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  (2009-1) 32"x1660 - TYPICAL CAST-IN-PLACE OR SLIP FORM CONSTRUCTION
  (2009-2) 32"x1660 - TYPICAL PRE-CAST CONSTRUCTION
  (2009-3) 42"x1660 - TYPICAL CAST-IN-PLACE OR SLIP FORM CONSTRUCTION
  (2009-4) SLOTTED PLATE CONNECTION DETAILS

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  (2009-2) DRAGON SCALE CONSTRUCTION DETAILS DETAIL OMITTED - SEE SPECIFICATIONS
  (2009-3) HOLLOW SECTION DETAIL DETAIL OMITTED - SEE SPECIFICATIONS
  (2009-4) TYPICAL REINFORCEMENT DETAILED DETAIL OMITTED - SEE SPECIFICATIONS
  (2009-5) JOINT CONNECTION DETAILED DETAIL OMITTED - SEE SPECIFICATIONS

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     (2009-1) TYPE 1
     (2009-2) TYPES 2, 3, & 4
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  C-3 (2009) - ENTRANCES
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     (2009-1) DETAIL VIEWS
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     (2009-8) DRAINAGE INLET TOP UNIT, TYPE 5
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<td>D-6</td>
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<tr>
<td>02091</td>
<td>1 BOX MANHOLE ASSEMBLY</td>
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<td>02091</td>
<td>2 ROUND MANHOLE ASSEMBLY</td>
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<td>3 MANHOLE FRAME AND COVER</td>
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<td>02091</td>
<td>4 BOX MANHOLE COVER SLAB</td>
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<td>D-7</td>
<td>JUNCTION BOX DETAILS</td>
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<td>02091</td>
<td>1 JUNCTION BOX ASSEMBLY</td>
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<td>2 JUNCTION BOX COVER SLAB</td>
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<td>D-8</td>
<td>PIPE BENDING</td>
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<td>02091</td>
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<td>DRAINAGE INLET SEDIMENT CONTROL</td>
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<td>CURB INLET SEDIMENT CONTROL</td>
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<td>STONE CHECK DAM</td>
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<td>E-6 (2005I)</td>
<td>SEDIMENT TRAP</td>
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<td>E-7 (2005I)</td>
<td>SEDIMENT TRAP, USING DRAINAGE INLET AS OUTLET</td>
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<td>E-8 (2005I)</td>
<td>RIGID PIPE ASSEMBLY FOR SEDIMENT TRAP</td>
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<td>1 ELEVATION</td>
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<td>0061</td>
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<td>EROSION CONTROL, BLANKET APPLICATIONS</td>
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<td>RIPRAP DITCH</td>
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<td>PERIMETER Dike/SWALE</td>
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T-3 (2009) - CONDUIT JUNCTION WELL, TYPE 5
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   O2005 - 2 TYPICAL SECTION BASES 1, 2A, 3A, 5, 3A, 3B, AND 7A, TYPICAL SECTION (BASE 4), TYPICAL INSTALLATION BASES 1, 2, 2A, 3A, 3B, 4, AND 7A
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TYPE I GUARDRAIL OR APPROPRIATE
END TREATMENT

26'-51/2"(7940) LIMIT OF PAYMENT

6'-3"(1905)
6'-3"(1905)
6'-3"(1905)
6'-3"(1905)
6'-3"(1905)
6'-3"(1905)

BEAM 1
NESTED W-BEAM

BEAM 2
NESTED W-BEAM

DIRECTION OF TRAVEL

PLAN

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

\* SINCE NO POST OR OFFSET BLOCK IS PRESENT AT THIS LOCATION,
\( \frac{9}{16} \)" GUARDRAIL BOLT (M-10) 12592 IS NOT REQUIRED.

