

Michigan Department of Transportation Traffic and Safety



STATEWIDE TRAFFIC SIGNAL DETAILS


SIG-10-A THROUGH SIG-460-A

Disclaimer:

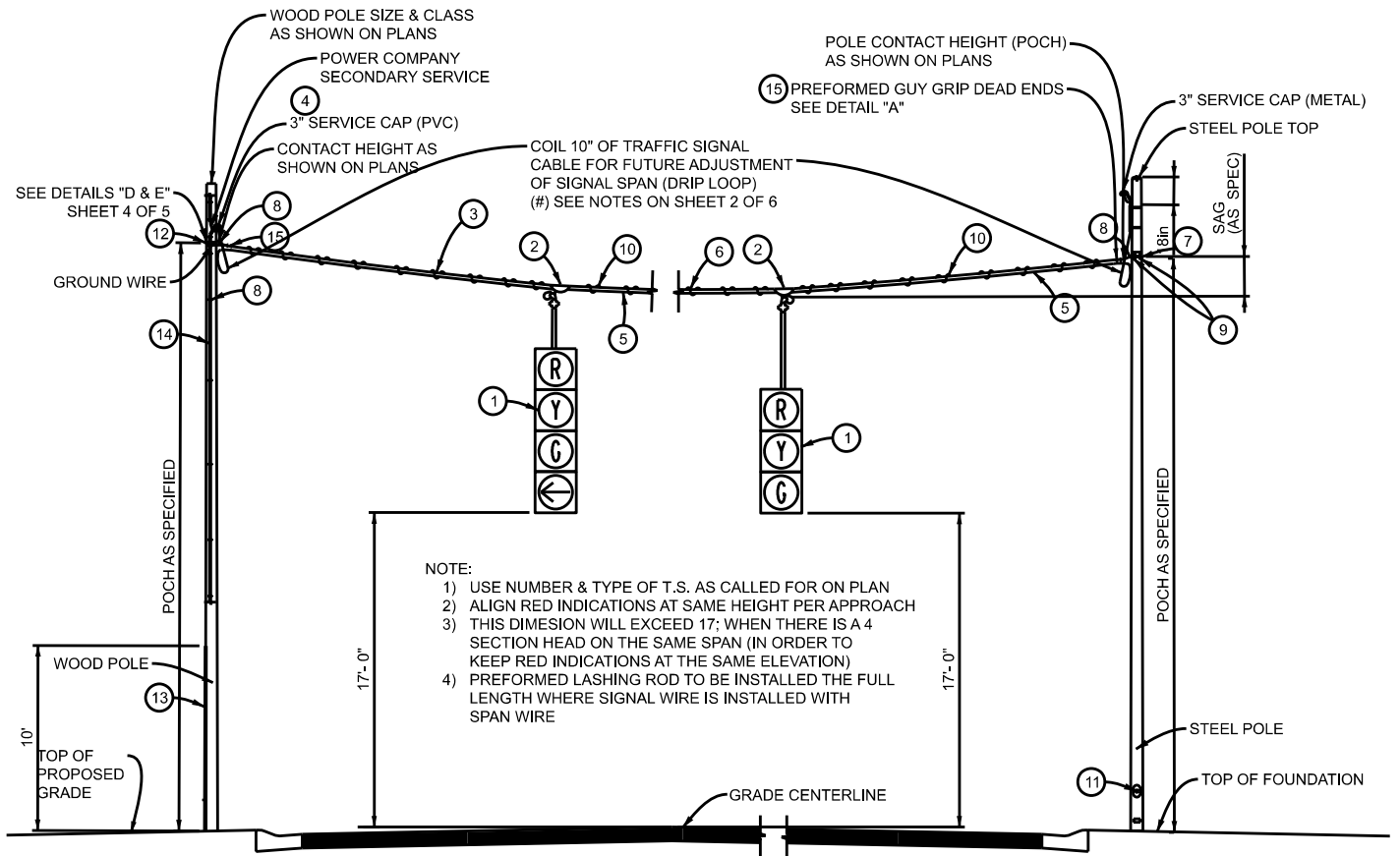
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ENGLISH VERSION

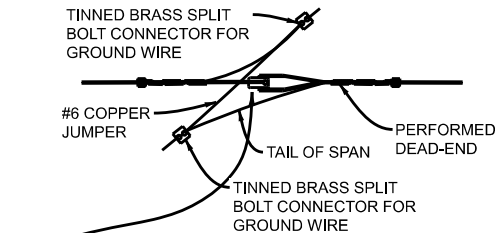
 Michigan Department of Transportation	PREPARED BY TRAFFIC AND SAFETY
	ENGINEER OF TRAFFIC AND SAFETY
DEPARTMENT DIRECTOR KIRK T. STEUDLE	DRAWN BY: MTS
	CHECKED BY: JAT
MDOTProjectwise\Documents\Reference Documents\Traffic Reference\Statewide Special Details\Develop	

Check if Applicable	TRAFFIC SIGNAL SPECIAL DETAILS INDEX/CHECKLIST		
	*One Completed Checklist required upon plan submittal for each contract package		
	Detail #	Description	# of Pages
	SIG-010-A	Span Wire TS on Steel and Wood Poles	7
	SIG-011-A	Installation of Integral Messenger Cable	4
	SIG-020-A	TS Strain Pole Loading Table and Design Criteria	1
	SIG-021-A	6 Anchor Bolt Strain Pole and Coupling	7
	SIG-030-A	TS Mast Arm Pole/Mast Arm Loading Table and Design Criteria	1
	SIG-030-B	TS Mast Arm Pole/Mast Arm Details - Category I	6
	SIG-031-A	TS Mast Arm Pole/Mast Arm Requirements - Category I	6
	SIG-032-A	TS Mast Arm Pole/Mast Arm Requirements - Category II	6
	SIG-033-A	TS Mast Arm Pole/Mast Arm Requirements - Category III	6
	SIG-040-B	TS Mast Arm Drilled Foundations Shaft	4
	SIG-050-A	Wood Pole Guys And Seting Depth	2
	SIG-060-A	Steel Truss Brackets	3
	SIG-061-A	Clamp On Bracket Arm Assembly (Street Light)	1
	SIG-070-A	Pedestal Foundation	3
	SIG-071-A	Pedestal Base Alternate Anchore Details	2
	SIG-072-A	Helix Pedestal Foundation	2
	SIG-100-A	Controller Cabinet Mounted on Steel or Wood Pole	3
	SIG-110-A	Base Mounted TS Cibtrikker Cabubet/Foundations	7
	SIG-111-A	Pole Mounted TS Controller Cabinet	1
	SIG-120-A	Global Positioning System (GPS) Module	3
	SIG-130-B	Antenna Attachment Detail (Yagi/Broadband)	6
	SIG-131-A	Cell Modem and RSU Attachment Detail	3
	SIG-140-A	Traffic Signal Uninterruptible Power System	2
	SIG-200-A	Secondary Service/Disconnect for wood poles	4
	SIG-201-A	Secondary Service/Disconnect for Steel poles	2
	SIG-210-B	Underground Service Metered and Unmetered	3
	SIG-211-A	Underground Service/Disconnect Wood Post and Unmetered	2
	SIG-220-A	Service for Street Name Signs and Street Lighting	4
	SIG-230-A	Color Code Wiring/Equipment Grounding	6
	SIG-231-A	Lightning Protection	6
	SIG-240-A	Handhole - Precast, Polumer Concrete	6
	SIG-250-A	Conduit (Direct Burial/Encased)	2
	SIG-251-A	Conduit Under Railroad Tracks	2
	SIG-260-A	Splice Box	3
	SIG-270-A	Typical Temporary Street Lighting Electrical Detail	1
	SIG-300-A	Span Wire Mounted TS Bracket Assembly	3
	SIG-301-A	Mast Arm Mounted TS Bracket Assembly	7
	SIG-302-A	Bracketing For 5 - Section Heads	1
	SIG-303-A	Bracketing for HAWK Signal Displays	2
	SIG-304-A	Traffic Signals Backplates	1
	SIG-305-D	Span Wire Top Tether Details	5
	SIG-310-A	Aligment of Traffic Signal Heads (Diagonal)	1
	SIG-311-A	Bracketing for Signal Head/Case Sign Combinations (Diagonal)	5
	SIG-312-A	Bracketing for Flashing Beacon/Case Sign Combinations	2
	SIG-320-A	Sign Mounted Beacon	9
	SIG-321-A	Rectangular Rapid Flashing Beacon	5
	SIG-330-A	Pedestal Mounted Signal Displays	2
	SIG-331-A	Pedestal Mounting Details for Signals	1
	SIG-340-A	Pole Mounted Signal Displays	2
	SIG-341-A	Pole Mounting Details for Signals	3
	SIG-342-A	Back Bracket Signal Display	2
	SIG-350-A	School Speed Limit Sign (LED)	3
	SIG-360-A	LED Changeable Message "Open-Close" Sign	4
	SIG-400-A	Pedestrian Push Button Details	4
	SIG-410-A	Traffic Loops	4
	SIG-420-A	Wireless Vehicle Detection System	10
	SIG-430-A	Video Detection Camera	2
	SIG-431-A	Hemispherical Video Detection	2
	SIG-432-A	Span Wire Mounted Video Detection Camera	3
	SIG-440-A	Microwave Vehicle Detector	4
	SIG-460-A	Radar Stop Bar Detection	2



1 DETAIL - TYPICAL SPAN WIRE INSTALLATION T.S.
 NTS STEEL POLE & WOOD POLES

NO.	ITEM
1	TRAFFIC SIGNAL (NO. HEADS AS INDICATED)
2	SPAN WIRE HANGER
3	5/16" EXTRA HIGH STRENGTH SPAN WIRE
4	3" SERVICE CAP (WEATHERHEAD), (METAL FOR STEEL AND PVC FOR WOOD POLES)
5	P.J. TRAFFIC SIGNAL CABLE (AS SPECIFIED)
6	PREFORMED LASHING RODS
7	POLE BAND CLAMP (STEEL POLE)
8	GUY THIMBLE (2" DIA.)
9	(2) 5/8" X 4" LONG BOLT, NUT, WASHERS PER POLE BAND CLAMP (STEEL POLE)
10	INSTALL SPAN WIRE PREFORMED (ARMOR ROD) UNDER EACH SPAN HANGER
11	ACCESS HAND HOLE ALL NEW & EXISTING STEEL POLES
12	5/8" EYEBOLT, OVAL EYE AND NUT
13	WOOD MOULDING OR PLASTIC DUCT (10' FROM GROUND LEVEL)
14	3" SCHEDULE 80 PVC OR RIGID METAL (*) SEE NOTE ON SHEET 2 OF 5
15	PREFORMED GUY GRIP DEAD ENDS



DETAIL - COPPER JUMPER
 NTS

NOTE:
 PORCELAIN STRAIN INSULATOR (IF REQUIRED) SHALL MEET THE CODES AND PLACEMENT REQUIREMENTS OF THE LOCAL UTILITY CO.

APPROVED BY: _____
 DIRECTOR, BUREAU OF FIELD SERVICES



DEPARTMENT DIRECTOR
 BRADLEY C. WIEFERICH, PE

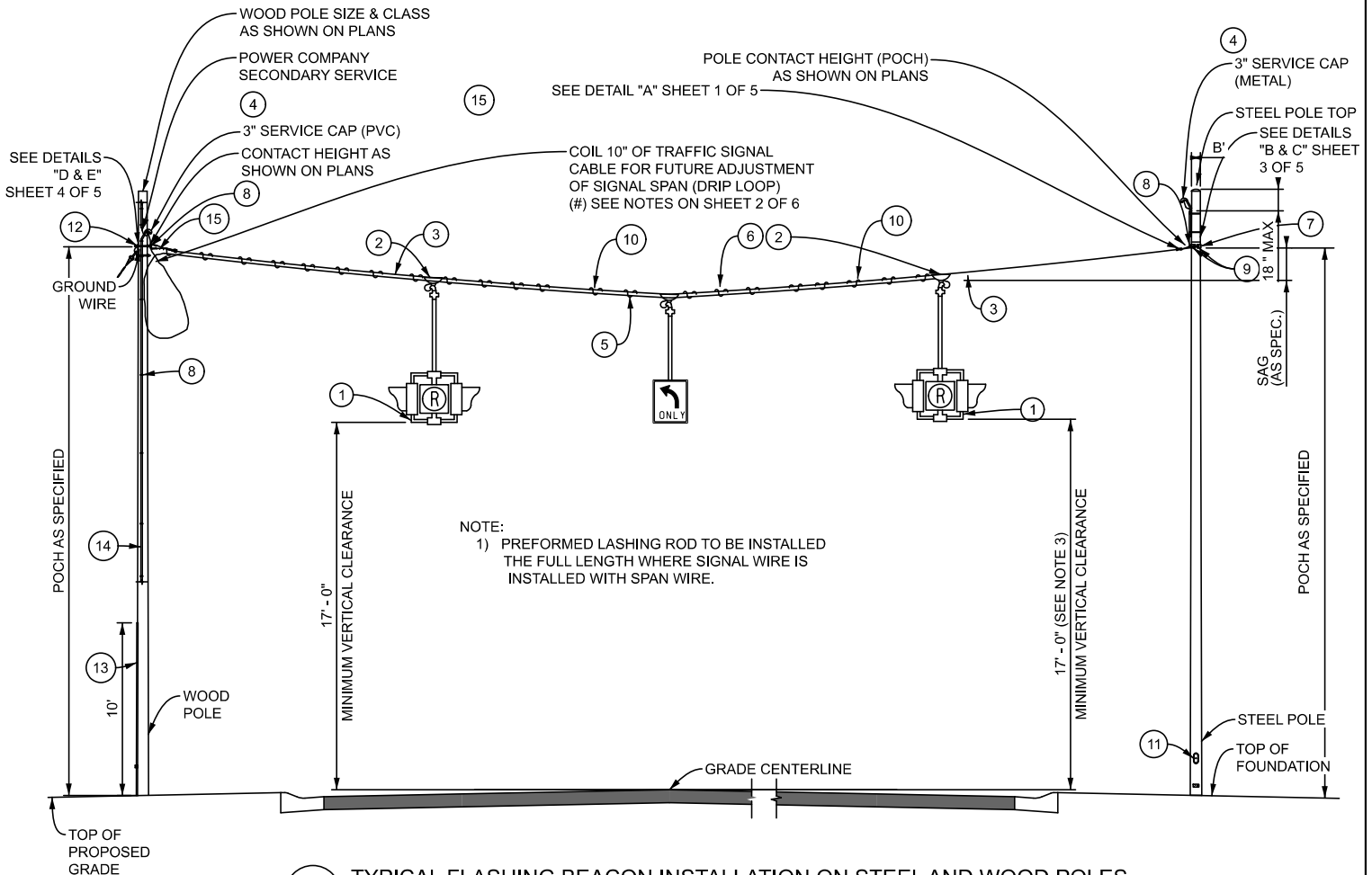
APPROVED BY: _____
 DIRECTOR, BUREAU OF DEVELOPMENT

STANDARD PLAN FOR
 SPAN WIRE CASING DETAILS

(SPECIAL DETAIL) 07/27/23
 FHWA APPROVAL PLAN DATE

SIG-010-A

SHEET
 1 OF 7

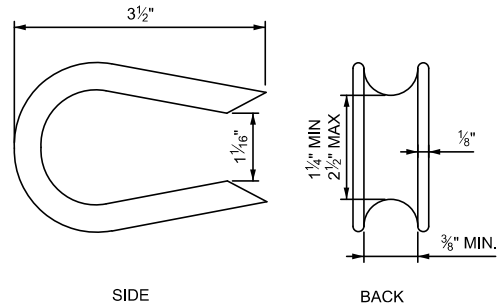
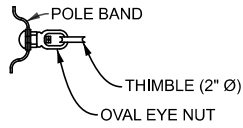
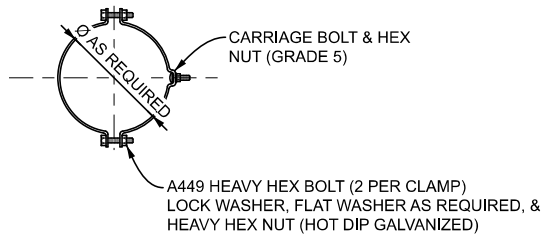
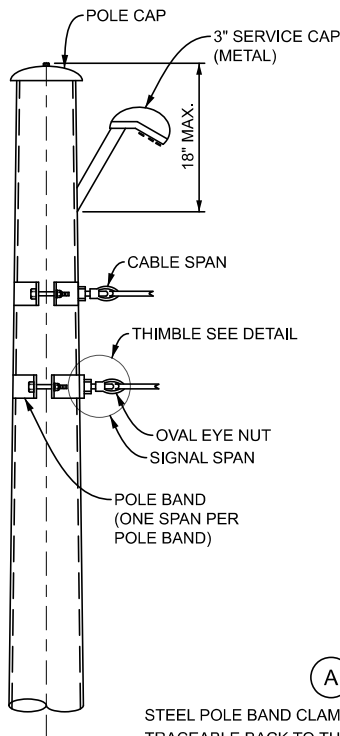


1 TYPICAL FLASHING BEACON INSTALLATION ON STEEL AND WOOD POLES
NTS

NO.	ITEM
1	TRAFFIC SIGNAL (NO. HEADS AS INDICATED)
2	SPAN WIRE HANGER
3	5/16" EXTRA HIGH STRENGTH SPAN WIRE
4	3" SCHEDULE 80 PVC OR RIGID METAL (*) SEE NOTE ON SHEET 2 OF 5
5	P.J. TRAFFIC SIGNAL CABLE (AS SPECIFIED)
6	PREFORMED LASHING RODS
7	POLE BAND CLAMP (STEEL POLE)
8	GUY THIMBLE (2" DIA.)
9	(2) 5/8" X 4" LONG BOLT, NUT, WASHERS PER POLE BAND CLAMP (STEEL POLE)
10	INSTALL SPAN WIRE PREFORMED (ARMOR ROD) UNDER EACH SPAN HANGER
11	ACCESS HAND HOLE ALL NEW & EXISTING STEEL POLES
12	5/8" EYEBOLT, OVAL EYE AND NUT
13	WOOD MOULDING OR PLASTIC DUCT (10' FROM GROUND LEVEL)
14	3" SERVICE CAP (WEATHERHEAD), (METAL FOR STEEL AND PVC FOR WOOD POLES)
15	PREFORMED GUY GRIP DEAD ENDS

NOTES:
 (*) FOR PROJECTS MAINTAINED BY THE WAYNE CO. DEPARTMENT OF PUBLIC SERVICES (WCDPS), USE RIGID METAL FOR CONDUIT(S) FROM GRADE LEVEL TO 10' (MIN.) ABOVE GRADE OR AS DIRECTED BY THE ENGINEER.
 (#) FOR PROJECTS MAINTAINED BY THE ROAD COMMISSION FOR OAKLAND COUNTY (RCOC), USE DRIP LOOP (WITHOUT COIL) FOR FUTURE ADJUSTMENT OF SIGNAL SPAN.

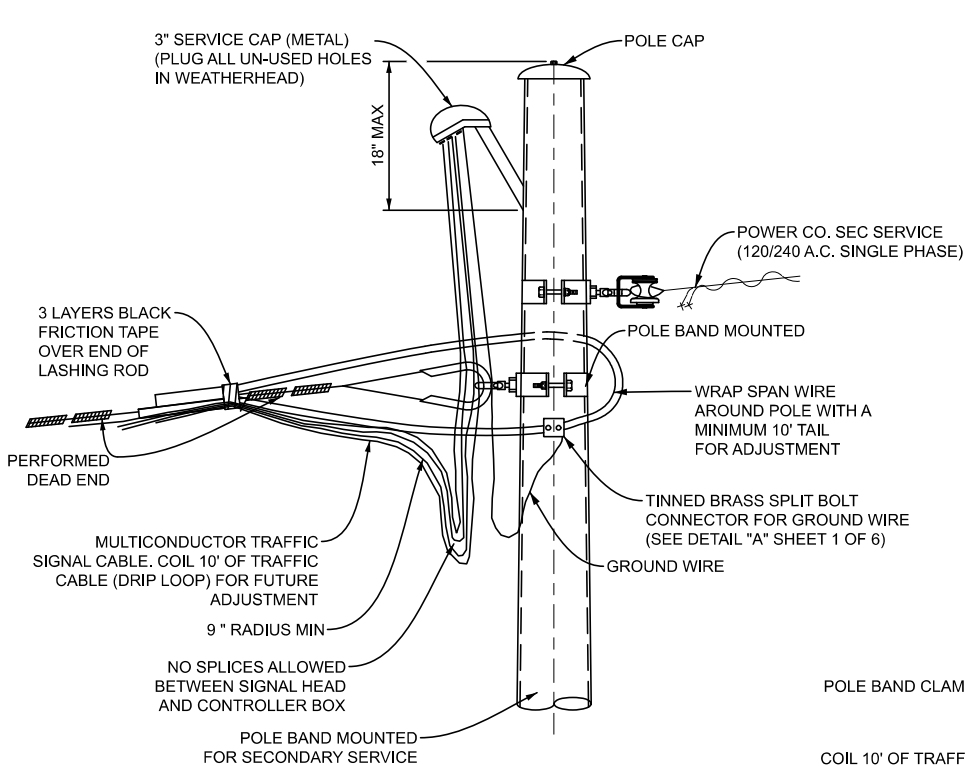
 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR SPAN WIRE CASING DETAILS		SIG-010-A	SHEET
	(SPECIAL DETAIL)	07/27/23		2 OF 7
FHWA APPROVAL	PLAN DATE			SECT



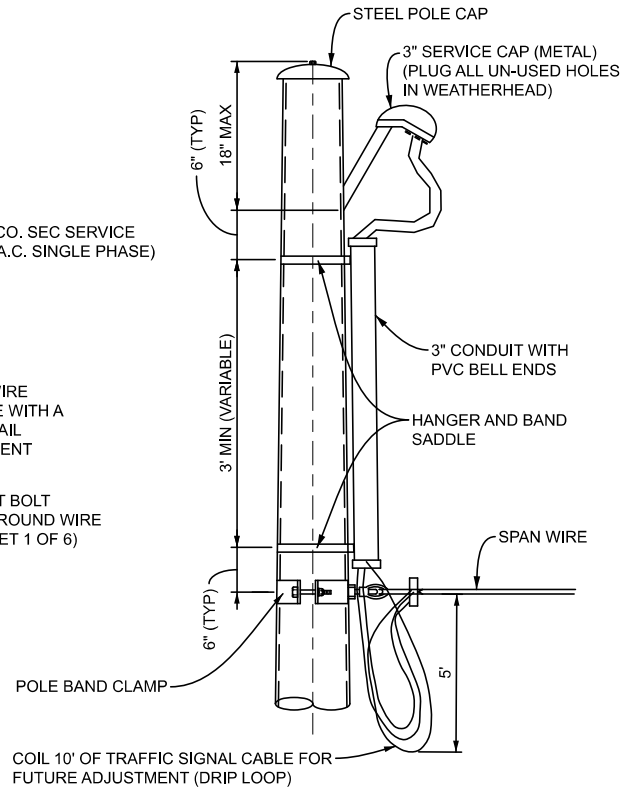
A DETAIL - POLE BAND CLAMP ON STEEL POLE

B DETAIL - THIMBLE

STEEL POLE BAND CLAMPS MUST BE STAMPED WITH IDENTIFICATION THAT IS TRACEABLE BACK TO THE MANUFACTURER, WHICH CAN BE USED TO DETERMINE THE MONTH AND YEAR OF CLAMP MANUFACTURE. THE STAMPING METHOD MUST BE A LOW STRESS STAMPING METHOD. THE STAMP CANNOT BE LOCATED NEAR THE BOLTED FLANGE, MUST BE LOCATED NEAR THE CENTER OF THE CLAMP ON THE BACK SIDE FACING AWAY FROM TRAFFIC, AND BE VISIBLE AFTER GALVANIZING. ALL BEND RADII ARE TO BE A MINIMUM OF 1.5 TIMES THE POLE BAND THICKNESS.

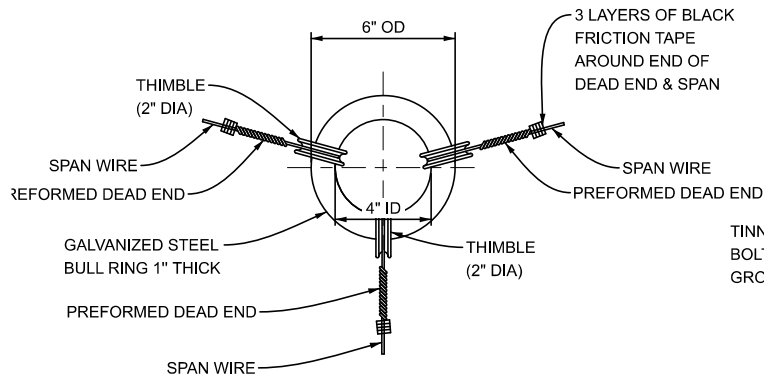


C DETAIL-CABLING ON STEEL POLE

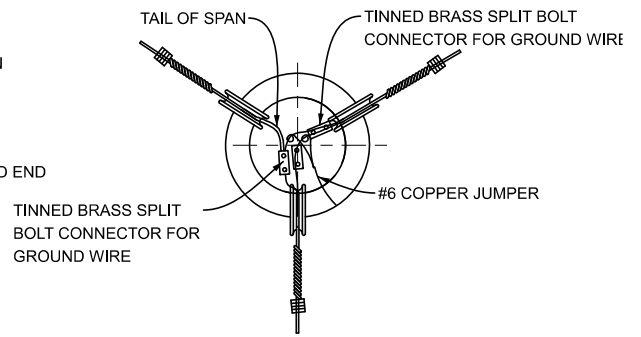


D DETAIL - SERVICE CABLE ON STEEL POLE

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR SPAN WIRE CASING DETAILS		SIG-010-A	SHEET 3 OF 7
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE		

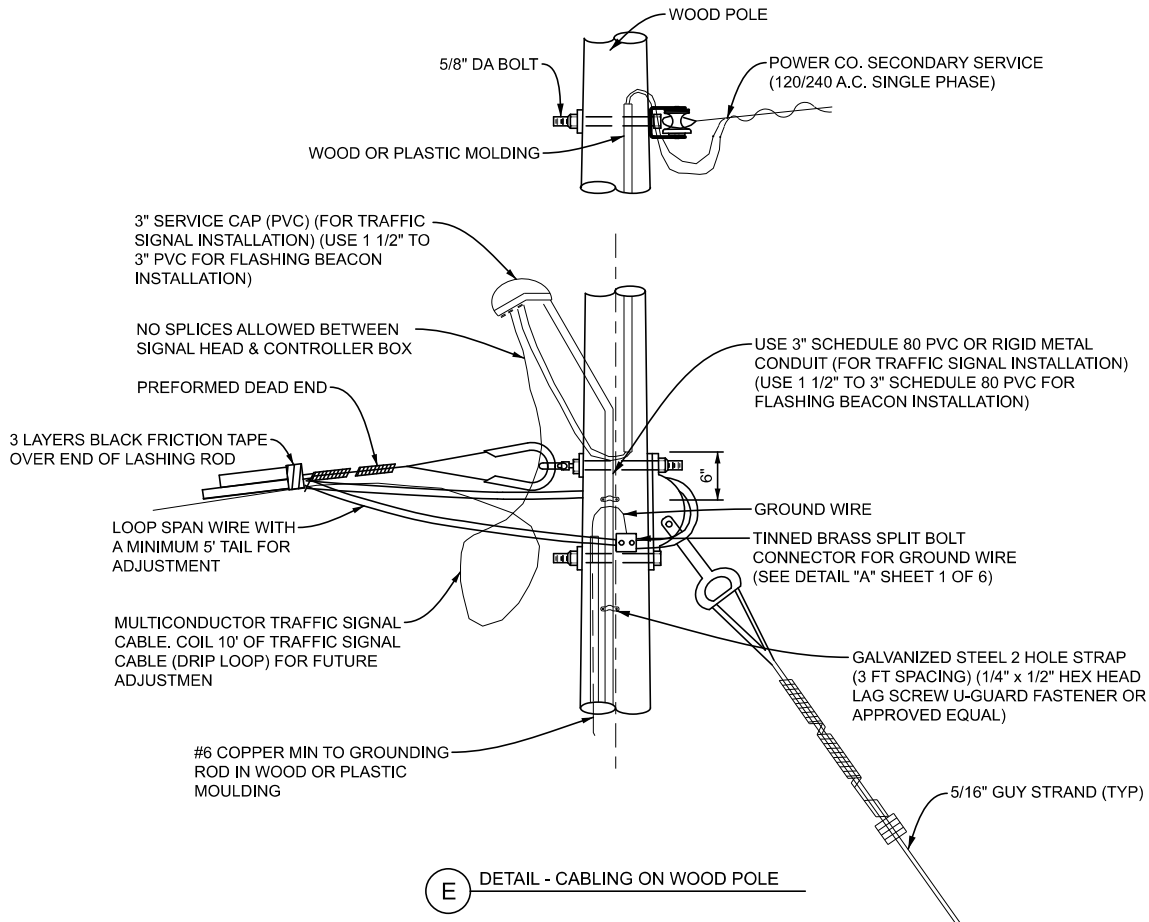


DETAIL
3-WAY TIE OFF BULL RING



DETAIL COPPER JUMPER
3-WAY TIE OFF

NOTE:
PORCELAIN STRAIN INSULATOR (IF REQUIRED)
SHALL MEET THE CODES AND PLACEMENT
REQUIREMENTS OF THE LOCAL UTILITY CO.



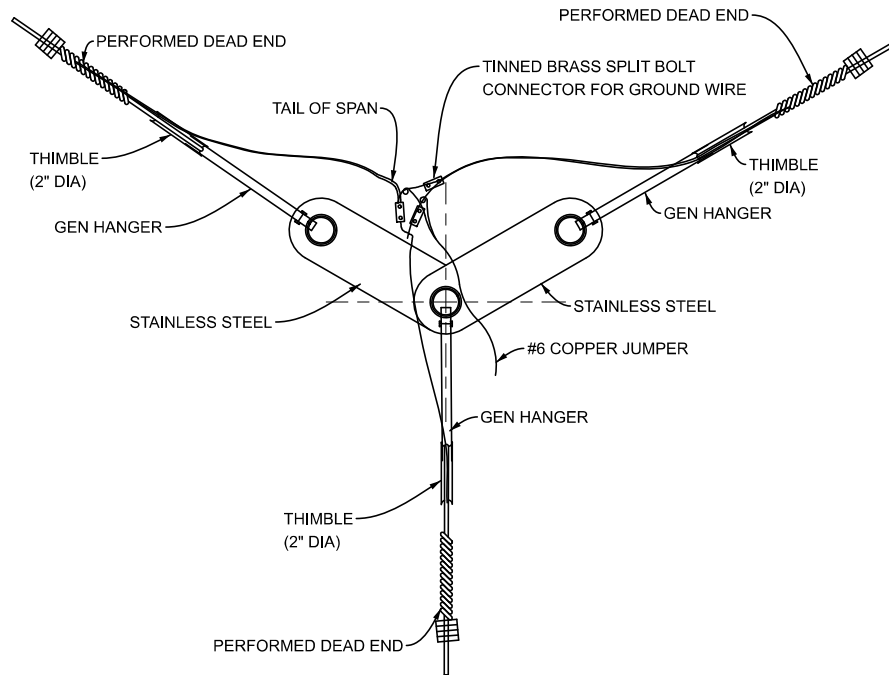
E **DETAIL - CABLING ON WOOD POLE**

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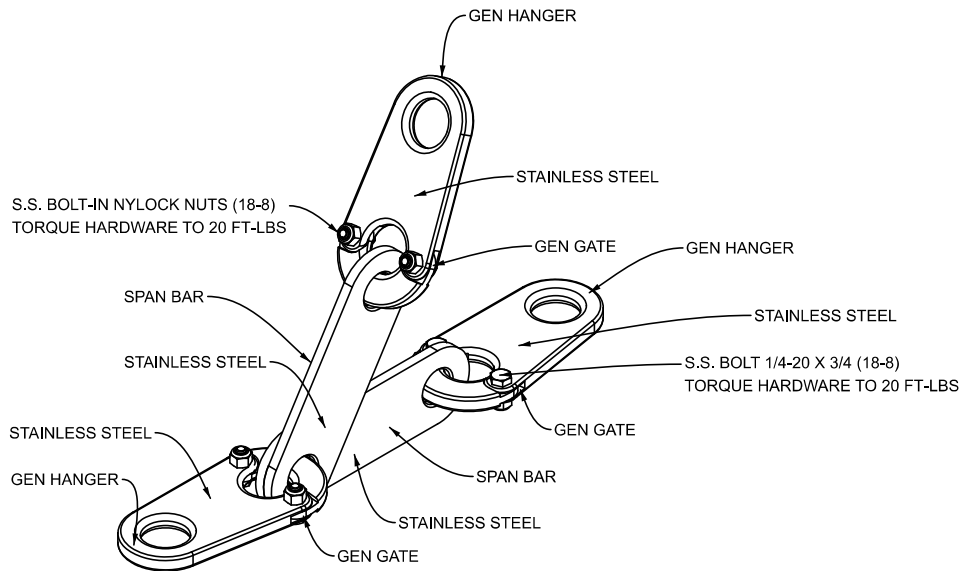
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR SPAN WIRE CASING DETAILS			
(SPECIAL DETAIL)	07/27/23	SIG-010-A	SHEET
FHWA APPROVAL	PLAN DATE		4 OF 7


SECT

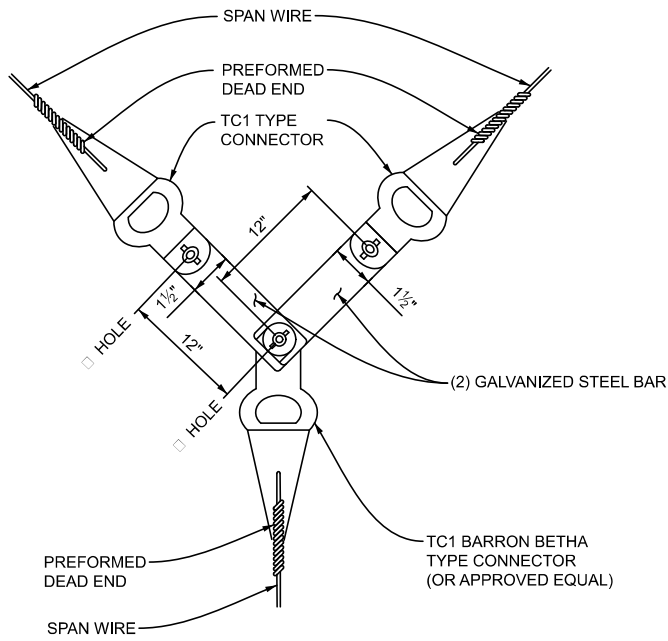


**DETAIL COPPER JUMPER
3-WAY TIE OFF**

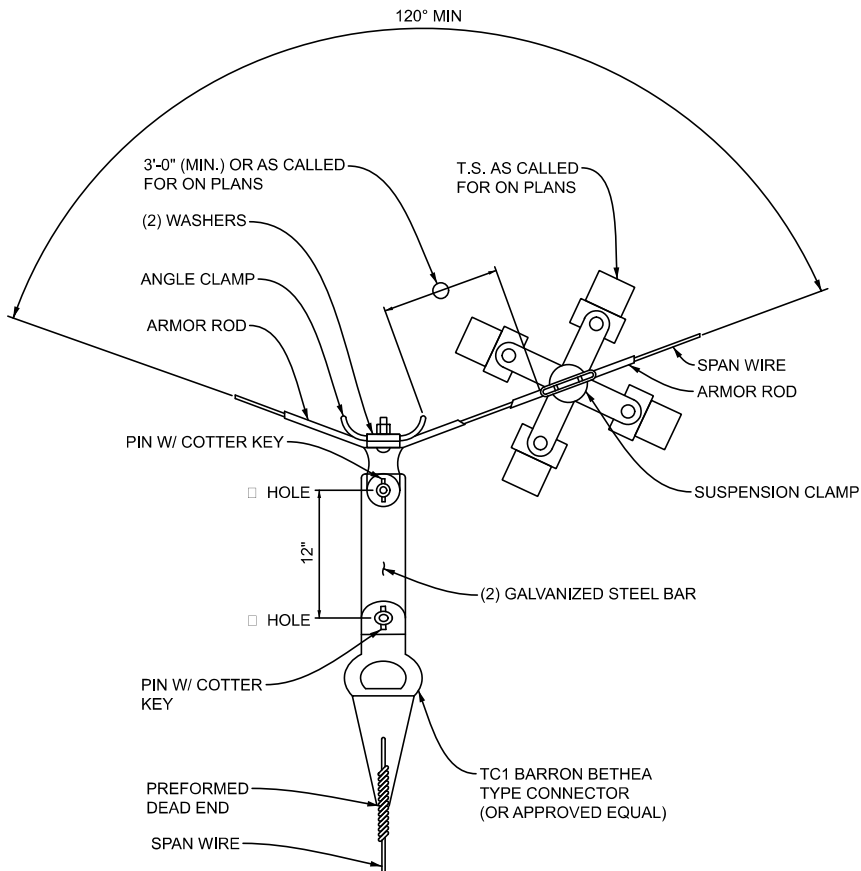


DETAIL SPAN HANGER ASSEMBLY (ALTERNATE)

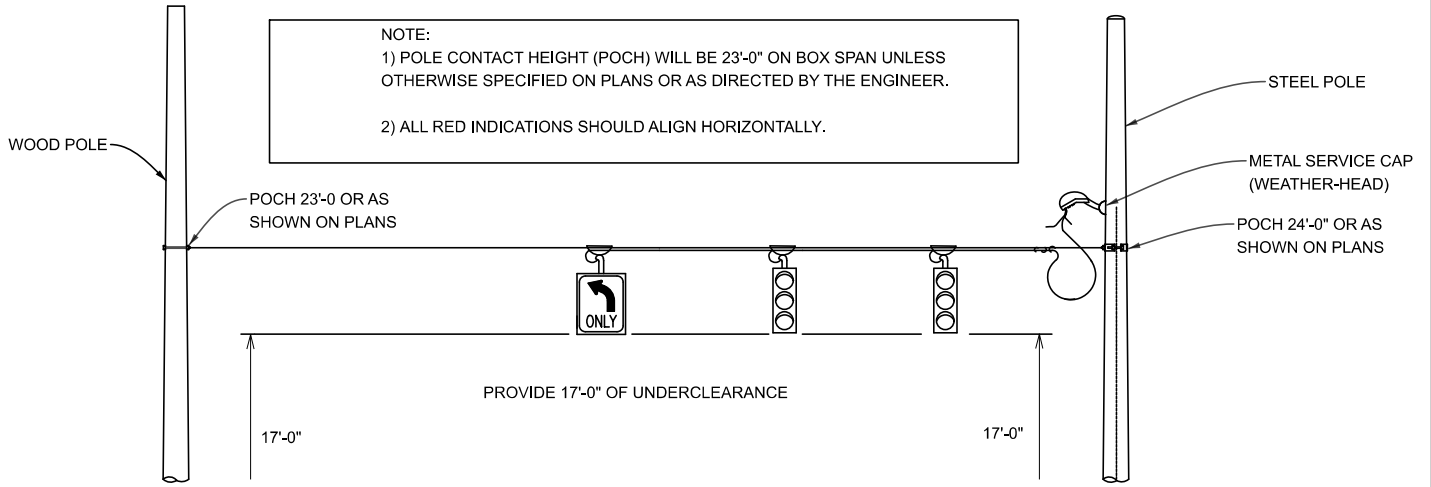
 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR SPAN WIRE CASING DETAILS			SIG-010-A	SHEET 5 OF 7
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE			



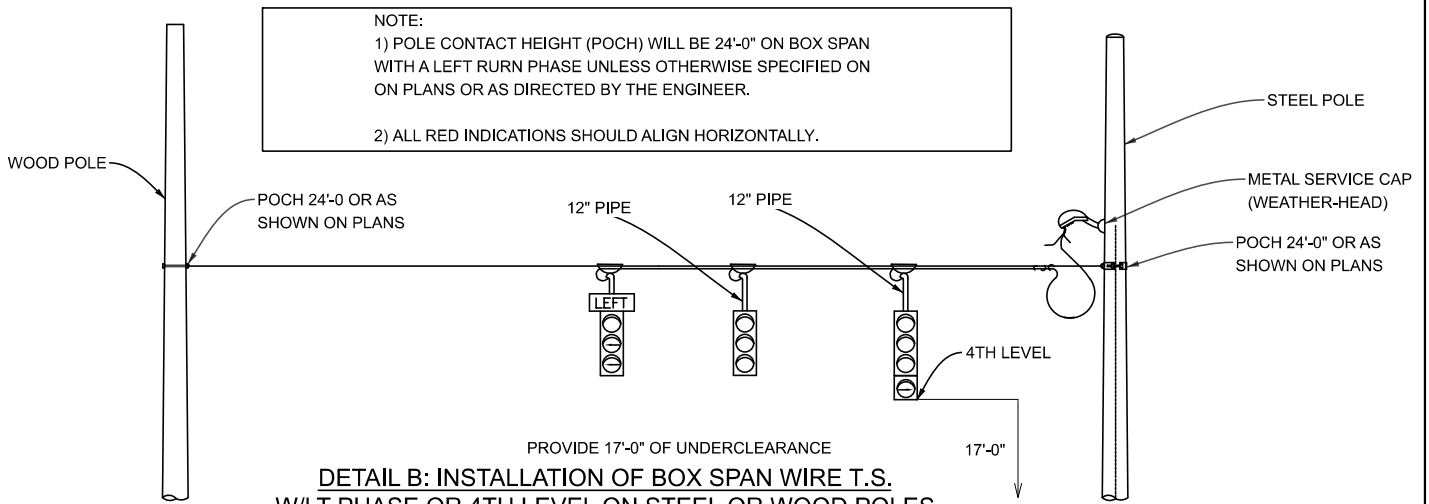
PULL-OFF CONNECTION DETAIL (ALTERNATE)
FOR 3-WAY SUSPENSION



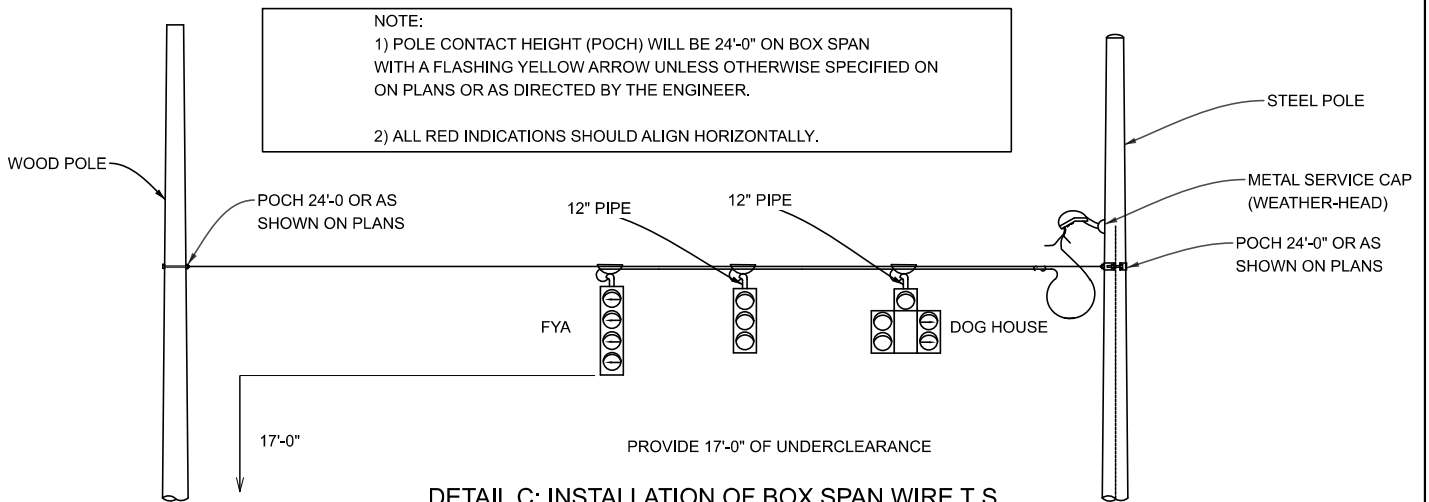
PULL-OFF CONNECTION DETAIL (ALTERNATE)
FOR 3-WAY SUSPENSION



DETAIL INSTALLATION OF BOX SPAN WIRE T.S. ON STEEL OR WOOD POLES



DETAIL B: INSTALLATION OF BOX SPAN WIRE T.S. W/LT PHASE OR 4TH LEVEL ON STEEL OR WOOD POLES



DETAIL C: INSTALLATION OF BOX SPAN WIRE T.S. FYA AND DOGHOUSE ON STEEL OR WOOD POLES

BOX SPAN WIRE T.S ON STEEL OR WOOD POLES FOR USE ON OAKLAND COUNTY ROADS ONLY



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
SPAN WIRE CASING DETAILS

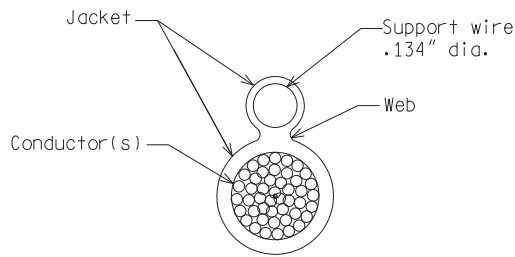
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FHWA APPROVAL

07/27/23
PLAN DATE

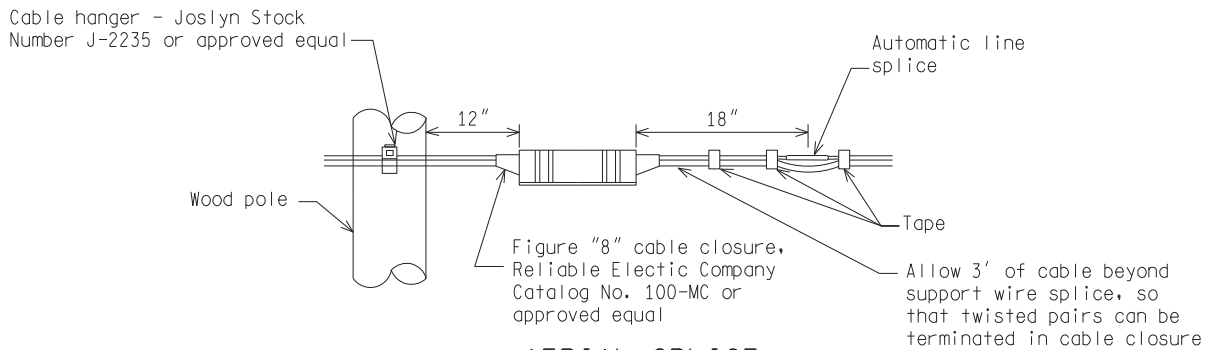
SIG-010-A

SHEET
7 OF 7

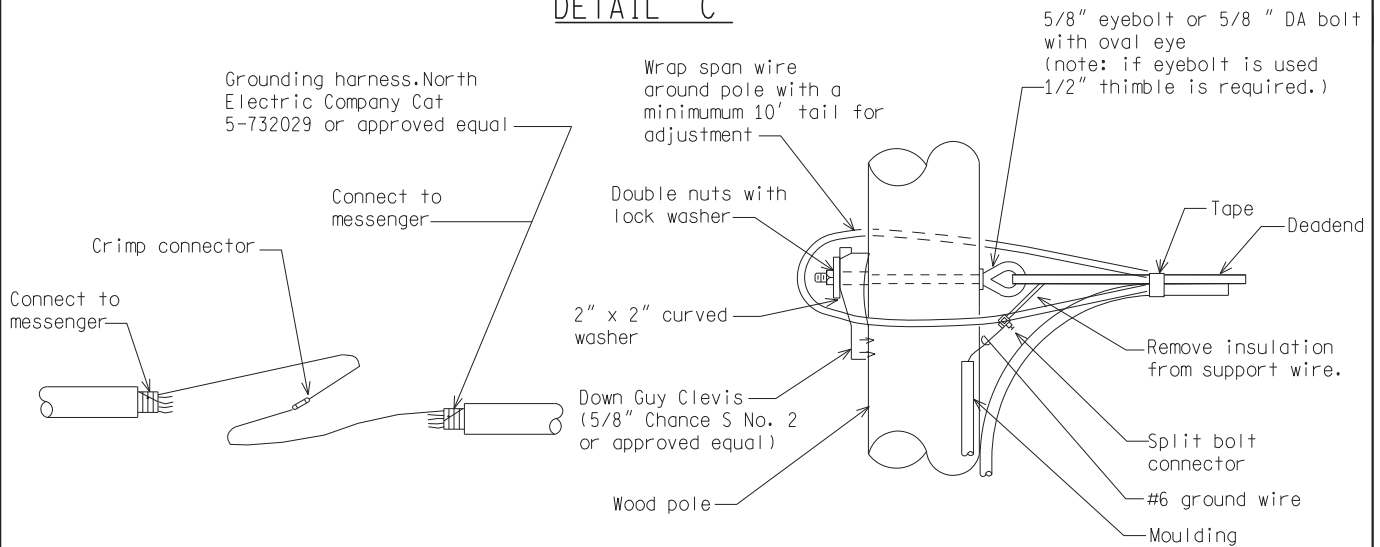
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**FIGURE 8 CABLE
INTERGRAL MESSENGER (I.M.) CABLE SECTION
DETAIL "A"**



**AERIAL SPLICE
DETAIL "C"**



**CABLE CLOSURE
DETAIL "D"**

**DEAD-END POLE
DETAIL "E"**

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG011A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

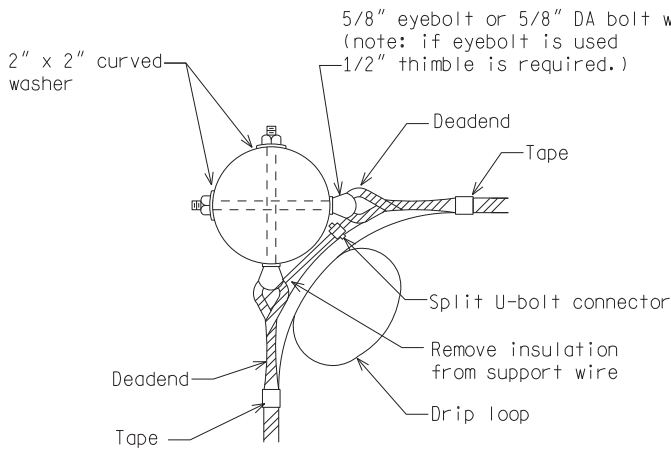
(SPECIAL DETAIL)
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**INSTALLATION OF INTEGRAL
MESSENGER CABLE**

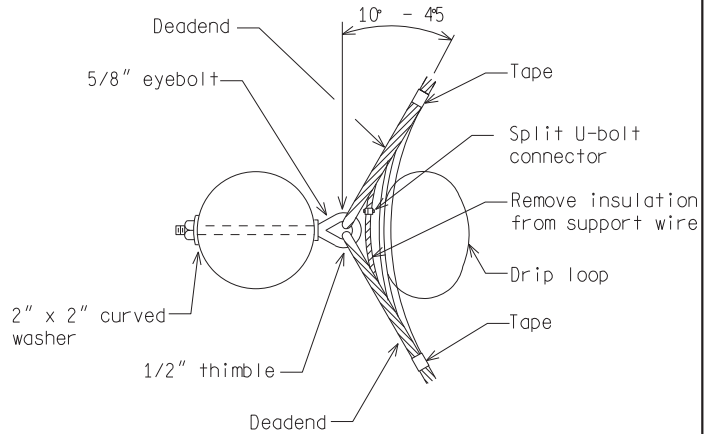
PLAN DATE

SIG-011-A

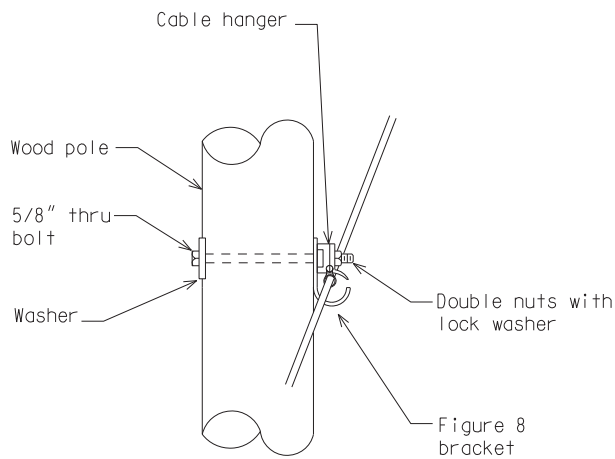
SHEET
1 of 4



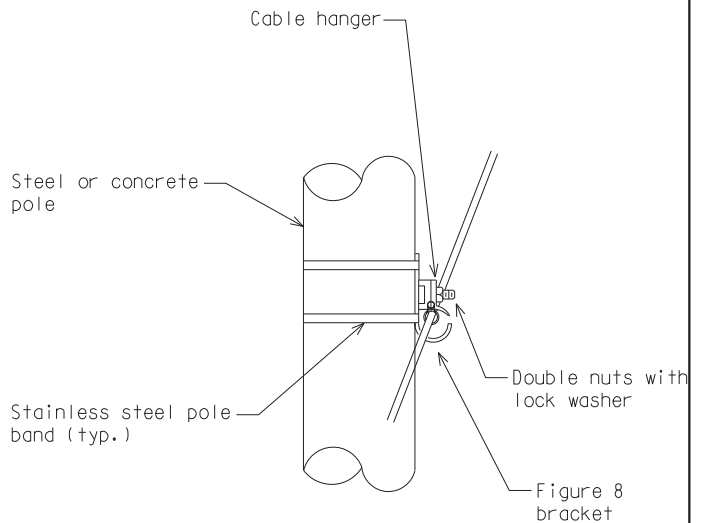
90 DEG. CORNER POLE
DETAIL "F"



10 DEG. - 45 DEG. ANGLE POLE
DETAIL "G"



TANGENT POLE (WOOD POLE)
DETAIL "H"



TANGENT POLE
(STEEL OR CONCRETE POLE)
DETAIL "I"

NOTE FOR DETAILS "E", "F", "G":
Individual connectors to be taped with 3
layers of approved plastic tape & overall
one layer of half lap approved plastic tape

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

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PLAN DATE

SIG-011-A

SHEET
2 of 4

DESCRIPTION:

Integral messenger wire consists of a support wire and a conductor core laid parallel and covered with a single extrusion of black low density polyethylene. The single extrusion provides a jacket over the support wire and core, and forms a web joining the two. See detail "A" this sheet. The support wire is 0.134 inches in diameter. Grade 190 steel, Class A galvanized, Extra High Strength steel having a rated breaking strength of 2680 pounds.

INSTALLATION:

Every effort shall be made to limit the length of spans to a maximum of 250 feet. Integral messenger wire is prone to low frequency wind vibration commonly referred to as "dancing" while "dancing" may not be so violent in low wind areas as to attract attention. Prolonged low amplitude vibration will eventually cause open circuits and/or support wire failure. Therefore, REA recommends that all integral messenger distribution wire be spiraled approximately one spiral for each 15 feet of span.

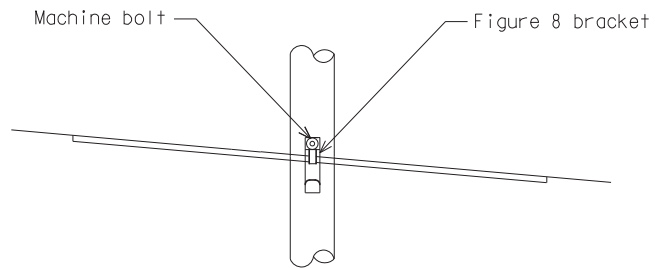
Spiraling of the wire should be done from every other pole by applying the spiraling torque to the support clamp after the two outside bolts have been properly tightened, thus keeping the spiraling torque on the support wire and not on the core. As spiraling operations proceed along a lead, spiraling at alternate poles should be in opposite directions, thereby reducing the torsion otherwise imposed on those clamps which are at the intermediate poles. The procedure to be followed in spiraling distribution wire is shown in detail "B" of this sheet.

If clamps are not adequately tightened the torsion developed in spiraling will cause the support wire to turn in the clamp resulting in the migration of the spirals from the spans toward the pole. "Dancing" of the wire and damage to it at the poles will be the final results of inadequate clamping. The proper type of support clamps must be used on all corners as shown in details "E", "F", "G" and "I" of this sheet.

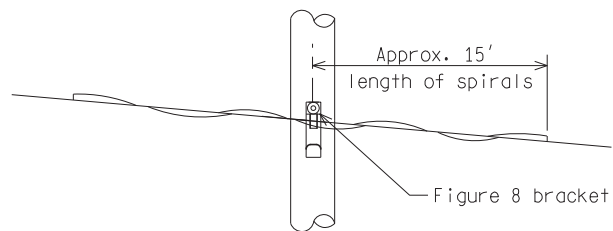
When pulling the wire up to correct sag, a suitable wire grip should be used directly on the insulated support wire. The grip should be of such design as to give proper holding power and yet not damage the support wire jacket. The Crescent Tool Company #800 or an equivalent grip is suggested. A standard line wire grip should not be used because it will damage the insulation. If the insulation is damaged in any way, it must be repaired with sealing compound or by cutting out the damaged portion. At deadends, it is necessary to remove the support wire covering before applying the deadend grips. It must be done carefully to avoid damaging the support wire or core the electrical continuity of the support wire must be maintained throughout the lead.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-011-A	SHEET 3 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG011A.dgn Rev. 02/16/17		PLAN DATE		



- Step 1 - Support and position integral messenger wire with cable brackets.
- Step 2 - Fasten and support clamp to the support messenger at the pole. Tighten the carriage bolts to the manufacturer's specifications.
- Step 3 - Spiral wire in the opposite direction from which the previous adjacent spiraling operation was performed. If the adjacent spans are unequal, use the shorter span for determining the number of spirals.
- Step 4 - Place the clamp on the machine bolt and tighten nuts to the manufacturer's specifications.



I.M. CABLE SPIRALS
DETAIL "B"

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	_____ PLAN DATE	SIG-011-A	SHEET 4 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG011A.dgn Rev. 02/16/17				

STRAIN POLE DESIGN CRITERIA:

THE DESIGN OF THE STRAIN POLE STRUCTURES SHOWN ON SIG-021-A IS BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION (2015), WITH 2017 TO 2022 INTERIM REVISIONS.

THE DESIGN IS BASED ON THE MAXIMUM WIND AREAS AND WEIGHTS SHOWN BELOW IN THE SPAN WIRE LOADING TABLE. THE SUM OF THE WEIGHTS AND AREAS (VIEWED PERPENDICULAR TO THE SPAN) OF ALL SIGNALS, SIGNS, DEVICES AND OTHER EQUIPMENT SUPPORTED ON EACH SPAN MUST BE LESS THAN THE MAXIMUM VALUES SHOWN. THE SPAN LENGTH IS DEFINED AS THE STRAIGHT HORIZONTAL DISTANCE BETWEEN POLES. FOR TIE-OFF CONFIGURATIONS, THE SPAN LENGTH IS DEFINED AS THE LONGEST HORIZONTAL DISTANCE BETWEEN ANY TWO ADJACENT POLES MEASURED ALONG THE LENGTHS OF EACH WIRE.

LOAD PARAMETERS:

WIND LOAD (EXTREME EVENT LIMIT STATE): 1700-YEAR MRI BASIC WIND SPEED MAP, 120 MPH DESIGN WIND SPEED

WIND LOAD (SERVICE I EVENT LIMIT STATE): 10-YEAR MRI BASIC WIND SPEED MAP, 76 MPH DESIGN WIND SPEED

HEIGHT AND EXPOSURE FACTOR (K_z): K_z IS CALCULATED USING A HEIGHT (Z) MEASURED FROM TOP OF THE DRILLED SHAFT (IT IS ASSUMED THAT THE POLE IS GROUND-MOUNTED).

DIRECTIONALITY FACTOR (K_d): 0.85

GUST EFFECT FACTOR (G): 1.14

WIND DRAG COEFFICIENT FOR WIND AREA (C_d): 1.2

WIND LOAD REDUCTION FACTOR FOR FREE-SWINGING DEVICES SUPPORTED BY THE SPAN WIRE (UNTETHERED CONFIGURATIONS): 0.65

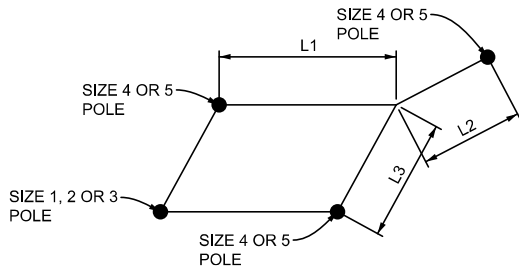
WIRE SAG: 5% (TYPICAL), 6.5% FOR SPANS WITH TIE-OFFS

STRAIN POLE LOADING: SEE SPAN WIRE LOADING TABLE BELOW. IN ADDITION, A DISAPPEARING LEGEND SIGN IS APPLIED MIDWAY ALONG ALL TIE-OFF SPANS (WHERE APPLICABLE). NO OTHER LOAD IS ALLOWED ON TIE-OFF SPANS.

SPAN WIRE + ELECTRIC CABLES WEIGHT: 1.155 LB/FT FOR 5/16" SPAN WIRE AND 1.467 LB/FT FOR 1/2" SPAN WIRE

SERVICABILITY PARAMETERS:

LIMIT FOR HORIZONTAL DEFLECTION AT TOP OF POLE UNDER DEAD LOAD ONLY: 2.5% OF POLE HEIGHT

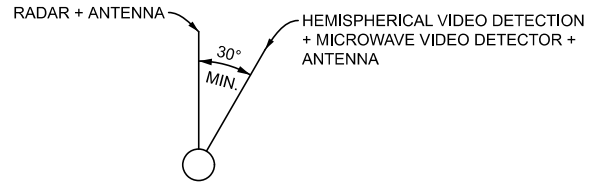


- NOTES:**
1. L1, L2 AND L3 ARE TIE-OFF SPANS.
 2. SEE SIG-021 FOR POLE SIZES.
 3. USE A SPAN LENGTH OF MAX(L1+L2, L2+L3) FOR DRILLED SHAFT LENGTH SELECTION FOR POLES CONNECTED TO TIE-OFF SPANS.

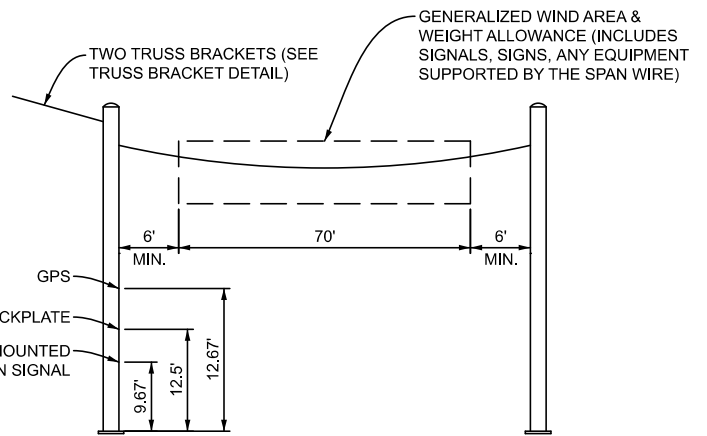
3 DETAIL - STRAIN POLE CONFIGURATION

SPAN LENGTH	WEIGHT OF GENERALIZED LOAD (LBS)**	MAX PERP. WIND AREA (TETHERED SPANS, SIGNALS WITH BACKPLATES) (SFT)**	MAX PERP. WIND AREA (UNTETHERED SPANS, SIGNALS WITHOUT BACKPLATES) (SFT)**
UP TO 100 FT	328	58.0	31.0
101 FT TO 120 FT	328	58.0	31.0
121 FT TO 150 FT	328	58.0	31.0
151 FT TO 175 FT	370	58.0	37.0
176 FT TO 200 FT	370	58.0	37.0

**WEIGHTS AND AREAS INCLUDE ALLOWANCE FOR SIGNALS, SIGNS, AND ANYTHING ELSE CARRIED BY THE CABLES.



1 DETAIL - TRUSS BRACKET



2 DETAIL - STRAIN POLE LOADING ELEVATION VIEW

EQUIPMENT	WEIGHT LBS	AREA SFT
ANTENNA	20	0.09
GPS MODULE	30	0.75
POLE MOUNTED PEDESTRIAN SIGNAL	25	1.78
1W-3C SIGNAL (WITH BACKPLATE)	43	8.67
18' STEEL TRUSS BRACKET	106	7.29
HEMISPHERICAL VIDEO DETECTION	22	2.11
MICROWAVE VEHICLE DETECTOR	4	0.97
RADAR VEHICLE DETECTOR	4	0.97
DISAPPEARING LEGEND SIGN	45	9

SEE ELEVATION VIEW FOR EQUIPMENT MOUNTING LOCATIONS.

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



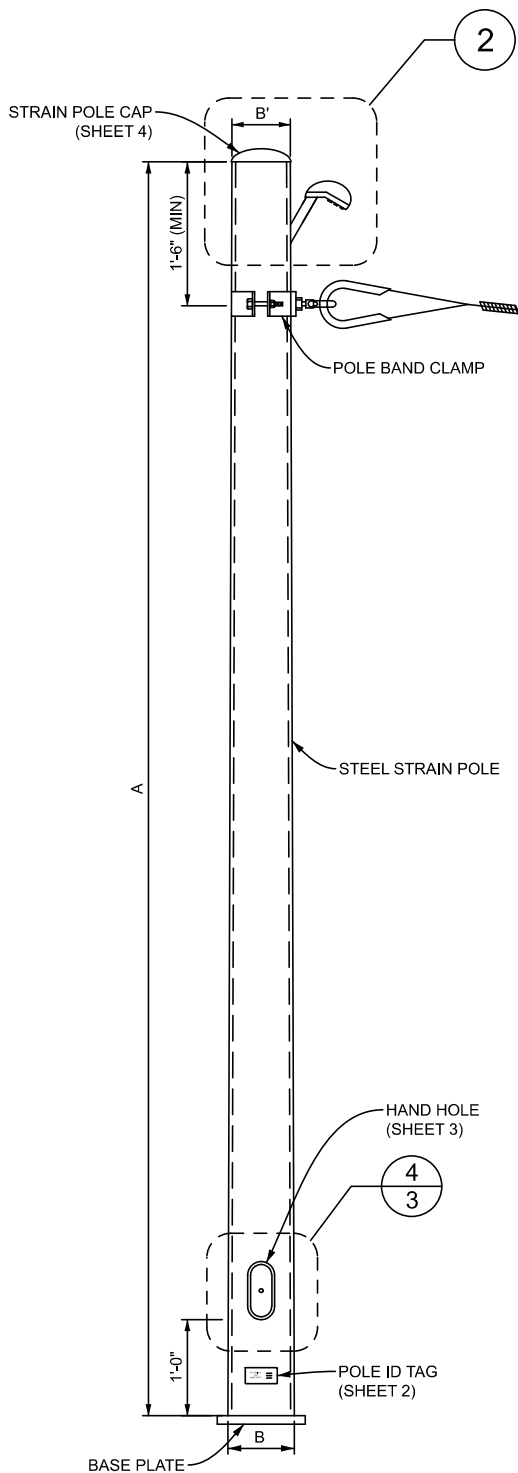
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
TRAFFIC SIGNAL STRAIN POLE LOADING
TABLE AND DESIGN CRITERIA

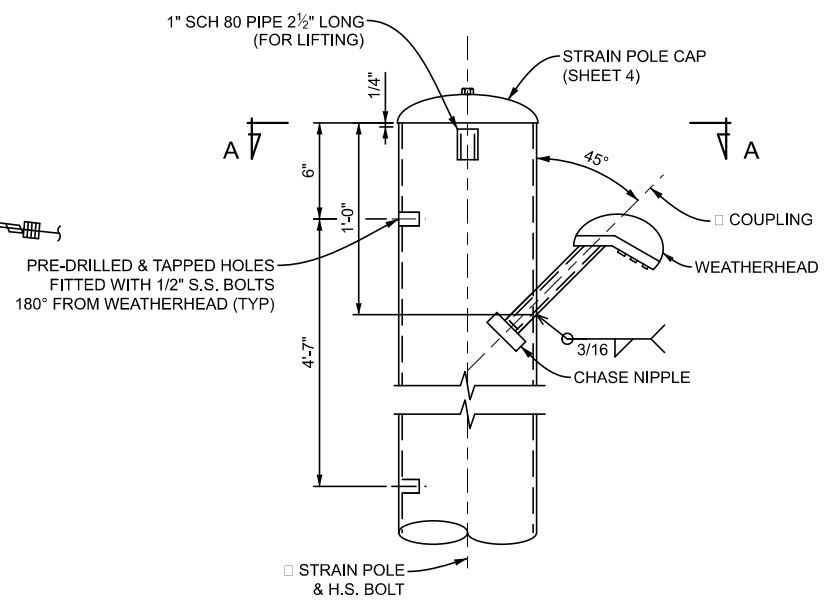
(SPECIAL DETAIL) 07/27/23
FHWA APPROVAL PLAN DATE

SIG-020-A

SHEET
1 OF 1

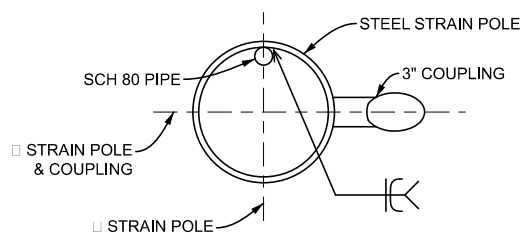


1 DETAIL - STEEL STRAIN POLE



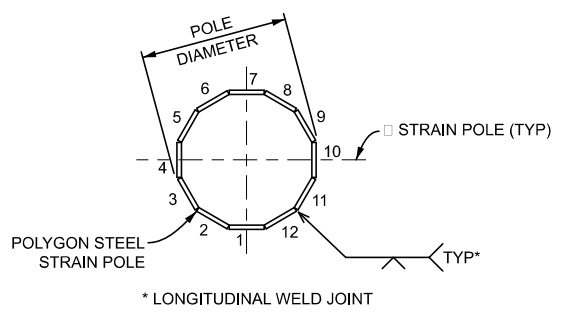
ORIENTATION OF 3" COUPLING TO BE 90° OR 270° FROM POLE HAND HOLE

2 DETAIL - COUPLING



SCH 80 PIPE ORIENTED 180° TO POLE HAND HOLE

A SECTION - ROUND POLE



A' SECTION - 12-SIDED POLYGON (OPTIONAL)

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



STANDARD PLAN FOR 6 ANCHOR BOLT TRAFFIC SIGNAL STRAIN POLE AND COUPLING DETAILS			
(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE	SIG-021-A	SHEET 1 OF 7

STRAIN POLE REQUIREMENTS

MARK	DESCRIPTION	UNIT	NOT CONNECTED TO TIE-OFF SPANS			CONNECTED TO TIE-OFF SPANS		
			SIZE 1	SIZE 2	SIZE 3	SIZE 4	SIZE 5	
A	POLE LENGTH	FT	30	36	40	36	40	
W	MIN POLE WALL THICKNESS	GR 50 STEEL	IN	5/8	5/8	5/8	5/8	5/8
		GR 65 STEEL	IN	1/2	1/2	1/2	1/2	1/2
B'	POLE DIAMETER - TOP *	IN	12.3 (MIN) ± 1/2	13.96 (MIN) ± 1/2	14.4 (MIN) ± 1/2	14.96 (MIN) ± 1/2	15.4 (MIN) ± 1/2	
B	POLE DIAMETER - BOTTOM *	IN	16.5 ± 1/2	19 ± 1/2	20 ± 1/2	20 ± 1/2	21 ± 1/2	
-	FULL LENGTH TAPER	IN / FT		+0.002	+0.002	+0.002	+0.002	+0.002
				0.14	0.14	0.14	0.14	0.14
				-0.000	-0.000	-0.000	-0.000	-0.000
E	POLE BASE FILLET WELD	GR 50 STEEL	IN	7/16	7/16	1/2	7/16	1/2
		GR 65 STEEL	IN	7/16	7/16	7/16	7/16	7/16
F	POLE BASE LANDING	IN	1/2	5/8	5/8	5/8	5/8	
-	ANCHOR BOLT DIAMETER	IN	1 3/4	2	2	2	2	
-	ANCHOR BOLT HOLE DIAMETER	IN	2 1/16	2 5/16	2 5/16	2 5/16	2 5/16	
-	ANCHOR BOLT CIRCLE DIAMETER	IN	24	27	27	29	29	
C	ANCHOR BOLT CHORD	IN	12	13 1/2	13 1/2	14 1/2	14 1/2	
D	BASE PLATE EDGE	IN	15 1/4	17 1/2	17 1/2	17 1/2	20 1/4	
T	BASE PLATE THICKNESS	IN	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	
P.O.C.H.	12 1/2" POLE BAND CLAMP	FT-IN	21'-6" TO 28'-6"	-	-	-	-	
P.O.C.H.	13 1/2" POLE BAND CLAMP	FT-IN	17'-0" TO 21'-0"	32'-6" TO 34'-6"	-	-	-	
P.O.C.H.	14 1/2" POLE BAND CLAMP	FT-IN	-	25'-6" TO 32'-0"	32'-6" TO 38'-6"	32'-6" TO 34'-6"	-	
P.O.C.H.	15 1/2" POLE BAND CLAMP	FT-IN	-	18'-0" TO 25'-0"	25'-6" TO 32'-0"	25'-6" TO 32'-0"	32'-6" TO 38'-6"	
P.O.C.H.	16 1/2" POLE BAND CLAMP	FT-IN	-	17'-0" TO 17'-6"	18'-0" TO 25'-0"	18'-0" TO 25'-0"	25'-6" TO 32'-0"	
P.O.C.H.	17 1/2" POLE BAND CLAMP	FT-IN	-	-	17'-0" TO 17'-6"	17'-0" TO 17'-6"	18'-0" TO 25'-0"	
P.O.C.H.	18 1/2" POLE BAND CLAMP	FT-IN	-	-	-	-	17'-0" TO 17'-6"	

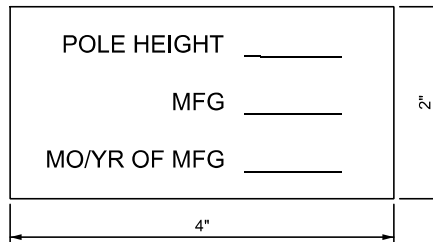
* DIAMETERS GIVEN ARE O.D.

NOTES:

1. ROUND OR 12-SIDED SECTIONS ARE ALLOWED.
2. MULTI-PLY SECTIONS ARE NOT ALLOWED.
3. STRAIN POLES USED IN APPLICATIONS OTHER THAN TRAFFIC SIGNALS REQUIRE UNIQUE DESIGN CALCULATIONS FOR THE SPECIFIC LOADING CASE.
4. E70 ELECTRODE REQUIRED FOR GR 50 STEEL. E80 ELECTRODE REQUIRED FOR GR 65 STEEL.

ABBREVIATIONS:


- S.S. = STAINLESS STEEL
- GA. = GAUGE
- GR = GRADE
- O.D. = OUTSIDE DIAMETER
- I.D. = INSIDE DIAMETER
- H.S. = HIGH STRENGTH
- SCH. = SCHEDULE
- P.O.C.H. = POINT OF CONTACT HEIGHT OF THE POLE BAND CLAMP, MEASURED FROM THE BOTTOM OF THE STRAIN POLE

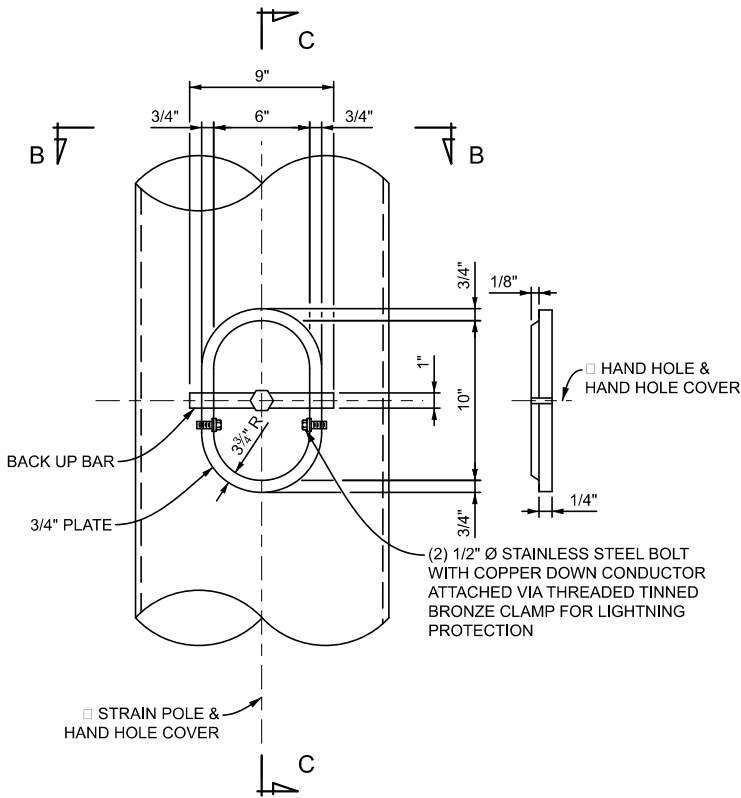


NOTES:

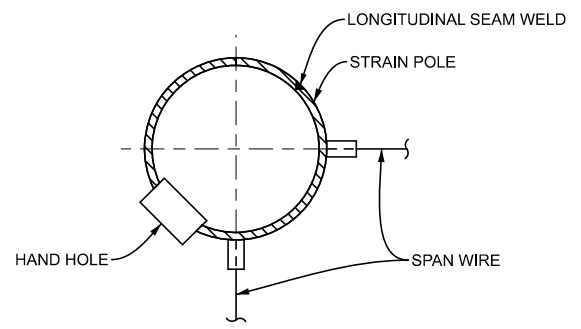
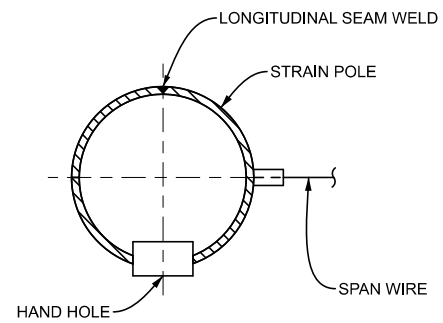
1. ATTACH ID TAG TO STRAIN POLE AT LOCATIONS SHOWN 4" ABOVE BASE OF TUBE, BELOW HANDHOLE, WITH (4) #8 x 3/8" S.S. TYPE U DRIVE SCREWS.
2. STAMP IN LETTERS WITH 3/8" CHARACTERS.

3 DETAIL - STRAIN POLE S.S. ID TAG

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR STRAIN POLE REQUIREMENTS			SHEET 2 OF 7
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE	SIG-021-A	
				SECT

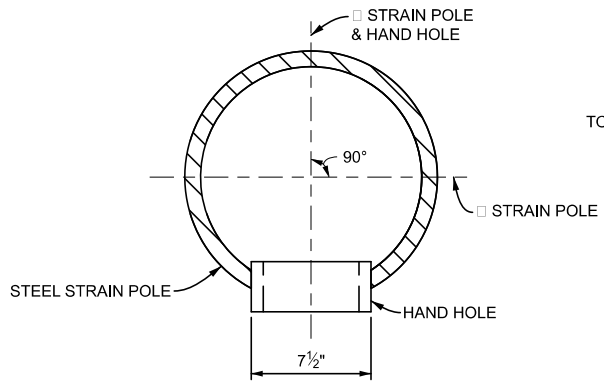


4 DETAIL - HAND HOLE



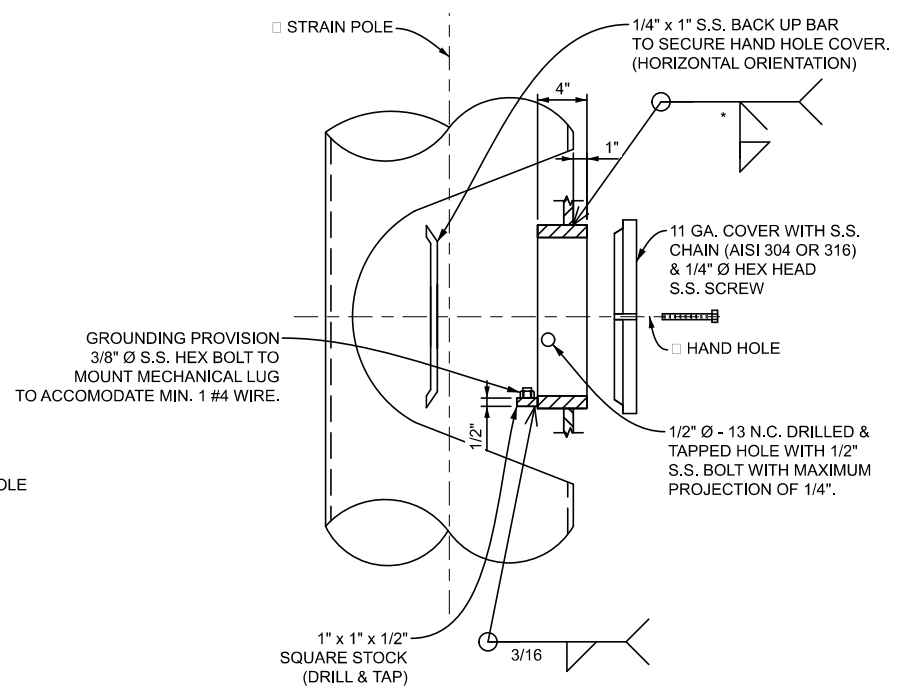
LONGITUDINAL SEAM WELD MUST BE 90° MINIMUM FROM THE HAND HOLE AND 30° MINIMUM FROM THE □ COUPLING (SEE SECTION A FOR □ COUPLING).

5 DETAIL - STRAIN POLE ORIENTATION



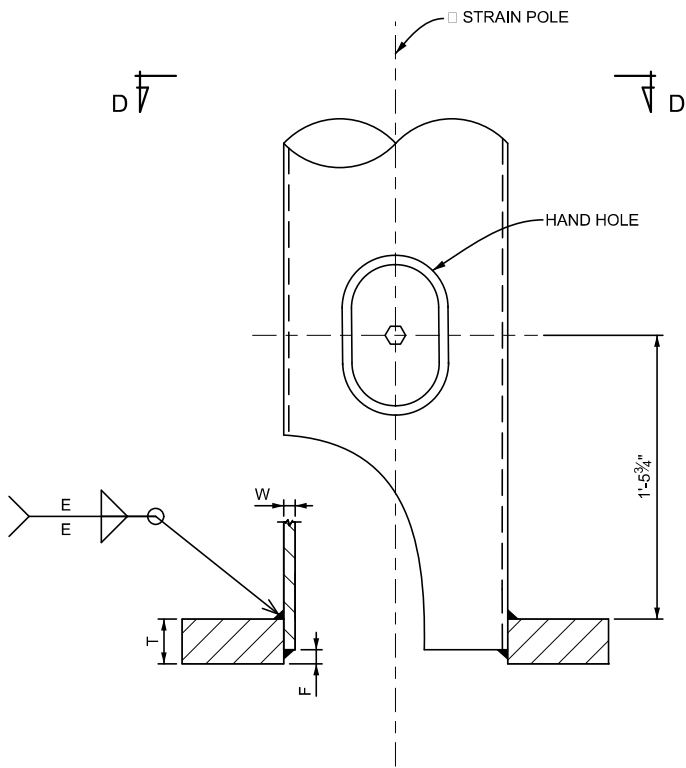
SEE STRAIN POLE ORIENTATION DETAIL

B SECTION - HAND HOLE



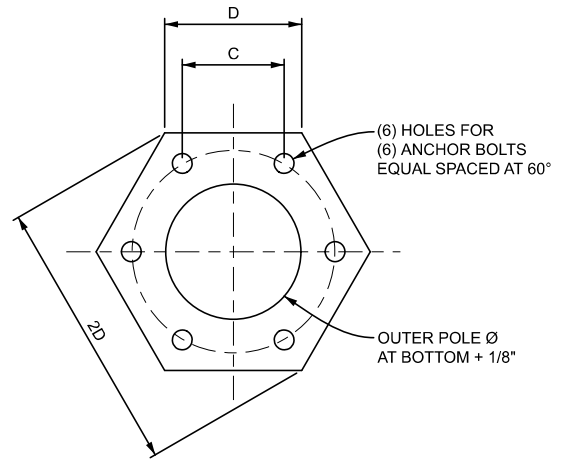
C SECTION - HAND HOLE

<p>MDOT Michigan Department of Transportation</p> <p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	<p>STANDARD PLAN FOR HAND HOLE & STRAIN POLE ORIENTATION DETAILS</p>			<p>SHEET 3 OF 7</p>
	<p>(SPECIAL DETAIL) FHWA APPROVAL</p>	<p>07/27/23 PLAN DATE</p>	<p>SIG-021-A</p>	



ANCHOR BOLTS NOT SHOWN FOR CLARITY.

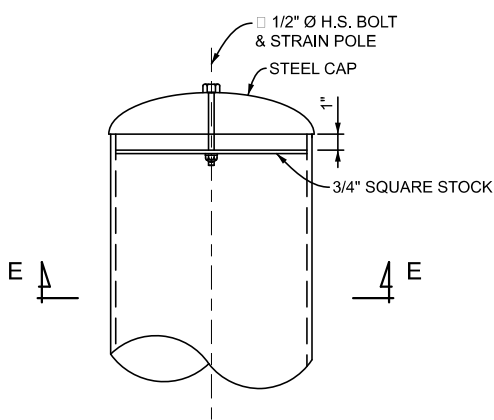
6 DETAIL - BASE PLATE



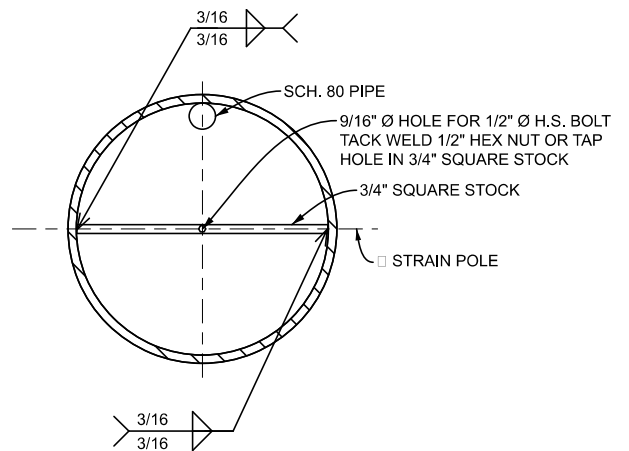
NOTES:

1. STRAIN POLE NOT SHOWN FOR CLARITY.
2. SEE STRAIN POLE REQUIREMENTS TABLE ON SHEET 2 FOR:
 ANCHOR BOLT CIRCLE Ø
 ANCHOR BOLT HOLE Ø
 ANCHOR BOLT Ø

D SECTION - BASE PLATE



7 DETAIL - STRAIN POLE CAP



E SECTION - STRAIN POLE CAP



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BASE PLATE AND STRAIN
POLE CAP DETAILS

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

SIG-021-A

SHEET
4 OF 7

SECT

STRAIN POLE FOUNDATION REQUIREMENTS

MARK	DESCRIPTION	UNIT	NOT CONNECTED TO TIE-OFF SPANS			CONNECTED TO TIE-OFF SPANS	
			SIZE 1	SIZE 2	SIZE 3	SIZE 4	SIZE 5
A	POLE LENGTH	FT	30	36	40	36	40
	ANCHOR BOLT DIAMETER	IN	1 3/4	2	2	2	2
	ANCHOR BOLT CIRCLE DIAMETER	IN	24	27	27	29	29
	ANCHOR BOLT LENGTH	IN	72	72	72	72	72
	FOUNDATION DIAMETER	IN	42	48	48	48	48

NOTES:

1. ALL WORK AND MATERIALS MUST BE IN ACCORDANCE WITH THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. CONSTRUCT STRAIN POLE FOUNDATIONS ACCORDING TO SECTION 718.03 OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
2. IF SOIL CONDITIONS INDICATE THERE IS NO NEED FOR A CASING PAY ITEM AS SHOWN ON THE PLAN, THE CONTRACTOR SHALL REQUEST PERMISSION OF THE ENGINEER TO INSTALL THE FOUNDATION WITHOUT CASING.
3. WHEN THE CASING PAY ITEM IS INCLUDING ON THE PLANS FOR A FOUNDATION (DUE TO GRANULAR SOILS, A WET HOLE OR OTHER UNSTABLE CONDITIONS), STEEL CASING (SMOOTH WALLED) IS TO BE INSTALLED TO ENABLE THE FOUNDATION TO BE POURED. THE THICKNESS OF THE STEEL CASING IS TO BE DETERMINED BY THE CONTRACTOR. THE STEEL MUST BE LEFT IN PLACE. SMOOTH WALLED STEEL CASING OUTSIDE DIAMETER TO MEET OR EXCEED FOUNDATION DIAMETER. IF SOIL EXTENDING LATERALLY WITHIN 6 FEET OF THE DRILLED SHAFT FOUNDATION IS LOOSENEED OR OTHERWISE DISTURBED, SCARIFY MATERIAL AT THE BASE OF THE EXCAVATION BELOW THE DEPTH OF DISTURBANCE AND RECOMPACT IN ACCORDANCE WITH 206.03.B OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. COMPACT ALL BACKFILL PLACED ABOVE THE RECOMPACTED BASE OF EXCAVATION IN ACCORDANCE WITH 206.03.B OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
4. WHEN THE CASING PAY ITEM IS CALLED FOR ON THE PLANS, THE STEEL CASING MAY STOP AT THE CONDUIT ENTRANCE TO FOUNDATION. TOP OF FOUNDATION MUST THEN BE FORMED SEPARATELY, EVEN THOUGH THE STEEL CASING STOPS AT THE CONDUIT ENTRANCE. THE CASING PAY ITEM QUANTITY WILL BE PAID FOR BASED ON ACTUAL LINEAR FEET INSTALLED.
5. CONSTRUCT STRAIN POLE FOUNDATIONS, CASED OR UNCASED, ACCORDING TO SUBSECTION 820.03.A AND 718 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION. ALL WORK AND MATERIALS MUST BE IN ACCORDANCE WITH THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
6. STEEL REINFORCEMENT MUST CONFORM TO SECTION 905 OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
7. EXPOSED CONCRETE SURFACES MUST BE CAST IN FORMS.
8. CONDUITS AND ANCHOR BOLTS MUST BE RIGIDLY INSTALLED BEFORE CONCRETE IS PLACED. ANCHOR BOLTS MUST BE SPACED BY MEANS OF A TEMPLATE. THE CENTER OF THE TEMPLATE MUST COINCIDE WITH THE CENTER OF THE FOUNDATION.
9. GROUNDING OF POLE INCLUDES ADDING #4 BARE COPPER GROUND WIRE BONDED BY LISTED MECHANICAL CONNECTION TO FOUNDATION REINFORCING STEEL AND HAVING 24" OF SLACK ABOVE THE TOP OF FOUNDATION.
10. INSTALL COPPER CLAD GROUND ROD(S) AS DIRECTED BY ENGINEER AND IN ACCORDANCE WITH CURRENT N.E.C. ALL GROUNDS MUST PROVIDE LESS THAN 10 OHM RESISTANCE TO GROUND.



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

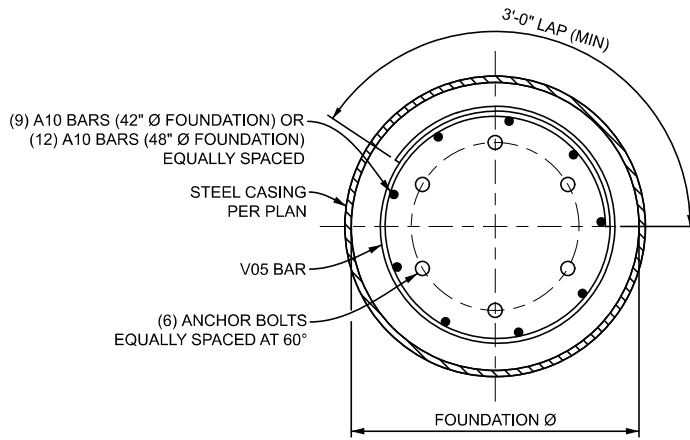
STANDARD PLAN FOR
FOUNDATION REQUIREMENTS

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

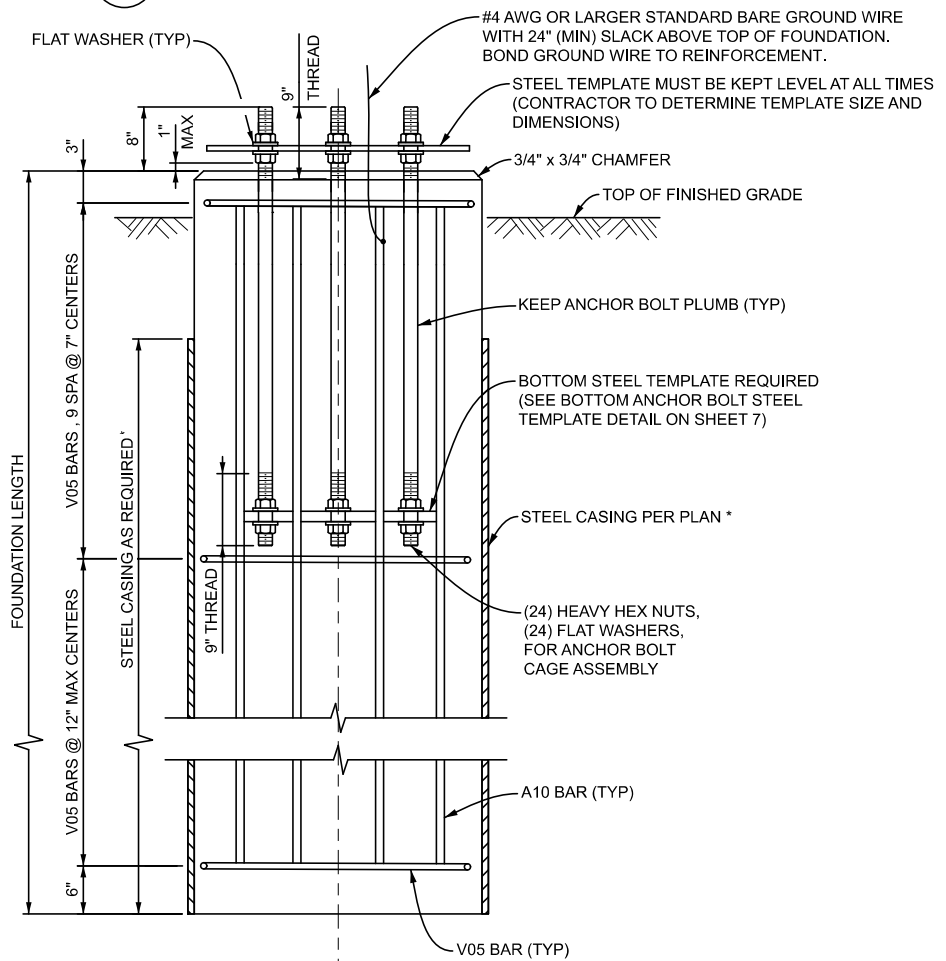
SIG-021-A

SHEET
5 OF 7



SEE STRAIN POLE FOUNDATION REQUIREMENTS TABLE ON PAGE 5 FOR:
ANCHOR BOLT CIRCLE Ø, ANCHOR BOLT Ø, & FOUNDATION Ø

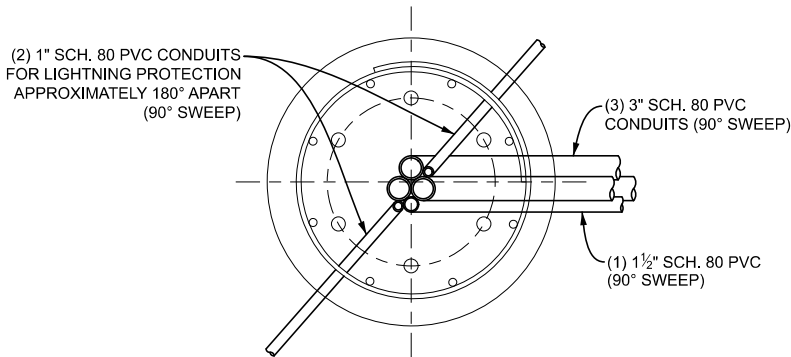
8 DETAIL - FOUNDATION PLAN



* SEE FOUNDATION NOTES AND PLANS FOR STEEL CASING PAY ITEM

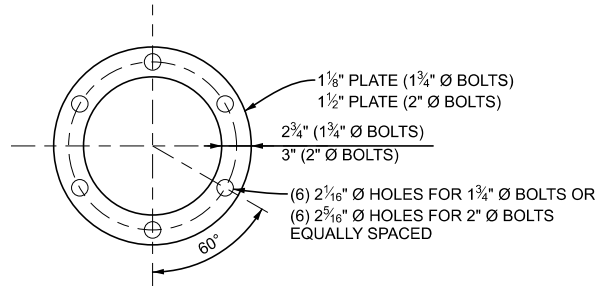
9 DETAIL - FOUNDATION ELEVATION

<p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	STANDARD PLAN FOR FOUNDATION DETAILS			<p>SHEET 6 OF 7</p>
	<p>(SPECIAL DETAIL) FHWA APPROVAL</p>	<p>07/27/23 PLAN DATE</p>	<p>SIG-021-A</p>	
				<p>SECT</p>



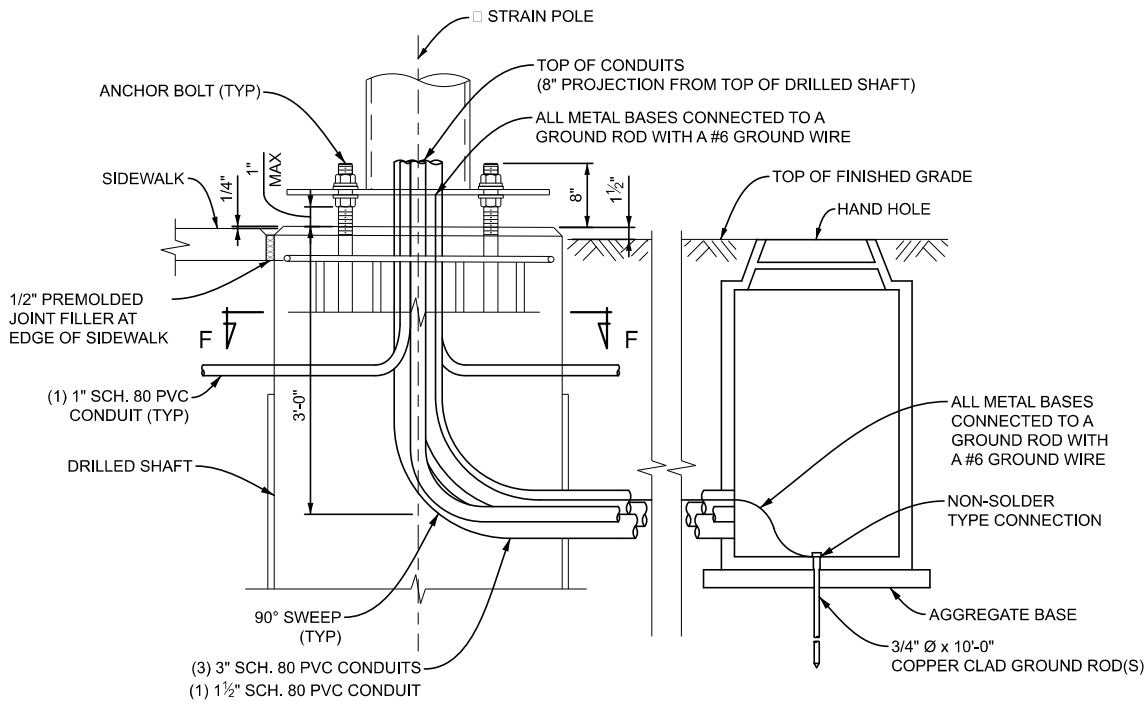
SECURE CONDUITS TOGETHER WITH SUITABLE BANDING TO ENSURE PLACEMENT TOGETHER PRIOR TO CONCRETE POUR.

F SECTION-CONDUIT LAYOUT



SEE STRAIN POLE FOUNDATION REQUIREMENTS TABLE ON SHEET 5 FOR:
ANCHOR BOLT CIRCLE Ø
ANCHOR BOLT HOLE Ø
FOUNDATION Ø

11 DETAIL - BOTT. ANCHOR BOLT STEEL TEMPLATE



10 DETAIL - CONDUIT LAYOUT



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
CONDUIT DETAILS

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

SIG-021-A

SHEET
7 OF 7

MAST ARM DESIGN CRITERIA:

THE DESIGN OF THE MAST ARM STRUCTURES SHOWN ON SIG-031-A, SIG-032-A & SIG-033-A IS BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION (2015), WITH 2017 TO 2022 INTERIM REVISIONS.

LOAD PARAMETERS:

WIND LOAD (EXTREME EVENT LIMIT STATE): 1700-YEAR MRI BASIC WIND SPEED MAP, 120 MPH DESIGN WIND SPEED

WIND LOAD (SERVICE I EVENT LIMIT STATE): 10-YEAR MRI BASIC WIND SPEED MAP, 76 MPH DESIGN WIND SPEED

HEIGHT AND EXPOSURE FACTOR (K_z): K_z IS CALCULATED USING A HEIGHT (Z) MEASURED FROM TOP OF THE DRILLED SHAFT (IT IS ASSUMED THAT THE POLE IS GROUND-MOUNTED).

DIRECTIONALITY FACTOR (K_d): 0.85

GUST EFFECT FACTOR (G): 1.14

MAST ARM LOADING: SEE MAST ARM LOADING TABLE BELOW. AREAS AND WEIGHTS SHOWN IN THE TABLE FOR SIGNALS INCLUDE BACKPLATES EXTENDING 5" FROM SIGNAL ON ALL SIDES. FOR TWIN MAST ARMS, THE LOADING IS THE SAME ON BOTH ARMS.

SERVICEABILITY PARAMETERS:

LIMIT FOR SLOPE AT TOP OF POLE UNDER DEAD LOAD ONLY: 0.35 IN/FT

LIMIT FOR MAST ARM VERTICAL DEFLECTION UNDER GALLOPING AND TRUCK GUST-INDUCED LOADING: 8 IN

FATIGUE PARAMETERS:

FATIGUE CATEGORY:

- SIG-031-A: CATEGORY I
- SIG-032-A: CATEGORY II
- SIG-033-A: CATEGORY III

MINIMUM BEND RADIUS FOR 16-SIDED SECTIONS: 5 X WALL THICKNESS OR 1", WHICHEVER IS GREATER

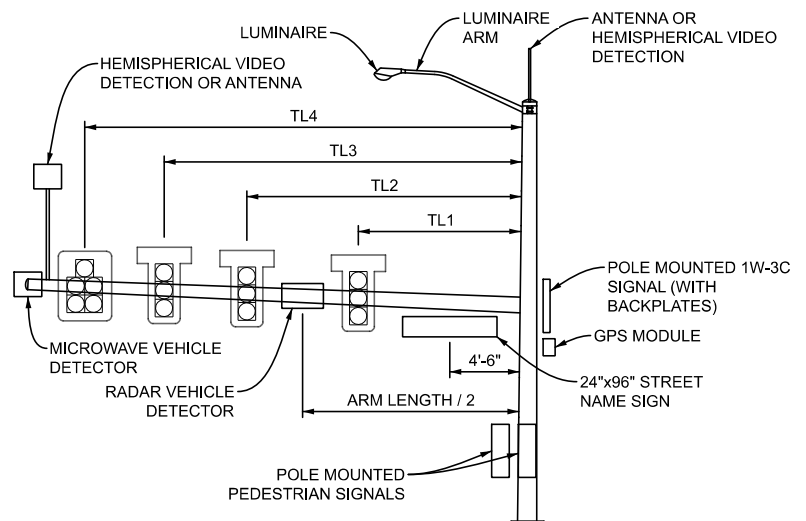
MAST ARM LOADING TABLE																			
MAST ARM DATA			TL1 (1W-3C SIGNAL)**				TL2 (1W-3C SIGNAL)				TL3 (1W-3C SIGNAL)				TL4 (1W-5C DOGHOUSE SIGNAL)				
SPAN FT	MTG HT SINGLE	MTG HT TWIN*	DISTANCE	WEIGHT LBS	AREA SFT	INC. 12"x27" SIGN?	DISTANCE	WEIGHT LBS	AREA SFT	INC. 12"x27" SIGN?	DISTANCE	WEIGHT LBS	AREA SFT	INC. 12"x27" SIGN?	DISTANCE	WEIGHT LBS	AREA SFT	INC. 12"x27" SIGN?	
20	19'-0"	18'-6" & 21'-0"	-	--	-	-	12'-0"	43	8.67	NO	20'-0"	43	8.67	NO	-	-	-	-	
25							17'-0"				25'-0"								
30							22'-0"				30'-0"								
35							19'-0"	27'-0"	75	10.92	YES	35'-0"	69	13.72					NO
40							24'-0"	32'-0"											
45							29'-0"	37'-0"											
50	26'-0"***	75**	10.92**	YES**	34'-0"	42'-0"	50'-0"												

*TWIN MAST ARMS NOT ALLOWED FOR CATEGORY III MAST ARMS. MINIMUM ALLOWABLE ANGLE BETWEEN ARMS IS 45 DEGREES.

**TL1 NOT ALLOWED FOR 50FT TWIN MAST ARMS

MAST ARM LOADING TABLE (CONT'D)		
EQUIPMENT	WEIGHT LBS	AREA SFT
ANTENNA	20	0.09
GPS MODULE	30	0.75
POLE MOUNTED PEDESTRIAN SIGNAL	25	1.78
1W-3C SIGNAL (WITH BACKPLATE)	43	8.67
LUMINAIRE	50	1.00
LUMINAIRE ARM	SEE SIG-031, SIG-032, AND SIG-033 FOR DETAILS	
HEMISPHERICAL VIDEO DETECTION	22	2.11
MICROWAVE VEHICLE DETECTOR	4	0.97
RADAR VEHICLE DETECTOR	4	0.97
24x96 STREET NAME SIGN	90	14.93

SEE ELEVATION VIEW FOR EQUIPMENT MOUNTING LOCATIONS.



1 DETAIL - MAST ARM LOADING ELEVATION VIEW

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



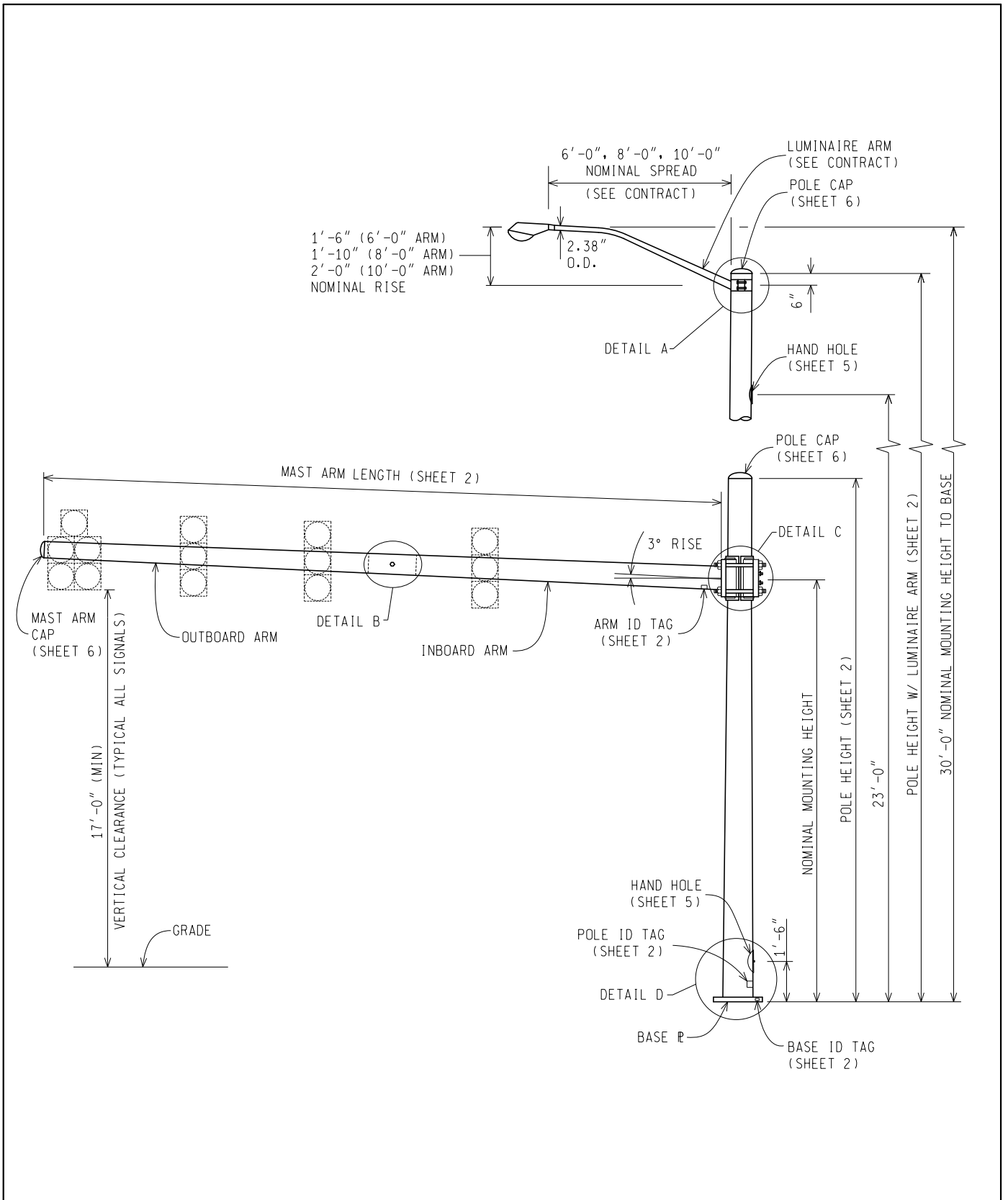
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
TRAFFIC SIGNAL MAST ARM POLE AND MAST ARM
LOADING TABLE AND DESIGN CRITERIA

(SPECIAL DETAIL) 07/27/23
FHWA APPROVAL PLAN DATE

SIG-030-A

SHEET
1 OF 1



NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG030B.dgn Rev. 11/05/18



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY:

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
TRAFFIC SIGNAL MAST ARM POLE AND
MAST ARM DETAILS - CATEGORY I

PLAN DATE

SIG-030-B

SHEET
1 of 6

ROUND TAPERED STEEL MAST ARM			
MAST ARM LENGTH	* MAST ARM DIMENSIONS	MTG HT SINGLE	MTG HT TWIN
20'-0"	0.1793"-16.50" x 13.70" x 20'-0"	19'-0"	18'-6" & 21'-0"
25'-0"	0.1793"-16.50" x 13.00" x 25'-0"		
30'-0"	0.1793"-16.50" x 12.30" x 30'-0"		
35'-0"	0.4290"-16.50" x 13.70" x 20'-0"		
	0.1793"- ** x 12.00" x **		
40'-0"	0.4290"-16.50" x 13.70" x 20'-0"		
	0.1793"- ** x 11.30" x **		
45'-0"	0.4290"-16.50" x 13.70" x 20'-0"		
	0.1793"- ** x 10.60" x **		
50'-0"	0.5000"-16.75" x 13.95" x 20'-0"		
	0.1793"- ** x 10.15" x **		

ROUND TAPERED STEEL MAST ARM POLE	
* POLE DIMENSIONS	LUMINAIRE ARM
0.4375"-18.00" x 14.78" x 23'-0"	NO
0.4375"-18.00" x 13.94" x 29'-0"	YES

POLE TUBE TAPER IS 0.140 IN/FT

* DIAMETERS GIVEN ARE O.D.

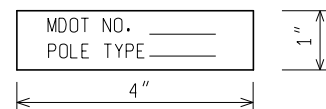
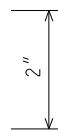
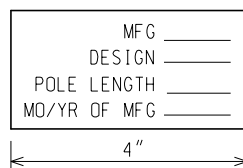
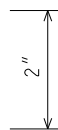
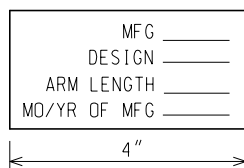
MAST ARM TUBE TAPER IS 0.140 IN/FT

* DIAMETERS GIVEN ARE O.D.

** TO BE DETERMINED BY CONTRACTOR BASED ON REQUIRED MAST ARM LENGTH AND TELESCOPIC SPLICE LENGTH.

NOTES:

1. THE DESIGN OF THIS STRUCTURE IS BASED ON THE 2001 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS FOR 90 MPH WIND LOAD AND CATEGORY I WITH GALLOPING, NATURAL WIND GUSTS, AND TRUCK INDUCED FATIGUE LOADS.
2. WELD THE LONGITUDINAL ARM SEAM ON THE INBOARD AND OUTBOARD SECTIONS OF THE TELESCOPIC FIELD SPLICE WITH A COMPLETE JOINT PENETRATION (CJP) WELD A MINIMUM OF 36 INCHES LONG. IN ADDITION, LONGITUDINAL SEAM WELDS MUST BE CJP FOR A MINIMUM OF 6 INCHES FROM TUBE TO PLATE CJP WELDS.
3. SEAM WELDS MUST BE 90° ± FROM HAND HOLE AT BASE.
4. LUMINAIRE ARM IS 11 GAUGE ROUND STEEL WITH 0.140 INCH PER FOOT TAPER.
5. BACKING BAR FOR PIPE TO BASE PLATE (Ⓢ) AND MAST ARM TO MAST ARM PLATE MUST BE MINIMUM 5/16 INCH X 2 INCH PLATE.
6. 1/2 INCH DIAMETER (Ø) ROUND STOCK C-HOOK ATTACHED TO ALL POLE SIZES. 3/4 INCH SCHEDULE (SCH.) 40 PIPE ATTACHED TO ALL POLE SIZES AND INBOARD AND OUTBOARD ARM.
7. S.S. DENOTES STAINLESS STEEL. GA. DENOTES GAUGE. O.D. DENOTES OUTSIDE DIAMETER. I.D. DENOTES INSIDE DIAMETER. H.S. DENOTES HIGH STRENGTH.



