STANDARD W-BEAM SECTION

W-THRE BEAM TRANSITION SECTION

STANDARD THRE BEAM SECTION

12 GAGE

POST BOLT SLOTS

3'-1\(\frac{1}{2}\"\) (914mm)

4\(\frac{1}{4}\") (63.5mm)

2\(\frac{1}{2}\") (63.5mm)

4\(\frac{1}{4}\") (63.5mm)

1'-8" (508)

2" (50.8)

1\(\frac{1}{4}\") (30.5)

2" (50.8)

3'-1\(\frac{1}{2}\") (914mm)

\(\frac{3}{4}\" (19.1)

\(\frac{3}{4}\" (19.1)

\(\frac{3}{4}\" (19.1)

\(\frac{3}{4}\" (19.1)

\(\frac{3}{4}\" (19.1) SPILE BOLT SLOTS

\(\frac{3}{4}\" (19.1) SPILE BOLT SLOTS

HARDWARE

B-13 (2004)

13
NOTES:  
1. ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
2. ALL WOOD SIZES ARE NOMINAL DIMENSIONS.

1.  ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
2.  ALL WOOD SIZES ARE NOMINAL DIMENSIONS.
SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY

NOTES:

1. TO ENSURE THAT THE TIMBER BEARING PLATE REMAINS IN POSITION, WELD END PLATE TO ANCHOR PLATE THREE SIDES.

2. TO DRILL 4 HOLES - 5/8" (16mm) DIA. (UPPER BOLT L) AND NUTS.

3. TO DRILL 4 HOLES - 5/8" (16mm) DIA. (LOWER BOLT L) AND RELATED HARDWARE ASSEMBLY.

END PLATE

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 THREE SIDES.

2. TO DRILL 4 HOLES - 5/8" (16mm) DIA. (UPPER BOLT L) AND NUTS.

3. TO DRILL 4 HOLES - 5/8" (16mm) DIA. (LOWER BOLT L) AND RELATED HARDWARE ASSEMBLY.

END PLATE

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 THREE SIDES.

2. TO DRILL 4 HOLES - 5/8" (16mm) DIA. (UPPER BOLT L) AND NUTS.

3. TO DRILL 4 HOLES - 5/8" (16mm) DIA. (LOWER BOLT L) AND RELATED HARDWARE ASSEMBLY.
GUARDRAIL REFLECTOR

MOUNTING POSITION

BEARING PLATE DETAIL

DELWARE DEPARTMENT OF TRANSPORTATION

HARDWARE

APPROVED

RECOMMENDED

GUARDRAIL BOLT

RECESSSED NUT
(FOR 5/8" (16) GUARDRAIL BOLT)

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

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

FULL THREAD LENGTH

HARDWARE

DELWARE DEPARTMENT OF TRANSPORTATION

APPROVED

NOTES:
1. ALL FILLETS SHALL HAVE A MINIMUM RADIUS OF 1/16".
2. IF THE BOLT EXTENDS MORE THAN 1/2" BEYOND THE NUT, THE BOLT SHALL BE TRIMMED BACK AS PER THE DEPARTMENT'S SPECIFICATIONS.
NOTE: Dimension for washer thickness is approximate base metal thickness.

HIGH-STRENGTH STRUCTURAL HEX BOLT

HIGH-STRENGTH STRUCTURAL HEX NUT

STEEL WASHER

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.

½"(16) HEX NUT

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
TYPICAL PRE-CAST CONSTRUCTION

"F" SHAPE BARRIER SECTION

TYPICAL PRE-CAST REINFORCEMENT DETAILS

CONCRETE SAFETY BARRIER (F SHAPE)

DELAWARE
DEPARTMENT OF TRANSPORTATION

STANDARD NO. B-14 (2001)  SHT. 2 OF 3

APPROVED

RECOMMENDED

NOTES:
1. CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1" (25MM) MIN.

BAR LIST

<table>
<thead>
<tr>
<th>MARK</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>
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<td>4-40</td>
<td>3</td>
<td>1&quot;-10' (6000)</td>
<td>1</td>
<td>5&quot; (127)</td>
<td>6&quot; (152)</td>
<td>2&quot; (50)</td>
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<td>**</td>
<td>1&quot;-10' (6000)</td>
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<td>5&quot; (127)</td>
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<td>6-40</td>
<td>2</td>
<td>1&quot; (25)</td>
<td>**</td>
<td>STR</td>
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* THE LENGTH OF BARS 682 SHALL BE 1" (25MM) 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.
STEEL CONNECTOR PLATE

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

SECTION A-A

SECTION B-B
1. **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.
   4. Depress curb flush with pavement or adjacent area at nose of islands, tapering back to full height at a slope of 12%.

