

MDOT
Michigan Department of Transportation

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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

**PERFORATED STEEL SQUARE
TUBE SIGN BREAKAWAY SYS**

05/24/18 F.H.W.A. APPROVAL	07/19/16 PLAN DATE	SIGN-207-D	SHEET 1 OF 15
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MDOT PART NUMBER	LIST OF MATERIALS
M-01	Slipbase (8" Sq. SYS.) - Northwest Pipe part #31209
M-02	Stub Insert (8" Sq. SYS.)
M-03	Post, Inner 2 1/2" sq. x variable length 10 ga.
M-04	Insert Anchor 3" sq. x 36" 7 ga.
M-05	5/16"- 18 Grade 5, 3" corner bolt
M-05a	5/16"- 18 Steel flange nuts
M-06	1/2"- 13 x 3" Grade 5 zinc plated flange bolts
M-06a	1/2"- 13 Flange nuts
M-06b	1/2" Flat washers, 3/16" thick, 9/16 I.D., 1-3/8 O.D.
M-07	1/2"- 13 x 4" Hot dipped galvanized Grade 8 hex head bolts with 1" of thread
M-07a	1/2"- 13 Hot dipped galvanized Grade 8 nut
M-07b	1/2" Hot dipped galvanized flat washers 1" O.D.
M-07c	1/2" Hot dipped galvanized lock washers 13/16" O.D.
M-08	Slipbase Bolt Keeper Plate (8" Sq. SYS.)

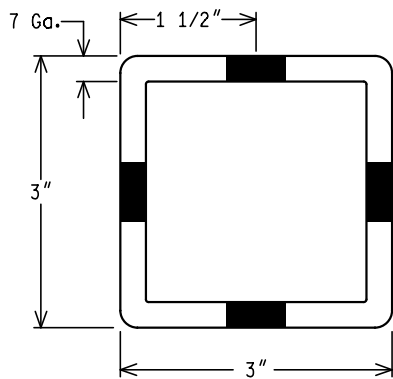
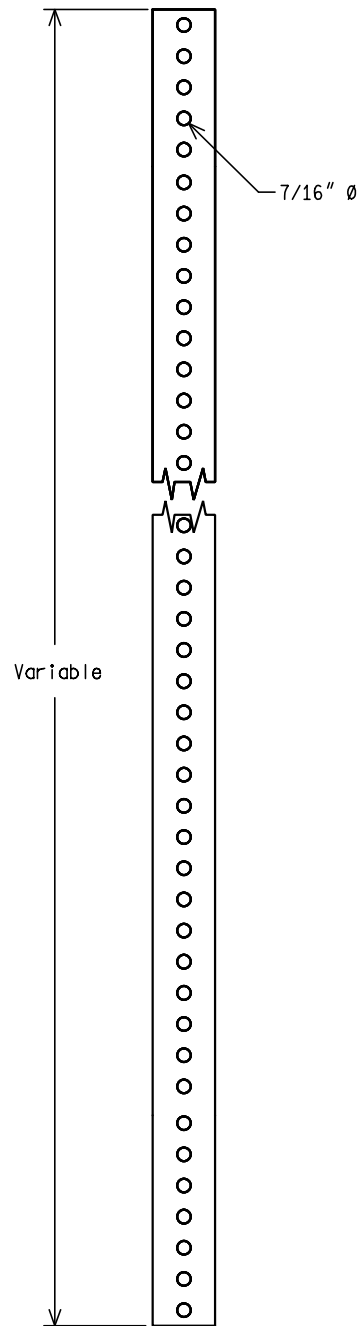
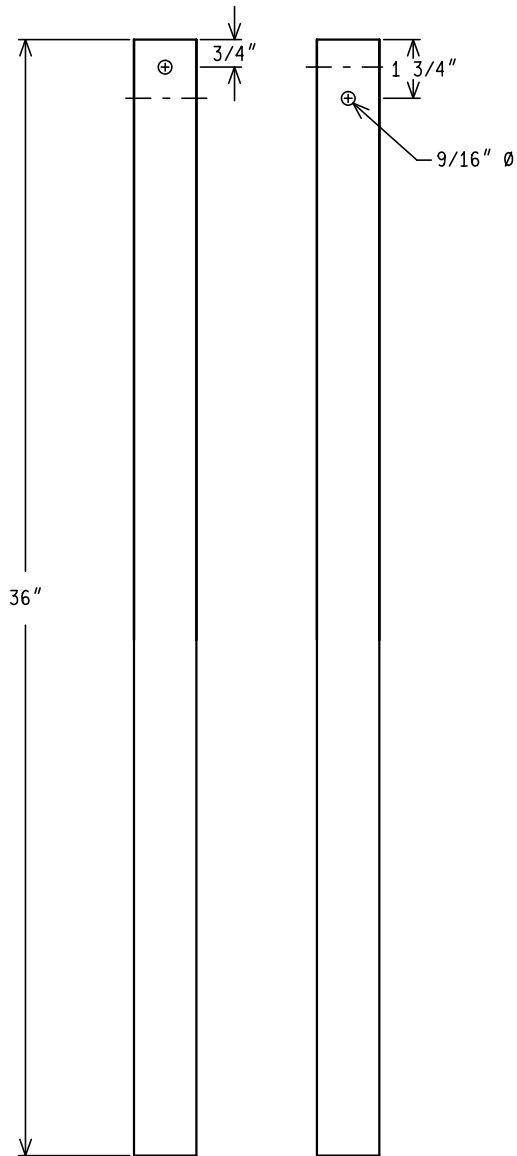
NOTES:

1. Refer to the wind-load charts (sheet 11 of 14) for appropriate sign post installation.
2. The anchor M-04 is for concrete installation.
3. Quantity of materials used for the single post installation will be increased according to the number of posts required for proper sign placement.