ARM/POLE S.S. ID TAG DETAIL

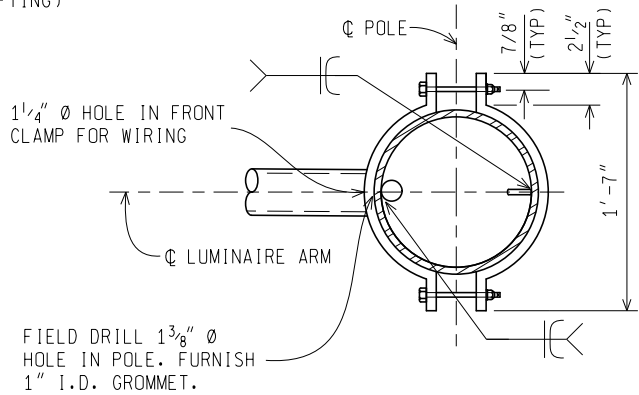
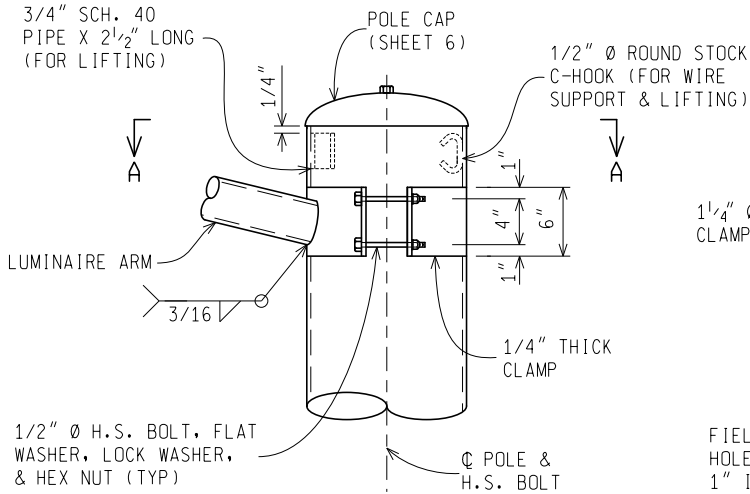
TO BE ATTACHED TO POLE OR MAST ARM AT LOCATIONS SHOWN 4" FROM BASE OF TUBE BELOW HANDHOLE WITH (4) #8 X 3/8" S.S. TYPE U DRIVE SCREWS.
(LETTERS STAMPED IN 3/8" CHARACTERS)

BASE S.S. ID TAG DETAIL

WELD TAG TO EDGE OF BASE Ⓢ
(LETTERS STAMPED IN 3/8" CHARACTERS)

NOT TO SCALE

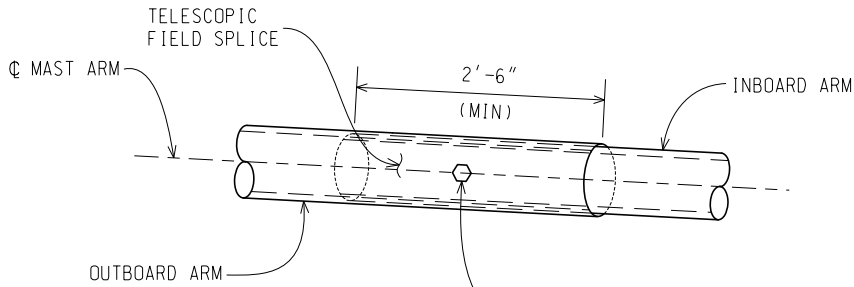
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	FHWA APPROVAL DATE	PLAN DATE	SIG-030-B	SHEET 2 of 6
File:RefDoc/TR/Signals/Web/Sp Det/Fin/SIG030B.dgn Rev. 11/05/18				



DETAIL A

ORIENTATION OF SCH. 40 PIPE 180° FROM HAND HOLE AT BASE & C-HOOK 180° FROM SCH. 40 PIPE

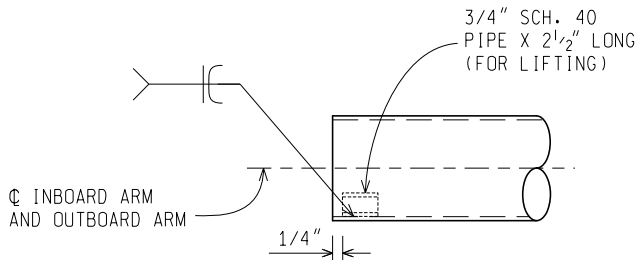
SECTION A-A



5/8" Ø BOLT WITH "ANCO" LOCK NUTS, 3/4" Ø HOLE FACTORY DRILLED IN OUTBOARD TUBE, FIELD DRILL INBOARD TUBE. (ORIENTATION MUST BE HORIZONTAL)

DETAIL B

(35'-0" ARMS AND GREATER)



INBOARD/OUTBOARD ARM LIFTING DEVICE

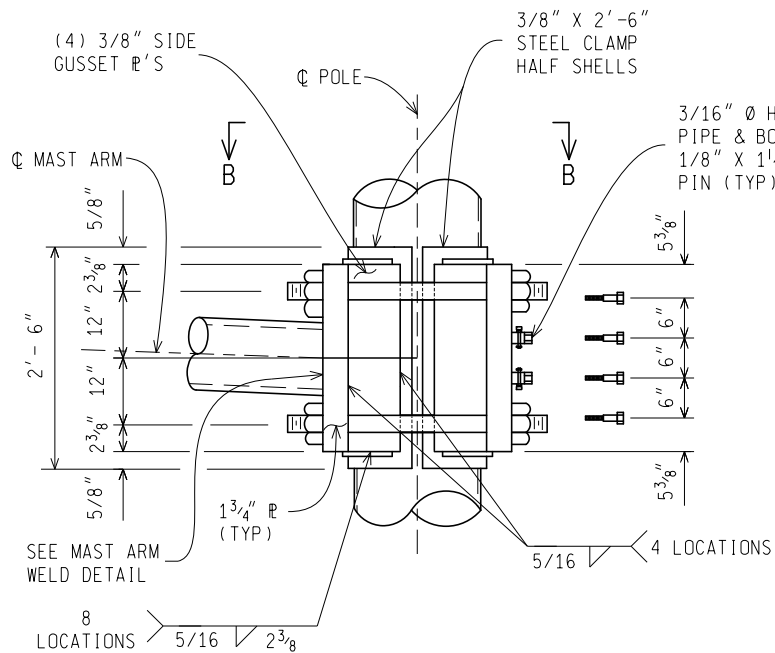
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

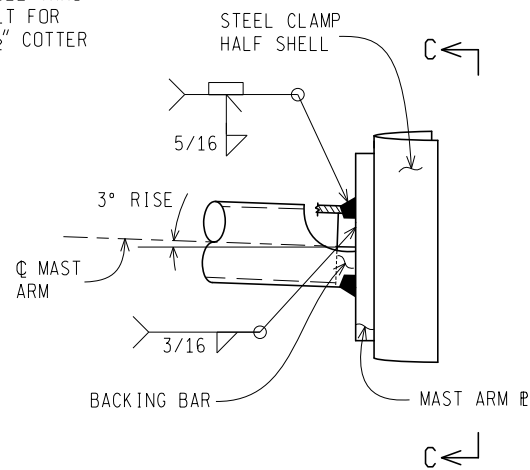
FHWA APPROVAL DATE

SIG-030-B

SHEET
3 of 6

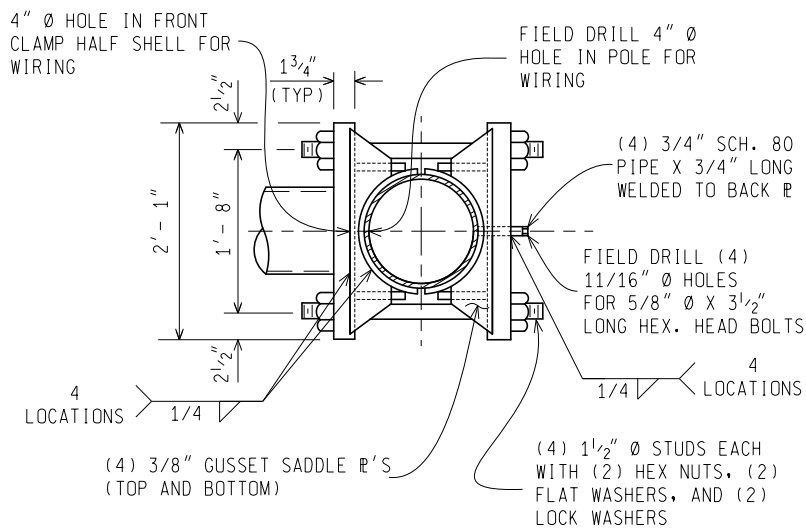


DETAIL C

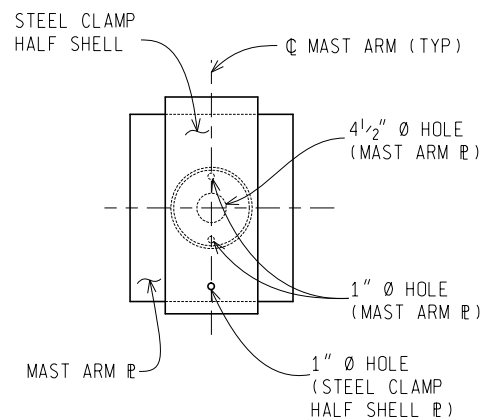


MAST ARM WELD DETAIL

SIDE GUSSET PLATES AND SADDLE PLATES NOT SHOWN FOR CLARITY



SECTION B-B



SECTION C-C

SIDE GUSSET PLATES AND SADDLE PLATES NOT SHOWN FOR CLARITY

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

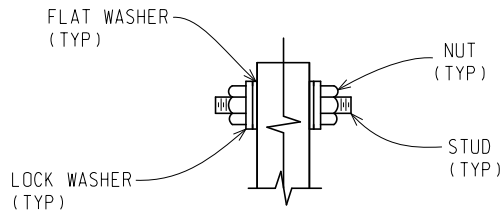
FHWA APPROVAL DATE

File: RefDoc/TR/Signals/Web/Sp Det/F in/SIG030B.dgn Rev. 11/05/18

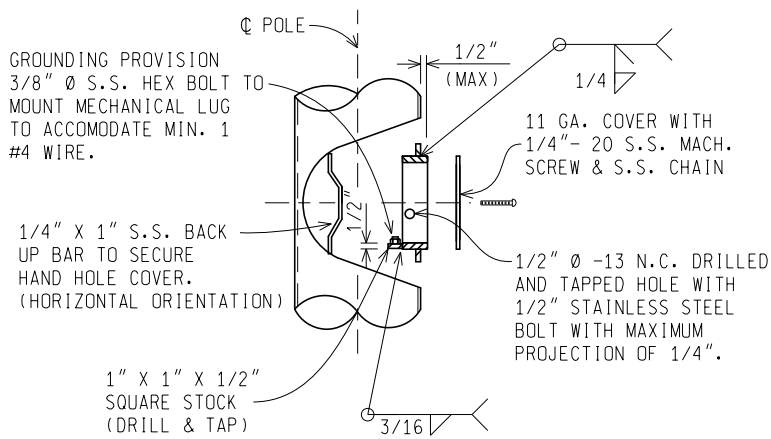
PLAN DATE

SIG-030-B

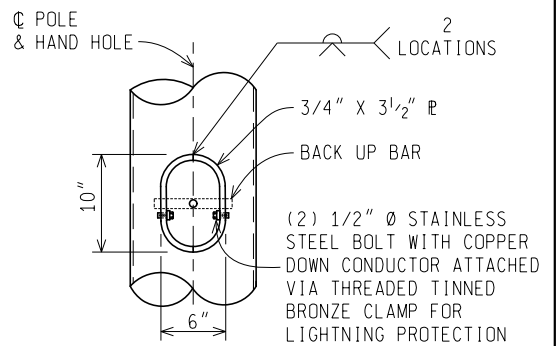
SHEET
4 of 6



MAST ARM CLAMP WASHER PLACEMENT

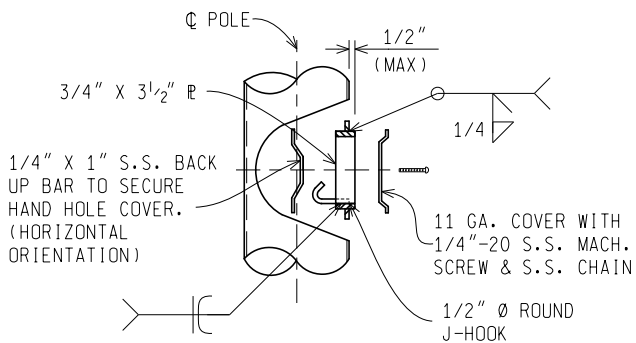


6" X 10" BAR BOTTOM HAND HOLE



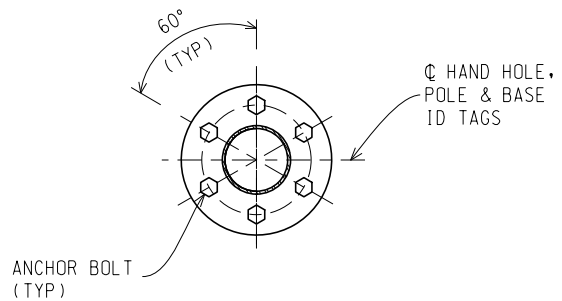
6" X 10" BAR BOTTOM HAND HOLE

(VIEW ROTATED 90 DEGREES)



4" X 6 1/2" BAR TOP HAND HOLE

DESIGN WITH 29'-0" POLE ONLY



ORIENTATION OF HAND HOLE

NOT TO SCALE

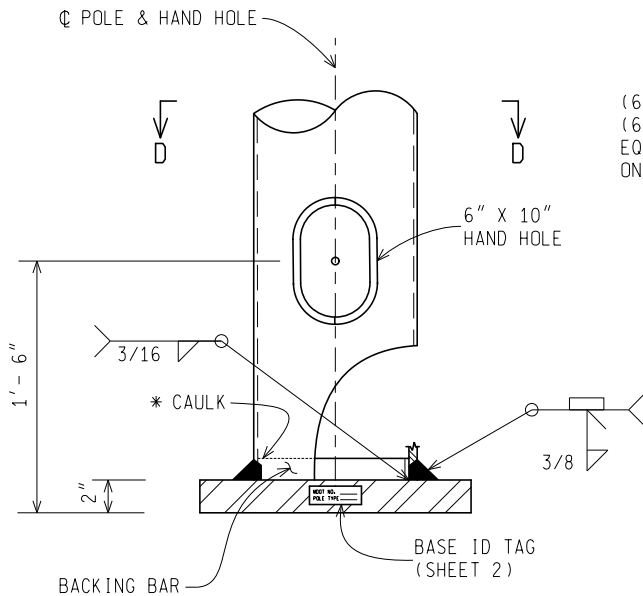
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

PLAN DATE

SIG-030-B

SHEET
5 of 6

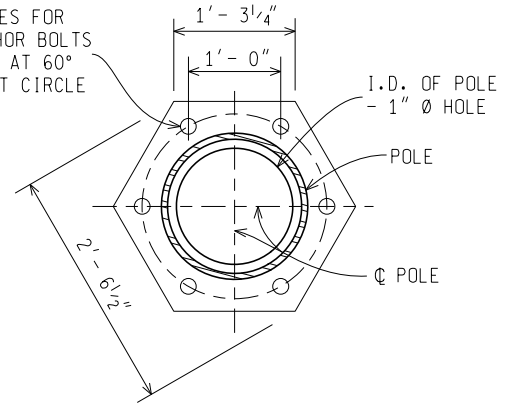


DETAIL D

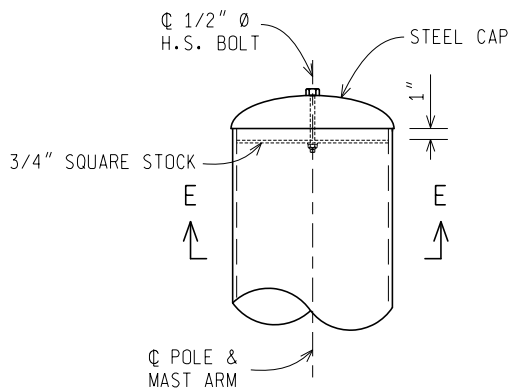
(VIEW ROTATED 90 DEGREES)

* SEAL JOINT WITH CAULK AFTER GALVANIZING

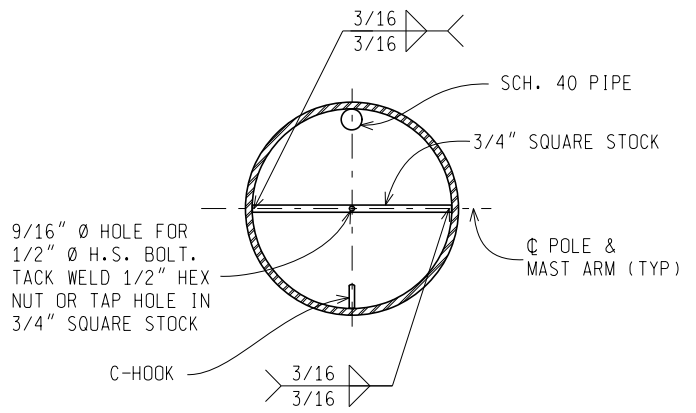
(6) 2 1/16" Ø HOLES FOR
 (6) 1 3/4" Ø ANCHOR BOLTS
 EQUALLY SPACED AT 60°
 ON A 24" Ø BOLT CIRCLE



SECTION D-D



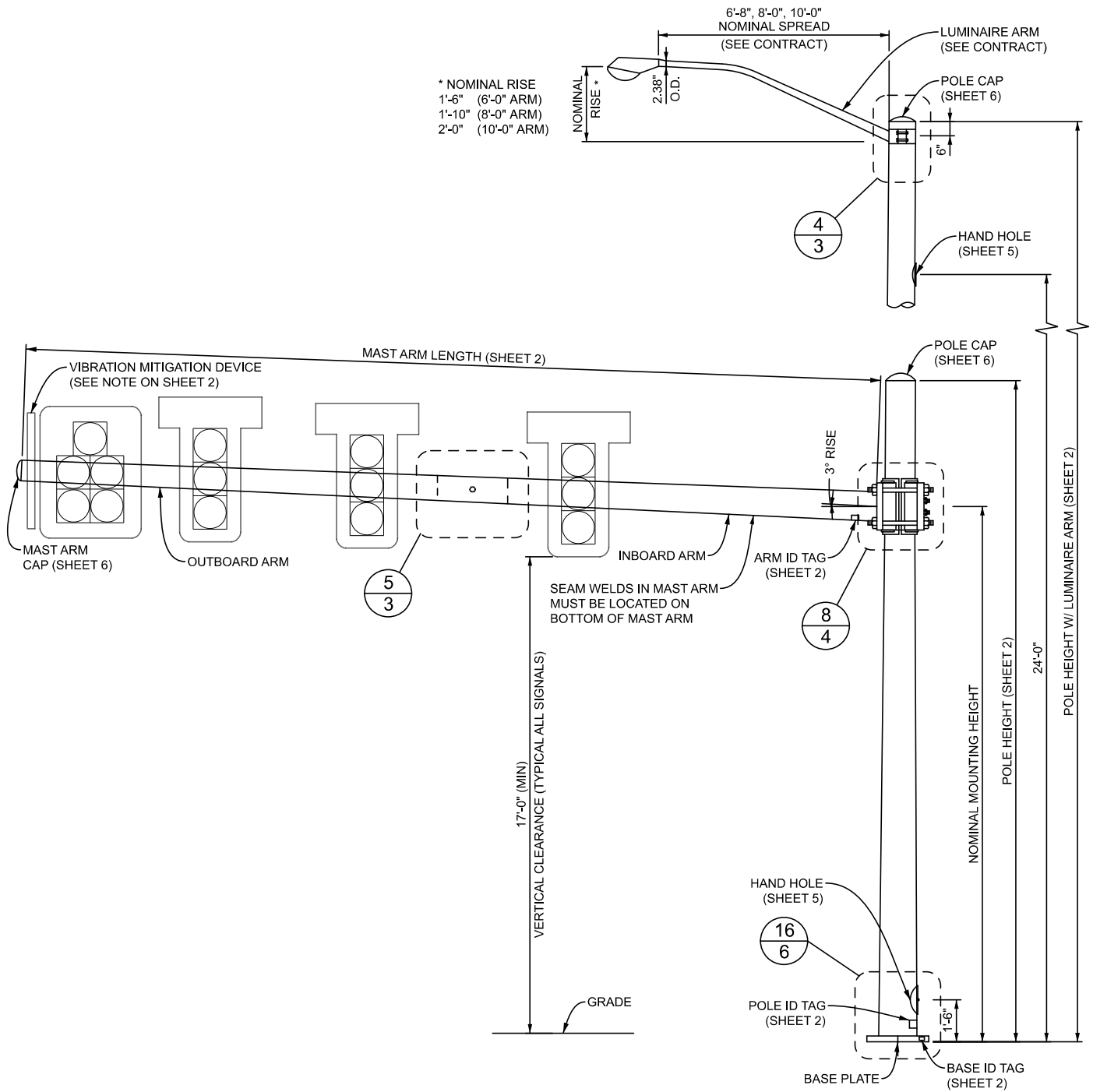
POLE AND MAST ARM CAP DETAIL



SECTION E-E

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	FHWA APPROVAL DATE	PLAN DATE	SIG-030-B	SHEET 6 of 6
File:RefDoc/TR/Signals/Web/Sp Det/F in/SIG030B.dgn	Rev. 11/05/18			



ELEVATION - MAST ARM POLE

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
TRAFFIC SIGNAL MAST ARM POLE AND
MAST ARM DETAILS - CATEGORY I

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

SIG-031-A

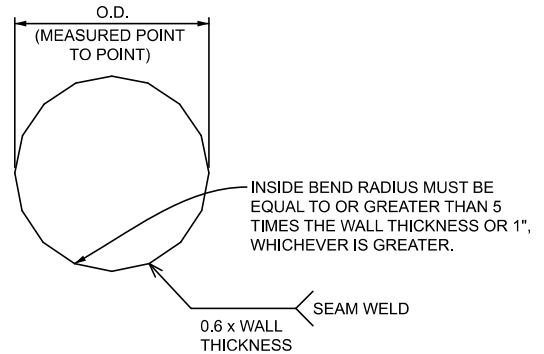
SHEET
1 OF 6

TAPERED STEEL MAST ARM POLE		
POLE DIMENSIONS *	LUMINAIRE ARM	MAST ARM LENGTH (FT)
0.4375"-18.00" x 14.78" x 23'-0"	NO	20, 25, 30, 35, 40, 45
0.4375"-18.00" x 13.94" x 29'-0"	YES	
0.5000"-18.00" x 14.78" x 23'-0"	NO	50
0.5000"-18.00" x 13.94" x 29'-0"	YES	

POLE TUBE TAPER IS 0.140 IN/FT
 * DIAMETERS ARE GIVEN BY O.D.

TAPERED STEEL MAST ARM			
MAST ARM LENGTH	MAST ARM DIMENSIONS *	MTG HT SINGLE	MTG HT TWIN
20'-0"	0.1793"-16.50" x 13.70" x 20'-0"	19'-0"	18'-6" & 21'-6"
25'-0"	0.1793"-16.50" x 13.00" x 25'-0"		
30'-0"	0.1793"-16.50" x 12.30" x 30'-0"		
35'-0"	0.4290"-16.50" x 13.70" x 20'-0"		
	0.1793"-14.30" x 12.00" x 16'-9"		
40'-0"	0.4290"-16.50" x 13.70" x 20'-0"		
	0.1793"-14.30" x 11.30" x 21'-9"		
45'-0"	0.4290"-16.50" x 13.70" x 20'-0"		
	0.1793"-14.30" x 10.60" x 26'-9"		
50'-0"	0.4290"-17.50" x 14.70" x 20'-0"		
	0.2391"-15.45" x 11.00" x 31'-11"		

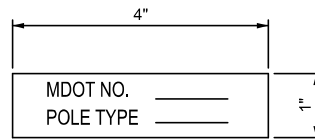
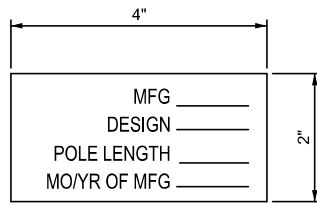
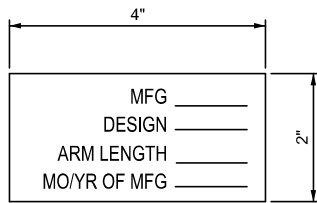
MAST ARM TUBE TAPER IS 0.140 IN/FT
 * DIAMETERS ARE GIVEN BY O.D.



1 DETAIL - 16-SIDED SECTION

NOTES:

- THE DESIGN OF THIS STRUCTURE IS BASED ON CATEGORY I GALLOPING, NATURAL WIND GUSTS, AND TRUCK INDUCED FATIGUE LOADS.
- WELD THE LONGITUDINAL ARM SEAM ON THE INBOARD AND OUTBOARD SECTIONS OF THE TELESCOPIC FIELD SPLICE WITH A COMPLETE JOINT PENETRATION (CJP) WELD WITH A LENGTH EQUAL TO THE TELESCOPIC FIELD SPLICE LENGTH PLUS 6 INCHES. THE LAP OF THE ARM SECTIONS CANNOT EXTEND BEYOND THE LONGITUDINAL ARM SEAM CJP WELD WHEN THE FIELD SPLICE IS ERECTED AND IN ITS FINAL POSITION. IN ADDITION, LONGITUDINAL SEAM WELDS MUST HAVE 60% MINIMUM PENETRATION OR FUSION AND MUST BE CJP FOR A MINIMUM OF 6 INCHES FROM TUBE TO PLATE CJP WELDS.
- SEAM WELDS IN MAST ARM POLE MUST BE 90° ± FROM HAND HOLE AT BASE. SEAM WELDS IN MAST ARM MUST BE LOCATED ON BOTTOM OF MAST ARMS.
- LUMINAIRE ARM IS 11 GAUGE ROUND STEEL WITH 0.140 INCH PER FOOT TAPER.
- BACKING BAR FOR PIPE TO BASE PLATE (□) AND MAST ARM TO MAST ARM PLATE MUST BE MINIMUM 5/16 INCH X 2 INCH PLATE.
- 1/2 INCH DIAMETER (Ø) ROUND STOCK C-HOOK ATTACHED TO ALL POLE SIZES. 1 INCH SCHEDULE (SCH.) 80 PIPE ATTACHED TO ALL POLE SIZES AND INBOARD AND OUTBOARD ARM.
- S.S. DENOTES STAINLESS STEEL. GA. DENOTES GAUGE. O.D. DENOTES OUTSIDE DIAMETER. I.D. DENOTES INSIDE DIAMETER. H.S. DENOTES HIGH STRENGTH.
- ROUND OR 16-SIDED SECTIONS ARE ALLOWED.
- MULTI-PLY SECTIONS ARE NOT ALLOWED.
- A VIBRATION MITIGATION DEVICE IS REQUIRED FOR 50 FOOT ARM AND SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO THE END OF THE ARM.



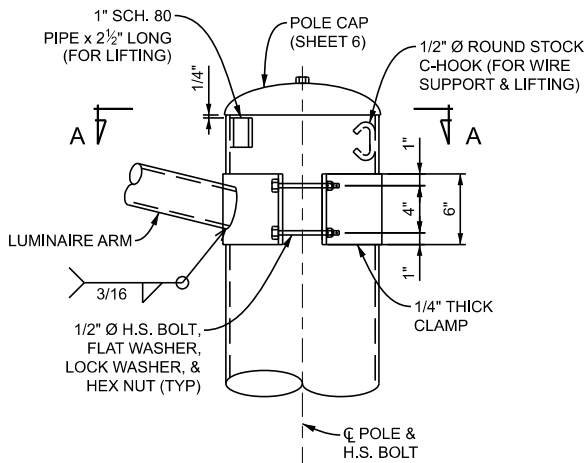
ATTACH TO POLE OR MAST ARM AT LOCATIONS SHOWN
 4" FROM BASE OF TUBE BELOW HANDHOLE WITH (4) #8 x 3/8"
 S.S. TYPE U DRIVE SCREWS.
 (LETTERS STAMPED IN 3/8" CHARACTERS)

WELD TAG TO EDGE OF BASE PLATE
 (LETTERS STAMPED IN 3/8" CHARACTERS)

2 DETAIL - ARM/POLE S.S. ID TAG

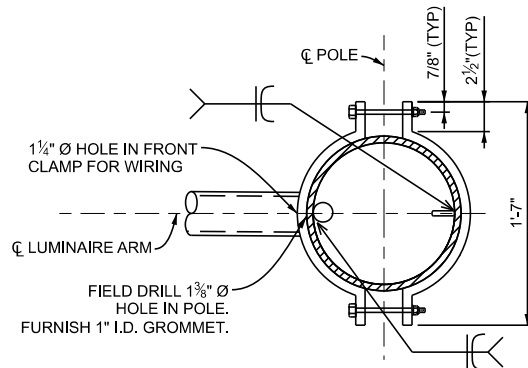
3 DETAIL - BASE S.S. ID TAG

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR MAST ARM POLE AND MAST ARM REQUIREMENTS			SHEET 2 OF 6
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE	SIG-031-A	

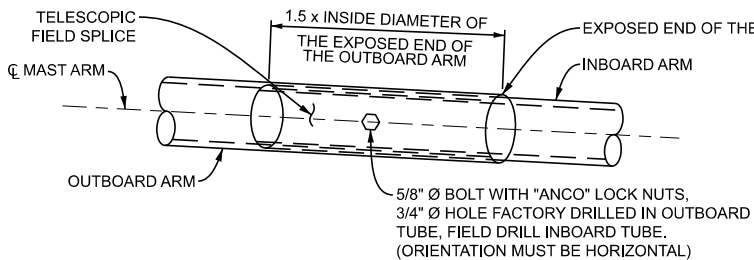


ORIENTATION OF SCH. 80 PIPE 180° FROM HAND HOLE AT BASE & C-HOOK 180° FROM SCH. 80 PIPE

4 DETAIL - LUMINAIRE ARM BRACKET

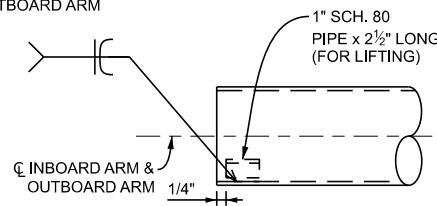


A SECTION - LUMINAIRE ARM BRACKET



NOTES:
 1. FOR 35'-0" ARMS AND GREATER.
 2. THE INBOARD AND OUTBOARD ARMS MUST FIT TIGHTLY.

5 DETAIL - TELESCOPIC SPLICE



6 INBOARD/OUTBOARD ARM
 DETAIL - LIFTING DEVICE



DEPARTMENT DIRECTOR
 BRADLEY C. WIEFERICH, PE

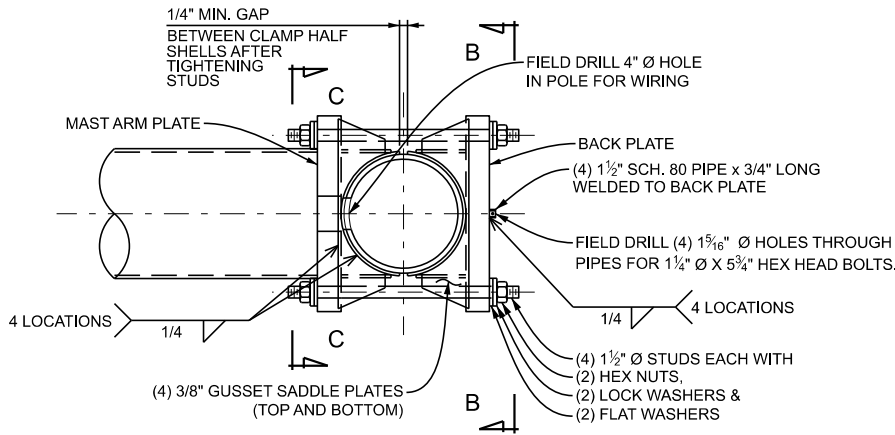
STANDARD PLAN FOR
 LUMINAIRE ARM BRACKET, TELESCOPIC
 SPLICE, AND LIFTING DEVICE DETAILS

(SPECIAL DETAIL)
 FHWA APPROVAL

07/27/23
 PLAN DATE

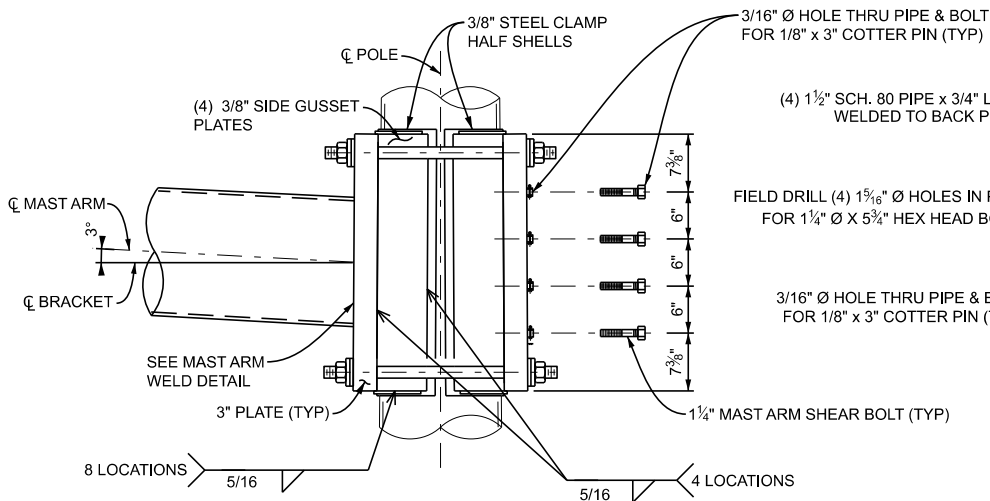
SIG-031-A

SHEET
 3 OF 6

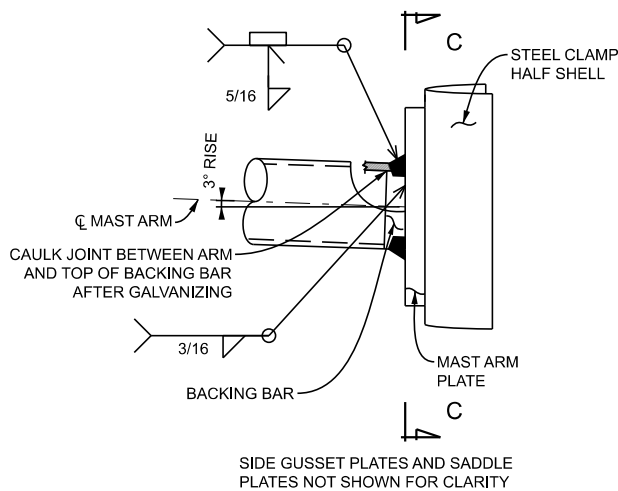


ROUND SECTION SHOWN, SAME CONNECTION DETAILS FOR 16-SIDED SECTION GUSSET SADDLE PLATES MUST MATCH 16-SIDED POLE SHAPE

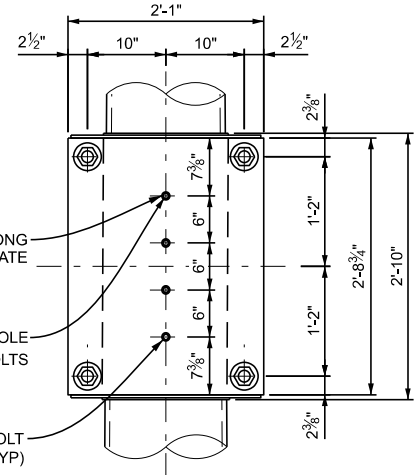
7 DETAIL - MAST ARM BRACKET PLAN



8 DETAIL - MAST ARM BRACKET ELEVATION

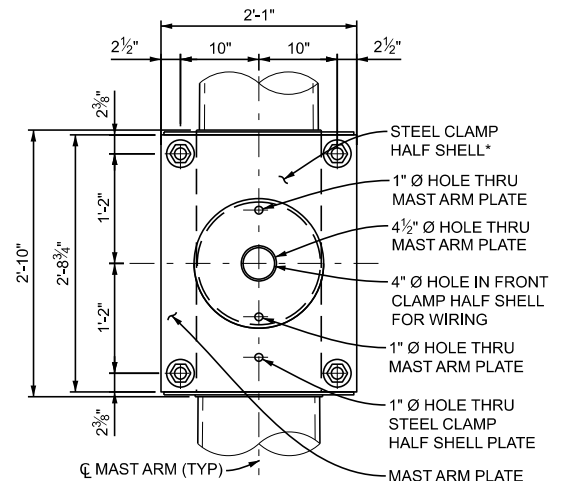


9 DETAIL - MAST ARM WELD



SIDE GUSSET PLATES AND SADDLE PLATES NOT SHOWN FOR CLARITY

B SECTION - BACK PLATE



SIDE GUSSET PLATES AND SADDLE PLATES NOT SHOWN FOR CLARITY

*INSIDE RADIUS OF STEEL CLAMP HALF SHELL SHALL BE WITHIN 1/4" OF THE DESIGNED POLE OUTSIDE RADIUS AT THE INTENDED MOUNTING HEIGHT

C SECTION - MAST ARM PLATE



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
MAST ARM BRACKET DETAILS

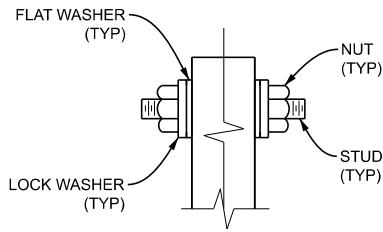
(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

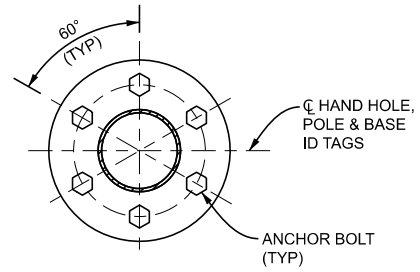
SIG-031-A

SHEET
4 OF 6

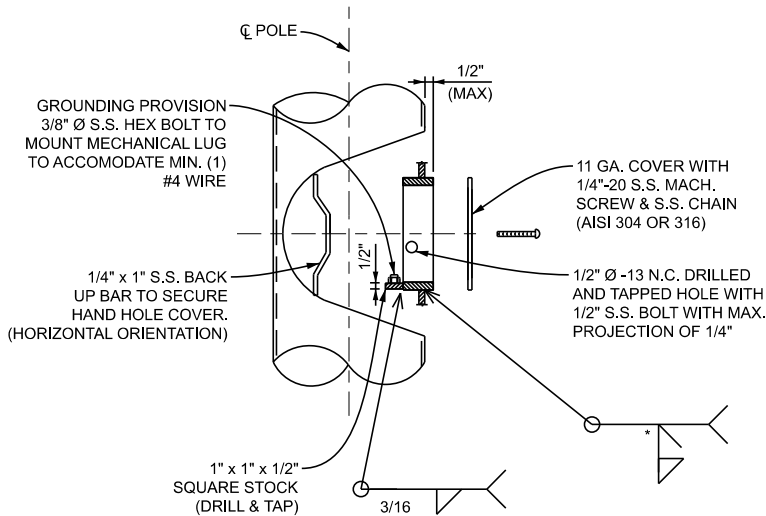
SECT



10 DETAIL - MAST ARM BRACKET WASHERS

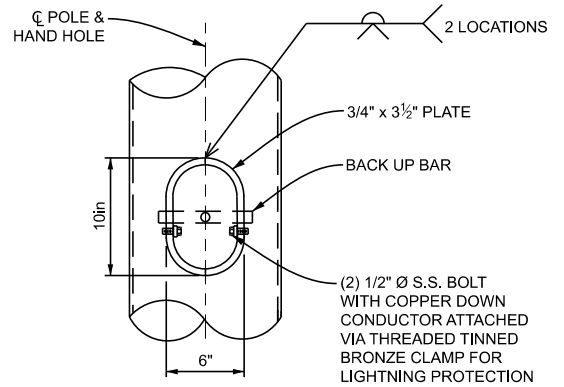


11 DETAIL - ORIENTATION OF HAND HOLE

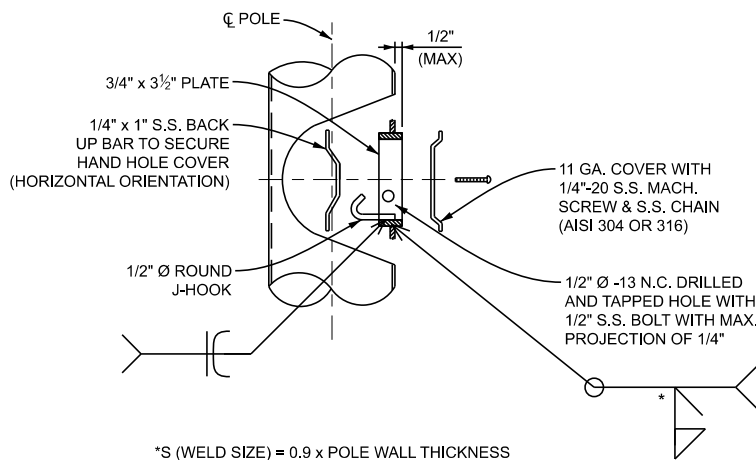


*S (WELD SIZE) = 0.9 x POLE WALL THICKNESS

12 DETAIL - 6" X 10" BAR BOTTOM HAND HOLE

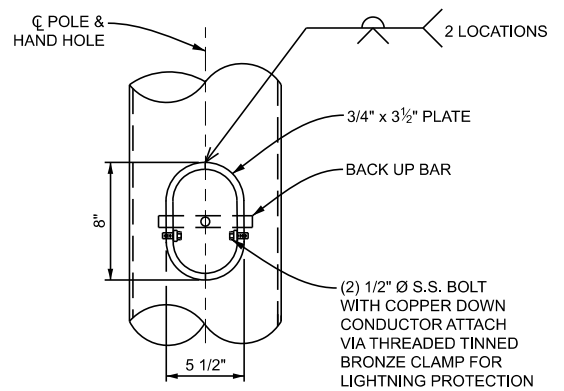


13 DETAIL - 6" X 10" BAR BOTTOM HAND HOLE
VIEW ROTATED 90 DEGREES



*S (WELD SIZE) = 0.9 x POLE WALL THICKNESS

14 DETAIL - 5 1/2" X 8" BAR TOP HAND HOLE



15 DETAIL - 5 1/2" X 8" BAR TOP HAND HOLE
VIEW ROTATED 90 DEGREES



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

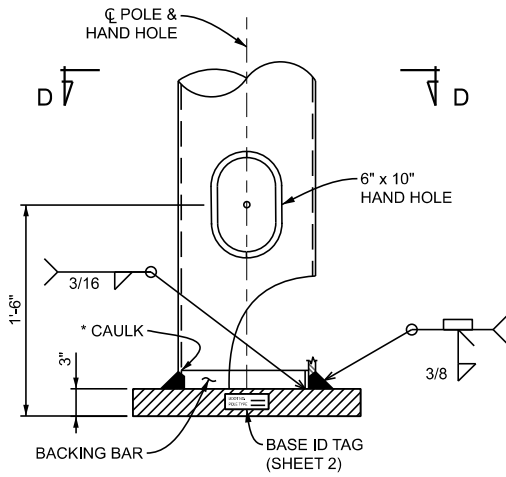
STANDARD PLAN FOR
HAND HOLE DETAILS

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

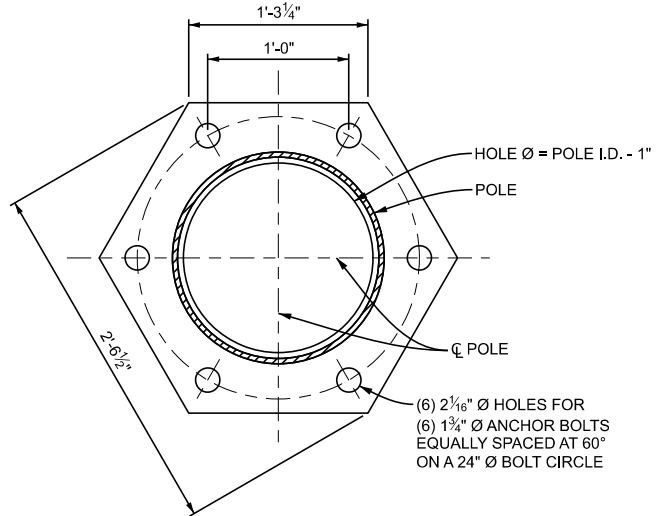
SIG-031-A

SHEET
5 OF 6

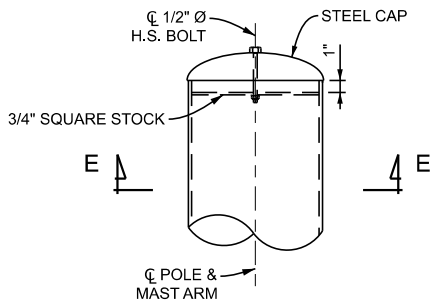


*SEAL JOINT WITH CAULK AFTER GALVANIZING

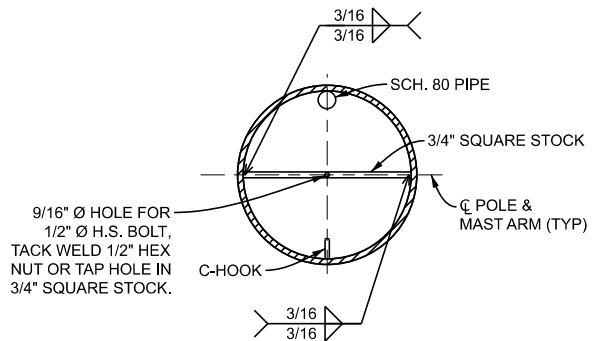
16 DETAIL - BASE PLATE WELD
VIEW ROTATED 90 DEGREES



D SECTION - BASE PLATE



17 DETAIL - POLE AND MAST ARM CAP



E SECTION - POLE AND MAST ARM CAP



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BASE PLATE, MAST ARM POLE CAP, AND
MAST ARM CAP DETAILS

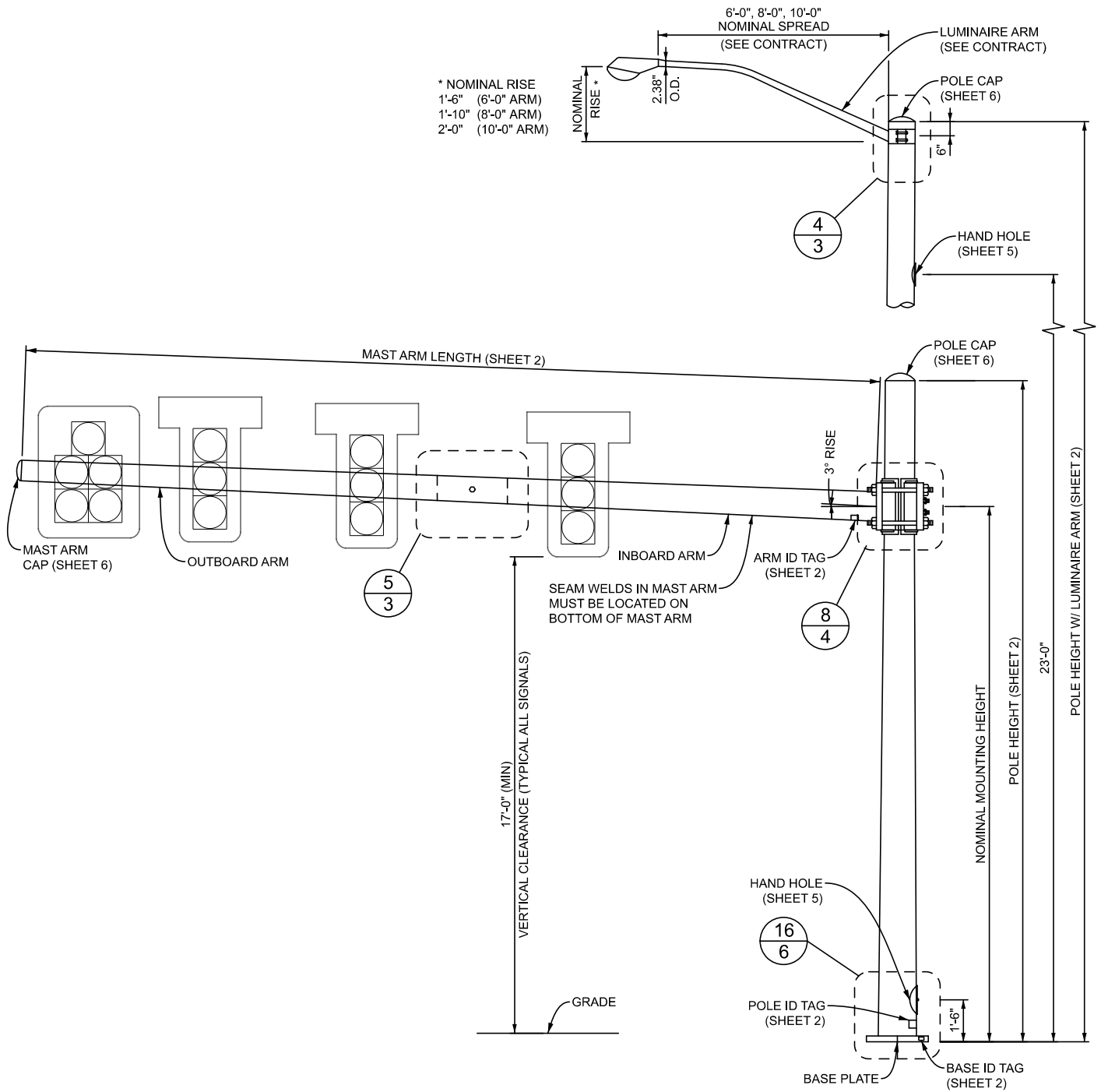
(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

SIG-031-A

SHEET
6 OF 6

SECT



ELEVATION - MAST ARM POLE

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
TRAFFIC SIGNAL MAST ARM POLE AND
MAST ARM DETAILS - CATEGORY II

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

SIG-032-A

SHEET
1 OF 6

TAPERED STEEL MAST ARM POLE		
POLE DIMENSIONS *	LUMINAIRE ARM	MAST ARM LENGTH (FT)
0.313"-15.00" x 11.78" x 23'-0"	NO	20, 25, 30
0.313"-15.00" x 10.94" x 29'-0"	YES	
0.429"-15.00" x 11.78" x 23'-0"	NO	35 & 40
0.429"-15.00" x 10.94" x 29'-0"	YES	
0.500"-15.50" x 12.28" x 23'-0"	NO	45 & 50
0.500"-15.50" x 11.44" x 29'-0"	YES	

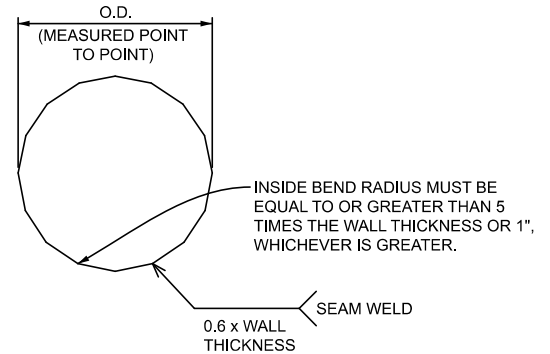
POLE TUBE TAPER IS 0.140 IN/FT
* DIAMETERS ARE GIVEN BY O.D.

TAPERED STEEL MAST ARM			
MAST ARM LENGTH	MAST ARM DIMENSIONS *	MTG HT SINGLE	MTG HT TWIN
20'-0"	0.2500"-8.50" x 5.70" x 20'-0"	19'-0"	18'-6" & 21'-0"
25'-0"	0.2500"-9.50" x 6.00" x 25'-0"		
30'-0"	0.2500"-10.50" x 6.30" x 30'-0"		
35'-0"	0.4290"-13.50" x 12.10" x 10'-0"		
	0.1793"-12.68" x 8.96" x 26'-7"		
40'-0"	0.5000"-13.50" x 12.10" x 10'-0"		
	0.2391"-12.80" x 8.38" x 31'-7"		
45'-0"	0.4290"-15.00" x 12.90" x 15'-0"		
	0.2391"-13.61" x 9.18" x 31'-8"		
50'-0"	0.5000"-15.50" x 12.70" x 20'-0"		
	0.2391"-13.41" x 8.98" x 31'-8"		

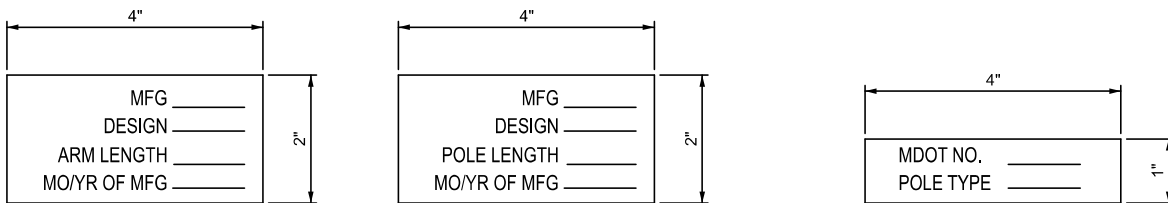
MAST ARM TUBE TAPER IS 0.140 IN/FT
* DIAMETERS ARE GIVEN BY O.D.

NOTES:

- THE DESIGN OF THIS STRUCTURE IS BASED ON CATEGORY II GALLOPING, NATURAL WIND GUSTS, AND TRUCK INDUCED FATIGUE LOADS.
- WELD THE LONGITUDINAL ARM SEAM ON THE INBOARD AND OUTBOARD SECTIONS OF THE TELESCOPIC FIELD SPLICE WITH A COMPLETE JOINT PENETRATION (CJP) WELD WITH A LENGTH EQUAL TO THE TELESCOPIC FIELD SPLICE LENGTH PLUS 6 INCHES. THE LAP OF THE ARM SECTIONS CANNOT EXTEND BEYOND THE LONGITUDINAL ARM SEAM CJP WELD WHEN THE FIELD SPLICE IS ERECTED AND IN ITS FINAL POSITION. IN ADDITION, LONGITUDINAL SEAM WELDS MUST HAVE 60% MINIMUM PENETRATION OR FUSION AND MUST BE CJP FOR A MINIMUM OF 6 INCHES FROM TUBE TO PLATE CJP WELDS.
- SEAM WELDS IN MAST ARM POLE MUST BE 90° ± FROM HAND HOLE AT BASE. SEAM WELDS IN MAST ARM MUST BE LOCATED ON BOTTOM OF MAST ARMS.
- LUMINAIRE ARM IS 11 GAUGE ROUND STEEL WITH 0.140 INCH PER FOOT TAPER.
- BACKING BAR FOR PIPE TO BASE PLATE (□) AND MAST ARM TO MAST ARM PLATE MUST BE MINIMUM 5/16 INCH X 2 INCH PLATE.
- 1/2 INCH DIAMETER (Ø) ROUND STOCK C-HOOK ATTACHED TO ALL POLE SIZES. 1 INCH SCHEDULE (SCH.) 80 PIPE ATTACHED TO ALL POLE SIZES AND INBOARD AND OUTBOARD ARM.
- S.S. DENOTES STAINLESS STEEL. GA. DENOTES GAUGE. O.D. DENOTES OUTSIDE DIAMETER. I.D. DENOTES INSIDE DIAMETER. H.S. DENOTES HIGH STRENGTH.
- ROUND OR 16-SIDED SECTIONS ARE ALLOWED.
- MULTI-PLY SECTIONS ARE NOT ALLOWED.



1 DETAIL - 16-SIDED SECTION



ATTACH TO POLE OR MAST ARM AT LOCATIONS SHOWN
4" FROM BASE OF TUBE BELOW HANDHOLE WITH (4) #8 x 3/8"
S.S. TYPE U DRIVE SCREWS.
(LETTERS STAMPED IN 3/8" CHARACTERS)

WELD TAG TO EDGE OF BASE PLATE
(LETTERS STAMPED IN 3/8" CHARACTERS)

2 DETAIL - ARM/POLE S.S. ID TAG

3 DETAIL - BASE S.S. ID TAG

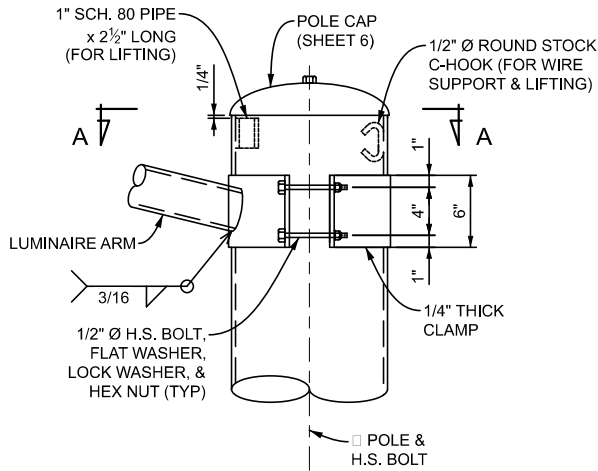
MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
MAST ARM POLE AND MAST ARM
REQUIREMENTS

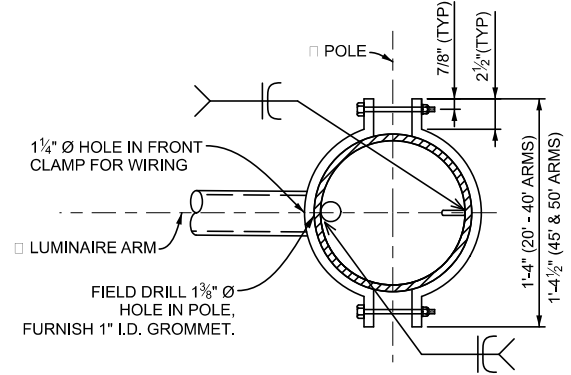
(SPECIAL DETAIL)	07/27/23	SIG-032-A	SHEET 2 OF 6
FHWA APPROVAL	PLAN DATE		

SECT

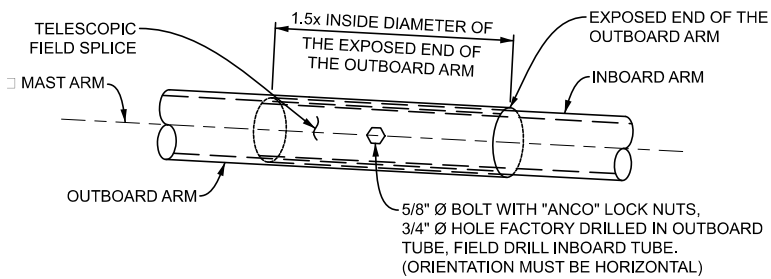


ORIENTATION OF SCH. 80 PIPE 180° FROM HAND HOLE AT BASE & C-HOOK 180° FROM SCH. 80 PIPE

4 DETAIL - LUMINAIRE ARM BRACKET

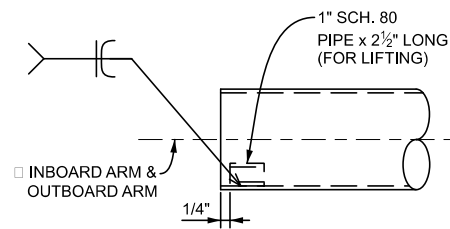


A SECTION - LUMINAIRE ARM BRACKET

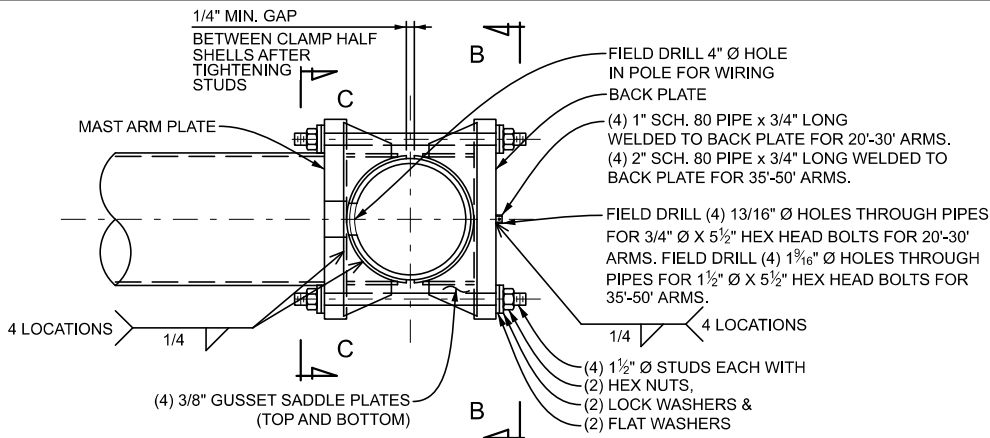


NOTES:
 1. FOR 35'-0" ARMS AND GREATER.
 2. THE INBOARD AND OUTBOARD ARMS MUST FIT TIGHTLY.

5 DETAIL - TELESCOPIC SPLICE

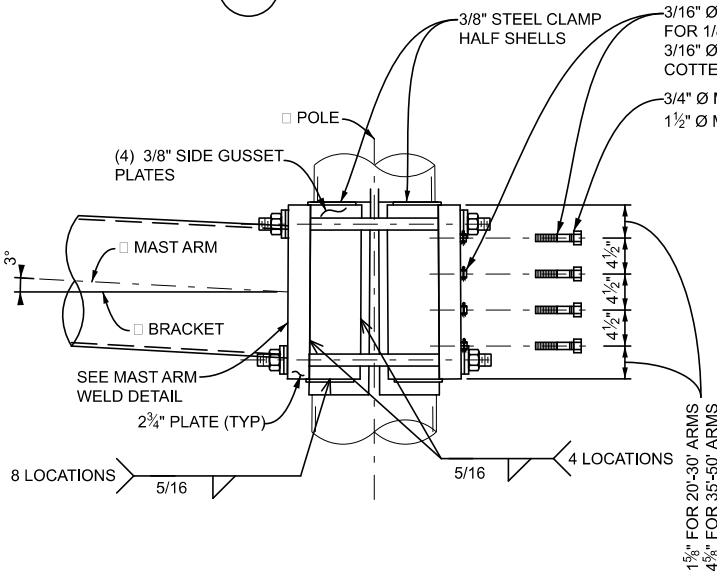


6 INBOARD/OUTBOARD ARM
DETAIL - LIFTING DEVICE

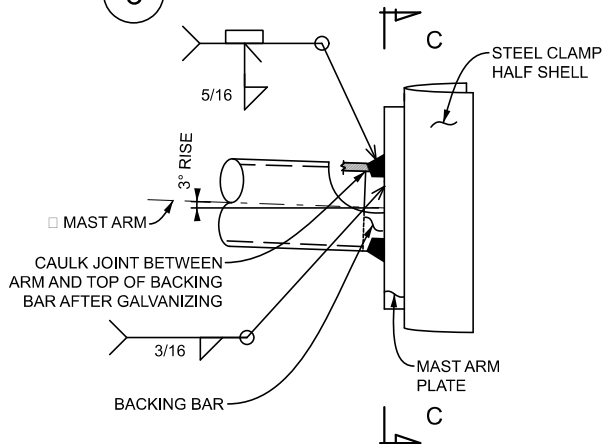


ROUND SECTION SHOWN. SAME CONNECTION DETAILS FOR 16-SIDED SECTION GUSSET SADDLE PLATES MUST MATCH 16-SIDED POLE SHAPE

7 DETAIL - MAST ARM BRACKET PLAN

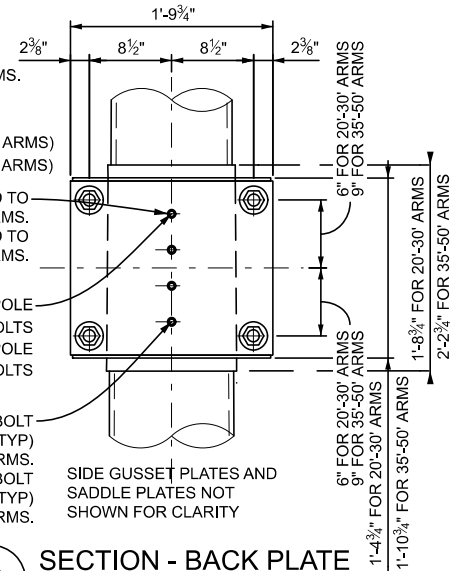


8 DETAIL - MAST ARM BRACKET ELEVATION

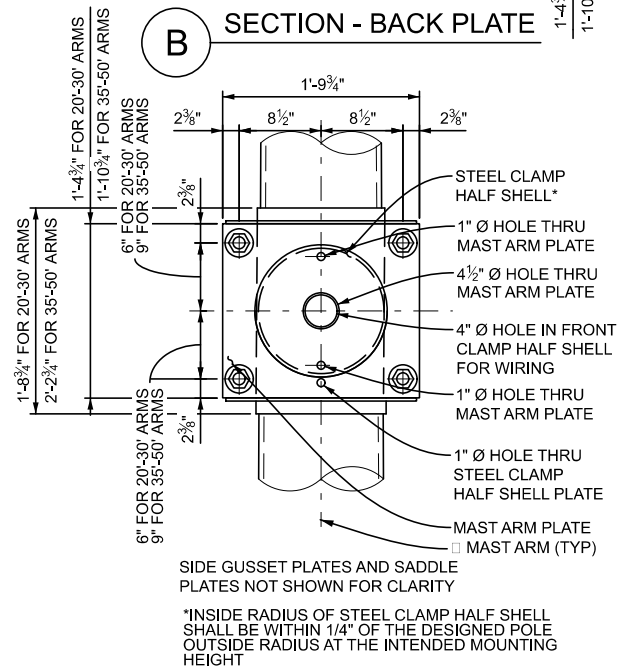


SIDE GUSSET PLATES AND SADDLE PLATES NOT SHOWN FOR CLARITY

9 DETAIL - MAST ARM WELD



B SECTION - BACK PLATE



C SECTION - MAST ARM PLATE



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
MAST ARM BRACKET DETAILS

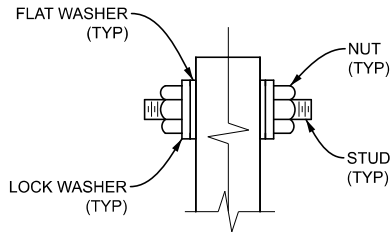
(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

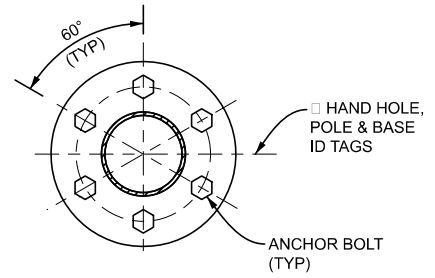
SIG-032-A

SHEET
4 OF 6

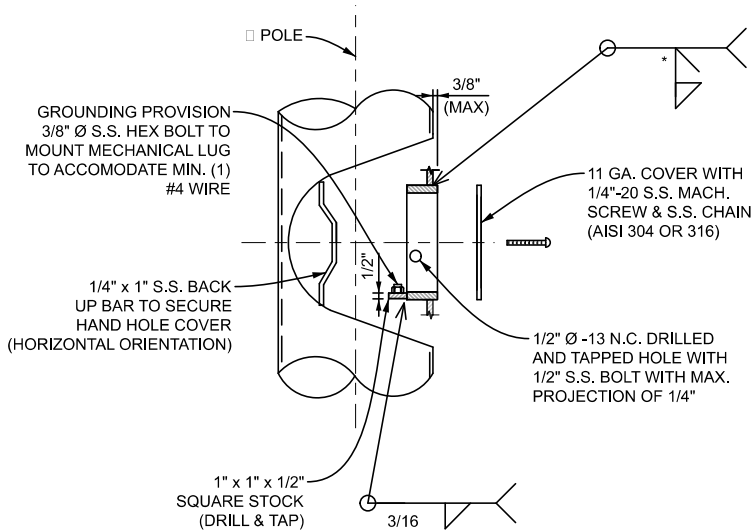
SECT



10 DETAIL - MAST ARM BRACKET WASHERS

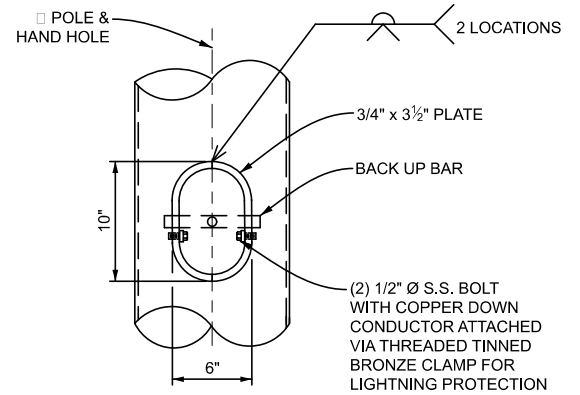


11 DETAIL - ORIENTATION OF HAND HOLE

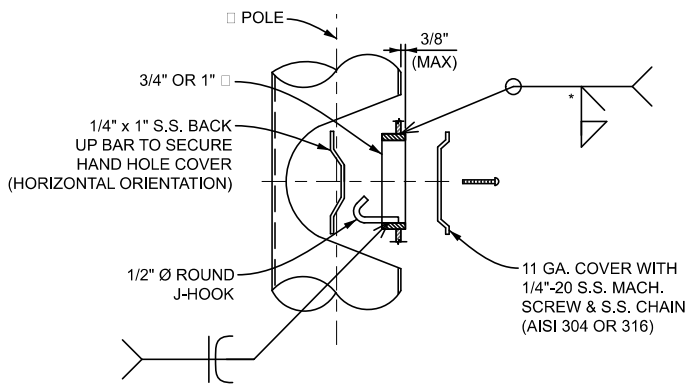


*S (WELD SIZE) = 0.9 x POLE WALL THICKNESS

12 DETAIL - 6" X 10" BAR BOTTOM HAND HOLE

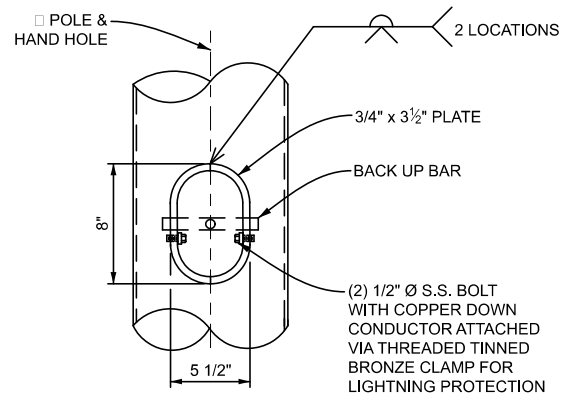


13 DETAIL - 6" X 10" BAR BOTTOM HAND HOLE
VIEW ROTATED 90 DEGREES



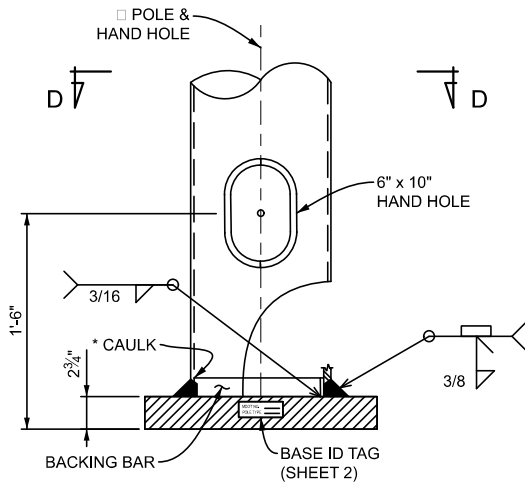
*S (WELD SIZE) = 0.9 x POLE WALL THICKNESS

14 DETAIL - 5 1/2" X 8" BAR TOP HAND HOLE



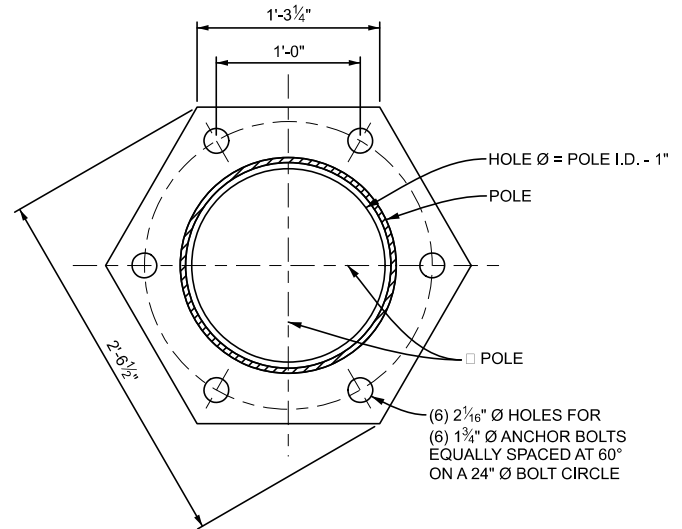
15 DETAIL - 5 1/2" X 8" BAR TOP HAND HOLE
VIEW ROTATED 90 DEGREES

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR HAND HOLE DETAILS		SIG-032-A	SHEET 5 OF 6
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE		

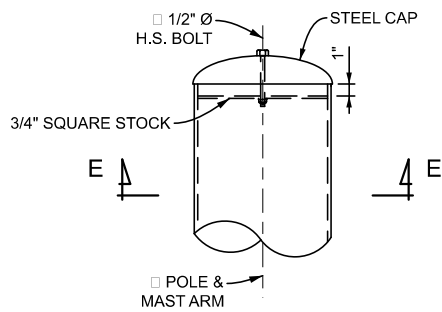


*SEAL JOINT WITH CAULK AFTER GALVANIZING

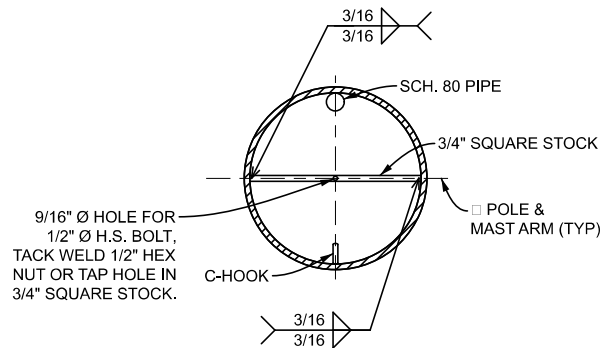
16 DETAIL - BASE PLATE WELD
VIEW ROTATED 90 DEGREES



D SECTION - BASE PLATE



17 DETAIL - POLE AND MAST ARM CAP



E SECTION - POLE AND MAST ARM CAP



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BASE PLATE, MAST ARM POLE CAP, AND
MAST ARM CAP DETAILS

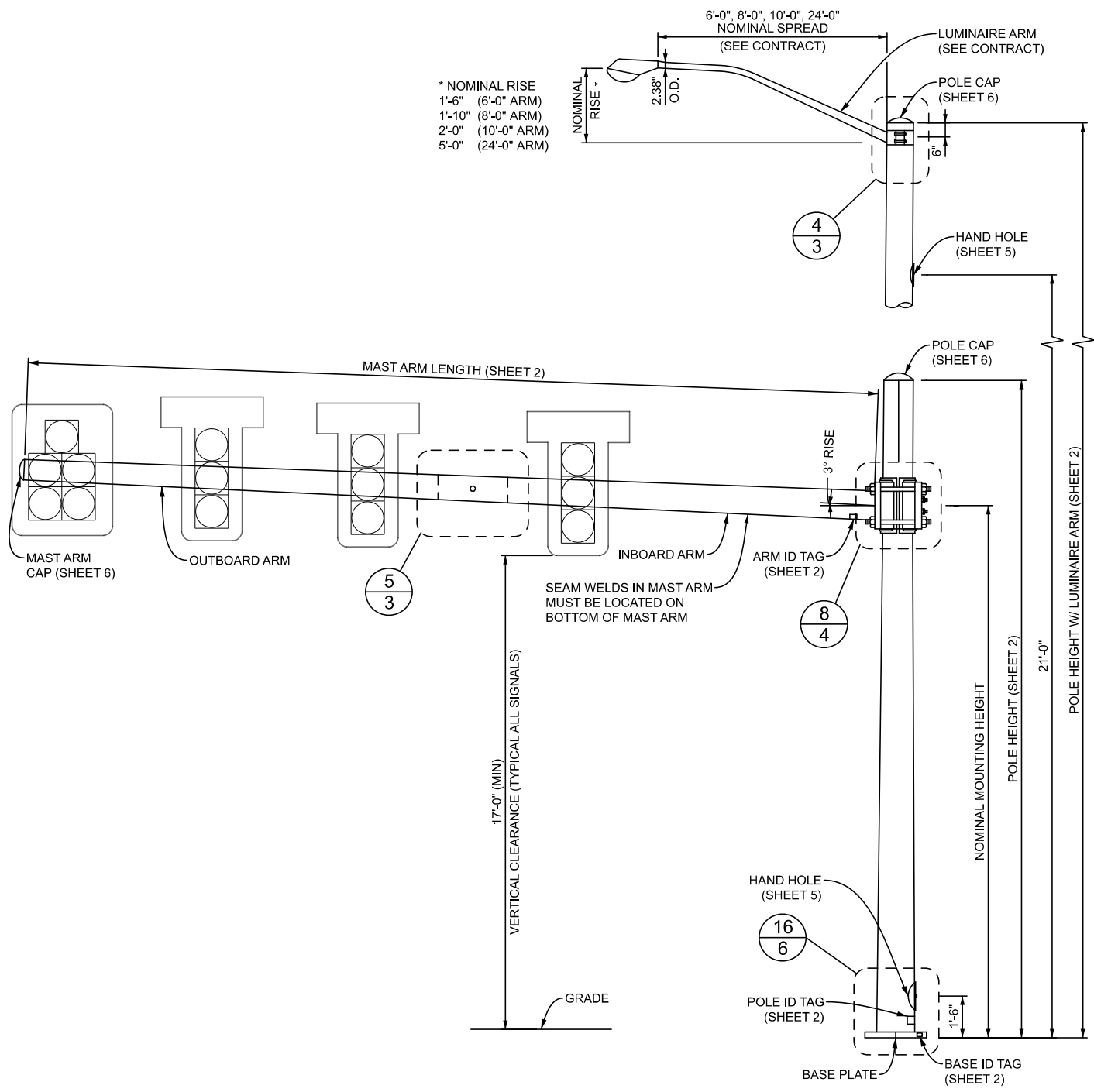
(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

SIG-032-A

SHEET
6 OF 6

SECT



ELEVATION - MAST ARM POLE

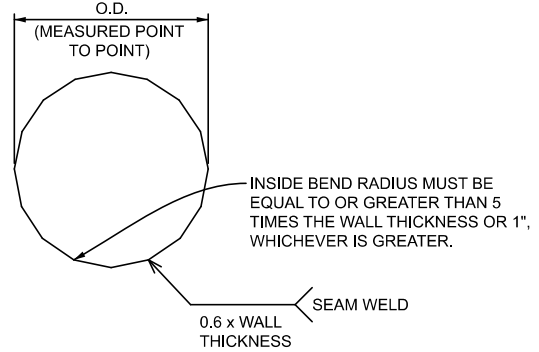
APPROVED BY: _____ DIRECTOR, BUREAU OF FIELD SERVICES		STANDARD PLAN FOR TRAFFIC SIGNAL MAST ARM POLE AND MAST ARM DETAILS - CATEGORY III	
APPROVED BY: _____ DIRECTOR, BUREAU OF DEVELOPMENT		(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE

TAPERED STEEL MAST ARM POLE	
POLE DIMENSIONS*	LUMINAIRE ARM DIMENSIONS
0.4375"-14.00" x 11.06" x 21'-0"	6'-0"
0.4375"-14.00" x 9.80" x 30'-0"	8'-0"
0.4375"-14.00" x 8.96" x 36'-0"	10'-0"
0.4375"-14.00" x 8.40" x 40'-0"	24'-0"

POLE TUBE TAPER IS 0.140 IN/FT
 * DIAMETERS GIVEN ARE O.D.

TAPERED STEEL MAST ARM	
MAST ARM LENGTH	MAST ARM DIMENSIONS*
20'-0"	0.2500"-8.00" x 5.20" x 20'-0"
25'-0"	0.2500"-8.00" x 4.50" x 25'-0"
30'-0"	0.2500"-8.00" x 3.80" x 30'-0"
35'-0"	0.2500"-11.00" x 6.10" x 35'-0"
40'-0"	0.2500"-11.00" x 5.40" x 40'-0"
45'-0"	0.3125"-11.00" x 8.66" x 16'-9" 0.1793"-9.18" x 5.10" x 29'-5"
50'-0"	0.3750"-15.00" x 12.66" x 16'-9" 0.2391"-13.37" x 8.48" x 34'-11"

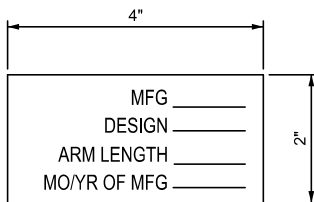
MAST ARM TUBE TAPER IS 0.140 IN/FT
 * DIAMETERS GIVEN ARE O.D.



1 DETAIL - 16-SIDED SECTION

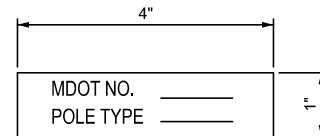
NOTES:

- THE DESIGN OF THIS STRUCTURE IS BASED ON CATEGORY III GALLOPING, NATURAL WIND GUSTS, AND TRUCK INDUCED FATIGUE LOADS.
- WELD THE LONGITUDINAL ARM SEAM ON THE INBOARD AND OUTBOARD SECTIONS OF THE TELESCOPIC FIELD SPLICE WITH A COMPLETE JOINT PENETRATION (CJP) WELD WITH A LENGTH EQUAL TO THE TELESCOPIC FIELD SPLICE LENGTH PLUS 6 INCHES. THE LAP OF THE ARM SECTIONS CANNOT EXTEND BEYOND THE LONGITUDINAL ARM SEAM CJP WELD WHEN THE FIELD SPLICE IS ERECTED AND IN ITS FINAL POSITION. IN ADDITION, LONGITUDINAL SEAM WELDS MUST HAVE 60% MINIMUM PENETRATION OR FUSION AND MUST BE CJP FOR A MINIMUM OF 6 INCHES FROM TUBE TO PLATE CJP WELDS.
- SEAM WELDS IN MAST ARM POLE MUST BE 90° ± FROM HAND HOLE AT BASE. SEAM WELDS IN MAST ARM MUST BE LOCATED ON BOTTOM OF MAST ARMS.
- LUMINAIRE ARM IS 11 GAUGE ROUND STEEL WITH 0.140 INCH PER FOOT TAPER.
- BACKING BAR FOR PIPE TO BASE PLATE (□) AND MAST ARM TO MAST ARM PLATE MUST BE MINIMUM 5/16 INCH X 2 INCH PLATE.
- 1/2 INCH DIAMETER (Ø) ROUND STOCK C-HOOK ATTACHED TO ALL POLE SIZES. 1 INCH SCHEDULE (SCH.) 80 PIPE ATTACHED TO ALL POLE SIZES AND INBOARD AND OUTBOARD ARM.
- S.S. DENOTES STAINLESS STEEL. GA. DENOTES GAUGE. O.D. DENOTES OUTSIDE DIAMETER. I.D. DENOTES INSIDE DIAMETER. H.S. DENOTES HIGH STRENGTH.
- ROUND OR 16-SIDED SECTIONS ARE ALLOWED.
- MULTI-PLY SECTIONS ARE NOT ALLOWED.



ATTACH TO POLE OR MAST ARM AT LOCATIONS SHOWN
 4" FROM BASE OF TUBE BELOW HANDHOLE WITH (4) #8 x 3/8"
 S.S. TYPE U DRIVE SCREWS.
 (LETTERS STAMPED IN 3/8" CHARACTERS)

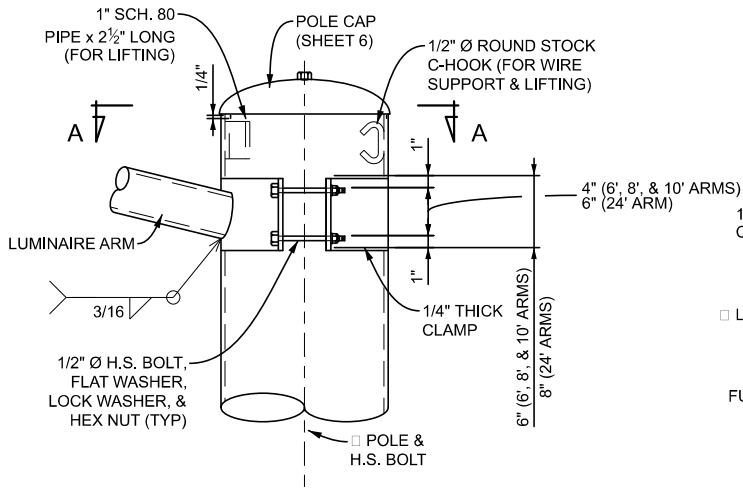
2 DETAIL - ARM/POLE S.S. ID TAG



WELD TAG TO EDGE OF BASE PLATE
 (LETTERS STAMPED IN 3/8" CHARACTERS)

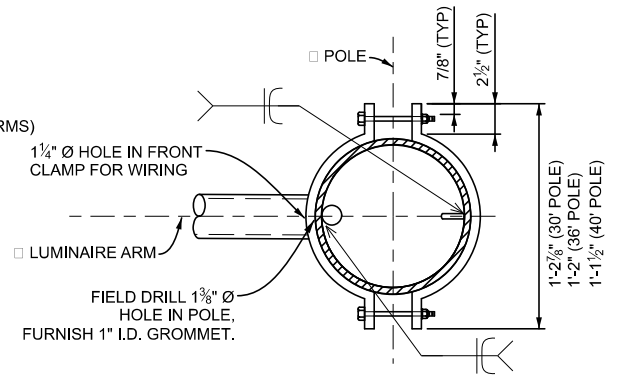
3 DETAIL - BASE S.S. ID TAG

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR MAST ARM POLE AND MAST ARM REQUIREMENTS			SHEET 2 OF 6
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE	SIG-033-A	

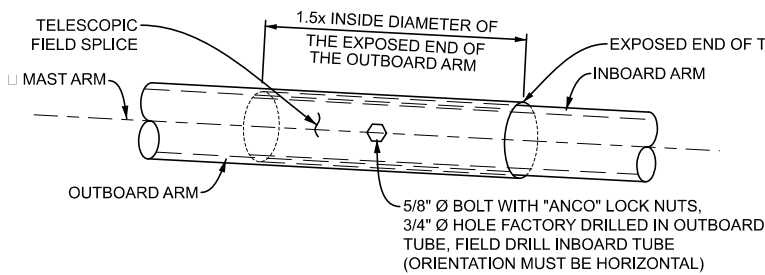


ORIENTATION OF SCH. 80 PIPE 180° FROM HAND HOLE AT BASE & C-HOOK 180° FROM SCH. 80 PIPE

4 DETAIL - LUMINAIRE ARM BRACKET

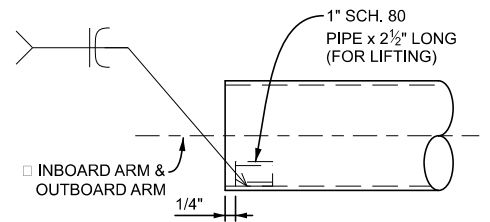


A SECTION - LUMINAIRE ARM BRACKET



NOTES:
1. FOR 45'-0" ARMS AND GREATER.
2. THE INBOARD AND OUTBOARD ARMS MUST FIT TIGHTLY.

5 DETAIL - TELESCOPIC SPLICE



6 INBOARD/OUTBOARD ARM DETAIL - LIFTING DEVICE



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

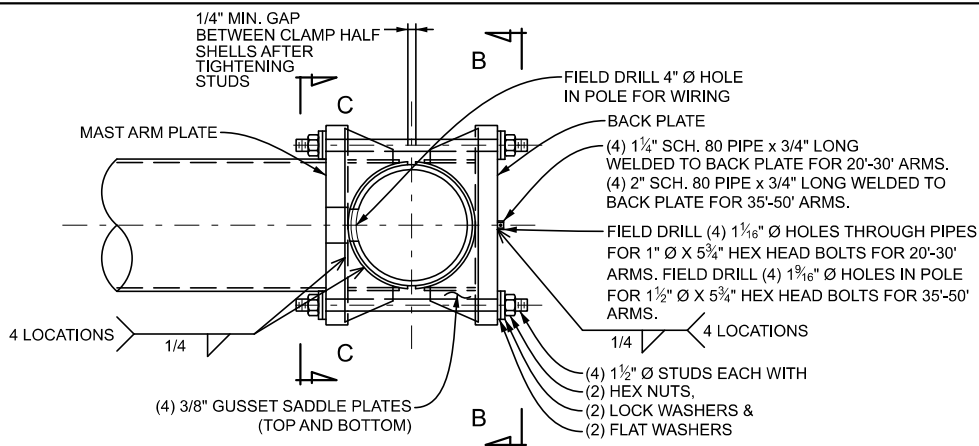
STANDARD PLAN FOR
LUMINAIRE ARM BRACKET, TELESCOPIC
SPLICE, AND LIFTING DEVICE DETAILS

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

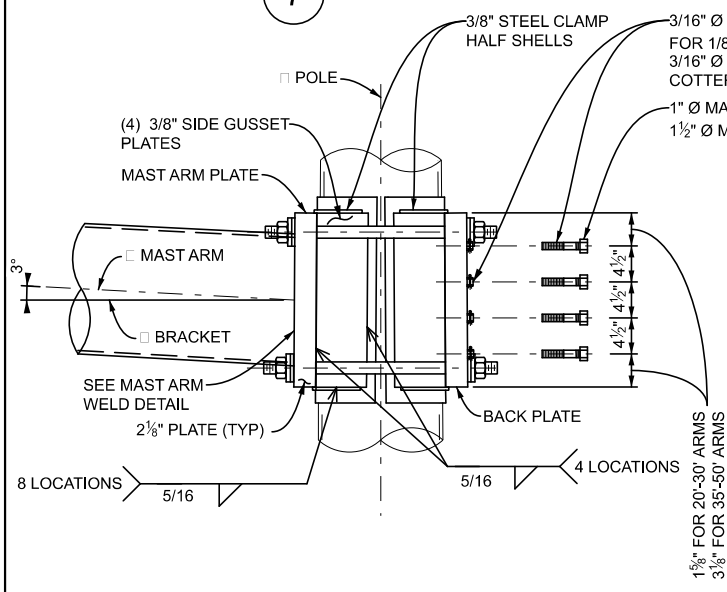
SIG-033-A

SHEET
3 OF 6

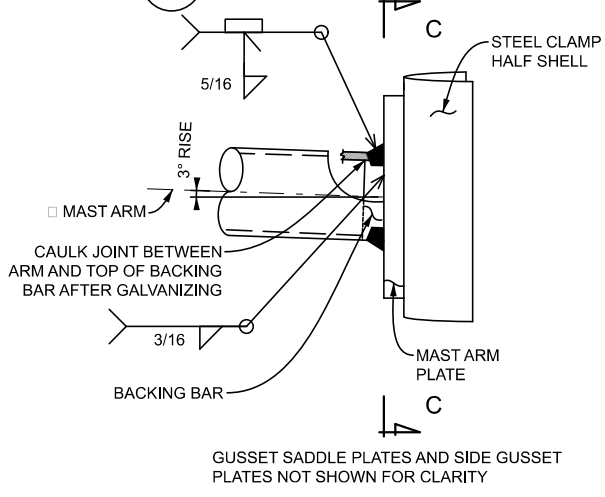


ROUND SECTION SHOWN. SAME CONNECTION DETAILS FOR 16-SIDED SECTION. GUSSET SADDLE PLATES MUST MATCH 16-SIDED POLE SHAPE

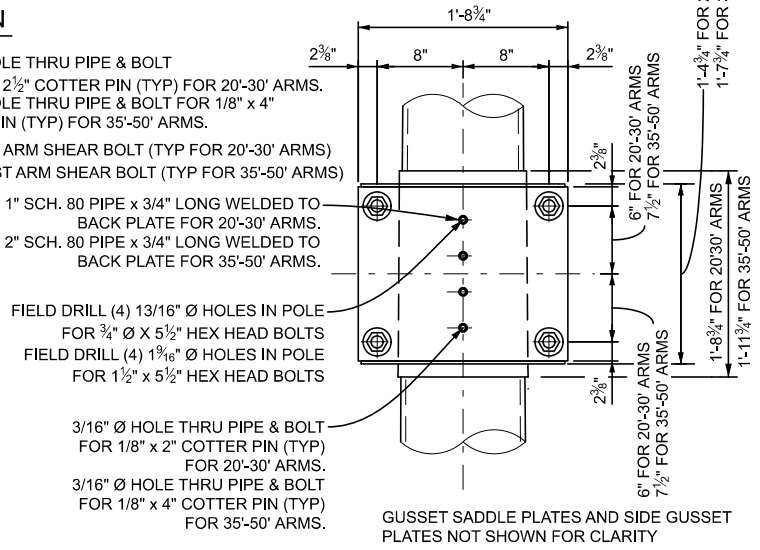
7 DETAIL - MAST ARM BRACKET PLAN



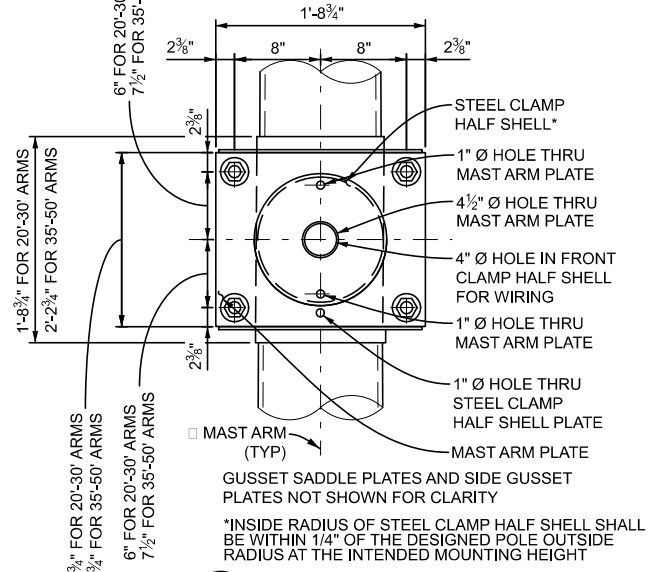
8 DETAIL - MAST ARM BRACKET ELEVATION



9 DETAIL - MAST ARM WELD

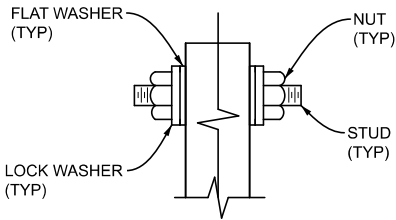


B SECTION - BACK PLATE

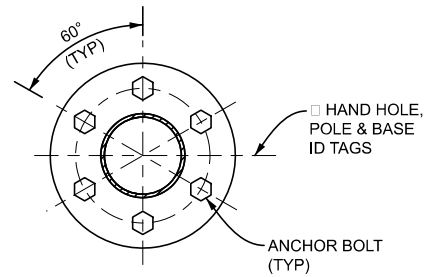


C SECTION - MAST ARM PLATE

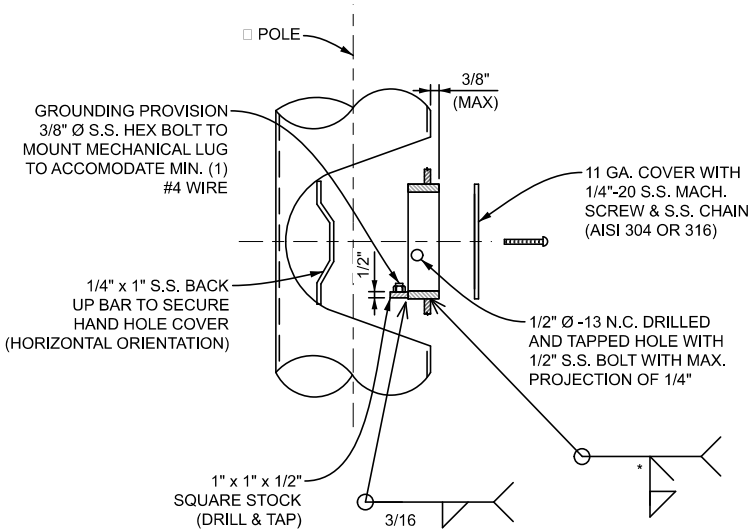
<p>MDOT Michigan Department of Transportation</p> <p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	STANDARD PLAN FOR MAST ARM BRACKET DETAILS		<p>SIG-033-A</p>	<p>SHEET 4 OF 6</p>
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE		



10 DETAIL - MAST ARM BRACKET WASHERS

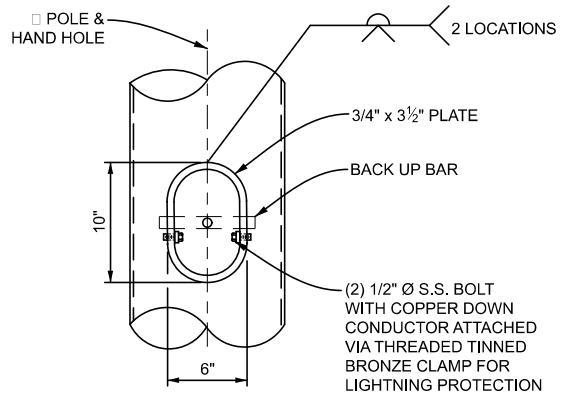


11 DETAIL - ORIENTATION OF HAND HOLE

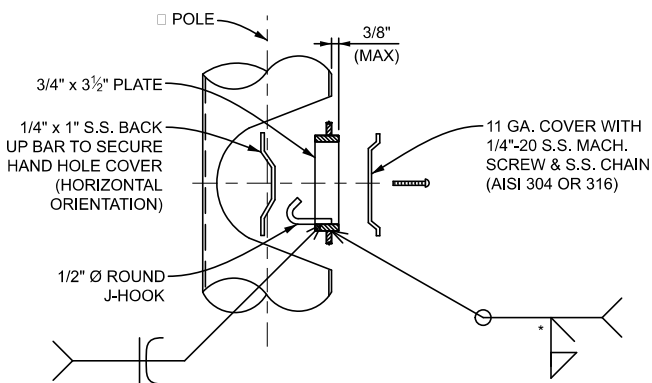


*S (WELD SIZE) = 0.9 x POLE WALL THICKNESS

12 DETAIL - 6" X 10" BAR BOTTOM HAND HOLE

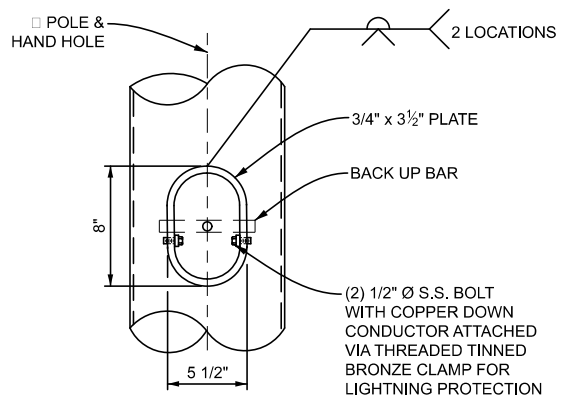


13 DETAIL - 6" X 10" BAR BOTTOM HAND HOLE
VIEW ROTATED 90 DEGREES



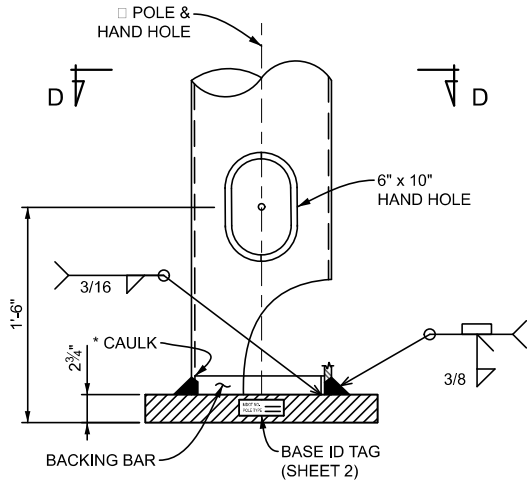
*S (WELD SIZE) = 0.9 x POLE WALL THICKNESS

14 DETAIL - 5 1/2" X 8" BAR TOP HAND HOLE



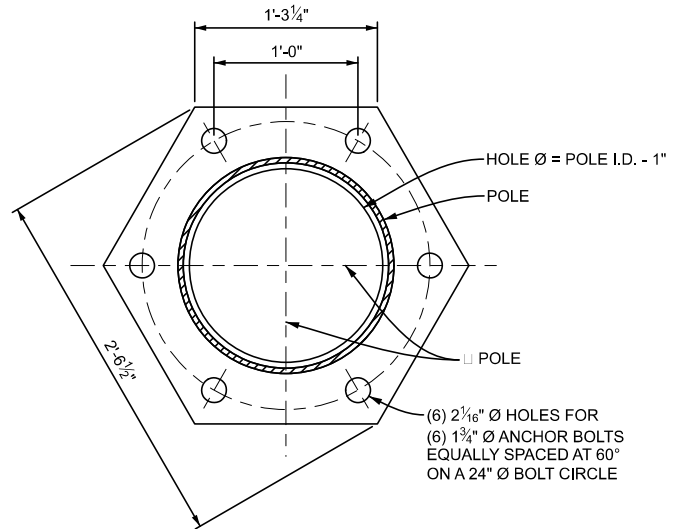
15 DETAIL - 5 1/2" X 8" BAR TOP HAND HOLE
VIEW ROTATED 90 DEGREES

<p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	STANDARD PLAN FOR HAND HOLE DETAILS		<p>SIG-033-A</p>	<p>SHEET 5 OF 6</p>
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE		

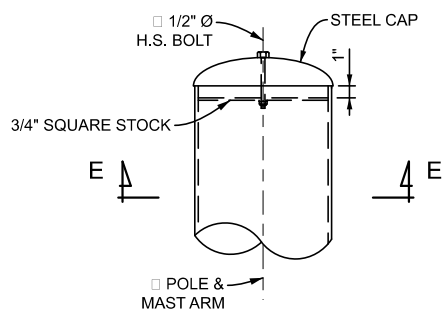


*SEAL JOINT WITH CAULK AFTER GALVANIZING

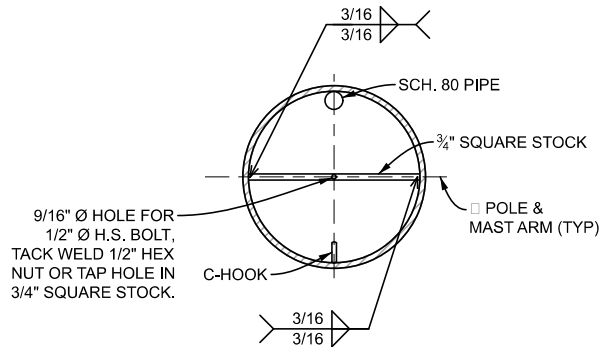
16 DETAIL - BASE PLATE WELD
VIEW ROTATED 90 DEGREES



D SECTION - BASE PLATE



17 DETAIL - POLE AND MAST ARM CAP



E SECTION - POLE AND MAST ARM CAP



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BASE PLATE, MAST ARM POLE CAP, AND
MAST ARM CAP DETAILS

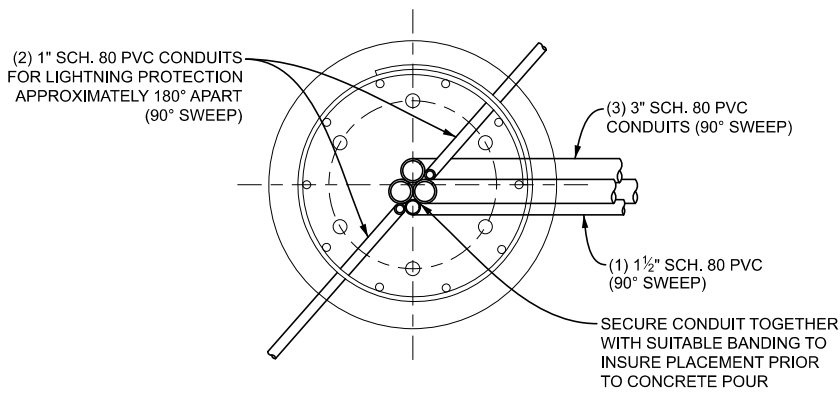
(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

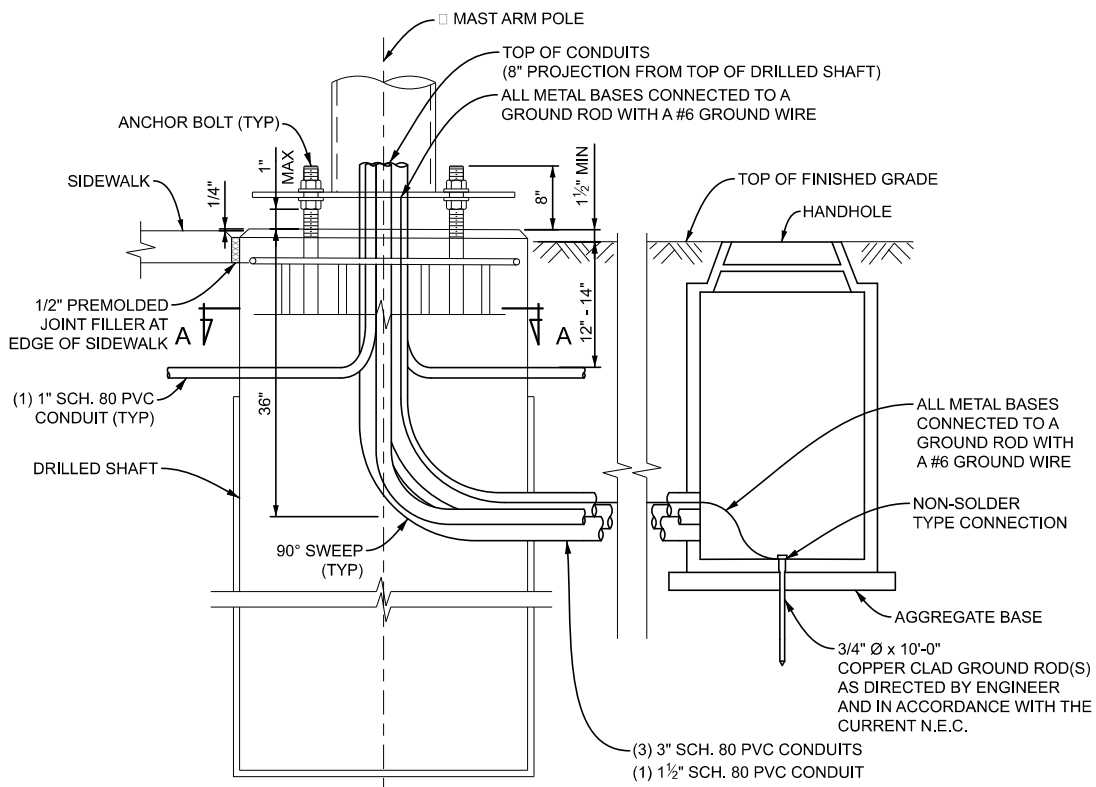
SIG-033-A

SHEET
6 OF 6

SECT



A SECTION - CONDUIT LAYOUT



1 DETAIL - CONDUIT LAYOUT AND GROUNDING

NOTES:

1. ALL GROUND RODS SHALL BE 3/4" X 10' COPPER CLAD ROD. A MINIMUM OF 2 GROUND RODS SHALL BE USED (ONE FOR THE SERVICE DISCONNECT AND ONE FOR THE MESSENGER CABLE & POLE).
2. GROUND ROD PLACEMENT SHALL NOT BE LESS THAN 12" FROM THE FOUNDATION WITH A MINIMUM OF 6' BETWEEN GROUND RODS. PLACEMENT SHALL BE AS DIRECTED BY THE ENGINEER AND IN COMPLIANCE WITH N.E.C.
3. GROUND WIRE CONNECTION TO GROUNDING ROD(S) SHALL UTILIZE A NON-SOLDER TYPE CONNECTION.
4. INDICATE THE DIRECTION OF CONDUITS IN FOUNDATION TOP WITH AN ARROW.
5. INSTALL POLE SUCH THAT THE FOUNDATION & ANCHOR BOLTS ARE PLUMB.
6. ALL GROUNDS SHALL PROVIDE LESS THAN 10 OHM RESISTANCE TO GROUND.

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

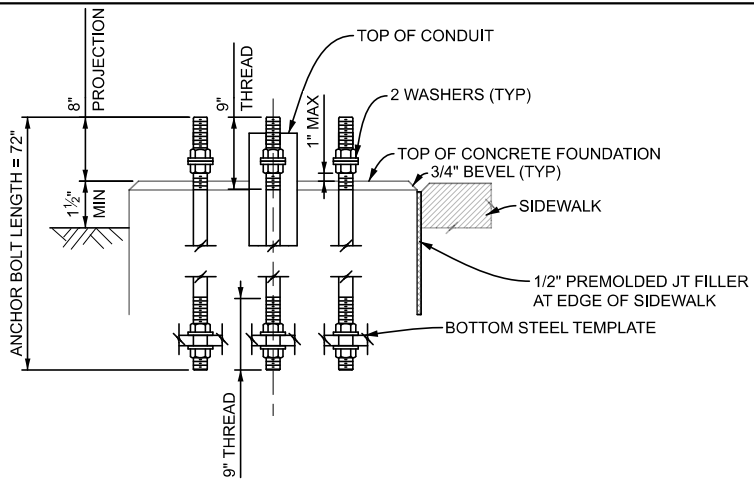
STANDARD PLAN FOR
TRAFFIC SIGNAL MAST ARM
STANDARD FOUNDATIONS

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

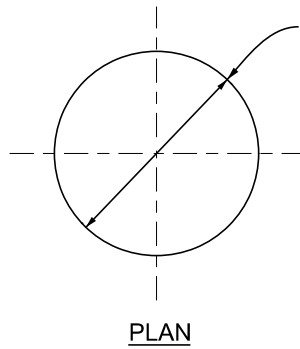
SIG-040-B

SHEET
1 OF 4



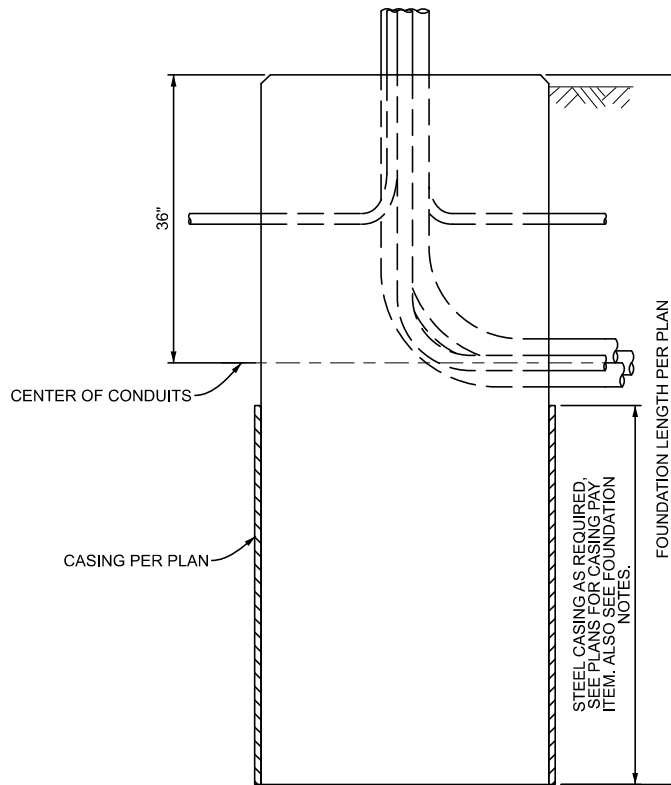
TRENCH FOR PLACEMENT OF CONDUITS AFTER CASING IS IN PLACE AND BEFORE DEWATERING.

2 DETAIL - ANCHOR BOLTS



IF REQUIRED, SMOOTH WALLED STEEL CASING OUTSIDE DIAMETER TO MEET OR EXCEED 42" FOUNDATION DIAMETER CASING. THICKNESS TO BE DETERMINED BY CONTRACTOR.

PLAN



ELEVATION



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
DRILLED FOUNDATION SHAFT
(SHOWN WITH CASING PAY ITEM)

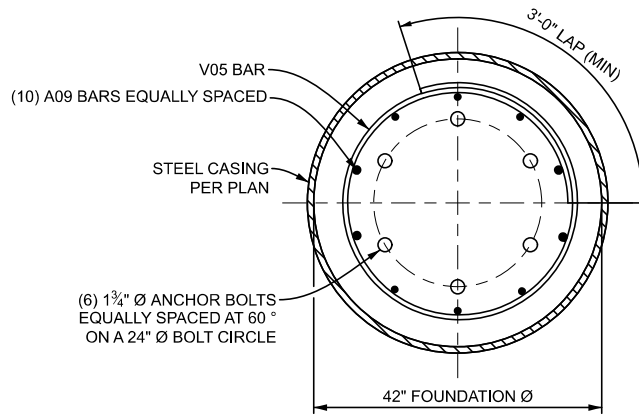
(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

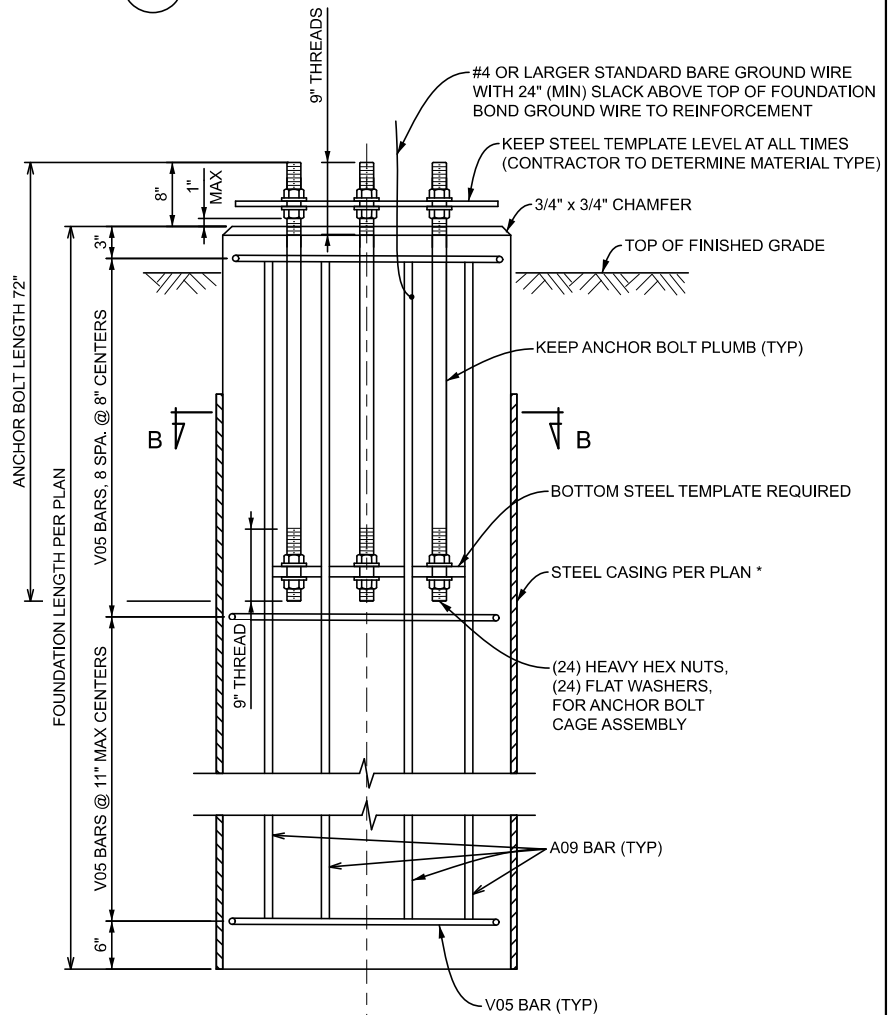
SIG-040-B

SHEET
2 OF 4

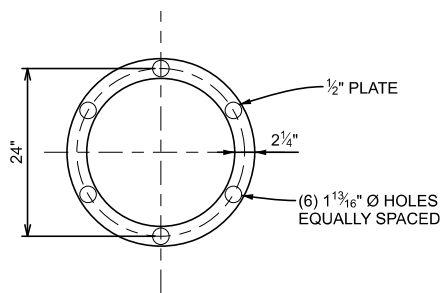
SECT



B SECTION - FOUNDATION PLAN



* SEE FOUNDATION NOTES AND PLANS FOR STEEL CASING PAY ITEM



3 DETAIL - BOTTOM STEEL TEMPLATE

4 DETAIL - MAST ARM FOUNDATION ELEVATION
SHOWN WITH CASING PAY ITEM



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
MAST ARM FOUNDATION
(SHOWN WITH CASING PAY ITEM)

(SPECIAL DETAIL)
FHWA APPROVAL


07/27/23
PLAN DATE

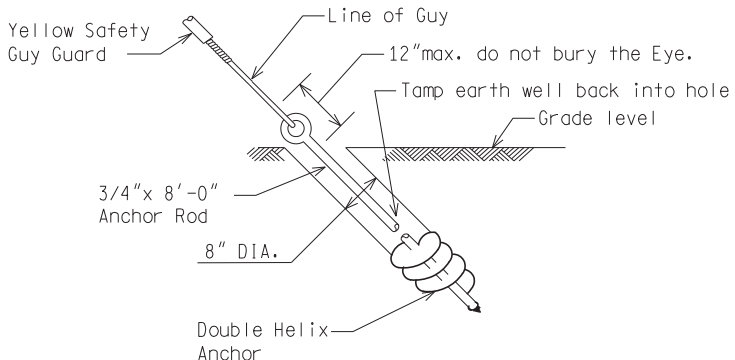
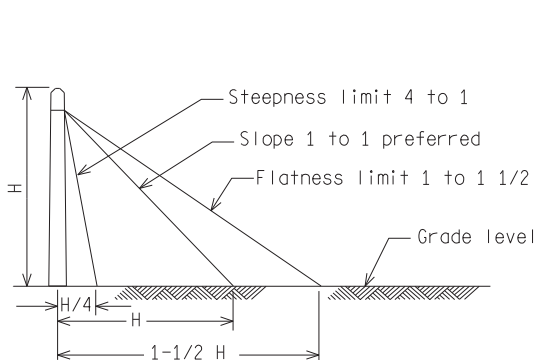
SIG-040-B

SHEET
3 OF 4

FOUNDATION NOTES:

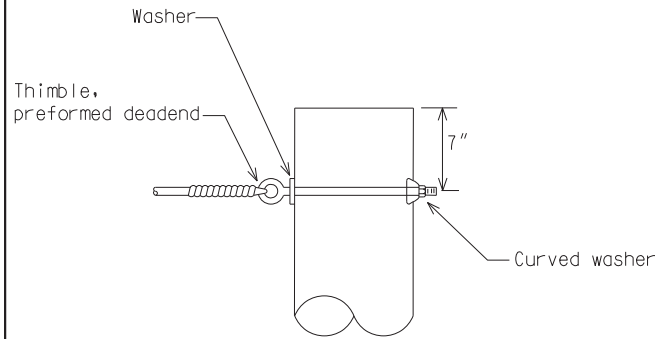
1. TEMPLATES SHALL BE SHOP FABRICATED AND ASSEMBLED PRIOR TO BEING APPROVED BY MDOT FOR SHIPPING.
2. DIAMETER OF BOLT HOLES IN TEMPLATE SHALL BE 1/16" LARGER THAN ANCHOR BOLT DIAMETER.
3. MAST ARM ORIENTATION IS NOT DEPENDENT ON ANCHOR BOLT POSITION.
4. CONDUITS AND ANCHOR BOLTS SHALL BE RIGIDLY INSTALLED BEFORE CONCRETE IS PLACED. THE CENTER OF THE TEMPLATE SHALL COINCIDE WITH THE CENTER OF THE FOUNDATION. THE TEMPLATE AND HANDLES SHALL BE WELL SUPPORTED, HORIZONTALLY LEVEL, HELD VERTICAL AT THE PROPER ELEVATION, AND FIRMLY ANCHORED IN PLACE A MINIMUM OF 24 HOURS AFTER THE CONCRETE PLACEMENT IS COMPLETED.
5. DUE CARE SHALL BE TAKEN DURING THE CONCRETE PLACEMENT TO AVOID DISPLACING THE ANCHOR BOLTS.
6. NO HAMMERING ON THE ANCHOR BOLTS OR TEMPLATE WILL BE ALLOWED.
7. AFTER TEMPLATE IS REMOVED, THREAD NUTS ON TO THE BOLT FLUSH WITH THE BOLT END TO PROTECT THREADS UNTIL SIGNAL SUPPORT IS ERECTED.
8. GALVANIZE ALL EXPOSED NUTS, BOLTS, AND WASHERS ACCORDING TO ASTM F2329. GALVANIZE ALL OTHER STEEL ITEMS ACCORDING TO ASTM A123. EMBEDDED NUTS, BOLTS, WASHERS, AND BOTTOM STEEL TEMPLATE NEED NOT BE GALVANIZED.
9. FOR ANCHOR BOLT MATERIAL, REFER TO SECTION 908.14 A AND B OF THE MICHIGAN STANDARD SPECIFICATIONS FOR CONSTRUCTION. FOR ANCHOR BOLT INSTALLATION AND TIGHTENING, REFER TO SECTION 810.03 N.
10. IF SOIL CONDITIONS INDICATE THERE IS NO NEED FOR A CASING PAY ITEM AS SHOWN ON THE PLANS, THE CONTRACTOR SHOULD REQUEST PERMISSION OF THE ENGINEER TO INSTALL THE FOUNDATION WITHOUT CASING.
11. WHEN THE CASING PAY ITEM IS INCLUDED ON THE PLANS FOR A FOUNDATION (DUE TO GRANULAR SOILS, A WET HOLE OR OTHER UNSTABLE CONDITIONS), STEEL CASING (SMOOTH WALLED) IS TO BE INSTALLED TO ENABLE THE FOUNDATION TO BE POURED. THE THICKNESS OF THE STEEL IS TO BE DETERMINED BY THE CONTRACTOR. THE STEEL CASING SHALL BE LEFT IN PLACE. IF SOIL EXTENDING Laterally WITHIN 6 FEET OF THE DRILLED SHAFT FOUNDATION IS LOOSENEED OR OTHERWISE DISTURBED, SCARIFY MATERIAL AT THE BASE OF THE EXCAVATION BELOW THE DEPTH OF DISTURBANCE AND RECOMPACT IN ACCORDANCE WITH 206.03.B OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. COMPACT ALL BACKFILL PLACED ABOVE THE RECOMPACTED BASE OF EXCAVATION IN ACCORDANCE WITH 206.03.B OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
12. WHEN THE CASING PAY ITEM IS CALLED FOR ON THE PLANS, THE STEEL CASING MAY STOP AT THE CONDUIT ENTRANCE TO FOUNDATION. TOP OF FOUNDATION MUST THEN BE FORMED SEPARATELY. THE CASING PAY ITEM QUANTITY WILL BE PAID FOR BASED ON ACTUAL LINEAR FEET INSTALLED.
13. CONSTRUCT MAST ARM FOUNDATIONS, ACCORDING TO SUBSECTIONS 718.03 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH THE MDOT STANDARD SPECIFICATIONS.
14. STEEL REINFORCEMENT SHALL BE ASTM A615 GRADE 60 WITHOUT EPOXY COATING.
15. EXPOSED CONCRETE SURFACES SHALL BE CAST IN FORMS. EXPOSED CONCRETE EDGES SHALL BE BEVELED 3/4".
16. GROUNDING OF POLE INCLUDES ADDING #4 BARE COPPER GROUND WIRE BONDED BY MECHANICAL CONNECTION TO FOUNDATION REINFORCING STEEL AND HAVING 24" OF SLACK ABOVE THE TOP OF FOUNDATION.

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR FOUNDATION NOTES			SHEET 4 OF 4
	(SPECIAL DETAIL) FHWA APPROVAL	07/27/23 PLAN DATE	SIG-040-B	
				SECT

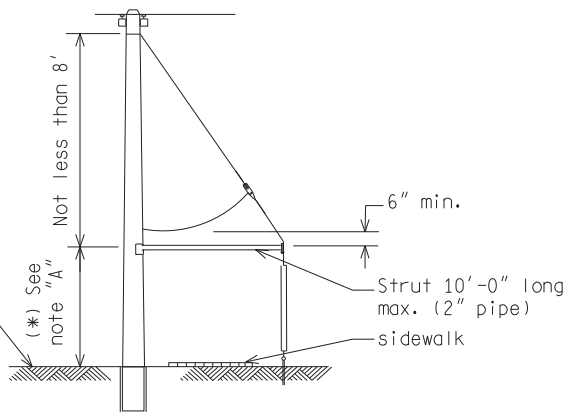


SLOPE LIMITS FOR ANCHOR GUYS

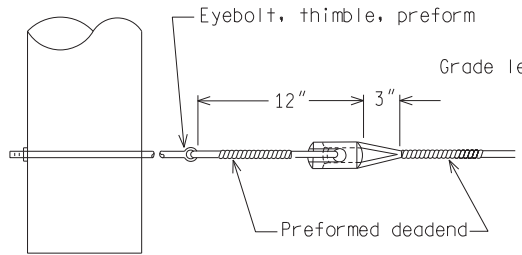
NOTE:
Use screw anchor or Double Helix anchor according to soil condition as directed by the Engineer.



POLE GUY

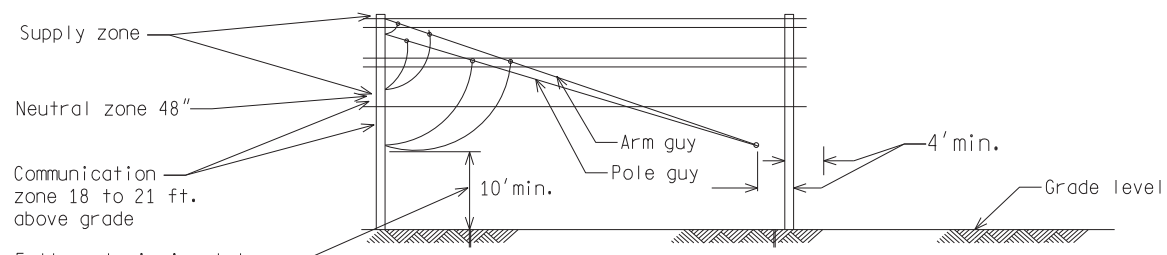


GUY STRUT



ARM GUY

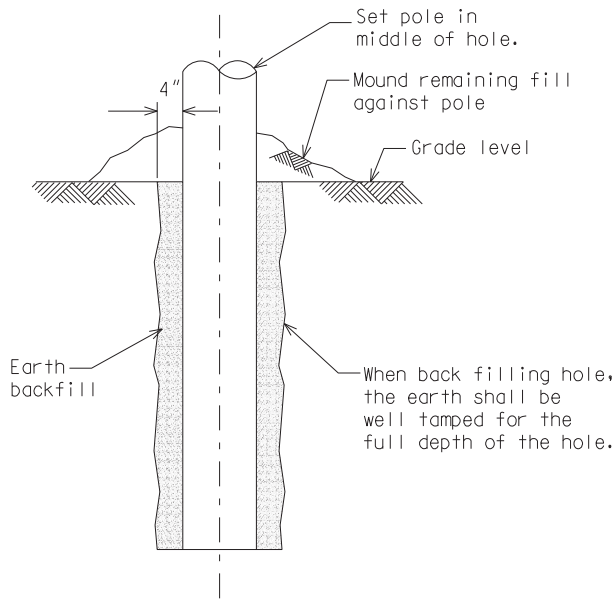
(* NOTE: "A"
This dimension to be 10' unless otherwise specified.



