP OF UNDERDRAIN TRENCH AND LAPPED AS ShOWN.
3. SLOPE OF UNDERDRAINS SHALL MATCH ROADWAY GRADE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. OUTLET PIPE CONFIGURATIONS SHALL USE 45 DEGREE ElBOWS OR SHALL USE STRAIGHT PIPE WITH A MINIMUM RADIUS OF 3'
0000 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.
7. WHEN TWO LINES OF PIPE UNDERDRAIN DRAIN TO A LOW POINT, EACH PIPE MUST HAVE ITS OWN OUTLET.
8. PERFORATED PIPE UNDERDRAIN SHALL NOT BE PLACED UNDER GUARDRAILS, IN ORDER TO AVOID PUNCTURING.

DELTAWARE
DEPARTMENT OF TRANSPORTATION

PERFORATED PIPE UNDERDRAIN DETAIL

STANDARD NO. D-9 (2006) SHT. 1 OF 1

APPROVED

RECOMMENDED

08/04/2006
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.

SECTION

ELEVATION

CONCRETE PLUG

12" (300) MIN

NOTE:
The contractor shall furnish material and plug abandoned drainage pipes with concrete as directed by the engineer.

DELTAWARE
DEPARTMENT OF TRANSPORTATION

PIPE PLUGGING DETAIL

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

APPROVED

RECOMMENDED

04/17/07
10/23/07

SCALE: M.T.S.
**NOTES:**

1) EDGE BERM 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 TRIMMED 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. Reinfocing strip is to be one complete strip covering all geotextile fabric at post.
If the inlet is not at a low point, install sediment control earth dike downstream from inlet.

Existing ground

Excavate and re-compact soil

Post driven into ground

Excavate and re-compact soil

NOTE: If the inlet is not in a low point, construct a sediment control earth dike in the ditchline downstream from it. See standard sheet for additional information.

Plan Symbol
SECTION B-B

SECTION A-A

NOTES:
1. FOR DITCHES LESS THAN 30" (750) IN DEPTH PLACE DAM AS DIRECTED BY THE ENGINEER.
2. THE CHECK DAM HEIGHT MUST NOT EXCEED 2' (600) AT THE CENTER OF THE WEIR.
3. THE CHECK DAM IS TO BE CONSTRUCTED SO THAT THE CENTER IS 6' (1800) MIN. LOWER THAN THE OUTER EDGES, FORMING A WEIR THAT WATER CAN FLOW ACROSS.
4. GEOTEXTILE FABRIC IS TO BE INSTALLED UNDERNEATH RIPRAP ON PERMANENT CHECK DAMS ONLY.
NOTES:
1. SEDIMENT TRAPS ARE INTENDED FOR USE IN EXISTING, PROPOSED, AND TEMPORARY DITCHES OF ALL TYPES WITH A MAXIMUM DRAINAGE AREA OF 16 ACRES (6.5 HECTARES), AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.
2. SLOPE 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, SIMDAR DEWATERING DEVICES, OR DRAINAGE PLETS MAY BE USED. SEE APPROPRIATE STANDARD SHEET FOR ADDITIONAL INFORMATION.
4. FOR SIZE, LOCATION, ETC. OF SEDIMENT TRAP, SEE CONSTRUCTION PHASING, M.O.T., AND EROSION CONTROL PLANS.
5. ALL SLOPES SHALL BE 2:1.
6. A 2:1 LENGTH TO WIDTH RATIO SHOULD BE ACHIEVED WHERE POSSIBLE. IF THIS IS NOT POSSIBLE, THE USE OF BAFFLES OR OTHER SPECIAL DESIGNS SHOULD BE INCORPORATED TO INCREASE FLOW TIME.

PLAN SYMBOL
S.T.
NOTES:
1. THE WORK SHALL CONSIST OF THE CONSTRUCTION OF A SEDIMENT TRAP AROUND A DRAINAGE INLET TO ALLOW SEDIMENTATION TO OCCUR BEFORE RUNOFF ENTERS THE DRAINAGE INLET.
2. DRAINAGE INLET SEDIMENT TRAPS SHALL BE LIMITED TO A THREE (3) ACRE 0.2 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 OR LESS. LARGER DRAINAGE AREAS REQUIRE AN ENGINEERED DESIGN.
3. THE HEIGHT OF THE SKINNER Dewatering DEvICE SHALL BE SPECIFIED BY THE ENGINEER IN THE FIELD.

