
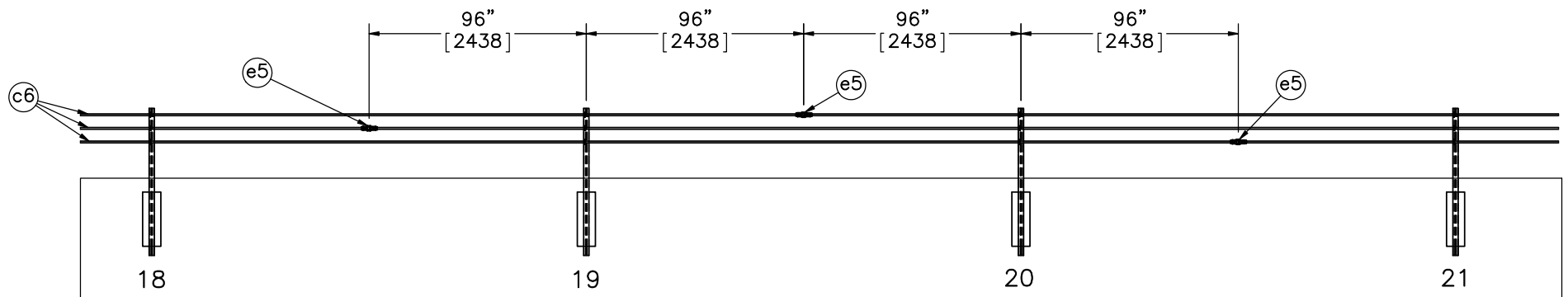
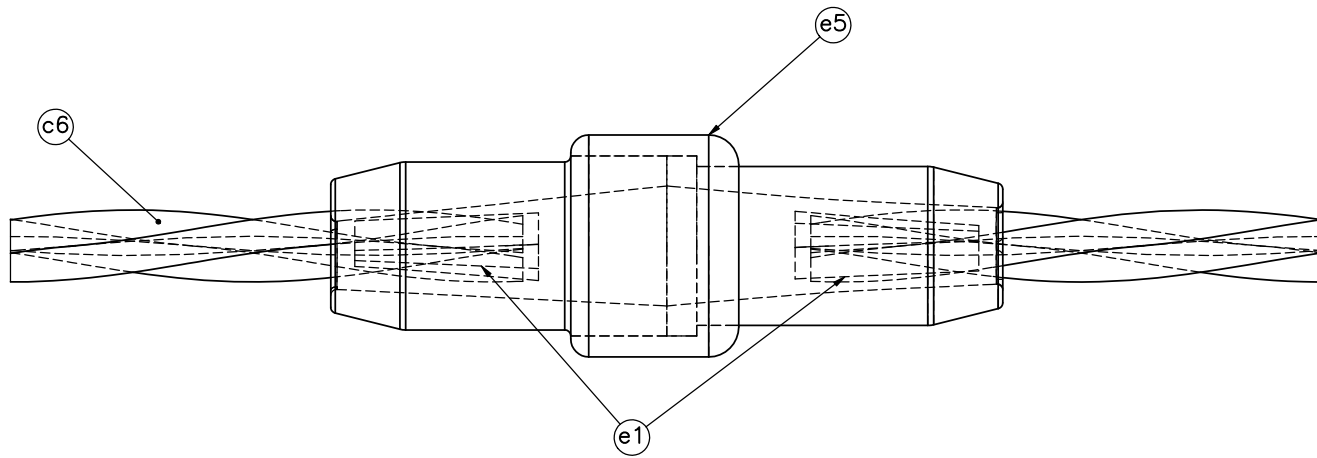


- Notes: (1) Test shall be performed according to test designation no. 3-11 of MASH criteria.
- (2) Impact point is 12" [305] upstream from center of post no. 17. Post nos. 14 through 17 could be used as reference for impact point location.
- (3) Splice locations are relative to impact location.
- (4) Post hole diameter is 2' [610] within the critical region.
- (5) Critical region extends from post nos. 15 through 26 based on location of impact relative to post no. 17.
- (6) Level grading needs to extend 15' [4572] behind the back face of posts.
- (7) Per NYSDOT, cable compensating device is not to be used.
- (8) Target upstream tension is approximately 600 lb. This tension approximately corresponds to a pretension in the impact location of 500 lb, which is the nominal installation tension for the system at 100 deg F, per MASH requirements.

 Midwest Roadside Safety Facility	NY Cable Guardrail New J-Bolt	SHEET: 1 of 16
	System Layout	DATE: 8/27/2013
DWG. NAME: NY-Cable-GR29_2_R1	SCALE: 1:750 UNITS: in.[mm]	DRAWN BY: SDB/ESG REV. BY: KAL/TH/ JCH




DETAIL A

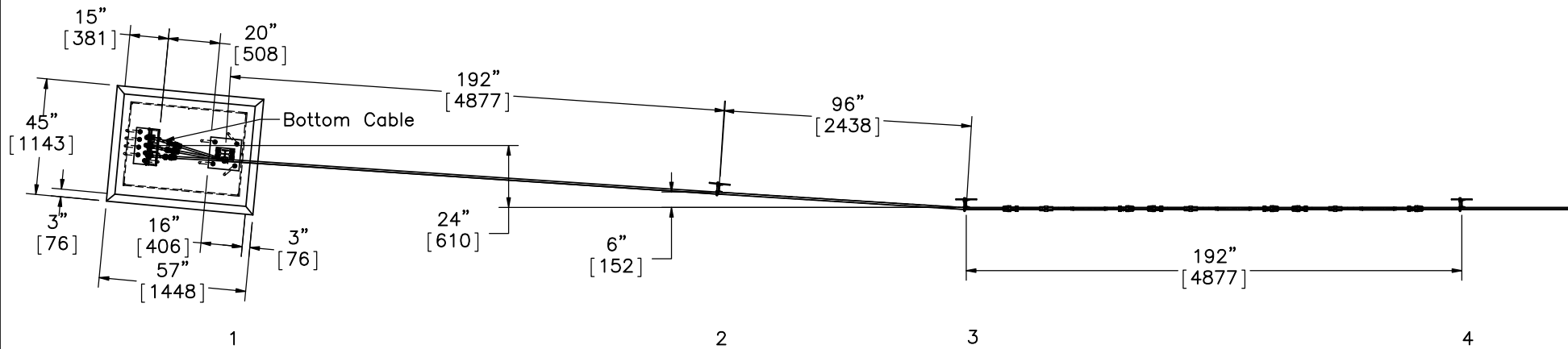


CABLE SPLICE DETAIL

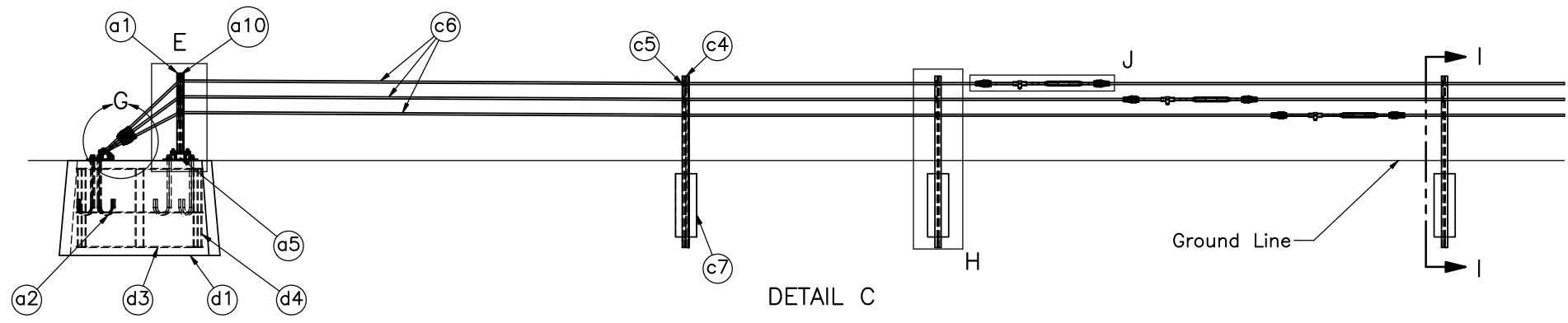
Notes:

- (1) Wedge fittings should be pounded into the cable splices and loaded with an initial tension sufficient to seat the wedge in the strands. One wire should be bent over the wedge to lock the wedge in place.
- (2) Markings should be applied to the cable at the end of the splice. Both initial and final pullout lengths should be measured and recorded.

