
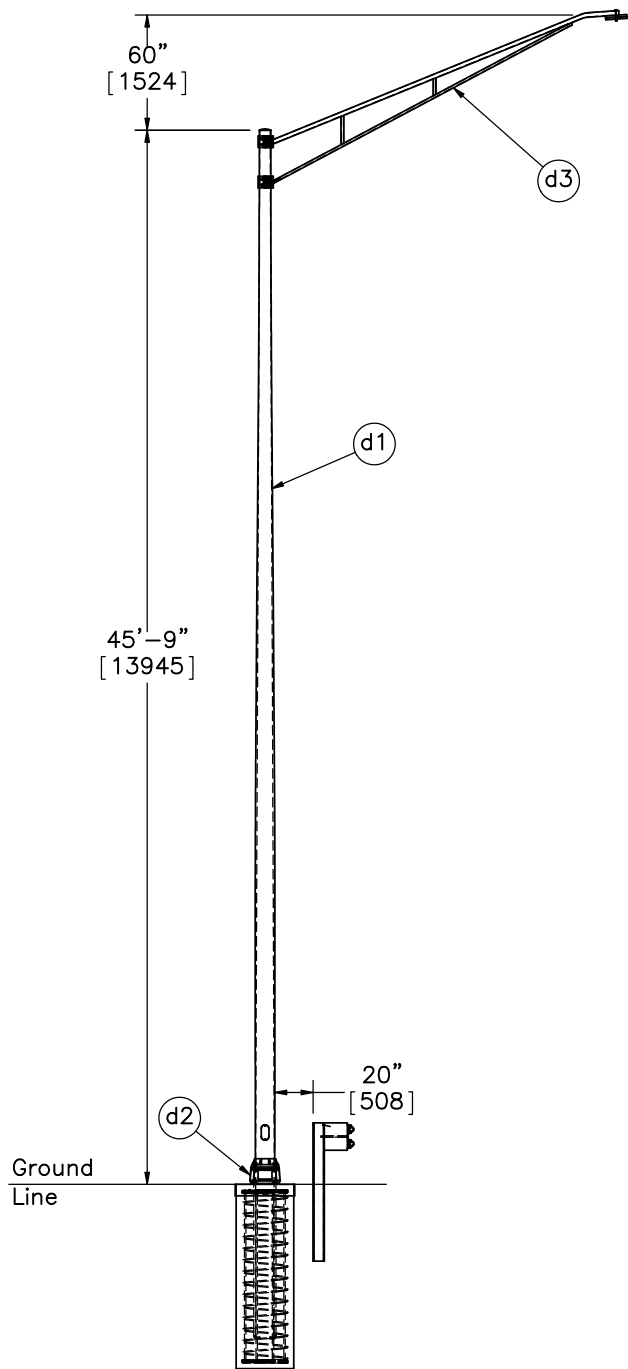
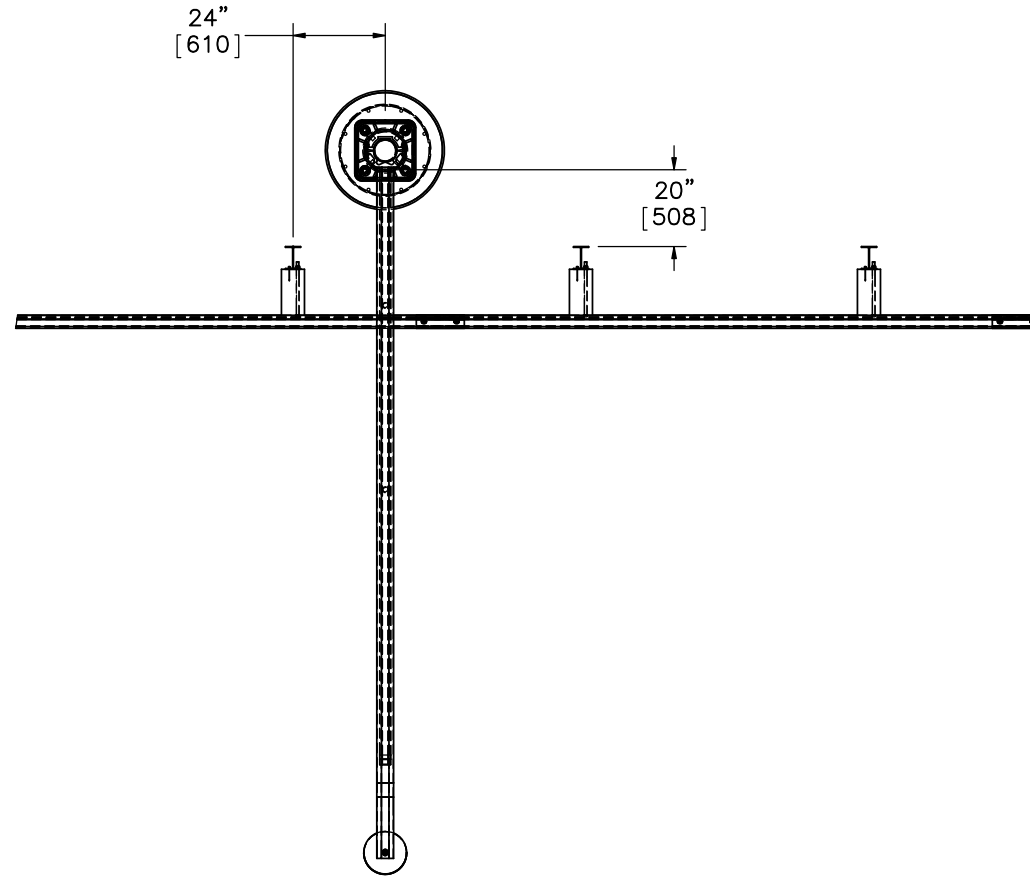


- Notes: (1) Test shall be performed according to test designation no. 3–11 of MASH criteria.  
 (2) The impact location is 4" [102] downstream of the centerline of post no. 11.  
 (3) BCT anchors are placed in  $\phi 3'$  [914] holes.  
 (4) Critical region is between post nos. 9 and 18.  
 (5) Load cells are to be used on both end anchors.

 <b>Midwest Roadside Safety Facility</b>	IL Tollway MGS–Pole  System Layout	SHEET: 1 of 28
	DWG. NAME: Illinois_Pole–MGS_R23	SCALE: 1:220 UNITS: In.[mm]
		DRAWN BY: TJD/JEK/DTM
		REV. BY: KAL/RWB/MP/TJD




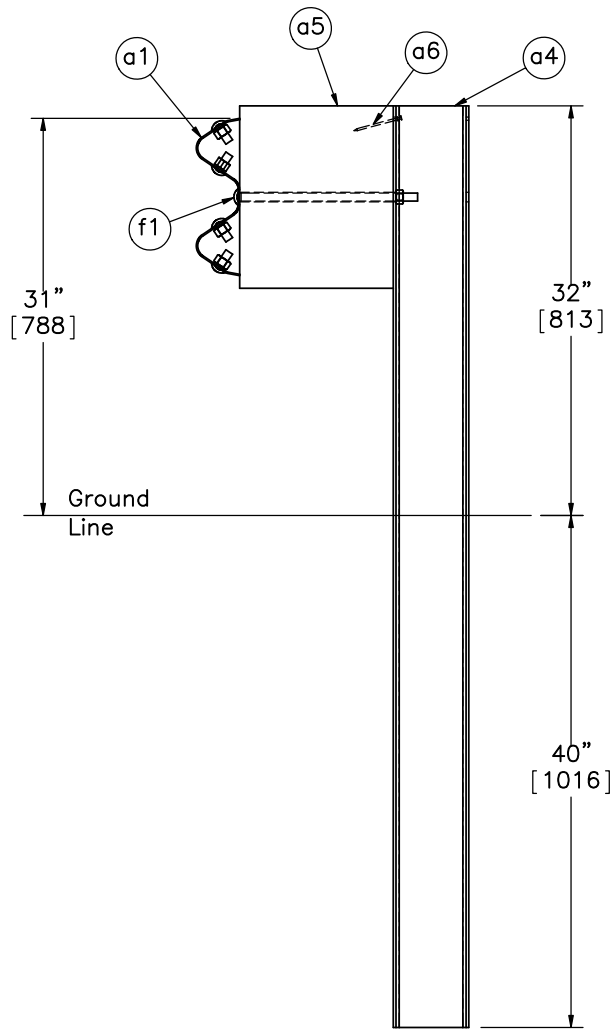
PROFILE VIEW




DETAIL A  
SCALE 1 : 50

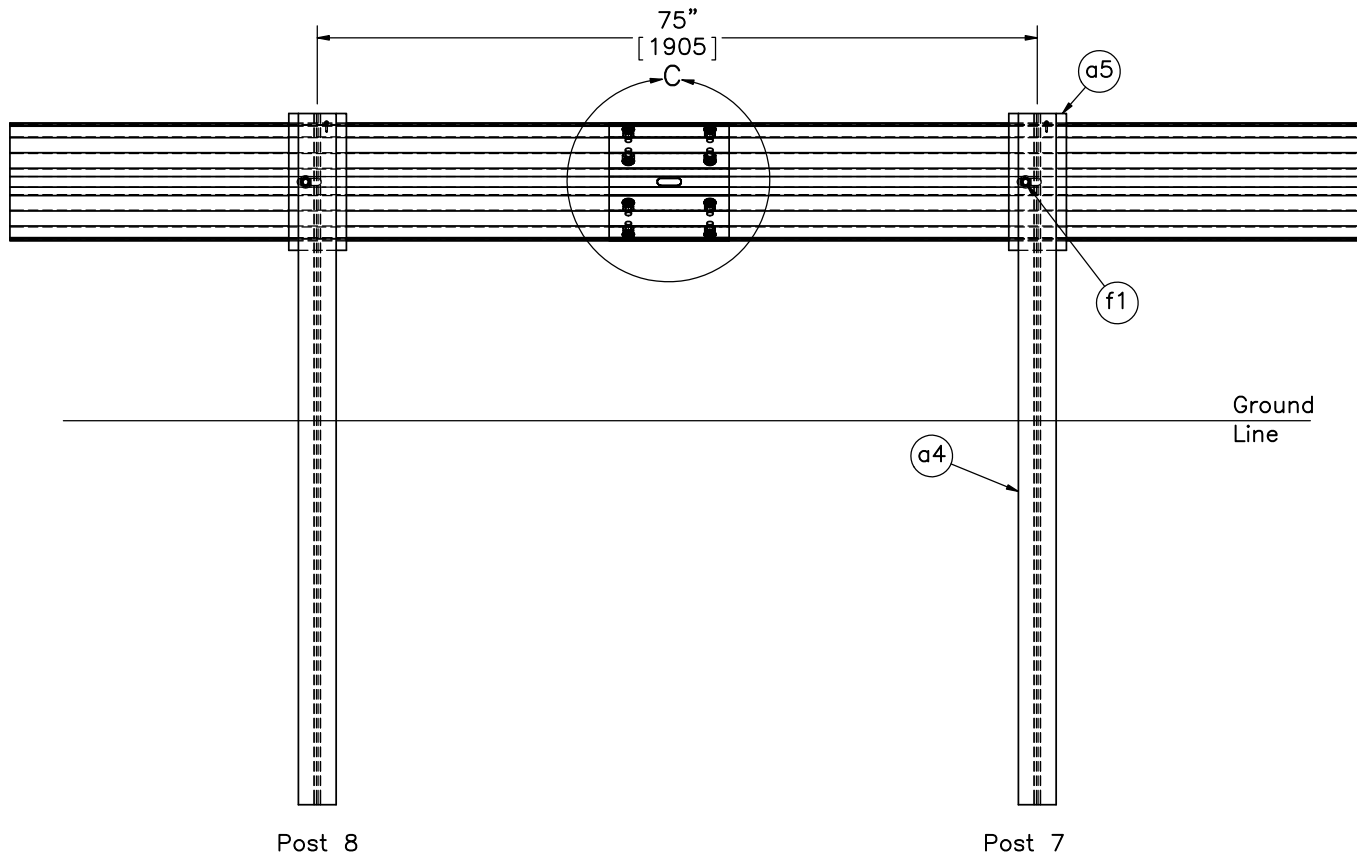
- Notes: (1) Pole hand hole is located on the upstream side of the pole.
- (2) Breakaway base is mounted with a flat face perpendicular to the guardrail, and the adjacent face parallel to the guardrail, as shown.