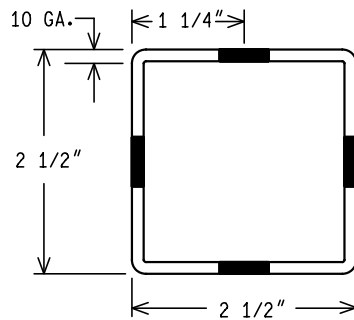
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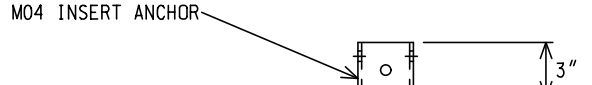
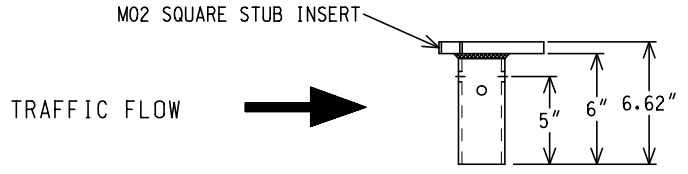


INSERT ANCHOR, M-04



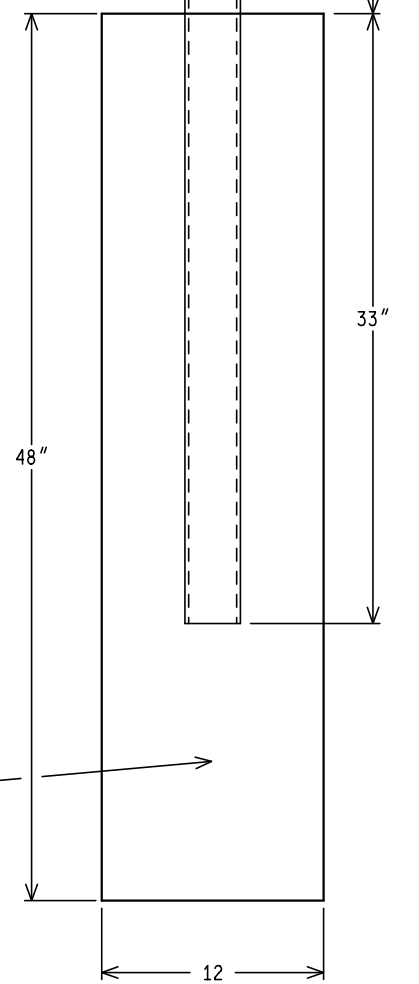
**PERFORATED SQUARE
STEEL POST, M-03**

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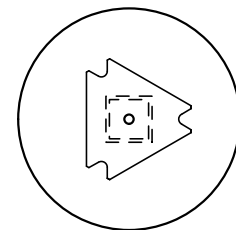


NOTES:

1. Top of foundation shall be flush with ground on flat slopes. edge of foundation nearest roadway shall be flush with ground on fill slopes. edge of foundation farthest from roadway shall be flush with ground on cut slopes.
2. Concrete for breakaway column foundations must be grade M as specified in section 601 of the Standard Specifications for Construction.
3. Concrete shall be used and placed against undisturbed soil in an augered hole. The steel anchor shall be held in correct position with a template until the concrete has properly set.



Elevation View

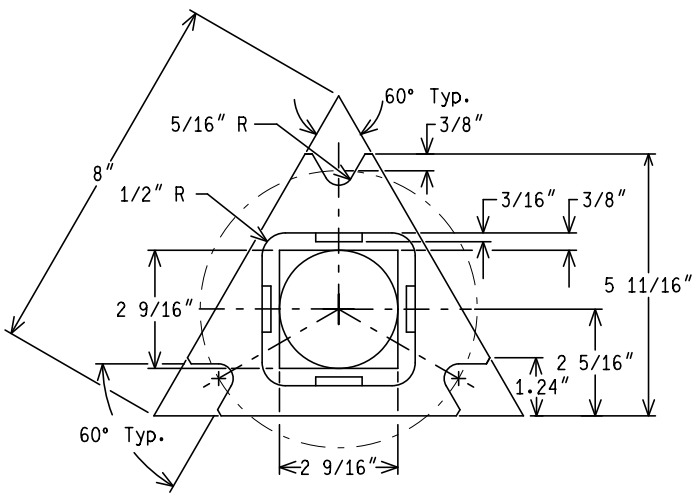


Top View
CONCRETE BASE
.12 Cu. Yds.

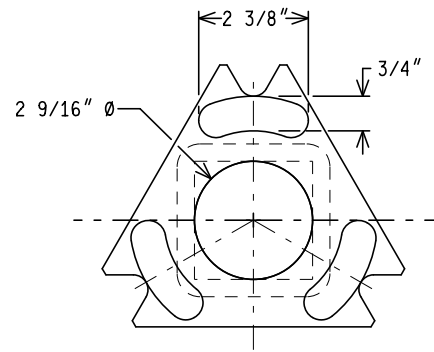
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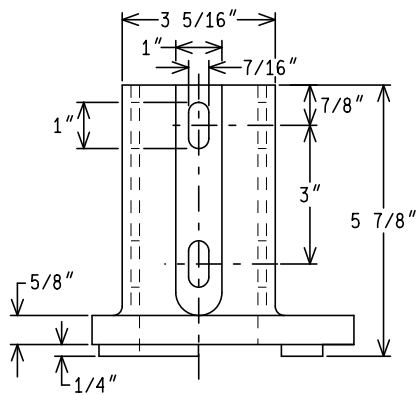
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TOP VIEW