 Midwest Roadside Safety Facility	NY Cable Guardrail New J-Bolt	SHEET: 2 of 16
	Cable Splice Location	DATE: 8/27/2013
DWG. NAME: NY-Cable-GR29_2_R1	SCALE: 1:70 UNITS: in.[mm]	DRAWN BY: SDB/ESG
		REV. BY: KAL/TH/ JCH




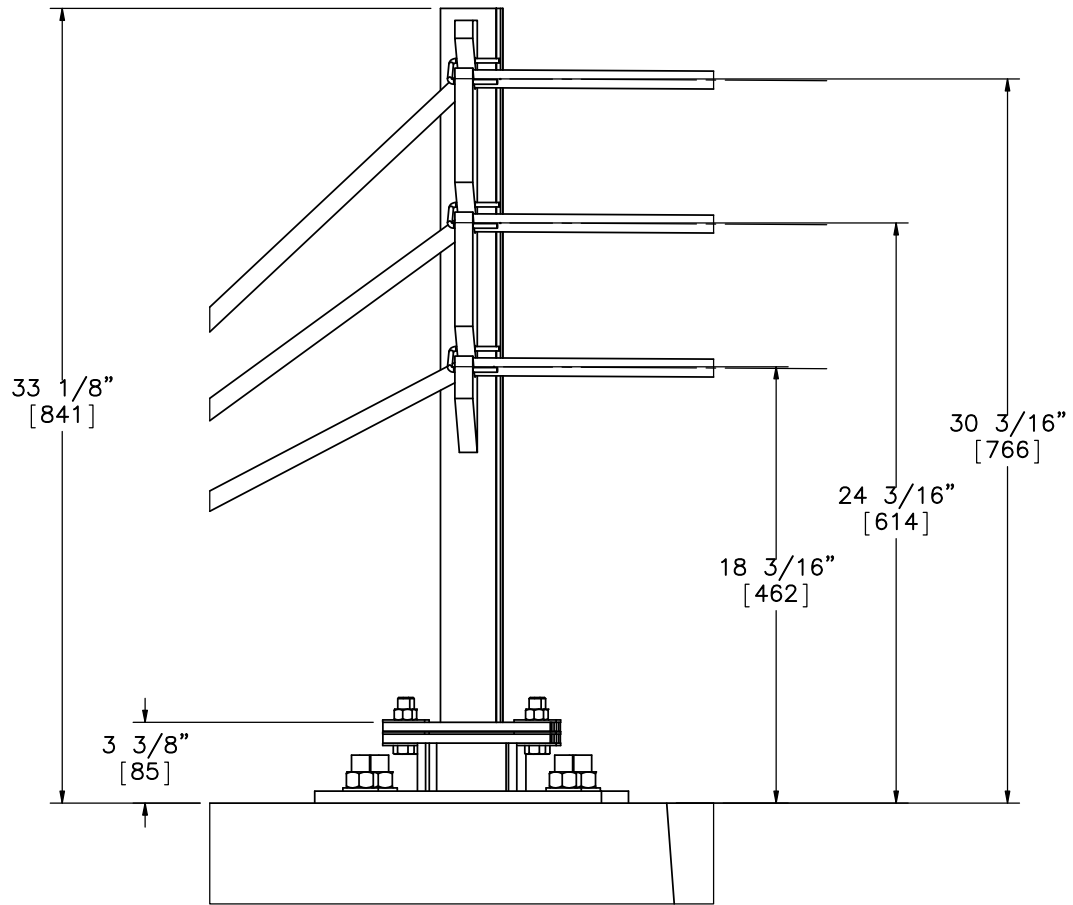
DETAIL B



DETAIL C

- Notes:
- (1) Wedge fittings should be pounded into the cable end fittings and loaded with an initial tension sufficient to seat the wedge in the strands. One wire should be bent over the wedge to lock the wedge in place.
 - (2) Markings should be applied to the cable at the end of the fitting. Both initial and final pullout lengths should be measured and recorded.
 - (3) The threaded rods should be inserted such that the end of the threaded rod is within 1/4" of the wedge before the cable is tensioned.

 Midwest Roadside Safety Facility	NY Cable Guardrail New J-Bolt	SHEET: 3 of 16
	Upstream Cable Terminal Detail	DATE: 8/27/2013
DWG. NAME: NY-Cable-GR29_2_R1	SCALE: 1:60 UNITS: in.[mm]	DRAWN BY: SDB/ESG
		REV. BY: KAL/TH/ JCH



DETAIL E
Post 1



Midwest Roadside
Safety Facility

NY Cable Guardrail
New J-Bolt

End Post Detail

DWG. NAME.
NY-Cable-GR29_2_R1

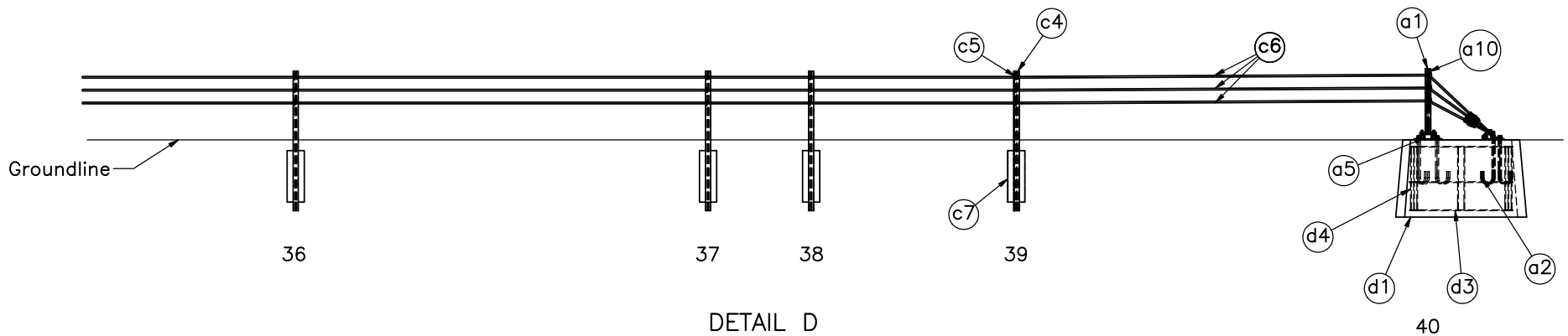
SCALE: 1:8
UNITS: in.[mm]

SHEET:
4 of 16

DATE:
8/27/2013

DRAWN BY:
SDB/ESG

REV. BY:
KAL/TH/
JCH



DETAIL D

- Notes:
- (1) Wedge fittings should be pounded into the cable end fittings and loaded with an initial tension sufficient to seat the wedge in the strands. One wire should be bent over the wedge to lock the wedge in place.
 - (2) Markings should be applied to the cable at the end of the fitting. Both initial and final pullout lengths should be measured and recorded.
 - (3) The threaded rods should be inserted such that the end of the threaded rod is within 1/4" of the wedge before the cable is tensioned.



Midwest Roadside
Safety Facility

NY Cable Guardrail
New J-Bolt

Downstream Cable Terminal
Detail

DWG. NAME:
NY-Cable-GR29_2_R1

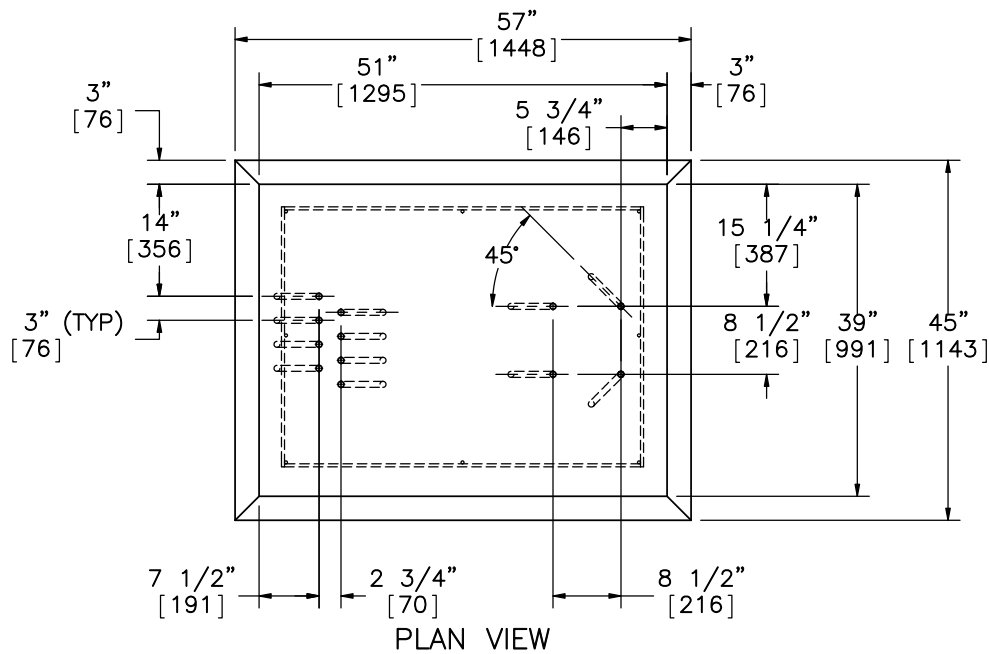
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UNITS: in./mm

