
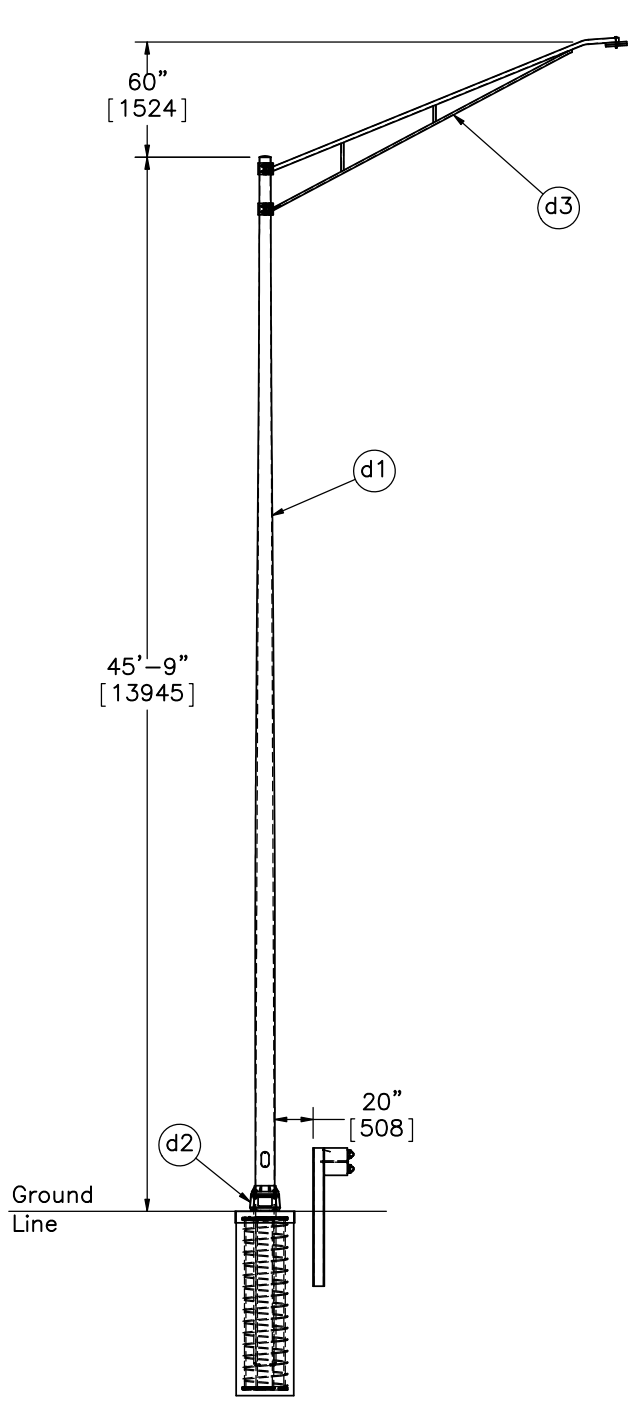
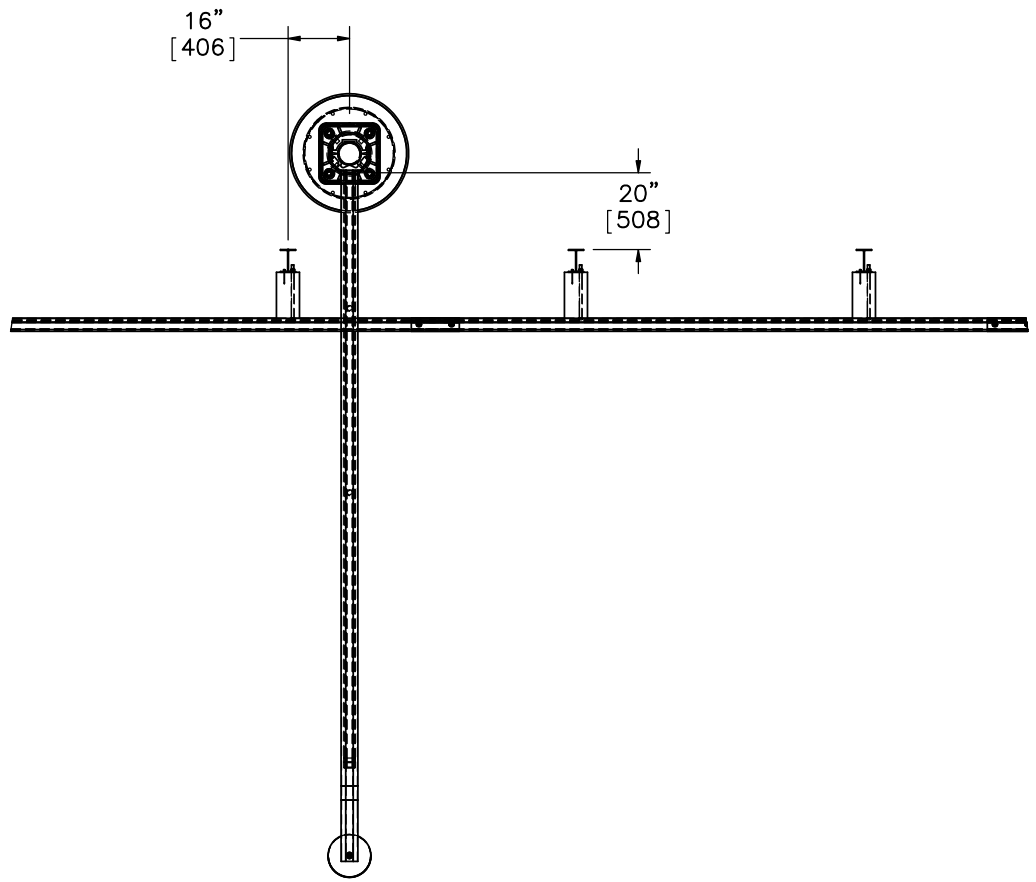


- Notes: (1) Test shall be performed according to test designation no. 3-10 of MASH criteria.
 (2) The impact location is the centerline of the splice between post nos. 11 and 12.
 (3) BCT anchors are placed in $\phi 3'$ [914] holes.
 (4) Critical region is between post nos. 9 and 18.
 (5) Load cells are to be used on both end anchors.

 Midwest Roadside Safety Facility	IL Tollway MGS-Pole Test 2	SHEET: 1 of 28
	System Layout	DATE: 5/18/2017
DWG. NAME: Illinois_Pole-MGS_Test_2_R10	SCALE: 1:220 UNITS: In./[mm]	DRAWN BY: TJD/JEK/DTM
		REV. BY: KAL/RWB/TJD/MP




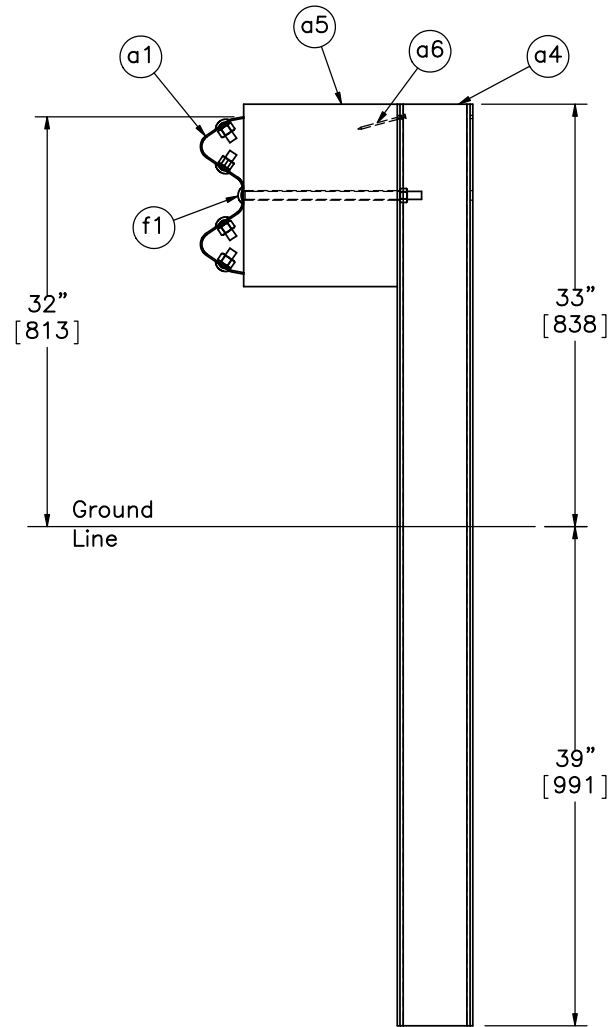
PROFILE VIEW



DETAIL A
SCALE 1 : 50

- Notes: (1) Pole hand hole is located on the upstream side of the pole.
- (2) Breakaway base is mounted with a flat face perpendicular to the guardrail, and the adjacent face parallel to the guardrail, as shown.

 Midwest Roadside Safety Facility	IL Tollway MGS-Pole Test 2	SHEET: 2 of 28
	Illinois Tollway Pole Details	DATE: 5/18/2017
DWG. NAME: Illinois_Pole-MGS_Test_2_R10	SCALE: 1:100 UNITS: In.[mm]	DRAWN BY: TJD/JEK/DTM REV. BY: KAL/RWB/TJD/MP



SECTION B-B



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

Post Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

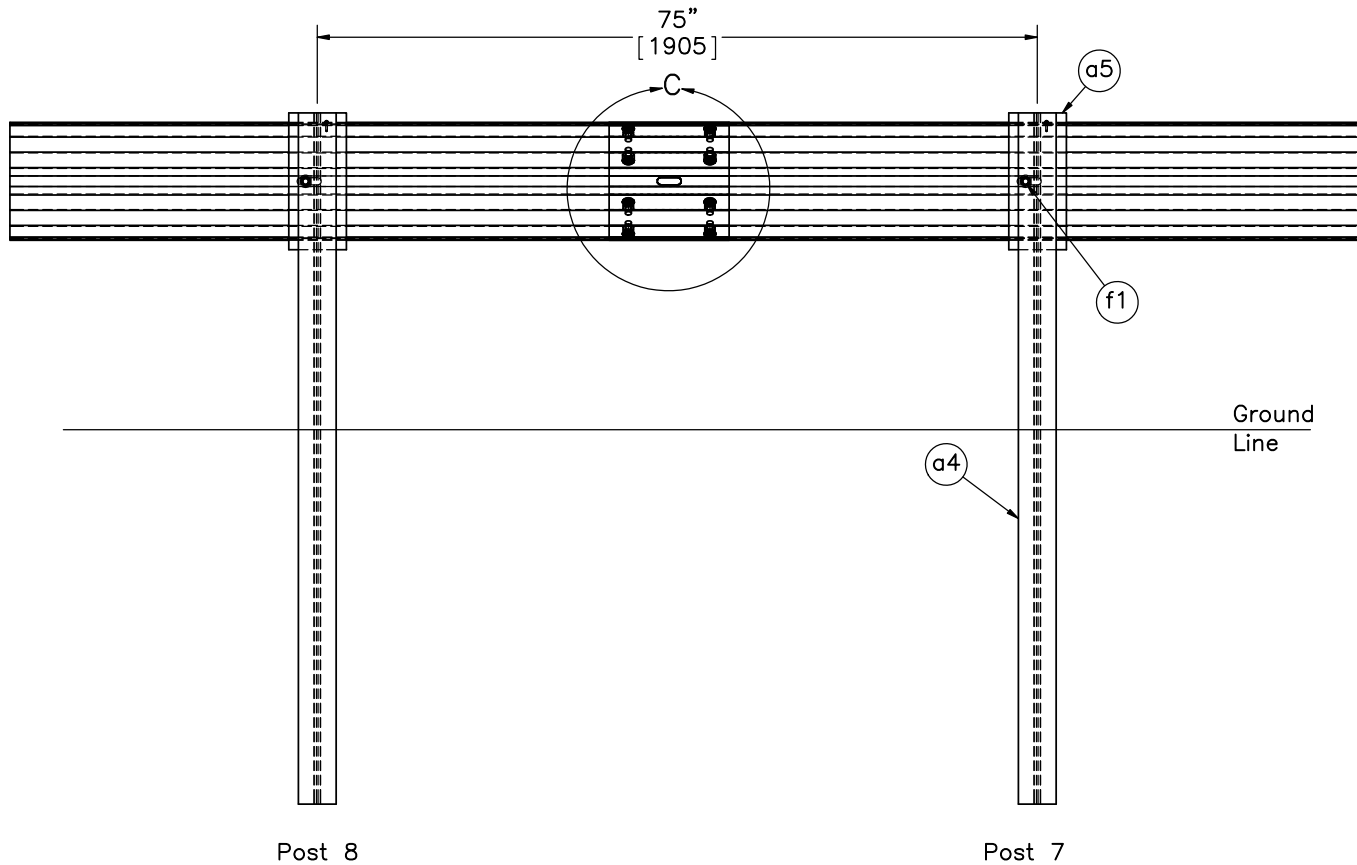
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UNITS: In.[mm]

SHEET:
3 of 28

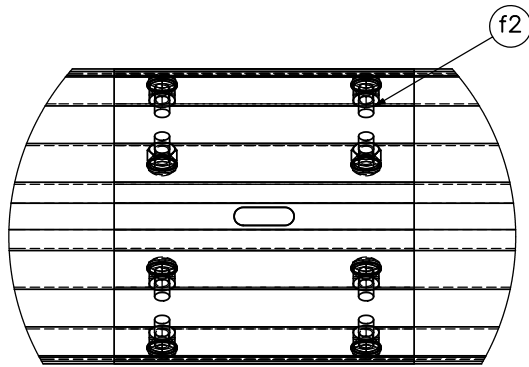
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