DELAWARE DEPARTMENT OF TRANSPORTATION

RISER PIPE ASSEMBLY FOR SEDIMENT TRAP

STANDARD NO. E-8 (2006) SHT. 1 OF 2

APPROVED

10/02/2006

RECOMMENDED
STABILIZATION OF EMBANKMENTS

NOTES:
1. STAPLES TO BE STAGGERED AT 18" (450mm) SPACING.
2. TOPSOIL UNDER EROSION CONTROL BLANKET IS TO BE TRACED 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 TRACED AND SEEDED.
**SECTION A-A**

- Geotextile
- Securing Pins
- Limit of Excavation
- Graded and Recompact Soil
- Riprap

**SECTION B-B**

- Geotextile
- Securing Pin
- Ditch Flow

**PLAN**

- 24 x 1600 Minimum Overlap
- Toe Wall

**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 special conditions.

**DELAWARE DEPARTMENT OF TRANSPORTATION**

**RIPRAP DITCH**

- Standard No. E-10 (2001)
- SHT. 1 OF 1

**APPROVED**

[Signature]

5/3/2001

**PLAN SYMBOL**

- Class Riprap
  - R-4 d = 14 (350) min
  - R-5 d = 26 (650) min
  - R-6 d = 34 (850) min

**SECTION DETAILS**

- Geotextile
- R-4
- R-5 or R-6
- R-6 and R-6
**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>DRAINAGE AREA A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5 AC / 12 ho OR LESS)</td>
</tr>
<tr>
<td>2</td>
<td>2.1 - 8.0%</td>
<td>DRAINAGE AREA B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(15 AC - 10 AC )</td>
</tr>
<tr>
<td>3</td>
<td>8.1 - 20%</td>
<td>ENGINEERED DESIGN</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' (300 MIN.)</td>
<td>1' (300 MIN.)</td>
</tr>
<tr>
<td>D</td>
<td>4' (1200 MIN.)</td>
<td>6' (1800 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-erosive velocity.

3. If temporary swales or clean water diversions are to be operational for more than 4 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 4 days, they shall be stabilized with geotextile in accordance with the standard detail “geotextile lined channel diversion.”

**PLAN SYMBOL**

A - 2 (CMD)  
B - 3 (CMD)  
CLEAN WATER DIVERSION  
A - 2  
B - 3  
TEMPORARY SWALE
SECTION A-A

OUTLET AS REQUIRED
SEE NOTES 1 & 2.

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

PLAN SYMBOL

A-1
A-1 (TOP)
CLEAN WATER DIVERSION

DELAWARE
DEPARTMENT OF TRANSPORTATION

PERIMETER DIKE / SWALE

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

APPROVED
RECOMMENDED

04/12/2001

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

SECTION A-A

CHART A - FLOW CHANNEL STABILIZATION

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

CHART B - EARTH DIKE DIMENSIONS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DIKE A 5-15 cc/2 gal or less</th>
<th>DIKE B 5-10 cc/2.4 gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-Dike Height</td>
<td>2&quot; (50)</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>B-Dike Width</td>
<td>12&quot; (300)</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>40&quot; (1000)</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.

PLAN SYMBOL

A-2 / B-3

DELAWARE
DEPARTMENT OF TRANSPORTATION

EARTH DIKE

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

04/17/2001
NOTES:

1. All temporary slope drains shall discharge into the back of sediment traps, into sediment basins or ditches discharging into traps or basins.

2. Temporary slope drains shall be used at the top of fill slopes as embankment is constructed, to prevent excessive erosion until shoulders are constructed and the slopes are seeded and mulched.

**PLAN SYMBOL**

T.S.O.
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; (200) MIN</td>
<td>2&quot; (500)</td>
</tr>
<tr>
<td>2</td>
<td>PERFORATED 48&quot;(1200) 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 SEDIMENT.
3. $\frac{1}{2}$" x $\frac{1}{2}$" x 0.015" GAGE STEEL 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"(30) IN DIAMETER AND 0.25"(6) ON CENTER IN ALL DIRECTIONS.
5. TYPE I SUMP PIT SHALL BE USED ONLY WHEN PUMPING IS NEEDED FOR LESS THAN 7 DAYS.

---

**PLAN SYMBOL**

- **SP-1**
- **SP-2**

---

**DEVELOPMENT OF TRANSPORTATION**

**SUMPT PIT, TYPE 1 & 2**

**STANDARD NO.** E-16 (2001)  **SHT. 1 OF 1**  **APPROVED**

**RECOMMENDED**

---

**SIGNATURES**

- Supervising Engineer
- Usher 9/18/01
- [Signature]
- 05/2/2001
NOTES:
1) A DEWATERING BASIN (DB) IS USED TO REMOVE SEDIMENT FROM SEDIMENT-LADING WATER PUMPED FROM A CONSTRUCTION SITE BEFORE THE WATER RE-ENTERS THE WATERWAY. THE DB SHALL HAVE A MINIMUM TOP WIDTH OF 5' (1.5M) AND A MINIMUM DEPTH OF 3' (0.9M). 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' + 92 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 DB SHALL CEASE WHEN THE EFFLUENT FROM THE BASIN BECOMES SEDIMENT-LADING.

3) A SUMP PIT OR STILLING WELL (SEE STANDARD SHEETS) SHALL BE USED IN CONJUNCTION WITH A DB. THE BASIN MAY BE BYPASSED INTO THE STABILIZED OUTFALL IF THE WATER BEING PUMPED IS NON-SEDIMENT-LADING. DIRECT DISCHARGE TO THE RECEIVING WATERS SHALL CEASE AND BE REDIRECTED TO THE DB WHEN EFFLUENT FROM THE PUMP BECOMES SEDIMENT-LADING.

