

- Notes: (1) Post nos. 1-9 and 32-40 are flared over 1 ft [305] to account for post nos. 1 and 40 being offset 3 ft [914] instead of 4 ft [1219].
- (2) Impact point at 5'-4" [1626] downstream of post no. 16 was used to allow for the potential maximum underride of the vehicle.
- (3) Post nos. 3-14 and 21-38 were old posts with 3" [76] shallower embedment but also located outside of impact regions
- (4) Post nos. 15-28 placed in 18" [457] diameter hole backfilled and tamped in NCHRP 350 soil.



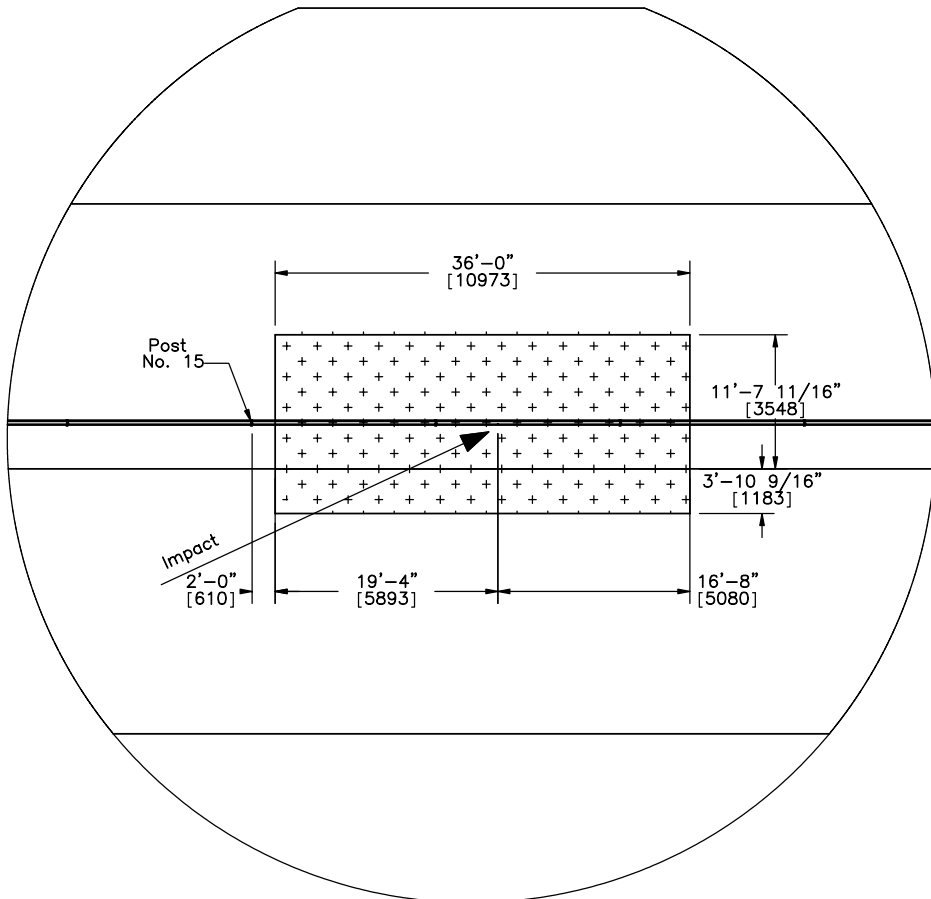
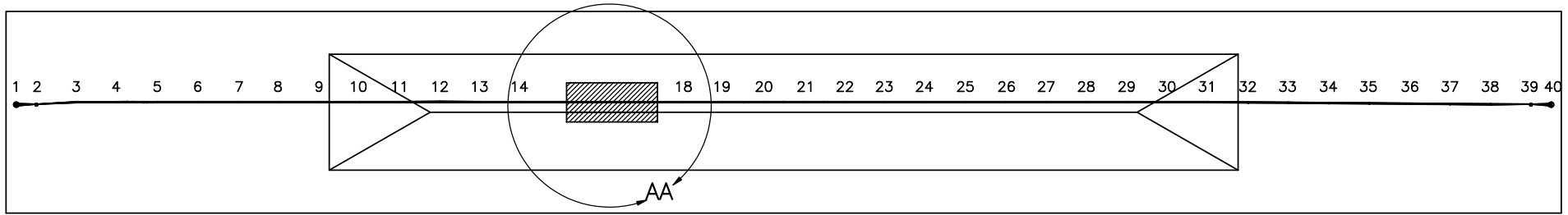
Midwest Roadside Safety Facility

4-Cable Median Barrier System Layout - 4CMB-3

DWG. NAME:
CableMedianBarrier-4CMB-3_R7


SCALE: 1:750
UNITS: Inches

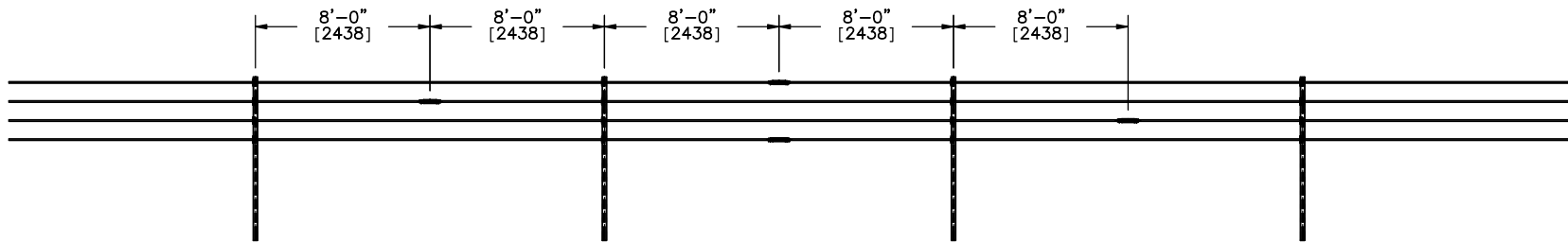
SHEET:
1 of 17
DATE:
11/16/11
DRAWN BY:
CSS/CME/
RJT/MJW/
JGP
REV. BY:
RKF/KAL



- Notes: (1) Well compacted NCHRP 350 soil region is to begin 19'-4" [5893] upstream from impact point.
- (2) Slope between post nos. 14 and 20 must be within testing tolerance of 1/4" [6.4].
- (3) Slope between post nos. 20 and 23 should be reasonably close but does not have to be exact.

DETAIL AA
SCALE 1 : 200

	4-Cable Median Barrier Soil Detail View	SHEET: 2 of 17
		DATE: 11/16/11
Midwest Roadside Safety Facility	DWG. NAME: CableMedianBarrier-4CMB-3_R7	DRAWN BY: CSS/CME/ RJT/MJW/ JGP
	SCALE: 1:750 UNITS: Inches	REV. BY: RKF/KAL



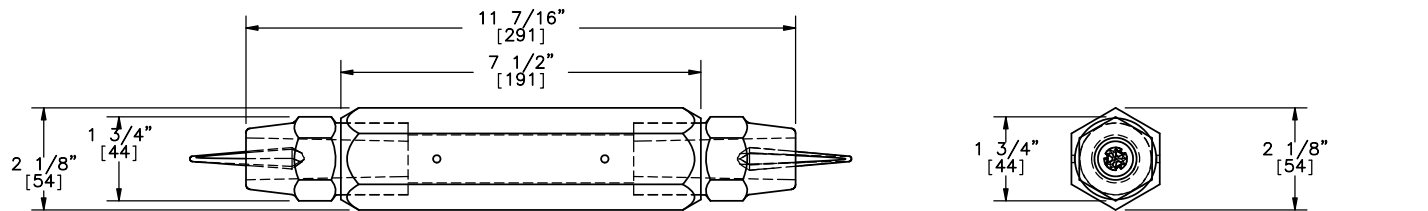
19

20

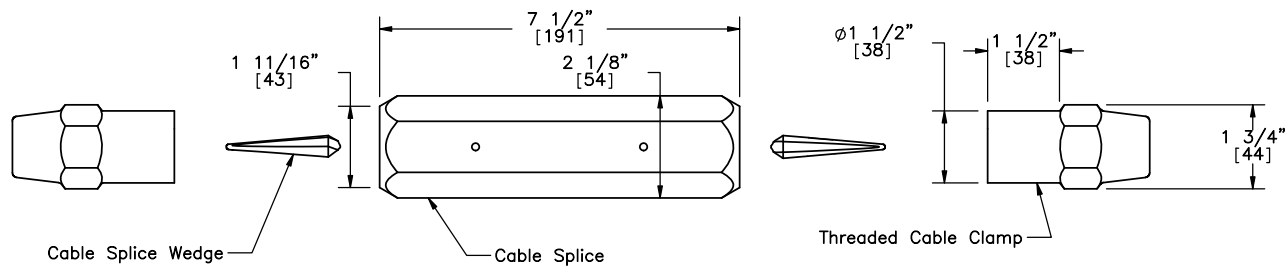
21

22

DETAIL B
Brifen Cable Splice Location Detail
(Ground Not Shown)