REV. BY:
KAL/RWB/
TJD/MP



SPLICE DETAIL
BACKSIDE



DETAIL C
SCALE 1 : 8



Midwest Roadside
Safety Facility

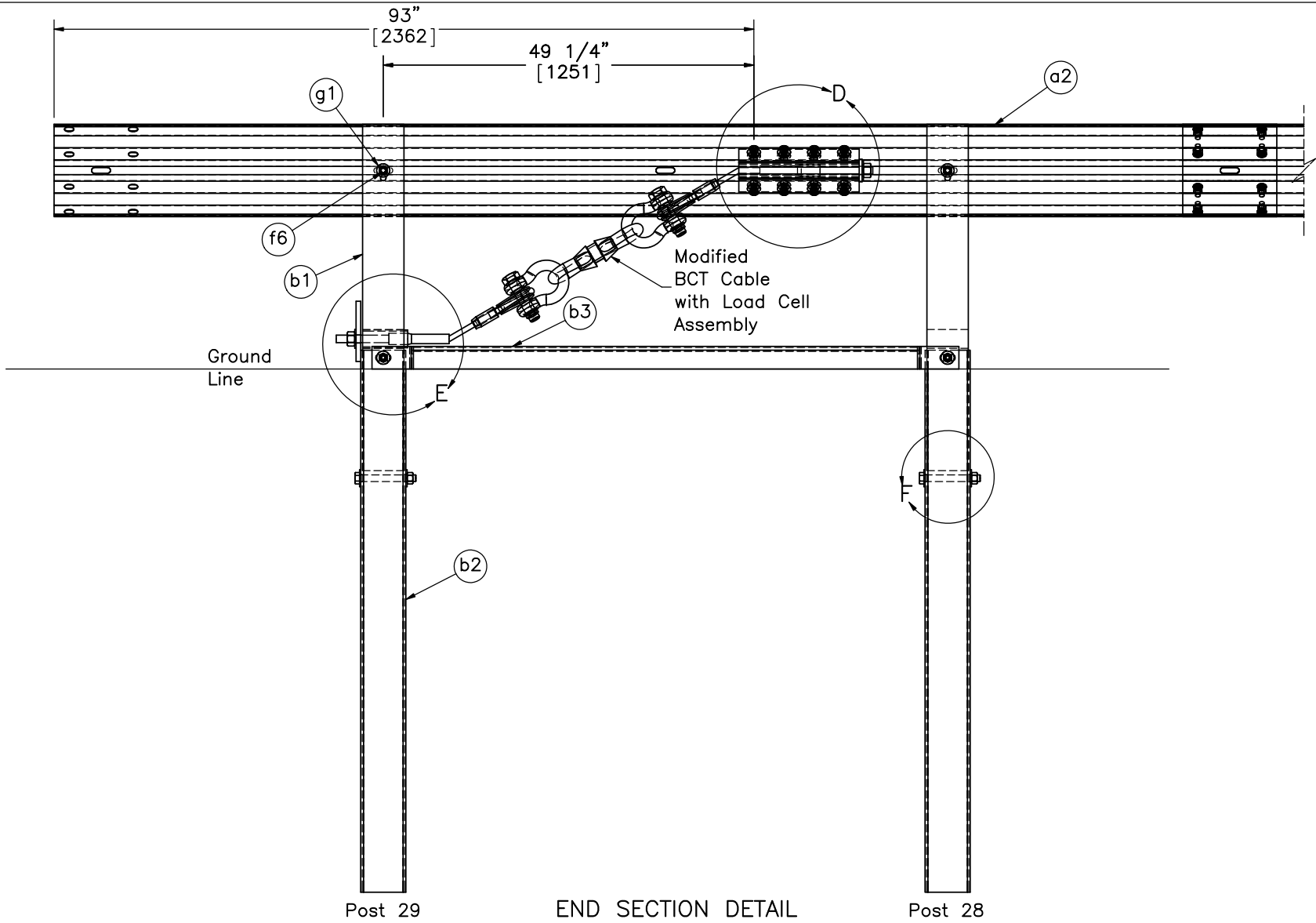
IL Tollway MGS-Pole
Test 2

Splice and Post Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

SCALE: 1:20
UNITS: In.[mm]

SHEET:
4 of 28
DATE:
5/18/2017
DRAWN BY:
TJD/JEK/
DTM
REV. BY:
KAL/RWB/
TJD/MP



END SECTION DETAIL
BACKSIDE



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

End Section Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

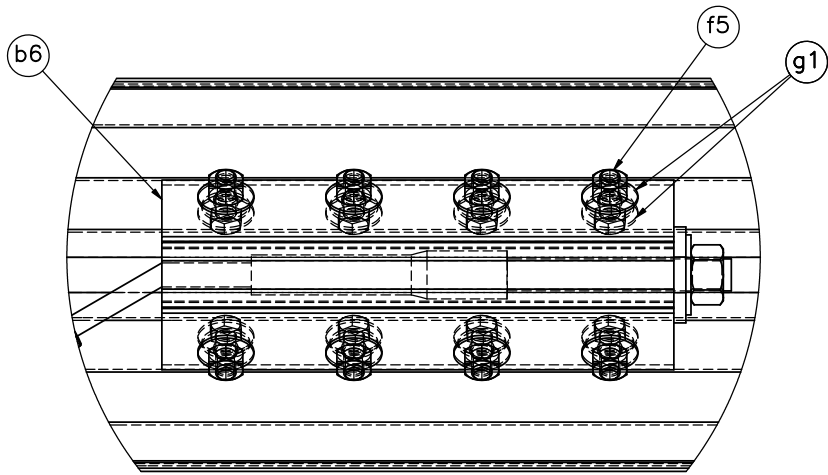
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UNITS: In.[mm]

SHEET:
5 of 28

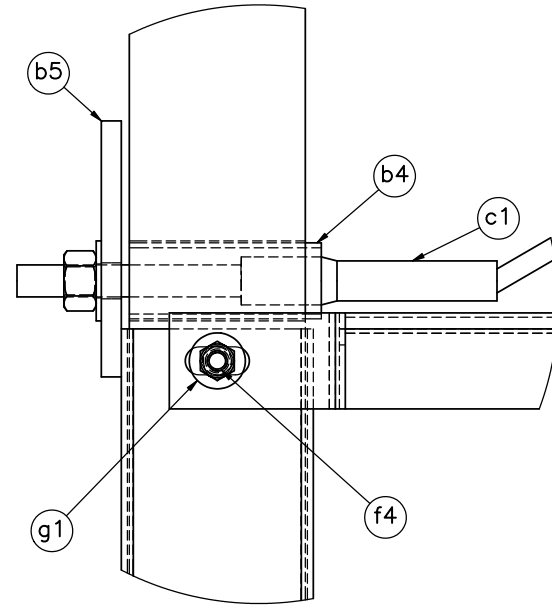
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

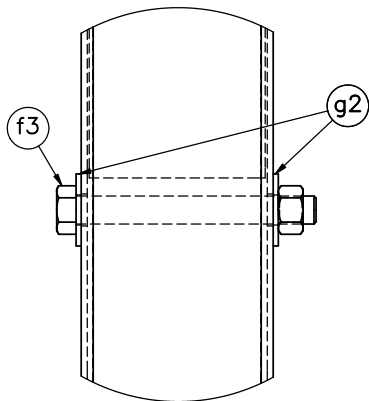
REV. BY:
KAL/RWB/
TJD/MP



DETAIL D



DETAIL E



DETAIL F

Note: (1) Additional washer (part g1) on the opposite side under the head of bolt (part f5).



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

BCT Anchor Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

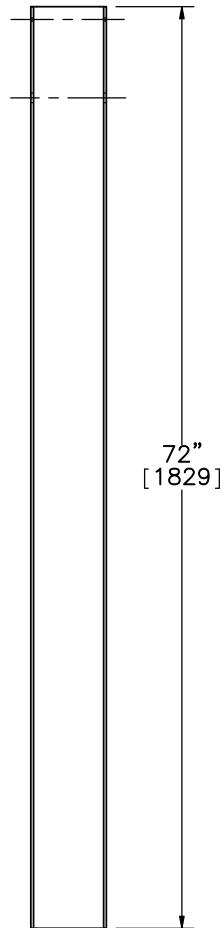
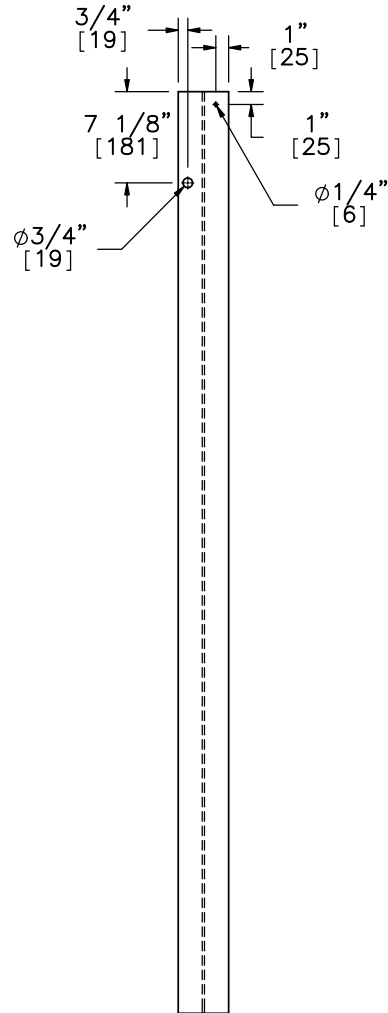
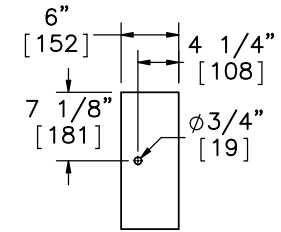
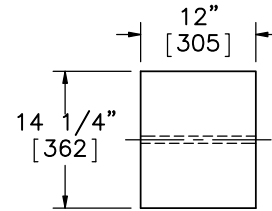
SCALE: 1:6
UNITS: In.[mm]

SHEET:
6 of 28

DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

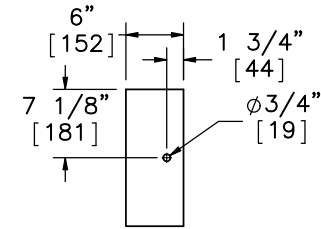
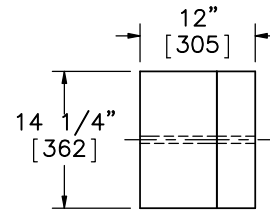
REV. BY:
KAL/RWB/
TJD/MP



ELEVATION VIEW

PROFILE VIEW

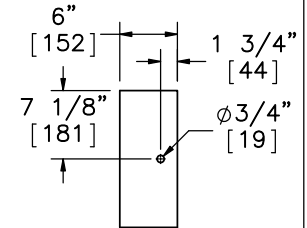
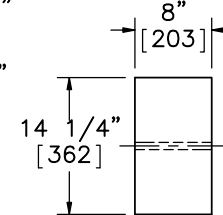
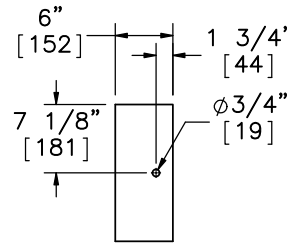
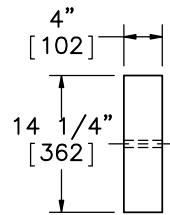
Part a5



ELEVATION VIEW

PROFILE VIEW

Alternate Blockout Option –
 6"x4"x14 1/4" [152x102x362] Blockout
 with 6"x8"x14 1/4" [152x203x362] Blockout



ELEVATION VIEW

PROFILE VIEW

ELEVATION VIEW

PROFILE VIEW

6"x4"x14 1/4" [152x102x362] Blockout

6"x8"x14 1/4" [152x203x362] Blockout

ELEVATION VIEW

PROFILE VIEW

Part a4



Midwest Roadside Safety Facility

IL Tollway MGS-Pole Test 2

Post Nos. 3-27 Components

DWG. NAME:
Illinois_Pole-MGS_Test_2_R10

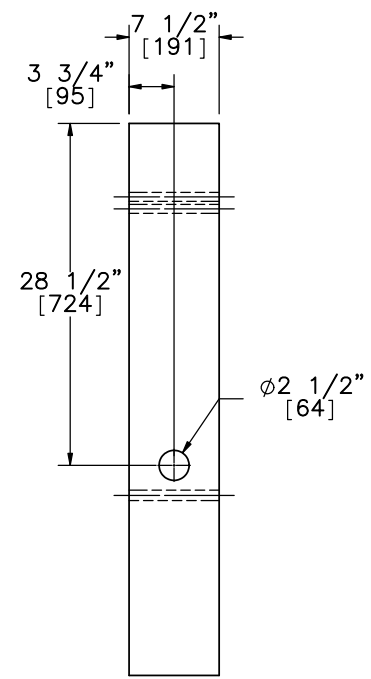
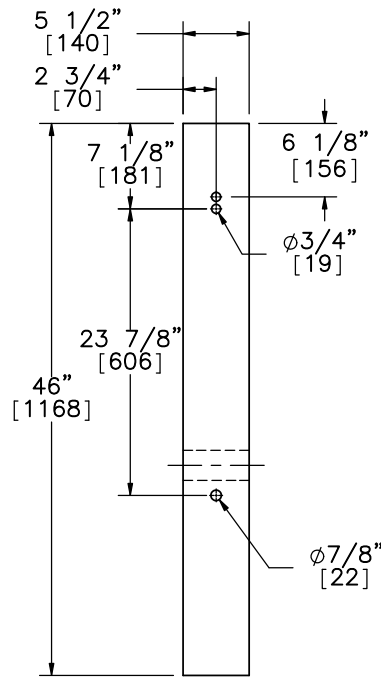
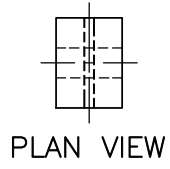
SCALE: 1:20
UNITS: In.[mm]