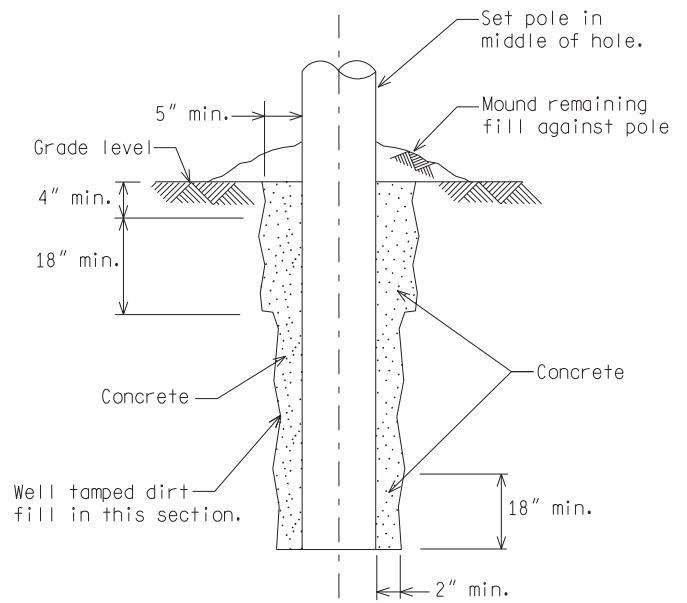
STRAIN INSULATOR POSITIONS IN GUY WIRES

NOT TO SCALE File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG050A.dgn Rev. 02/16/17

<p>PREPARED BY TRAFFIC AND SAFETY</p>	<p>ENGINEER OF DELIVERY</p>	<p>MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR WOOD POLE GUYS AND SETTING DEPTH</p>	
	<p>ENGINEER OF DEVELOPMENT</p>		
<p>DRAWN BY: DJF</p>	<p>(SPECIAL DETAIL)</p>	<p>SIG-050-A</p>	<p>PLAN DATE</p>
<p>CHECKED BY:</p>	<p>FHWA APPROVAL DATE</p>		



WOOD POLE INSTALLATION



SELF SUPPORTING WOOD POLE
IN CONCRETE

POLE HEIGHT	SETTING DEPTH
30'	6.0'
35'	6.0'
40'	6.0'
45'	6.5'
50'	7.0'
55'	7.5'
60'	8.0'

WOOD POLE SETTING DEPTHS

Reference Standard Specification for Construction Section 819.03

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

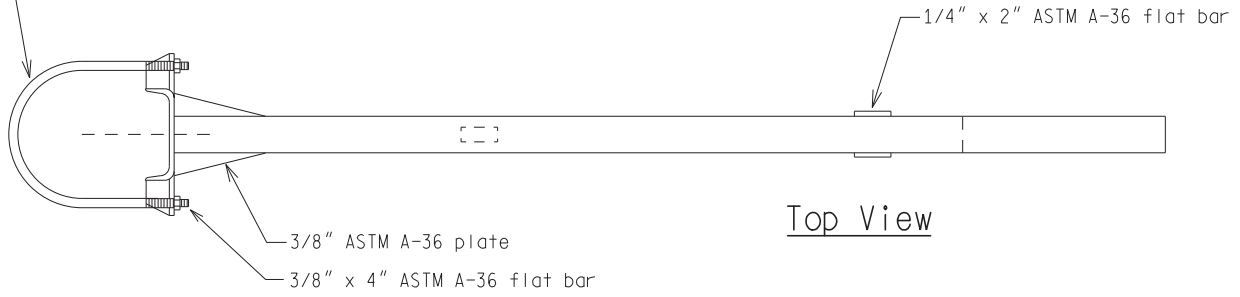
(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

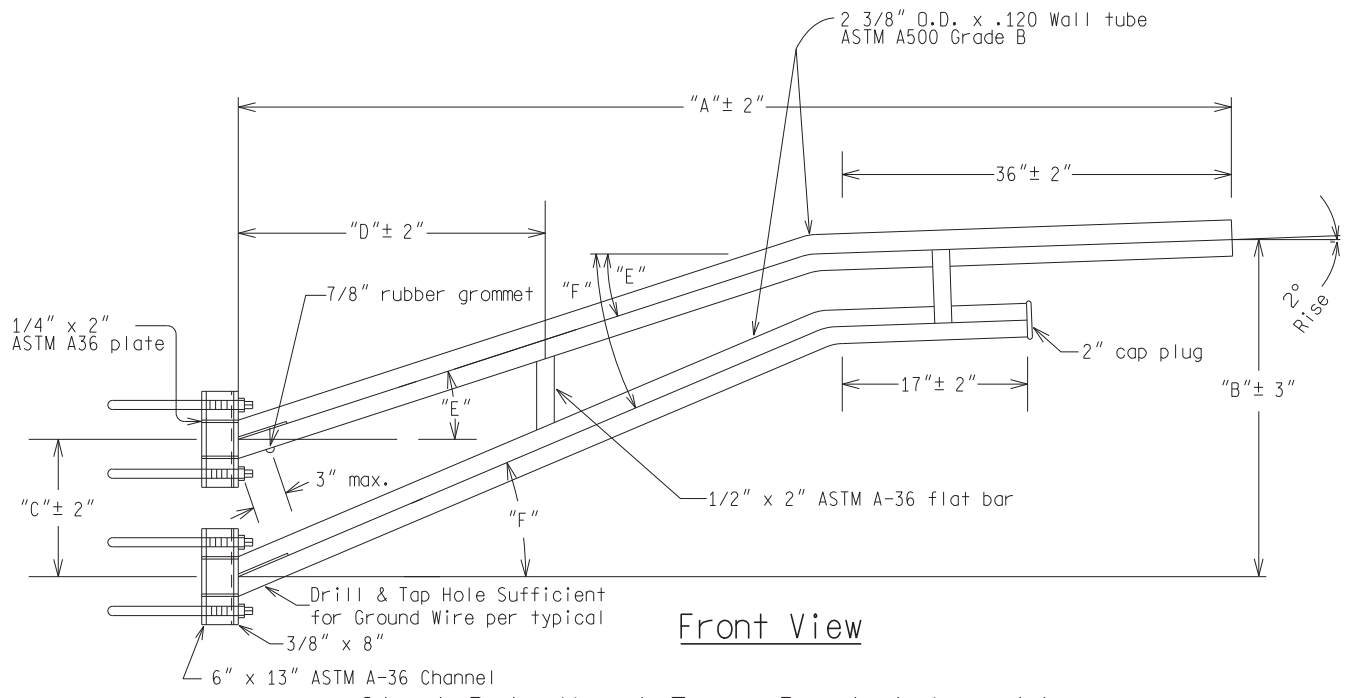
SIG-050-A

SHEET
2 of 2

5/8"-11 x 8" U-bolt w/Hex nut, flat & lock washer for poles with a diameter range from 8 1/2" to 9 1/8"
 or
 3/4"-10 x 10" U-bolt w/Hex nut, flat & lock washer for poles with a diameter range from 9 1/8" to 10 1/4"



Top View



Front View

Steel Pole Mount Truss Bracket Assembly

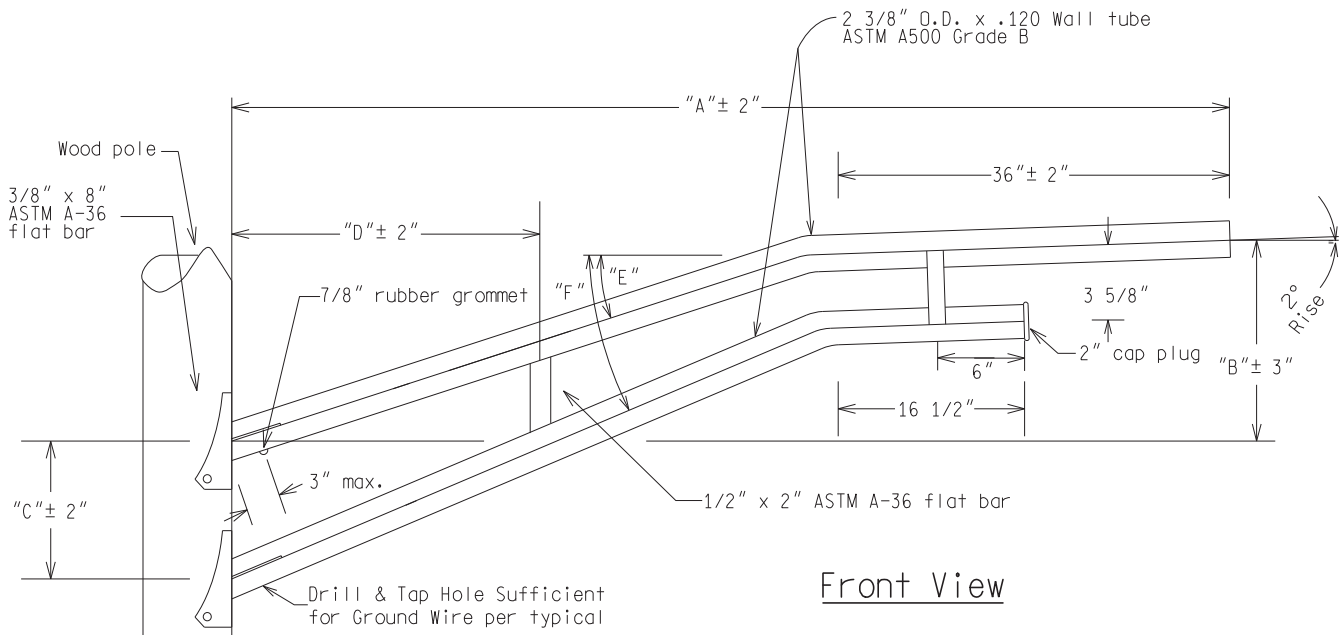
"Dimensions" Size Table

A	B	C	D	E	F
18' - 0"	81 3/4"	21 3/4"	84"	18°	23°
15' - 0"	66"	18"	66"	18°	23°
12' - 0"	50 3/8"	14 1/4"	54"	18°	23°
9' - 0"	36 3/4"	12"	36"	18°	23°
6' - 0"	23"	10"	18"	18°	27°

NOT TO SCALE File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG060A.dgn Rev. 02/16/17

Michigan Department of Transportation PREPARED BY TRAFFIC AND SAFETY	_____ ENGINEER OF DELIVERY	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR STEEL TRUSS BRACKETS	
	_____ ENGINEER OF DEVELOPMENT (SPECIAL DETAIL) FHWA APPROVAL DATE	_____ PLAN DATE	SIG-060-A

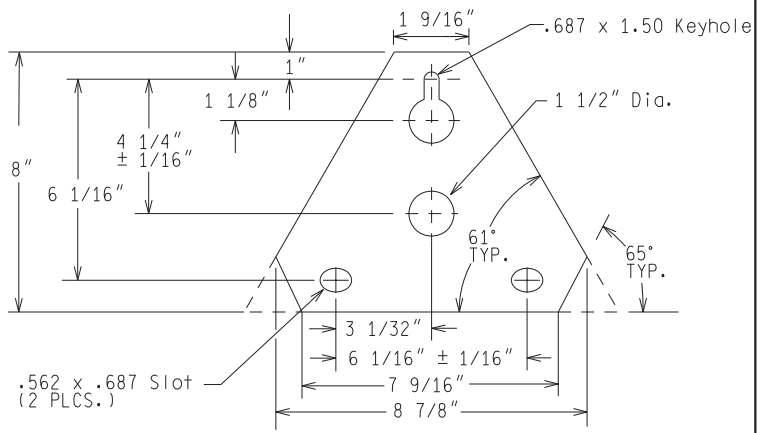
Ensure each plate incorporates two 0.562 inch slot holes and one 0.687 x 1.50 inch keyhole for lagging to the wood pole



Wood Pole Mount Truss Bracket Assembly

"Dimensions" Size Table

A	B	C	D	E	F
15' - 0"	47 3/4"	18"	66"	18°	23°
12' - 0"	36"	14 3/8"	48"	18°	23°
9' - 0"	26 3/8"	12"	36"	18°	23°
6' - 0"	12 1/2"	8 1/2"	18"	18°	23°



NOT TO SCALE

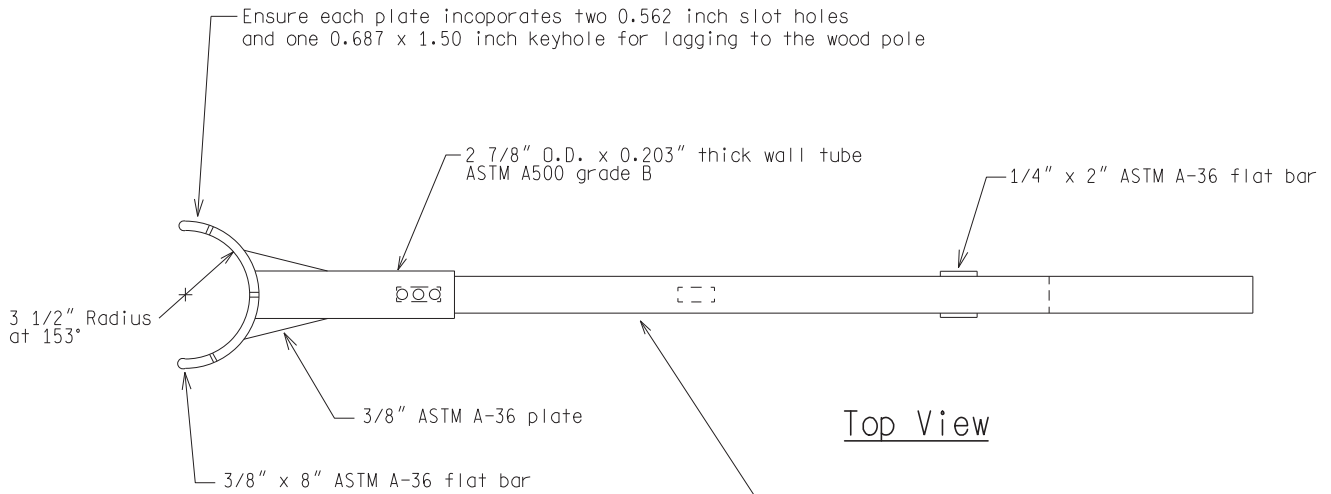
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

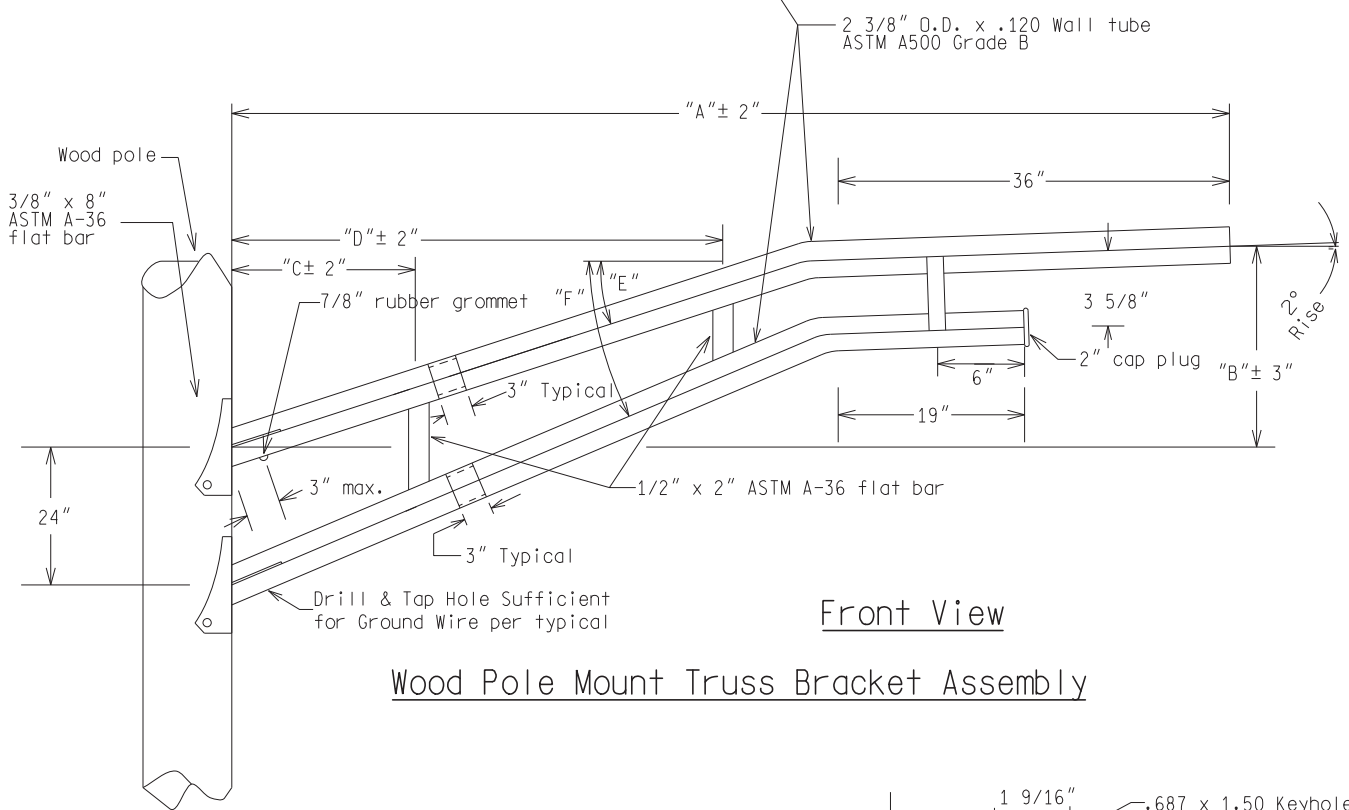
PLAN DATE

SIG-060-A

SHEET
2 of 3



Top View

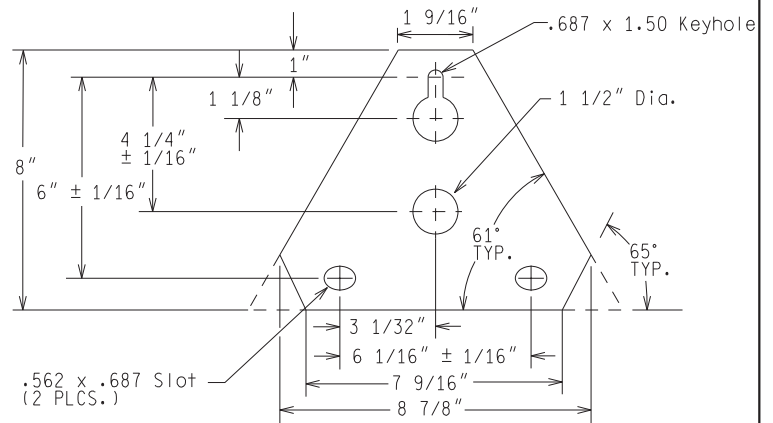


Front View

Wood Pole Mount Truss Bracket Assembly

"Dimensions" Size Table

A	B	C	D	E	F
17'-6"	60"	28"	80"	19°	26°



Mounting Plate Detail

NOT TO SCALE

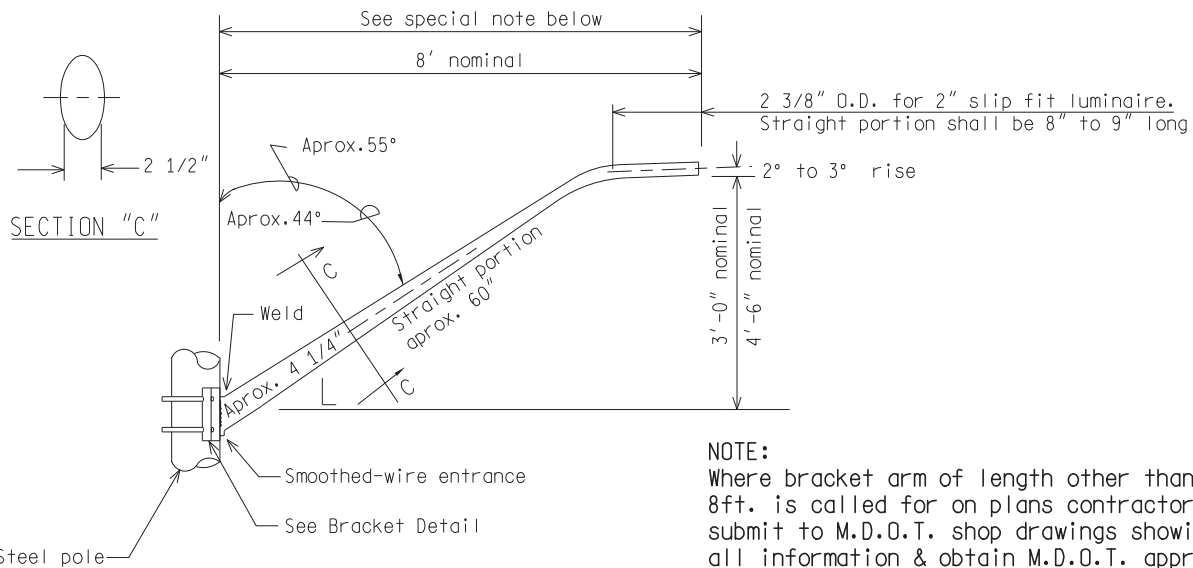
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

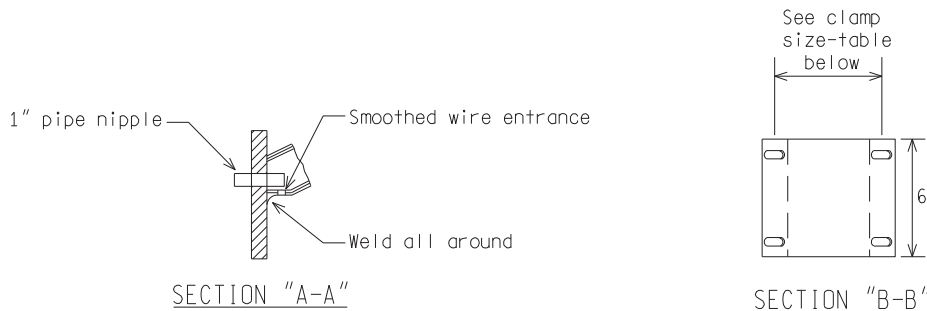
PLAN DATE

SIG-060-A

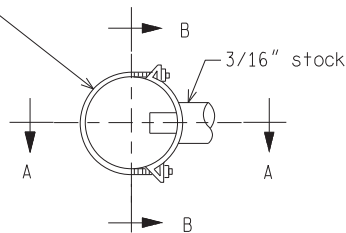
SHEET
3 of 3



CLAMP ON BRACKET ARM ASSEMBLY (STREET LIGHT)



(2) 5/8" dia. "U" bolts, cadmium or zinc phosphate plating with lockwashers & nuts.



BRACKET DETAIL

CLAMP SIZE TABLE

TYPE	POLE DIAMETER
A	3.6" - 4.5"
B	6.1" - 6.9"
C	7.5" - 8.5"

NOT TO SCALE

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PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

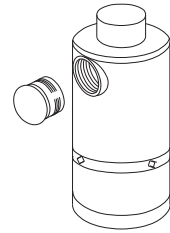
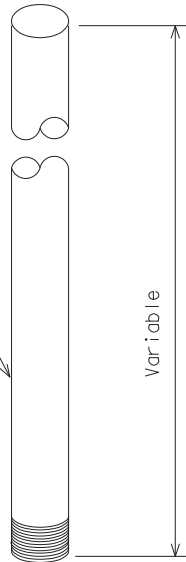
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**CLAMP ON BRACKET ARM ASSEMBLY
(STREET LIGHT)**

PLAN DATE

SIG-061-A

SHEET
1 of 1

Aluminum Pedestal
6063-T6 alloy, 4" x .237"
wall schedule 40-3.73 #/ft.
spun finish.

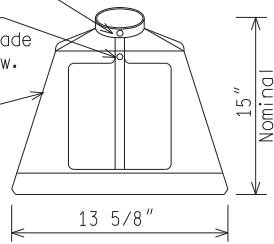


**POST TOP
(SLIP FITTER)**

3/8"x1 1/4" stainless
steel set screw

Cover held in place with a
1/4"x 20 UNC Hex head 300 grade
stainless steel machine screw.

Frangible Square
aluminum base
See Note 4) on
sheet 3 of 3.



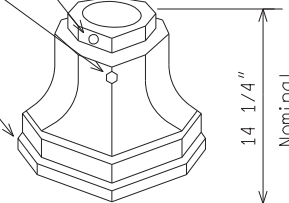
SQUARE ALUMINUM BASE

3/8" x 20 UNC x 2" stainless
steel set screw

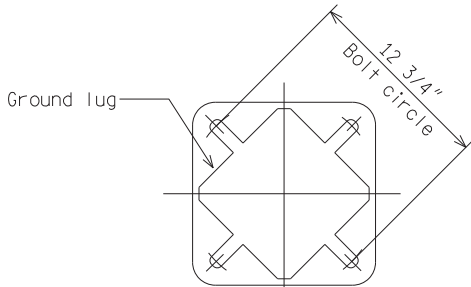
Cover held in place with a
1/4"x20 UNC Hex head 300 grade
stainless steel machine screw.

Frangible Octagonal
aluminum base
See Note 4) on
sheet 3 of 3.

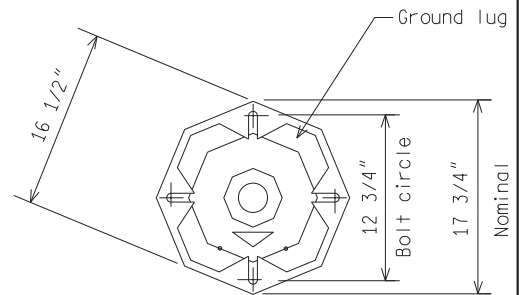
See Note 5) on sheet 3 of 3
for RCOC preference.



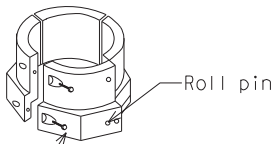
OCTAGONAL BASE



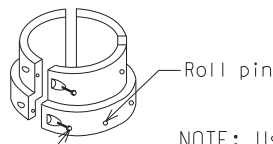
**SQUARE BASE
BOTTOM PLAN**



**OCTAGONAL BASE
BOTTOM PLAN**



**COLLAR
(OCTAGONAL BASE)**



**COLLAR
(SQUARE BASE)**

NOTE: Use pedestal collar for pedestal length greater than or equal to 14' (typical for 3 color traffic signals with pedestrian signals)

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG070A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY:

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

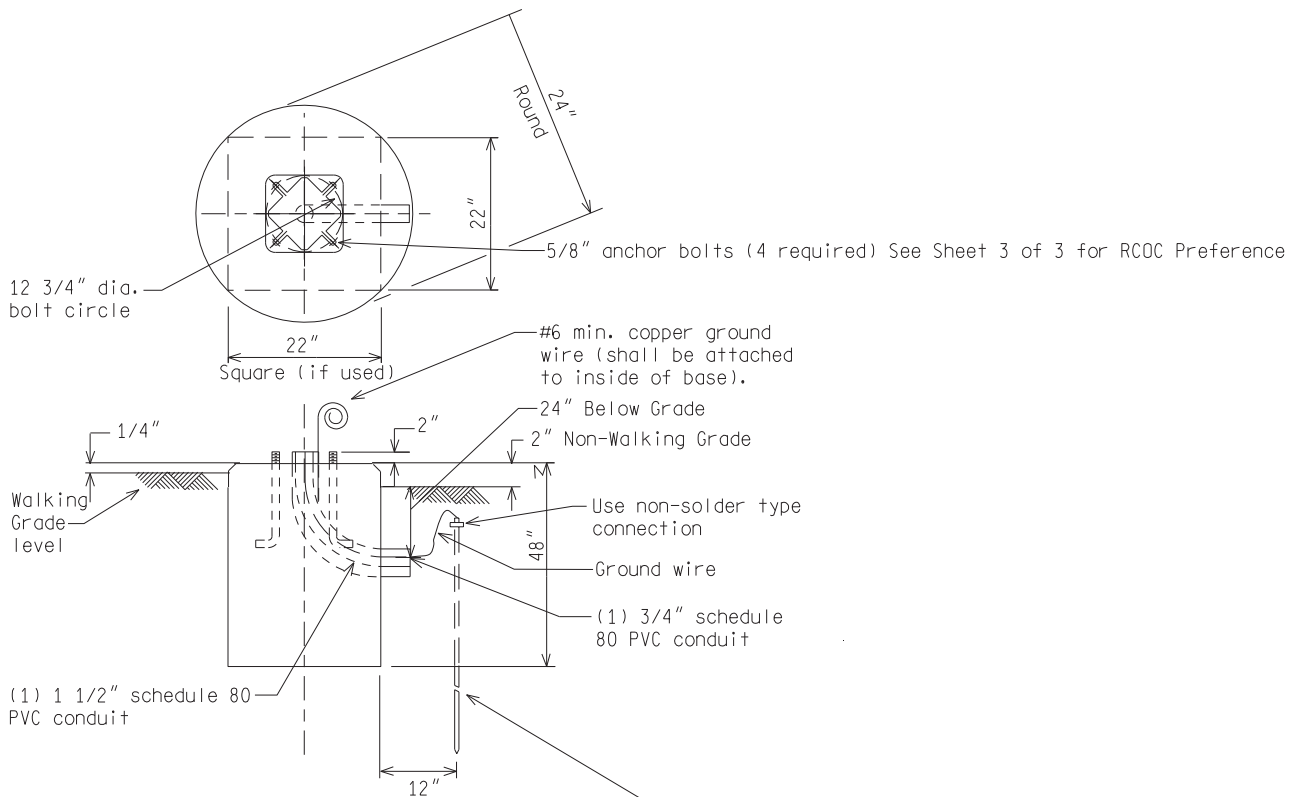
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

PEDESTAL FOUNDATION

PLAN DATE

SIG-070-A

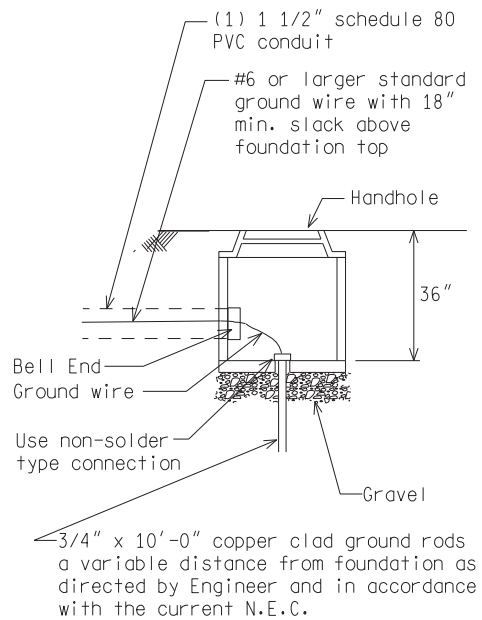
SHEET
1 of 3



3/4"x10'-0" copper clad ground rod(s). (Ground rod(s) must be installed in handhole outside of fdn. (a min. of 12" from fdn.-6" below grade) or as directed by the Engineer.)

PEDESTAL FOUNDATION

See notes 1, 2 & 3 on sheet 3 of 3.



HANDHOLE DETAIL

NOT TO SCALE

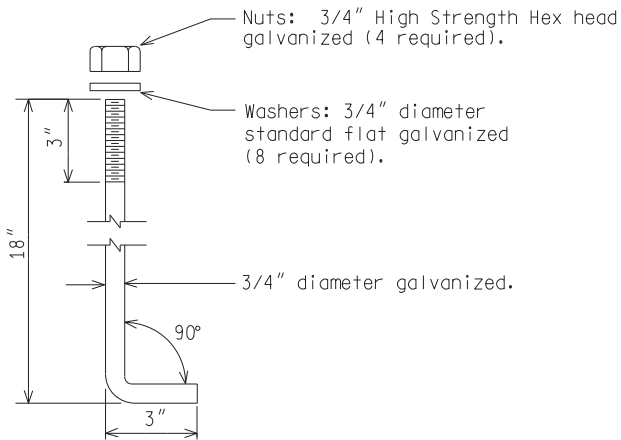
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

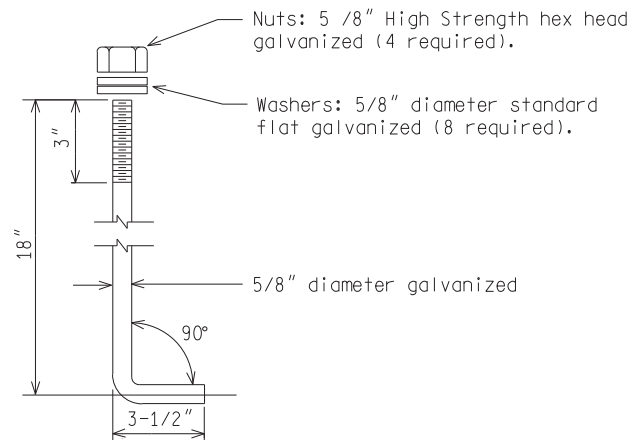
PLAN DATE

SIG-070-A

SHEET
2 of 3



For use on MDOT Trunkline.



For use on Oakland County Roads only.

ANCHOR BOLT DETAIL

NOTE: Anchor bolts are to be ASTM-A307 steel (4-required)

NOTES:

- 1) Alternate foundation may be constructed 22"x22" square - 48" deep.
- 2) Grounding system shall measure 10 ohm or less to ground.
- 3) Construction joints not permitted in foundation.
- 4) Pedestal base must meet the requirements of National Cooperative Highway Research Program Report 350 (NCHRP 350) or Manual for Assessing Safety Hardware (MASH) and have Federal Highway Administration (FHWA) acceptance. Pedestal base must also be certified to have a 4-inch maximum stub height after the support has broken away from its base, as specified in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals and the AASHTO Roadside Design Guide.
- 5) Use the Octagonal Base as a preference by the Road Commission for Oakland County (RCOC), for use on Oakland County roads only.

NOT TO SCALE

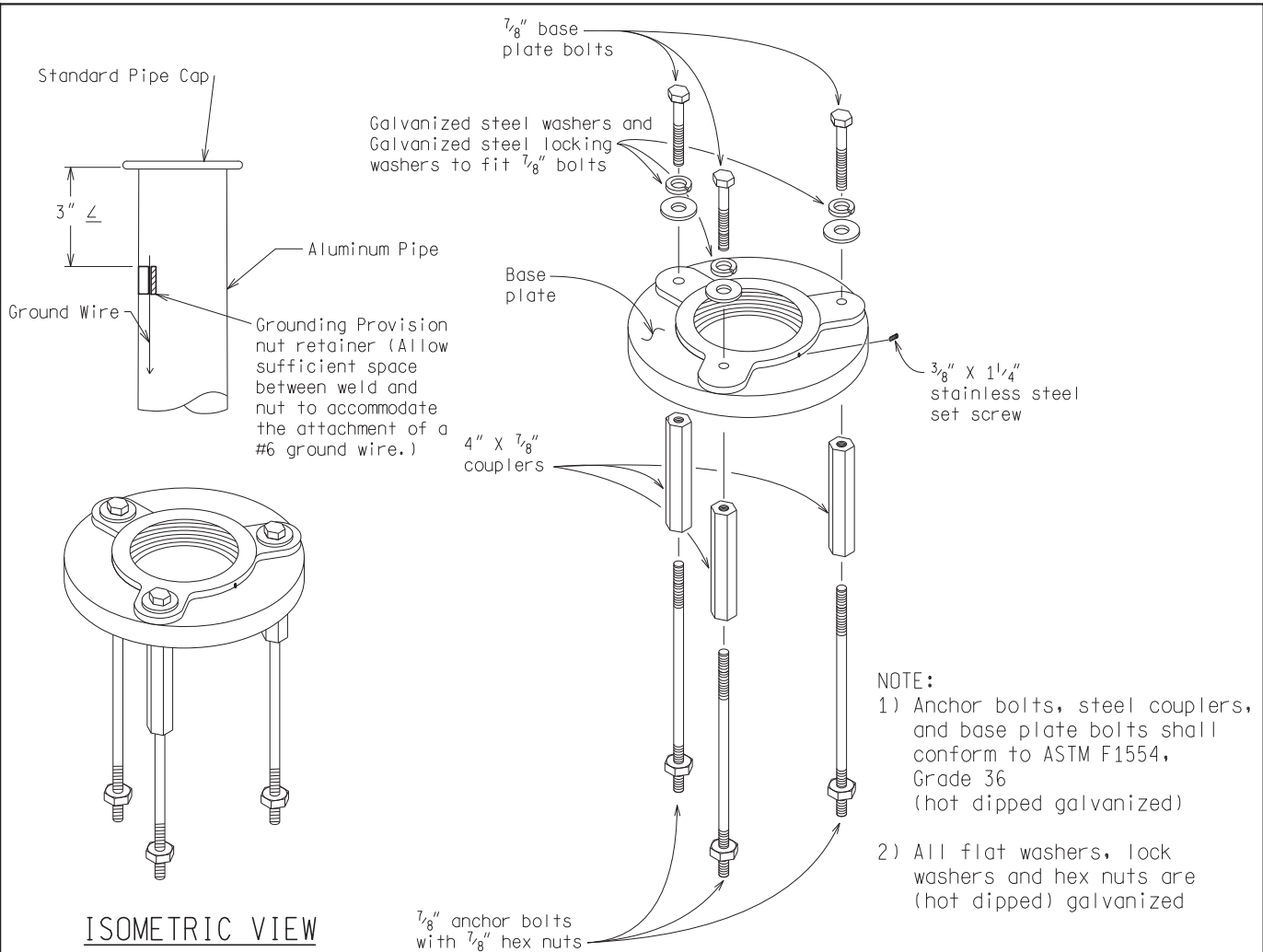
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

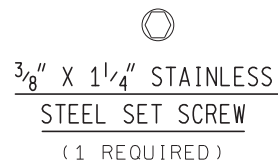
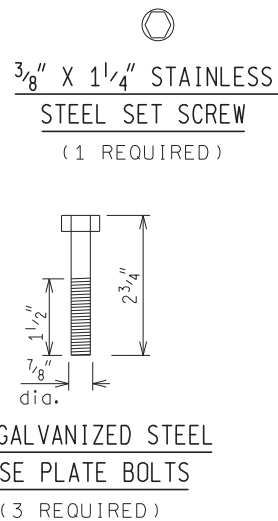
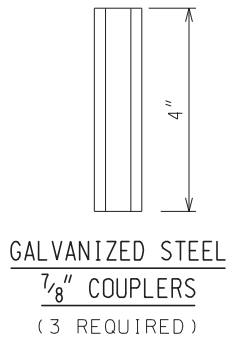
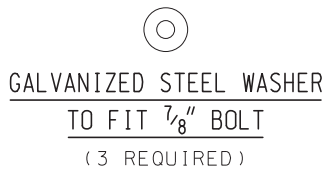
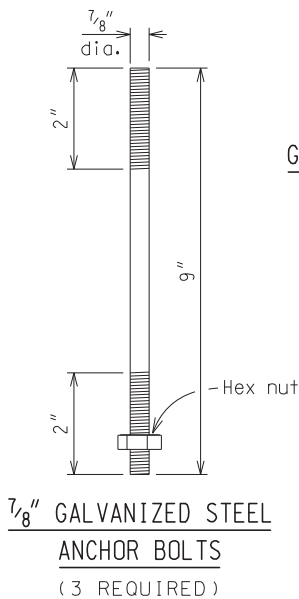
SIG-070-A

SHEET
3 of 3



ISOMETRIC VIEW

ASSEMBLY VIEW



NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG071A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY:
CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

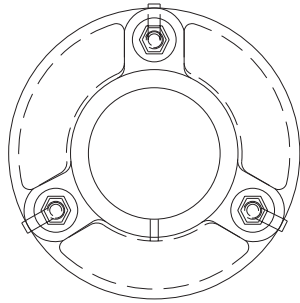
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
PEDESTAL BASE
ALTERNATE ANCHORAGE DETAILS

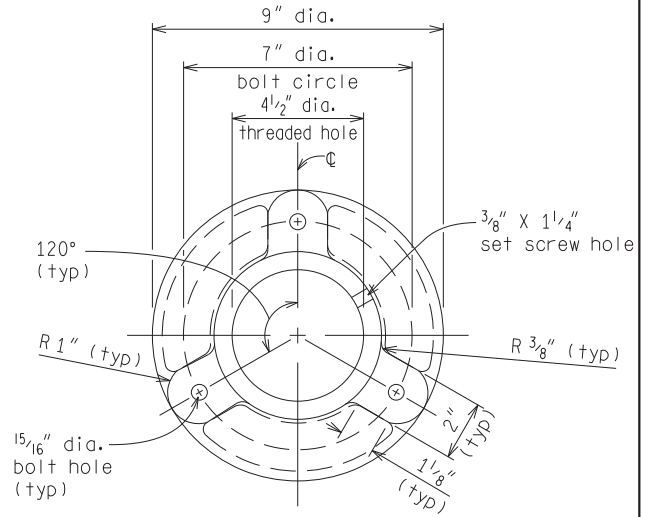
PLAN DATE

SIG-071-A

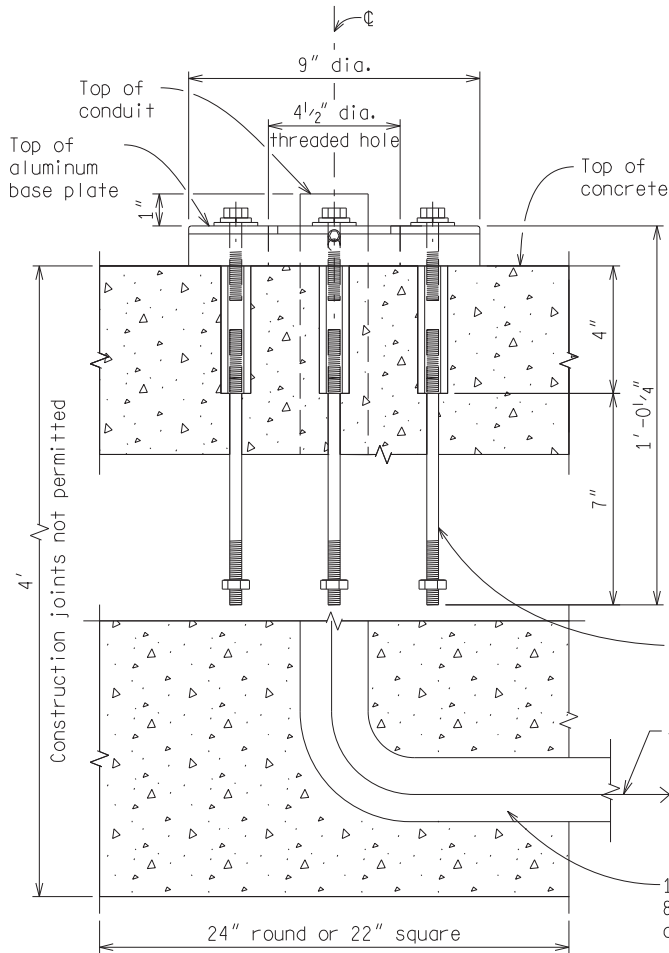
SHEET
1 of 2



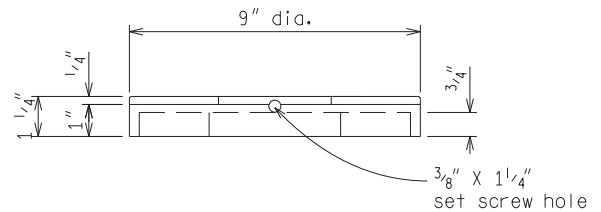
TOP VIEW
(ASSEMBLED)



TOP VIEW
(ROUND ALUMINUM BASE PLATE)

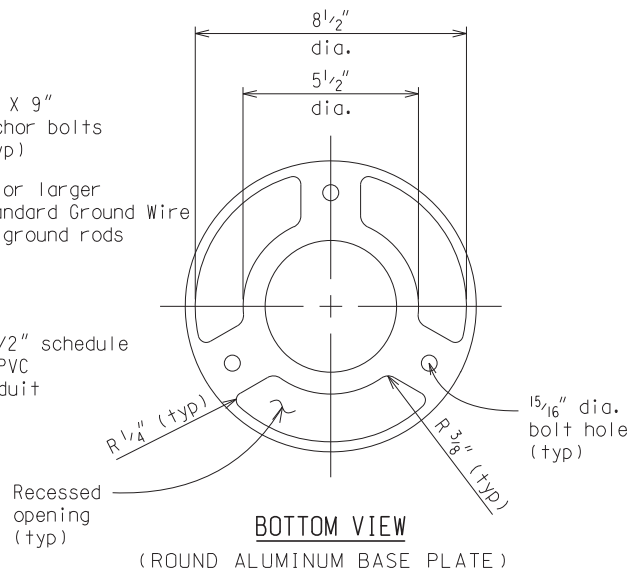


FRONT VIEW
(ASSEMBLED)



FRONT VIEW
(ROUND ALUMINUM BASE PLATE)

NOTE: WHERE THE 1 1/2" CONDUIT DOES NOT FEED INTO A HANDHOLE, INSTALL AN ADDITIONAL 3/4" SCHEDULE 80 PVC CONDUIT FOR GROUNDING. 3/4" X 10'-0" COPPER CLAD GROUND RODS IN ACCORDANCE WITHIN THE CURRENT N.E.C.



BOTTOM VIEW
(ROUND ALUMINUM BASE PLATE)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

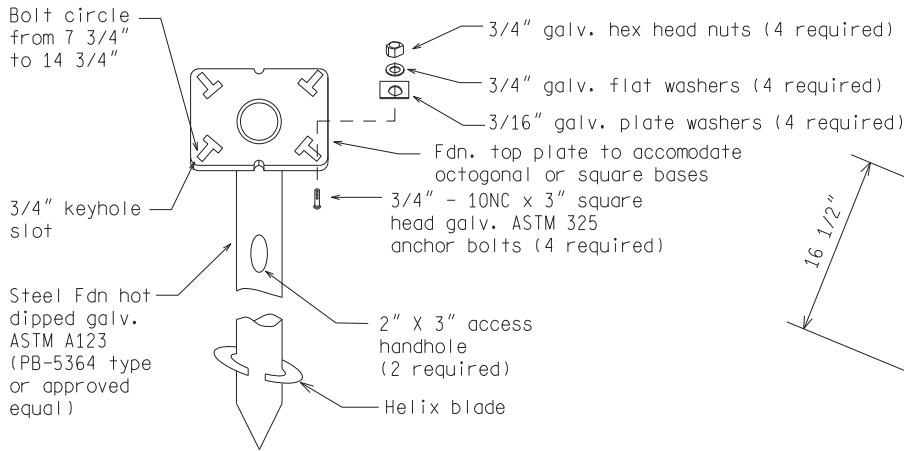
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Rev. 02/16/17

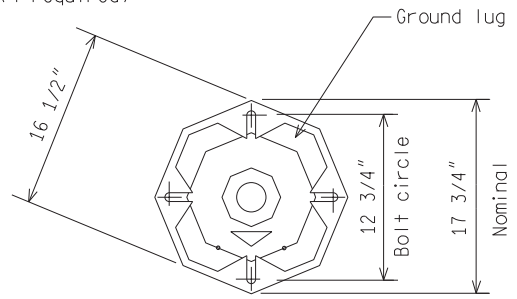
PLAN DATE

SIG-071-A

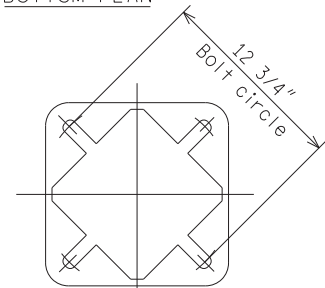
SHEET
2 of 2



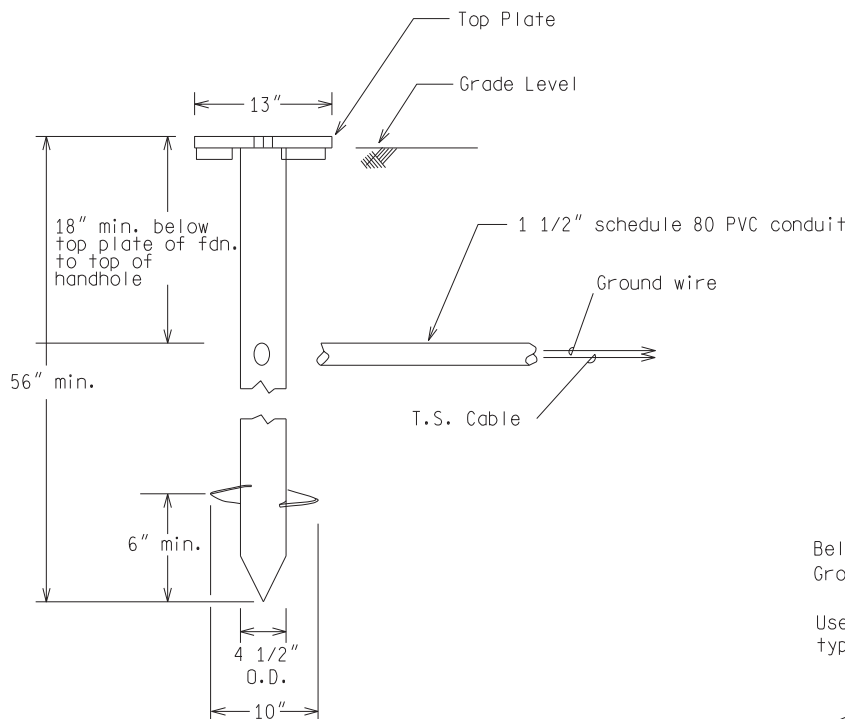
ISOMETRIC VIEW



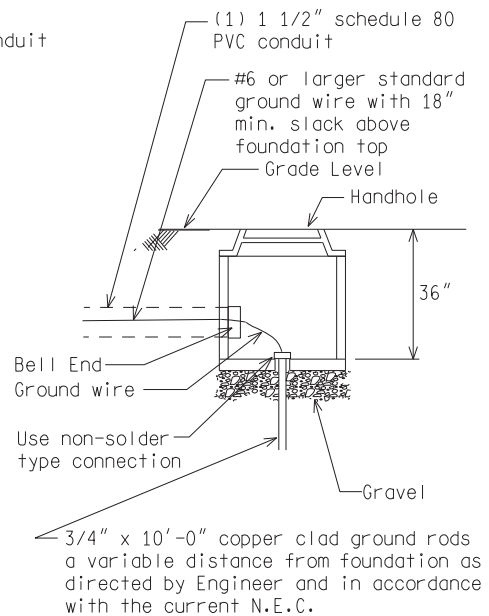
OCTAGONAL BASE
BOTTOM PLAN



SQUARE BASE
BOTTOM PLAN



HELIX FOUNDATION ANCHOR ASSEMBLY
FOR PEDESTRIAN PUSHBUTTON PEDESTAL ONLY
(REFER TO SIG-120-A)



HANDHOLE DETAIL

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG072A.dgn Rev. 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: JAM

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

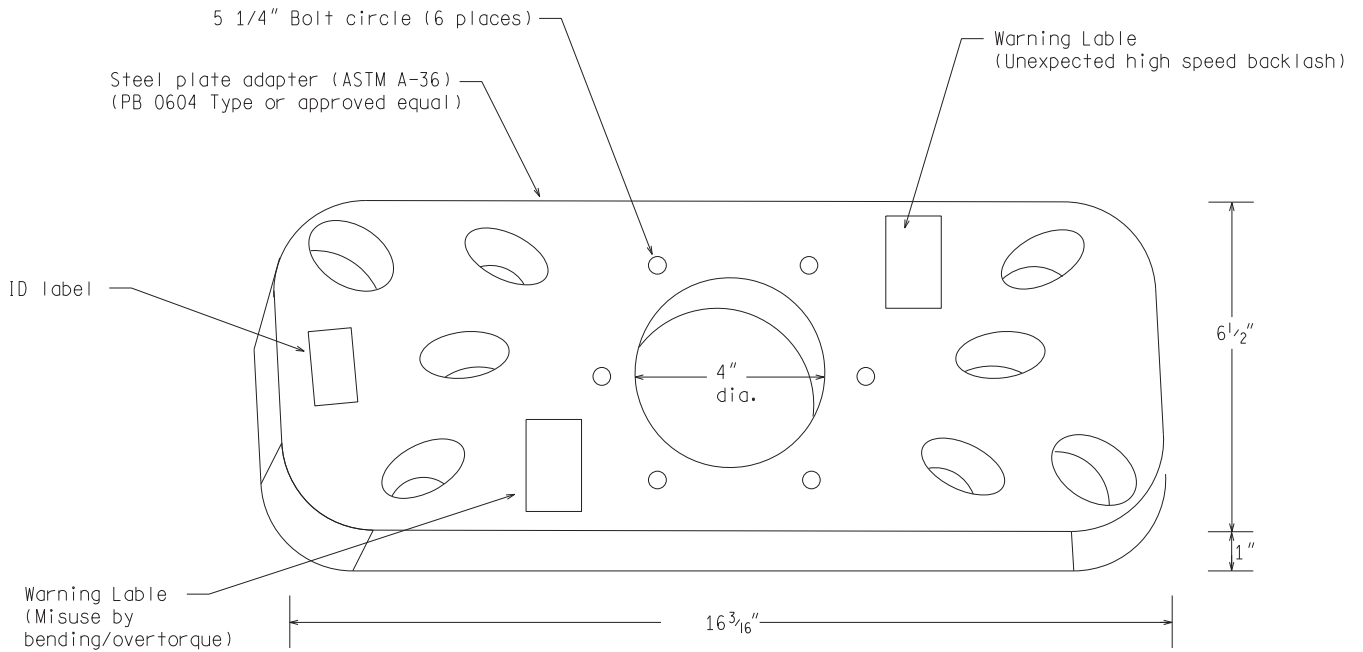
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

HELIX PEDESTAL
FOUNDATION

SIG-072-A

PLAN DATE

SHEET
1 of 2

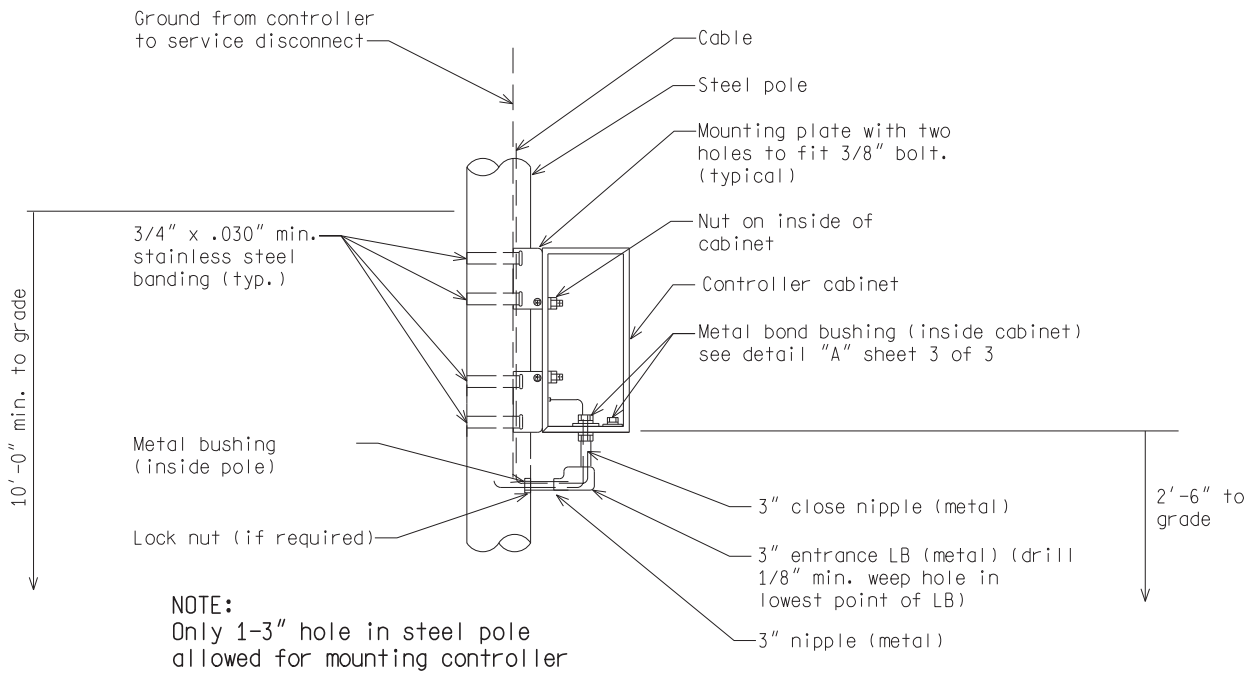


STEEL DRIVER ADAPTER
(FOR 4", 6", OR 8" SCREW IN FOUNDATION ANCHORS)

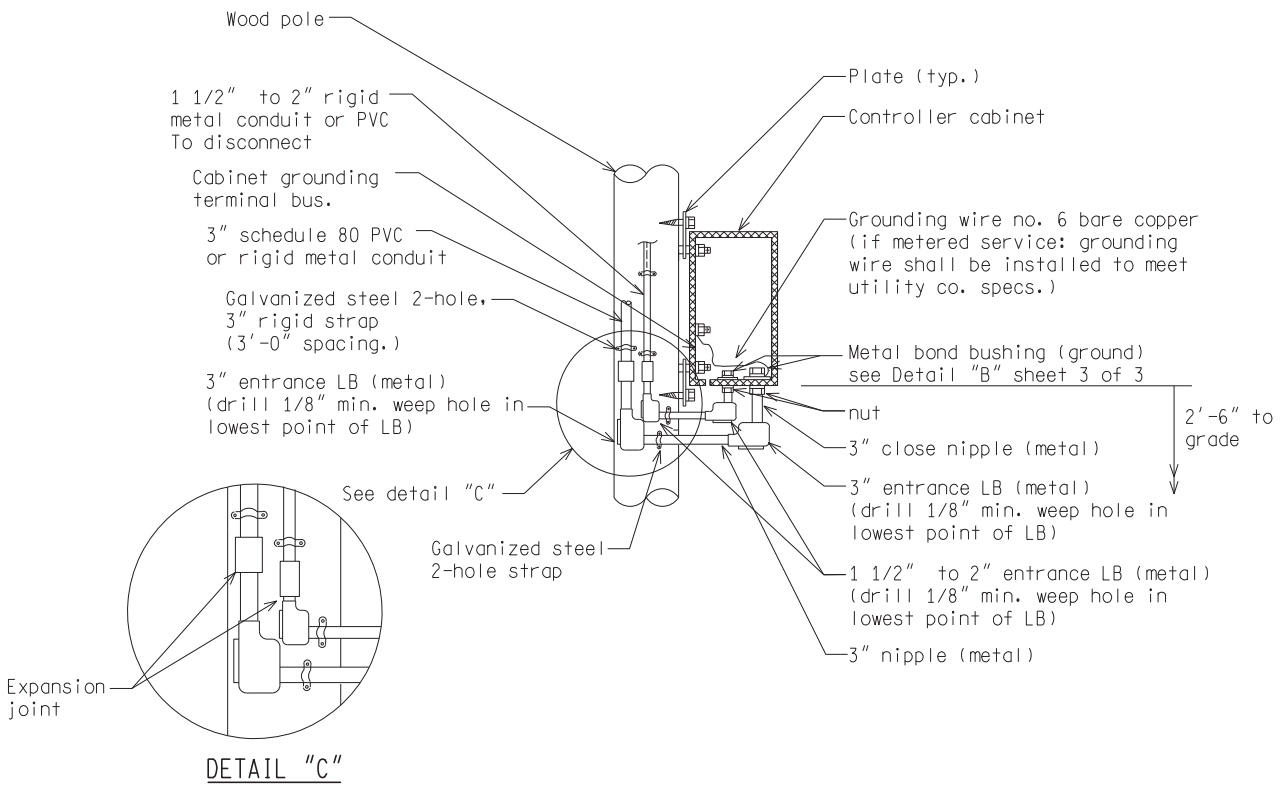
NOTE: Typically the driver adapter is attached between the Kelly Bar Adapter (hub) on the drill equipment and the top plate of the foundation anchor.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR	(SPECIAL DETAIL) FHWA APPROVAL DATE		<h2 style="margin: 0;">SIG-072-A</h2>	SHEET 2 of 2
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG072A.dgn	Rev. 02/16/17	PLAN DATE		



TRAFFIC SIGNAL CONTROLLER CABINET MOUNTED ON STEEL POLES



TRAFFIC SIGNAL CONTROLLER CABINET MOUNTED ON WOOD POLES

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG100A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

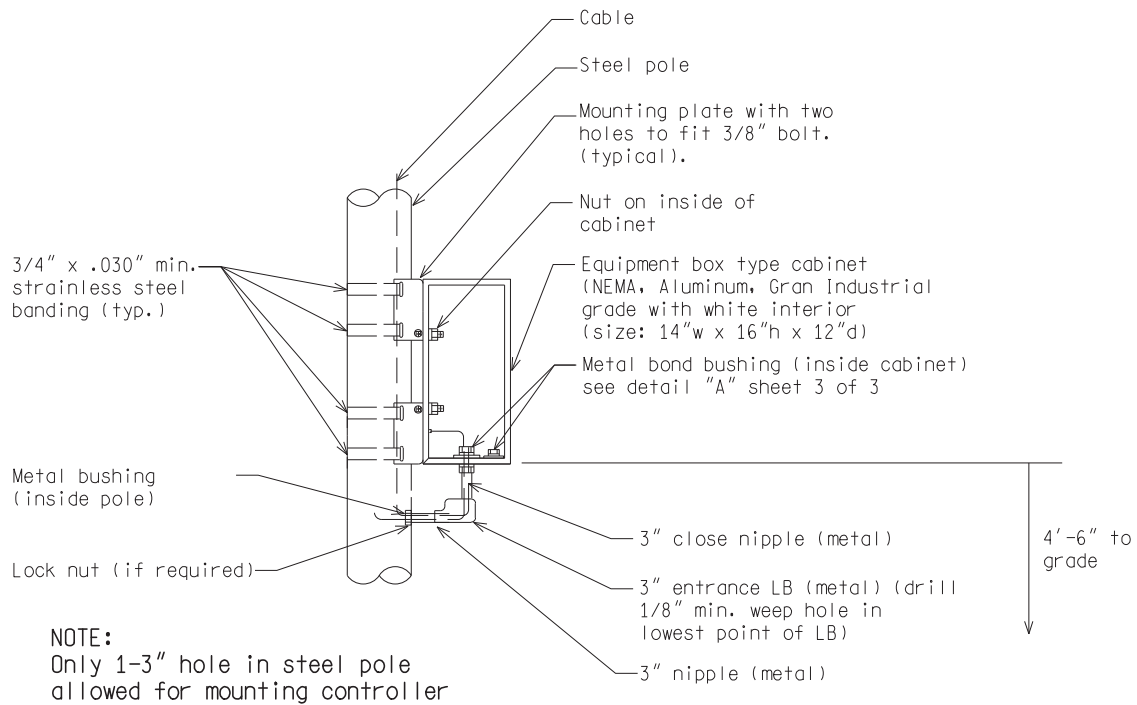
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**CONTROLLER CABINET MOUNTED
ON STEEL OR WOOD POLES**

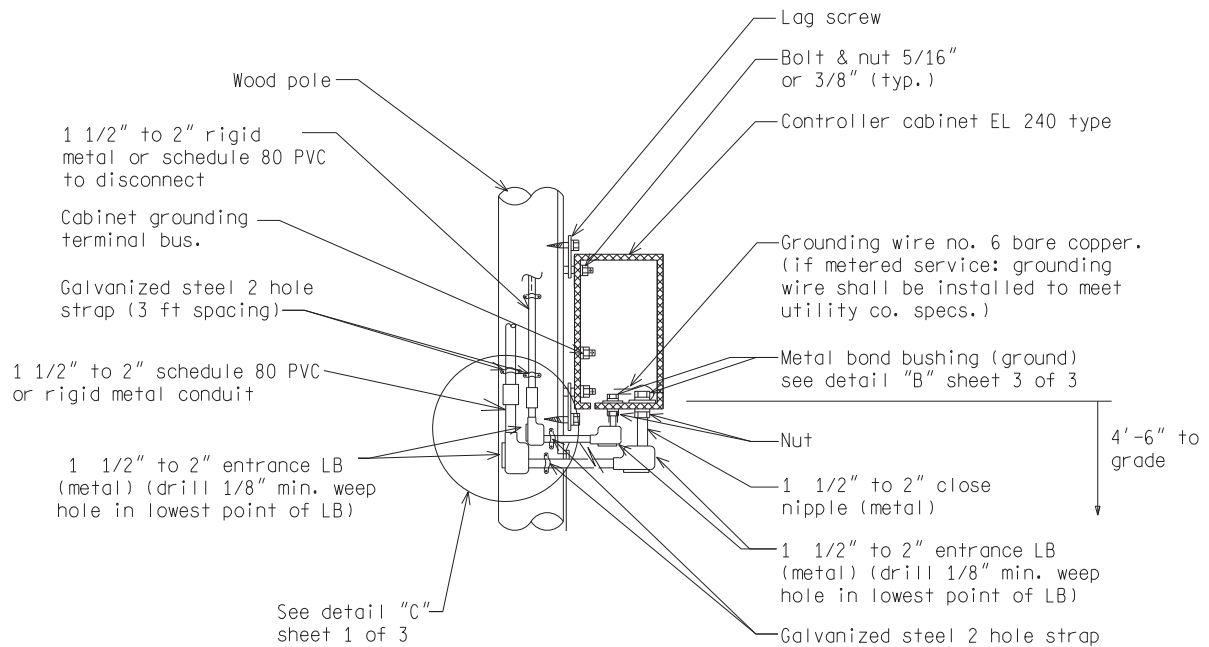
PLAN DATE

SIG-100-A

SHEET
1 of 3



FLASHING BEACON CONTROLLER CABINET
(EQUIPMENT BOX) MOUNTED ON STEEL POLES



FLASHING BEACON CONTROLLER CABINET (EL 240 TYPE OR EQUIVALENT)
MOUNTED ON WOOD POLES

NOT TO SCALE

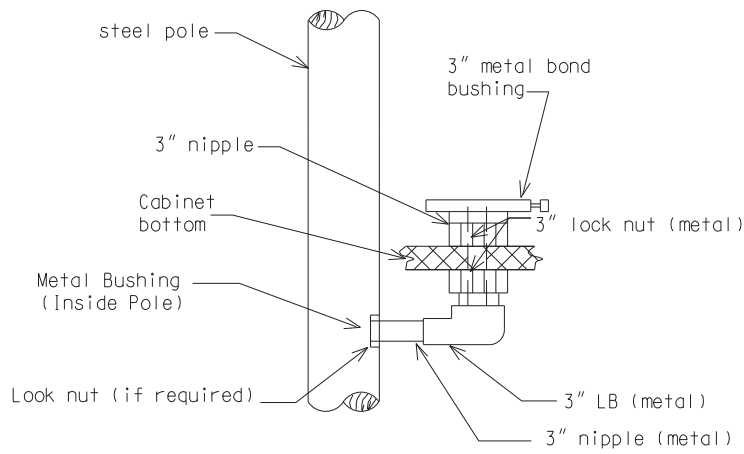
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

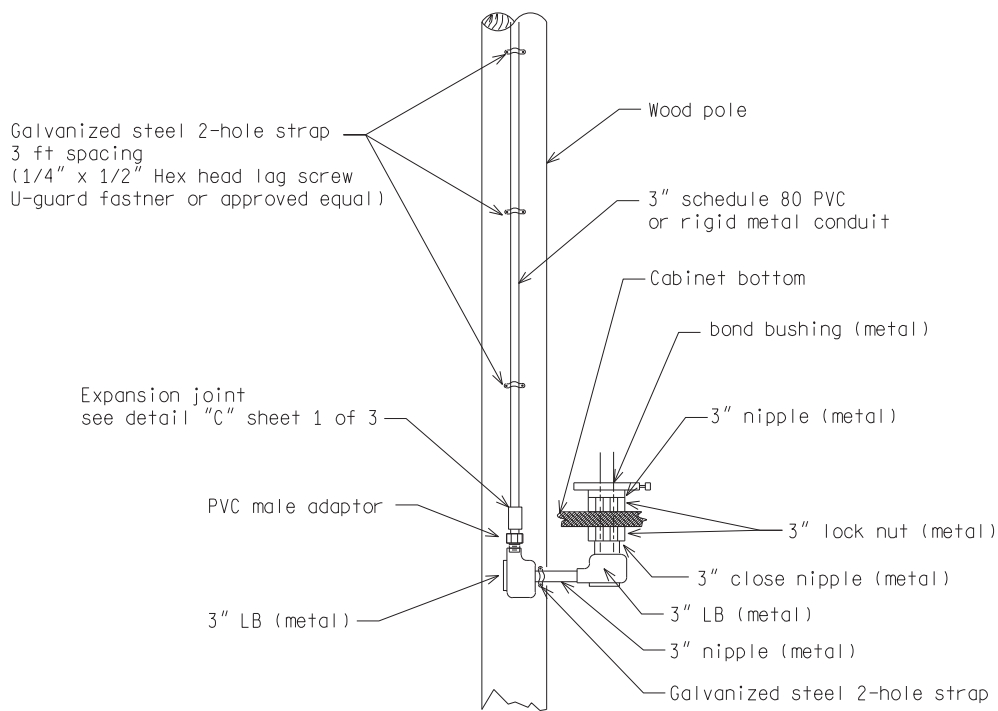
PLAN DATE

SIG-100-A

SHEET
2 of 3



CONTROLLER CABINET MOUNTED ON STEEL POLE DETAIL "A"



CONTROLLER CABINET MOUNTED ON WOOD POLE DETAIL "B"

NOTE:
 The distance between LB's as shown on this detail is for clarity of the drawing only. Actual distance between LB's shall be minimized as is practical to the installation.

NOTE:
 If rigid metal conduit is used, the conduit must be bonded according to the current N.E.C.

NOT TO SCALE

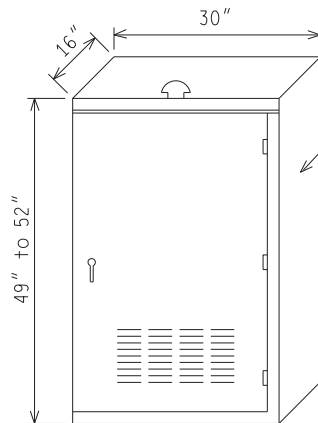
MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
 FHWA APPROVAL DATE

PLAN DATE

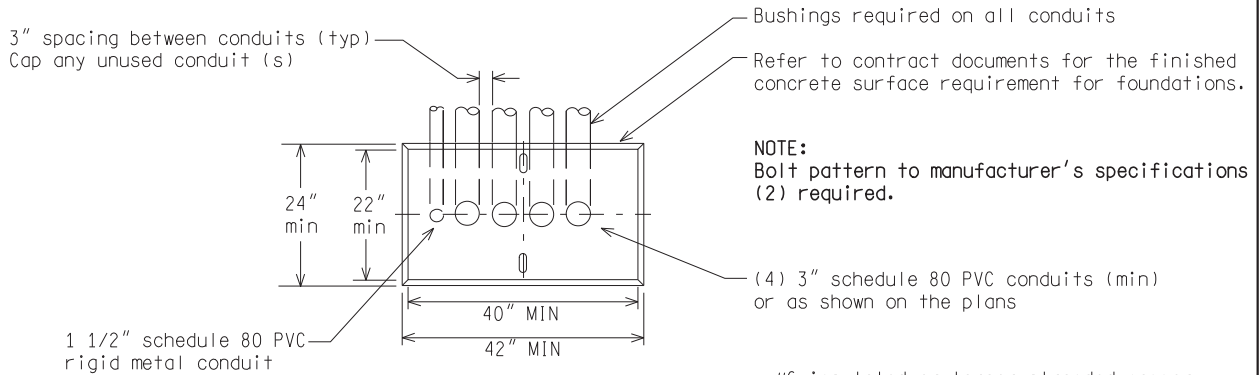
SIG-100-A

SHEET
 3 of 3

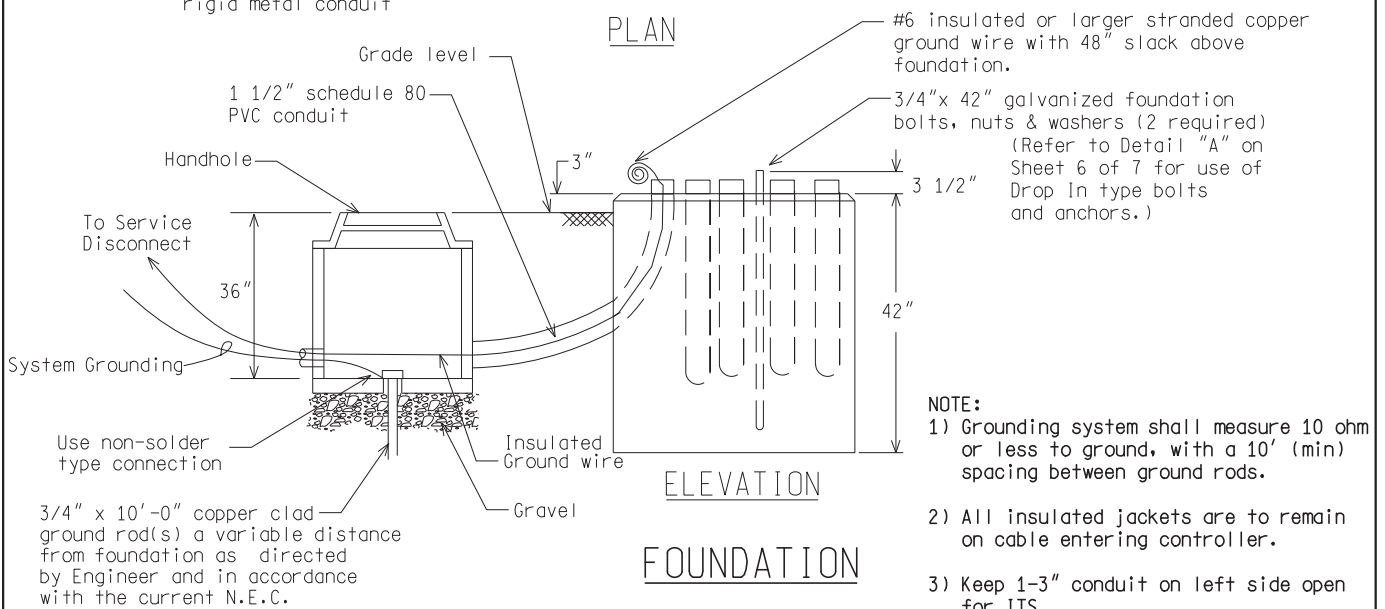


Vented aluminum cabinet with base mounting shall be Type NEMA 3R Size M-30

BASE MOUNTED TRAFFIC SIGNAL CONTROLLER CABINET



PLAN



ELEVATION

FOUNDATION

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG110A.dgn Rev: 02/16/17



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DRAWN BY:

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ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

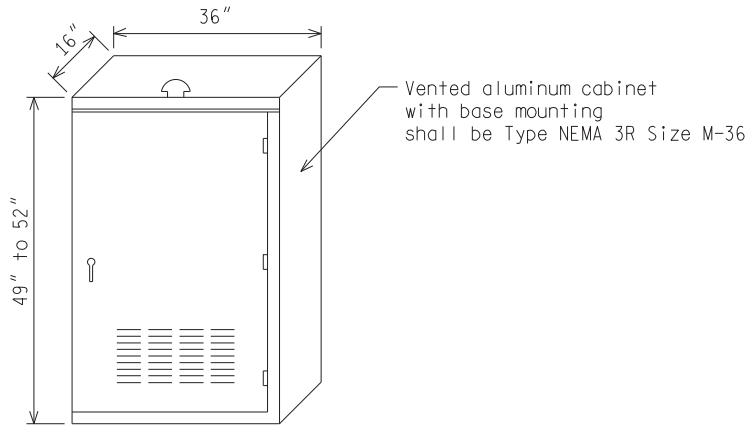
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

BASE MOUNTED T.S. CONTROLLER CABINET/FOUNDATIONS

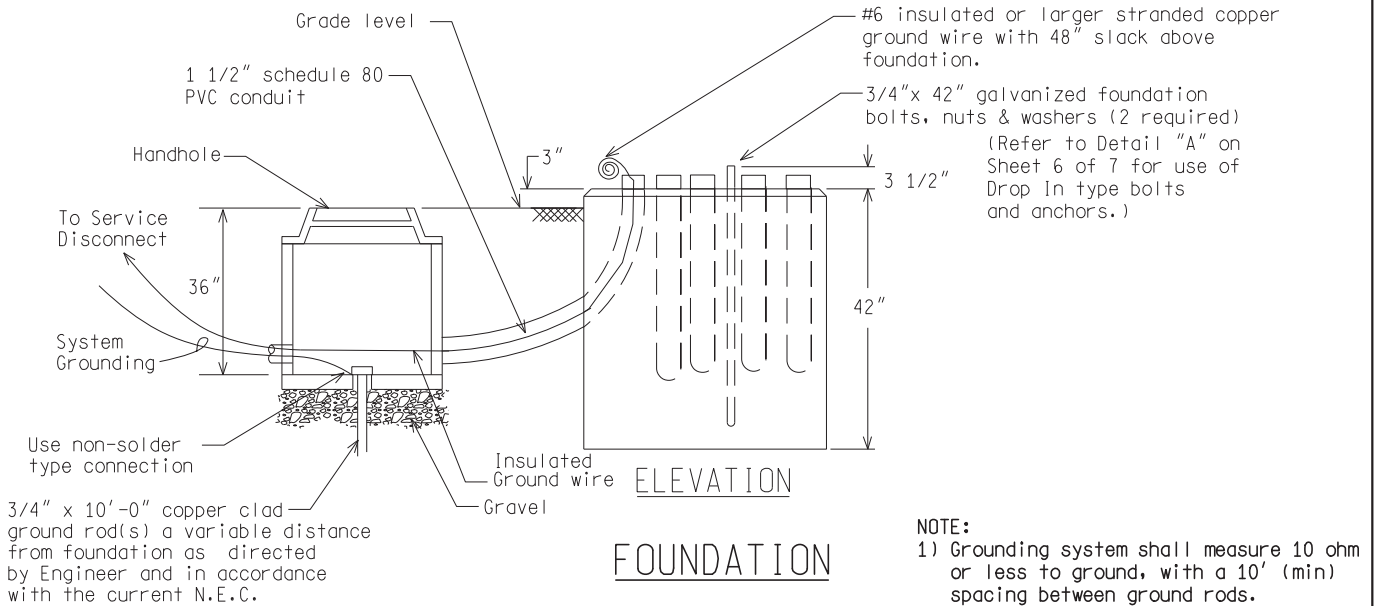
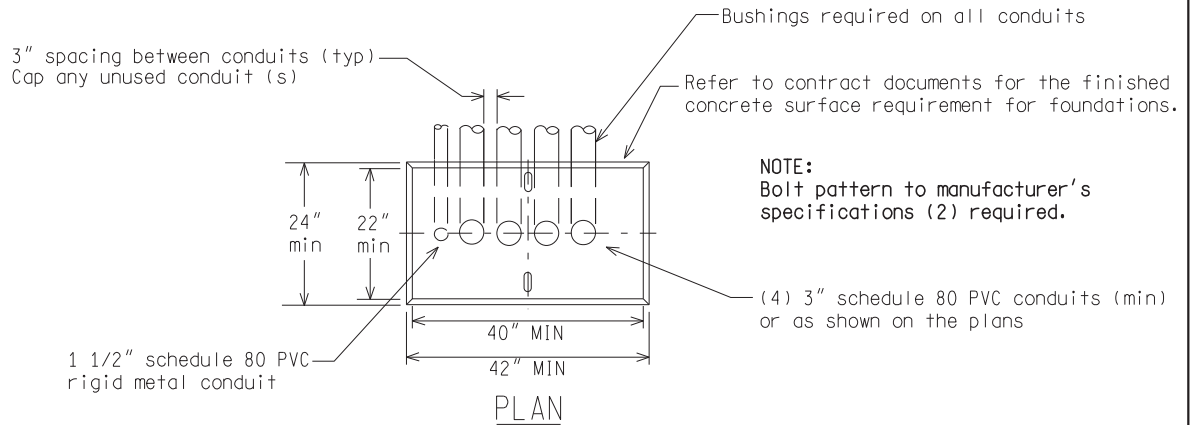
PLAN DATE

SIG-110-A

SHEET
1 of 7



BASE MOUNTED TRAFFIC SIGNAL CONTROLLER CABINET



NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

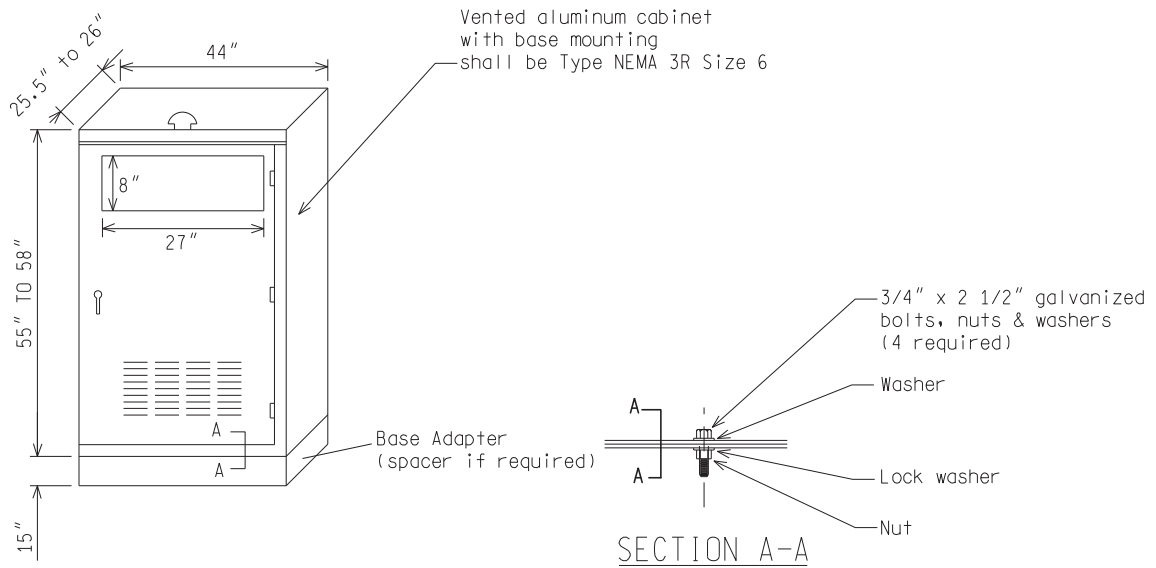
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Rev. 02/16/17

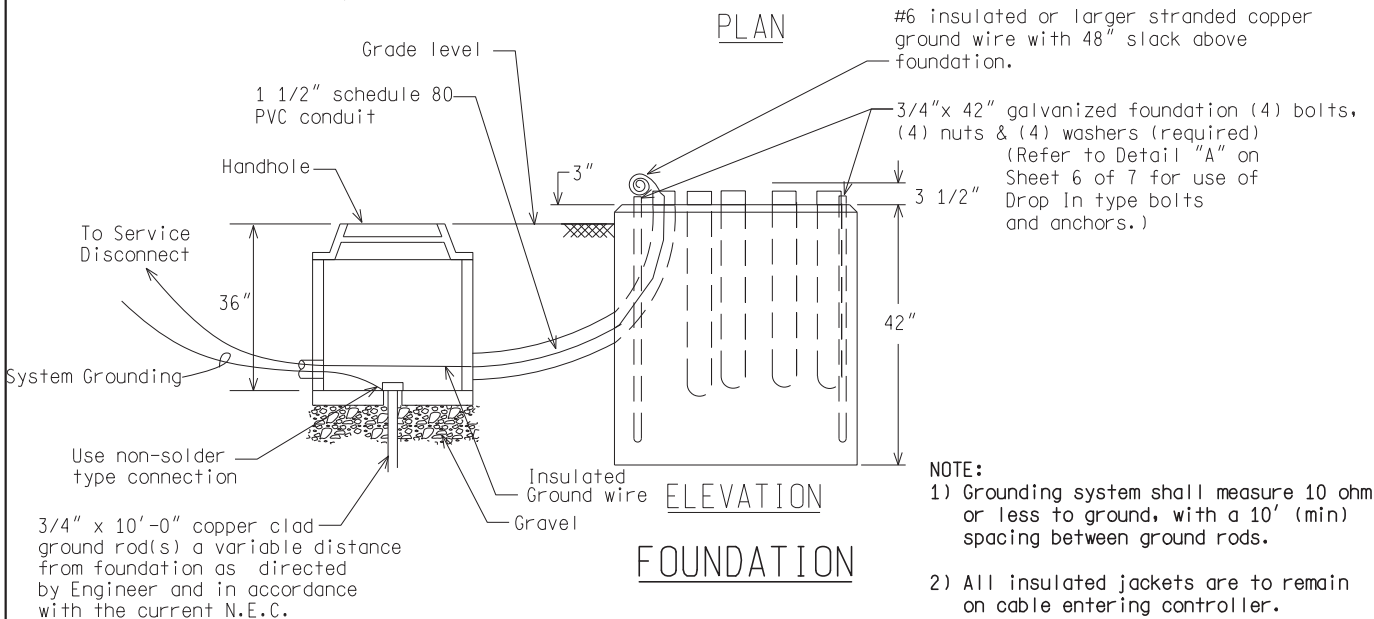
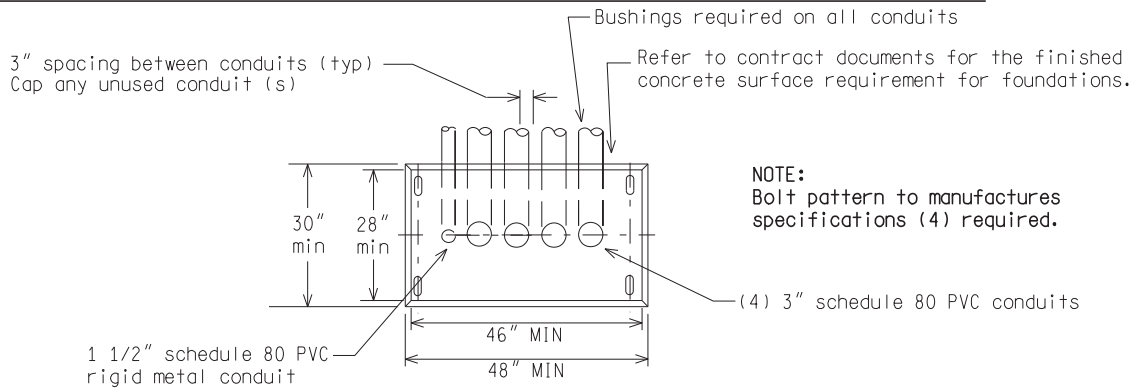
PLAN DATE

SIG-110-A

SHEET
2 of 7



BASE MOUNTED TRAFFIC SIGNAL SIGNAL CONTROLLER CABINET



- NOTE:**
- 1) Grounding system shall measure 10 ohm or less to ground, with a 10' (min) spacing between ground rods.
 - 2) All insulated jackets are to remain on cable entering controller.
 - 3) Keep 1-3" conduit on left side open for ITS

NOT TO SCALE

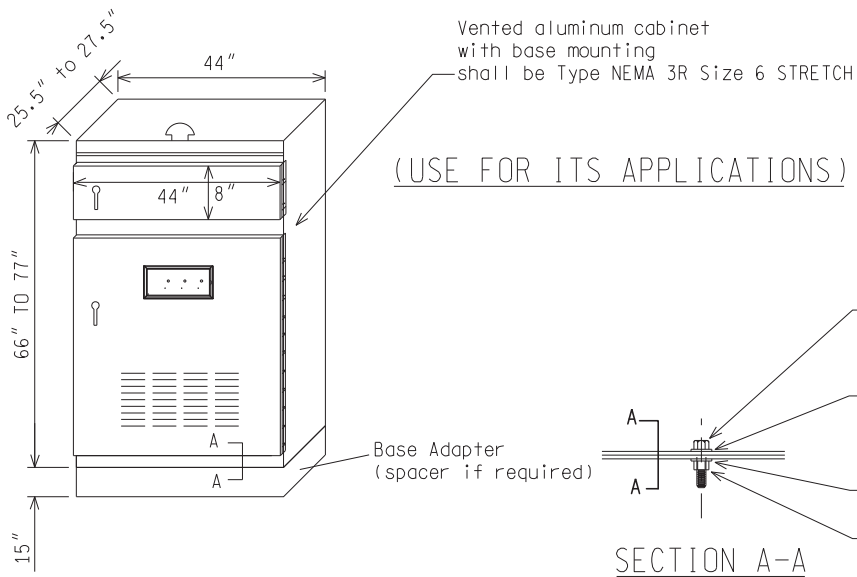
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

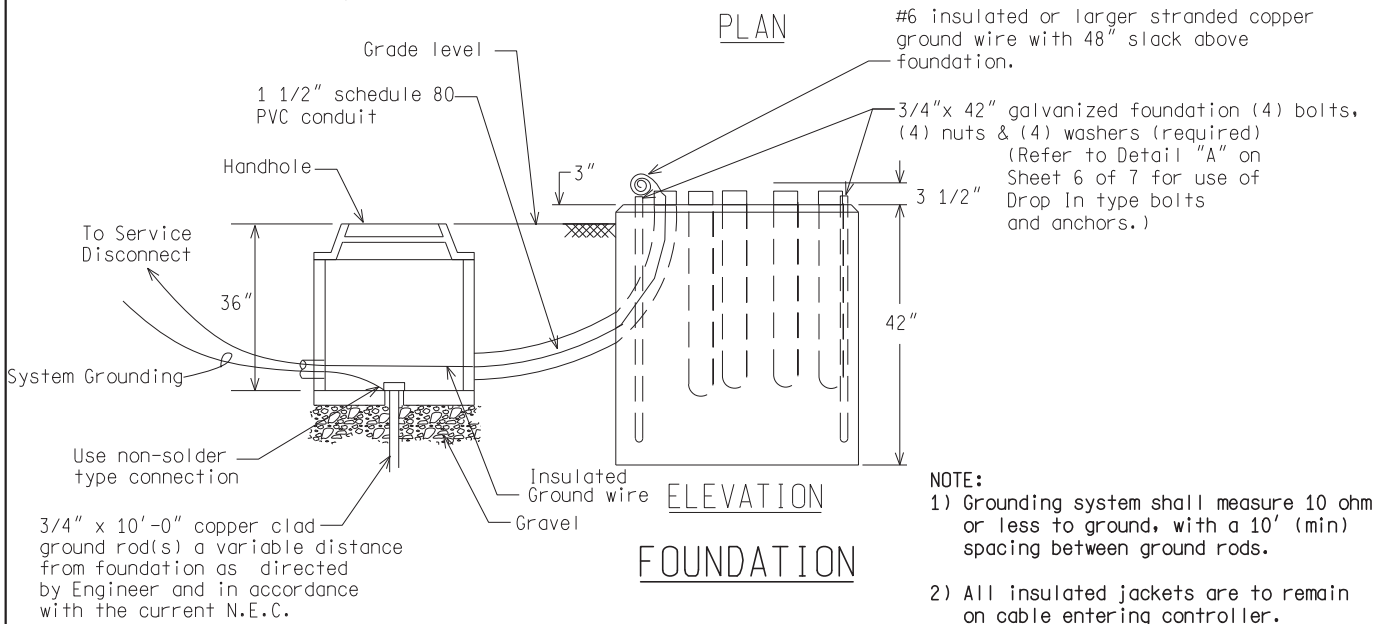
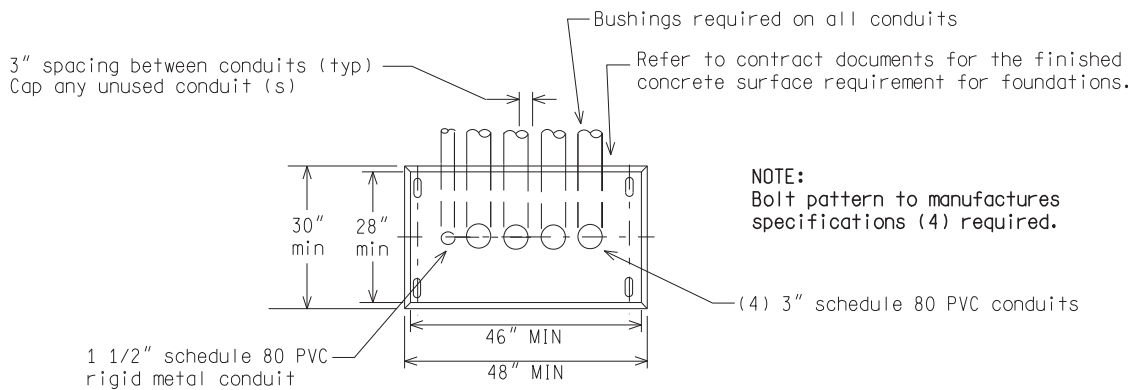
PLAN DATE

SIG-110-A

SHEET
3 of 7



BASE MOUNTED TRAFFIC SIGNAL ITS CONTROLLER CABINET (IF USED)



NOT TO SCALE

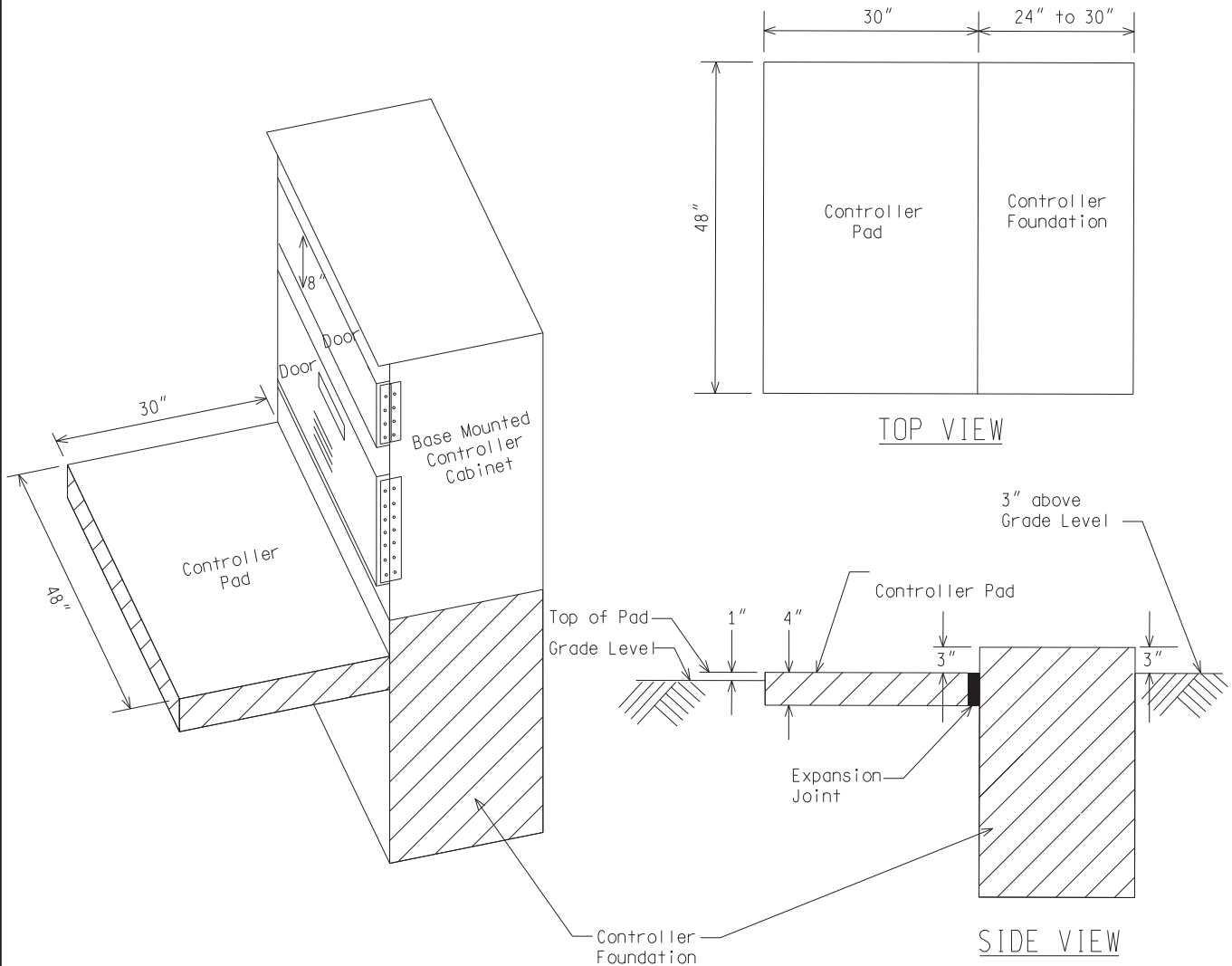
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-110-A

SHEET
4 of 7

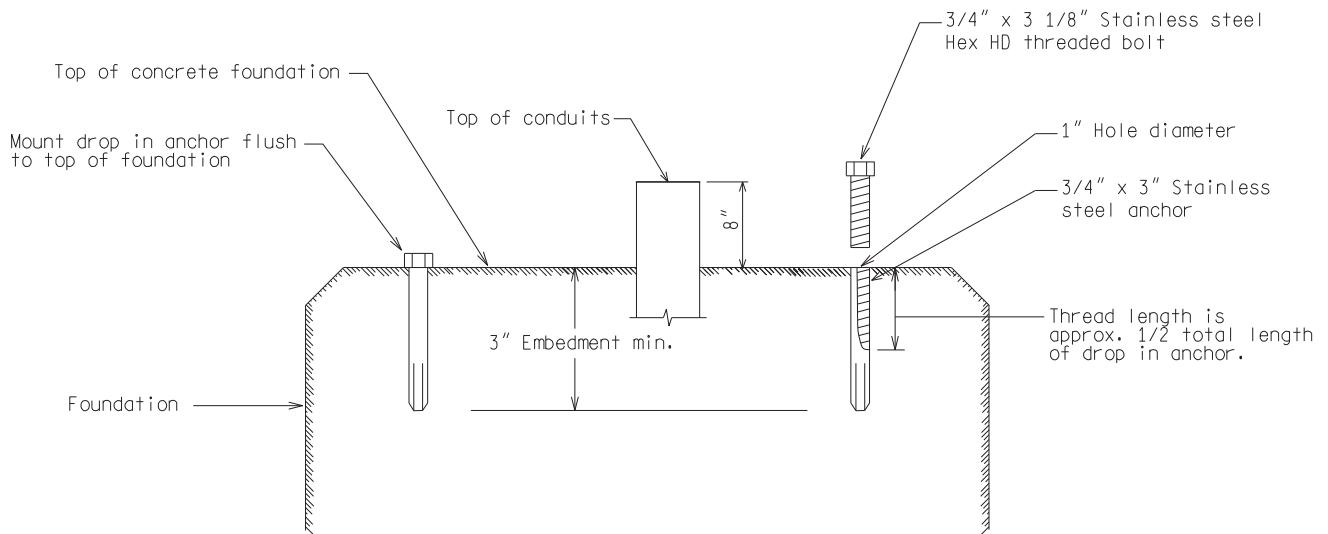


BASE MOUNTED CONTROLLER PAD

NOTE:
 Payment for controller pad to be included in controller foundation pay item.
 Controller cabinet door to open toward pad.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-110-A	SHEET 5 of 7
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG110A.dgn	Rev. 02/16/17	PLAN DATE		

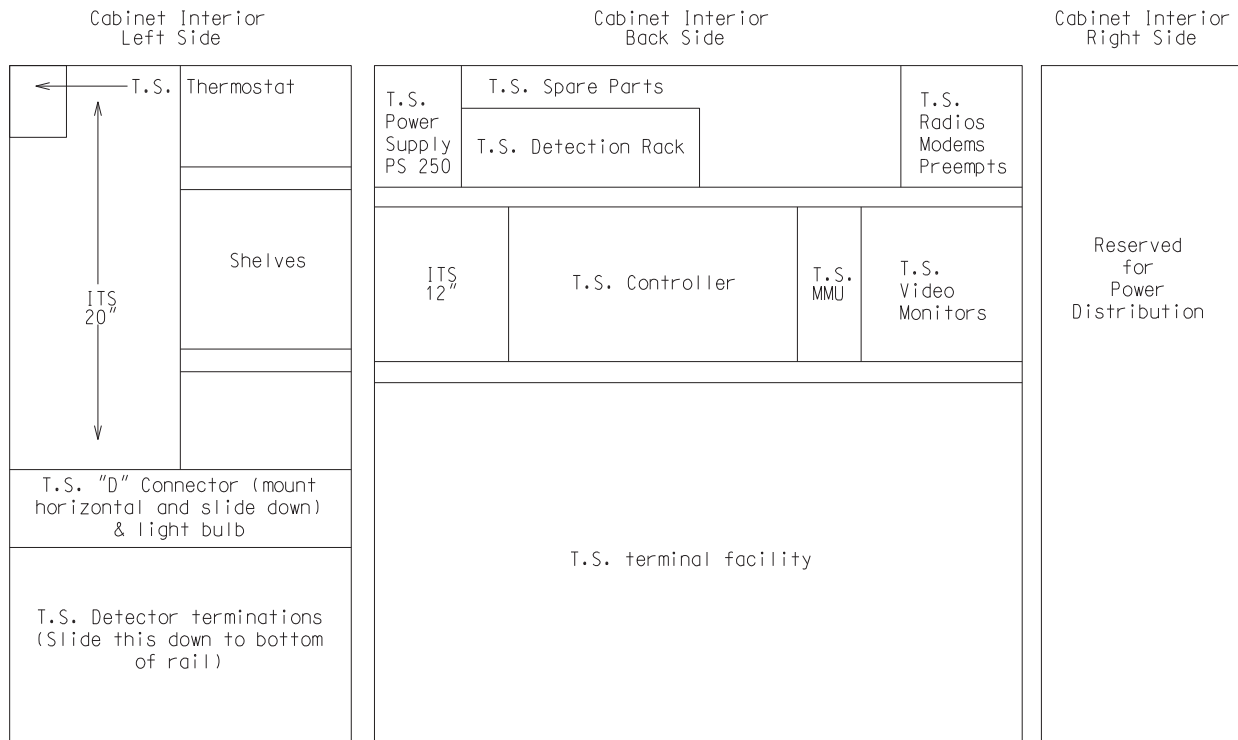


- Notes:
1. Use AISI 300 Series Stainless Steel for all bolts and anchors.
 2. Use Drop In foundation bolts and anchors as directed by the Engineer.

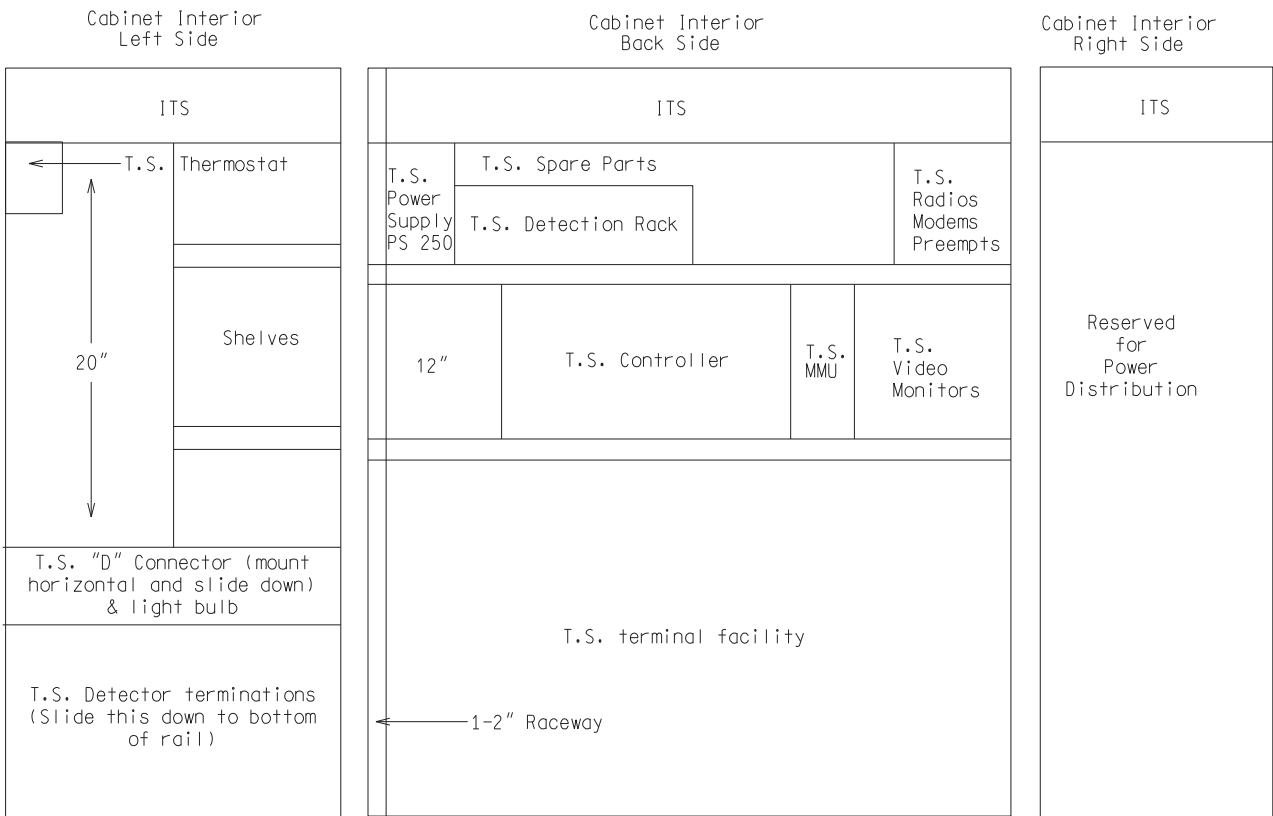
ALTERNATIVE DETAIL "A": DROP IN FOUNDATION BOLTS & ANCHORS

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-110-A	SHEET 6 of 7
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG110A.dgn	Rev. 02/16/17	PLAN DATE		



TRAFFIC SIGNAL NEMA 3R SIZE 6 CABINET REQUIREMENTS



TRAFFIC SIGNAL NEMA 3R SIZE 6 STRETCH CABINET REQUIREMENTS

FOR ITS APPLICATIONS

NOT TO SCALE

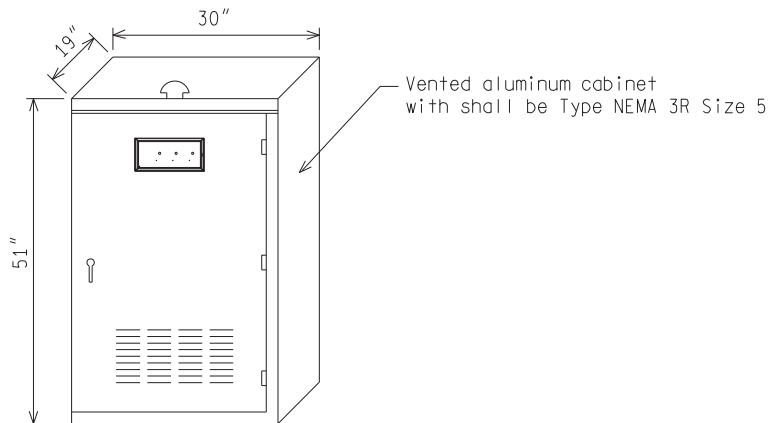
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

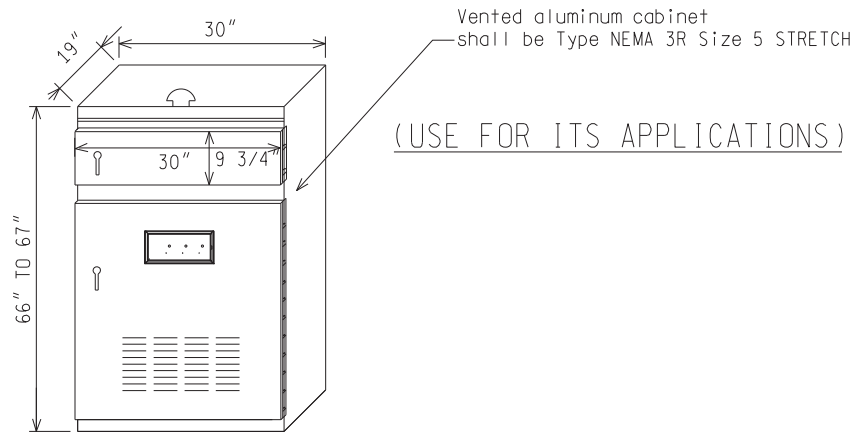
PLAN DATE

SIG-110-A

SHEET
7 of 7



POLE MOUNTED TRAFFIC SIGNAL CONTROLLER CABINET



POLE MOUNTED TRAFFIC SIGNAL ITS CONTROLLER CABINET (IF USED)

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG111A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY:
CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

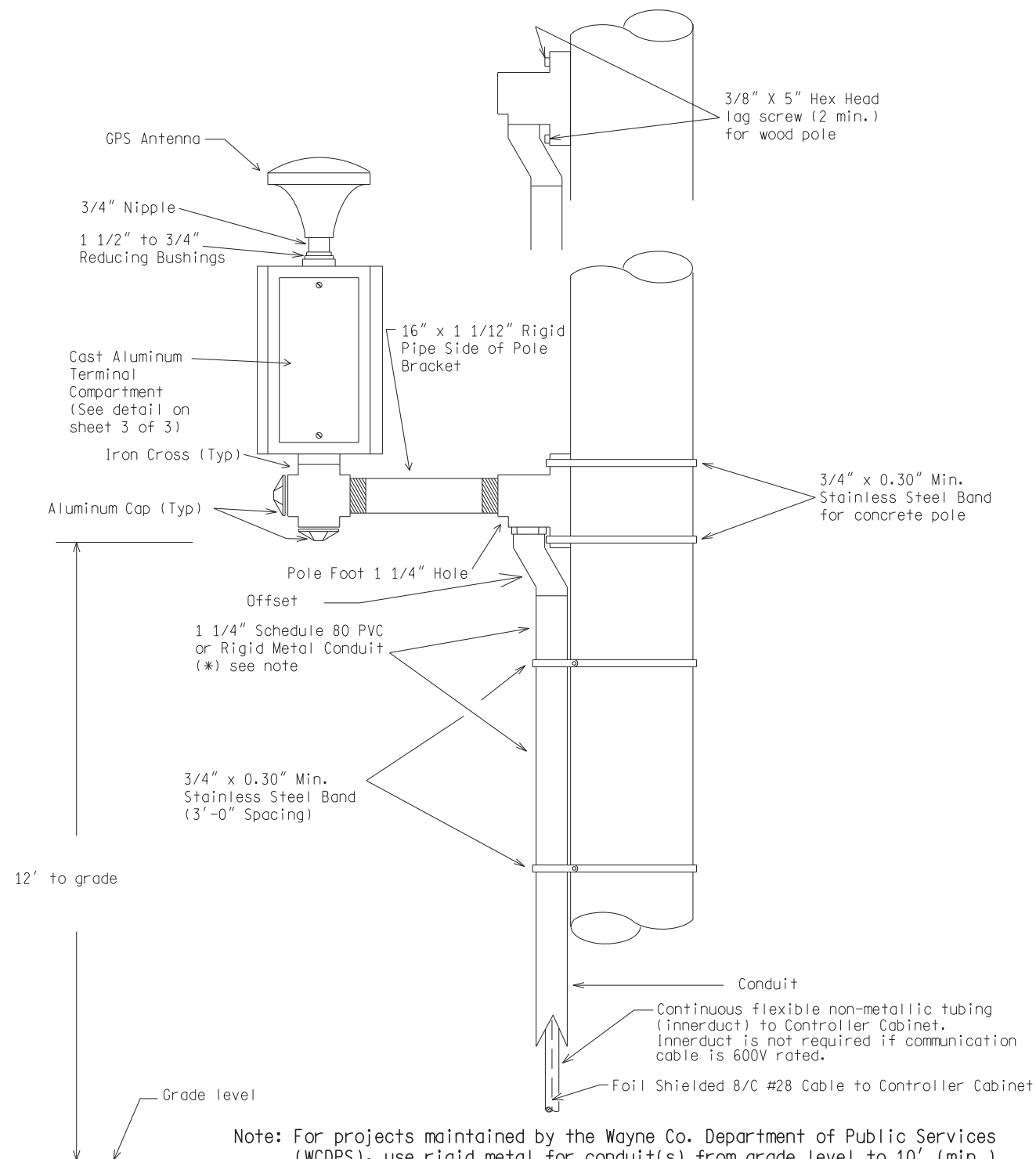
(SPECIAL DETAIL)
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**POLE MOUNTED T.S.
CONTROLLER CABINET/FOUNDATIONS**

PLAN DATE

SIG-111-A

SHEET
1 of 1



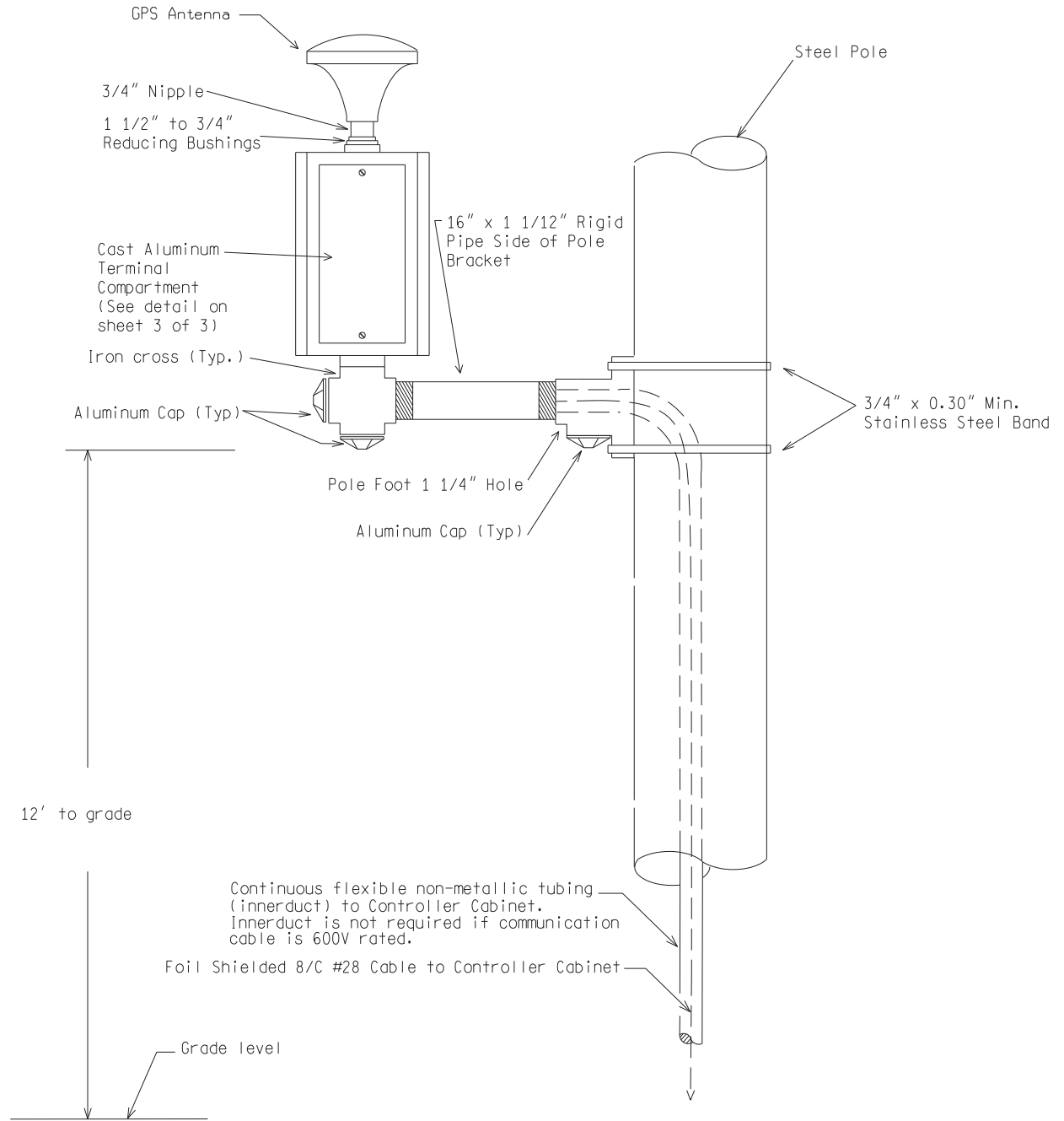
Note: For projects maintained by the Wayne Co. Department of Public Services (WCDPS), use rigid metal for conduit(s) from grade level to 10' (min.) above grade or as directed by the Engineer.

GLOBAL POSITIONING SYSTEM (GPS) MODULE MOUNTED ON WOOD/CONCRETE POLE

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG120A.dgn Rev: 02/16/17

<p>PREPARED BY TRAFFIC AND SAFETY</p>	<p>_____ ENGINEER OF DELIVERY</p>	<p>MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR</p> <p>GLOBAL POSITIONING SYSTEM (GPS) MODULE</p>	
	<p>_____ ENGINEER OF DEVELOPMENT</p> <p>(SPECIAL DETAIL) FHWA APPROVAL DATE</p>	<p>_____ PLAN DATE</p>	<p>SIG-120-A</p>



GLOBAL POSITIONING SYSTEM (GPS) MODULE MOUNTED ON STEEL POLE

NOT TO SCALE

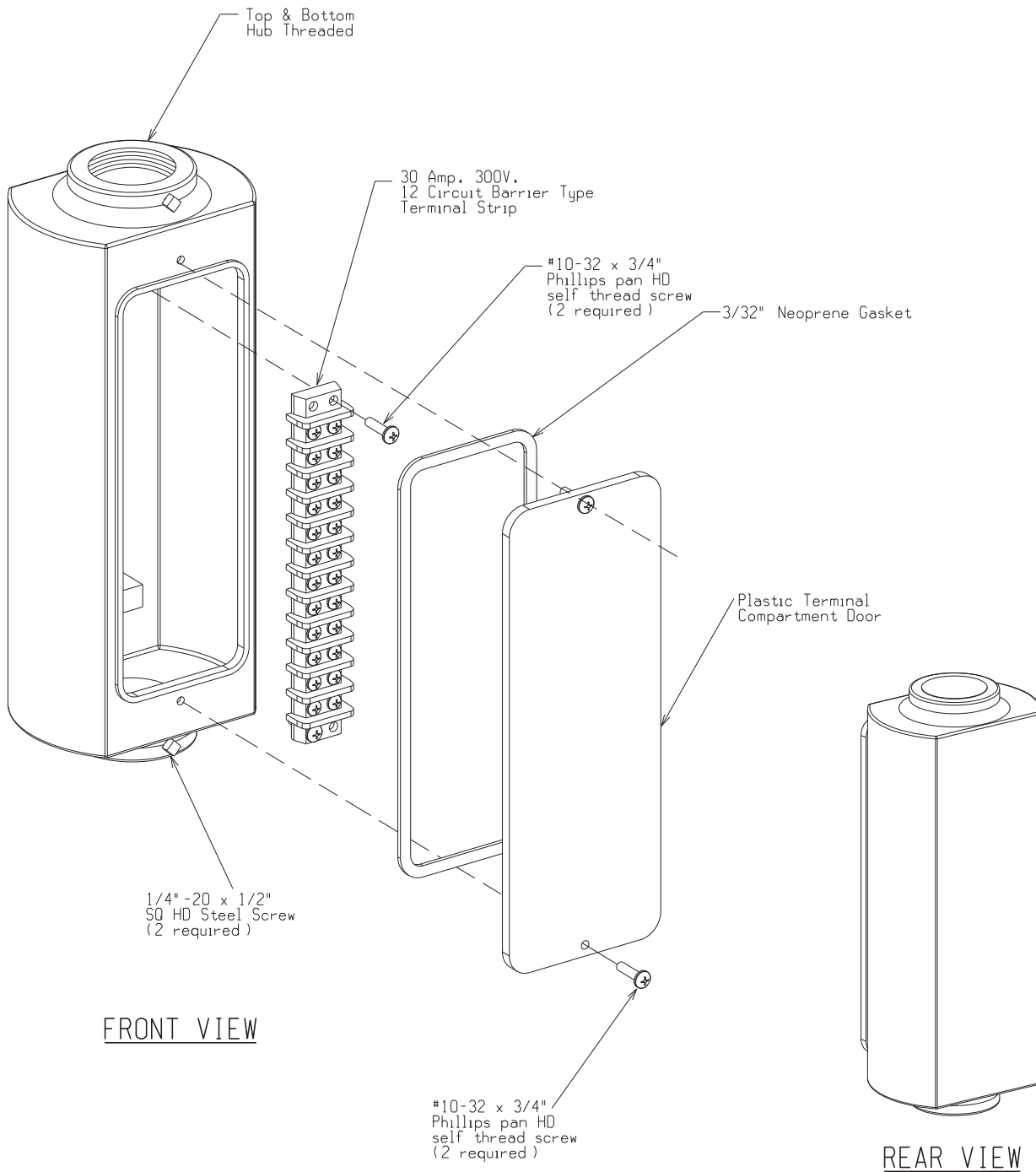
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

PLAN DATE

SIG-120-A

SHEET
2 of 3



CAST ALUMINUM COMPARTMENT DETAIL

NOTE: All hardware is stainless steel

NOT TO SCALE

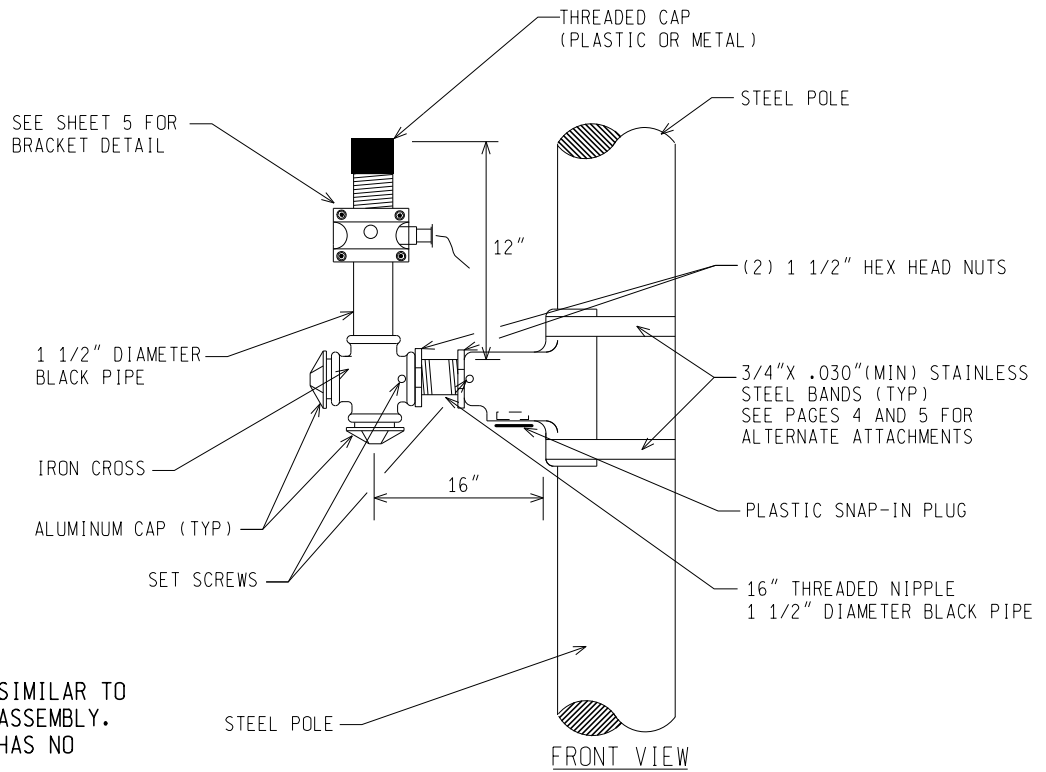
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

PLAN DATE

SIG-120-A

SHEET
3 of 3




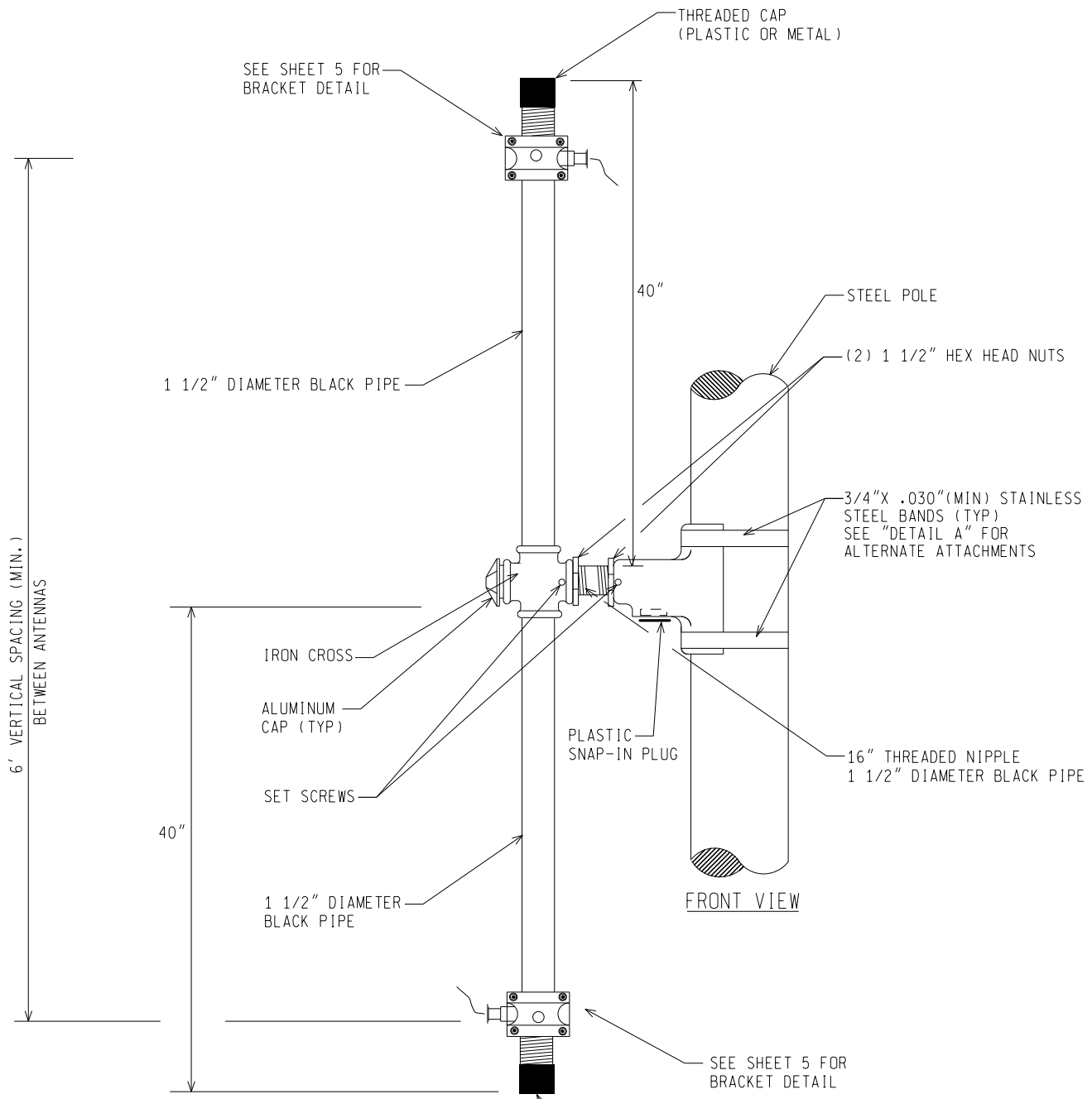
(*) NOTE:
 ANTENNA ATTACHMENT SIMILAR TO
 PED SIGNAL BRACKET ASSEMBLY.
 (FINISHED ASSEMBLY HAS NO
 THREADS EXPOSED.)

ANTENNA ATTACHMENT DETAIL (STEEL POLE)
FOR REMOTE LOCATION

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG130B.dgn Rev. 02/06/2018

 PREPARED BY TRAFFIC AND SAFETY	_____ ENGINEER OF DELIVERY	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR ANTENNA ATTACHMENT DETAIL	
	_____ ENGINEER OF DEVELOPMENT (SPECIAL DETAIL) FHWA APPROVAL DATE	_____ PLAN DATE	SIG-130-B

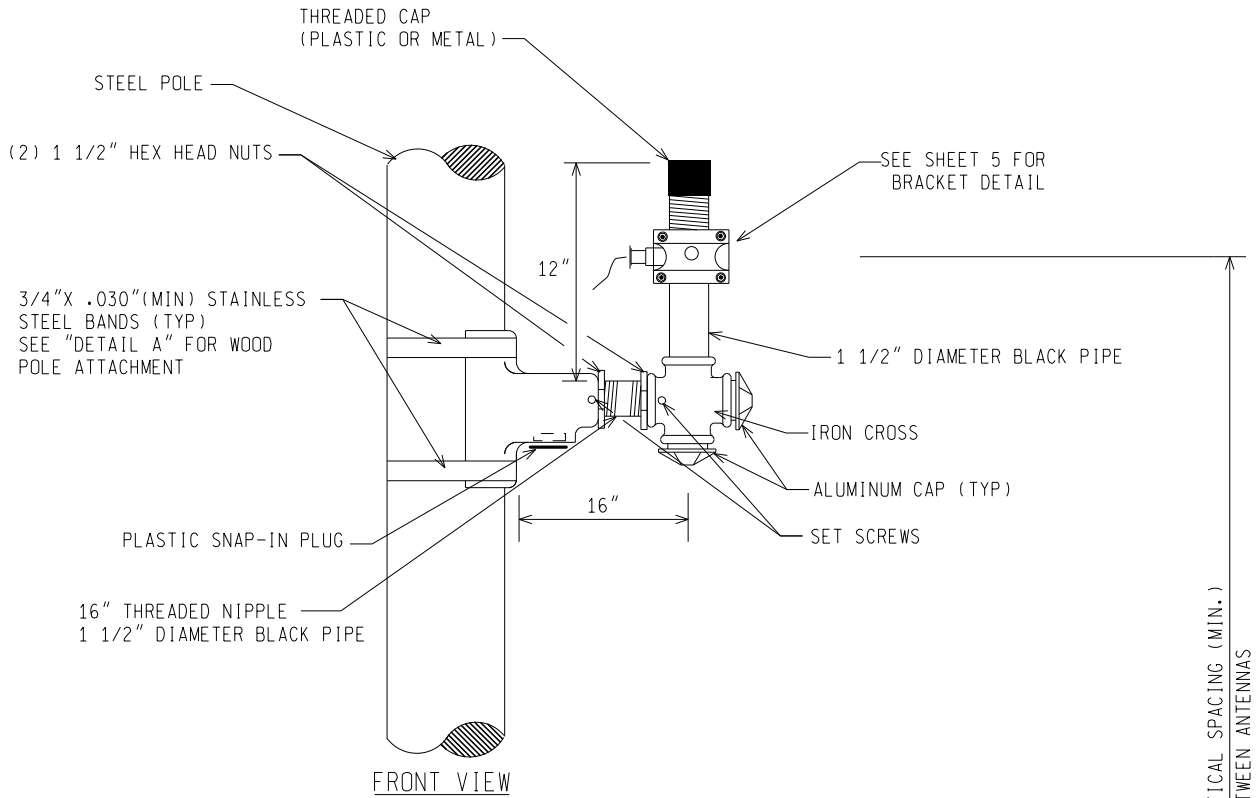


(* NOTE:
 ANTENNA ATTACHMENT SIMILAR TO
 PED SIGNAL BRACKET ASSEMBLY.
 (FINISHED ASSEMBLY HAS NO
 THREADS EXPOSED.)