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**DELAWARE
DEPARTMENT OF TRANSPORTATION**

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

**STANDARD NO.** C-1 (2007)  **SHT. 1 OF 1**  **APPROVED**

**CHIEF ENGINEER**

**DESIGN ENGINEER**

**RECOMMENDED**

**SCALE:** 1:500

**DATE:** 06/12/2007

**SIGNED:**

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**07/14/2007**

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**06/12/2007**
**DETECTABLE WARNING TRUNCATED DOME DETAILS**

**NOTES:**

A) The area of detectable warning truncated domes shall be 24-16000 square inches and the full width of the ramp or depressed curb.

B) See specification for additional information.

**ELEVATION A-A**

**SECTION B-B**

**MAXIMUM DIFFERENCE IN GRADE**

For example, if the curb ramp and depressed curb slope is 8% and the pavement slope is 6%, then to determine the difference in grade, add X + Y to get 14%, which is greater than the %R preferred but less than the %R maximum.

**CURB RAMP, TYPE I AND SECTIONS**

**CURB RAMP, TYPE I AND SECTIONS**

DELAWARE
DEPARTMENT OF TRANSPORTATION

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

RECOMMENDED

08/03/2006
DELAWARE DEPARTMENT OF TRANSPORTATION

CURB RAMP TYPE 5 & SECTIONS

APPROVED

RECOMMENDED

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

08/03/2006

NOTES:
1. A CUT-THROUGH LEVEL, WITH THE STREET IS THE PREFERRED TREATMENT FOR ISLANDS. ALTHOUGH RAMPS CAN BE USED WHERE THE ISLAND WIDTH IS SUFFICIENT TO ACCOMMODATE THEM, POSITIVE SURFACE DRAINAGE MUST BE PROVIDED FOR EITHER TREATMENT; OTHER TREATMENT IS ACCEPTABLE.
2. WHERE A 2% MAXIMUM SLOPE RAMP IS NOT MET THE SIDEWALK GRADE WITHIN A LENGTH OF 20’ (6M) DUE TO SLOPE, THE RAMP LENGTH MAY BE LIMITED TO 15’ (4.5M), AND THE RAMP SLOPE ALLOWED TO EXCEED 2%.
3. A CONTINUOUS PATH MUST BE PROVIDED BETWEEN ADJACENT CURB RAMPS IN ISLANDS AND MEDANS, WITH A MAXIMUM RUNNING SLOPE OF 2%.
4. RAMP AND SIDEWALK CROSS SLOPE SHALL BE 5% (200:1) MAXIMUM.
5. WHERE THERE IS NO DEPRESSED CURB AT A CUT-THROUGH OR CURB RAMP, THE DETECTABLE WARNING SHALL BE INSTALLED 3” (75MM) FROM THE ROADWAY PAVEMENT.
6. IF THE MINIMUM CLEAR SPACE BETWEEN DETECTABLE WARNINGS IS LESS THAN 2” (6MM), THEN UNDER THE MEDIAN CURB RAMP AREA IS TO BE COVERED WITH DETECTABLE WARNING.
7. PEDESTRIAN SIGNALS SHALL BE ACCESSIBLE WITH A LEVEL LANDING, WHOSE EDGE IS NO MORE THAN 6” (150MM) FROM ALL PEDESTRIAN PUSH BUTTONS.
TYPE F
INTEGRAL P.C.C. CURB AND GUTTER, TYPE 3

TYPE G
INTEGRAL P.C.C. CURB AND GUTTER, TYPE 4
NOTE: 30' SAFETY END STRUCTURE TO BE PRECAST

SECTION A-A
* REQUIRED ONLY FOR PPE SIZE OF 2' x (525) OR 24' x (600)
GRATE DETAIL

FRAME & GRATE ASSEMBLY DETAIL

DELAWARE
DEPARTMENT OF TRANSPORTATION

SAFETY GRATES

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

APPROVED

RECOMMENDED

1/23/2005
1. Personnel safety grates (PSG) shall only be installed on the inlets of storm water pipes 12" (300) or larger in diameter that are not straight from the inlet to the open outlet, regardless of the length.
2. The grate shall be made to fit the outside perimeter of the flared end section (FES) ±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" (150) above invert of FES.
6. All hardware attached to concrete shall be attached using approved tamper proof anchors.

