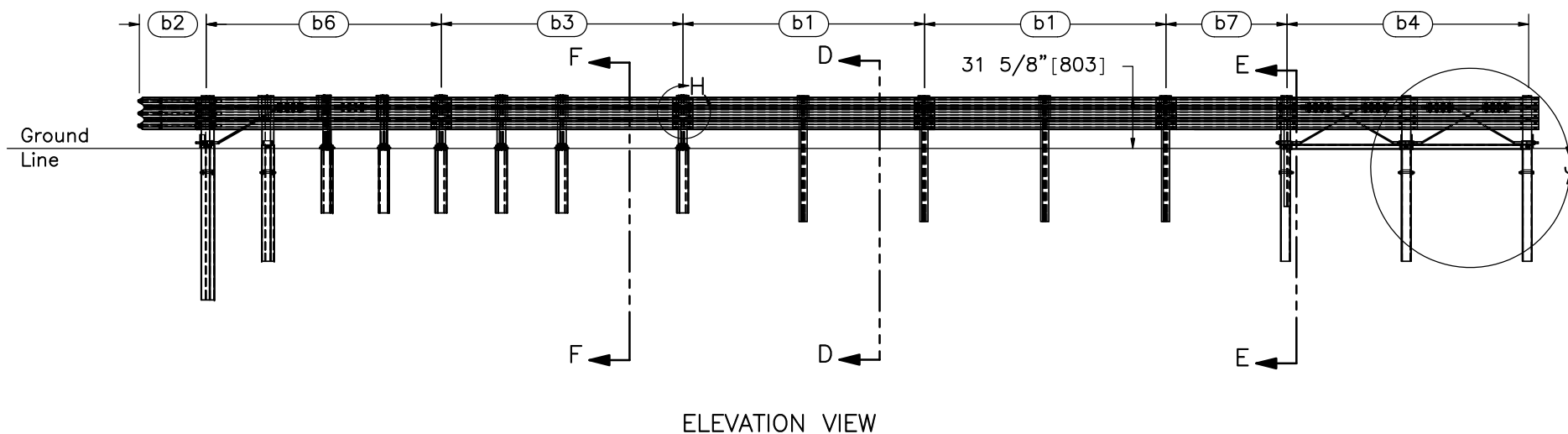
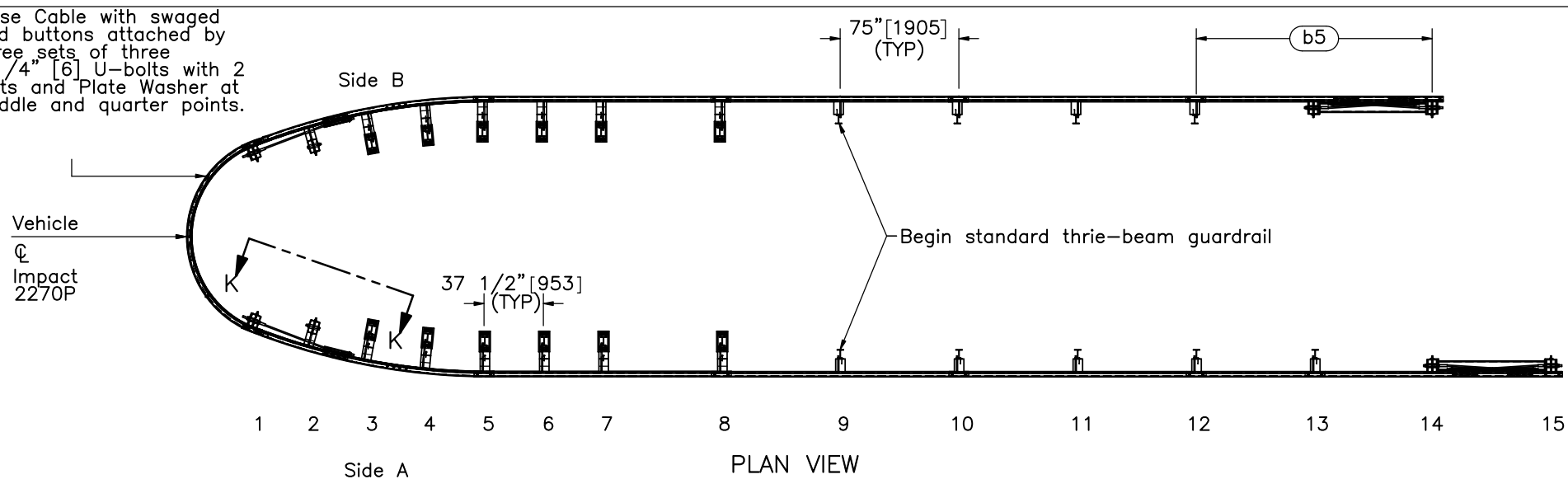


Nose Cable with swaged end buttons attached by three sets of three $\phi 1/4"$ [6] U-bolts with 2 Nuts and Plate Washer at middle and quarter points.



- Notes: (1) The test shall be performed to test designation no. 3-31 of MASH criteria.
- (2) The impact location is the center of the vehicle at the bullnose center.
- (3) All posts are to be installed using $\phi 3'$ [914] augered holes with the HE8 compaction method.
- (4) BCT Anchors are to be placed in $\phi 3'$ [914] holes and backfilled with soil.



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

System Layout

DWG. NAME.
Bullnose-6_R4

SCALE: 1:100
UNITS: In./mm

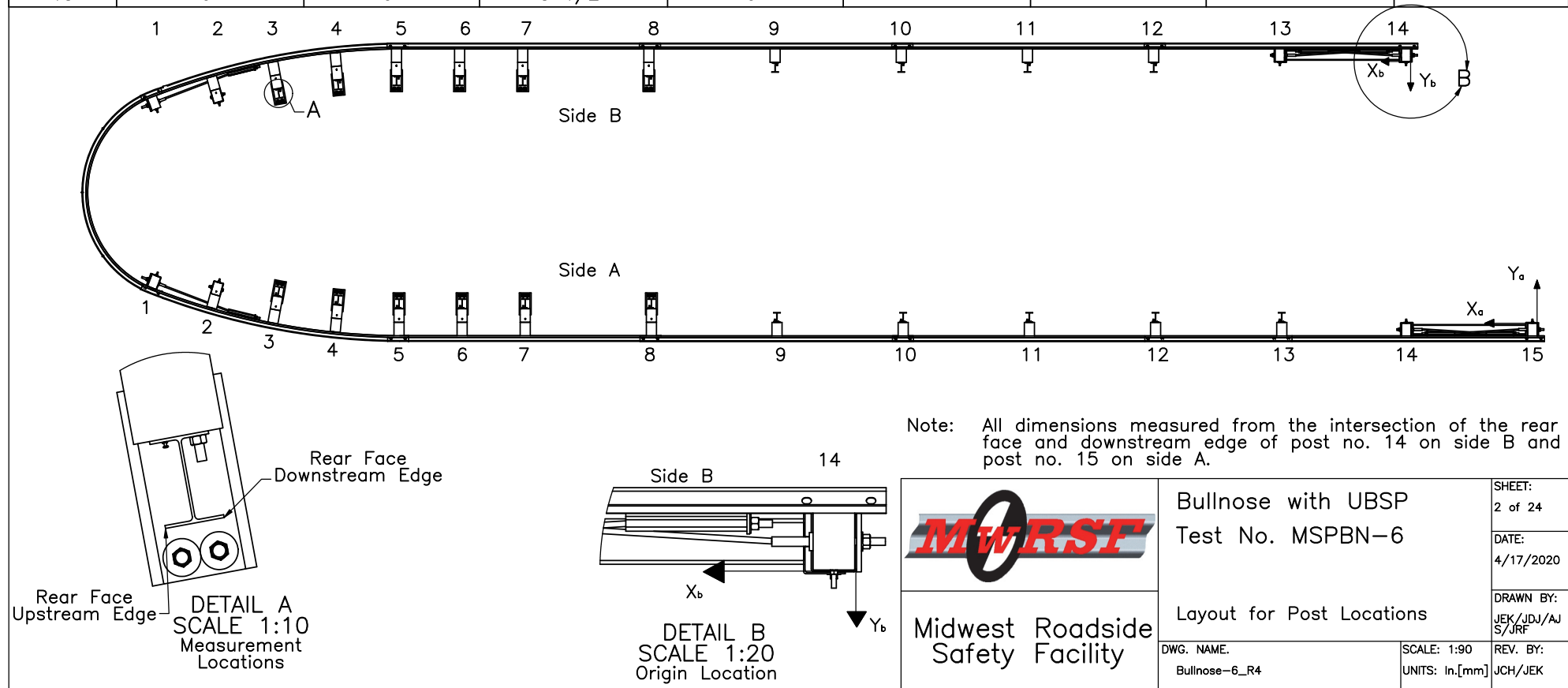
SHEET:
1 of 24

DATE:
4/17/2020

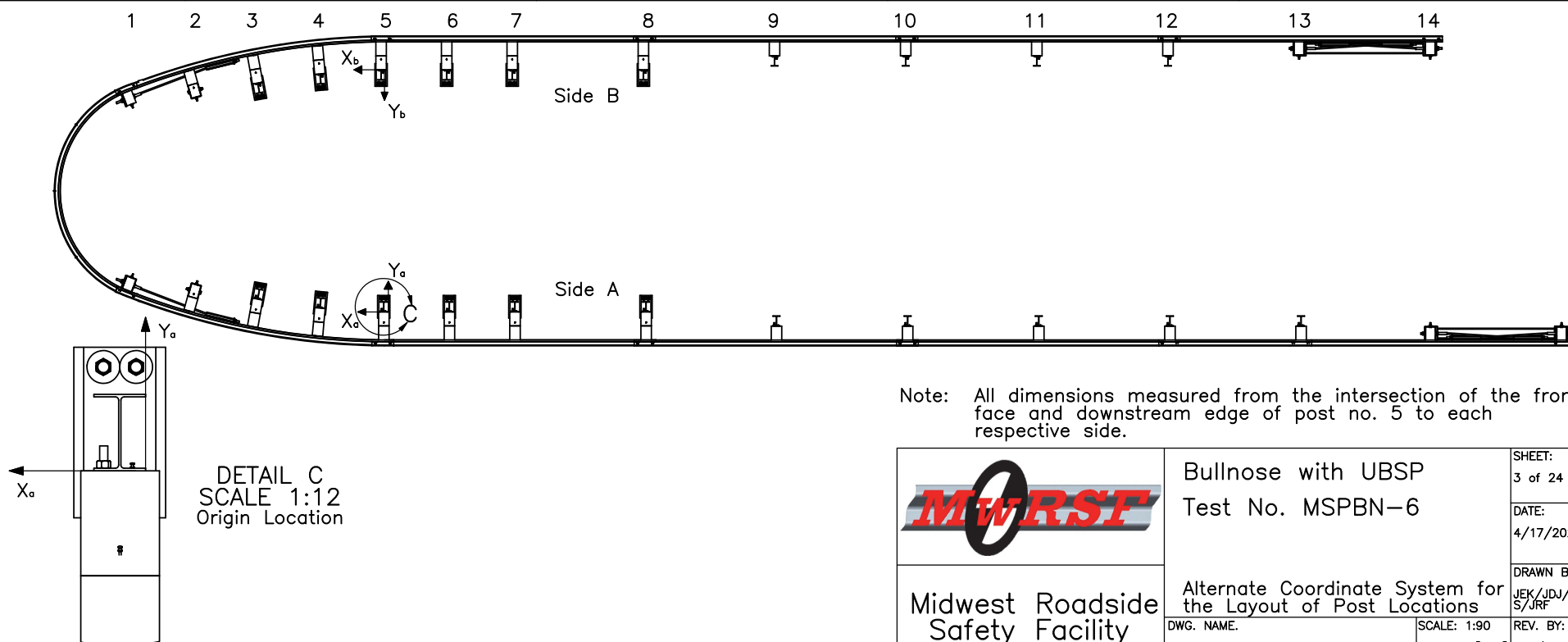
DRAWN BY:
JEK/JDJ/AJS/JRF

REV. BY:
JCH/JEK

Post No.	Side A				Side B			
	Rear Face-DS Edge		Rear Face-US Edge		Rear Face-DS Edge		Rear Face-US Edge	
	X	Y	X	Y	X	Y	X	Y
1	68'-1 7/8"	2'-3 1/8"	68'-7"	2'-5 1/8"	61'-10 7/8"	2'-3 1/8"	62'-4"	2'-5 1/8"
2	65'-0 3/4"	1'-11 1/4"	65'-6 1/8"	2'-0 3/4"	58'-9 3/4"	1'-11 1/4"	59'-3 1/8"	2'-0 3/4"
3	61'-1 1/4"	1'-9 3/8"	62'-5 1/8"	1'-10 1/8"	55'-10 1/4"	1'-9 3/8"	56'-2 1/8"	1'-10 1/8"
4	59'-2 1/4"	1'-4 3/8"	59'-6 1/8"	1'-4 3/4"	52'-11 1/4"	1'-4 3/8"	53'-3 1/8"	1'-4 3/4"
5	56'-3 3/4"	1'-2 3/8"	56'-7 3/4"	1'-2 3/8"	50'-0 3/4"	1'-2 3/8"	50'-4 3/4"	1'-2 3/8"
6	53'-2 1/4"	1'-2 3/8"	53'-6 1/4"	1'-2 3/8"	46'-11 1/4"	1'-2 3/8"	47'-3 1/4"	1'-2 3/8"
7	50'-0 3/4"	1'-2 3/8"	50'-4 3/4"	1'-2 3/8"	43'-9 3/4"	1'-2 3/8"	44'-1 3/4"	1'-2 3/8"
8	43'-9 3/4"	1'-2 3/8"	44'-1 3/4"	1'-2 3/8"	37'-6 3/4"	1'-2 3/8"	37'-10 3/4"	1'-2 3/8"
9	37'-6 3/4"	6 3/8"	37'-10 3/4"	6 3/8"	31'-3 3/4"	6 3/8"	31'-7 3/4"	6 3/8"
10	31'-3 3/4"	6 3/8"	31'-7 3/4"	6 3/8"	25'-0 3/4"	6 3/8"	25'-4 3/4"	6 3/8"
11	25'-0 3/4"	6 3/8"	25'-4 3/4"	6 3/8"	18'-9 3/4"	6 3/8"	19'-1 3/4"	6 3/8"
12	18'-9 3/4"	6 3/8"	19'-1 3/4"	6 3/8"	12'-6 3/4"	6 3/8"	12'-10 3/4"	6 3/8"
13	12'-6 3/4"	6 3/8"	12'-10 3/4"	6 3/8"	6'-3 3/4"	0"	6'-8 1/2"	0"
14	6'-3"	0"	6'-8 1/2"	0"	0"	0"	5 1/2"	0"
15	0"	0"	5 1/2"	0"	-	-	-	-



