SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY

ANCHOR PLATE TO W-BEAM CONNECTION DETAIL

NOTES:
1. To ensure that the timber bearing plate remains in position, 2 - 10d galvanized steel nails shall be driven in the short timber breakaway post, and bent over bearing plate.
2. Tighten assembly until cable is taught.
3. All holes shall be drilled prior to galvanizing.
NOTES:
1. Rail shall be mounted on guardrail adjacent to a driveway or sidewalk.
2. All components of the rail shall be shop fabricated. All cutting and drilling shall be done in the shop.
3. All exposed threaded hardware shall be burried.
4. Guardrail posts upon which rail is to be installed shall be shop drilled for the rail brackets during fabrication.
5. Rail splices will be at rail support brackets. The same bolt used to attach the rail to the bracket will be used to secure the splice tube.
6. Rails shall be installed only on standard beam sections and at least one post away from the payment limits of the end treatment.
SECTION

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

ELEVATION

BAR OFFSETS

<table>
<thead>
<tr>
<th>Nominal Length of Barrier Section (ft)</th>
<th>X</th>
<th>No. Req'd for Each Barrier Section</th>
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<tbody>
<tr>
<td>20' (6000)</td>
<td>5' 0&quot; (1500)</td>
<td>4</td>
</tr>
<tr>
<td>36' (10800)</td>
<td>4' 0&quot; (1200)</td>
<td>4</td>
</tr>
<tr>
<td>36' (10800)</td>
<td>3' 0&quot; (900)</td>
<td>4</td>
</tr>
<tr>
<td>14' (4200)</td>
<td>2' 0&quot; (600)</td>
<td>4</td>
</tr>
<tr>
<td>10' (3000)</td>
<td>2' 0&quot; (600)</td>
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BAR LIST

<table>
<thead>
<tr>
<th>Mark</th>
<th>Size</th>
<th>No.</th>
<th>Length (inches)</th>
<th>Type</th>
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<th>B</th>
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<tr>
<td>481</td>
<td>4 (13)</td>
<td>**</td>
<td>5' 4&quot; (1625)</td>
<td>1</td>
<td>175</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>418</td>
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<td></td>
<td>5' 1/2 (1650)</td>
<td>1</td>
<td>175</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>418</td>
<td>4</td>
<td>4</td>
<td>7' 0&quot; (1875)</td>
<td>1</td>
<td>150</td>
<td>N/A</td>
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* The length of bar 418 shall be 6' (1800) shorter in length than the nominal size of the barrier in which it is used.
* See "Bar Offsets" chart on this sheet for more information.

NOTICE:
1. Concrete cover for reinforcing bars shall be 1/2" (13) min.
2. Bars shall be cut at every joint if made using continuous slip-form construction.

DELWARE
DEPARTMENT OF TRANSPORTATION

32" (6000) CONCRETE SAFETY BARRIER (F SHAPE)

STANDARD NO. B-14 (2009)  SHT. 1 OF 4  APPROVED

SIGNATURE ON FILE  12/28/2010  RECOMMENDED

SIGNATURE ON FILE  12/27/2010  DATE

52/21/2009
TYPICAL PRE-CAST CONSTRUCTION

T-SHAPE BARRIER SECTION

TYPICAL PRE-CAST REINFORCEMENT DETAILS

DELaware
DEPARTMENT OF TRANSPORTATION

32' (960 CONCRETE SAFETY BARRIER (T SHAPE)

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

APPROVED  12/28/2010
RECOMMENDED  12/27/2010

NOTES: 1. CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1/2" (12.7) MIN.

BAR LIST

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<th>WORK</th>
<th>SIZE</th>
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<th>LENGTH</th>
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<tr>
<td>4B1</td>
<td>4</td>
<td>6</td>
<td>4-1/2&quot; (1140)</td>
<td>1</td>
<td>5&quot; (125)</td>
<td>6&quot; (152)</td>
<td>5&quot; (125)</td>
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<tr>
<td>4B2</td>
<td>4</td>
<td>2</td>
<td>4-1/2&quot; (1140)</td>
<td>2</td>
<td>5&quot; (125)</td>
<td>6&quot; (152)</td>
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<tr>
<td>6B1</td>
<td>6</td>
<td>1</td>
<td>4-1/2&quot; (1140)</td>
<td>3</td>
<td>STR.</td>
<td>8&quot; (203)</td>
<td>5&quot; (125)</td>
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<tr>
<td>6B2</td>
<td>6</td>
<td>2</td>
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<td>4</td>
<td>STR.</td>
<td>8&quot; (203)</td>
<td>5&quot; (125)</td>
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</tbody>
</table>