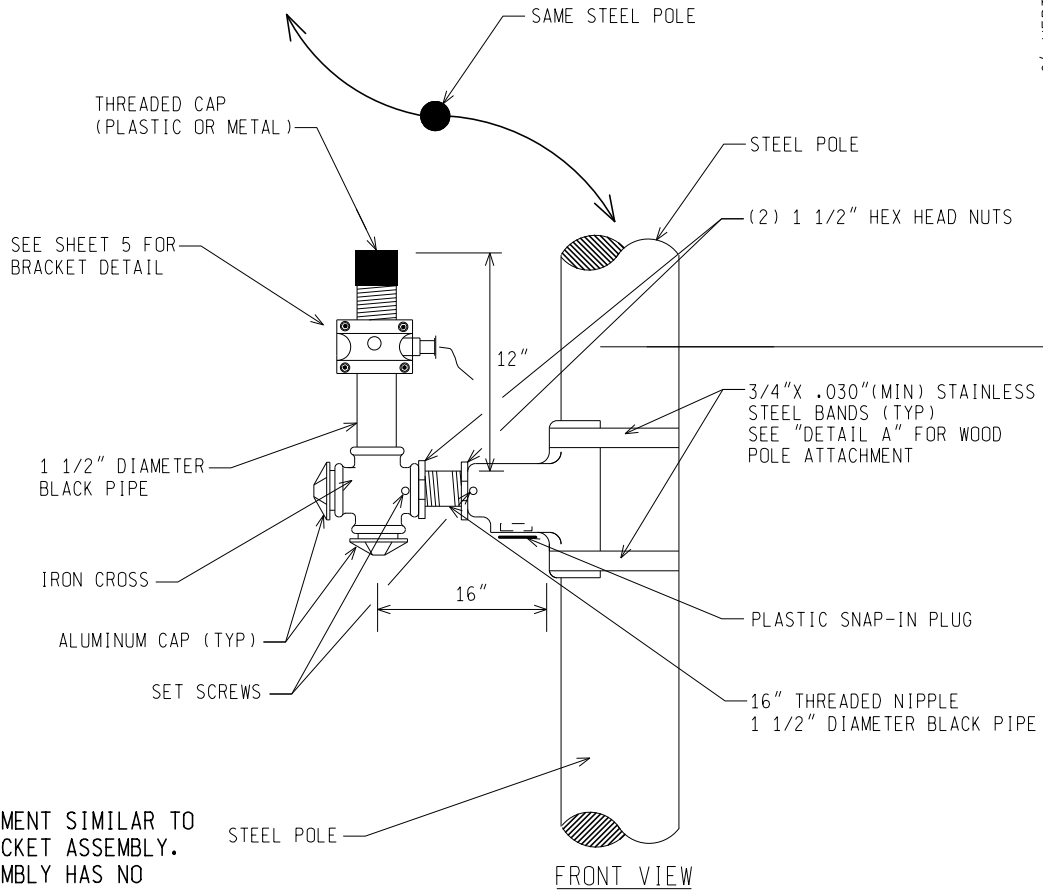
ANTENNA ATTACHMENT DETAIL (STEEL POLE)
FOR MASTER OR REPEATER LOCATION
 SINGLE BRACKET METHOD PREFERRED

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-130-B	SHEET 2 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG130B.dgn Rev. 02/06/18				



FRONT VIEW



FRONT VIEW

6' VERTICAL SPACING (MIN.)
BETWEEN ANTENNAS

(* NOTE:
ANTENNA ATTACHMENT SIMILAR TO
PED SIGNAL BRACKET ASSEMBLY.
(FINISHED ASSEMBLY HAS NO
THREADS EXPOSED.)

ANTENNA ATTACHMENT DETAIL (STEEL POLE)
FOR MASTER OR REPEATER LOCATION
USE WHEN 2 BRACKETS ARE REQUIRED

NOT TO SCALE

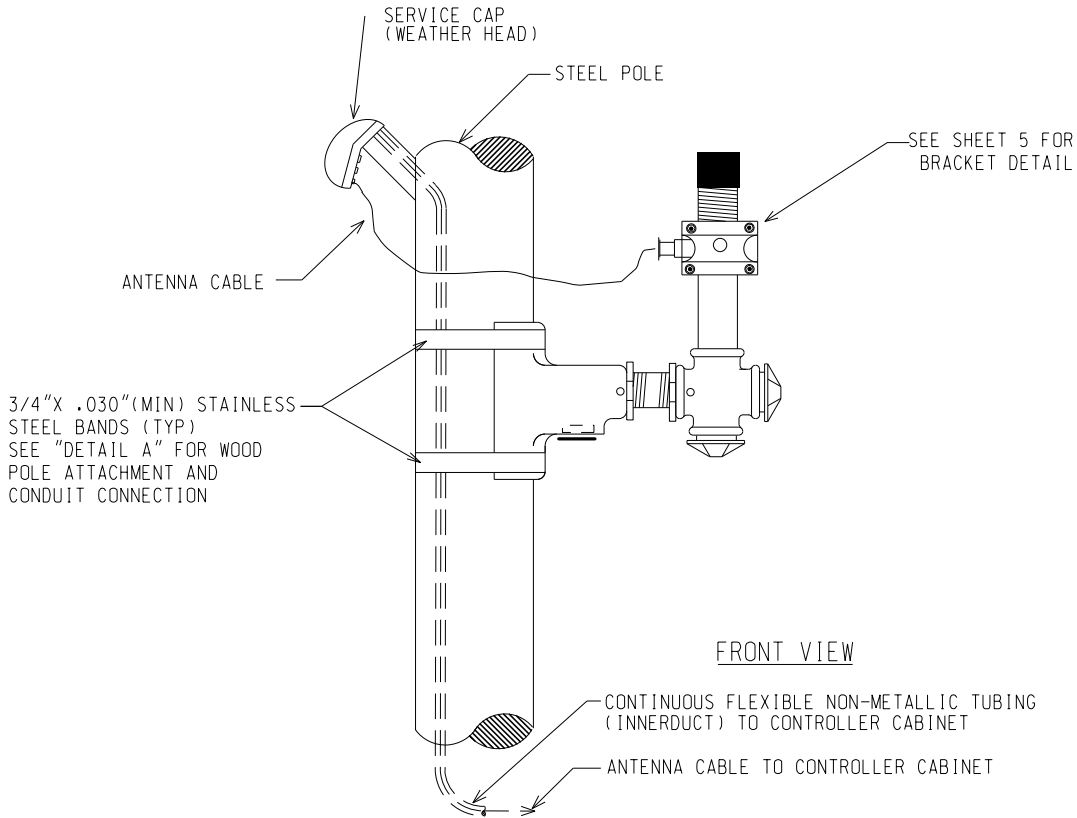
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

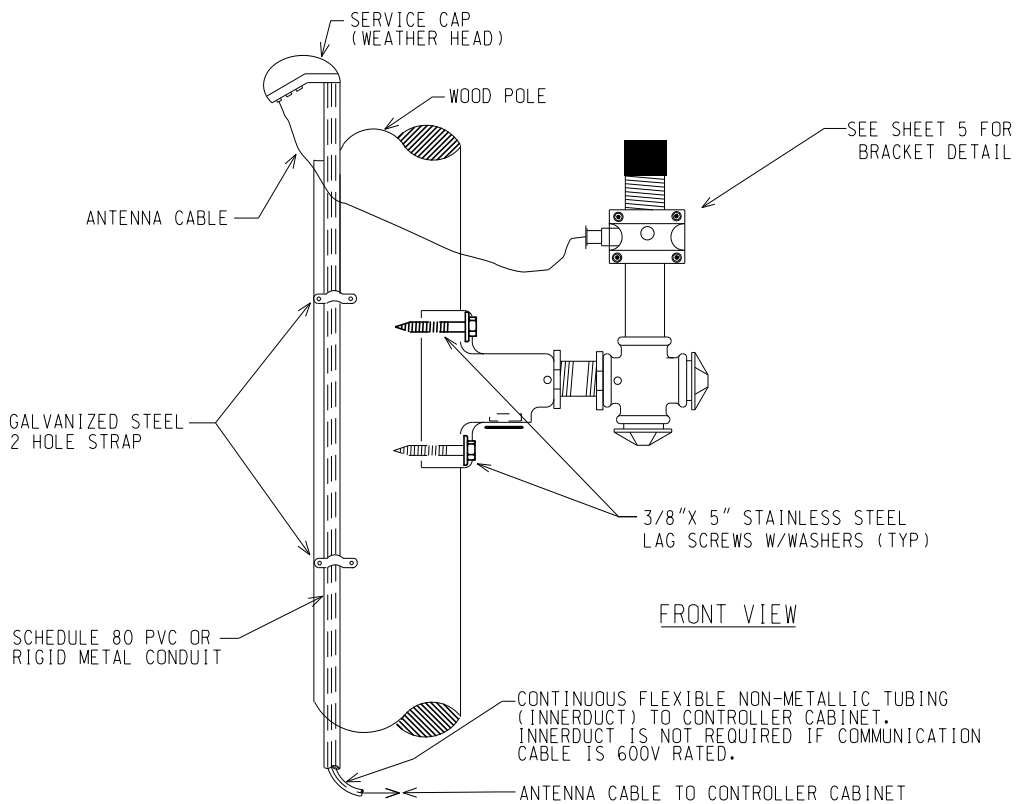
PLAN DATE

SIG-130-B

SHEET
3 of 6



ANTENNA ATTACHMENT DETAIL (STEEL POLE)



ANTENNA ATTACHMENT DETAIL (WOOD POLE)

NOT TO SCALE

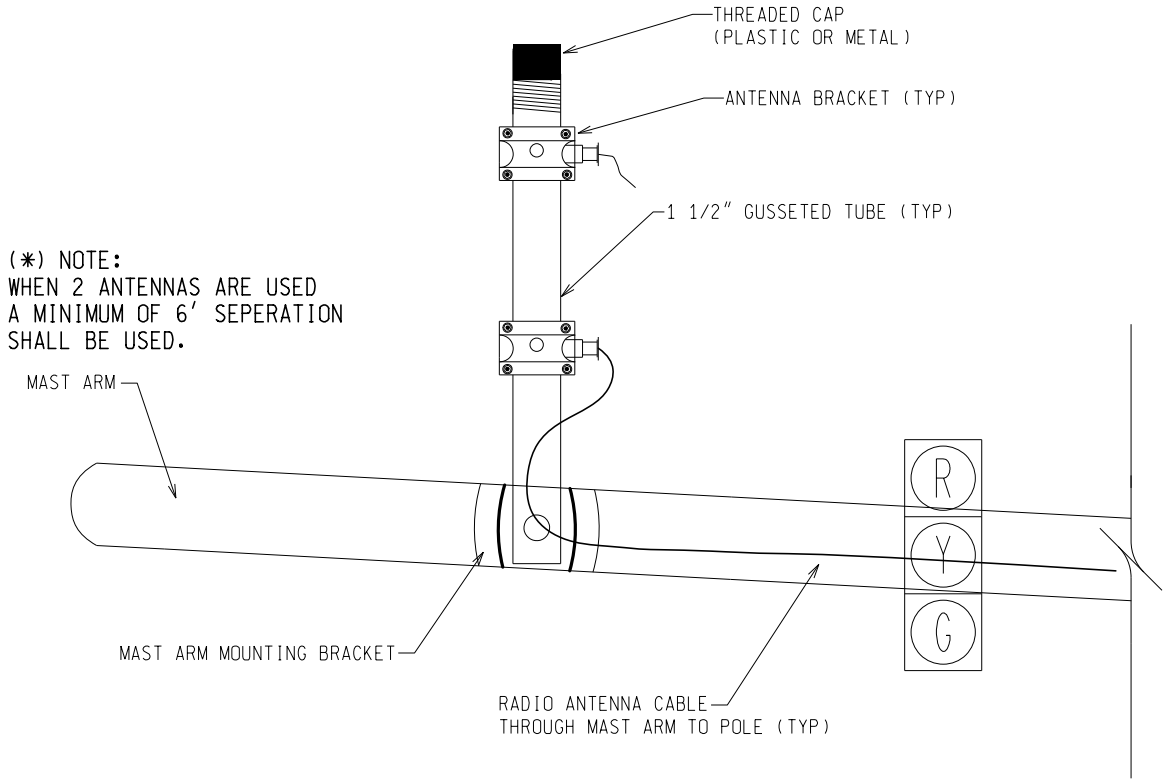
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

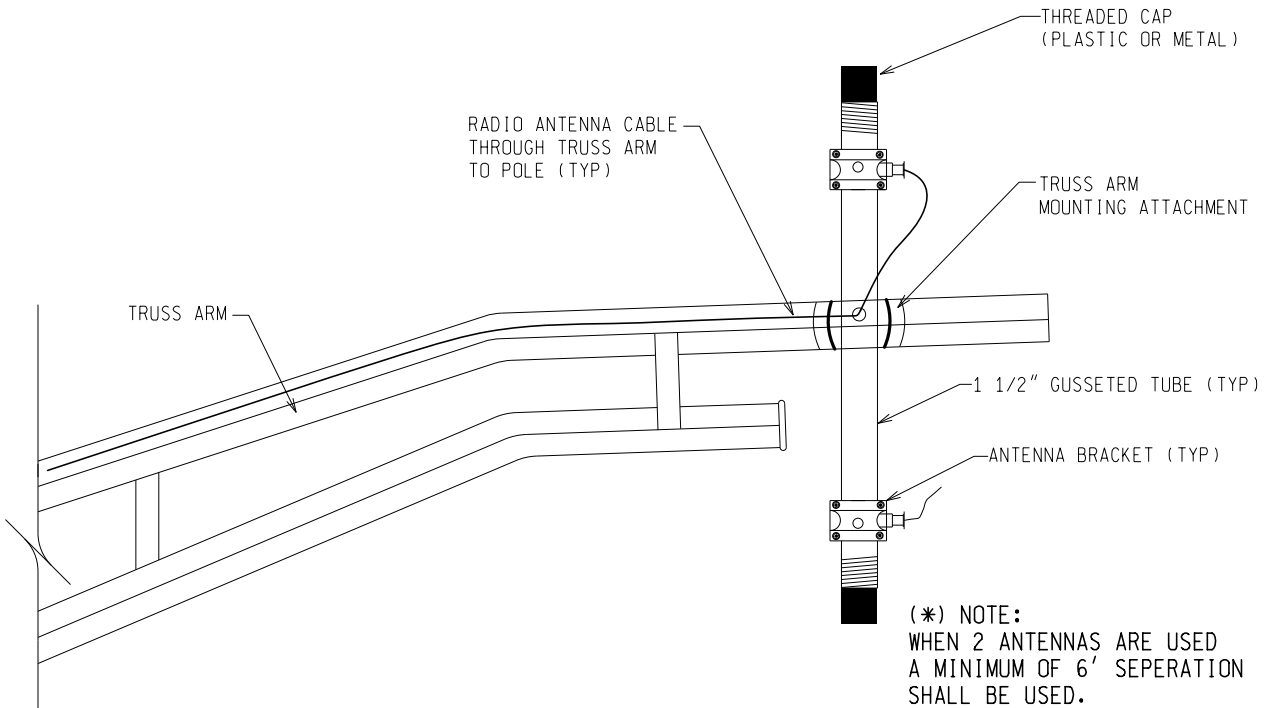
PLAN DATE

SIG-130-B

SHEET
4 of 6



ANTENNA ATTACHMENT DETAIL (MAST ARM)



ANTENNA ATTACHMENT DETAIL (TRUSS ARM)

NOT TO SCALE

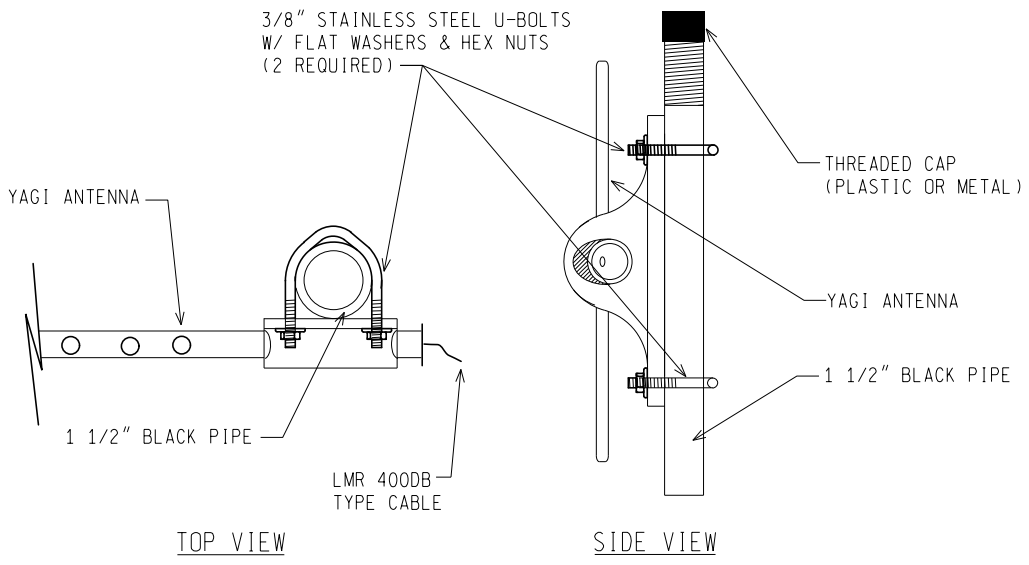
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

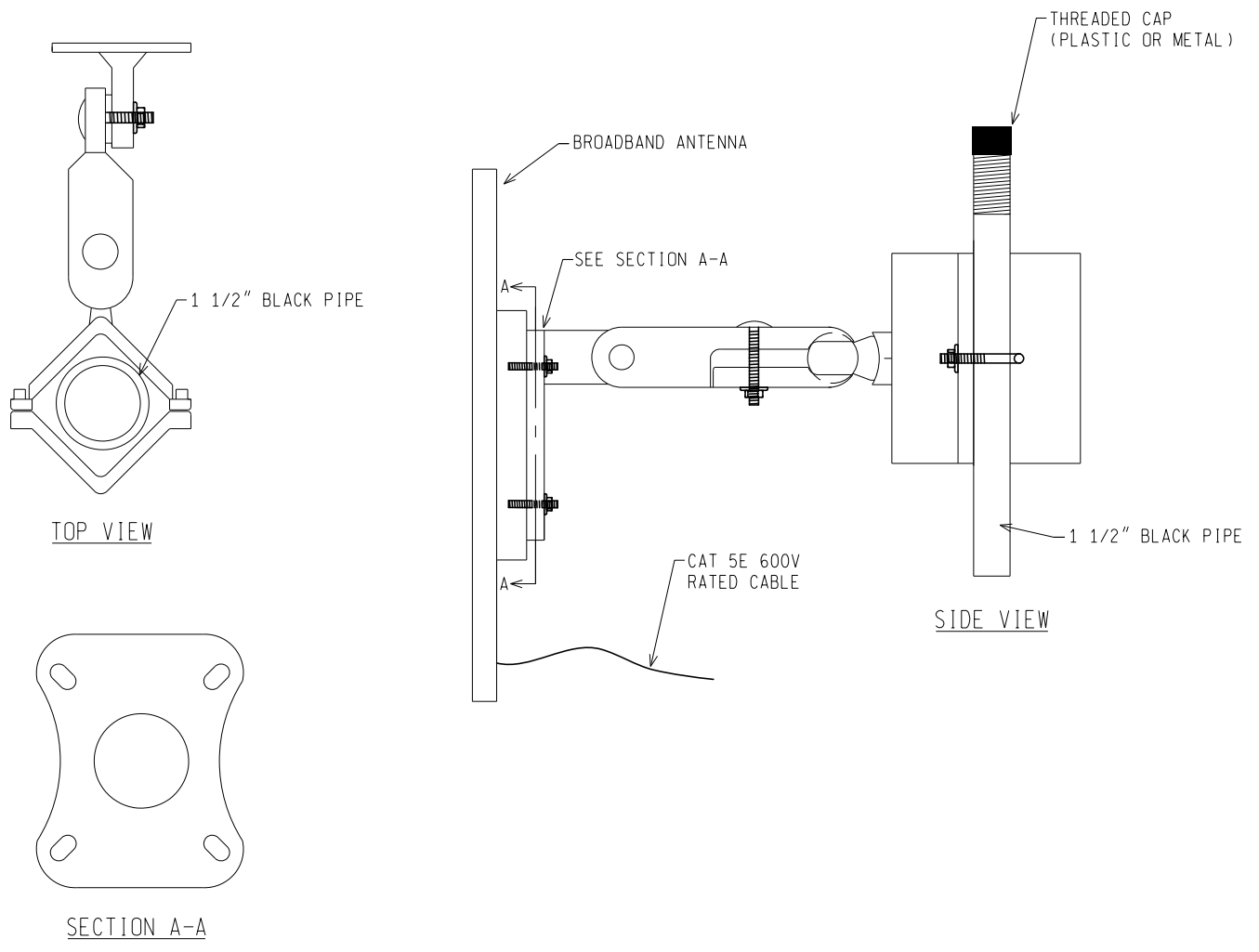
PLAN DATE

SIG-130-B

SHEET
5 of 6



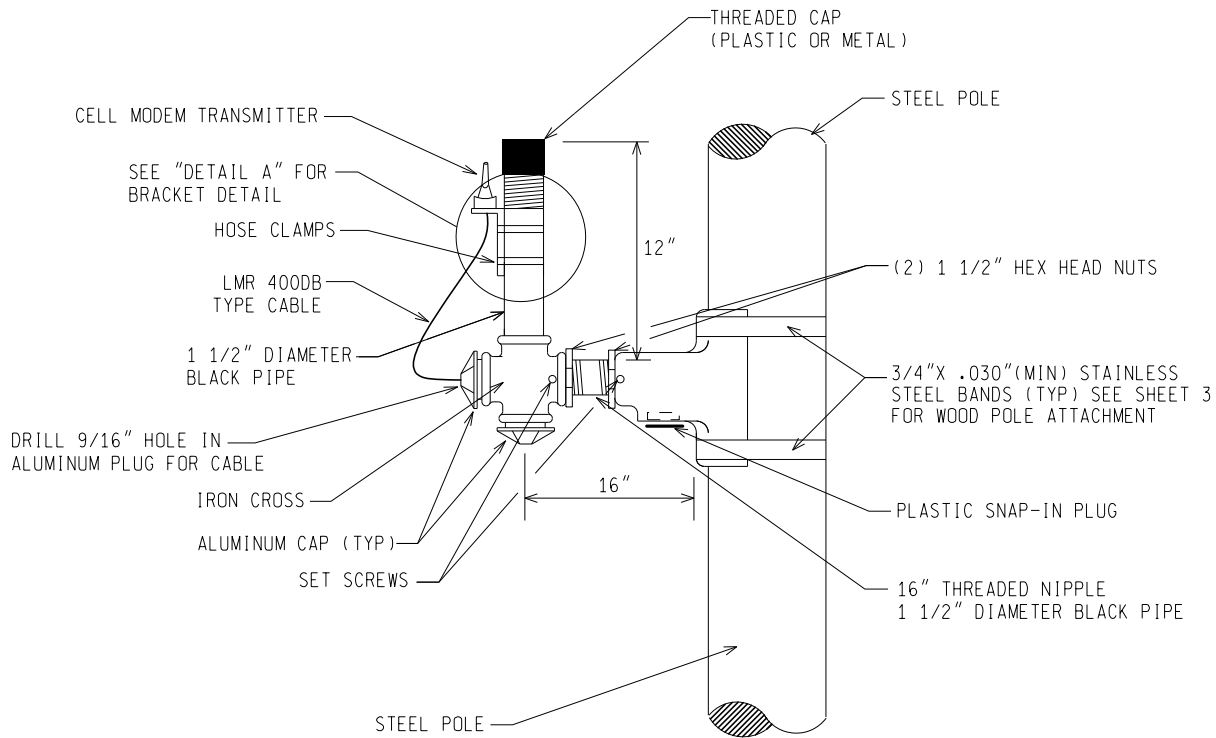
YAGI ANTENNA BRACKET ATTACHMENT DETAIL



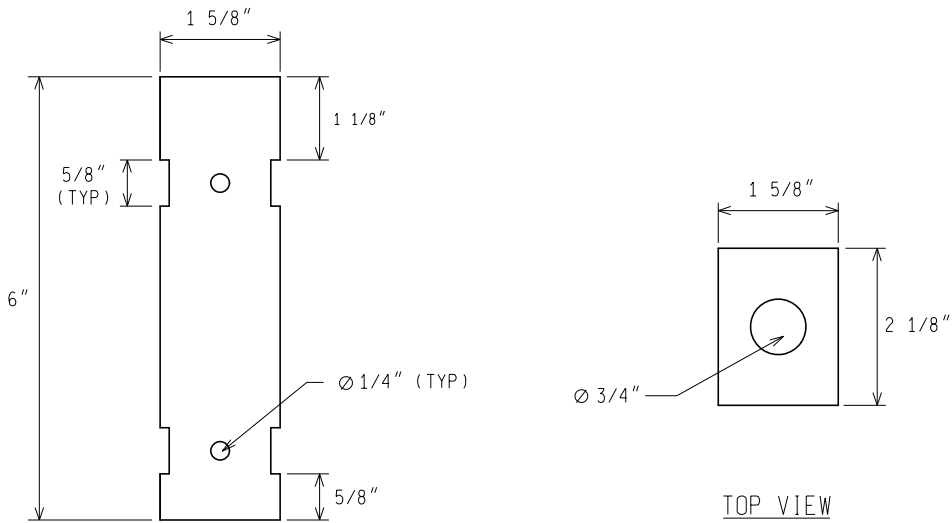
BROADBAND ANTENNA BRACKET ATTACHMENT DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-130-B	SHEET 6 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG130B.dgn Rev. 02/06/18				



**ANTENNA ATTACHMENT DETAIL (STEEL POLE)
FOR CELL MODEM TRANSMITTER**



FRONT VIEW

TOP VIEW

CELL MODEM TRANSMITTER BRACKET DETAIL "A"

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG131A.dgn Rev.



PREPARED BY
TRAFFIC AND SAFETY

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

DRAWN BY: DSP

(SPECIAL DETAIL)

CHECKED BY:

FHWA APPROVAL DATE

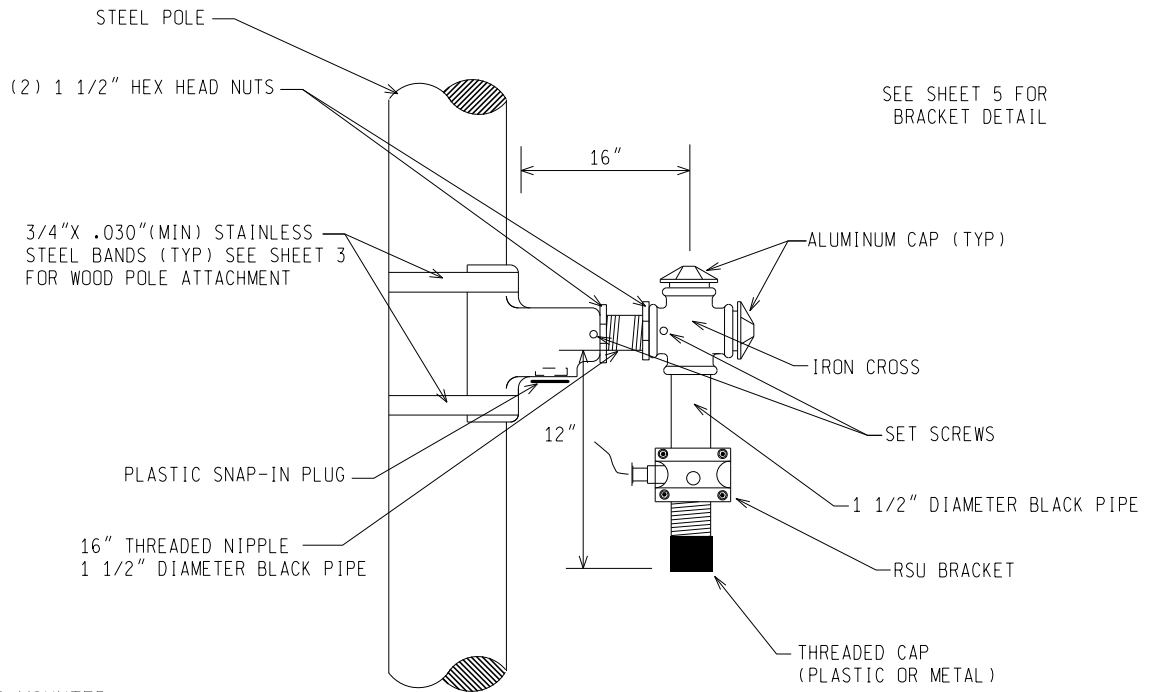
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**CELL MODEM AND RSU
ATTACHMENT DETAIL**

02/06/18
PLAN DATE

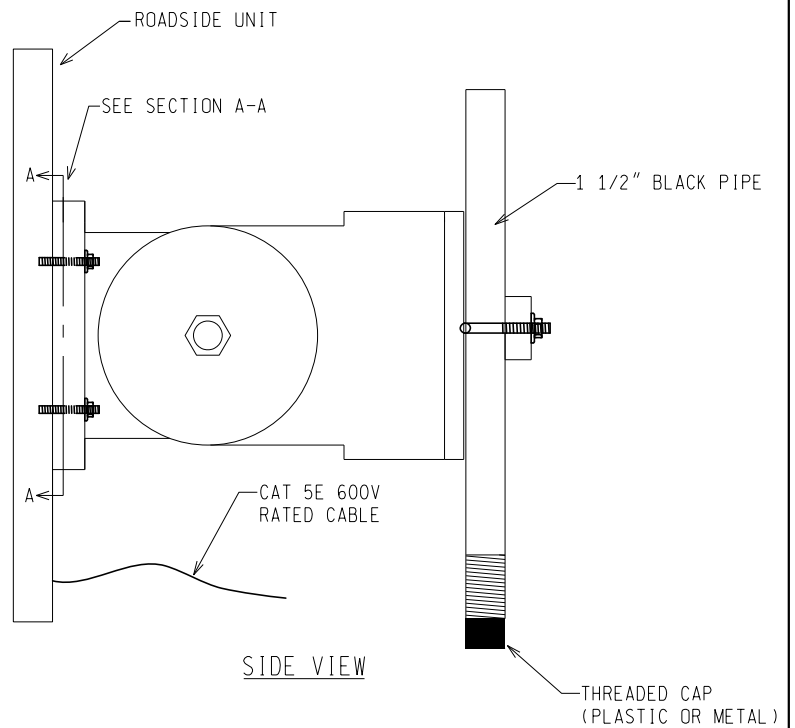
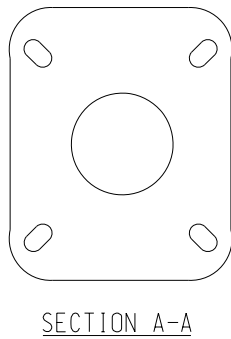
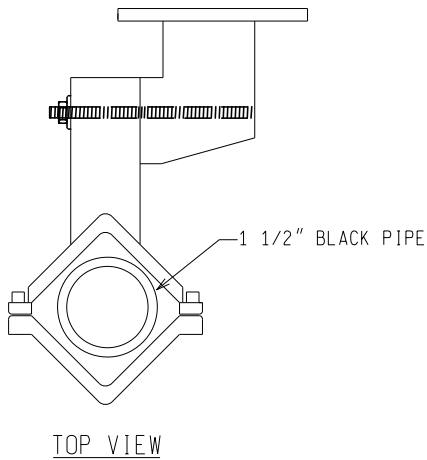
SIG-131-A

SHEET
1 of 3



(*) NOTE:
RSU SHALL BE MOUNTED
BETWEEN 19' AND 25'

ANTENNA ATTACHMENT DETAIL (STEEL POLE)
FOR CELL MODEM TRANSMITTER



NOT TO SCALE

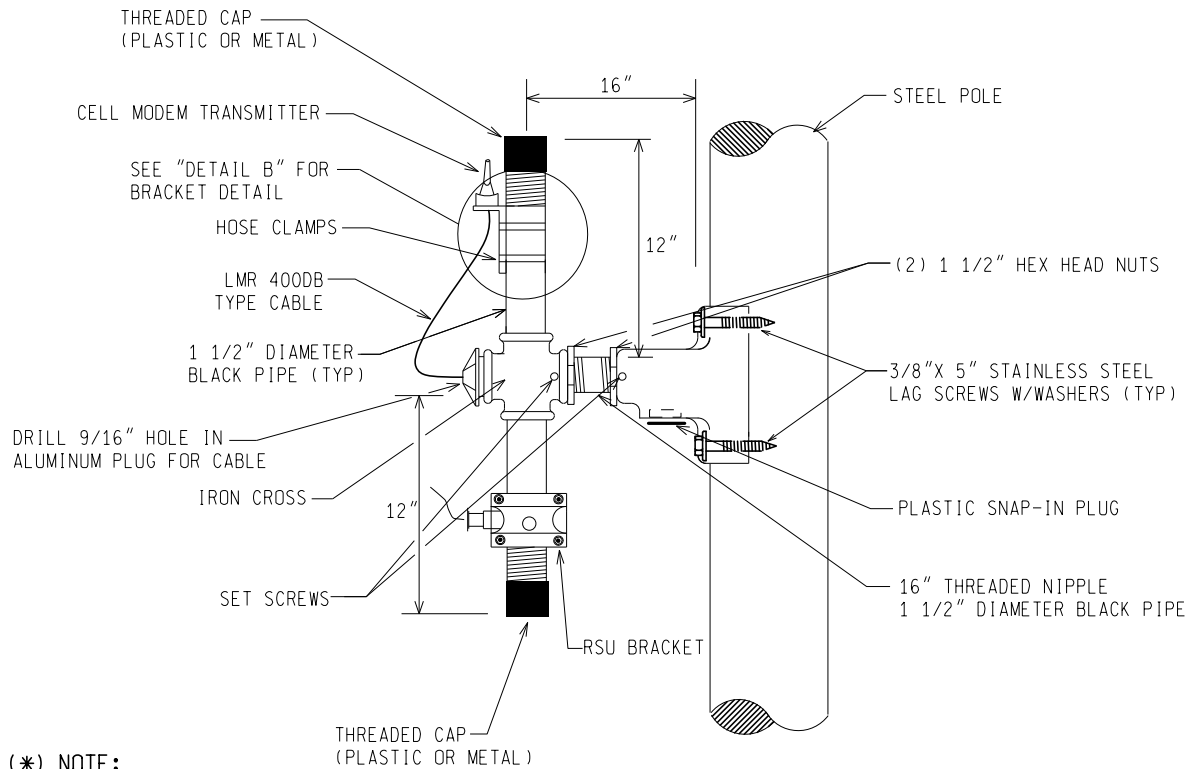
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

02/06/18
PLAN DATE

SIG-131-A

SHEET
2 of 3



(*) NOTE:
RSU SHALL BE MOUNTED
BETWEEN 19' AND 25'

ANTENNA ATTACHMENT DETAIL (WOOD POLE)
FOR CELL MODEM TRANSMITTER AND RSU COMBO

NOT TO SCALE

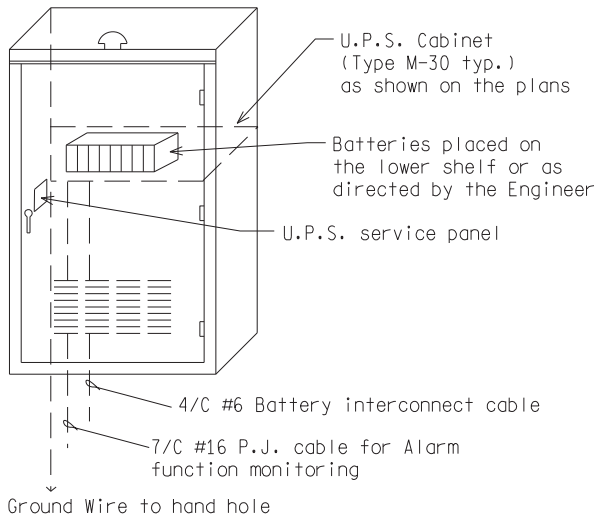
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

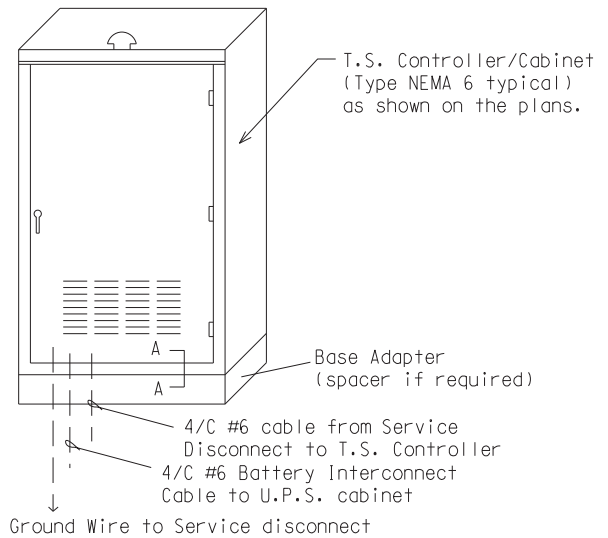
02/06/18
PLAN DATE

SIG-131-A

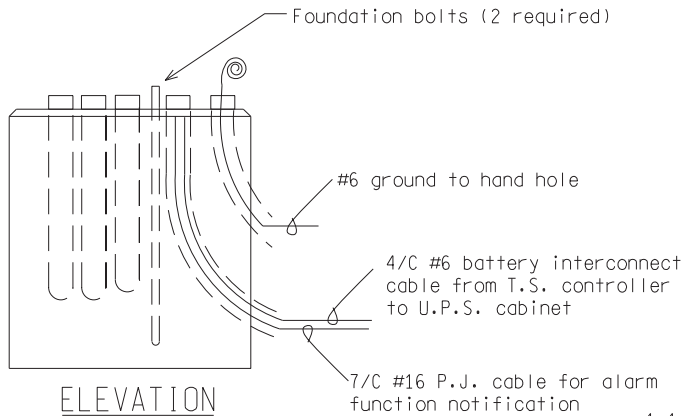
SHEET
3 of 3



U.P.S. CABINET BASE MOUNTED



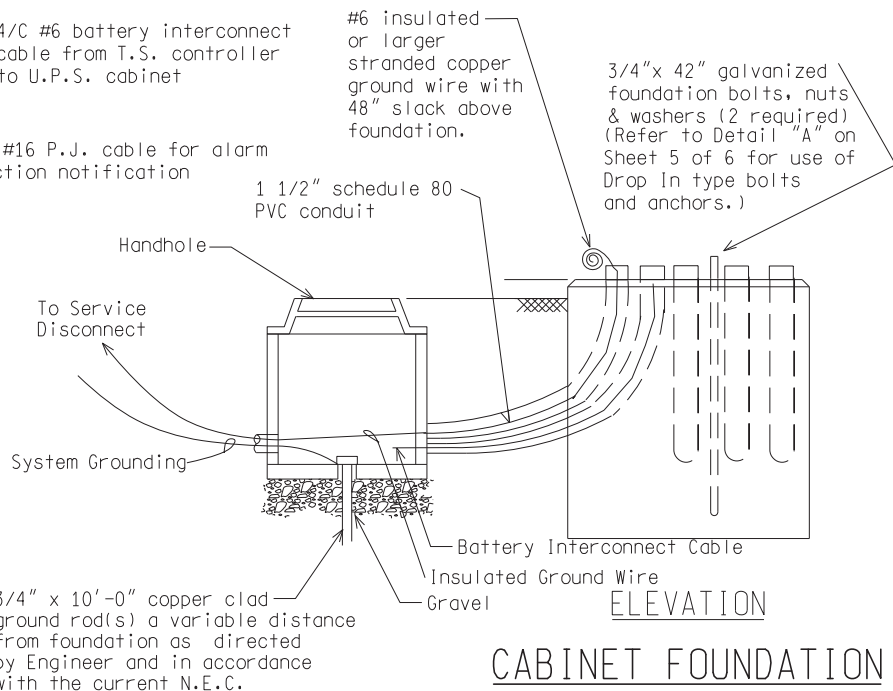
TRAFFIC SIGNAL CONTROLLER/CABINET BASE MOUNTED



CABINET FOUNDATION

NOTE:

1. Refer to SIG-011-A for Controller Cabinet Mounting on Steel or Wood Pole
2. Refer to SIG-045-A for T.S. Base Mounted Controller Cabinet foundations.
3. Refer to SIG-153-A for strain pole foundation details.



CABINET FOUNDATION

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG140A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY:

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

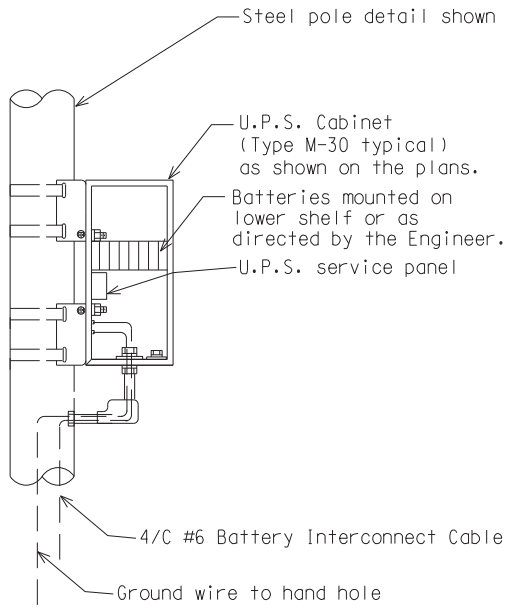
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

TRAFFIC SIGNAL
UNINTERRUPTIBLE POWER SYSTEM

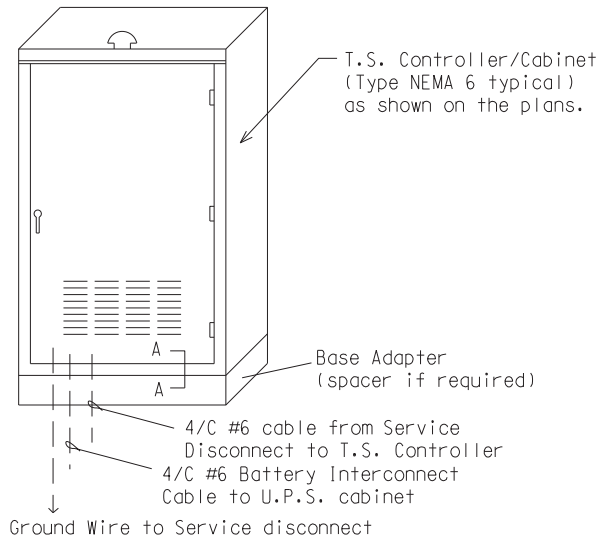
PLAN DATE

SIG-140-A

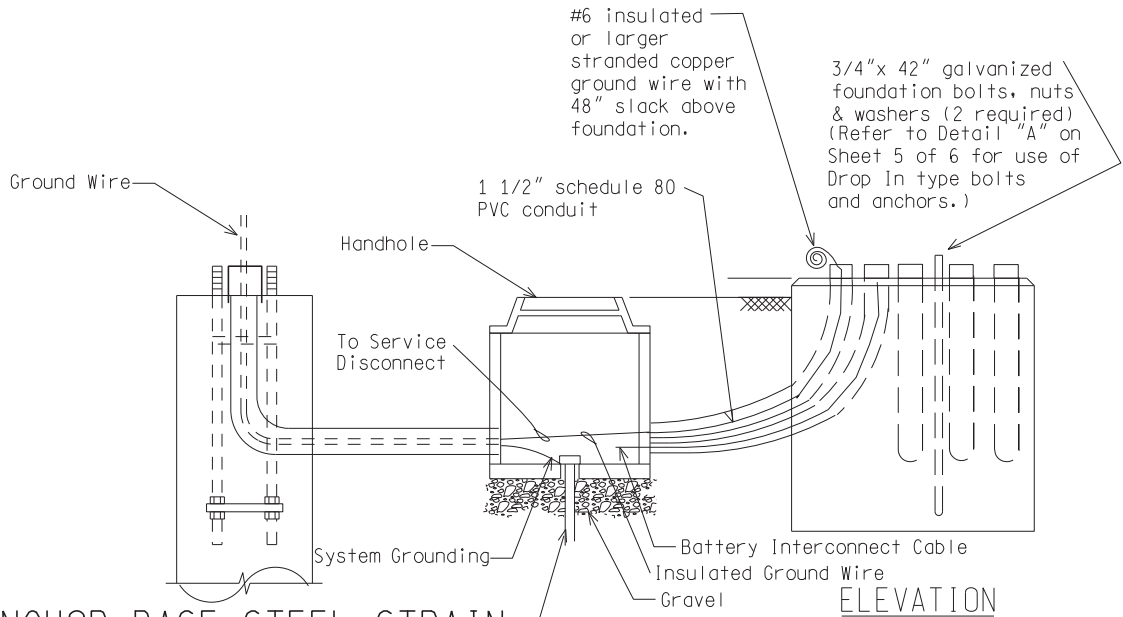
SHEET
1 of 2



U.P.S. CABINET
POLE MOUNTED



TRAFFIC SIGNAL CONTROLLER/
CABINET BASE MOUNTED



ANCHOR BASE STEEL STRAIN
POLE FOUNDATION

CABINET FOUNDATION

3/4" x 10'-0" copper clad ground rod(s) a variable distance from foundation as directed by Engineer and in accordance with the current N.E.C.

NOT TO SCALE

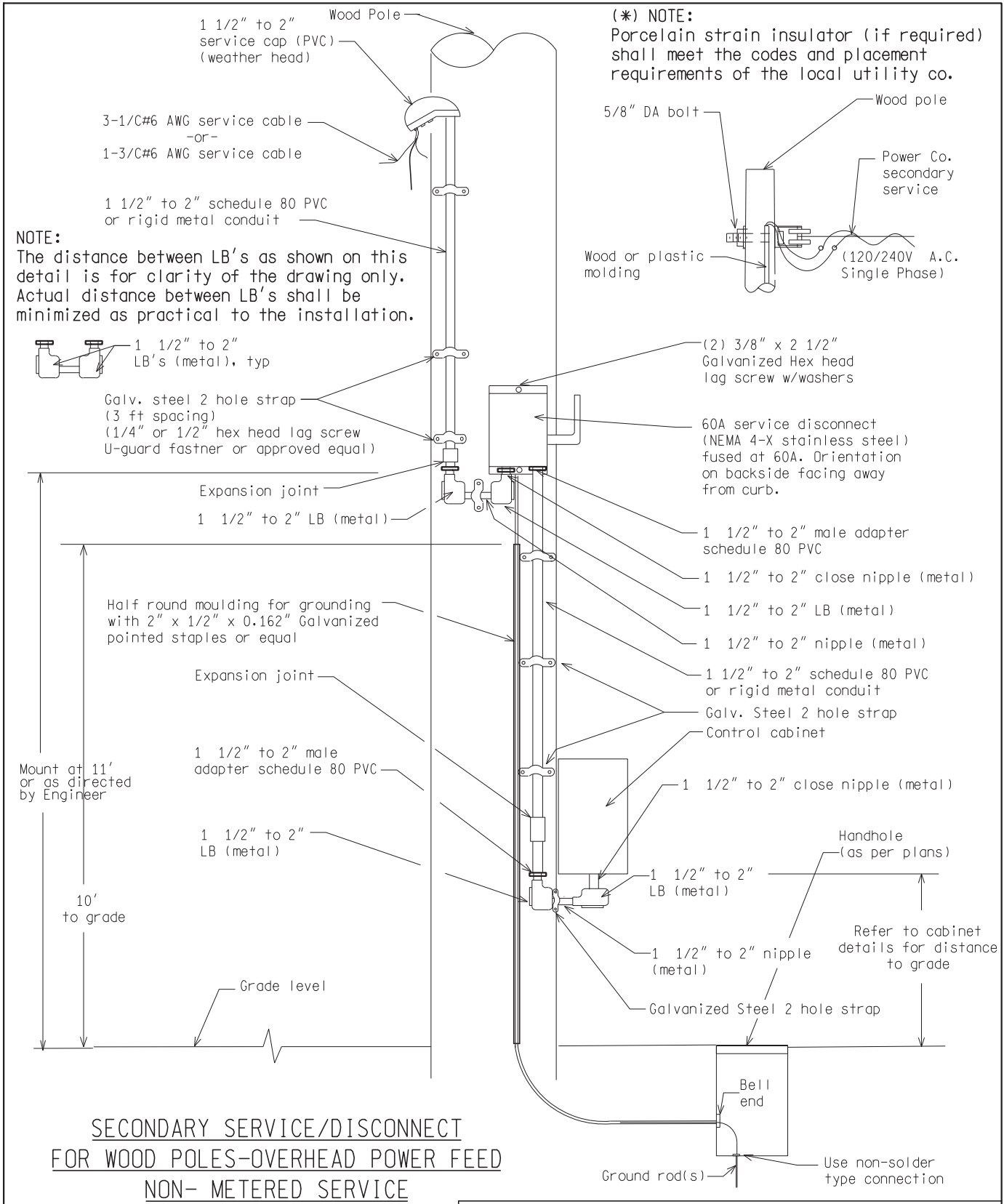
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-140-A

SHEET
2 of 2



**SECONDARY SERVICE/DISCONNECT
FOR WOOD POLES-OVERHEAD POWER FEED
NON- METERED SERVICE**

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG200A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**SECONDARY SERVICE/DISCONNECT
FOR WOOD POLES**

PLAN DATE

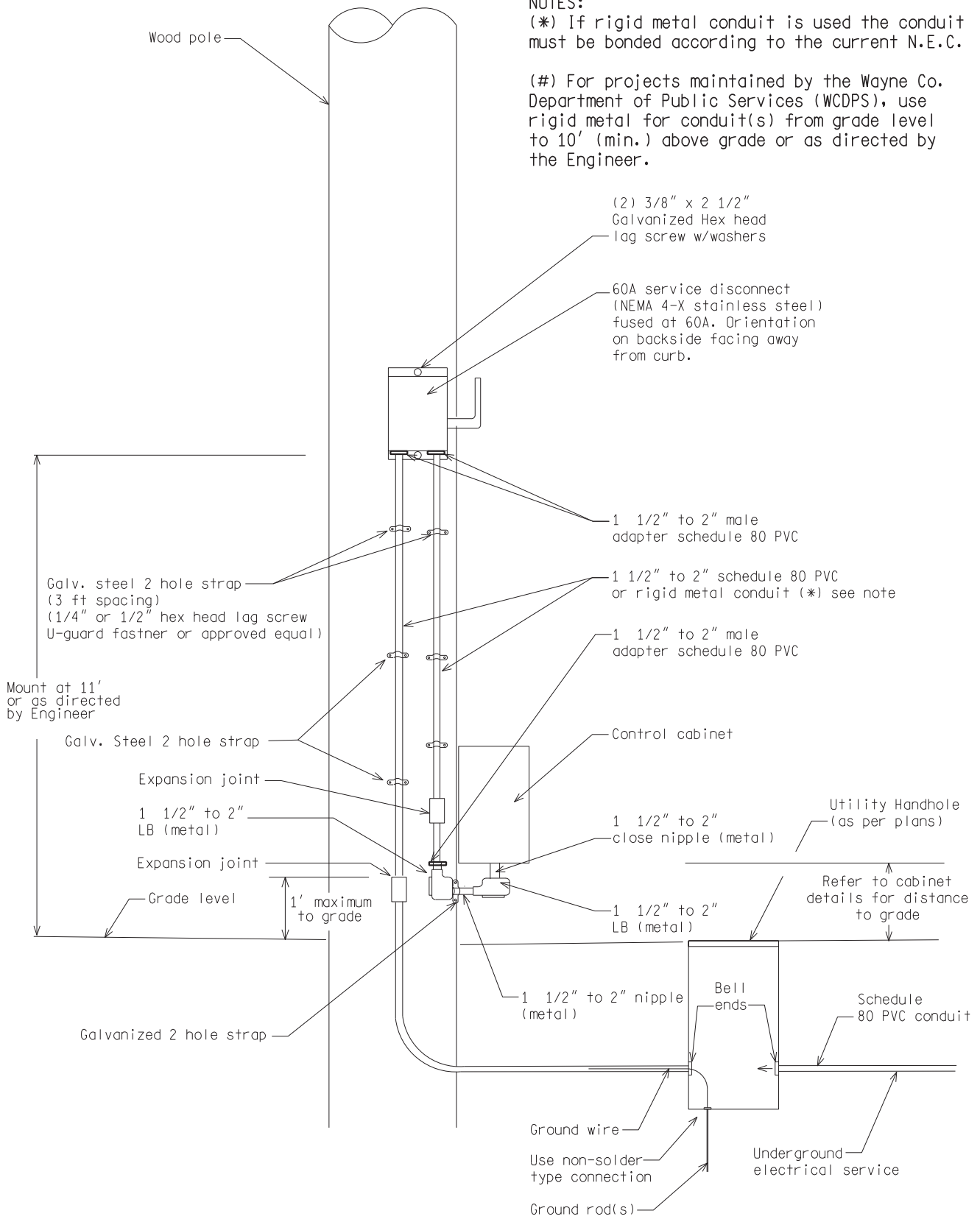
SIG-200-A

SHEET
1 of 4

NOTES:

(*) If rigid metal conduit is used the conduit must be bonded according to the current N.E.C.

(#) For projects maintained by the Wayne Co. Department of Public Services (WCDPS), use rigid metal for conduit(s) from grade level to 10' (min.) above grade or as directed by the Engineer.



**SECONDARY SERVICE/DISCONNECT FOR
WOOD POLES-UNDERGROUND POWER FEED
NON-METERED SERVICE**

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-200-A

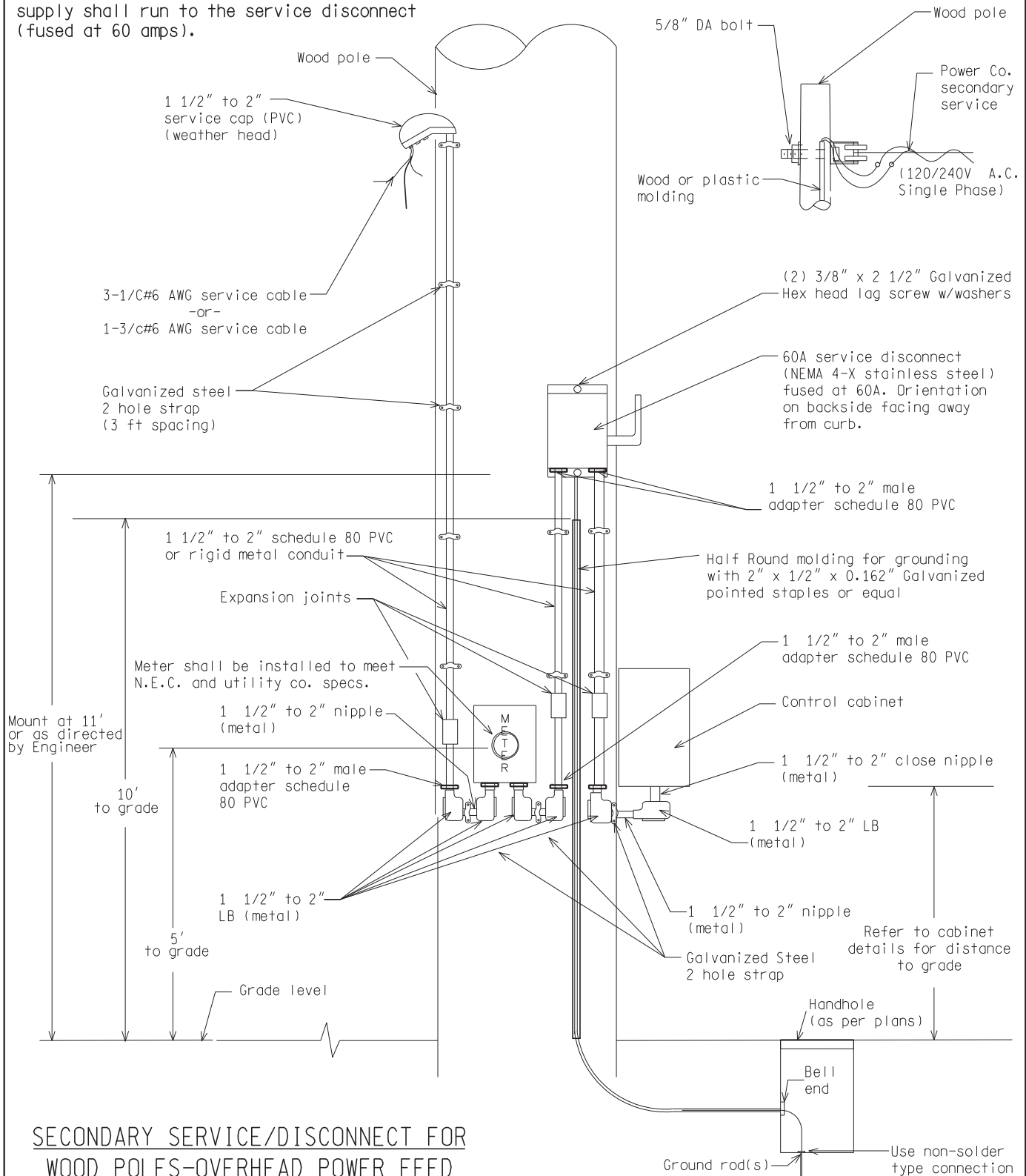
SHEET
2 of 4

(*) NOTE:

This detail is illustrated as a metered installation. If the plans call for an un-metered installation, then the meter shall be omitted and a direct electrical supply shall run to the service disconnect (fused at 60 amps).

(*) NOTE:

Porcelain strain insulator (if required) shall meet the codes and placement requirements of the local utility co.



SECONDARY SERVICE/DISCONNECT FOR WOOD POLES-OVERHEAD POWER FEED METERED SERVICE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

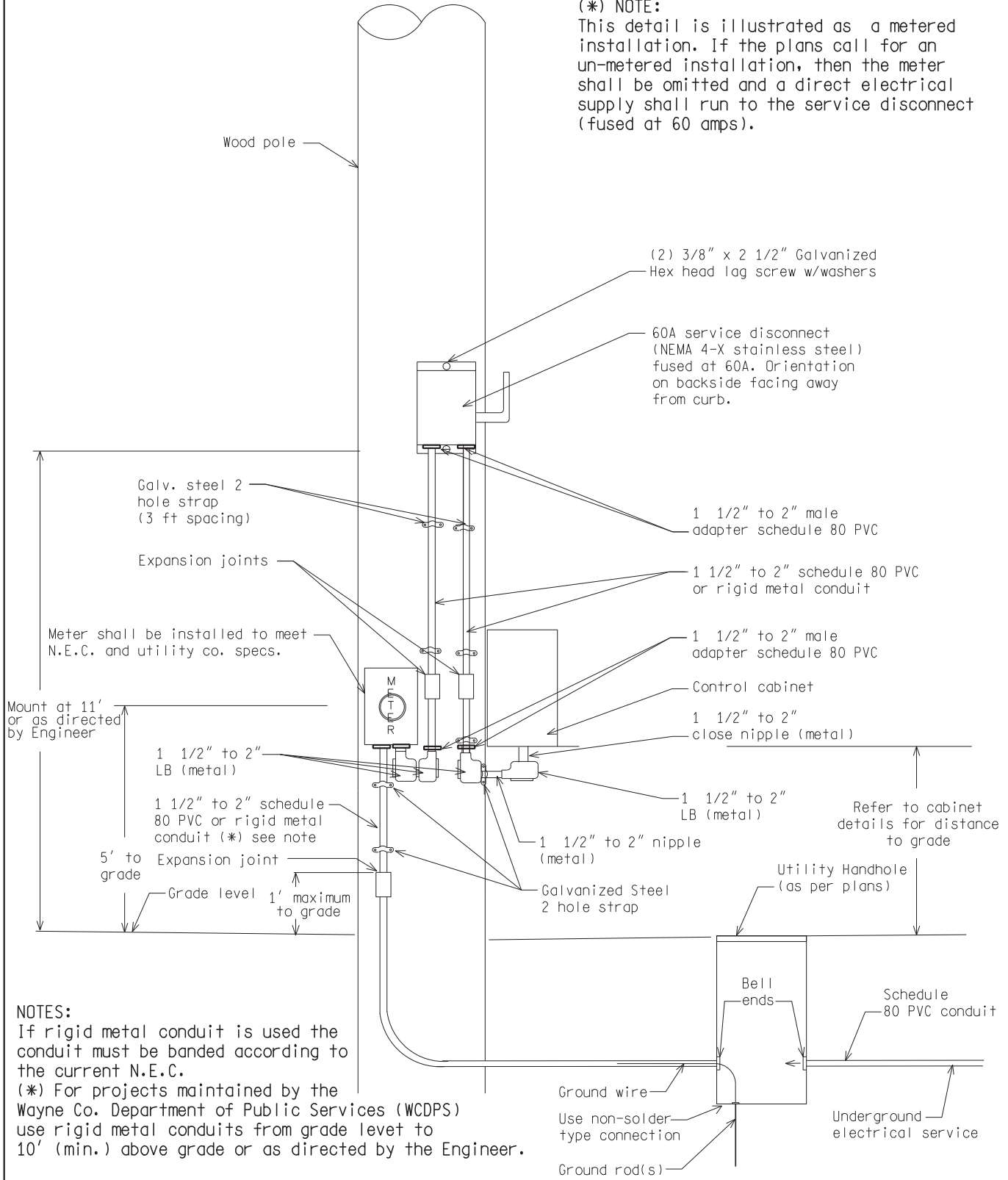
(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-200-A

SHEET
3 of 4

(*) NOTE:
 This detail is illustrated as a metered installation. If the plans call for an un-metered installation, then the meter shall be omitted and a direct electrical supply shall run to the service disconnect (fused at 60 amps).

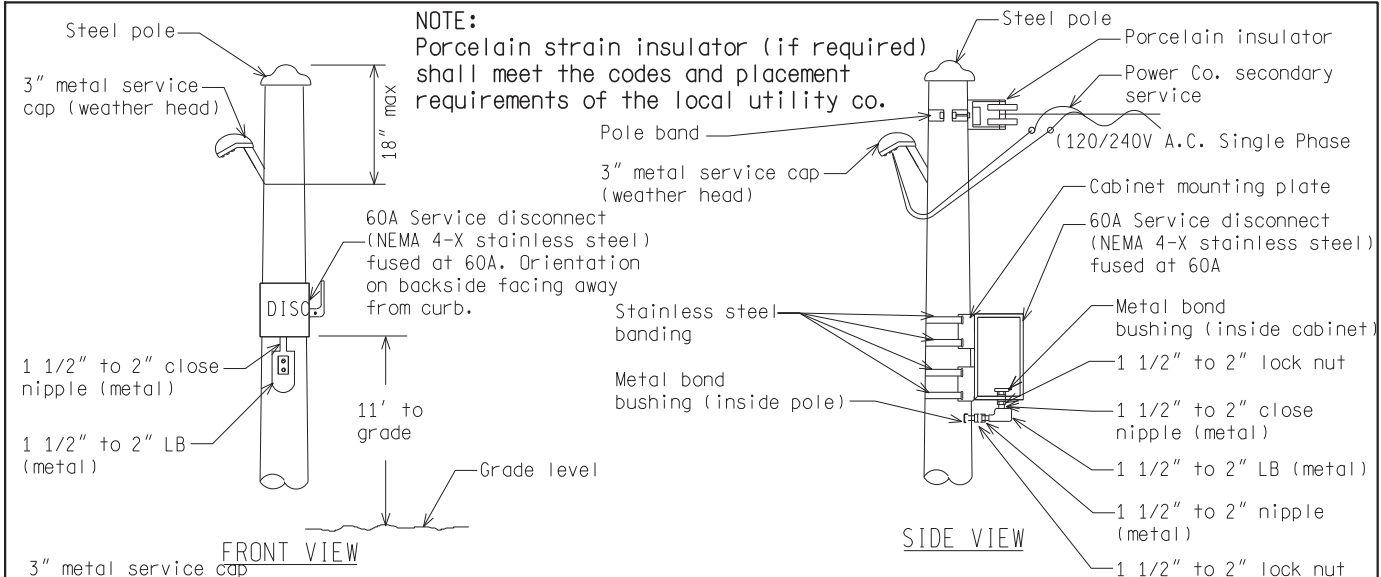


NOTES:
 If rigid metal conduit is used the conduit must be banded according to the current N.E.C.
 (*) For projects maintained by the Wayne Co. Department of Public Services (WCDPS) use rigid metal conduits from grade level to 10' (min.) above grade or as directed by the Engineer.

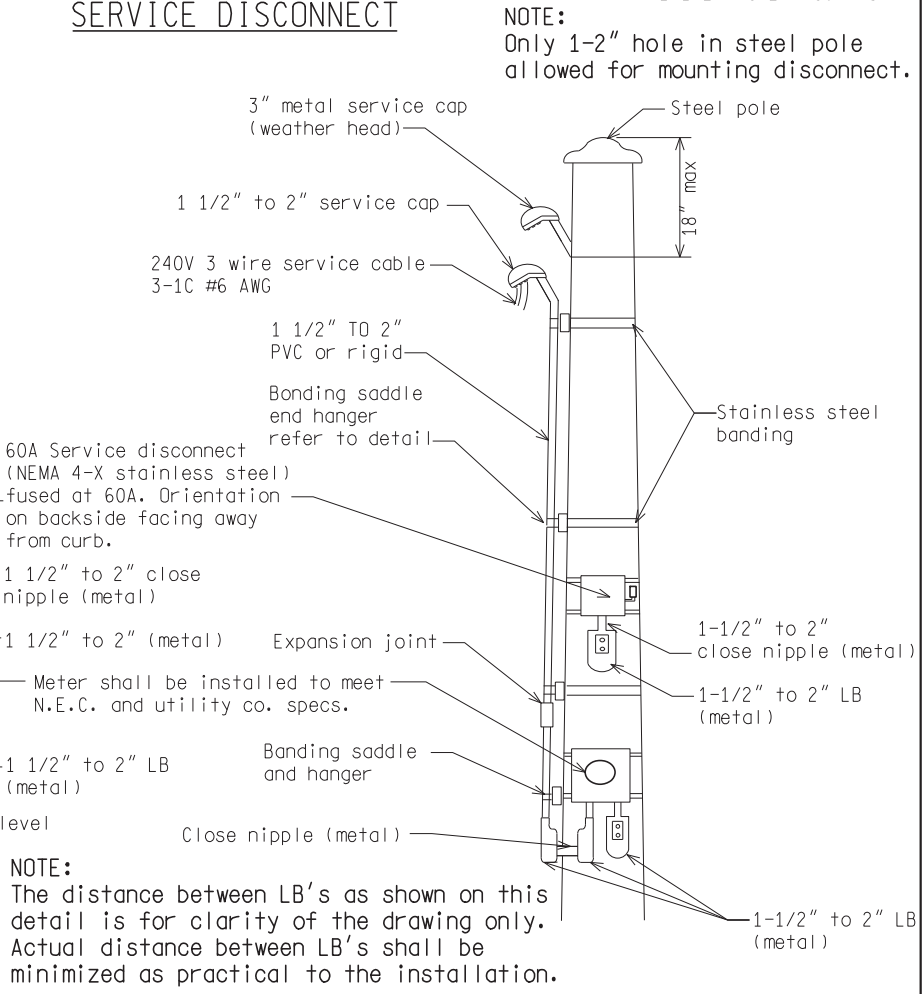
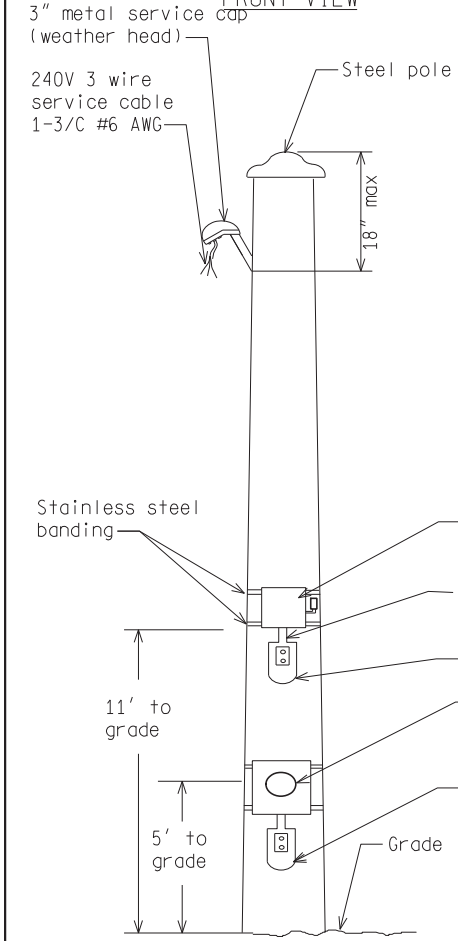
SECONDARY SERVICE/DISCONNECT FOR WOOD POLES-UNDERGROUND POWER FEED
METERED SERVICE

NOT TO SCALE

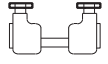
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-200-A	SHEET 4 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG200A.dgn Rev. 02/16/17				



SERVICE DISCONNECT



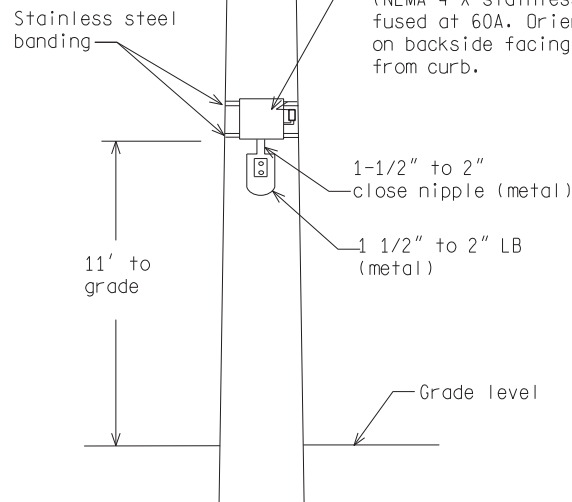
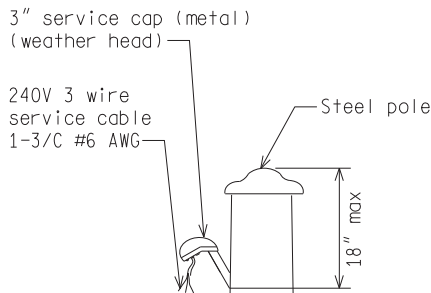
METERED SERVICE WITH 1-3/C #6 AWG SERVICE CABLE



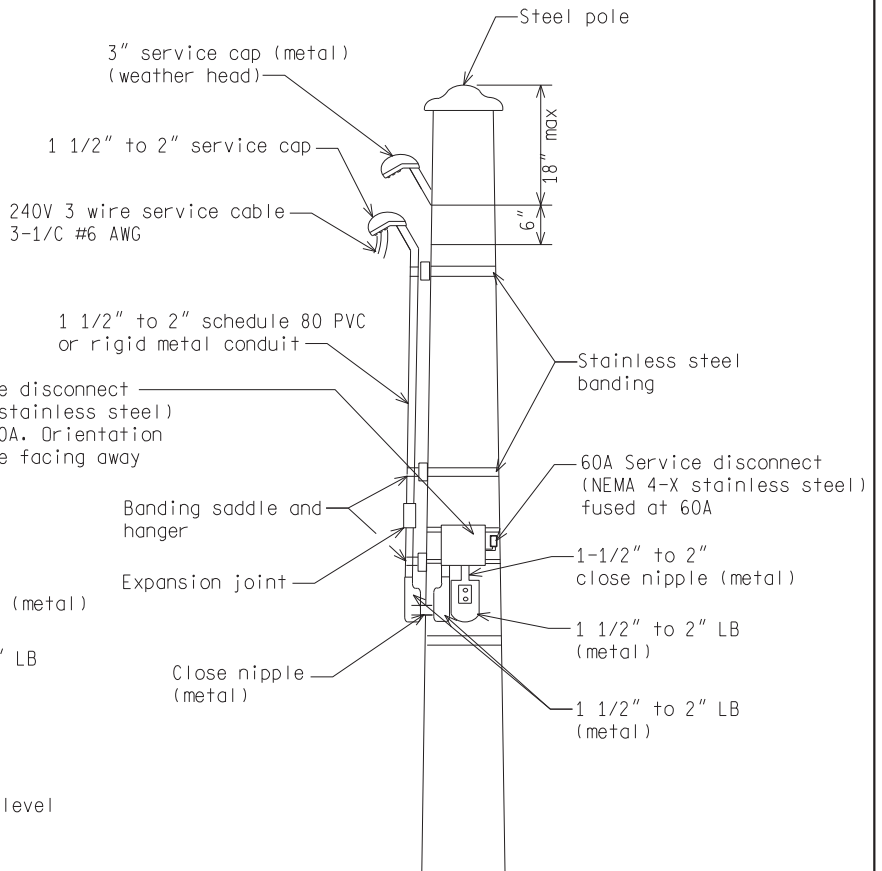
METERED SERVICE WITH 3-1/C #6 AWG SERVICE CABLE

NOT TO SCALE File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG201A.dgn Rev: 02/16/17

<p>PREPARED BY TRAFFIC AND SAFETY</p> <p>DRAWN BY: DJF</p> <p>CHECKED BY:</p>	<p>ENGINEER OF DELIVERY</p> <hr/> <p>ENGINEER OF DEVELOPMENT</p>	<p>MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR</p> <p>SECONDARY SERVICE/DISCONNECT FOR STEEL POLES</p>	
	<p>(SPECIAL DETAIL)</p> <p>FHWA APPROVAL DATE</p>	<p>SIG-201-A</p>	<p>SHEET 1 of 2</p>
	<p>PLAN DATE</p>		



NON-METERED SERVICE WITH
1-3/C #6 AWG SERVICE CABLE



NON-METERED SERVICE WITH
3-1/C #6 AWG SERVICE CABLE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

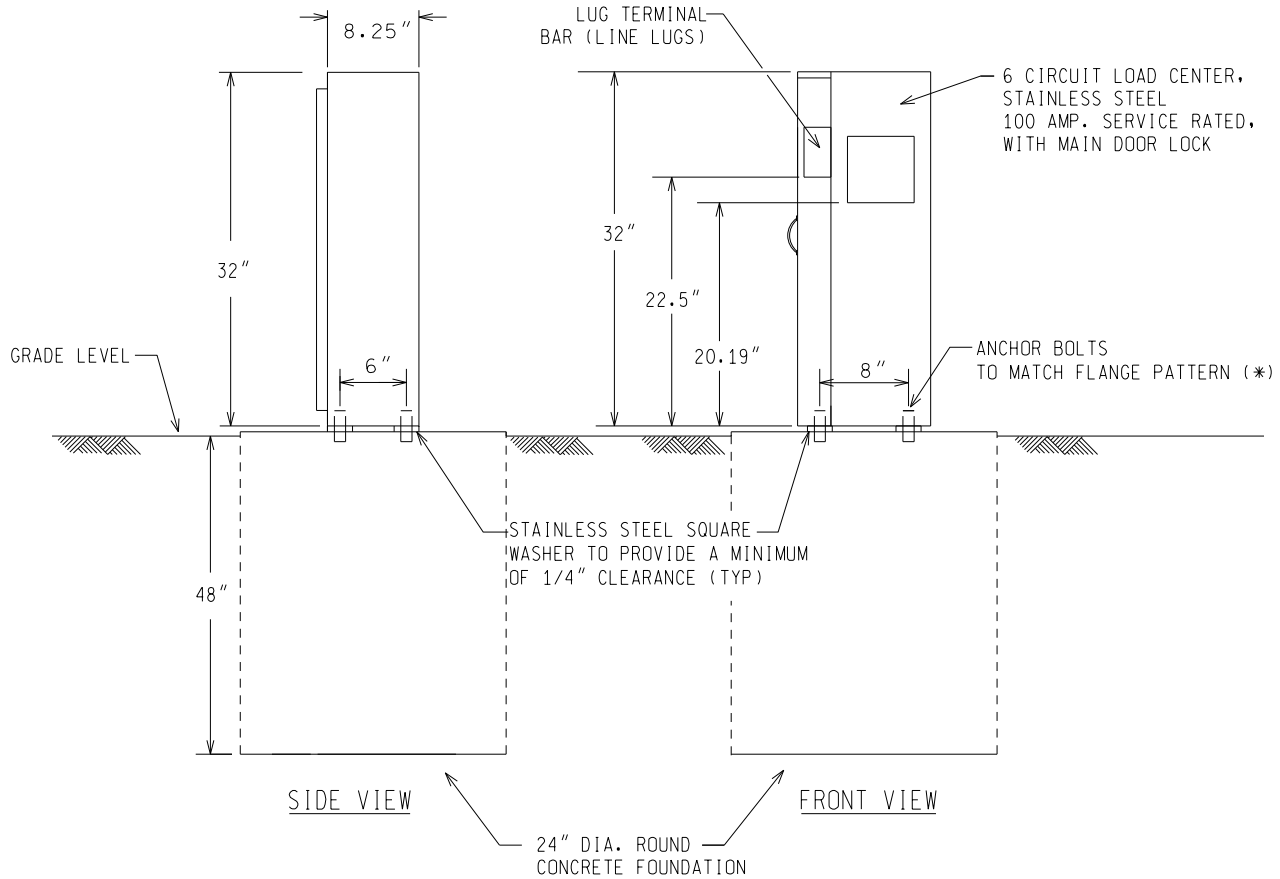
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PLAN DATE

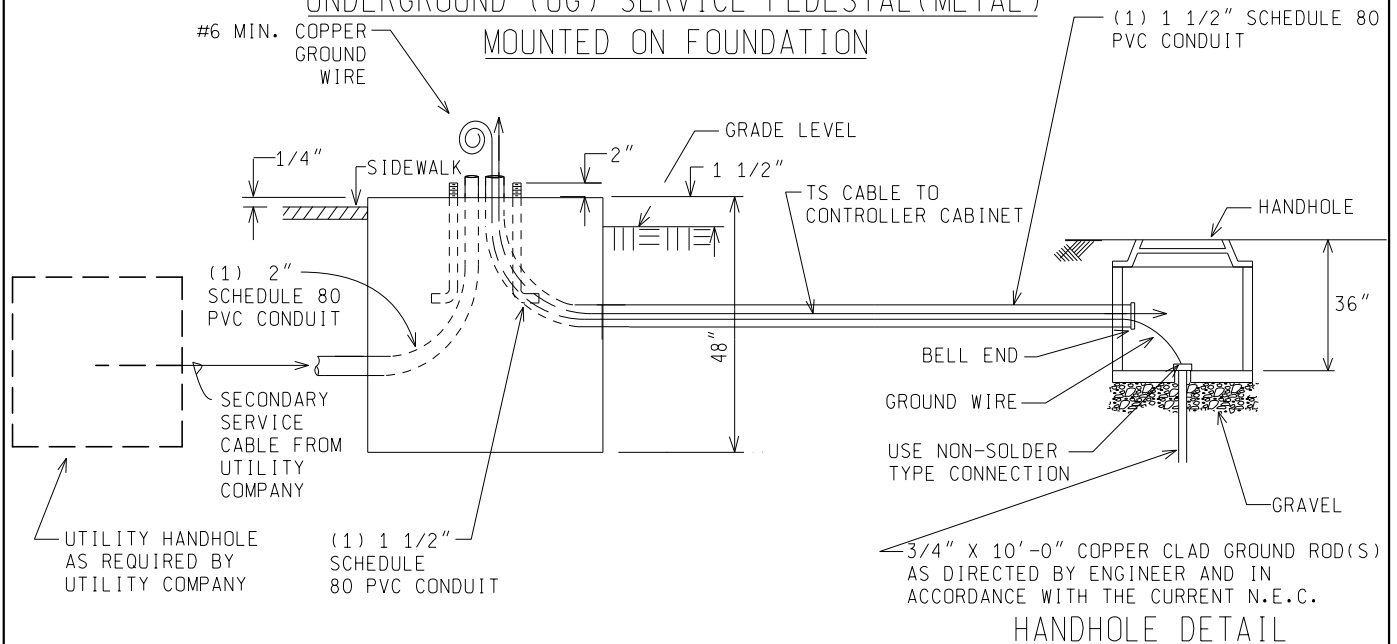
SIG-201-A

SHEET
2 of 2

(* NOTE: STAINLESS STEEL ANCHOR BOLTS OR STAINLESS STEEL DROP INS, TO BE USED ON EXISTING FOUNDATIONS WITH PROPER GRADE AND SIZE.



UNDERGROUND (UG) SERVICE PEDESTAL (METAL)
MOUNTED ON FOUNDATION



NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG210B.dgn Rev. 02/06/18



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DSP

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

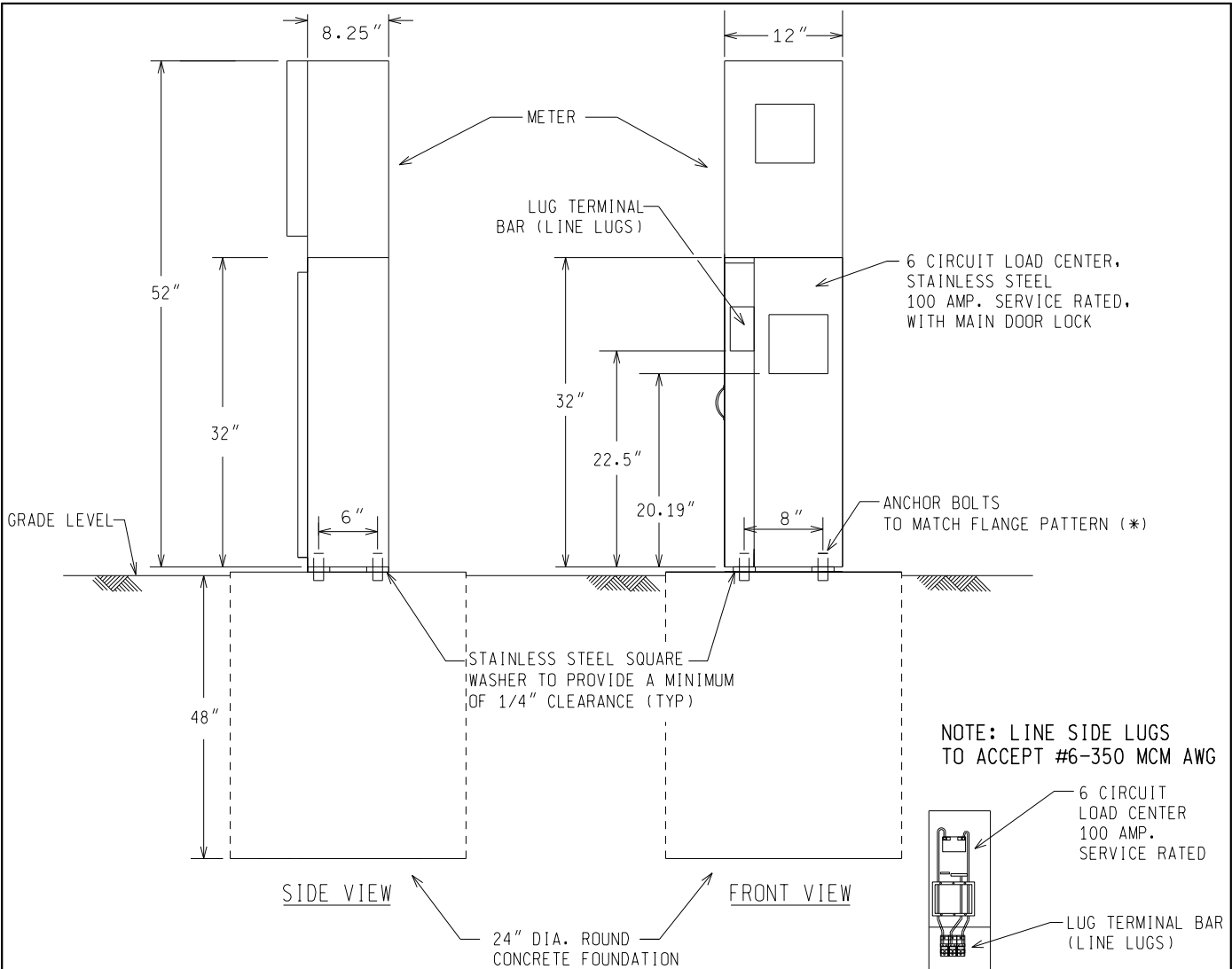
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
UNDERGROUND SERVICE
METERED AND UNMETERED

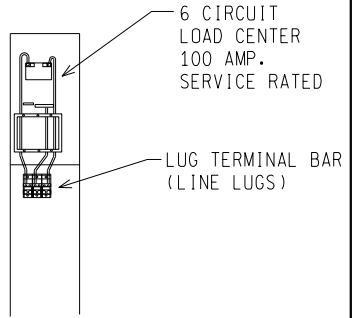
PLAN DATE

SIG-210-B

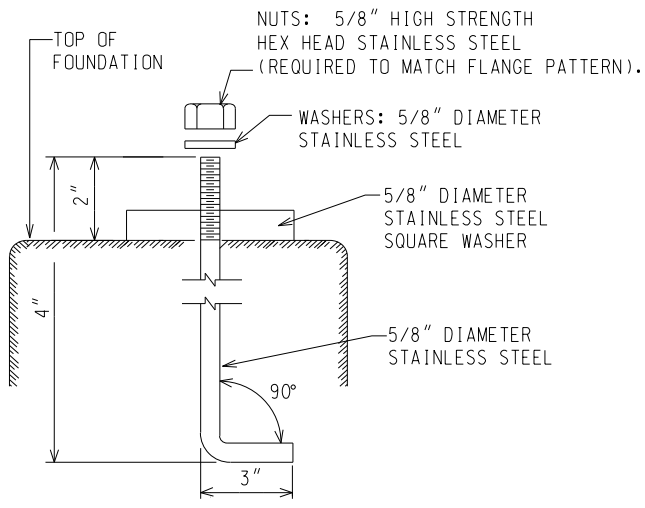
SHEET
1 of 3



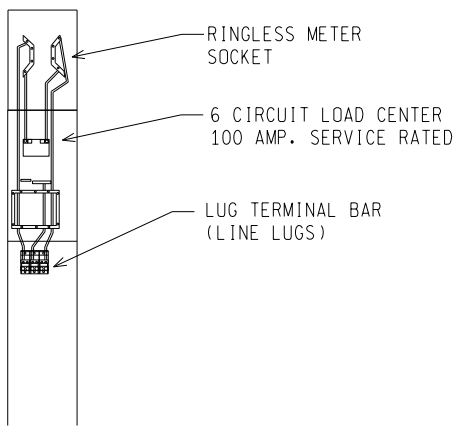
NOTE: LINE SIDE LUGS TO ACCEPT #6-350 MCM AWG



DETAIL WIRING DIAGRAM (UNMETERED)

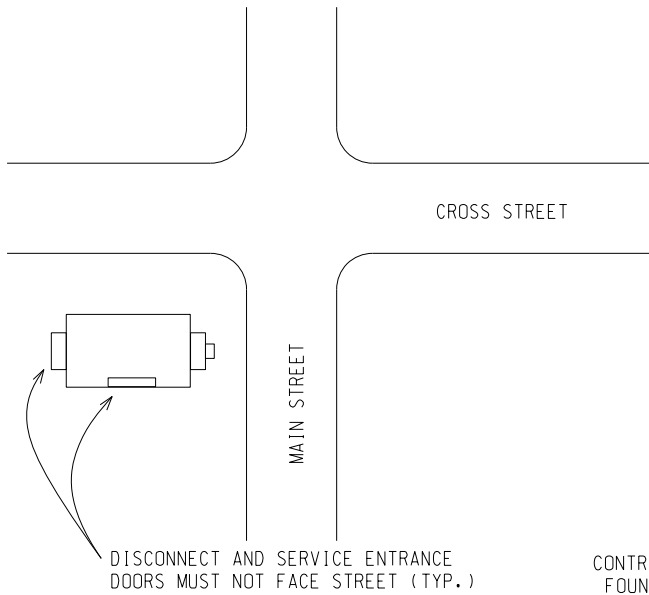


ANCHOR BOLT DETAIL

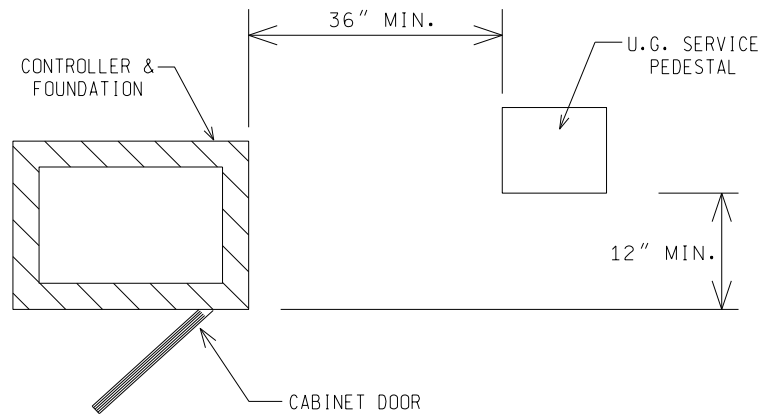


DETAIL WIRING DIAGRAM (METERED)

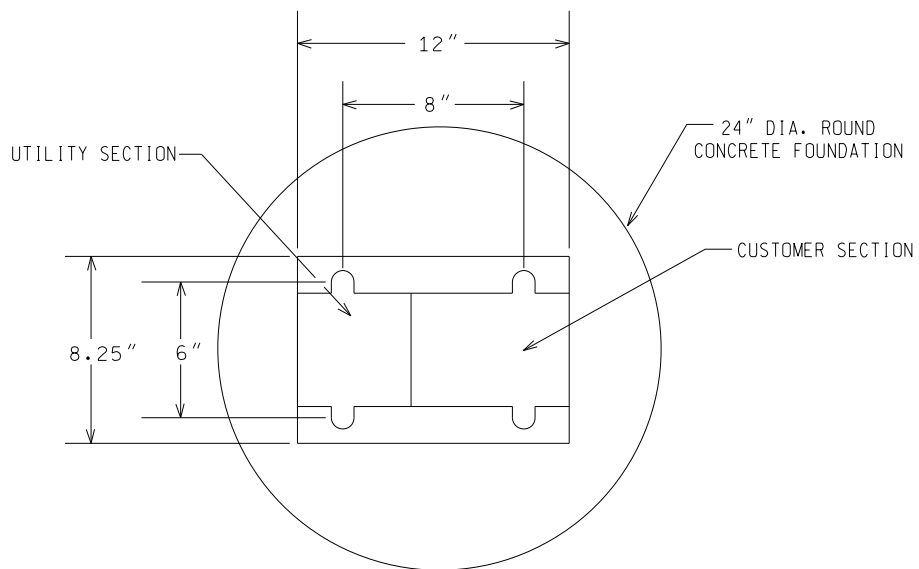
PREFERRED SITE
ORIENTATION PLAN



(PLACE PEDESTAL SO IT DOES NOT
INTERFERE WITH FULL OPERATION
OF CABINET DOOR)



PREFERRED PEDESTAL & FOUNDATION
ORIENTATION PLAN



BOLT PATTERN LAYOUT

NOT TO SCALE

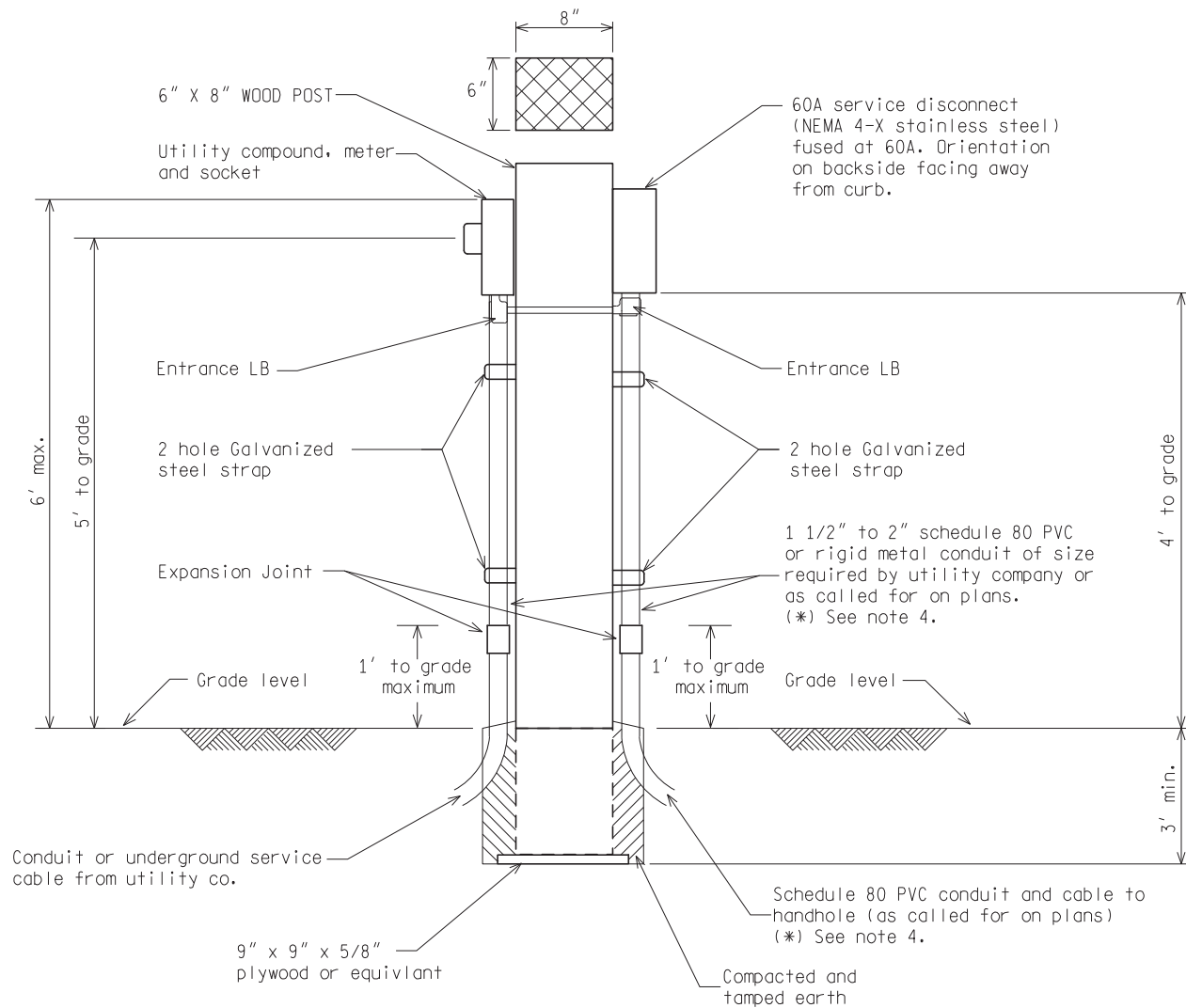
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-210-B

SHEET
3 of 3



**UNDERGROUND METERED SERVICE
(120/240V 60 HZ)**

NOTES:

- 1) The 6" x 8" wood post shall meet the requirement of the current M.D.O.T. Standard Specifications for Construction.
- 2) The meter and socket shall be as approved and required by the local power company.
- 3) All National Electric Code and local utility requirements for underground metered service shall be met.
- 4) For projects maintained by the Wayne Co. Department of Public Services (WCDPS), use rigid metal for conduit(s) from grade level to 10' (min.) above grade or as directed by the Engineer.

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG211A.dgn Rev: 02/16/17



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DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

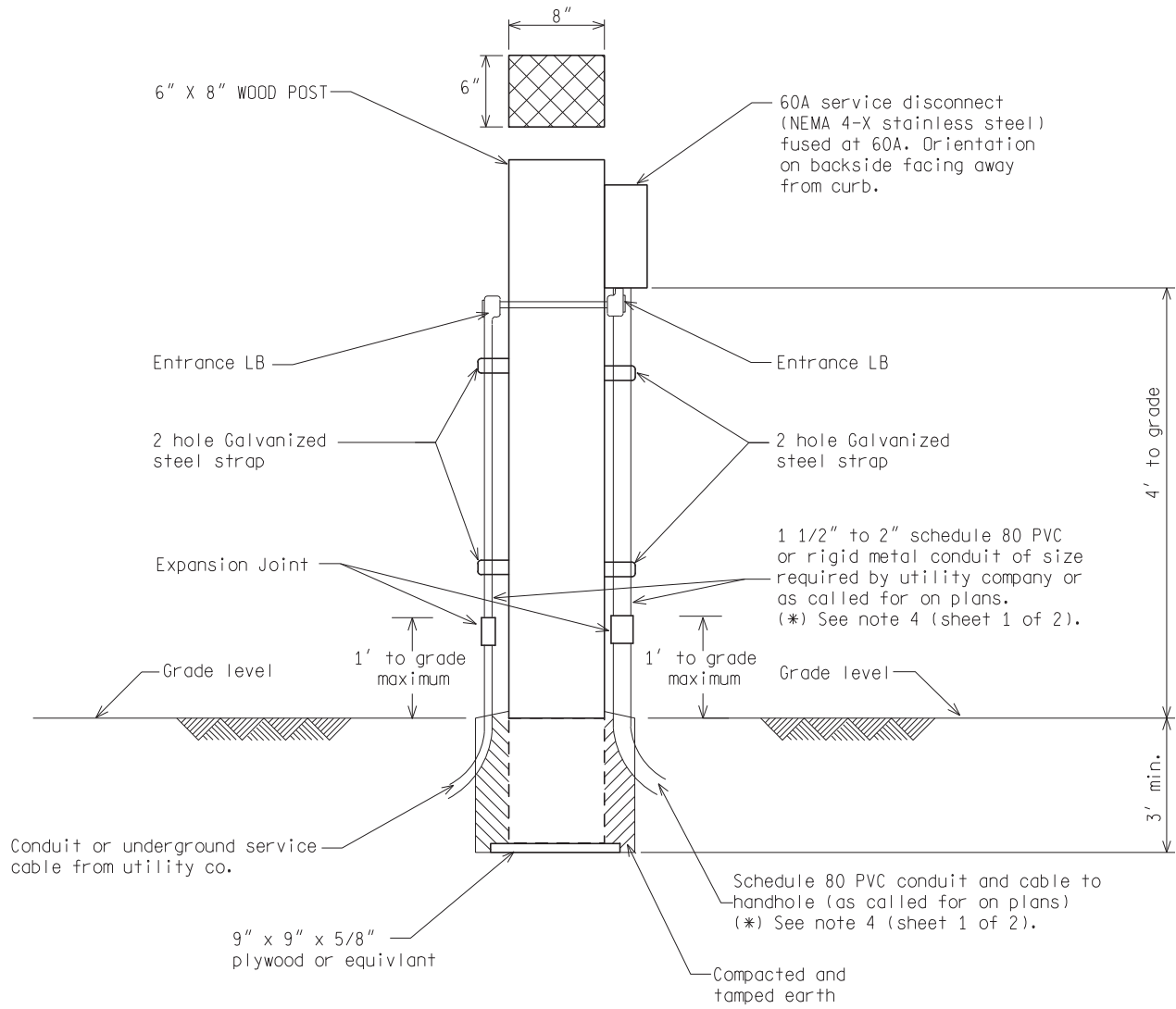
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**UNDERGROUND SERVICE/
DISCONNECT WOOD POST**

PLAN DATE

SIG-211-A

SHEET
1 of 2



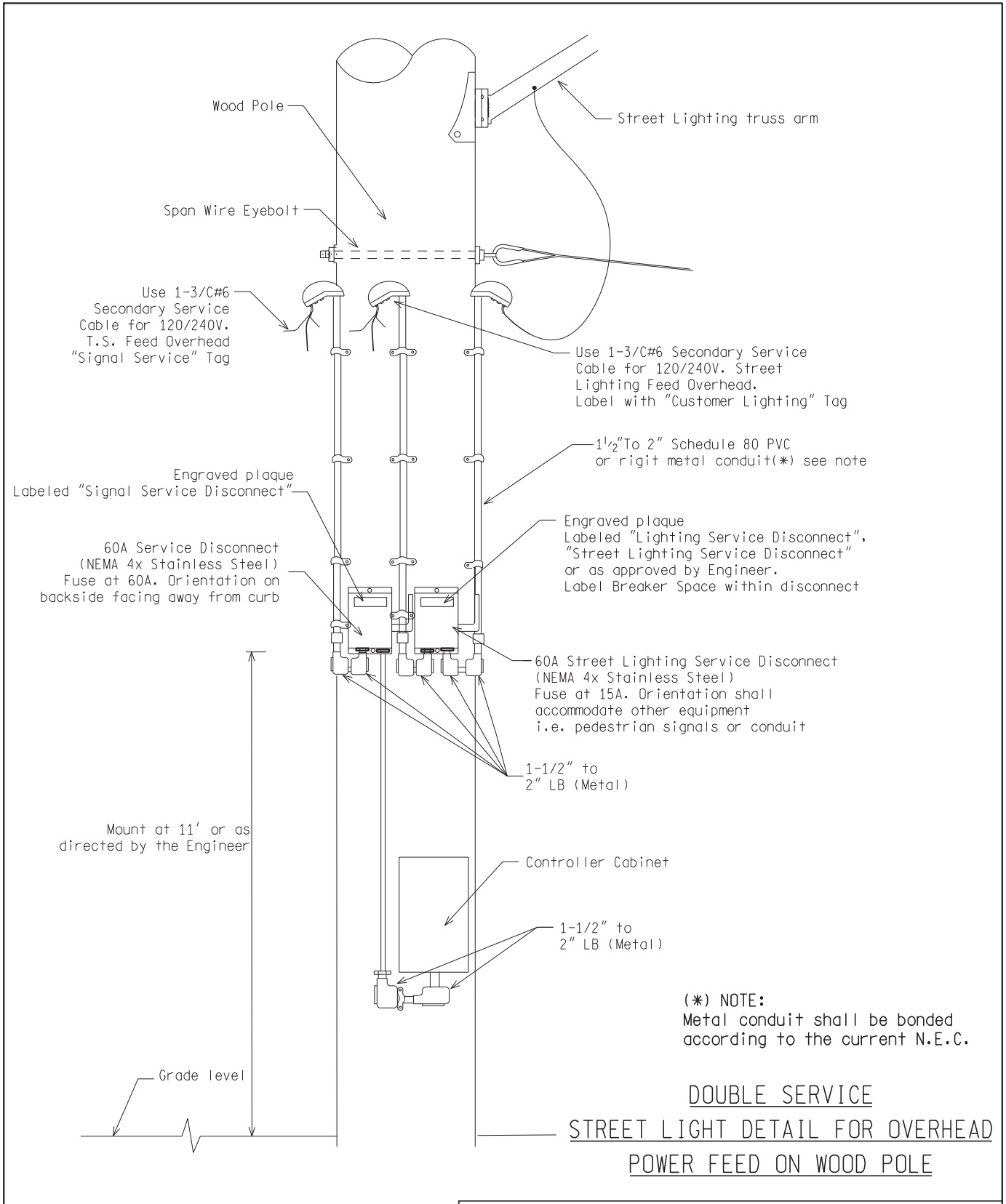
**UNDERGROUND NON-METERED SERVICE,
(120/240V 60 HZ)**

NOTES:

- 1) The 6" x 8" wood post shall meet the requirement of the current M.D.O.T. Standard Specifications for Construction.
- 2) All National Electric Code and local utility requirements for underground non metered service shall be met.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-211-A	SHEET 2 of 2
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG211A.dgn Rev. 02/16/17		PLAN DATE		



NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG220A.dgn Rev.



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DSP

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

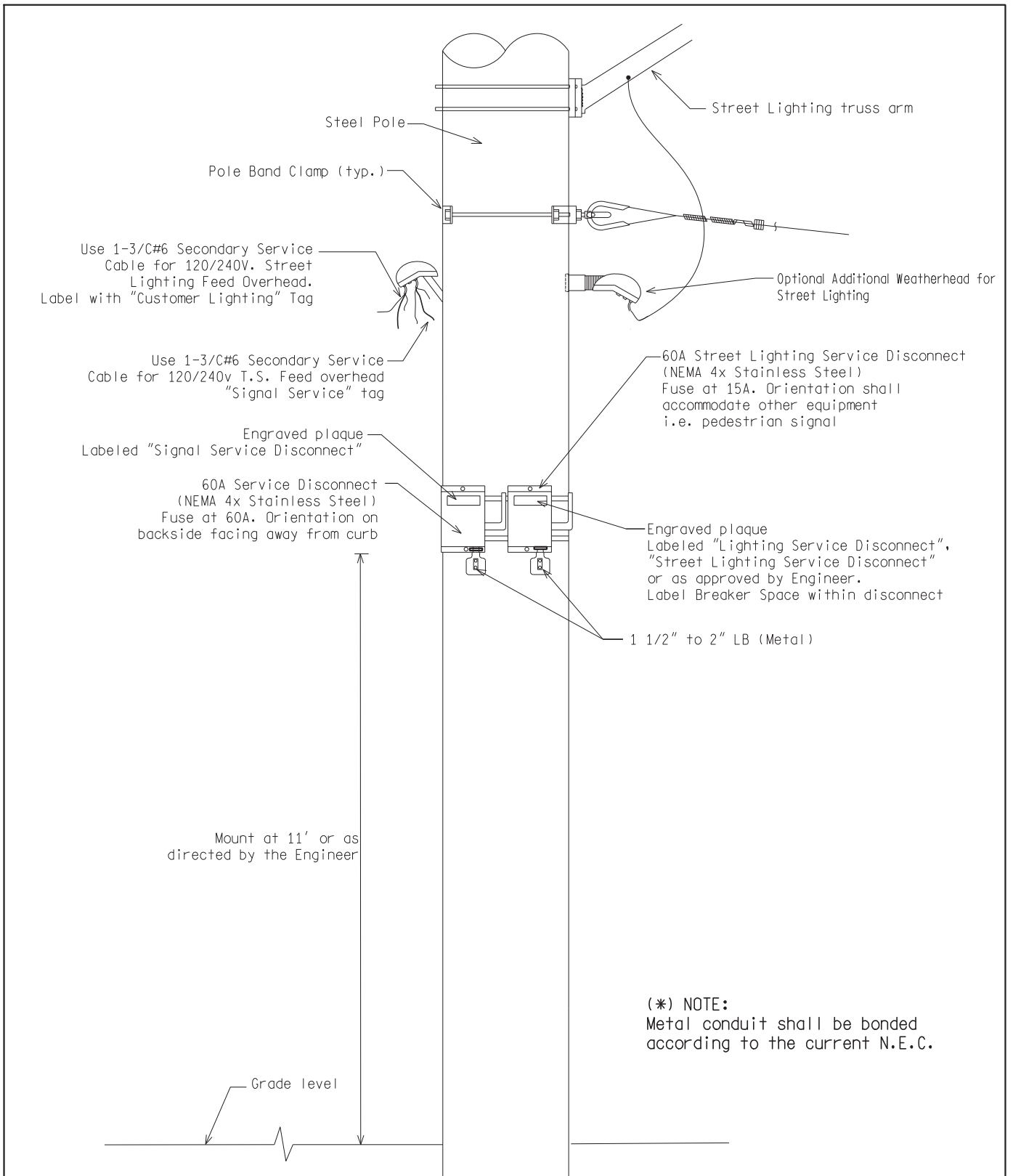
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**SECONDARY SERVICE FOR STREET
LIGHTING AND STREET NAME SIGNS**

02/16/17
PLAN DATE

SIG-220-A

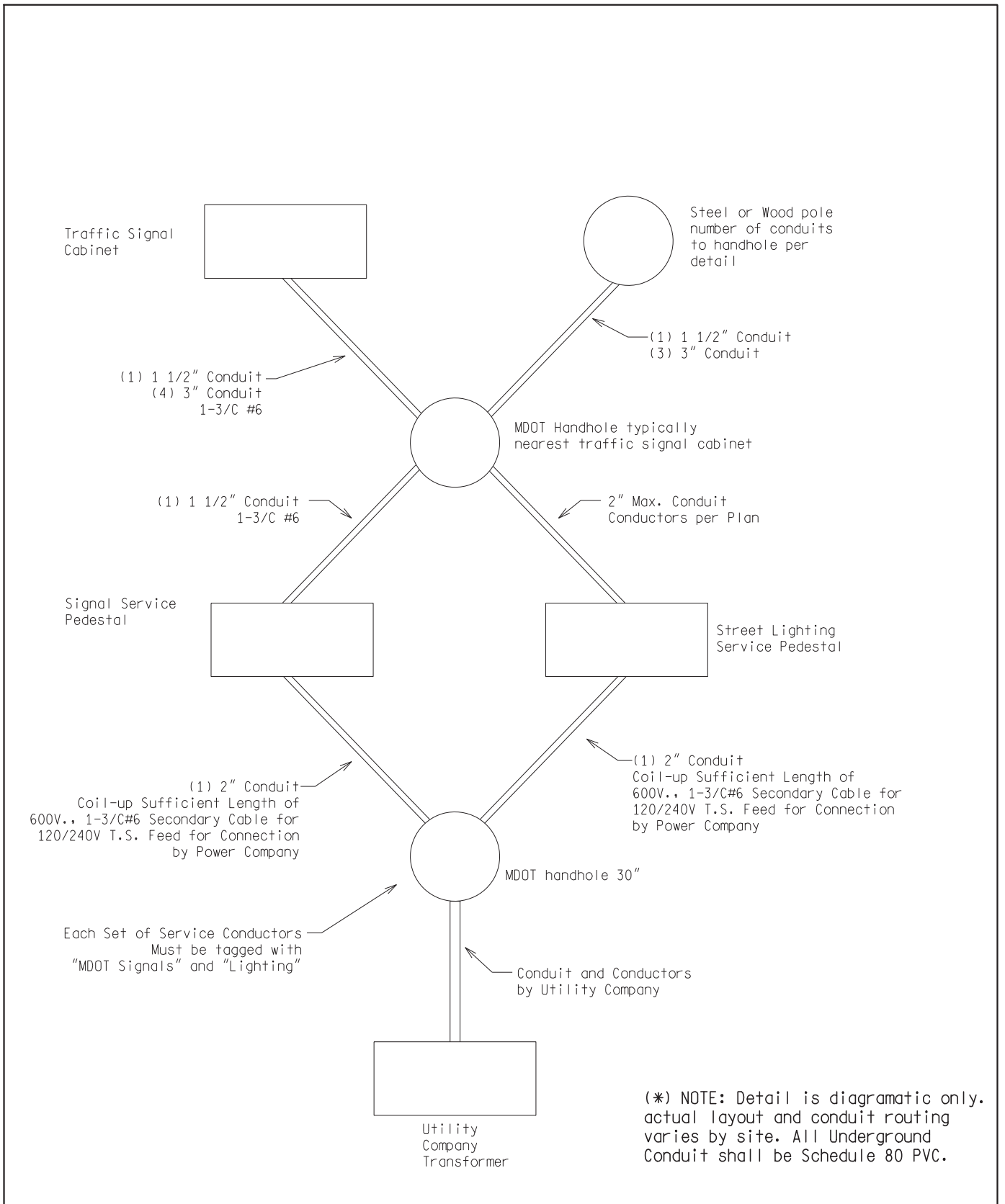
SHEET
1 of 4



DOUBLE SERVICE
STREET LIGHT DETAIL FOR OVERHEAD
POWER FEED ON STEEL POLE

NOT TO SCALE

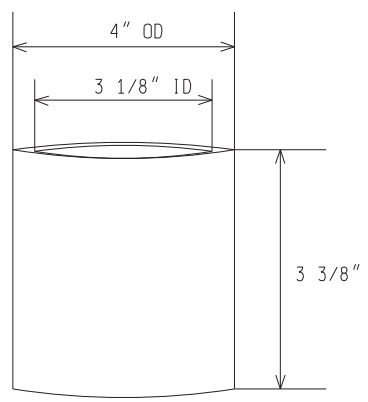
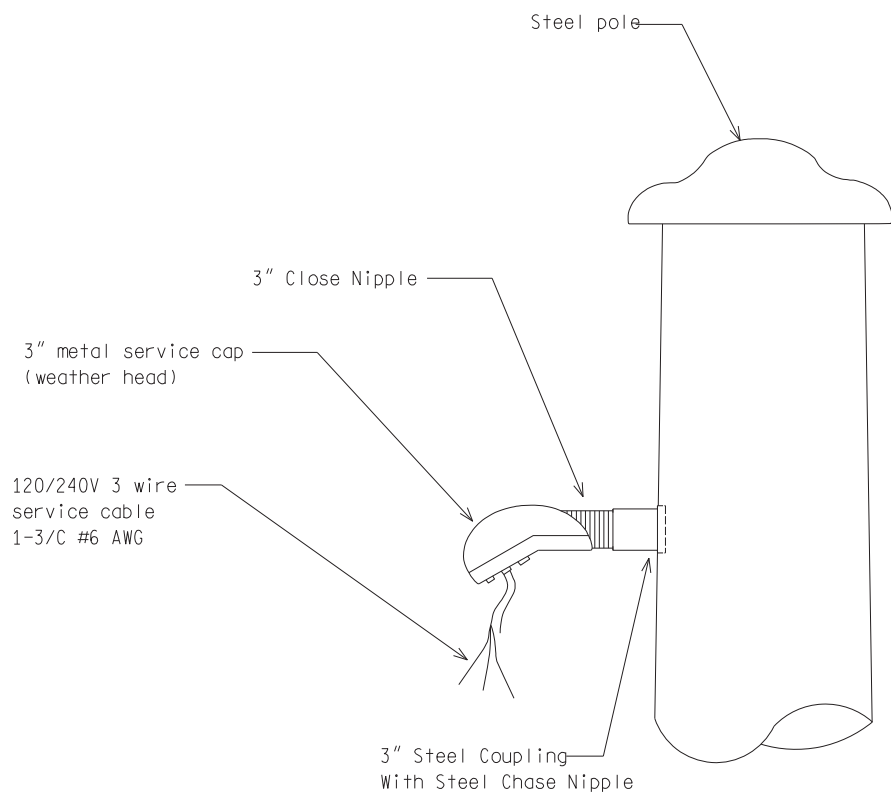
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	02/16/17 PLAN DATE	SIG-220-A	SHEET 2 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG220A.dgn Rev.				



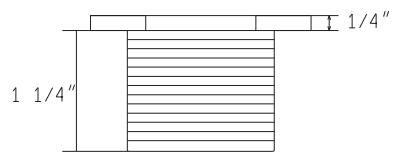
UNDERGROUND DOUBLE SERVICE STREET LIGHTING
WIRING DIAGRAM

NOT TO SCALE

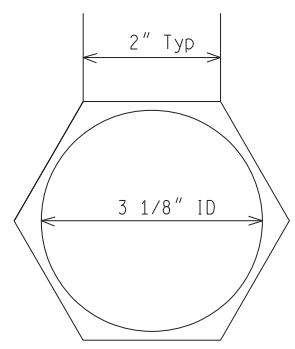
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	02/16/17	SIG-220-A	SHEET 3 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG220A.dgn Rev.		PLAN DATE		



Steel Coupling



Chase Nipple A

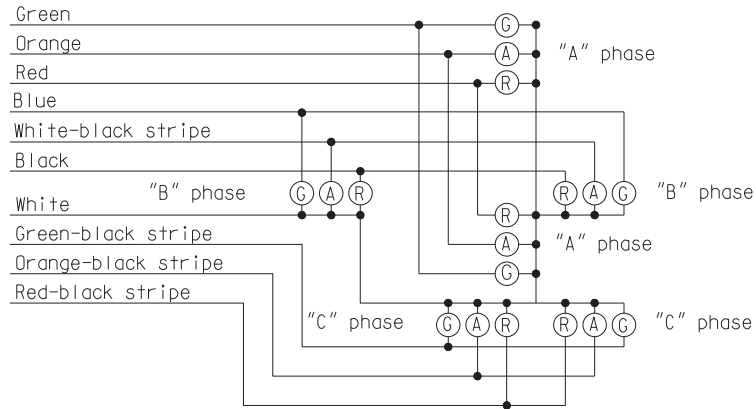


Chase Nipple B

STRAIN POLE WEATHER HEAD INSTALLATION

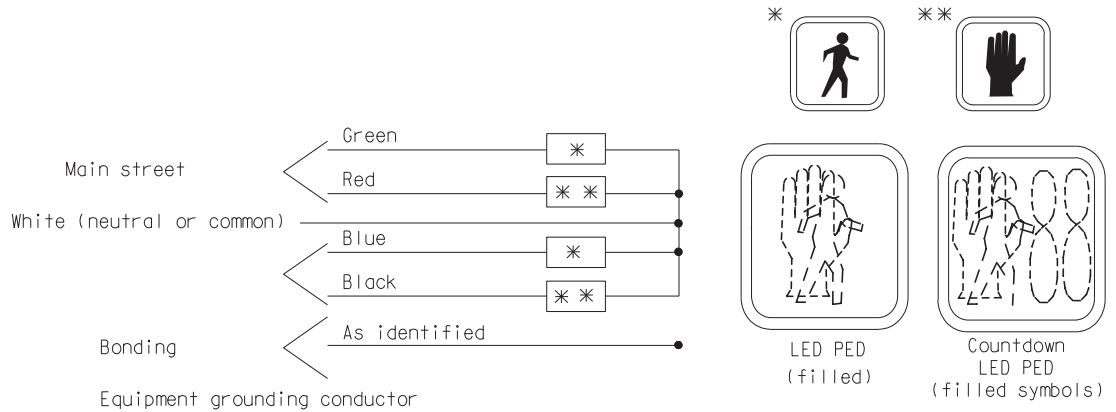
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	02/16/17 PLAN DATE	SIG-220-A	SHEET 4 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG220A.dgn Rev.				



COLOR CODE FOR WIRING CONNECTING TRAFFIC SIGNAL LAMPS

NOTE: No splices allowed between traffic signal head and controller.



COLOR CODE FOR WIRING CONNECTING PEDESTRIAN SIGNAL LAMPS
(WALKING PERSON - HAND SYMBOL)

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

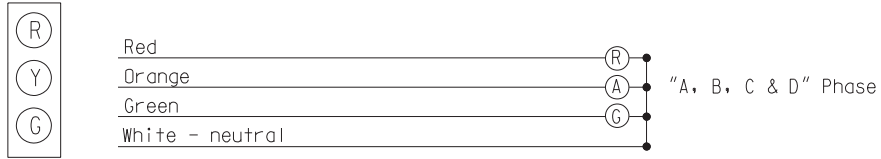
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**COLOR CODE WIRING/
EQUIPMENT GROUNDING**

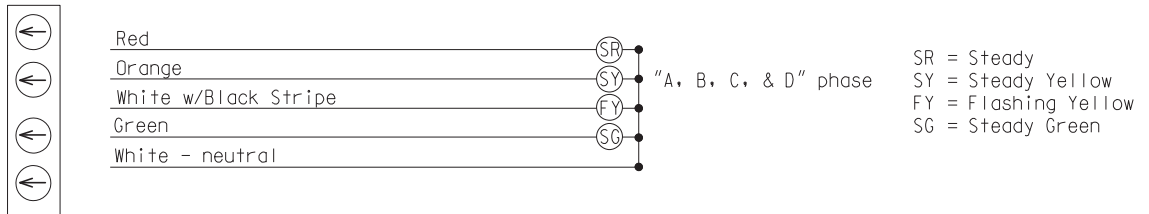
PLAN DATE

SIG-230-A

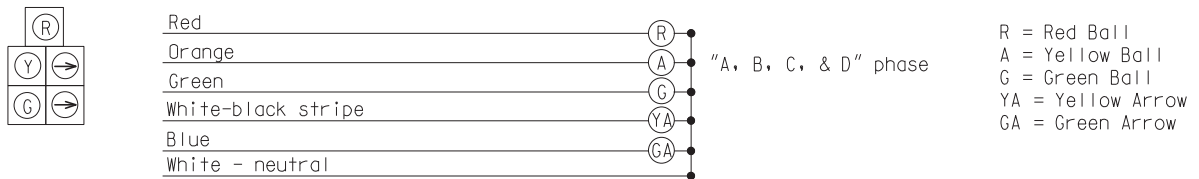
SHEET
1 of 6



STANDARD - 3 COLOR SIGNAL DISPLAY



FLASHING YELLOW ARROW (FYA) - 4 COLOR SIGNAL DISPLAY



DOG HOUSE W/RIGHT TURNS - 5 COLOR SIGNAL DISPLAY

COLOR CODE FOR WIRING CONNECTING TRAFFIC SIGNAL LAMPS

NOT TO SCALE

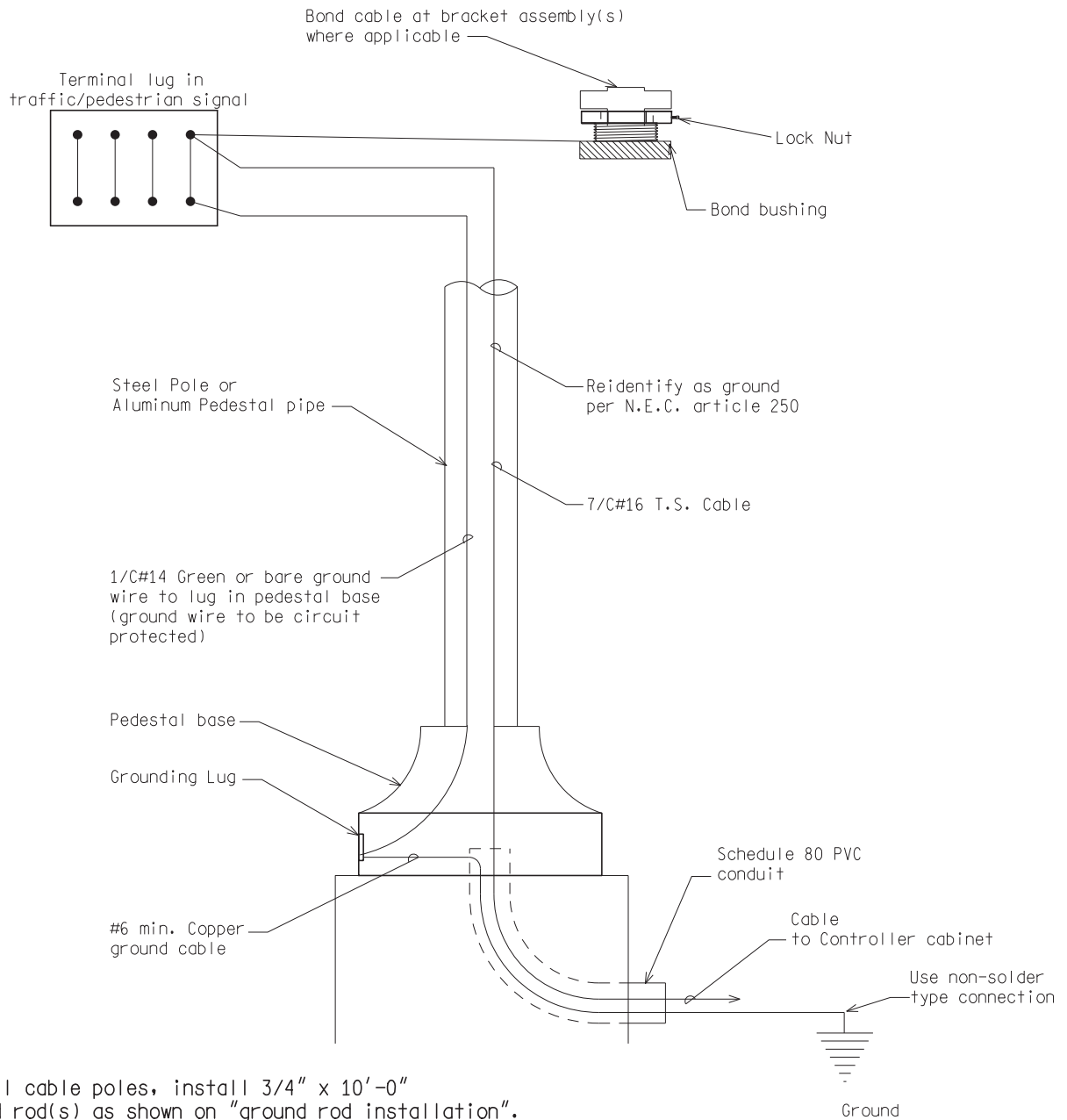
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-230-A

SHEET
2 of 6



NOTE:
 For all cable poles, install 3/4" x 10'-0"
 ground rod(s) as shown on "ground rod installation".
 Connect ground rod(s) with #6 min. copper wire to
 messenger wire with non-solder type connection.