SHEET:
5 of 16

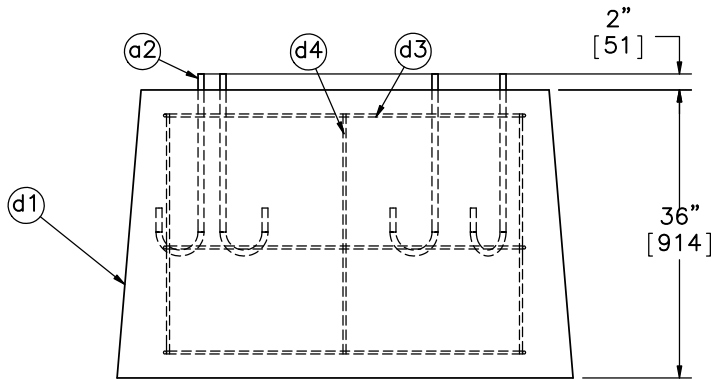
DATE:
8/27/2013

DRAWN BY:
SDB/ESG

REV. BY:
KAL/TH/
JCH

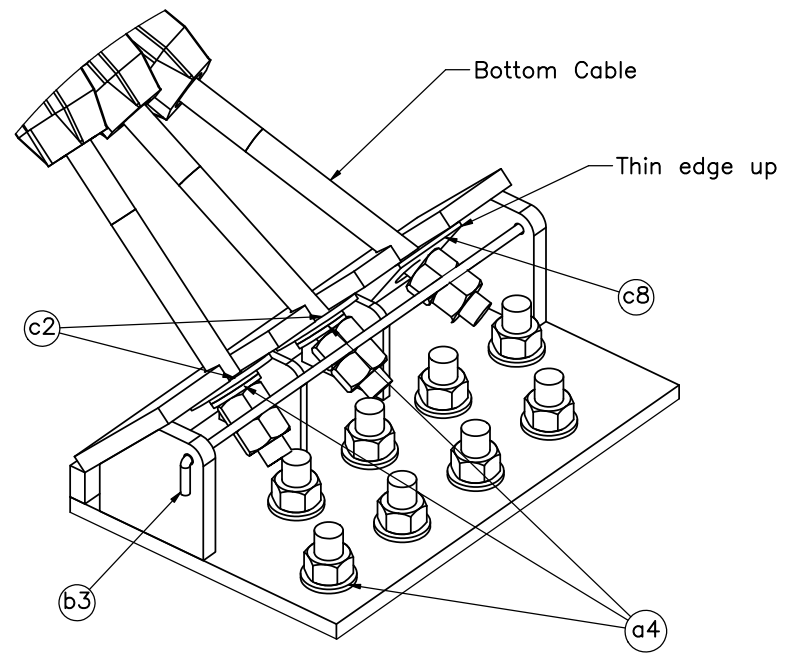


PLAN VIEW

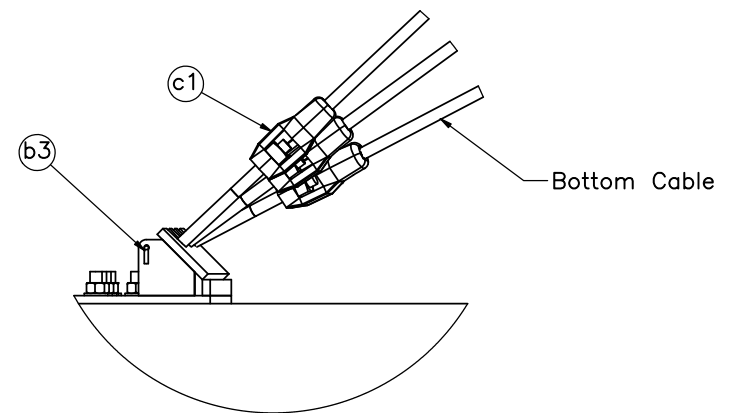


ELEVATION VIEW

Concrete Anchor Block and Hooked Anchor Studs




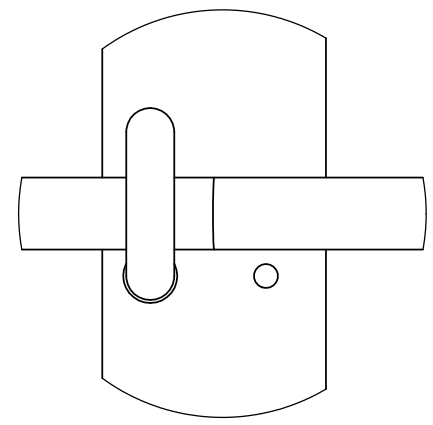
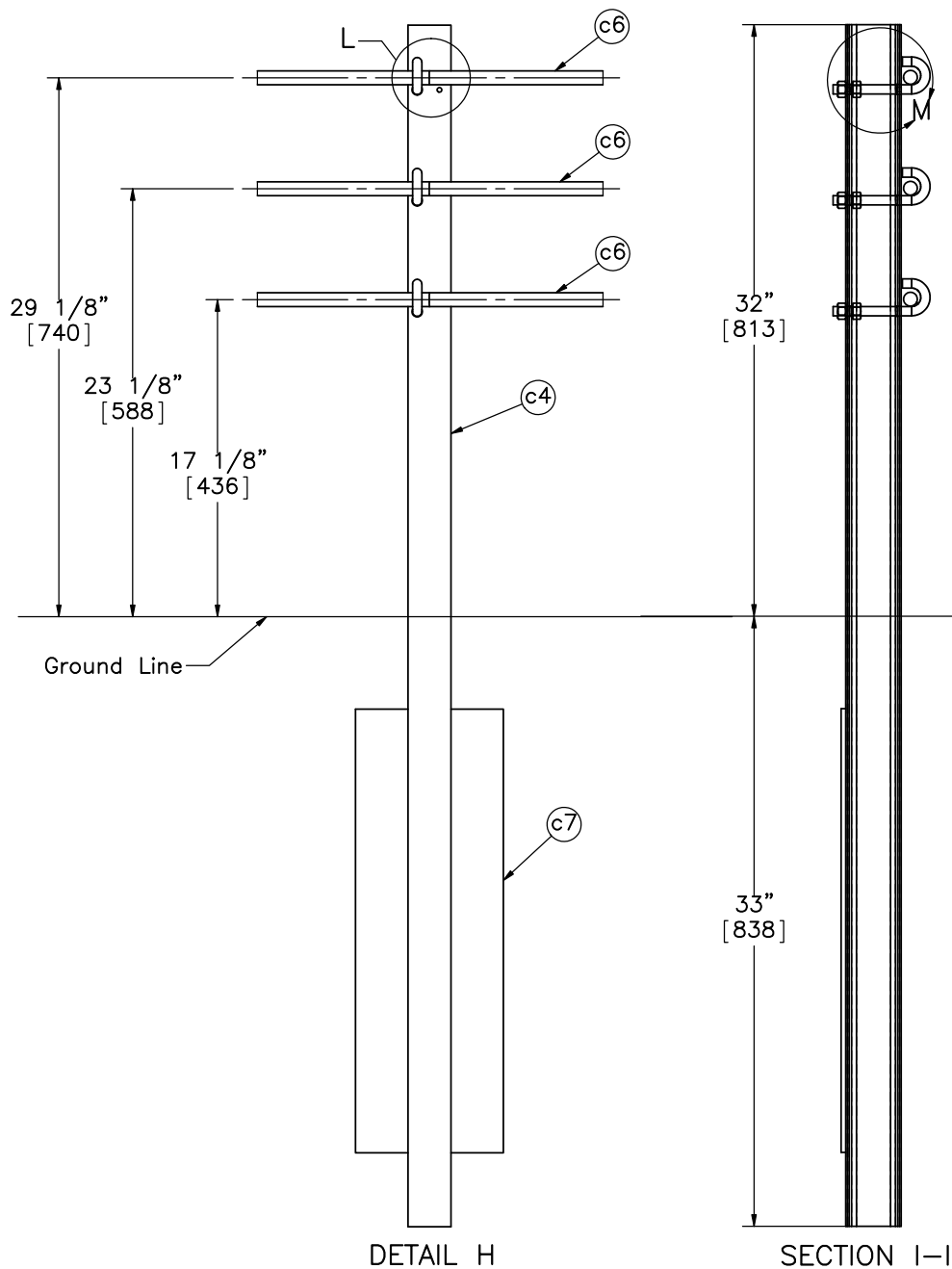
ISOMETRIC VIEW
SCALE 1:5



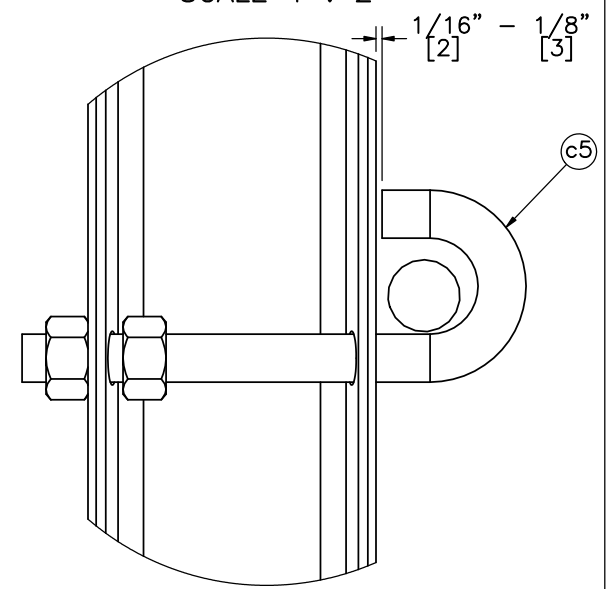
DETAIL G
SCALE 1:12

- Notes: (1) 14 in. [356] long anchor rod with 12 in. [305] embedment depth may be used in place of part no. a2.
 (2) Need to be careful when drilling holes for anchor rods so as to not break out the concrete.
 (3) The threaded rods should be inserted such that the end of the threaded rod is within 1/4" of the wedge before the cable is tensioned.


	NY Cable Guardrail New J-Bolt	SHEET: 6 of 16
	Anchor Details	DATE: 8/27/2013
Midwest Roadside Safety Facility	DWG. NAME: NY-Cable-GR29_2_R1	DRAWN BY: SDB/ESG
	SCALE: 1:24 UNITS: in.[mm]	REV. BY: KAL/TH/ JCH

