SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES

'R' RADIUS (FEET)	'D' DEGREE OF CURVE	✳ SPACING● ON CURVE (FEET)	✳ SPACING IN ADVANCE OF AND BEYOND CURVE (FEET)		
			FIRST SPACE	SECOND SPACE	THIRD SPACE
20000	0° 17'	300	300	300	300
17000	0° 20'	300	300	300	300
14000	0° 25'	300	300	300	300
12000	0° 29'	300	300	300	300
10000	0° 34'	299	300	300	300
8000	0° 43'	267	300	300	300
6000	0° 57'	231	300	300	300
5000	1° 09'	211	300	300	300
4000	1° 26'	189	300	300	300
3500	1° 38'	176	300	300	300
3000	1° 55'	163	300	300	300
2500	2° 18'	148	297	300	300
2000	2° 52'	132	265	300	300
1800	3° 11'	125	251	300	300
1600	3° 35'	118	236	300	300
1400	4° 06'	110	220	300	300
1200	4° 47'	102	203	300	300
1000	5° 44'	92	185	277	300
900	6° 22'	87	175	262	300
800	7° 10'	82	164	246	300
700	8° 11'	76	153	229	300
600	9° 33'	70	141	211	300
500	11° 28'	64	127	191	300
450	12° 44'	60	120	180	300
400	14° 20'	56	112	168	300
350	16° 22'	52	104	156	300
300	19° 06'	47	95	142	285
250	22° 55'	42	85	127	255
200	28° 39'	37	73	110	220
150	38° 12'	30	60	90	180
100	57° 18'	21	42	64	127
75	76° 24'	20	30	45	90

✳ On conventional roadways omit the "Third Space" and double the spacing "On the Curve" and "In Advance of and Beyond the Curve" (300' Max).

● Spacing for curves not shown may be computed from the formula:

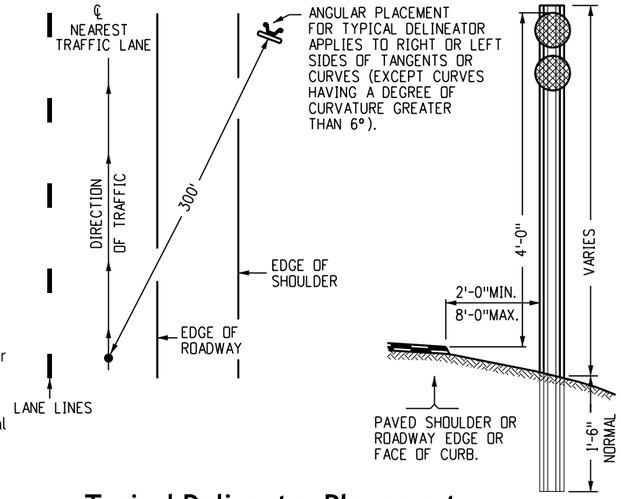
$S = 3\sqrt{R-50}$

Spacing in advance of and beyond the curve is; First Space = 2S, Second Space = 3S and Third Space =3S. Spaces should not be less than 20 feet or greater than 300 feet.

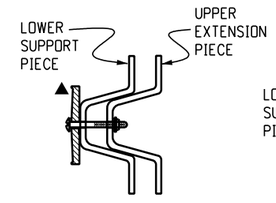
Residual space after "On Curve" spacing is applied, shall be divided equally among all of the "On Curve" spaces so that the last delineator falls at the P.T. or C.S of the curve.

General Notes

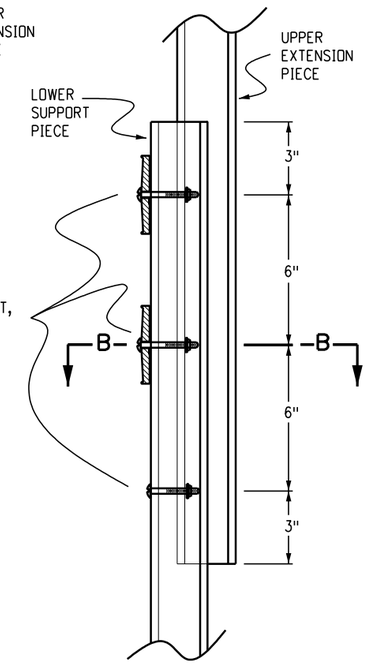
1. See the tabulation of quantities included in the plans for the numbers and locations of delineators required.
2. The color of delineator reflectors shall, in all cases, conform to the color of edge lines, except:
   a. Red, green, and blue delineators.
   b. Type III delineators (3 Yellow).
3. The color of delineator posts and all special mounting brackets shall be interstate green.
4. Delineators are mandatory on all roadways on the state highway system. They are optional where fixed source lighting is in operation; however, all concrete barriers and Type 3 guardrail shall have reflectors or supplemental tabs.
5. Type I (Yellow) delineators are mandatory on the left side of expressway roadways (median).
6. Red delineators may be installed on the reverse side of any delineator and/or a separate post on one-way roadways or ramps where investigation shows a need for wrong-way movement protection.
7. Type III (3-Yellow) delineators are to be installed to warn of the existence of objects not actually in the roadway but that may be so close to the edge of the roadway that they need a marker. These include underpass piers, bridge abutments, handrails, and culvert heads. The inside edge of the marker shall be in line with the inner edge of the obstruction.
8. Interchange ramps shall be delineated on the right side, the left side, or both sides with Type I delineators of the appropriate color (crystal or yellow) as illustrated on Sheet Number 3.
9. Frontage road delineators are not to be installed where they might be misleading to mainline traffic.
10. Spacing of delineators for tunnels and snow sheds shall be as shown on the plans.
11. Where practicable, the approach ends of islands and medians should be delineated.
12. Typical installation locations for all Type I delineators on tangent sections shall be on 1/10th-mile intervals in relation to the highway mile markers. A 200-foot minimum will apply to the "last space" exiting a horizontal curve, and the following delineator shall be installed on the next 1/10th-mile location (maximum spacing is also 528 feet). At all other locations, such as A & D lanes, ramps, width transitions, and turn lanes, a "last space" should not be less than 50% of the spacing shown for that location.
13. Type II delineators shall be installed at 100-foot spacing on all acceleration lanes and tapers, deceleration lanes and tapers, and lane transitions involving pavement width reductions in the direction of traffic. Type II delineators are not required for redirect tapers, for traffic moving in the direction of wider pavement, or on the side of the roadway where the alignment is not affected by the lane reduction. Type II (Yellow) delineators shall only be used when a raised or depressed median is present. For width transitions where traffic moves in the direction of wider pavement, the normal spacing shall be adjusted so there is a delineator at each of the angle points of the width transition.
14. Type I delineators shall be installed at 100-foot spacing on interchange ramp tangent sections and by the spacing table on ramp curves. Spacing "in advance of and beyond curve" does not apply to ramp curves.
15. For spacing on a curve that follows a tangent section with spaces shorter than those shown in the curve spacing table: modify the table so that the curve spacing is no greater than the tangent spacing.
16. Where guardrail intrudes into the space between the pavement edge and the line of delineators, place the delineators immediately above or behind the rail face; delineator spacing shall remain the same behind the rail face.
17. When normal spacing falls on an intersecting roadway, driveway, etc., the delineator may be moved in either direction to a distance not exceeding one-quarter of the normal spacing.
18. The angular placement for all delineators should be by the "traffic orienting" method: aim the face of the delineator at the centerline of the nearest lane of approaching traffic at a point 300 feet away (or as directed by the engineer for special locations and curves having a degree of curvature greater than 6 degrees).
19. Type III (Yellow-Blue-Yellow) delineators are to be installed to warn of the existence of an asphalt curb installed below guardrail. The delineator shall be placed in line with the asphalt curb.
20. If farming or other oversize loads actively utilize sections of any two-lane state highway, the delineator posts shall be staggered no less than one-tenth of a mile. Flexible delineators or other engineering solutions shall be considered under the discretion of the engineer. Delineator posts shall not be staggered where it is deemed unsafe by the engineer (e.g., curves).