STEEL POLE/PEDESTAL GROUNDING DETAIL

NOT TO SCALE

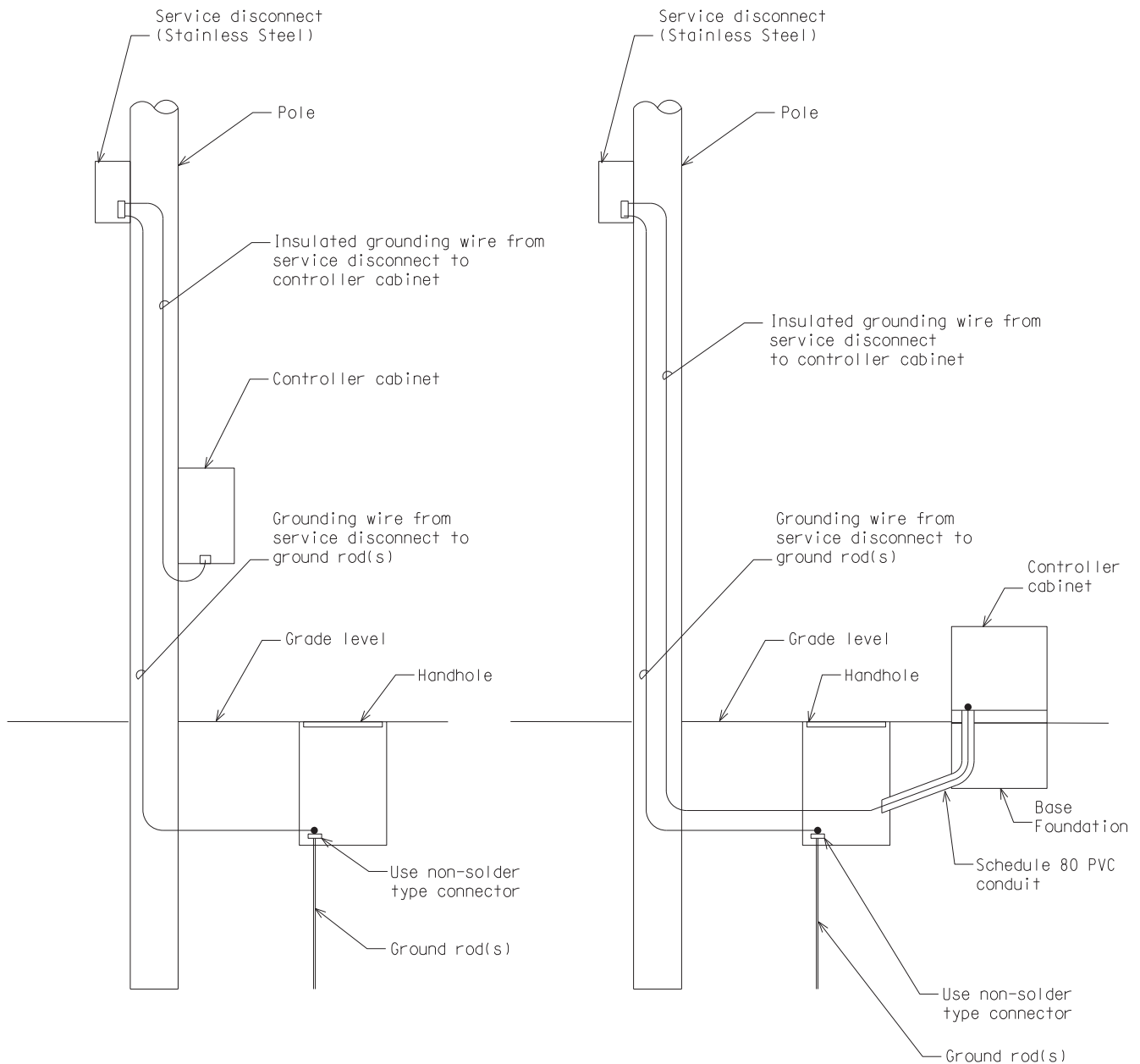
MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
 FHWA APPROVAL DATE

PLAN DATE

SIG-230-A

SHEET
 3 of 6



GROUNDING

Install 3/4 " x 10'-0" copper clad ground rod(s) as required to provide less than 10 OHM resistance to ground.

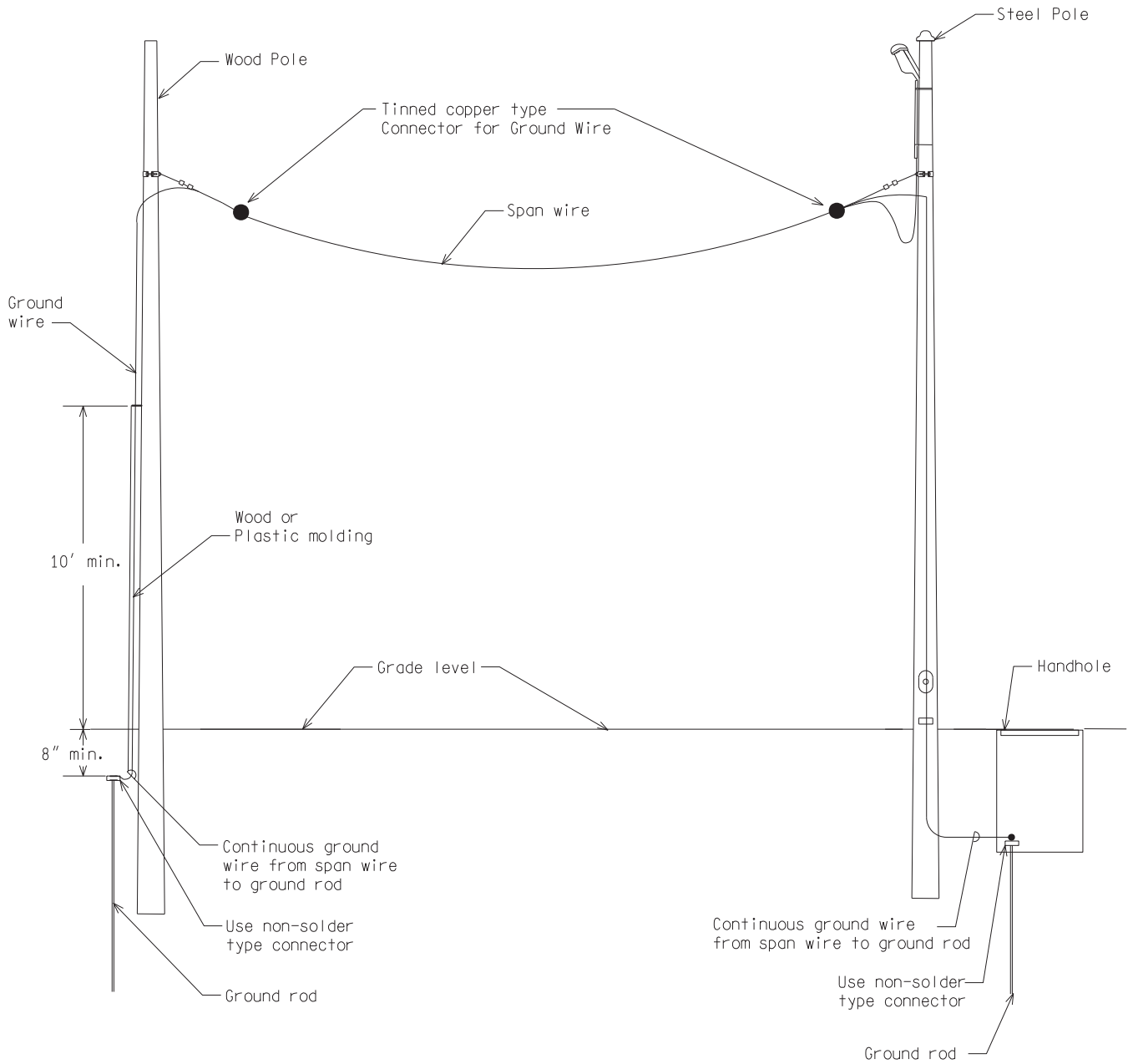
Grounding wire #6 AWG min. bare copper grounding wire shall be installed to meet N.E.C. and utility company specs.

Ground wire from disconnect to ground rod to be in moulding (wood pole or post) or inside the pole (steel). Ground wire from disconnect to controller cabinet to be in conduit (wood pole, wood post, and steel pole).

CONTROLLER CABINET GROUNDING DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-230-A	SHEET 4 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17		PLAN DATE		



SPAN WIRE GROUNDING DETAIL

NOT TO SCALE

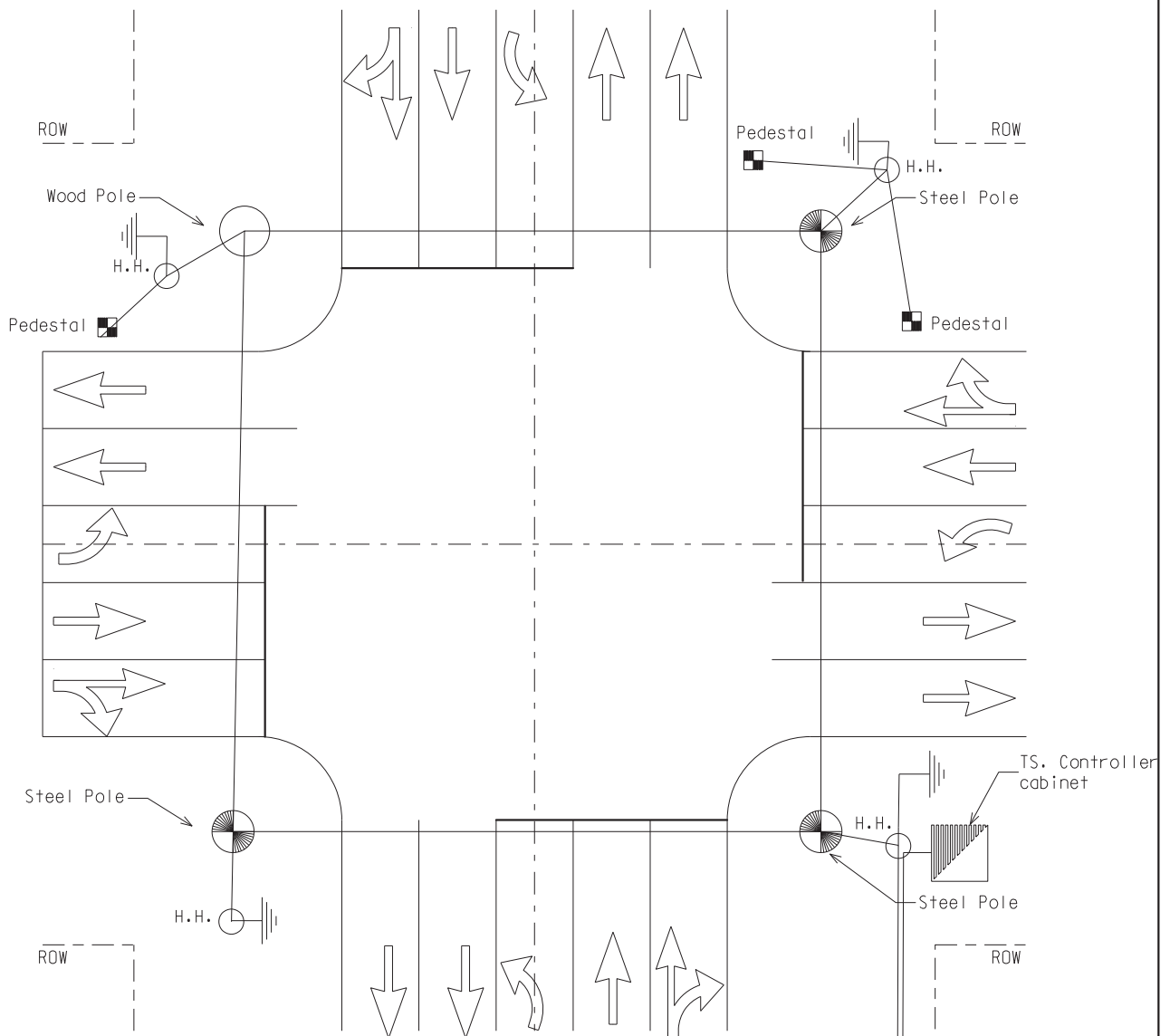
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

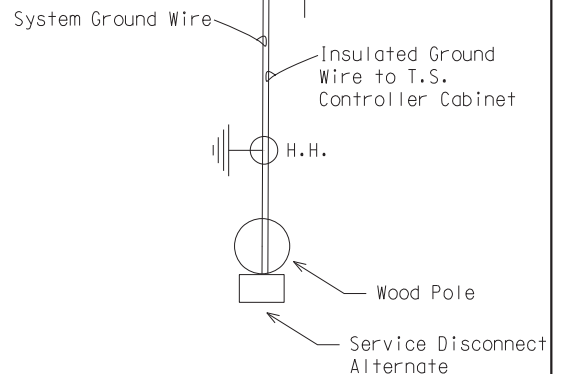
PLAN DATE

SIG-230-A

SHEET
5 of 6



- 1) All ground rods shall be 3/4" x 10' in length copperclad.
- 2) Ground rods shall be drive straight down, so that only the required portions of of the ground rod is exposed to attach the ground wires.
- 3) All ground rods shall be connected to each other or to a span wire with a single #6 AWG copper conductor.
- 4) Each ground wire attaching to a ground rod shall have its own approved acorn type connector.
- 5) Do not install any ground rods within 10' of any other ground rods from other grounding.
- 6) The grounding system shall measure 10 ohms or less.
- 7) A separate insulated green #6 AWG copper ground is required from the service disconnect (safety switch) to the ground bussbar in the controller cabinet.
- 8) Ground rod for each steel pole, wood pole, pedestal and/or traffic signal controller cabinet shall be located in the adjacent handhole as indicated on the plans or as directed by the Engineer.
- 9) All metal bases must be connected to a ground rod with a #6 ground wire.



SYSTEM GROUNDING DETAIL

NOT TO SCALE

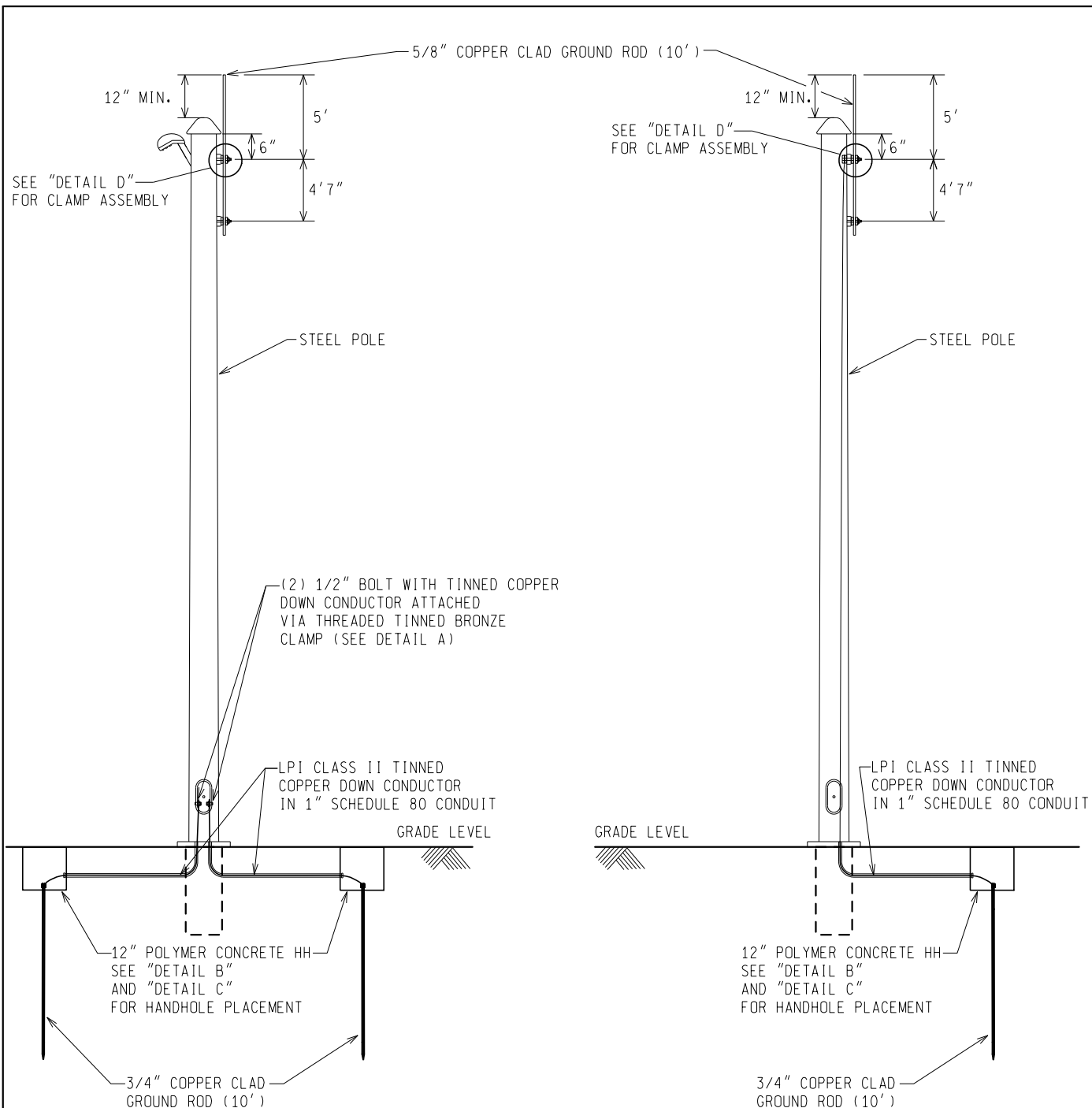
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE


SIG-230-A

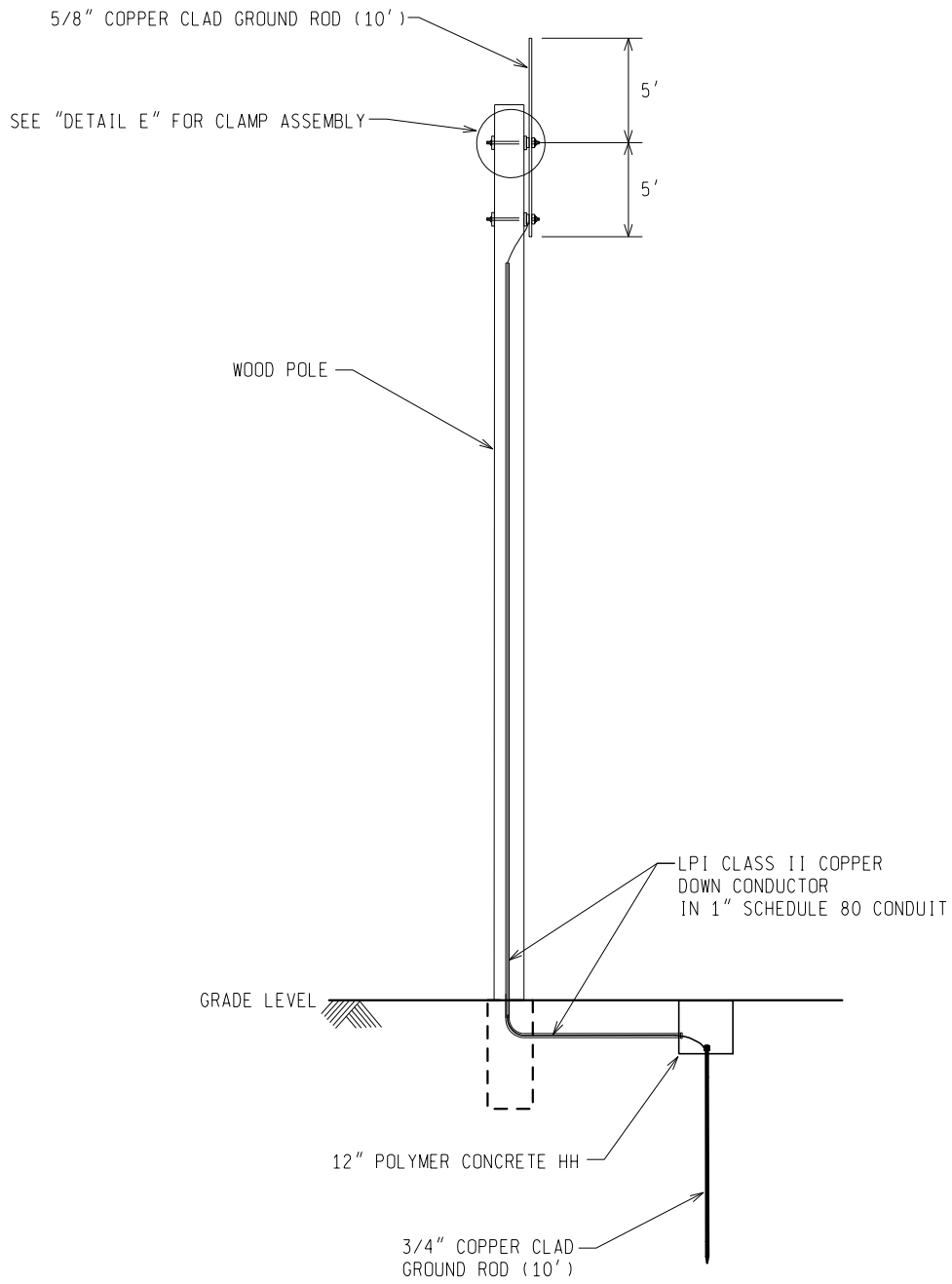
SHEET
6 of 6



LIGHTNING PROTECTION ON STEEL POLE

NOT TO SCALE File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG231A.dgn Rev. 11/05/18

 PREPARED BY TRAFFIC AND SAFETY	_____ ENGINEER OF DELIVERY	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR LIGHTNING PROTECTION DETAIL	
	_____ ENGINEER OF DEVELOPMENT (SPECIAL DETAIL) FHWA APPROVAL DATE	_____ PLAN DATE	SIG-231-A



LIGHTNING PROTECTION ON WOOD POLE

NOT TO SCALE

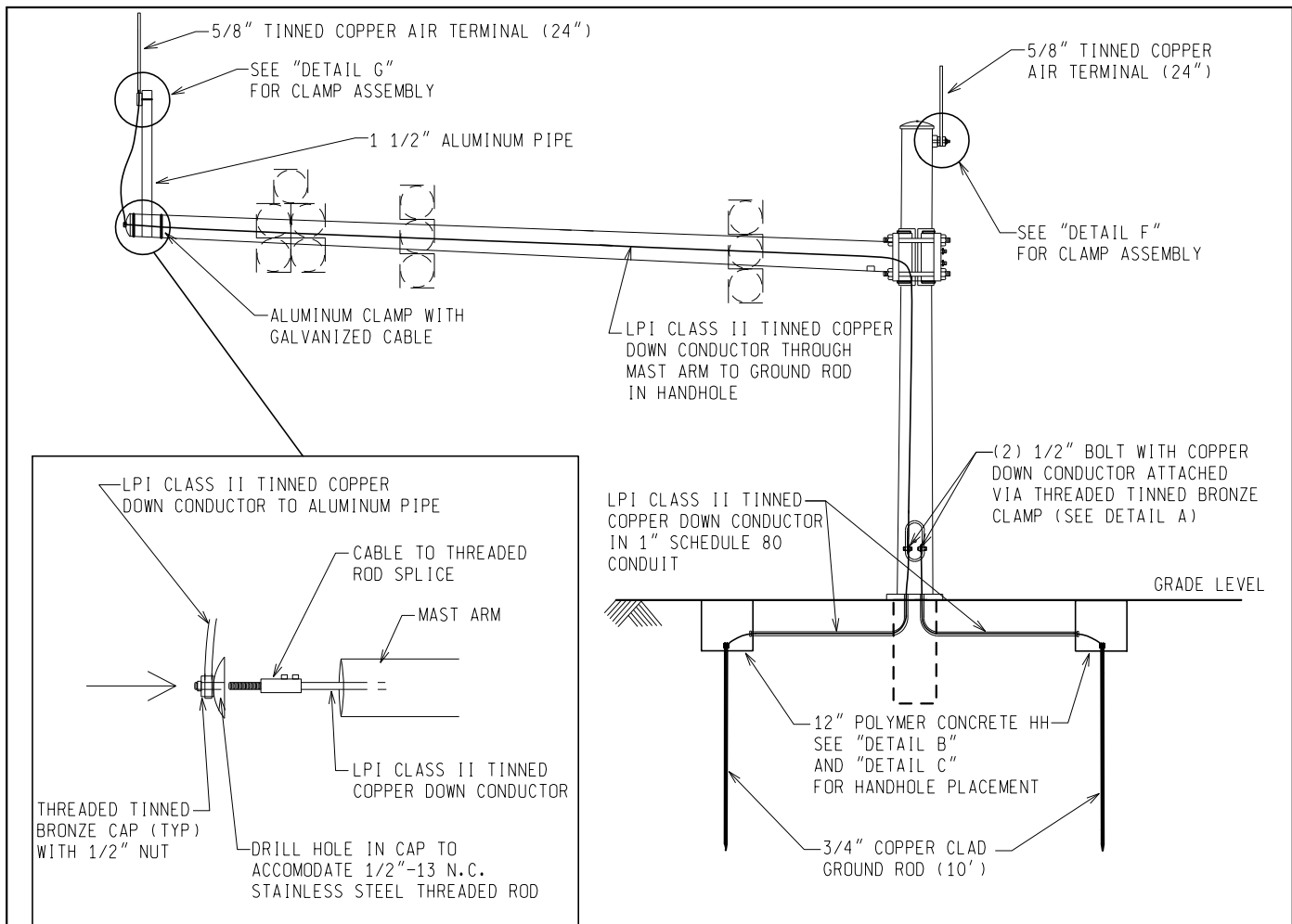
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

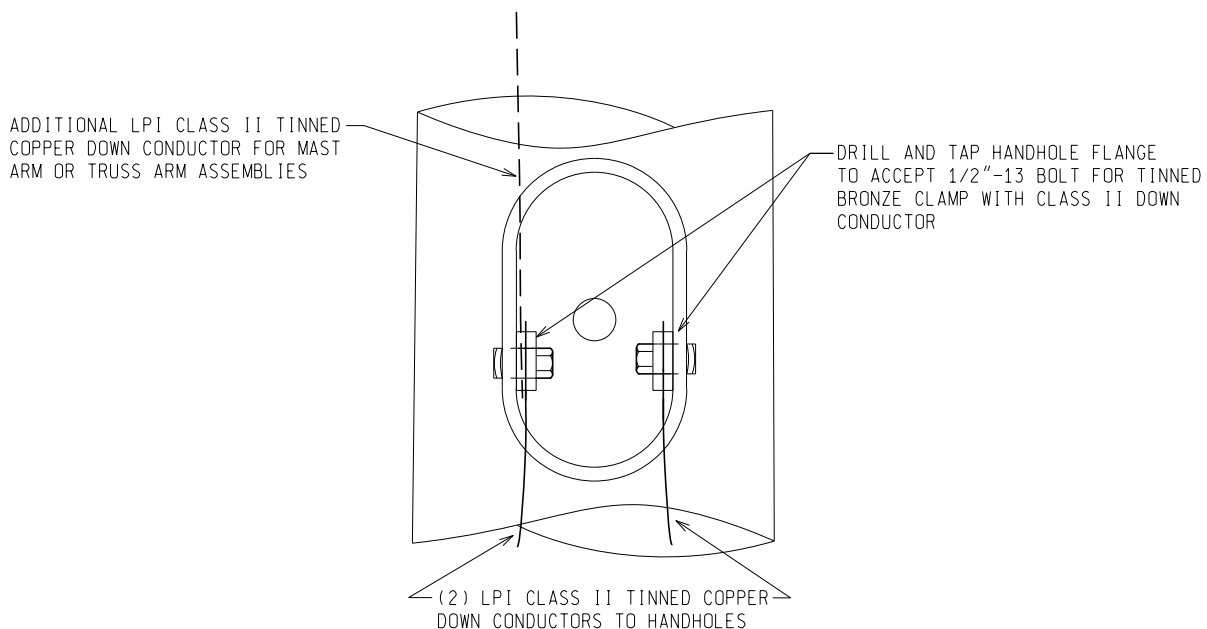
PLAN DATE

SIG-231-A

SHEET
2 of 6



LIGHTNING PROTECTION ON MAST ARM



POLE HANDHOLE "DETAIL A"

NOT TO SCALE

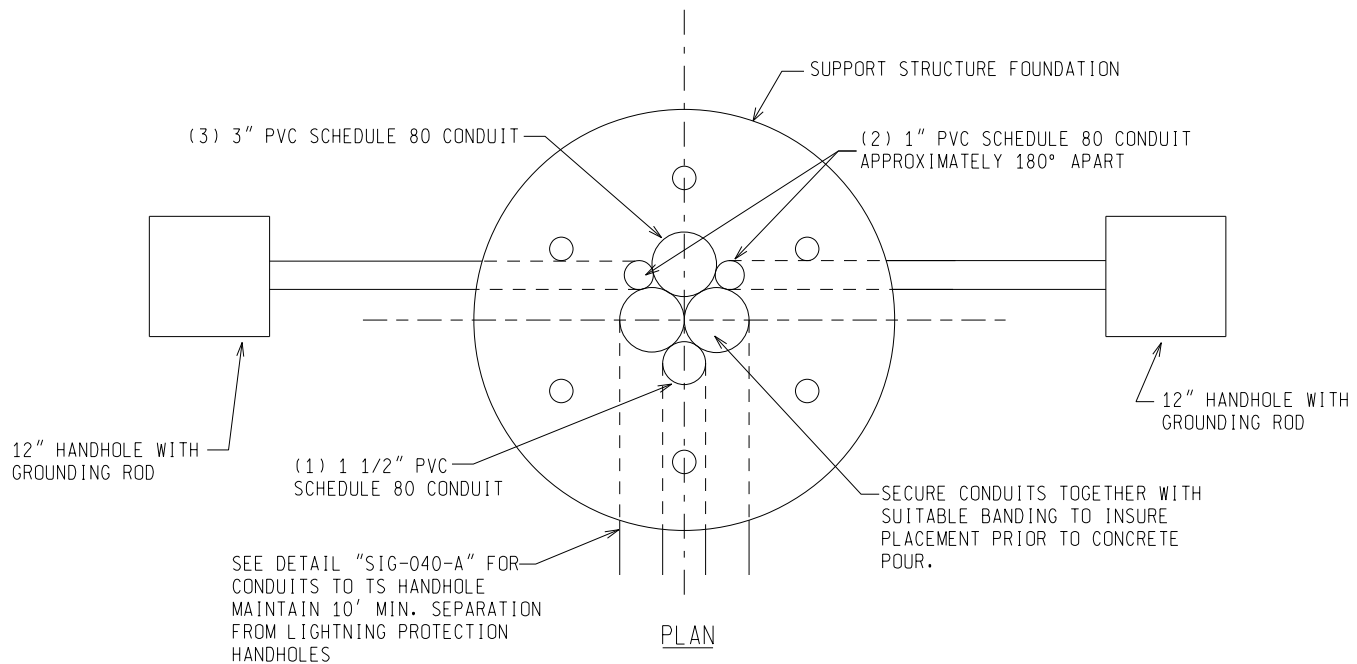
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BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

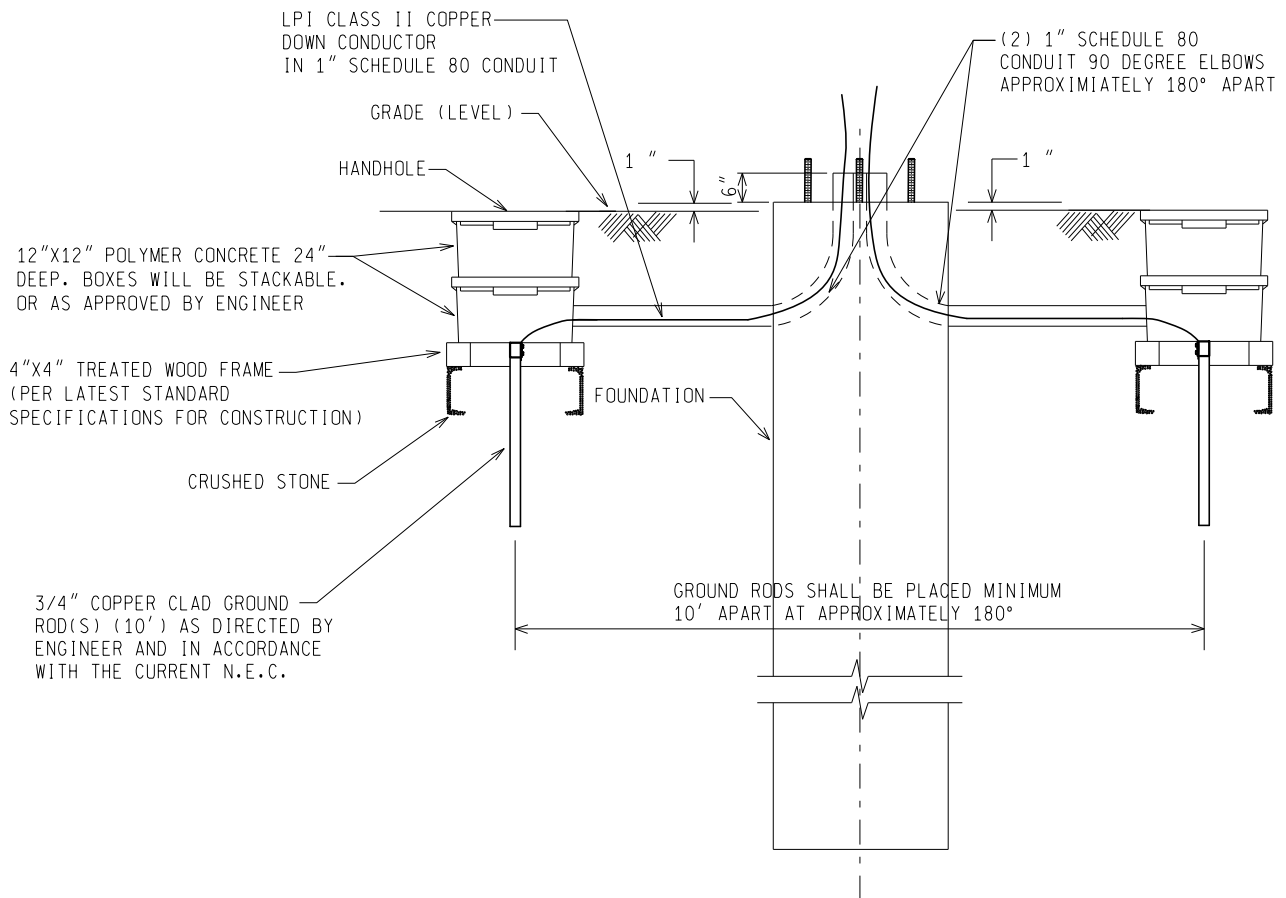
PLAN DATE

SIG-231-A

SHEET
3 of 6



STEEL POLE HANDHOLE PLAN VIEW
LAYOUT "DETAIL B"



STEEL POLE HANDHOLE ELEVATION VIEW
LAYOUT "DETAIL C"

NOT TO SCALE

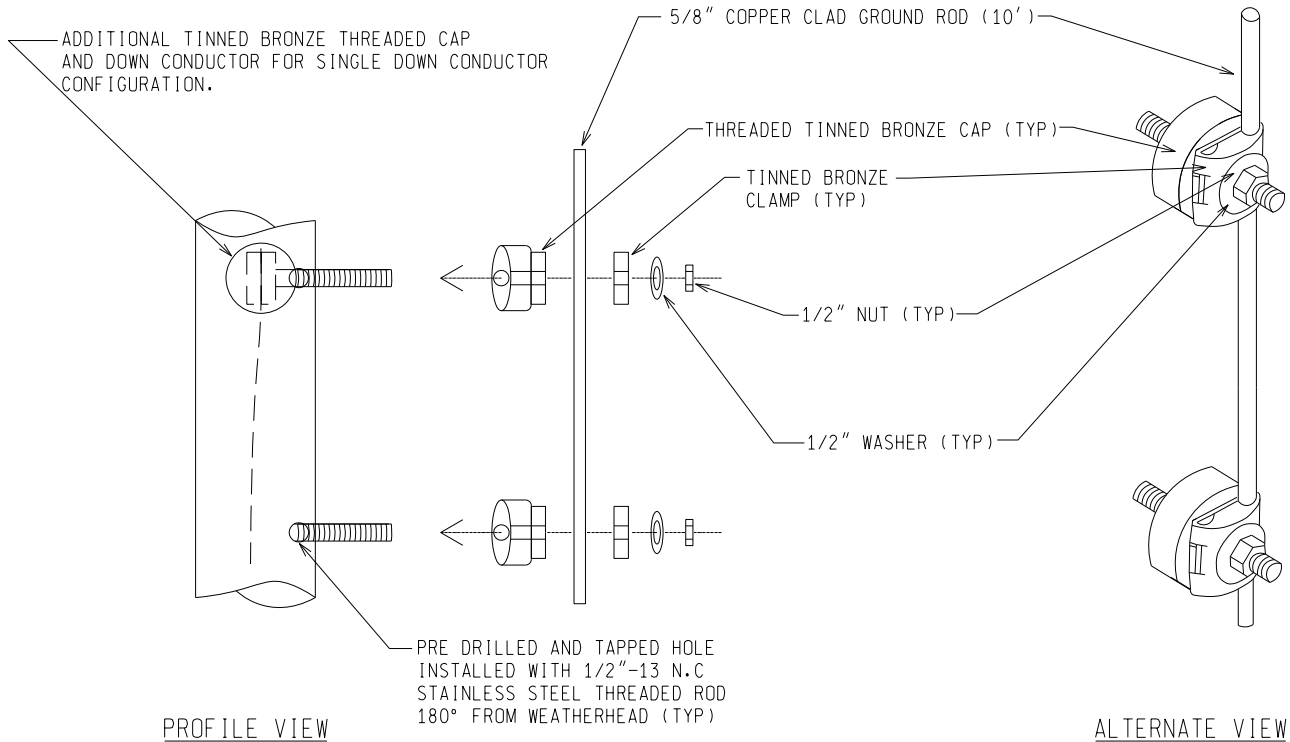
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BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

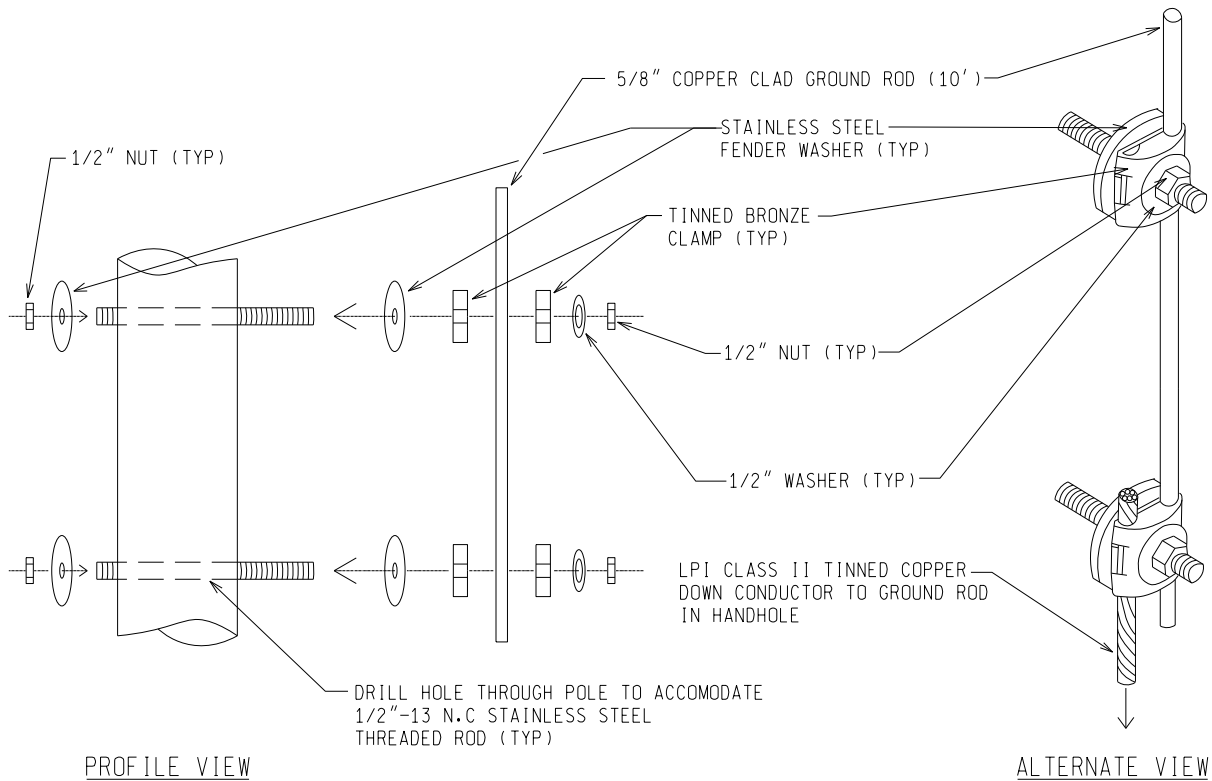
PLAN DATE

SIG-231-A

SHEET
4 of 6



LIGHTNING PROTECTION CLAMP
ON STEEL POLE "DETAIL D"



LIGHTNING PROTECTION CLAMP
ON WOOD POLE "DETAIL E"

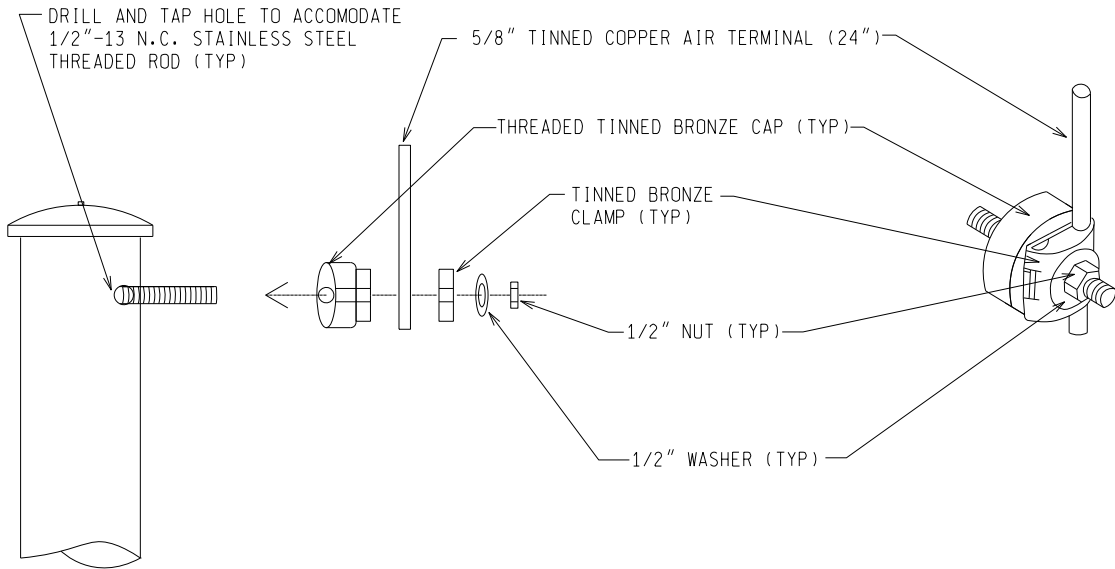
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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

SIG-231-A

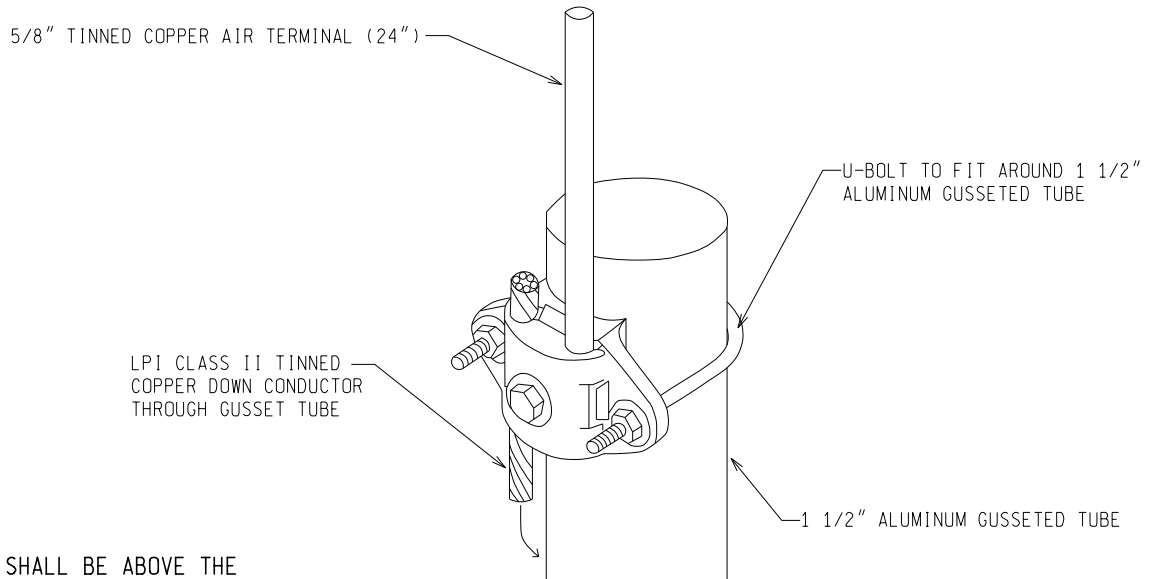
SHEET
5 of 6



PROFILE VIEW

ALTERNATE VIEW

LIGHTNING PROTECTION CLAMP ON
MAST ARM POLE "DETAIL F"



(* NOTE:
AIR TERMINAL SHALL BE ABOVE THE
DEVICE(S) IT'S PROTECTING BY
A MINIMUM OF 12 INCHES.

LIGHTNING PROTECTION CLAMP ON
ALUMINUM STEEL GUSSETED TUBE
"DETAIL G"

NOT TO SCALE

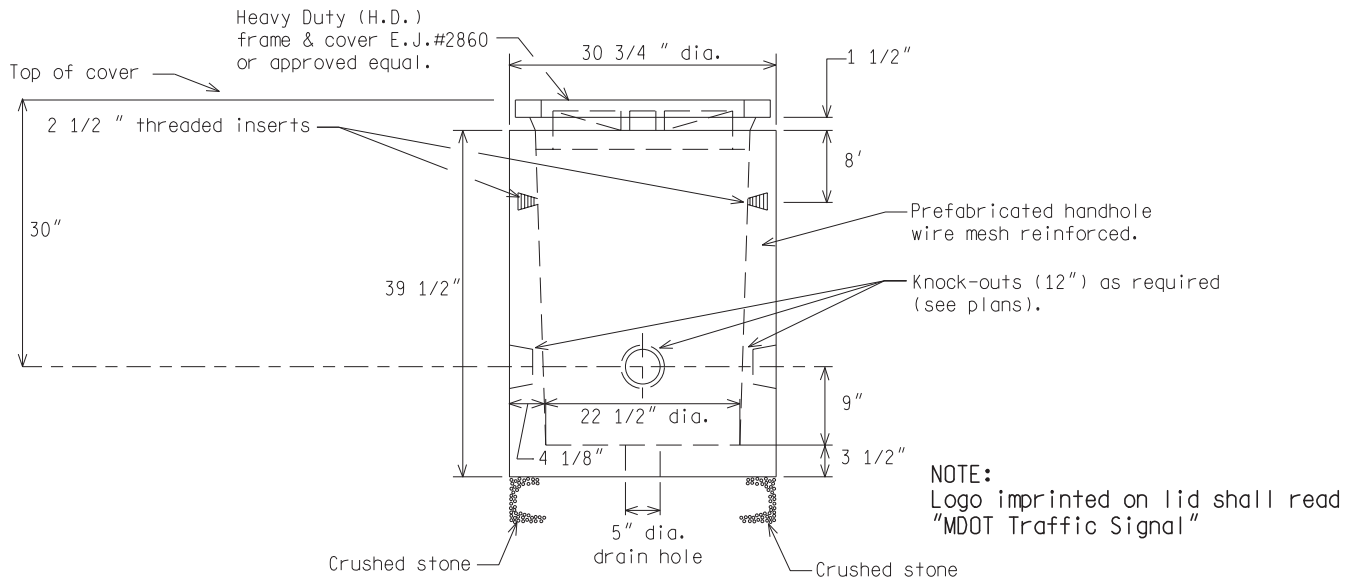
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

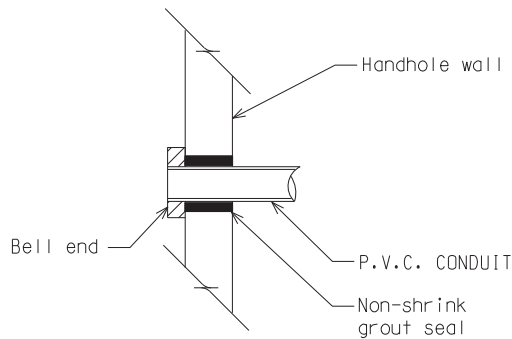
PLAN DATE

SIG-231-A

SHEET
6 of 6



2' PRECAST ROUND HANDHOLE WITH FLOOR



TYPICAL CONDUIT ENTRANCE
AT HANDHOLE

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG240A.dgn Rev. 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

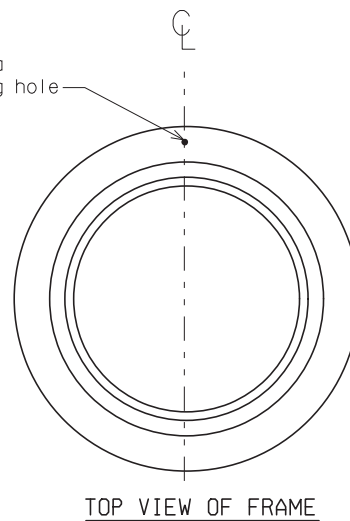
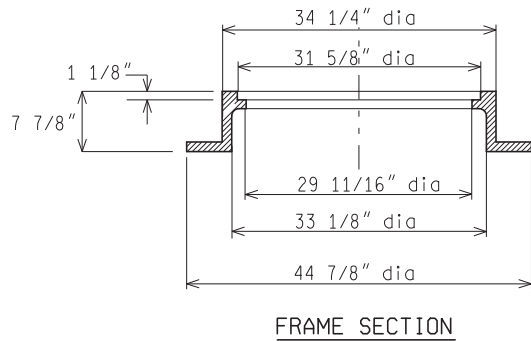
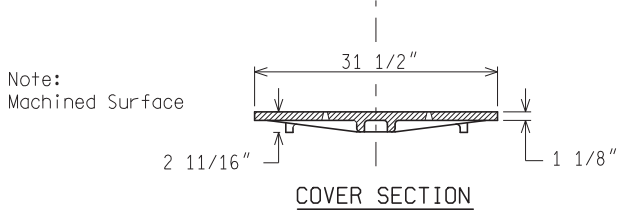
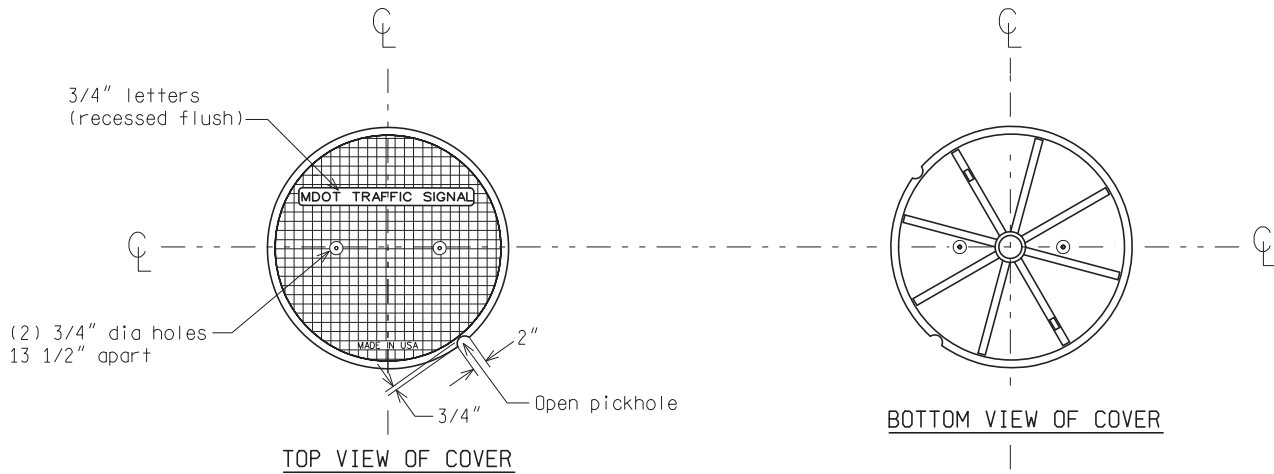
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

HANDHOLE- PRECAST,
POLYMER CONCRETE

PLAN DATE

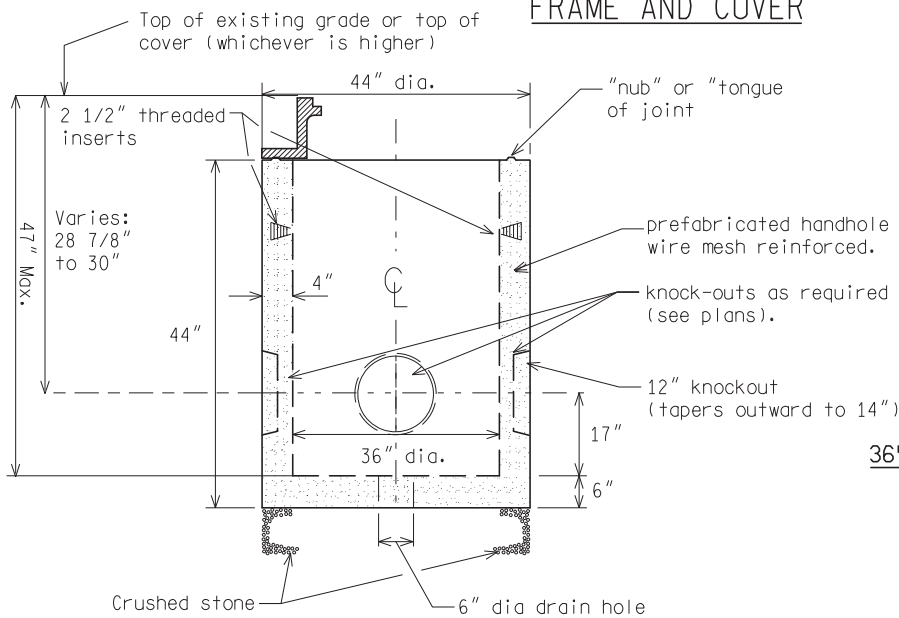
SIG-240-A

SHEET
1 of 6



The H. D. frame and cover shall be manufactured by East Jordan Iron Works, Model 1220 or approved equal.

FRAME AND COVER



NOTE:
Logo imprint may read "Traffic Signal" for non MDOT Installation

36" PRECAST ROUND HANDHOLE SECTION DETAIL

3' DIAMETER ROUND PRECAST CONCRETE HANDHOLE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

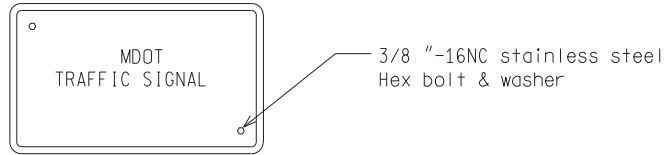
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PLAN DATE

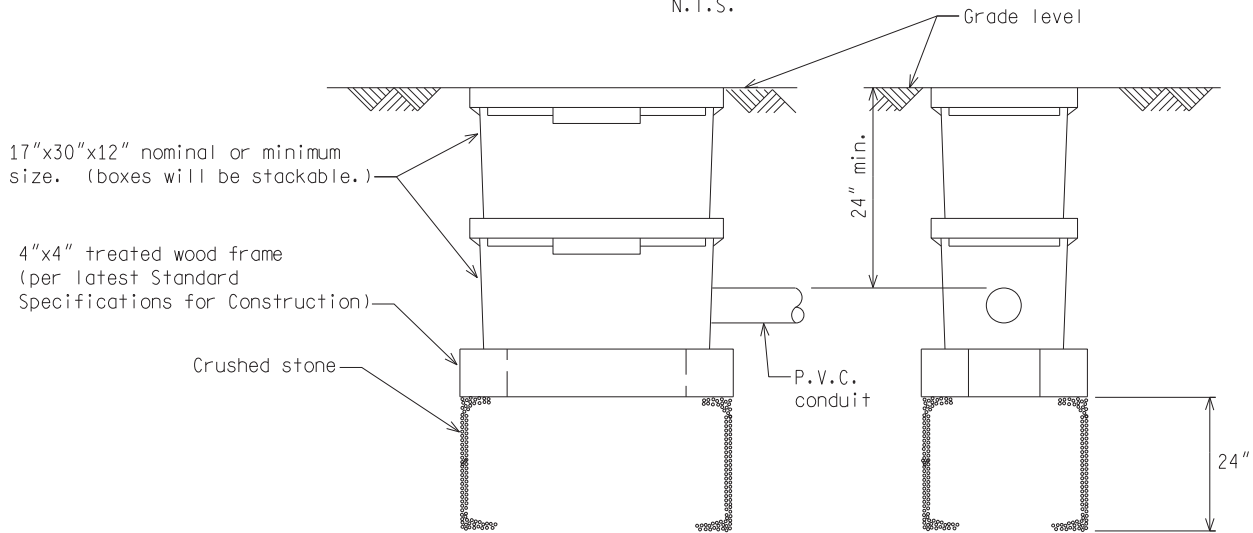
SIG-240-A

SHEET
2 of 6

NOTE:
Logo imprint may read "Traffic Signal"
for non MDOT installations



COVER
N.T.S.



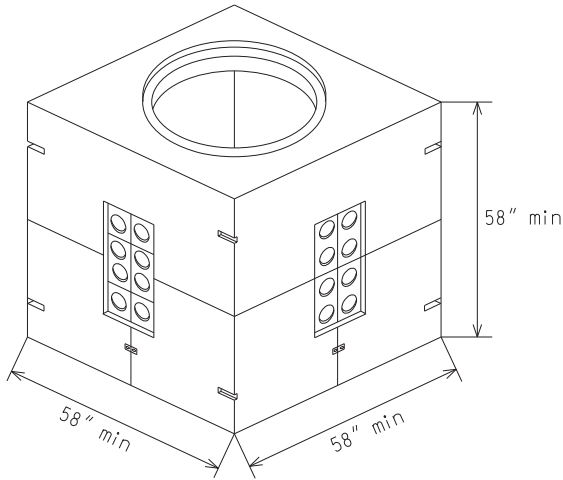
POLYMER CONCRETE HANDHOLE

NOTES PERTAIN TO PRECAST OR BRICK:

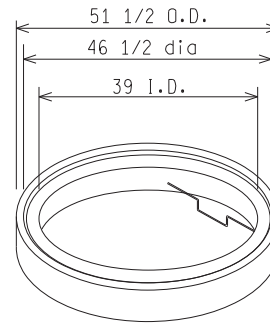
- 1) The material and workmanship shall be in accordance with the current M.D.O.T. Standard Specifications for Construction.
- 2) All concrete masonry shall be grade 30M.
- 3) The inner surface of the handhole shall be smooth.
- 4) Heavy Duty covers shall be castings which meet the requirements of the current specifications for gray iron castings ASTM designation A48 and shall have a minimum strength as provided for Class No. 30 gray iron castings.
- 5) All castings shall be cleaned by sand blasting.
- 6) The seating face of the cover and the seat for the same on the frame if required, shall be ground or machined so that the cover shall have an even bearing on its seat to prevent rocking or tilting.
- 7) The castings shall be free of pouring faults, blow holes, cracks, and other imperfections. They shall be sound, true to form and thickness, clean and neatly finished and shall be coated with tar pitch varnish.
- 8) Light Duty cover shall be bolted to frame with not less than 2 countersunk Hex head bronze bolts.
- 9) The Heavy Duty cover & frame shall be East Jordan Iron Works #8206 Neenah Foundry, #R-6662-HP for square cover or East Jordan Iron Works #2860 Type "A", Neenah Foundry #R-6052 D for circular cover or an approved equal.
- 10) Handhole shall be equipped with cable rack and hooks to train cable.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-240-A	SHEET 3 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG240A.dgn Rev. 02/16/17		PLAN DATE		



NOTE:
Galvanized step is standard with
grade ring ASTM C478.



Dimensions	
A	Min Wt. (lbs)
6	440
9	650
12	860

	Length	Width	Height
Inside	48	48	48
Outside	58	58	58
Recommended Hole size	82	82	--

GRADE RING WITH 39" I.D. &
46 1/2" RECESS

Min Thickness

Min Weight lbs

Wall	5	Top	3300
Roof	5	Bottom	3850
Floor	5	Total	7150

4' x 4' x 4' PRECAST CONCRETE HANDHOLE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

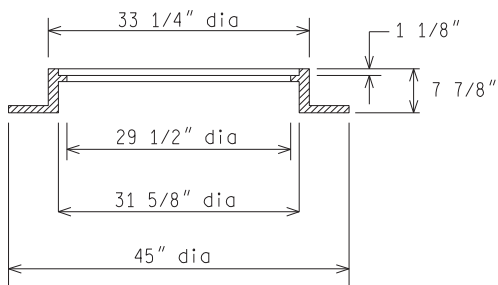
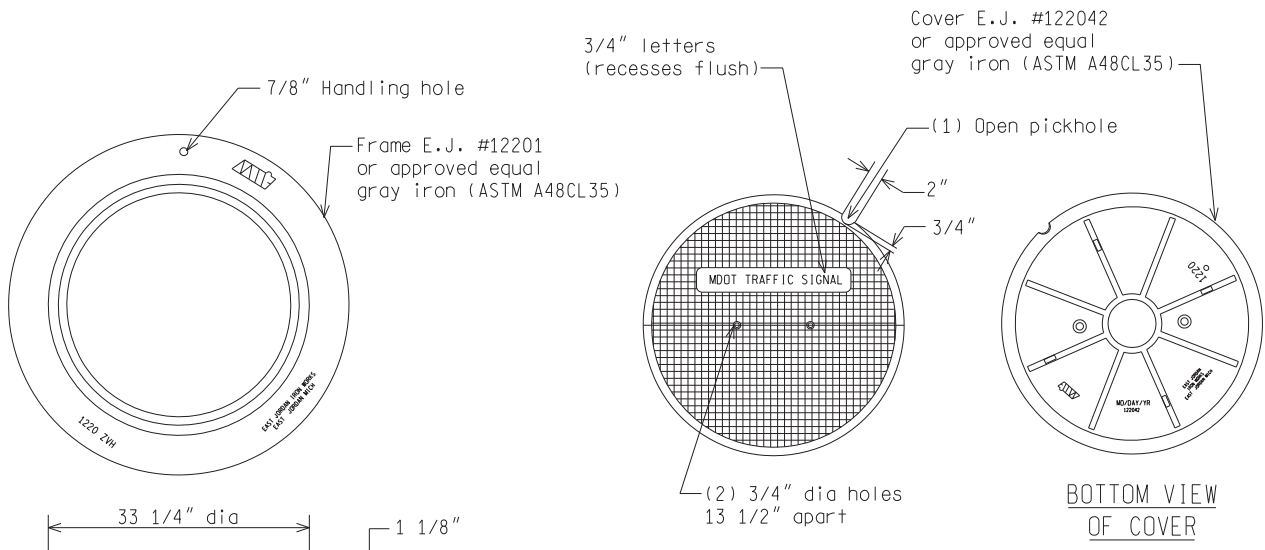
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PLAN DATE

SIG-240-A

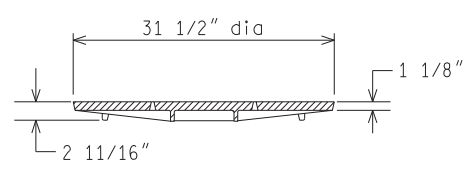
SHEET
4 of 6

NOTE:
 Logo imprint it on cover shall
 read "MDOT Traffic Signal" for
 MDOT installations



FRAME SECTION
MANHOLE FRAME
(HEAVY DUTY)
 Estimated weight 410 lbs

NOTE:
 Machined surface



COVER SECTION
MANHOLE COVER
(HEAVY DUTY)
 Estimated weight 245 lbs

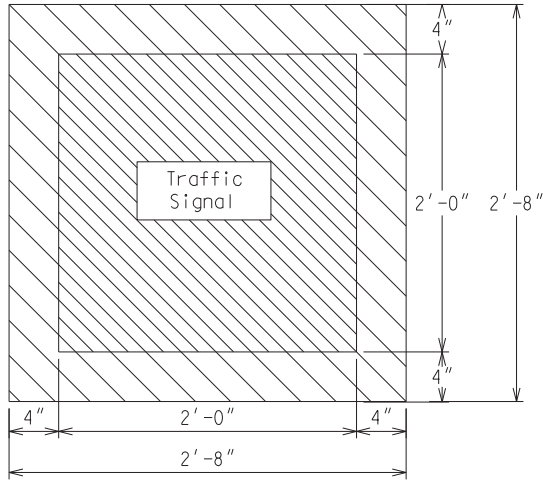
NOTE:
 Machined surface

4' x 4' x 4' PRECAST CONCRETE HANDHOLE

NOT TO SCALE

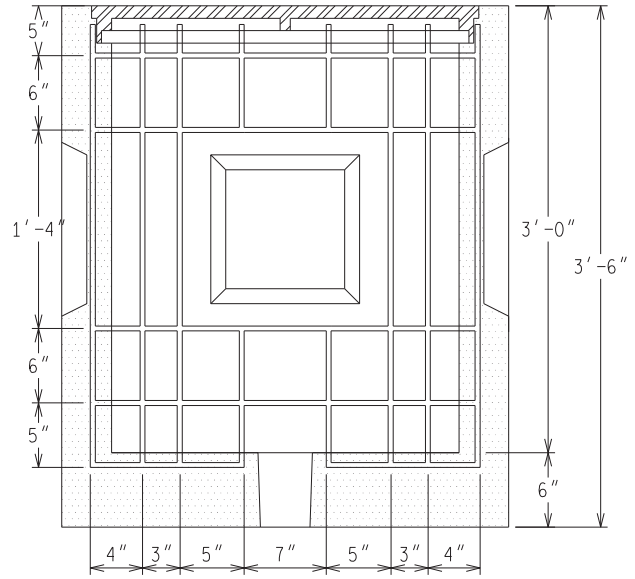
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-240-A	SHEET 5 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG240A.dgn Rev. 02/16/17				

Concrete: 4500 p.s.i. @ 28 days
 Reinforcement: Grade 60 rebar
 All bars are #4



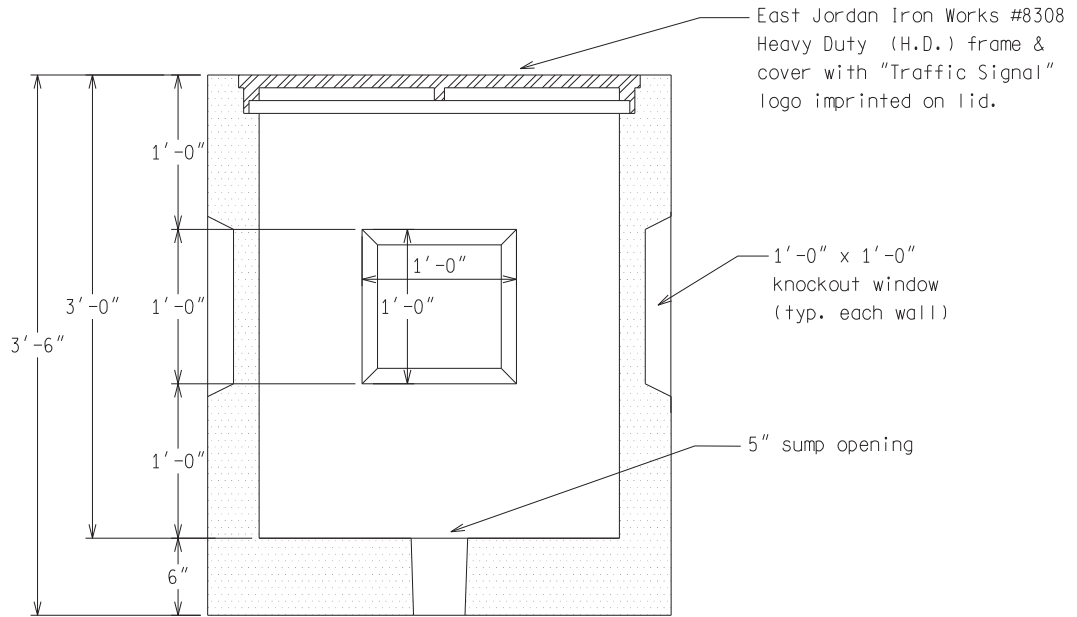
PLAN VIEW

With out frame & cover



SECTION VIEW

Typ. reinforcement all walls



SECTION VIEW

2' x 2' SQUARE x 3' HANDHOLE

For use on Oakland County roads only.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

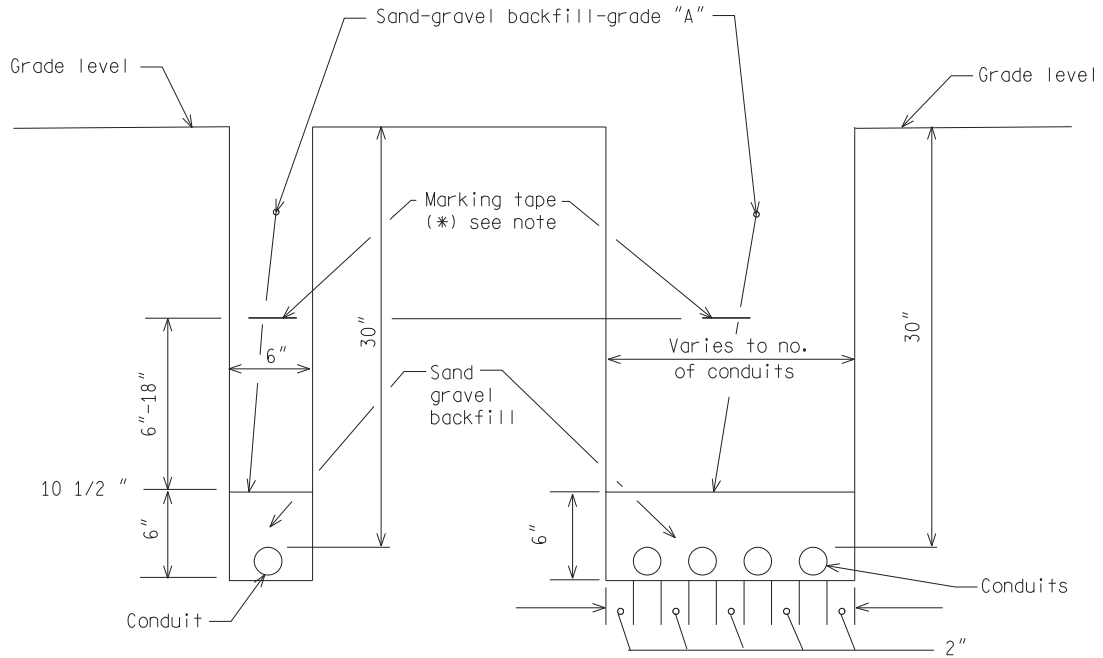
(SPECIAL DETAIL)
 FHWA APPROVAL DATE

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PLAN DATE

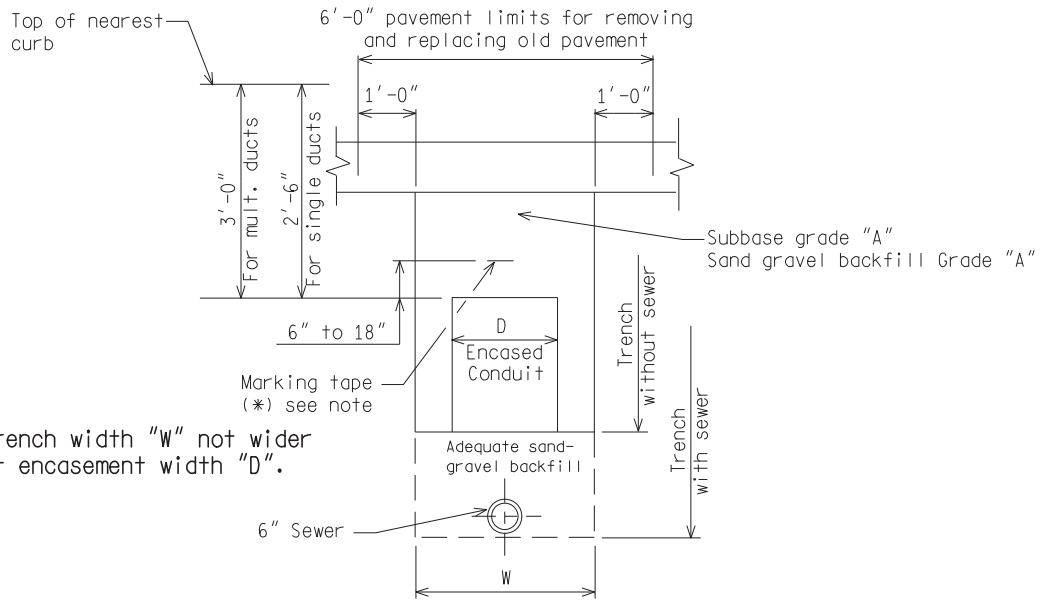
SIG-240-A

SHEET
 6 of 6



(*) NOTE:
 Marking tape shall have proper logo as supplied
 by the Engineer and installed by the Contractor.

DIRECT BURIAL CONDUIT(S)/CABLE(S)



NOTE:
 Preferred trench width "W" not wider
 than conduit encasement width "D".

TYPICAL SECTION OF TRENCH ENCASED CONDUIT

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG250A.dgn Rev: 02/16/17



PREPARED BY
 TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

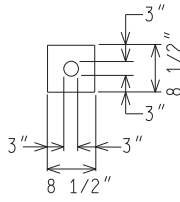
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
CONDUIT
 (DIRECT BURIAL/ENCASED)

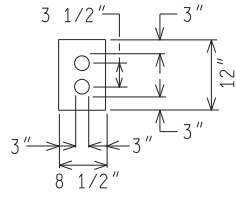
SIG-250-A

PLAN DATE

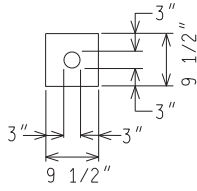
SHEET
 1 of 2



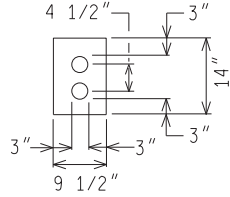
1 2" CONDUIT



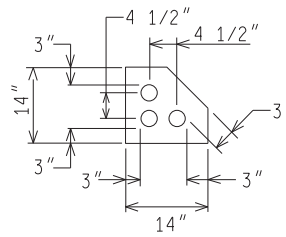
2 2" CONDUIT



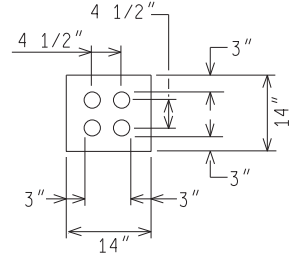
ONE
2 1/2" CONDUIT



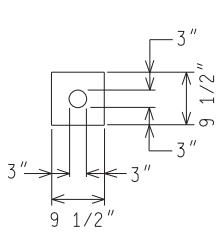
TWO
2 1/2" CONDUIT



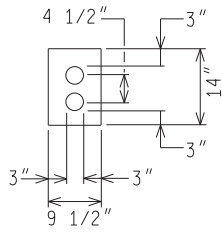
THREE
2 1/2" CONDUIT



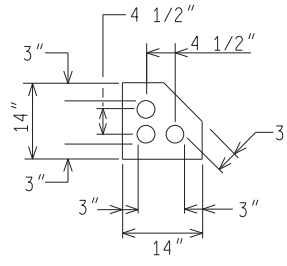
FOUR
2 1/2" CONDUIT



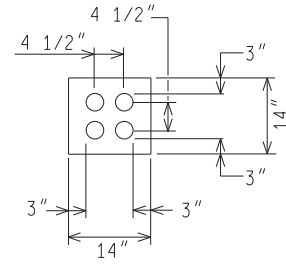
1 3" CONDUIT



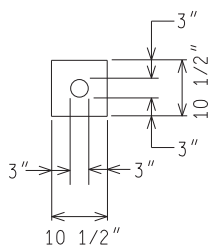
2 3" CONDUIT



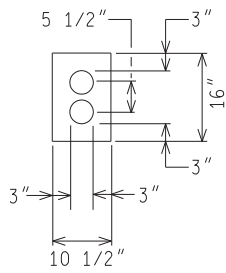
3 3" CONDUIT



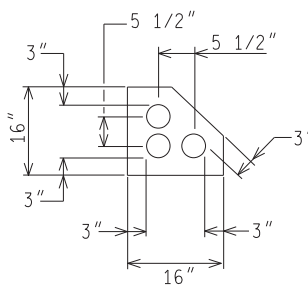
4 3" CONDUIT



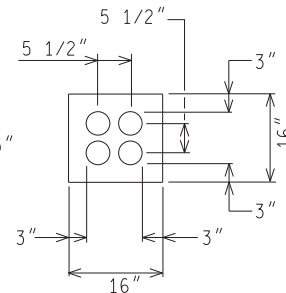
1 4" CONDUIT



2 4" CONDUIT



3 4" CONDUIT



4 4" CONDUIT

ENCASED CONDUIT SECTIONS

NOT TO SCALE

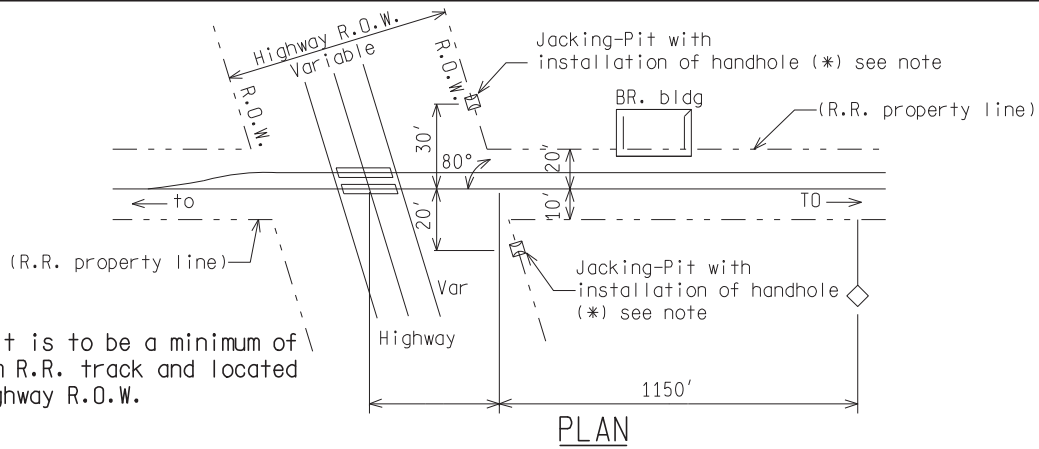
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

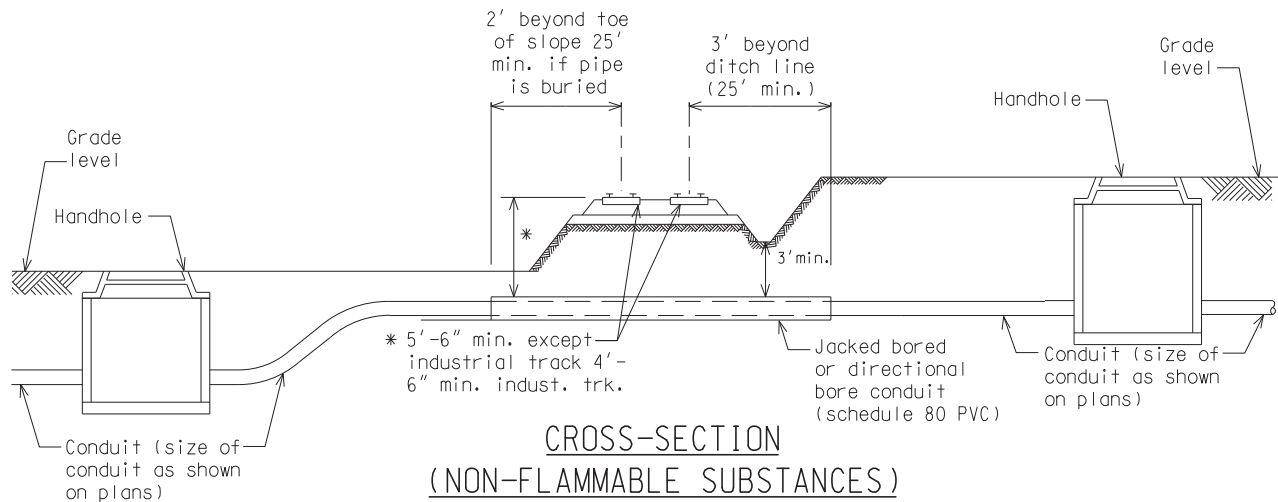
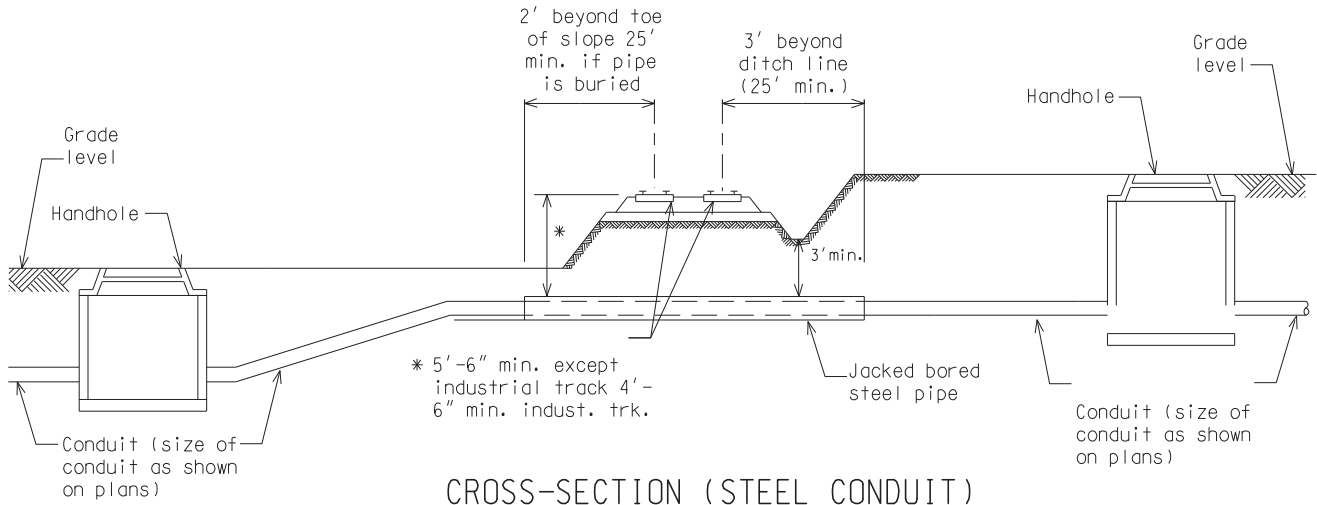
PLAN DATE

SIG-250-A

SHEET
2 of 2



PLAN



HORIZONTAL DISTANCES ARE MEASURED AT RIGHT ANGLES TO CENTERLINE OF TRACK

NOT TO SCALE

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TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

CONDUIT UNDER
RAILROAD TRACKS

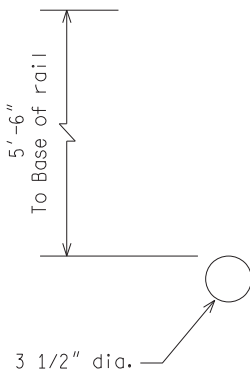
SIG-251-A

PLAN DATE

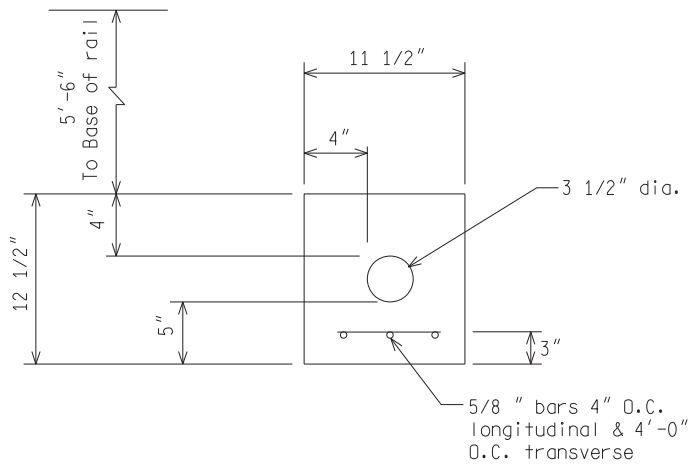
SHEET
1 of 2

NOTES:

- 1) The conduit shall be installed at a min. depth of 5'-6" with reinforced bars (if required per R.R. requirements) as shown in detail and as indicated on the plans within the entire crossing of railroad R.O.W.
- 2) Track support devices shall be placed & removed to carry the railroad tracks over the open trench installation with the trench properly supported with sheeting & any other supports required to complete the conduit installation within the railroad R.O.W. the extra cost of such installation shall be incidental to the encased conduit item.
- 3) Contractor shall contact Division Engineer of railroad before starting excavation for conduit installation.
- 4) Contractor shall reimburse railroad Co. for services performed by railroad Co. where required.
- 5) All work shall be conducted so as not to interfere with, interrupt or endanger the integrity of rail operation.



(1) 3" CONDUIT
N.T.S.



(1) 3" REINFORCED CONDUIT
N.T.S.

CONDUIT UNDER RAILROAD TRACKS

NOT TO SCALE

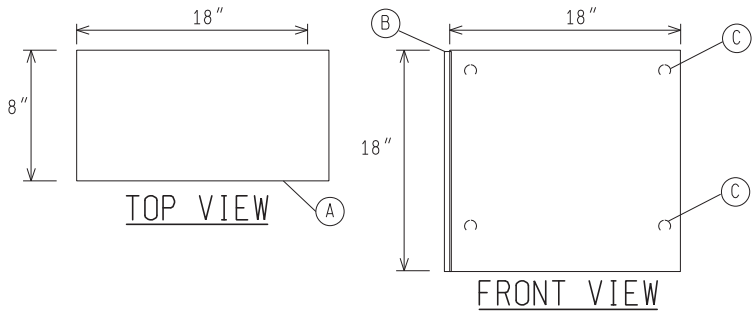
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BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

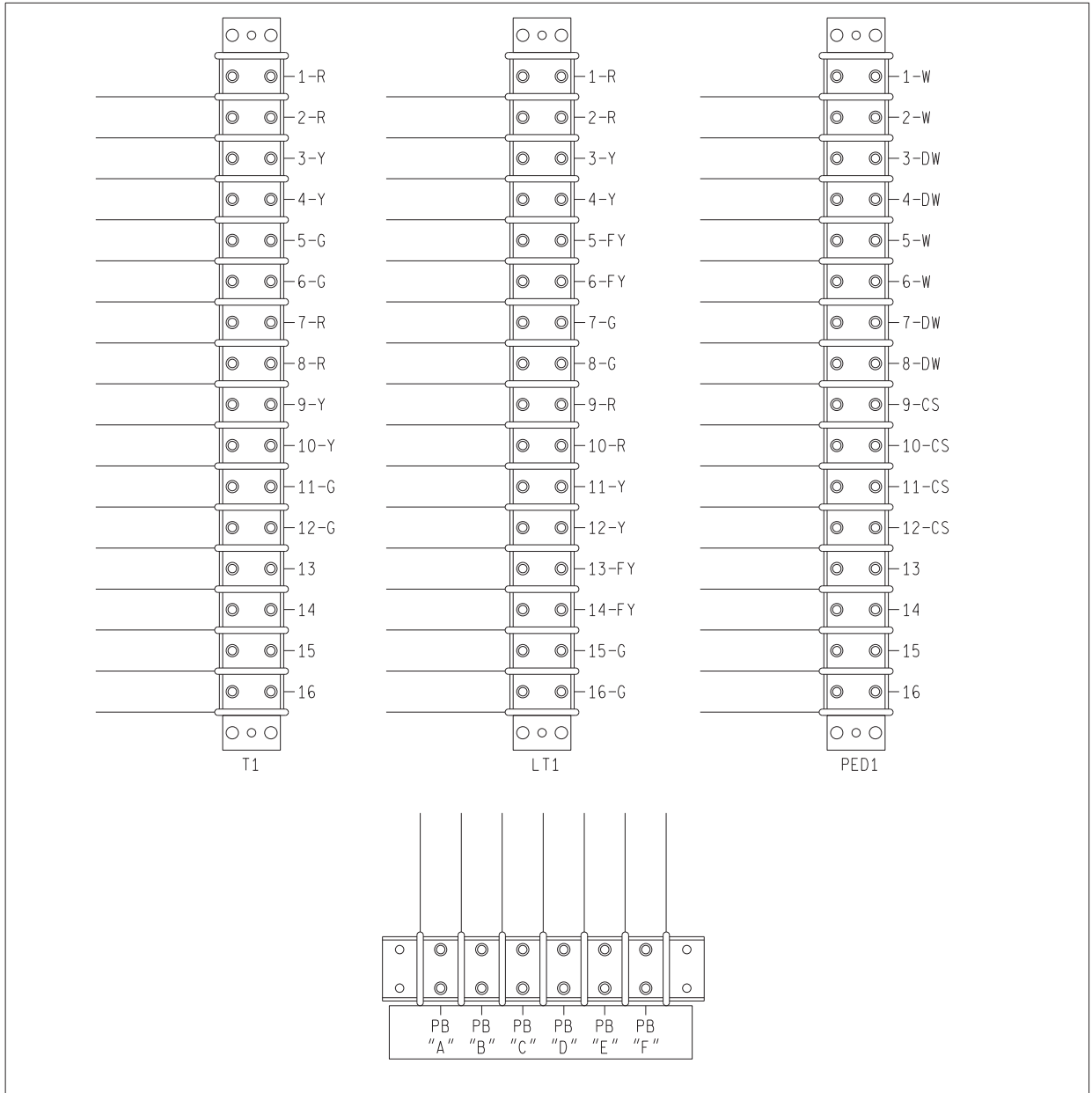
SIG-251-A

SHEET
2 of 2



- (A) .125 inch ASTM 5052-H32 Aluminum
- (B) Stainless steel continuous hinge on left side for door opening
- (C) Predrilled holes (4) on back of enclosure to accept two cabinet mounting brackets.

SPLICE BOX ENCLOSURE



SPLICE BOX WIRING DIAGRAM

NOT TO SCALE

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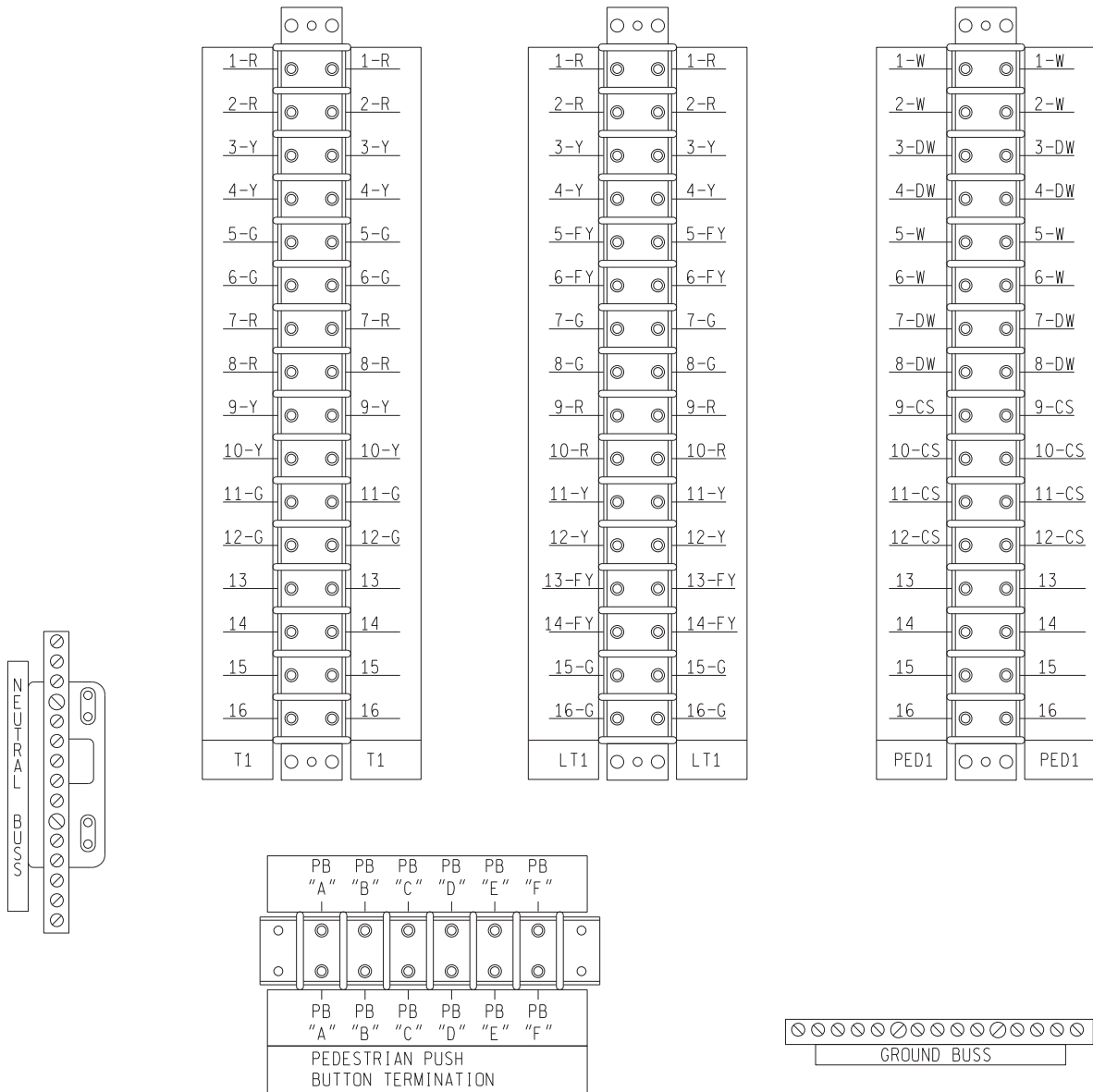
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

SPLICE BOX

SIG-260-A

PLAN DATE

SHEET
1 of 3



SPLICE BOX BACK PANEL

NOT TO SCALE

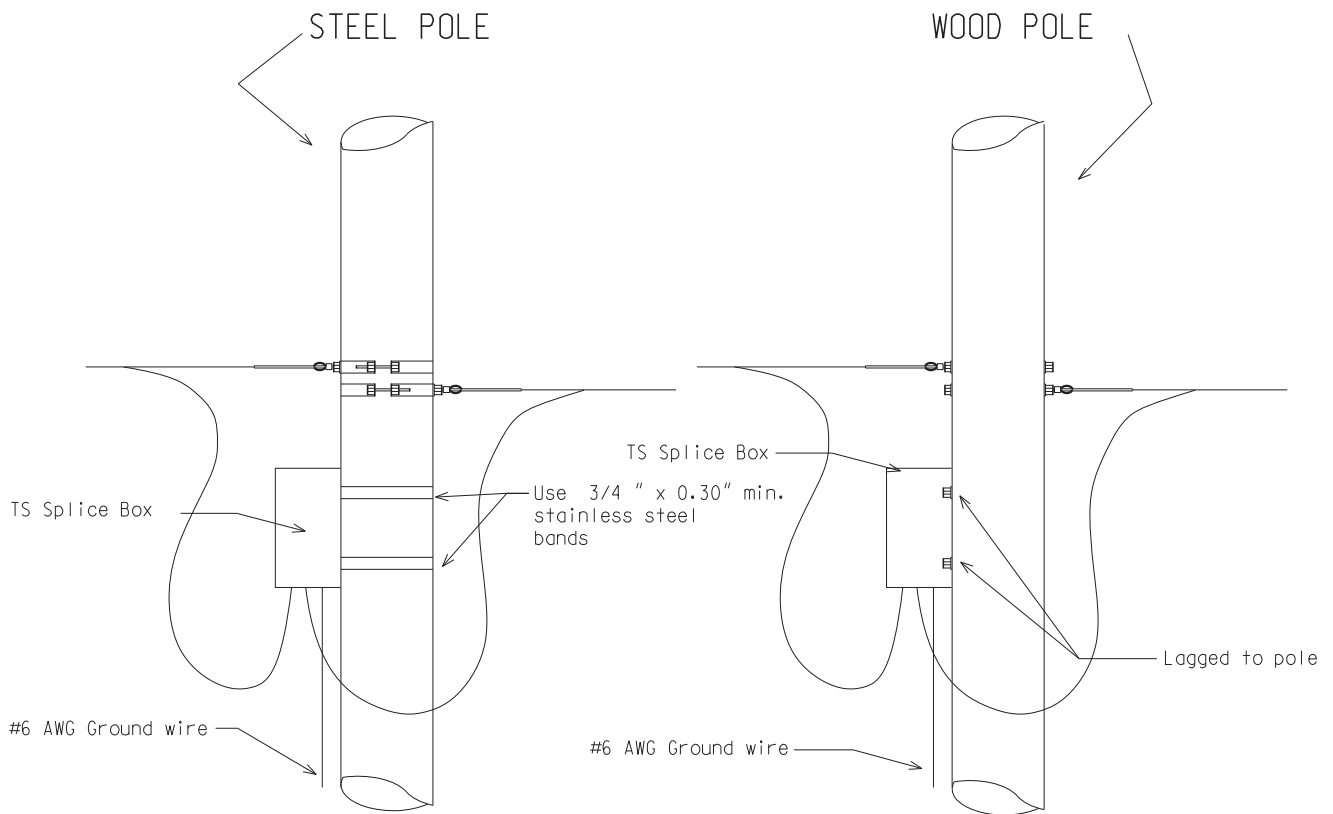
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BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

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FHWA APPROVAL DATE

PLAN DATE

SIG-260-A

SHEET
2 of 3



- NOTES: 1) Splice box to be constructed to provide a weather tight enclosure.
 2) All cables shall enter TS splice box through bottom of enclosure with a water tight fitting.
 3) Bushing for cable entrance into enclosure to be liquid tight and sized per cable used.

TRAFFIC SIGNAL (TS) SPLICE BOX MOUNTED ON STEEL OR WOOD POLES

NOT TO SCALE

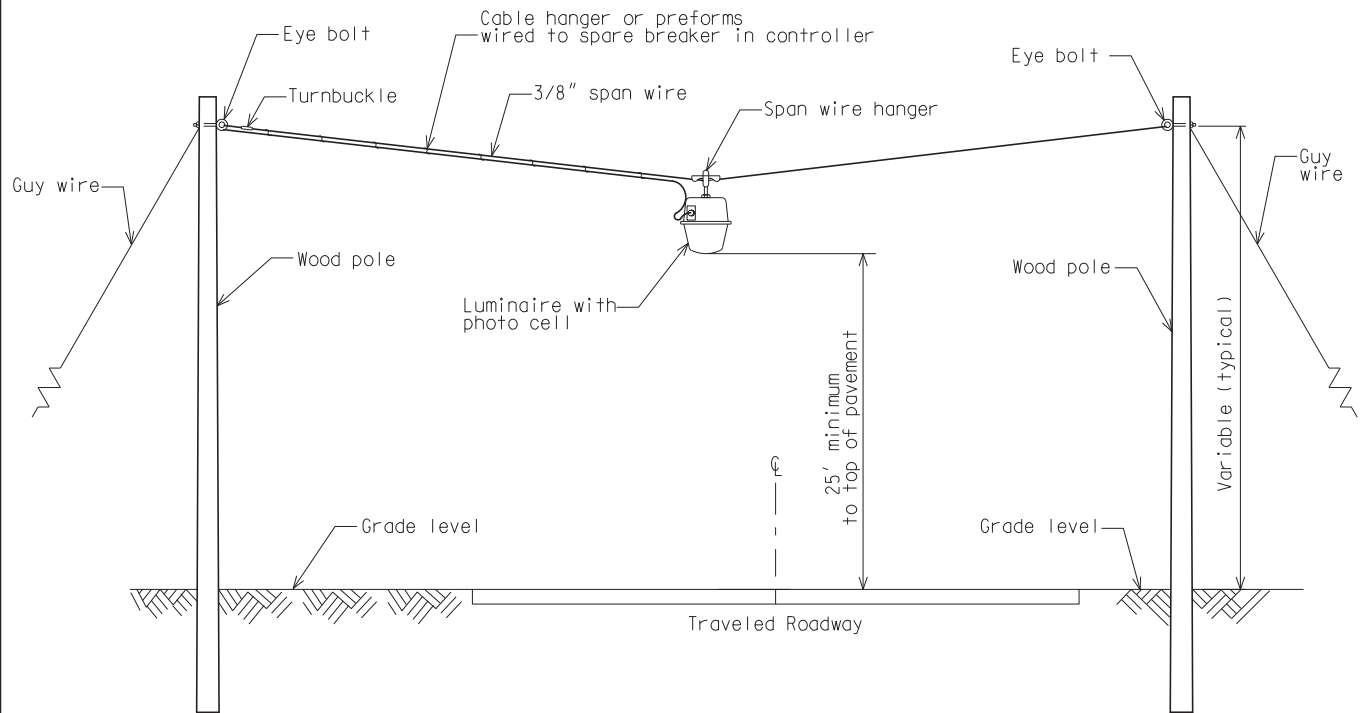
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SIG-260-A

SHEET
 3 of 3



OVERHEAD LIGHTING DETAIL

TEMPORARY STREET LIGHTING TYPICAL ELECTRICAL DETAIL

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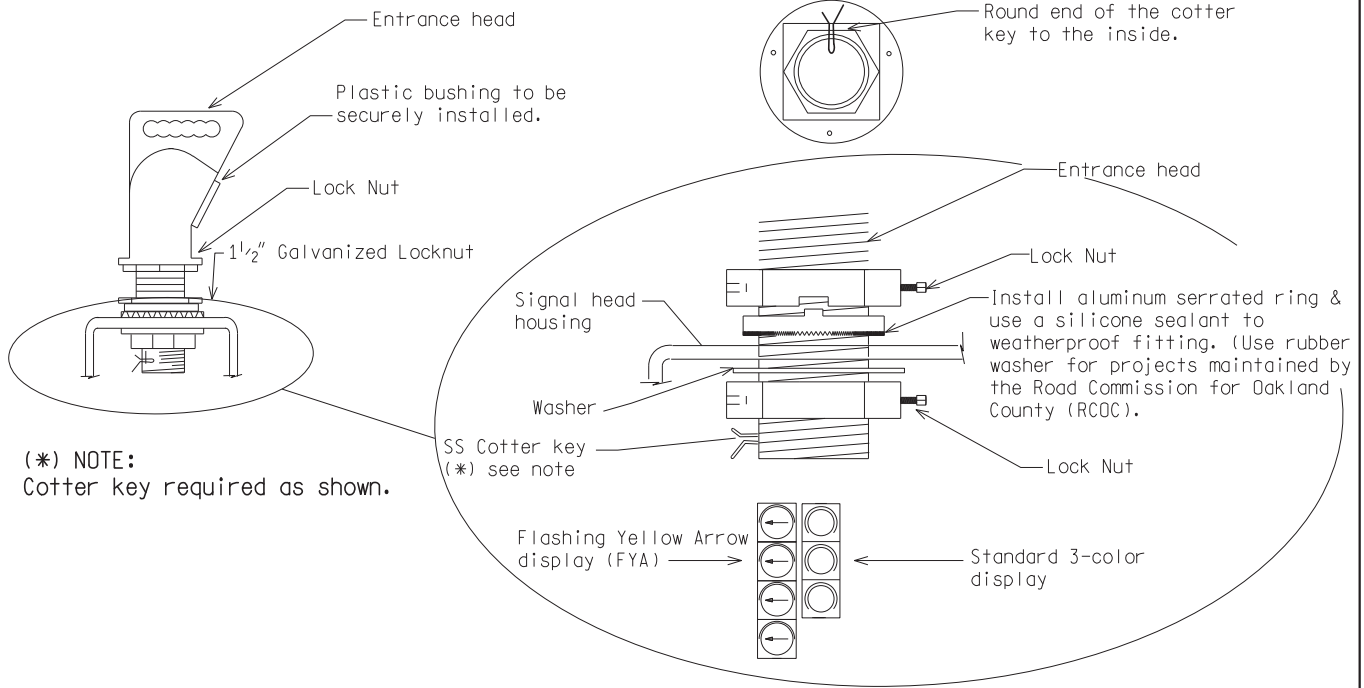
(SPECIAL DETAIL)
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**TYPICAL TEMPORARY STREET
LIGHTING ELECTRICAL DETAIL**

PLAN DATE

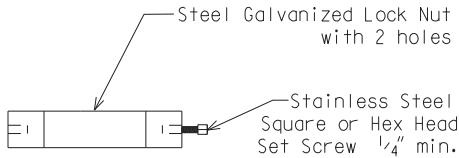
SIG-270-A

SHEET
1 of 1

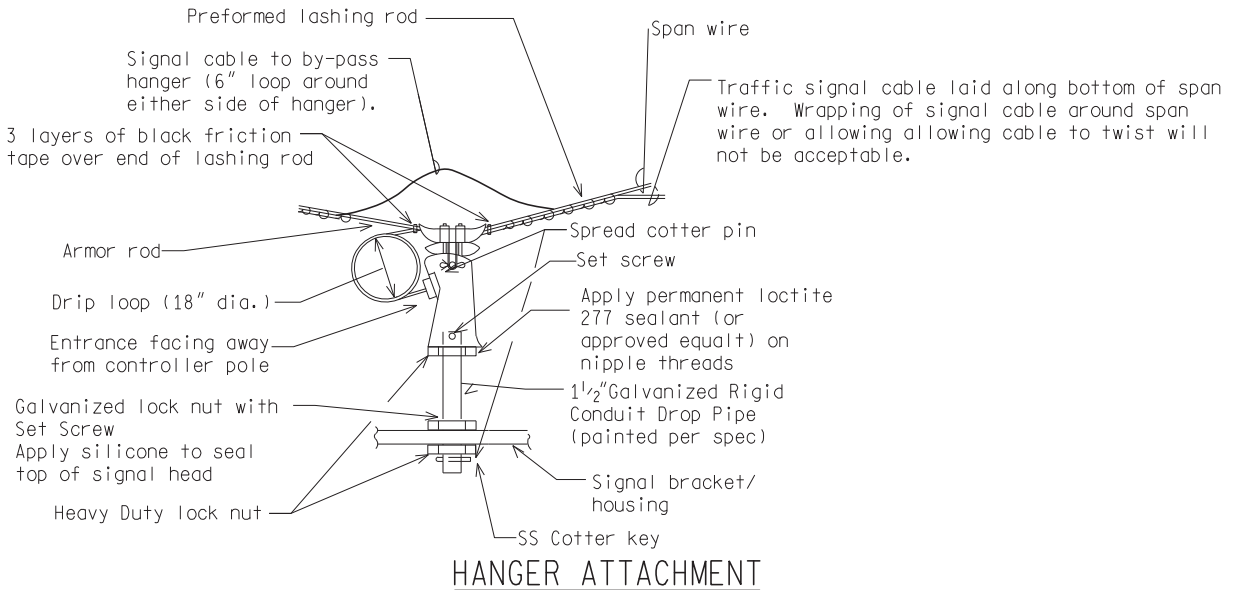


(* NOTE:
Cotter key required as shown.

ONE-WAY TRAFFIC SIGNAL HEAD



OH SIGNAL LOCK NUT DETAIL



HANGER ATTACHMENT

NOT TO SCALE

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(SPECIAL DETAIL)

FHWA APPROVAL DATE

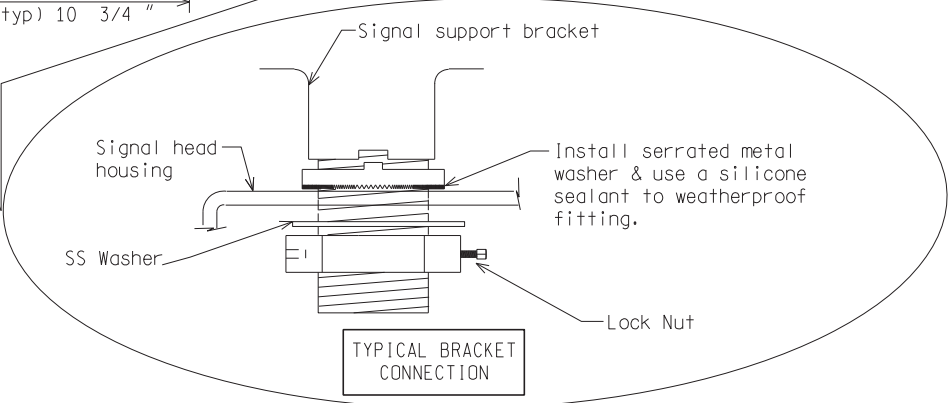
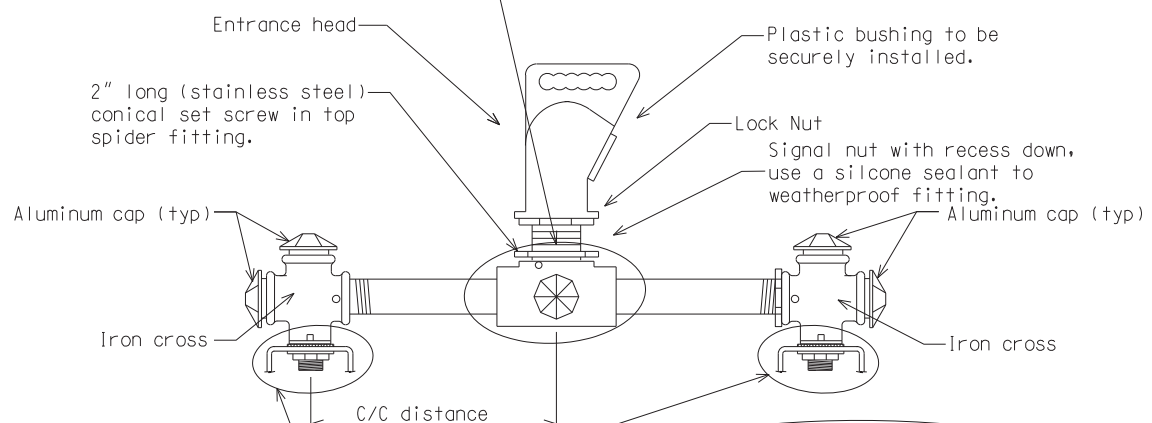
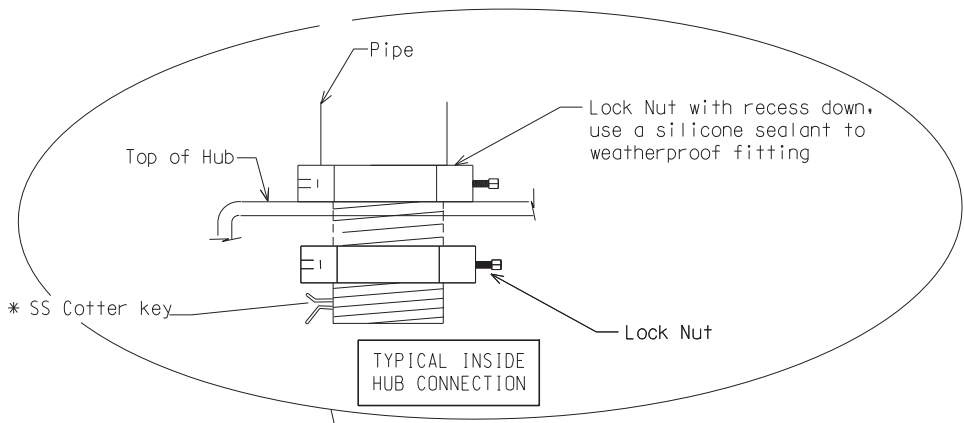
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**SPAN WIRE MOUNTED
T.S. BRACKET ASSEMBLY**

PLAN DATE

SIG-300-A

SHEET
1 of 3



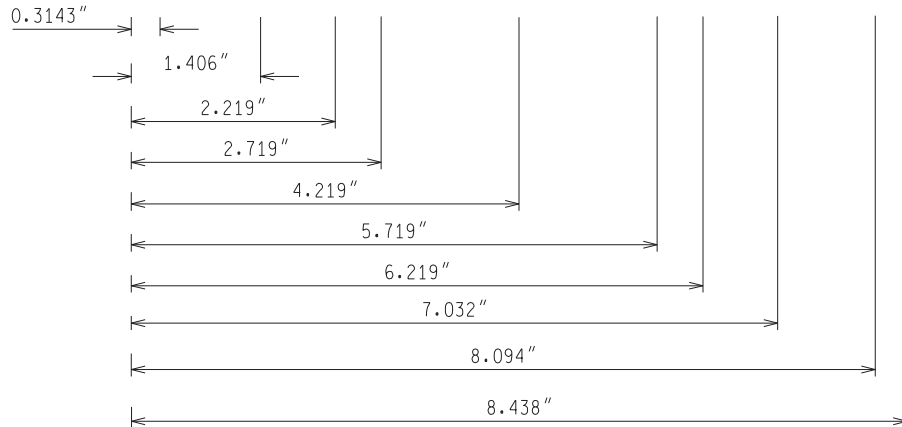
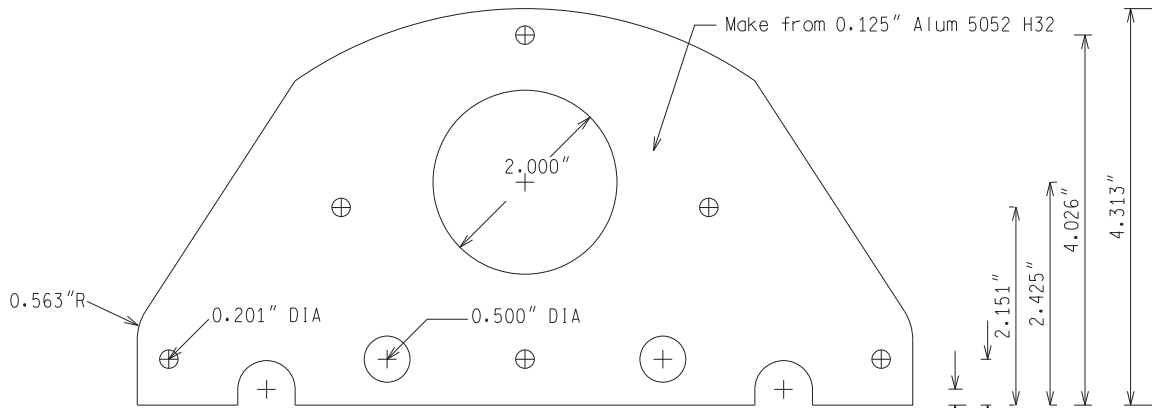
NOTE:
 2-way T.S. shown
 3-way T.S. & 4-way similar

MULTIPLE-WAY TRAFFIC SIGNAL HEAD(S)

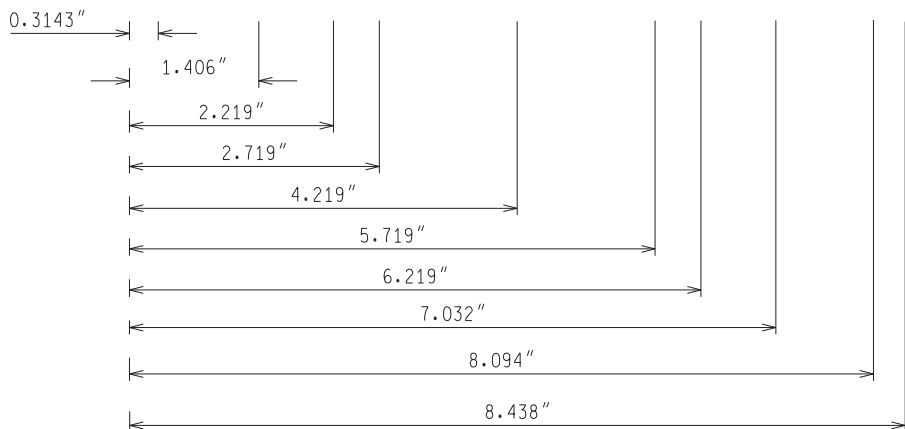
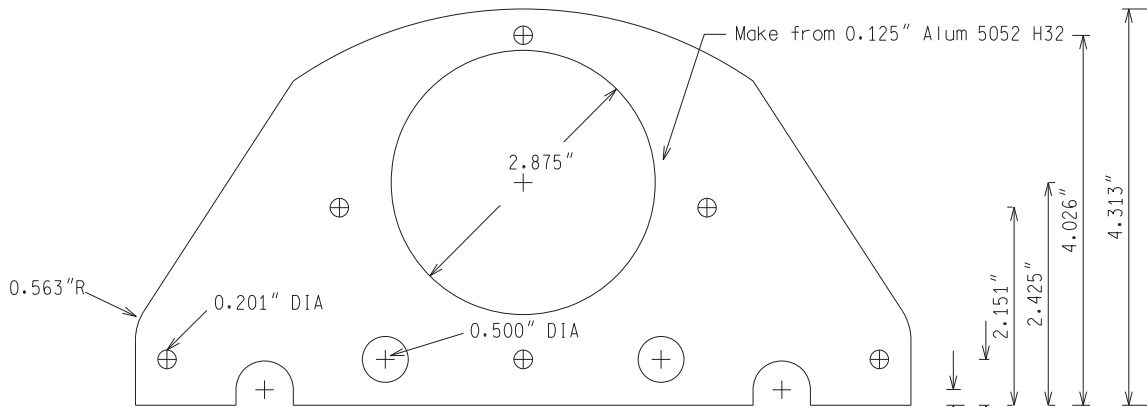
- NOTE:
- 1) Exterior surface of all mounting assemble located below span clamps, including stems, lock nuts, and related hardware must match the current FHWA Highway yellow color tolerance chart per the Standard Specifications for Construction.
 - 2) Tolerance within $\pm 1/8"$ for all bracketing.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-300-A	SHEET 2 of 3
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG300A.dgn Rev. 02/16/17		PLAN DATE		



INSIDE SIGNAL HOUSING



OUTSIDE SIGNAL HOUSING

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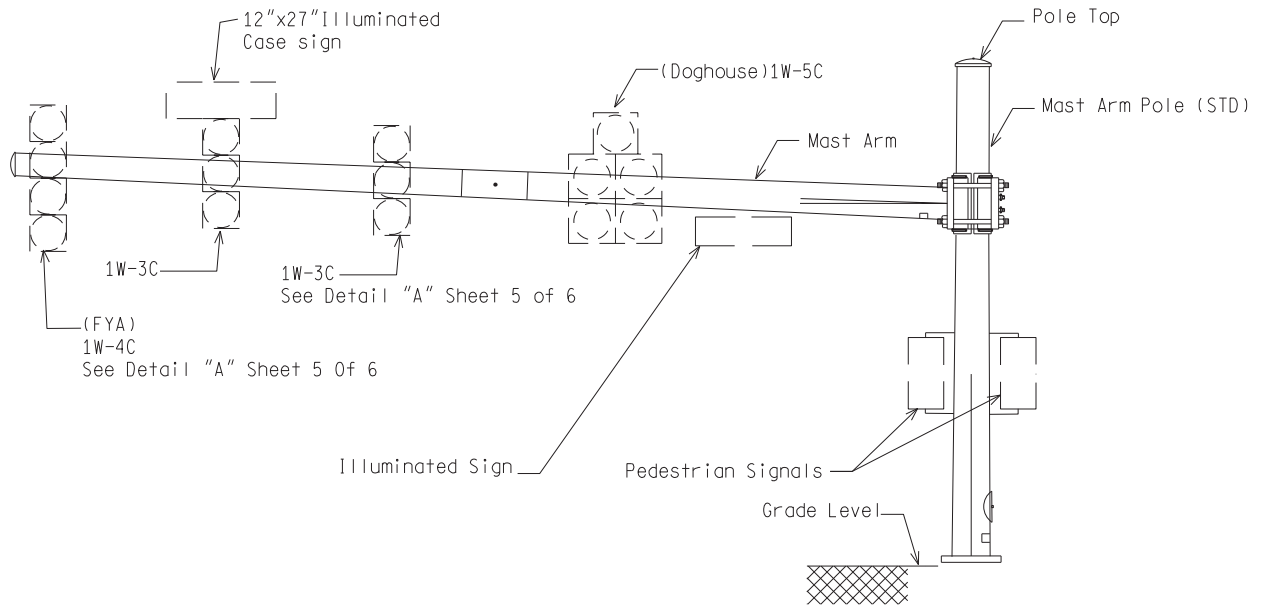
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BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

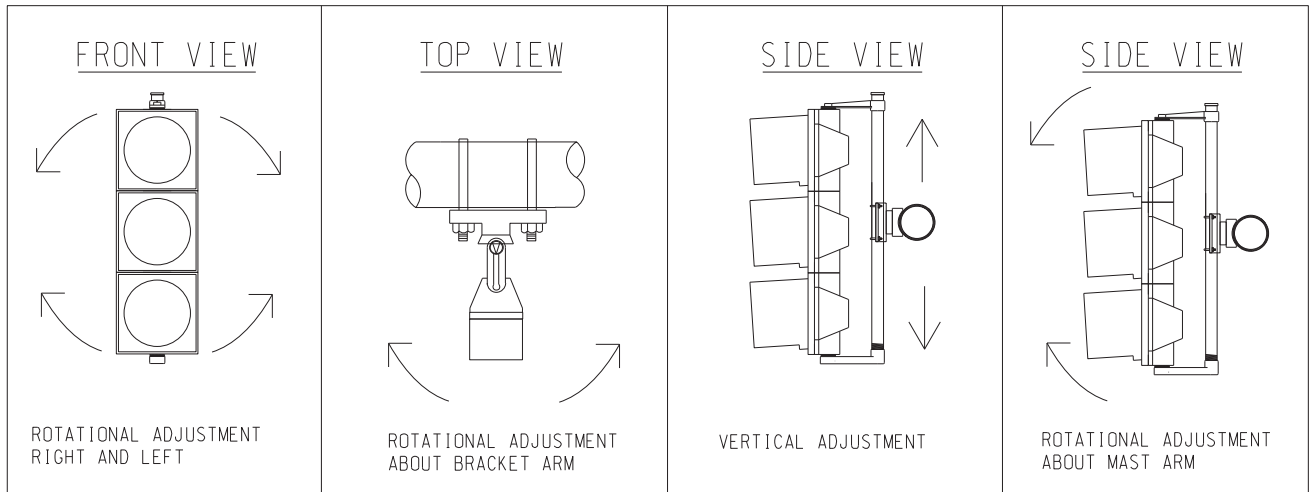
PLAN DATE

SIG-300-A

SHEET
3 of 3



TYPICAL SIGNAL DISPLAYS



SIGNAL HEAD BRACKET ADJUSTMENT

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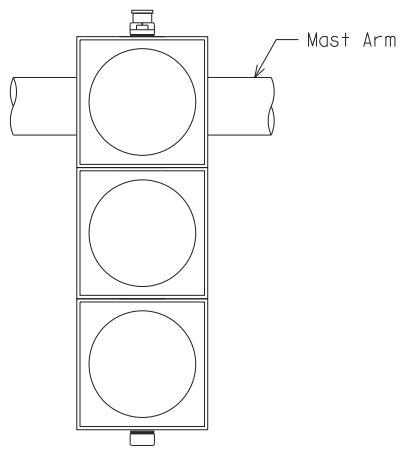
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

MAST ARM MOUNTED
T.S. BRACKET ASSEMBLY

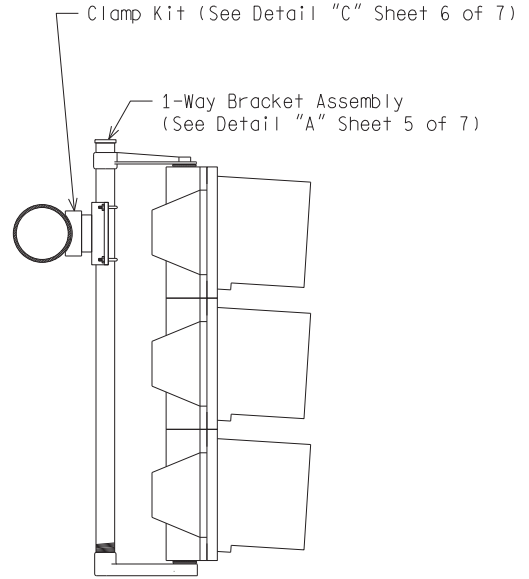
PLAN DATE

SIG-301-A

SHEET
1 of 7

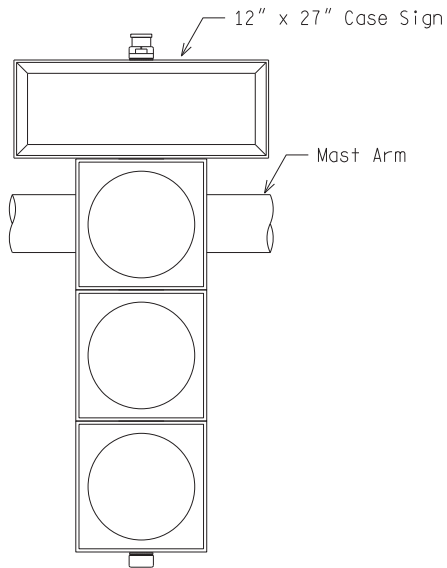


FRONT VIEW

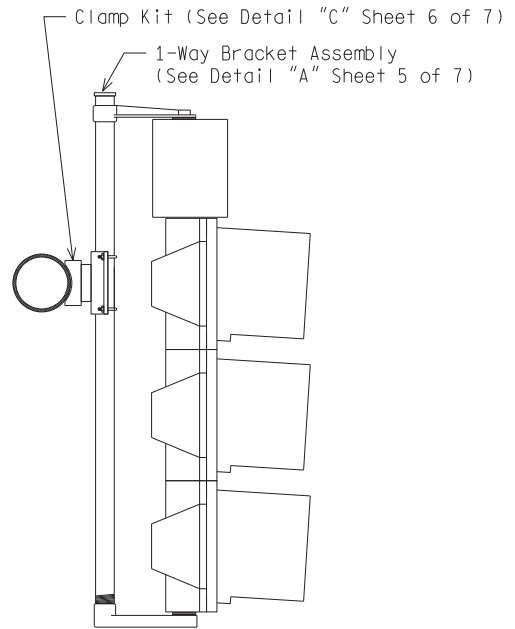


SIDE VIEW

1W-3C



FRONT VIEW



SIDE VIEW

1W-3C With 12\" x 27\" Case Sign

NOT TO SCALE

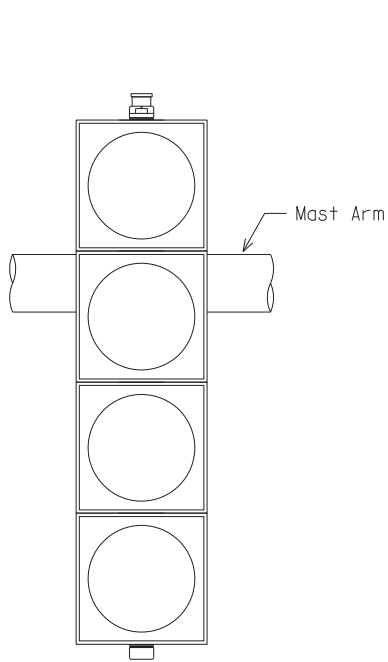
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

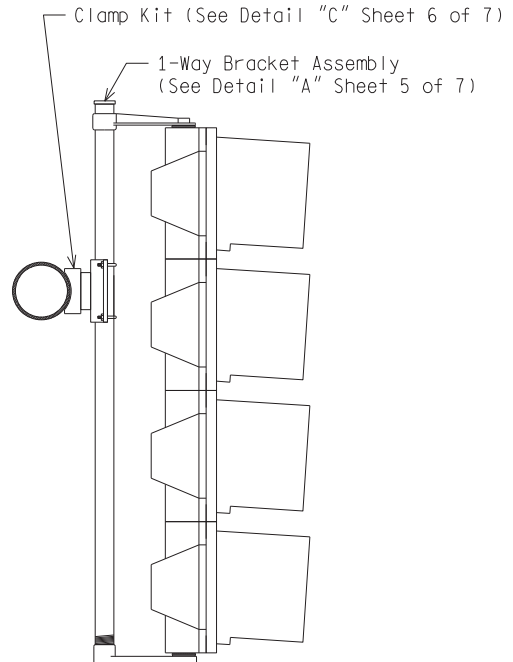
PLAN DATE

SIG-301-A

SHEET
2 of 7

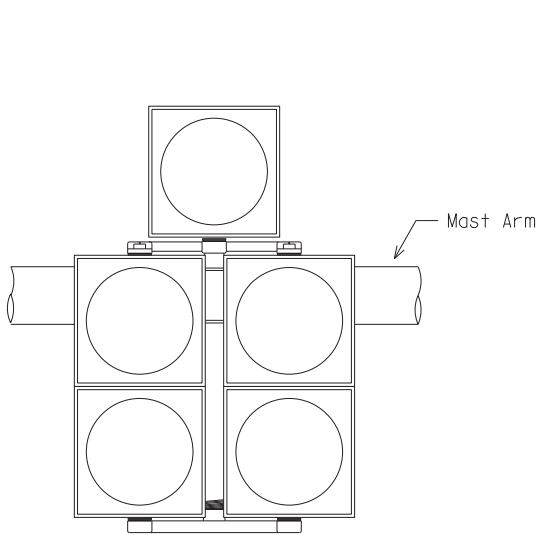


FRONT VIEW

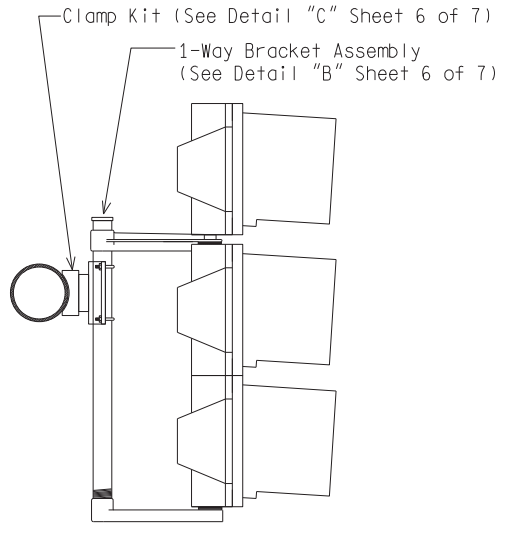


SIDE VIEW

1W-4C (FYA)



FRONT VIEW



SIDE VIEW

1W-5C (Doghouse)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

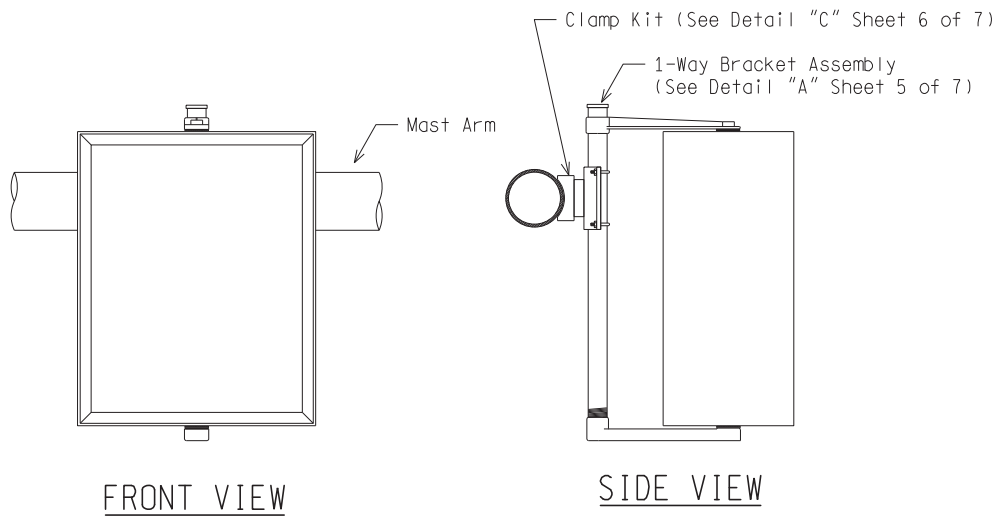
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PLAN DATE

SIG-301-A

SHEET
3 of 7



1W-Case Sign (24" x 30" Shown)

NOT TO SCALE

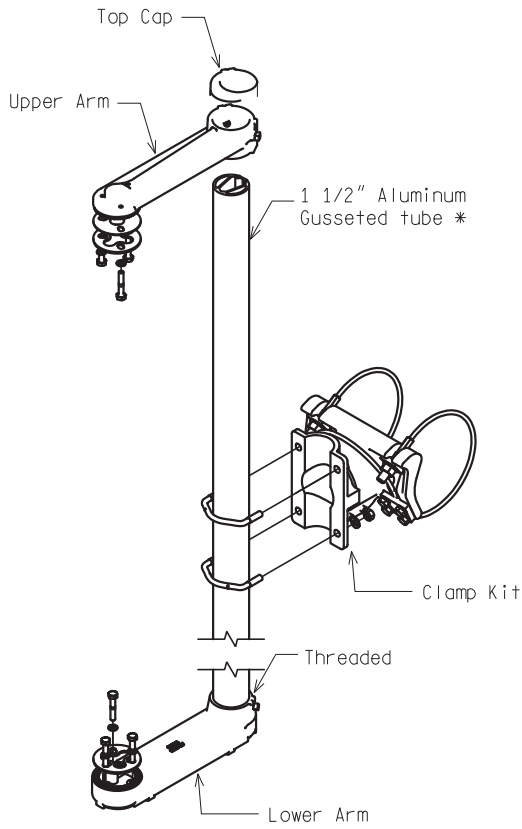
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

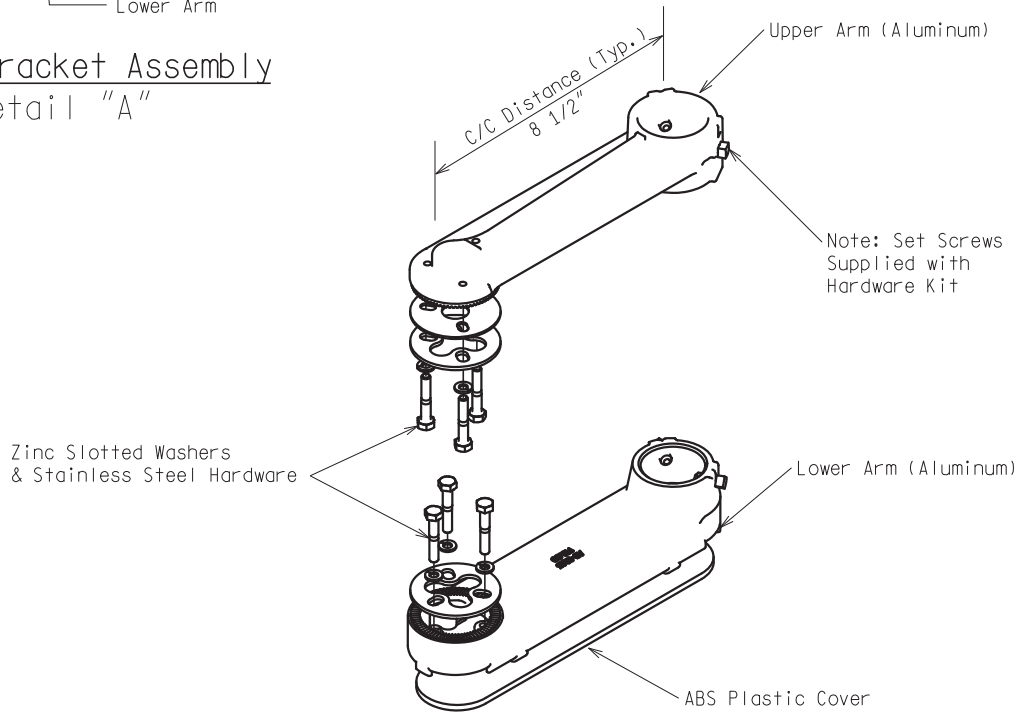
SIG-301-A

SHEET
4 of 7



* Note: Use 46" tube for 3 section T.S.
Use 58" tube for 4 section T.S.