Post No.	Rear Face—DS Edge			
	X _a and X _b	Y _a and Y _b	X _a and X _b	Y _a and Y _b
1	11'-10 1/8"	1'-6 5/8"	12'-3 1/4"	1'-8 5/8"
2	8'-9"	1'-2 3/4"	9'-2 3/8"	1'-4 1/4"
3	5'-9 1/2"	1'-0 7/8"	6'-1 3/8"	1'-1 5/8"
4	2'-10 1/2"	7 7/8"	3'-2 3/8"	8 1/4"
5	0"	5 7/8"	4"	5 7/8"



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Alternate Coordinate System for
the Layout of Post Locations

DWG. NAME.

Bullnose-6_R4

SCALE: 1:90

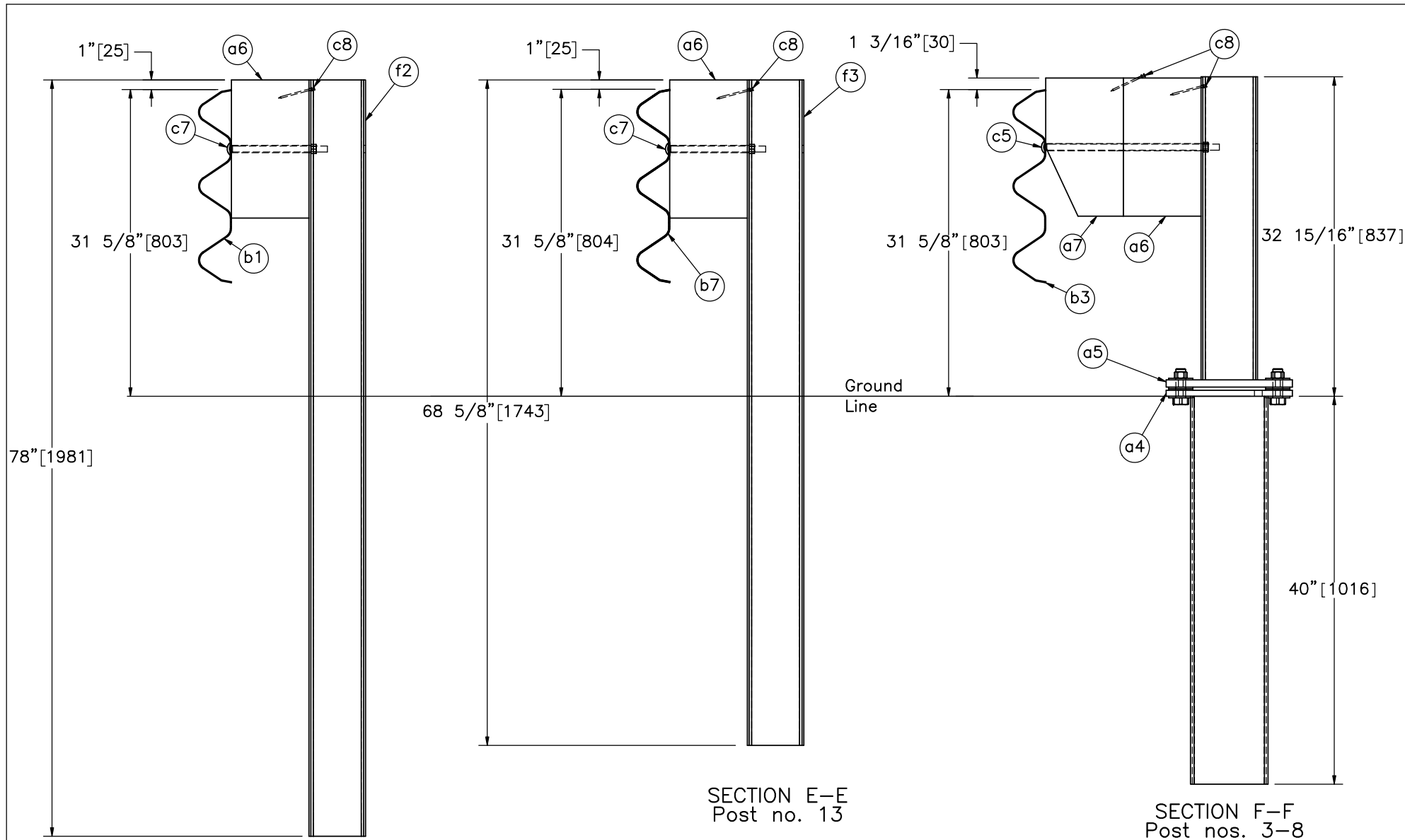
UNITS: In.[mm]

SHEET:
3 of 24

DATE:
4/17/2020

DRAWN BY:
JEK/JDJ/AJ
S/JRF

REV. BY:
JCH/JEK



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Post Nos. 3-8, 9-12 and 13
Details

DWG. NAME.
Bullnose-6_R4

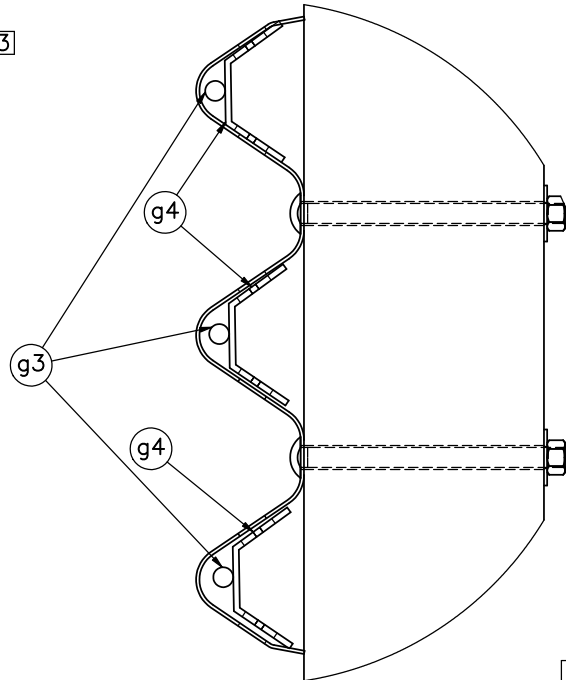
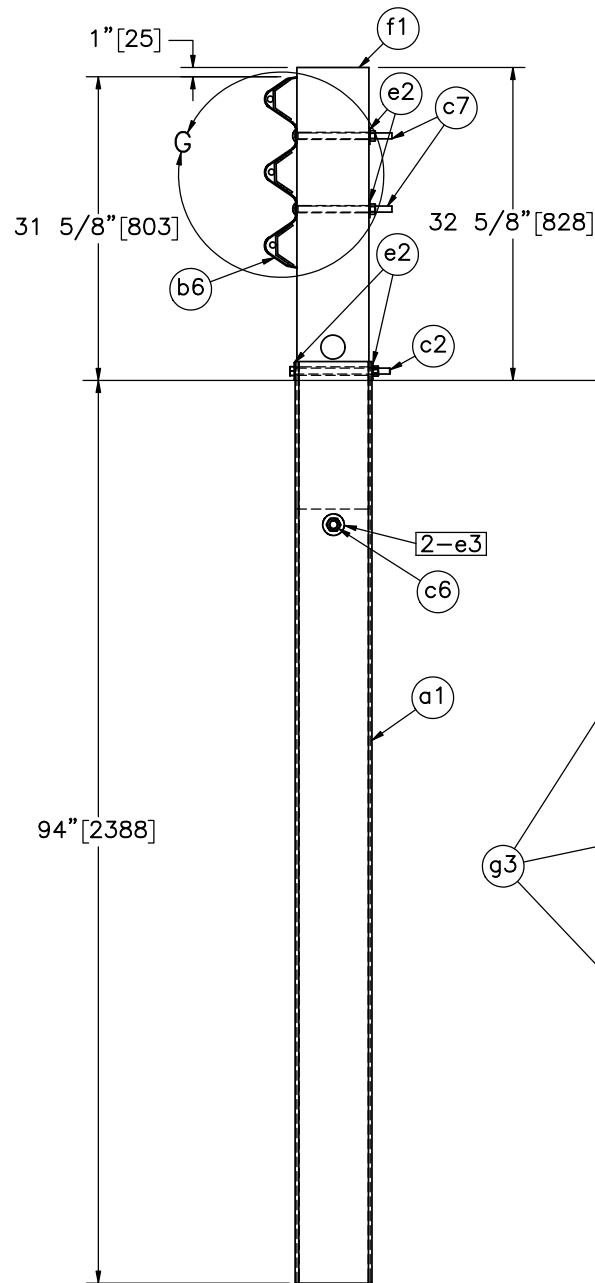
SCALE: 1:14
UNITS: In./mm

SHEET:
4 of 24

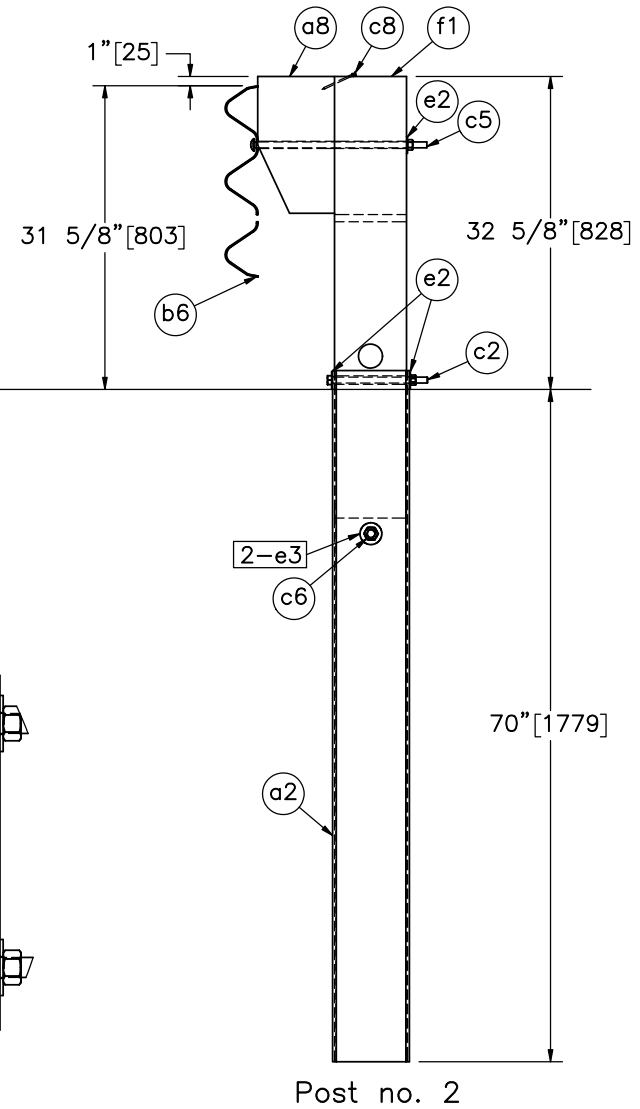
DATE:
4/17/2020

DRAWN BY:
JEK/JDJ/AJ
S/JRF

REV. BY:
JCH/JEK



DETAIL G
SCALE 1 : 6



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Post Nos. 1 and 2 Details

DWG. NAME.
Bullnose-6_R4

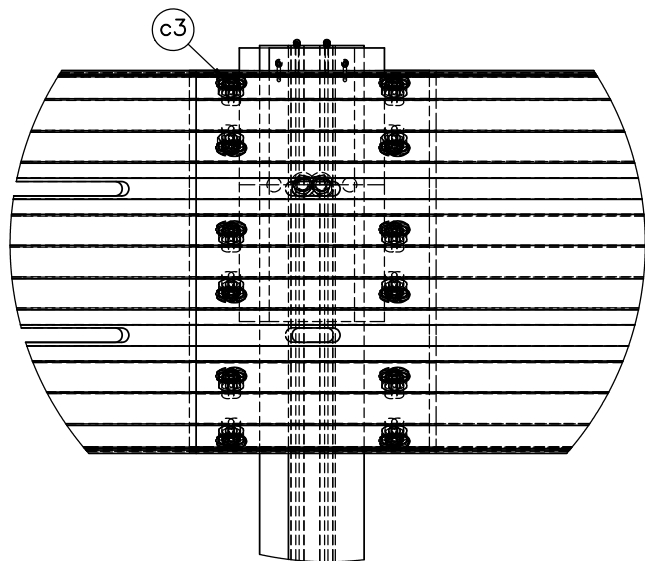
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UNITS: In./mm