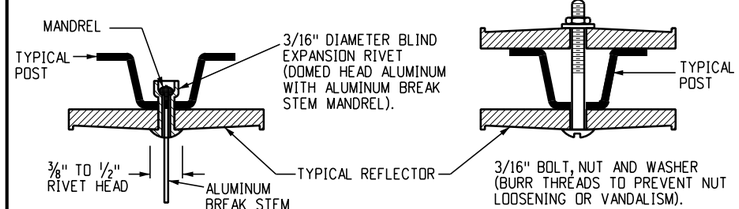
Typical Delineator Placement



Section B-B



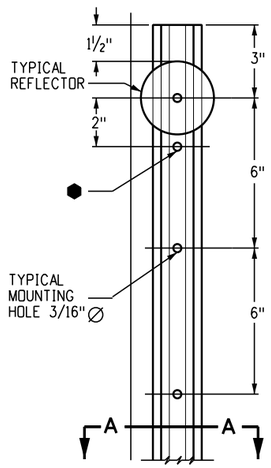
Typical Double Height Installation



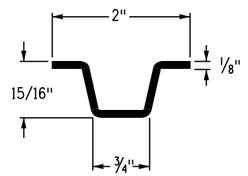
Typical Installation Single Direction

Typical Installation Back - to - Back

Typical Delineator Fabrication Details



Typical 1.12# Delineator Post



Section A-A

Allowable Tolerance Dimension:

1" and Up	± 1/8"
1/2" to 1"	± 1/16"
1/2" and Below	± 1/32"

Weight:

Minus 3 1/2% of the weight of any one post.

Post Notes

1. Posts shall be a uniform flanged channel section (U-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.
2. Posts shall be set in drilled or excavated holes, placed plumb and firmly tamped in place;or may be driven plumb.
3. A minimum of 3 holes of 3/16" diameter, spaced as shown, are required for all delineator posts.

⬢ An additional hole is required when the adjustable reflector bracket is used.

Double Height Posts

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

▲ 5. Reflectors 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 7 feet.

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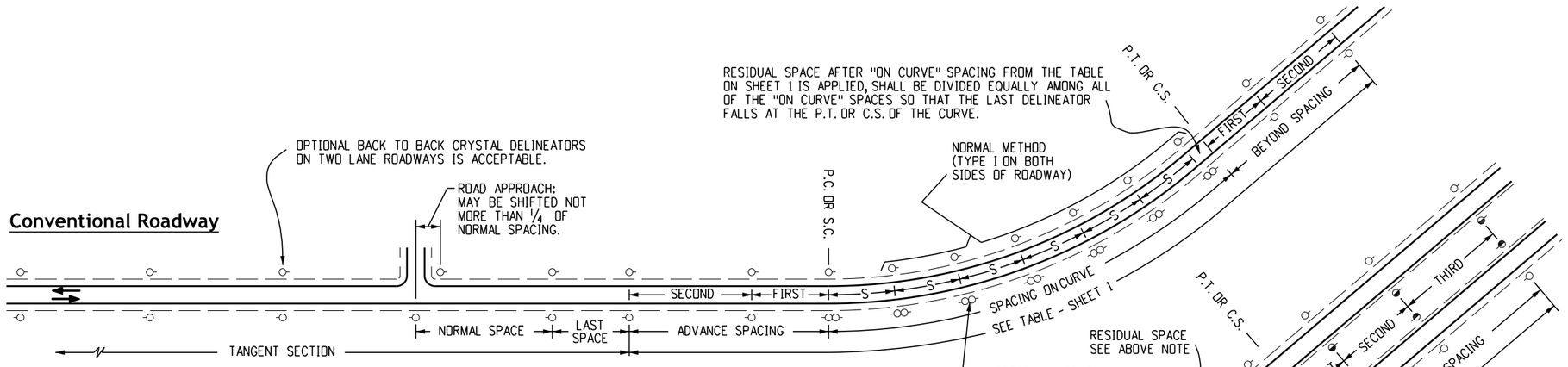
Colorado Department of Transportation
Traffic Safety & Engineering Services
2829 West Howard Place
Denver, CO 80204
EB

Delineator Installations

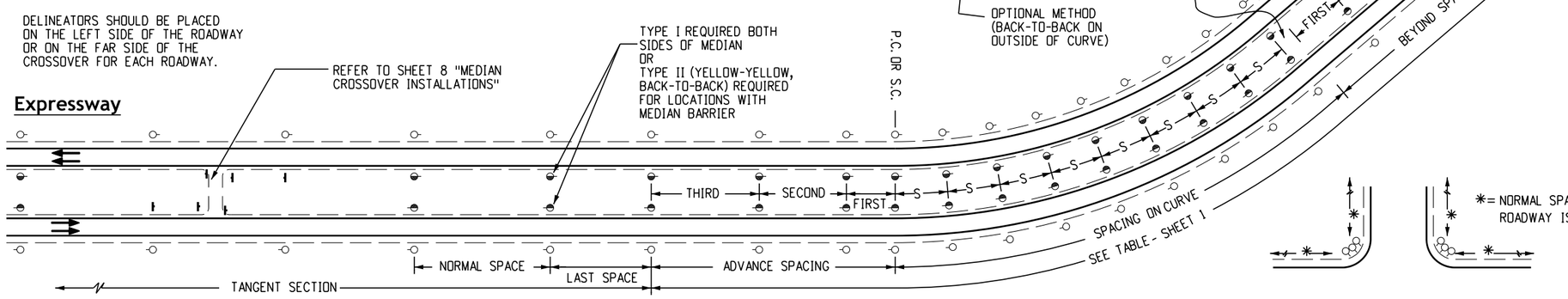
Issued by the Traffic Safety & Engineering Services: July 01, 2026