4) MAINTENANCE MUST BE PERFORMED FOR THE DB TO FUNCTION PROPERLY. ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED DISPOSAL AREA WHEN THE BASIN IS FILLED TO WITHIN 6" (150MM) 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' (300) ABOVE THE PEAK ELEVATION OF THE ONE YEAR STORM.
NOTES:
1. THE WORK SHALL CONSIST OF INSTALLING A SANDBAG DIKE FOR THE PURPOSE OF EROSION CONTROL. WHEN CONSTRUCTION ACTIVITIES TAKE PLACE WITHIN THE STREAM CHANNEL SUCH AS BANK STABILIZATION OR BRIDGE ABUTMENT CONSTRUCTION.

2. THE SANDBAG DIKE SHALL BE INSTALLED AT THE UPSTREAM LOCATION FIRST.

3. THE HEIGHT OF THE SANDBAG DIKE SHALL BE 1'5" ABOVE THE PEAK ELEVATION OF THE ONE-YEAR STORM, OR EQUAL WITH THE TOP OF BANK, WHICHEVER IS LESS. SEE PLANS FOR INFORMATION.

4. THE SPILLWAY SHALL BE SIZED TO PASS A 1% ONE-YEAR STORM EVENT PEAK FLOW, SEE PLANS.

5. THE PIPE, WHEN UTILIZED, SHALL BE SIZED TO PASS THE STREAM BASE FLOW.
NOTES:
1. ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED UNDER THE ENTRANCE, IF NECESSARY, A MOUNTABLE BERM WITH SLOPES SHALL BE ALLOWED TO FACILITATE PLACEMENT OF PIPES IN SHALLOW CONDITIONS.

2. THE LOCATION AND NUMBER OF STABILIZED CONSTRUCTION ENTRANCES SHALL BE AS INDICATED ON THE PLANS. ANY CHANGE IN LOCATION, ADDITION, OR DELETION OF AN ENTRANCE SHALL BE APPROVED IN ADVANCE BY THE ENGINEER.

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

4. THE TOP 2" OF STONE SHALL BE REMOVED AND REPLACED WITH 2" OF CLEAN STONE WHEN VDOS ARE FILLED OR AS DIRECTED BY THE ENGINEER.
NOTES
1. ALL PVC PIPES ARE TO BE 4" X 000-LD. SCHEDULE 40
2. ALL JOINTS OF THE FLOATATION SECTION SHALL
   BE SOLVENT WELDED. JOINTS OF SKIMMER SECTION
   NEED NOT BE WATER-TIGHT.
3. 4" OD HOPE FLEXIBLE DRAIN PIPE IS TO BE ATTACHED
   TO THE POND OUTLET STRUCTURE WITH WATER-TIGHT
   CONNECTIONS.
4. ORIFICE IS TO BE SIZED ACCORDING TO STORAGE
   VOLUME AND TO SLOWLY RELEASE 2.05 LITER RUNOFF
   FOR AT LEAST 24 HOURS.

PLAN VIEW

FRONT VIEW

SIDE VIEW

DELWARE
DEPARTMENT OF TRANSPORTATION

SKIMMER DEWATERING DEVICE

STANDARD NO. E-22 (2006) SHT. 1 OF 1

APPROVED

RECOMMENDED

10/02/2006
PLAN VIEW
OPEN WATER APPLICATION

PLAN VIEW
SHORELINE APPLICATION

CLEAR WATER
50' (15000)
OR
100' (30000)
MOORING LINE WITH
FLOATATION (TYP.)
TURBID WATER
ANCHOR (TYP.)
DREDGE,
FILL AREA OR
BRIDGE PIER

ELEVATION

TOP LOAD LINE
FLOATATION UNIT
BOTTOM LOAD LINE

FLOATING TURBIDITY CURTAIN

NOTE:
1) ADDITIONAL PANELS 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.

DELAWARE
DEPARTMENT OF TRANSPORTATION

TURBIDITY CURTAIN

STANDARD NO. E-25 (2001)
SHT. 1 OF 2
APPROVED
RECOMMENDED
04/17/2001
SECTION

ELEVATION

PLAN VIEW
SHALLOW WATER/MARSH APPLICATION

STAKED TURBIDITY CURTAIN

DELWARE
DEPARTMENT OF TRANSPORTATION

TURBIDITY CURTAIN

STANDARD NO. E-25 (2001)  SHT. 2 OF 2  

APPROVED  

STC

04/17/2001
NOTES:

1. THE PORTABLE SEDIMENT TANK SHOWN MAY BE USED IN SITES WHERE SPACE IS LIMITED TO CONSTRUCT A DewaterING BASKET.

2. THE MAXIMUM PUMP DISCHARGE INTO THIS TYPICAL PORTABLE SEDIMENT TANK SHALL BE 425 GALLONS PER MINUTE (1612 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.