SHEET:
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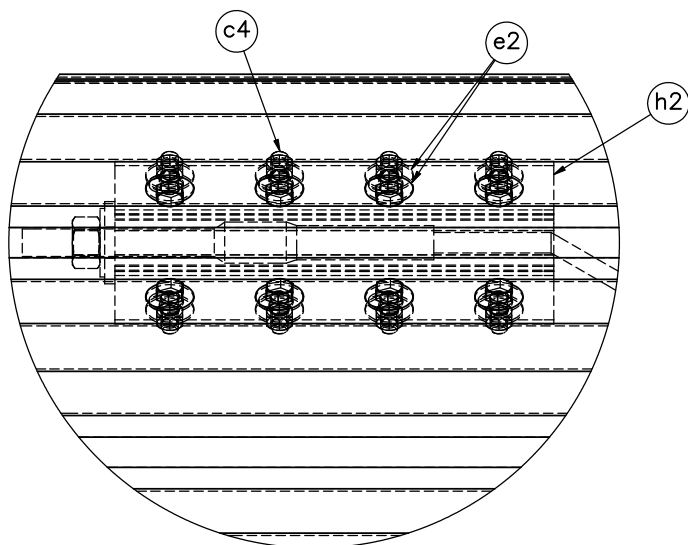
DATE:
4/17/2020

DRAWN BY:
JEK/JDJ/AJ
S/JRF

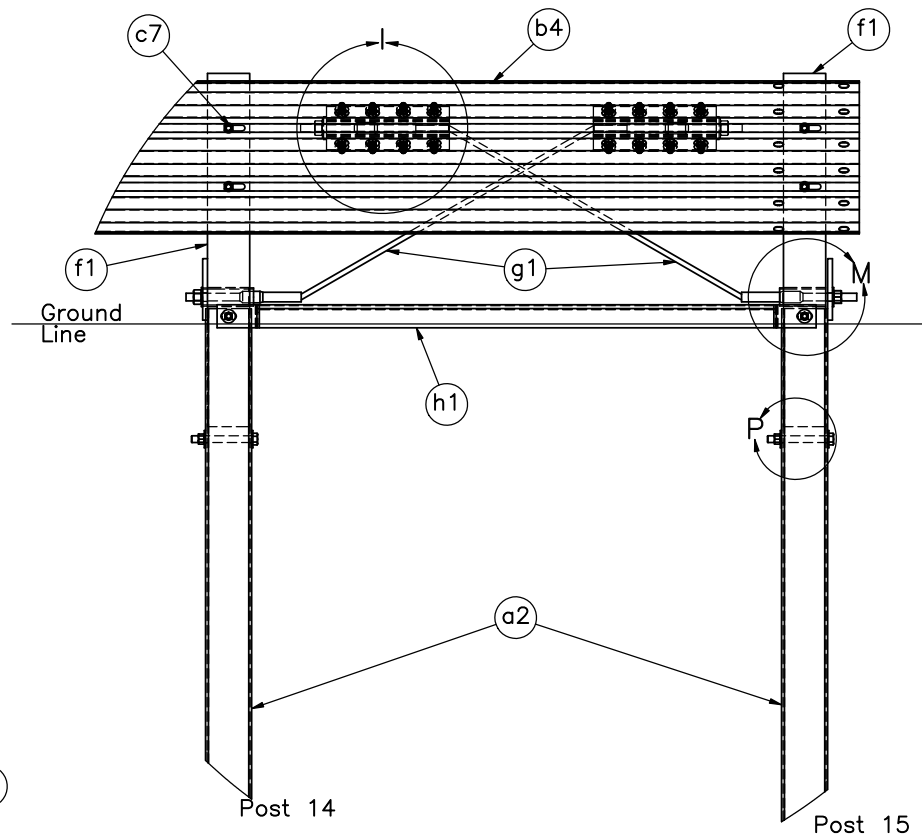
REV. BY:
JCH/JEK



DETAIL H
SCALE 1 : 10



DETAIL I
SCALE 1 : 7



DETAIL J

Notes: (1) Two nails (Part c8) bent over bearing plate (Part a3) to prevent rotation.
(2) Components in Detail J on side B of system hidden for clarity.



Midwest Roadside
Safety Facility

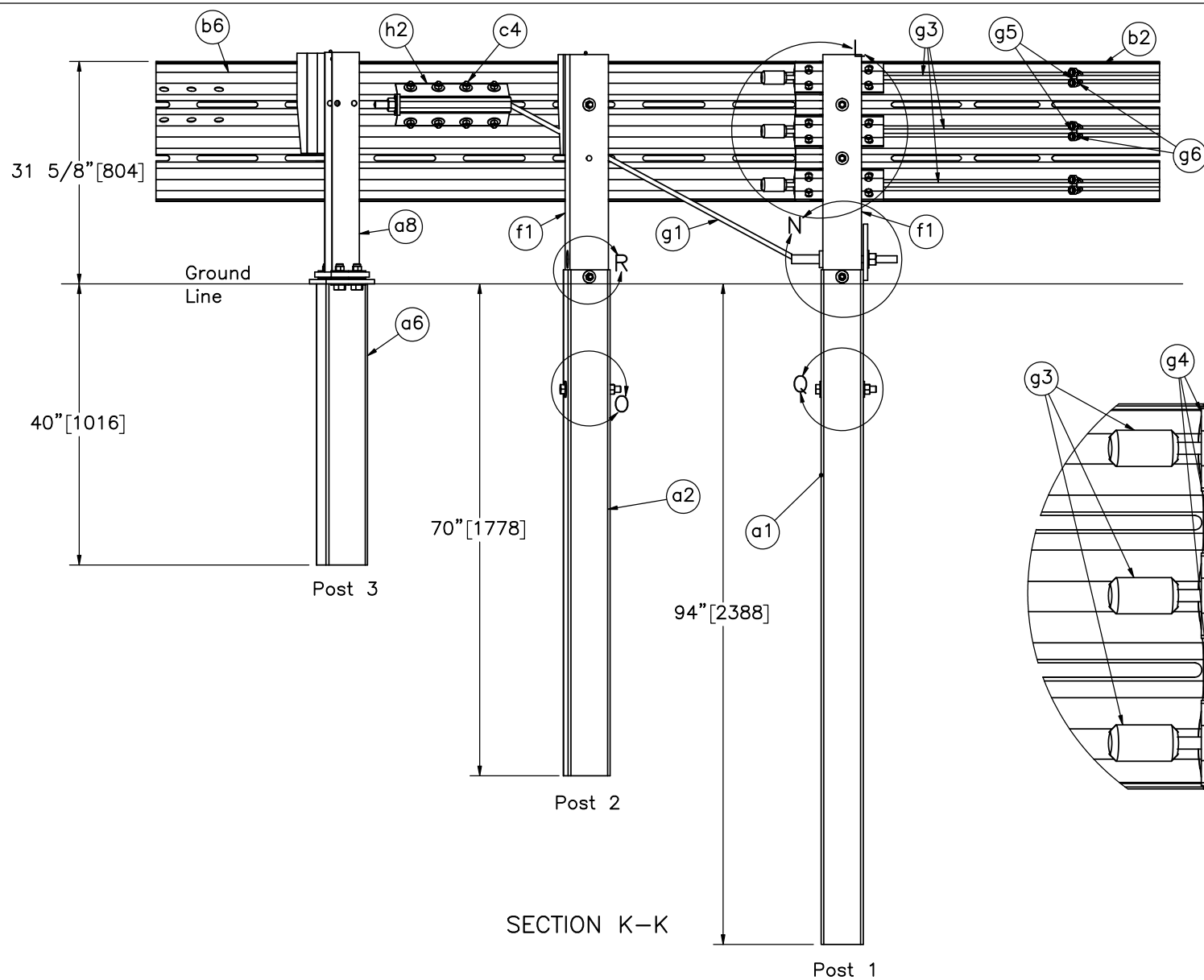
Bullnose with UBSP
Test No. MSPBN-6

End Rail Splice Detail

DWG. NAME.
Bullnose-6_R4

SCALE: 1:25
UNITS: In./mm

SHEET:
6 of 24
DATE:
4/17/2020
DRAWN BY:
JEK/JDJ/AJ
S/JRF
REV. BY:
JCH/JEK



Note: (1) Two nails (Part c8) bent over bearing plate (Part a3) to prevent rotation.



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Nose Section Detail

DWG. NAME.
Bullnose-6_R4

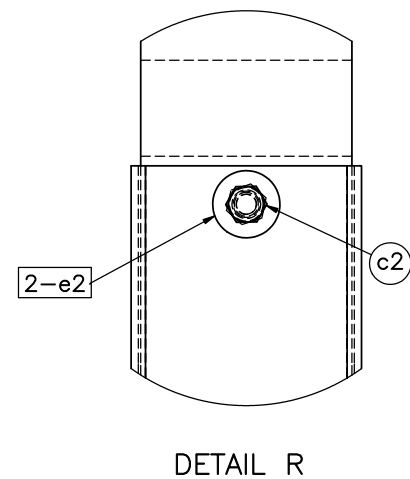
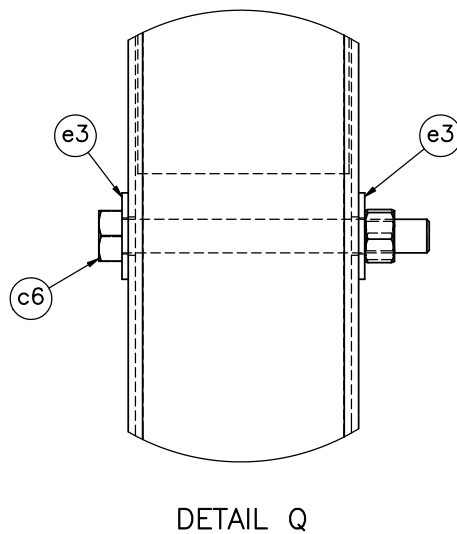
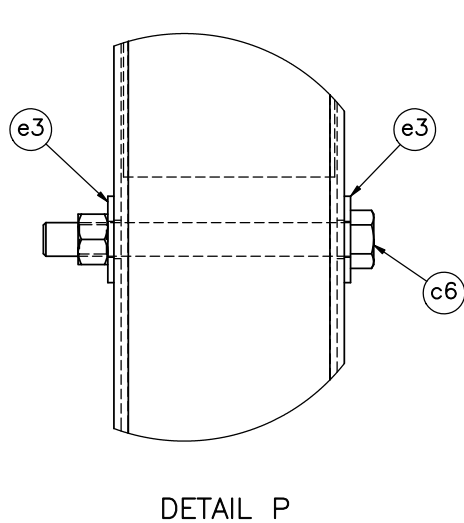
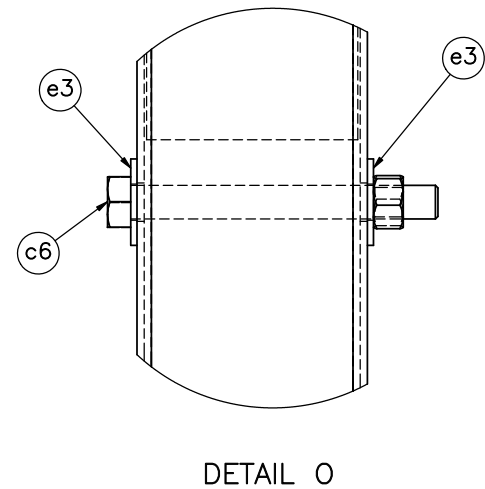
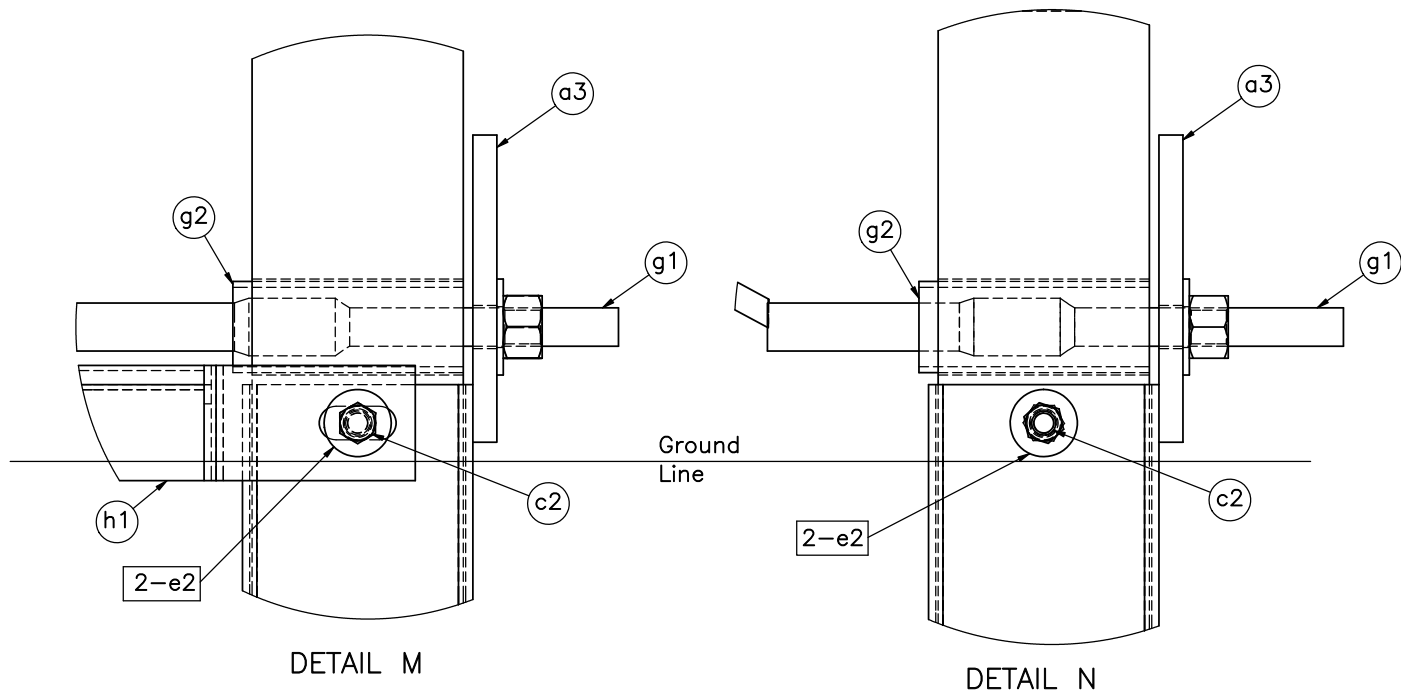
SCALE: 1:22
UNITS: In./mm