BOTTOM VIEW



SIDE VIEW

**SLIPBASE
(8" SQUARE SYSTEM)**

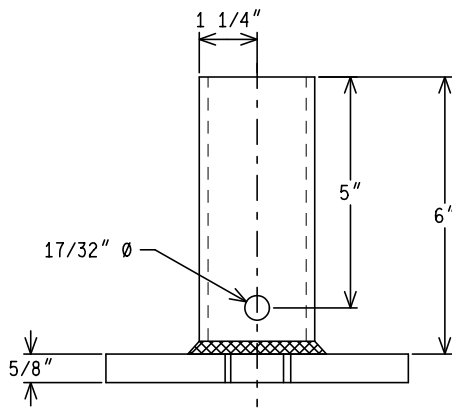
NOTES:

1. Material: ASTM A-536 Grade 65-45-12 ductile iron.
2. Hot dip galvanize per ASTM A-153.
3. Clean bore I.D. and counterbore after galvanizing to remove excess zinc.
4. Casting part number-31209.
5. Unless noted: all radii and fillets are 1/4".
6. Square hole tapers from 2 9/16" to 2 1/2" at the bottom.

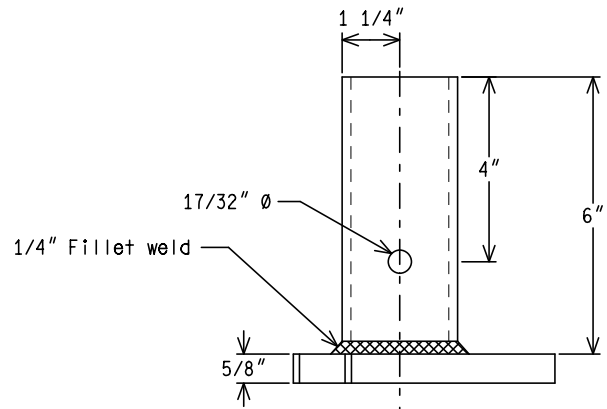
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MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	05/24/18 F.H.W.A. APPROVAL	07/19/16 PLAN DATE	SIGN-207-D	SHEET 5 OF 15
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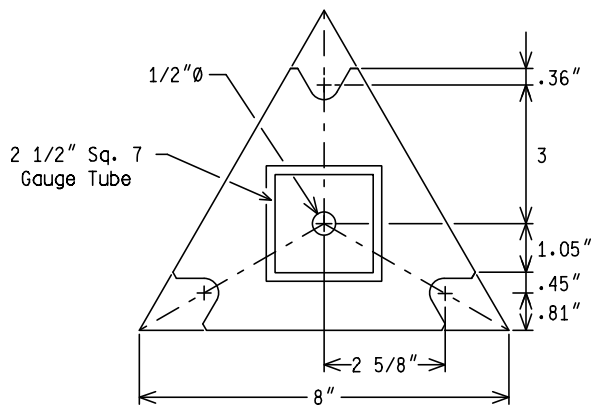
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TOP VIEW



SIDE VIEW



END VIEW

SLIPBASE STUB INSERT (8" SQUARE SYSTEM)

NOTES:

1. Tube shall conform to ASTM A53 GR B or A500.
2. All fabrication shall be completed prior to galvanization according to ASTM A 123 G85 min.
3. Hole in Sliplate is to provide escape path for gasses during hot dip galvanization. Exact hole placement may vary as needed.
4. Sliplate shall be fabricated from ASTM A36 or A572 steel plate.
5. All welding to be preformed in accordance with ANSI/AWI D1.1 specifications.

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BUREAU OF DEVELOPMENT STANDARD PLAN

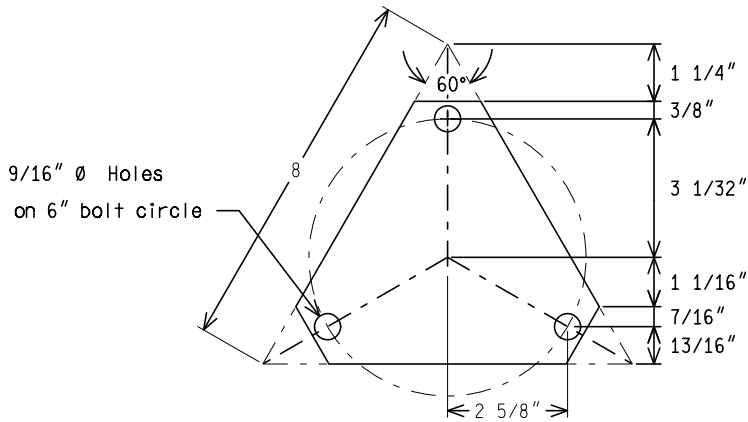
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07/19/16
PLAN DATE

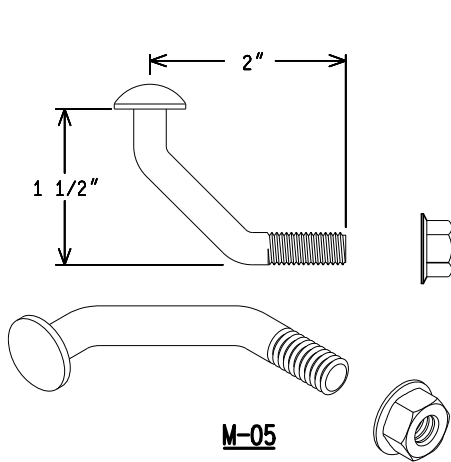
SIGN-207-D

SHEET
6 OF 15

Stamp Bolt Keeper Plate Spacer from galvanized sheet
 26-30 ga. ASTM A-563 G-90 coating

