**SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES**

<table>
<thead>
<tr>
<th>CURVE LENGTH (FEET)</th>
<th>SPACING IN FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>300</td>
</tr>
<tr>
<td>3000</td>
<td>300</td>
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<tr>
<td>4000</td>
<td>300</td>
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<tr>
<td>5000</td>
<td>300</td>
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<tr>
<td>6000</td>
<td>300</td>
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<tr>
<td>7000</td>
<td>300</td>
</tr>
<tr>
<td>8000</td>
<td>300</td>
</tr>
<tr>
<td>9000</td>
<td>300</td>
</tr>
<tr>
<td>10000</td>
<td>300</td>
</tr>
</tbody>
</table>

**GENERAL NOTES**

1. **Spacing for Curves Not Shown**
   - Spacing for curves not shown may be computed from the formula: \( S = \frac{0.10}{R} \times \frac{1}{2} \).

2. **Spacing in Advance and Beyond the Curve**
   - Spacing in advance and beyond the curve is 5/10 of the first space, 5/20 of the second space, and 3/30 of the third space. Spacing above 300 should not be less than 21 ft, or greater than 300 ft.

**TYPICAL INSTALLATION SINGLE DIRECTION**

**TYPICAL INSTALLATION BACK - TO - BACK**

**DELINER INSTALLATIONS**

<table>
<thead>
<tr>
<th>POST NOTES</th>
<th>DESCRIPTION</th>
<th>ALLOWABLE TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Posts shall be uniform flanged channel section or 3/4&quot;-shape made from hot-rolled structural steel, re-rolled rail steel, or new billet steel having a minimum yield strength of 30,000 psi and a minimum tensile strength of 50,000 psi.</td>
<td>( \pm \frac{1}{4} )</td>
</tr>
<tr>
<td>2.</td>
<td>Posts shall be set in drilled or excavated holes, placed plum and parallel to pavement in place or may be driven plumb.</td>
<td>( \pm \frac{1}{4} )</td>
</tr>
<tr>
<td>3.</td>
<td>A minimum of 3 holes of ( \frac{1}{2} ) diameter, spaced as shown, are required for all delineator posts.</td>
<td>( \pm \frac{1}{4} )</td>
</tr>
</tbody>
</table>

**DOUBLE HEIGHT POSTS**

4. **The lower section of the 2-post combination shall be installed according to the same placement specifications as a typical single post.**

5. **Reflections shall be mounted at the connection of the posts, and at the top of the upper post in accordance with the appropriate configuration for the application.**

6. **The length of the upper extension piece shall not exceed 1 foot.**

**DELINER INSTALLATIONS**

**STANDARD PLAN NO.**

S-612-1

**STANDARD SHEET NO.**

1 of 8
Optional back to back crystal delineators on two lane roadways is acceptable.

Road approach:
Residual space after "on curve" spacing from the table on sheet 1 is applied, shall be divided equally among all of the "on curve" spaces so that the last delineator falls at the P.T. or C.S. of the curve.

Normal method (type I on both sides of roadway):

- Conventional roadway: May be shifted not more than \( \frac{1}{4} \) of normal spacing.

- Expressway roadways:

  - Tangent section:
    - Delineators should be placed on the left side of the roadway on the far side of the crossover for each roadway.
  - Median crossover:
    - Type III (blue-2 yellow) delineators should be placed on both sides of the crossover for both directions of travel.
    - Type I required both sides of median.
    - Type II (yellow-yellow, back-to-back) required for locations with median barrier.

Optional method (back-to-back on outside of curve):

- Normal space • I • : I: Advance spacing last space

- Normal spacing = --- Normal • spacing

- Normal • spacing --- Taper length varies

Bridge approaches:

Type III (3 yellow)

- Bridge deck:
  - Normal space
  - Taper length varies

- Bridge approach:
  - Normal space
  - Taper length varies

Typical installation:

- Conventional roadway:
  - Normal spacing
  - Taper length varies

- Expressway roadway:
  - Normal spacing
  - Taper length varies

Bridge notes:

1. Where curb to curb width of bridge is equal to or greater than roadway width plus usable shoulder width, use the Type III delineator (3 yellow) only and omit all the Type I delineators.
2. For guard rail installations where approach end is not flared, place a Type III delineator (3 yellow) immediately in advance of approach end.
3. All Type I delineators are to be mounted above or immediately behind guard rail and are not a constant distance from the roadway.
**Typical Installation for Interchanges**

**Legend**

A = See Curve Spacing Table
B = Advance Spaces (First & Second)
C = Spacing On Curve
D = Beyond Spaces (First & Second)
E = Last Space

**NOTE**

A = See Curve Spacing Table
B = Advance Spaces (First & Second)
C = Spacing On Curve
D = Beyond Spaces (First & Second)
E = Last Space

Delineators may be installed if necessary for "Wrong Way" protection.