SHEET:
7 of 24

DATE:
4/17/2020

DRAWN BY:
JEK/JDJ/AJ
S/JRF

REV. BY:
JCH/JEK



Note: (1) Two nails (Part c8) bent over bearing plate (Part a3) to prevent rotation.



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Anchor Post Details

DWG. NAME.
Bullnose-6_R4

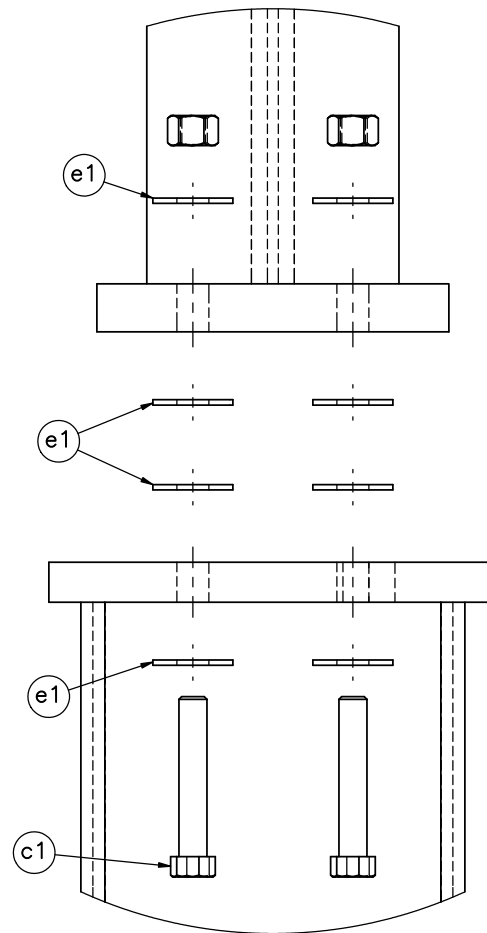
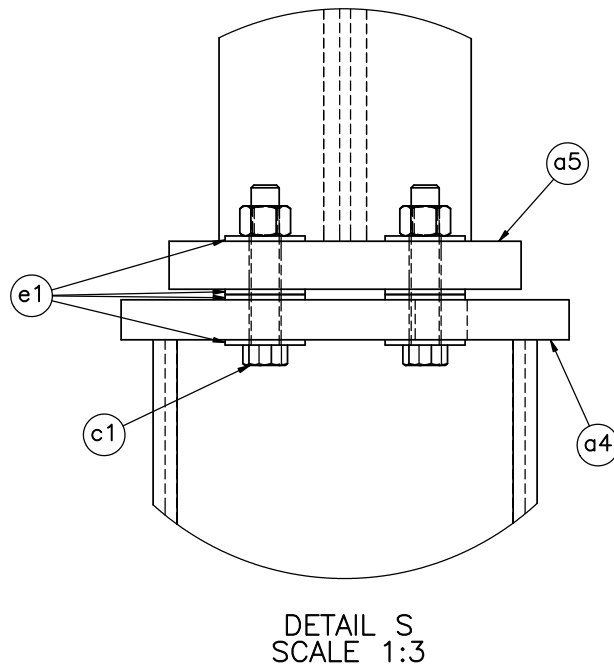
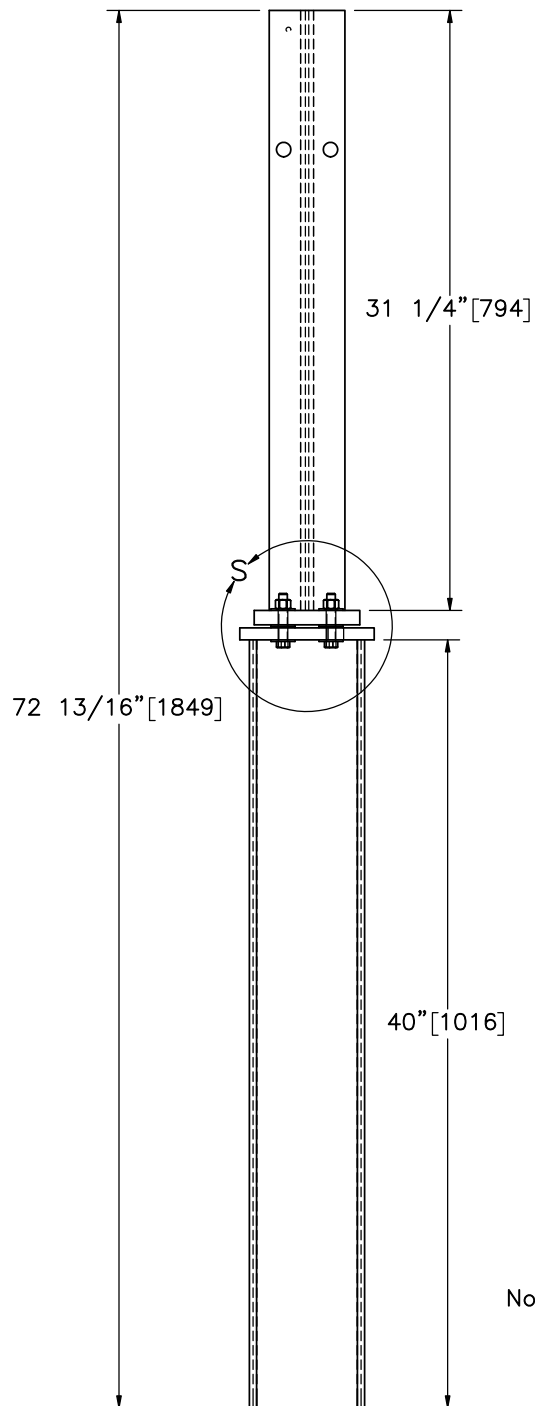
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SHEET:
8 of 24

DATE:
4/17/2020

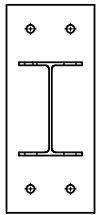
DRAWN BY:
JEK/JDJ/AJ
S/JRF

REV. BY:
JCH/JEK

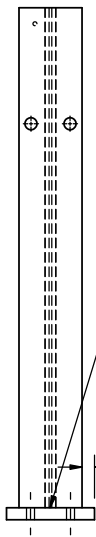


Note: Vertical through-bolts (part c1) are to be torqued to approximately 60–75 ft-lb [81.3–101.7 N-m].

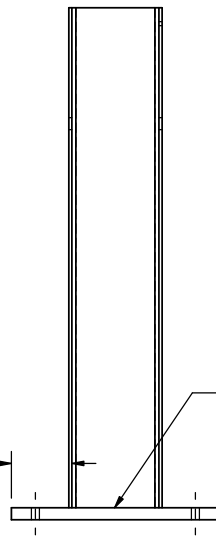
	Bullnose with UBSP Test No. MSPBN-6		SHEET: 9 of 24
	UBSP Post and Component Details		DATE: 4/17/2020
Midwest Roadside Safety Facility	DWG. NAME: Bullnose-6_R4	SCALE: 1:10 UNITS: In./mm	DRAWN BY: JEK/JDJ/AJ S/JRF
			REV. BY: JCH/JEK