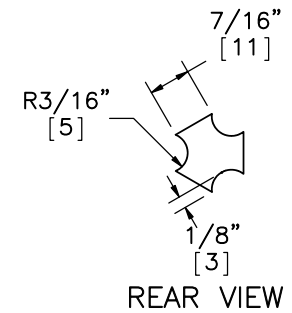
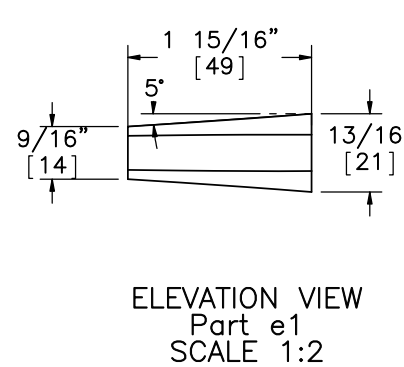
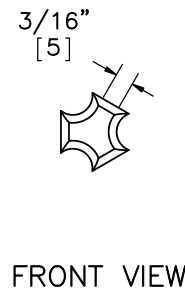
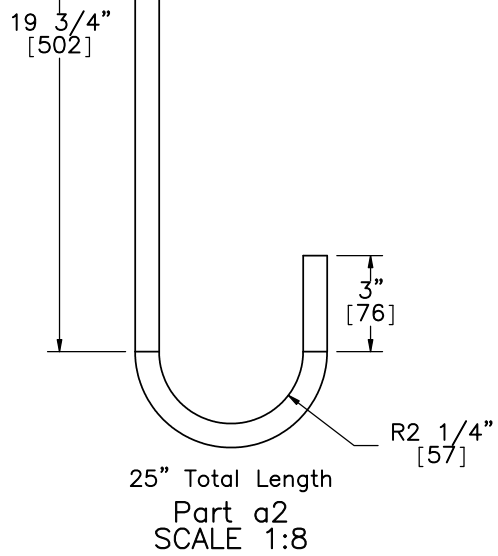
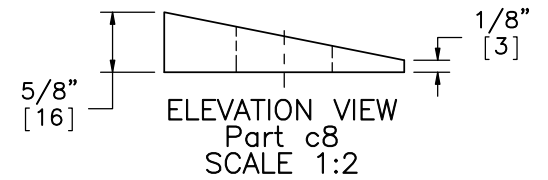
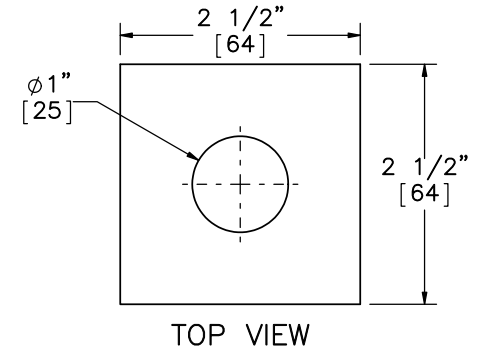
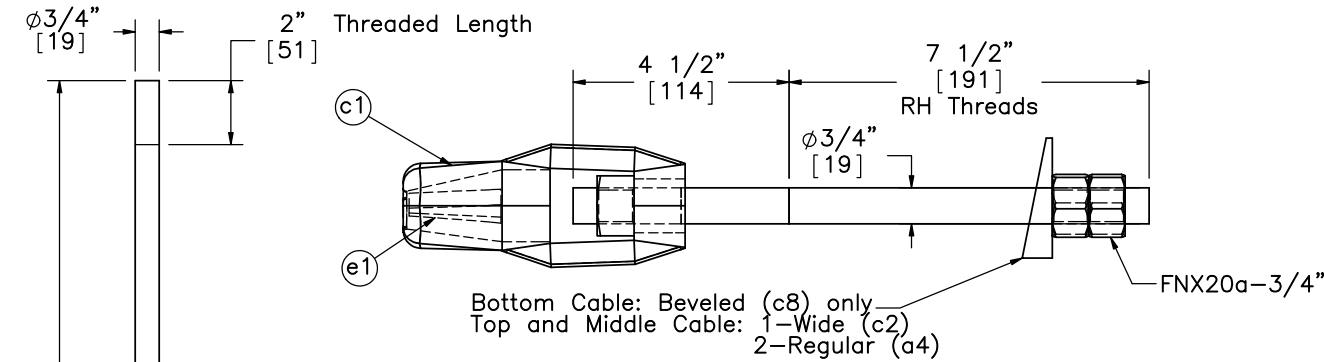
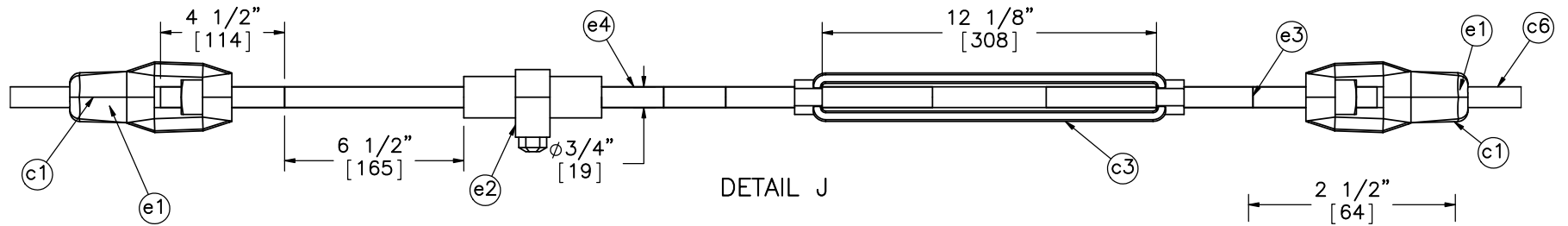


DETAIL L
SCALE 1 : 2



DETAIL M
SCALE 1 : 2

	NY Cable Guardrail New J-Bolt		SHEET: 7 of 16
	S3x5.7 Post Assembly		DATE: 8/27/2013
Midwest Roadside Safety Facility	DWG. NAME: NY-Cable-GR29_2_R1	SCALE: 1:10 UNITS: in.[mm]	DRAWN BY: SDB/ESG
			REV. BY: KAL/TH/ JCH



Washer	Washer Series	Inside Diameter "A"			Outside Diameter "B"			Thickness "C"		
		Basic	Tolerance		Basic	Tolerance		Basic	Max.	Min.
			Plus	Minus		Plus	Minus			
3/4"	Regular	0.812	0.03	0.007	1.469	0.03	0.007	0.134	0.16	0.108
	Wide	0.812	0.03	0.007	2	0.03	0.007	0.165	0.192	0.136
1/2"	Narrow	0.531	0.015	0.005	1.062	0.03	0.007	0.095	0.121	0.074



Midwest Roadside Safety Facility

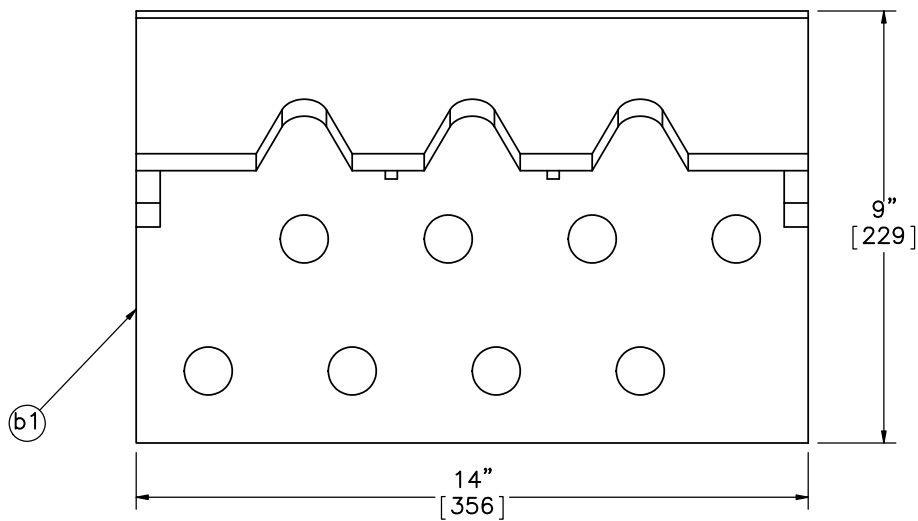
NY Cable Guardrail New J-Bolt

Anchor Stud and Cable Turnbuckle

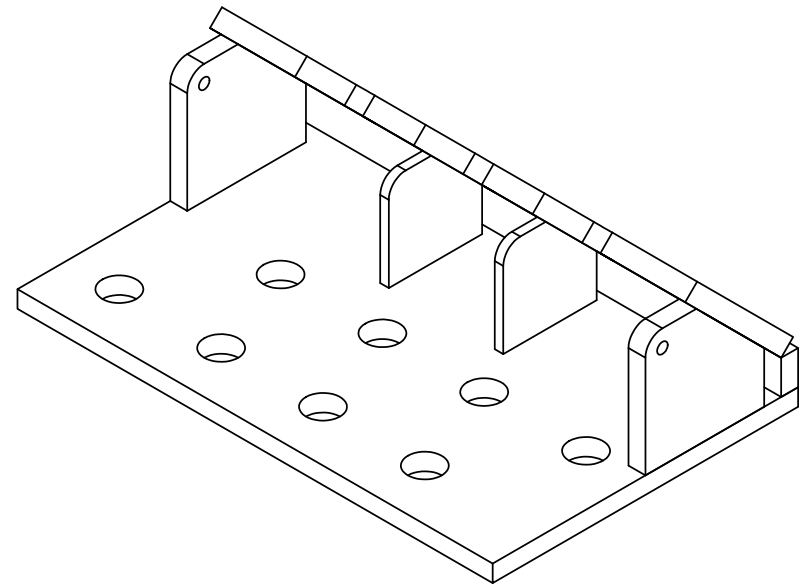
DWG. NAME:
NY-Cable-GR29_2_R1

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

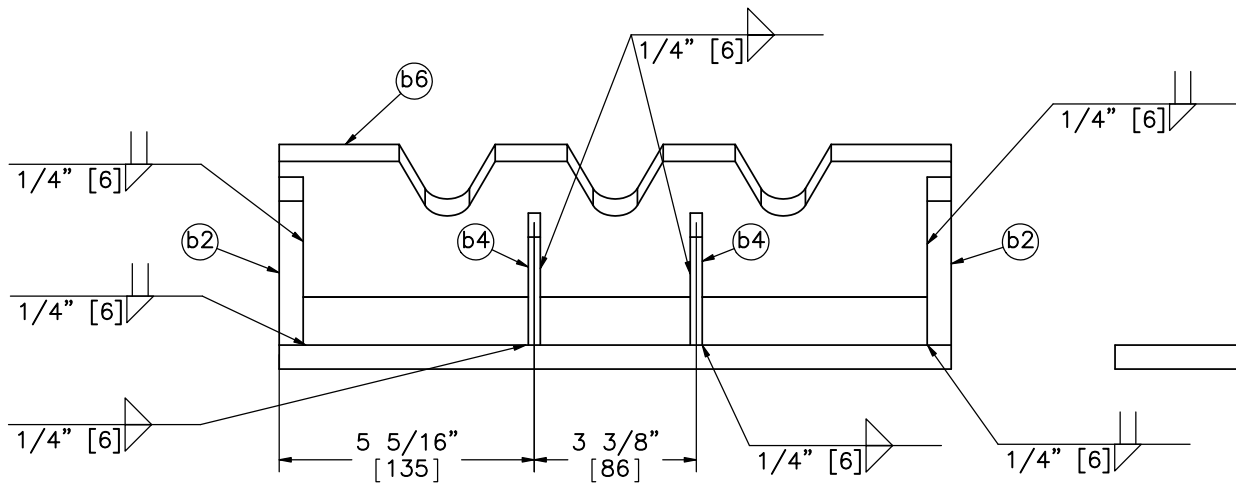
SHEET:
8 of 16
DATE:
8/27/2013
DRAWN BY:
SDB/ESG
REV. BY:
KAL/TH/
JCH