	IL Tollway MGS-Pole	SHEET: 2 of 28
		DATE: 5/18/2017
Midwest Roadside Safety Facility	Illinois Tollway Pole Details	DRAWN BY: TJD/JEK/ DTM
	DWG. NAME: Illinois_Pole-MGS_R23	SCALE: 1:100 UNITS: In.[mm]



SECTION B-B

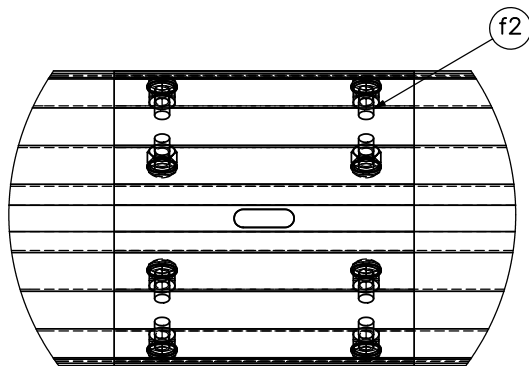
	IL Tollway MGS-Pole		SHEET: 3 of 28
	Post Detail DWG. NAME: Illinois_Pole-MGS_R23		DATE: 5/18/2017
Midwest Roadside Safety Facility			DRAWN BY: TJD/JEK/ DTM
		SCALE: 1:15 UNITS: In.[mm]	REV. BY: KAL/RWB/ MP/TJD



Post 8

Post 7

SPLICE DETAIL  
BACKSIDE



DETAIL C  
SCALE 1 : 8



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

Splice and Post Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

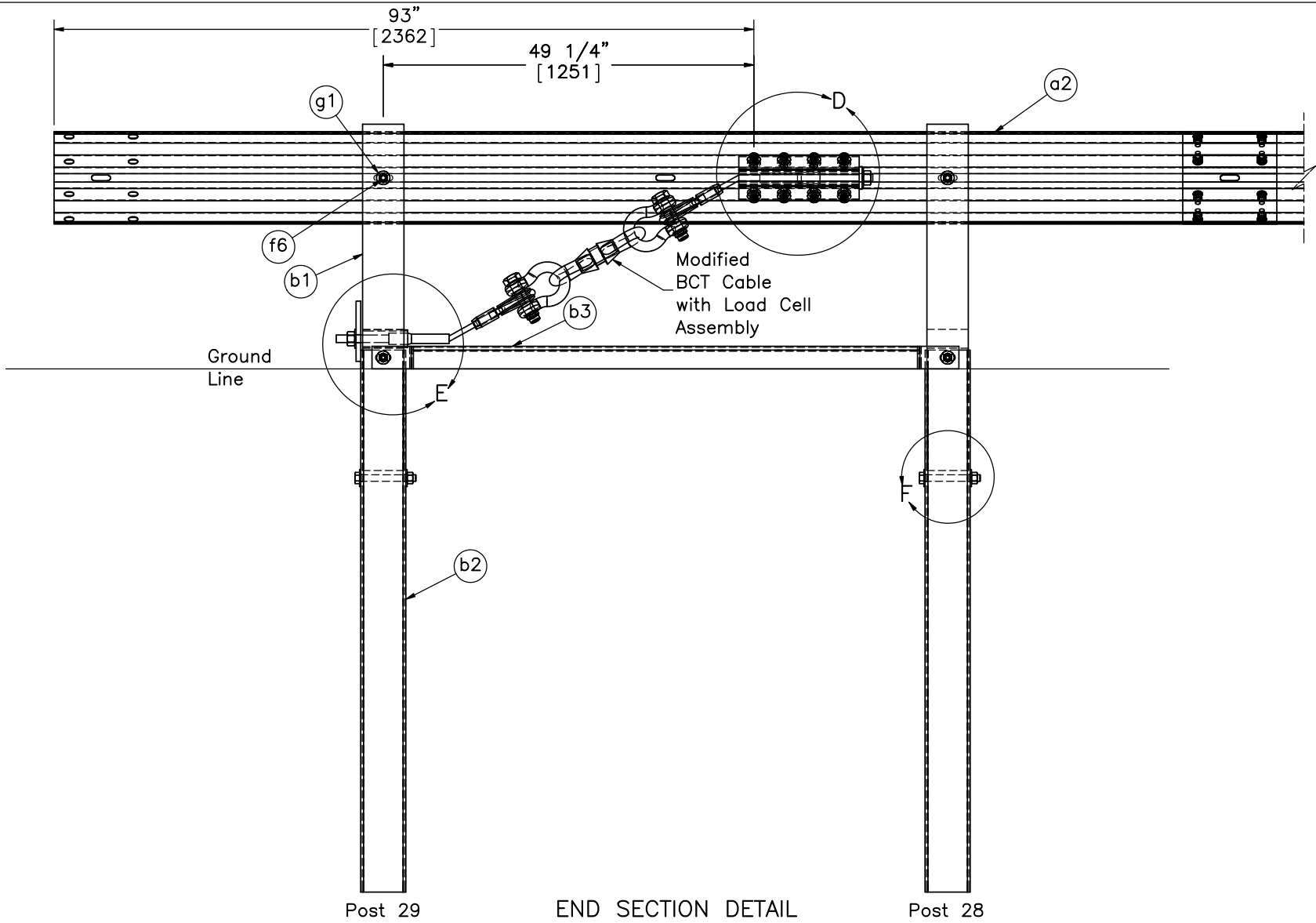
SCALE: 1:20  
UNITS: In.[mm]

SHEET:  
4 of 28

DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD



END SECTION DETAIL  
BACKSIDE



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

End Section Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

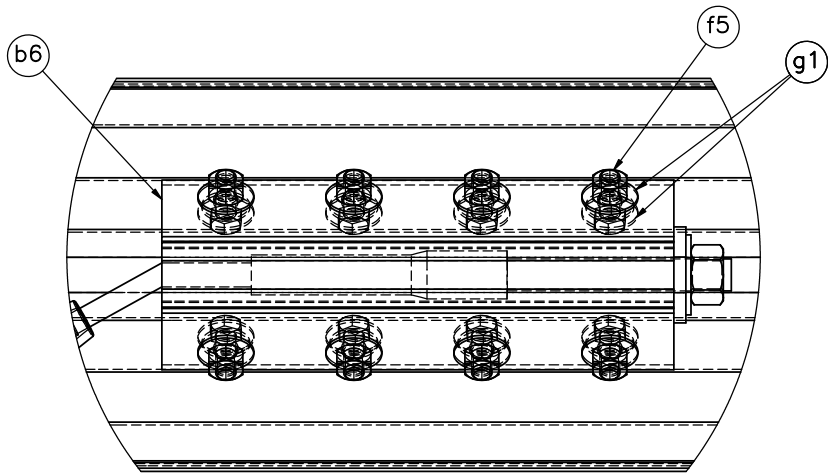
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SHEET:  
5 of 28

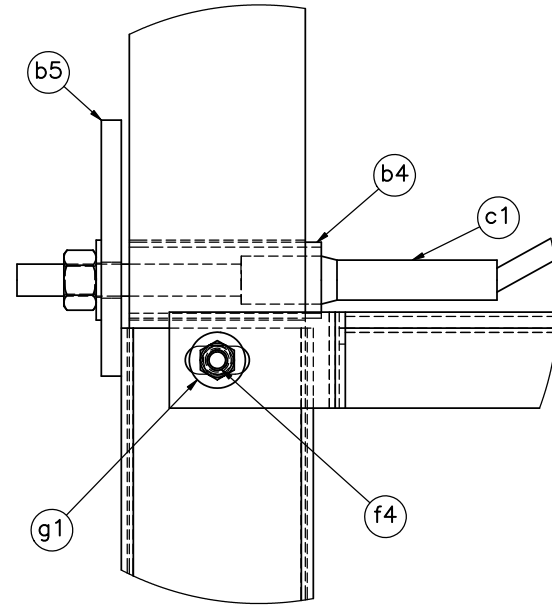
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

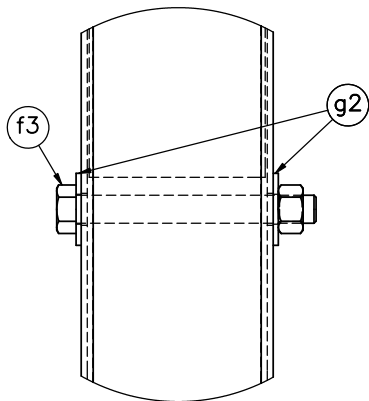
REV. BY:  
KAL/RWB/  
MP/TJD



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

BCT Anchor Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

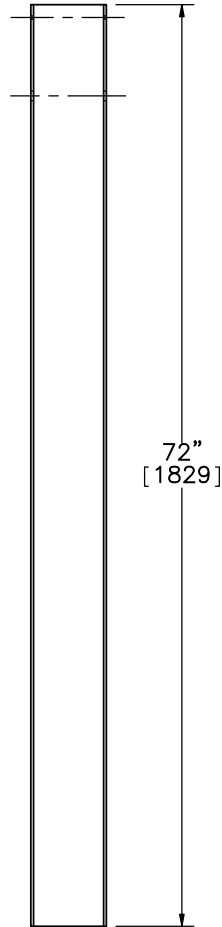
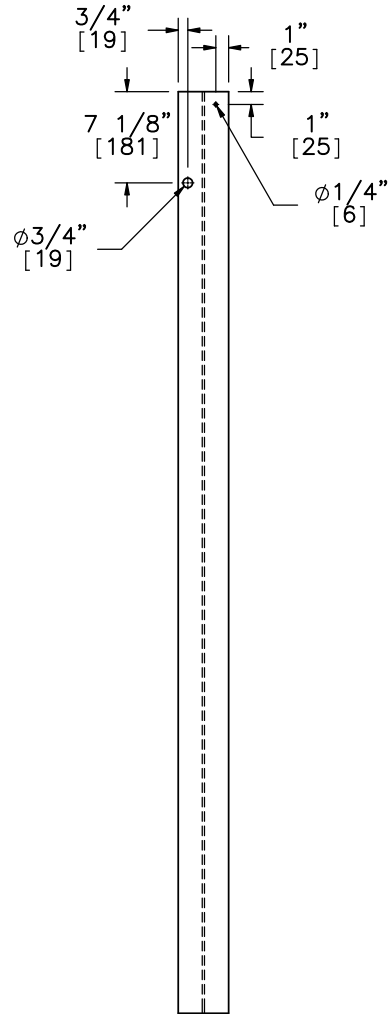
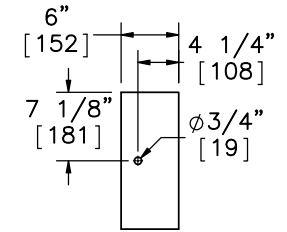
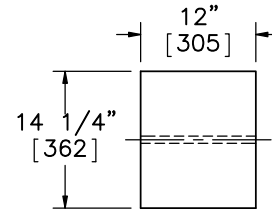
SCALE: 1:6  
UNITS: In.[mm]

SHEET:  
6 of 28

DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

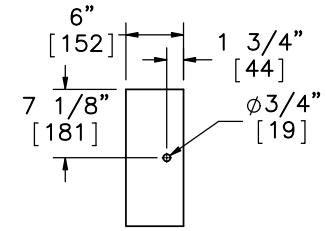
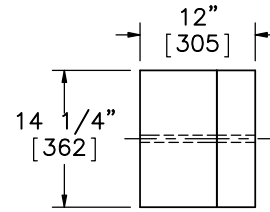
REV. BY:  
KAL/RWB/  
MP/TJD



ELEVATION VIEW

PROFILE VIEW

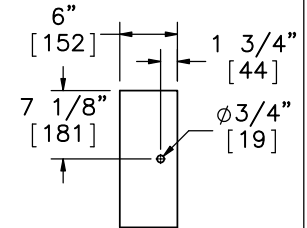
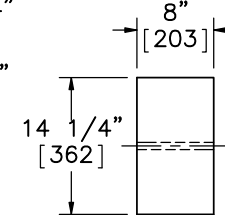
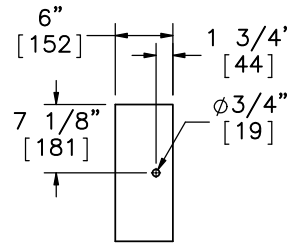
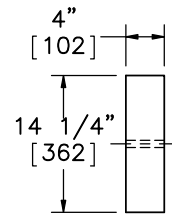
Part a5



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

Post Nos. 3-27 Components

DWG. NAME:  
Illinois\_Pole-MGS\_R23

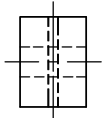
SCALE: 1:20  
UNITS: In.[mm]

SHEET:  
7 of 28

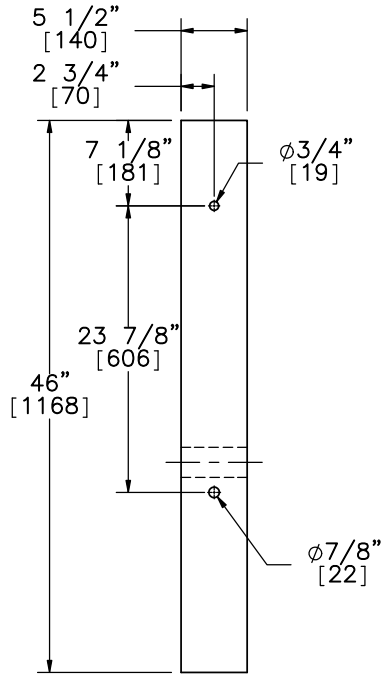
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