Cable Splice Detail
Part G



Cable Splice Exploded View



Midwest Roadside
Safety Facility

4-Cable Median Barrier
Cable Splice Location and
Detail

SHEET:
3 of 17

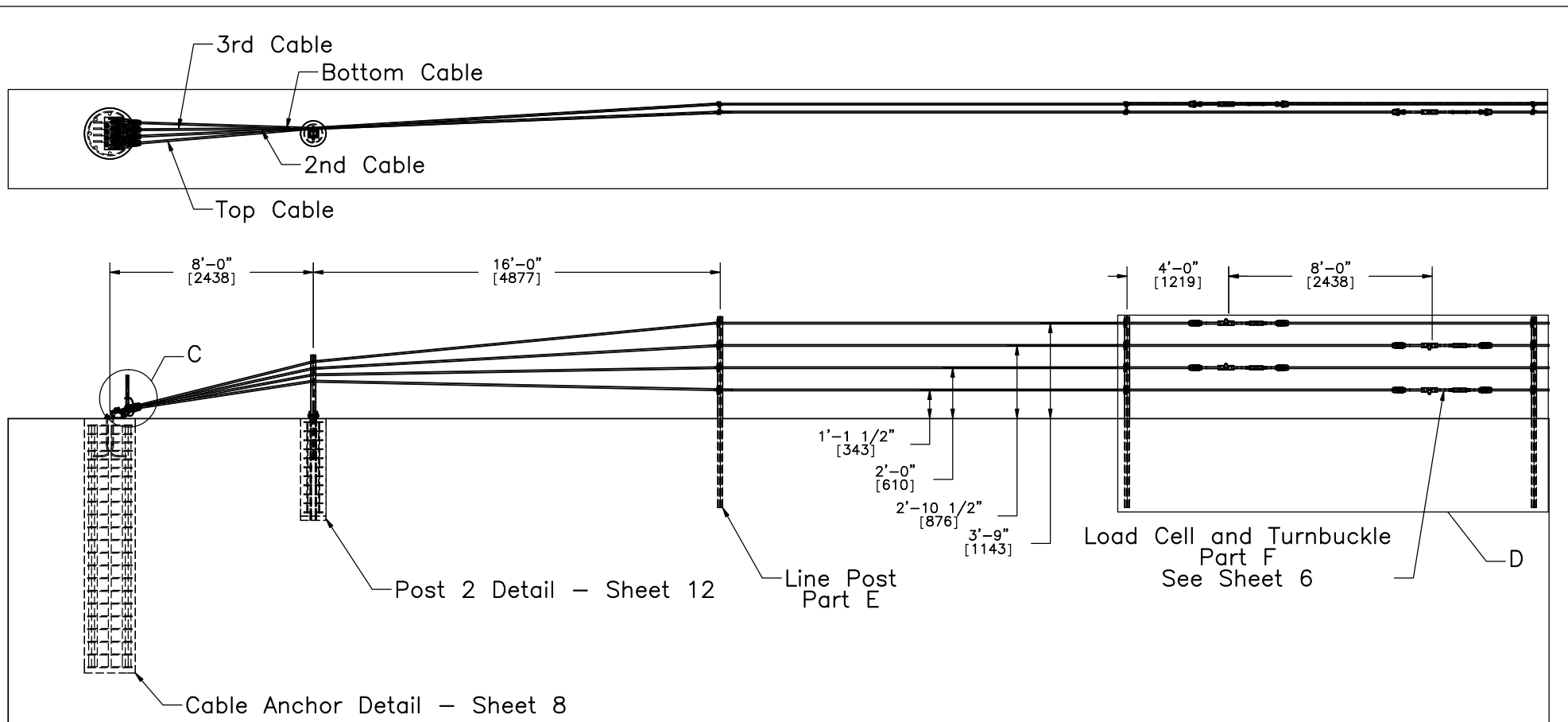
DATE:
11/16/11

DRAWN BY:
GSS/CME/
RJT/MJW/
JGP


DWG. NAME:
CableMedianBarrier-4CMB-3_R7

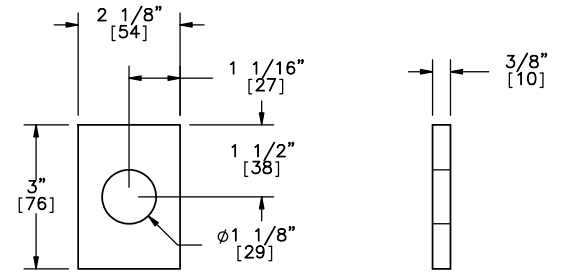
SCALE: 1:100
UNITS: Inches

REV. BY:
RKF/KAL

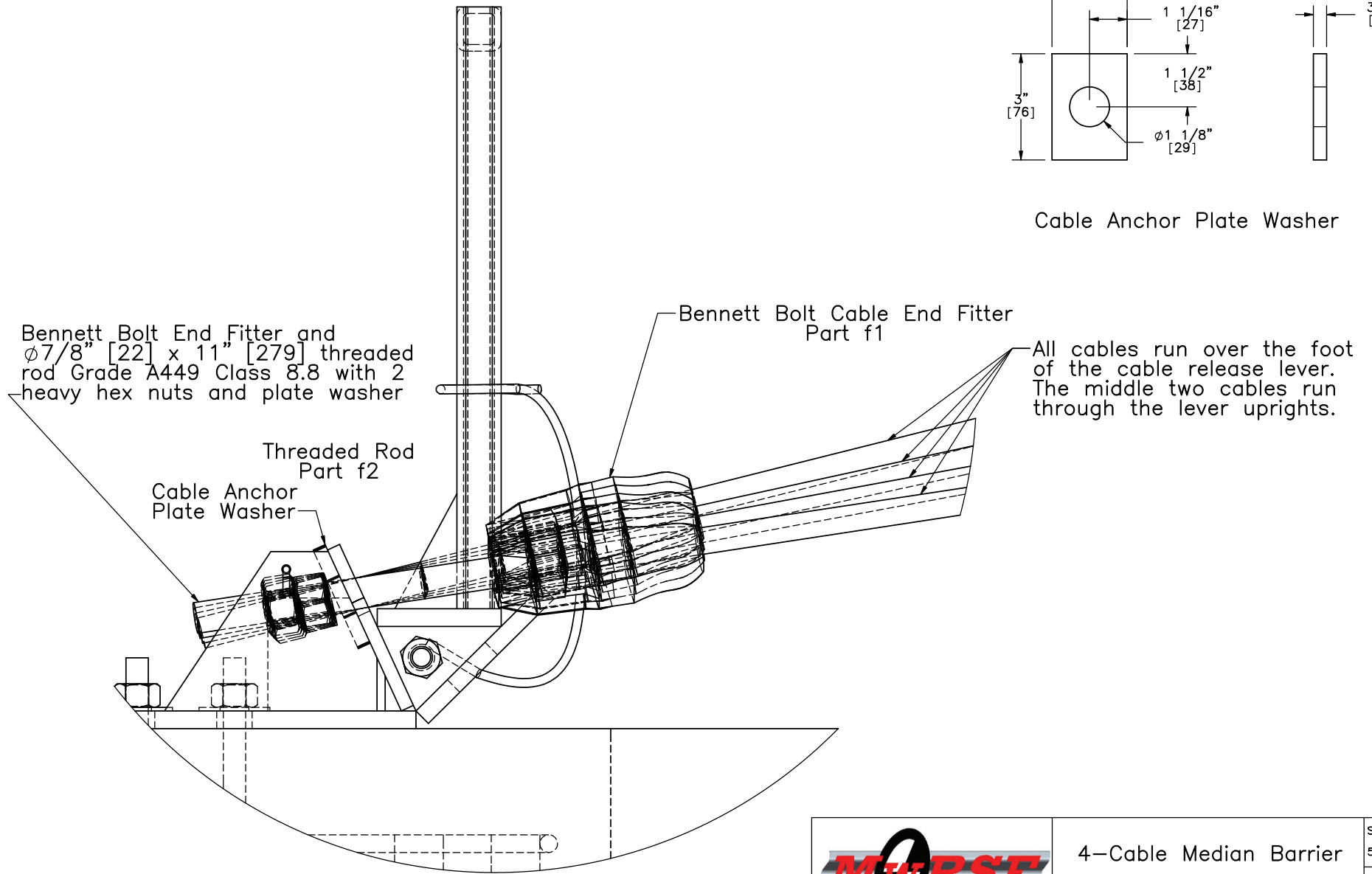


Note: Slip base posts in terminal were omitted due to cost considerations.

	4-Cable Median Barrier	SHEET: 4 of 17
	Cable Terminal Detail As Built	DATE: 11/16/11
Midwest Roadside Safety Facility	DWG. NAME. CableMedianBarrier-4CMB-3_R7	DRAWN BY: CSS/CME/ RJT/MJW/ JGP
	SCALE: 1:72 UNITS: Inches	REV. BY: RKF/KAL



Cable Anchor Plate Washer



Bennett Bolt End Fitter and $\phi 7/8$ " [22] x 11" [279] threaded rod Grade A449 Class 8.8 with 2 heavy hex nuts and plate washer

Bennett Bolt Cable End Fitter Part f1

All cables run over the foot of the cable release lever. The middle two cables run through the lever uprights.