SHEET:
7 of 28

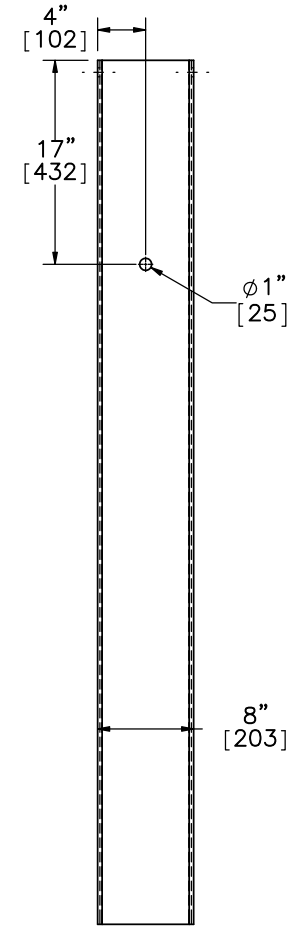
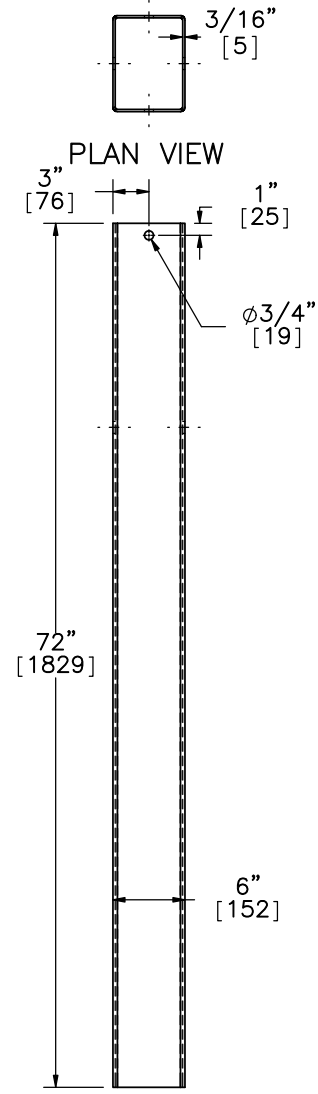
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

REV. BY:
KAL/RWB/
TJD/MP



Part b1



ELEVATION VIEW

PROFILE VIEW

Part b2



Midwest Roadside Safety Facility

IL Tollway MGS-Pole Test 2

BCT Timber Posts & Foundation Tube Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

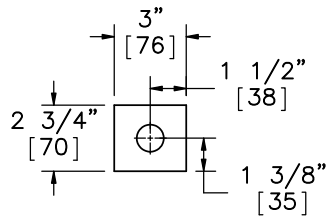
SCALE: 1:16
UNITS: In./[mm]

SHEET:
8 of 28

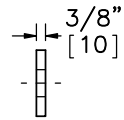
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

REV. BY:
KAL/RWB/
TJD/MP

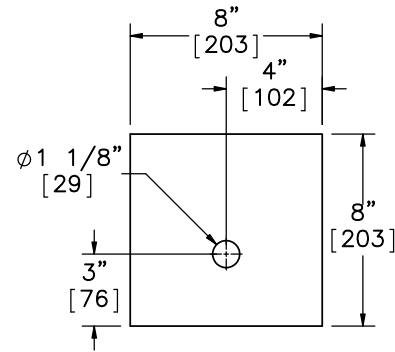


ELEVATION VIEW

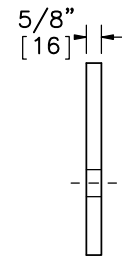


PROFILE VIEW

Anchor Bracket End Plate

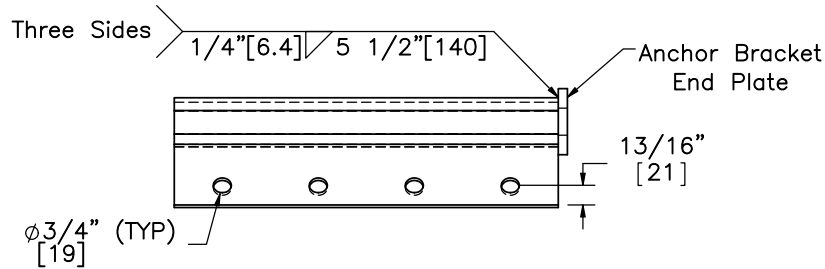


ELEVATION VIEW

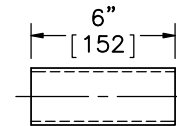


PROFILE VIEW

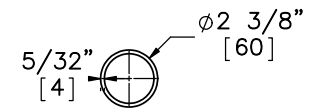
Part b5



PLAN VIEW

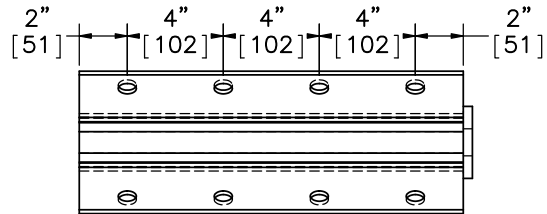


ELEVATION VIEW

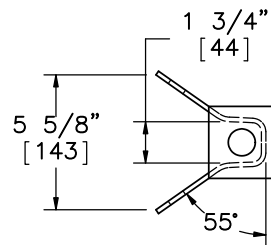


PROFILE VIEW

Part b4




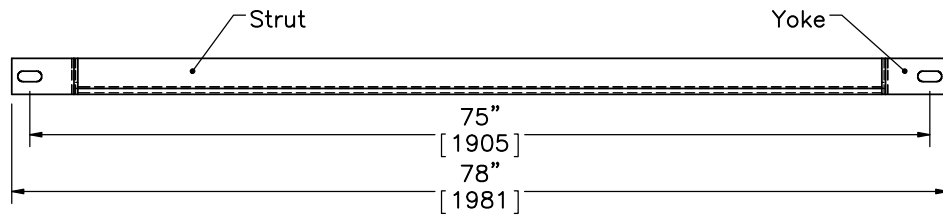
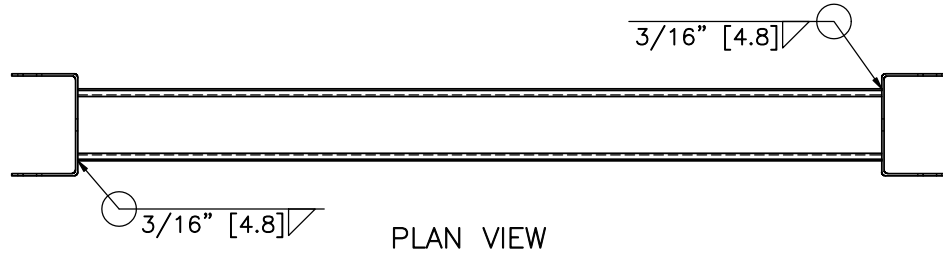
ELEVATION VIEW



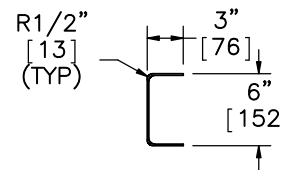
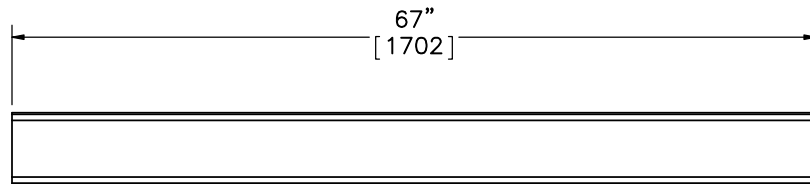
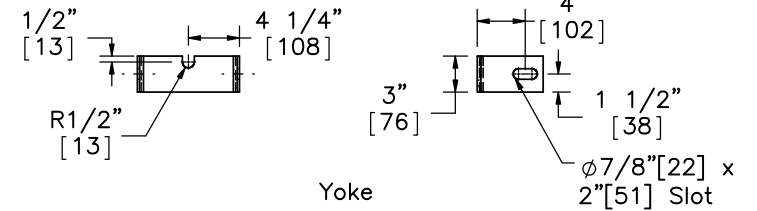
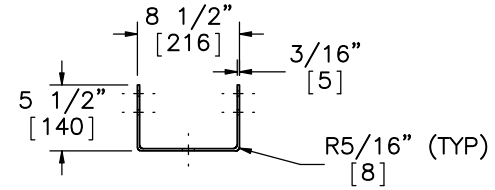
PROFILE VIEW

Part b6

	IL Tollway MGS-Pole Test 2		SHEET: 9 of 28
	BCT Post Components & Anchor Bracket		DATE: 5/18/2017
Midwest Roadside Safety Facility			DRAWN BY: TJD/JEK/ DTM
DWG. NAME: Illinois_Pole-MGS_Test_2_R10		SCALE: 1:8 UNITS: In.[mm]	REV. BY: KAL/RWB/ TJD/MP



Part b3



ELEVATION VIEW

6"x3" [152x76] 10 Gauge [3.4] Strut



Midwest Roadside Safety Facility

IL Tollway MGS-Pole Test 2

Ground Strut Details

DWG. NAME:
Illinois_Pole-MGS_Test_2_R10

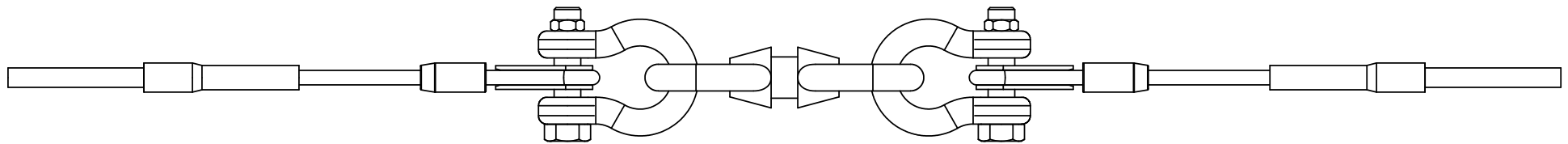
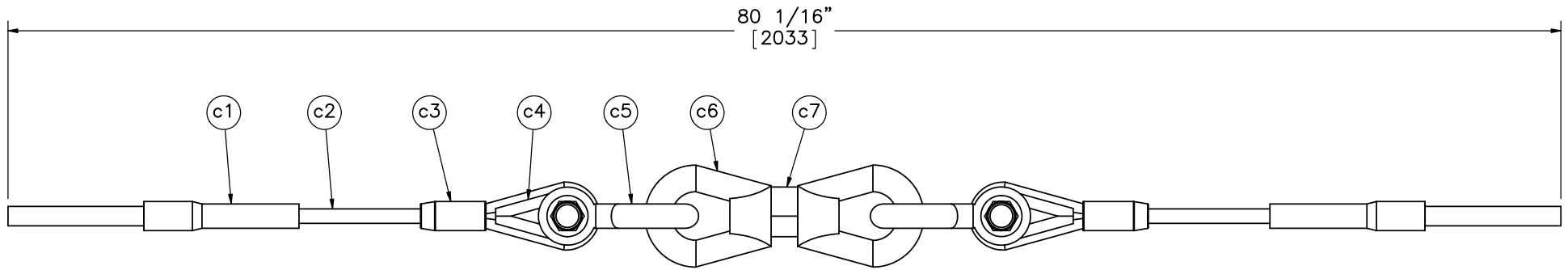
SCALE: 1:16
UNITS: In.[mm]

SHEET:
10 of 28

DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

REV. BY:
KAL/RWB/
TJD/MP



Note: (1) 6x25 IWRC IPS cables meet the minimum breaking strength of 42.7 kips [190 kN] and may be substituted for the 6x19 IWRC IPS cables.



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

BCT Anchor Cable & Load Cell
Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

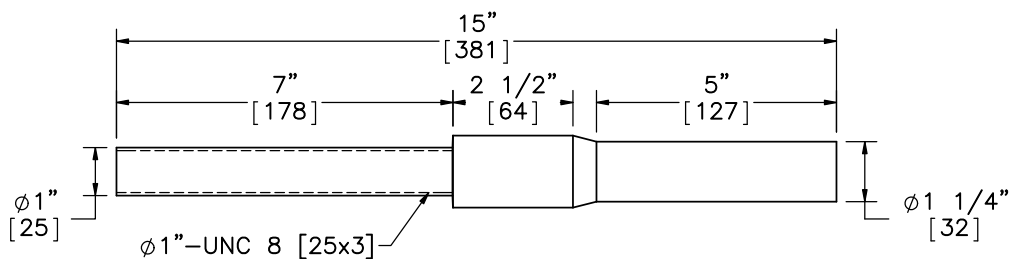
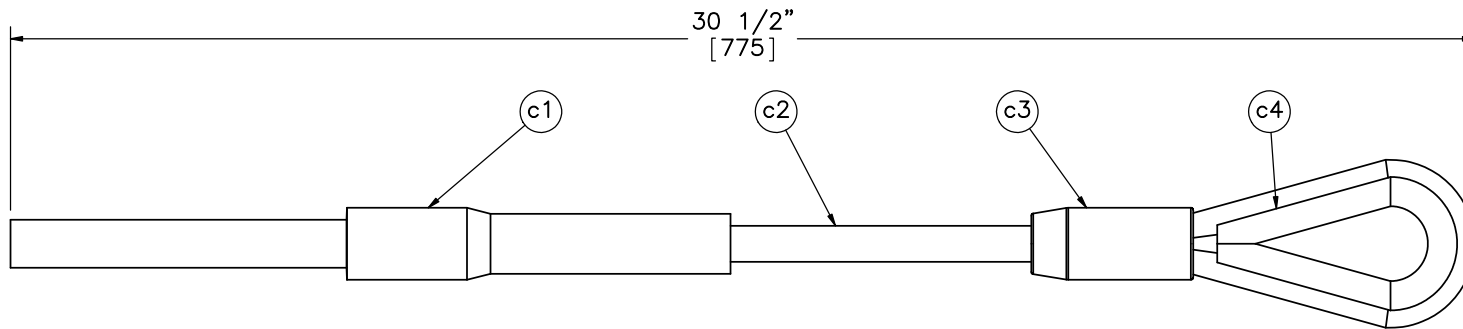
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UNITS: In.[mm]

SHEET:
11 of 28

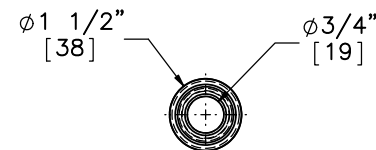
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