PLAN VIEW

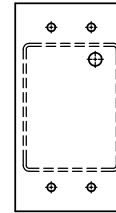


ELEVATION VIEW

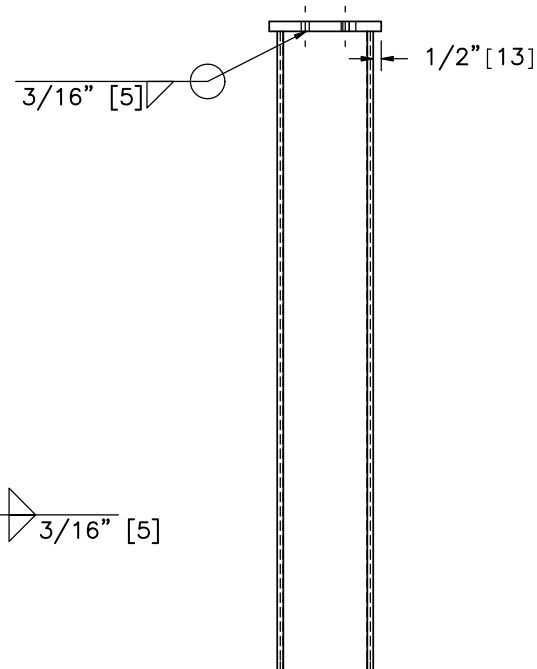


PROFILE VIEW

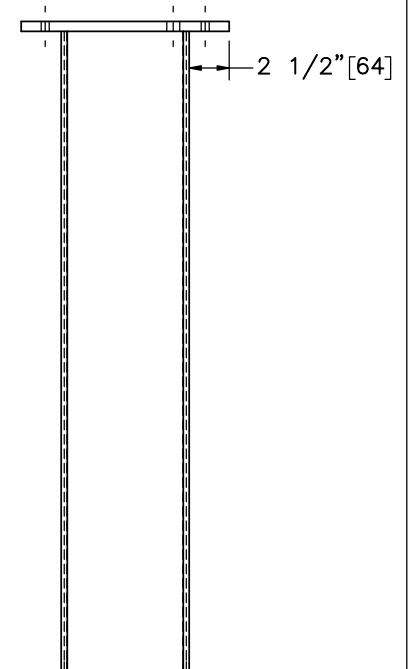
Part a5



PLAN VIEW



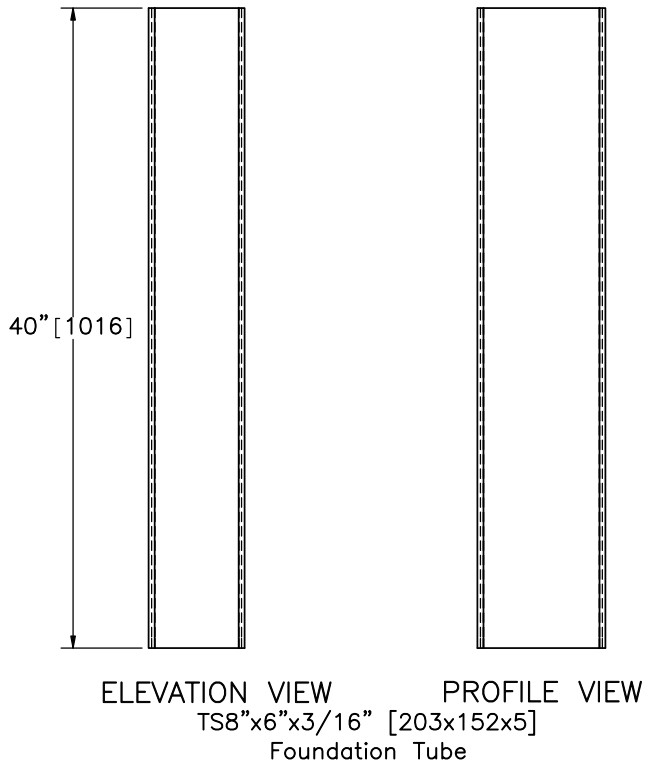
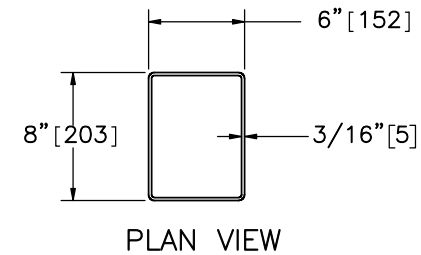
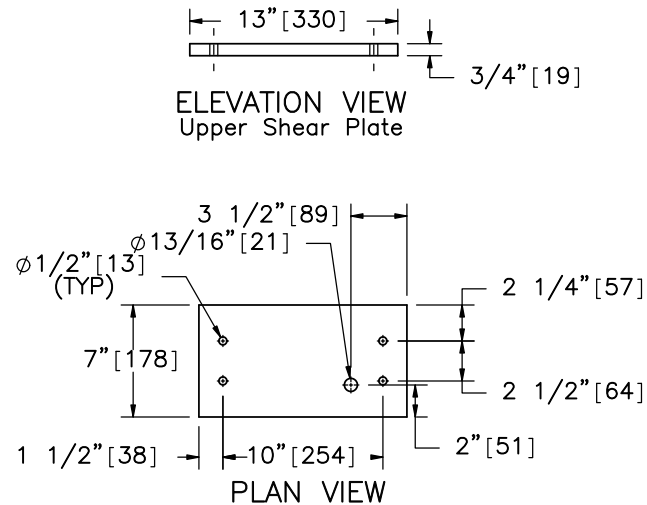
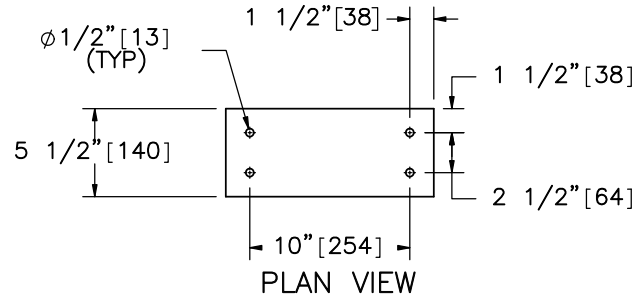
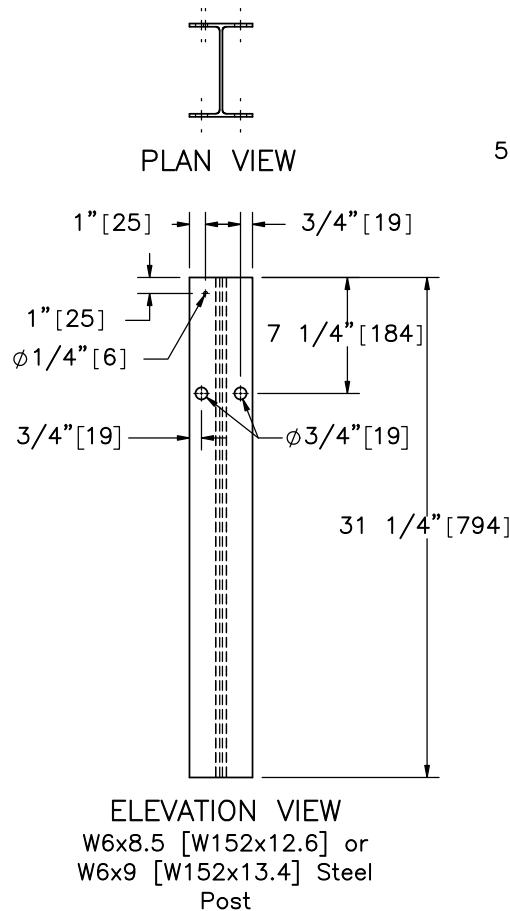
ELEVATION VIEW



PROFILE VIEW

Part a4

	Bullnose with UBSP Test No. MSPBN-6		SHEET: 10 of 24
	Upper and Lower Post Assembly Details		DATE: 4/17/2020
DWG. NAME: Bullnose-6_R4		SCALE: 1:12 UNITS: In.[mm]	DRAWN BY: JEK/JDJ/AJ S/JRF
REV. BY: JCH/JEK			



Note: $\phi 3/8$ " [10] Weep Hole is to be drilled in the steel plate (Part a4) to allow for draining of the hot zinc coating during the galvanization process.



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

UBSP Component Details

DWG. NAME.
Bullnose-6_R4

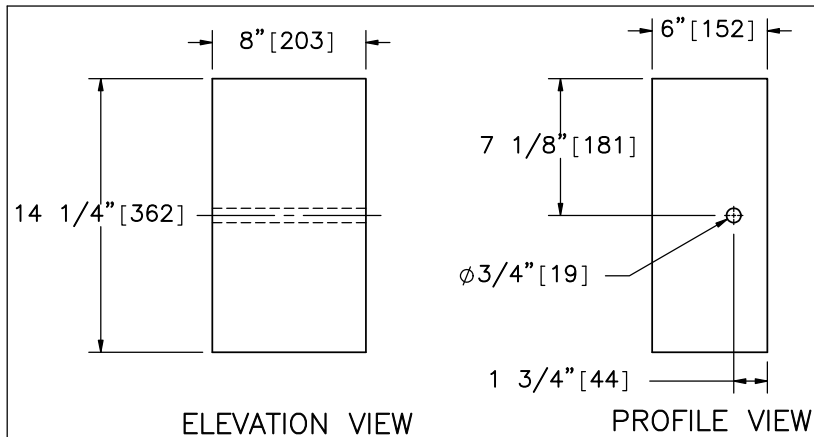
SCALE: 1:12
UNITS: In./mm

SHEET:
11 of 24

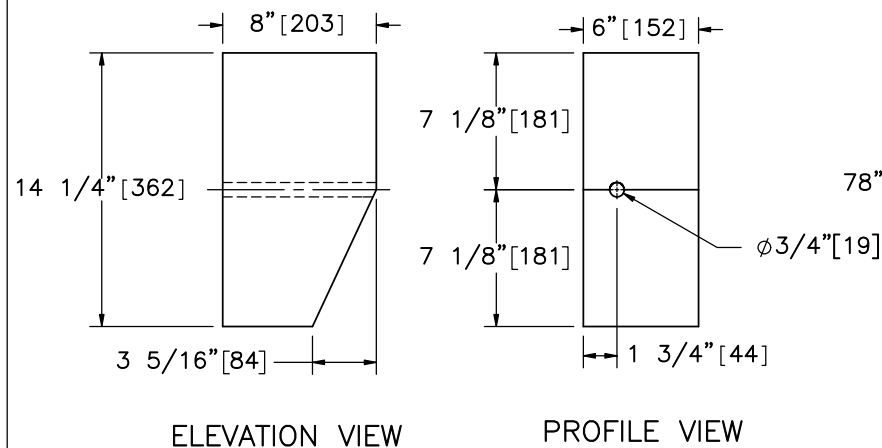
DATE:
4/17/2020

DRAWN BY:
JEK/JDJ/AJS/JRF

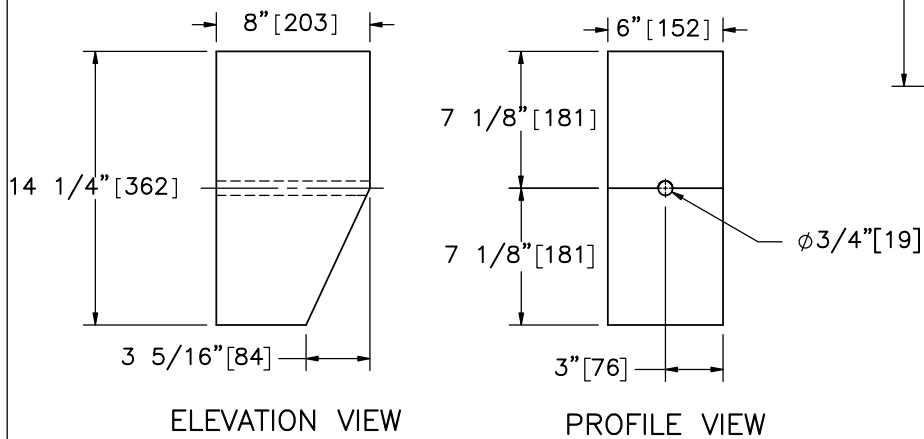
REV. BY:
JCH/JEK



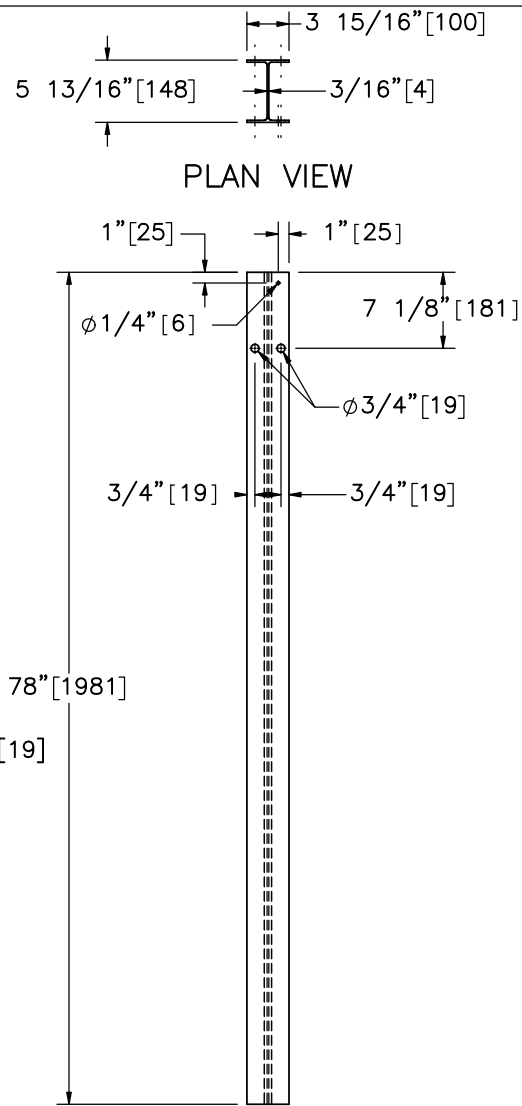
Part a6



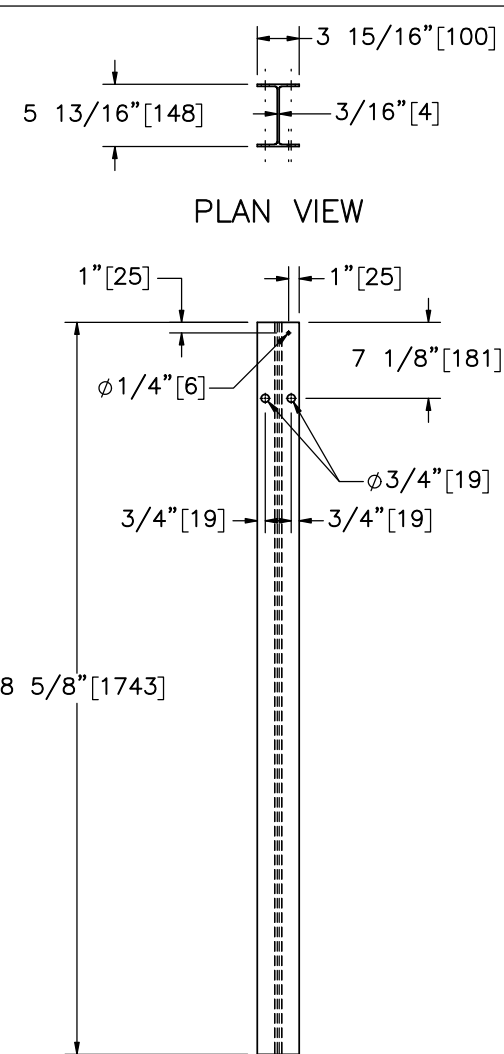
Part a7



Part a8



SCALE 1:18
Part f2



SCALE 1:18
Part f3



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

W6x9 Post and Blockout
Details

DWG. NAME.