DELAWARE
DEPARTMENT OF TRANSPORTATION

PORTABLE SEDIMENT TANK

STANDARD NO. E-24 (2000) SHT. 1 OF 1 APPROVED 6/12/01

RECOMMENDED

05/2/2001
INITIAL TRENCH ANCHOR DETAIL
APPLIED AT THE DOWNSTREAM END OF DITCH

TERMINAL TRENCH ANCHOR DETAIL
APPLIED AT THE UPSTREAM END OF DITCH

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

DELWARE
DEPARTMENT OF TRANSPORTATION

TURF REINFORCEMENT MAT APPLICATIONS

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

APPROVED

RECOMMENDED

05/3/2001
NOTES:
1. RIPRAP IS TO BE PLACED PRIOR TO PLACING PIPE.
2. PLACE DELAWARE NO. 3 STONE UNDER PIPE.
3. ELEVATION (EL) SHOULD NOT BE HIGHER THAN PIPE INVERT.
4. REFER TO THE PIPE ENERGY DISSIPATOR SCHEDULE ON THE CONSTRUCTION PLANS FOR THE VALUE OF DIMENSION VARIABLES.

DELTA
DEPARTMENT OF TRANSPORTATION

RIPRAP ENERGY DISSIPATOR DETAIL

STANDARD NO. E-26 (2006) SHT. 1 OF 1

APPROVED

RECOMMENDED

08/04/2006
ALL DEAD, BROKEN, & CROSSING BRANCHES SHALL BE PRUNED OFF FOLLOWING INSTALLATION.

ROOT BALL SHALL BE SET FLUSH TO GRADE OR 1'-0" TO 2'-0" ABOVE GRADE IF SOILS ARE SLOW TO DRAIN, DO NOT COVER THE TOP OF THE ROOT BALL WITH SOIL.

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.

NOTES:
1. BASE OF PLANTING PIT SHALL BE A MINIMUM WIDTH OF TWICE THE ROOT BALL SIZE AND A MAXIMUM OF THREE TIMES THE ROOT BALL SIZE.
2. SHRUBS SHALL BE INSTALLED IN MASSES OF NO LESS THAN 3 PLANTS, A MINIMUM OF 8'-0" IN 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 ULA, 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
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.


5. WHEN PLANTING TREES ALONG SIDEWALKS, THE TREE SHALL BE LIMBED TO 7" (180MM) 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 *2'* 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 TAMPED 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

DELAWARE DEPARTMENT OF TRANSPORTATION

PLANTING DETAILS

STANDARD NO. L-12006 SH. 2 OF 3

APPROVED

RECOMMENDED

08/04/2006
NOTES:
1. SEE PLANT LIST FOR SPACING Data.

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

SECTION VIEW

PERENNIAL/GROUND COVER PLANTING DETAIL
LONGITUDINAL STEEL 6 GAGE 14.39 WIRE SPACED 3'(75) C.C., 26'(8580) LONG (TYP)

TRANSVERSE STEEL 7 GAGE 14.50 WIRE SPACED 8'(2438) C.C.

SECTION A-A

NOTES:
1. LONGITUDINAL STEEL SHALL BE HELD IN PLACE BY CRADLES.
2. LETTERS AND CROSS TO BE COUNTERSUNK IN TOP OF MARKER ¼" (6).

DELAWARE DEPARTMENT OF TRANSPORTATION

CONCRETE MONUMENT

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

APPROVED

RECOMMENDED
BOLLARD DETAILS

1. THE 4"(100) CONCRETE SHARED-USE PATH SHALL BE FINISHED TO INCLUDE A TEXTURED WARNING SURFACE BY USING A JOINT STRIPE TO PRODUCE A 1/2"(13) DEEP "V"-JOINT AT 6"(1525) O.C.
   PAYMENT FOR INSTALLING THE GROOVED FINISH SHALL BE INCIDENTAL TO THE SIDEWALK CONSTRUCTION.

2. FOR 8"(2450) AND 10"(3050) PATH WIDTH, THE OUTSIDE DIMENSION FROM CENTER OF BOLLARD TO EDGE OF PATH SHALL BE 2"(610) AND 3"(915) RESPECTIVELY.


4. STEEL TUBE TO EXTEND 1/2"(13) ABOVE GROUND WITH CONCRETE TO SLOPE AWAY FROM TUBE TO KEEP WATER AND SEDIMENT FROM DRAINING INTO TUBE.

NOTES:
1. SEE DETAIL A-A
2. SEE DETAIL 1
3. DETAIL A-A
4. SEE DETAIL 4

REMOVABLE BOLLARD

BOLLARD DETAILS

SHARED USE PATH INTERSECTION

NOTES:
1. THE 4"(100) CONCRETE SHARED-USE PATH SHALL BE FINISHED TO INCLUDE A TEXTURED WARNING SURFACE BY USING A JOINT STRIPE TO PRODUCE A 1/2"(13) DEEP "V"-JOINT AT 6"(1525) O.C.
   PAYMENT FOR INSTALLING THE GROOVED FINISH SHALL BE INCIDENTAL TO THE SIDEWALK CONSTRUCTION.

2. FOR 8"(2450) AND 10"(3050) PATH WIDTH, THE OUTSIDE DIMENSION FROM CENTER OF BOLLARD TO EDGE OF PATH SHALL BE 2"(610) AND 3"(915) RESPECTIVELY.