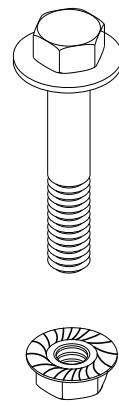


BOLT KEEPER PLATE
(8" SQUARE SYSTEM)



M-05

- (2) 5/16" - 18 Grade 5 large corner steel bolt
- (2) 5/16" - 18 Hex flange steel nut



M-08

- (3) 1/2" - 13 x 3" Hex flange head zinc plated bolt
- (3) 1/2" - 13 Hex flange zinc plated nut
- (6) 1/2" x 3/32" Heavy duty zinc plated flat washer

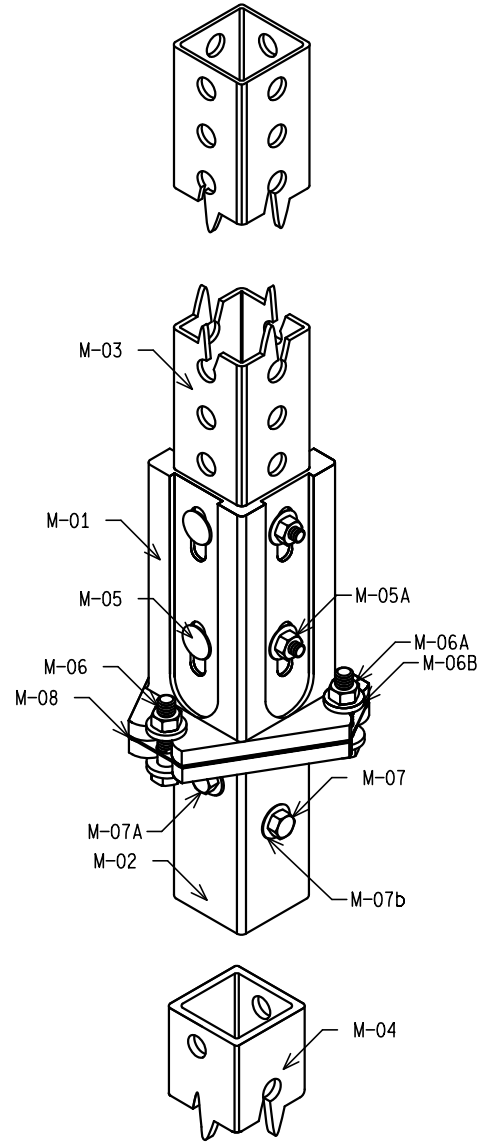
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MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	05/24/18 F.H.W.A. APPROVAL	07/19/16 PLAN DATE	SIGN-207-D	SHEET 7 OF 15
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INSTALLATION CHECKLIST

1. Install the anchor assembly (M0-4) into the concrete base and align with the traffic flow (see figure 1).
 - a) For concrete installation (required in weak soil), a 48" deep and 12" minimum diameter hole is required for concrete footings.
2. Install anchor assembly allowing only two holes above grade.(3" max.)
3. Slide 6" stub (M0-2) of breakaway assembly into anchor having the bolt location align with traffic flow (see figure 1) and fasten with two 1/2" x 4" bolts (M-07) washers (M0-7b) and nuts (M-07a).
4. If breakaway assembly is pre-assembled, proceed to step 14.
5. Place the Slipbase bolt keeper plate (M-08) on the 6" stub (M02).
6. Place the square Slipbase (M01) on top of the bolt keeper (M08) with the 3 hole side facing on coming traffic.
7. Align the Slipbase (M01), the bolt keeper (M-08) and the 6" stub insert (M02).
8. Slide each flat washer (M-06b) on each of the three inverted 1/2" x 3" steel bolts (M-06).
9. Insert above bolt (M-06) with flat washer (M-06c) up through notched hole of assembly (M-01).
10. Place the second flat washer (M-06b) down on to the above bolts (M-06).
11. Complete by fastening the nut (M-06b) to the steel bolt (M-06) and tighten snugly down against the top flat washer (M-06b).
12. Repeat step 9, 10 & 11 on the two remaining notched holes of the triangular points.
13. After fastening all hardware, torque the three 1/2" nuts (M-06b) in a circular pattern to 80 ft-lbs maximum.
14. Slide appropriate upright post (M03), (refer to the allowable sign area per post/wind load charts), into the 8" Slipbase (M01) of breakaway assembly and fasten with two 5/16" corner bolts (M-05) and flange nuts (M-05a).



TRAFFIC FLOW

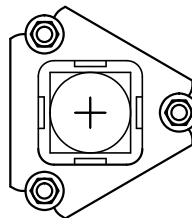


FIGURE 1

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	05/24/18 F.H.W.A. APPROVAL	07/19/16 PLAN DATE	SIGN-207-D	SHEET 8 OF 15
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INSTALLATION INSTRUCTIONS

1. Check with utility companies to mark anchor and post location
2. Drill 12" hole 48" deep install concrete foundation.
3. Orientate anchor for correct sign placement (see figure 1, sheet 8 of 14).
4. Continue to install anchor until two holes are remaining above surface level.
5. Check anchor for plumb and square.
6. Install sign on post using MDOT approved hardware for Type II signs and aluminum rivets for Type III signs.
7. Insert post with sign into Slipbase six holes deep.
8. See Sign-100-Series and Sign-120-Series for appropriate bottom height.
9. Use corner bolt to fasten anchor and post.
10. Following these procedures the post and anchor will be installed according to NCHRP 350.
11. The signs should be placed on the supports following SHS 10 - Support Hole Placement. For rectangular signs the support should be long enough to reach The top of the sign. The support should not extend beyond the top edge of the sign. For signs that are not rectangular the support should extend to the top of the sign without extending beyond the top edge. The support should not be visible when facing the sign.