Threaded Rod Part f2

Cable Anchor Plate Washer

DETAIL C
SCALE 1 : 4

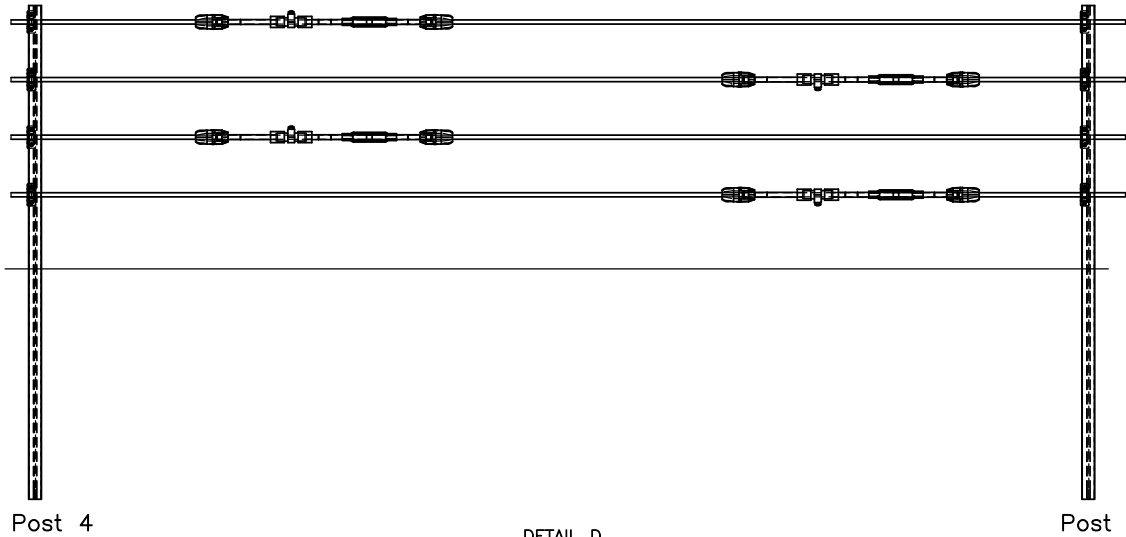


Midwest Roadside Safety Facility

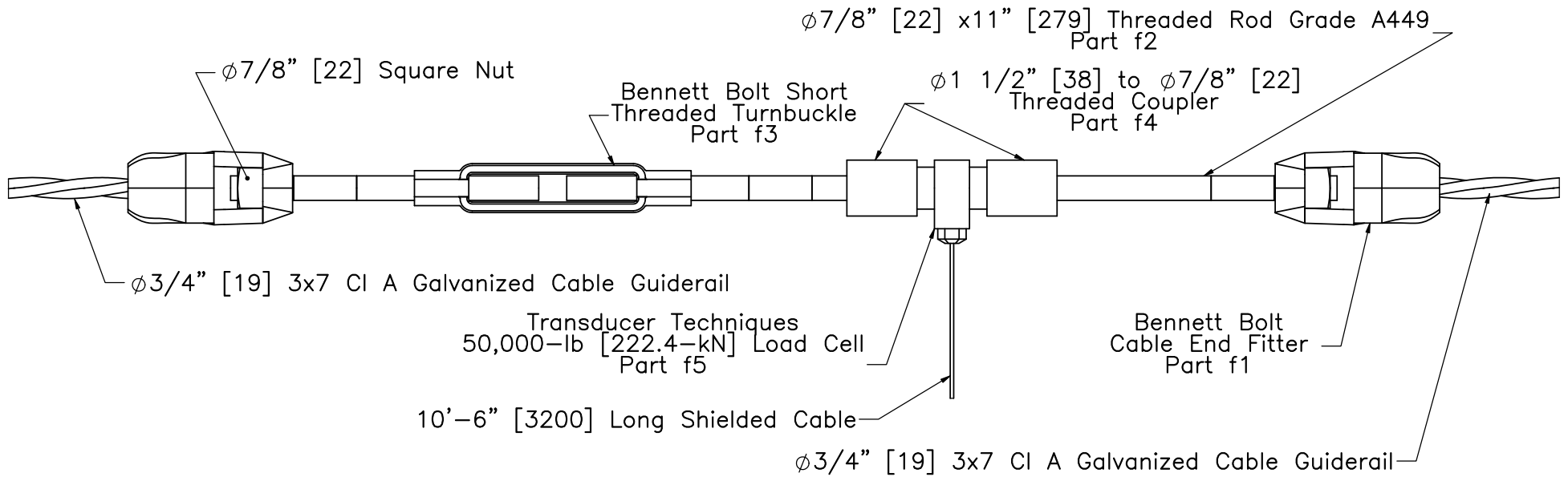
4-Cable Median Barrier
Cable Anchor Details

SHEET:
5 of 17
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11/16/11
DRAWN BY:
CSS/CME/
RJT/MJW/
JGP

DWG. NAME: CableMedianBarrier-4CMB-3_R7	SCALE: 1:4 UNITS: Inches	REV. BY: RKF/KAL
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DETAIL D
SCALE 1 : 35



Note: Two RH-threaded rods and one LH-threaded rod required for load cell and turnbuckle assembly.



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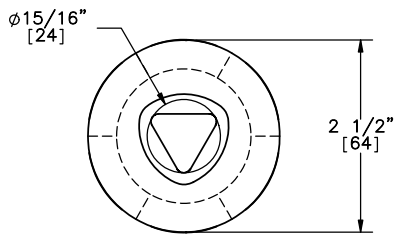
4-Cable Median Barrier

Load Cell and Turnbuckle Assembly Part F

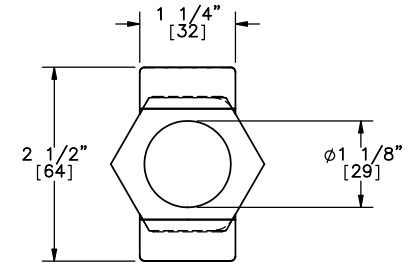
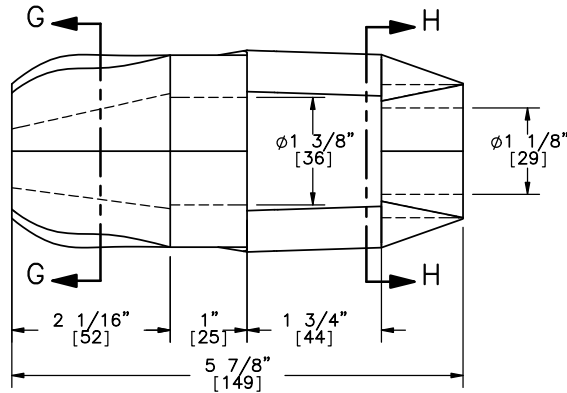
DWG. NAME.
CableMedianBarrier-4CMB-3_R7

SCALE: 1:25
UNITS: Inches

SHEET:
6 of 17
DATE:
11/16/11
DRAWN BY:
GSS/CME/
RJT/MJW/
JGP
REV. BY:
RKF/KAL

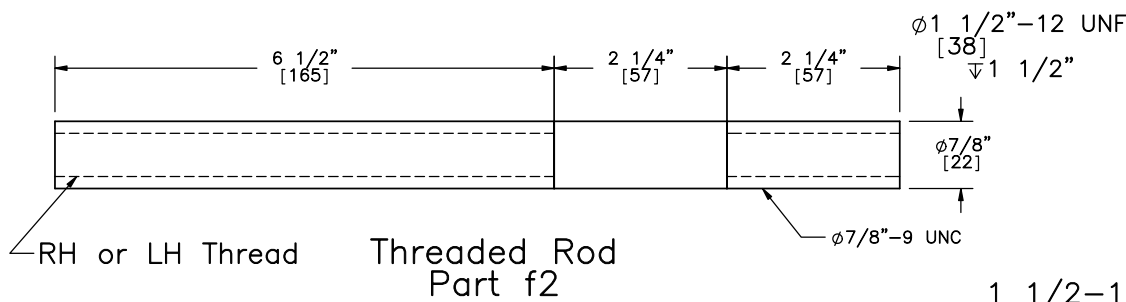


SECTION G-G

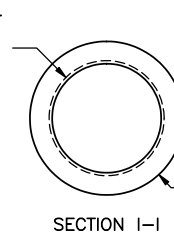


SECTION H-H

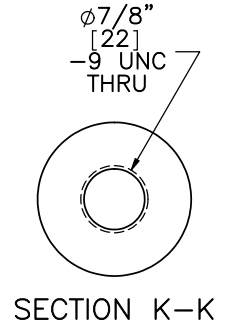
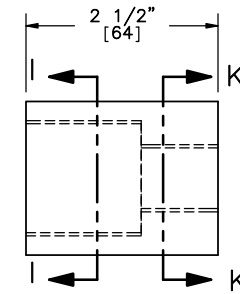
Bennett Bolt Cable End Fitter
Part f1



Threaded Rod
Part f2

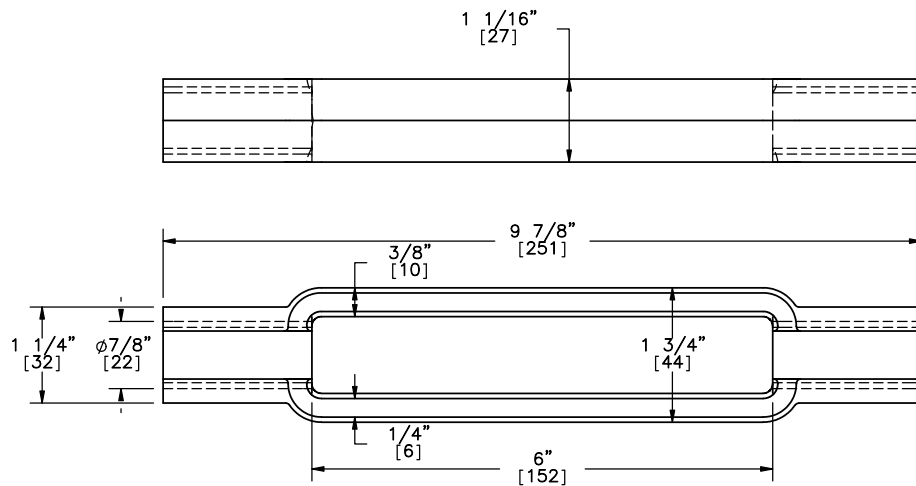
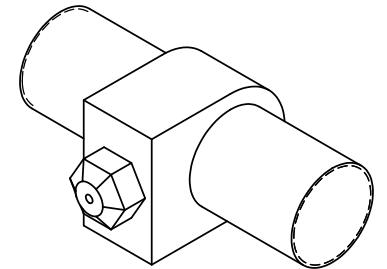
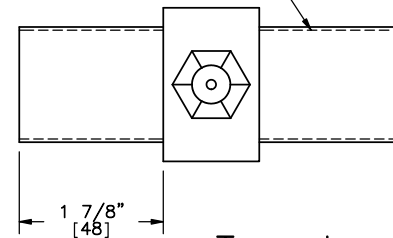


SECTION I-I



SECTION K-K

1 1/2-12 [M36-2.1] UNF
Threaded Both Sides



Bennett Bolt Threaded Turnbuckle
Part f3

Transducer Techniques
50,000-lb [222.4-kN] Rated Load Cell
Part f5



Midwest Roadside
Safety Facility

4-Cable Median Barrier
Load Cell Assembly
Component Details

SHEET:

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DATE:

11/16/11

DRAWN BY:
CSS/CME/
RJT/MJW/
JGP

REV. BY:

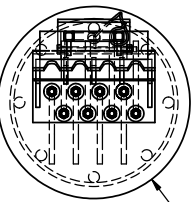
RKF/KAL

DWG. NAME.

CableMedianBarrier-4CMB-3_R7

SCALE: 1:2

UNITS: Inches
and mm



Ø2'-0" [610]

Cable Release Lever
Part B

Brass Keeper Rod
Ø3/16" [4.8] x 16" [406] long. Bend ends of rod to secure.