4. STEEL TUBE TO EXTEND 1/2"(13) ABOVE GROUND WITH CONCRETE TO SLOPE AWAY FROM TUBE TO KEEP WATER AND SEDIMENT FROM DRAINING INTO TUBE.

NOTES:
1. THE 4"(100) CONCRETE SHARED-USE PATH SHALL BE FINISHED TO INCLUDE A TEXTURED WARNING SURFACE BY USING A JOINT STRIPE TO PRODUCE A 1/2"(13) DEEP "V"-JOINT AT 6"(1525) O.C.
   PAYMENT FOR INSTALLING THE GROOVED FINISH SHALL BE INCIDENTAL TO THE SIDEWALK CONSTRUCTION.

2. FOR 8"(2450) AND 10"(3050) PATH WIDTH, THE OUTSIDE DIMENSION FROM CENTER OF BOLLARD TO EDGE OF PATH SHALL BE 2"(610) AND 3"(915) RESPECTIVELY.


4. STEEL TUBE TO EXTEND 1/2"(13) ABOVE GROUND WITH CONCRETE TO SLOPE AWAY FROM TUBE TO KEEP WATER AND SEDIMENT FROM DRAINING INTO TUBE.

NOTES:
1. THE 4"(100) CONCRETE SHARED-USE PATH SHALL BE FINISHED TO INCLUDE A TEXTURED WARNING SURFACE BY USING A JOINT STRIPE TO PRODUCE A 1/2"(13) DEEP "V"-JOINT AT 6"(1525) O.C.
   PAYMENT FOR INSTALLING THE GROOVED FINISH SHALL BE INCIDENTAL TO THE SIDEWALK CONSTRUCTION.

2. FOR 8"(2450) AND 10"(3050) PATH WIDTH, THE OUTSIDE DIMENSION FROM CENTER OF BOLLARD TO EDGE OF PATH SHALL BE 2"(610) AND 3"(915) RESPECTIVELY.


4. STEEL TUBE TO EXTEND 1/2"(13) ABOVE GROUND WITH CONCRETE TO SLOPE AWAY FROM TUBE TO KEEP WATER AND SEDIMENT FROM DRAINING INTO TUBE.
FRONT VIEW

- 12" (300) RADIUS
- 2" (50) DIAMETER
- 8" (200) WALL THICKNESS
- 24" (600) LENGTH
- 36" (900) HEIGHT
- 48" (1200) WIDTH

CONCRETE OR GROUT

ALTERNATE ANCHOR OPTION

- 3/8" (9.5) x 1/2" (13) TAMPER PROOF CONCRETE ANCHOR (TYP)
- 4 1/2" (113) DIAMETER

EXISTING CONCRETE

SECTION VIEW

- 1 2" (300) RADIUS
- 1 8" (450) WALL THICKNESS
- 12" (300) DIAMETER
- 4" (100) RADIUS

ISOMETRIC VIEW

- 30" (750) MINIMUM CLEARANCE
- 4 BIKE INSTALLATION

BIKE RACK DETAILS

- CONCRETE OR GROUT
- TAMPER PROOF CONCRETE ANCHOR (TYP)
- EXISTING CONCRETE

DELAWARE
DEPARTMENT OF TRANSPORTATION

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

APPROVED 10/23/07

RECOMMENDED 10/23/07

04/03/2001
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:

- Posts 8' (2.4m) O.C. on straight runs, 4' (1.2m) O.C. around curves.
- Path width shall be 24" (610) minimum.
- Slope to drain shall be 3:12.
- Class B concrete.
- Typical joint detail.
- Attach with 4-12d hot dip galvanized ring nails (typ.)
- 4" (100) x 4" (100) nominal treated posts (typ.)
- Miter top at 3:12 slope.

SEE NOTE 2
PATTERNED HOT-MIX OR CONCRETE & BRICK PAVER DETAILS

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

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

4" (100) x 8" (200) HERRINGBONE PATTERN

NOTES:
1. ACTUAL PATTERN TO BE USED SHALL BE SPECIFIED ON THE PLANS. COLOR IS TO BE "BRICK RED" UNLESS OTHERWISE NOTED ON THE PLANS.
2. MATERIALS AND PAVEMENT BOX VARY DEPENDING ON PLANS.
3. FOR CROSSWALK APPLICATIONS, 8" (200) WHITE LINES SHOULD BE PLACED ON BOTH SIDES.
4. THE PATTERNS ABOVE ARE THE PREFERRED PATTERNS AVAILABLE FOR SIDEWALK OR CROSSWALK APPLICATIONS.