* THE LENGTH OF BARS 6B1 AND 6B2 SHALL BE 1" (25) 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.
TYPE 1-27 GUARDRAIL
POST SPACING 6'-3" (1905"

SED OR OBSTRUCTION

REQUIRED CLEARANCE,
4'-12"

SEE NOTE 1

EDGE OF SHOULDER

EDGE OF TRAVEL LANE

SHOULDER

TYPE 1-27 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT
WHEN THE REQUIRED 4'-12" CLEARANCE TO OBSTRUCTION IS AVAILABLE

TYPE 2-27 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT
WHEN 2'-16" TO 4'-12" CLEARANCE TO OBSTRUCTION IS AVAILABLE

EDGE OF TRAVEL LANE

FLARE RATES

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<th>DESIGN SPEED</th>
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<td>55 MPH (90 km/h)</td>
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<td>50 MPH (80 km/h)</td>
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<td>45 MPH (70 km/h)</td>
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<tr>
<td>40 MPH (65 km/h)</td>
<td>9:1</td>
</tr>
<tr>
<td>30 MPH (50 km/h)</td>
<td>7:1</td>
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DELWARE DEPARTMENT OF TRANSPORTATION
GUARDRAIL APPLICATIONS
STANDARD NO. B-15 (2010) SHT. 1 OF 3
APPROVED
12/28/2010

RECOMMENDED
12/27/2010

NOTES:
1. THE DISTANCE FROM THE EDGE OF THE TRAVEL LANE OR SHOULDER TO THE FACE OF GUARDRAIL SHOULD BE MAXIMIZED. THIS AREA SHALL BE GRADED TO OR FLATTENED.
2. PLACE GUARDRAIL DELINATORS AT THE INTERVALS SPECIFIED IN THE DELWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
TYPE 2-27

2\(\frac{1}{2}\) (122) OVERLAP
2" (50), 4\(\frac{1}{2}\)" (100), 4\(\frac{1}{2}\)" (100), 2" (50)

NOTE: OVERLAP W BEAMS IN DIRECTION OF TRAVEL.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

STANDARD NO.  B-15 (2010)  SHT.  2  OF  3

APPROVED

RECOMMENDED

09/2010
TYPE 1-27 GUARDRAIL OR APPROPRIATE
END TREATMENT

26'-5 1/2" (7940) LIMIT OF PAYMENT

BEAM 1
(NESTED W-BEAM)

BEAM 2
(NESTED W-BEAM)

DIRECTION OF TRAVEL

PLAN

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

ELEVATION

2'-0" MIN.
TO CULVERT TYP.

GROUND LINE

NOTES:

1. ALL W-BEAMS ARE 13'-6 1/2" (4130) IN LENGTH.
2. PLACE GUARDRAIL DELINERATIONS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 1-27

STANDARD NO. B-16 (2010)  SHT. 1 OF 3  APPROVED  SIGNATURE ON FILE  12/28/2010

RECOMMENDED  SIGNATURE ON FILE  12/27/2010

09/22/2010
END SECTION PLAN

END SECTION ELEVATION

NOTES:
1. ADDITIONAL HOLES FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANOPLATING. SEE STANDARD HARDWARE SHEET FOR HOLE SPACING INFORMATION.
2. CONTRACTOR HAS THE OPTION OF USING A 3/8" STEEL TUBE WITHOUT A SOIL PLATE OR A 5" STEEL TUBE WITH A SOIL PLATE.

DELAWARE
DEPARTMENT OF TRANSPORTATION

END ANCHORAGE, TYPE 27

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

APPROVED  SIGNATURE ON FILE  12/28/2010

RECOMMENDED  SIGNATURE ON FILE  12/27/2010
GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-27

1. Curb shall not be used at the face of rail within the limits of this installation.
2. Posts 1, 2, 3, 4, and 6 require an additional hole to attach wood blocks and/or bent rail.
3. Do not attach rails to posts 1, 2, 3, 5, or 7.
4. Posts 1 and 2 are W8x13 (W200x19.3), 7'-6" (2.28m) long. All other posts in transition are W8x9 (W150x13.5), 6'-0" (1.82m) long.
5. Bent rail may be shop bent to facilitate installation or may be field bent using heat.
6. Approved concrete inserts may be used in new construction to attach terminal connectors to parapet.