1-WAY Bracket Assembly
Detail "A"



1-WAY Bracket Arm Assembly

NOT TO SCALE

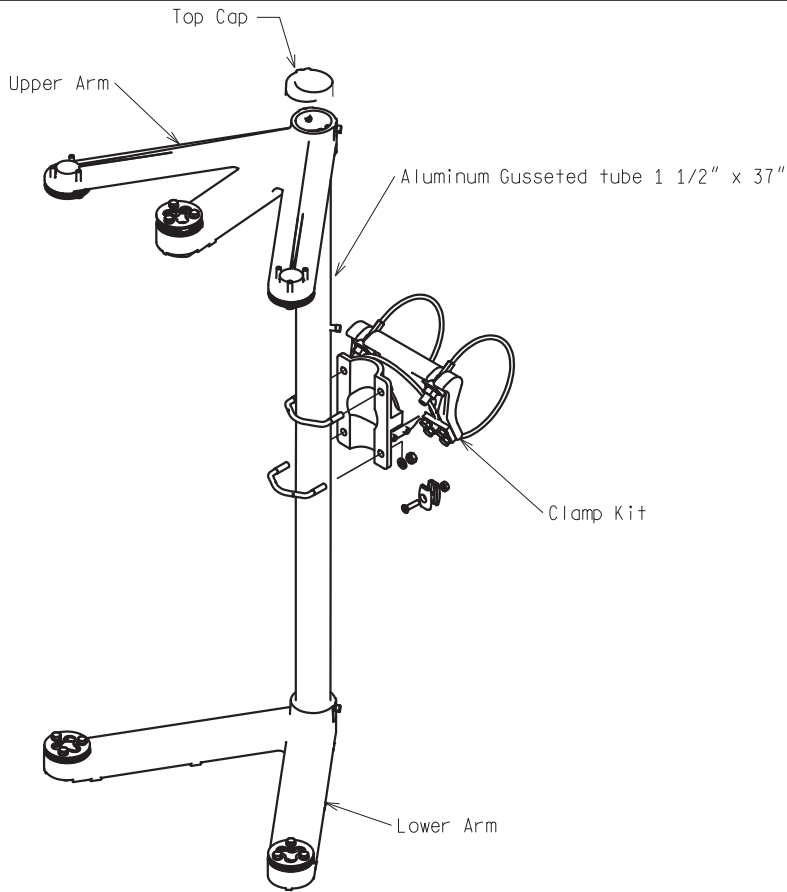
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

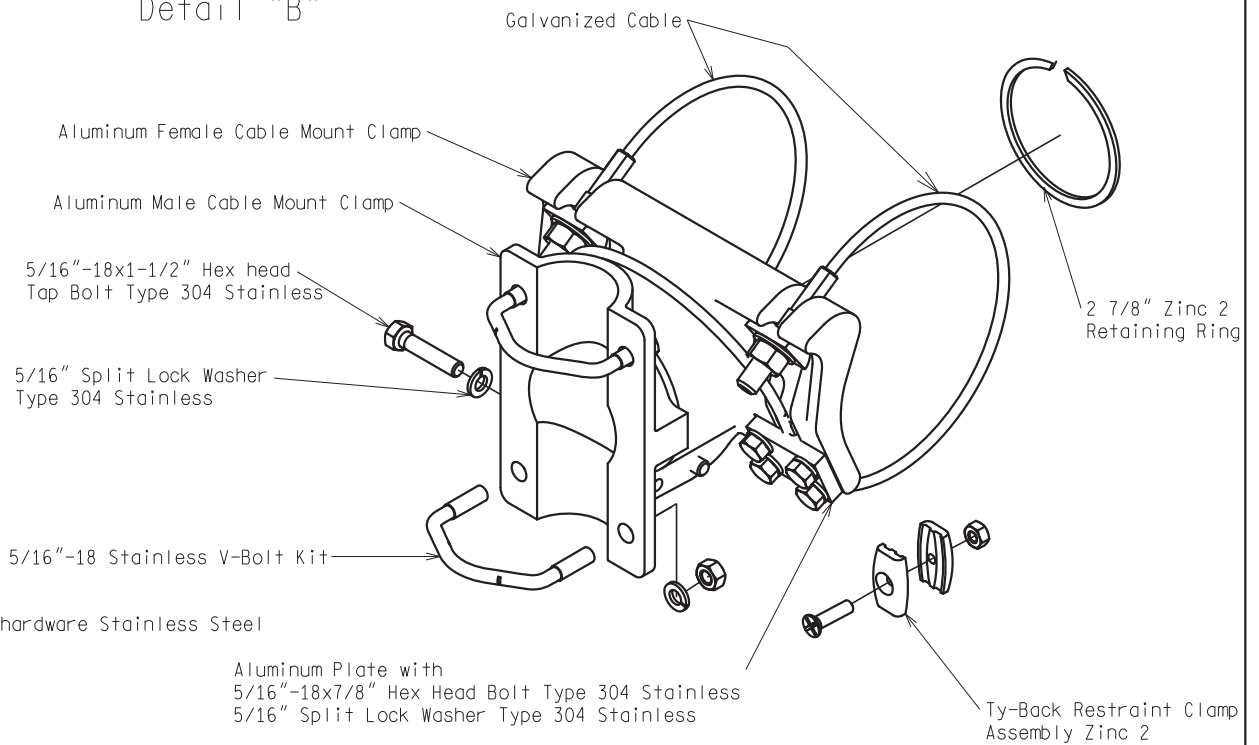
PLAN DATE

SIG-301-A

SHEET
5 of 7



1-WAY 5-Section Cluster Bracket Assembly
Detail "B"



Note: All hardware Stainless Steel

Aluminum Clamp With Galvanized Cable
Detail "C"

NOT TO SCALE

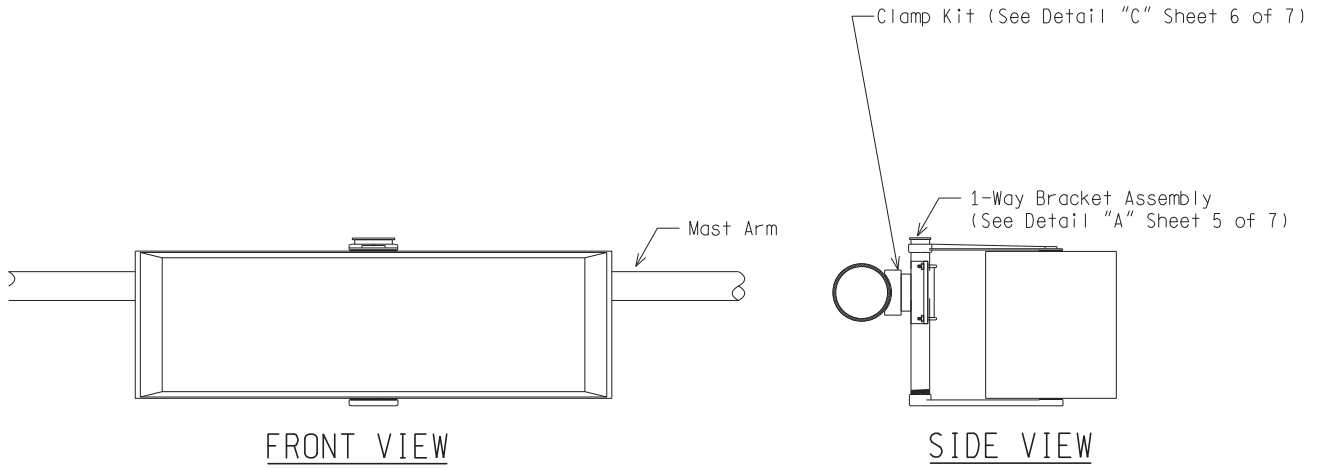
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

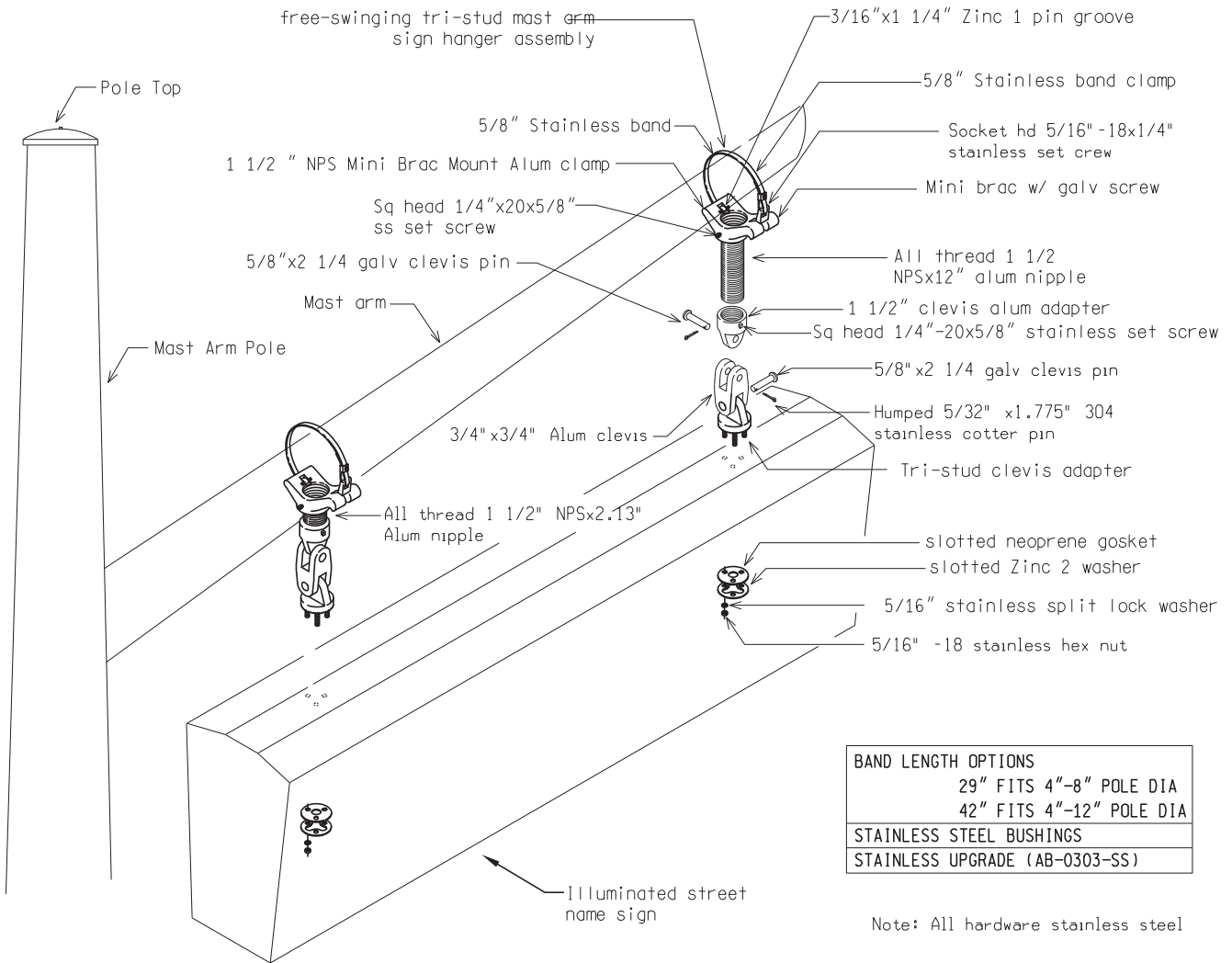
PLAN DATE

SIG-301-A

SHEET
6 of 7



1W-Illuminated Street Name Sign



2W-Illuminated Street Name Sign

NOT TO SCALE

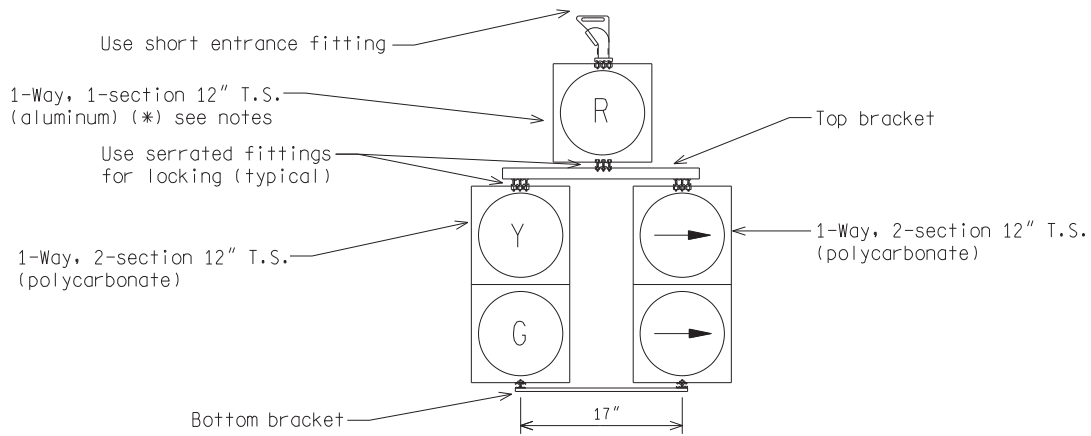
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

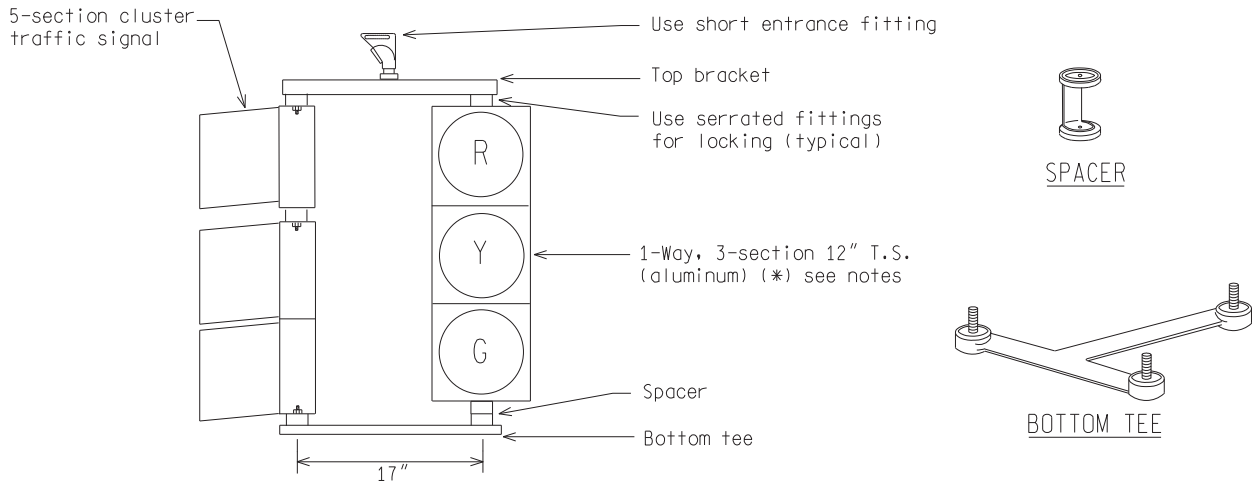
PLAN DATE

SIG-301-A

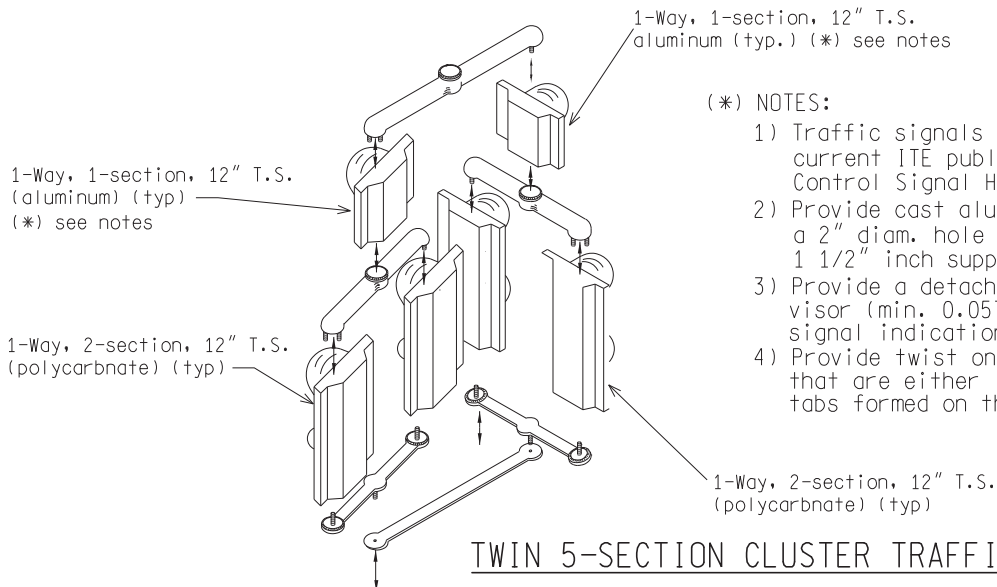
SHEET
7 of 7



5-SECTION CLUSTER (DOGHOUSE) TRAFFIC SIGNAL



COMBINATION 5-SECTION CLUSTER & 1-WAY T.S. (ALUMINUM)



(*) NOTES:

- 1) Traffic signals must conform to the current ITE publication "Vehicle Traffic Control Signal Heads."
- 2) Provide cast aluminum alloy housings with a 2" diam. hole top and bottom to receive 1 1/2" inch supporting pipe.
- 3) Provide a detachable, sheet aluminum visor (min. 0.057" thick), for each signal indication.
- 4) Provide twist on slots for visor mounting that are either in the visor or on the tabs formed on the visor.

TWIN 5-SECTION CLUSTER TRAFFIC SIGNAL

NOT TO SCALE

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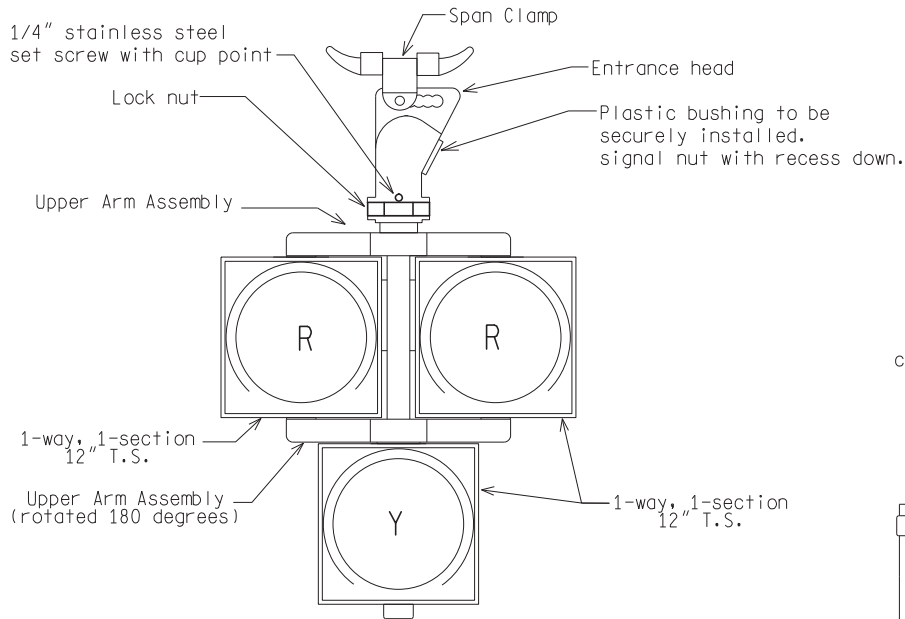
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**BRACKETING FOR
5-SECTION HEADS**

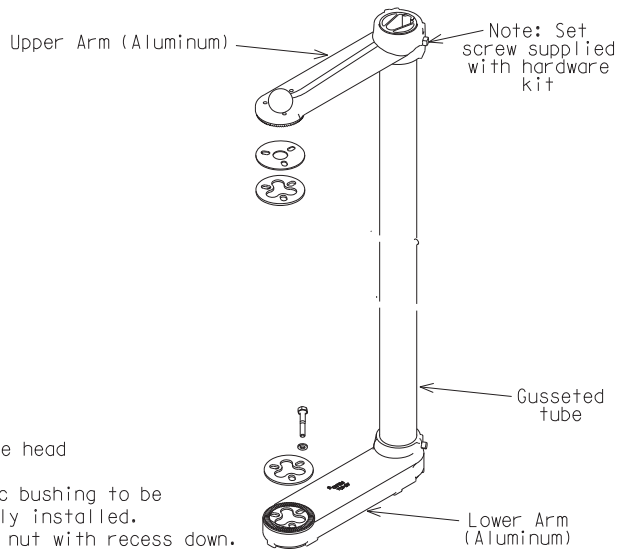
PLAN DATE

SIG-302-A

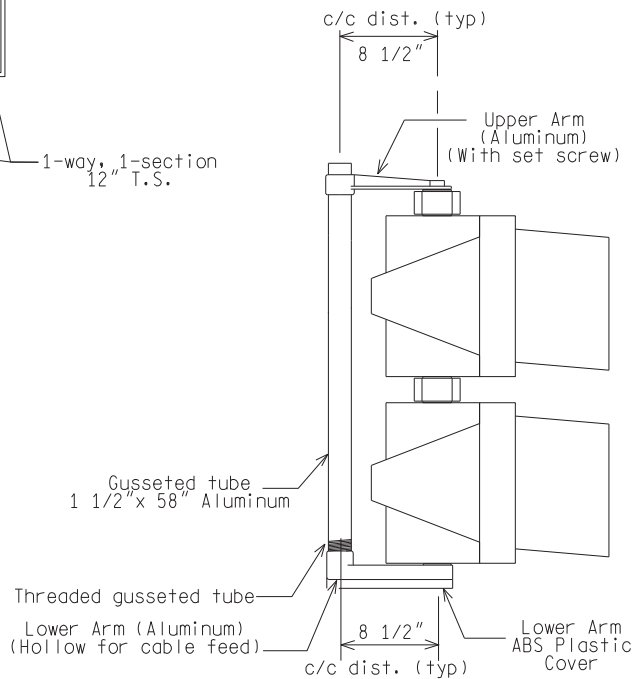
SHEET
1 of 1



SPAN WIRE DISPLAY



ISOMETRIC VIEW



SIDE VIEW

HIGH INTENSITY ACTUATED CROSSWALK BEACON
(TO STOP TRAFFIC FOR PEDESTRIAN CROSSING LOCATIONS)

NOT TO SCALE

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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**BRACKETING FOR
HAWK SIGNAL DISPLAY**

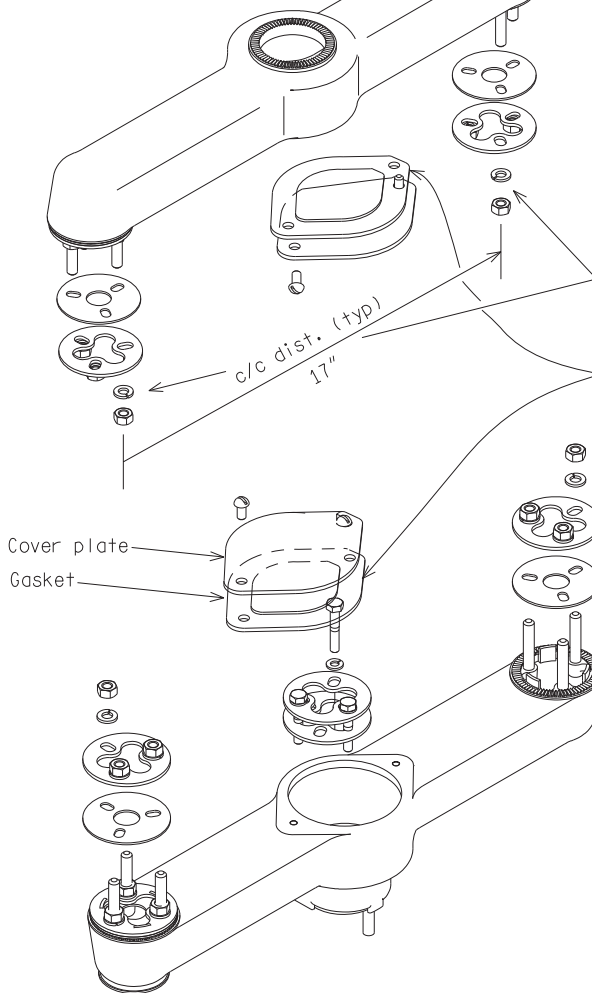
PLAN DATE

SIG-303-A

SHEET
1 of 2

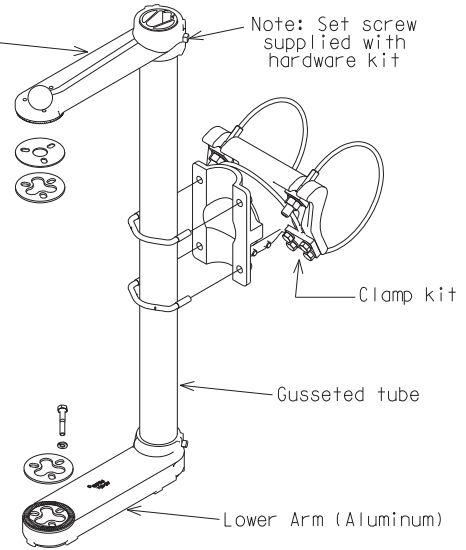
ISOMETRIC VIEW

Aluminum Tri-stud
Upper Arm Assembly



Upper Arm (Aluminum)

Note: Set screw
supplied with
hardware kit



Clamp kit

Gusseted tube

Lower Arm (Aluminum)

Zinc slotted washers
& Stainless steel
hardware

weatherproof fitting

c/c dist. (typ)
17"

Cover plate
Gasket

ISOMETRIC VIEW

Upper Arm Assembly

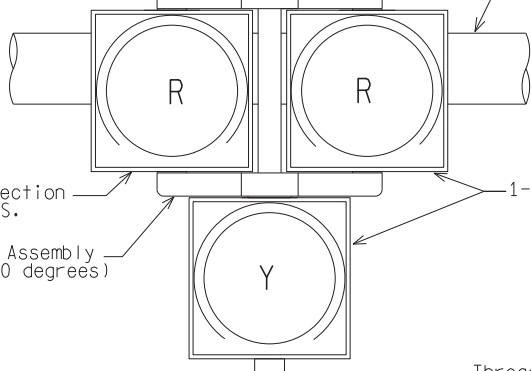
Aluminum Clamp kit
(with galv. cable
mount)

Mast Arm tube

Top Cap

c/c dist. (typ)
8 1/2"

Upper Arm (Aluminum)
(With set screw)

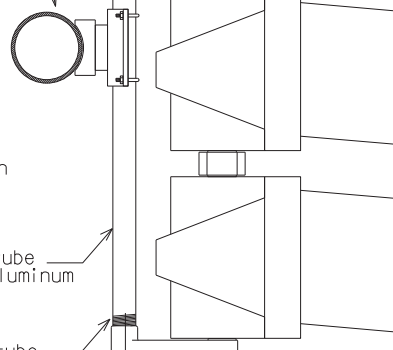


1-way, 1-section
12" T.S.

1-way, 1-section
12" T.S.

Upper Arm Assembly
(rotated 180 degrees)

FRONT VIEW



Gusseted tube
1 1/2" x 58" Aluminum

Threaded gusseted tube

Lower Arm (Aluminum)
(Hollow for cable feed)

c/c dist. (typ)
8 1/2"

Lower Arm
ABS Plastic Cover

SIDE VIEW

NOT TO SCALE MAST ARM DISPLAY

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

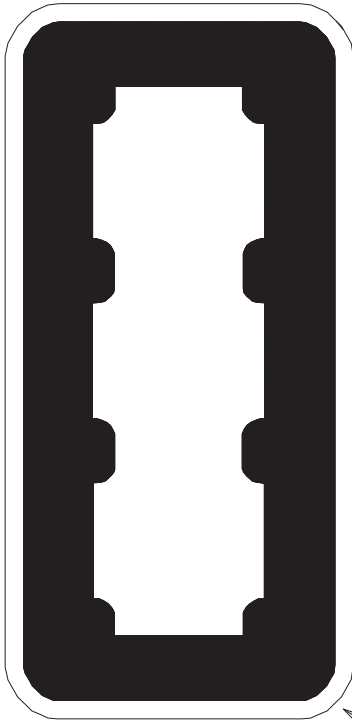
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Rev. 02/16/17

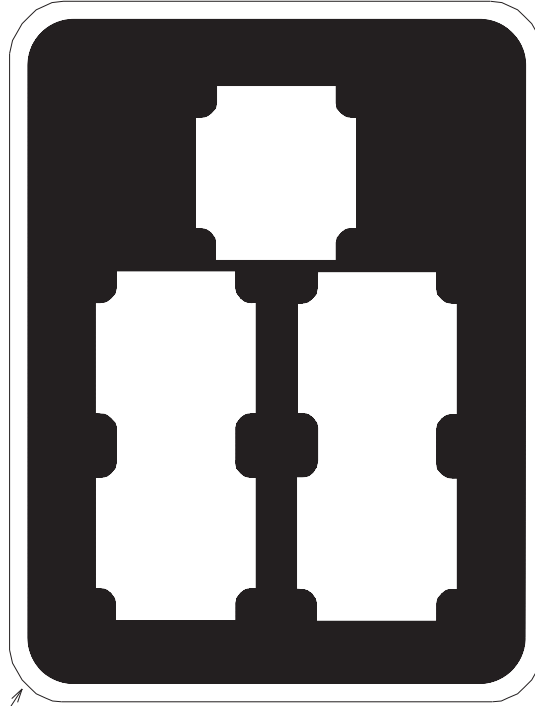
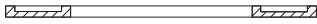
PLAN DATE

SIG-303-A

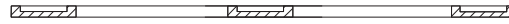
SHEET
2 of 2



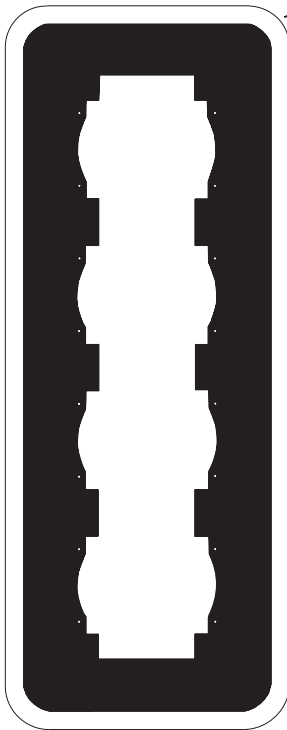
12", 3 SECTION



12", 5 SECTION



ASTM TYPE IV Reflective yellow tape border.



12", 4 SECTION

NOTES:

- 1) Backplates are to be used for mast arm type (fixed support) or tethered span wire type installations as indicated on the plans or as directed by the Engineer.
- 2) Backplates must be a one piece construction unless otherwise directed by the Engineer.
- 3) Do not cut the backplate for installation.
- 4) Use one inch border with yellow signal heads and visors.

TRAFFIC SIGNAL BACKPLATES

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG304A.dgn Rev: 02/16/17



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY:
CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

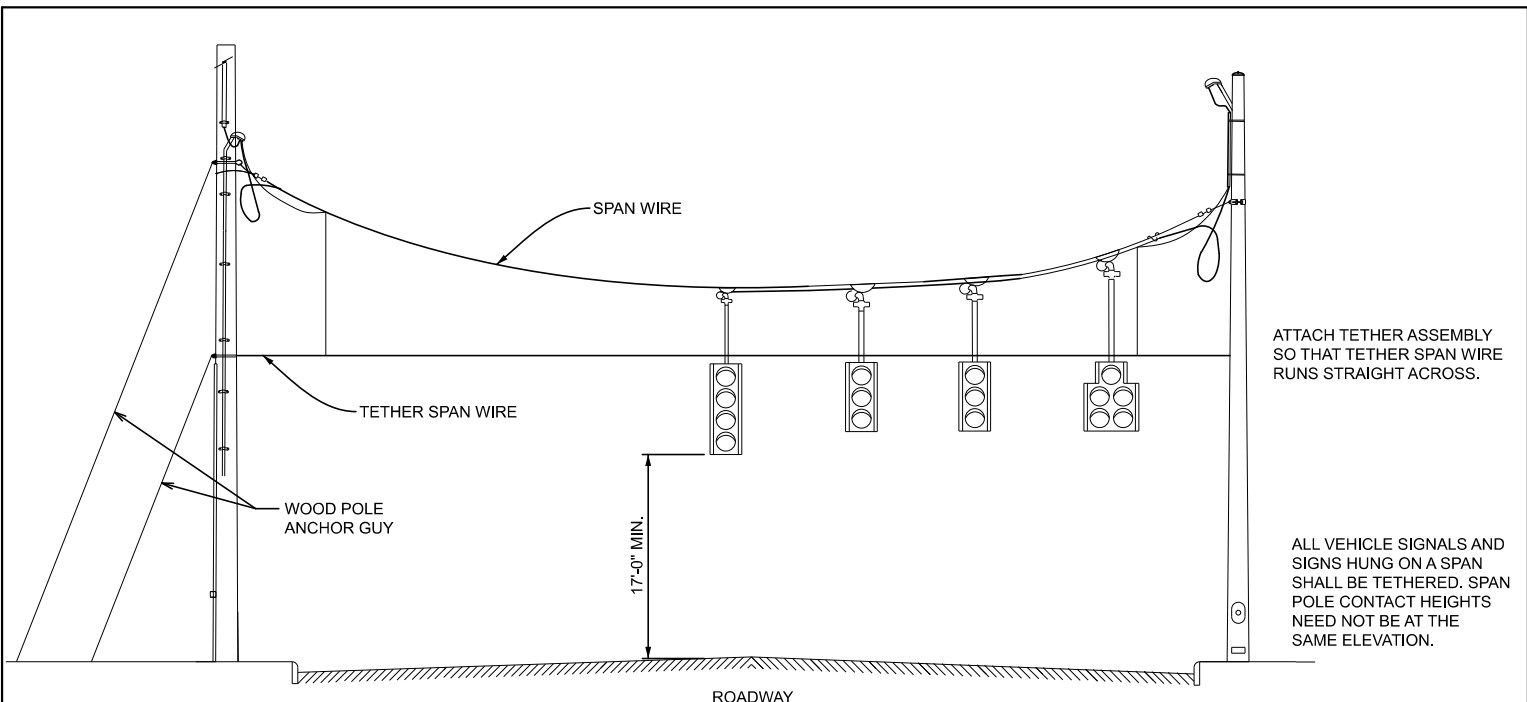
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

TRAFFIC SIGNAL BACKPLATES

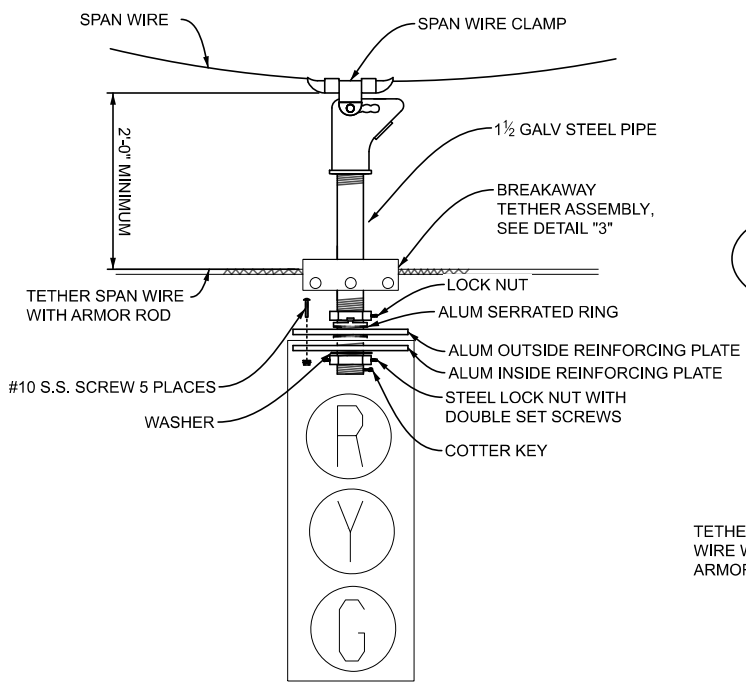
PLAN DATE

SIG-304-A

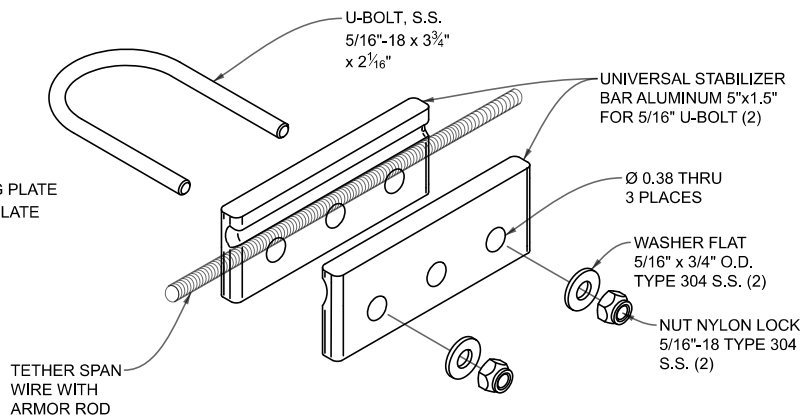
SHEET
1 of 1



1 DETAIL - TOP TETHER



2 DETAIL - SPAN WIRE INSTALLATION



3 DETAIL - BREAKAWAY TETHER ASSEMBLY FOR TOP OF SIGNAL HEAD

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

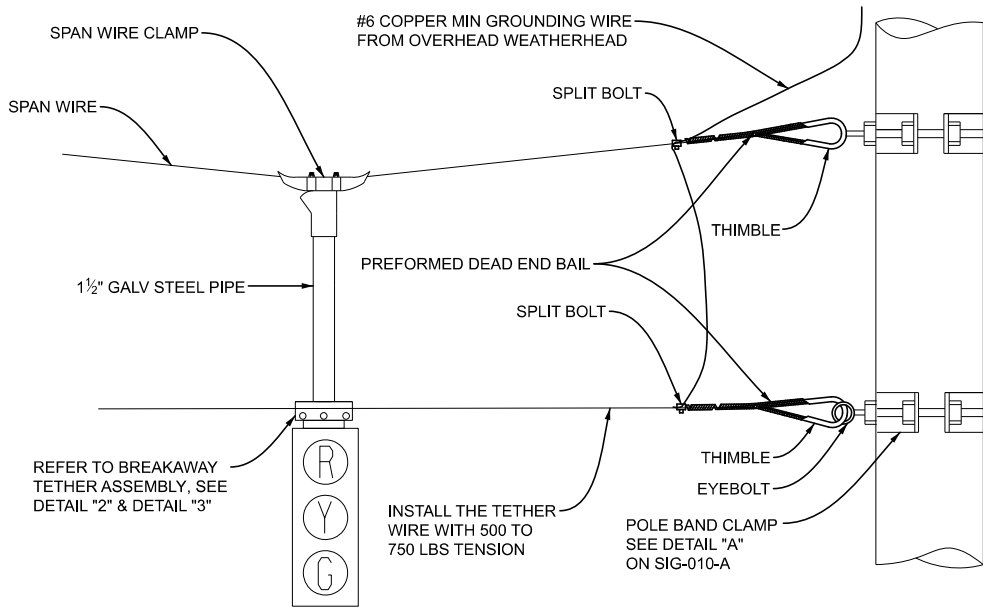
STANDARD PLAN FOR
SPAN WIRE TOP TETHER DETAILS

(SPECIAL DETAIL)
FHWA APPROVAL

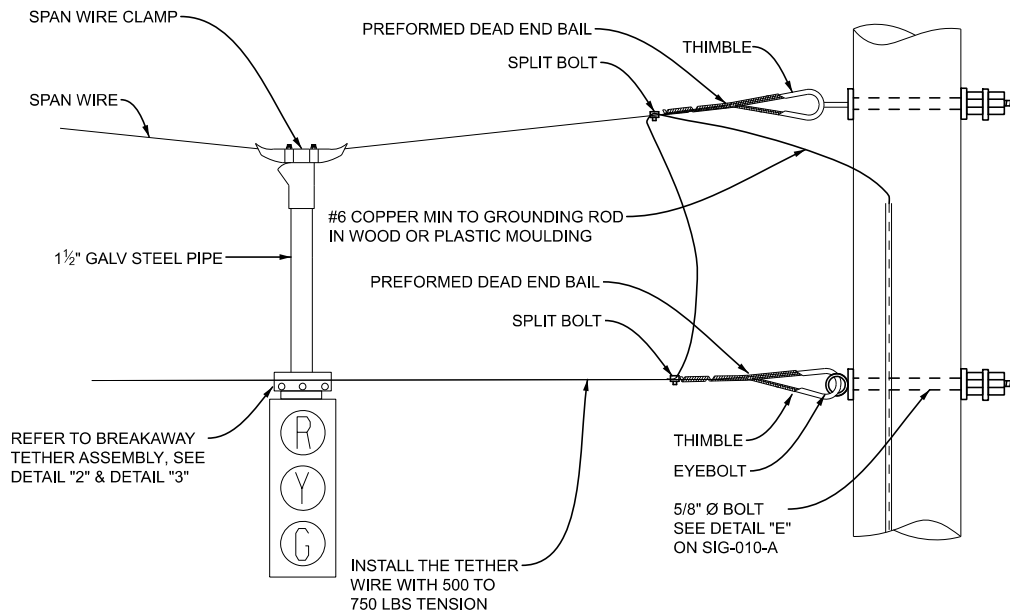
07/27/23
PLAN DATE

SIG-305-D

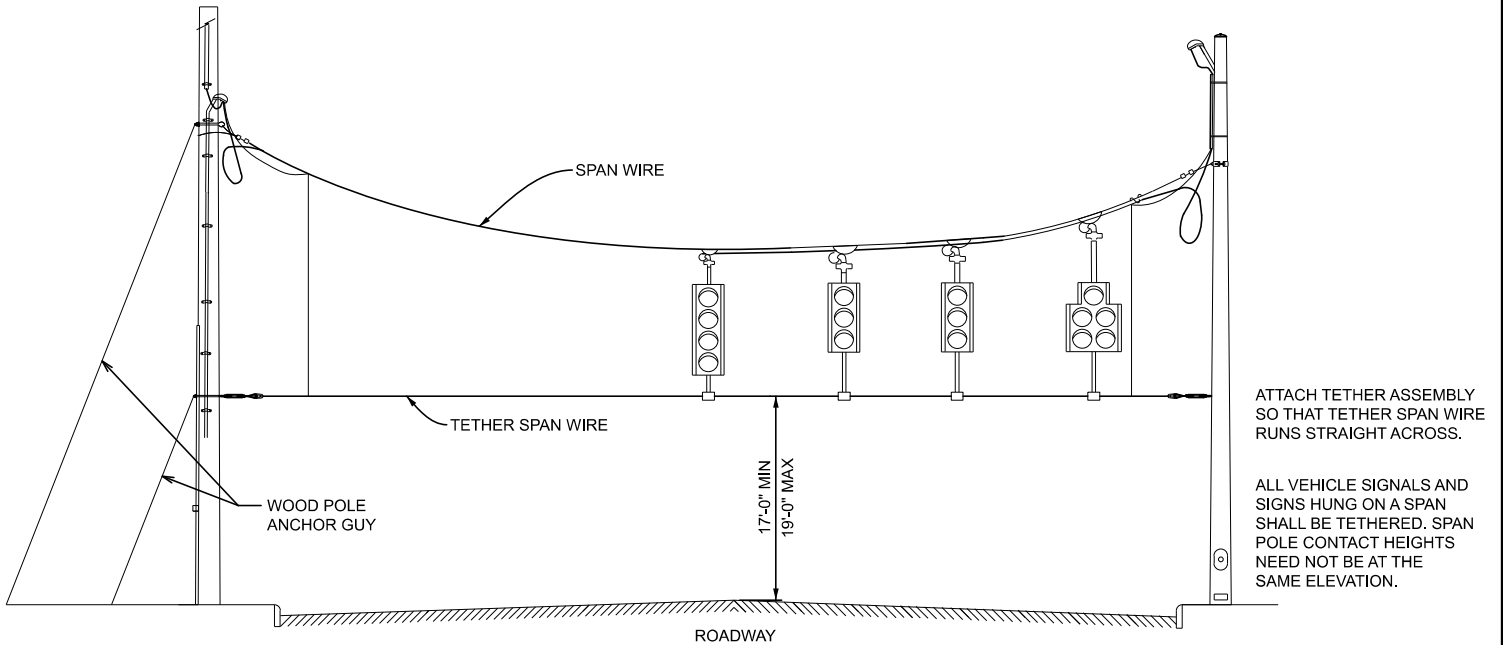
SHEET
1 OF 5



4 TOP TETHER SPAN WIRE STEEL POLE CONNECTION



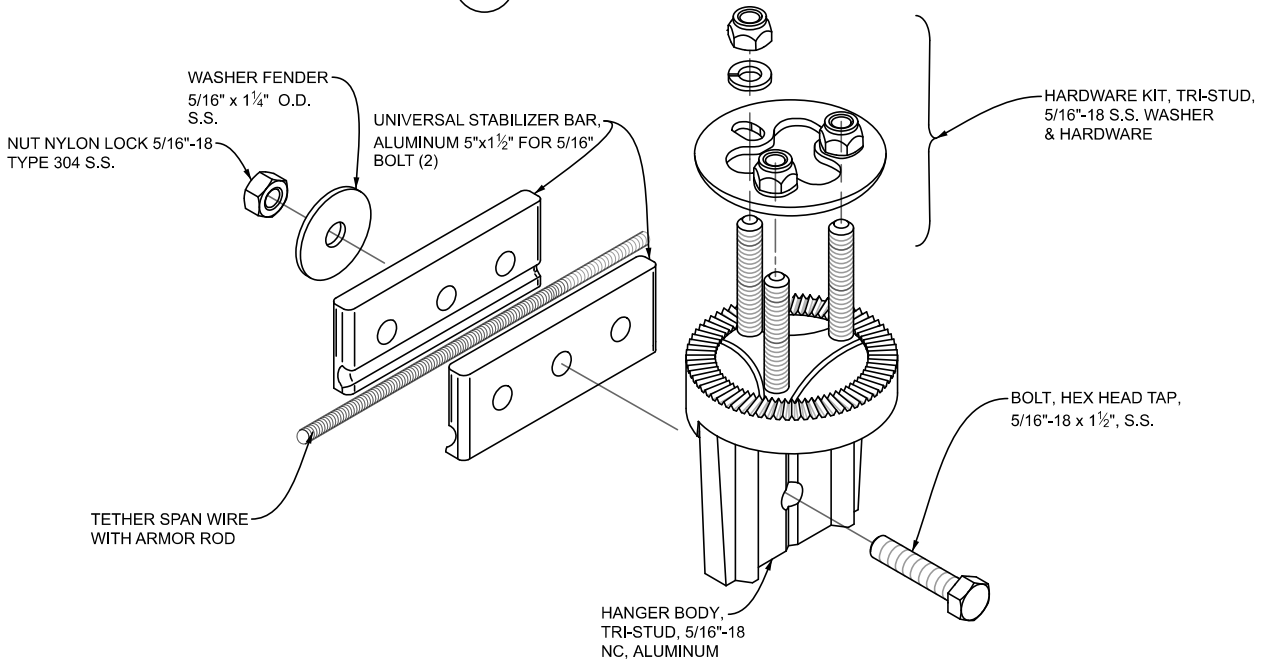
5 TOP TETHER SPAN WIRE WOOD POLE CONNECTION



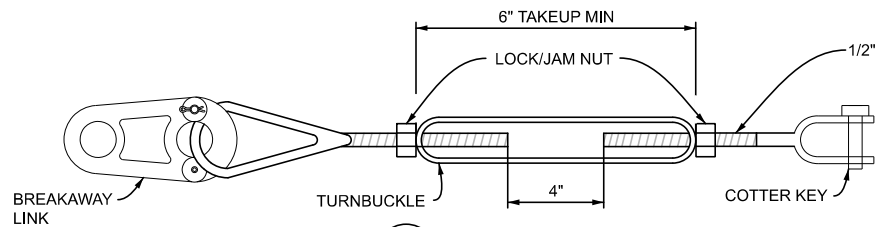
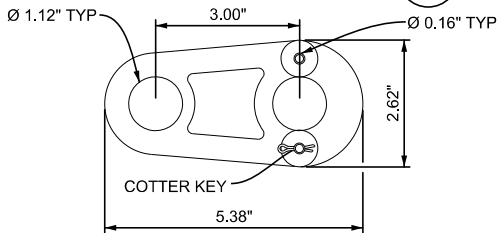
ATTACH TETHER ASSEMBLY SO THAT TETHER SPAN WIRE RUNS STRAIGHT ACROSS.

ALL VEHICLE SIGNALS AND SIGNS HUNG ON A SPAN POLE CONTACT HEIGHTS NEED NOT BE AT THE SAME ELEVATION.

6 BOTTOM TETHER INSTALLATION



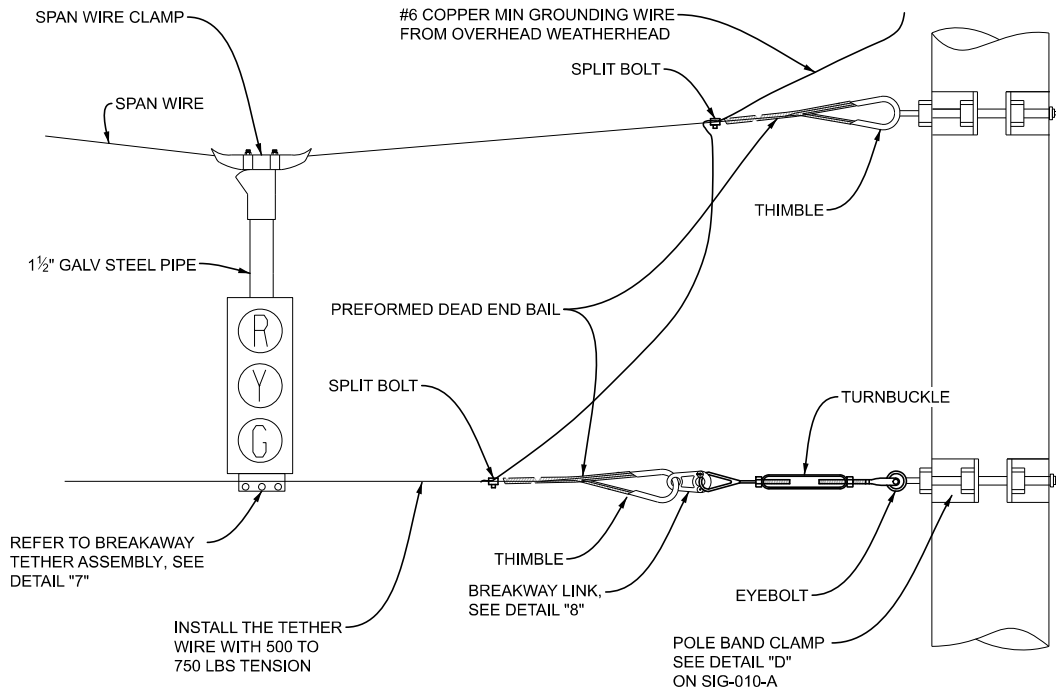
7 DETAIL - TETHER ASSEMBLY TRI-STUD BREAKAWAY



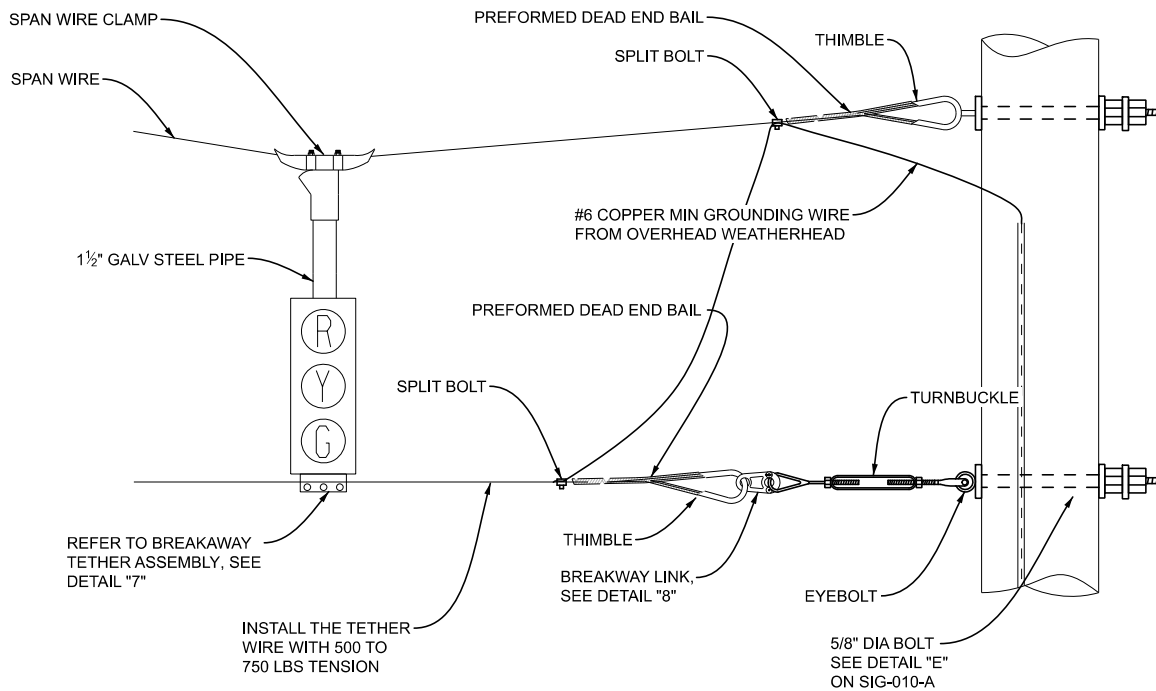
9 DETAIL - TURNBUCKLE

8 DETAIL - BREAKAWAY TETHER ASSEMBLY FOR BOTTOM OF SIGNAL HEAD

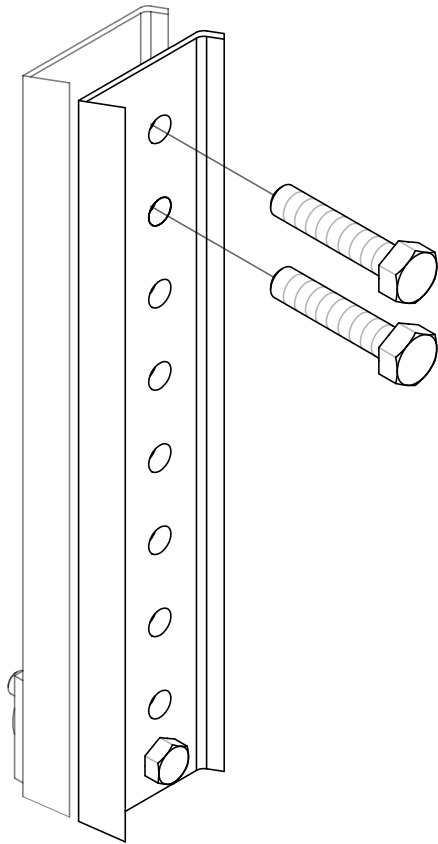
<p>MDOT Michigan Department of Transportation</p> <p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	<p>STANDARD PLAN FOR SPAN WIRE BOTTOM TETHER DETAILS</p>			<p>SIG-305-D</p>	<p>SHEET 3 OF 5</p>
	<p>(SPECIAL DETAIL) FHWA APPROVAL</p>	<p>07/27/23 PLAN DATE</p>			



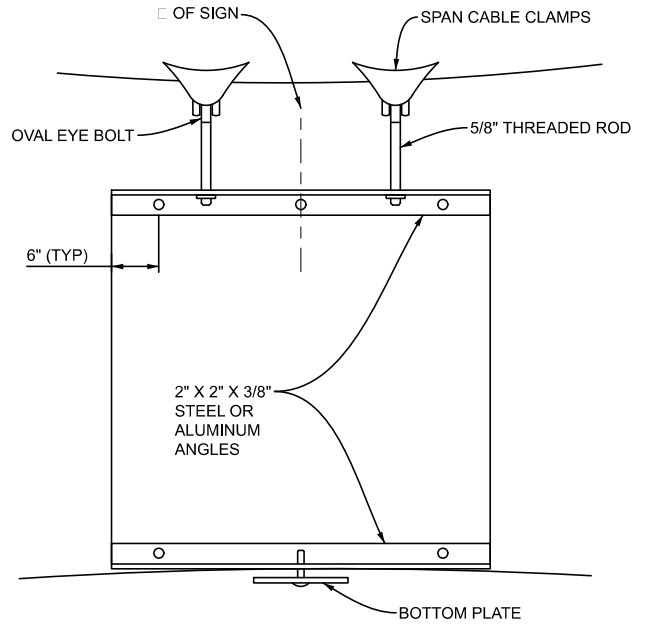
10 BOTTOM TETHER SPAN WIRE STEEL POLE CONNECTION



11 BOTTOM TETHER SPAN WIRE WOOD POLE CONNECTION



12 EXTENDER OPTION 8", 11", 19", 24", & 72 (CUT TO LENGTH)



13 DETAIL - OVERHEAD LANE ASSIGNMENT SIGN CONNECTION

NOTES:

1. BREAKAWAY LINK AND TURNBUCKLE ARE REQUIRED AT BOTH ENDS OF ALL BOTTOM TETHER SPANS. IF BREAKAWAY LINK BEGINS TO YIELD DURING INSTALLATION, IT SHALL BE REMOVED AND REPLACED. THE WIRE TENSION SHALL BE ADJUSTED TO MINIMIZE MOVEMENT OF SIGNAL HEADS IN HIGH WINDS. TYPICAL TENSION IS 500 TO 750 LBS.
2. INSTALL GROUND WIRE AT BOTH ENDS OF TOP AND BOTTOM TETHERING.
3. IF SIGNAL ORIENTATION IS NOT PERPENDICULAR TO SPAN AND TETHER WIRE, THEN USE AN ANCHOR EXTENSION. CLAMP ASSEMBLY MUST BE ATTACHED TO THE FLAT SIDE OF THE EXTENDER BAR.
4. GROUNDING WIRE ANCHOR HEIGHT TO THE SPAN WIRE IS ADJUSTED IN THE FIELD BEFORE BREAKAWAY LINK IS INSTALLED. GROUNDING WIRE LENGTH SHALL BE ADJUSTED SO THAT THE MINIMUM VERTICAL CLEARANCE OF THE SAGGING TETHER WIRE ABOVE THE PAVEMENT WITHOUT THE BREAKAWAY LINK INSTALLED IS AT LEAST 14'. GROUNDING WIRE SHALL CONTAIN ENOUGH SLACK FOR HEAD TO SWAY IN HIGH WINDS. GROUNDING WIRE SHALL BE ATTACHED TO THE SPAN WIRE USING A TINNED COPPER SPLIT BOLT.
5. TRAFFIC SIGNAL HOUSING REINFORCEMENT PLATES ARE REQUIRED WHEN TETHERING.
 - A. TOP TETHERING REQUIRES REINFORCEMENT PLATES AT THE TOP OF THE POLYCARBONATE HOUSING. (2 PLATES TOTAL)
 - B. BOTTOM TETHERING REQUIRES REINFORCEMENT PLATES AT THE TOP AND BOTTOM OF POLYCARBONATE HOUSING. (4 PLATES TOTAL)
 - C. BOTTOM TETHERING 5-SECTION HEADS REQUIRES REINFORCEMENT PLATES ON THE TOP AND BOTTOM OF THE POLYCARBONATE HOUSING (12 TOTAL) AND AN ALUMINUM TRI-STUD UPPER ARM ASSEMBLY IN PLACE OF THE BOTTOM BRACKET.
 - D. IF POLYCARBONATE HOUSING CONNECTS TO AN ALUMINUM CASE SIGN, REINFORCEMENT PLATES MUST BE USED AT THE CONNECTION.

NOTES:

1. ALUMINUM ANGLES SHALL BE USED FOR ALUMINUM SIGNS (TYPE III).
2. STEEL OR ALUMINUM ANGLES MAY BE USED ON PLYWOOD SIGNS (TYPE II).



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

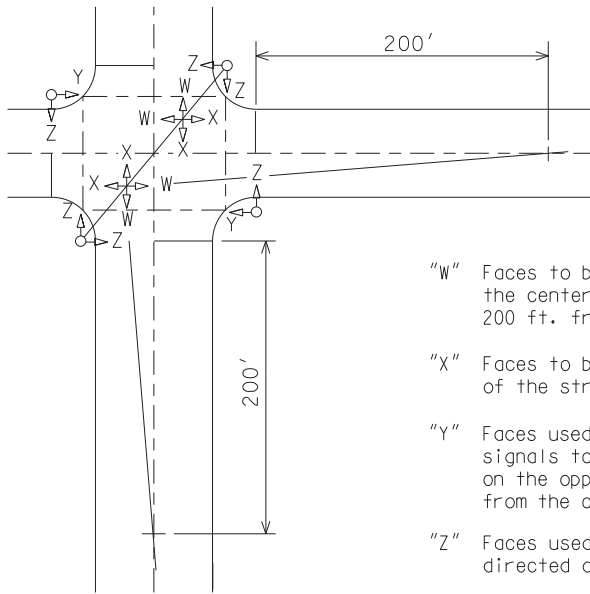
STANDARD PLAN FOR
EXTENDER OPTION AND OVERHEAD LANE
ASSIGNMENT SIGN CONNECTION DETAILS

(SPECIAL DETAIL)
FHWA APPROVAL

07/27/23
PLAN DATE

SIG-305-D

SHEET
5 OF 5



NOTE:
 Where field conditions require deviation from these standards, Engineer will furnish specific directional setting for signals at time of installation.

"W" Faces to be directed to intersect a point on the centerline of the street they control 200 ft. from the stop bar.

"X" Faces to be directed parallel to the centerline of the street they control.

"Y" Faces used as starting signals with near side signals to be directed to intersect a point on the opposite stop bar approximately 4 ft. from the curb.

"Z" Faces used as pedestrian signals to be directed along crosswalks.

DIAGONAL SPAN WIRE STANDARD FOR DIRECTIONAL SETTINGS OF TRAFFIC SIGNALS

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG310A.dgn Rev: 02/16/17



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 TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

 ENGINEER OF DELIVERY

 ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

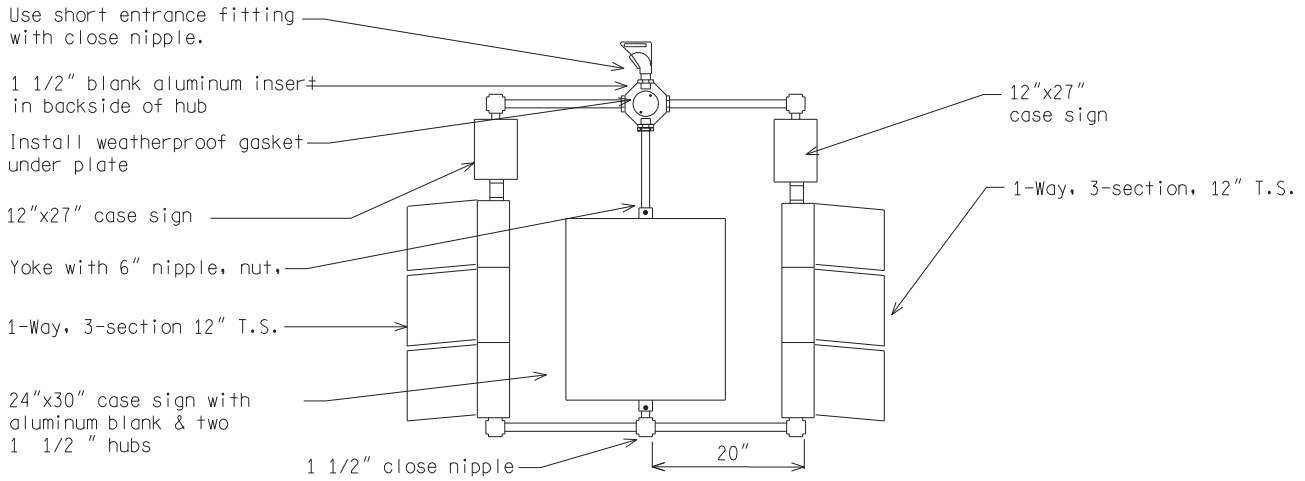
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**ALIGNMENT OF TRAFFIC
 SIGNAL HEADS (DIAGONAL)**

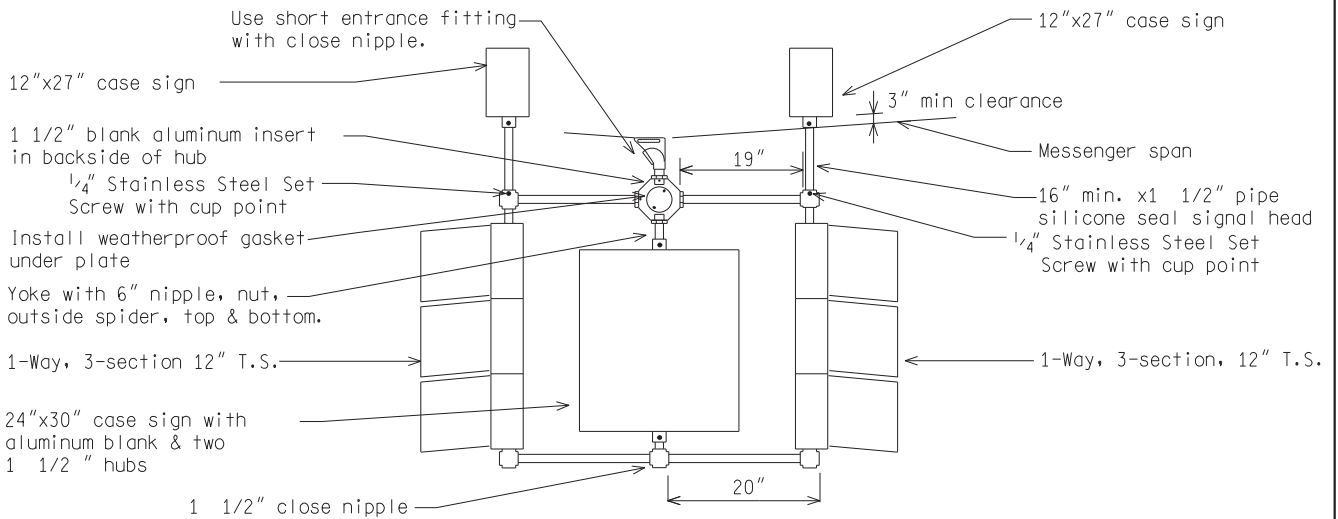
SIG-310-A

PLAN DATE

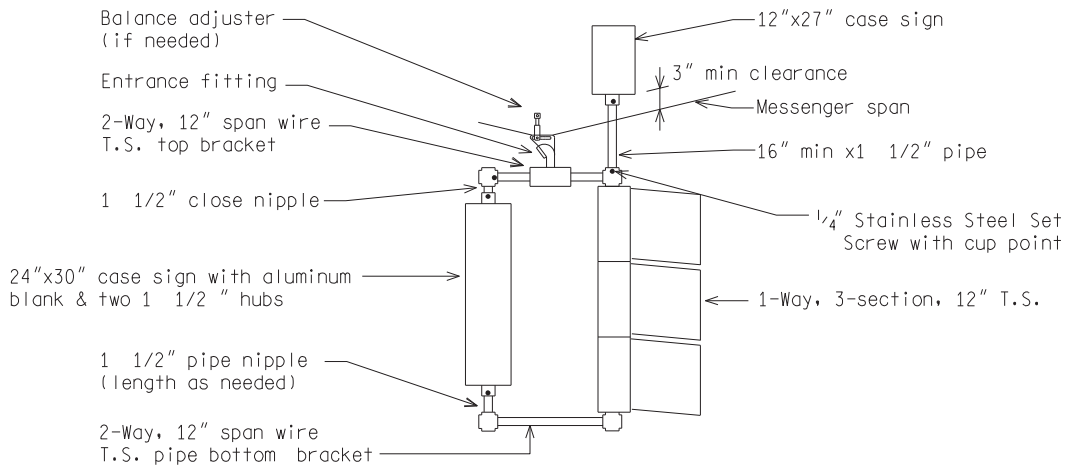
SHEET
 1 of 1



PREFERRED METHOD 2-WAY T.S./CASE SIGN COMBINATION BELOW HUB



(ALTERNATE) 2-WAY T.S./CASE SIGN COMBINATION ABOVE HUB



1-WAY T.S./CASE SIGN COMBINATION ABOVE HUB

NOT TO SCALE

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(SPECIAL DETAIL)

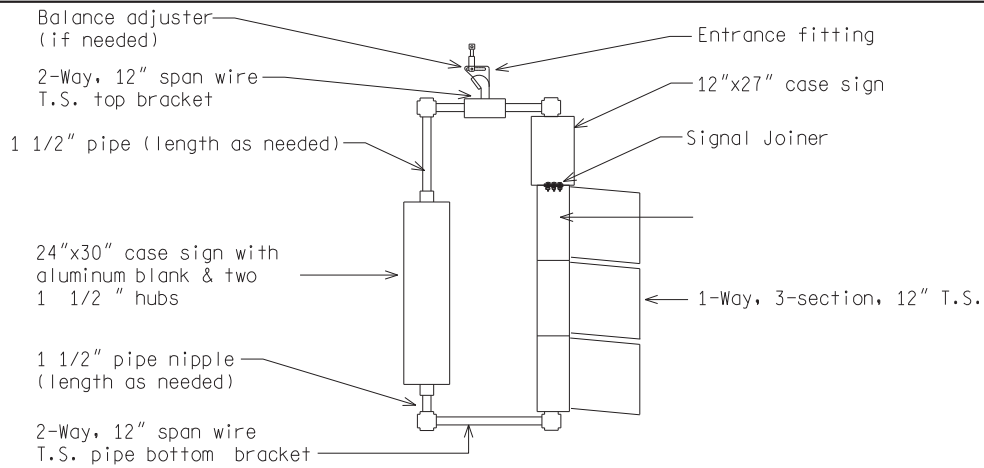
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**BRACKETING FOR SIGNAL
HEAD/CASE SIGN COMBINATIONS**

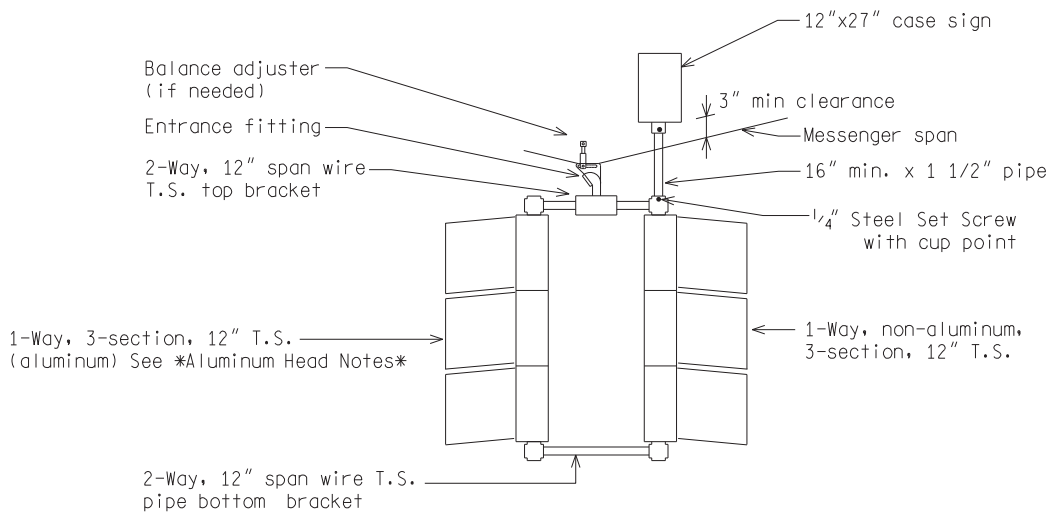
PLAN DATE

SIG-311-A

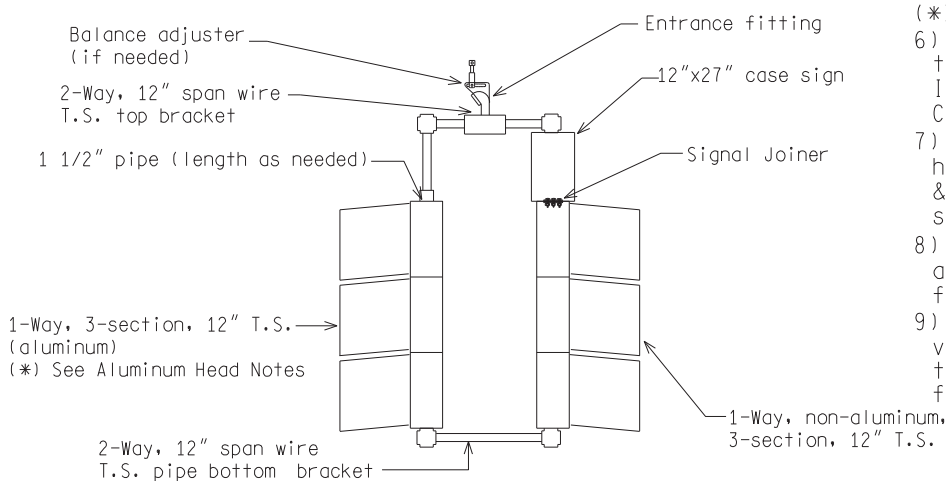
SHEET
1 of 5



1-WAY T.S./CASE SIGN COMBINATION BELOW HUB



1-WAY (ALUMINUM) & 1-WAY T.S./CASE SIGN COMBINATION ABOVE HUB



- (*) Aluminum Head Notes:
- 6) Traffic signals must conform to the requirements of the current ITE publication "Vehicle Traffic Control Signal Heads."
 - 7) Provide cast alum. alloy housings with a 2" diam. hole top & bottom to receive 1 1/2" supporting pipe.
 - 8) Provide a detachable, sheet alum. visor (min. 0.057" thick), for each signal indication.
 - 9) Provide twist on slots for visor mounting that are either in the visor or on the tabs formed on the visor.

1-WAY (ALUMINUM) & 1-WAY T.S./CASE SIGN COMBINATION BELOW HUB

NOT TO SCALE

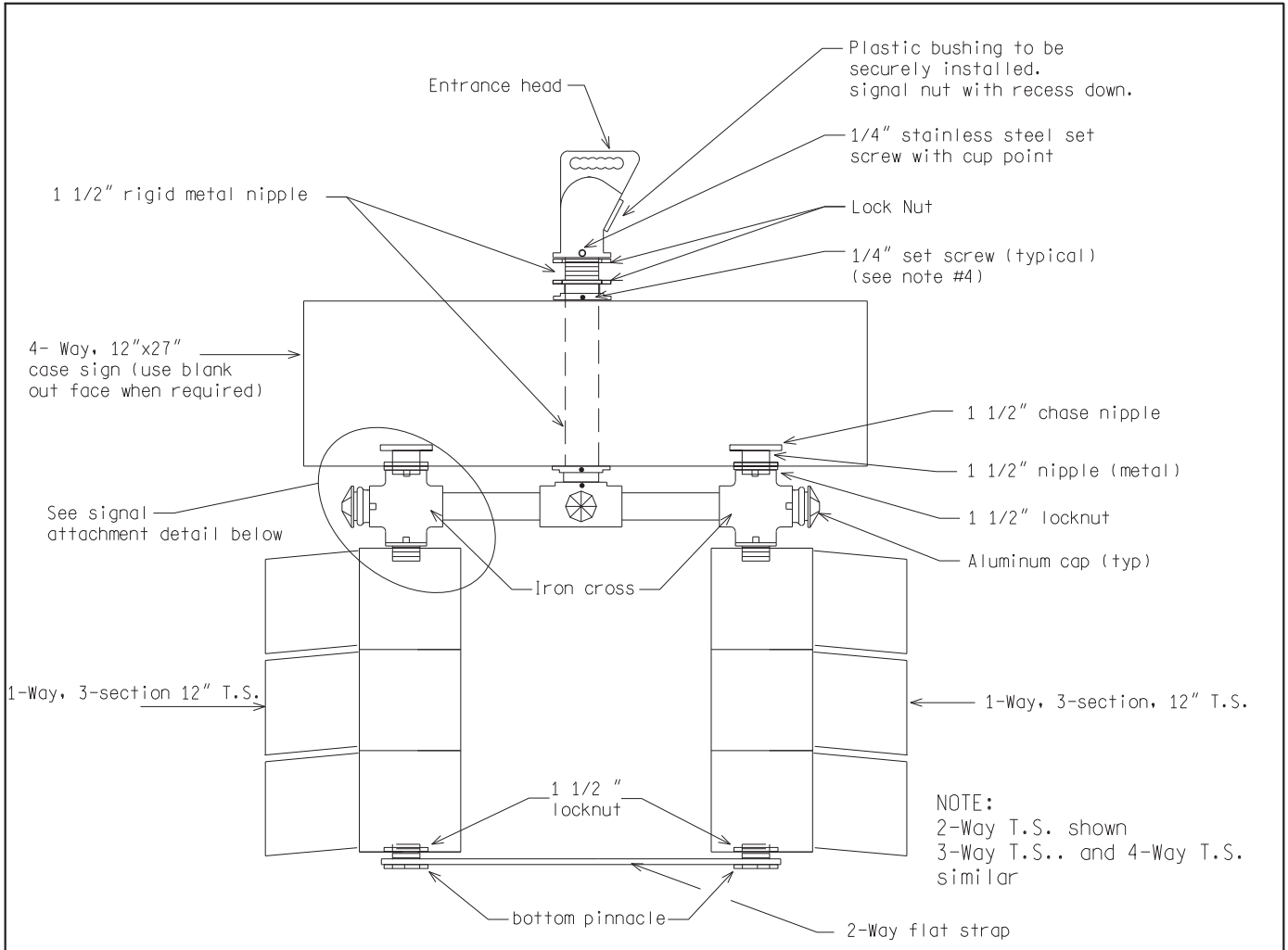
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

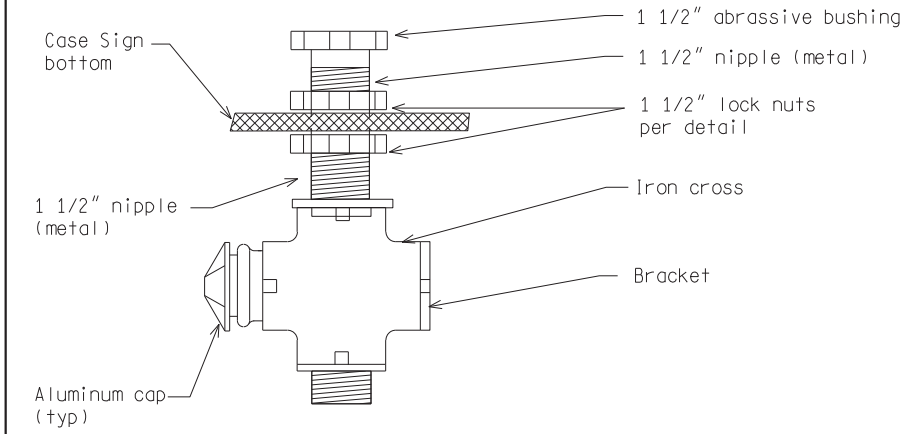
PLAN DATE

SIG-311-A

SHEET
2 of 5



SPAN WIRE MOUNTED T.S. BRACKET ASSEMBLY
WITH 4-WAY CASE SIGN COMBINATION BELOW HUB

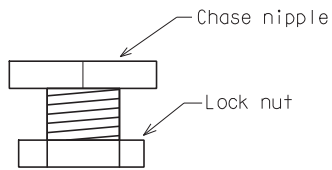
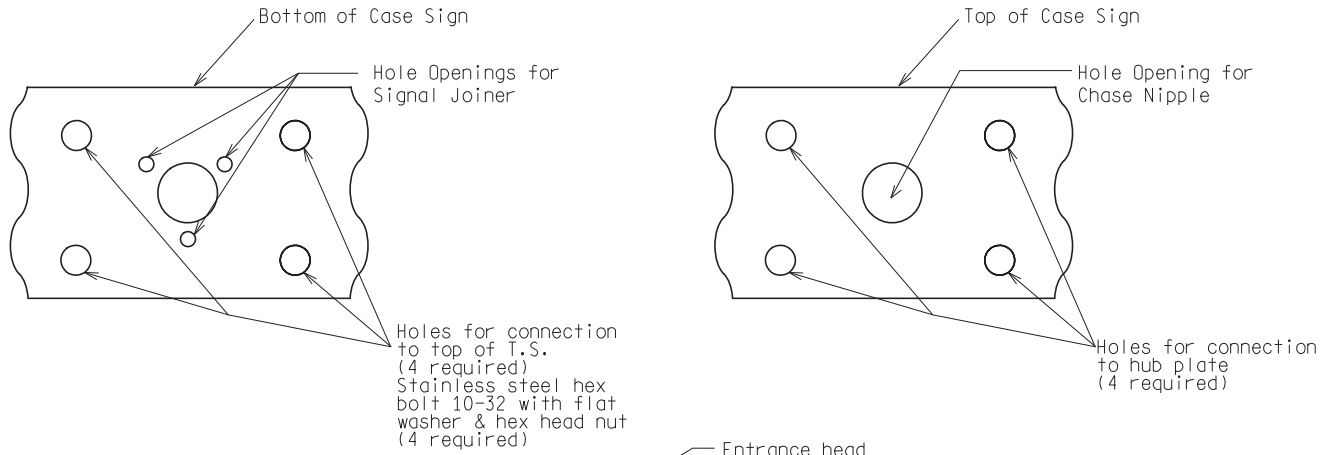


- NOTES for all details:
- 1) All pipe sizes include thread.
 - 2) Install pinnacles in all unused openings in hubs, crosses & tees.
 - 3) 4-Way case sign legend to be as shown on plans.
 - 4) Denotes 1/4" stainless steel set screw (typical)
 - 5) Apply silicon sealant to the fittings on the top of case signs, and the top and bottom connections of signal heads

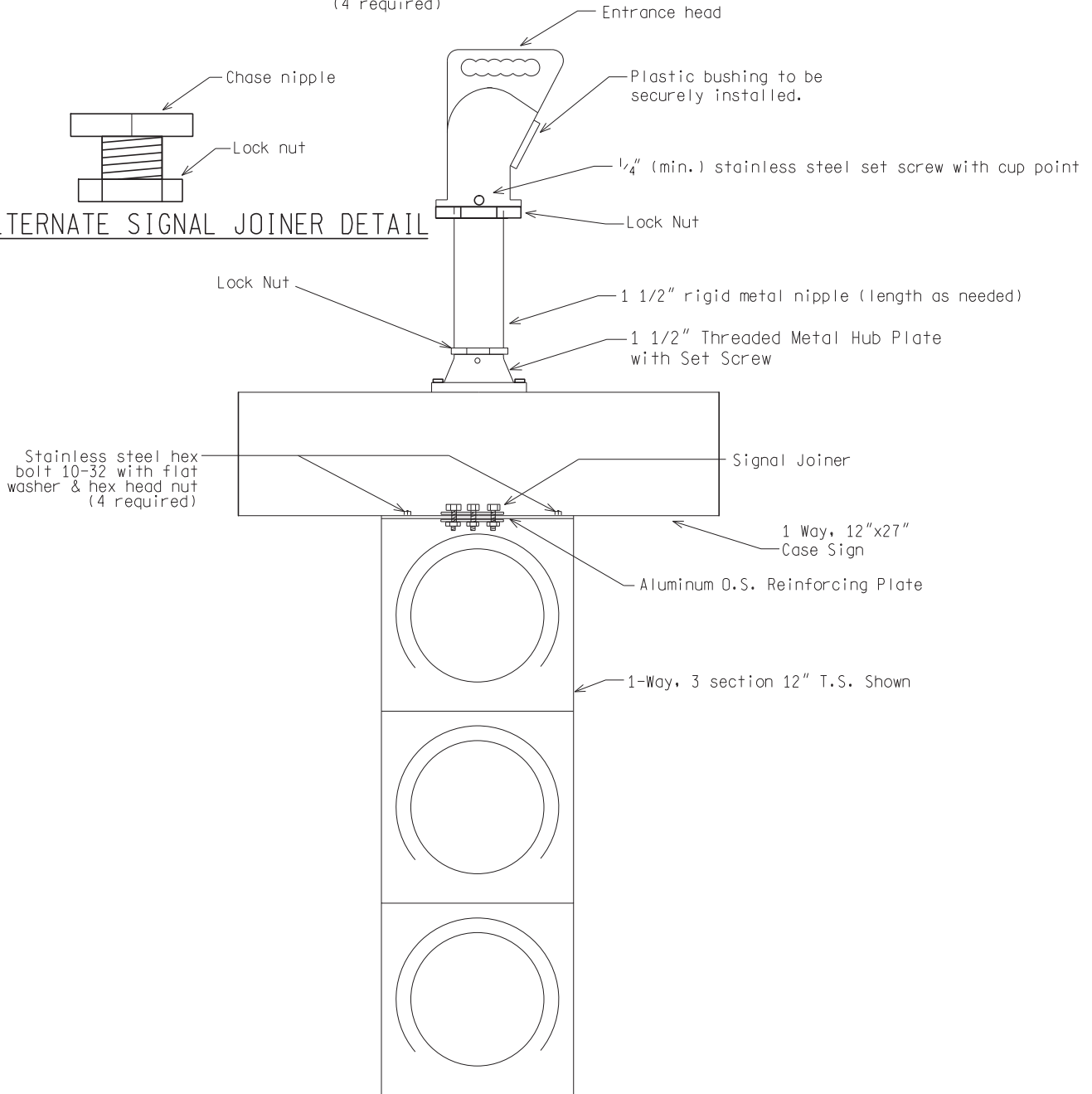
SIGNAL ATTACHMENT DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-311-A	SHEET 3 of 5
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG311A.dgn Rev. 02/16/17				



ALTERNATE SIGNAL JOINER DETAIL



T.S. MOUNTED BELOW CASE SIGN

NOT TO SCALE

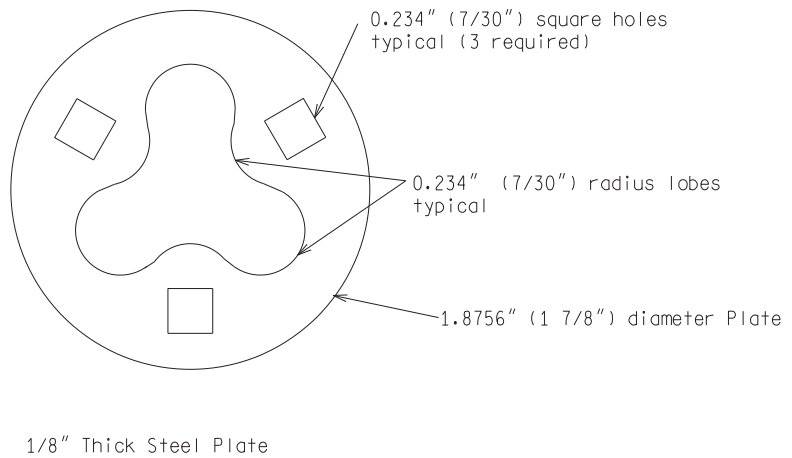
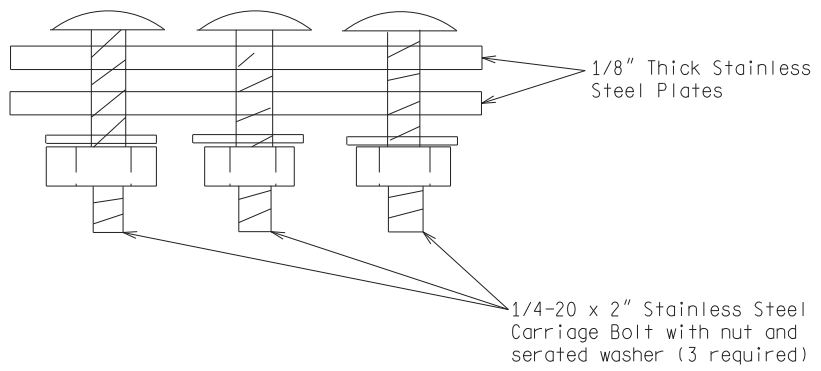
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-311-A

SHEET
4 of 5



SIGNAL JOINER

NOT TO SCALE

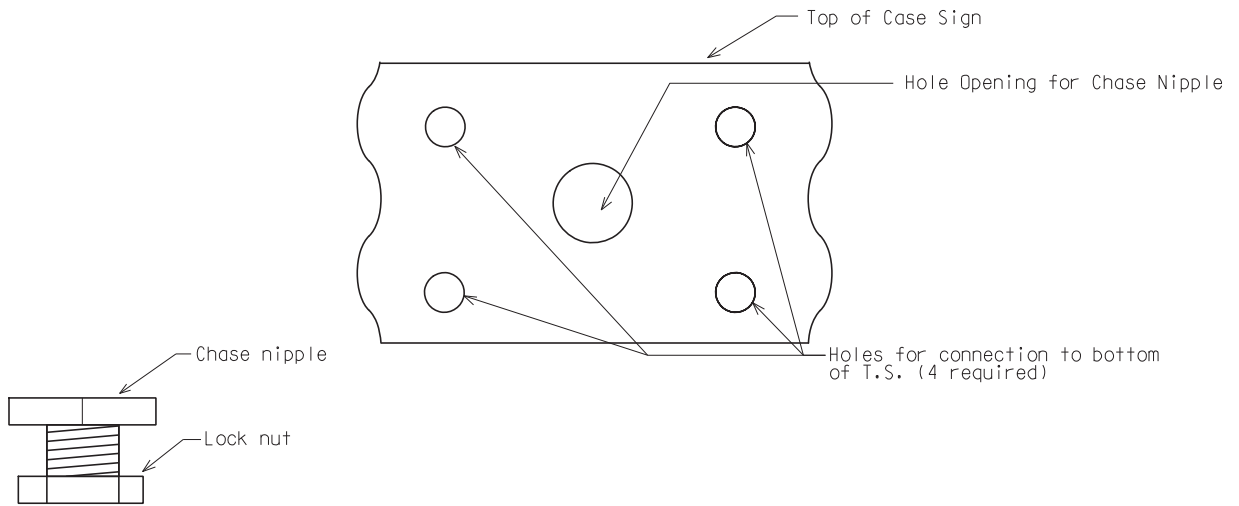
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BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

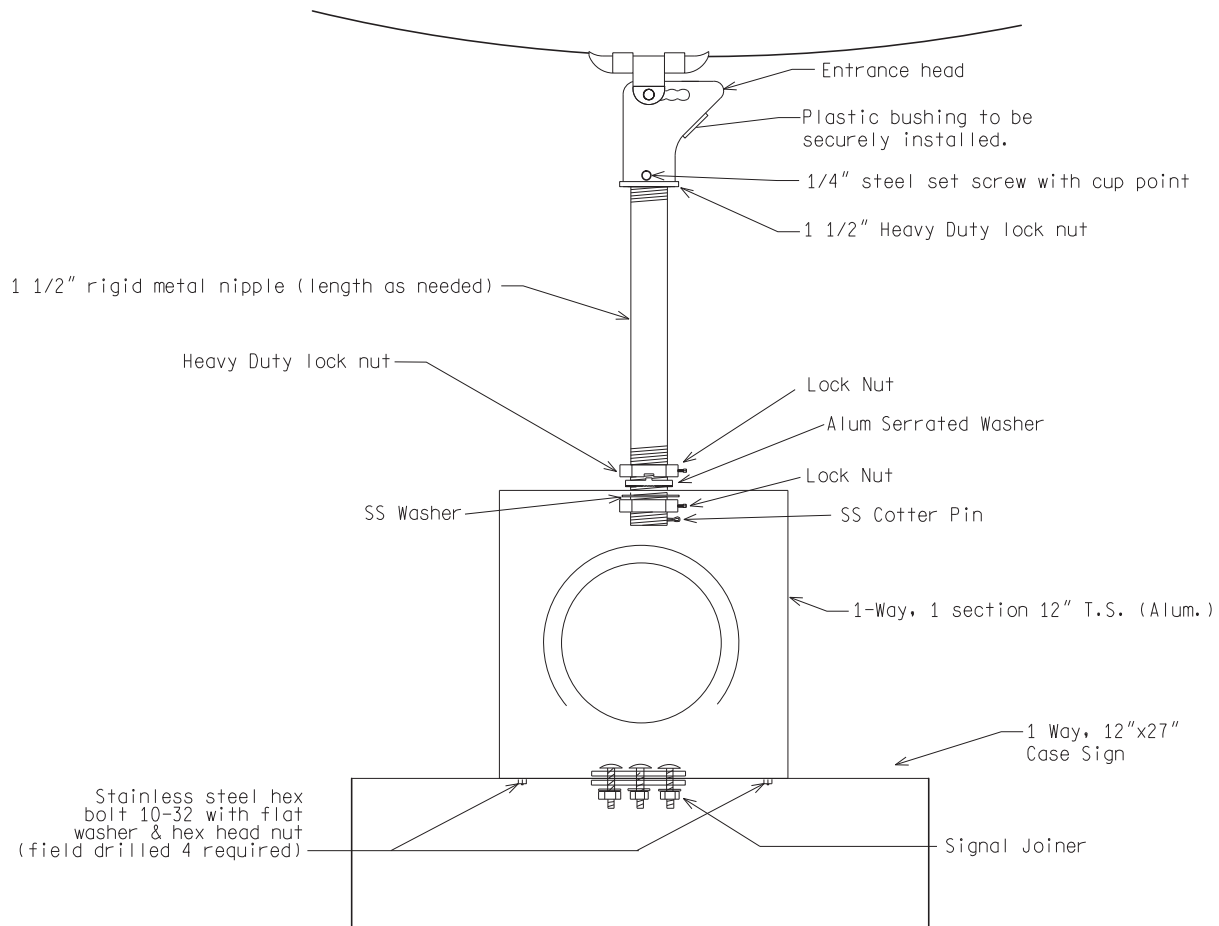
PLAN DATE

SIG-311-A

SHEET
5 of 5



ALTERNATE SIGNAL JOINER DETAIL



T.S. MOUNTED ON CASE SIGN

NOT TO SCALE

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DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

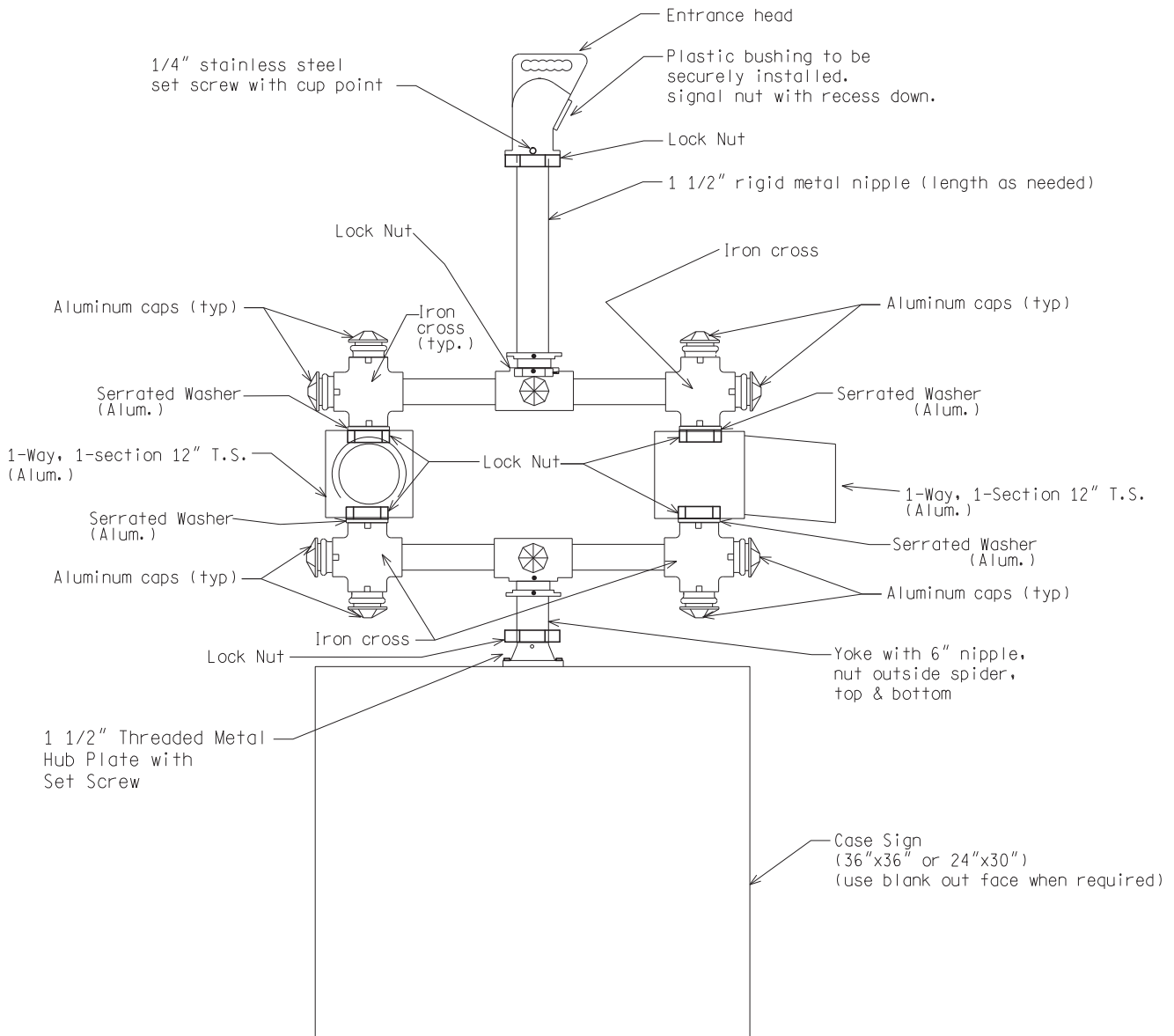
(SPECIAL DETAIL)
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**BRACKETING FOR FLASHING
BEACON/CASE SIGN COMBINATIONS**

PLAN DATE

SIG-312-A

SHEET
1 of 2



NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

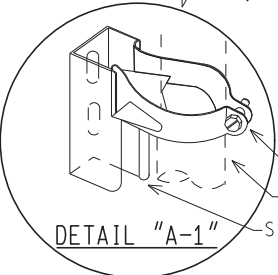
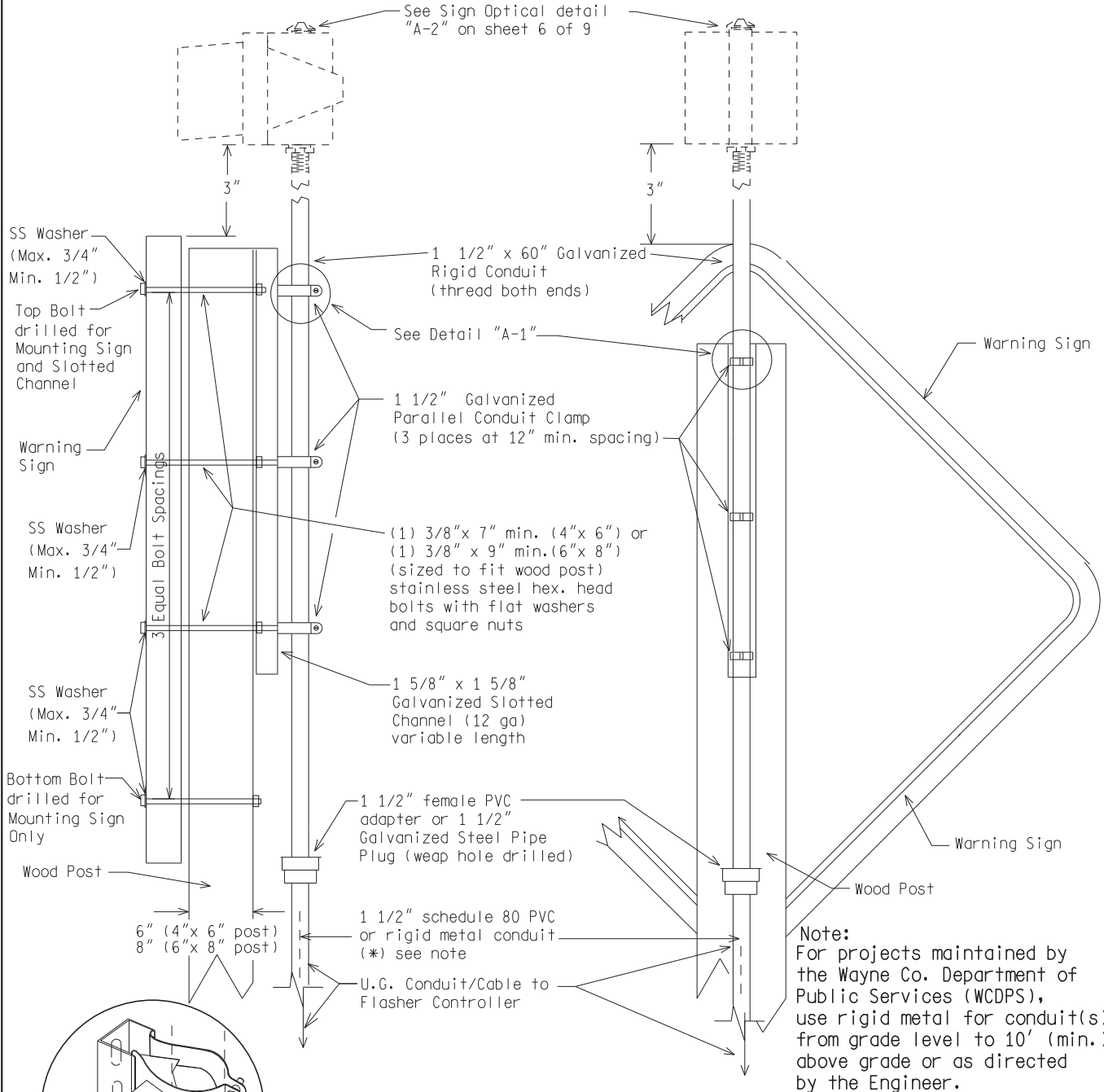
PLAN DATE

SIG-312-A

SHEET
2 of 2

SIDE VIEW

BACK VIEW



SINGLE SIGN MOUNTED FLASHING BEACON
INSTALLED ON ONE WOOD POST

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG320A.dgn Rev: 02/16/17

MDOT
Michigan Department of Transportation

PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

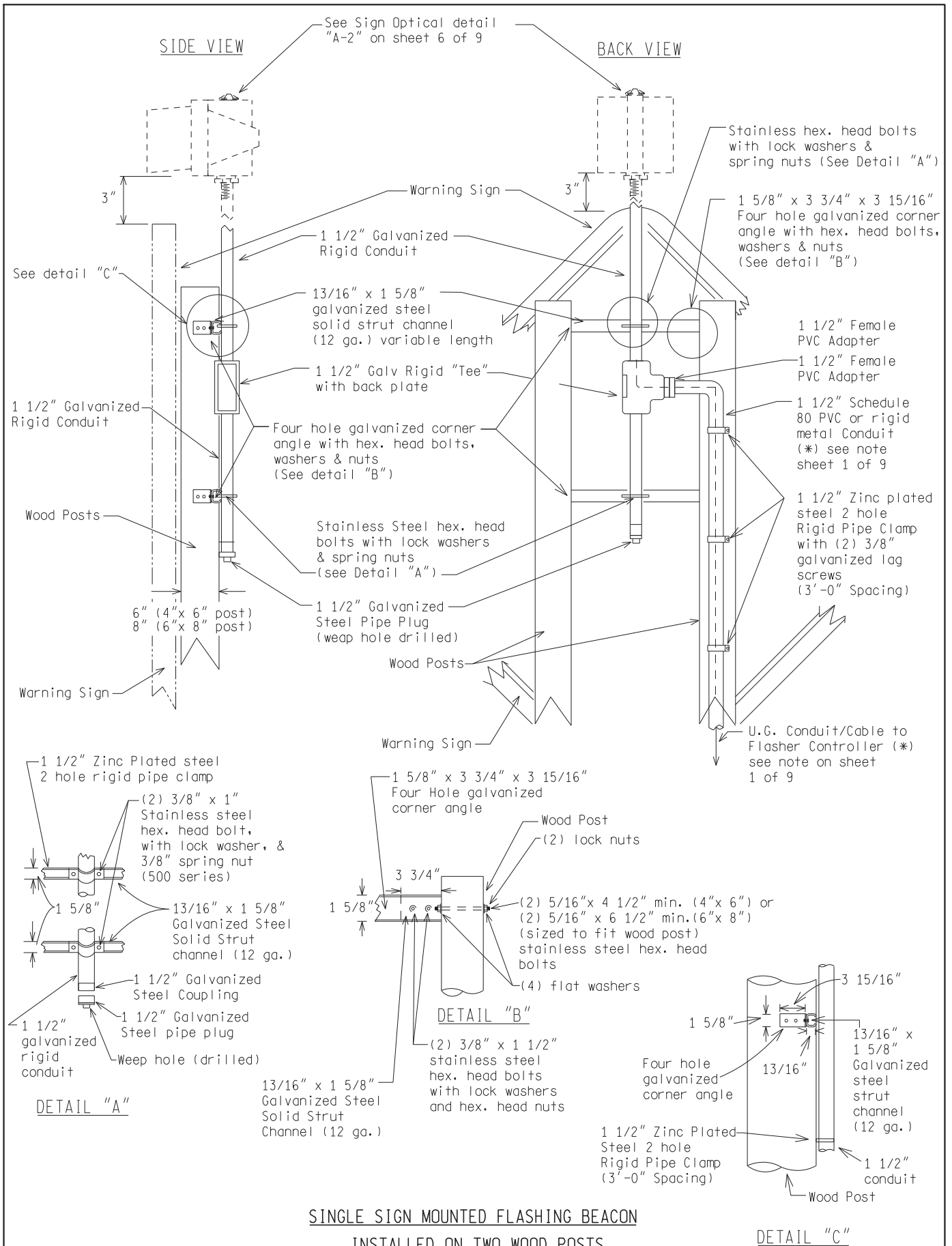
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**SIGN MOUNTED
BEACON**

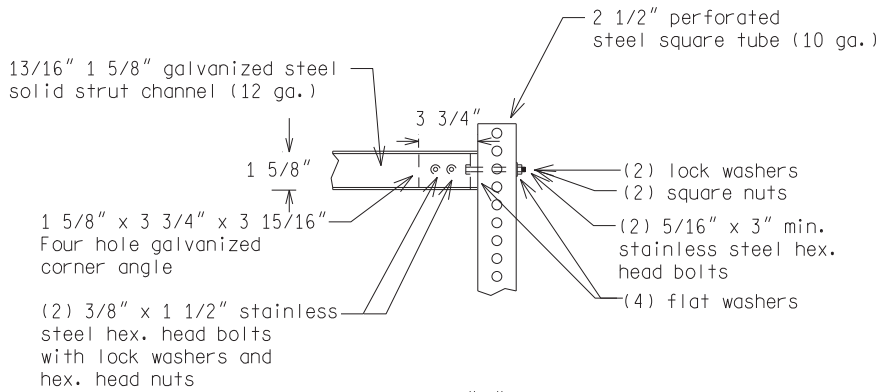
SIG-320-A

SHEET
1 of 9

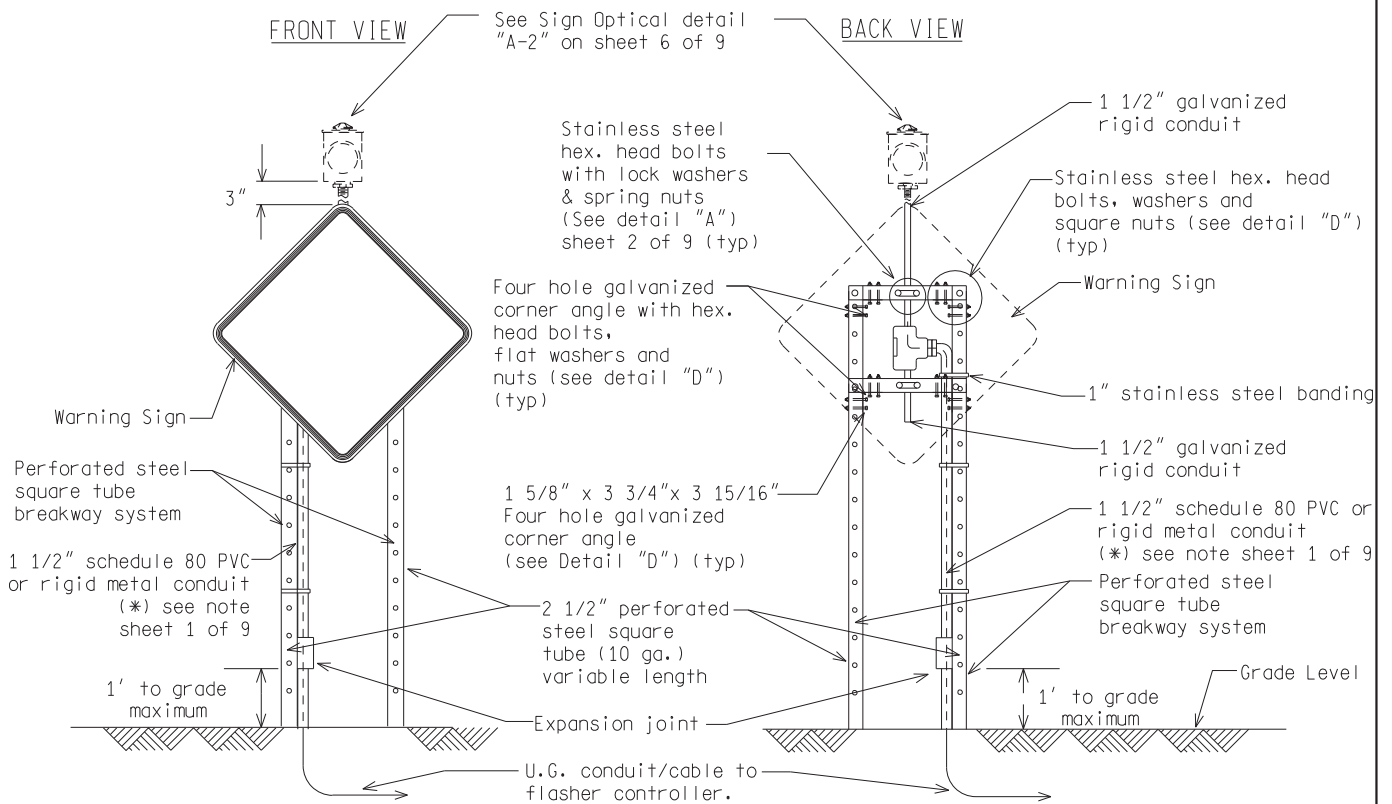
PLAN DATE



NOT TO SCALE					
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN		(SPECIAL DETAIL) FHWA APPROVAL DATE		PLAN DATE	
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG320A.dgn		Rev. 02/16/17		SIG-320-A	
				SHEET 2 of 9	



DETAIL "D"



SINGLE SIGN MOUNTED FLASHING BEACON
INSTALLED ON TWO STEEL POSTS
(PERFORATED STEEL SQUARE TUBE BREAKAWAY SYSTEM)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
 FHWA APPROVAL DATE

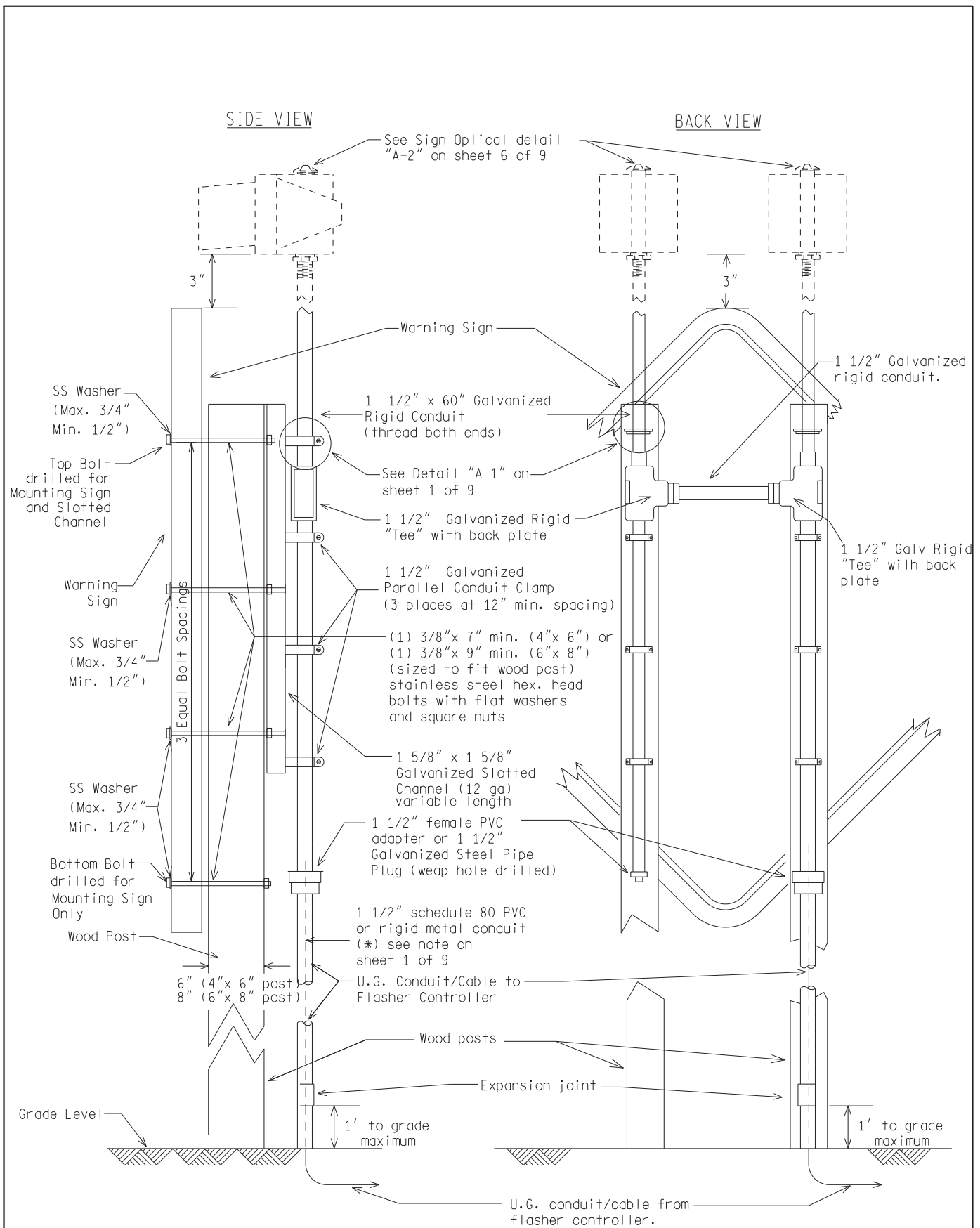
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Rev. 02/16/17

PLAN DATE

SIG-320-A

SHEET
 3 of 9



**SIGN MOUNTED DUAL FLASHING BEACONS
INSTALLED ON TWO WOOD POSTS**

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

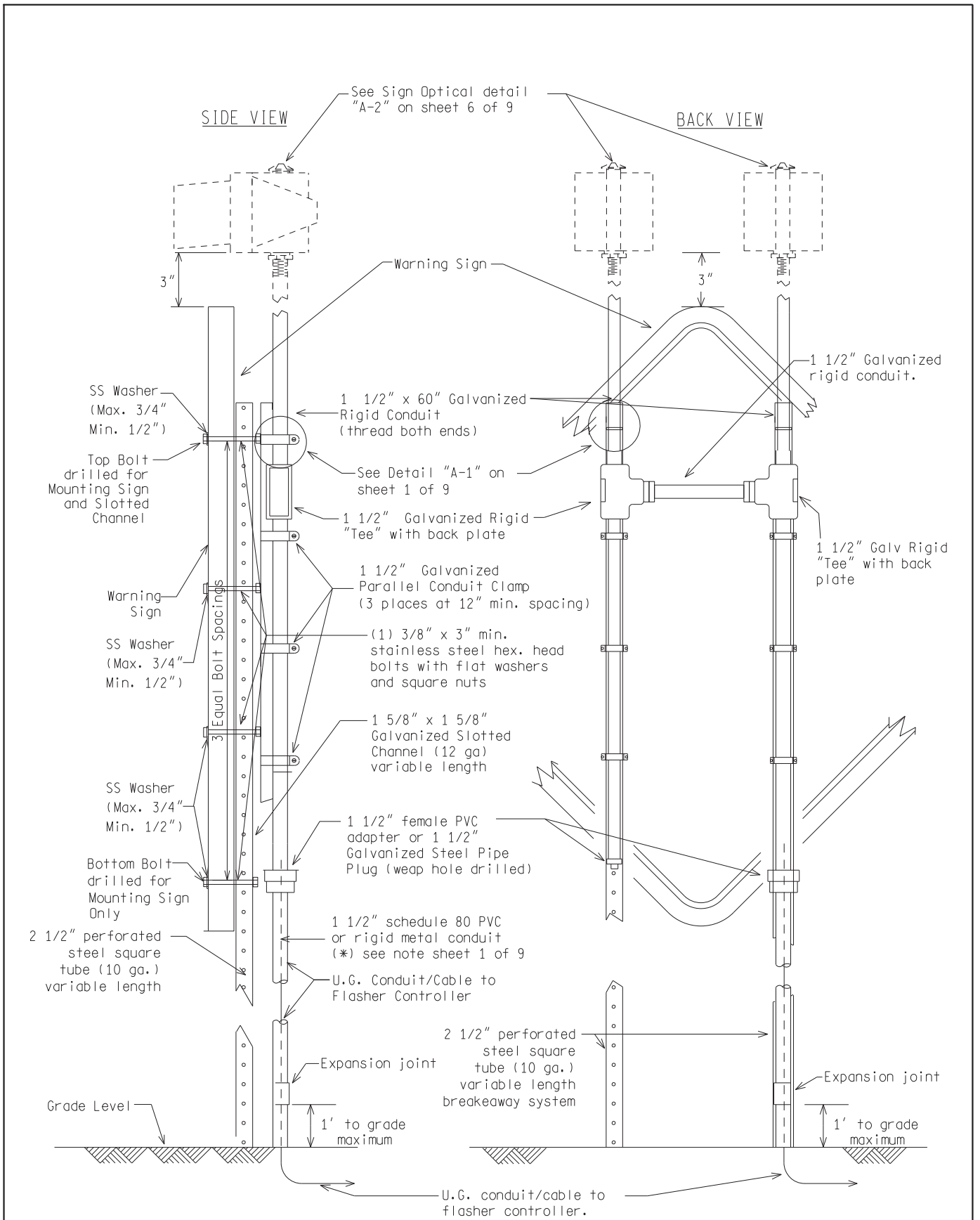
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Rev. 02/16/17

PLAN DATE

SIG-320-A

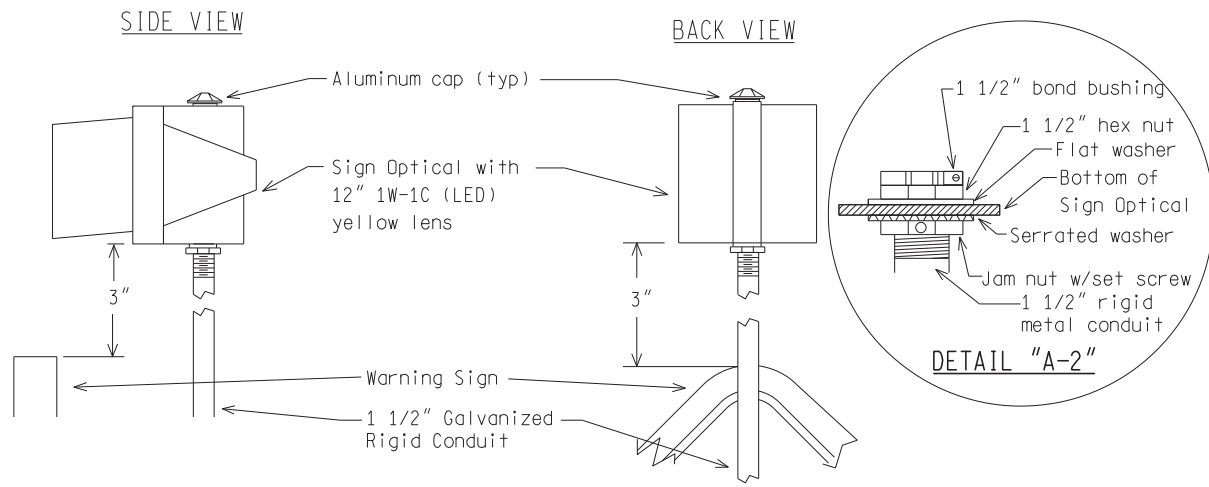
SHEET
4 of 9



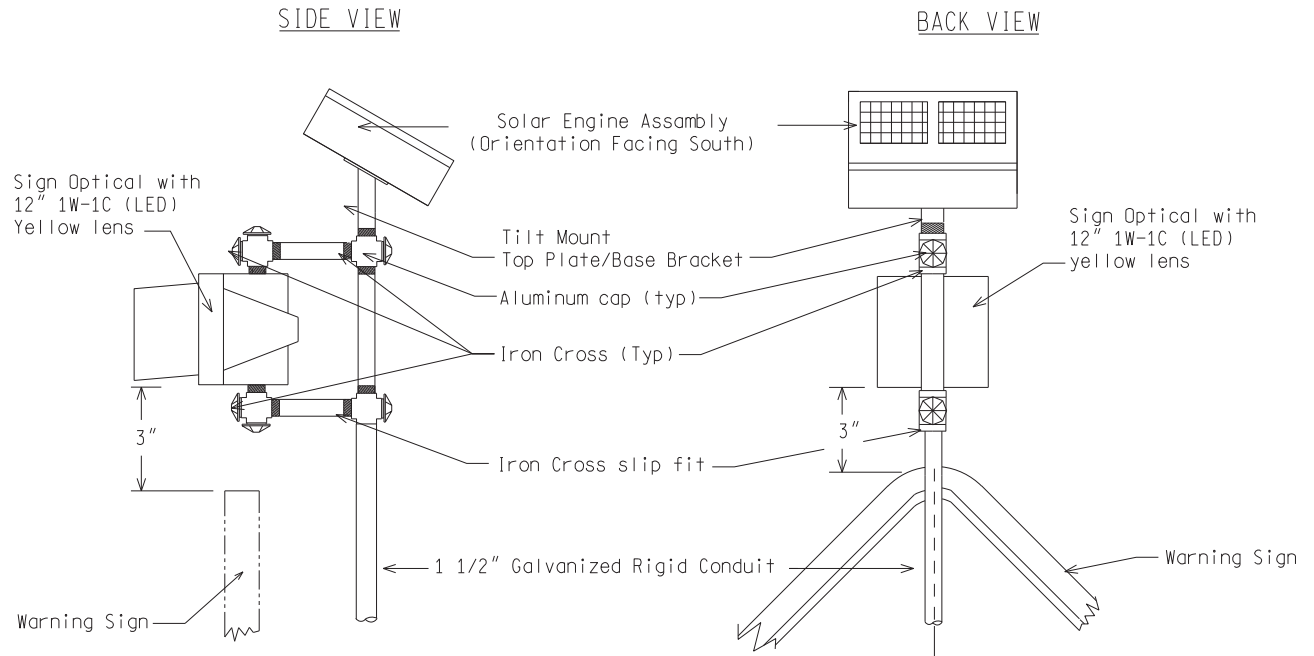
**SIGN MOUNTED DUAL FLASHING BEACONS
 INSTALLED ON TWO STEEL POSTS
 (PERFORATED STEEL SQUARE TUBE BREAKAWAY SYSTEM)**

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	_____ FHWA APPROVAL DATE	_____ PLAN DATE	SIG-320-A	SHEET 5 of 9
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG320A.dgn		Rev. 02/16/17		



SIGN MOUNTED FLASHING BEACON



Note: Use 6" x 8" wood posts(s) when supporting solar panel(s)

U.G. conduit/cable to dual advance warning sign optical location when required.