4" (100) CONCRETE BASE, CLASS B

1" (25) SAND BED

SUBGRADE COMPACTED TO 96% OF ASTM D 657

BRICK PAVER SIDEWALK DETAIL

NOTES:
1. ALL PAVERS ARE TO BE "BRICK RED" UNLESS OTHERWISE SPECIFIED ON THE PLANS. THE PATTERN SHALL BE SPECIFIED ON THE PLANS.
2. EXPANSION JOINT MAY BE NEEDED ON NON-CURB SIDE OF BRICK PAVER SIDEWALK IF THIS IS AGAINST BUILDING OR OTHER CONFINING FEATURE.
SLAB PLAN (WITH DOWEL AND TIE LOCATIONS)

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

DELTA DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT

APPREOVED

STANDARD NO.  P-1 (2001)  SHT.  1  OF  5  RECOMMENDED
Notes:
1. As dimensioned, the width of the Transverse sealant reservoir is applicable when the temperature of the pavement surface is between 60°F (16°C) and 80°F (27°C). When the temperature is below 60°F (16°C), the sealant reservoir shall be cut 0.3T (10” (250) P.C.C. PAVEMENT) wider. When the temperature is above 80°F (27°C), the sealant reservoir shall be cut 0.4T (12” (300) P.C.C. PAVEMENT).
2. “T” refers to the actual constructed slab thickness.
3. Tolerance on all joint sealant detail dimensions shown without ranges shall be plus 0.3T, minus 0.1T.
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 1/3T (20) to 0.4T (60) below the top of the slab.
8. A 45° chamfer shall be cut 0.5T (125) to 0.6T (150) 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.

Joint and Sealant Details:
- Sealant Reservoir
- Tie Bar (Hook Bolt or T-Bolt may also be used)
- Dowel
- Keyway
- Prefabricated Elastomeric Compression Seal

Sealant Details:
- Longitudinal Joint
- Transverse Joint
- Longitudinal Saw-cut Joint
- Longitudinal Construction Joint
- Transverse Saw-cut Joint
- Transverse Construction Joint
- Top of Slab

Notes:
- 1. As dimensioned, the width of the Transverse sealant reservoir is applicable when the temperature of the pavement surface is between 60°F (16°C) and 80°F (27°C). When the temperature is below 60°F (16°C), the sealant reservoir shall be cut 0.3T (10” (250) P.C.C. PAVEMENT) wider. When the temperature is above 80°F (27°C), the sealant reservoir shall be cut 0.4T (12” (300) P.C.C. PAVEMENT).
- 2. “T” refers to the actual constructed slab thickness.
- 3. Tolerance on all joint sealant detail dimensions shown without ranges shall be plus 0.3T, minus 0.1T.
- 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 1/3T (20) to 0.4T (60) below the top of the slab.
- 8. A 45° chamfer shall be cut 0.5T (125) to 0.6T (150) 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.

Delaware Department of Transportation
P.C.C. Pavement
Sht. 2 of 5
Recommended: 1/10/05
Approved: 1/10/05

Date: 1/10/05

Dowel Support Basket

DELWARE
DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT

STANDARD NO. P-1 (2001)
SHT. 4 OF 5

APPROVED

RECOMMENDED

04/18/2001
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" (600 MM) THROUGH THE EXISTING JOINT, WHICH WILL REDUCE THE JOINT.
2. PROPOSED LOCATIONS FOR TRANSVERSE JOINTS, WHEN NOT ALIGNED WITH THE FINAL, TRANSVERSE JOINT LOCATIONS IN THE IMMEDIATELY ADJACENT LANES, SHALL BE OFFSET A MINIMUM OF 24" (600 MM) FROM THE FOREMENTIONED JOINTS.
3. THE LONGITUDINAL JOINT ALIGNMENT SHALL BE STRAIGHT AND CONTINUOUS THROUGH THE REPAIRED AREA.

**FULL DEPTH PATCH**
SECTION A-A

SECTION B-B

SECTION C-C

FULL DEPTH PATCH

DELAWARE
DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT PATCHING

APPROVED

DEPARTMENT OF TRANSPORTATION

P.C.C. PAVEMENT PATCHING


SEALANT RESERVOIR SEE SHEET 3

SEALANT RESERVOIR SEE SHEET 3
LONGITUDINAL JOINT

TRANSVERSE SAW-CUT JOINT

TRANSVERSE CONSTRUCTION JOINT

DOWEL BAR

NOTES:

1. AS DIMENSIONED; THE WIDTH OF THE TRANSVERSE SEALANT RESERVOIR IS APPLICABLE WHEN THE TEMPERATURE OF THE PAVEMENT SURFACE IS BETWEEN 60°F (16°C) AND 80°F (27°C). WHEN THE TEMPERATURE IS BELOW 60°F (16°C), THE SEALANT RESERVOIR SHALL BE CUT 1/8" NARROWER. WHEN THE TEMPERATURE IS ABOVE 80°F (27°C), THE SEALANT RESERVOIR SHALL BE CUT 1/8" WIDER.

2. "T" REFERS TO THE EXISTING "AS-BUILT" SLAB THICKNESS.

3. TOLERANCE ON ALL JOINT SEALANT DETAIL DIMENSIONS SHOWN WITHIN RANGES SHALL BE PLUS/PLUS 1/32" MINUS 0."

4. THE TOP EDGES OF THE CONTACT SURFACES OF THE SEALANT MATERIAL ON BOTH SIDES OF THE JOINT RESERVOIR SHALL BE AT THE SAME ELEVATION.