ELEVATION

7. All holes shall be drilled prior to galvanizing.
8. Place guardrail delimiters at the intervals specified in the Delaware Manual on Uniform Traffic Control Devices.
9. For installations where curb exists, if the existing curb is 8" (200mm) or higher and cannot be removed, the bottom rail can be eliminated.
10. See detail B-5, Sheet 5 of 6 for hardware details.
11. Bent rail shall be bolted to the back of post 6 with a 3/4" (19mm) guardrail bolt, 4" (120mm) long, washed, and nut.

NOTES:

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-27

STANDARD NO. B-21 (2010) SHT. 2 OF 3

APPROVED  RECOMMENDED

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

09/22/2010
NOTES:

1. CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.
2. GUARDRAIL SECTION AND TERMINAL CONNECTORS SHALL BE OVERLAPPED IN THE DIRECTION OF TRAVEL.
3. INSTALLATION SHOWN ABOVE WITH A T-TYPE BARRIER FACE. GUARDRAIL SECTION OF BARRIER CONNECTION SHALL BE ADJUSTED HORIZONTALLY IN ORDER TO MEET FLUSH AGAINST VARIOUS TYPES OF WALLS AND BARRIERS.
DEPRESSED CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 4:1.

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 DETAIL P-2, SHEET 3 OF 5. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
2. DEPRESS CURB AT ENTRANCES AND CURB RAMPS AS DETAILED ON THIS SHEET.
3. DEPRESS CURB FLUSH WITH PAVEMENT AT CURB RAMPS. MAXIMUM SLOPE OF CURB AT CURB RAMPS IS 20:1 IN THE DIRECTION OF PEDESTRIAN TRAVEL. SEE DETAIL C-2, SHEET 1 OF 6.
4. DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 4:1.

TYPICAL CURB SECTION
TYPICAL TAPER SECTION
AT NOSE OF MEDIANS
TYPE 1-8 CURB SHOWN

NOTES:
- C-1 (2011)
- STANDARD NO.
- P.C.C. CURB
- SHEET 1 OF 4
- DELAWARE DEPARTMENT OF TRANSPORTATION

APPROVED
SIGNATURE ON FILE 12/22/2011

RECOMMENDED
SIGNATURE ON FILE 12/21/2011
NOTES:

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

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

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

4. DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 4:1. SEE DETAIL C-1, SHEET 1 OF 2 FOR TYPICAL SECTION OF TAPER AT NOSE OF MEDIAN ISLANDS.

5. 4" OF GABC, TYPE B SHALL BE PLACED UNDER P.C.C. CURB AND P.C.C. CURB AND GUTTER.
NOTES:
A. THE AREA OF DETECTABLE WARNING TRUNCATED DOMES SHALL BE
   24' x 1600' (12,800 ft²) AND THE FULL WIDTH OF THE RAMP OR DEPRESSED CURB.
B. SEE SPECIFICATION FOR ADDITIONAL INFORMATION.

MAXIMUM DIFFERENCE IN GRADE
FOR EXAMPLE, IF THE CURB RAMP AND DEPRESSED CURB SLOPE \( x \) IS 5%, AND THE PAVEMENT SLOPE \( y \) IS 4%, THEN TO DETERMINE THE DIFFERENCE IN GRADE, ADD \( x + y \) TO GET 9%, WHICH IS GREATER THAN THE 8% PRESCRIBED BUT LESS THAN THE 10% MAXIMUM.

CURB RAMP, TYPE 1
PERPENDICULAR CURB RAMP

DEPARTMENT OF TRANSPORTATION
STANDARD NO. C-2 (006) SHT. 1 OF 4
APPROVED

DELTA®
DT-6055
CURVED CURB RAMP
SAMPLE LAYOUT OF DETECTABLE WARNING TRUNCATED DOMES ALONG A CURB RADIUS

DETECTABLE WARNINGS SHALL BE PLACED THE FULL WIDTH OF THE DEPRESSED CURB.