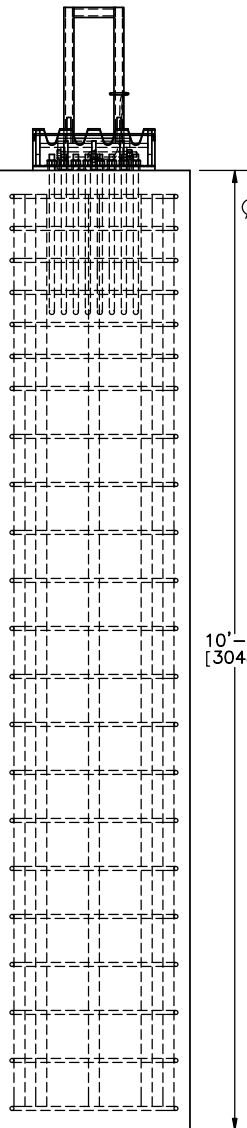
Steel Fabricators Inc.
Cable Anchor Bracket
Part A

Ø3/4" [19] A449 Hook
Bolts with heavy hex
nuts and washers

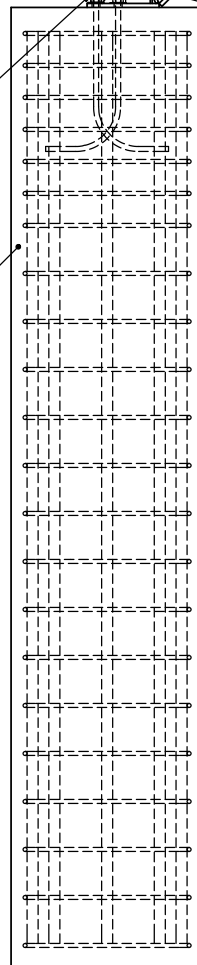
Concrete

Lever Retaining Cable:
Ø1/4" [6.4] 7x19 galvanized
aircraft cable, 36" [914] long
with 3 1/2" [89] long loops
and 1" [25] clips

Ø5/8" [16] Grade 5 Hex Head Bolt
9 1/2" [241] long with washer and nut

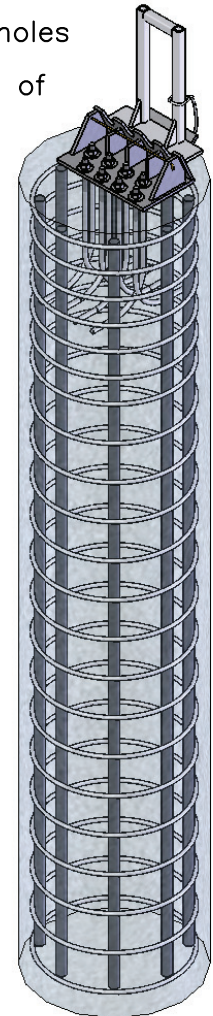


10'-0" [3048]



NOTE:

Brass rod to be placed after all cables are installed and tensioned. Slide rod through the 1/4" [6.4] holes in the Anchor Bracket, leaving a minimum of 1" [25] on each side of the Anchor Bracket. Bend brass rod down on each side of Anchor Bracket to secure.



NOTE:

- (1) Grade 60 reinforcement.
- (2) 1 1/2" [38] clear cover on sides, 3" [76] on top clear cover, and 2 1/2" [64] clear cover on bottom.
- (3) Eight No. 11 longitudinal bars.
- (4) 22 - No. 4 hoops with an inner diameter of 20" [508] at 4" [102] spacing for the top 24" [610] and subsequently at 6" [152] spacing until bottom clear cover.
- (5) Eight No. 6 standard J-hook anchor studs having a length of 27" [686] and a development length of 14 3/8" [365].
- (6) Concrete mix for anchor and posts shall provide a minimum f'c of 4000 psi [27.6 MPa].



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Safety Facility

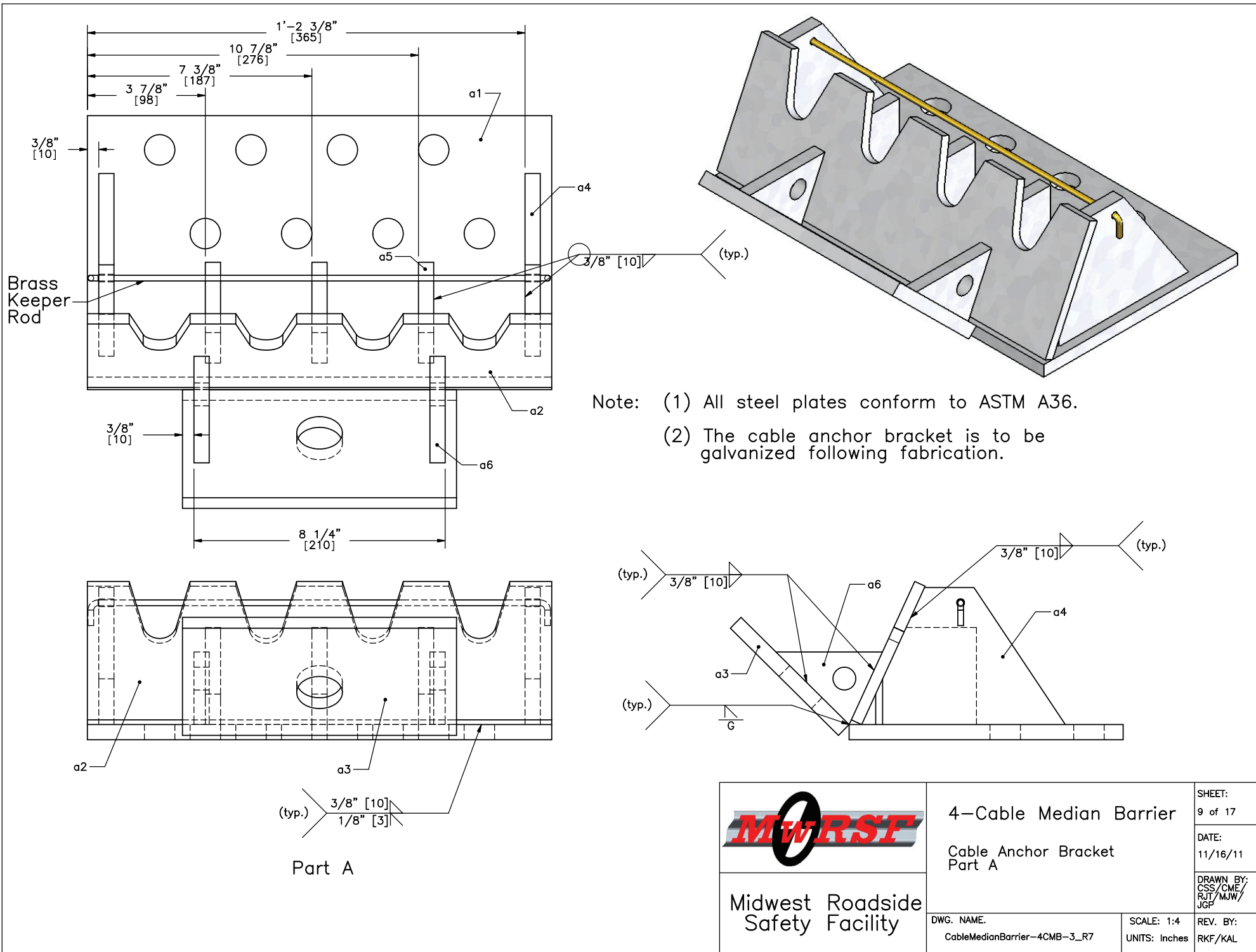
4-Cable Median Barrier

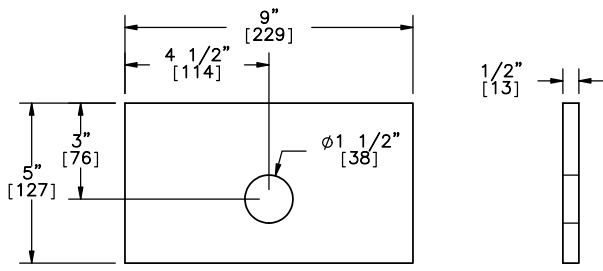
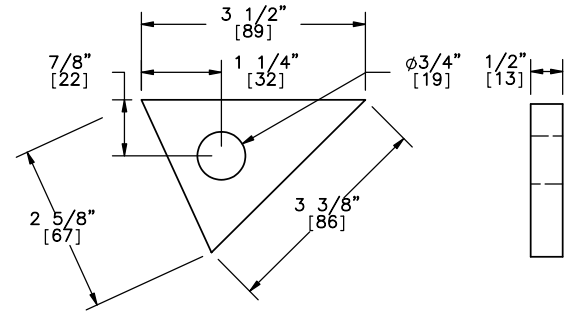
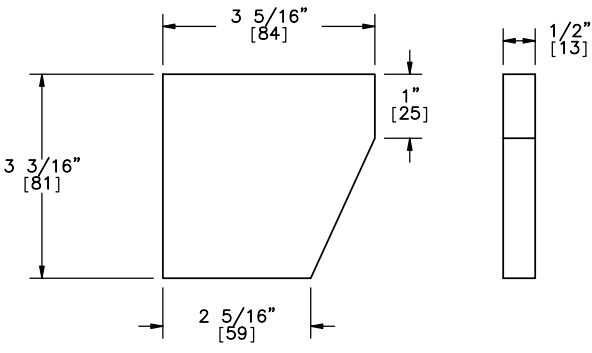
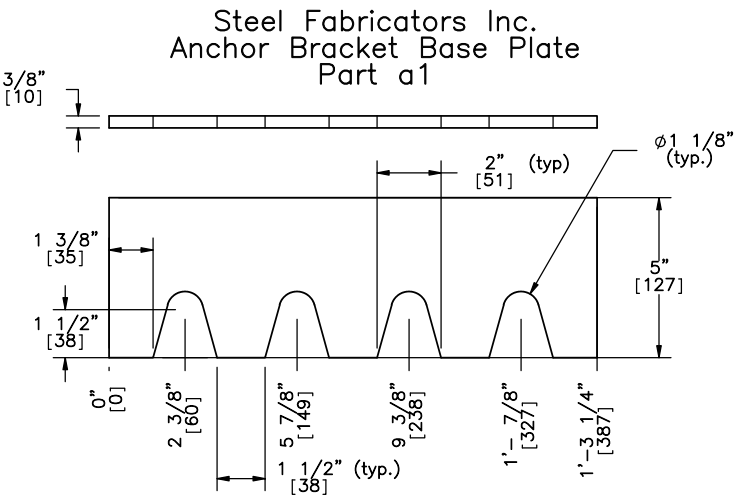
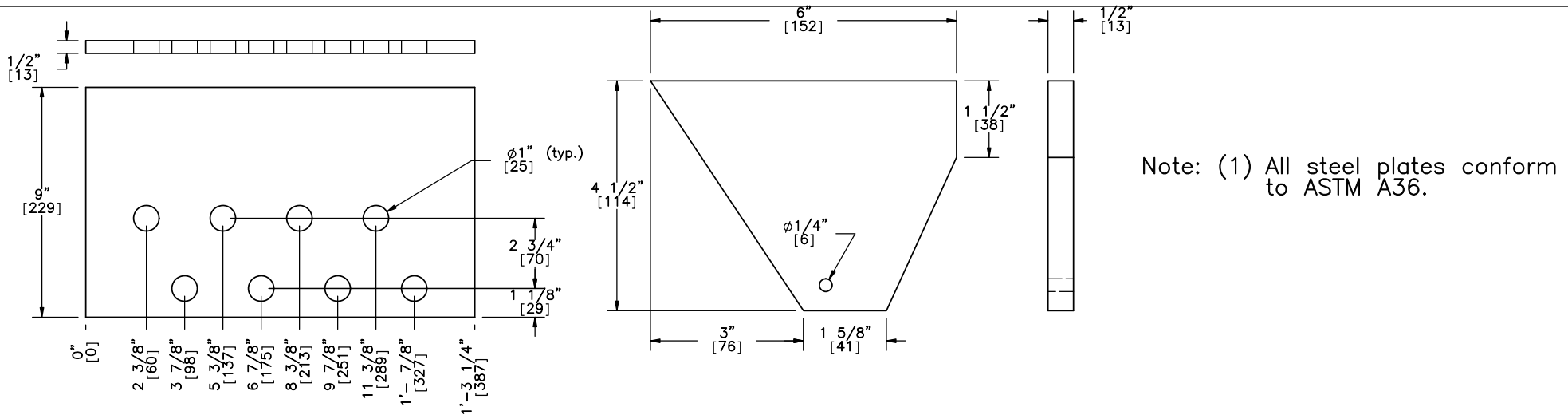
Cable Anchor Detail
Post Nos. 1 & 40
As Built