FULL DEPTH PATCH

DELAWARE DEPARTMENT OF TRANSPORTATION

PCC PAVEMENT PATCHING


APPROVED

RECOMMENDED

DATE

1/10/05

1/10/05

1/10/05
VERTICAL TRANSLATION

HORIZONTAL TRANSLATION

LONGITUDINAL TRANSLATION

HORIZONTAL ROTATION

VERTICAL ROTATION

Dowel & Tie Bar Placement Tolerances

Full Depth Patch
NOTES:
1. TYPE 1 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE. AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5"ID DIAMETER COMPLETELY THROUGH THE WALL, UNUSED HOLES SHALL BE PLUGGED.
2. TYPE 2 AND TYPE 3 CONDUIT JUNCTION WELLS SHALL BE BRICK AND WILL CONFORM TO STANDARD SPECIFICATIONS FOR BRICK MASONRY. JOINTS SHALL BE CONCEAL TYPE. TYPE 2 WALLS WILL BE A NOMINAL 4"ID WALL. TYPE 3 WALL WILL BE A NOMINAL 8"OD WALL.
3. TYPE 2 AND TYPE 3 CONDUIT JUNCTION WELLS SHALL NOT BE PLACED UNDER ANY TYPE OF PAVEMENT.
4. ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC., WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM CONDUIT JUNCTION WELL.
NOTES:
1. TYPE 4 CONDUIT JUNCTION WELL SHALL BE PRECAST CONCRETE, AT LEAST ONE HOLE IN PRECAST WELLS WILL BE OF A 5" (125) DIAMETER COMPLETELY THROUGH THE WALL. UNUSED HOLES SHALL BE PLUGGED.
2. ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC. WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM CONDUIT JUNCTION WELL.
NOTES:

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

2. ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC. WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM CONDUIT JUNCTION WELL.
INSTALL INSULATING BUSHINGS AT THIS END OF CONDUIT.

EXPANSION BOLT (6)

GROUND RODS AND ALL CONDUIT 2" (50) MIN. - 3" (75) MAX.

GROUND RODS 5/8" X 62" (15 x 1588)

CONCRETE CABINET BASE

CONCRETE BASE

PLAN VIEW

CONCRETE CABINET BASE

SECTION A-A

PLAN SYMBOL

DELWARE DEPARTMENT OF TRANSPORTATION

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

APPROVED

RECOMMENDED
ROUND BASE

- Underground conduit ends shall be capped with a galvanized threaded conduit plug unless connected to an existing conduit.
- 8 equally spaced #8 (2/5) reinforcing bars.
- Equally spaced #4 (1/2) reinforcing bars.
- Bolt circle diameter to be as directed by the engineer.
- Direction of load (mast arm or span).
- Existing conduit.

SQUARE BASE

- Underground conduit ends shall be capped with a galvanized threaded conduit plug unless connected to an existing conduit.
- 8 equally spaced #8 (2/5) reinforcing bars.
- Equally spaced #4 (1/2) reinforcing bars.
- Bolt circle diameter to be as directed by the engineer.
- Direction of load (mast arm or span).
- Existing conduit.

NOTE: Base dependent on pole and equipment to be attached.
SECTION A-A

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" (150MM) X 1 1/2" (38MM) P.V.C., SCHEDULE 40 (TYP) VENTS IN THE GROUT AS DIRECTED IN THE FIELD BY THE ENGINEER.
STUB POST (DIMENSIONS VARY)

FINISHED GRADE

1 - #3 (#9) SPIRAL BAR, 50'-6" (#15400)
LONG AT 8' (2400) PITCH

8 - #5 (#11) BARS, 4'-6" (#130) LONG

SECTION A-A

NOTES: 3. STUB POST TO BE SUPPLIED BY THE DEPARTMENT'S TRAFFIC, ENGINEERING, AND MANAGEMENT SECTION.
NOTES:
1. The contractor shall be responsible for protecting the conduit against any possible damage in paving operations.
2. The weatherproof fitting shall consist of a galvanized 1/2" CB1 coupling containing a steel threaded reducing bushing 1/2" CB1 to 3/4" CB1 and a 3/4" CB1 watertight connector for service entrance cable.
3. The lead-in wire shall be run through the rubber of the weatherproof fitting.

DETAIL A - TYPICAL INSTALLATION UNDER INTEGRAL CURB AND GUTTER

DETAIL B - TYPICAL INSTALLATION UNDER CURBING

DETAIL C - TYPICAL INSTALLATION WITHOUT CURBING

PLAN SYMBOL
1. Saw cuts for wire slot construction shall be extended beyond the corners so that the slot is full depth at turn points. A forty-five (45) degree angle shall be cut 12" (300) back from the point of the extended corner.

2. The diagonal cut shall be stopped approximately 2" (50) from the corner to prevent the triangular portion of the pavement from breaking.

3. A maximum of two loop detectors can be spliced to one lead-in cable. The detail illustrates the method of splicing two loop detectors (Loop #1 and Loop #2) to a lead-in cable.