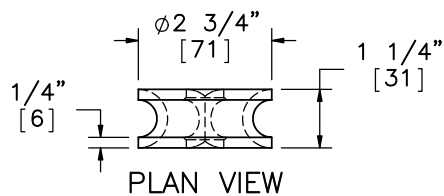
REV. BY:
KAL/RWB/
TJD/MP



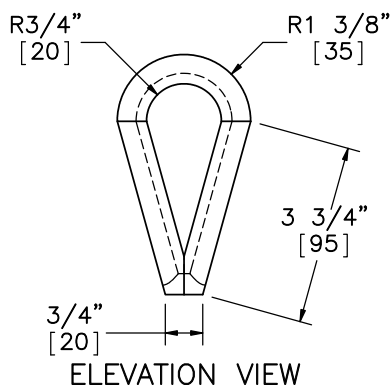
Part c1



PLAN VIEW

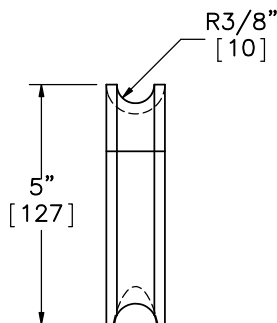


PLAN VIEW

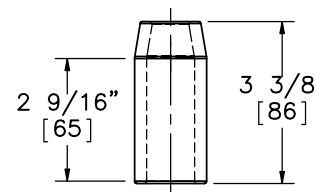


ELEVATION VIEW

Part c4



PROFILE VIEW



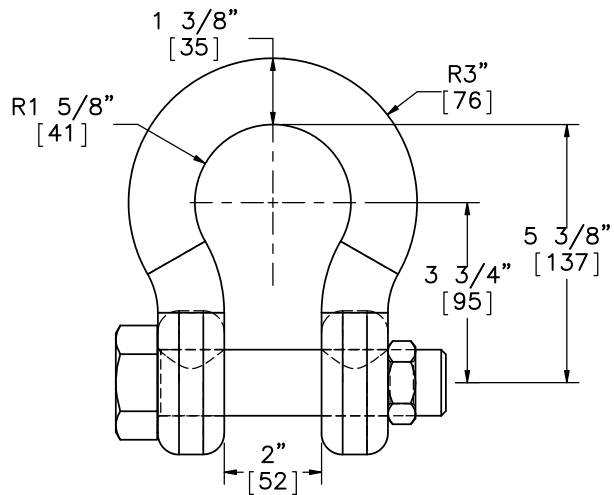
ELEVATION VIEW

Part c3

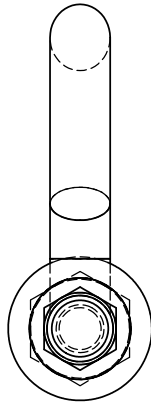


Midwest Roadside Safety Facility

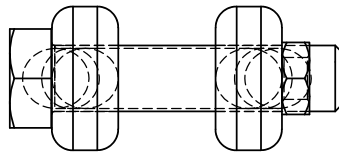
IL Tollway MGS-Pole Test 2		SHEET: 12 of 28
Modified BCT Anchor Cable		DATE: 5/18/2017
DWG. NAME: Illinois_Pole-MGS_Test_2_R10		DRAWN BY: TJD/JEK/DTM
SCALE: 1:4	UNITS: In.[mm]	REV. BY: KAL/RWB/TJD/MP



ELEVATION VIEW

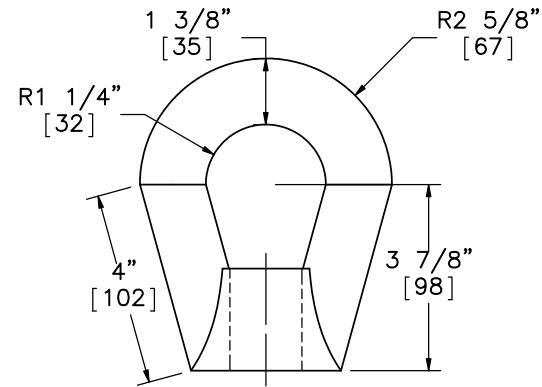


PROFILE VIEW

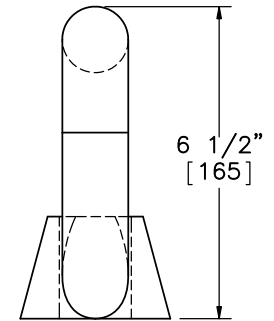


PLAN VIEW

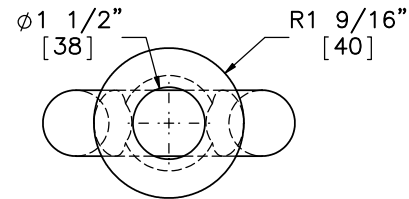
Part c5



ELEVATION VIEW



PROFILE VIEW



PLAN VIEW

Part c6



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

Shackle and Eye Nut Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

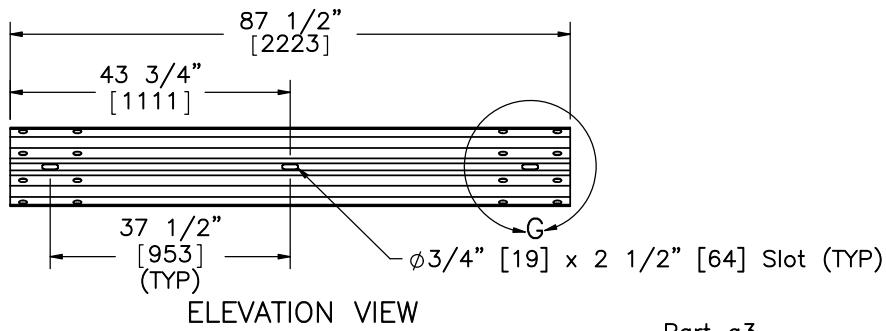
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SHEET:
13 of 28

DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

REV. BY:
KAL/RWB/
TJD/MP

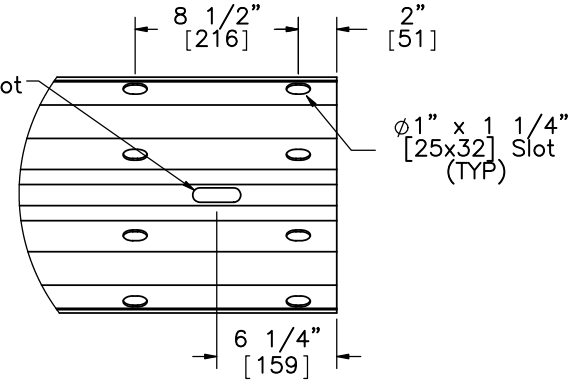


ELEVATION VIEW

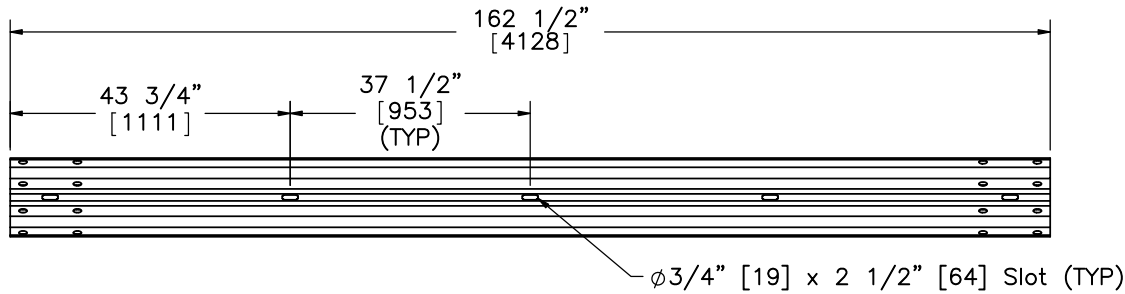
Part a3

ϕ3/4" [19] x 2 1/2" [64] Slot

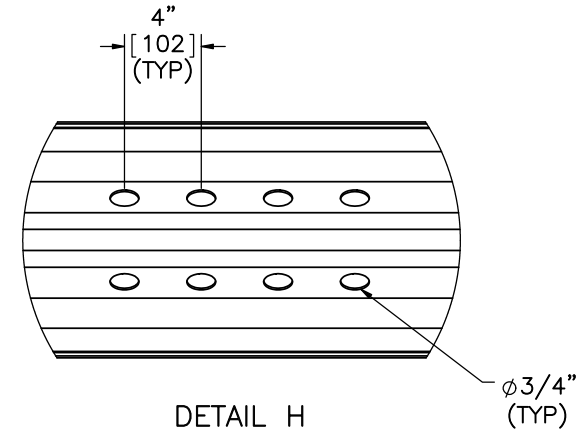
PROFILE VIEW



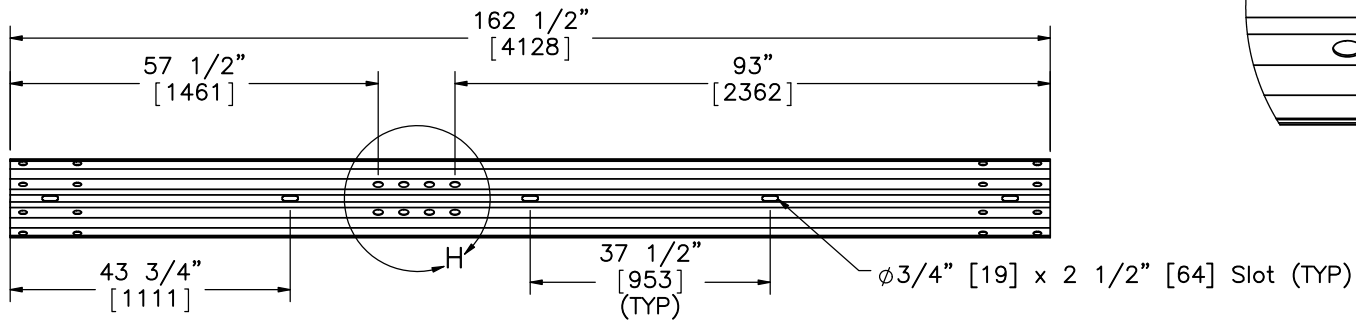
DETAIL G
SCALE 1 : 10



ELEVATION VIEW
Part a1



DETAIL H
SCALE 1 : 10



ELEVATION VIEW
Part a2



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

Rail Section Details

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

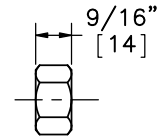
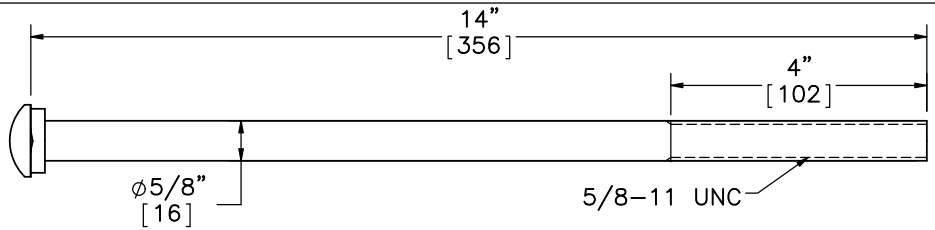
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UNITS: In.[mm]

SHEET:
14 of 28

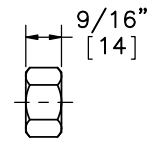
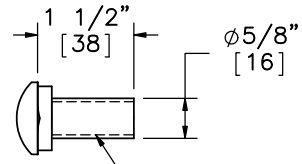
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

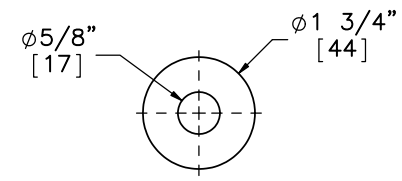
REV. BY:
KAL/RWB/
TJD/MP



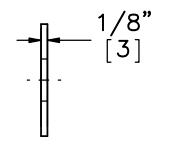
Part f1



Part f2

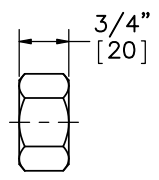
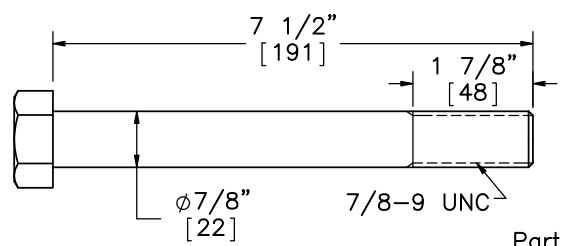


ELEVATION VIEW

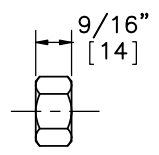
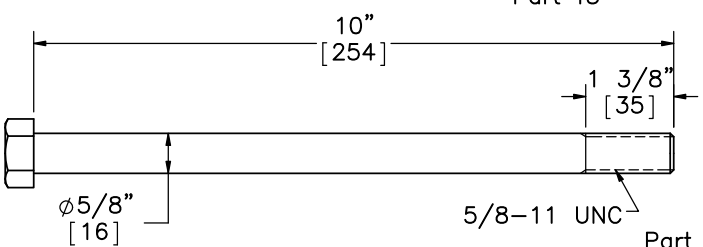


PROFILE VIEW

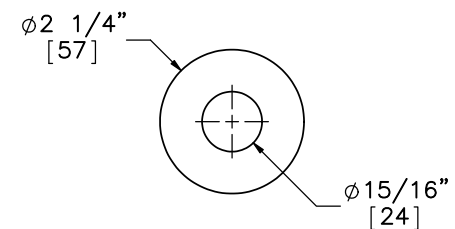
Part g1



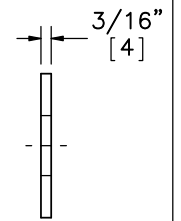
Part f3



Part f4

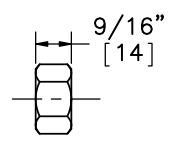
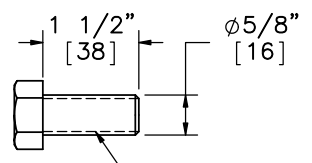


ELEVATION VIEW

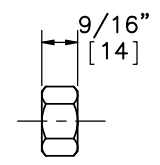
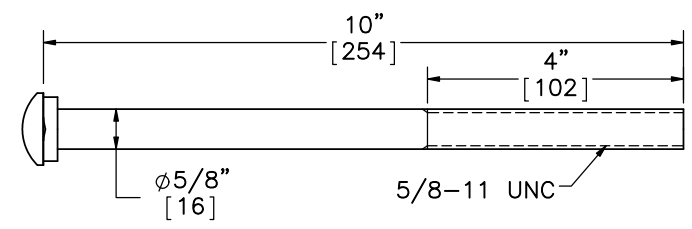


PROFILE VIEW

Part g2



Part f5



Part f6



Midwest Roadside Safety Facility

IL Tollway MGS-Pole
Test 2

Guardrail Hardware Details

DWG. NAME:
Illinois_Pole-MGS_Test_2_R10

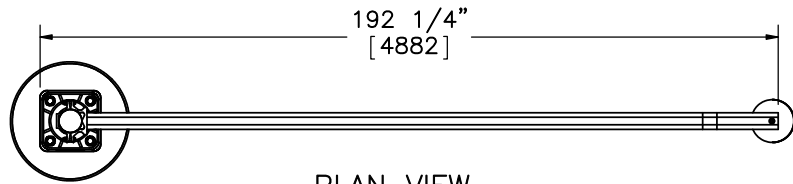
SCALE: 1:3
UNITS: In.[mm]