DWG. NAME.
CableMedianBarrier-4CMB-3_R7

SCALE: 1:24
UNITS: Inches

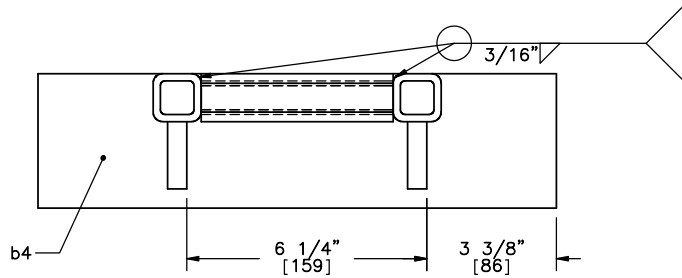
SHEET:
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DATE:
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DRAWN BY:
CSS/CME/
RJT/MJW/
JGP
REV. BY:
RKF/KAL



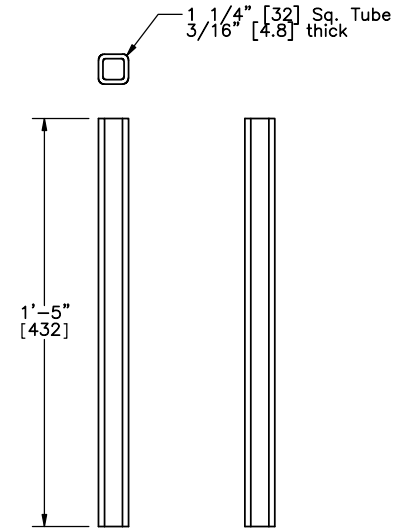
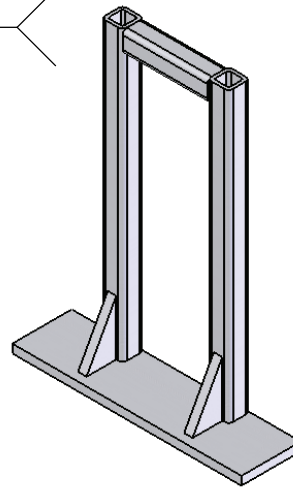


Midwest Roadside
Safety Facility

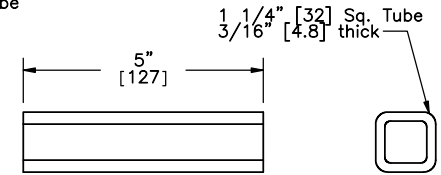
4-Cable Median Barrier		SHEET: 10 of 17
Cable Anchor Bracket Part A Details		DATE: 11/16/11
DWG. NAME: CableMedianBarrier-4CMB-3_R7		DRAWN BY: GSS/CME/ RJT/MJW/ JGP
SCALE: 1:6	UNITS: Inches	REV. BY: RKF/KAL



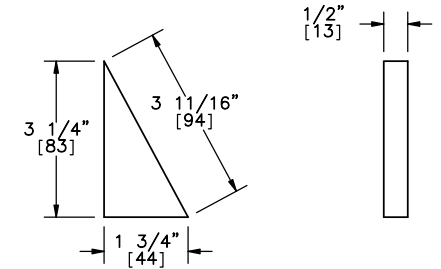
- Notes: (1) The kicker lever should be flush with the top of the kicker plate.
- (2) The 3 1/4" [83] leg of the kicker plate gusset should line up with the kicker lever.
- (3) The bottom of the cable release lever should rest upon part a6.
- (4) All steel plates conform to ASTM A36.
- (5) All steel tubing conforms to ASTM A500 Grade B.



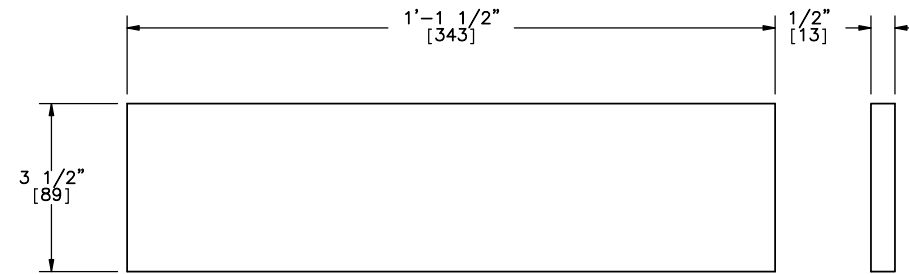
Kicker Lever
Part b1



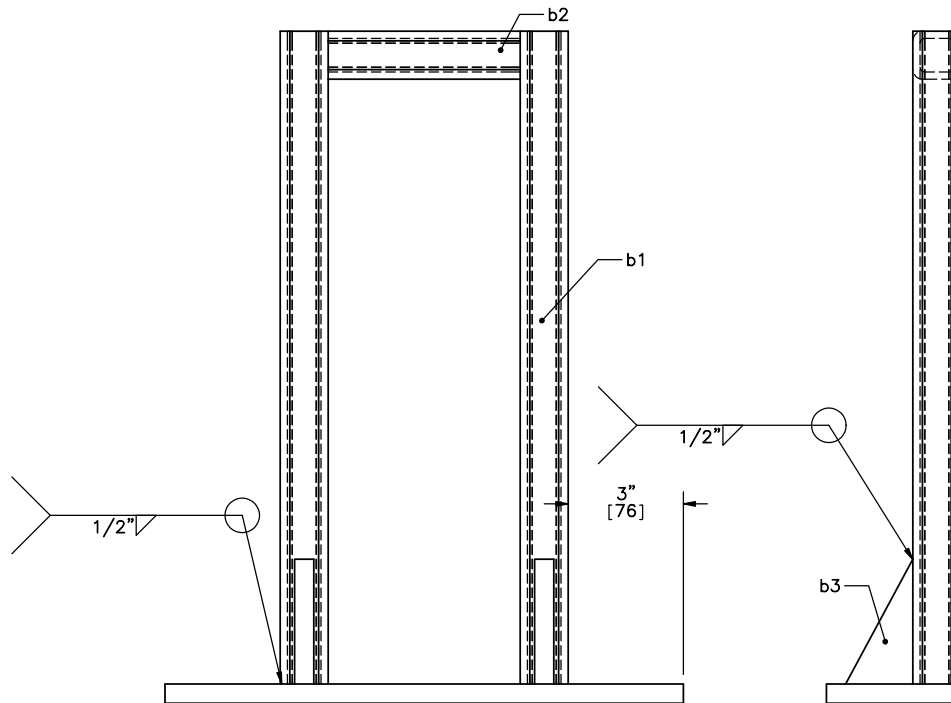
Connector Tube
Part b2



Kicker Plate Gusset
Part b3



Kicker Plate
Part b4



Rivers Metal Product, Inc.
Cable Release Lever
Part B



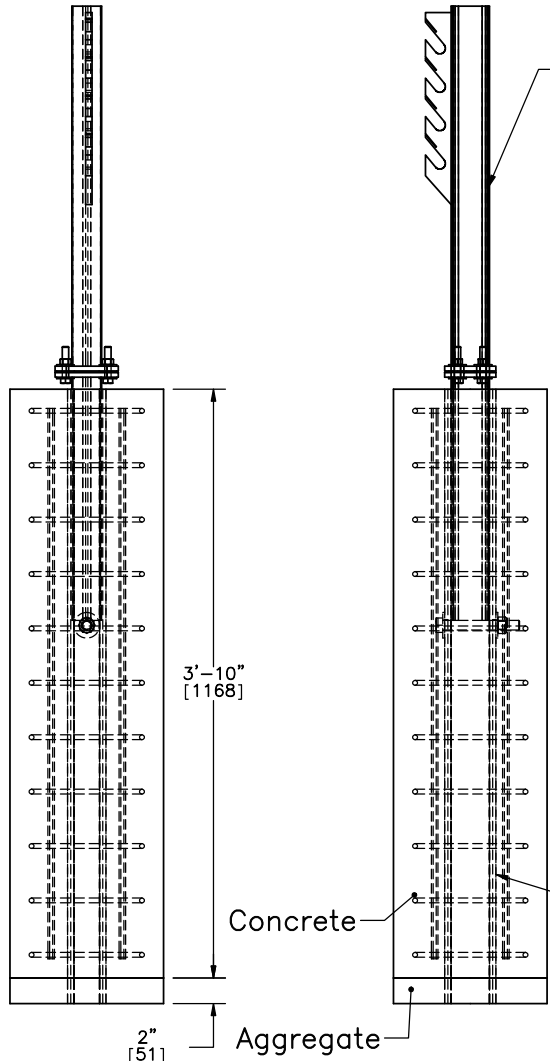
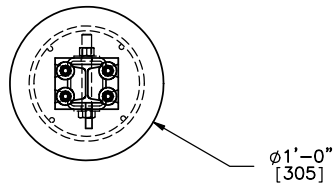
Midwest Roadside
Safety Facility