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MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	05/24/18 F.H.W.A. APPROVAL	07/19/16 PLAN DATE	SIGN-207-D	SHEET 9 OF 15
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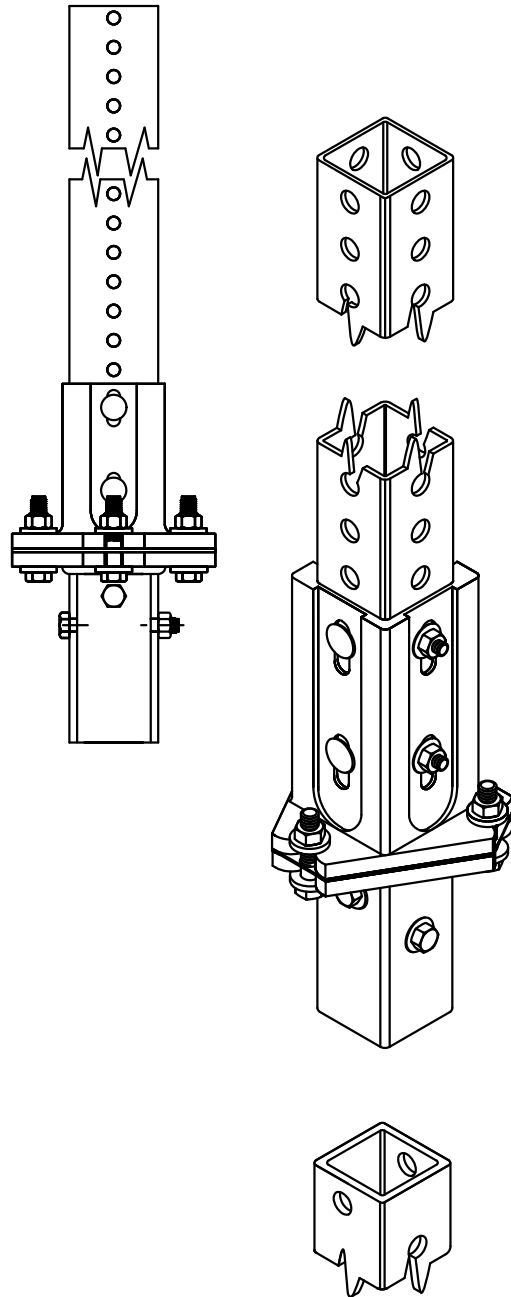
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PERFORATED STEEL SQUARE TUBE SIGN BREAKAWAY SYSTEM SPECIFICATIONS

The breakaway system is designed to allow a traffic sign to breakaway near ground level upon impact by a vehicle. the breakaway system conforms to NCHRP 350 standards for breakaway sign supports.

BASIC COMPONENTS: Top coupling, middle bolt keeper plate, bottom coupling, and clamping bolts including nuts and flat washers.

1. Top casting consists of a 8" triangular ASTM A-536 Grade 65-45-12 ductile iron casting with a minimum yield strength of 45,000 psi.
2. Bottom coupling consists of a 2 1/2" square steel tube (3/16" wall @ 6" long) welded to a 5/8" triangular steel plate.
3. The bottom steel tubing is structural ASTM A-53 Grade B with a minimum Yield Strength of 46,000 psi.
4. The bottom 5/8" thick triangular steel plate is structural ASTM A572 Grade 50 with a minimum Yield Strength of 50,000 psi.
5. Both top and bottom couplings are hot-dip galvanized (zinc coated) finished.
6. Top and bottom triangular steel plates have a bolt circle diameter of 6".
7. Middle bolt keeper galvanized sheet, plate thickness: 26-30 gauge.
8. Clamping bolt type: Grade 5, zinc plated flanged bolt.
9. Clamping bolt size: 1/2" diameter and 3" in length.
10. Steel nuts are 1/2", zinc plated flanged nut.
11. Flat washers are 3/16" thick, 17/32" I.D, 1-1/8" O.D.
12. Clamping bolt torque: 80 lbs-ft maximum.
13. No scheduled re-torque is required.
14. Periodic inspection is recommended.

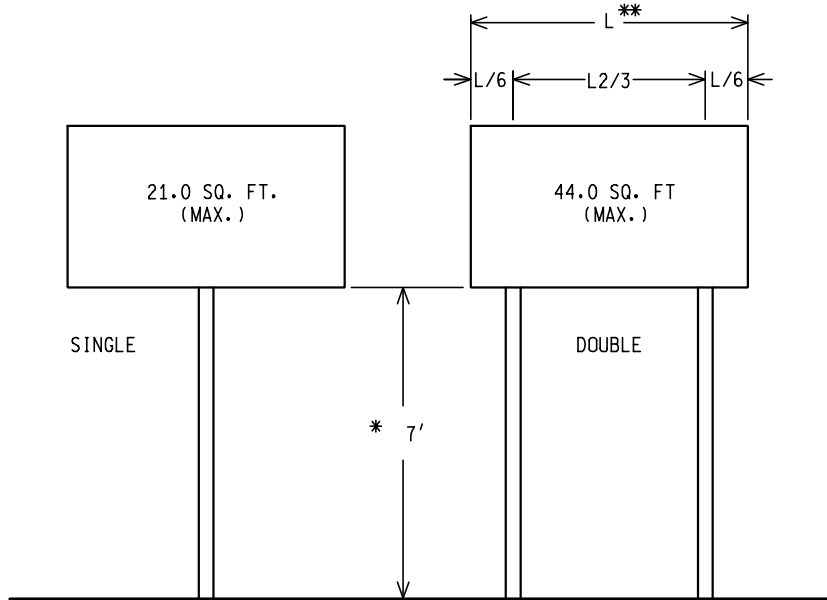


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PERFORATED STEEL SQUARE
TUBE SIGN BREAKAWAY SYSTEM
FOR
90 MPH WIND SPEED