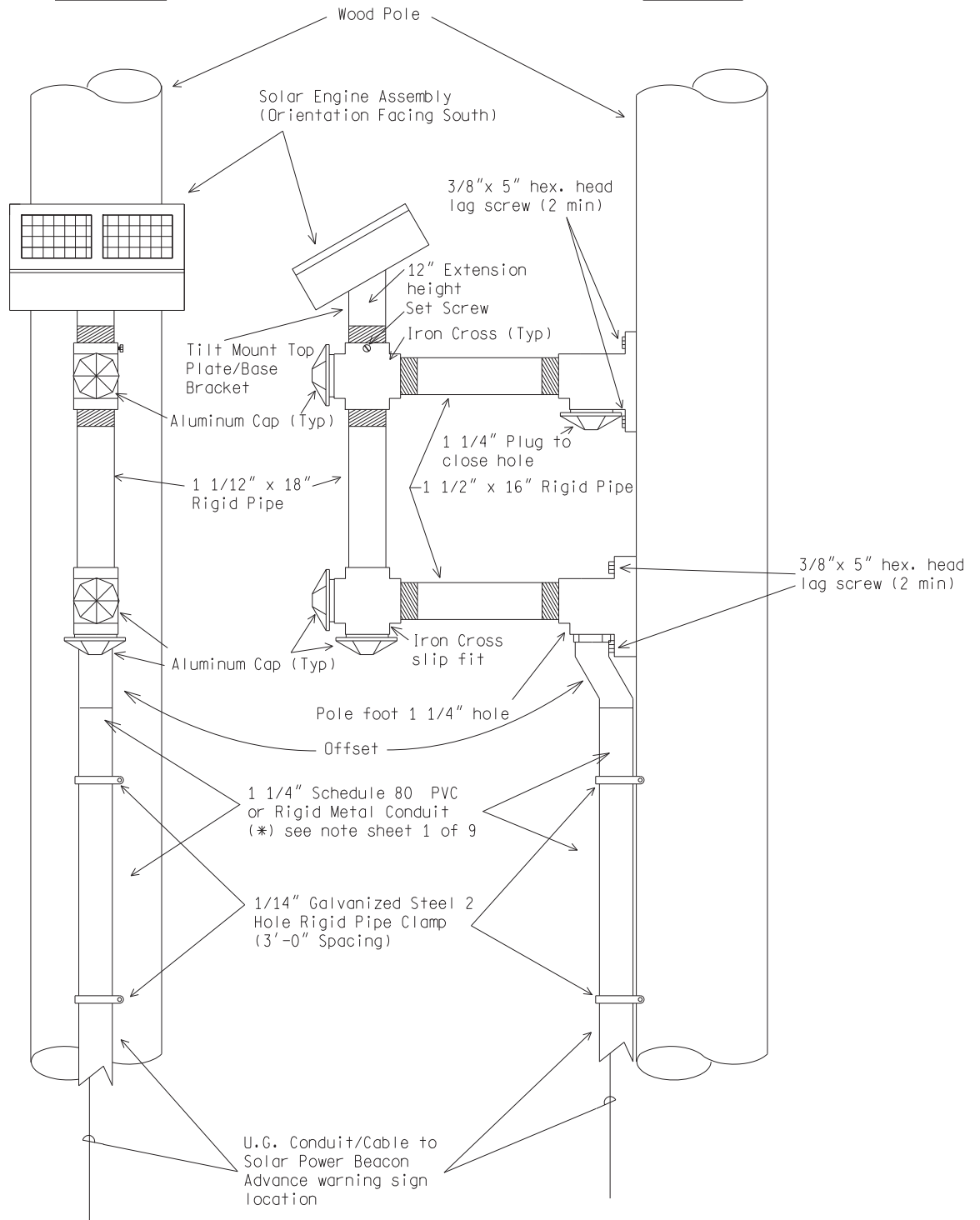
SIGN MOUNTED FLASHING BEACON (ONE SOLAR ENGINE ASSEMBLY)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-320-A	SHEET 6 of 9
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG320A.dgn	Rev. 02/16/17	PLAN DATE		

FRONT VIEW

SIDE VIEW



SOLAR ENGINE ASSEMBLY MOUNTED WOOD POLE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

FHWA APPROVAL DATE

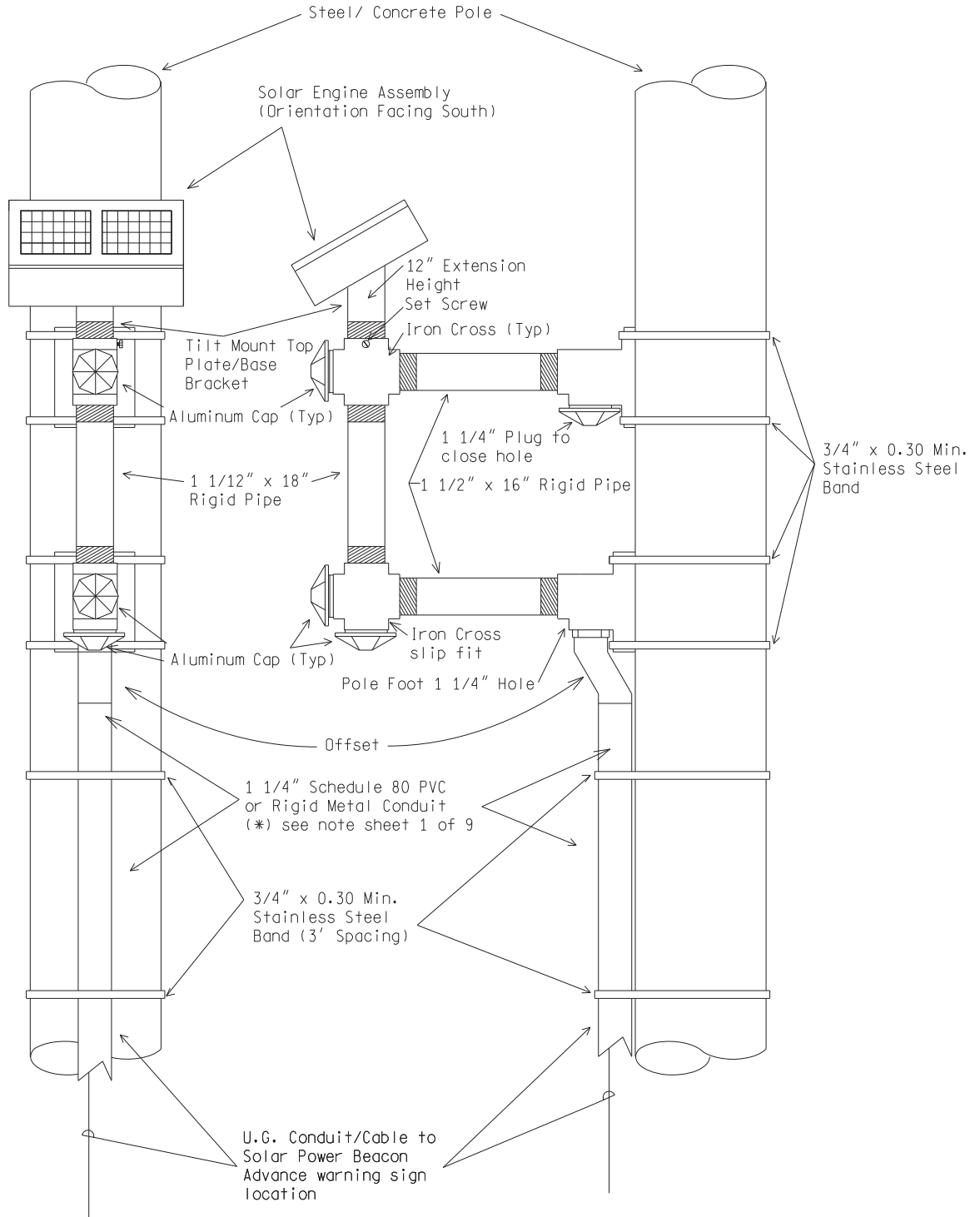
PLAN DATE

SIG-320-A

SHEET
7 of 9

FRONT VIEW

SIDE VIEW



SOLAR ENGINE ASSEMBLY MOUNTED ON STEEL/CONCRETE POLE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

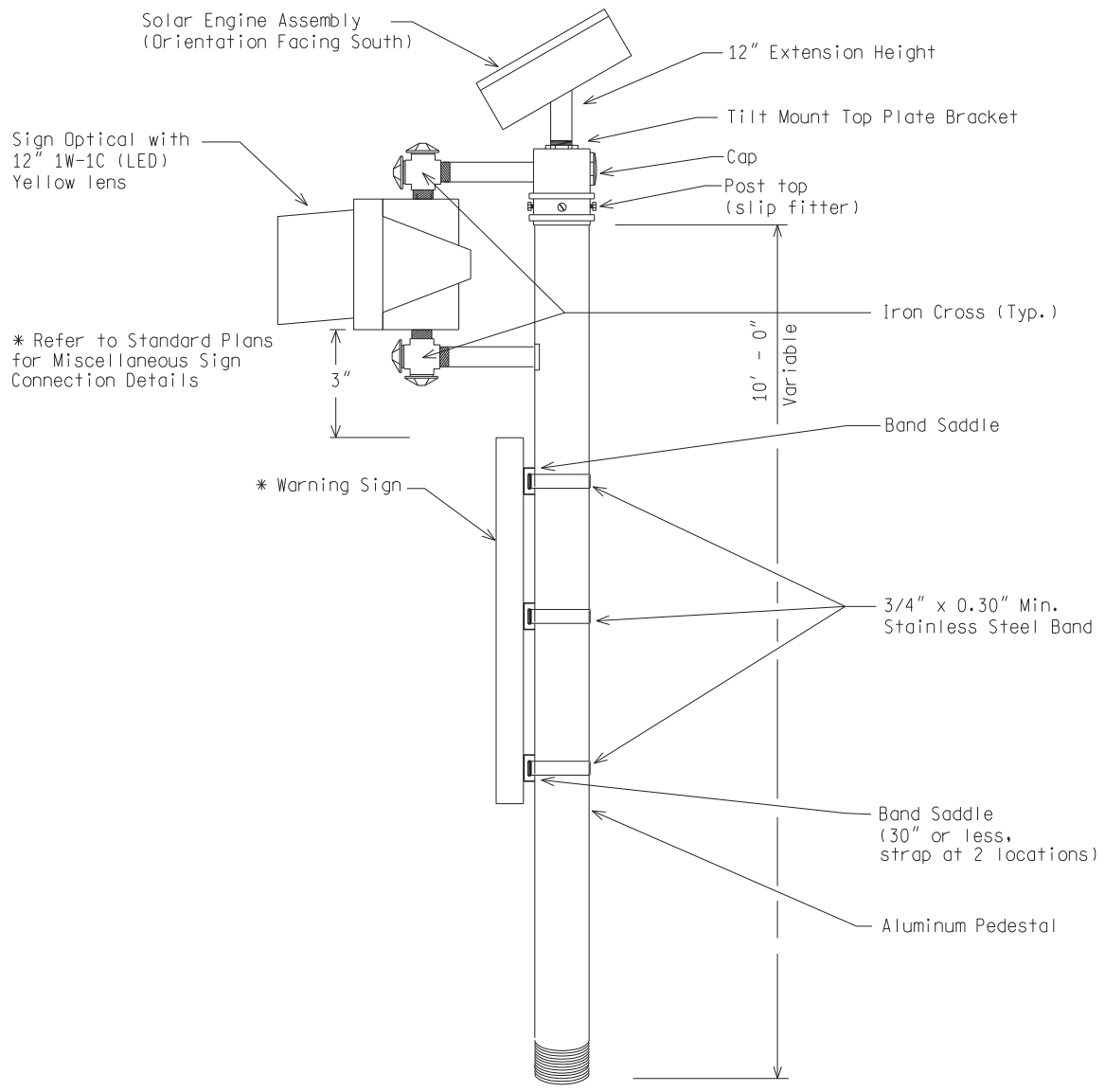
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Rev. 02/16/17

PLAN DATE

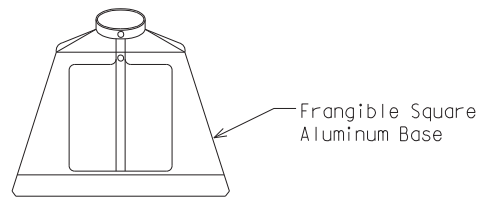
SIG-320-A

SHEET
8 of 9



* Refer to Standard Plans for Miscellaneous Sign Connection Details

* Warning Sign



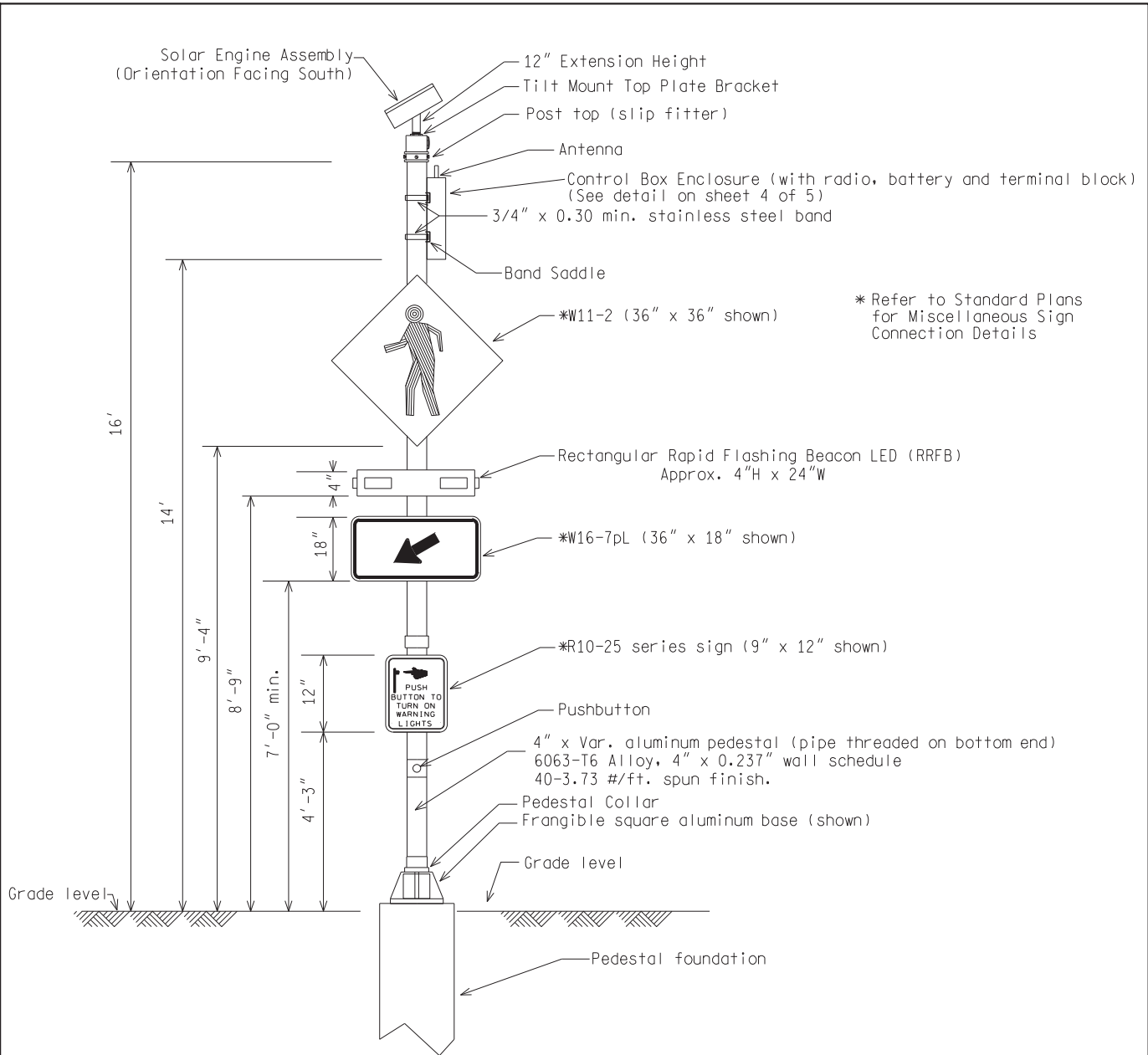
SQUARE ALUMINUM BASE

Note: Use pedestal collar for pedestal length greater than 14'

SOLAR ENGINE MOUNTED ON PEDESTAL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-320-A	SHEET 9 of 9
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG320A.dgn	Rev. 02/16/17			



FRONT VIEW

SOLAR POWER ASSEMBLY (ONE-SIDED RRFB)

NOT TO SCALE

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ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
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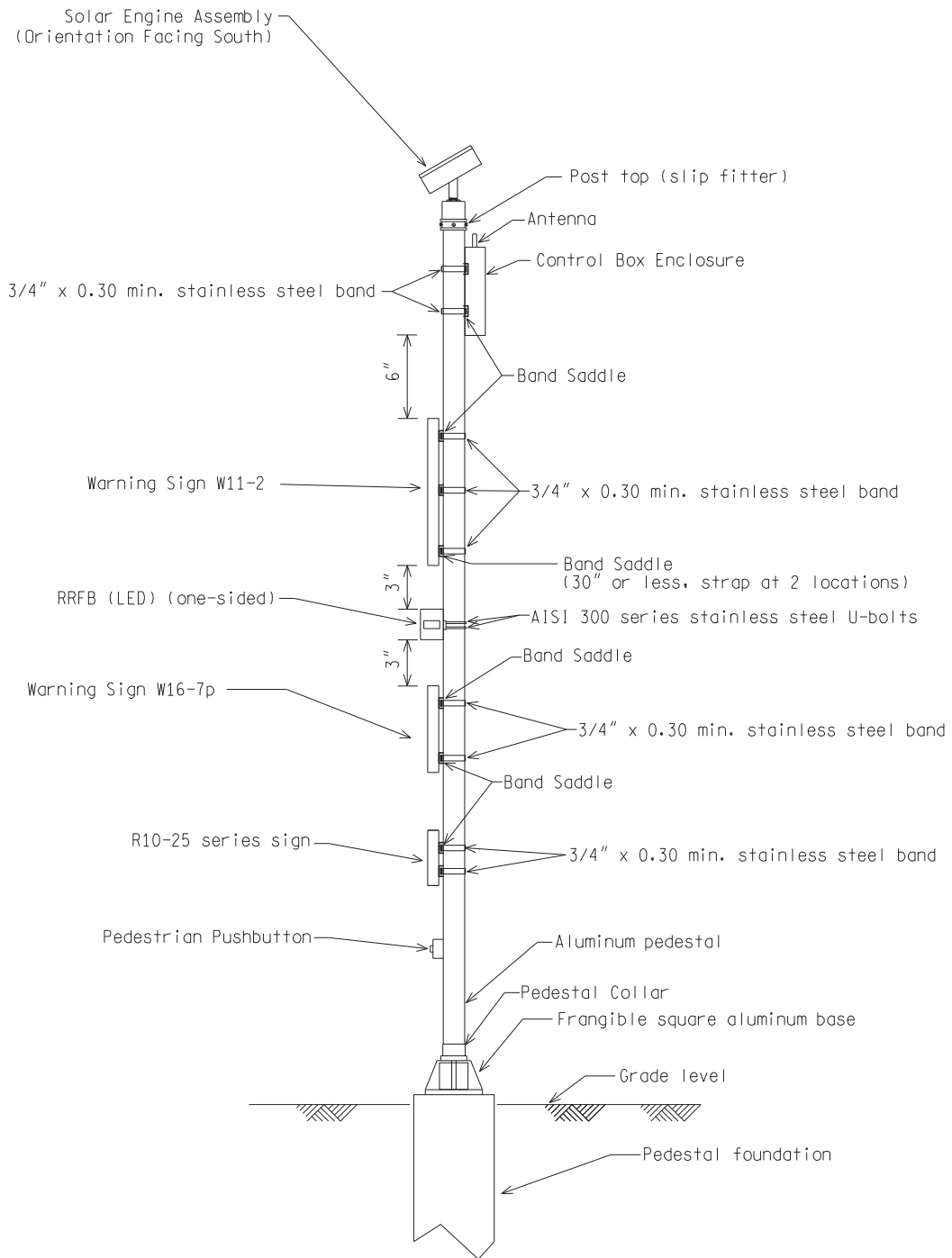
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

RECTANGULAR RAPID
FLASHING BEACON

PLAN DATE

SIG-321-A

SHEET
1 of 5



SIDE VIEW

SOLAR POWER ASSEMBLY (ONE-SIDED RRFB)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

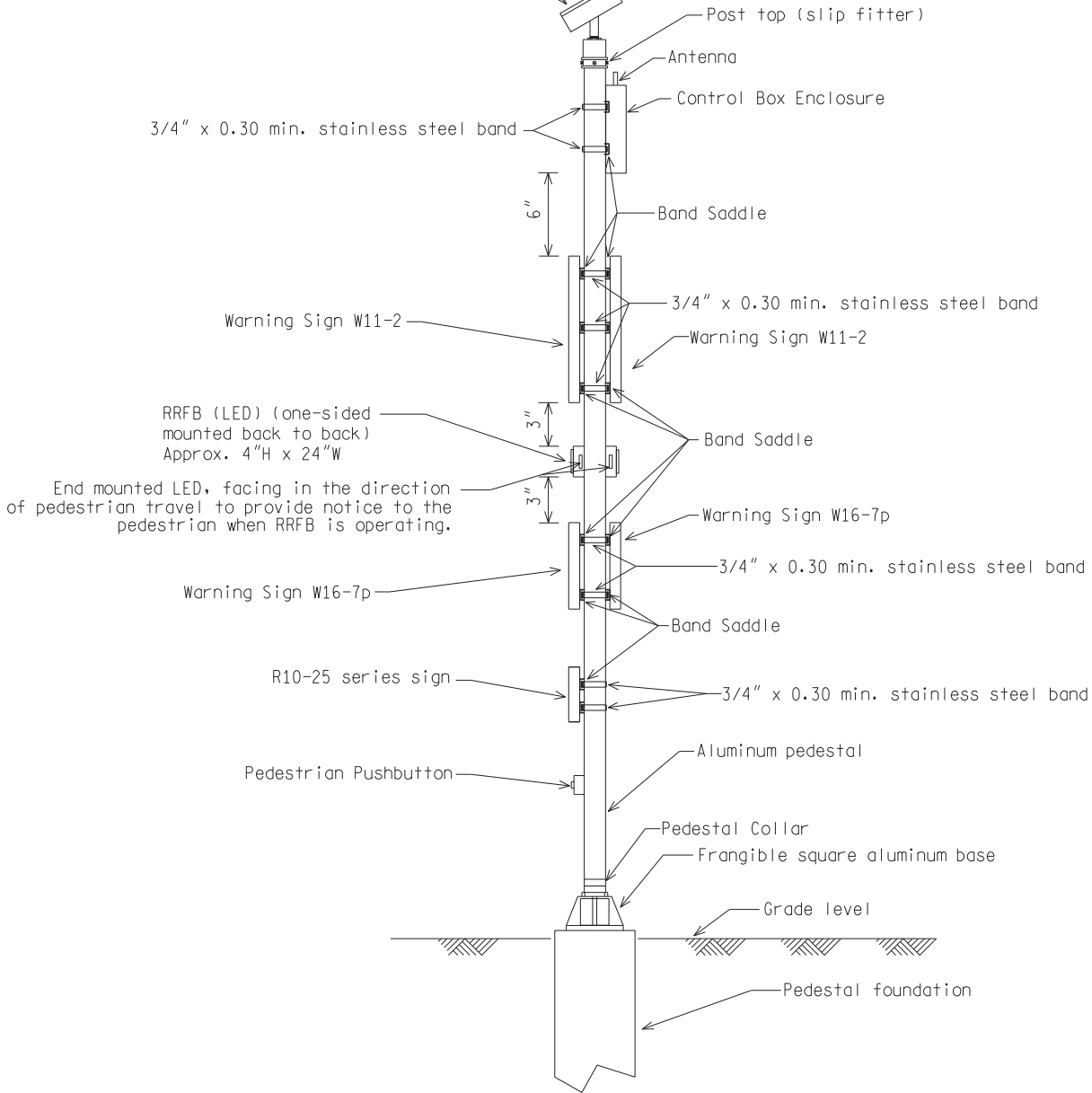
(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-321-A

SHEET
2 of 5

Solar Engine Assembly
(Orientation Facing South)



SIDE VIEW

SOLAR POWER ASSEMBLY (TWO-SIDED RRFB)

NOT TO SCALE

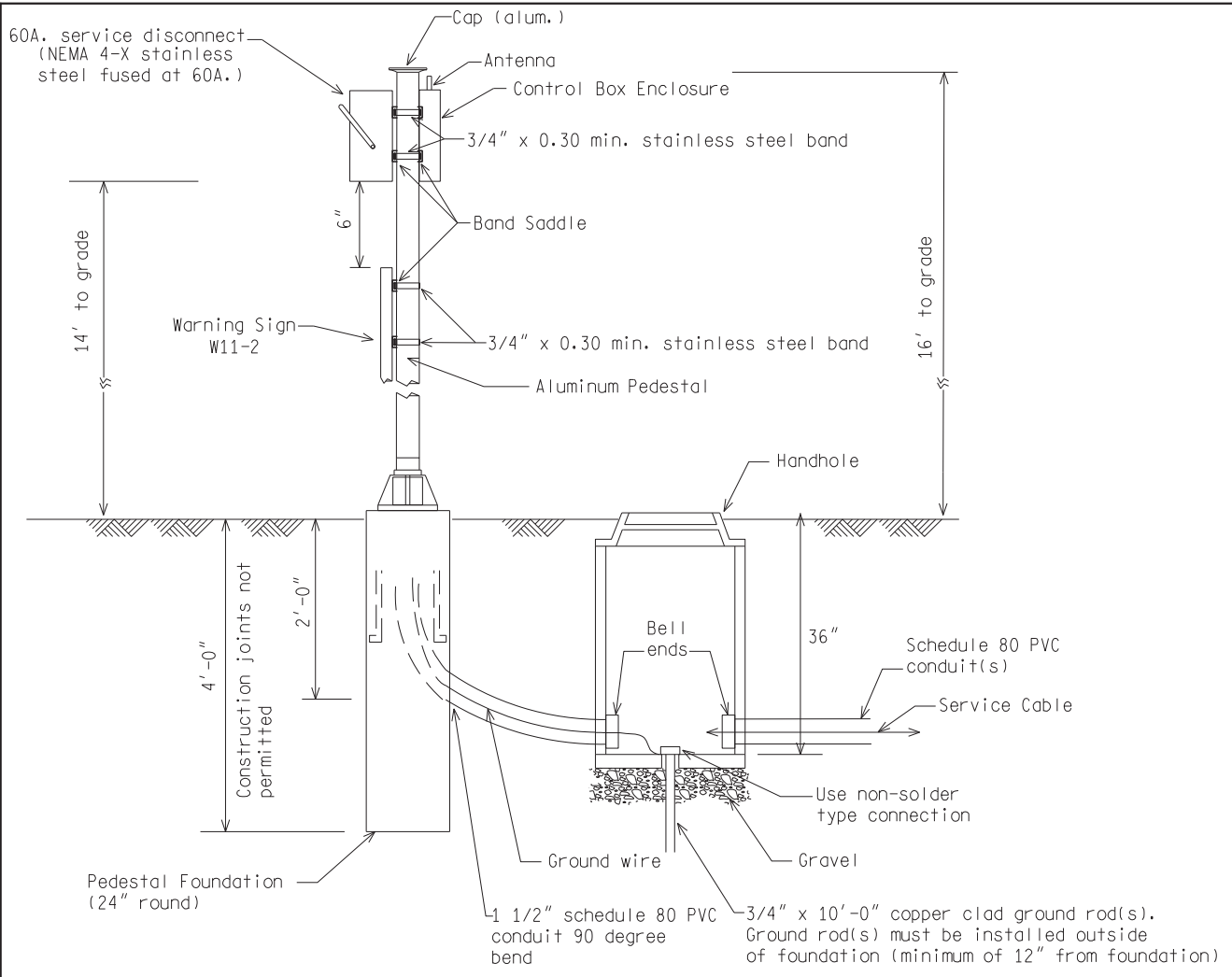
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

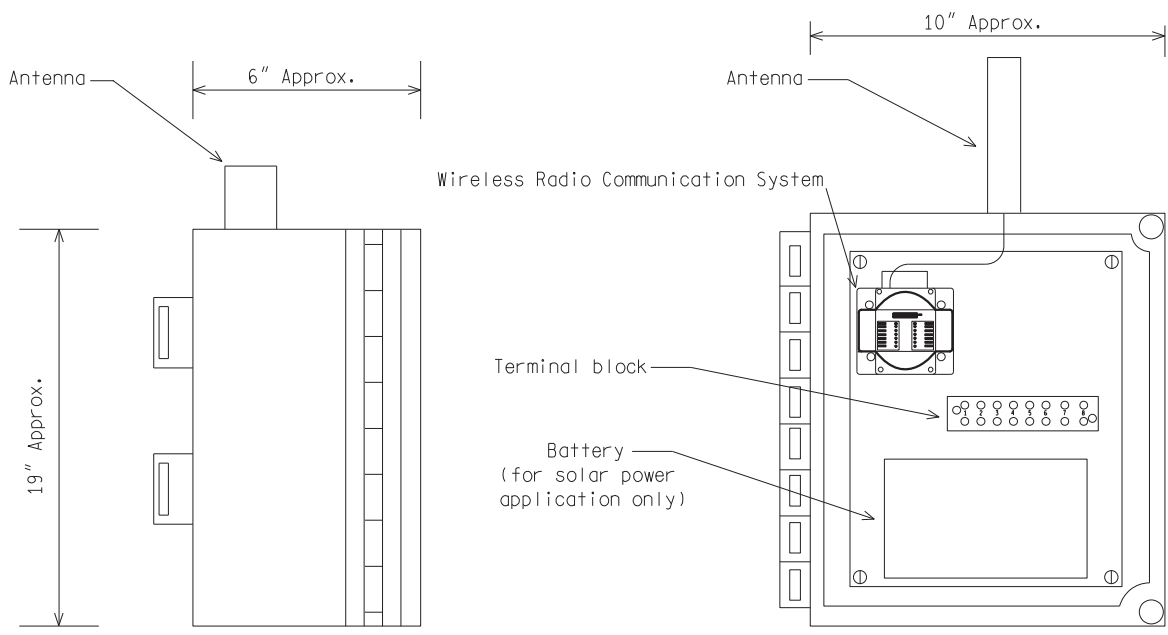
PLAN DATE

SIG-321-A

SHEET
3 of 5



PERMANENT POWER SOURCE (RRFB)



SIDE VIEW

CONTROL BOX ENCLOSURE DETAIL

INSIDE VIEW

NOT TO SCALE

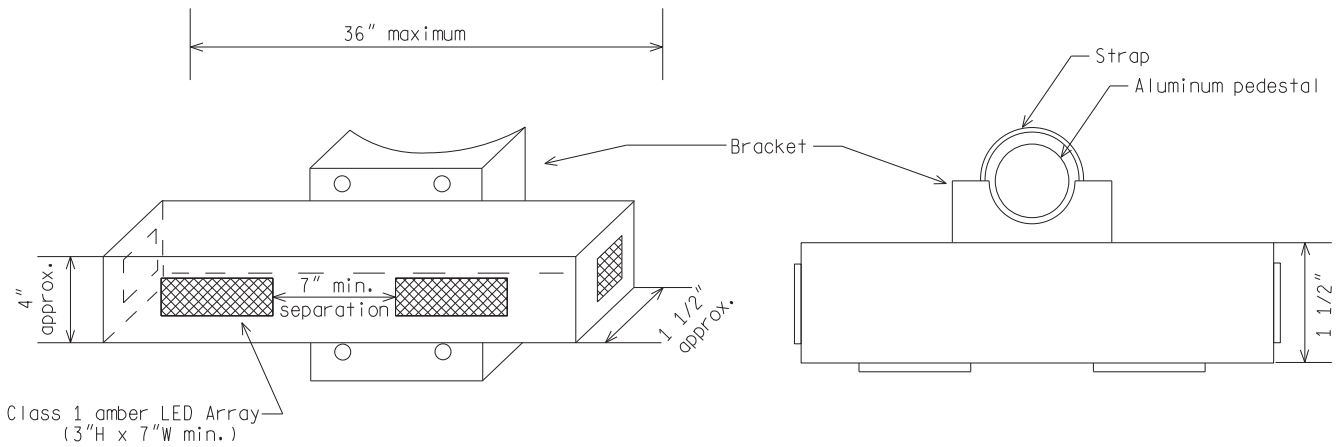
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-321-A

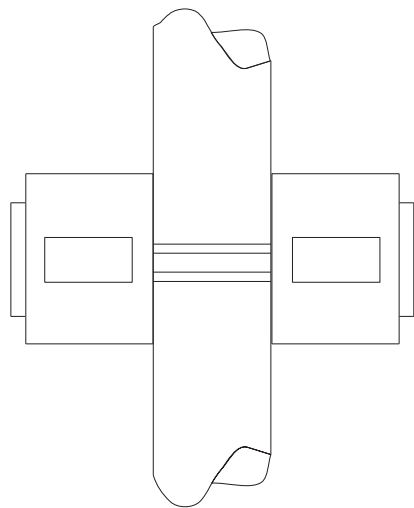
SHEET
4 of 5



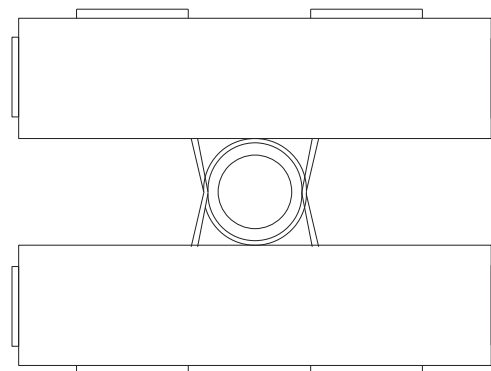
FRONT VIEW

TOP VIEW

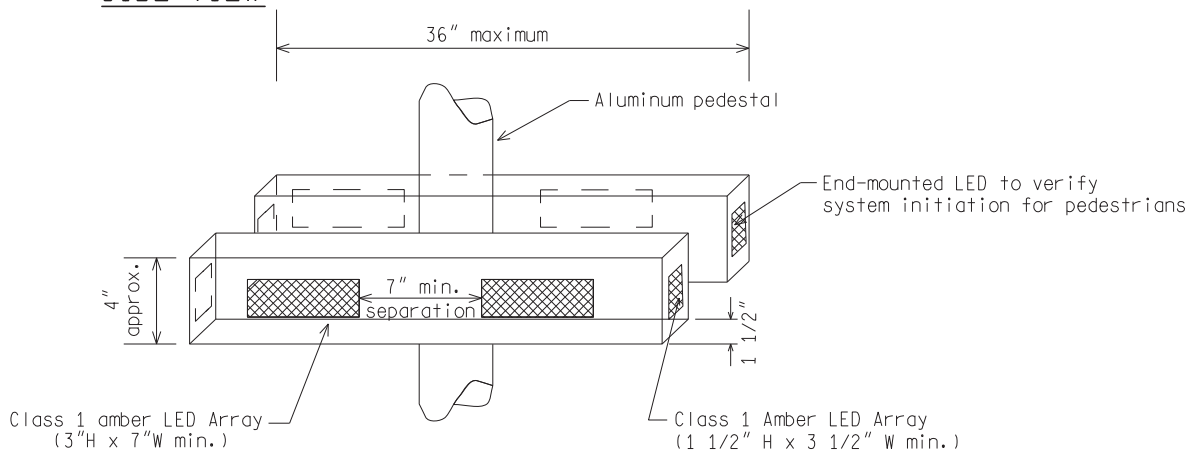
ONE-WAY RRFB (4 LED' S)



SIDE VIEW



TOP VIEW



FRONT VIEW

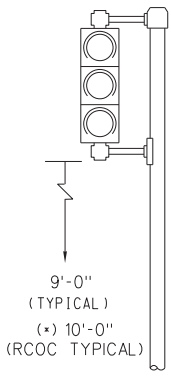
TWO-WAY RRFB (8 LED' S)
TWO ONE WAY MOUNTED BACK TO BACK

- Notes: 1) All dimensions are approximate.
 2) Use manufacturer's recommended mounting brackets, fittings, and connectors.
 3) Use AISI 300 series stainless steel hardware.

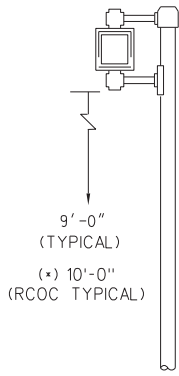
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-321-A	SHEET 5 of 5
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG321A.dgn	Rev. 02/16/17	PLAN DATE		

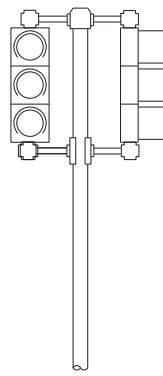
(* Refer to Note 4 on Sheet 2 of 2.



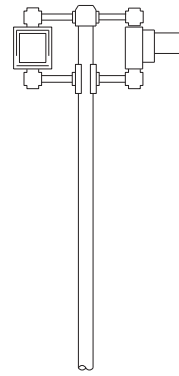
DETAIL "A-2"



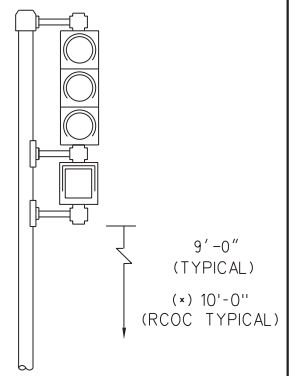
DETAIL "B-2"



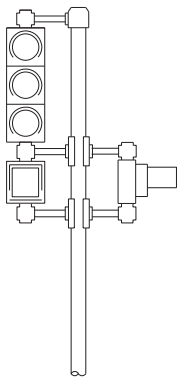
DETAIL "C-2"



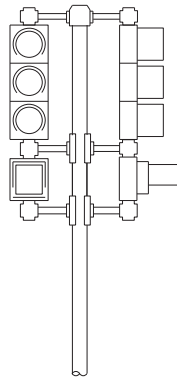
DETAIL "D-2"



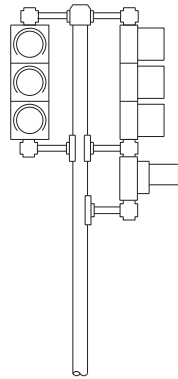
DETAIL "E-2"



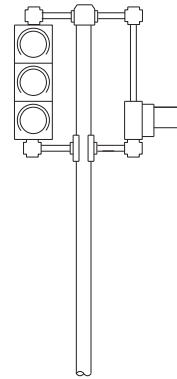
DETAIL "F-2"



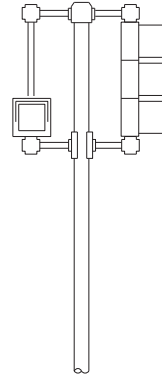
DETAIL "G-2"



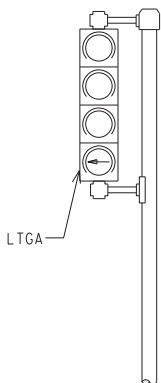
DETAIL "H-2"



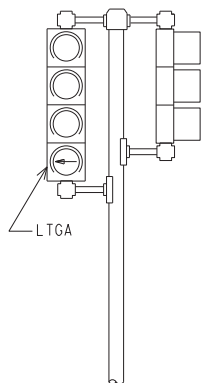
DETAIL "I-2"



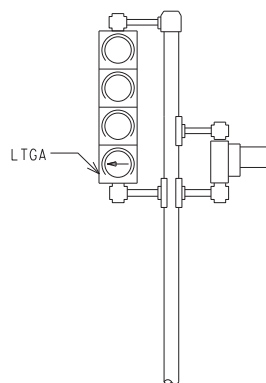
DETAIL "J-2"



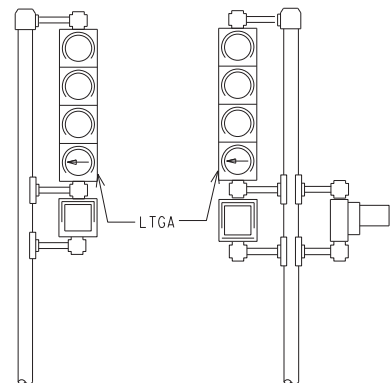
DETAIL "K-2"



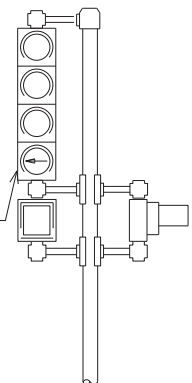
DETAIL "L-2"



DETAIL "M-2"



DETAIL "N-2"



DETAIL "O-2"

Left Turn Green Arrow (LTGA)

NOT TO SCALE

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ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

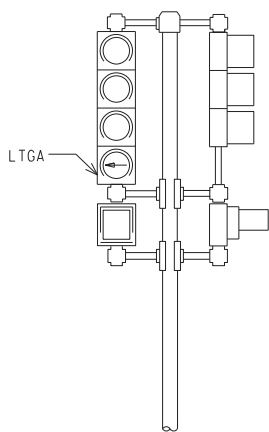
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

PEDESTAL MOUNTED
SIGNAL DISPLAYS

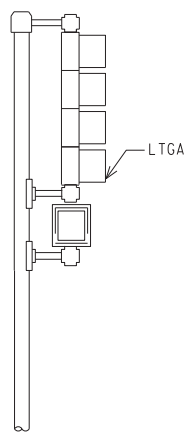
SIG-330-A

PLAN DATE

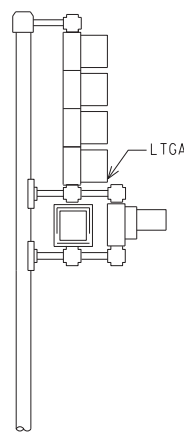
SHEET
1 of 2



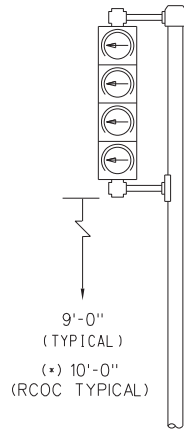
DETAIL "P-2"



DETAIL "Q-2"

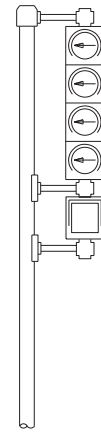


DETAIL "R-2"



DETAIL "S-2"

(FYA)

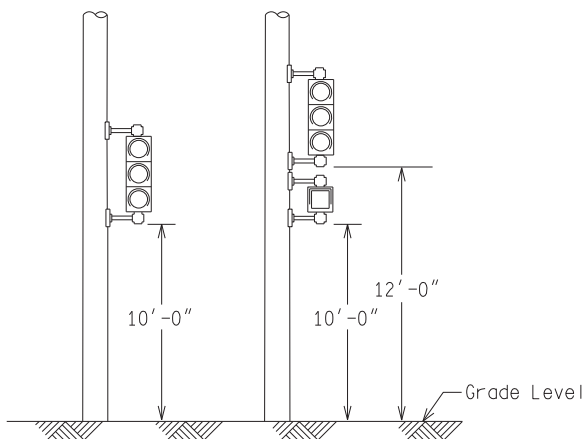


DETAIL "T-2"

(FYA)

Left Turn Green Arrow (LTGA)

Flashing Yellow Arrow (FYA)



RCOC Mounting Detail (*) see note

DETAIL "U-2"

(FYA)

DETAIL "V-2"

(FYA)

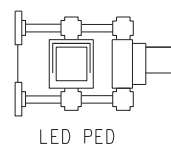
DETAIL "Typical"

WITH CASE SIGN

Flashing Yellow Arrow (FYA)

NOTE:

- 1) Pipe assembly shall be such length and height as to accommodate traffic signals and pedestrian signals for proper maintenance and clear vehicular and pedestrian viewing.
 - 2) Pipe assembly shall be of such length and height as to accommodate an illuminated (12"x27") case sign for proper maintenance and clear vehicular viewing.
 - 3) Bracket lengths are 16 inches for LED pedestrian signals and for LED pedestrian countdown signals.
 - 4) Tolerance within +/- 1/8" for bracketing.
- (*) For projects maintained by the Road Commission for Oakland County (RCOC), use the bottom heights and bracket assemblies as shown for the RCOC mounting detail.

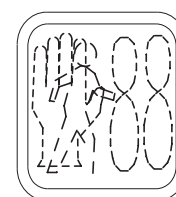


LED PED

NOTE:
Walking person and hand symbol are filled.

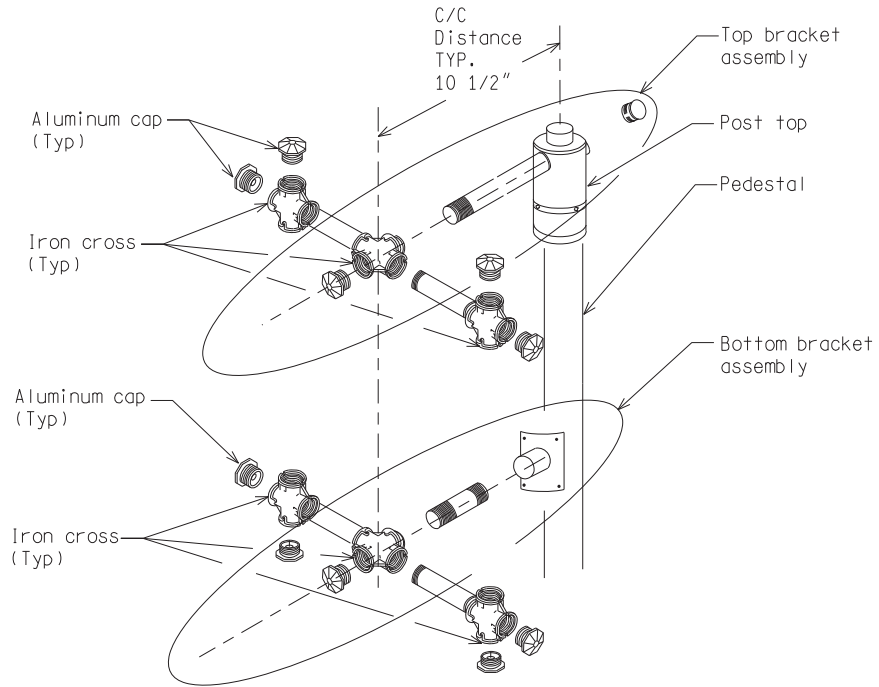


LED PED (filled)

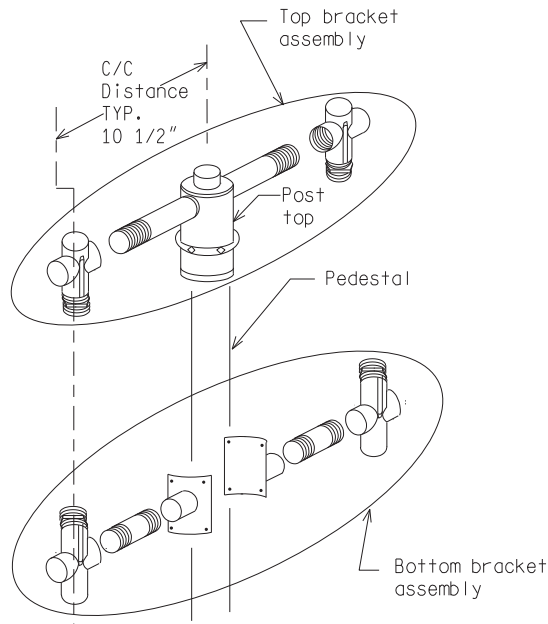


Countdown LED PED (filled symbols)

NOT TO SCALE



SIGNAL MOUNTING HARDWARE FOR BACKSIDE BRACKET



SIGNAL MOUNTING HARDWARE - STANDARD BRACKET

NOT TO SCALE

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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

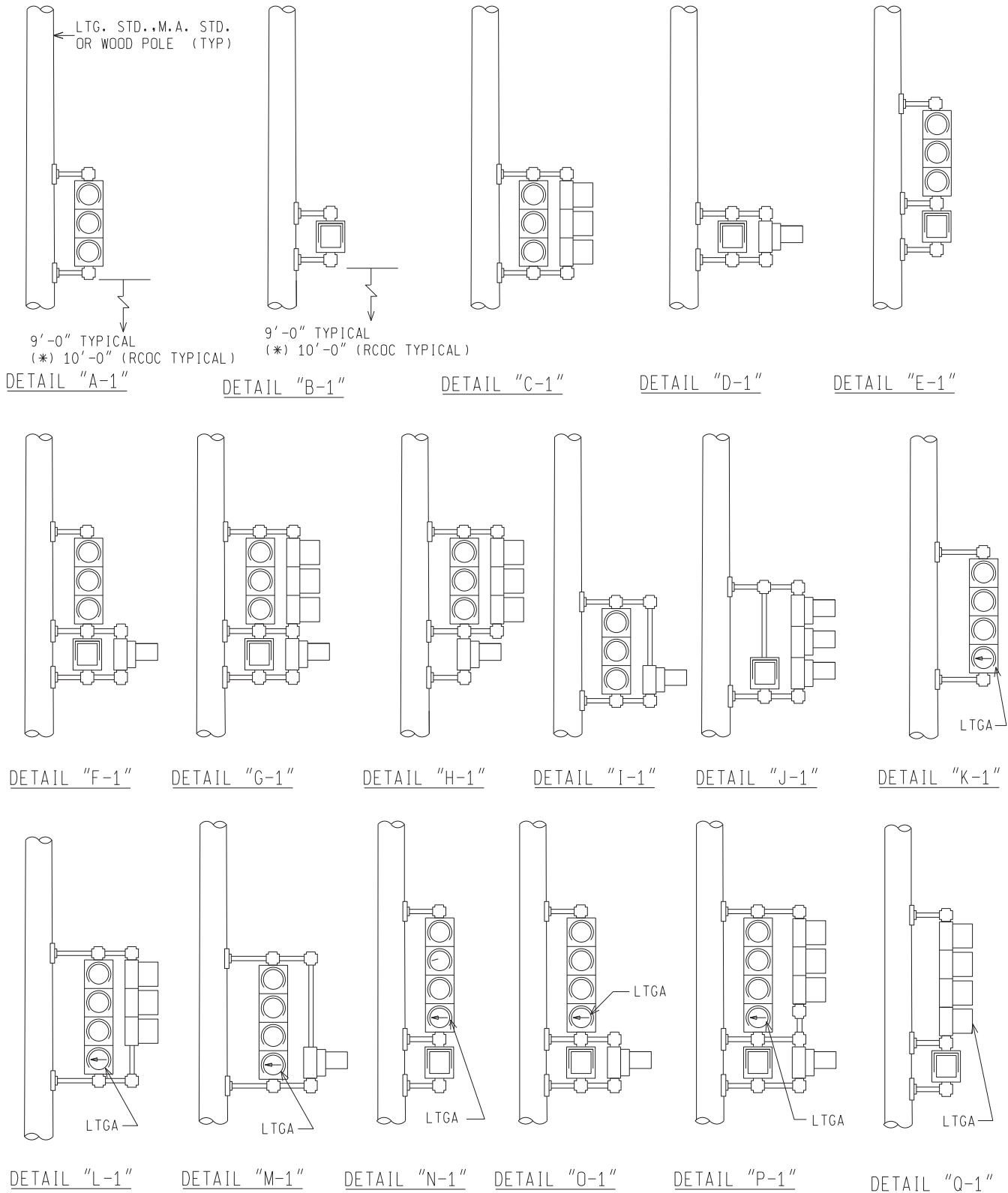
PEDESTAL MOUNTING
FOR SIGNALS

02/16/17
PLAN DATE

SIG-331-A

SHEET
1 of 1

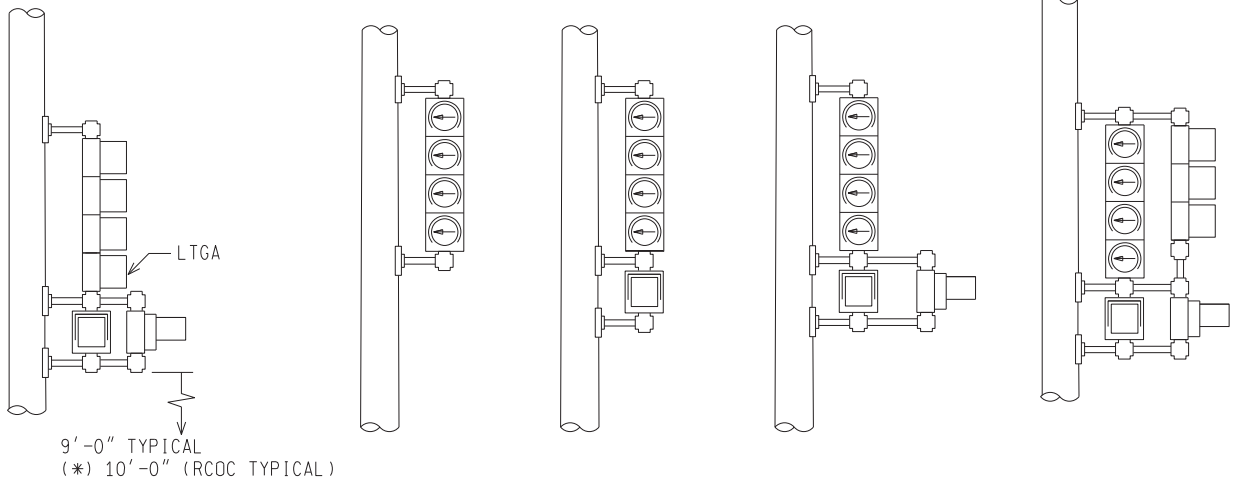
(*) Refer to Note 5 on Sheet 2 of 2.



NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG340A.dgn Rev: 02/16/17

<p>PREPARED BY TRAFFIC AND SAFETY</p>	<p>ENGINEER OF DELIVERY</p>	<p>MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR</p>	
	<p>ENGINEER OF DEVELOPMENT</p>	<p>POLE MOUNTED SIGNAL DISPLAYS</p>	
<p>DRAWN BY:</p> <p>CHECKED BY:</p>	<p>(SPECIAL DETAIL) FHWA APPROVAL DATE</p>	<p>PLAN DATE</p>	<p>SIG-340-A</p>
			<p>SHEET 1 of 2</p>



DETAIL "R-1"

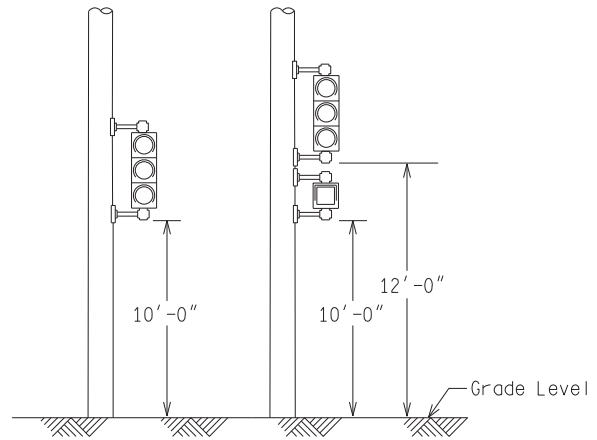
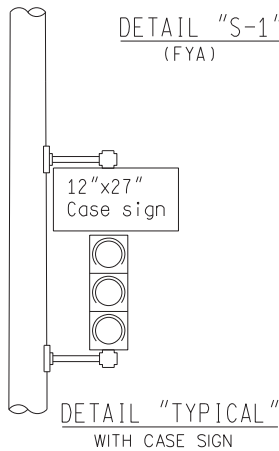
DETAIL "S-1"
(FYA)

DETAIL "T-1"
(FYA)

DETAIL "U-1"
(FYA)

DETAIL "V-1"
(FYA)

Flashing Yellow Arrow (FYA)

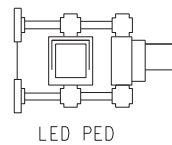


RCOC Mounting Detail (*) see note

NOTES:

- 1) The relative position of 2-Way T.S. & pedestrian bracket arm signals within the bracket assembly shall be reversed (i.e. the signal nearest the pole goes to the outside of the bracket assembly & the outside signal goes inboard or nearest to pole) according to the plan view to provide clear vehicular and pedestrian viewing.
- 2) Pipe assembly shall be of such length and height as to accommodate traffic signals and pedestrian signals for proper maintenance and clear vehicular and pedestrian viewing.
- 3) Pipe assembly shall be of such length and height as to accommodate an illuminated (12"x27") case sign for proper maintenance and clear vehicular viewing.
- 4) Bracket lengths are 16 inches for LED pedestrian signals and LED pedestrian countdown signals.
- 5) For poles located 6' or less from face of curb, contact Engineer for traffic and/or pedestrian bracket type and orientation if field installation requires a change from information shown on the plans.
- 6) Tolerance within +/- 1/8" for bracketing.

(*) For projects maintained by the Road Commission for Oakland County (RCOC), use the bottom heights and bracket assemblies as shown for the RCOC mounting detail.

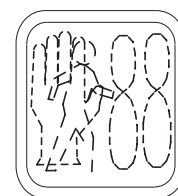


LED PED

NOTE:
Walking person and hand symbol are filled.



LED PED
(filled)



Countdown
LED PED
(filled symbols)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
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PLAN DATE

SIG-340-A

SHEET
2 of 2

See detail "A" sheet 3 of 3

1 1/4" schedule 80 PVC or rigid metal conduit.

1 1/4" pulling "L" box (Type C)

Wood or plastic moulding

NOTES:

1) Exterior surface of all mounting assemblies for pedestrian signals including brackets, nuts and related hardware shall be weather-resistant black enamel.

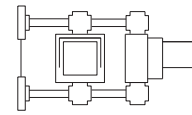
(*) For projects maintained by the Road Commission for Oakland County (RCOC), use the bottom heights and bracket assemblies as shown on SIG-028A, SIG-029A or SIG-029B for the RCOC Mounting Detail.

Grade level

9'-0" (*) see note

Use non-solder type connection

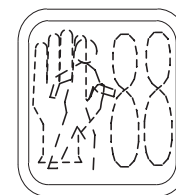
Ground rod (s)



LED ped



LED PED (filled)



Countdown LED PED (filled symbols)

WOOD POLE

OVERHEAD FEED

1 1/4" schedule 80 PVC or rigid metal conduit, shown, but apply to all conduit sizes.

Galvanized Steel 2 hole Strap

Expansion Joint

Grade level

1' to Grade Maximum

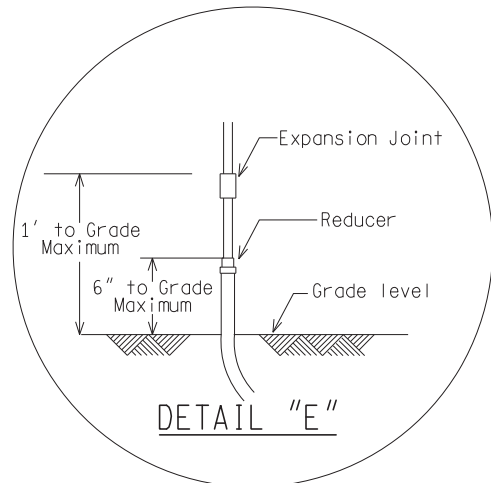
Handhole

WOOD POLE

NOTE:

If rigid metal conduit is used, the conduit must be bonded according to the current N.E.C.

Schedule 80 PVC conduit (size of conduit as shown on plans)



DETAIL "E"

UNDERGROUND ALTERNATE (COUPLING NOT SHOWN)

NOT TO SCALE

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CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

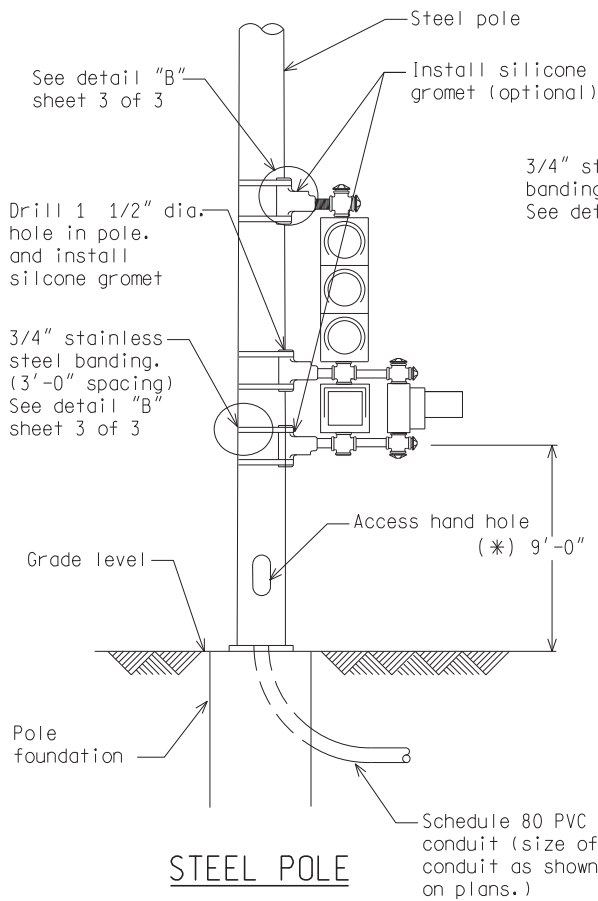
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

**POLE MOUNTING DETAILS
FOR SIGNALS**

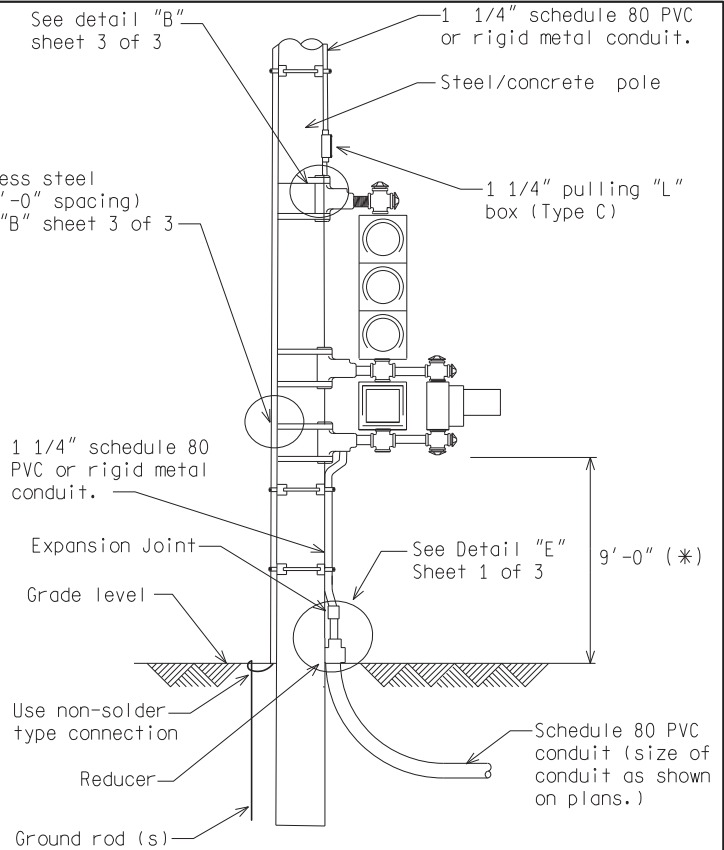
PLAN DATE

SIG-341-A

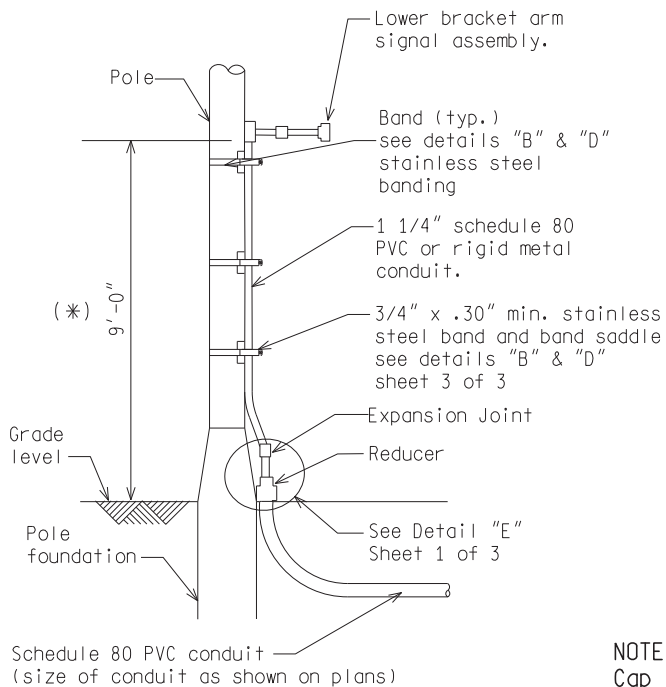
SHEET
1 of 3



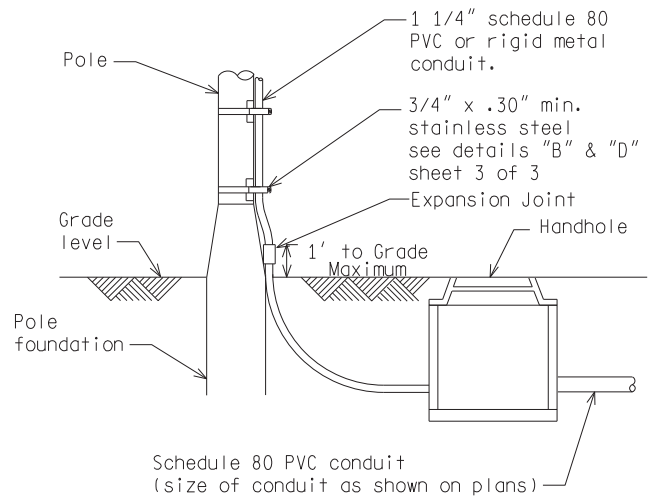
STEEL POLE



STEEL STREET LIGHT POLE OR CONCRETE POLE

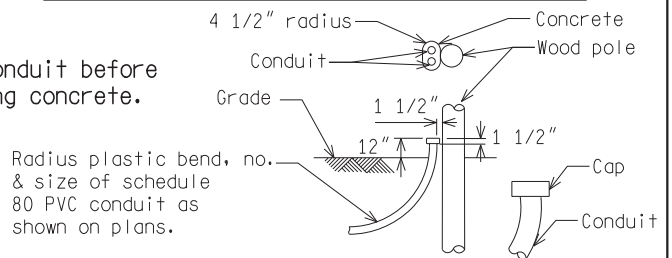


INSTALLATION OF CONDUIT ON OUTSIDE OF POLE



INSTALLATION OF CONDUIT ON OUTSIDE OF POLE (ALTERNATE)

NOTE:
Cap conduit before pouring concrete.



INSTALLATION OF CONDUIT AT CABLE POLE

(*) Refer to Note 2 on Sheet 1 of 3.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

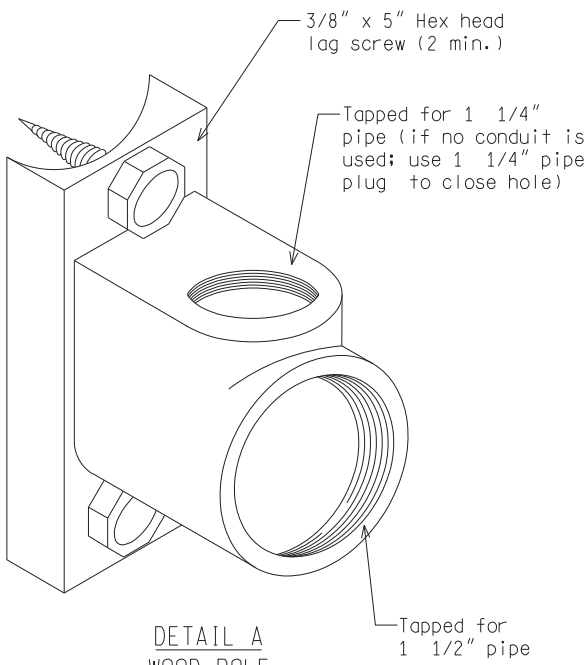
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Rev. 02/16/17

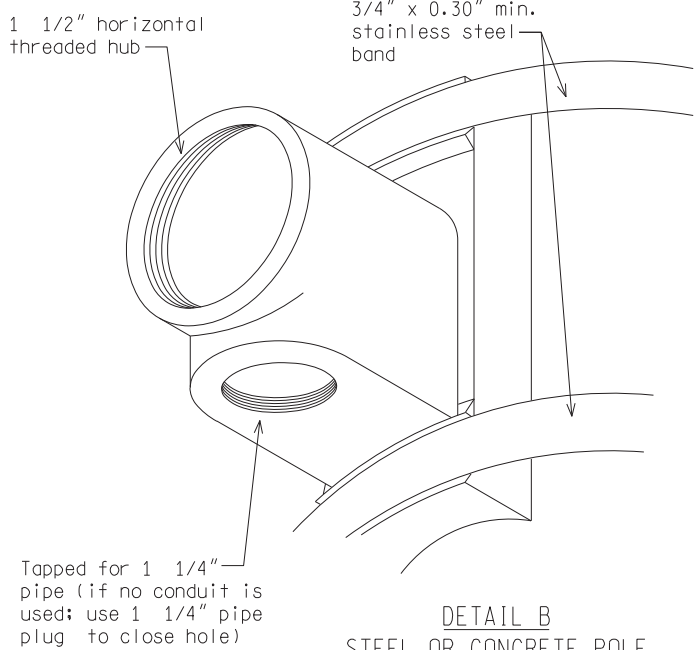
PLAN DATE

SIG-341-A

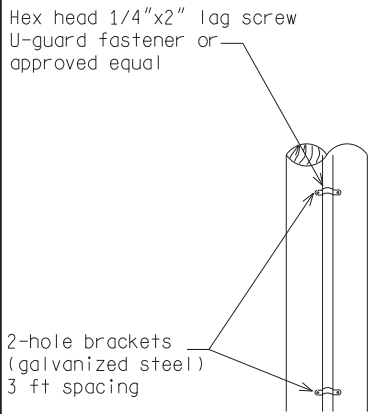
SHEET
2 of 3



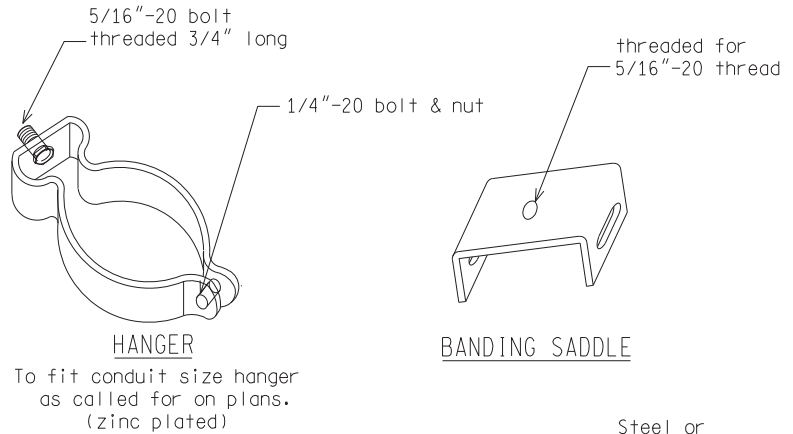
DETAIL A
WOOD POLE



DETAIL B
STEEL OR CONCRETE POLE

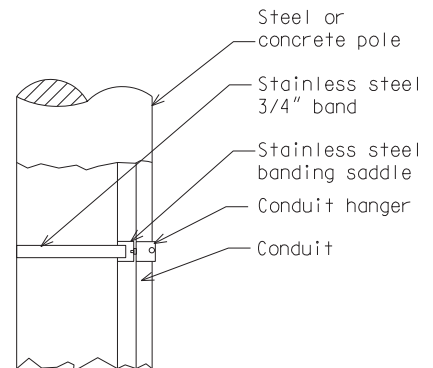


DETAIL C
TYPICAL CONDUIT ATTACHMENT TO WOOD POLE



HANGER
To fit conduit size hanger as called for on plans. (zinc plated)

BANDING SADDLE



DETAIL D
TYPICAL CONDUIT ATTACHMENT TO STEEL OR CONCRETE POLE.

NOTES:

- 1) Install 3/4" x 10'-0" copper clad ground rod (s) as required to provide less than 10 ohm resistance to ground. install #6 min. copper wires from ground rod (s) to span wire at each supporting pole using non-solder type connections for span wire ground.
- 2) Use conduit size specified (min.) unless current N.E.C. indicates a larger size is required.

NOT TO SCALE

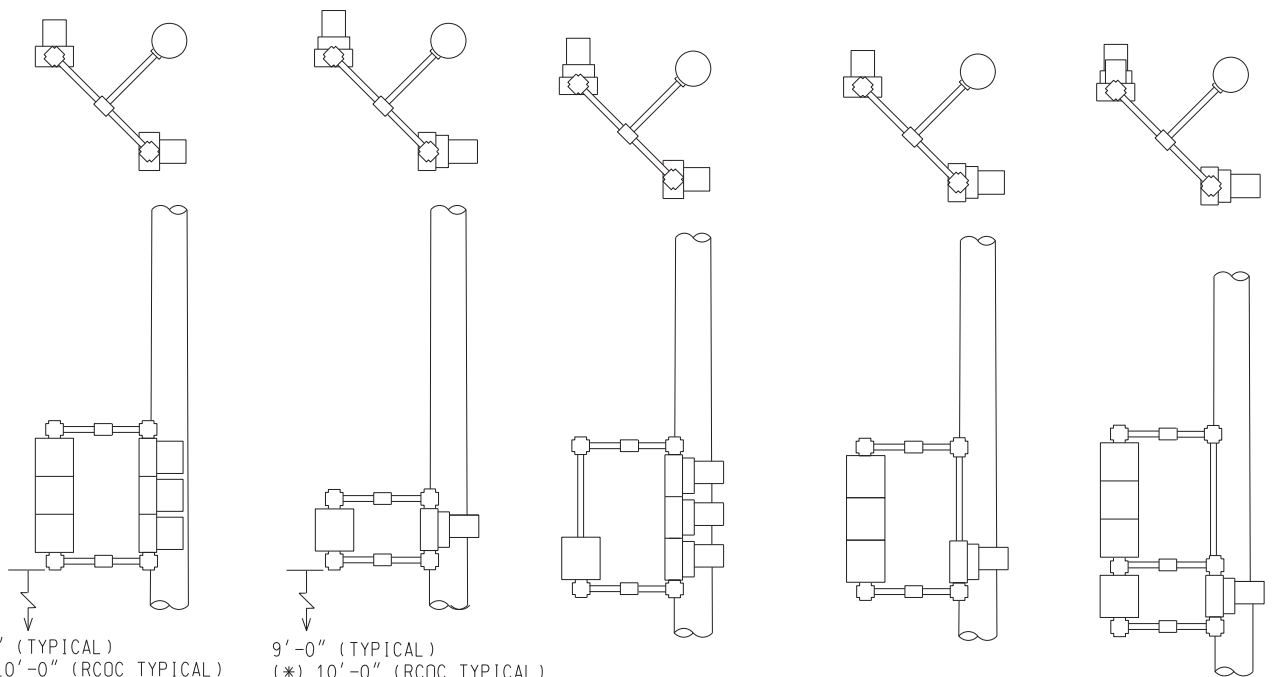
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-341-A

SHEET
3 of 3



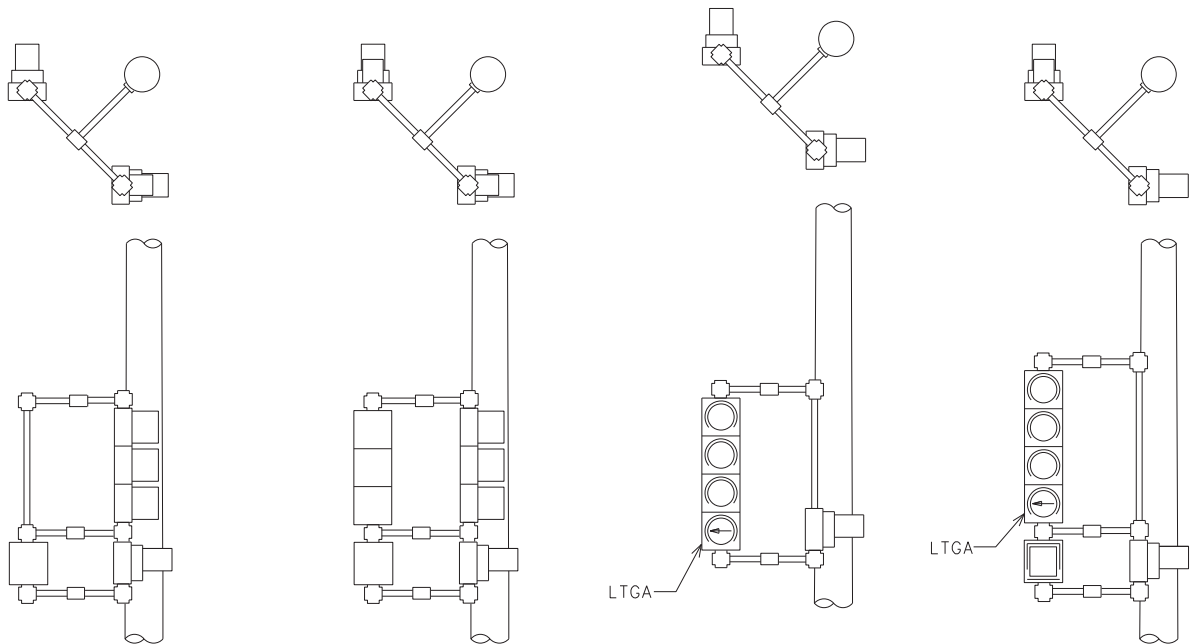
DETAIL "A-3"

DETAIL "B-3"

DETAIL "C-3"

DETAIL "D-3"

DETAIL "E-3"



DETAIL "F-3"

DETAIL "G-3"

DETAIL "H-3"

DETAIL "I-3"

Left Turn Green Arrow (LTGA)

(*) Refer to Note 5 on Sheet 2 of 2.

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG342A.dgn Rev: 02/16/17



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TRAFFIC AND SAFETY

DRAWN BY:
CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

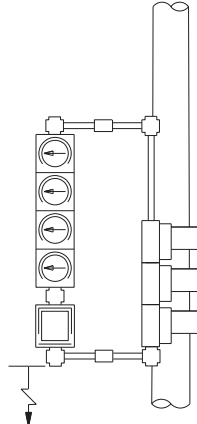
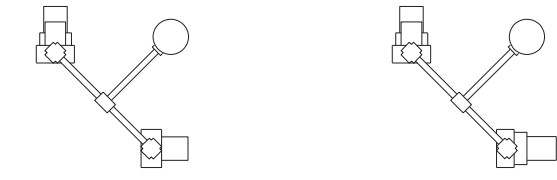
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

BACK BRACKET
SIGNAL DISPLAYS

PLAN DATE

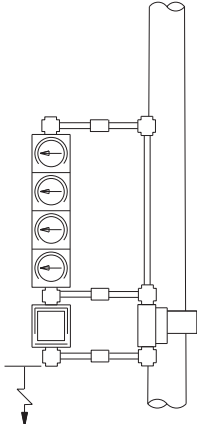
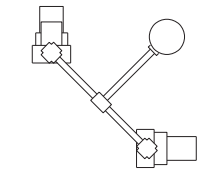
SIG-342-A

SHEET
1 of 2



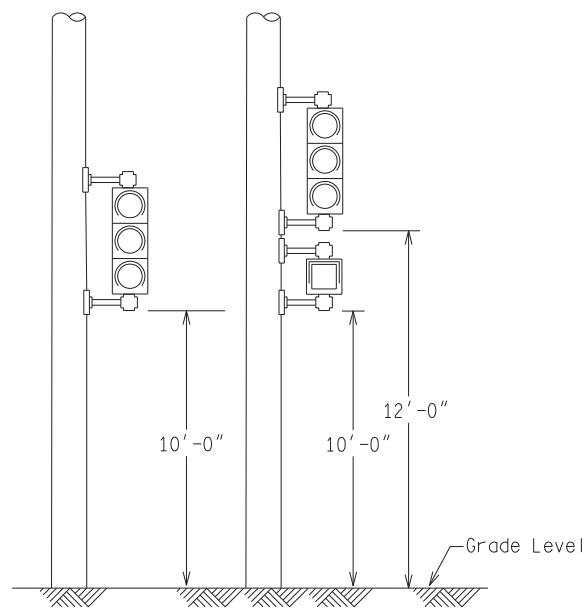
9'-0" (TYPICAL)
 (*) 10'-0" (RCOC TYPICAL)

DETAIL "J-3"
 (FYA)



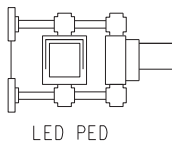
9'-0" (TYPICAL)
 (*) 10'-0" (RCOC TYPICAL)

DETAIL "K-3"
 (FYA)



RCOC Mounting Detail (*) see note

Flashing Yellow Arrow (FYA)



LED PED

NOTES: Walking person and hand symbol are filled.



LED PED
 (filled)



Countdown
 LED PED
 (filled symbols)

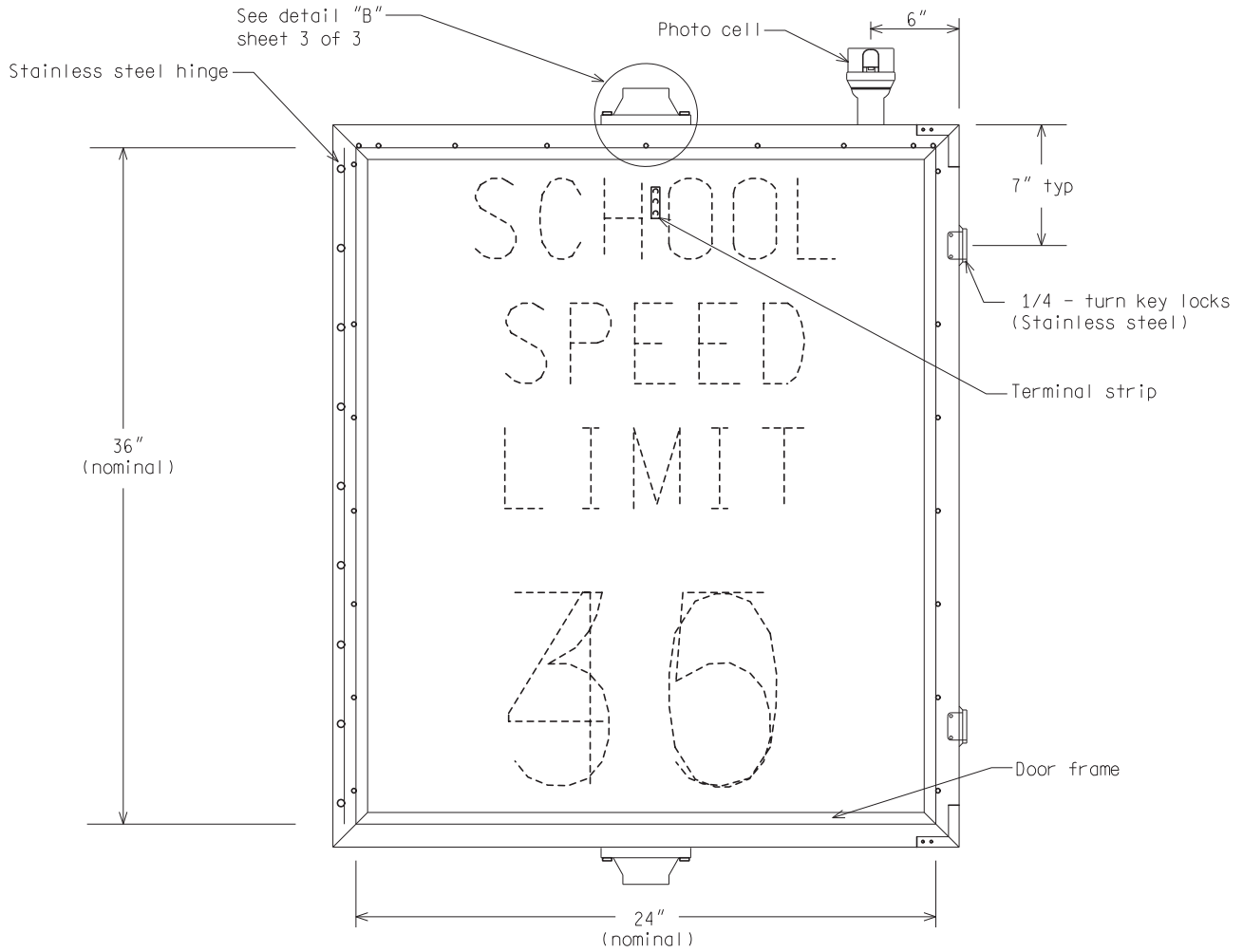
NOTES:

- 1) The relative position of 2-Way T.S. & pedestrian bracket arm signals within the bracket assembly shall be reversed (i.e. the signal nearest the pole goes to the outside of the bracket assembly & the outside signal goes inboard or nearest to pole) according to the plan view to provide clear vehicular and pedestrian viewing.
- 2) Pipe assembly shall be of such length and height as to accommodate traffic signals and pedestrian signals for proper maintenance and clear vehicular and pedestrian viewing.
- 3) Pipe assembly shall be of such length and height as to accommodate an illuminated (12"x27") case sign for proper maintenance and clear vehicular viewing.
- 4) Bracket lengths are 16 inches for LED pedestrian signals and LED pedestrian countdown signals.
- 6) Tolerance within +/- 1/8" for bracketing.

(*) For projects maintained by the Road Commission for Oakland County (RCOC), use the bottom heights and bracket assemblies as shown for the RCOC mounting detail.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-342-A	SHEET 2 of 2
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG342A.dgn Rev. 02/16/17				



NOTES:

- 1) "SIGN MESSAGE" shall utilize a single row of LED's to form each character or numeral, and capable of displaying messages in one direction
- 2) Message displays and colors:



Message 1
(white)



Message 2
("SCHOOL" - yellow)
("SPEED LIMIT 30" - white)

- 3) Provide a dimming device with photo cell for improved night time visibility.
- 4) Sign housing shall be pre-drilled for power entry through top mounting hub.
- 5) Provide a sign with nominal viewing area of 24" by 36" or otherwise indicated on the plans or directed by the Engineer.
- 6) Provide a three-sided visor
- 7) All hardware shall be AISI series 300 stainless steel

NOT TO SCALE

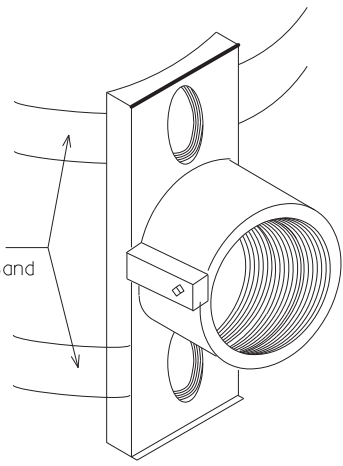
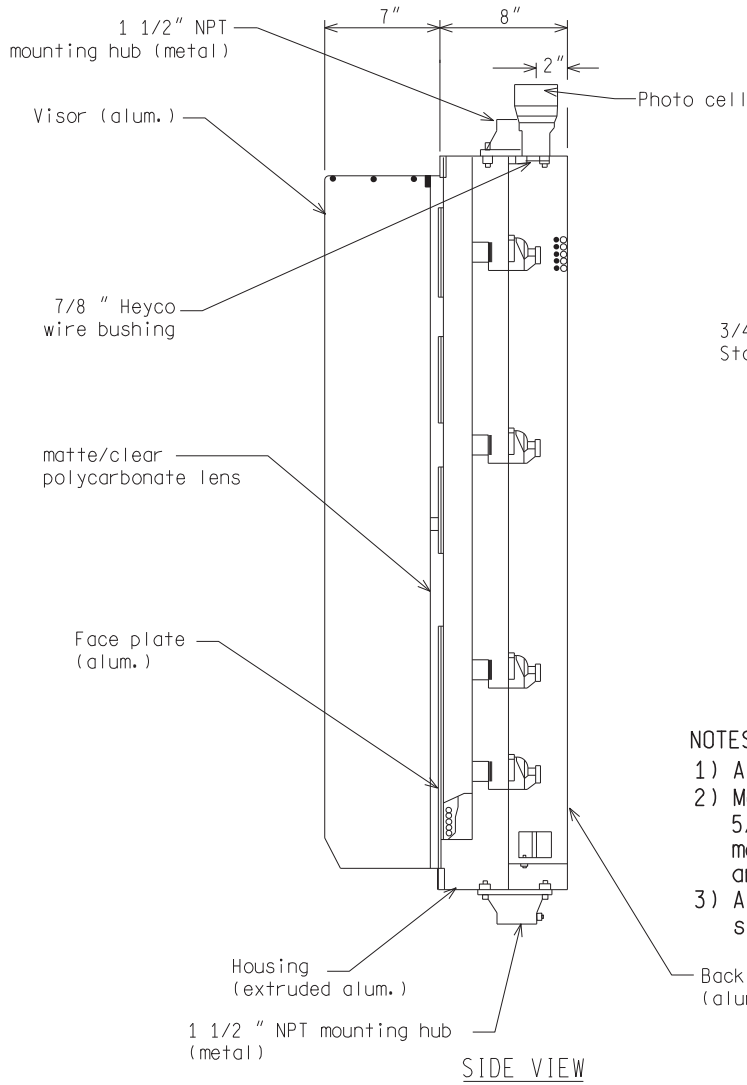
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

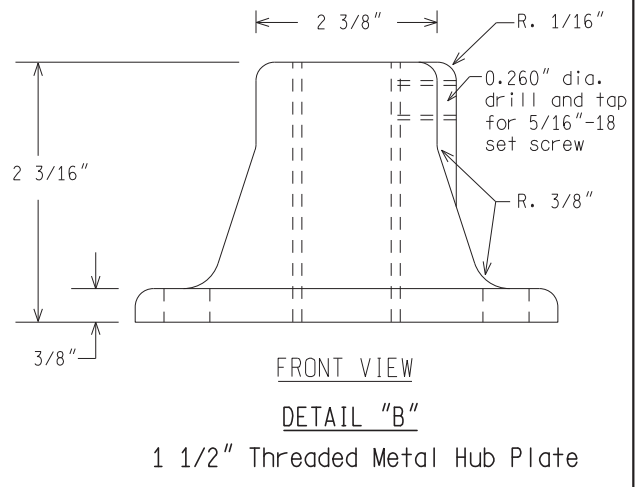
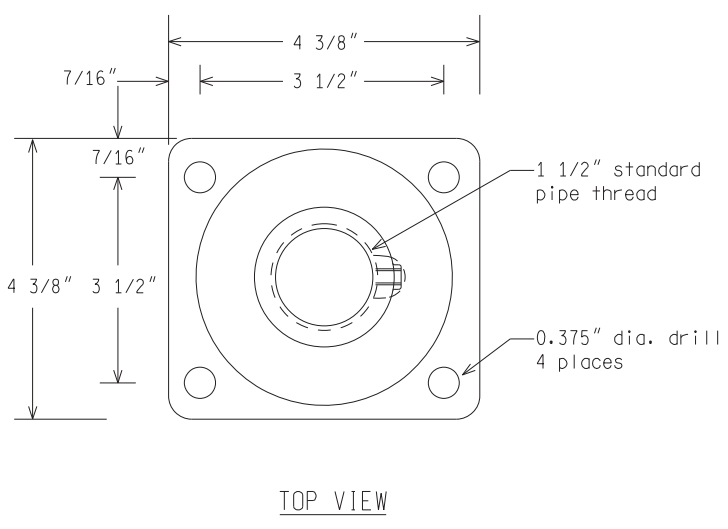
SIG-350-A

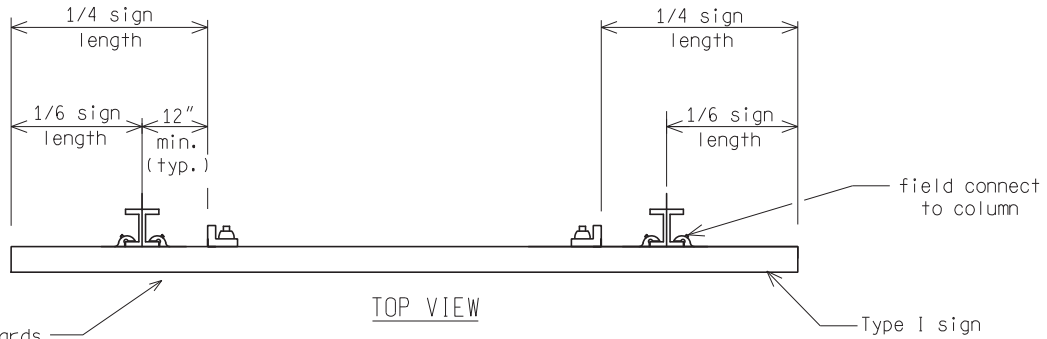
SHEET
2 of 3



DETAIL "A"
1 1/2" NPS Metal Hub Plate (4" Pipe)

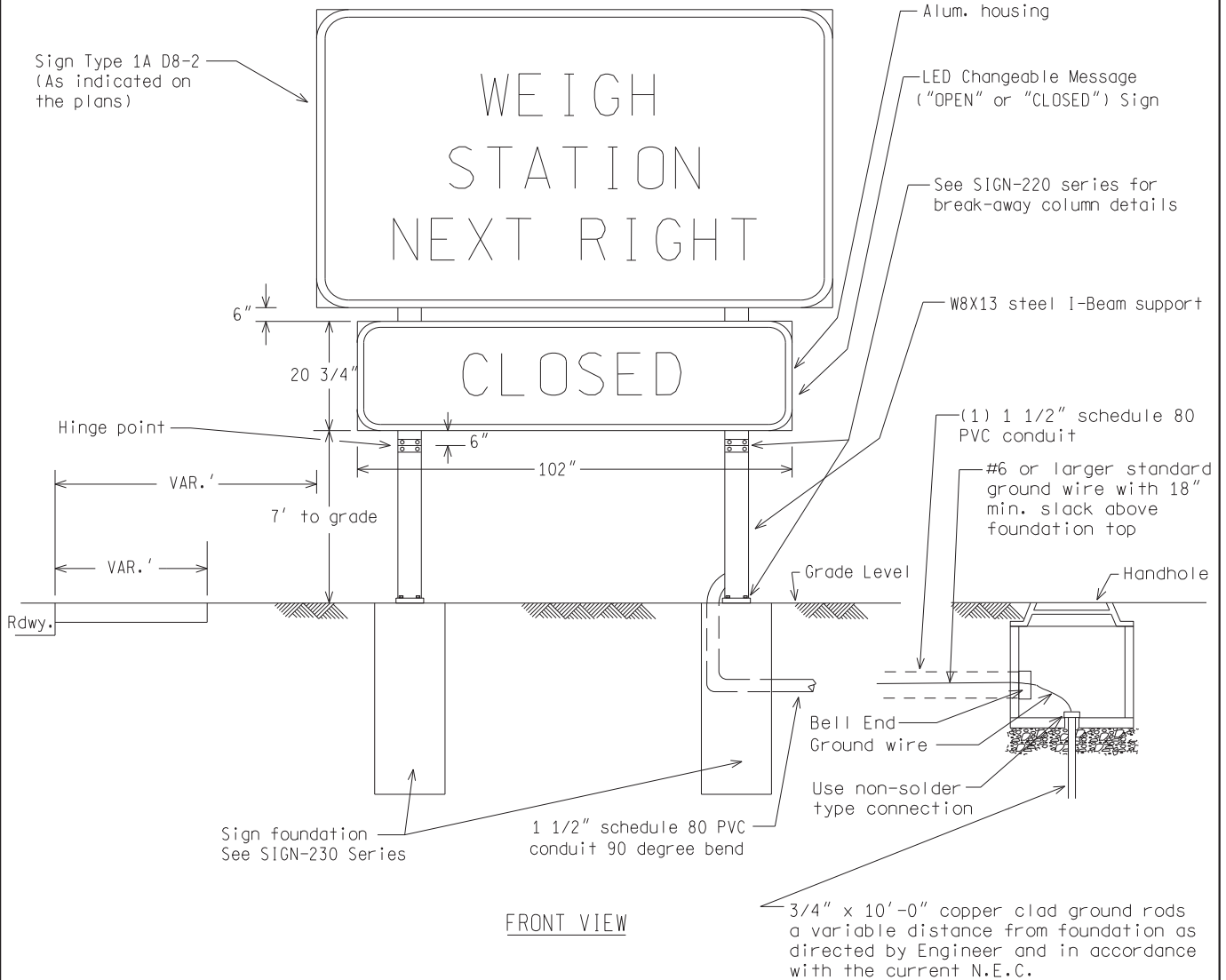
- NOTES:**
- 1) All fillets to be 1 1/8", unless specified
 - 2) Mount to sign housing with four (4) 5/16"-18 x 1 1/4" stainless steel hex machine screw bolts, hex locknuts, flat washers, and bonded seal washers
 - 3) All hardware to be AISI 300 series stainless steel





Refer to sign standards
SIGN-700-B

TOP VIEW
STEEL COLUMN BREAKAWAY



FRONT VIEW

NOT TO SCALE

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DRAWN BY:
CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

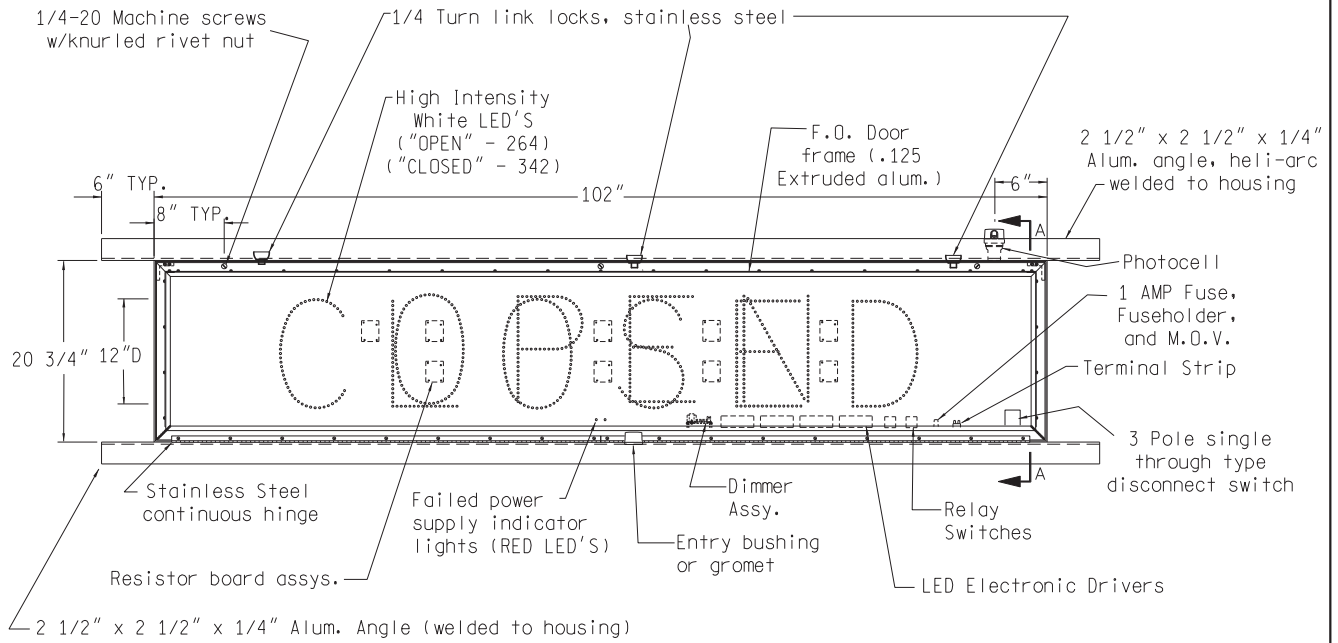
(SPECIAL DETAIL)
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**LED CHANGEABLE
MESSAGE "OPEN-CLOSED" SIGN**

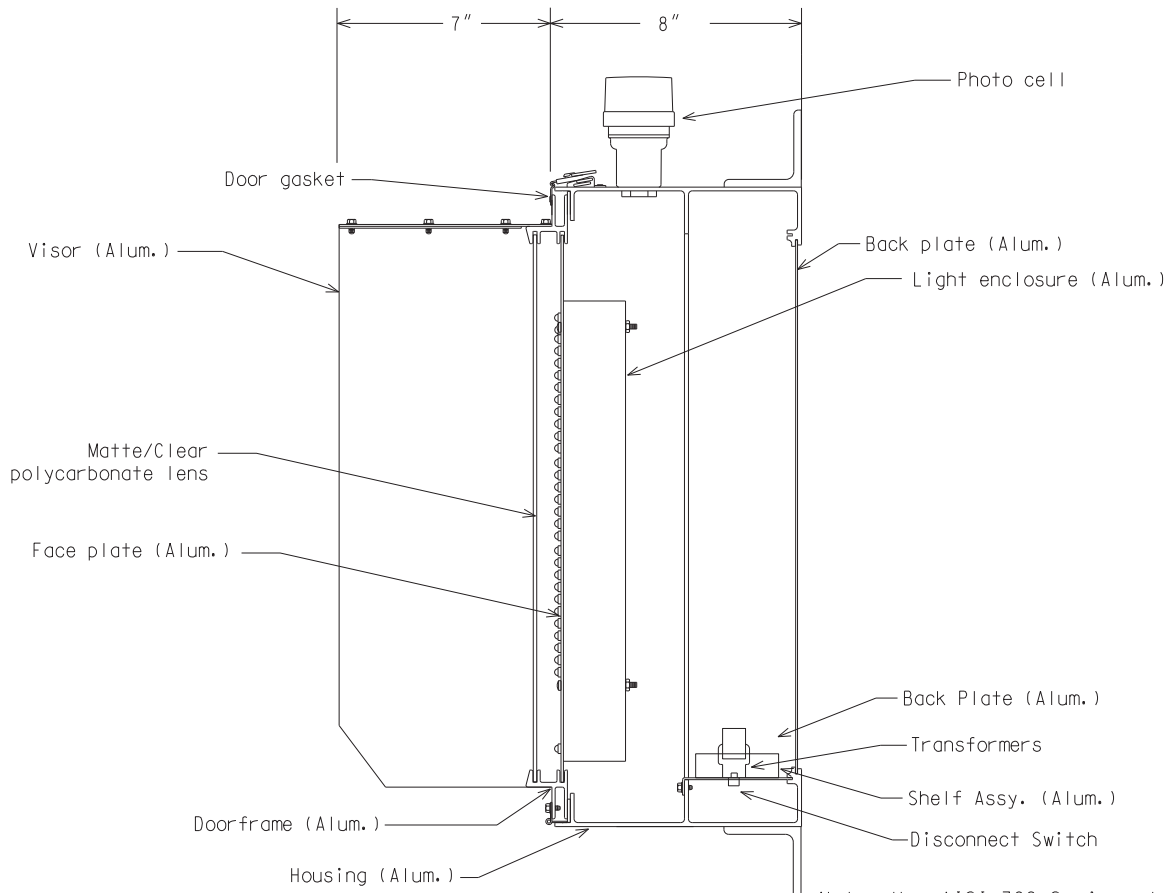
PLAN DATE

SIG-360-A

SHEET
1 of 4



FRONT VIEW



Note: Use AISI 300 Series stainless steel for all hinges, fasteners & hardware.

SECTION A-A

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

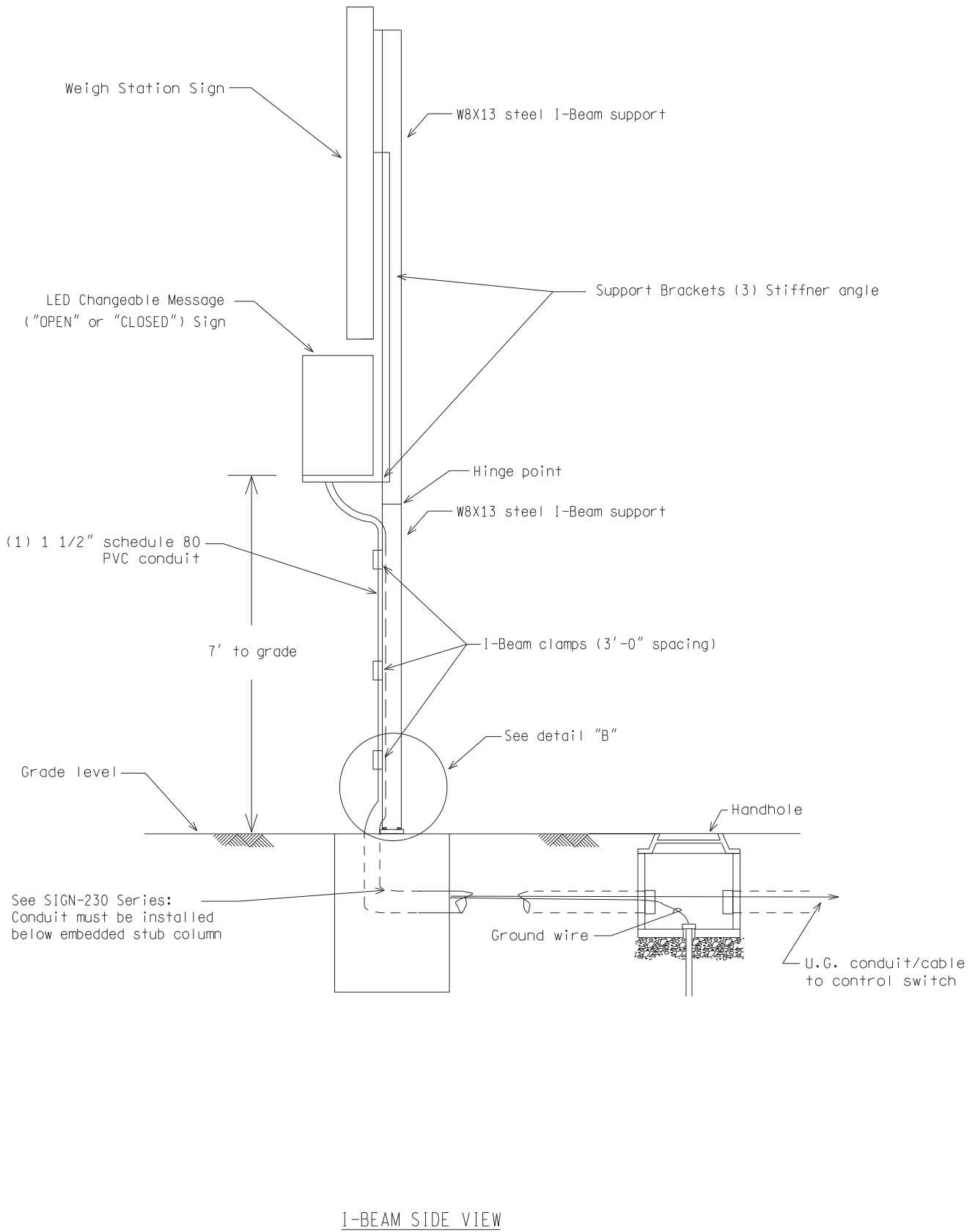
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Rev. 02/16/17

PLAN DATE

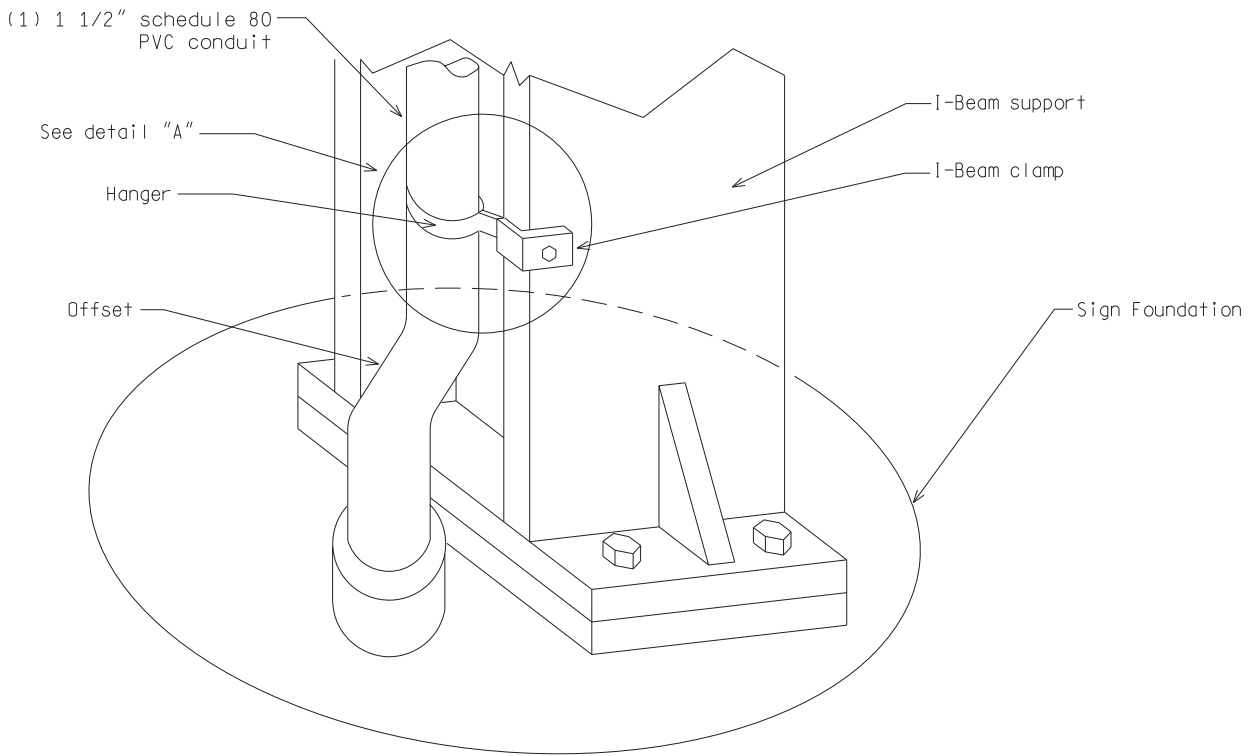
SIG-360-A

SHEET
2 of 4

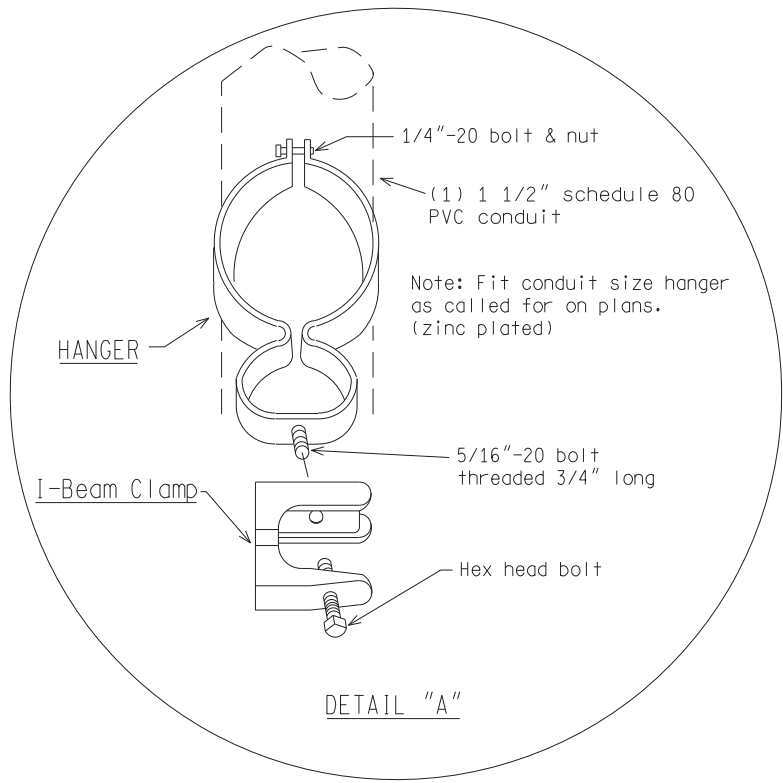


NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-360-A	SHEET 3 of 4
File: RefDoc/TR/Signals/Web/Sp Det/F in/SIG360A.dgn Rev. 02/16/17		PLAN DATE		



DETAIL "B"



DETAIL "A"

I-BEAM CONDUIT ATTACHMENT DETAILS

NOT TO SCALE

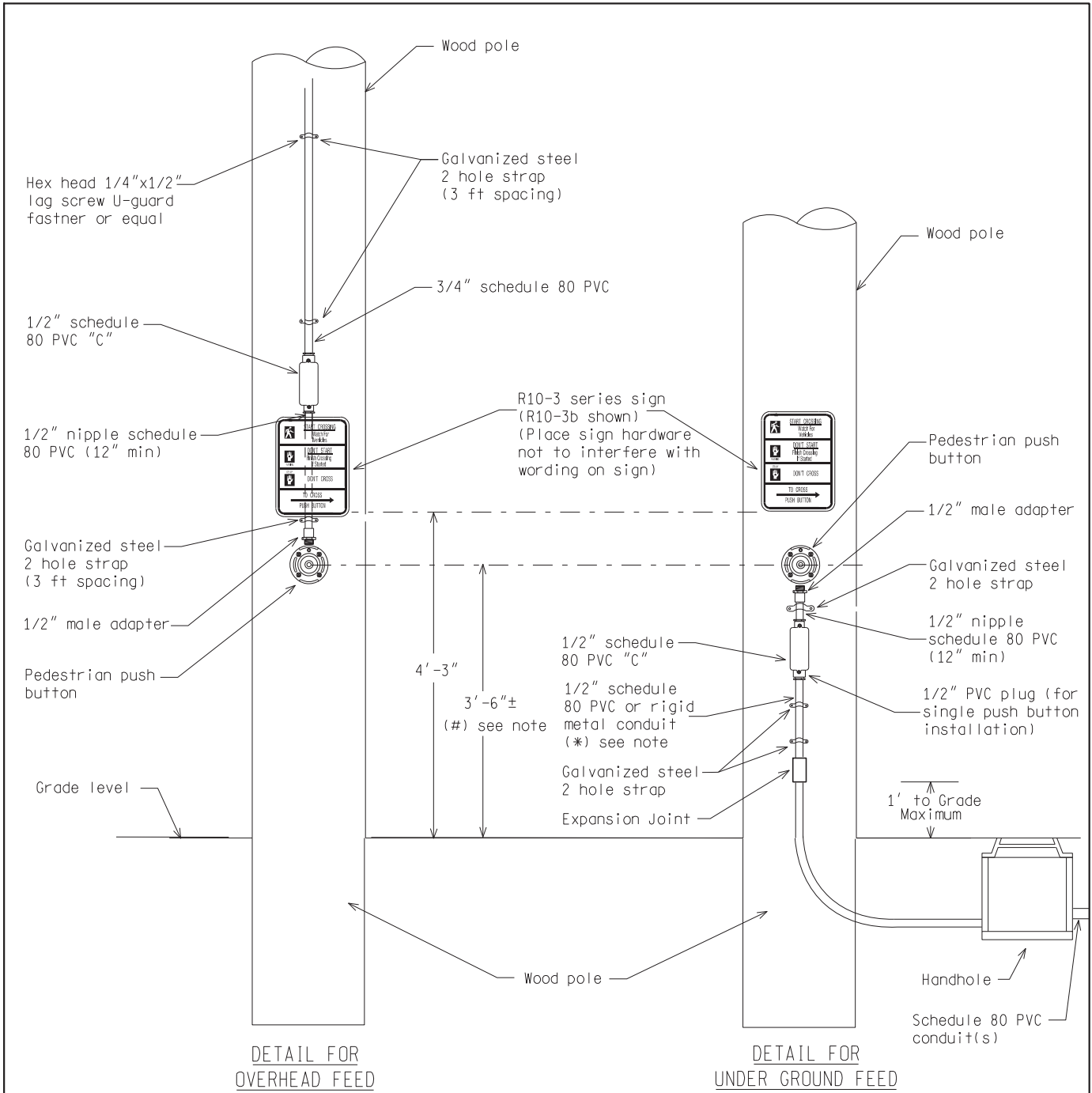
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-360-A

SHEET
4 of 4



DETAIL FOR OVERHEAD FEED

DETAIL FOR UNDER GROUND FEED

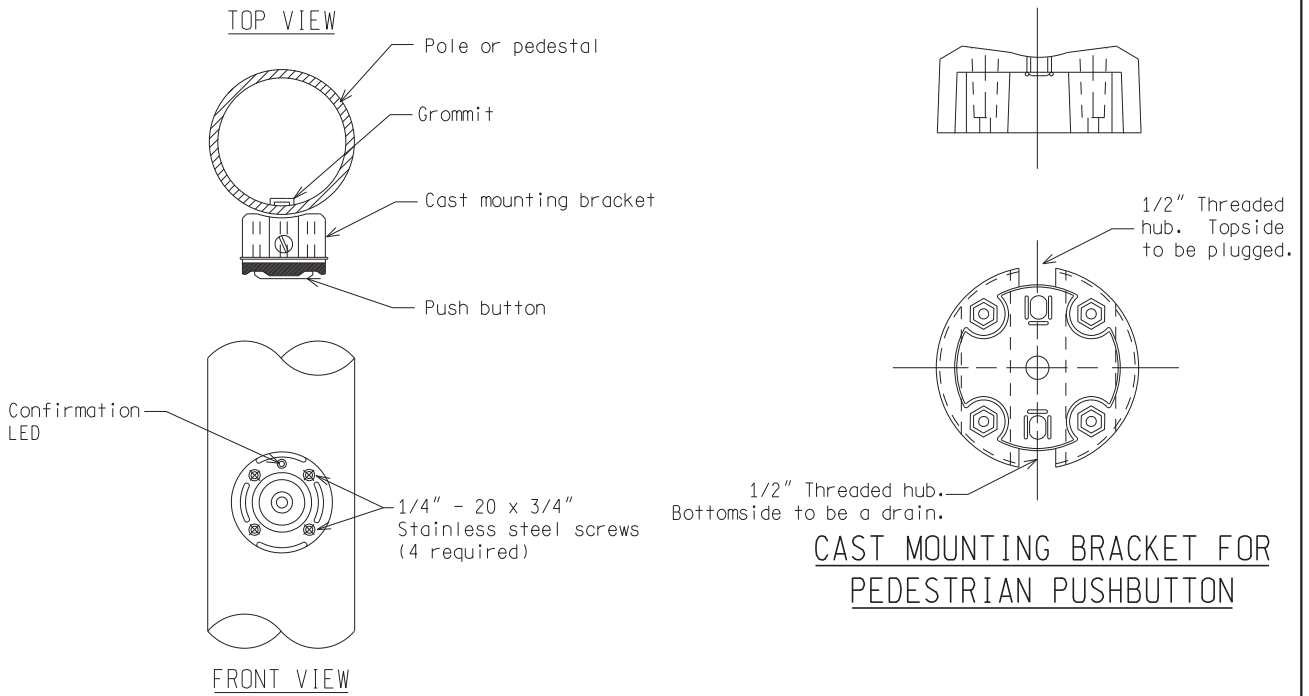
Note: (*) For projects maintained by the Wayne Co. Department of Public Services (WCDPS), use rigid metal for conduit(s) from grade level to 10' (min.) above grade or as directed by the Engineer.