Standard Plan No.
S-612-1
Standard Sheet No. 1 of 8
Project Sheet Number:

Conventional Roadway

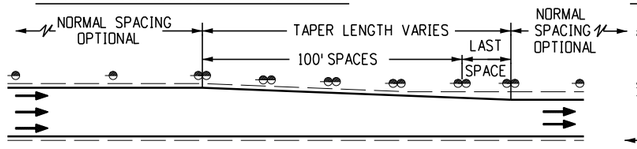


Expressway

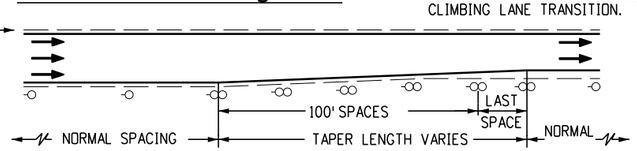


Typical Installation for Tangent Section and Curves

Width Reduction on Left Side

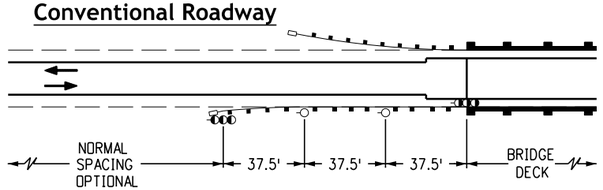


Width Reduction on Right Side

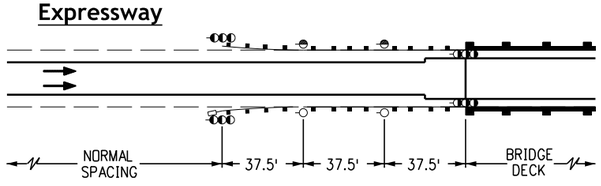


Typical Installation for Lane Transition

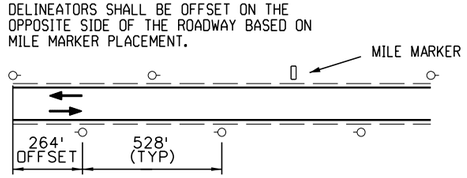
Conventional Roadway



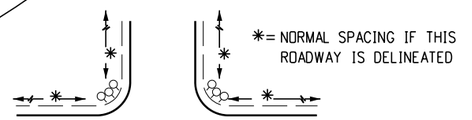
Expressway

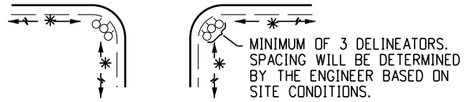


Typical Installation for Bridge Approaches



Typical Installation Staggered Delineators, 2-Lane State Highway





Typical Installation for Minor Intersection

Delineator Symbols and Typical Configuration

- Type I (Crystal)
- Type I (Yellow)
- Type I (Red)
- Type I (Blue) (Maintenance Marker)
- Type I (Green) (Maintenance Marker)
- Type II (2 Crystal)
- Type II (2 Yellow)
- Type II (Crystal-Crystal Back-to-Back)
- Type II (Yellow-Yellow, Back-to-Back)
- Type II (Crystal-Red, Back-to-Back)
- Type II (Yellow-Red, Back-to-Back)
- Type III (3 Yellow)
- Type III (2 Crystal-Red, Back-to-Back)
- Type III (2 Yellow-Red, Back-to-Back)
- Type III (Green) (Maintenance Marker)
- Type III (Blue) (Maintenance Marker)
- Median Crossover Delineator
- Type III (Yellow-Blue-Yellow)
- Bridge Joint Marker (OM1-U, OM1-D)

Bridge Approach Notes

1. Where the curb-to-curb width of a bridge is equal to or greater than the roadway width plus the usable shoulder width, use Type III delineators only and omit Type I delineators.
2. For guardrail installations where the approach end is not flared, place a Type III delineator (3 Green) immediately in advance of the approach end.
3. All Type I delineators are to be mounted above or immediately behind the guardrail and are not placed at a constant distance from the roadway.

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Delineator Installations

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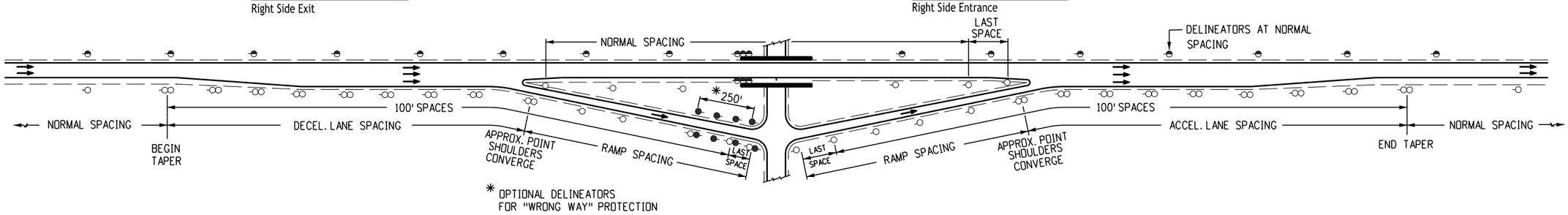
Standard Plan No.
S-612-1
Standard Sheet No. 2 of 8
Project Sheet Number:

Decel. Lane & Ramp
Right Side Exit

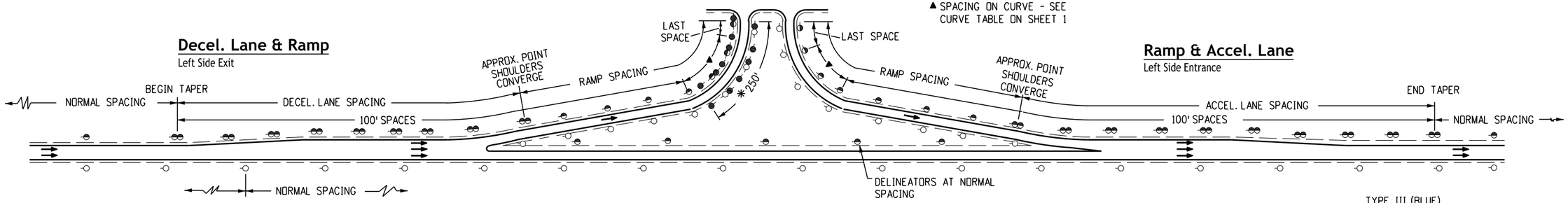
Ramp & Accel. Lane
Right Side Entrance



▲ SPACING ON CURVE - SEE CURVE TABLE ON SHEET 1

Decel. Lane & Ramp
Left Side Exit

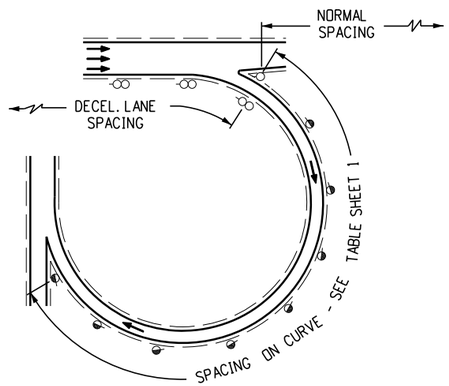
Ramp & Accel. Lane
Left Side Entrance



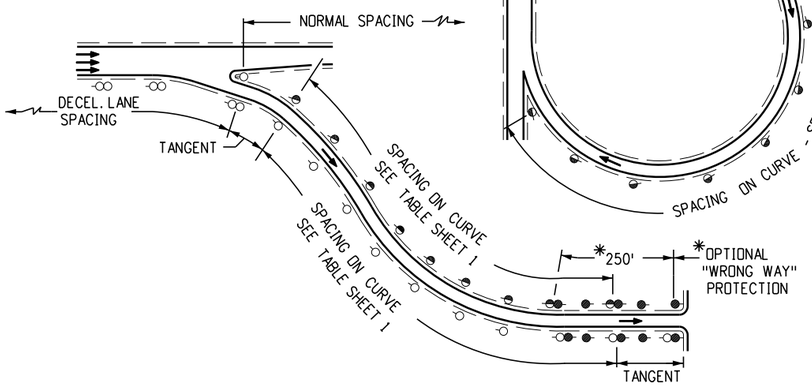
Typical Installation for Interchanges

Note
"Spacing in Advance of and Beyond The Curve" (1st., 2nd. & 3rd. Spaces) as shown in the spacing table on Sheet 1 shall not apply to ramp curves.

Cloverleaf Curve



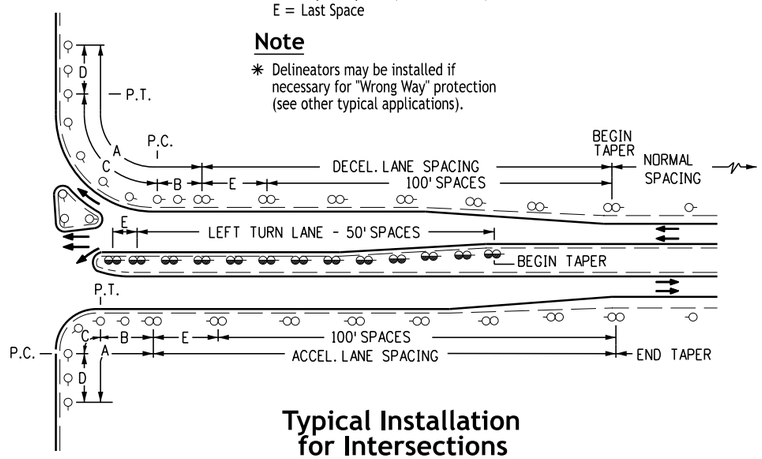
Curve & Reverse Curve



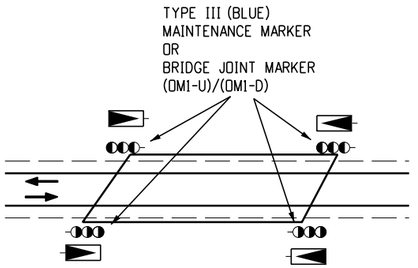
Typical Installation for Ramp Curves

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

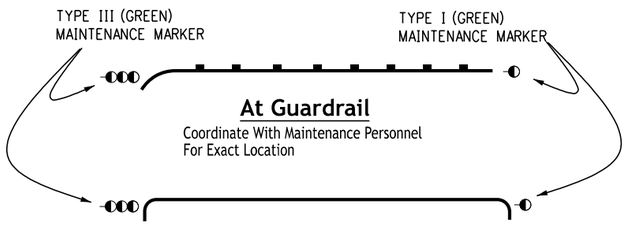
Note
* Delineators may be installed if necessary for "Wrong Way" protection (see other typical applications).



Typical Installation for Intersections
With Accel. & Decel. Lanes



At Bridge Joints



At Guardrail
Coordinate With Maintenance Personnel For Exact Location

At Curbs
When Deemed Necessary By Maintenance Superintendent

Maintenance Marker Locations for Obstructions

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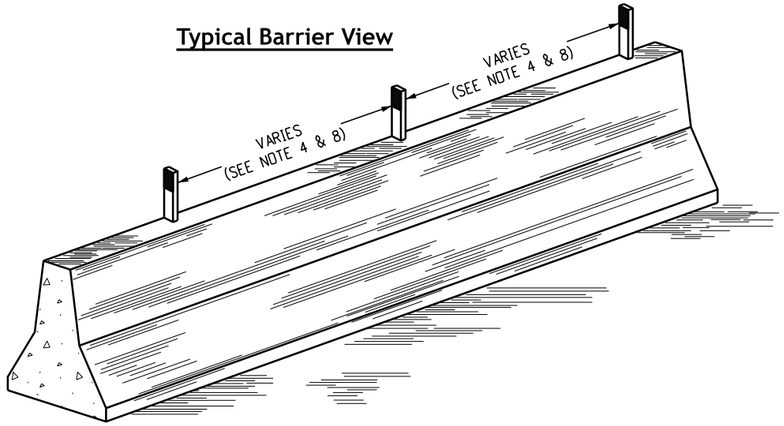
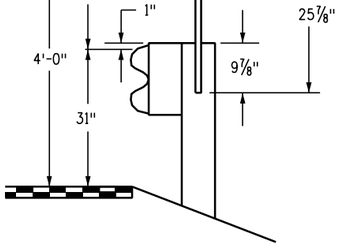
Standard Plan No.
S-612-1
Standard Sheet No. 3 of 8
Project Sheet Number:

Typical Barrier View

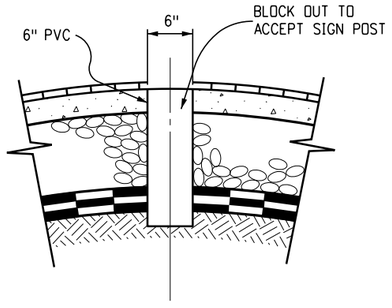


Typical Reflector Details for Concrete Barrier



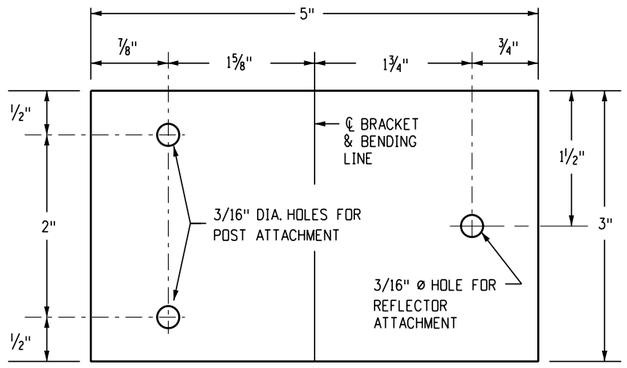
Typical Guardrail Post Mount Delineators

Post mount delineators shall be attached by a method approved by the Engineer or a method required by the device manufacturer.

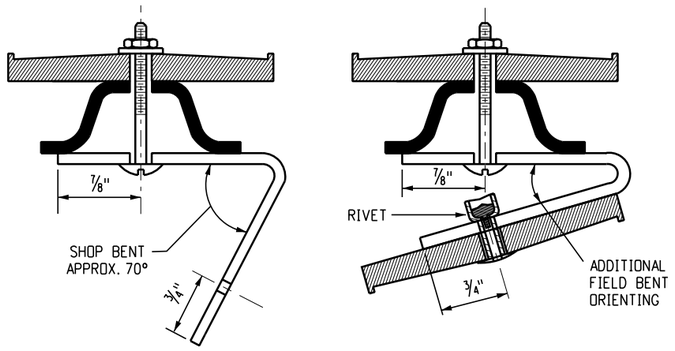


Typical Sleeve Installation for Median Delineator Posts

Plan View



Typical Adjustable Reflector Bracket

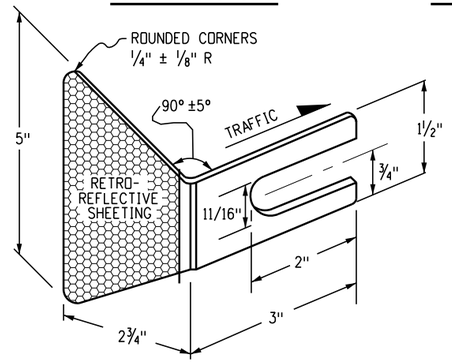


Typical Bracket Fabrication Details

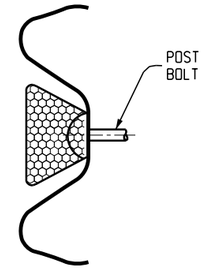
Bracket Notes

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 cadmium plated.
4. All bracket holes are 3/16 inch diameter and delineator posts require an additional hole 2 inches below the top hole provided in the post.
5. Shop bend the bracket approx. 70 degrees as shown, attach to the delineator post with 3/16 inch bolts and field bend as necessary to "Traffic Orient". Then the bracket reflector can be attached with a 3/16 inch blind expansion rivet or a bolt.
6. Burr the threads of all bolts to prevent nut loosening or vandalism.

Reflector Tab



Mounting Position On Guard Rail Type 3



Typical Guardrail Reflector Tab

See 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). The use of these reflectors is mandatory.
2. The color of reflective 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. Barrier reflectors shall be installed to meet the minimum spacing requirements of standard typical delineator installations. A 200 foot maximum tangent and curve spacings apply to barrier reflectors, unless otherwise noted in the plans or directed by the Engineer.
5. Top mount reflectors are standard, side-mount barrier reflectors or 6 inch wide reflector strips may be required if specified in the plans.
6. Median 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, barrier reflectors shall be installed to meet the minimum spacing requirements of the standard typical delineator installations. The maximum spacing shall be 50 feet, and they will not be paid for, but are included in the work.

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Delineator Installations

Issued by the Traffic Safety & Engineering Services: July 01, 2026

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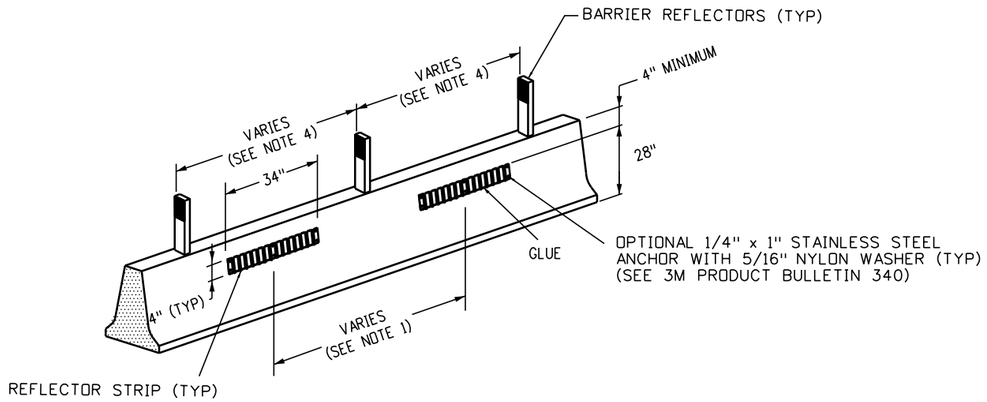
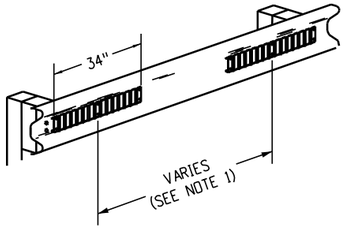
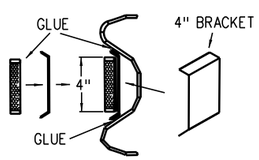
Typical Installation Detail for Continuous Concrete Barrier



Typical Installation Detail For Guardrail Type 3





Attachment Details

Typical Reflector Strip Installation

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 contact 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 ensure 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 use 1/4" x 1" stainless steel anchor with 5/16 inch nylon washer, as specified in 3M Product Bulletin 340.
4. Barrier reflectors shall be installed to meet the minimum spacing requirements of standard typical delineator installations. A 200-foot maximum tangent and curve spacing applies to barrier reflectors along the top of the barrier, unless otherwise noted in the plans or directed by the Engineer.