*/** The bottom height is defined as height from the near edge of the travel lane pavement to the bottom of the sign panel. See Sign-100-Series and Sign-120-Series for required minimum bottom height and support spacings.

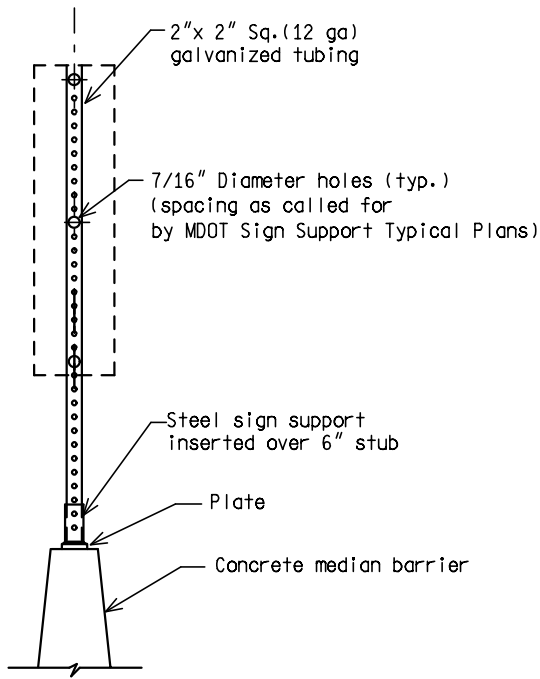
NOTE:

For signs over 44 sft. use the charts on SIGN-150-SERIES.

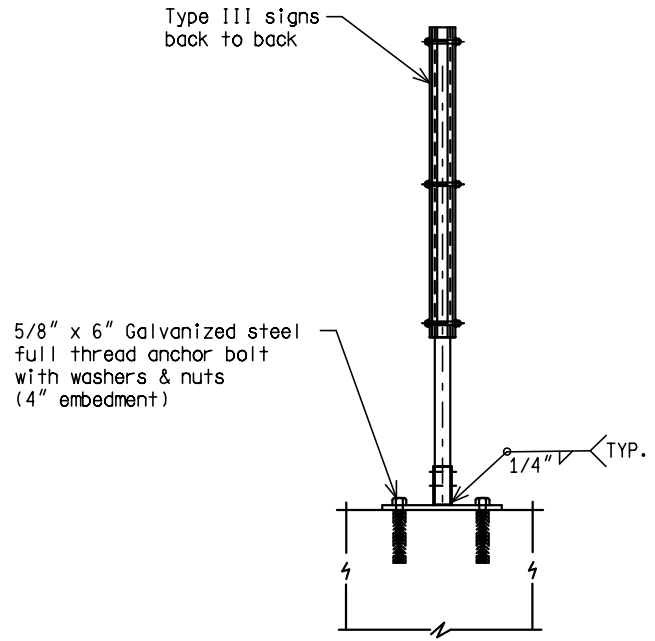
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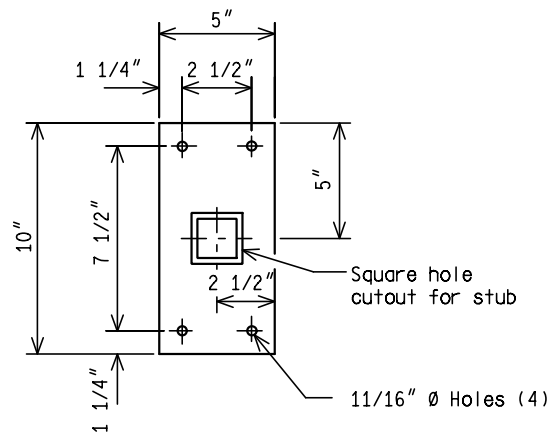
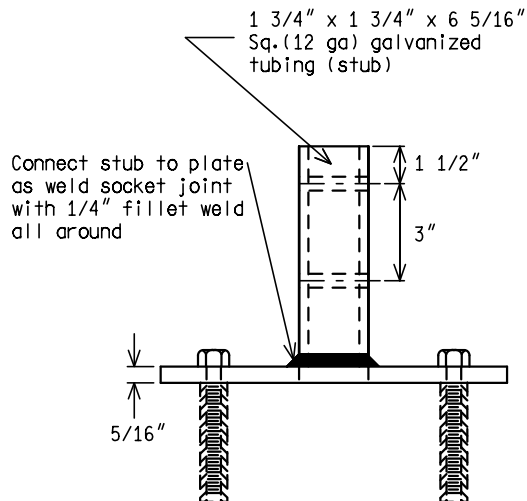