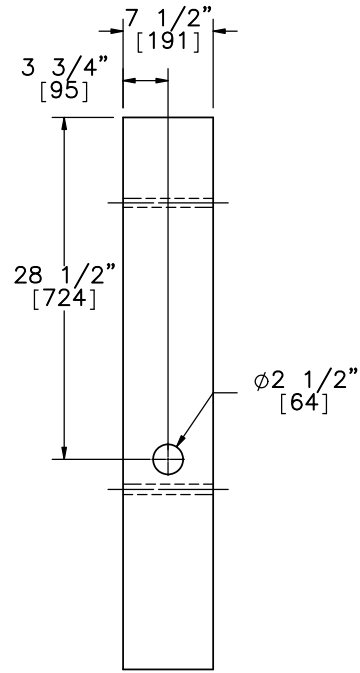
REV. BY:  
KAL/RWB/  
MP/TJD



PLAN VIEW

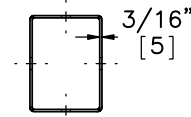


ELEVATION VIEW

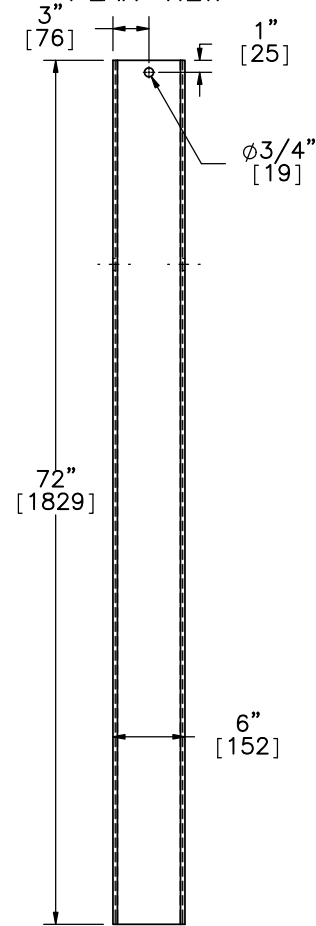


PROFILE VIEW

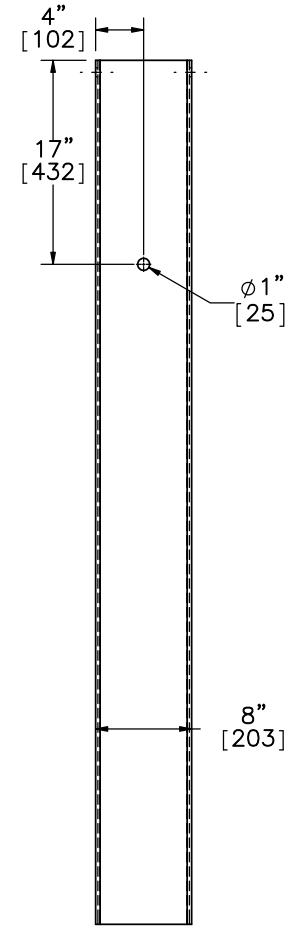
Part b1



PLAN VIEW



ELEVATION VIEW



PROFILE VIEW

Part b2



Midwest Roadside Safety Facility

IL Tollway MGS-Pole

BCT Timber Posts & Foundation Tube Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

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

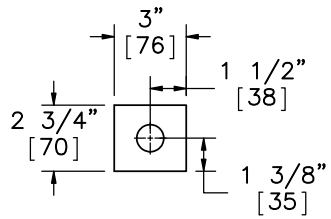
SHEET:  
8 of 28

DATE:  
5/18/2017

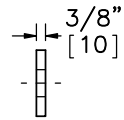
DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD



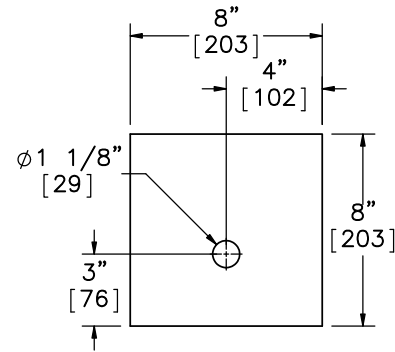


ELEVATION VIEW

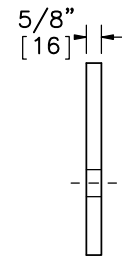


PROFILE VIEW

Anchor Bracket End Plate

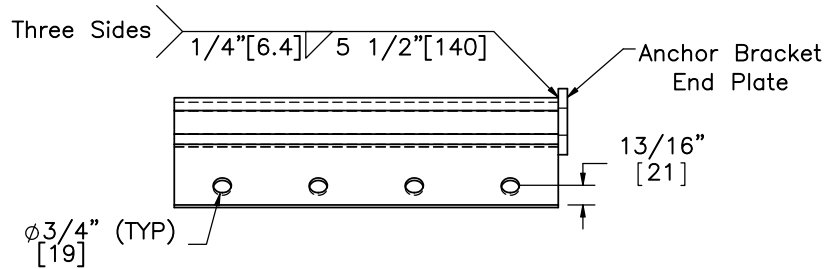


ELEVATION VIEW

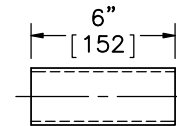


PROFILE VIEW

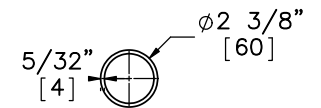
Part b5



PLAN VIEW

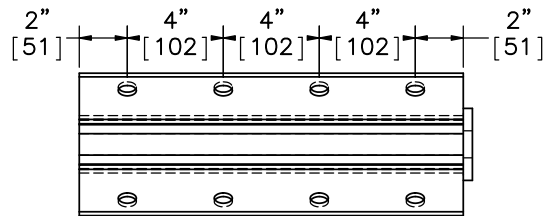


ELEVATION VIEW

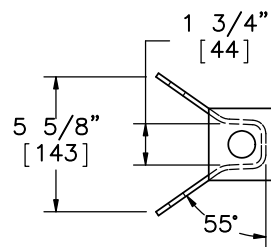


PROFILE VIEW

Part b4



ELEVATION VIEW



PROFILE VIEW

Part b6



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

BCT Post Components &  
Anchor Bracket

DWG. NAME:  
Illinois\_Pole-MGS\_R23

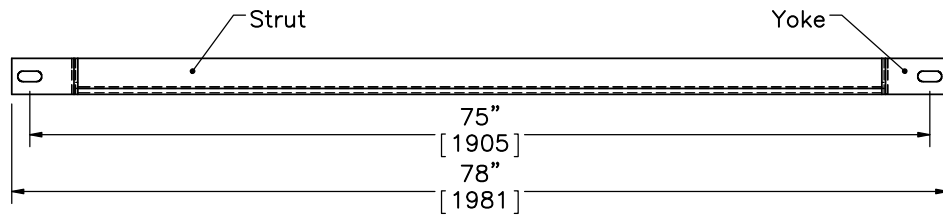
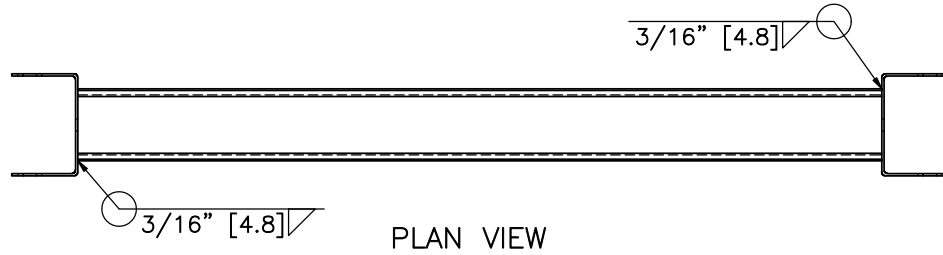
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UNITS: In.[mm]

SHEET:  
9 of 28

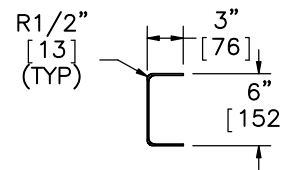
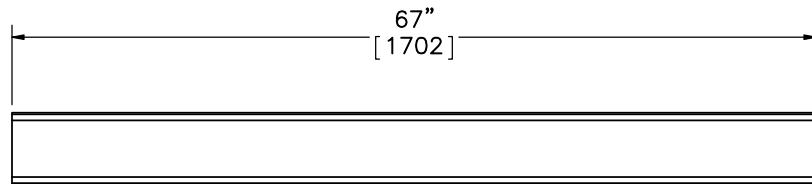
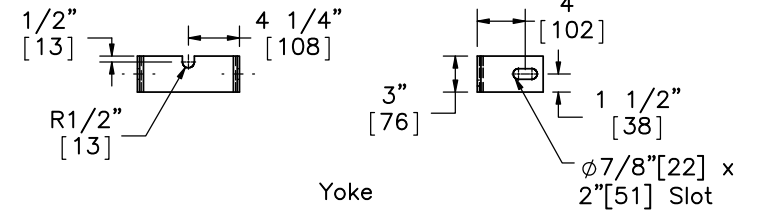
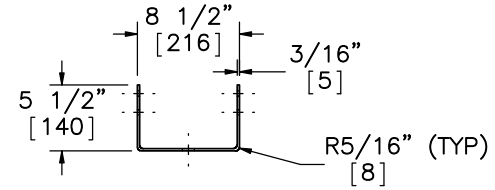
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD



Part b3



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



Midwest Roadside Safety Facility

IL Tollway MGS-Pole

Ground Strut Details

DWG. NAME:  
Illinois\_Pole-MGS\_R23

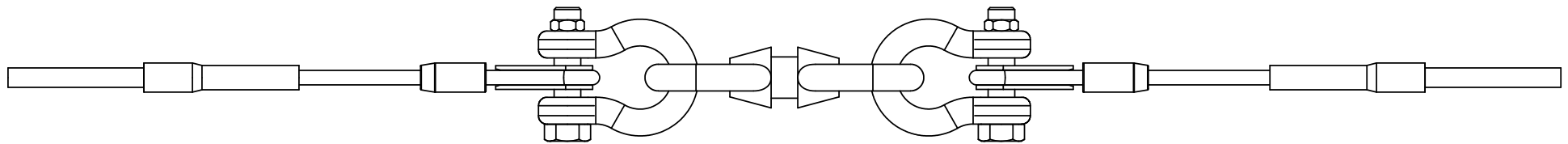
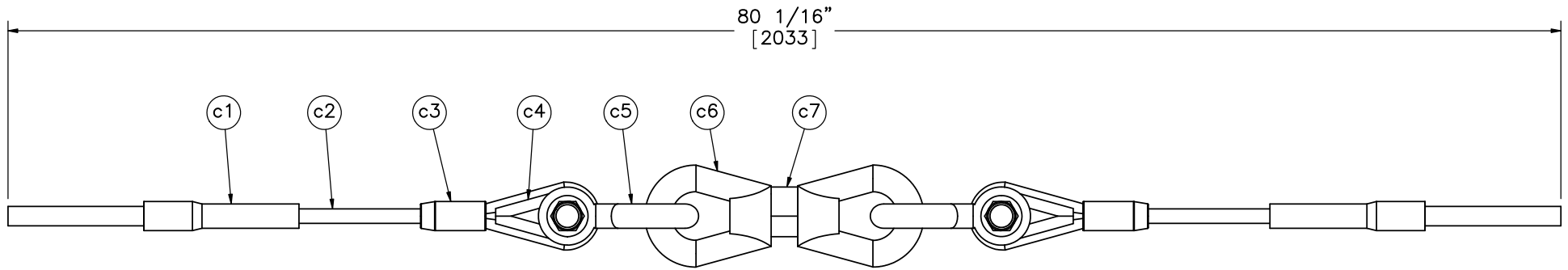
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UNITS: In.[mm]

SHEET:  
10 of 28

DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD



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

BCT Anchor Cable & Load Cell  
Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