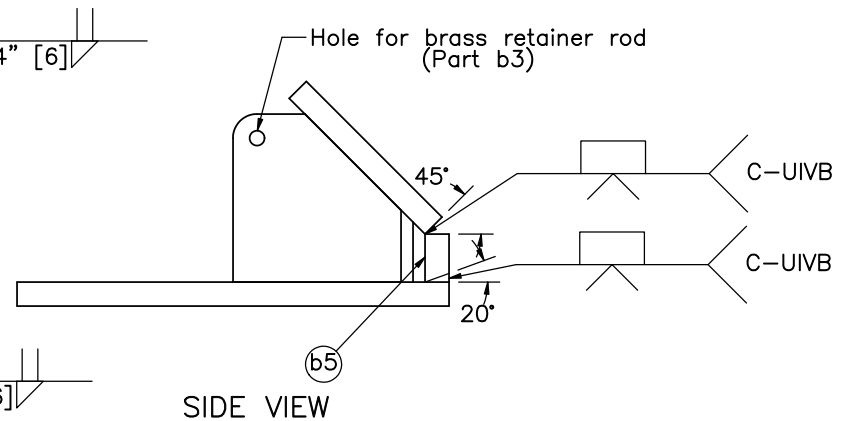
PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW



SIDE VIEW

Note: (1) Brass rods should be inserted into designated holes, and the ends of brass retainer rod should be bent downward to retain rod in anchor.



Midwest Roadside
Safety Facility

NY Cable Guardrail
New J-Bolt

Welded Plate Anchor Angle
Detail

DWG. NAME:
NY-Cable-GR29_2_R1

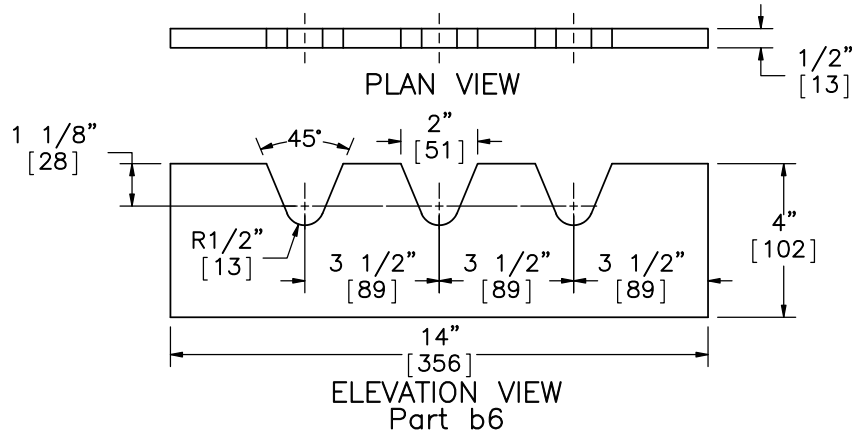
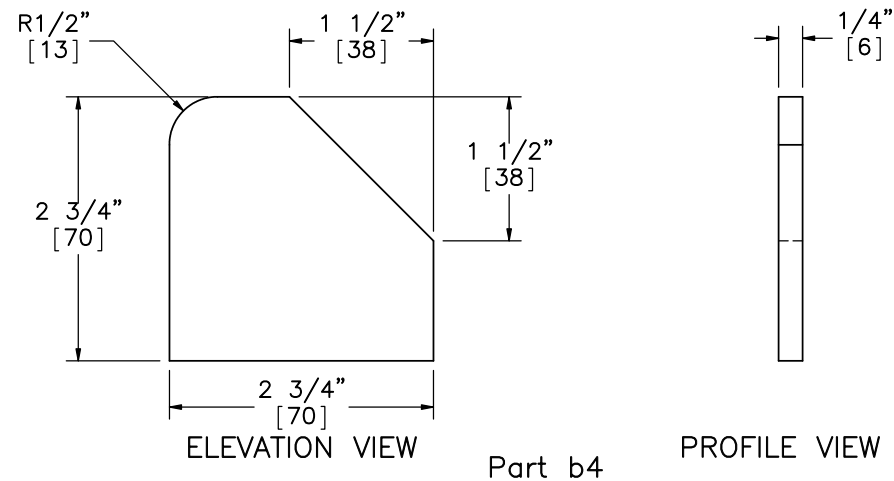
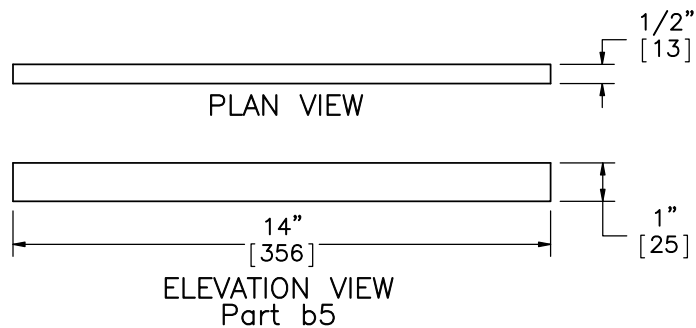
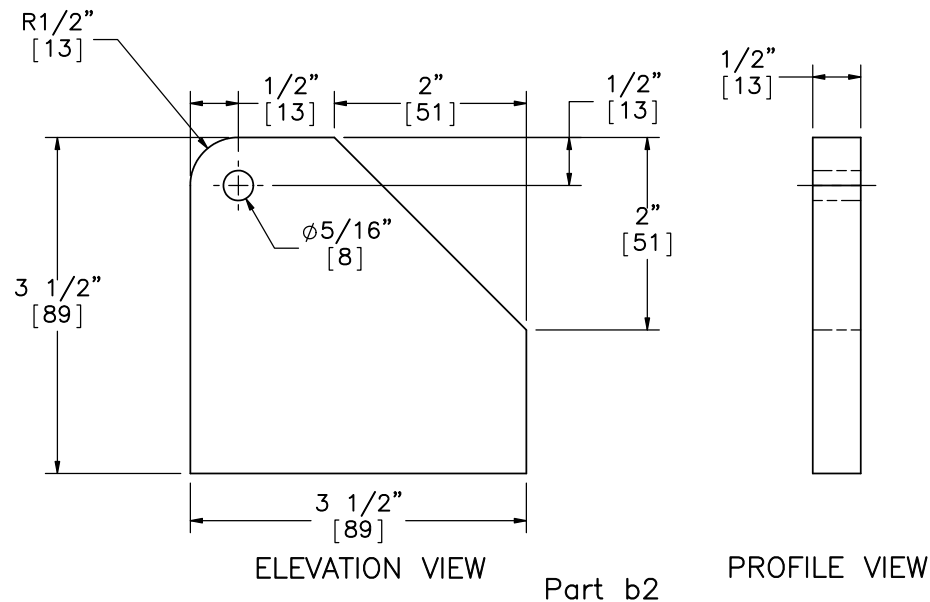
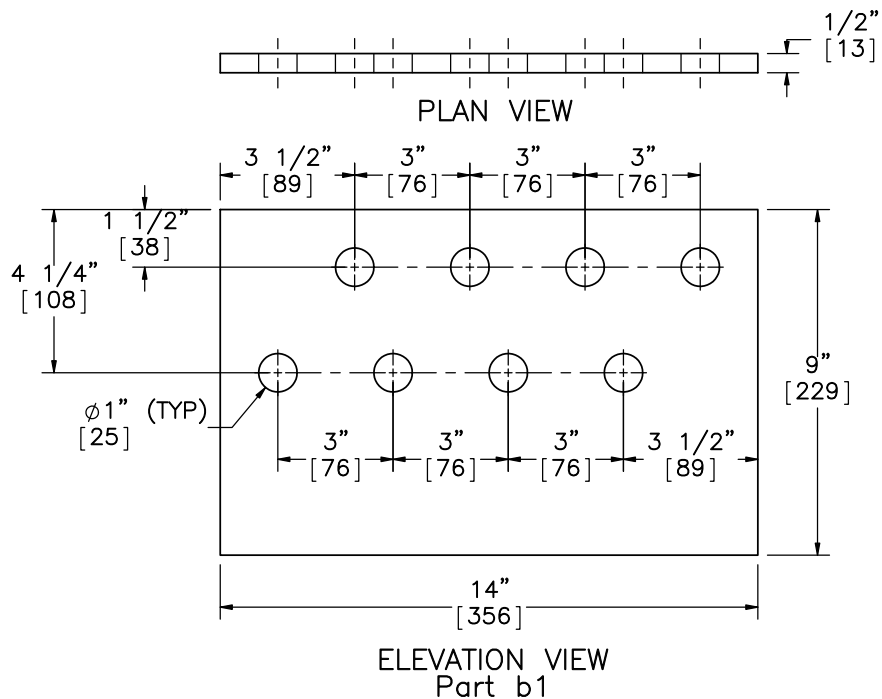
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UNITS: in.[mm]

SHEET:
9 of 16

DATE:
8/27/2013

DRAWN BY:
SDB/ESG

REV. BY:
KAL/TH/
JCH



Midwest Roadside Safety Facility

NY Cable Guardrail New J-Bolt

Welded Plate Anchor Angle Components

DWG. NAME:
NY-Cable-GR29_2_R1

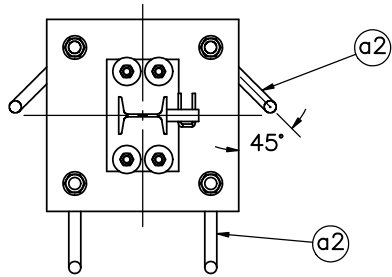
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UNITS: in.[mm]