FRONT ELEVATION



SIDE ELEVATION

**CONCRETE MEDIAN BARRIER CONNECTION
(SQUARE TUBE SUPPORT)**

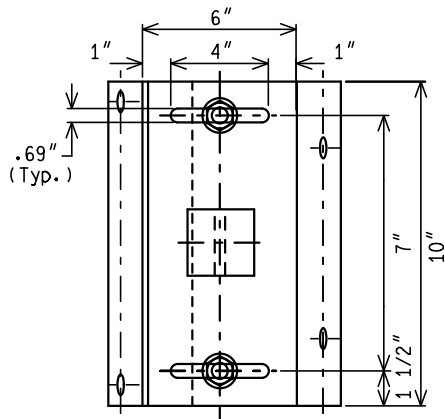


BASE PLATE DETAILS

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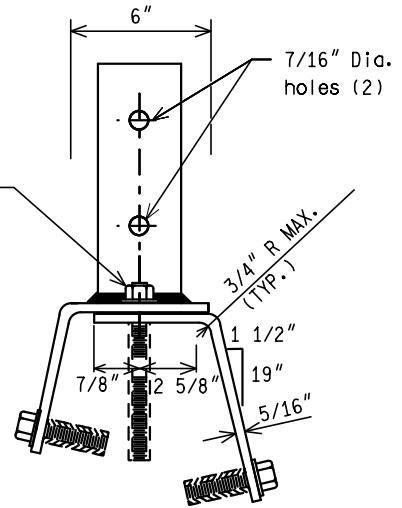
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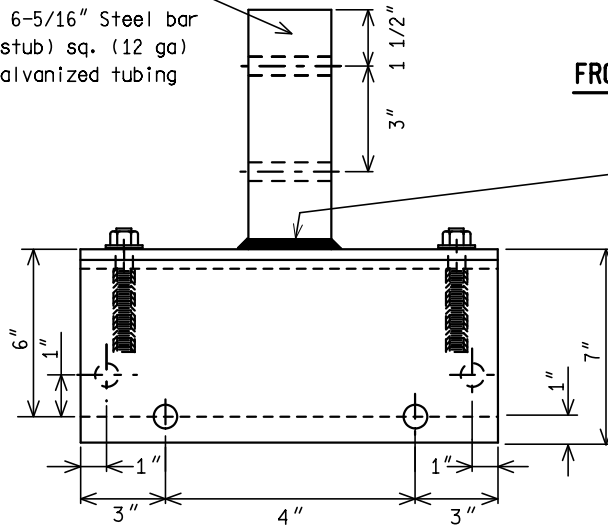
TOP VIEW

5/8" x 6" Galvanized steel full thread anchor bolt w/ washers & nuts (4" embedment)



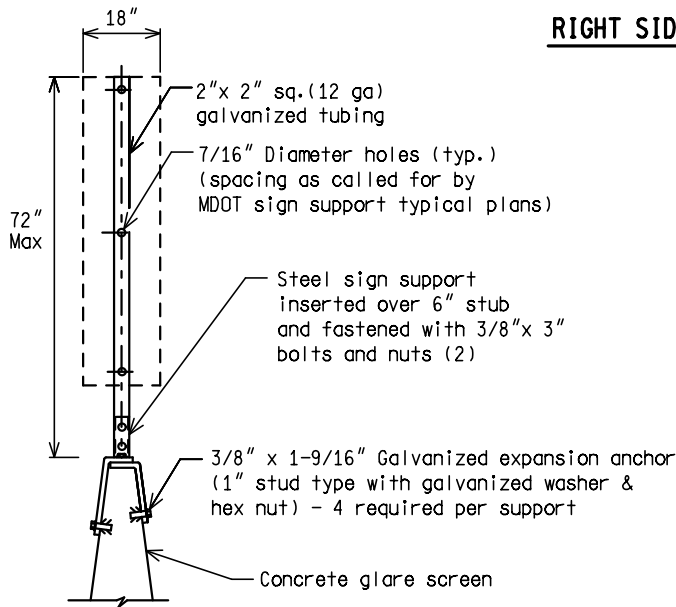
FRONT VIEW

1 3/4" x 1 3/4" @ 6-5/16" Steel bar (stub) sq. (12 ga) galvanized tubing

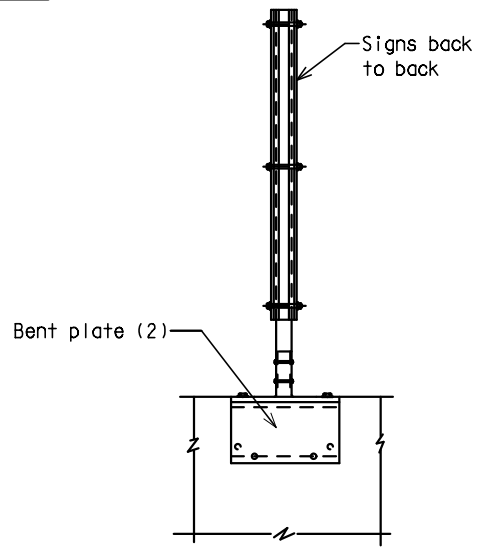


RIGHT SIDE VIEW

Connect stub to bent plate as a weld socket joint with 1/4" fillet weld all around.