4. Loop detector shall be centered in travel lane.
WIRE SLOT CONSTRUCTION

1. Saw cuts for wire slot construction shall be extended beyond the corners so that the slot is full depth at turn points. A forty-five (45) degree angle shall be cut 1' (0.3m) back from the point of the extended corner.

2. The diagonal cut shall be stopped approximately 2" (50) from the corner to prevent the triangular portion of the pavement from breaking.

3. A maximum of two loop detectors can be spliced to one lead-in cable. The detail illustrates the method of splicing two loop detectors (Loop #1 and Loop #2) to a lead-in cable.

4. Loop detector shall be centered in travel lane.
TOP VIEW

CABLE SPACER
MESSENER CLAMP
SERVICE WEDGE CLAMP
COORDINATION CABLE
MESSENER WIRE
LASHING WIRE

GALVANIZED 3/8" X 3" EYEBOLT
GALVANIZED 3/4" X 1/2" NUTS
WASHES 3/8" X 1/2" HOLE

WASHER 3/8" X 1/2" HOLE

WOOD POLE

GALVANIZED 1/4" X 1/4" X 3" (75 X 3" X 75)

Span Wire Attachment Between Poles

- Strain plate (2 required, 1 in front and 1 in rear of pole)
- Wood pole
- Guy hook
- Galvanized screw (3/8 x 3"
- Lag screw

Note: Span wire attachment between metal poles is the same as shown for wood poles except that the strain plates and guy hooks are not used. For detail see T-14 Sheet 2 - "Dead End Messenger Wire Attachment, Metal Poles".

Plan Symbol

- X
- O
DELAWARE
DEPARTMENT OF TRANSPORTATION

DEAD END MESSENGER WIRE ATTACHMENT

STANDARD NO. T-12 (2004)  SHT. 2 OF 2  APPROVED

PLAN SYMBOL

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

WOOD POLES

WOOD POLE

SERVICE SLEEVE

SERVICE WEDGE CLAMP

MESSENGER WIRE

MESSENGER CLAMP

LASHING WIRE

CABLE SPACER

ELECTRICAL CABLE

WOOD POLE

METAL POLES

METAL POLE

SERVICE SLEEVE

MESSENGER WIRE

GALVANIZED 3-1/2" X 3" X 3" GUY CLAMPS (12 REQUIRED)

GALVANIZED 3/8" X 1" WASHER WITH 3/8" X 1" HOLE

GALVANIZED 3/8" X 1" EYES BOLT

GALVANIZED 3/8" X 1" NUTS (2 REQUIRED)

GALVANIZED 1/4" X 2" X 3" METAL POLE

GALVANIZED 1/4" X 2" X 3" METAL POLE
1. Type 6 conduit junction well shall be precast polymer concrete.
2. All conduit junction wells constructed within pavement, sidewalks, etc. will be constructed flush with the surface of the same. Installation in unpaved areas will be constructed above grade and graded to drain away from the conduit junction well.
3. Polymer concrete covers shall be the heavy-duty type with a design load of 6,000 lbs (6800 kg) over a 10" (250) square.
POLYMER CONCRETE WITH A HEAVY-_WEAVE FIBERGLASS REINFORCEMENT

3/8" (9) - 16 UNC HEX BOLT W/ WASHERS TO BE SECURED INTO THE WELL FRAME

1/2" X 2" X 1000 TONGS

NOTES:
1. TYPE T CONDUIT JUNCTION WELL SHALL BE PRECAST POLYMER CONCRETE.
2. ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC. WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO ORGAN AWAY FROM THE CONDUIT JUNCTION WELL.
3. POLYMER CONCRETE COVERS SHALL BE THE HEAVY DUTY TYPE WITH A DESIGN LOAD OF 5,000 LBS (4800 KG) OVER A 0" X 0" SQUARE.

PLAN VIEW

SECTION A-A
NOTES:
1. TYPES 8 & 10 CONDUIT JUNCTION WELLS SHALL BE PRECAST POLYMER CONCRETE.
2. ALL CONDUIT JUNCTION WELLS CONSTRUCTED WITHIN PAVEMENT, SIDEWALKS, ETC. WILL BE CONSTRUCTED FLUSH WITH THE SURFACE OF THE SAME. INSTALLATION IN UNPAVED AREAS WILL BE CONSTRUCTED ABOVE GRADE AND GRADED TO DRAIN AWAY FROM THE CONDUIT JUNCTION WELL.
3. POLYMER CONCRETE COVERS SHALL BE THE HEAVY-DUTY TYPE WITH A DESIGN LOAD OF 8,000 LBS (5600 KGF) OVER A 10" (254MM) SQUARE.

PLAN VIEW

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>TYPE 8</th>
<th>TYPE 10</th>
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<tr>
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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:
1. INVERTED CONFIGURATION SHALL BE USED FOR SPAN MOUNT.
2. SPAN WIRE MOUNTING HARDWARE SHALL BE SUPPLIED BY THE DEPARTMENT.
3. TEFLOK TAPE SHALL BE APPLIED TO THREADS BEFORE MOUNTING.
5. WRAP 5 WRAPS OF SCOTCH SUPER 33 TAPE.