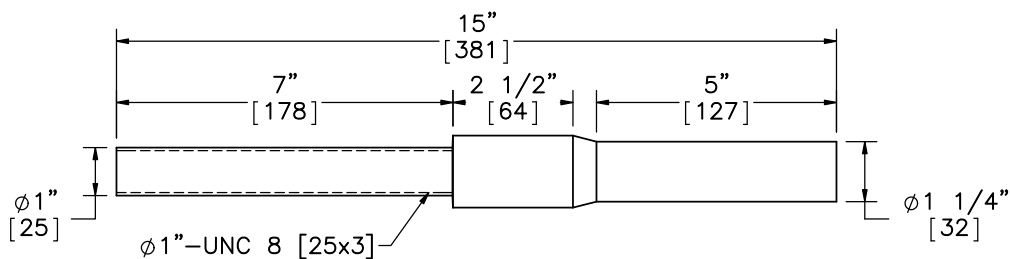
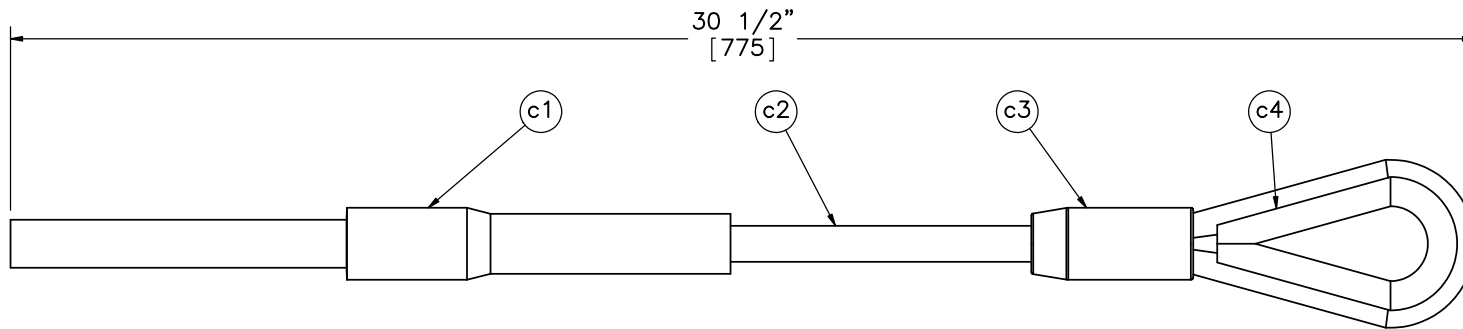
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UNITS: In.[mm]

SHEET:  
11 of 28

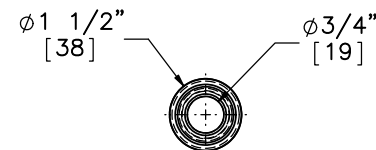
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

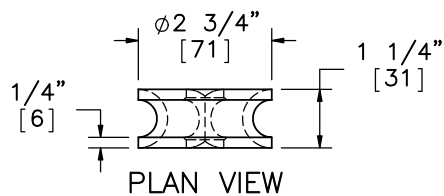
REV. BY:  
KAL/RWB/  
MP/TJD



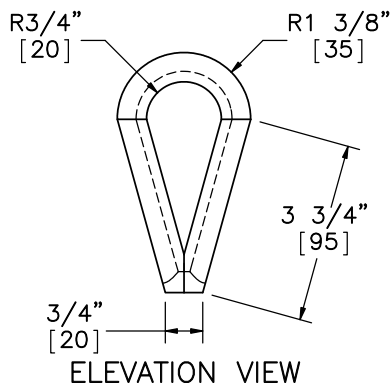
Part c1



PLAN VIEW

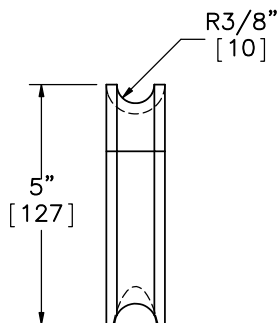


PLAN VIEW

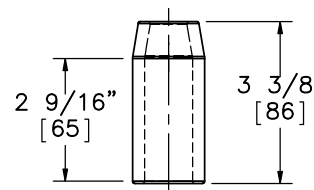


ELEVATION VIEW

Part c4



PROFILE VIEW



ELEVATION VIEW

Part c3



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

Modified BCT Anchor Cable

DWG. NAME:  
Illinois\_Pole-MGS\_R23

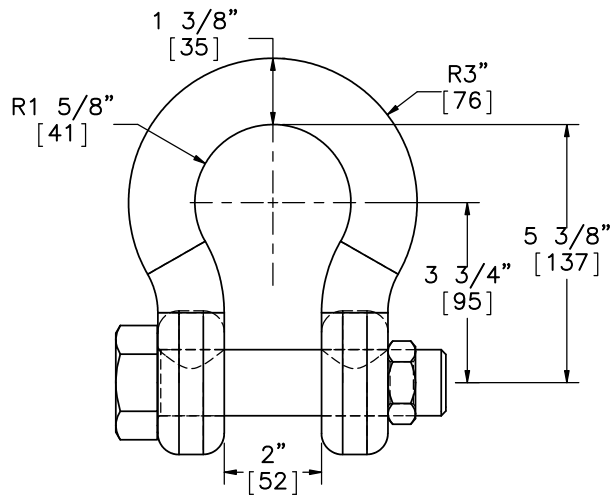
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SHEET:  
12 of 28

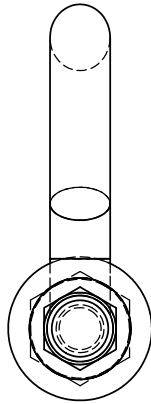
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

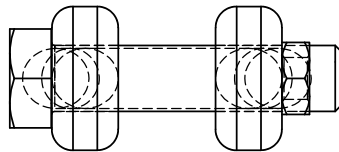
REV. BY:  
KAL/RWB/  
MP/TJD



ELEVATION VIEW

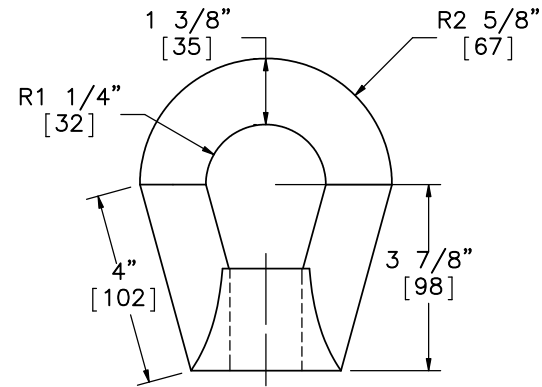


PROFILE VIEW

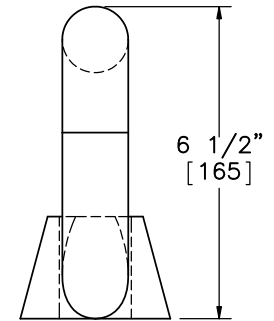


PLAN VIEW

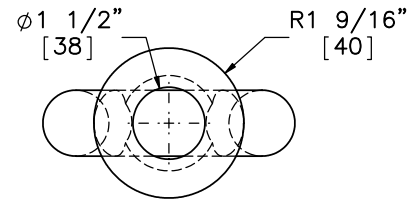
Part c5



ELEVATION VIEW



PROFILE VIEW



PLAN VIEW

Part c6



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

Shackle and Eye Nut Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

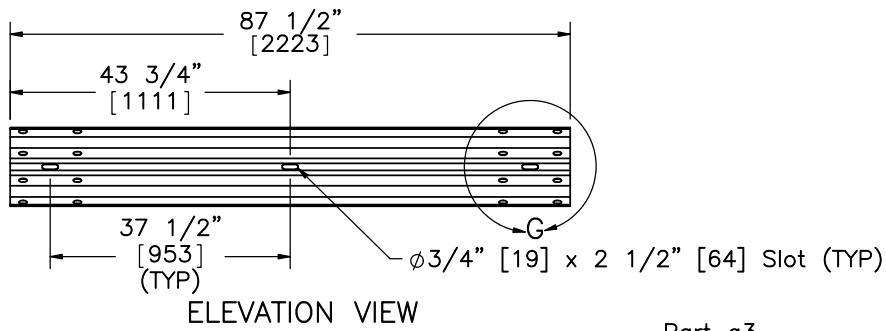
SCALE: 1:4  
UNITS: In.[mm]

SHEET:  
13 of 28

DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD



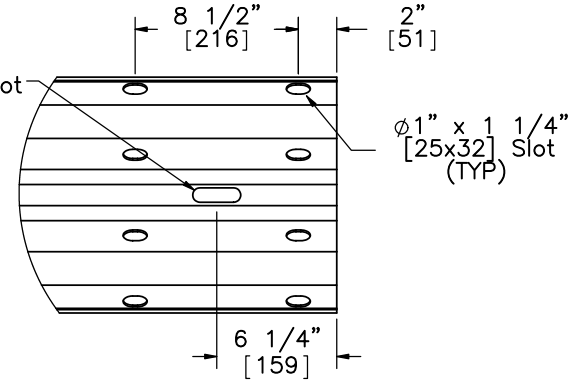
ELEVATION VIEW

Part a3

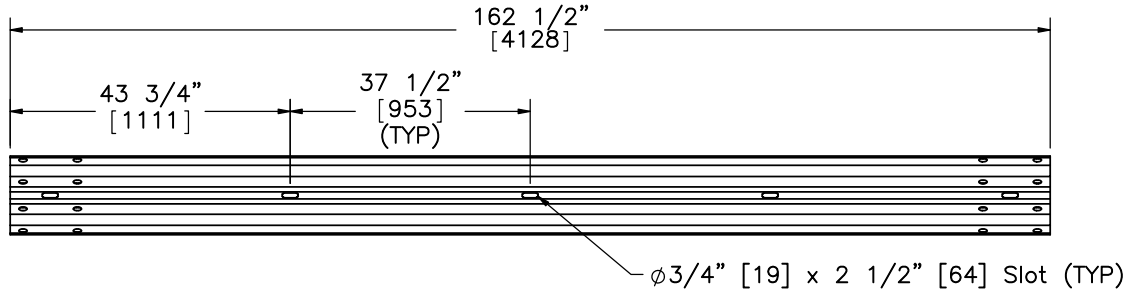
ϕ3/4" [19] x 2 1/2" [64] Slot



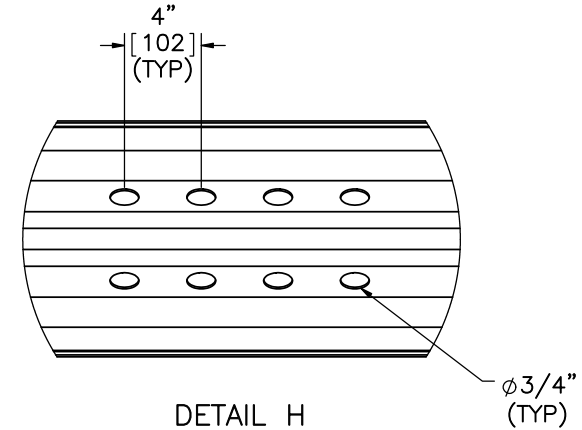
PROFILE VIEW



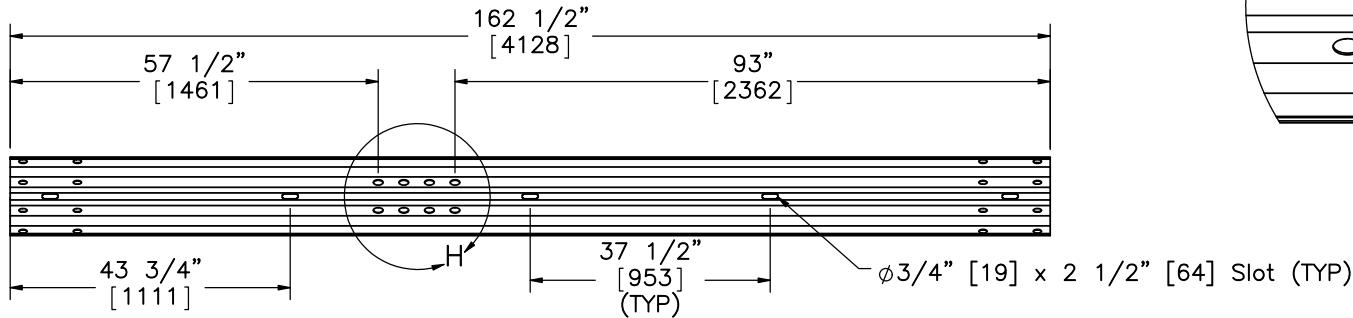
DETAIL G  
SCALE 1 : 10



ELEVATION VIEW  
Part a1



DETAIL H  
SCALE 1 : 10



ELEVATION VIEW  
Part a2



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

Rail Section Details

DWG. NAME.  
Illinois\_Pole-MGS\_R23

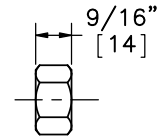
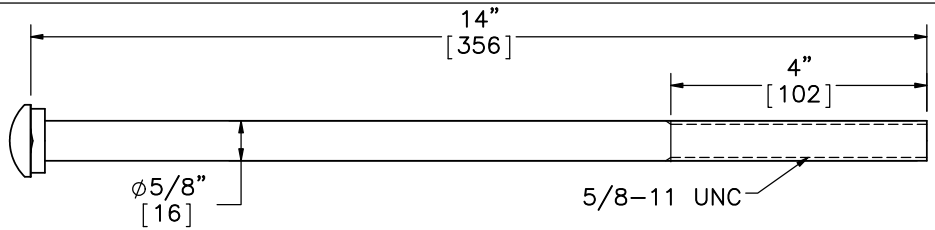
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UNITS: In.[mm]

SHEET:  
14 of 28

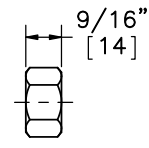
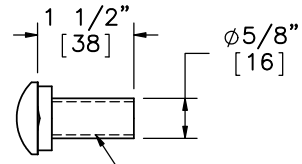
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5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