Bullnose-6_R4

SCALE: 1:10

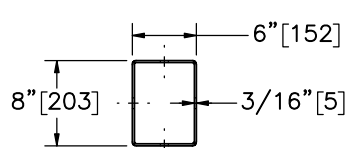
UNITS: In./mm

SHEET:
12 of 24

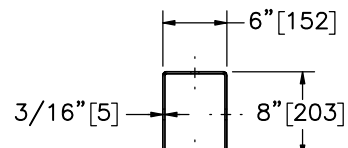
DATE:
4/17/2020

DRAWN BY:
JEK/JDJ/AJ
S/JRF

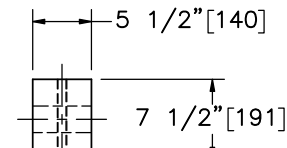
REV. BY:
JCH/JEK



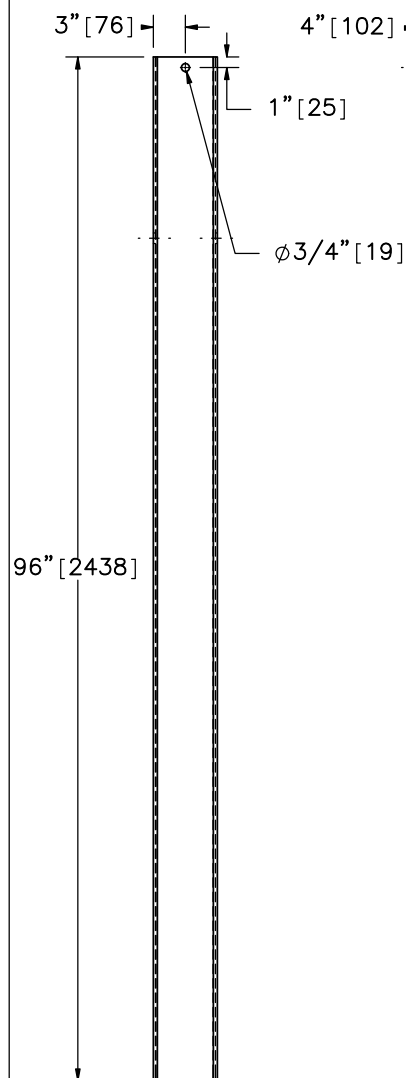
PLAN VIEW



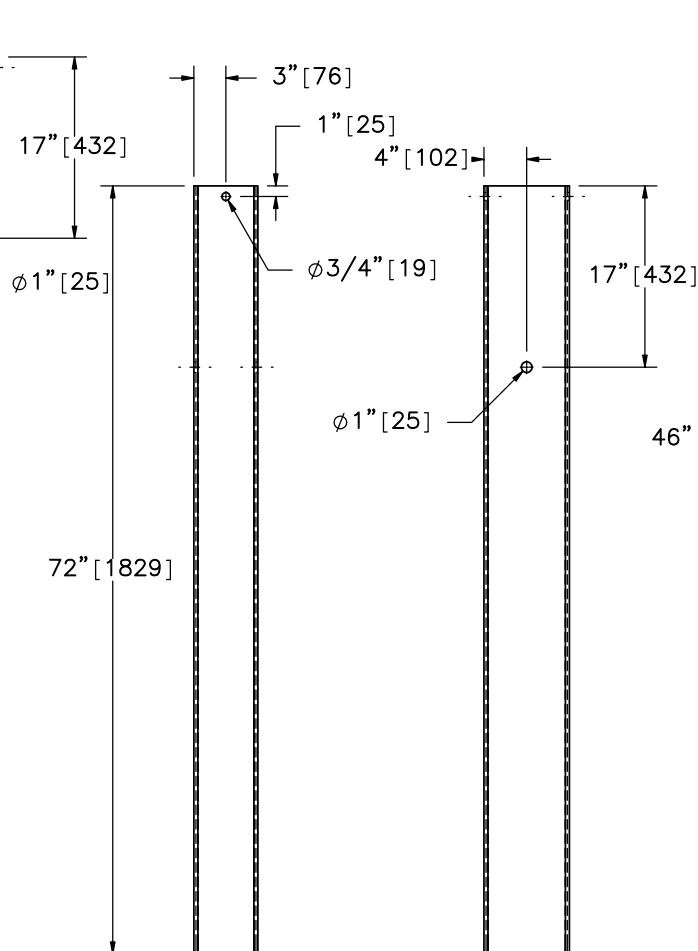
PLAN VIEW



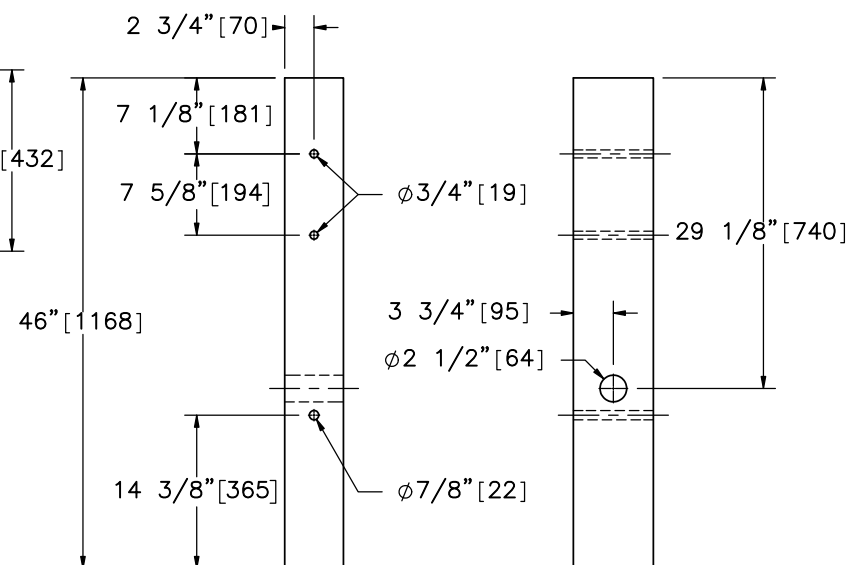
PLAN VIEW



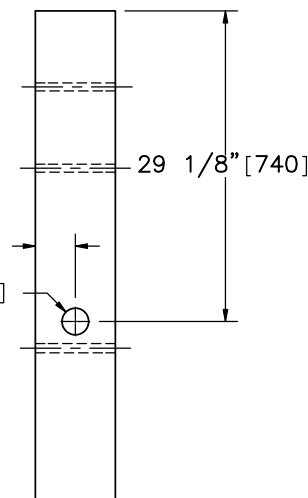
ELEVATION VIEW
Part a1



ELEVATION VIEW
Part a2



ELEVATION VIEW
Part f1



PROFILE VIEW



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

BCT Timber Posts and
Foundation Tube Details

DWG. NAME.
Bullnose-6_R4

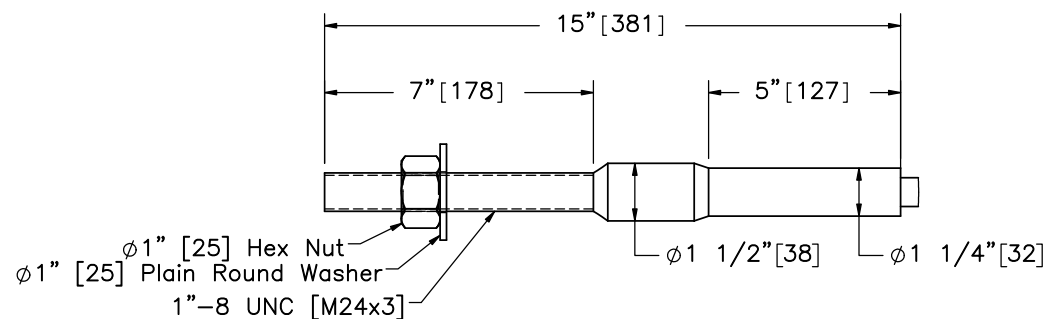
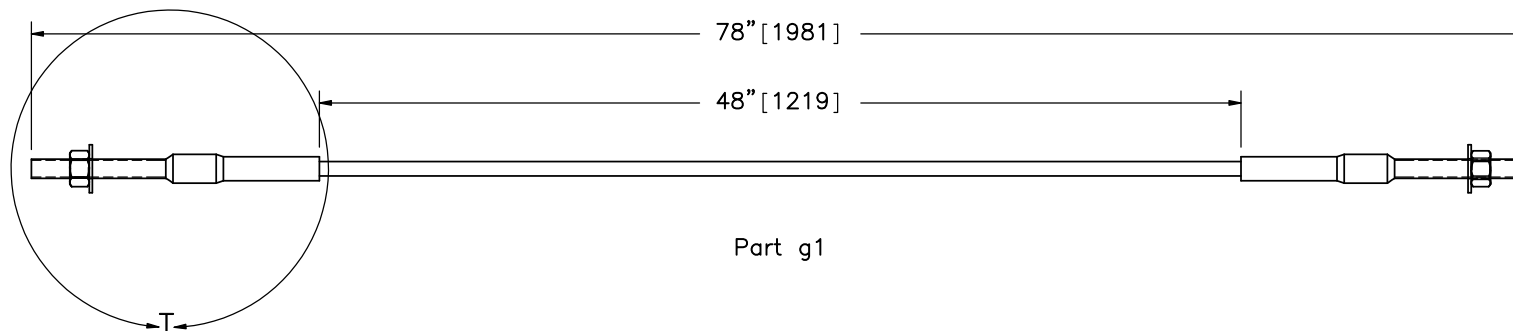
SCALE: 1:18
UNITS: In./mm

SHEET:
13 of 24

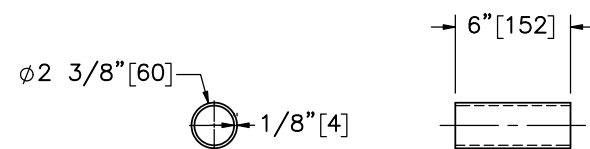
DATE:
4/17/2020

DRAWN BY:
JEK/JDJ/AJ
S/JRF

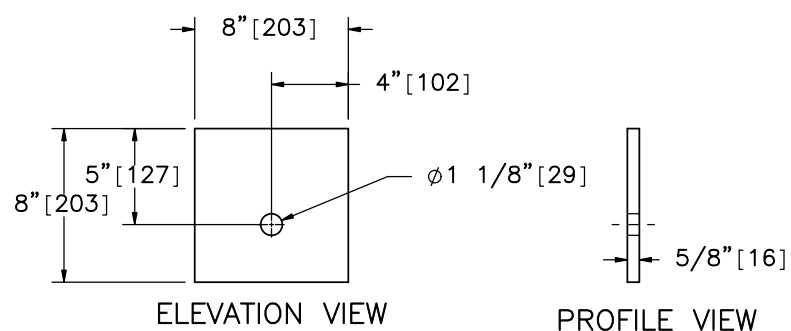
REV. BY:
JCH/JEK



DETAIL T
SCALE 1:5



ELEVATION VIEW PROFILE VIEW
Part g2



Part a3



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

BCT Anchor Cable Detail

DWG. NAME.
Bullnose-6_R4

SCALE: 1:10
UNITS: In.[mm]

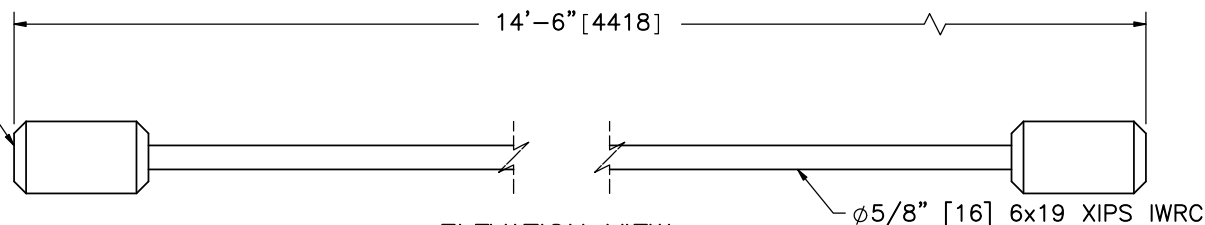
SHEET:
14 of 24

DATE:
4/17/2020

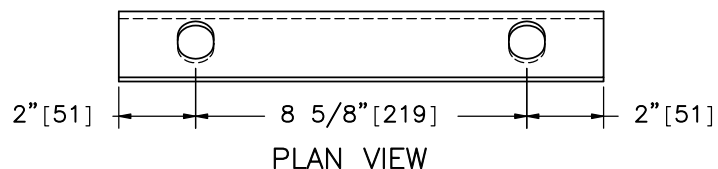
DRAWN BY:
JEK/JDJ/AJ
S/JRF

REV. BY:
JCH/JEK

"Cold Tuff" Button, S-409
 Size No. 12 SB, Stock No.
 1040395 for $\phi 5/8"$ [16]
 (6x19) wire rope (or any
 similarly sized swage-grip
 button ferrules)

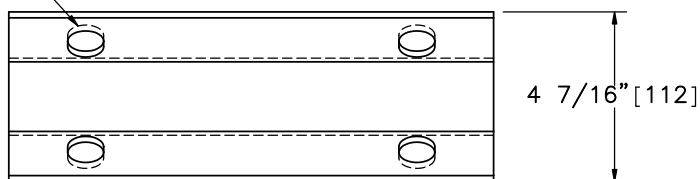


ELEVATION VIEW
 Part g3



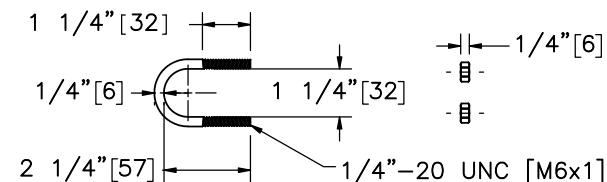
PLAN VIEW

$\phi 29/32"$ x 1 1/8" [23x29]
 Slot (TYP)