SHEET:
10 of 16

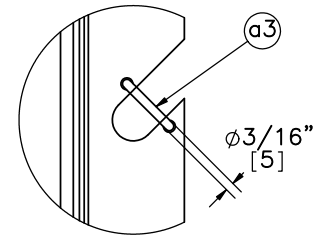
DATE:
8/27/2013

DRAWN BY:
SDB/ESG

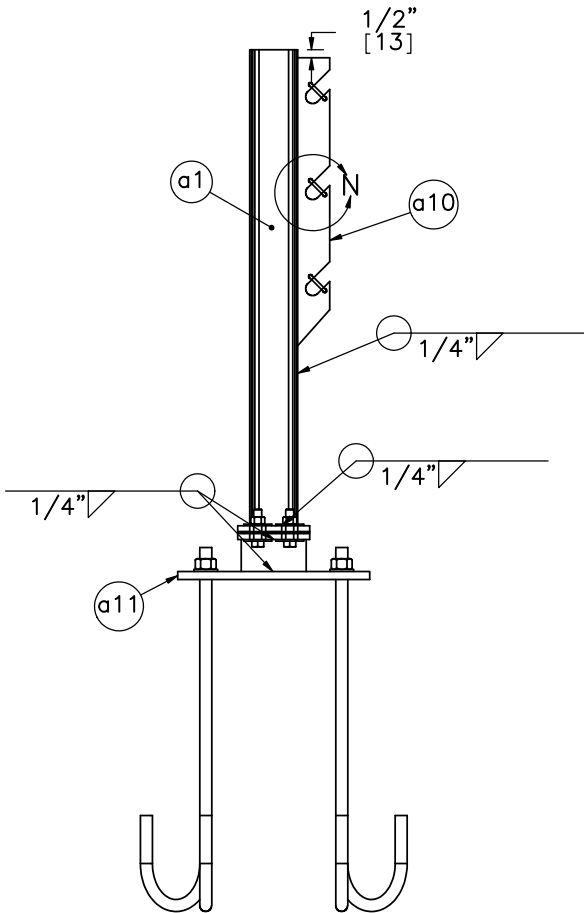
REV. BY:
KAL/TH/JCH



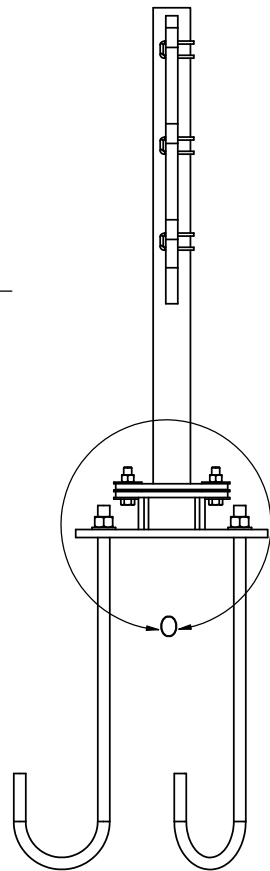
TOP VIEW



DETAIL N
SCALE 1 : 4

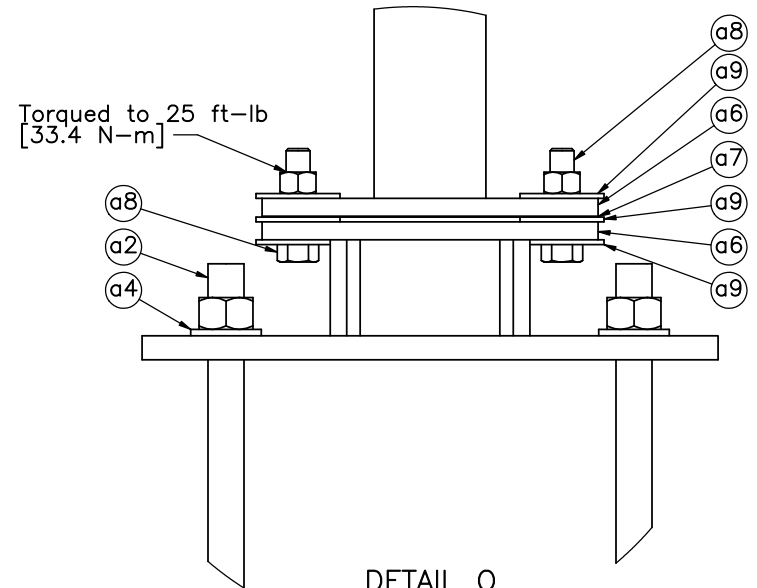


PROFILE VIEW



ELEVATION VIEW

Post nos. 1 and 40



DETAIL O
SCALE 1 : 4



Midwest Roadside
Safety Facility

NY Cable Guardrail
New J-Bolt

Anchor Post Assembly

DWG. NAME:
NY-Cable-GR29_2_R1

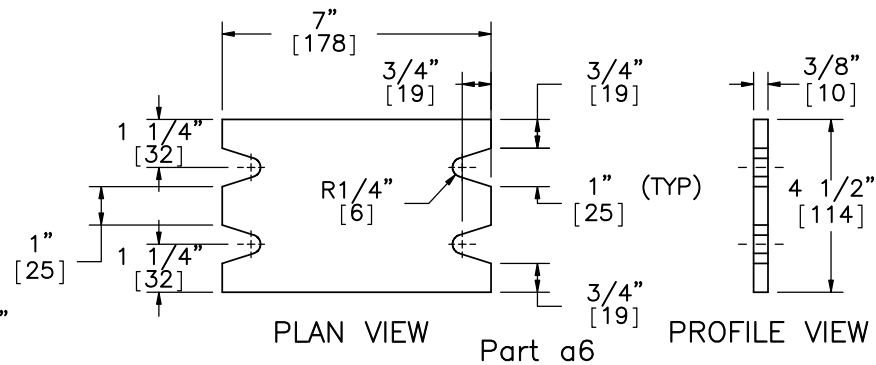
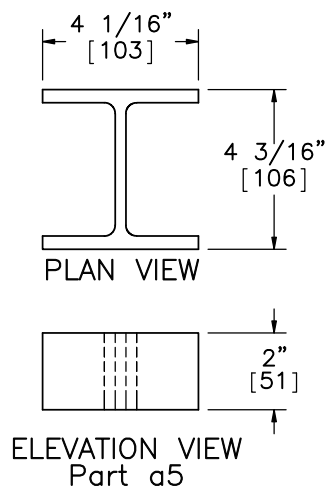
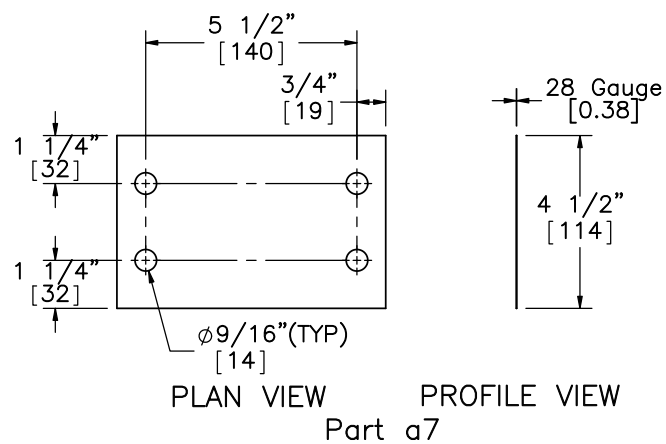
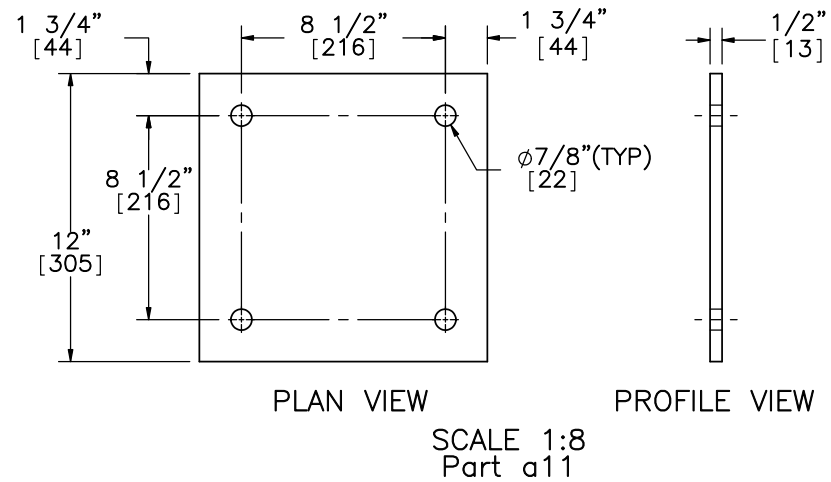
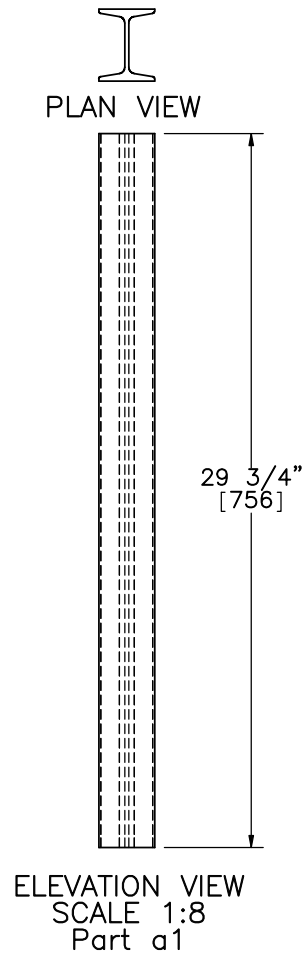
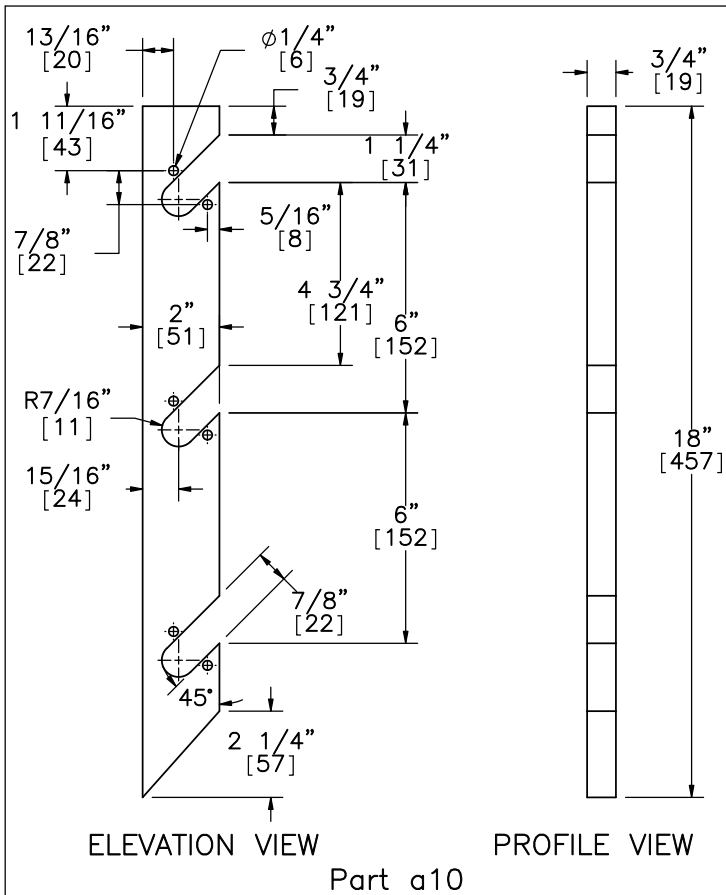
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UNITS: in.[mm]