GROUND LINE

ELEVATION

2'-6(500 WS)

TO CULVERT (H-71)

NOTES :
1. ALL W-BEAMS ARE 12'-61/2" (1905) IN LENGTH.
2. PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
Plan

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

Elevation

2' (600MM) TO CURVET TYPE

Notes:
1. All H-beams are 15'-6" (4750MM) in length.
2. Place guardrail reflector every fifth post.

Delaware Department of Transportation

Guardrail Over Culverts, Type 2


Approved
Signature on File  01/19/2010

Recommended
Signature on File  01/14/2020

06/30/2009
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GUARDRAIL OVER CULVERT, TYPE 3

STANDARD NO. B-2 (2009)  SHT. 3 OF 3

APPROVED

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RECOMMENDED

SIGNED ON FILE

1. Place guardrail reflector every fifth post.
2. Posts 1-4 and 8-14 are to be 6x6x50.00x0.50x0.50 steel post. Posts 5-10 are to be 6x3.5x3.5x150x1x1x0.50 brakeaway wood posts with 2 wood blocks at each of these 6 posts.
3. The spikes at posts 5, 7, 8, & 10 are to use 3/8" 16GGuardrail bolt L=22" 16G.
TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

BAR OFFSETS

<table>
<thead>
<tr>
<th>NOMINAL LENGTH OF BARRIER SECTION (ft)</th>
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<tr>
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<td>0-150000</td>
</tr>
<tr>
<td>4' 150000</td>
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</tr>
<tr>
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<td>2'</td>
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BAR LIST

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<th>MARK</th>
<th>SIZE</th>
<th>NUMBER OF EACH SECTION</th>
<th>LENGTH</th>
<th>TYPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<td>4 (1)</td>
<td></td>
<td>5'-0&quot;</td>
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<td>N/A</td>
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<tr>
<td>482</td>
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<td>5'-0&quot;</td>
<td>STAB</td>
<td>N/A</td>
<td>N/A</td>
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* THE LENGTH OF BAR 482 SHALL BE 6'-0" (1500 mm) SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.

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

NOTES:

1. CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1'-0" (300 mm) MIN.
2. BARS SHALL BE CUT AT EVERY JOINT IF MADE USING CONTINUOUS SLIP-FORM CONSTRUCTION.
TYPICAL PRE-CAST CONSTRUCTION

TYPICAL PRE-CAST REINFORCEMENT DETAILS

DELaware
DEPARTMENT OF TRANSPORTATION

32' (960 CONCRETE SAFETY BARRIER (F SHAPE))

standard no. b-14 (2009) sht. 2 of 4

approved

recommended

03/18/2009
### Bar List

<table>
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<tr>
<th>MARK</th>
<th>SME</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>8&quot;</td>
<td>16G</td>
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<td>N/A</td>
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<tr>
<td>481</td>
<td>4</td>
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<td>15</td>
<td>6&quot;</td>
<td>16G</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* The length of bar 482 shall be 6" (150) 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

- Concrete clear cover for reinforcing bars shall be 1/2" (12 mm).
- Bbars shall be cut at every joint or made using continuous slip-form construction.

---

**NOTES:**

- Concrete clear cover for reinforcing bars shall be 1/2" (12 mm).
- Bars shall be cut at every joint or made using continuous slip-form construction.
72" (830) x 72" (830) INLET

72" (830) x 48" (620) INLET

72" (830) x 24" (600) INLET

SECTION A-A

SECTION B-B

FOR TYPE B TOP UNITS

FOR TYPES A, C, D, E TOP UNITS

NOTES:
1. relocate encroaching reinforcing bars when using TYPE B TOP UNIT.
2. COVER SLABS ARE TO BE PRECAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
3. ALL BARS ARE TO BE #5 (6" SPACE) # 6" (500) UNLESS NOTED OTHERWISE. TOP REINFORCEMENT SHALL BE 0.04" (10 MM) MIN. HORIZONTAL REINFORCEMENT PER FOOT IN BOTH DIRECTIONS.
4. MINIMUM BAR COVER = 1.5" (38).