SHEET:
15 of 28

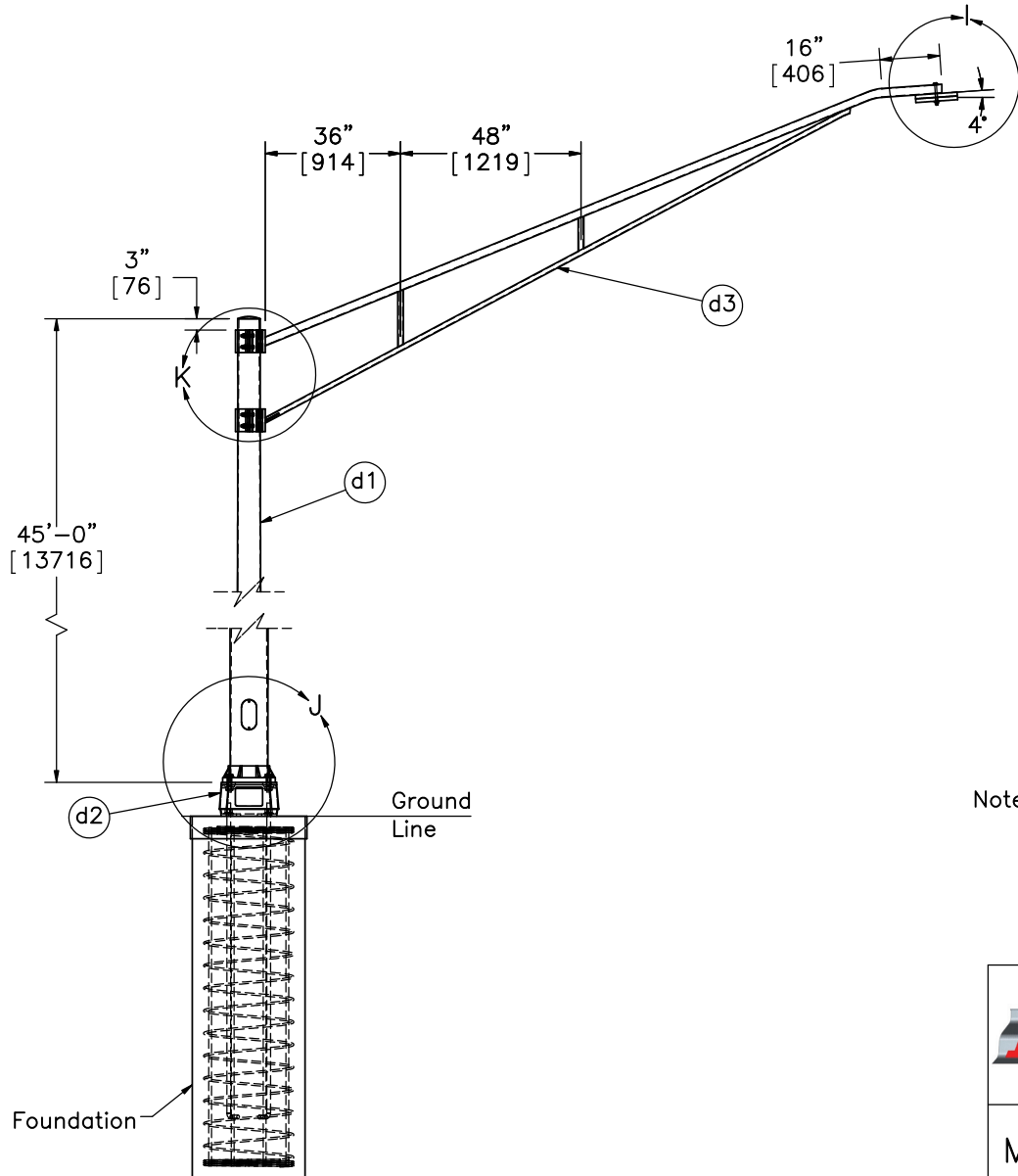
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

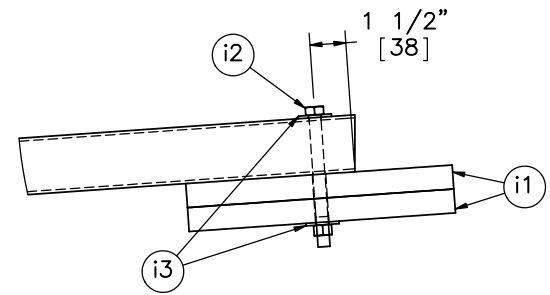
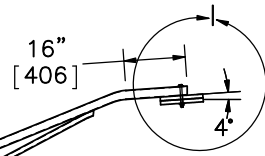
REV. BY:
KAL/RWB/
TJD/MP



PLAN VIEW




ELEVATION VIEW

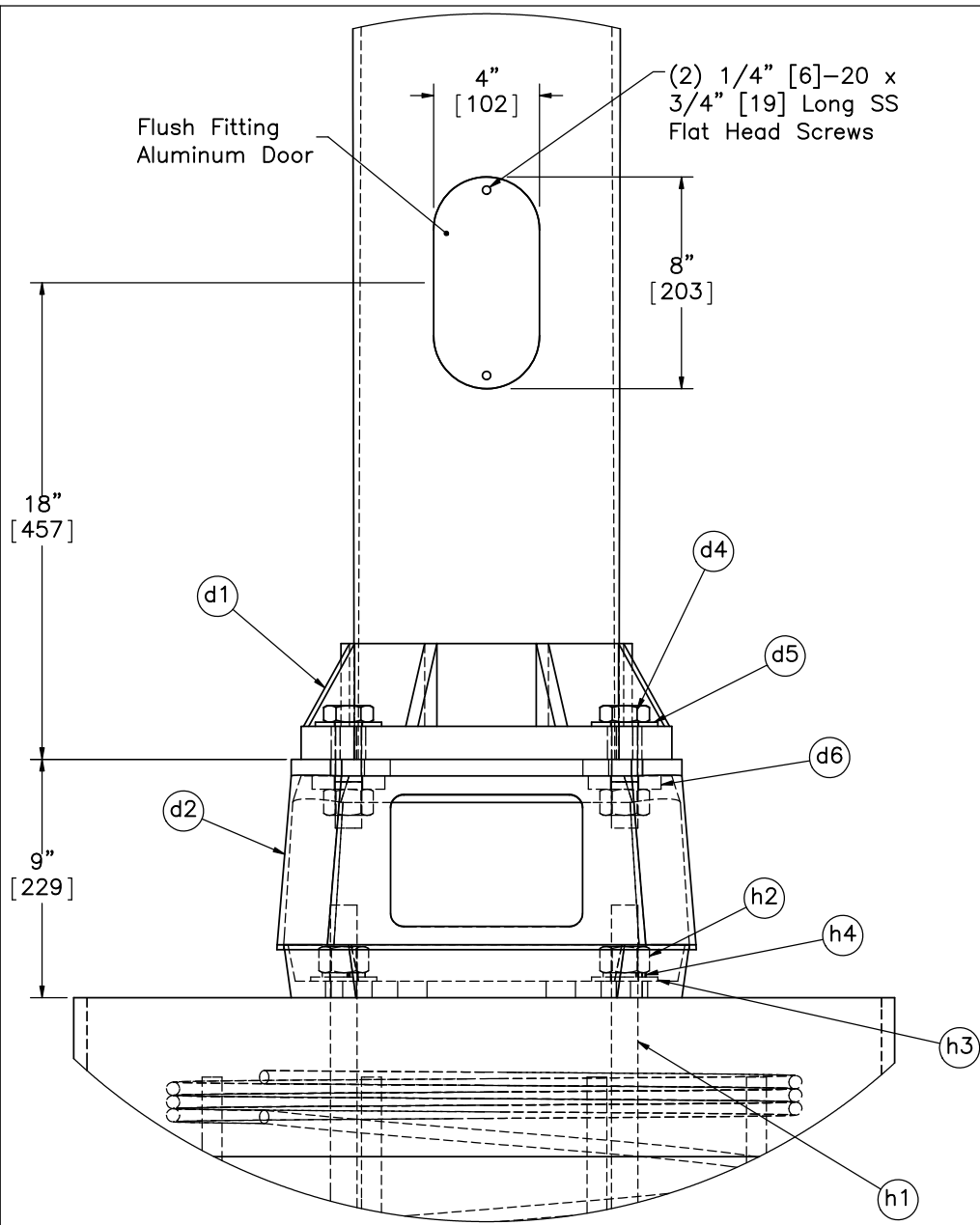


DETAIL I
SCALE 1 : 8

Notes: (1) Pole hand hole is located on the upstream side of the pole.

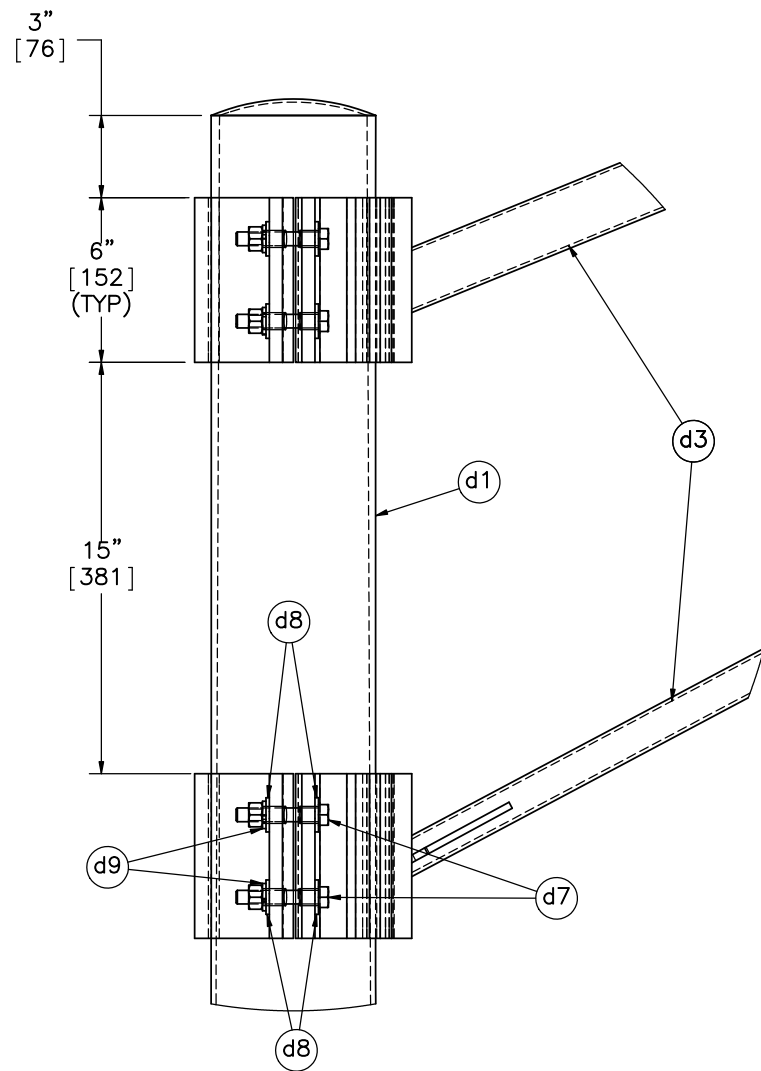
(2) 5/8" [16] dia. through hole in the truss arm for ballast attachment is to be field drilled.

	IL Tollway MGS-Pole Test 2		SHEET: 16 of 28
			DATE: 5/18/2017
Midwest Roadside Safety Facility		Illinois Tollway Pole Details	
		DWG. NAME: Illinois_Pole-MGS_Test_2_R10	SCALE: 1:50 UNITS: In.[mm]
		DRAWN BY: TJD/JEK/ DTM	REV. BY: KAL/RWB/ TJD/MP



DETAIL J

Note: (1) Pole Base (Part d2) connects to the foundation's four anchor bolts (Part h1) using hex nuts (Part h2), flat washers (Part h3), and lock washers (Part h4).