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 type 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, 1.5-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 use 1/4 inch x 1 inch stainless steel anchor with 5/16 inch nylon washer, as specified in 3M Product Bulletin 340.
5. Installation requires the use of three brackets (minimum) per reflector strip corresponding to the pre-drilled reflector strip holes.

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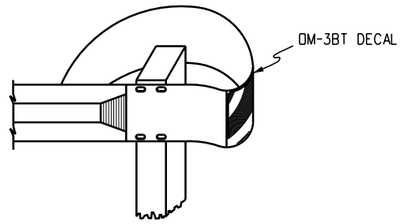
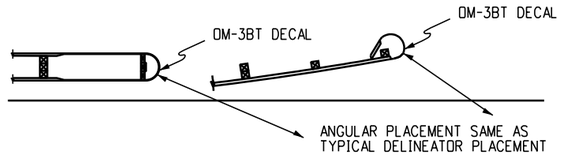
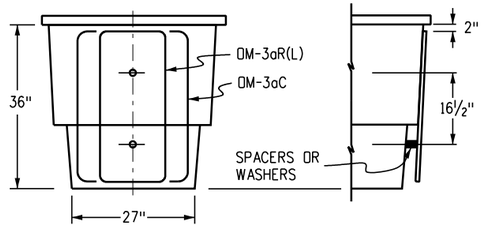


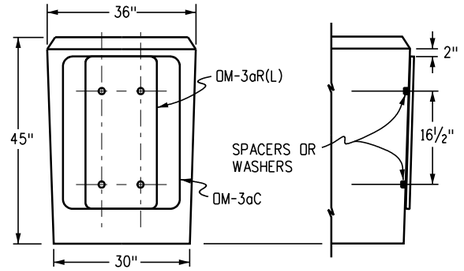
Side View



Top Views

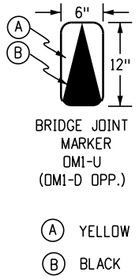
Buffer Terminals (BT)

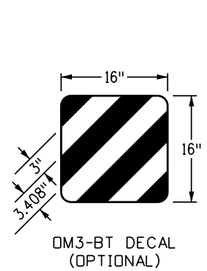


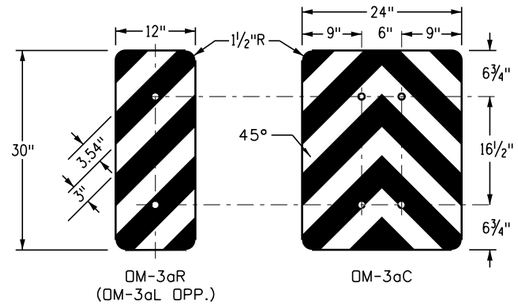


Front Views Side Views

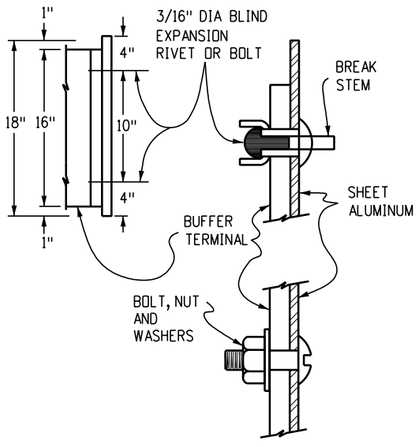
Impact Attenuator (Sand Filled)



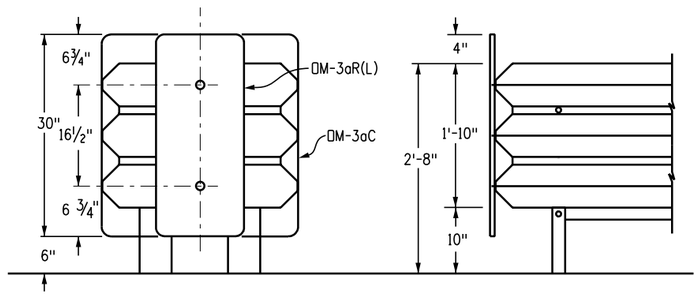




Supplemental Delineation Details

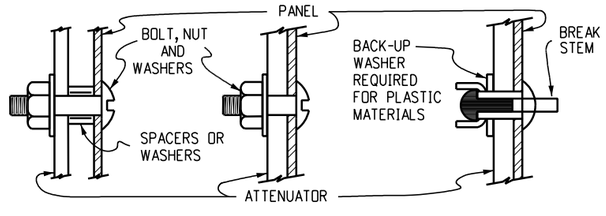


Buffer Panel Attachment Details



Front View Side View

Impact Attenuator (Modular)



Attenuator Panel Attachment Details

Supplemental Panel Notes

1. All supplemental delineation panels shall be single sheet aluminum, 0.080" minimum thickness.
2. Panels shall be fastened directly to the impact attenuator with 2 or 4-3/16 inch diameter blind expansion rivets, or 2 or 4-3/16 inch bolts, nuts and washers.
3. Expansion rivets shall be domed head aluminum with aluminum break stem mandrel, and shall have a back-up washer when used with plastic materials.
4. Bolts, nuts and washers shall be galvanized or cadmium plated.
5. Spacers, or spacing washers shall be used as necessary for sand filled attenuators.
6. 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).
7. 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 yellow sheeting background with stencil 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.
8. 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.
9. Reference S-612-1 Sheet 7 of 8 for base detail.