CURB RAMP, TYPE 2

CURB RAMP, TYPE 3
DIAGONAL CURB RAMP

CURB RAMP, TYPE 4
PERPENDICULAR CURB RAMP

NOTES:

1. WHERE A 12% MAXIMUM SLOPE RAMP WILL NOT MEET THE SIDEWALK GRADE WITHIN A LENGTH OF 5' A MINIMUM DUE TO A STEEP ADJACENT ROADWAY, THE RAMP LENGTH MAY BE LIMITED TO 5' 6" MAXIMUM AND THE RAMP SLOPE ALLOWED TO EXCEED 12%.

2. TRANSITION TO EXISTING SIDEWALKS MUST BE OVER THE LENGTH OF THE RAMP.

3. RAMP AND SIDEWALK CROSS SLOPES SHALL BE 5% MAXIMUM.

4. IF GRADING WILL BE STEEPER THAN 6% ADJACENT TO THE CURB RAMP OR SIDEWALK, THEN A TYPE I CURB OR RETAINING WALL SHOULD BE USED TO ELIMINATE THE NEED FOR THE STEEP SLOPE.


7. IF THE WIDTH OF THE FULLY DEPRESSED CURB AT THE STREET IS 5' 6" MAXIMUM OR LESS, THEN A RECTANGULAR PIECE OF DETECTABLE WARNING TRUNCATED DOMES MAY BE USED.
CURB / SIDEWALK OPENING

NOTE:
### Dimensions

<table>
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<th>Pipe Size</th>
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<th>B</th>
<th>C</th>
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<tr>
<td>6&quot; (1575)</td>
<td>9&quot;-6&quot; (2890)</td>
<td>2&quot;-5&quot; (735)</td>
<td>8&quot;-4&quot; (2540)</td>
</tr>
<tr>
<td>8&quot; (1950)</td>
<td>8&quot;-6&quot; (2215)</td>
<td>8&quot;-9&quot; (2241)</td>
<td>10&quot;-3&quot; (3075)</td>
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<td>8&quot; (1950)</td>
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### Approximate Quantities

<table>
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<tr>
<th>Pipe Size</th>
<th>Concrete CFT (in 1')</th>
<th>Reinforcement Steel LBS (kg)</th>
<th>No. of Grates</th>
<th>Length to Be Cut from 1 Grate</th>
<th>Weight of Full Size Grate LBS (kg)</th>
<th>Weight of Cut Grate LBS (kg)</th>
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<tr>
<td>6&quot; (1575)</td>
<td>25 (0.706)</td>
<td>25.45 (0.720)</td>
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<td>--</td>
<td>275.92 (422,881)</td>
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<tr>
<td>8&quot; (1950)</td>
<td>35.5 (0.969)</td>
<td>32.07 (0.908)</td>
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<td>2'-1&quot; (635)</td>
<td>275.92 (422,881)</td>
<td>35.47 (63,465)</td>
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<td>35.5 (0.969)</td>
<td>32.07 (0.908)</td>
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<td>275.92 (422,881)</td>
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</tbody>
</table>

### Bending Diagram

- **Pipe Size**: 6" (1575), 8" (1950)
- **B-Bars**: 25" (635) to 4" (102)
- **G-Bars**: 25" (635) to 4" (102)
- **A-Bars**: 25" (635) to 4" (102)

### Schedule of Reinforcing Steel

<table>
<thead>
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<th>Pipe Size</th>
<th>A-Bars</th>
<th>B-Bars</th>
<th>C-Bars</th>
<th>D-Bars</th>
<th>G-Bars</th>
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<tbody>
<tr>
<td>6&quot; (1575)</td>
<td>4 (M)</td>
<td>2</td>
<td>8&quot; (200)</td>
<td>72&quot; (1830)</td>
<td>4 (M)</td>
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<tr>
<td>8&quot; (1950)</td>
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<td>2</td>
<td>8&quot; (200)</td>
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Delaware Department of Transportation

61 Safety End Structure

Approved: [Signature]

Standard No.: D-1 (2001)

Sht. 2 of 2

Recommended: [Signature]

Date: 6/18/01
**PLAN VIEW**

**SHOWN WITHOUT GRATE**

**NOTE:** 10% SAFETY END STRUCTURE TO BE PRECAST

**SECTION A-A**

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

**DELWARE**
**DEPARTMENT OF TRANSPORTATION**

<table>
<thead>
<tr>
<th>STANDARD NO.</th>
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**APPROVED**

Signature: [Signatures]

Date: [Dates]