See other typical installations.

**Typical Installation for Ramp Curves**

**Legend**

A = See Curve Spacing Table
B = Advance Spaces (First & Second)
C = Spacing On Curve
D = Beyond Spaces (First & Second)
E = Last Space

**NOTE**

Delineators may be installed if necessary for "Wrong Way" protection.

See other typical installations.

**Maintenance Marker Locations for Obstructions**

- Type I (Green) Maintenance Marker
- Type III (Blue) Maintenance Marker
- At Bridge Joints
- Not to be used on bridges
- At Guardrail
- (When deemed necessary by maintenance superintendent)
- At Curbs
- (When deemed necessary by maintenance superintendent)
PLAN VIEW

TYPICAL BRACKET FABRICATION DETAILS

1. THE ADJUSTABLE REFLECTOR BRACKET IS TO BE USED TO "TRAFFIC ORIENT" BACK-TO-BACK DELINEATORS USED ON CURVES.
2. REFLECTOR BRACKETS SHALL BE FABRICATED FROM EITHER GALVANIZED STEEL NOT LESS THAN 16 GAGE, OR ALUMINUM NOT LESS THAN 0.100 INCH THICKNESS.
3. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED OR CATHODIC PLATED.
4. ALL BRACKET HOLES ARE 1/16 INCH DIAMETER AND DELINEATOR POSTS REQUIRE AN ADDITIONAL HOLE 2 INCH BELOW THE TOP HOLE PROVIDED IN THE POST.
5. SHOP BEND THE BRACKET APPROX. 70 DEGREES AS SHOWN, THEN ATTACH TO THE DELINEATOR POST WITH A 1/16 INCH BLIND EXPANSION RIVET OR A BOLT.
6. BURR THE THREADS OF ALL BOLTS TO PREVENT NUT LOOSENING OR VANDALISM.

TYPICAL GUARDRAIL INSTALLATION

SOFTWARE MOUNT DELINEATORS

POST MOUNT DELINEATORS SHALL BE ATTACHED BY A METHOD APPROVED BY THE ENGINEER OR A METHOD REQUIRED BY THE DEVICE MANUFACTURER.

TYPICAL GUARDRAIL REFLECTOR TAB

SEE THE M-606-1 STANDARD PLAN FOR REFLECTOR TAB FABRICATION AND PLACEMENT DETAILS. RETROREFLECTIVE SHEETING SHALL CONFORM TO ASTM D4956 TYPE IV.

BARRIER REFLECTOR NOTES

1. BARRIER REFLECTORS, REGARDLESS OF TYPE, SHALL MEET THE RETROREFLECTIVE QUALITIES SPECIFIED IN SECTION 713 OF THE STANDARD SPECIFICATIONS FOR DELINEATOR REFLECTORS AND BE PAID FOR AS DELINEATOR (TYPE ) (BARRIER) (EACH). USE OF THESE REFLECTORS IS MANDATORY.
2. THE COLOR OF RETROREFLECTIVE SURFACE SHALL MATCH THE COLOR OF THE ADJACENT EDGE LINE.
3. CONCRETE SURFACE PREPARATION, ADHESIVE, AND METHOD OF APPLICATION SHALL BE AS RECOMMENDED BY THE REFLECTOR MANUFACTURER.
4. UNLESS OTHERWISE NOTED IN THE PLANS OR DIRECTED BY THE ENGINEER, A 200 FOOT MAXIMUM TANGENT AND CURVE SPACING APPLIES TO BARRIER REFLECTORS.
5. TOP MOUNT REFLECTORS ARE STANDARD. SIDE MOUNT REFLECTORS OR 6 INCH WIDE REFLECTOR STRIPS MAY BE REQUIRED IF SPECIFIED IN THE PLANS.
6. MEDIUM BARRIER REFLECTORS SHALL BE TYPE II (YELLOW-YELLOW, BACK-TO-BACK).
7. FOR A TWO-WAY ROADWAY, BARRIER REFLECTORS SHALL BE TYPE II (CRYSTAL-CRYSTAL, BACK-TO-BACK).
8. FOR TEMPORARY CONCRETE BARRIER, REFLECTORS SHALL BE INSTALLED THAT MEET THE MINIMUM REQUIREMENTS OF STANDARD TYPICAL DELINEATOR INSTALLATIONS, EXCEPT THE MAXIMUM SPACING SHALL BE 50 FEET, AND THEY WILL NOT BE PAID FOR, BUT ARE INCLUDED IN THE WORK.
**TYPICAL INSTALLATION DETAIL FOR CONTINUOUS CONCRETE BARRIER**