SHEET:
11 of 16

DATE:
8/27/2013

DRAWN BY:
SDB/ESG

REV. BY:
KAL/TH/
JCH



Midwest Roadside
Safety Facility

NY Cable Guardrail
New J-Bolt

Anchor Post Components

DWG. NAME:
NY-Cable-GR29_2_R1

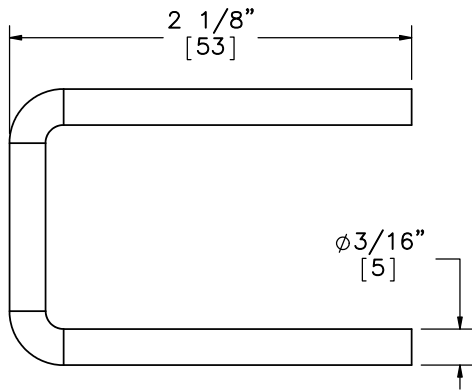
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UNITS: in.[mm]

SHEET:
12 of 16

DATE:
8/27/2013

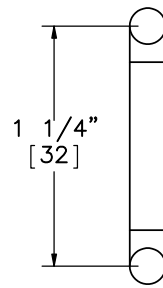
DRAWN BY:
SDB/ESG

REV. BY:
KAL/TH/
JCH

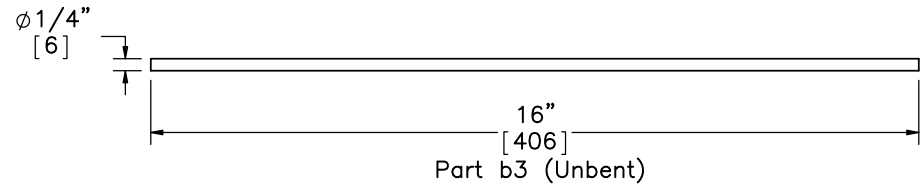


ELEVATION VIEW

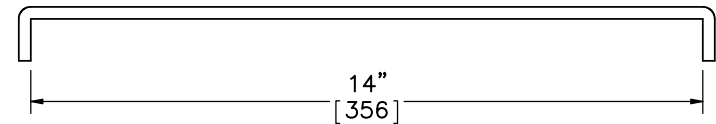
Part a3



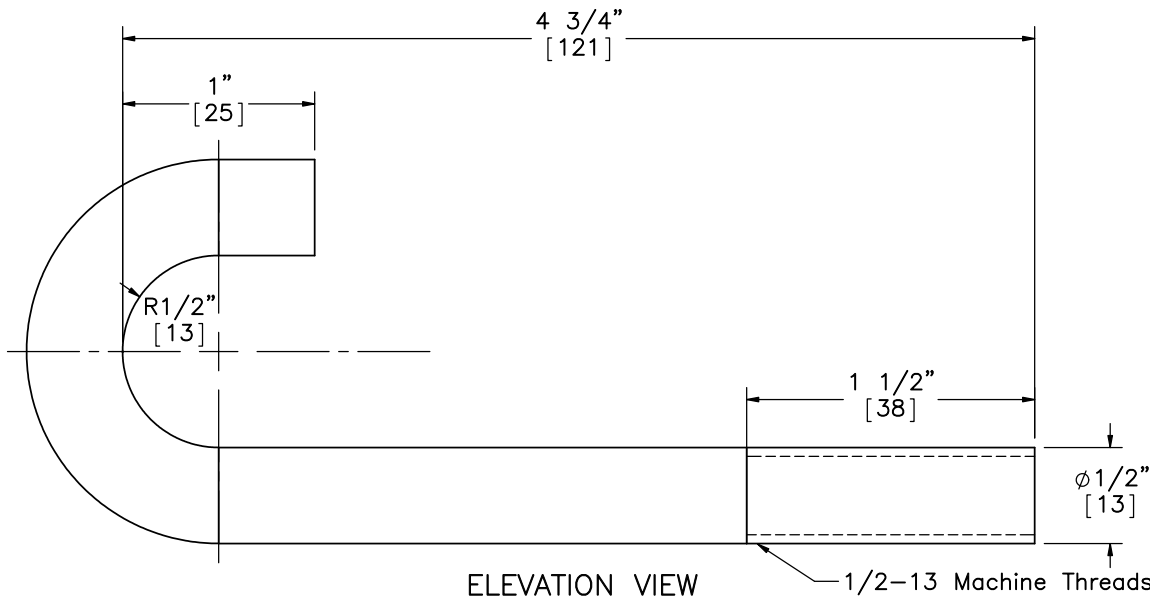
PLAN VIEW



Part b3 (Unbent)

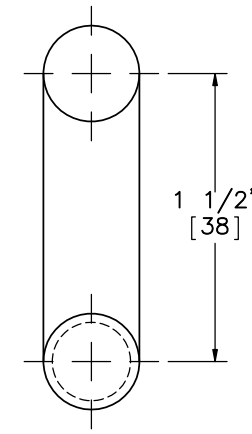


Part b3



ELEVATION VIEW

Part c5



PLAN VIEW

Note: (1) For testing purposes, the j-bolt may be fabricated from ASTM A36 round bar stock which is bent and threads cut and then galvanized.