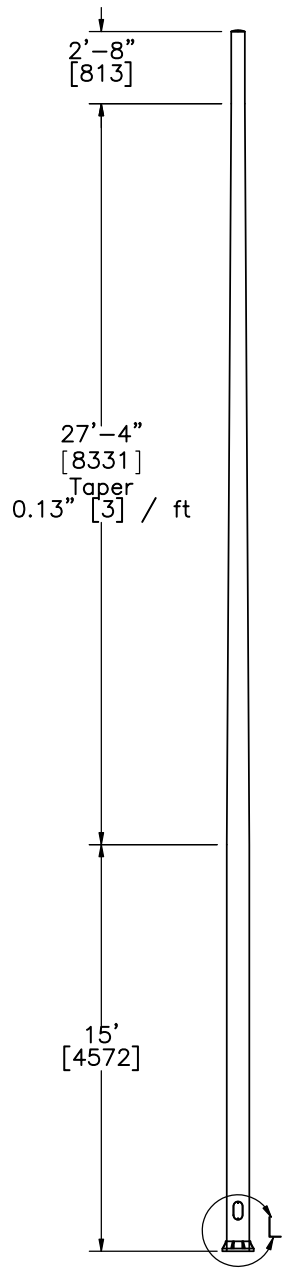


DETAIL K

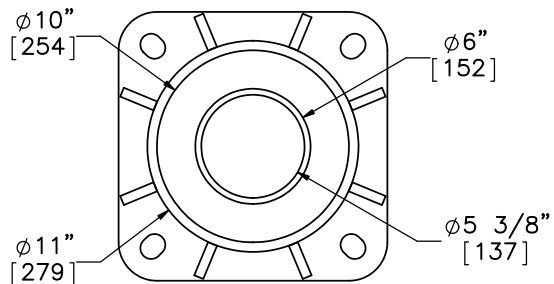
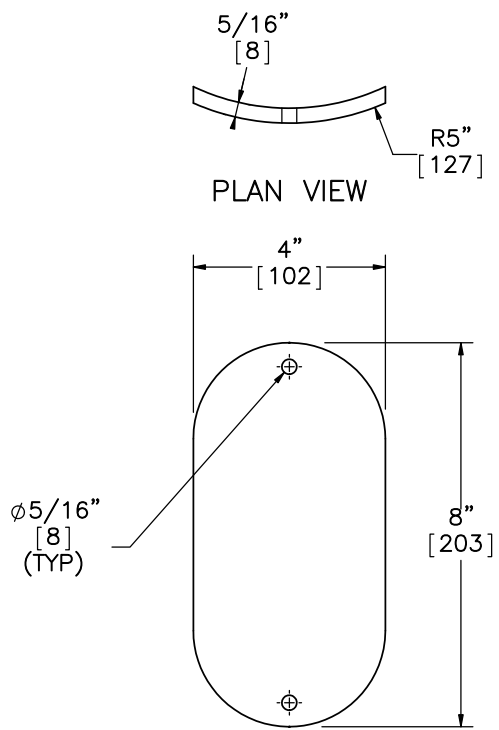


Midwest Roadside Safety Facility

IL Tollway MGS-Pole Test 2	SHEET: 17 of 28
	DATE: 5/18/2017
Pole Base and Truss Connection Detail	DRAWN BY: TJD/JEK/ DTM
DWG. NAME: Illinois_Pole-MGS_Test_2_R10	REV. BY: KAL/RWB/ TJD/MP
SCALE: 1:7 UNITS: In.[mm]	

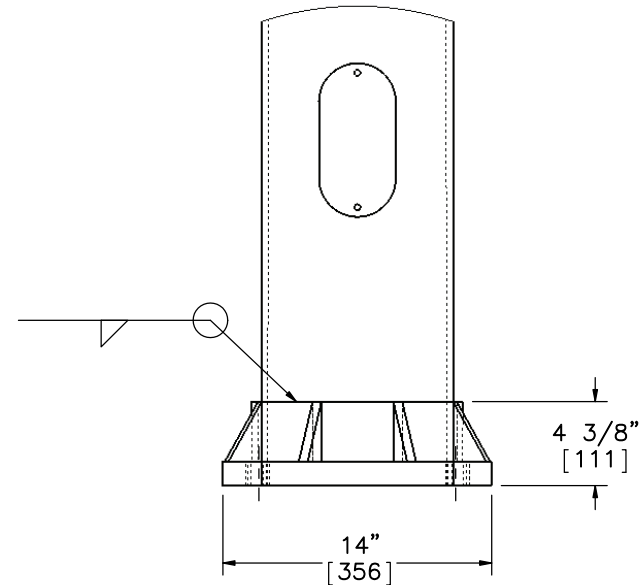


ELEVATION VIEW
SCALE 1:85



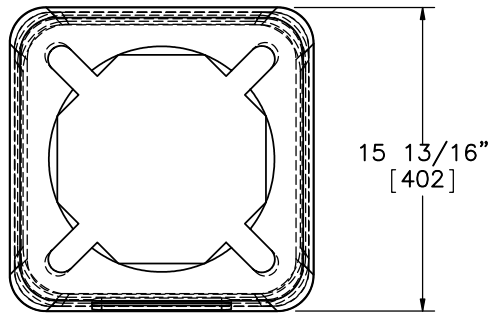
PLAN VIEW

Part d1

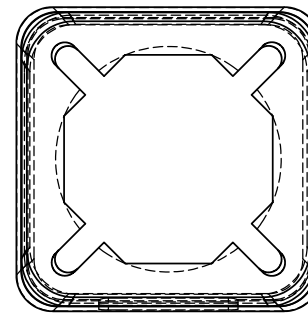


DETAIL L

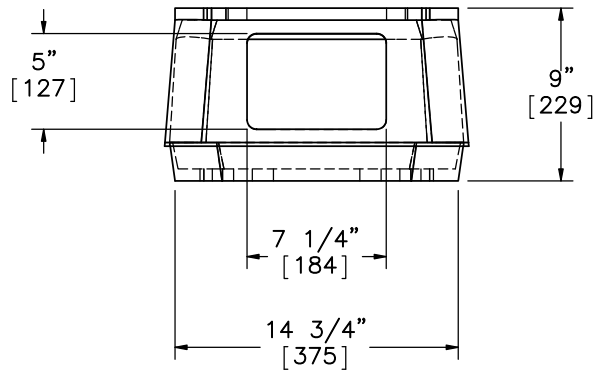
Midwest Roadside Safety Facility	IL Tollway MGS-Pole Test 2	SHEET: 18 of 28
	Pole Detail	DATE: 5/18/2017
DWG. NAME: Illinois_Pole-MGS_Test_2_R10	SCALE: 1:10 UNITS: In.[mm]	DRAWN BY: TJD/JEK/ DTM
		REV. BY: KAL/RWB/ TJD/MP



PLAN VIEW




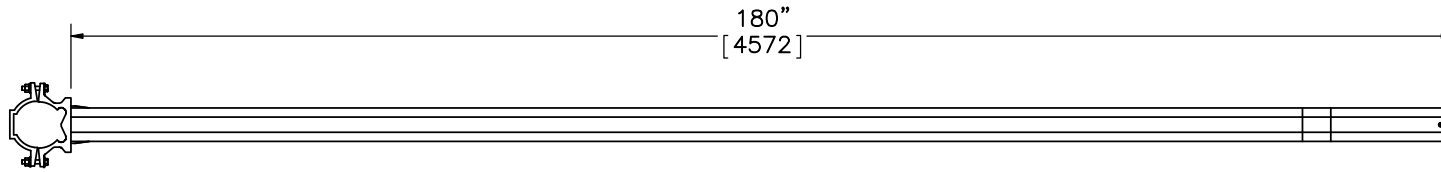
BOTTOM VIEW



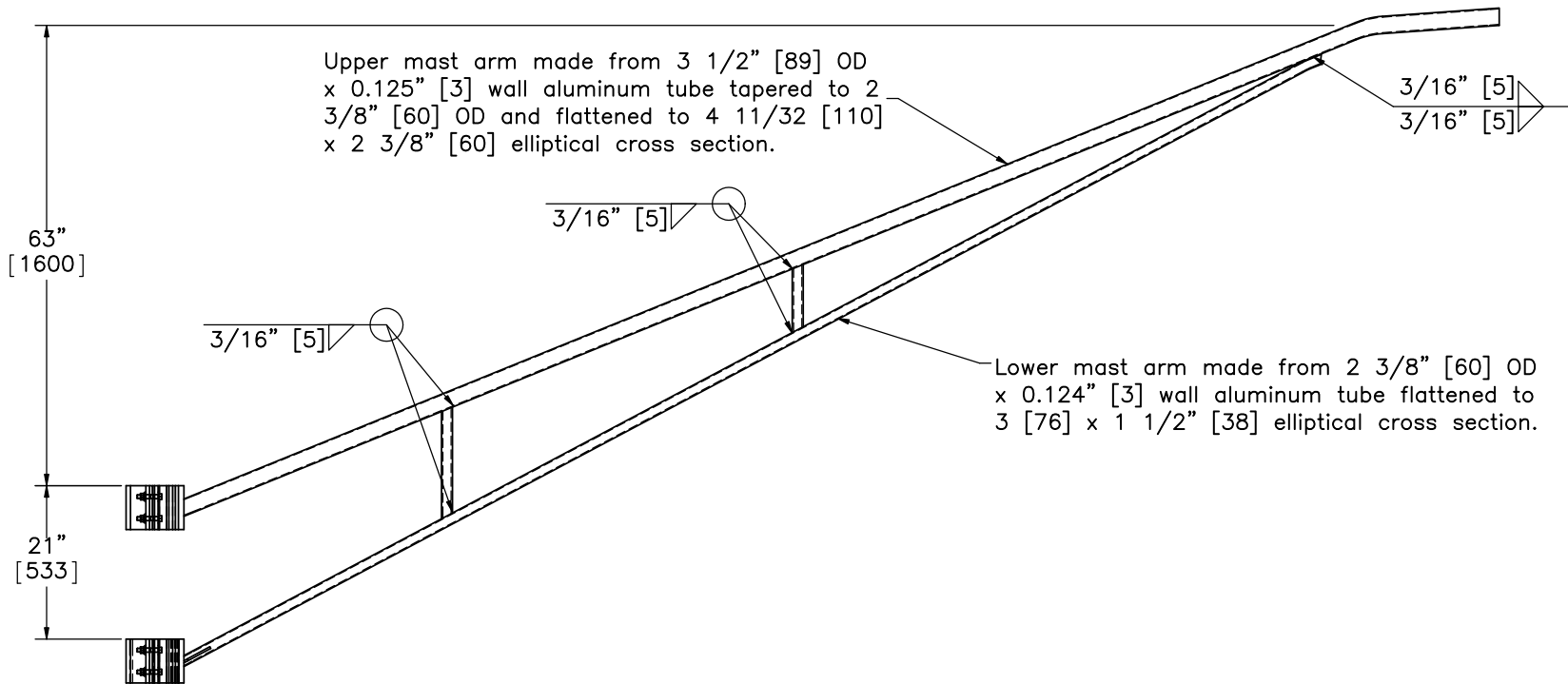
ELEVATION VIEW
Part d2

Note: (1) The pole (Part d1) is attached to the base using hex head bolts and nuts (Part d4) and flat washers (Part d5) and (Part d6) provided with the base assembly (Part d2).

	IL Tollway MGS-Pole Test 2		SHEET: 19 of 28
	Anchor Base Detail		DATE: 5/18/2017
Midwest Roadside Safety Facility	DWG. NAME: Illinois_Pole-MGS_Test_2_R10	SCALE: 1:10 UNITS: In.[mm]	DRAWN BY: TJD/JEK/ DTM REV. BY: KAL/RWB/ TJD/MP




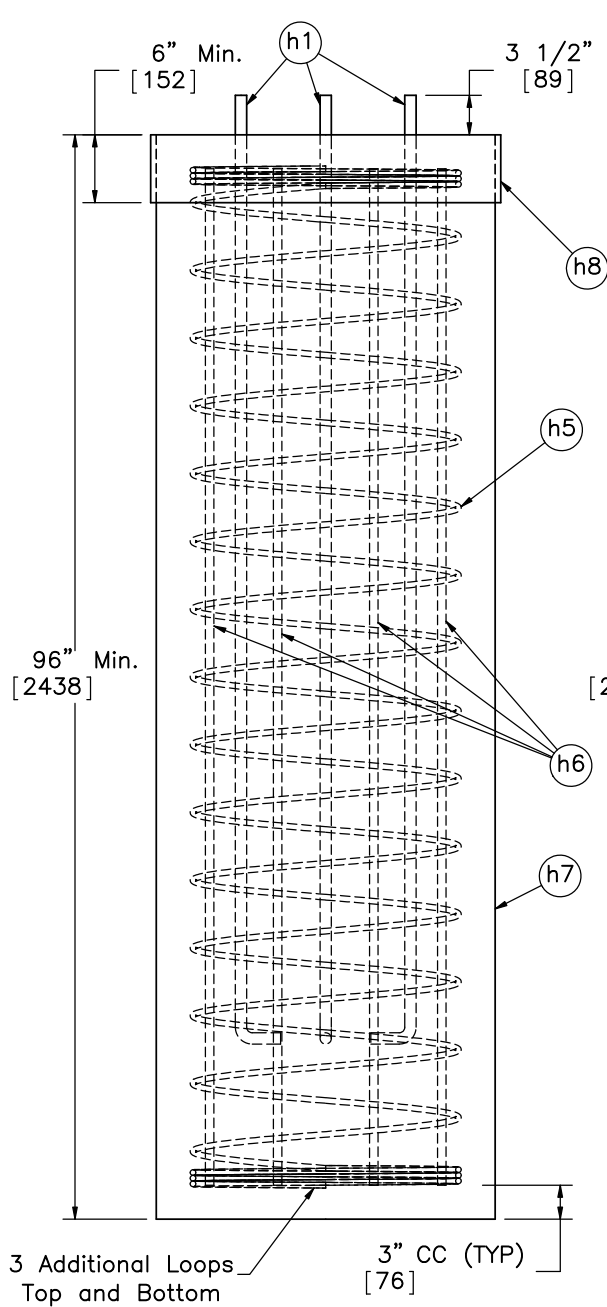
PLAN VIEW



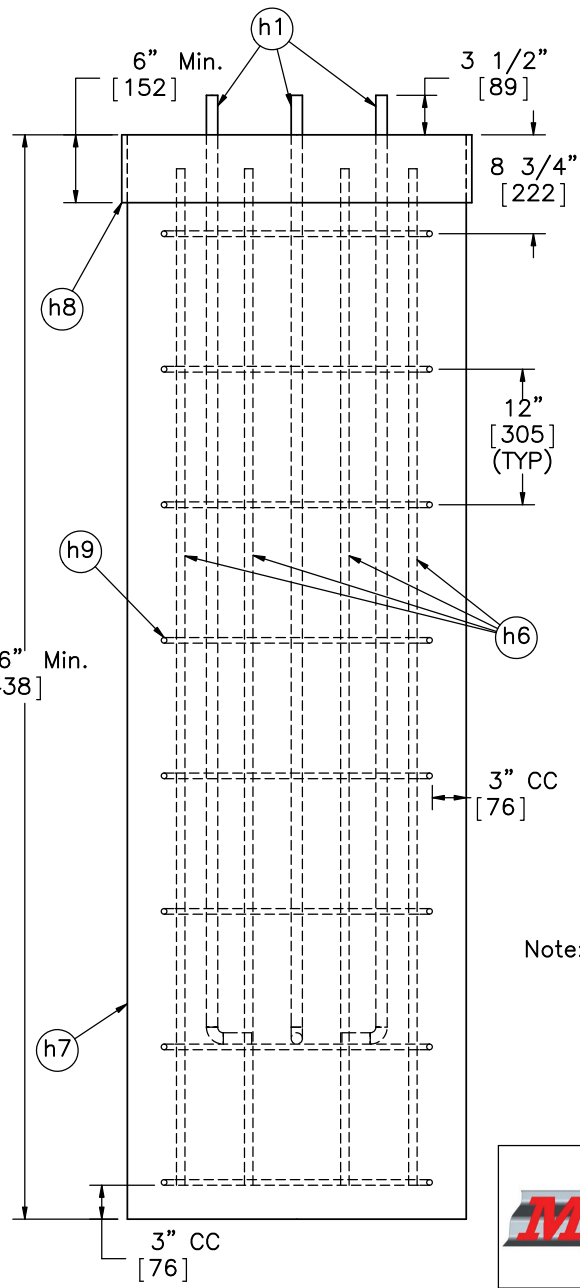
ELEVATION VIEW
Part d3

- Note: (1) Connecting bolts and hex nuts (Part d7), flat washers (Part d8), and lock washers (Part d9) are provided with truss assembly (Part d3).
- (2) 5/8" [16] dia. through hole in the truss arm for ballast attachment is to be field drilled.