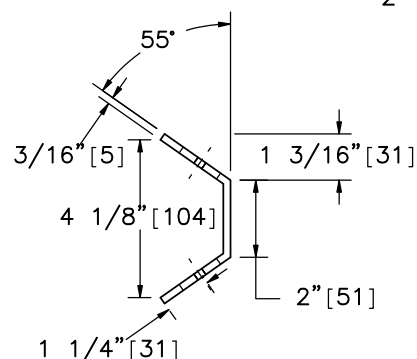


ELEVATION VIEW

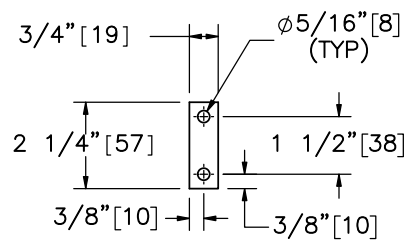
Part g4



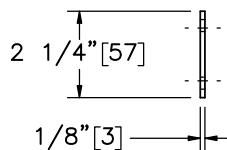
Part g6



PROFILE VIEW



ELEVATION VIEW



PROFILE VIEW

Part g5



Midwest Roadside
 Safety Facility

Bullnose with UBSP
 Test No. MSPBN-6

Nose Cable Detail

DWG. NAME.
 Bullnose-6_R4

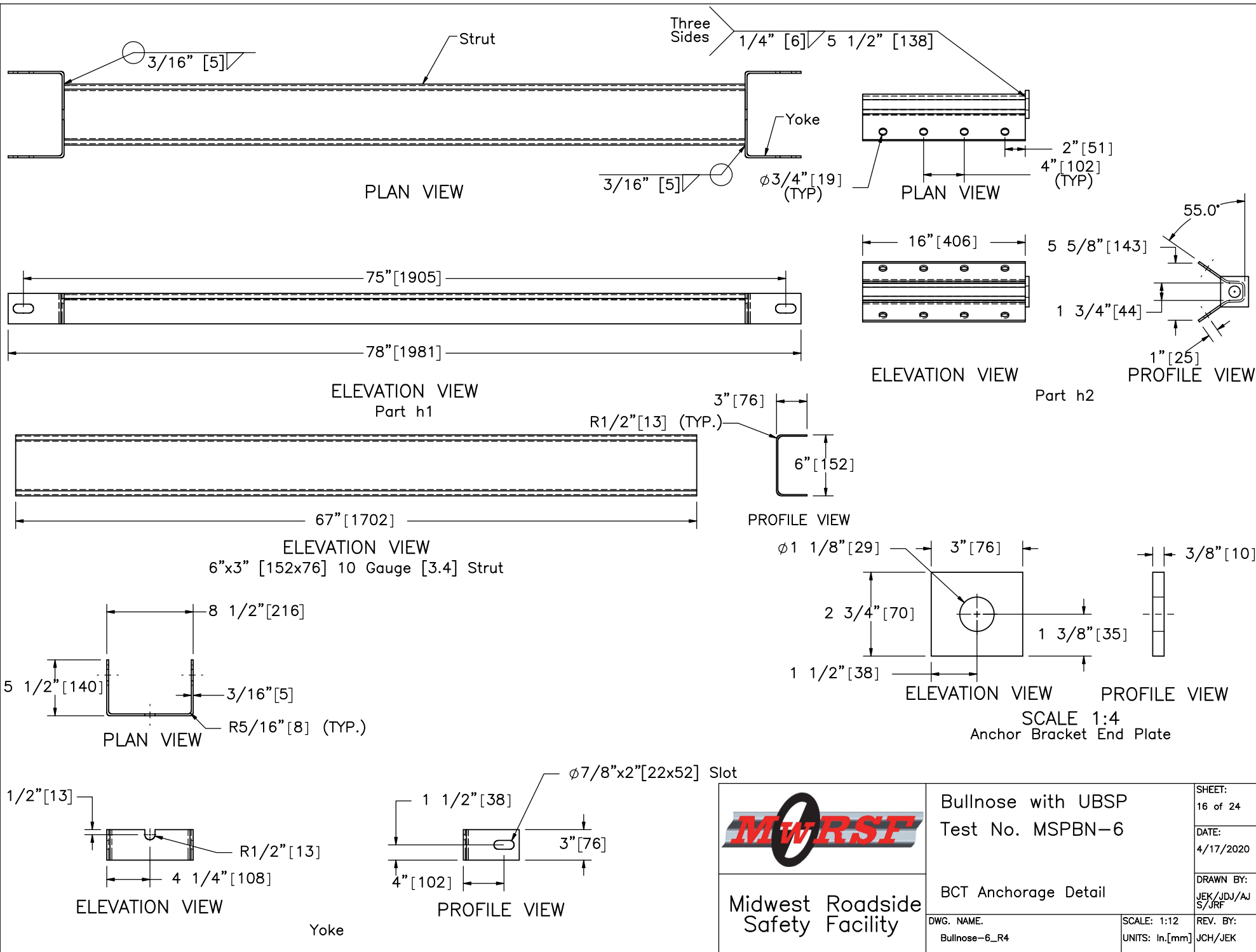
SCALE: 1:5
 UNITS: In./mm

SHEET:
 15 of 24

DATE:
 4/17/2020

DRAWN BY:
 JEK/JDJ/AJ
 S/JRF

REV. BY:
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Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

BCT Anchorage Detail

DWG. NAME.
Bullnose-6_R4

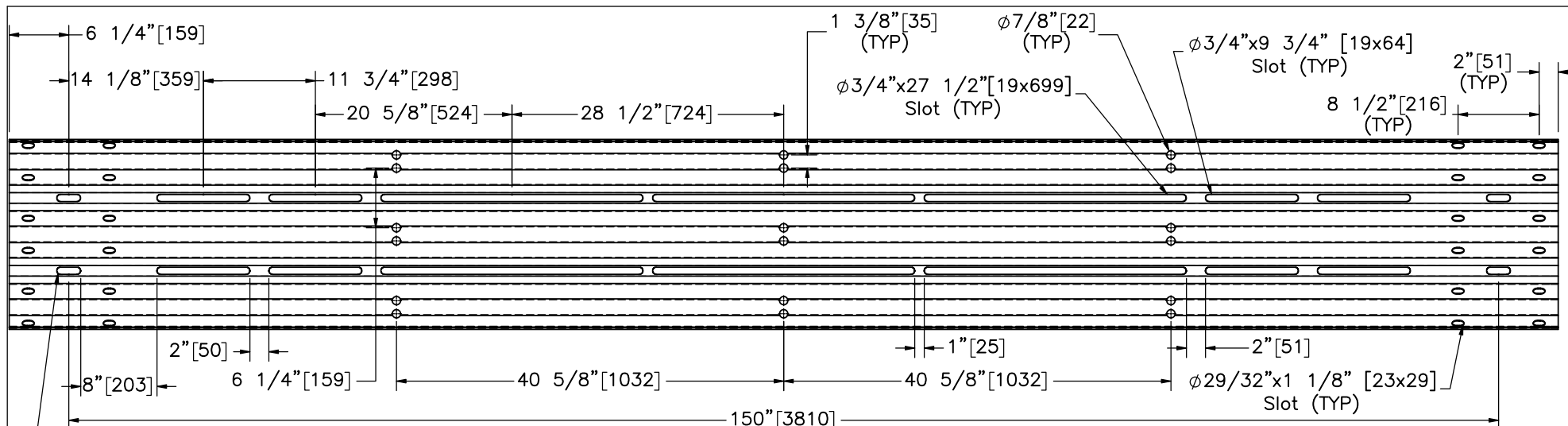
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UNITS: In./mm

SHEET:
16 of 24

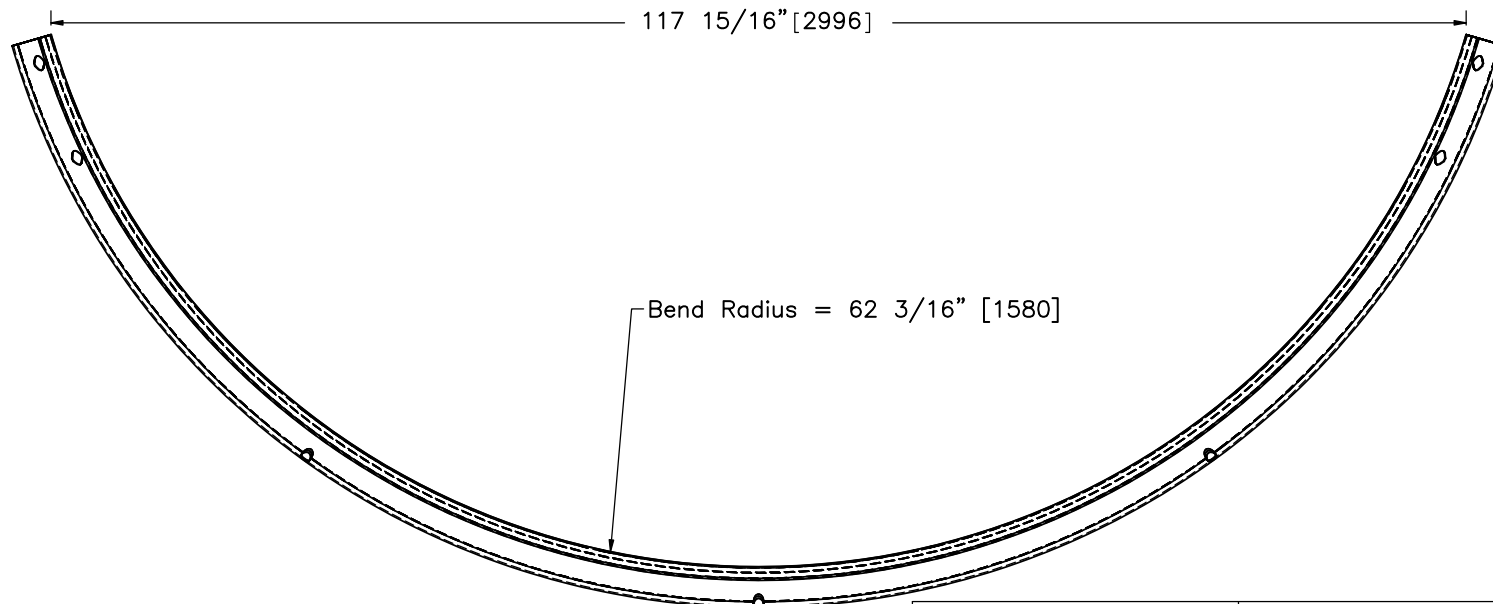
DATE:
4/17/2020

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S/JRF

REV. BY:
JCH/JEK



ELEVATION VIEW
 NON-RADIUSED
 Part b2
 117 15/16" [2996]



PLAN VIEW
 Part b2



Midwest Roadside
 Safety Facility

Bullnose with UBSP
 Test No. MSPBN-6

Rail Section Details
 Section No. 1

DWG. NAME:
 Bullnose-6_R4

SCALE: 1:16
 UNITS: In./mm

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DATE:
 4/17/2020

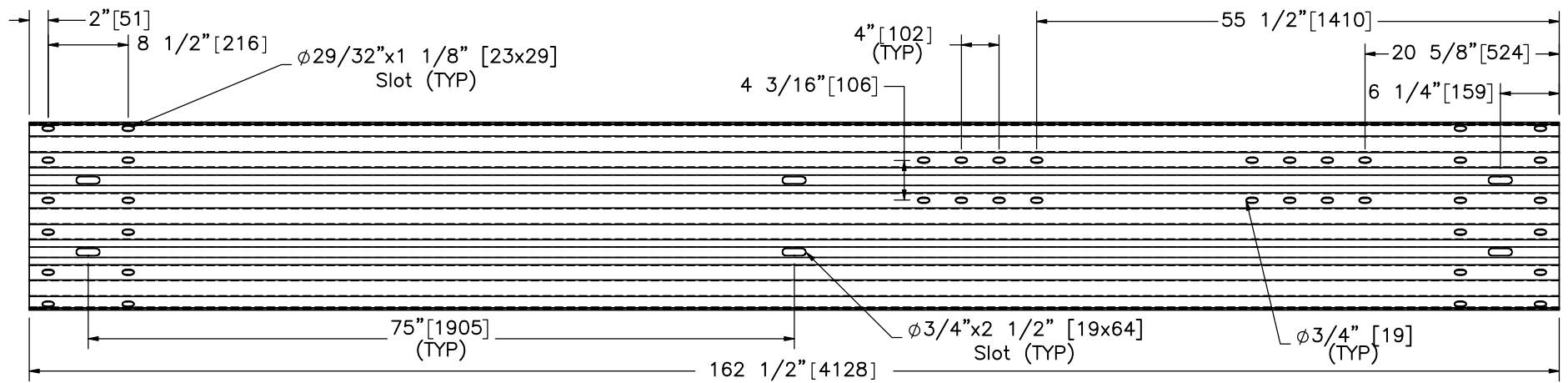
DRAWN BY:
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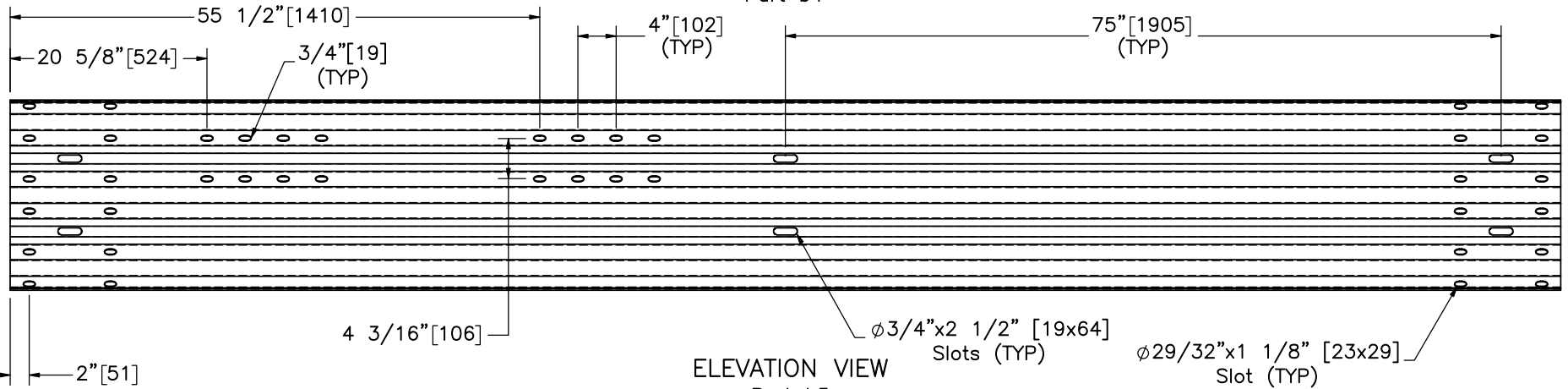