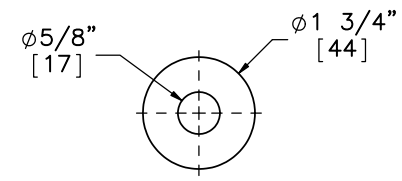
REV. BY:  
KAL/RWB/  
MP/TJD



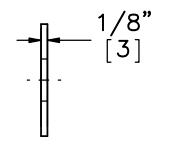
Part f1



Part f2

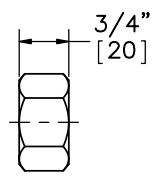
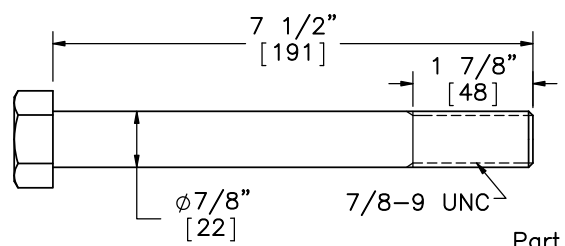


ELEVATION VIEW

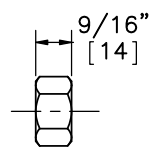
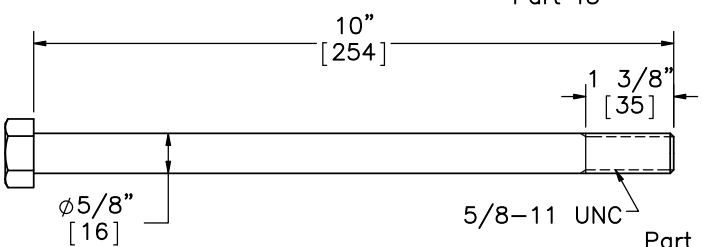


PROFILE VIEW

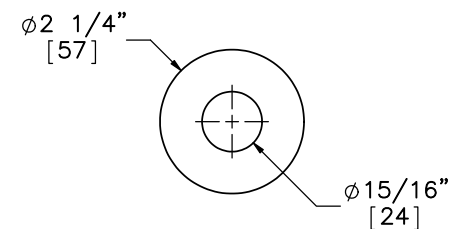
Part g1



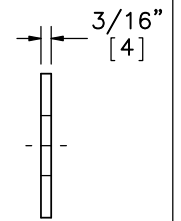
Part f3



Part f4

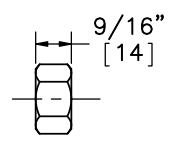
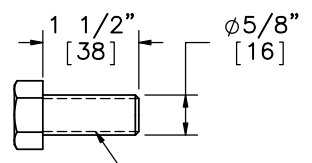


ELEVATION VIEW

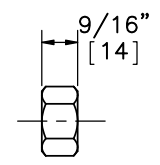
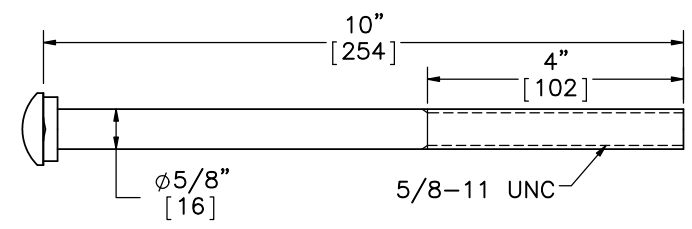


PROFILE VIEW

Part g2



Part f5



Part f6



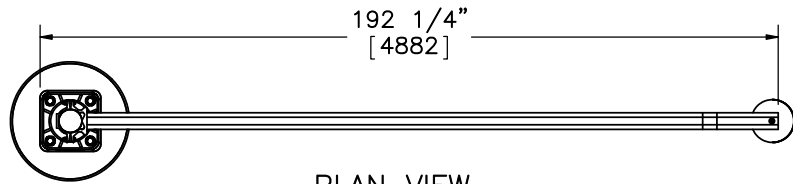
Midwest Roadside Safety Facility

IL Tollway MGS-Pole  
Guardrail Hardware Details

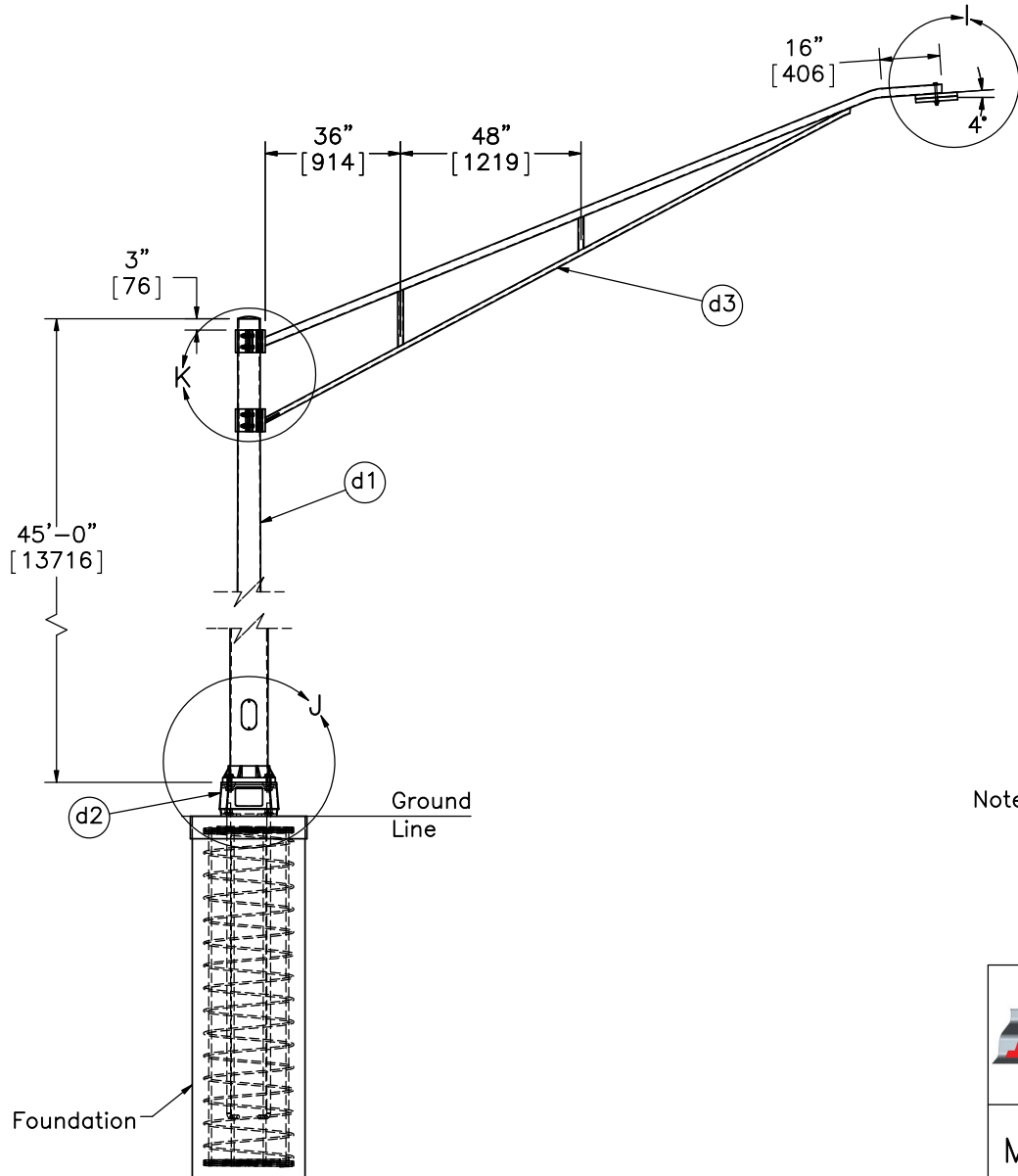
DWG. NAME:  
Illinois\_Pole-MGS\_R23

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

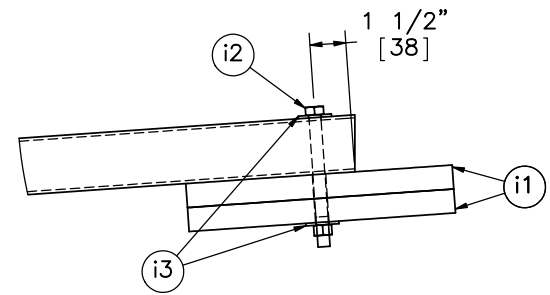
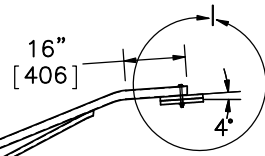
SHEET:  
15 of 28  
DATE:  
5/18/2017  
DRAWN BY:  
TJD/JEK/  
DTM  
REV. BY:  
KAL/RWB/  
MP/TJD



PLAN VIEW




ELEVATION VIEW



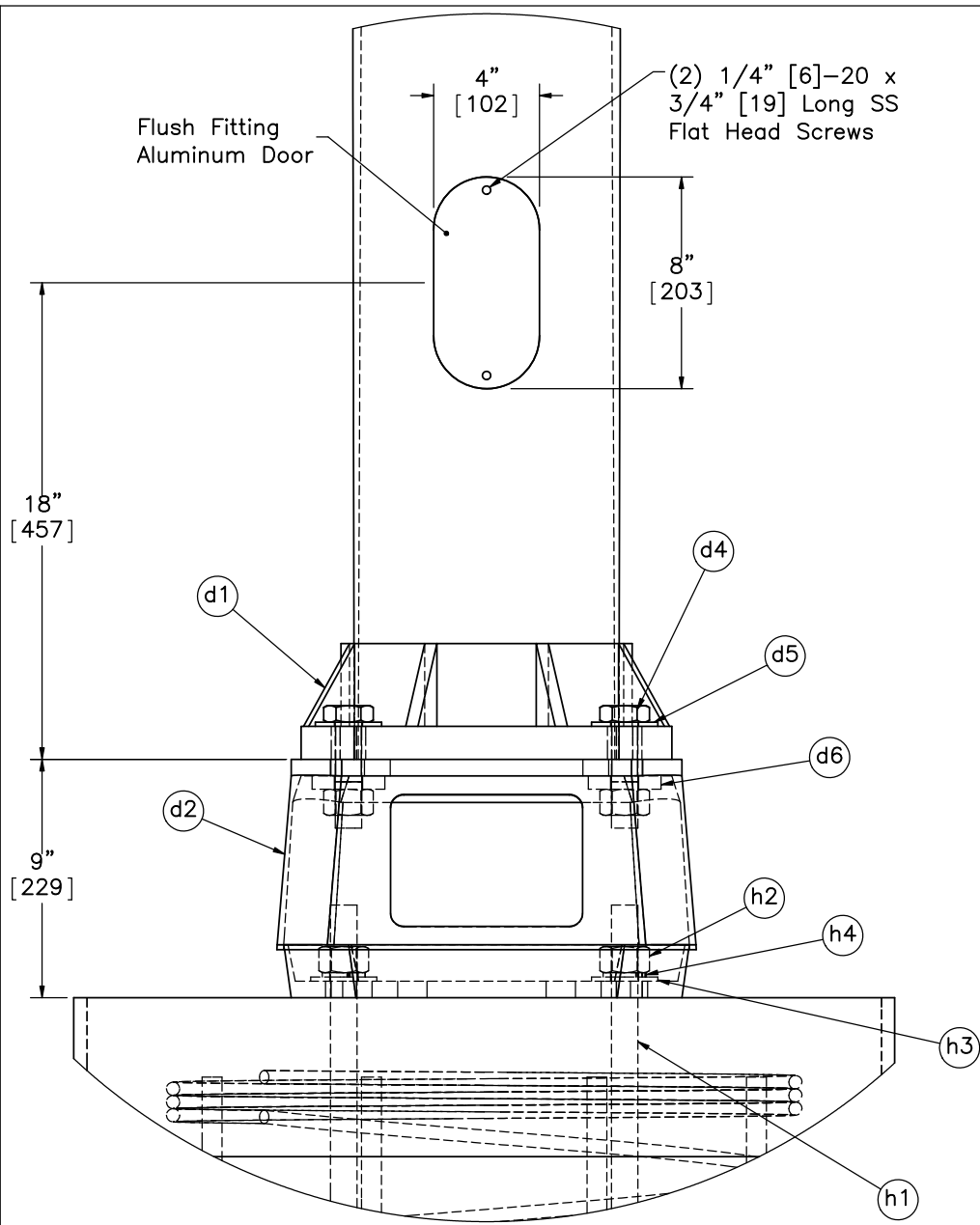
DETAIL I  
SCALE 1 : 8

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.