 Midwest Roadside Safety Facility	IL Tollway MGS-Pole Test 2	SHEET: 20 of 28
	Truss Detail	DATE: 5/18/2017
DWG. NAME: Illinois_Pole-MGS_Test_2_R10	SCALE: 1:25 UNITS: In.[mm]	DRAWN BY: TJD/JEK/ DTM
		REV. BY: KAL/RWB/ TJD/MP

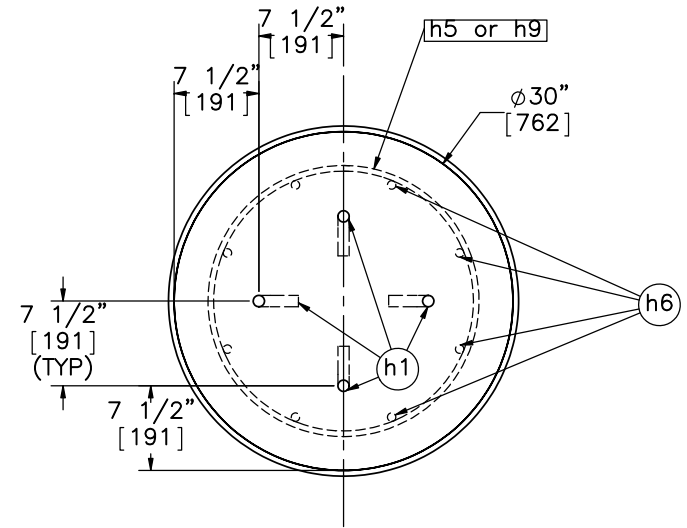


ELEVATION VIEW
Option 1



ELEVATION VIEW
Option 2

FOUNDATION



PLAN VIEW

- Note: (1) Pole Base (Part d2) connects to the foundation's four anchor bolts (Part h1) using hex nuts (Part h2), flat washers (Part h3), and lock washers (Part h4).
 (2) $\phi 30$ " [762] Sonotube (Part h8) at upper part of concrete foundation exposed to grade.
 (3) Option 2 used in testing.



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

Foundation Detail

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

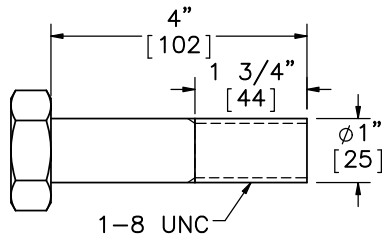
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UNITS: In.[mm]

SHEET:
21 of 28

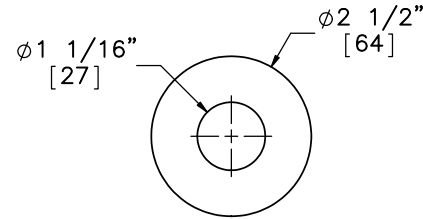
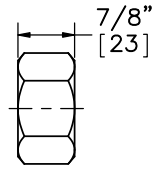
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

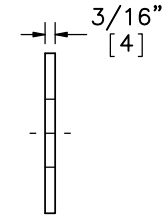
REV. BY:
KAL/RWB/
TJD/MP



Part d4

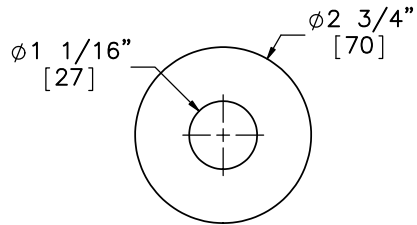


ELEVATION VIEW



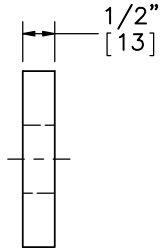
PROFILE VIEW

Part d5

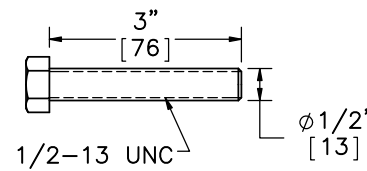


ELEVATION VIEW

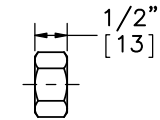
Part d6



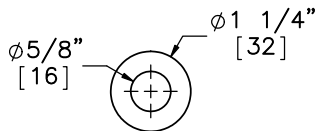
PROFILE VIEW



1/2-13 UNC

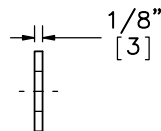


Part d7

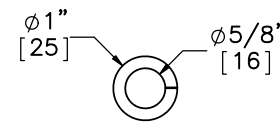


ELEVATION VIEW

Part d8

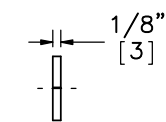


PROFILE VIEW

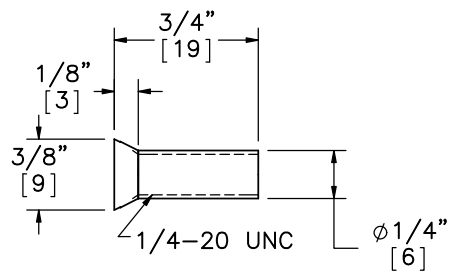


ELEVATION VIEW

Part d9



PROFILE VIEW



Part d10
SCALE 1:1



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

Pole Hardware Details

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

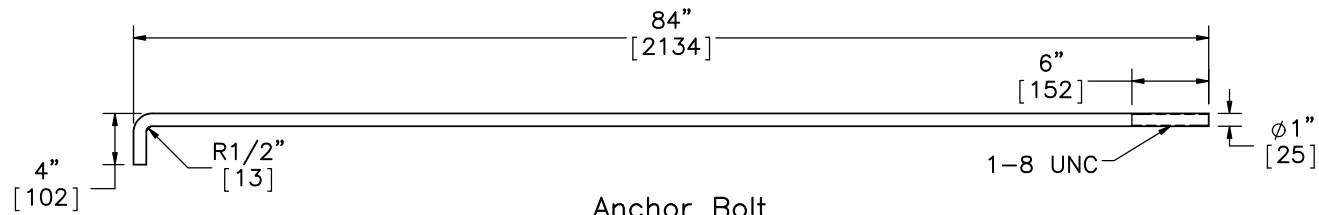
SCALE: 1:3
UNITS: In.[mm]

SHEET:
22 of 28

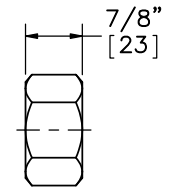
DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

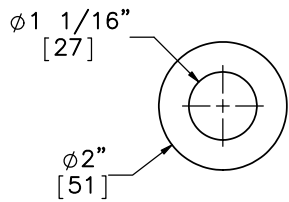
REV. BY:
KAL/RWB/
TJD/MP



Anchor Bolt
Part h1
SCALE 1:15

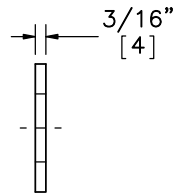


Part h2

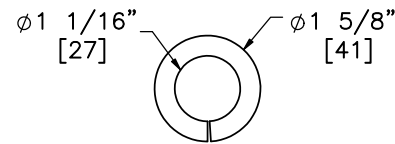


ELEVATION VIEW

Hardened Washer
Part h3

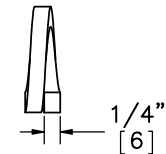


PROFILE VIEW



ELEVATION VIEW

Lock Washer
Part h4



PROFILE VIEW



Midwest Roadside
Safety Facility

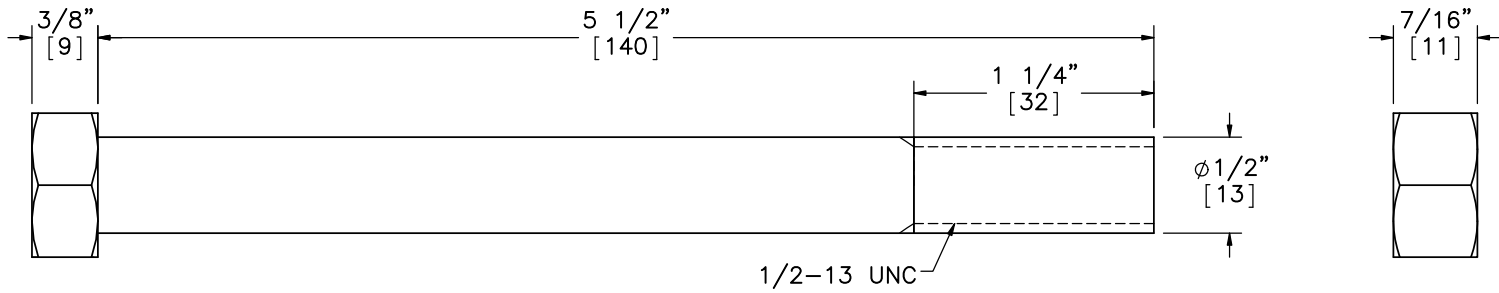
IL Tollway MGS-Pole
Test 2

Foundation Hardware Details

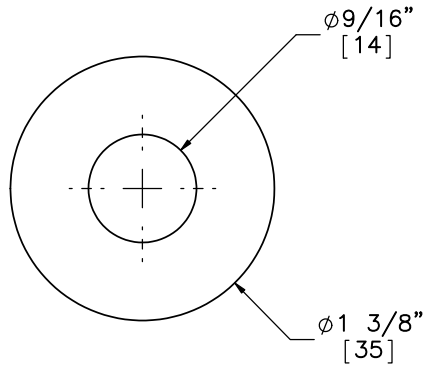
DWG. NAME:
Illinois_Pole-MGS_Test_2_R10

SCALE: 1:3
UNITS: In.[mm]

SHEET:
23 of 28
DATE:
5/18/2017
DRAWN BY:
TJD/JEK/
DTM
REV. BY:
KAL/RWB/
TJD/MP

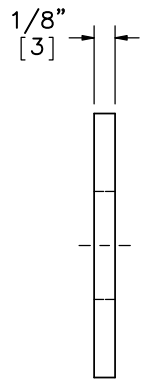


Part i2

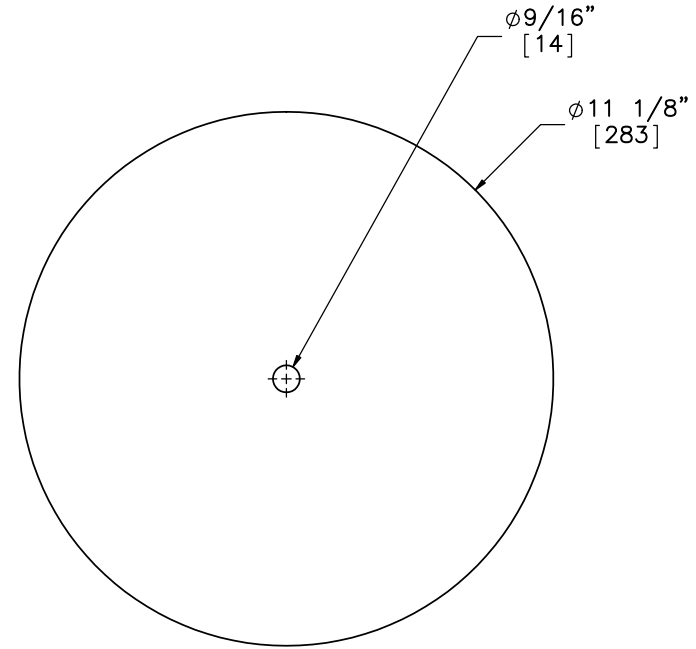


ELEVATION VIEW

Part **i3

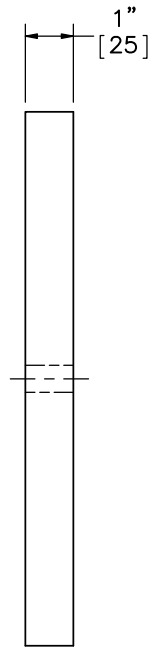


PROFILE VIEW



ELEVATION VIEW

Part i1
SCALE 1:4



PROFILE VIEW



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

Ballast Plate and Attachment
Hardware

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

SCALE: 1:1
UNITS: In.[mm]

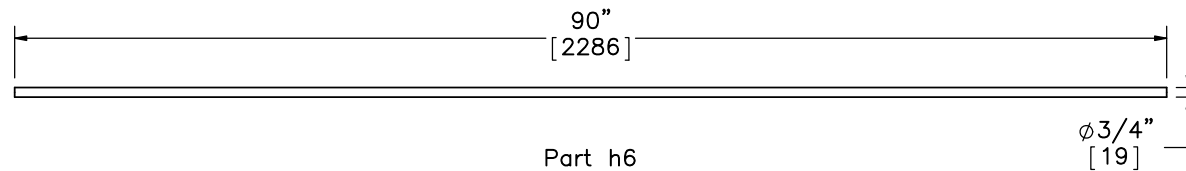
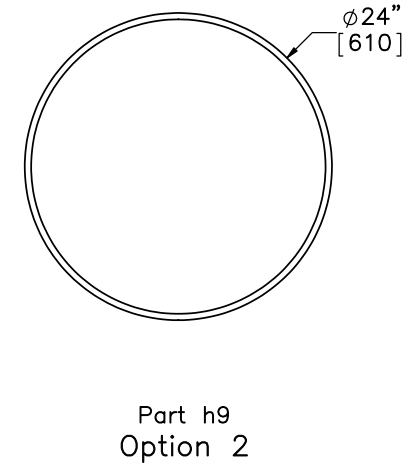
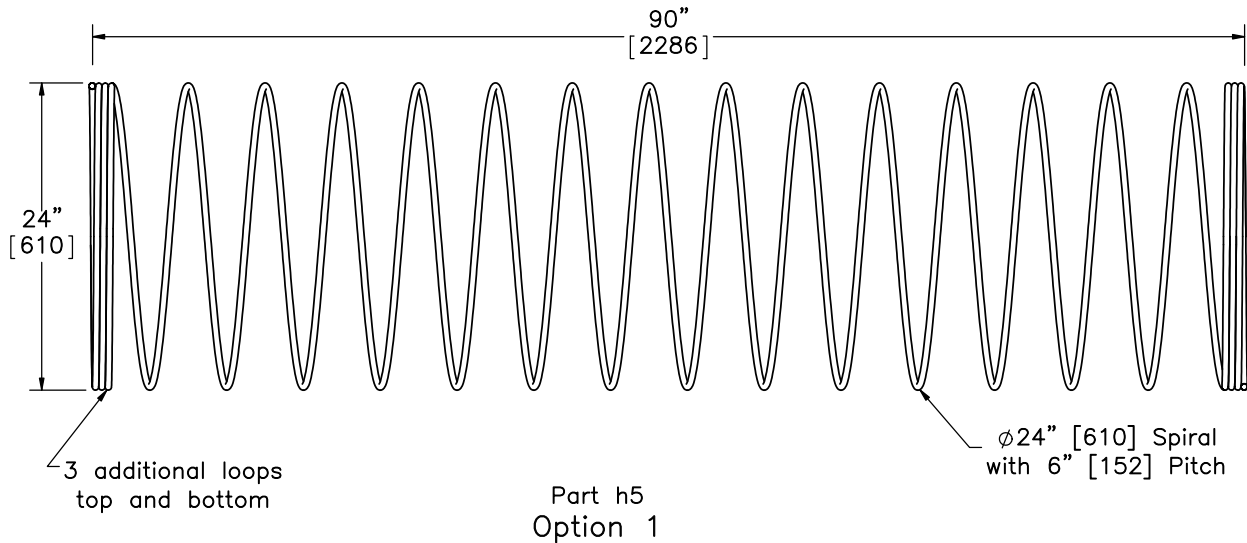
SHEET:
24 of 28

DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

REV. BY:
KAL/RWB/
TJD/MP

BILL OF BARS				
ITEM NO.	QTY.	BAR SIZE	UNBENT LENGTH	MATERIAL SPEC.
h5 Option 1	1	#4 [13]	1517" [38532]	Epoxy-Coated ASTM A615 Gr. 60
h9 Option 2	8	#4 [13]	74" [1880]	Epoxy-Coated ASTM A615 Gr. 60
h6	8	#6 [19]	90" [2286]	Epoxy-Coated ASTM A615 Gr. 60



Midwest Roadside Safety Facility

IL Tollway MGS-Pole Test 2

Bill of Bars

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

SCALE: 1:15
UNITS: In.[mm]

SHEET:
25 of 28
DATE:
5/18/2017
DRAWN BY:
TJD/JEK/
DTM
REV. BY:
KAL/RWB/
TJD/MP

Item No.	QTY.	Description	MaterialSpec	As-Tested	Modification	Hardware Guide
a1	12	12'-6" [3810] W-Beam MGS Section	12 gauge [2.7] AASHTO M180 Galv. (ASTM A653)	-		RWM04a
a2	2	12'-6" [3810] W-Beam MGS End Section	12 gauge [2.7] AASHTO M180 Galv. (ASTM A653)	-		RWM14a
a3	1	6'-3" [1905] W-Beam MGS Section	12 gauge [2.7] AASHTO M180 Galv. (ASTM A653)	-		RWM04a
a4	25	W6x8.5 [W152x12.6] or W6x9 [W152x13.4], 72" Long [1829] Steel Post	ASTM A992 or ASTM A36 Min. 50 ksi [345 MPa] Steel Galv. Per AASHTO M111 (ASTM A123)	-		PWE06
a5	25	6"x12"x14 1/4" [152x305x368] Timber Blockout for Steel Posts	SYP Grade No.1 or better	-		PDB10a
a6	25	16D Double Head Nail	-	-		-
b1	4	BCT Timber Post - MGS Height	SYP Grade No. 1 or better (No knots 18" [457] above or below ground tension face)	-		PDF01
b2	4	72" [1829] Long Foundation Tube	ASTM A500 Grade B Galv. Per AASHTO M11 (ASTM A123)	-		PTE06
b3	2	Ground Strut Assembly	ASTM A36 Steel Galv. Per AASHTO M111 (ASTM A123)	A-1011-SS, Yield Strength 48,380 psi, Tensile Strength 64,020 psi		PFP02
b4	2	2 3/8" [60] O.D. x 6" [152] Long BCT Post Sleeve	ASTM A53 Grade B Schedule 40 Galv. Per AASHTO M111 (ASTM A123)	-		FMM02
b5	2	8"x8"x5/8" [203x203x16] Anchor Bearing Plate	ASTM A36 Steel Galv. Per AASHTO M111 (ASTM A123)	-		FPB01
b6	2	Anchor Bracket Assembly	ASTM A36 Steel Galv. Per AASHTO M111 (ASTM A123)	-		FPA01
c1	4	BCT Anchor Cable End Swaged Fitting	Grade 5 - Galv. Fitting Per AASHTO M232 (ASTM A153), Stud Per AASHTO M232 or M298 (ASTM A153 or B695)	-		-
c2	2	3/4" [190] Dia. 6x19, 24 1/2" [622] Long IWRC IPS Wire Rope	IPS Galv. Per AASHTO M30 (ASTM A741) Type II Class A	-		-
c3	4	115-HT Mechanical Splice - 3/4" [19] Dia.	As Supplied	-		-
c4	4	Crosby Heavy Duty HT - 3/4" [19] Dia. Cable Thimble	Stock No. 1037773 - Galv. - As Supplied	-		-
c5	4	Crosby G2130 or S2130 Bolt Type Shackle - 1 1/4" [32] Dia. with thin head bolt, nut, and cotter pin, Grade A, Class 3	Stock Nos. 1019597 and 1019604 - As Supplied	-		-
c6	4	Chicago Hardware Drop Forged Heavy Duty Eye Nut - Drilled and Tapped 1 1/2" [38] Dia. - UNC 6 [M36x4]	Stock No. 107 - As Supplied	-		-
c7	2	TLL-50K-PTB Load Cell	-	-		-
d1	1	45' [13716] Long Aluminum Pole, Pay Item No. 903A10, JS830003	6063-T4 Aluminum Alloy			-
d2	1	CS-370 Anchor Base, Model No. 10R145153B9T	6063 Aluminum Alloy			-
d3	1	Truss, Model No. 1TA1566C60ZA	6063-T6 Aluminum Alloy			-



Midwest Roadside
Safety Facility

IL Tollway MGS-Pole
Test 2

Bill of Materials

DWG. NAME.
Illinois_Pole-MGS_Test_2_R10

SCALE: None
UNITS: In./mm

SHEET:
26 of 28

DATE:
5/18/2017

DRAWN BY:
TJD/JEK/
DTM

REV. BY:
KAL/RWB/
TJD/MP

Item No.	QTY.	Description	Material Specification	As-Tested	Modification	Hardware Guide
d4	4	1" [25] Dia. UNC, 4" [102] Long Hex Head Bolt	Bolt – ASTM A449 or SAE J429 Grade 5 Galv. Per ASTM A153, Nut – ASTM A563DH Galv. Per ASTM A153	–	–	–
d5	8	1" [25] Dia. Hardened Flat Washer	ASTM A153 Galv. Low Carbon Steel	–	–	–
d6	4	1" [25] Dia. 1/2" [13] Thick Flat Washer	Q235 Steel, Galv. Per ASTM A123, Coating Grade 50	–	–	–
d7	8	1/2" [13] Dia. UNC x 3" [76] Long Hex Head Bolt and Nut	Bolt – 304 Stainless Steel or ASTM F593, Nut – ASTM F594 Stainless Steel	–	–	–
d8	16	1/2" [13] Dia. Flat Washer	18–8 Stainless Steel	–	–	–
d9	8	1/2" [13] Dia. Split Lock Washer	18–8 Stainless Steel	–	–	–
d10	2	1/4" [6] Dia. x 3/4" [19] Flat Head Screw	18–8 Stainless Steel	–	–	–
f1	25	5/8" [16] Dia. UNC x 14" [356] Long Guardrail Bolt and Nut	Bolt ASTM A307 Galv., Nut ASTM A563A Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FBB06
f2	114	5/8" [16] Dia. UNC x 1 1/2" [38] Long Guardrail Bolt and Nut	Bolt ASTM A307 Galv., Nut ASTM A563A Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FBB01
f3	4	7/8" Dia. [22] UNC x 7 1/2" [191] Long Hex Head Bolt and Nut	Bolt ASTM A307 Galv., Nut ASTM A563A Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FBX22a
f4	4	5/8" [16] Dia. UNC x 10" [254] Long Hex Head Bolt and Nut	Bolt ASTM A307 Galv., Nut ASTM A563A Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FBX16a
f5	16	5/8" [16] Dia. x 1 1/2" [38] Long Hex Head Bolt and Nut	Bolt ASTM A307 Galv., Nut ASTM A563A Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FBX16a
f6	4	5/8" [16] Dia. UNC x 10" [254] Long Guardrail Bolt and Nut	Bolt ASTM A307 Galv., Nut ASTM A563A Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FBB03
g1	44	5/8" [16] Dia. Plain Round Washer	ASTM F844 Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FWC16a
g2	8	7/8" [22] Dia. Plain Round Washer	ASTM F844 Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FWC22a
h1	4	1" [25] Dia., 84" [2134] Long Anchor Bolt	ASTM F1554 Grade 105 or A449 Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	–
h2	4	1" [25] Dia. UNC Hex Nut	ASTM A563DH or A194 Gr. 2H Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	–	–	FNX24b




Midwest Roadside Safety Facility

IL Tollway MGS–Pole Test 2	SHEET: 27 of 28
	DATE: 5/18/2017
Bill of Materials	DRAWN BY: TJD/JEK/ DTM
	REV. BY: KAL/RWB/ TJD/MP
DWG. NAME: Illinois_Pole–MGS_Test_2_R10	SCALE: None UNITS: In.[mm]

Item No.	QTY.	Description	Material Specification	As-Tested Modification	Hardware Guide
h3	4	1" [25] Dia. Hardened Round Washer	ASTM F436 Galv. Per ASTM B695	—	FWC24b
h4	4	1" [25] Dia. Split Lock Washer	Steel Galv. Per AASHTO M232 (ASTM A153) for Class C or Per AASHTO M298 (ASTM B695) for Class 50	—	—
*h5	1	1/2" [13] Dia. Bent Rebar, unbent 1517" [38532] Long	Epoxy-Coated ASTM A615 Gr. 60	—	—
h6	8	3/4" [19] Dia., 90" [2286] Long Rebar	Epoxy-Coated ASTM A615 Gr. 60	—	—
h7	1	Light Pole Concrete Foundation	Min. f'c = 3,500 psi [24.1 MPa]	—	—
h8	1	30" [762] Dia. x 6" [152] Sonotube	Sonotube	—	—
*h9	8	1/2" [13] Dia., Bent Rebar, unbent 74" [1880] Long	Epoxy-Coated ASMT A615 Gr. 60	—	—
i1	2	11 1/8" [283] Dia. x 1" [25] Thick Ballast Plate	ASTM A36	—	—
i2	1	1/2" [13] Dia. UNC, 5 1/2" [140] Long Hex Head Bolt	Bolt – ASTM A325 Type 1, Nut – ASTM A563C	—	FBX12b
**i3	2	1/2" [13] Dia. Plain Round Washer	ASTM F844	—	FWC12a

* Either Part h5 or Part h9 is used.

** Per researcher recommendation, use ASTM F844 washer instead of ASTM F436 to attach ballast.

	IL Tollway MGS-Pole Test 2	SHEET: 28 of 28
		DATE: 5/18/2017
Midwest Roadside Safety Facility	Bill of Materials	DRAWN BY: TJD/JEK/ DTM
	DWG. NAME: Illinois_Pole-MGS_Test_2_R10	SCALE: None UNITS: In.[mm]
		REV. BY: KAL/RWB/ TJD/MP

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	6/30/2016	-	Drawing created from Illinois_Pole-MGS_R13	-	TJD
1	6/30/2016	1	Note edits.	KAL	TJD
		8	Added new holes to bct timber post.		
2	7/18/2016	-	Ballast plates and attachment hardware added. Post cap and hand hole cover added. All Detail and Section View Lettering.	RWB	JEK
		1	Detail A added.		
		2	Detail A added. Note added. General movement.		
		16	Detail I added. Note added. General movement.		
		23	Part h3 name change.		
		25	Description edit: a4, d5, d6. Material spec edit: a1-4, b2-6, e1, e4, d4-6.		
26	New parts: i1-3. Description edit: h3. Material spec edit: d7-9, f1-6, g1-2, h1-3.				
3	7/19/2016	-	New page: 24.	TJD	JEK
		17	Plate and screws noted.		
		18	Plate details added. General movement.		
		22	Part d10 added.		
		23	Part h3 OD edit.		
		24	New. Ballast and ballast attachment hardware.		
		26	Material spec edit: a5, d4.		
27	New part: d10. Description edit: i1. Material spec edit: d7, f1-6, h1-3, i2. HWG edit: h2-3, i2-3.				
4	7/20/2016	-	Font size edits.	TJD	JEK
		5	Post numbering corrected.		
		16	Note added.		
		17	Part b4 corrected to d4.		
		19	Note edit.		
		24	Part i2 thread corrected. Part i1 inner diameter change. Text edit.		
		26	Material spec edit: d4.		
27	Material spec edit: h2, i2. HWG edit: i2. Note added.				
5	7/21/2016	-	BOM spill onto a third page. (New page)	RWB	JEK
		2	Note added.		
		16	Note 2 edit.		

5	7/21/2016	18	Aluminum door hole size edit.	RWB	JEK
		19	Note edit.		
		20	Note added.		
		24	Text edit.		
		26	Description edit: d4. Material edit: c2.		
		27	Material edit: h3.		
		28	Note edit.		
6	7/22/2016	27	Material edit: h4.	TJD/KAL	JEK
		28	Material edit: i1.		
7	8/2/2016	-	Created from Illinois_Pole-MGS_R21.	KAL	JEK
8	9/27/2016	1	Changed notes 1 and 2 to match notes from rev. 6.	KAL	TJD
		5	Moved dimension at top of page to not overlap border.		
		26	Added part a5 to bill of materials.		
9	3/13/2017	2	Note 2 edit.	MP	JEK
		17	Note 1 edit.		
		21	Note 1 edit.		
10	5/18/2017	25	Corrected spelling in material spec table.	JEK	DTM