FRONT ELEVATION



SIDE ELEVATION

**CONCRETE GLARE SCREEN CONNECTION
(SQUARE TUBE SUPPORT)**

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BUREAU OF DEVELOPMENT STANDARD PLAN

05/24/18
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07/19/16
PLAN DATE

SIGN-207-D

SHEET
13 OF 15

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NOTES:

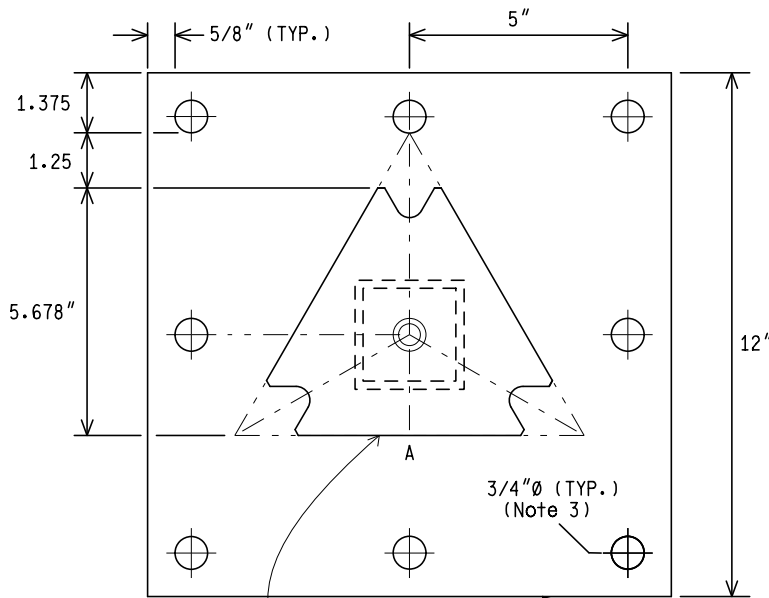
1. The materials and galvanized finish for the connection components (steel pipe, channels, square tube, stub & plate) shall be per the current MDOT Standard Specifications for Construction after fabrication. (section 919)
2. All fastening hardware (bolts, nuts and washers) shall be galvanized to ASTM 153, full thread anchor bolt manufactured to ASTM A36 Mod55. Hex bolt manufactured to A307.
3. The adhesive anchoring system tested to ASTM E488.
4. Square tube support suitable for single sign connection with a maximum of 9 sft. Back to back sign connections have a maximum of 18 sft.
5. Sign substrates shall be aluminum for barrier connections per section 919 of the Standard Specifications for Construction.
6. Use the concrete median barrier connection (square tube support) when installing signs on concrete barriers having a top width of 6 inches or wider.
7. Glare screen and barrier connections must be installed to ensure that either a pipe support or a square tube is plumb on the glare screen or concrete barrier wall.

NOT TO SCALE

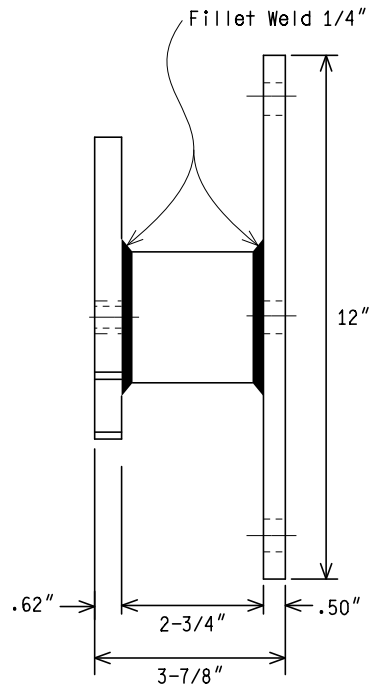
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SQUARE BOLTDOWN STUB

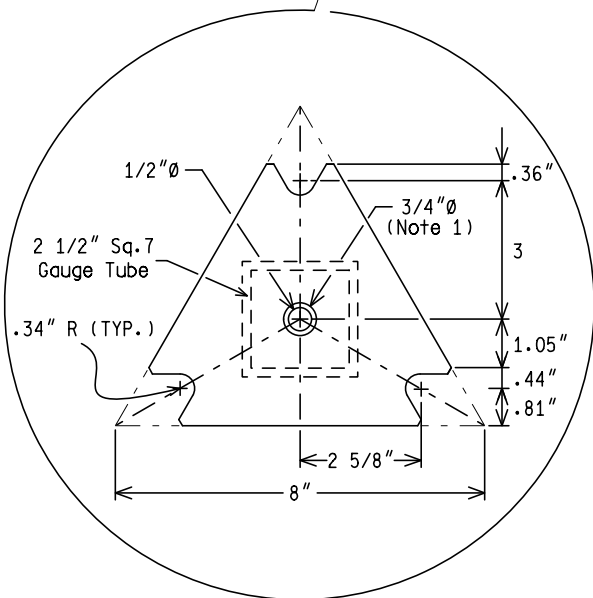


TOP VIEW

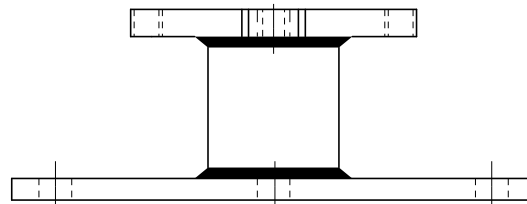


SIDE VIEW

Base Plate
(Note 2)



DETAIL A



FRONT VIEW

NOTES:

1. The hole in the bottom base is 3/4" dia. for escape of zinc and gasses during the hot dip galvanizing. This hole should be located under the 1/2" hole in the top plate, but may vary as needed. The tolerance on this hole dia. is + - .125"
2. Base plate 1/2" ASTM A-36, 441 OR 572 Steel plate pipe stub 3" square tubing nominal 7 gauge, ASTM A-52 GRB fabricate and galvanize to ASTM A-123.
3. 300 series stainless steel wedge anchor bolt with stainless steel lockwasher and nut. Refer to 2012 Specifications for Construction Section 919.02.

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PLAN DATE

SIGN-207-D

SHEET
15 OF 15