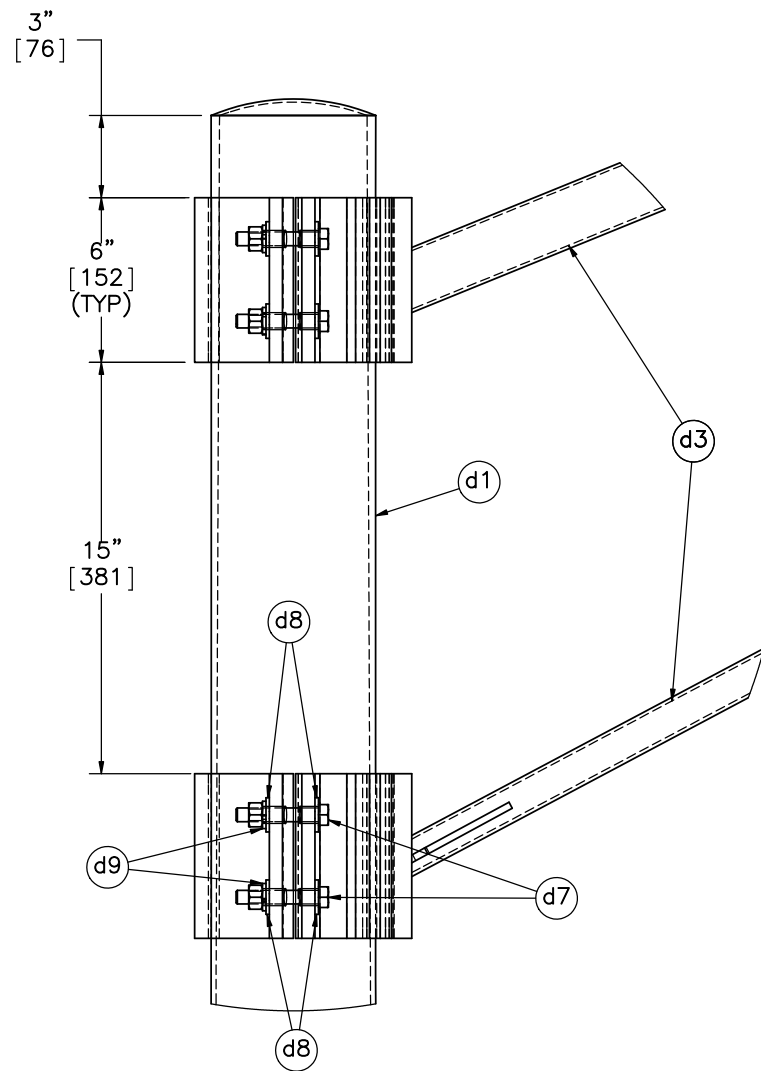
 <b>Midwest Roadside Safety Facility</b>	<b>IL Tollway MGS-Pole</b>	SHEET: 16 of 28
	Illinois Tollway Pole Details	DATE: 5/18/2017
DWG. NAME: Illinois_Pole-MGS_R23	SCALE: 1:50 UNITS: In.[mm]	DRAWN BY: TJD/JEK/DTM
		REV. BY: KAL/RWB/MP/TJD





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

Pole Base and Truss Connection Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

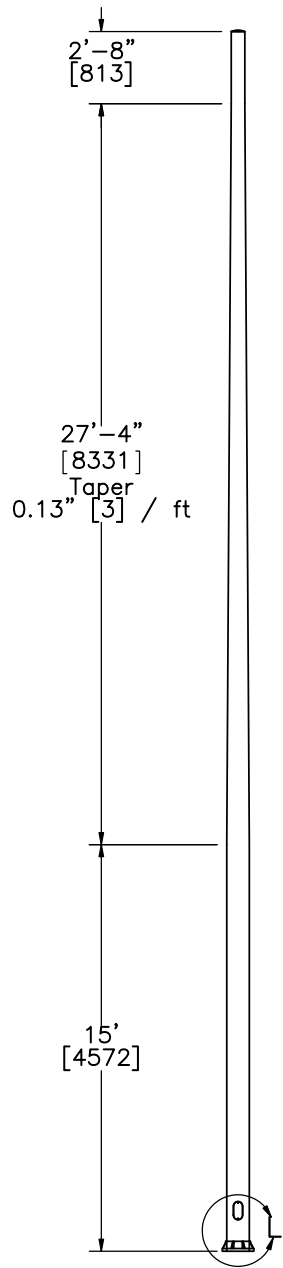
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UNITS: In./[mm]

SHEET:  
17 of 28

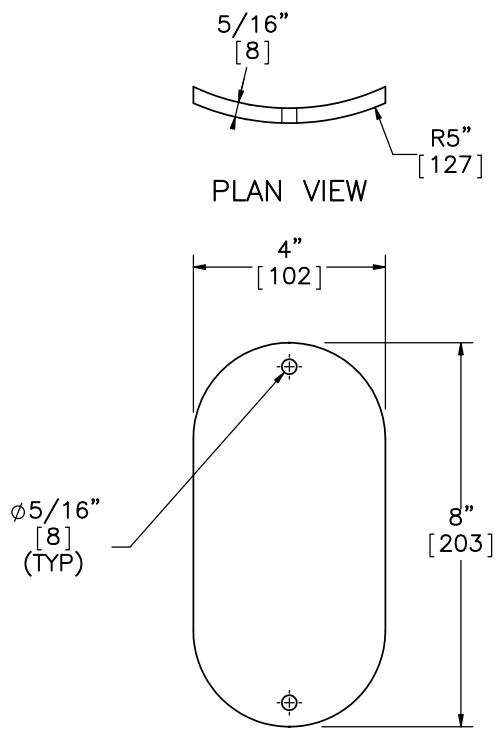
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

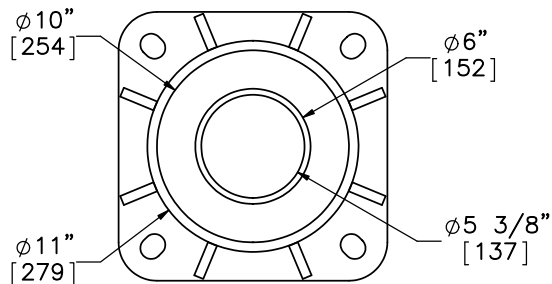
REV. BY:  
KAL/RWB/  
MP/TJD



ELEVATION VIEW  
 SCALE 1:85

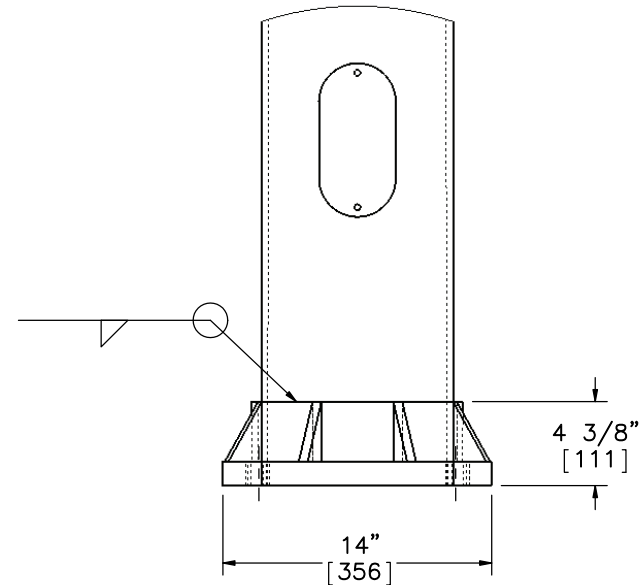


Flush Fitting Aluminum Door  
 SCALE 1:4



PLAN VIEW

Part d1



Midwest Roadside  
 Safety Facility

IL Tollway MGS-Pole

Pole Detail

DWG. NAME.  
 Illinois\_Pole-MGS\_R23

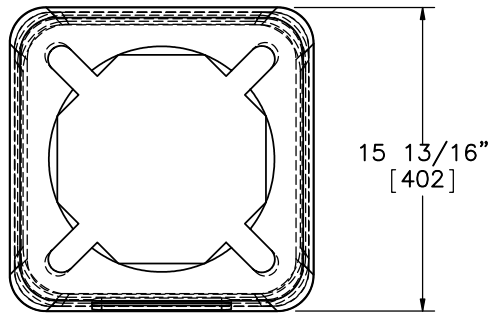
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 UNITS: In.[mm]

SHEET:  
 18 of 28

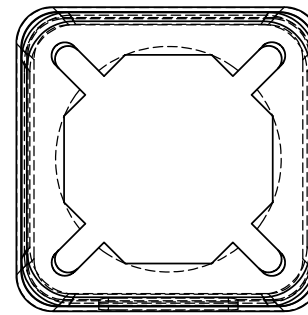
DATE:  
 5/18/2017

DRAWN BY:  
 TJD/JEK/  
 DTM

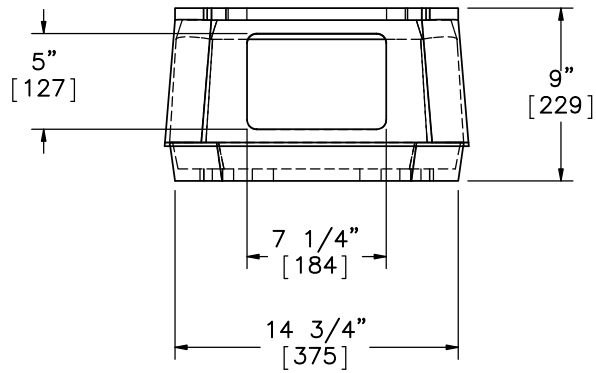
REV. BY:  
 KAL/RWB/  
 MP/TJD



PLAN VIEW




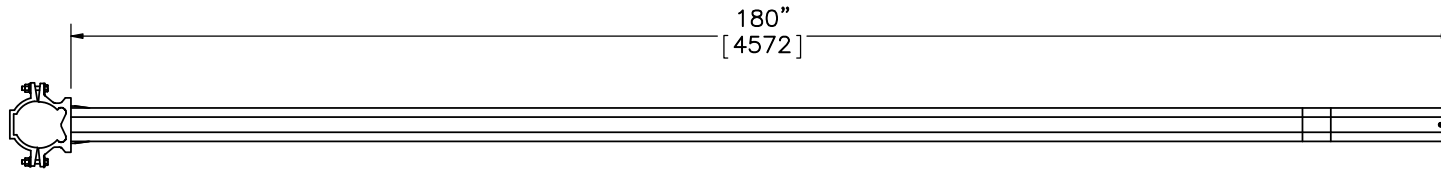
BOTTOM VIEW



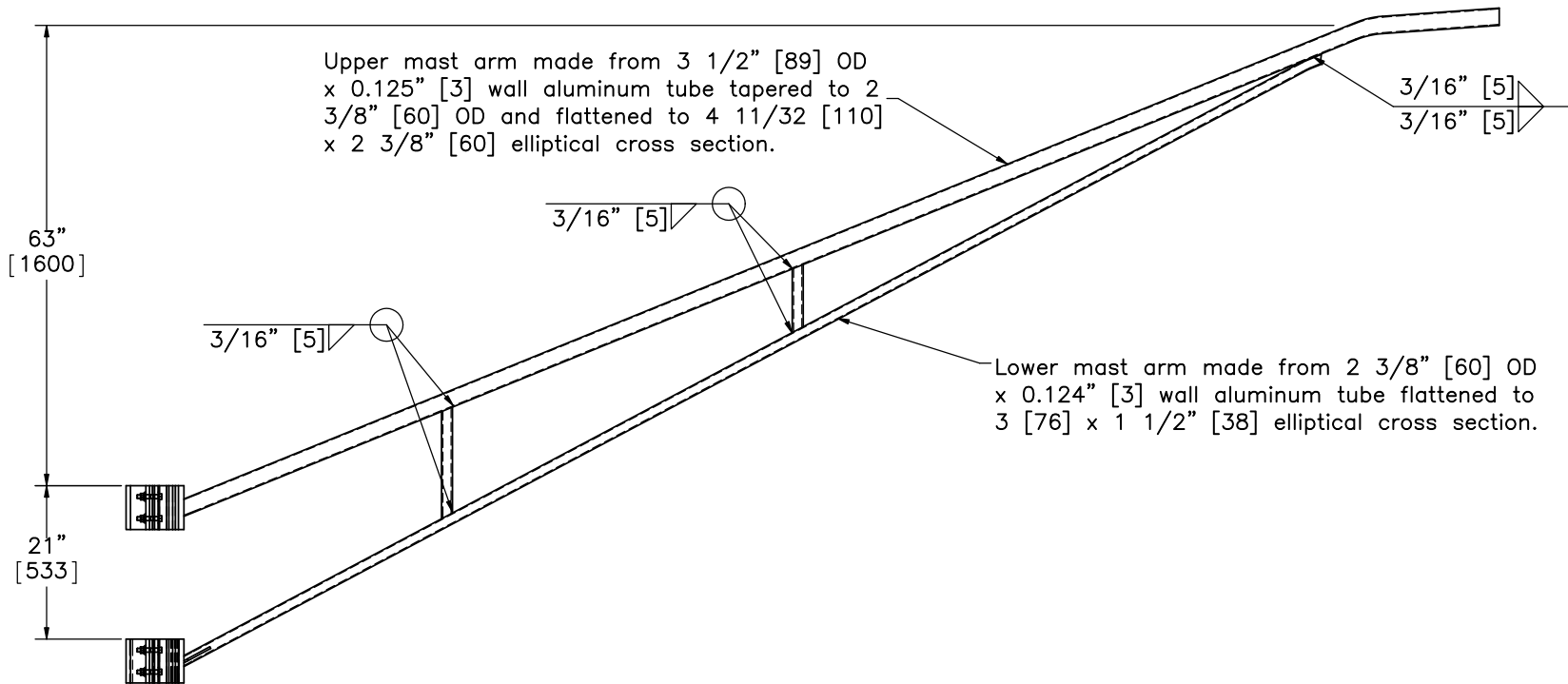
ELEVATION VIEW  
Part d2

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		SHEET: 19 of 28
	Anchor Base Detail		DATE: 5/18/2017
Midwest Roadside Safety Facility			DRAWN BY: TJD/JEK/ DTM
		DWG. NAME: Illinois_Pole-MGS_R23	SCALE: 1:10 UNITS: In.[mm]