4-Cable Median Barrier
Cable Release Lever
Part B

SHEET:
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DATE:
11/16/11
DRAWN BY:
CSS/CME/
RJT/MJW/
JGP
REV. BY:
RKF/KAL

DWG. NAME:
CableMedianBarrier-4CMB-3_R7

SCALE: 1:8
UNITS: Inches

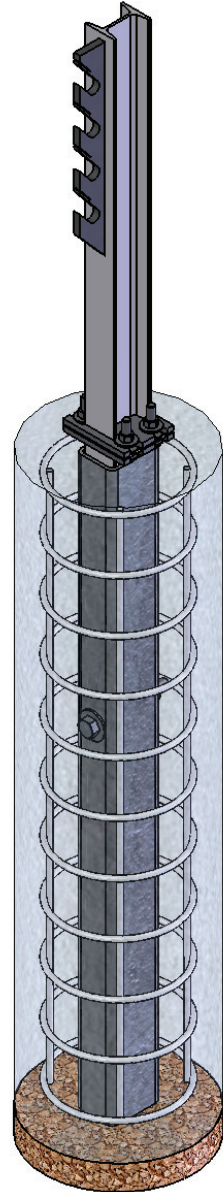


Hanger Assembly
Part C

2nd Post Foundation Tube Assembly
Part D

Notes:

- (1) Grade 60 Reinforcement.
- (2) 1 1/2" [38] clear cover.
- (3) 11 No. 3 hoops with an inner diameter of 7 1/4" [184] and a vertical spacing of 4 1/4" [108].
- (4) 4 No. 3 longitudinal bars.
- (5) Concrete mix for anchor posts shall provide a minimum f'c of 4000 psi [27.6 MPa].



Rivers Metal Products, Inc.
Cable Support Post
Post 2 & 39 Only



Midwest Roadside
Safety Facility

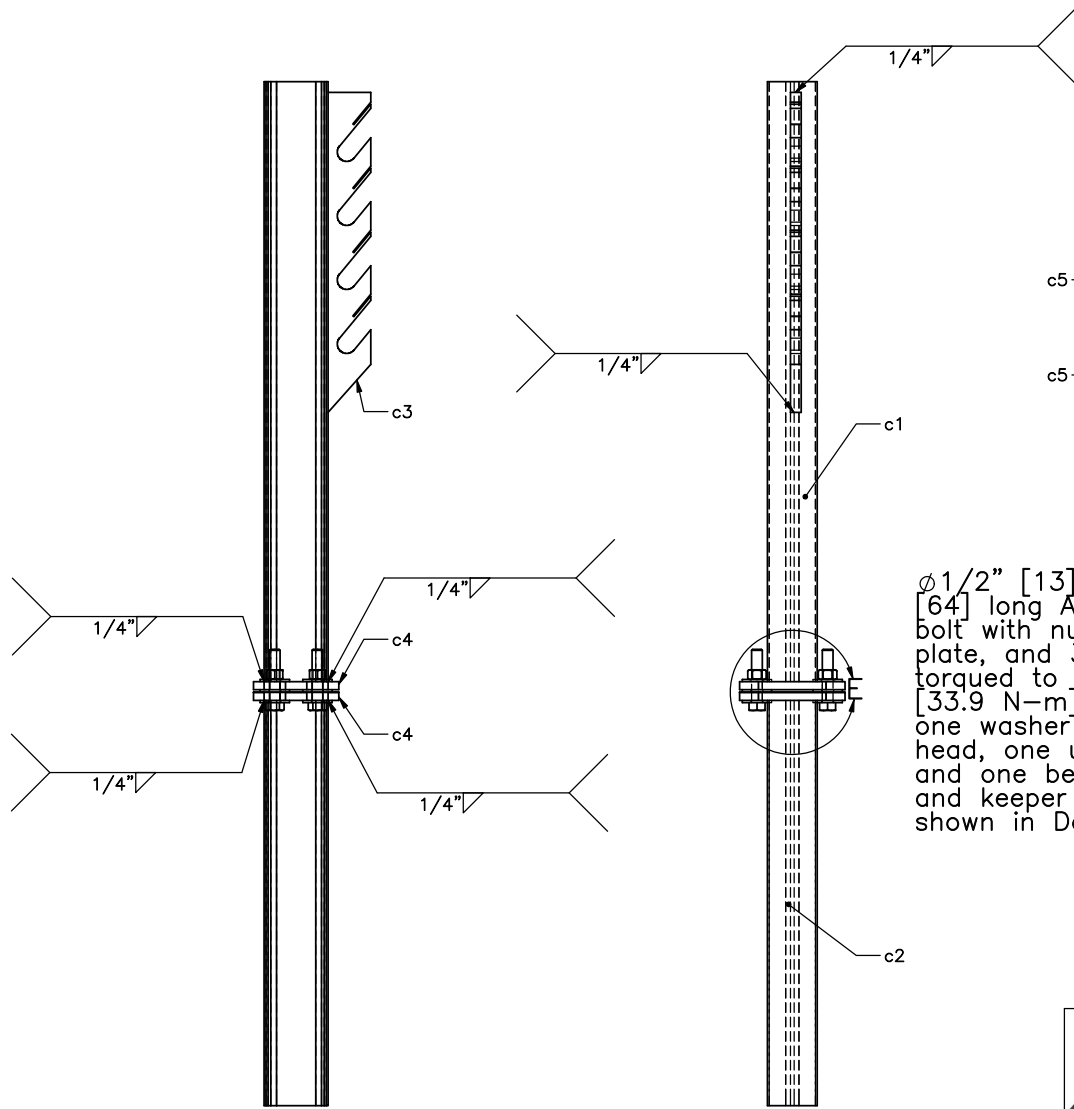
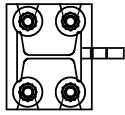
4-Cable Median Barrier

Second Post Detail
Post Nos. 2 & 39
As Built

DWG. NAME.
CableMedianBarrier-4CMB-3_R7

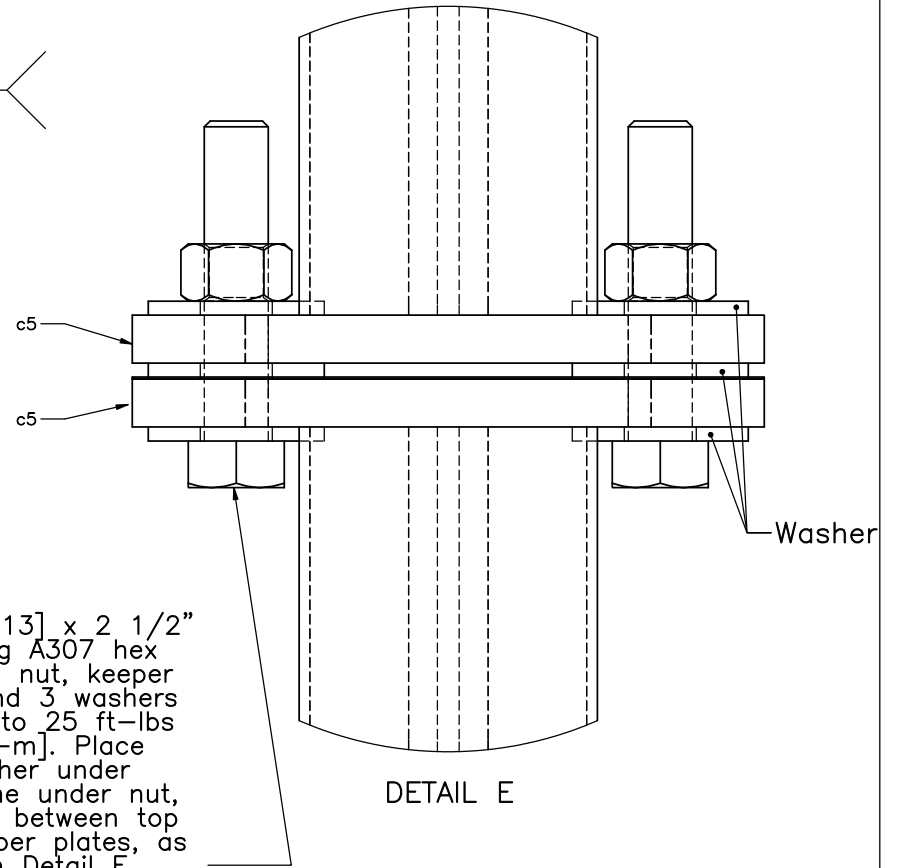
SCALE: 1:15
UNITS: Inches

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DRAWN BY:
CSS/CME/
RJT/MJW/
JGP
REV. BY:
RKF/KAL



Part C

$\phi 1/2"$ [13] x 2 1/2" [64] long A307 hex bolt with nut, keeper plate, and 3 washers torqued to 25 ft-lbs [33.9 N-m]. Place one washer under head, one under nut, and one between top and keeper plates, as shown in Detail E.