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

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DOUBLE INLET COVER SLAB DETAILS

STANDARD NO. D-6 (2009) SHT. 5 OF 8

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01/18/2010

D/8/2009
**5503 BENDING DIAGRAM**

5503 is not required to be one continuous bar. If more than one bar is used, there must be a 6" to 12" overlap between bars.

---

**TOP UNIT DETAILS**

Notes: See detail D-5, Sheet 3 of 8 for inlet top unit applications.

---

**SECTION A-A**

Drainage inlet details.

Notes refer to previous sheets for reinforcing requirements.

- See optional pipe opening detail on standard no. D-4, sheet 1 of 1

---

**SECTION B-B**

Cast-in-place concrete flow channel (Typ.)

---

**SECTION D-D**

Cover slab details.

Note: Cover slab is only needed for types A, D, B, E top units for the 34" (865) x 24" (610) drainage inlet.
TYPE A

TYPE C

MATCH FLOW LINE
MATCH PROPOSED PAVEMENT GRADE

MATCH FLOW LINE
MATCH PROPOSED PAVEMENT GRADE

MATCH FLOW LINE
MATCH PROPOSED PAVEMENT GRADE

TOP UNIT DETAILS

TEMPORARY DRAINAGE OPENING (TYP)

SECTION A-A

SECTION B-B

NOTES:
1. REFER TO PREVIOUS SHEETS FOR REINFORCEMENT REQUIREMENTS
2. THE HEIGHT OF THIS INLET IS LIMITED TO 4'-0" MAXIMUM, THEREFORE STEPS WILL NOT BE REQUIRED AND SHOULD NOT BE INSTALLED ON THIS INLET.
3. REFER TO DETAIL D-5, SHEET 3 OF 8 FOR INLET TOP UNIT APPLICATION.

42 1/2" (1070)
6" (150)
18" (450)

FRAME

CLOSE

BACK OF CURB

5504 RENDING DIAGRAM

5504 IS NOT REQUIRED TO BE ONE CONTINUOUS BAR. IF MORE THAN ONE BAR IS USED, THERE MUST BE A 12'-1300 OVERLAP BETWEEN BARS.

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DEPARTMENT OF TRANSPORTATION

34" (860) x 18" (450) DRAINAGE INLET DETAILS

STANDARD NO. D-6 (2009)
SHT. 7 OF 8

APPROVED
SIGNATURE ON FILE 01/19/2010

RECOMMENDED
SIGNATURE ON FILE 01/19/2010

04/25/2010
SINGLE GRATE SETUP

LIMITS OF PAYMENT H-6'12" (1505) FOR DOUBLE GRATE

TRANSITION FROM PCC CURB AND
GUTTER TYPE 2 TO 8' (2440) PCC
CURB TYPE 1 WITH CURB OPENING
(TYP.)

50" (1270) FOR SINGLE GRATE

EDGE OF GUTTER

4" (100) COVER SLAB OPENING

FLOW LINE

STEPS IN FRONT WALL

3' (915)

4" (100) REBAR @ 12" (305) FOR SINGLE GRATE,
17" (4370) FOR DOUBLE GRATE (TYP.)

SEE NOTE 4.

NORMAL GUTTER SLOPE

NORMAL ROADWAY CROSS SLOPE

COVERSLAB WIDTH

4" (100)

6' (180)

6' (180)

3' (915)

SUBDIVISION TOP & CONFIGURATION

LIMITS OF PAYMENT H-18'4" (5470)

TRANSITION FROM PCC CURB AND
GUTTER TYPE 2 TO 8' (2440) PCC
CURB TYPE 1 WITH CURB OPENING
(TYP.)