Supplemental Delineation for Guard Rail Buffer Terminals and Impact Attenuators

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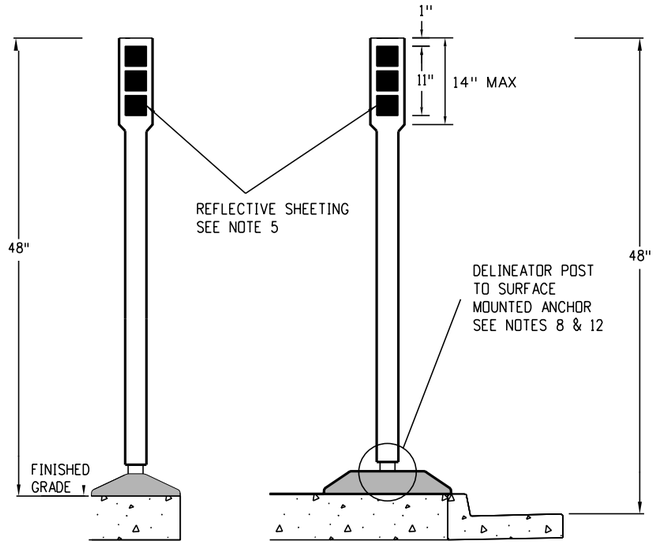
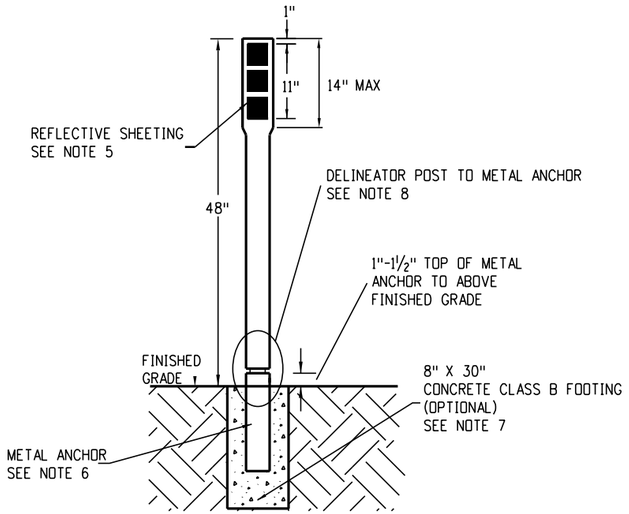
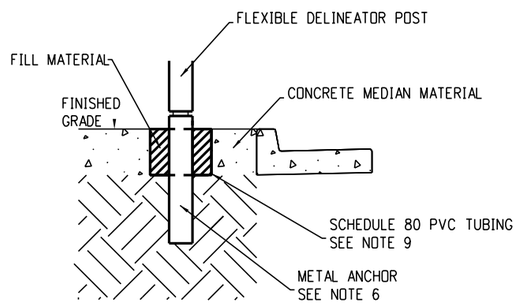


Surface Mounted

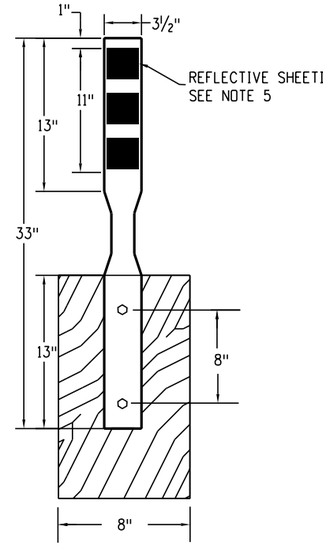


Typical Soil Conditions

Driveable Method

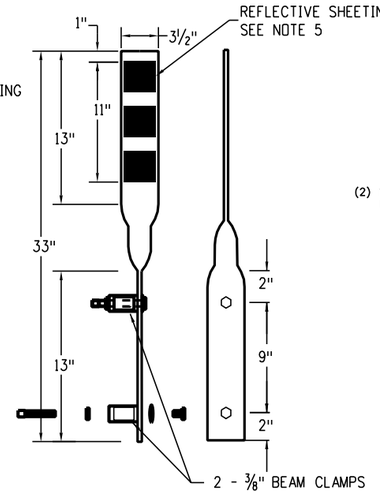


Concrete Median Material



Post Mounted

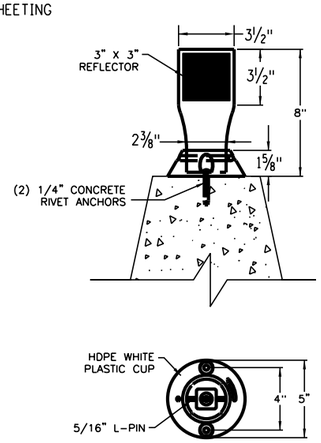
Guardrail



Front and Side View

Clamp Mounted

Cable Rail



Front and Top View

Cup Mounted

Concrete Barrier

Flexible Delineator Notes

1. Flexible delineator posts shall follow the requirements as outlined in CDOT's most recent version of the "Standard Specifications for Road and Bridge Construction". Flexible delineator posts shall be listed on CDOT's "Approved Products List" prior to installation.
2. The length of the flexible delineator post shall be installed to provide a height of 48 inches above the edge of pavement.
3. Flexible delineator posts shall be installed so that the reflective elements face oncoming traffic.
4. Reflective elements shall be pre-installed at the manufacturer's facility.
5. Reflective elements (sheeting) shall be Type IV or Type V. Reflective sheets shall be 3 inch squared. Reflective sheets shall be placed in a straight vertical column starting 1 inch from the top edge and separated by 1 inch vertically in the column. Sheeting quantity and color are dependent on the location of the delineator. See Sheet 2 of S-612-01 for typical configurations.
6. The metal anchor shall be 2 inch galvanized steel perforated square tubing measuring 24 inches in length and shall have an anchoring depth of 22 1/2 to 23 inches.
7. When a concrete base is required or as directed by the engineer, the metal anchor shall be encased in an 8 inch diameter by 30 inch depth concrete Class B footing. Concrete shall be included in the cost of the pay item.
8. The connection between the flexible delineator post and the metal anchor is product specific. all flexible delineator posts shall be installed per manufacturer's instructions.
9. Concrete median installations shall include a 4 inch diameter schedule 80, PVC tube. The tube length shall match the thickness of the concrete median material, be cut flush with the concrete, and be backfilled with soil.
10. "Drivable Method" is the preferred installation method for ground installations.
11. "Surface Mounted" installation shall only be installed during retrofit applications or as directed by the Engineer.
12. Surface mounted delineators should only be utilized for temporary configurations during construction. Surface mounted delineators may be utilized for curb and gutter applications; however, the "Drivable Method" is preferred. Surface mounted bases shall be attached to the surface via either bolt down or glue down methods.