Notes:

PLAN VIEW

SECTION A-A

NOTES:

DELaware DEPARTMENT OF TRANSPORTATION

SAFETY GRATES

STANDARD NO. D-3 (2007) SHT. 2 OF 2

APPROVED

RECOMMENDED

08/01/2007

08/13/2007
1. Inlet boxes shall be pre-cast or cast-in-place.
2. Pipes shall not be installed through any corner of the inlet box.
3. Riser sections may be used for deep inlet boxes.
4. Pipes may be installed near or through joints for riser sections.
5. When the cover above the pipe is less than 4" (100) to the cover slab or top unit opening, the portion of box wall above the pipe may be removed as shown in the optional pipe opening detail. The area above the pipe shall then be formed and filled with high-strength, non-shrink grout mixed with coarse aggregate in a 1:1 ratio by weight.
6. Concrete flow channel shall be warped for positive drainage.
7. When inlet box is precast, pipe opening shall be between 3" (75) and 4" (100) larger than outside diameter of pipe and shall not encroach on adjacent wall.
NOTES:
1) STEPS SHALL BE INSTALLED IN BACK WALL AS PER SPECIFICATIONS.
2) NO PIPE WITH AN OUTSIDE DIAMETER LARGER THAN 8" (127mm) 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.

DELTAWS DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

STANDARD NO. D-5 (2002) SHT. 1 OF 8

APPROVED

RECOMMENDED

05/02/2002
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**

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

**INLET TOP UNIT APPLICATIONS**

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

**S501 BENDING DIAGRAM**

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

**FRAME**

**BACK OF CURB**

**PAY LIMIT FOR TYPE B, C, D & E UNITS**

**2" (50) x 4" (100) TEMPORARY DRAINAGE OPENING**

**TRANSITION**

**ISOMETRIC VIEW**

**TYPE E UNIT SHOWN**

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**DELaware**

**DEPARTMENT OF TRANSPORTATION**

**DRAINAGE INLET DETAILS**

**STANDARD NO.** D-5 (2004)  **SHT. 3 OF 8**  **APPROVED**

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**09/27/2004**
NOTE:
L. 4"x100% throat is for Types B and C top units only.
2. Relocate endroaching 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 (46) 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 (2000) SHT. 5 OP 8

APPROVED

5502 BENDING DIAGRAM
5502 is not required to be one continuous bar. If more than one bar is used, there must be a 2"(50mm) overlap between bars.
34" (865) x 24" (610) DRAINAGE INLET DETAILS

NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS
34" (865) x 18" (455) DRAINAGE INLET DETAILS

NOTES:
1. REFER TO PREVIOUS SHEETS FOR REINFORCEMENT REQUIREMENTS.
2. THE WEIGHT OF THIS INLET IS LIMITED TO 4' (1220) MAXIMUM. THEREFORE STEPS WILL NOT BE REQUIRED AND SHOULD NOT BE INSTALLED ON THIS INLET.
1. REINFORCEMENT SHALL BE 4"(102) X 4"(102) #4 X #4 (W26 X W26)
2. INLET BOXES ARE TO BE PRE-CAST OR CAST-IN-PLACE.
**DELAWARE DEPARTMENT OF TRANSPORTATION**

**MANHOLE DETAILS**

**STANDARD NO.** D-6 (2007)  **SHT.** 1  **OF** 4  **APPROVED**  **RECOMMENDED**

**SCALE:** 1/4" = 1'-0"

**DATE:** 09/18/2007

**MANHOLE DETAILS**

**TOP UNIT (CAST IN PLACE)**
- **COVER SLAB (PRE-CAST)**
  - **TYPE 1 JOINT (TYP):**
    - 6" (150) TYP.
    - 2'-1" (625) DIA. OPENING
  - **TYPE 3 JOINT (TYP):**
    - 1" (25) MIN.

**COVER SLAB**
- **BOX WALL**
  - 7" (185) 20"

**INLET BOX** (PRE-CAST)
- **SEE DETAIL D-4, SHEET 1 OF 1 FOR DETAILS**

**DIMENSIONS MAY VARY**

**JOINT SEALANT AS PER SPECIFICATIONS ONLY BETWEEN 2 PRECAST UNITS**

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

**SECTION A-A**
- **SECTION B-B**

**PLAN**
- **2'-1" (625) DIA. OPENING**
- **CAST IN PLACE CONCRETE FLOW CHANNEL (TYP)**
- **SEE NOTE 6 ON DETAIL D-4 SHEET 1 OF 4**

**BOX MANHOLE ASSEMBLY**