88" (2235)

REAR OF CURB

4" (100)

COVER SLAB OPENING

FLOW LINE

3' (915)

3' (915)

EDGE OF GUTTER

DOUBLE GRATE SETUP

NOTES:
1. MINIMUM BOX SIZE TO BE 34" (850) X 24" (600)
2. PIPE OPENINGS IN THE FRONT WALL SHALL NOT INTERFERE WITH THE
   STEPS. THE PPE SHALL BE SHIFTED HORIZONTALLY TO AVOID THE STEPS.
   IT MAY BE NECESSARY TO USE A LARGER BOX TO AVOID CONFLICT BETWEEN
   STEPS AND PIPE OPENING.
3. SEE DETAIL D-5, SHEET 3 OF 8, FOR 5501 BAR DIAGRAM.
4. THE REBAR IN THE HEAD IS PREFERRED TO BE 1 CONTINUOUS PIECE, HOWEVER,
   IF MULTIPLE PIECES ARE TO BE USED, EACH PIECE SHALL OVERLAP BY 12" (305)
   MINIMUM AND THE FINAL LENGTH OF THE SPLICED REBAR SHALL BE AS NOTED ON
   THIS DETAIL.

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DRAINAGE INLET TOP UNIT, TYPE S

STANDARD NO. D-6 (2009)

SHT. 8 OF 8

APPROVED

RECOMMENDED

SIGNATURE ON FILE

07/19/2010

01/14/2010

D/01/2009
PLAN

SECTION A-A

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

SECTION B-B

JUNCTION BOX ASSEMBLY

TYPE 3 JOINT DETAIL

COVER SLAB (PRE-CAST)

INLET BOX (PRECAST OR CAST-IN-PLACE) SEE STANDARD NO. D-4, SHEET 1 OF 4 FOR DETAILS
NOTES:
1. THE PROFILE OF THE OVERLAY PAVING SHALL BE ADJUSTED TO ASSURE A SMOOTH TRANSITION THROUGH THE BUTT JOINT.
THE REMOVAL AND CLEANUP OF THE HOT MIX RESIDUE MEGE LEFT FROM THE MILLING OPERATIONS ALONG CURB LINES,
ADJACENT TO SPEED RUMPS, ACROSS INTERSECTING STREETS, AND AT THE BEGINNING AND ENDING POINTS OF THE BUTT
JOINT, SHALL BE INCIDENTAL TO THE BUTT JOINT ITEM.

2. THE LENGTH OF THE BUTT JOINT SHALL BE EQUAL TO 30'/900mm FOR EVERY 1'125/OF OVERLAY DEPTH.
**BREAK-AWAY ASSEMBLY**

**NOTES:**

1. SQUARE TUBES ARE TO BE FORMED FROM GALVANIZED SHEET STRUCTURAL (PHYSICAL QUALITY, ASTM A 446, GRADE A, COATING DESIGNATION C 9G, REGULAR SPANGLE, OR HOT ROLLED CARBON STEEL STRUCTURAL (PHYSICAL QUALITY, ASTM A 57, GRADE 33).

2. NOMINAL OUTSIDE DIMENSIONS ARE AS FOLLOWS:
   - 2" x 3/4" x 1/4" x 0.008
   - 2 1/2" x 5/8" x 1/4" x 0.012
   - 3" x 5/8" x 1/4" x 0.012

3. ALL FOUR SIDES ARE TO HAVE EVENLY SPACED 1/8" ID DIAMETER HOLES ON 1" CENTERS THE ENTIRE LENGTH OF THE TUBE.

4. STANDARD CORNER RADIUS SHALL BE 3/8" RADIUS.

5. THE FASTENERS TO BE SUPPLIED UNDER THIS SPECIFICATION SHALL BE 1/4" x 1/2" GRADE 5 UNC CORNER BOLTS WITH CADMIUM OR ZINC PLATING. INSTALLATION OF FASTENERS SHALL BE WITH 3/8" x 1/2" UNC BOLT WITH LOCKNUT AND WASHER.

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

**DELTA END**

DEPARTMENT OF TRANSPORTATION

**BREAKWAY SIGN POST AND PIN ASSEMBLY DETAILS**

STANDARD NO. T-15 (2009)  SHT. 1 OF 1

01/01/2010  01/14/2010

DELTA END