Midwest Roadside Safety Facility

NY Cable Guardrail
New J-Bolt

J-Bolt and Brass Rod Details

DWG. NAME:
NY-Cable-GR29_2_R1

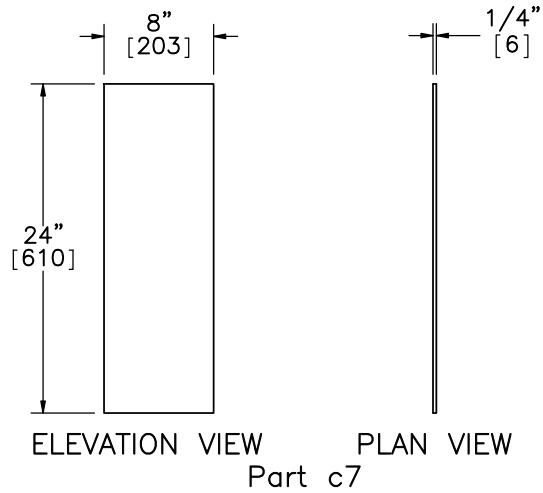
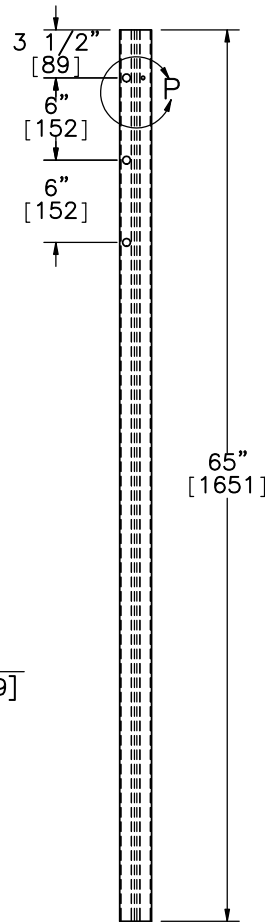
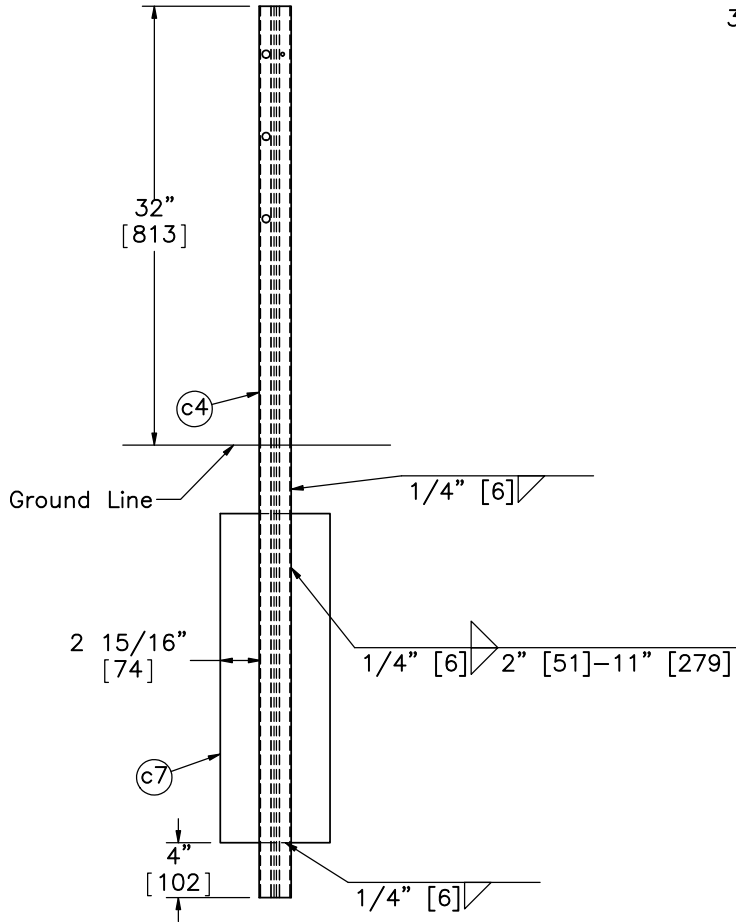
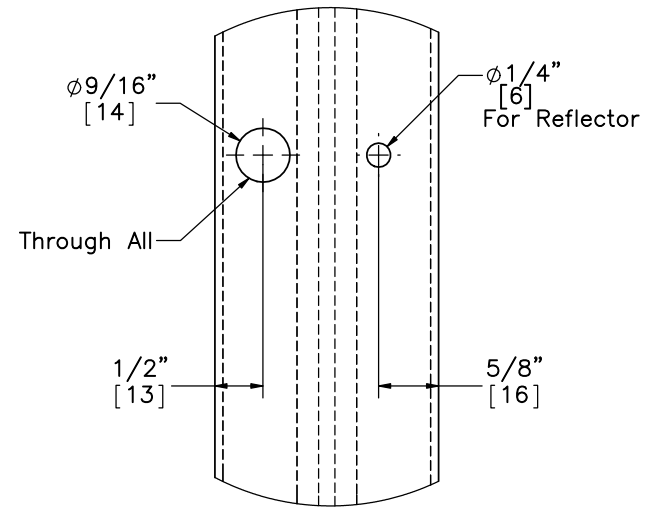
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UNITS: in.[mm]

SHEET:
13 of 16

DATE:
8/27/2013

DRAWN BY:
SDB/ESG

REV. BY:
KAL/TH/
JCH



NOTE: (1) Soil plate on non-impact side.



Midwest Roadside
Safety Facility

NY Cable Guardrail
New J-Bolt

Line Post

DWG. NAME:
NY-Cable-GR29_2_R1

SCALE: 1:14
UNITS: in.[mm]

SHEET:
14 of 16
DATE:
8/27/2013
DRAWN BY:
SDB/ESG
REV. BY:
KAL/TH/
JCH

Item No.	QTY.	Description	Material Specification	Hardware Guide
a1	2	S3x5.7 [S76x8.5] 29 3/4" [756] Long Anchor Post	ASTM A36 Galv.	-
a2	24	3/4" [19] Dia. UNC, Hooked Anchor J-Bolt and Nut	ASTM A307 Gr. C and ASTM A563 DH Galv.	FRH20a
a3	6	3/16" [5] Dia. 5 1/4" [133] Long Brass Rod	ASTM B16-00	-
a4	32	3/4" [19] Dia. Plain Round Washer (OD 1.5" [38])	ASTM F844/SAE Gr. 2	FWC20a
a5	2	W4x13 [W102x19.3] Anchor Post Stub	ASTM A36 Galv.	-
a6	4	7"x4 1/2"x3/8" [178x114x10] Slip Impact Base	ASTM A36 Galv.	-
a7	2	7"x4 1/2"x28 Gauge [178x144x0.38] Keeper Plate	ASTM A36 Galv.	-
a8	8	1/2" [13] Dia. UNC, 2" [51] Long Bolt and Nut	ASTM A307 Gr. A/ASTM F1554 Gr. 36/SAE Gr. 2 and ASTM A563 Gr. A	FBX14a
a9	24	1/2" [13] Dia. Narrow Washer (OD 1" [25])	ASTM 844/SAE Gr. 2	FWC12a
a10	2	18"x2"x3/4" [457x51x19] Anchor Post Cable Hanger	ASTM A707 Gr. 36 Galv.	-
a11	2	12"x12"x1/2" [305x305x13] Anchor Post Base	ASTM A709 Gr. 36 Galv.	-
b1	2	14"x9"x1/2" [356x229x13] Cable Anchor Base Plate	ASTM A709 Gr. 36 Galv.	-
b2	4	3 1/2"x3 1/2"x1/2" [89x89x13] Cable Anchor External Gusset	ASTM A709 Gr. 36 Galv.	-
b3	2	1/4" [6] Dia. 16" [406] Long Brass Rod	ASTM B16-00	-
b4	4	2 3/4"x2 3/4"x1/4" [70x70x6] Cable Anchor Internal Gusset	ASTM A709 Gr. 36 Galv.	-
b5	2	14"x1"x1/2" [356x25x13] Cable Anchor Front Plate	ASTM A709 Gr. 36 Galv.	-
b6	2	14"x4"x1/2" [356x102x13] Cable Anchor Top Plate	ASTM A709 Gr. 36 Galv.	-
c1	12	Cable End Fitting	ASTM A27 Galv.	RCE03
c2	4	3/4" [19] Plain Round Washer (OD 2" [51])	ASTM F844/SAE Gr. 2 Galv.	FWC20a
c3	3	Cable Turnbuckle	AASHTO M269/ASTM F1145	-
c4	38	S3x5.7 [S76x8.5] 65" [1651] Long Line Post	ASTM A36	-
c5	114	1/2" [13] J-Bolt and Nut	Bolt ASTM A36 and Nut ASTM A563DH Galv.	-
c6	3	3/4" [19] Dia. Cable Approx. 600' [183 m]	AASHTO M30 Type 1 Class A Galv.	RCM01
c7	38	2'x8"x0.25" Soil Plate	ASTM A36 Galv.	-
c8	2	1" [25] Dia. Beveled Washer	ASTM A36	-
d1	2	Concrete Anchor Block	3000 psi [20.68 MPa] Compressive Strength	-
d2	12	32 1/2" [826] Long #3 [#10] Rebar	ASTM A36	-
d3	12	44 1/2" [1130] Long #3 [#10] Rebar	ASTM A36	-
d4	16	30" [762] Long #3 [#10] Rebar	ASTM A36	-
e1	18	Cable Wedge	ASTM A47 Gr. 32510	-
e2	3	50,000-lb Load Cell	N/A	-
e3	12	3/4" [19] Dia. UNC Threaded Rod	ASTM A449	-
e4	3	3/4" [19] Dia. UNC Left-Handed Threaded Rod	ASTM A449	-
e5	3	3/4" [19] Cable Splice	ASTM A536	-



Midwest Roadside
Safety Facility

NY Cable Guardrail
New J-Bolt


Bill of Materials

DWG. NAME.
NY-Cable-GR29_2_R1

SCALE: NONE
UNITS: in.[mm]

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DRAWN BY:
SDB/ESG
REV. BY:
KAL/TH/
JCH

- (1) All posts shall be S3x5.7 rolled steel section. The anchor post stub shall be W4x13.
- (2) 3/4" round wire cable shall consist of three strands (7 wires per strand) and have a minimum tensile strength of 25,000 lbf.
- (3) Cable ends shall be fabricated from malleable iron or cast steel. The cable splice and wedge shall be fabricated from malleable iron or ASTM A536 ductile iron 65-42-12.
- (4) All cable ends and splices shall be designed to use the wedge shown on sheet 11 and shall develop the full strength of the 3/4" round cable (25000 lb). The cables, ends, and splices shall be hot dipped galvanized as indicated in material specification for cable guide rail. The wedge shall not be galvanized.
- (5) Stagger cable splices. Provide a minimum of 20' between any pair. Provide a minimum of 100' between cable splices on the same cable.
- (6) Alternate designs for the steel turnbuckle cable end assembly or spring cable end assembly shall be submitted for approval.
- (7) Tension cable such that the upstream load cell records an initial tension of approximately 600 lb.
- (8) The concrete anchor shall be set into the excavation as detailed. The bottom of the anchor shall have a full and even bearing on the surface under it. The top shall be back filled in accordance with the requirements of 203-3.15 "fill and back fill at structures, culverts, pipes, conduits, and direct burial cables."
- (9) Do not install cable guide railing on curves with a centerline radius of less than 440'.
- (10) Curbs greater than 3" high are not to be retained or placed if design, posted, or operating speed exceeds 35 mph. Rail mounting height is to be measured from pavement if offset between pavement and curb is less than or equal to 9" and from ground beneath rail if offset > 9".
- (11) Lifting devices, if embedded in concrete, shall be rated by their manufacturer as having a "safe working load" of four tons.
- (12) At all locations where the cable is connected to a cable socket with a wedge type connection, one wire of the wire rope shall be crimped over the base of the wedge to hold it firmly in place. Per NY specs, Engineering Instruction EI 07-026, "Place a splice end over a cable. Twist the cable to separate the three strands. Insert the wedge into the center of the strands, leaving at least 1" of excess cable, and pull back until wedge is snug to the splice. Pound the wedge into the splice. Crimp at least one wire of the cable over the wedge. Repeat this procedure for the other cable. Connect the two splice ends together."
- (13) The threaded rods should be installed such that the end of the threaded rod is within 1/4" of the wedge prior to tensioning the cable.

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