Flexible Delineator Installations

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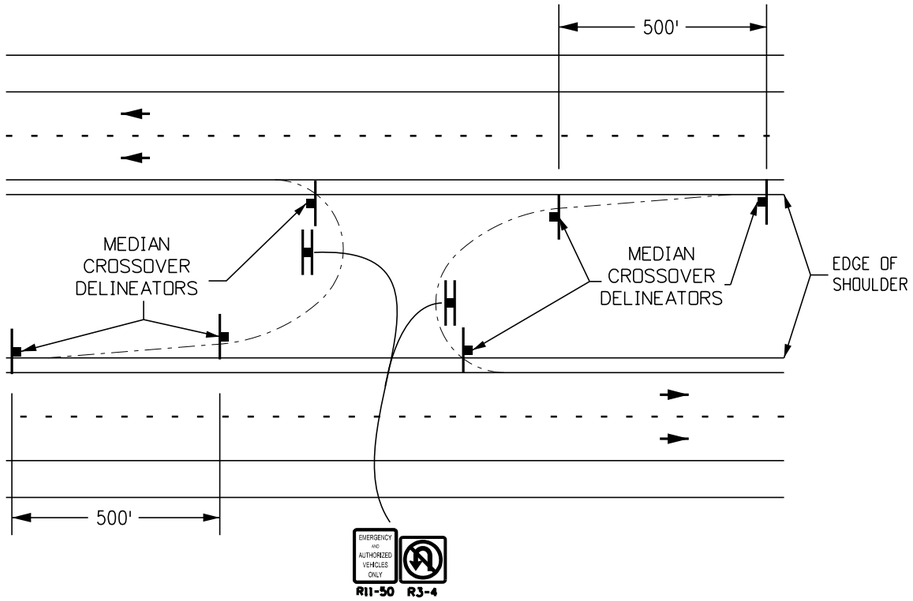
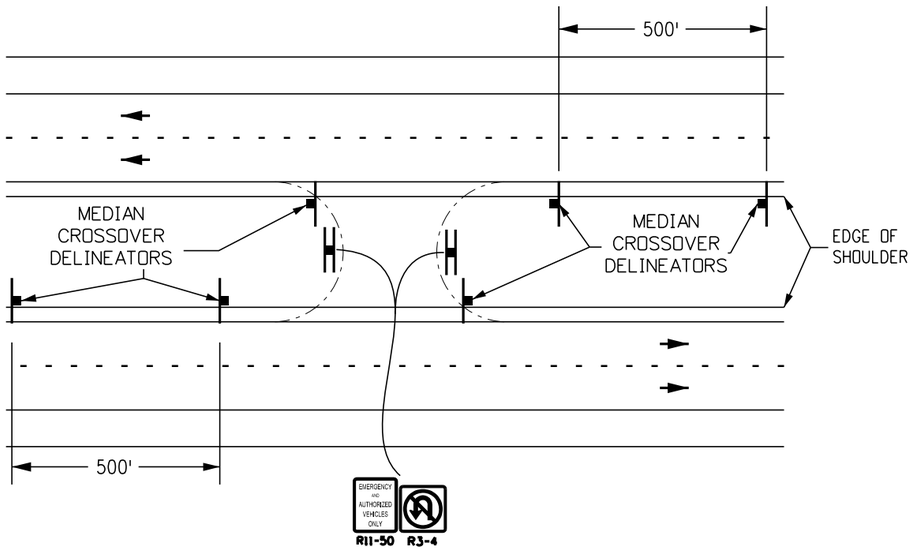


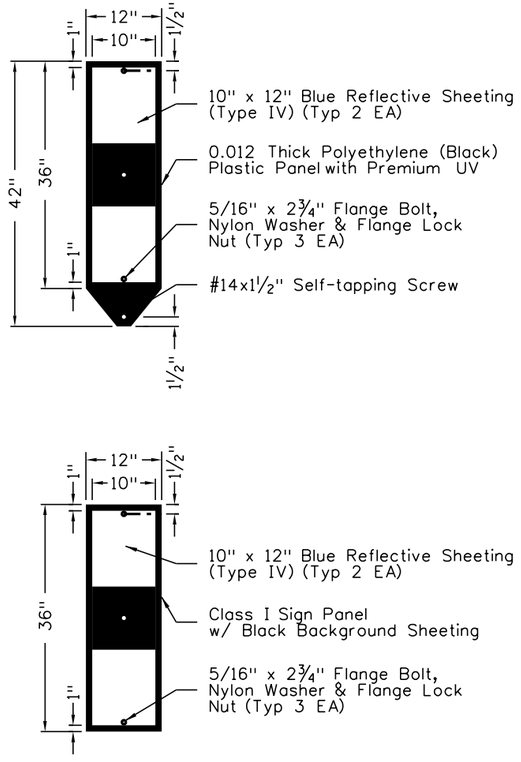
Median Width Greater Than 50 Feet



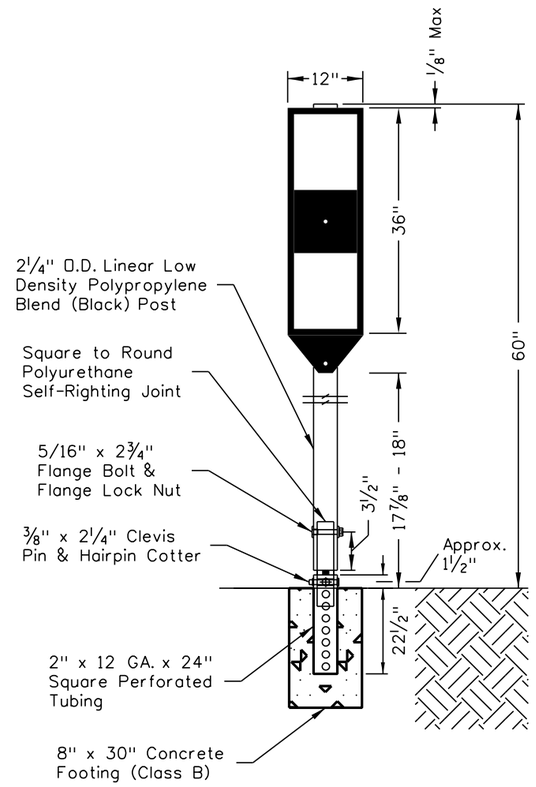
Median Width Less Than 50 Feet

Median Crossover Notes

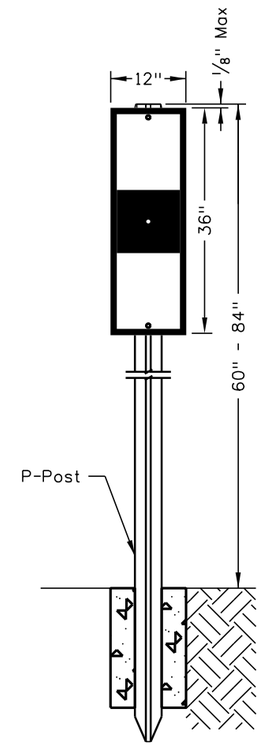
1. Mounting height to bottom of R11-50, "Emergency and Authorized Vehicles Only" sign, shall be 7 feet from the original ground.
2. See tubular steel sign support details (S-614-8) for concrete footing information for socket system installations and additional post installation requirements.
3. Place six (6) median crossover delineators, one 500 feet in advance of median crossover and one on each side of crossover as shown on the detail.
4. For visually constrained median crossovers, multiple sign panels (R3-4 and R11-50) may need to be placed within the crossover on separate posts, as directed by the Engineer.
5. The polyethylene plastic panel may be used on either polypropylene blend post and P-Post installations. In contrast, the Class I sign panel shall only be used on P-Post installations.



Median Crossover Delineators



Driveable (Preferred)



Socket System (Alternate)

Median Crossover Installations

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