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

Truss Detail

DWG. NAME:  
Illinois\_Pole-MGS\_R23

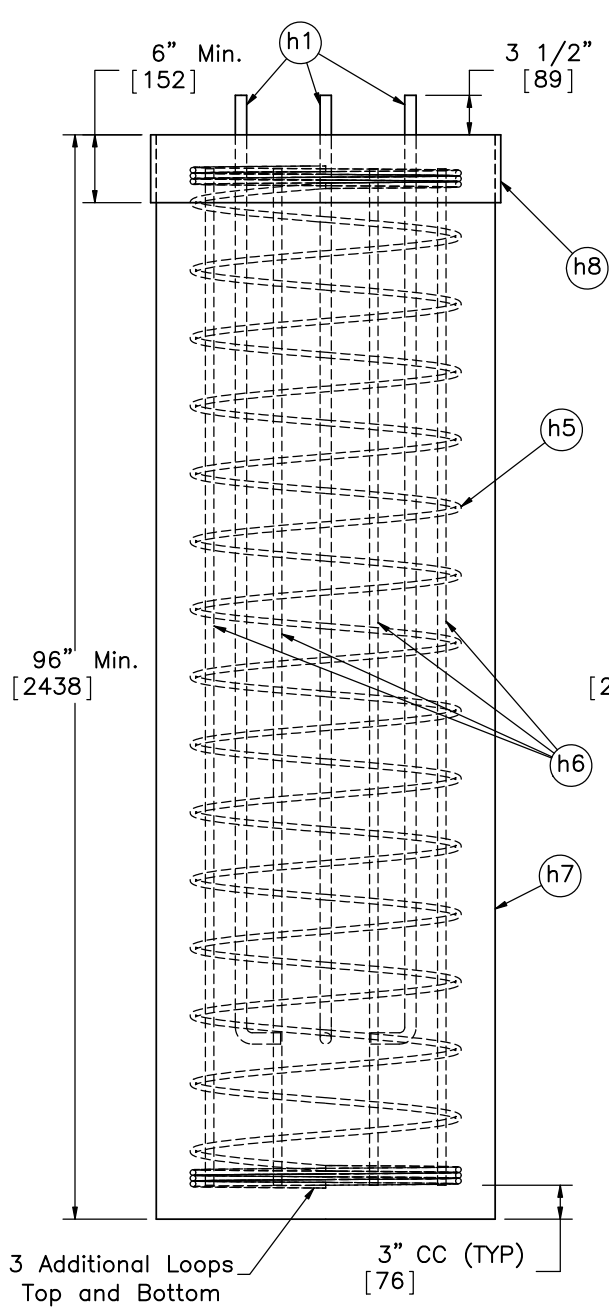
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SHEET:  
20 of 28

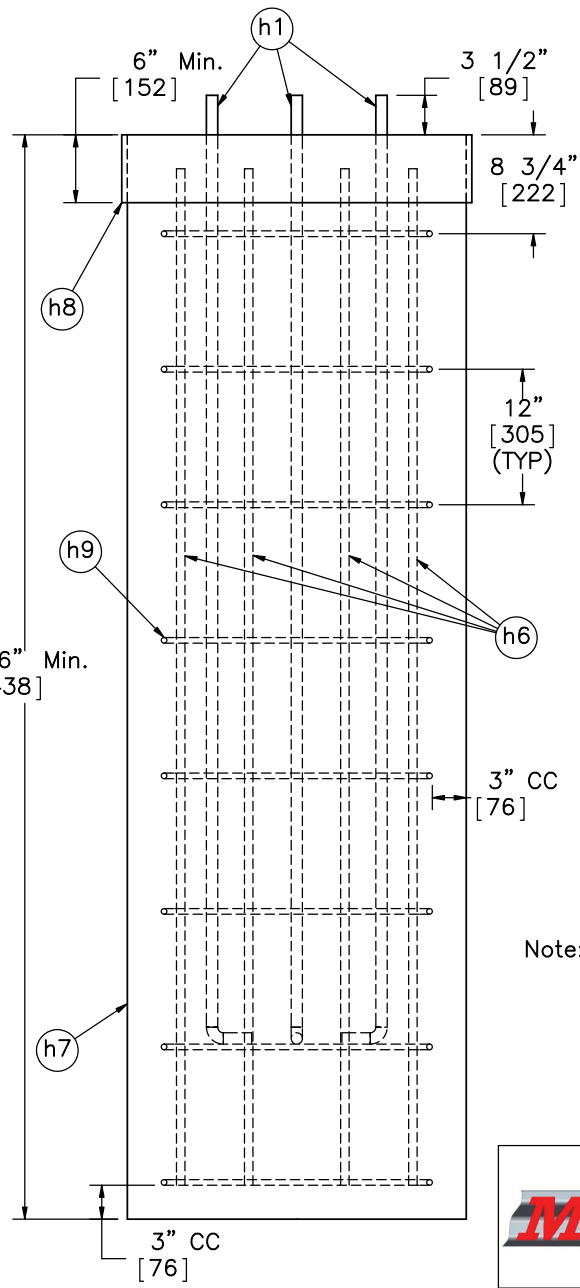
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD

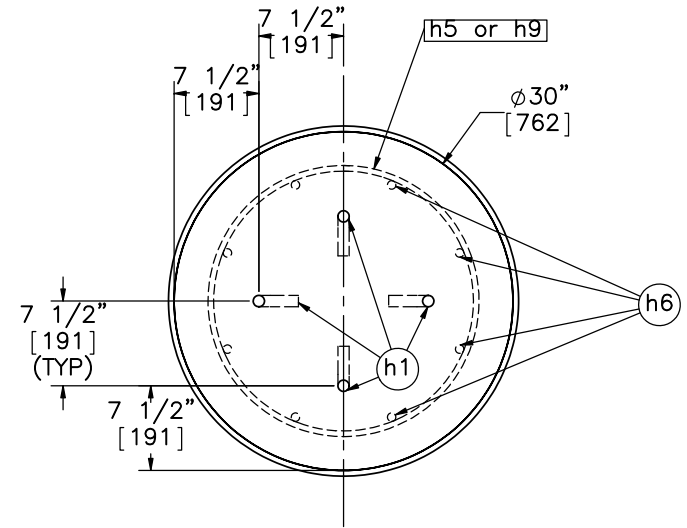


ELEVATION VIEW  
Option 1



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

Foundation Detail

DWG. NAME.  
Illinois\_Pole-MGS\_R23

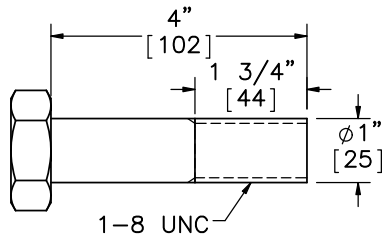
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SHEET:  
21 of 28

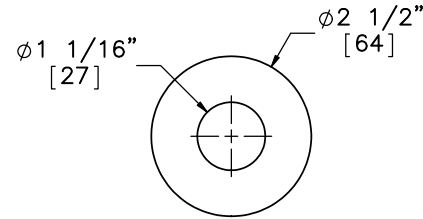
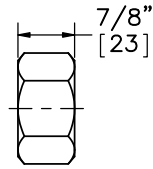
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

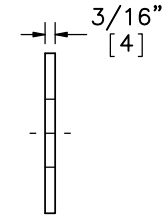
REV. BY:  
KAL/RWB/  
MP/TJD



Part d4

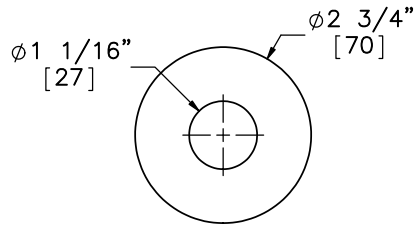


ELEVATION VIEW



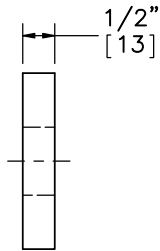
PROFILE VIEW

Part d5

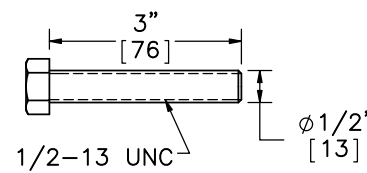


ELEVATION VIEW

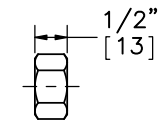
Part d6



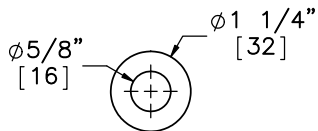
PROFILE VIEW



1/2-13 UNC

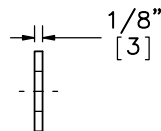


Part d7

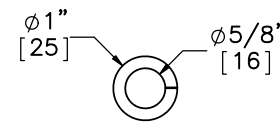


ELEVATION VIEW

Part d8

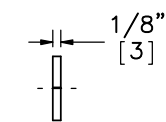


PROFILE VIEW

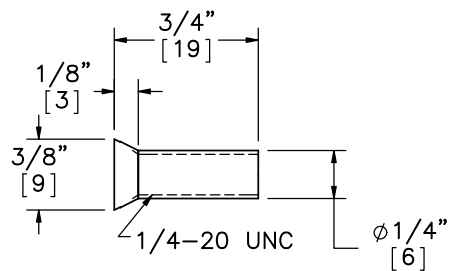


ELEVATION VIEW

Part d9



PROFILE VIEW



Part d10  
SCALE 1:1



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

Pole Hardware Details

DWG. NAME:  
Illinois\_Pole-MGS\_R23

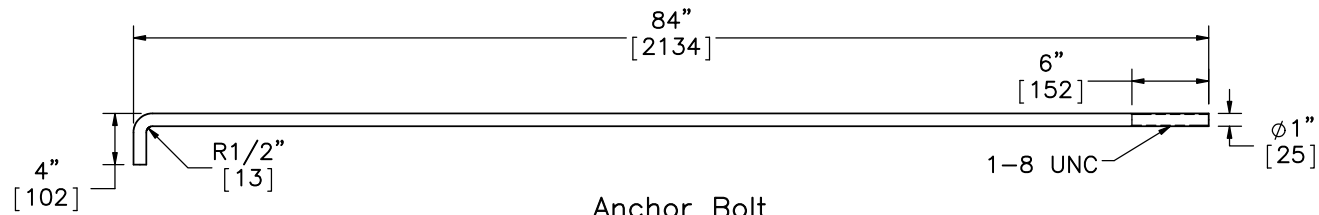
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SHEET:  
22 of 28

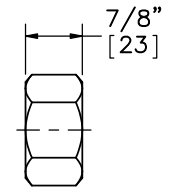
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

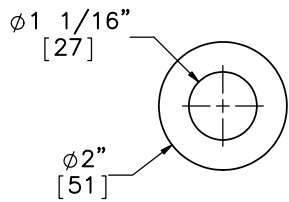
REV. BY:  
KAL/RWB/  
MP/TJD



Anchor Bolt  
Part h1  
SCALE 1:15

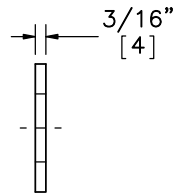


Part h2

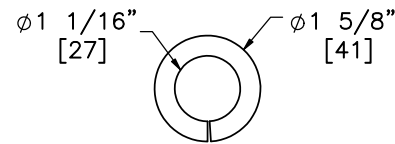


ELEVATION VIEW

Hardened Washer  
Part h3

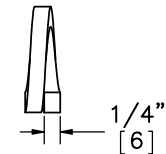


PROFILE VIEW



ELEVATION VIEW

Lock Washer  
Part h4



PROFILE VIEW



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

Foundation Hardware Details

DWG. NAME.  
Illinois\_Pole-MGS\_R23

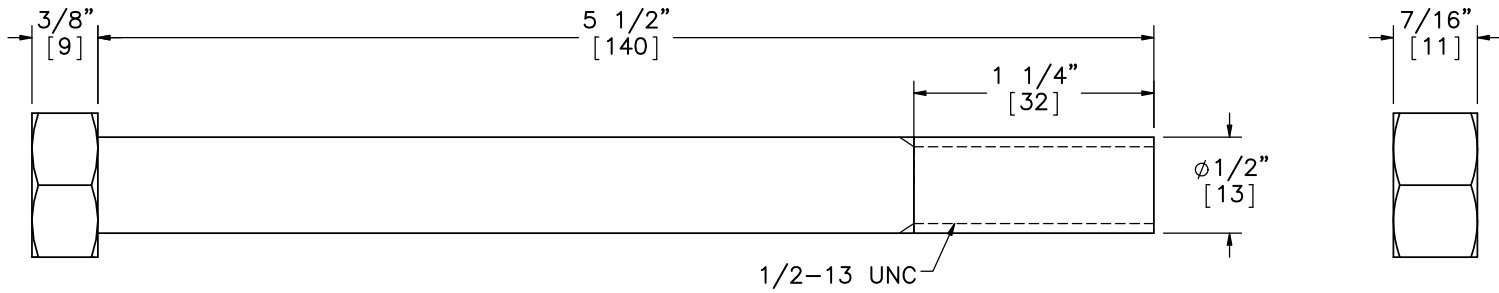
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SHEET:  
23 of 28