DETAIL E



Midwest Roadside Safety Facility

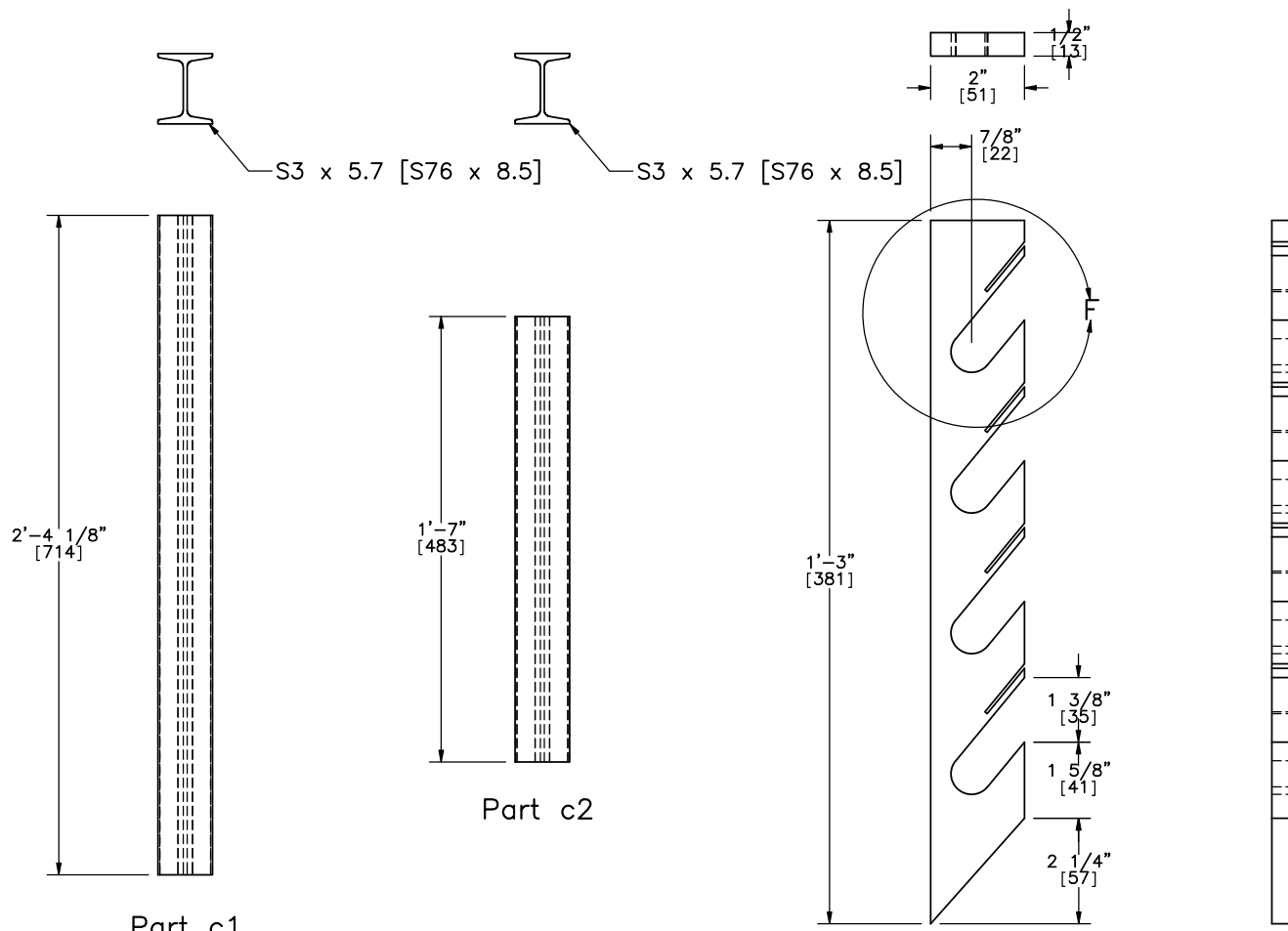
4-Cable Median Barrier

Cable Hanger Assembly
Post Nos. 2 & 39
Part C

DWG. NAME.
CableMedianBarrier-4CMB-3_R7

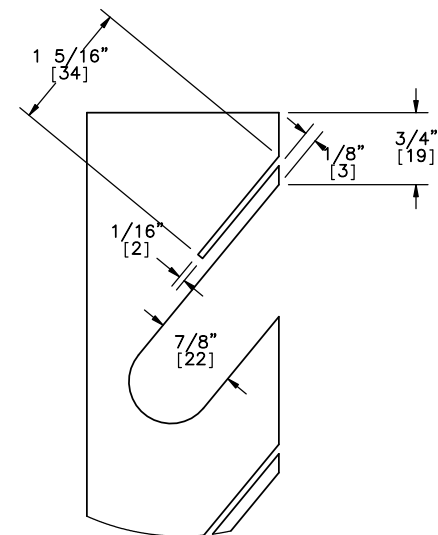
SCALE: 1:9
UNITS: Inches

SHEET:
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DATE:
11/16/11
DRAWN BY:
CSS/CME/
RJT/MJW/
JGP
REV. BY:
RKF/KAL

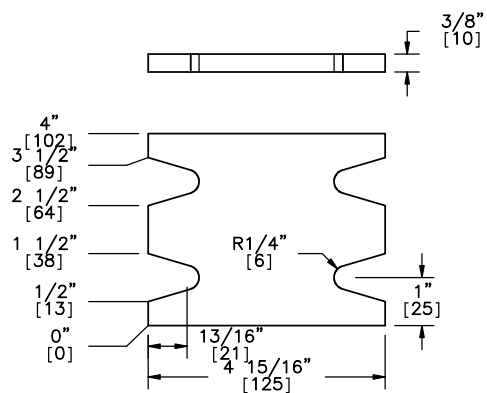


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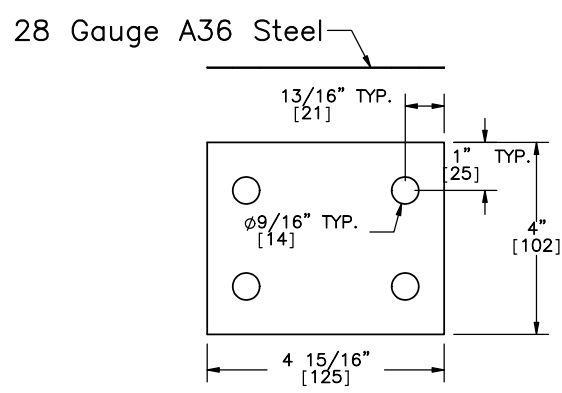
Tabs to be bent after all cables have been installed and tensioned to secure.



DETAIL F



Part c4



Part c5

Part c3



Midwest Roadside Safety Facility

4-Cable Median Barrier

Cable Hanger Assembly
Post Nos. 2 & 39
Part C Details

SHEET:
14 of 17

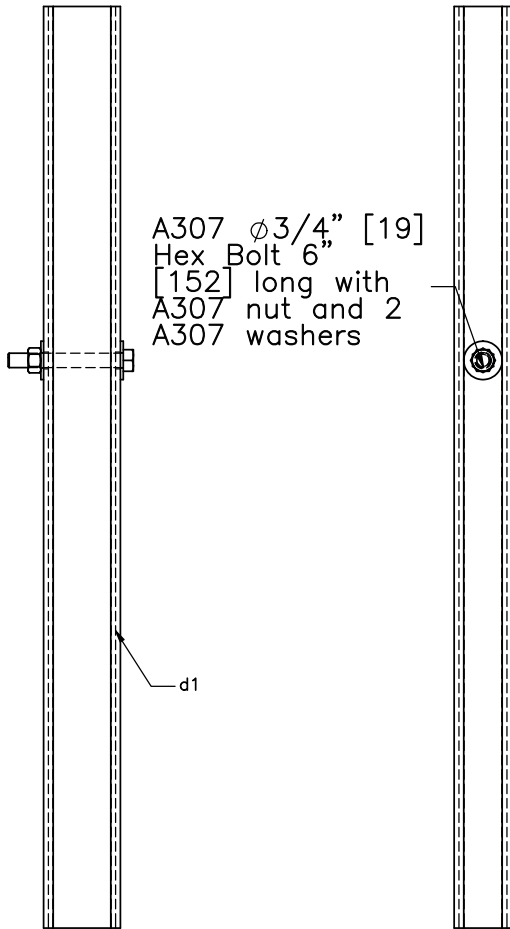
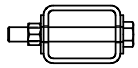
DATE:
11/16/11