1. Reflector strips shall be spaced at intervals of 20 feet off-center for tangent sections of barrier and 10 feet off-center for curved sections of barrier.
2. This device shall be installed per manufacturer's recommendations. It is the responsibility of the installer to confirm the manufacturer representative whenever there is a question regarding application procedures or substrate conditions.
3. The color of the reflective surface shall match the color of the adjacent roadway edge line.
4. At the time of installation, the contacting surface shall be dry and moisture-free.
5. After reflector strip installation, surfaces should stay dry without rain in the forecast for at least 8 hours.
6. Surface preparation, brackets, bolts, and glue (or equivalent) shall be included in the cost of each delineator strip.

**CONCRETE BARRIER NOTES**

1. Concrete surface preparation, adhesive, and method of application shall be as recommended by the reflector manufacturer.
2. To assume a straight, level application, snap a chalk line across the barrier.
3. For mounting the reflector strip to concrete barrier including the brackets, the use of 3M Windo-Weld Super Fast Urethane glue or equivalent applied at 60 degrees Fahrenheit in dry weather is recommended. This product is available in a standard caulking tube, and should be applied to the brackets and panels with a construction style caulking gun, and/or use 

**GUARDRAIL TYPE 3 NOTES**

1. The use of reflector strips on guardrail type 3 is supplemental to the reflector tab.
2. Two different styles of mounting brackets are available. There is one style for the 4-inch reflector strip and another for the 6-inch reflector strip. The brackets must be matched to fit the exact 4-inch or 6-inch reflector strip panel. The 4-inch reflector strip size is typical, however, 3-inch or 6-inch reflector strips may be installed as specified in the plans.
3. Metal guardrail shall be wire brushed/sanded, then cleaned with isopropyl alcohol where the brackets will adhere to the guardrail.
4. For mounting the reflector strip to guardrail, including the brackets, the use of 3M Windo-Weld Super Fast Urethane glue or equivalent applied at 60 degrees Fahrenheit in dry weather is recommended. This product is available in a standard caulking tube, and should be applied to the brackets and panels with a construction style caulking gun, and/or use 

**ATTACHMENT DETAILS**

- Glue
- 4" Bracket
- Stainless steel anchor with 

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**TYPICAL INSTALLATION DETAIL FOR GUARDRAIL TYPE 3**
SUPPLEMENTAL DELINEATION DETAILS

1. ALL SUPPLEMENTAL DELINEATION PANELS SHALL BE SINGLE SHEET ALUMINUM, 0.080" MINIMUM THICKNESS.
2. A) PANELS SHALL BE FASTENED DIRECTLY TO THE IMPACT ATTENUATOR WITH 2 OR 4 3/16 INCH DIAMETER BLIND EXPANSION RIVETS, OR 2 OR 4 5/32 INCH BOLTS, NUTS AND WASHERS.
   B) EXPANSION RIVETS SHALL BE DOMED-HEAD ALUMINUM WITH ALUMINUM BREAK STEM MANDREL, AND SHALL HAVE A BACK-UP WASHER WHEN USED WITH PLASTIC MATERIALS.
   C) BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED OR CADMIUM PLATED.
   D) SPACERS, OR SPACING WASHERS SHALL BE USED AS NECESSARY FOR SAND FILLED ATTENUATORS.
3. OM-3BT DECAL (BUFFER TERMINAL OBJECT MARKER) SHALL BE PRESSURE SENSITIVE REFLECTIVE SHEETING AND SHALL BE APPLIED DIRECTLY TO THE GUARDRAIL END TREATMENT (FLARED OR NON-FLARED).
4. RETROREFLECTIVE SHEETING SHALL CONFORM TO ASTM D4956, TYPE IV. THE SHEETING SHALL BE YELLOW FOR PERMANENT INSTALLATIONS. OM-3BT DECAL AND OM-3aR(L)(C) PANELS SHALL HAVE BLACK STRIPES. THE SHEETING FOR TEMPORARY (CONSTRUCTION ZONE) INSTALLATIONS SHALL BE AS FOLLOWS: OM-3BT DECAL AND OM-3aR(L)(C) PANELS SHALL HAVE ALTERNATING ORANGE AND WHITE REFLECTORIZED STRIPES.
5. SUPPLEMENTAL DELINEATION PANELS OR PRESSURE SENSITIVE RETROREFLECTIVE SHEETING DECALS SHALL BE INCLUDED IN THE COST OF THE GUARDRAIL END ANCHOR OR THE IMPACT ATTENUATOR ITEM.
6. REFERENCE SHEET S-612-1 SHEET 7 OF 8 FOR BASE DETAIL.