(#) If pushbutton is from 10" to 24" from edge of sidewalk an acceptable range is 38" to 46"

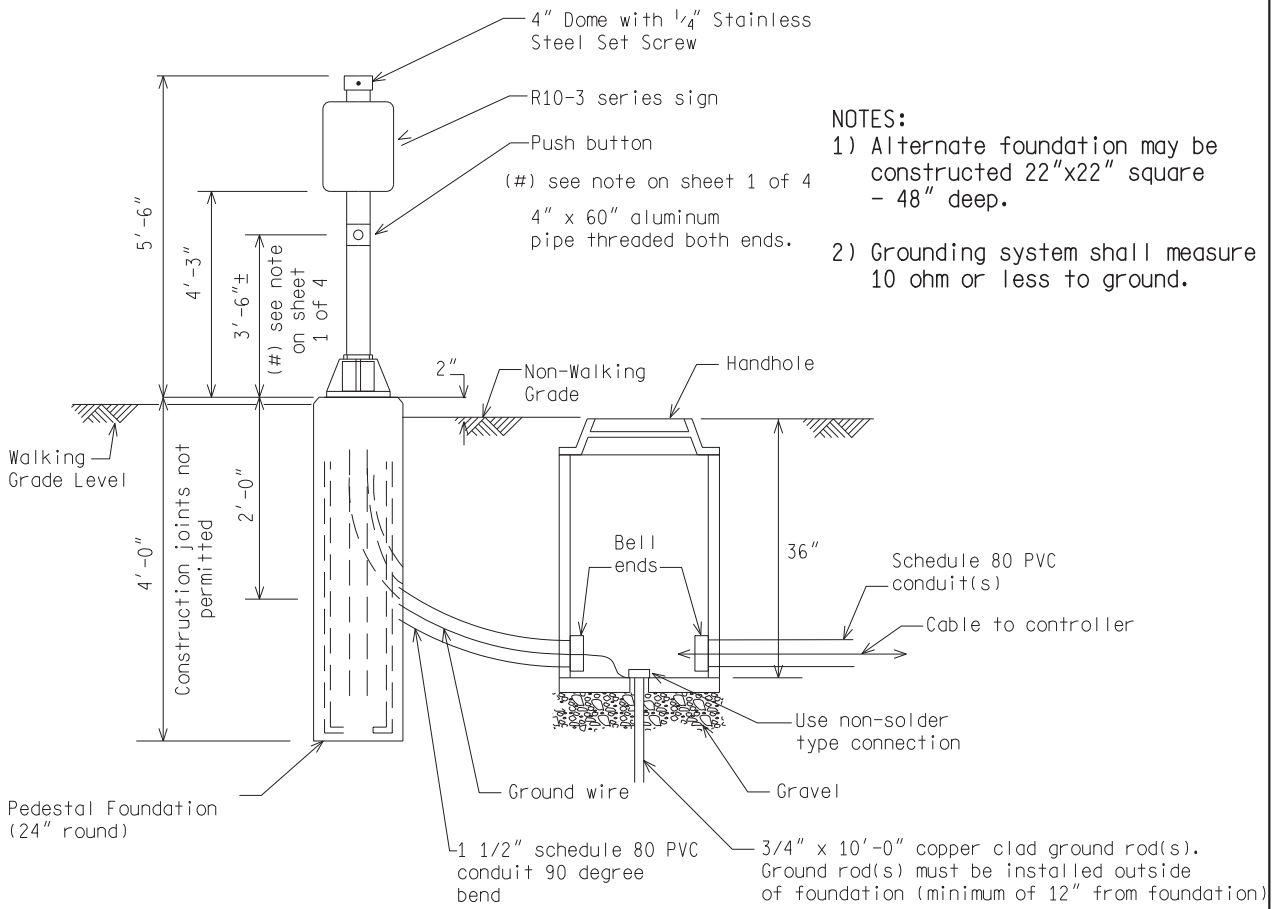
PEDESTRIAN PUSH BUTTON DETAILS ON WOOD POLE

NOT TO SCALE File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG400A.dgn Rev. 02/16/17

<p>PREPARED BY TRAFFIC AND SAFETY</p>	<p>ENGINEER OF DELIVERY</p>	<p>MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR PEDESTRIAN PUSH BUTTON DETAILS</p>	
	<p>ENGINEER OF DEVELOPMENT</p>		
<p>DRAWN BY:</p>	<p>(SPECIAL DETAIL)</p>	<p>SIG-400-A</p>	<p>SHEET 1 of 4</p>
<p>CHECKED BY:</p>	<p>FHWA APPROVAL DATE</p>		



**PEDESTRIAN PUSHBUTTON INSTALLATION
ON STEEL POLE OR PEDESTAL**



- NOTES:**
- 1) Alternate foundation may be constructed 22"x22" square - 48" deep.
 - 2) Grounding system shall measure 10 ohm or less to ground.

PUSH BUTTON PEDESTAL

NOT TO SCALE

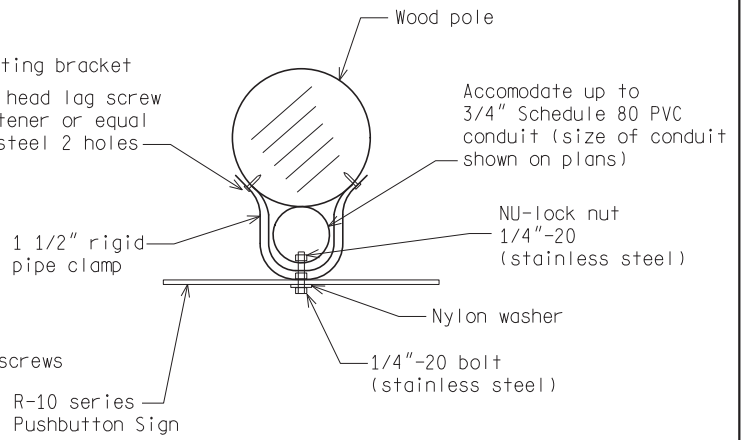
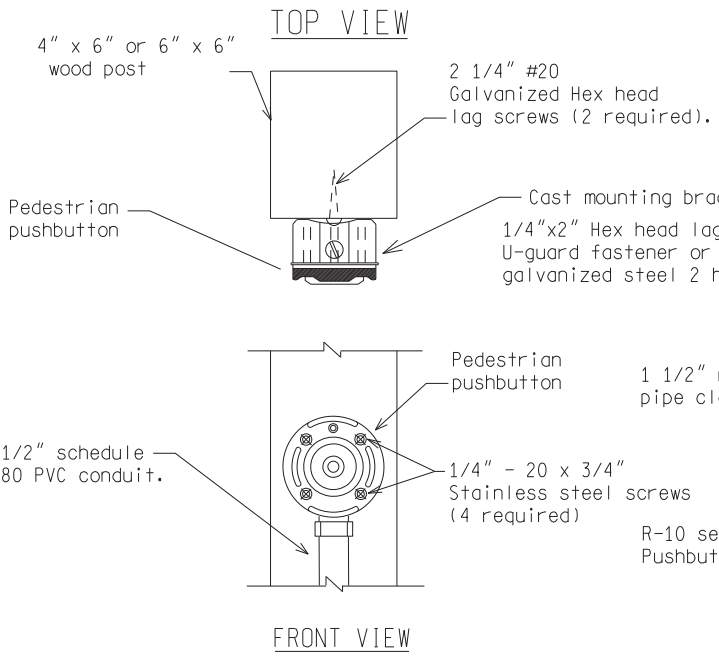
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

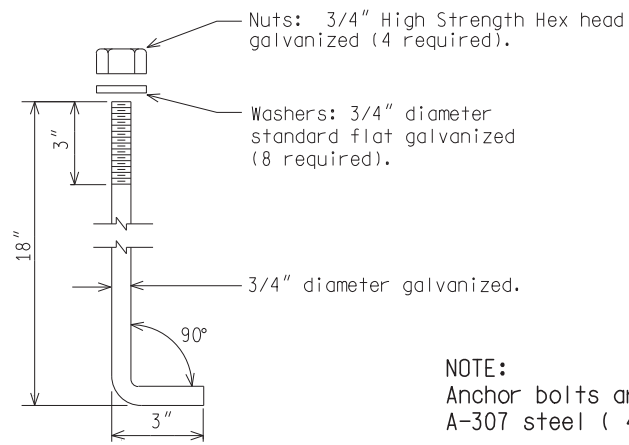
SIG-400-A

SHEET
2 of 4



**PEDESTRIAN PUSHBUTTON
SIGN INSTALLATION
ON WOOD POLE**

**PEDESTRIAN PUSHBUTTON
INSTALLATION ON WOOD POST**

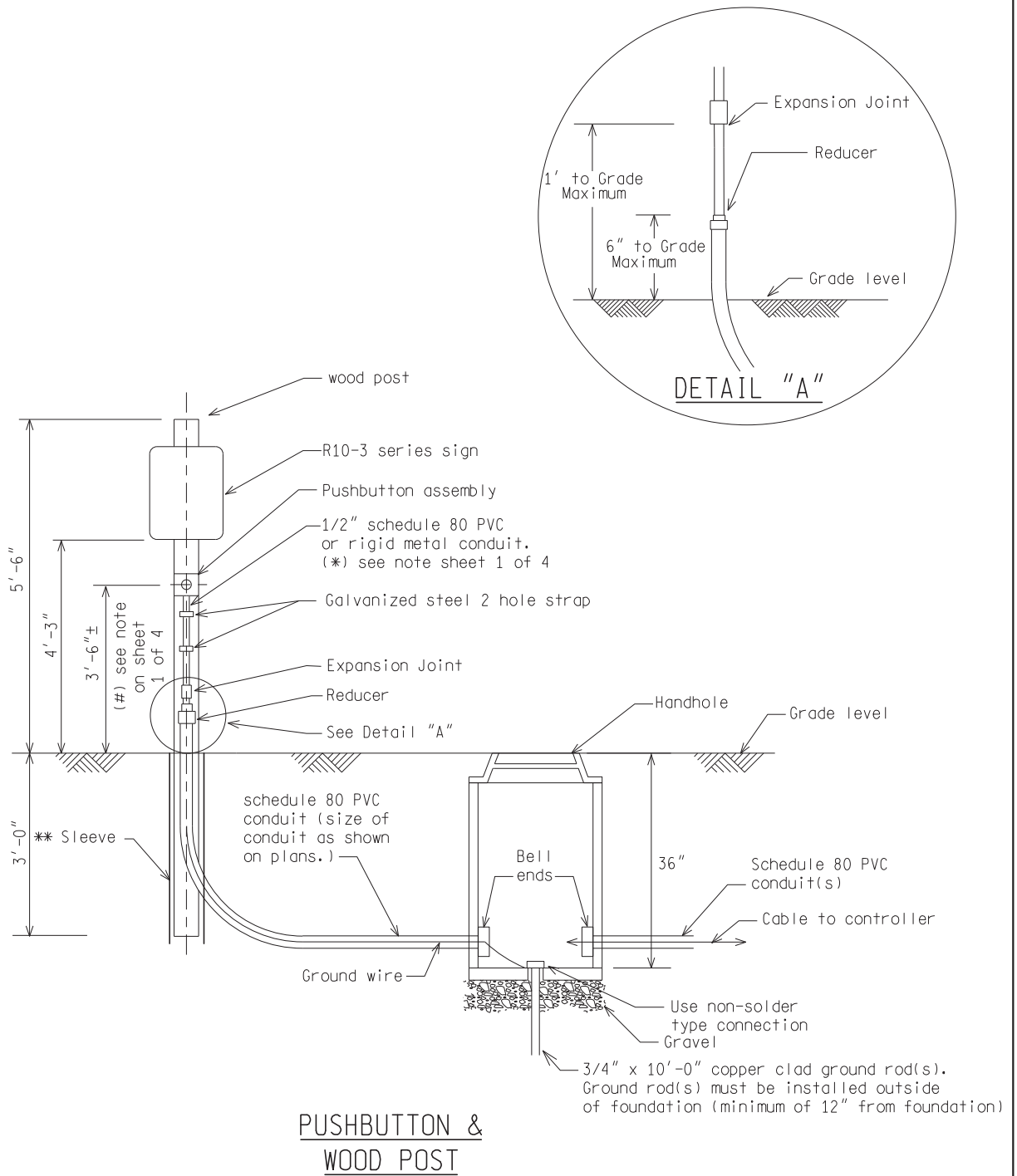


NOTE:
Anchor bolts are to be ASTM A-307 steel (4-required)

ANCHOR BOLT DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-400-A	SHEET 3 of 4
File: RefDoc/TR/Signals/Web/Sp Det/F in/SIG400A.dgn	Rev. 02/16/17	PLAN DATE		



** Refer to Standard Plan for Wood Posts

NOT TO SCALE

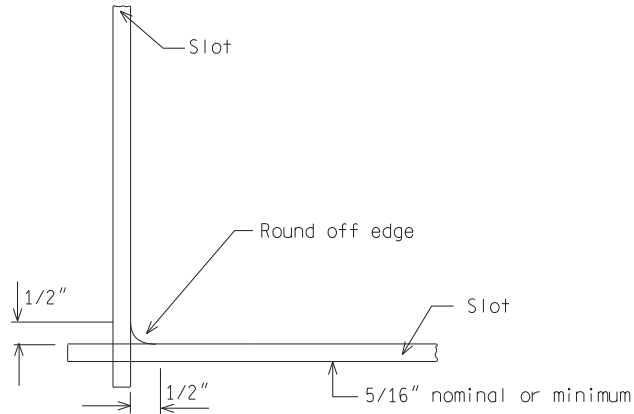
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

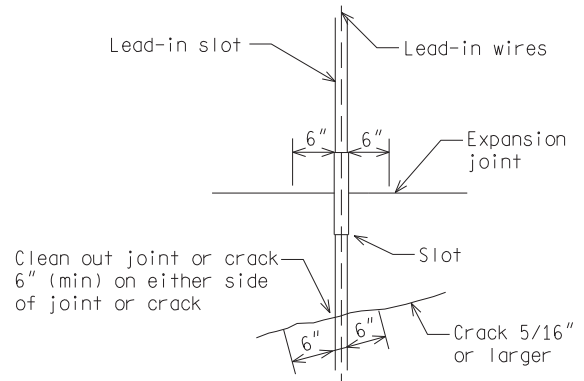
PLAN DATE

SIG-400-A

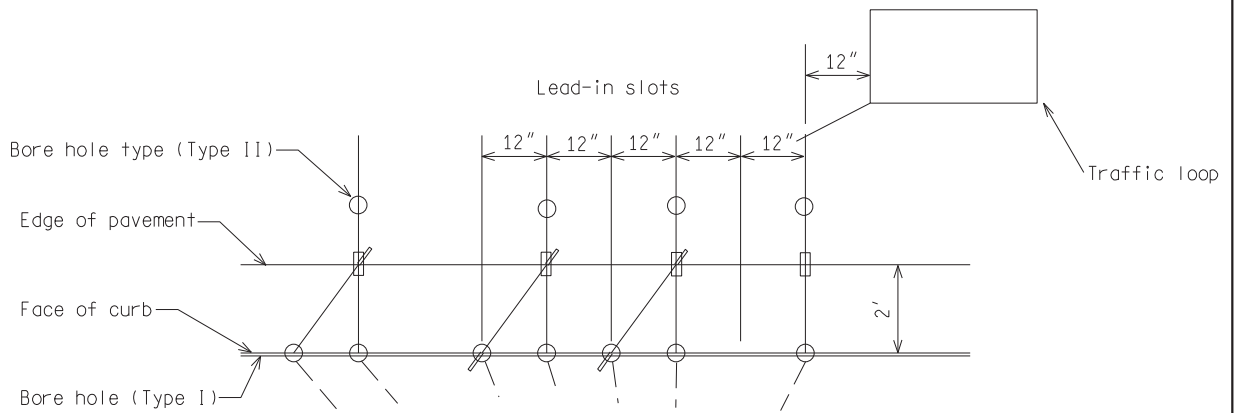
SHEET
4 of 4



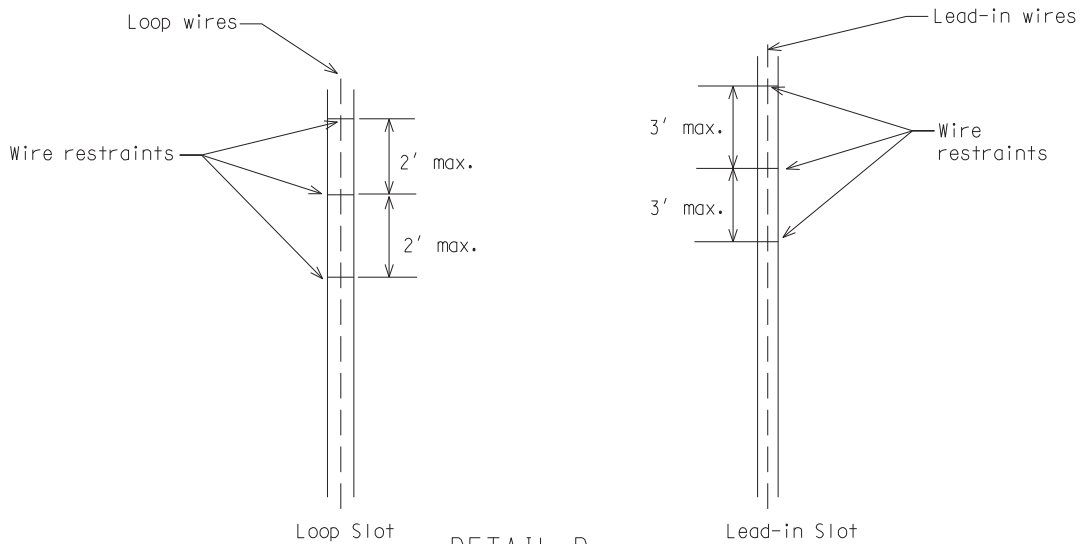
DETAIL A
CORNER CUTS



DETAIL B
EXPANSION JOINT CUTS



DETAIL C
TERMINATION OF LEAD-IN SLOTS



DETAIL D
WIRE RESTRAINTS

NOT TO SCALE

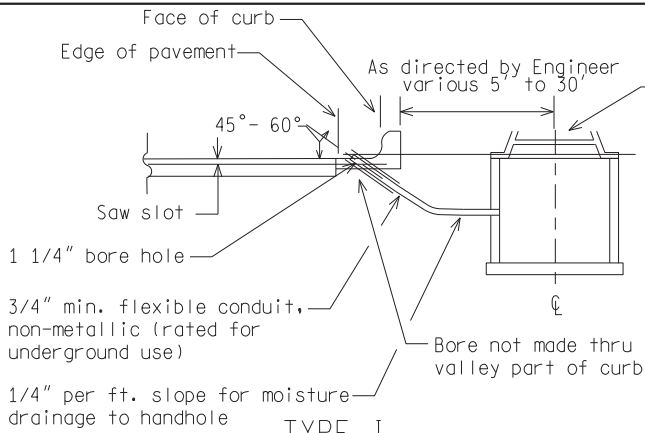
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

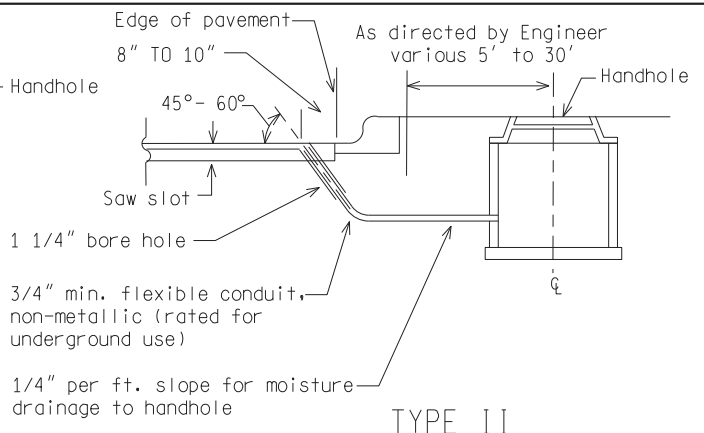
PLAN DATE

SIG-410-A

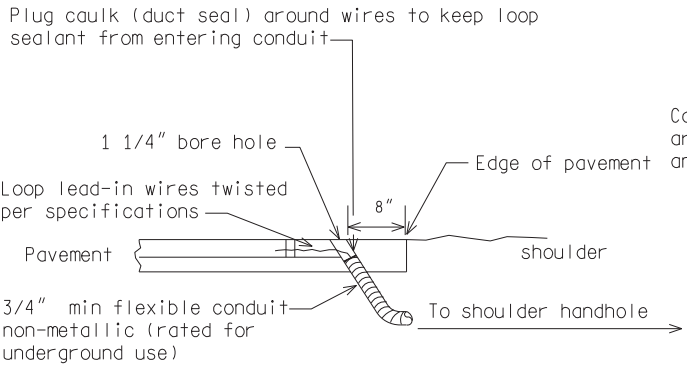
SHEET
2 of 4



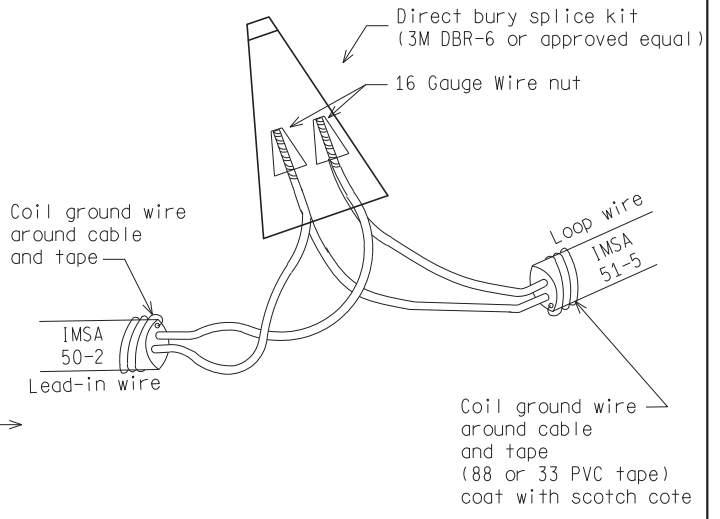
TYPE I
SECTION "E-E"
UNDER CURB INSTALLATION



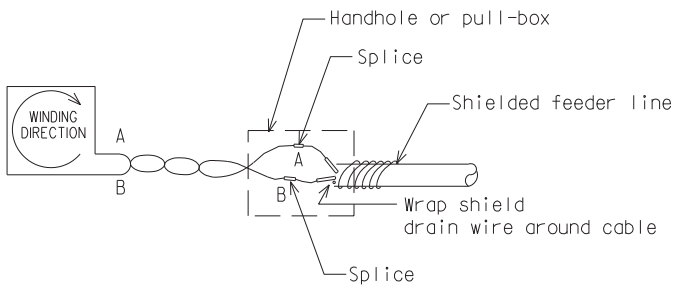
TYPE II
SECTION "E-E"
UNDER CURB INSTALLATION



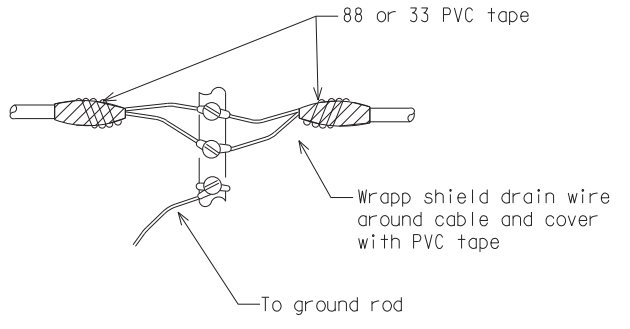
BORE HOLE & LOOP WIRING
SECTION F-F
UNDER PAVEMENT INSTALLATION



HANDHOLE & PULL-BOX SPLICES
(WATERPROOF)



SINGLE LOOP CONNECTION



CONTROLLER CABINET CONNECTION

NOT TO SCALE

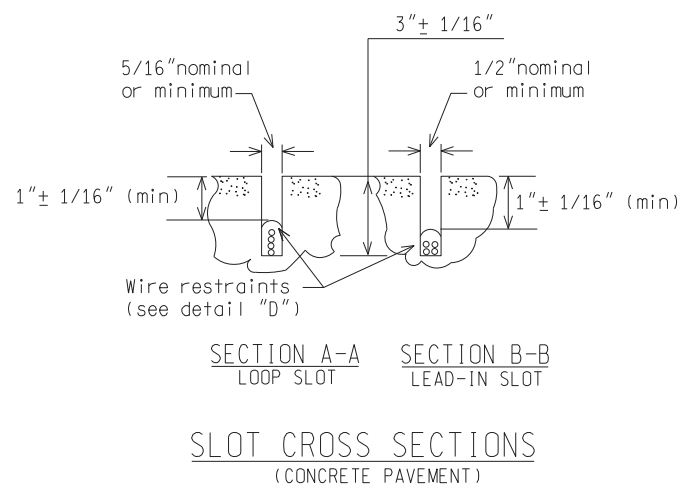
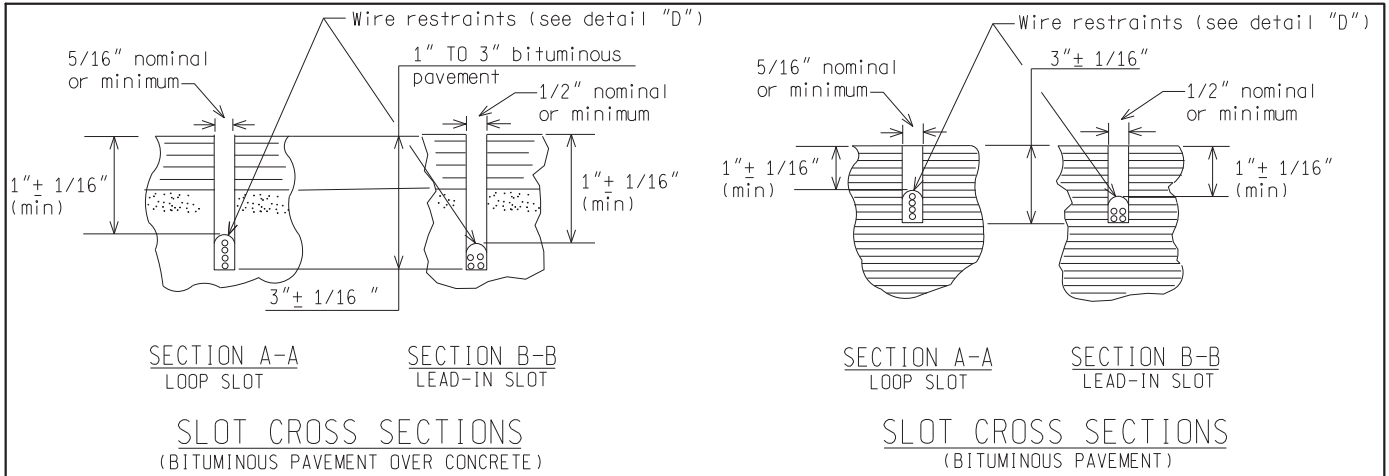
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

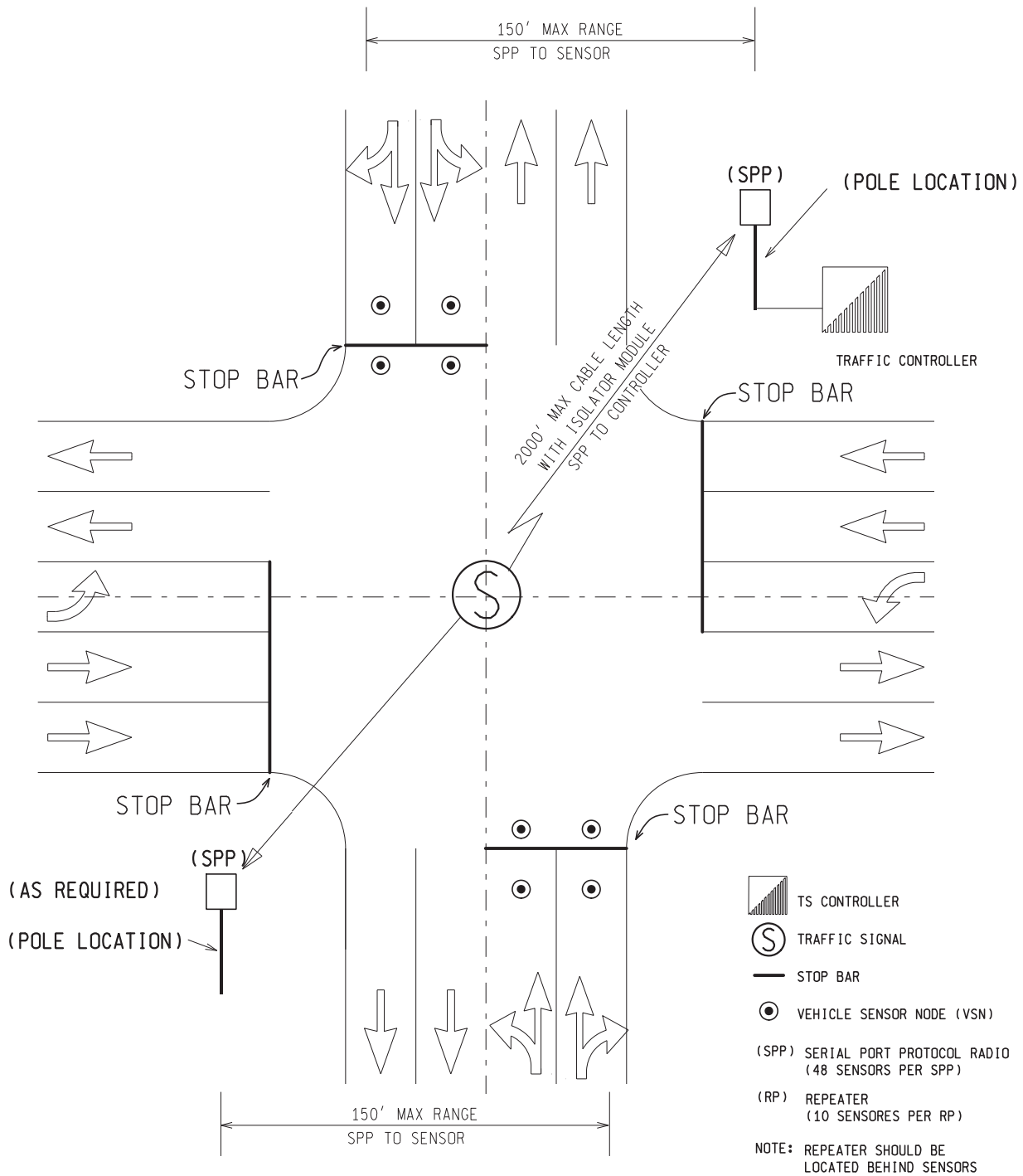
SIG-410-A

SHEET
3 of 4



NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-410-A	SHEET 4 of 4
File: RefDoc/TR/Signals/Web/Sp Det/F in/SIG410A.dgn	Rev. 02/16/17	PLAN DATE		



TYPICAL VEHICLE SENSOR NODE CONFIGURATION

INTERSECTION DETECTION CROSS ROAD ACTIVATED (NON-LOCKING)

NOT TO SCALE

File: PW:RD/T&S/Standards/Signals/mdot_420a.dgn

Rev. 06/18/2013



PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY: KMZ

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

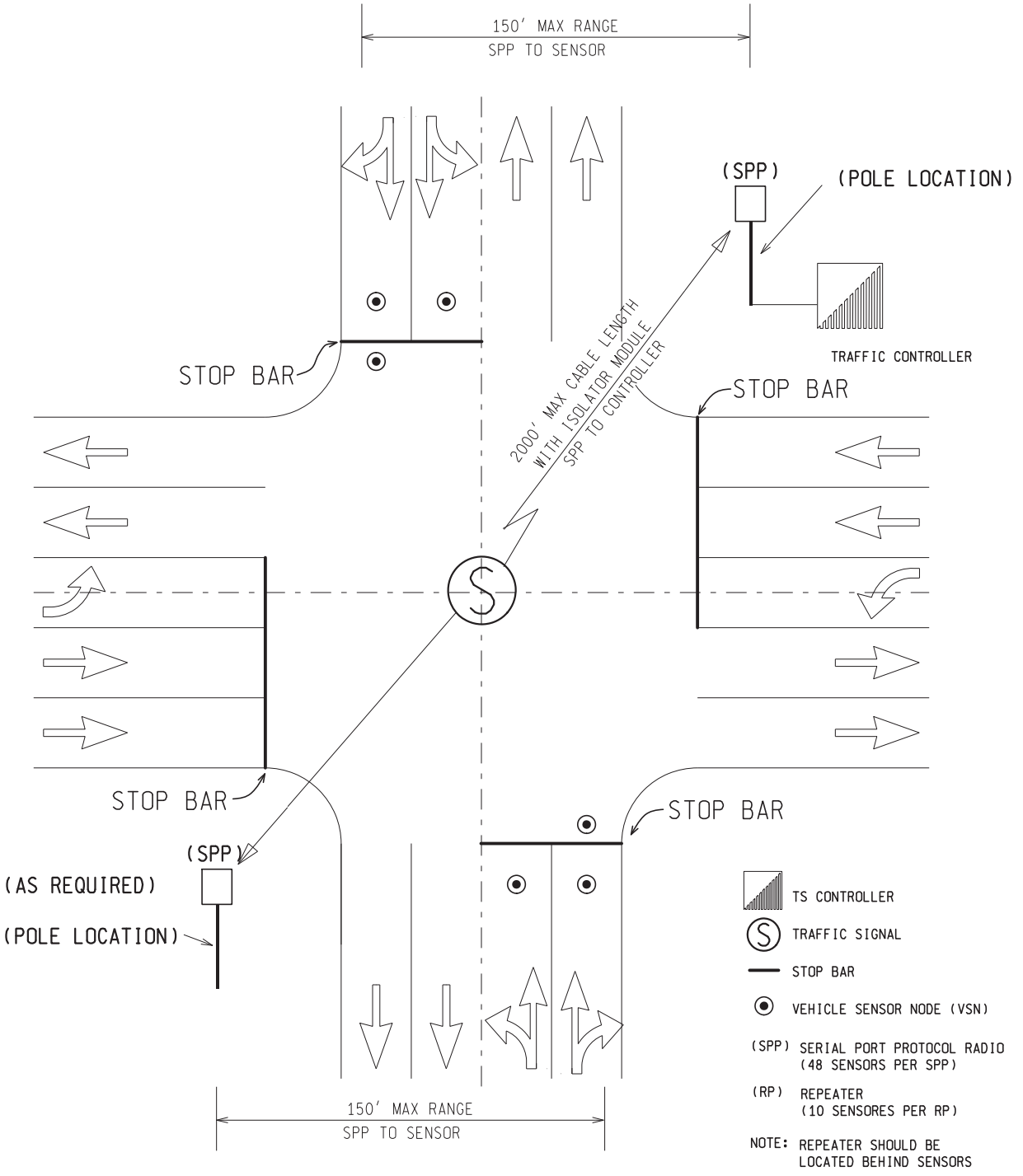
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

WIRELESS VEHICLE DETECTION SYSTEM

SIG-420-A

PLAN DATE

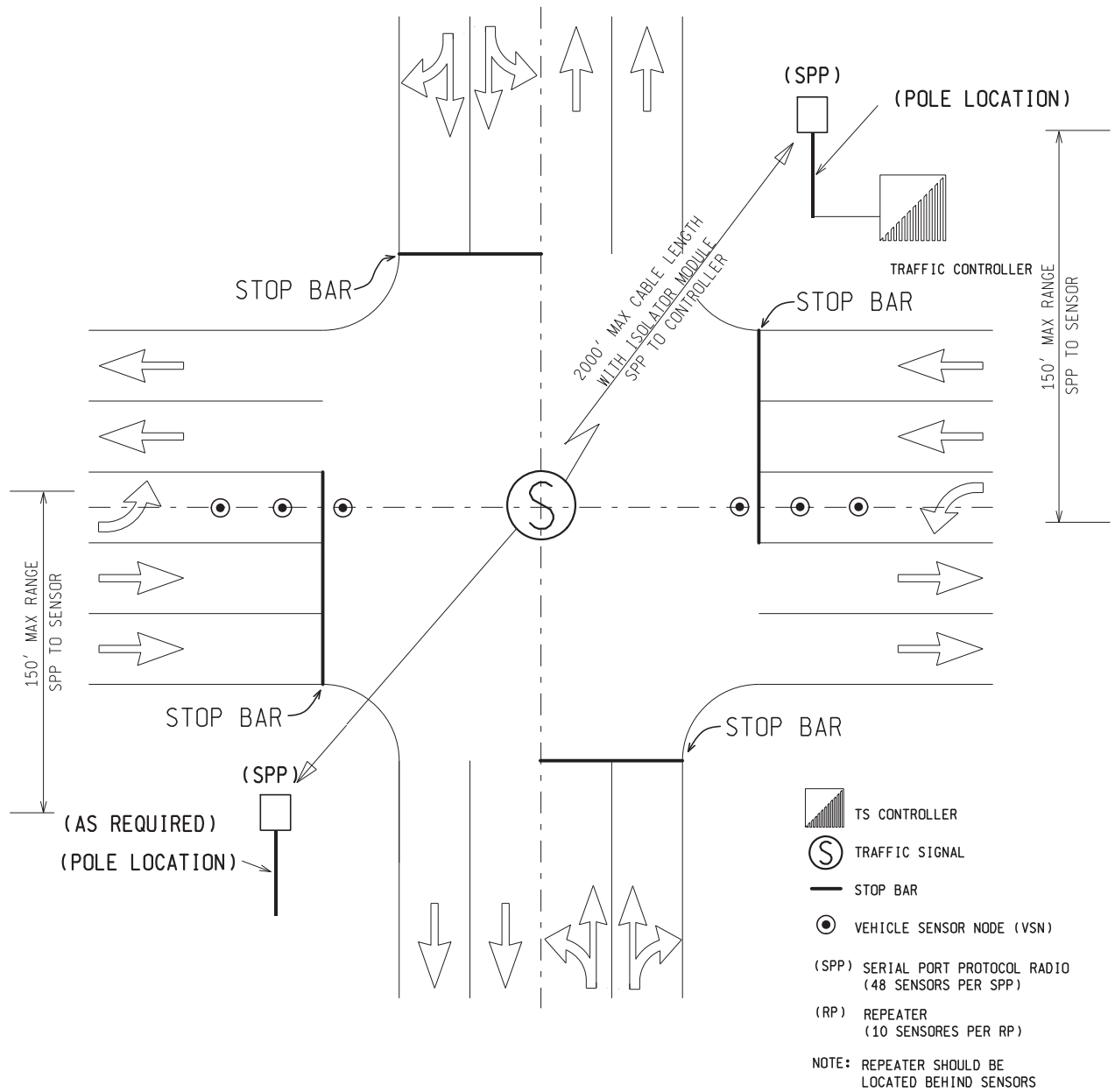
SHEET
1 of 10



TYPICAL VEHICLE SENSOR NODE CONFIGURATION
INTERSECTION DETECTION CROSS ROAD ACTIVATED (LOCKING)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN		(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 2 of 10
File: PW:RD/T&S/Standards/Signals/mdot_420a.dgn	Rev. 06/18/2013	PLAN DATE			



TYPICAL VEHICLE SENSOR NODE CONFIGURATION
 INTERSECTION DETECTION LEFT-TURN ACTIVATED
 PERMISSIVE PROTECTED (NON-LOCKING)

NOT TO SCALE

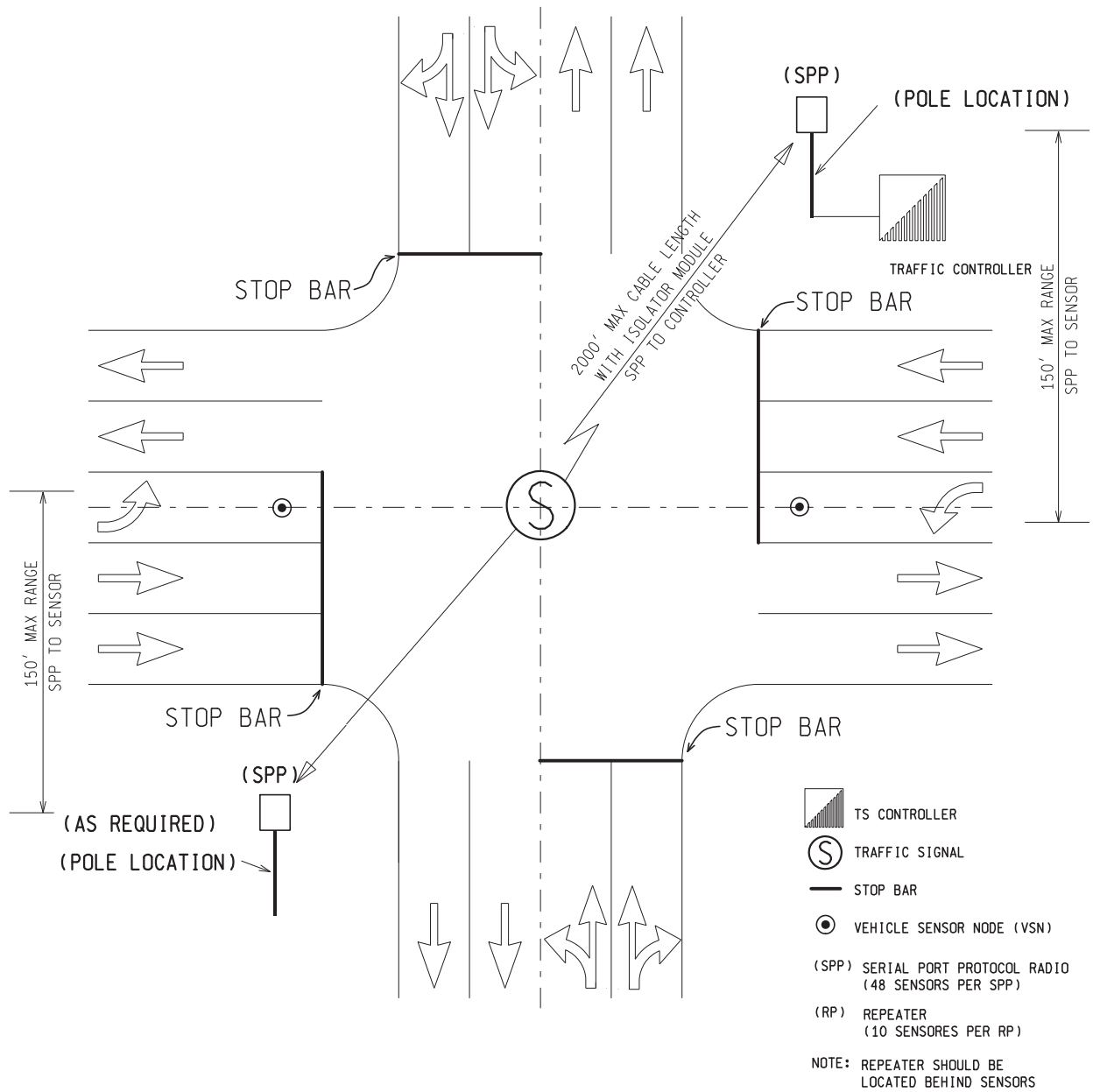
MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
 FHWA APPROVAL DATE

PLAN DATE

SIG-420-A

SHEET
 3 of 10



TYPICAL VEHICLE SENSOR NODE CONFIGURATION
 INTERSECTION DETECTION LEFT-TURN ACTIVATED
 PROTECTED ONLY (LOCKING)

NOT TO SCALE

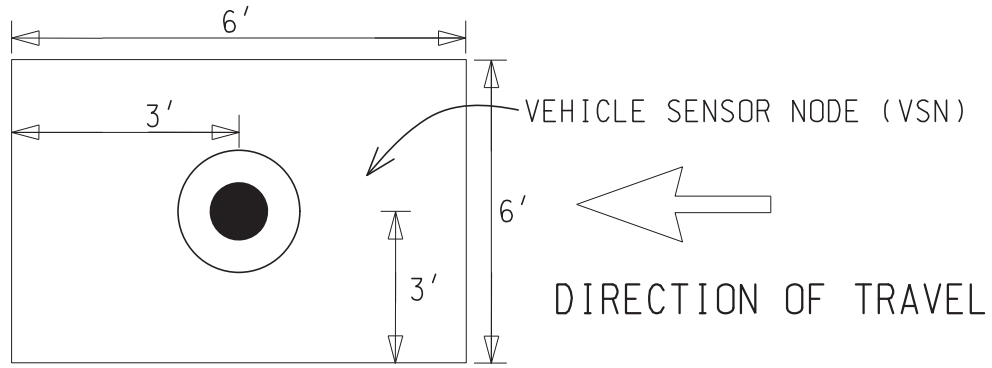
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 BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
 FHWA APPROVAL DATE

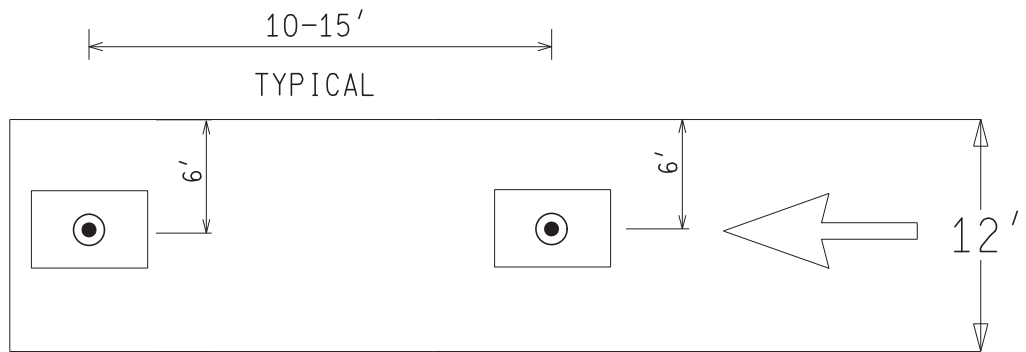
PLAN DATE

SIG-420-A

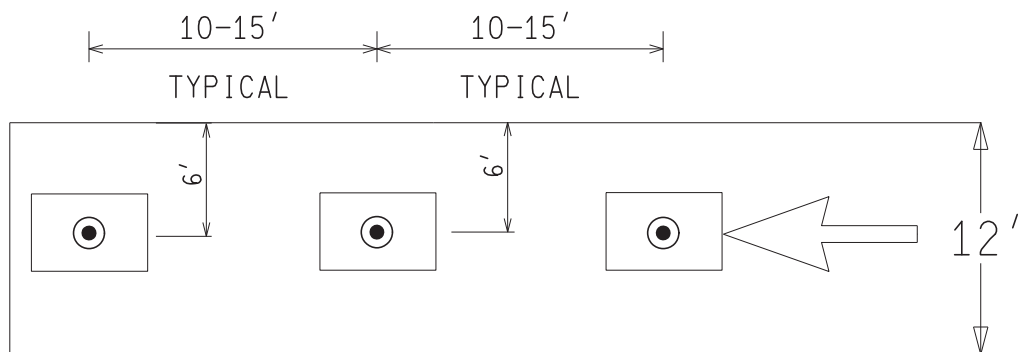
SHEET
 4 of 10



TYPICAL 6' X 6' DETECTION ZONE



TYPICAL 6' X 20' DETECTION ZONE



TYPICAL 6' X 30' DETECTION ZONE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

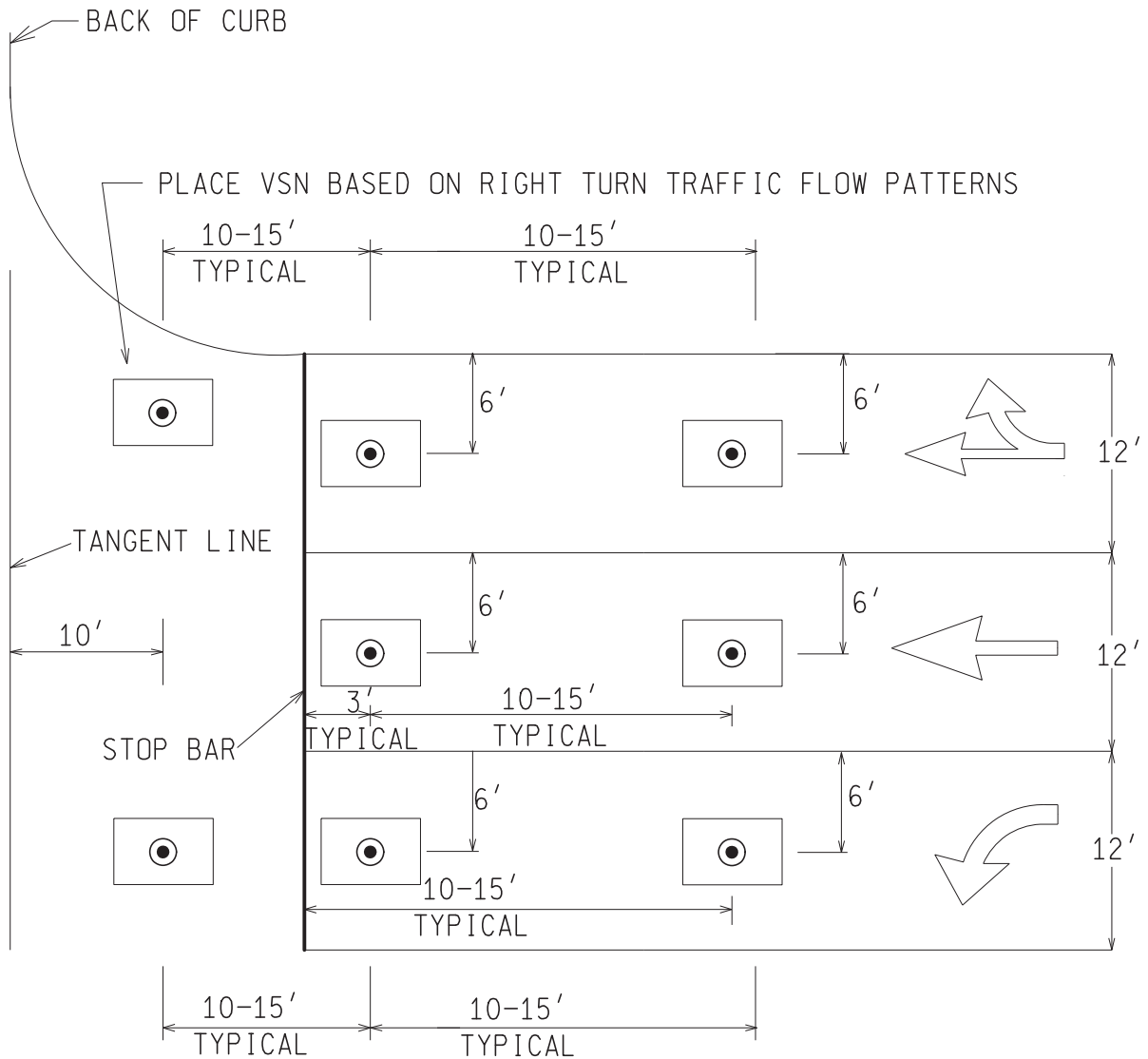
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Rev. 06/18/2013

PLAN DATE

SIG-420-A

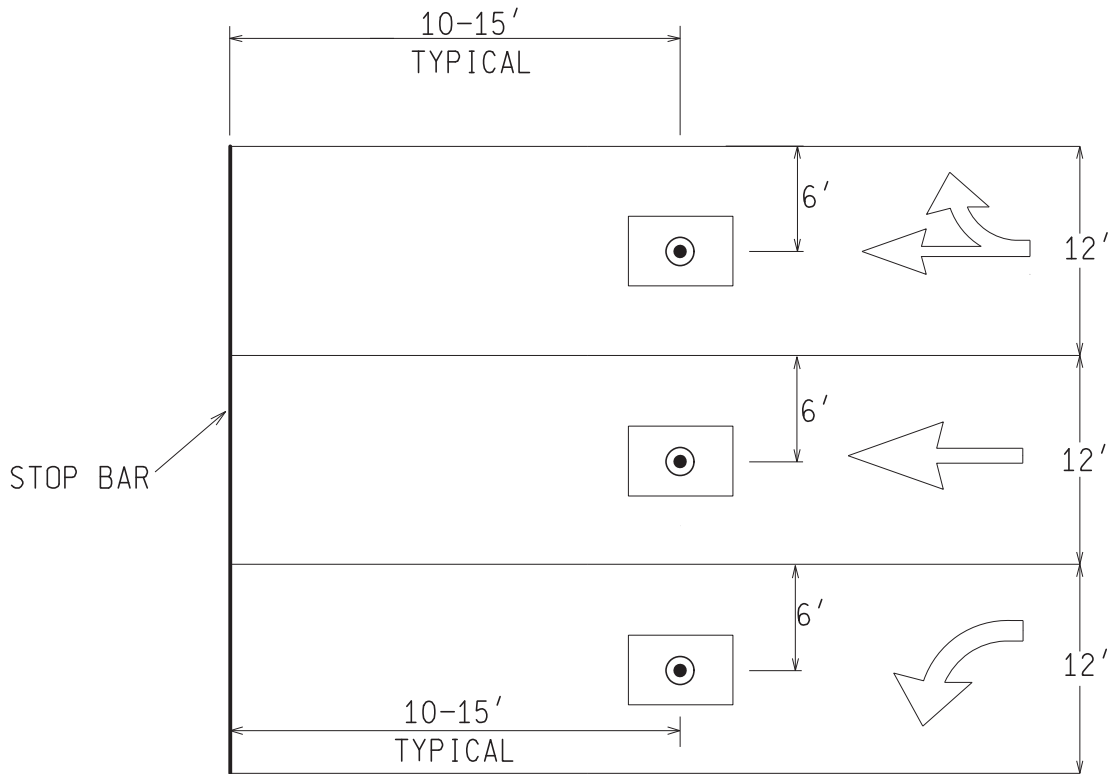
SHEET
6 of 10



TYPICAL VEHICLE SENSOR NODE (NON-LOCKING) INSTALLATION DIAGRAM
 FOR A TWO PHASE (NON-COORDINATED) APPROACH WITH (NON-LOCKING) PERMISSIVE OR
 PERMISSIVE-PROTECTED LEFT TURN PHASING

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 7 of 10
File: PW:RD/T&S/Standards/Signals/mdot_420a.dgn	Rev. 06/18/2013	PLAN DATE		



TYPICAL VEHICLE SENSOR NODE (LOCKING) INSTALLATION DIAGRAM

FOR AT TWO PHASE APPROACH WITH (LOCKING)
PROTECTED ONLY LEFT TURN PHASING

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

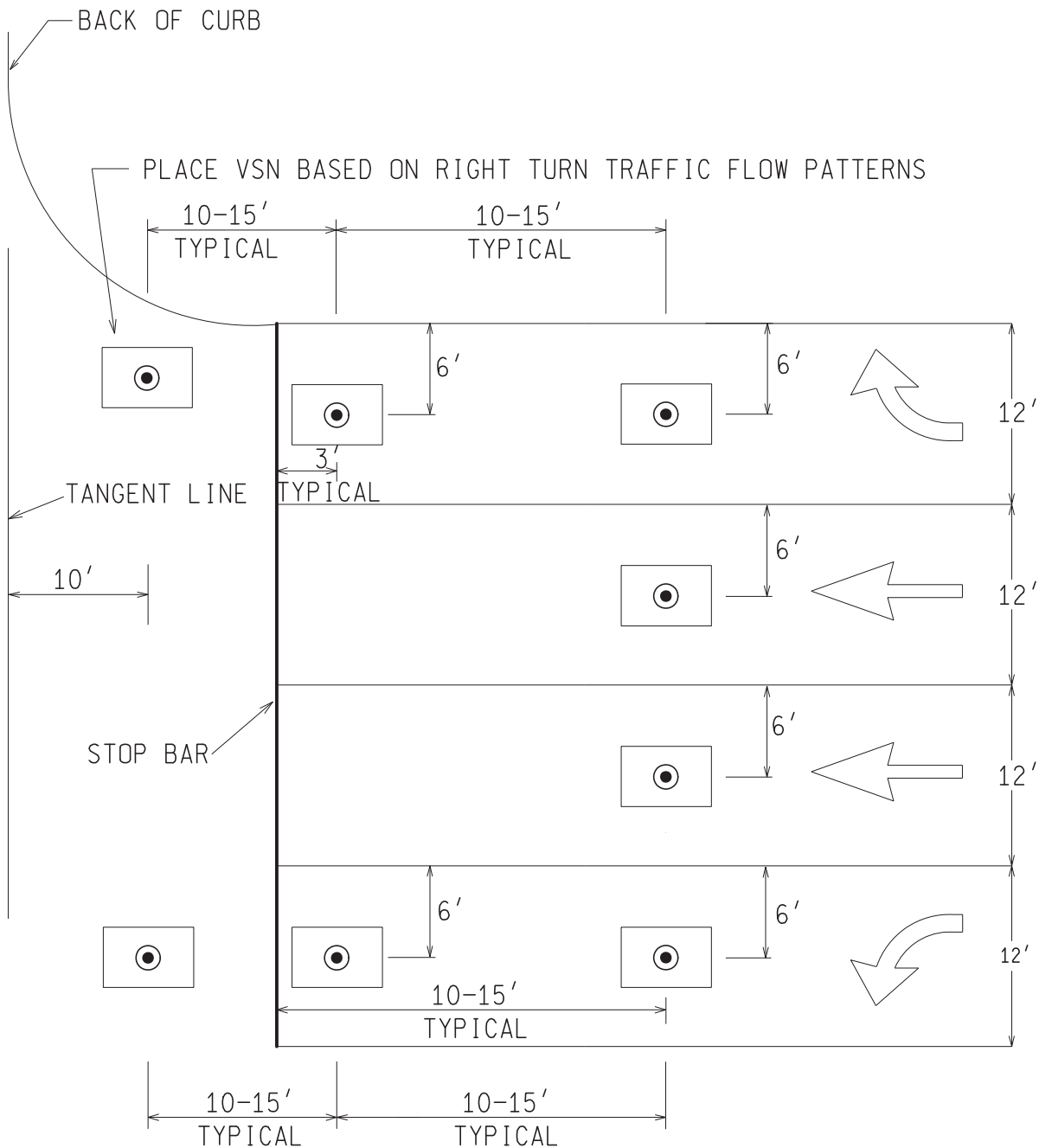
File: PW:RD/T&S/Standards/Signals/mdot_420a.dgn

Rev. 06/18/2013

PLAN DATE

SIG-420-A

SHEET
8 of 10



TYPICAL VEHICLE SENSOR NODE (NON-LOCKING) INSTALLATION DIAGRAM

FOR A TWO PHASE (COORDINATED) APPROACH WITH (NON-LOCKING) PERMISSIVE OR PERMISSIVE-PROTECTED LEFT TURN PHASING

NOT TO SCALE

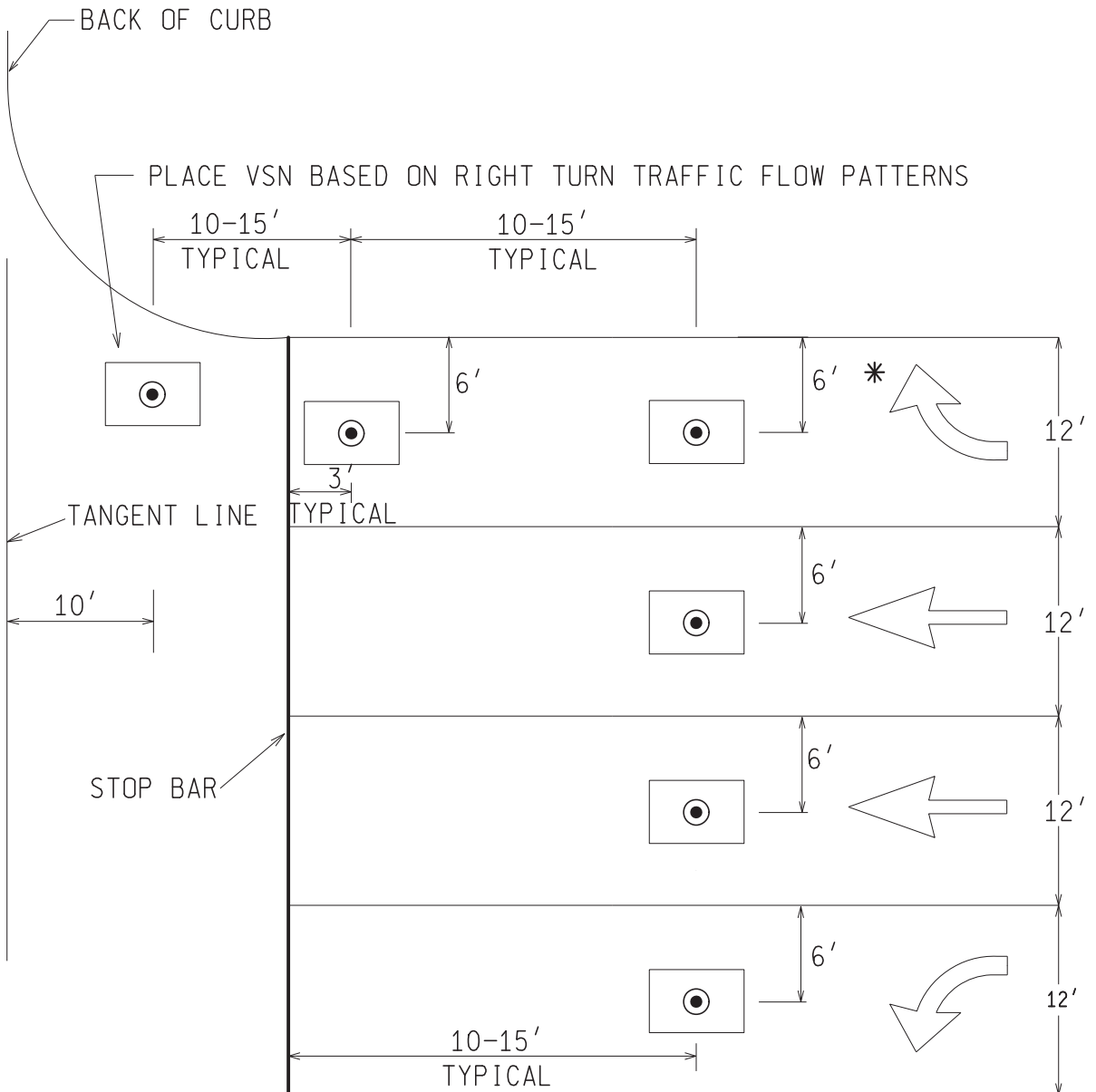
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-420-A

SHEET
9 of 10



TYPICAL VEHICLE SENSOR NODE (LOCKING) INSTALLATION DIAGRAM

FOR A TWO PHASE APPROACH WITH PROTECTED ONLY LEFT TURN PHASING

* RIGHT TURNS MAY BE NON-LOCKING OR LOCKING WITH RIGHT TURN DELAYS

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

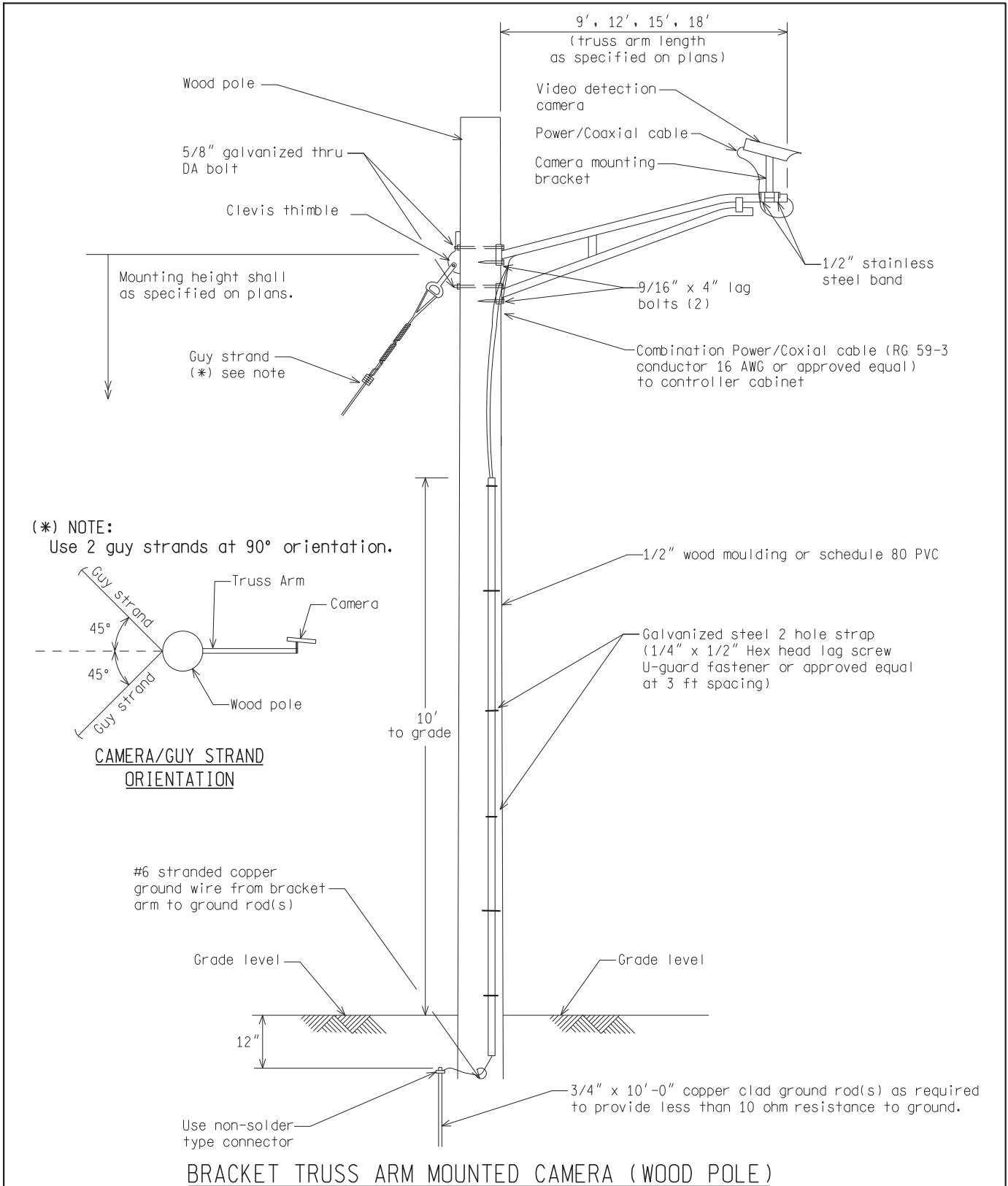
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Rev. 06/18/2013

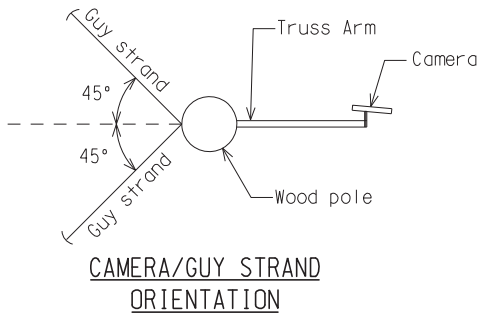
PLAN DATE

SIG-420-A

SHEET
10 of 10




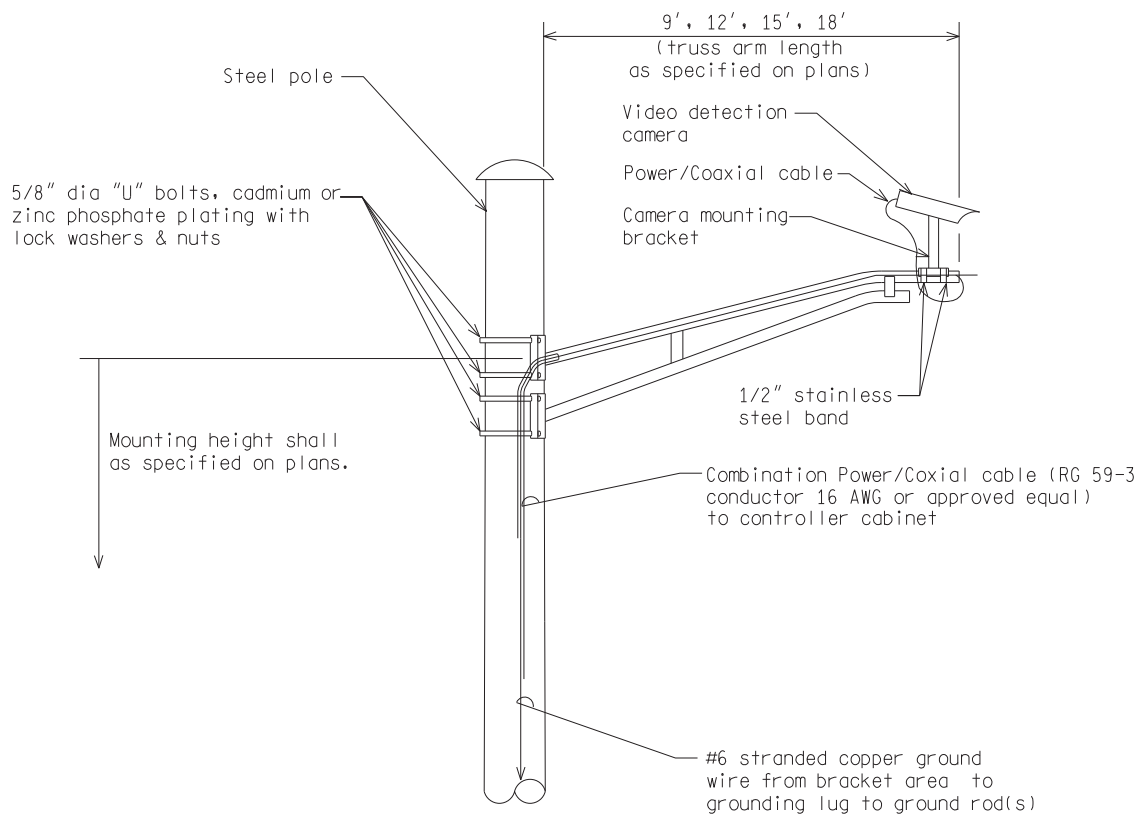
(*) NOTE:
Use 2 guy strands at 90° orientation.



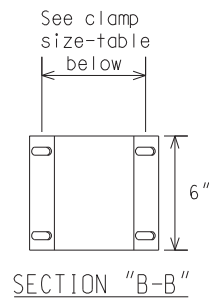
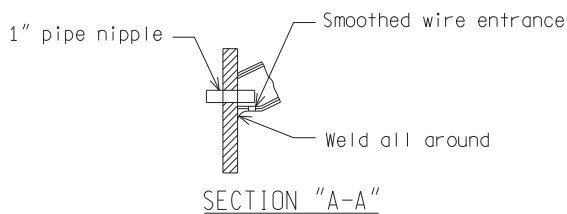
BRACKET TRUSS ARM MOUNTED CAMERA (WOOD POLE)

NOT TO SCALE File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG430A.dgn Rev: 02/16/17

 PREPARED BY TRAFFIC AND SAFETY	_____ ENGINEER OF DELIVERY	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR <h2 style="margin: 0;">VIDEO DETECTION CAMERA</h2>	
	_____ ENGINEER OF DEVELOPMENT (SPECIAL DETAIL) FHWA APPROVAL DATE	_____ PLAN DATE	<h1 style="margin: 0;">SIG-430-A</h1>

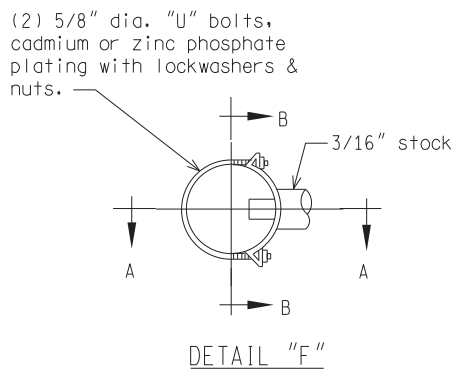


BRACKET TRUSS ARM MOUNTED CAMERA (STEEL POLE)



CLAMP SIZE TABLE

TYPE	POLE DIAMETER
A	3.6" - 4.5"
B	6.1" - 6.9"



NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

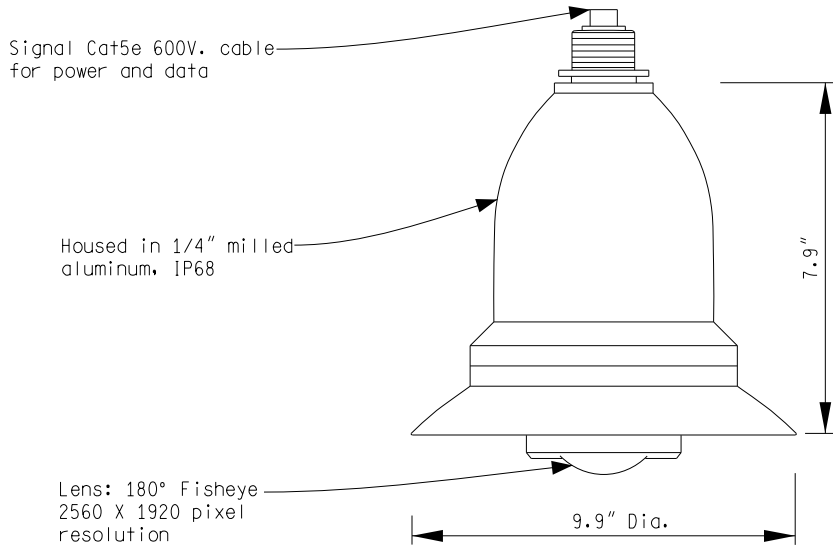
(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

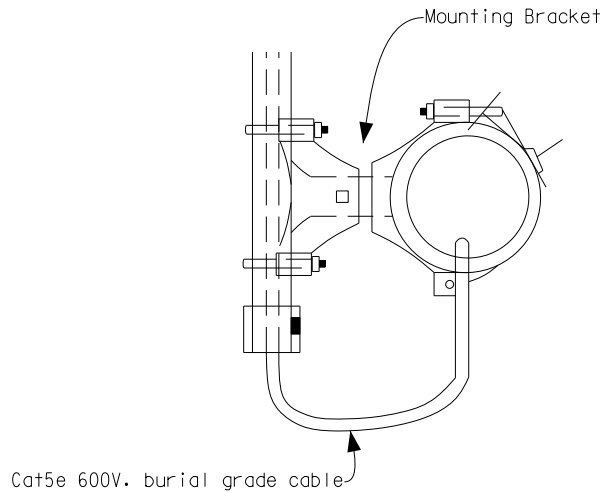
SIG-430-A

SHEET
2 of 2

HEMISPHERICAL CAMERA



TYPICAL WIRING OF BRACKET ARM/MAST ARM MOUNTED HEMISPHERICAL CAMERA AND MOUNTING BRACKET



NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG431A.dgn Rev. 05/15/23



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TRAFFIC AND SAFETY

DRAWN BY:

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

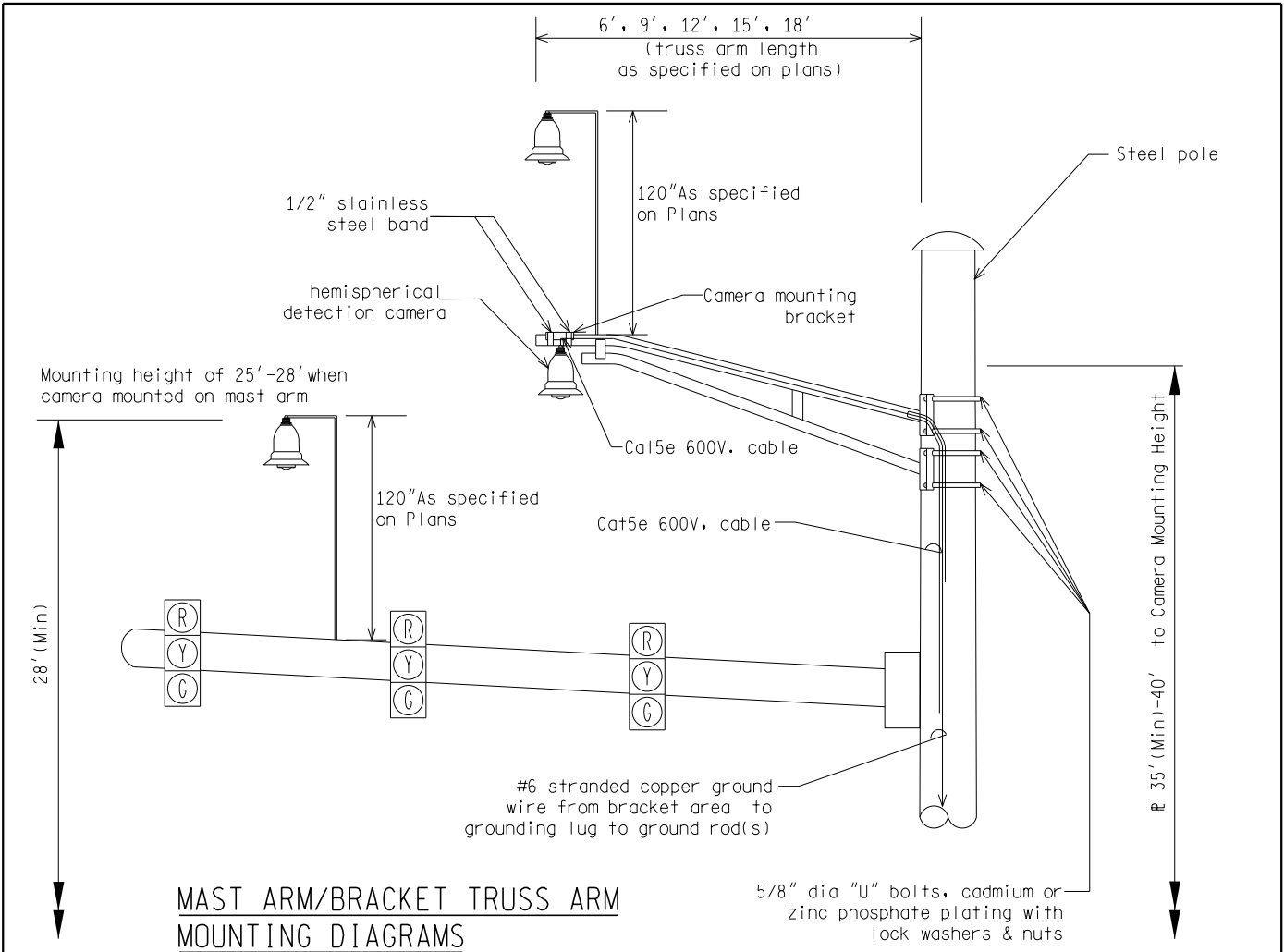
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

HEMISPHERICAL VIDEO DETECTION SYSTEM

PLAN DATE

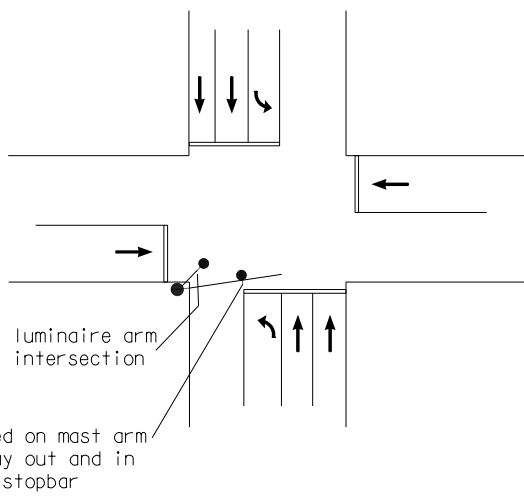
SIG-431-A

SHEET
1 of 2



MAST ARM/BRACKET TRUSS ARM MOUNTING DIAGRAMS

HEMISPHERICAL CAMERA PLACEMENT RELATIVE TO INTERSECTION



Camera mounted on luminaire arm 45 degrees to the intersection

Camera mounted on mast arm approx. midway out and in front of the stopbar

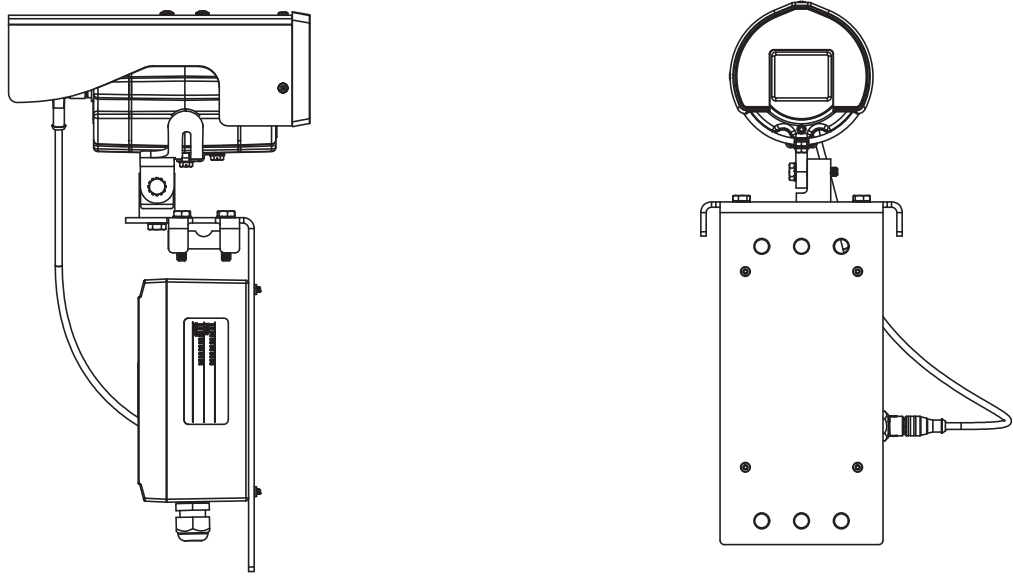
- Notes:
1. Camera should be mounted at least 35' high when using a luminaire arm and no less than 28' when using a mast arm. Or as specified on the plans.
 2. Mast arm mounts are only acceptable if the camera can be located near the center of the intersection with no occlusion.
 3. Camera must be less than 75' from the intersection center when mounted on a luminaire arm and 50' on mast arm
 4. Camera should be located with the least amount of occlusion.
 5. Installer should aim for the best "head-on" view of all approaches.
 6. Hemispherical camera shall only be installed on steel poles

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-431-A	SHEET 2 of 2
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File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG431A.dgn Rev. 05/15/23

CONTROL SECTION	JOB NO.	SHEET NO.
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SPAN WIRE MOUNTED VIDEO DETECTION CAMERA

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG432A.dgn Rev.



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DRAWN BY: DSP

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

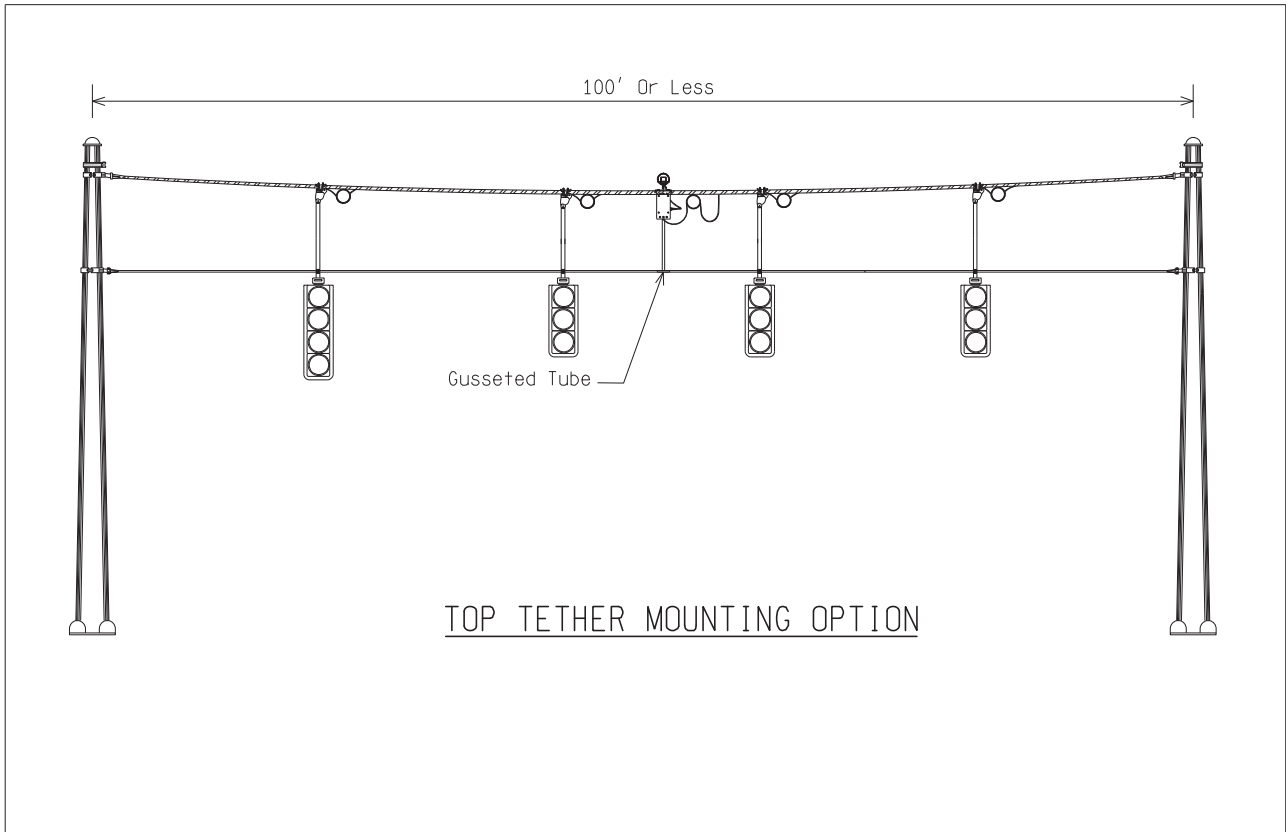
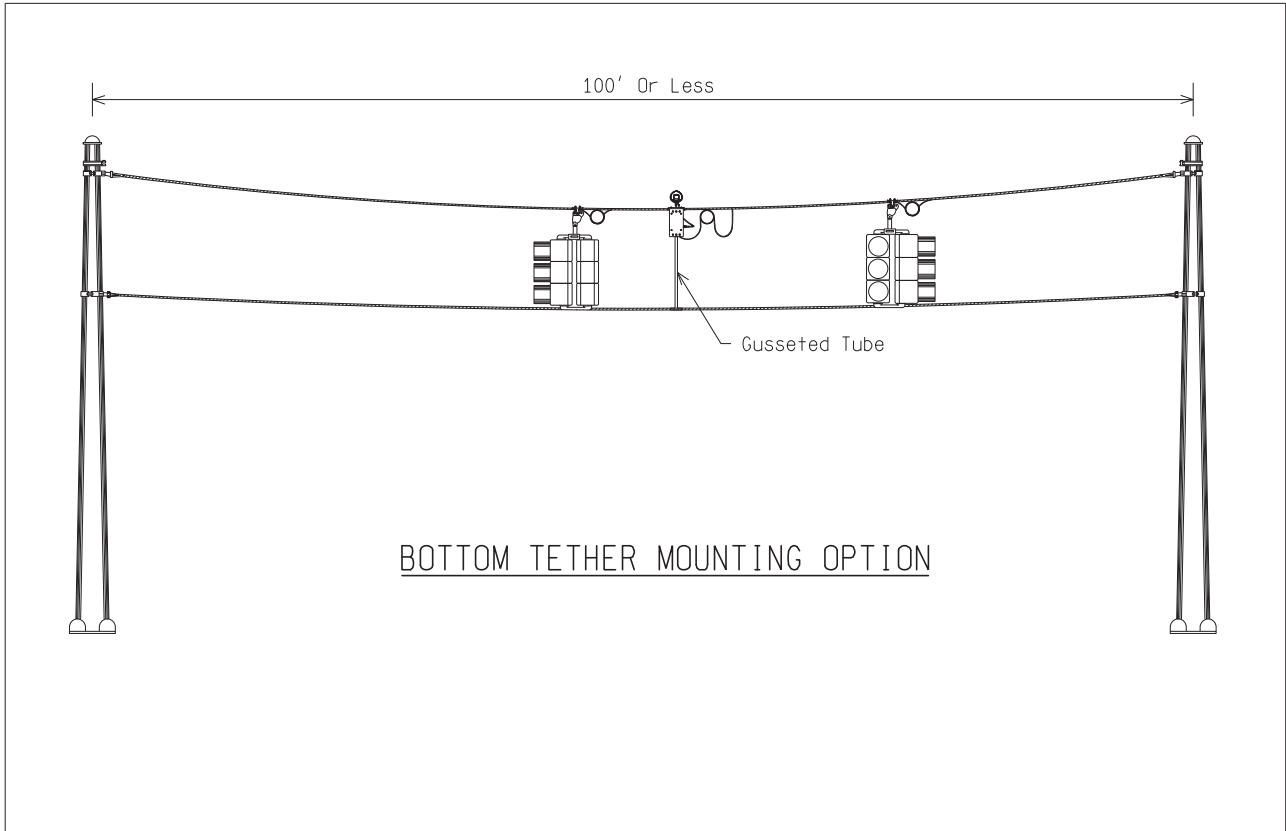
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
**SPAN WIRE MOUNTED
VIDEO DETECTION CAMERA**

02/16/17
PLAN DATE

SIG-432-A

SHEET
1 of 3



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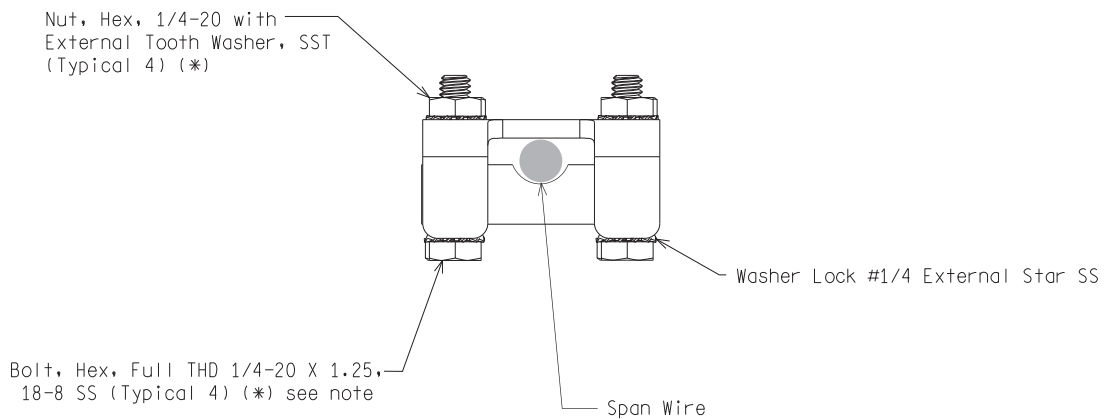
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BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

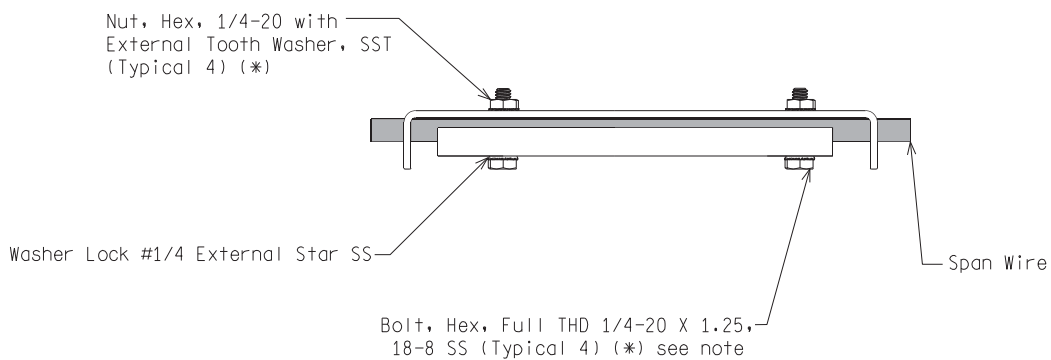
2/16/17
PLAN DATE

SIG-432-A

SHEET
2 of 3



SPAN WIRE CONNECTION BRACKET, FRONT VIEW

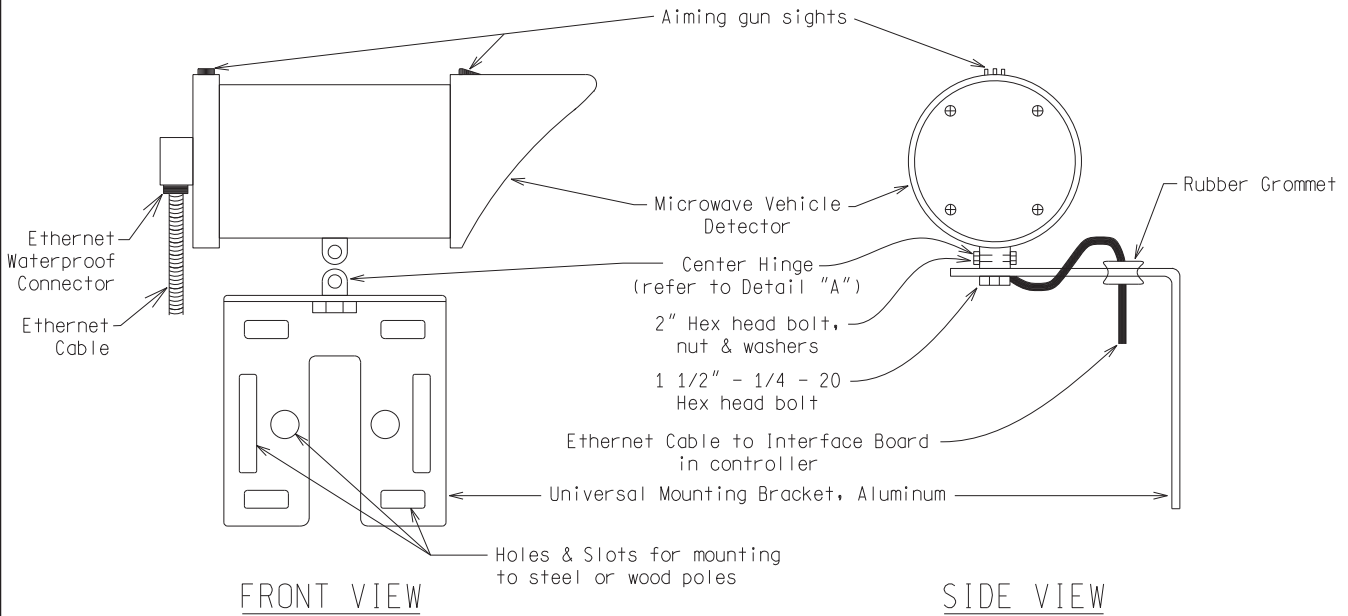


SPAN WIRE CONNECTION BRACKET, SIDE VIEW

(*) NOTE:
 For Span Wires over 1/2" to 7/8" use Bolt, Hex HD,
 Full THD 1/4-20 X 1.75 LG, SST.

NOT TO SCALE

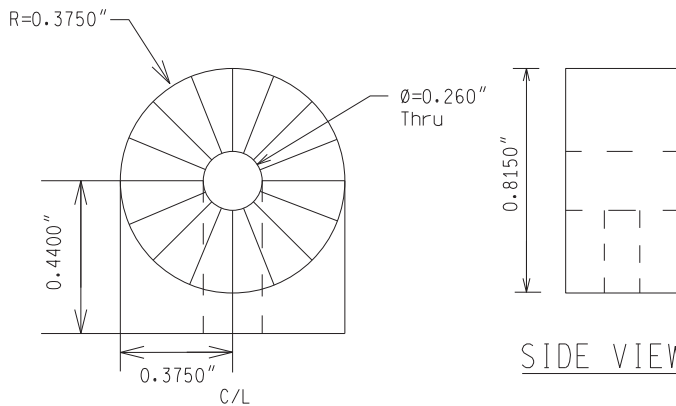
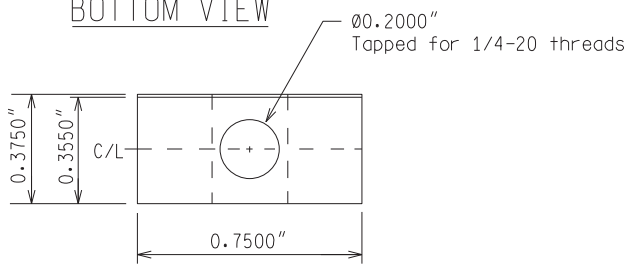
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	02/16/17 PLAN DATE	SIG-432-A	SHEET 3 of 3
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG432A.dgn Rev.				



FRONT VIEW

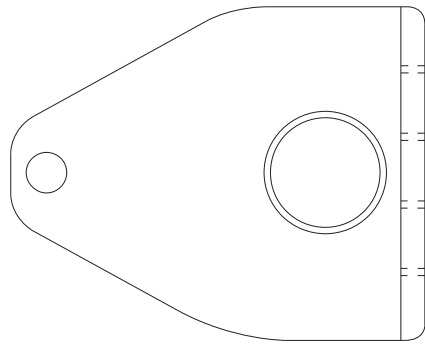
SIDE VIEW

BOTTOM VIEW



FRONT VIEW

SIDE VIEW



UNIVERSAL MOUNT BRACKET

TOP VIEW

CENTER HINGE STAINLESS STEEL
DETAIL "A"

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG440A.dgn Rev: 02/16/17



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DRAWN BY: DCK
CHECKED BY:

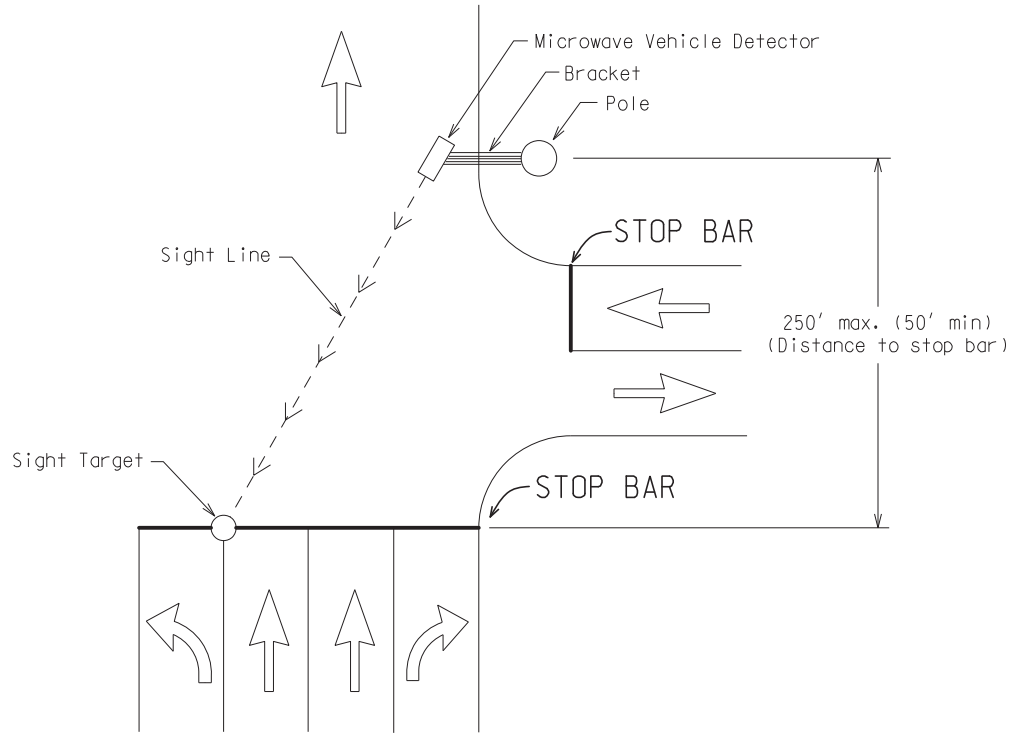
ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

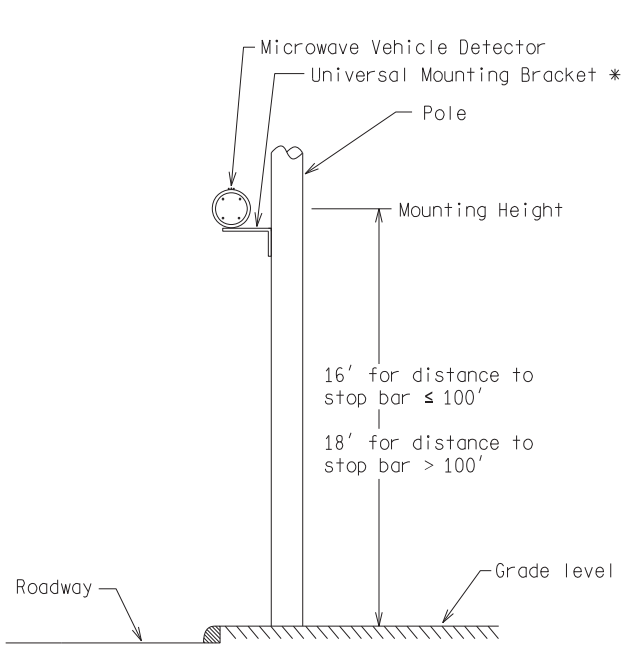
(SPECIAL DETAIL)
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR
MICROWAVE VEHICLE DETECTOR

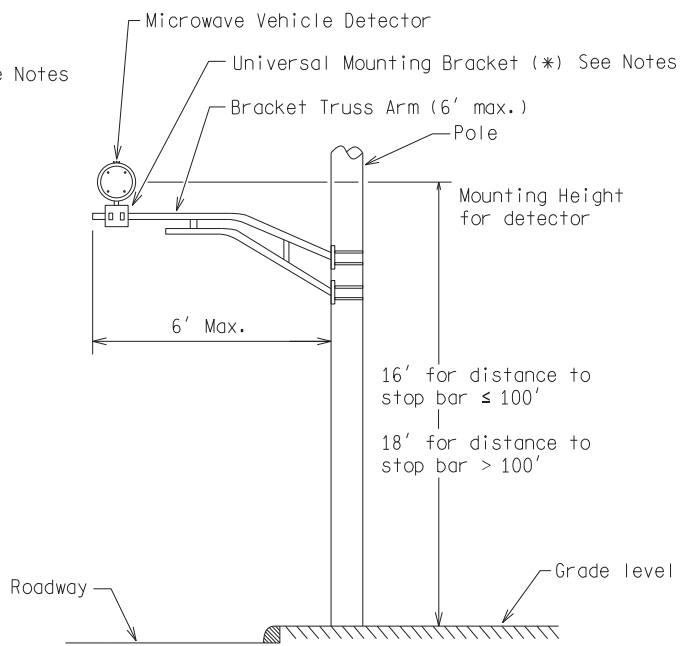
PLAN DATE	SIG-440-A	SHEET 1 of 4
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SIGHT ORIENTATION DIAGRAM



SIDE POLE MOUNTED



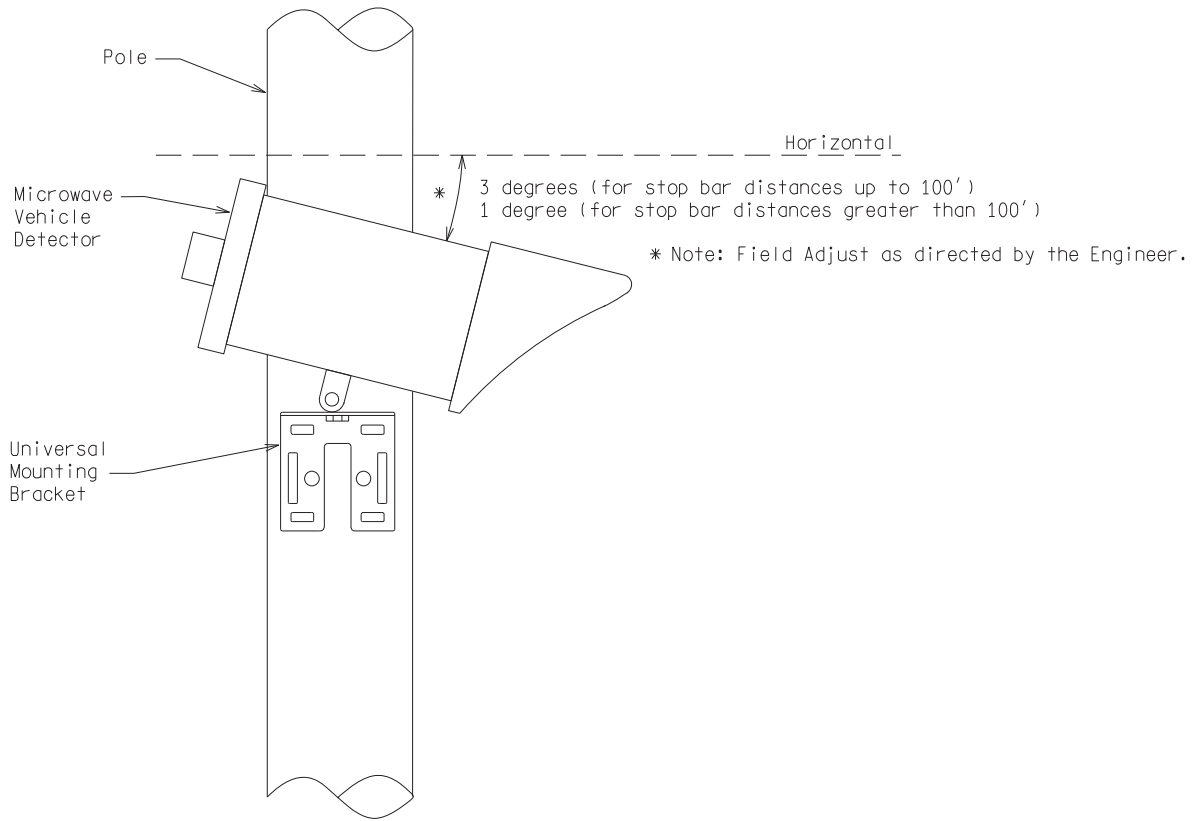
BRACKET TRUSS ARM MOUNTED

(*) Notes:

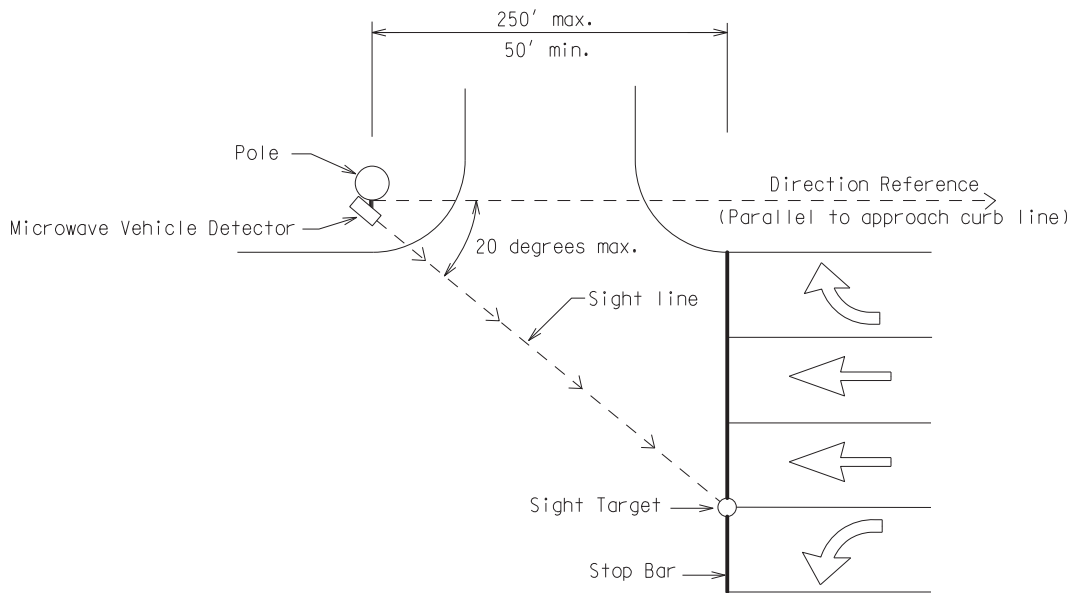
1. Use 3/8" x 5" Hex head screw (2" min.) for mounting to wood poles.
2. Use 3/4" x 0.30 min. stainless steel band for mounting to steel poles, pedestals or bracket truss arms.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-440-A	SHEET 2 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG440A.dgn	Rev. 02/16/17	PLAN DATE		



VERTICAL ORIENTATION



HORIZONTAL ORIENTATION

MICROWAVE VEHICLE SENSOR ORIENTATION DIAGRAM

NOT TO SCALE

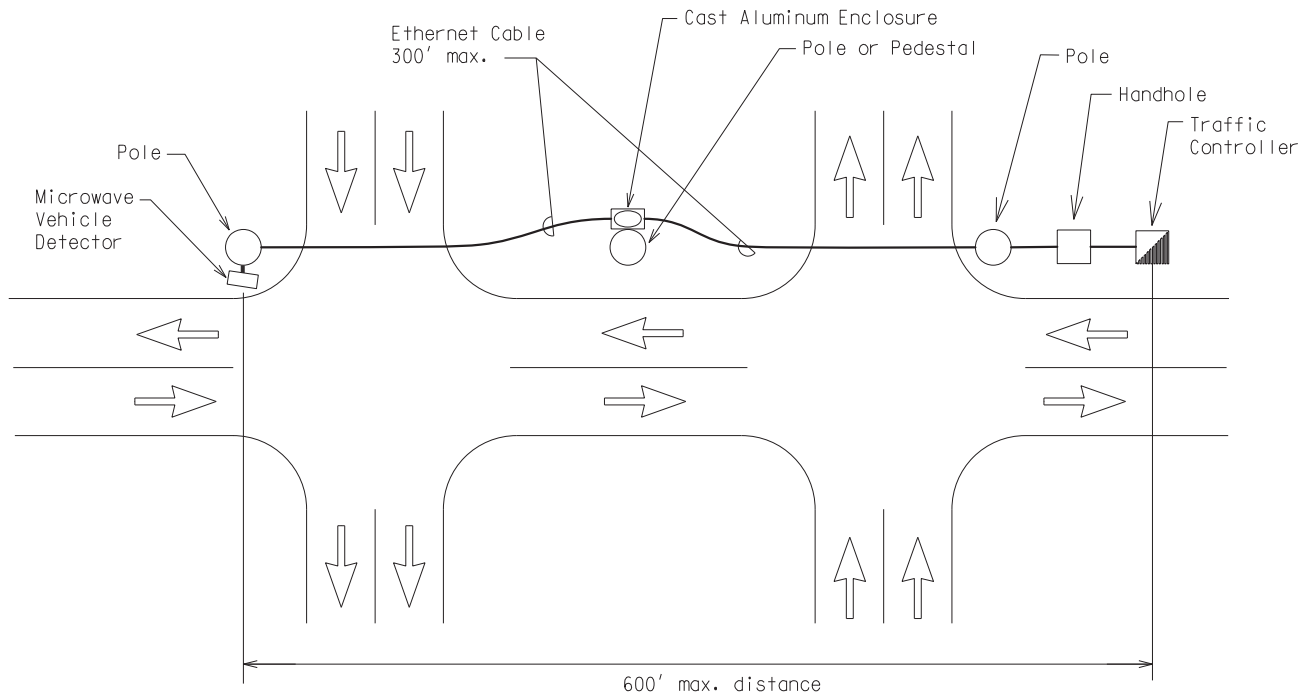
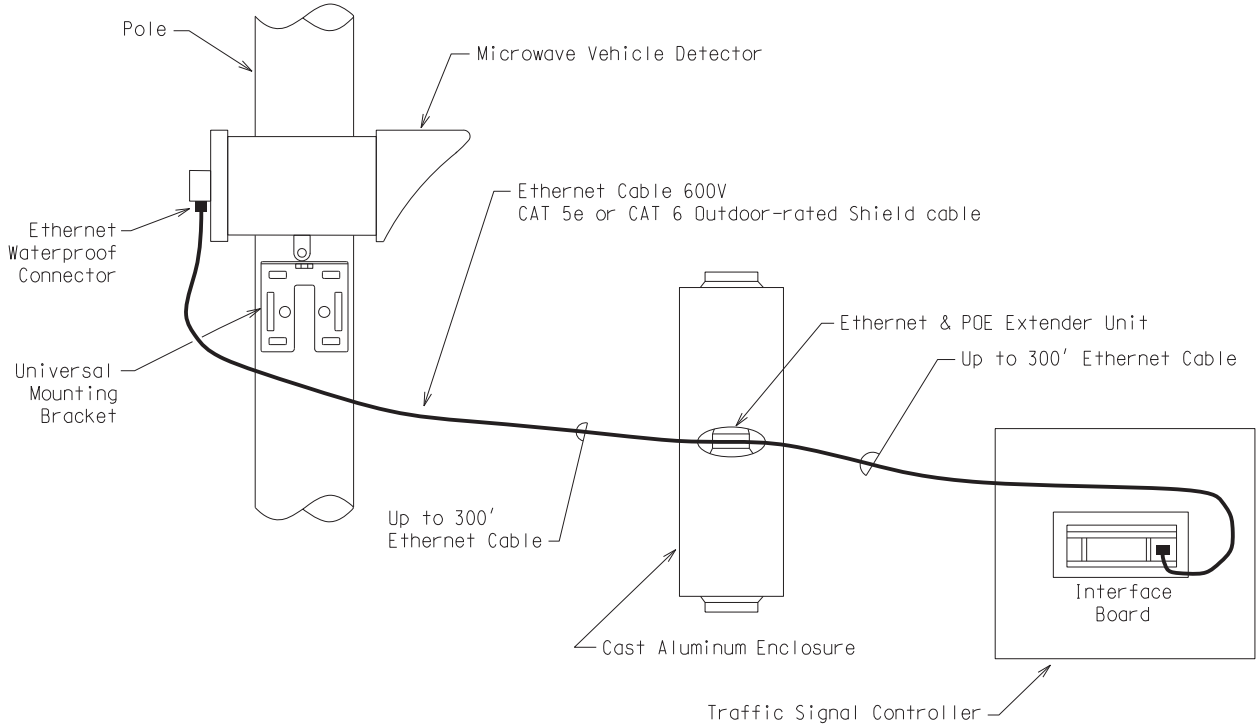
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-440-A

SHEET
3 of 4



ETHERNET CABLE EXTENSION ORIENTATION DIAGRAM

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

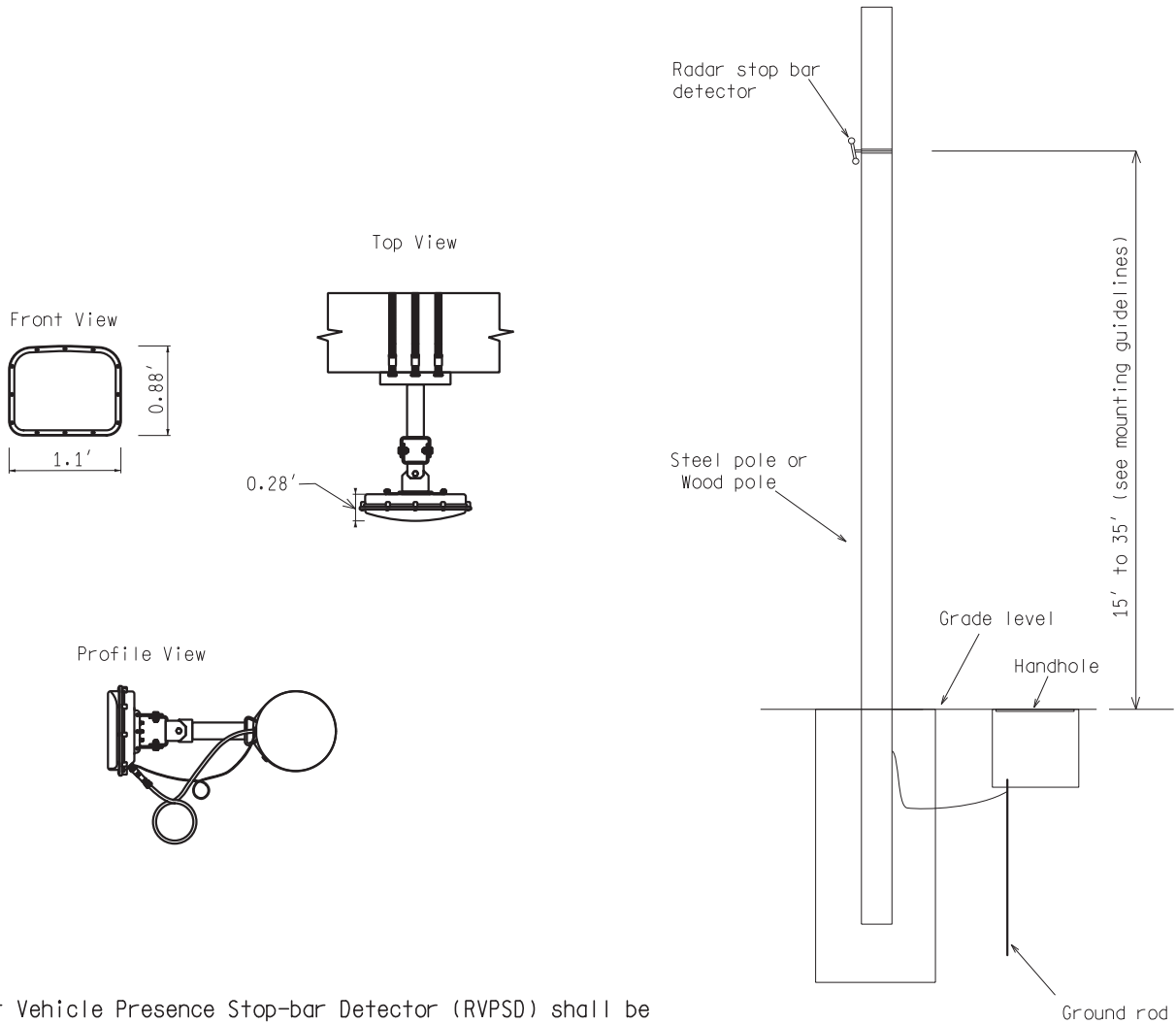
(SPECIAL DETAIL)
FHWA APPROVAL DATE

PLAN DATE

SIG-440-A

SHEET
4 of 4

RADAR VEHICLE PRESENCE STOP-BAR DETAIL



Note:
Radar Vehicle Presence Stop-bar Detector (RVPSD) shall be installed and configured in coordination with agency and/or manufacturer representative.

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File: RefDoc/TR/Signals/Web/Sp Det/FIn/SIG460A.dgn Rev.



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DRAWN BY: DSP

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

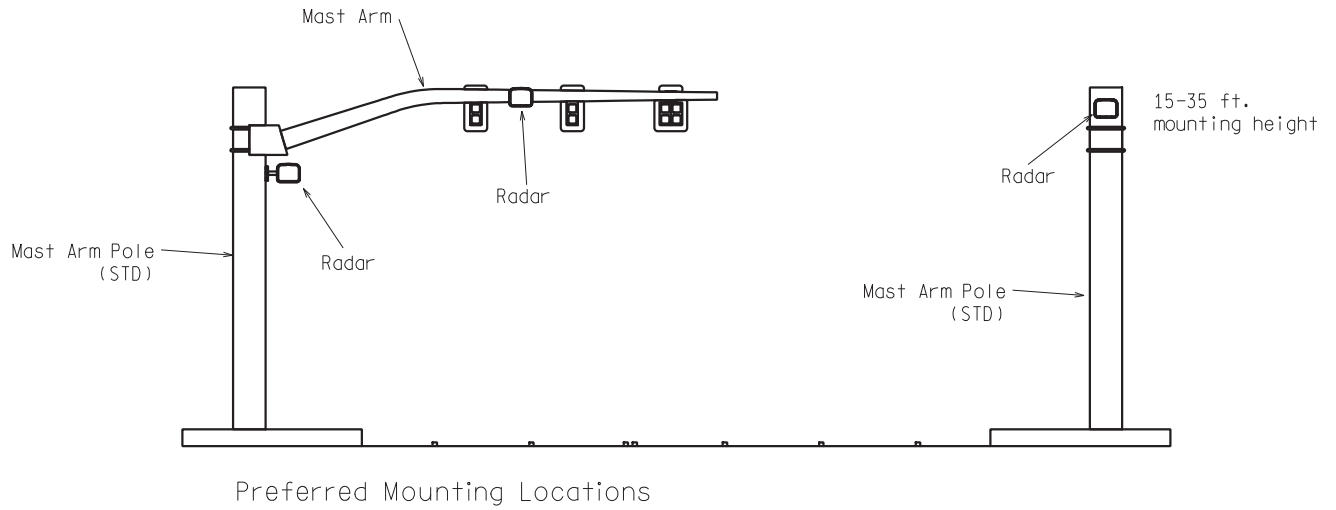
RADAR STOP BAR DETECTION

02/16/17
PLAN DATE

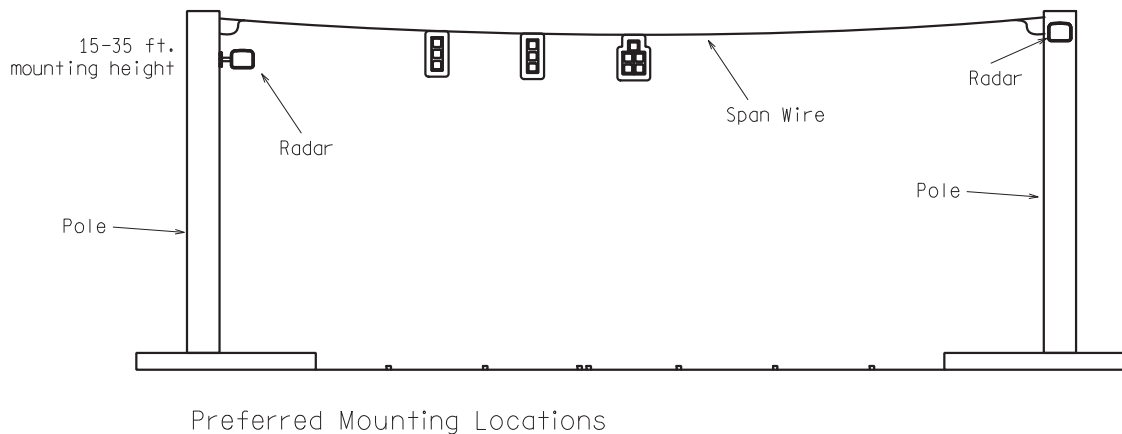
SIG-460-A

SHEET
1 of 2

RADAR VEHICLE PRESENCE STOP-BAR DETECTOR
MAST ARM INSTALLATION DETAIL



RADAR VEHICLE PRESENCE STOP-BAR DETECTOR
SPAN WIRE INSTALLATION DETAIL



NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	02/16/17	SIG-460-A	SHEET 2 of 2
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG460A.dgn Rev.		PLAN DATE		