DRAWN BY:
CSS/CME/
RJT/MJW/
JGP

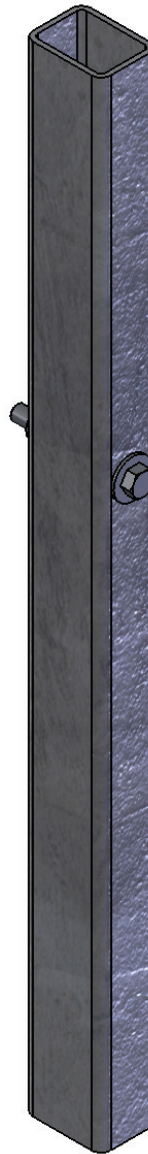
DWG. NAME:
CableMedianBarrier-4CMB-3_R7

SCALE: 1:8
UNITS: Inches

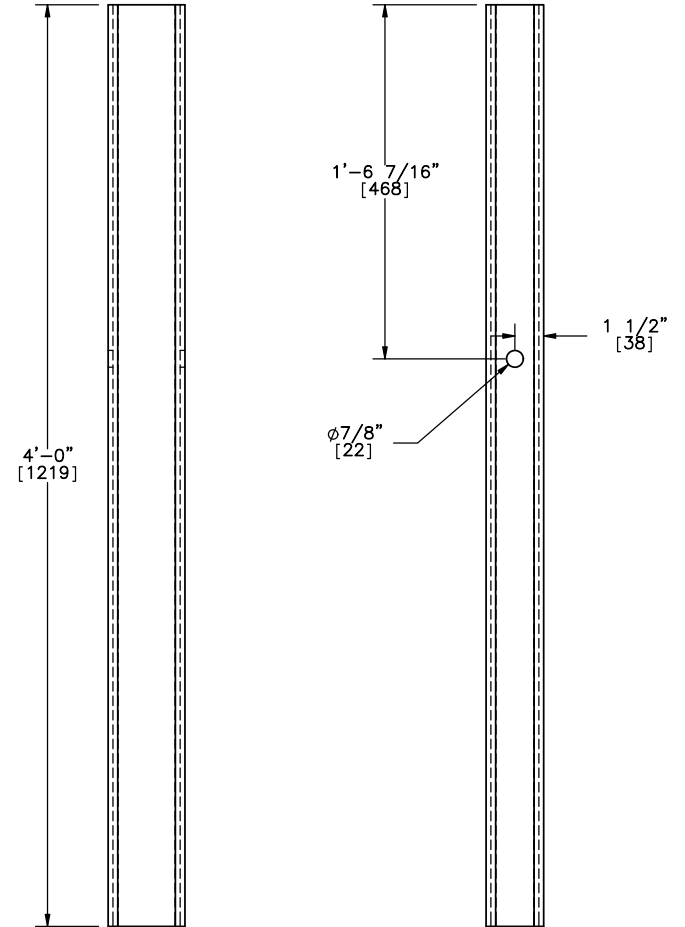
REV. BY:
RKF/KAL



Part D



4" [102] x 3" [76] x 1/4" [6.3]
tube ASTM A500 Grade B



Part d1



Midwest Roadside
Safety Facility

4-Cable Median Barrier

Foundation Tube Assembly
Post Nos. 2 & 39
Part D

SHEET:
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DATE:
11/16/11

DRAWN BY:
CSS/CME/
RJT/MJW/
JGP

DWG. NAME.

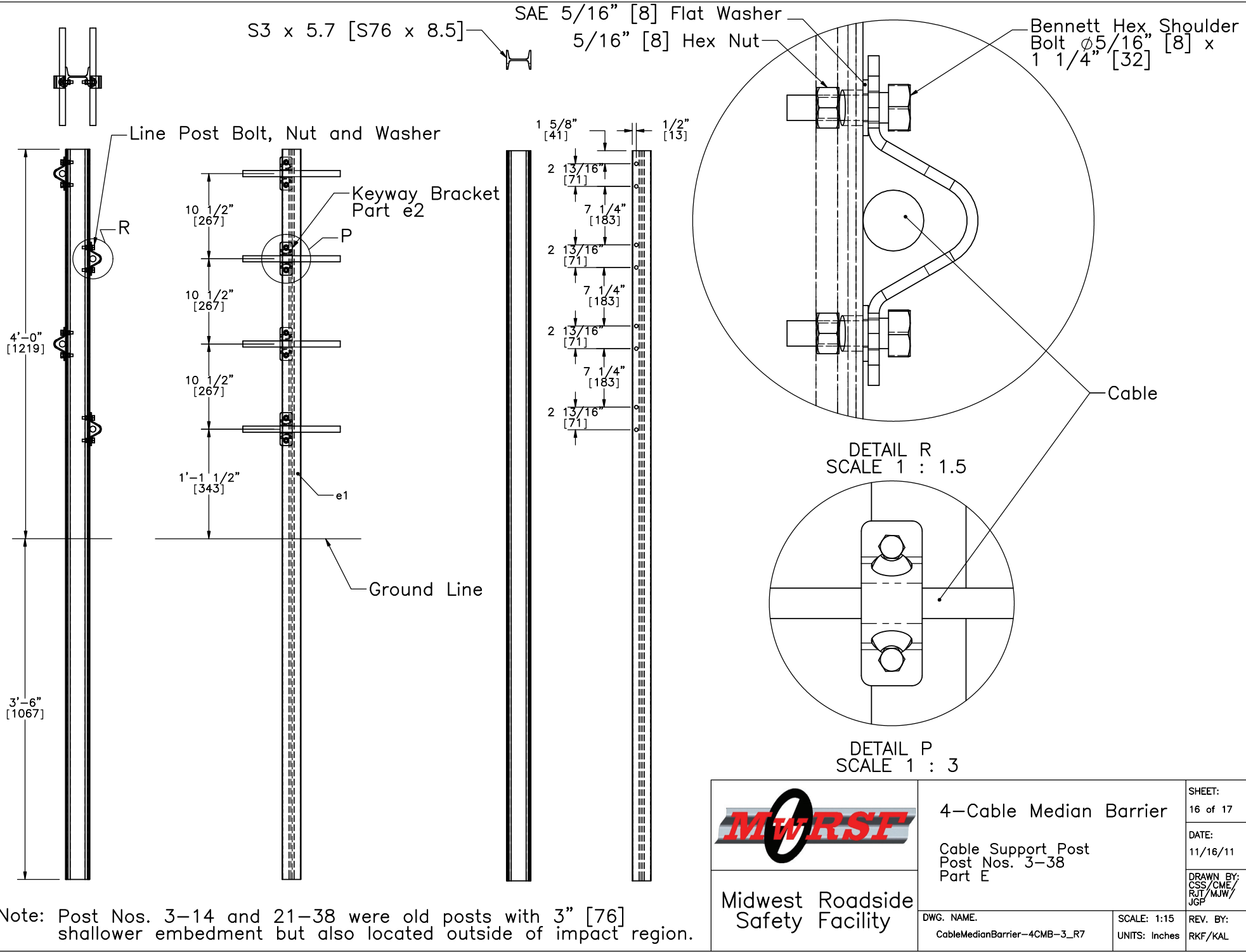
CableMedianBarrier-4CMB-3_R7

SCALE: 1:10

UNITS: Inches

REV. BY:

RKF/KAL



Note: Post Nos. 3-14 and 21-38 were old posts with 3" [76] shallower embedment but also located outside of impact region.



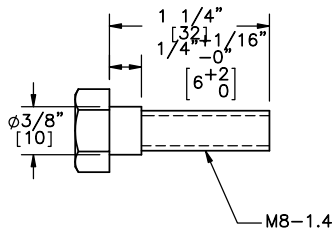
Midwest Roadside Safety Facility

4-Cable Median Barrier
Cable Support Post
Post Nos. 3-38
Part E

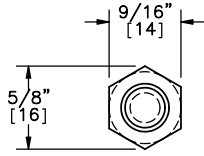
DWG. NAME:
CableMedianBarrier-4CMB-3_R7

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DATE:
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DRAWN BY:
CSS/CME/
RJT/MJW/
JGP
REV. BY:
RKF/KAL

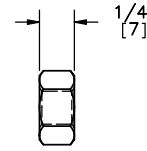
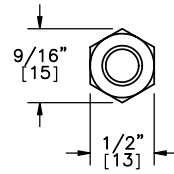
SCALE: 1:15
UNITS: Inches



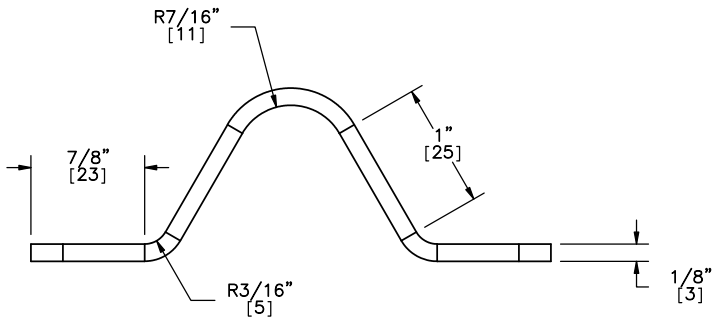
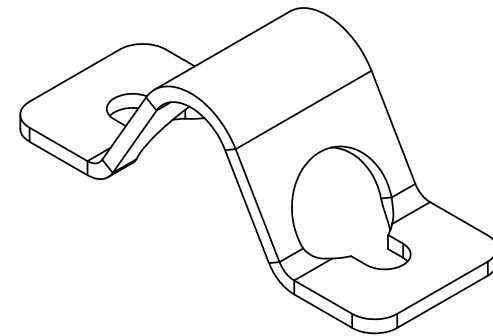
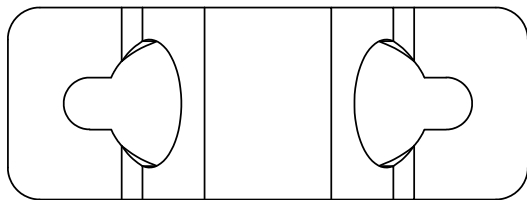
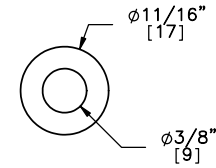
Hex Shoulder Bolt 5/16"-18x1 1/4" [M8-1.5-32]



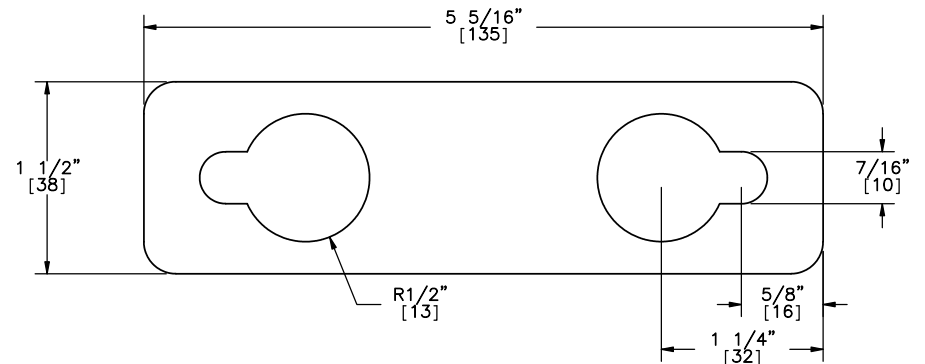
5/16" [8] Hex Nut



SAE FW 5/16" [8]



Keyway Bracket with Bends



Keyway Bracket Flat Pattern



Midwest Roadside Safety Facility

4-Cable Median Barrier

Shoulder Bolt, Nut, and SAE Washer Detail
Keyway Bracket Detail

SHEET:
17 of 17

DATE:
11/16/11

DRAWN BY:
CSS/CME/
RJT/MJW/
JGP

DWG. NAME:
CableMedianBarrier-4CMB-3_R7

SCALE: 1:1.5
UNITS: Inches

REV. BY:
RKF/KAL