SUPPLEMENTAL DELINEATION FOR GUARD RAIL BUFFER TERMINALS AND IMPACT ATTENUATORS

BUFFER TERMINALS (BT)

BUFFER PANEL ATTACHMENT DETAILS

IMPACT ATTENUATOR (SAND FILLED)

IMPACT ATTENUATOR (MODULAR)

ATTENUATOR PANEL ATTACHMENT DETAILS
**GENERAL NOTES**

1. IMPACT RESISTANT, DELINEATOR POSTS, COMPRISSED OF HIGH DENSITY THERMOPLASTIC, CONSISTING OF A MINIMUM OF 70% BY VOLUME, POST CONSUMER RECYCLED HOPE, WITH AN INTERSTATE GREEN, PREMIUM U.V. INHIBITED, CO-EXTRUDED HDTP SHELL AND A FLEXIBLE INSERT WHICH TRANSITIONS FROM SQUARE TO ROUND.

2. THE TOP OF TUBULAR POSTS SHALL BE PERMANENTLY CLOSED TO PREVENT MOISTURE OR DEBRIS FROM ENTERING.

3. THE SIDE OF THE POST FACING TRAFFIC, UPON WHICH THE DELINEATOR IS TO BE MOUNTED, SHALL HAVE A FLAT SURFACE WITH MINIMUM DIMENSIONS OF 3.25 INCHES IN WIDTH BY 13 INCHES IN LENGTH. THE TEXTURE OF THE PROJECTED SURFACE SHALL BE SMOOTH AND SUITABLE FOR THE ADHESION OF REFLECTIVE SHEETING WITHOUT PREPARATION OTHER THAN WIPING WITH A CLEAN CLOTH DAMPENED WITH MINERAL SPIRITS TO REMOVE OIL-TYPE CONTAMINANTS.

4. FOR POST MOUNTED AND CLAMP MOUNTED DELINEATORS, THE BOTTOM OF THE POST SHALL HAVE A MINIMUM OF 13 INCHES LENGTH FLAT MOUNTING SURFACE WITH THE MINIMUM DIMENSION OF 3.25 INCHES IN WIDTH.

5. THE WIDTH OF THE POST AT ANY POINT (EXCLUDING THE BASE, IF ANY) SHALL BE A MAXIMUM OF 4 1/4 INCHES.

6. THE OUTSIDE DIAMETER OF THE TUBULAR POST SHALL BE A MAXIMUM OF 2 1/2 INCHES.
GENERAL NOTES

1. MOUNTING HEIGHT TO BOTTOM OF R3-50, "EMERGENCY AND AUTHORIZED VEHICLES ONLY" SIGN, SHALL BE 7 FEET FROM ORIGINAL GROUND.

2. SEE TUBULAR STEEL SIGN SUPPORT DETAILS (S-614-8) FOR CONCRETE FOOTING INFORMATION FOR SOCKET SYSTEM INSTALLATIONS AND ADDITIONAL POST INSTALLATION REQUIREMENTS.

3. PLACE SIX (6) Crossover Markers, ONE 500 FEET IN ADVANCE OF MEDIAN CROSSOVER AND ONE ON EACH SIDE OF CROSSOVER AS SHOWN ON DETAIL.

4. CROSSOVER MARKERS SHALL BE LOCATED IN-LINE WITH DELINEATOR POSTS.

5. FOR VISUALLY CONSTRAINED MEDIAN CROSSOVERS, MULTIPLE SIGN PANELS (R3-4 AND R3-50) MAY NEED TO BE PLACED WITHIN THE CROSSOVER ON SEPARATE POSTS, AS DIRECTED BY THE ENGINEER.

6. THE POLYETHYLENE PLASTIC PANEL MAY BE USED ON EITHER POLYPROPYLENE BLEND POST AND/OR P-POST INSTALLATIONS. IN CONTRAST, THE CLASS I SIGN PANEL SHALL ONLY BE USED ON P-POST INSTALLATIONS.

MEDIAN Crossover INSTALLATIONS

MEDIAN WIDTH GREATER THAN 50 FT.

MEDIAN WIDTH LESS THAN 50 FT.