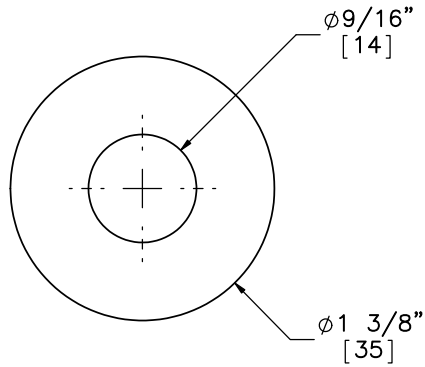
DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD

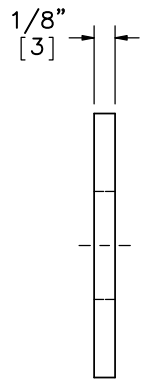


Part i2

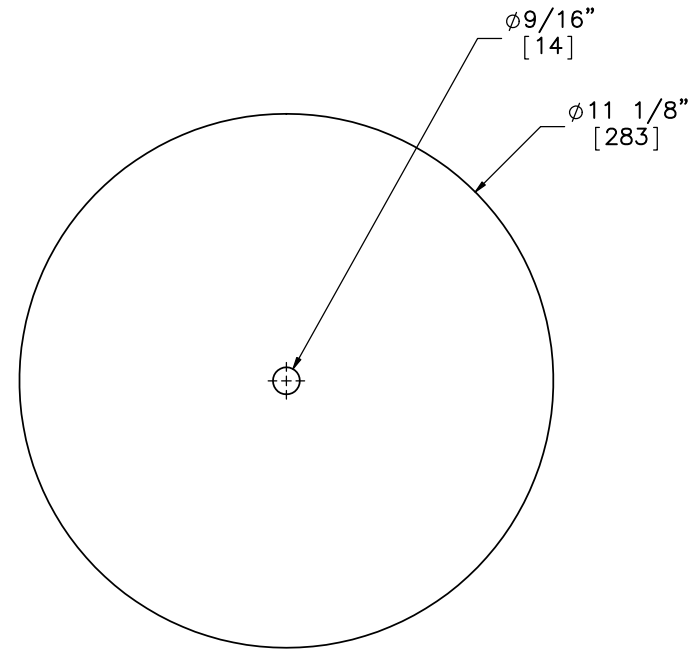


ELEVATION VIEW

Part \*\*i3

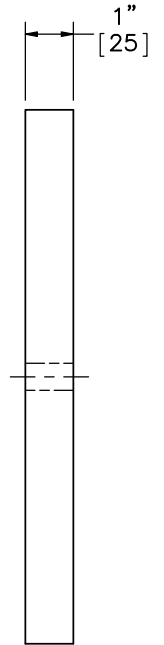


PROFILE VIEW



ELEVATION VIEW

Part i1  
SCALE 1:4



PROFILE VIEW



Midwest Roadside  
Safety Facility

IL Tollway MGS-Pole

Ballast Plate and Attachment  
Hardware

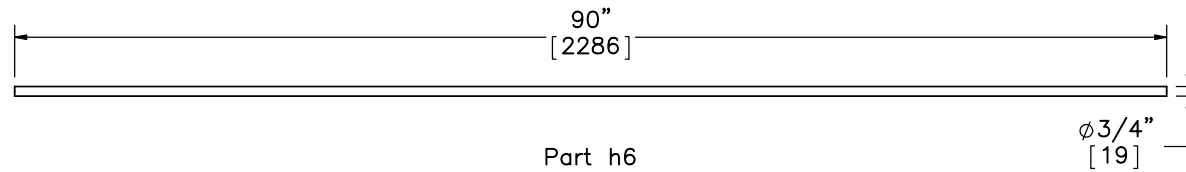
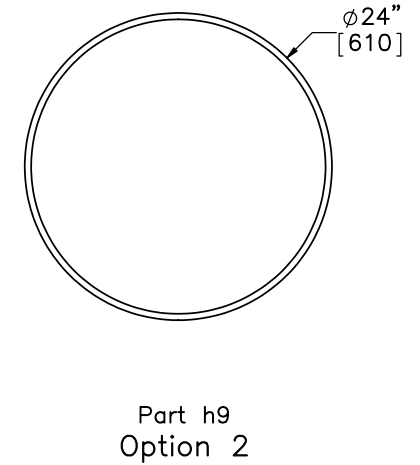
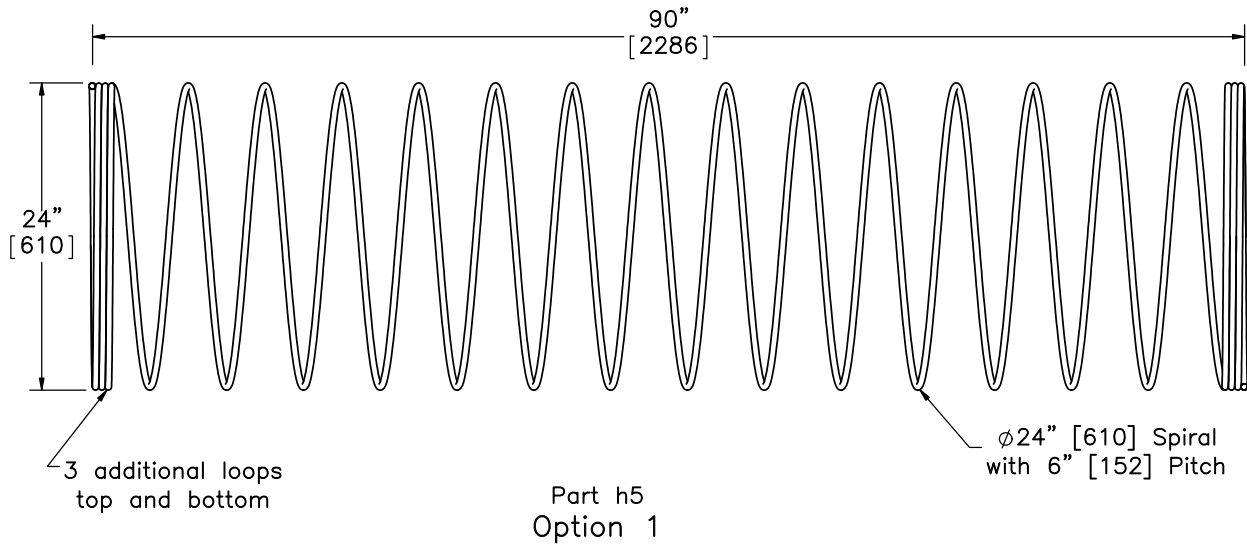
DWG. NAME.  
Illinois\_Pole-MGS\_R23

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

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



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

Bill of Bars

DWG. NAME.  
Illinois\_Pole-MGS\_R23

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

SHEET:  
25 of 28

DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD

Item No.	QTY.	Description	Material Specification	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	PFPO2
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 WRC 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

Bill of Materials

DWG. NAME.  
Illinois\_Pole-MGS\_R23

SCALE: None  
UNITS: In./mm

SHEET:  
26 of 28

DATE:  
5/18/2017

DRAWN BY:  
TJD/JEK/  
DTM

REV. BY:  
KAL/RWB/  
MP/TJD

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		SHEET: 27 of 28
		DATE: 5/18/2017
Bill of Materials		DRAWN BY: TJD/JEK/ DTM
DWG. NAME: Illinois_Pole–MGS_R23	SCALE: None UNITS: In./mm	REV. BY: KAL/RWB/ MP/TJD

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	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_R23	SCALE: None UNITS: In.[mm] REV. BY: KAL/RWB/ MP/TJD

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	3/30/2016	–	Drawing created from MGS_OmittedPost_R3	–	TJD
1	5/11/2016	–	Reordered pages to be consistent with other MGS drawings.	KAL	TJD
		1	Removed section view b–d. Note edits. Added ground line.		
		2	Moved section a view to new page and increased scale.		
		3	Added post numbers.		
		7	Added blockout options.		
		10	Rearranged drawing layout.		
2	5/18/2016	–	Added pages 21–23.	KAL	TJD
		1	Added pole foundation to drawing.		
		4	Added foundation.		
		16	Added foundation.		
		17	Added foundation hardware callouts.		
		18	Corrected light pole plan view.		
3	5/18/2016	25	Added foundation to bill of materials.	KAL	TJD
		–	Reordered pages 2–4.		
		1	Added dimension to show distance from center of pole to back of post.		
		2	Removed break from view.		
		12	Added overall length to cable assembly.		
		14	Dimension edit.		
		15	Added width dimensions to nuts.		
		17	Added dimension to pole cutout.		
		18	Fixed scale of elevation view.		
		21	Dimension edits.		
		22	Added radius to anchor bolt.		
23	Added diameter to spiral rebar.				
24	Bill of materials edits.				
4	5/19/2016	21	Added sonotube dimension.	KAL	TJD
5	5/25/2016	–	Added sheet 22.	RWB	TJD
		15	Updated thread length of parts f3 and f4		
		17	Added pole mounting hardware callouts.		
		19	Note edit.		

		20	Note edit.		
		25	Bill of materials edits.		
		26	Bill of materials edits.		
6	6/7/2016	1	Dimension edit.	MP/KAL/RWB	TJD
		2	Dimension edit.		
		20	Dimension edit.		
		21	Added alternate foundation option.		
		24	Added alternate foundation option rebar.		
7	6/9/2016	2	Dimension edit.	KAL	TJD
		21	Added rebar callout to plan view.		
		24	Changed part h5 option 2 to part h9. Bill of bars edit.		
		26	Bill of materials edits.		
8	6/14/2016	-	Changed all text to bold.	KAL	TJD
		1	Added impact and pole location dimensions. Note edit.		
		2	Added pole location dimensions.		
9	6/14/2016	1	Edited pole location dimension.	KAL	TJD
		2	Edited pole location dimension.		
10	6/17/2016	1	Edited pole location dimension.	KAL	TJD
		2	Edited pole location dimension.		
11	6/20/2016	26	Bill of materials edits.	KAL	TJD
12	6/20/2016	1	Note edit.	KAL	TJD
13	6/30/2016	1	Reversed impact direction so the 6'-3" beam was upstream of impact.	RWB/KAL	TJD
14	6/30/2016	1	Note edits.	KAL	TJD
15	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.		

16	7/19/2016	-	New page: 24.	TJD	JEK
		17	Plate and screws noted.		
		18	Plate details added.		
		22	Part d10 added. General movement.		
		23	Part h3 OD edit.		
		24	New. Ballast and ballast attachment hardware.		
		26	Material spec edit: a5, d4. General movement.		
		27	New part: d10. Description edit: i1. Material spec edit: d7, f1-6, h1-3, i2. HWG edit: h2-3, i2-3. General movement.		
17	7/20/2016	-	Font size edits. Detail lettering.	TJD	JEK
		16	Note added.		
		17	Part b4 corrected to d4.		
		18	Pole cap hidden in plan view to appropriate show inner diameter.		
		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.		
18	2/21/2016	-	BOM spill onto a third page (New page)	RWB	JEK
		2	Note added.		
		16	Note 2 edit.		
		18	Aluminum door hole size edit.		
		19	Note edit.		
		20	Note added.		
		24	Text edit.		
		26	Description edit: d4. Material edit: c2.		
		27	Material edit: h3.		
		28	Note edit.		
19	7/22/2016	27	Material edit: h4.	TJD/KAL	JEK
		28	Material edit: i1.		
20	8/1/2016	5	Anchor plate placement dimensions changed.	TJD/KAL	JEK
		14	Part a2 change.		
		21	Note added.		
		BOM	General movement. Part b3 as-tested mod added.		

21	8/2/2016	5	Break added to view.	KAL	JEK
		25	Table placement corrected.		
		26	Spelling correction, as-tested mod, part b3.		
22	3/13/2017	2	Note 2 edit.	MP	JEK
		17	Note 1 edit.		
		21	Note 1 edit.		
23	5/18/2017	25	Fixed epoxy misspelling.	JEK	DTM