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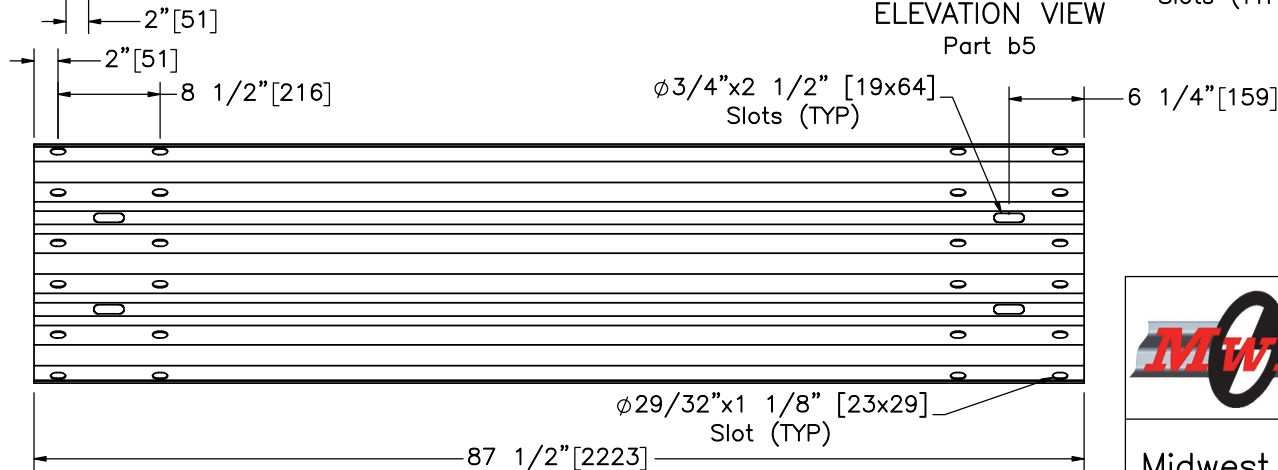
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ELEVATION VIEW
Part b4



ELEVATION VIEW
Part b5



ELEVATION VIEW
Part b7



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Rail Section Details
Section Nos. 5 and 6

DWG. NAME:
Bullnose-6_R4

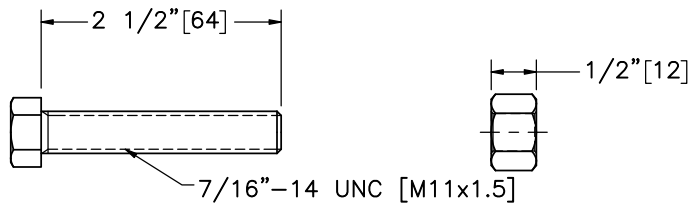
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SHEET:
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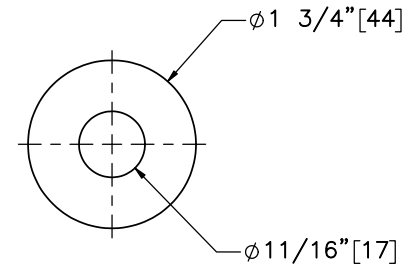
DATE:
4/17/2020

DRAWN BY:
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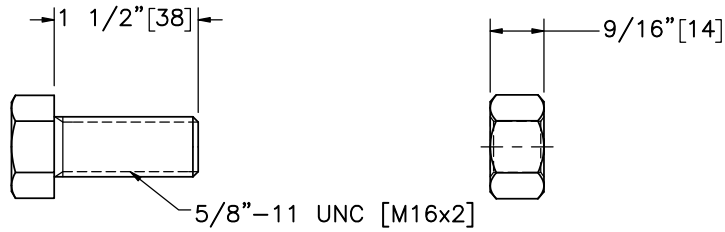
REV. BY:
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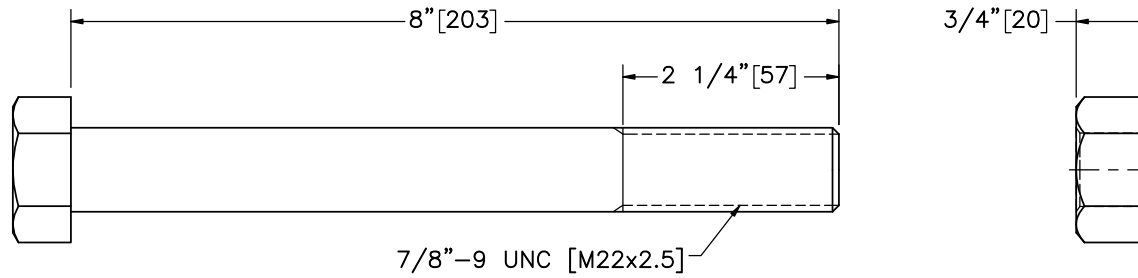
Part c1



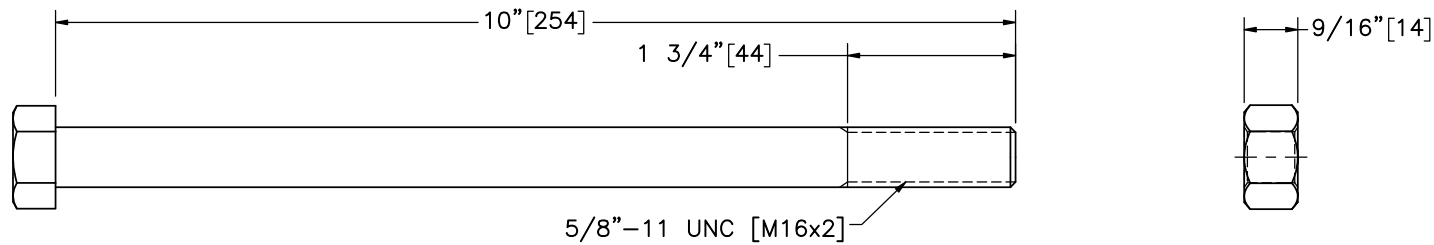
Part e2



Part c4



Part c6



Part c2



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

System Hardware

DWG. NAME.
Bullnose-6_R4

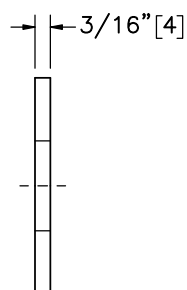
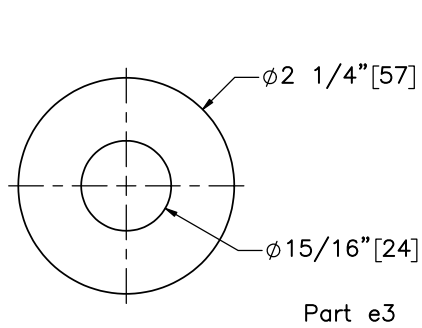
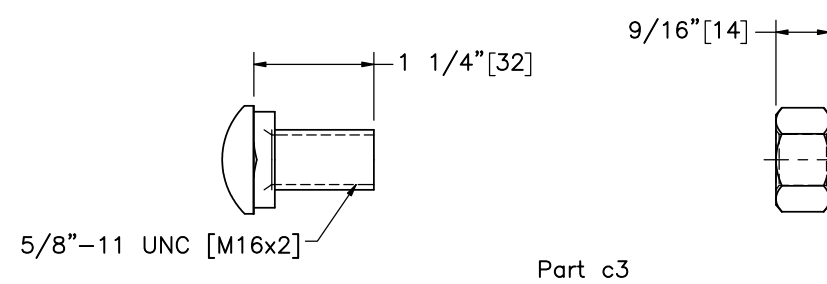
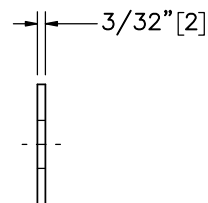
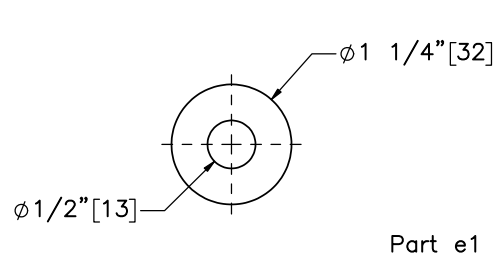
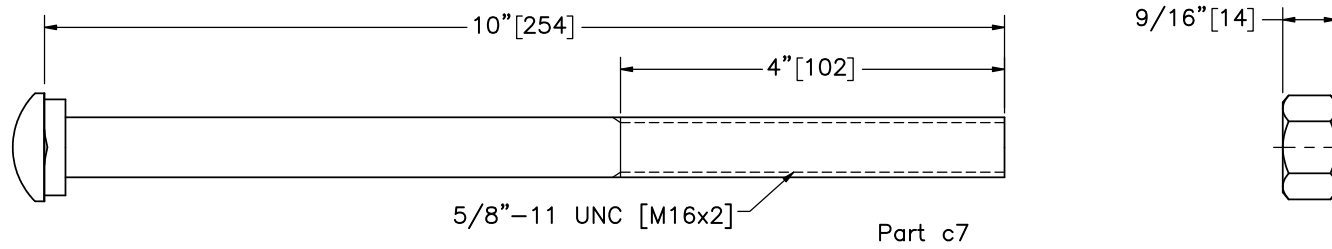
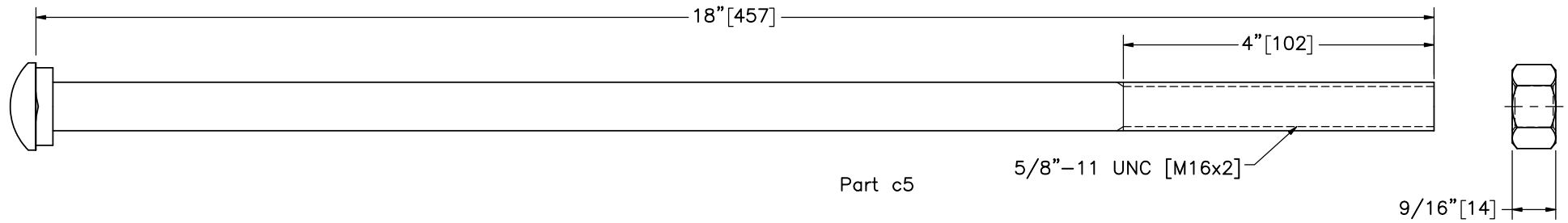
SCALE: 1:2
UNITS: In.[mm]

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Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

System Hardware

DWG. NAME.
Bullnose-6_R4

SCALE: 1:2
UNITS: In./mm

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4/17/2020

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JCH/JEK

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
a1	2	TS8"x6"x3/16" [203x152x5], 96" [2,438] Long Foundation Tube	ASTM A500 Gr. B	ASTM A123	PTE07
a2	6	TS8"x6"x3/16" [203x152x5], 72" [1,829] Long Foundation Tube	ASTM A500 Gr. B	ASTM A123	PTE06
a3	6	8"x8"x5/8" [203x203x16] Anchor Bearing Plate	ASTM A36	ASTM A123	FPB01
a4	12	Lower Slip Post Assembly	Plate—ASTM A36 Foundation Tube—ASTM A500 Gr. B	ASTM A123	PTE08
a5	12	Upper Slip Post Assembly	Plate—ASTM A36 Post—ASTM A992	ASTM A123	PWE11
a6	21	6"x8"x14 1/4" [152x203x362] Timber Blockout	SYP Grade No. 1 or better	—	PDB09
a7	12	6"x8"x14 1/4" [152x203x362] Tapered Timber Blockout	SYP Grade No. 1 or better	—	PDB20
a8	2	6"x8"x14 1/4" [152x203x362] Tapered Timber Blockout — Post 2	SYP Grade No. 1 or better	—	PDB12
b1	4	12'-6" [3,810] 12 gauge [2.7] Thrie Beam Section	AASHTO M180	ASTM A123 or A653	RTM02a
b2	1	12'-6" [3,810] 12 gauge [2.7] Bent Thrie Beam Section	AASHTO M180	ASTM A123 or A653	RTM07a
b3	2	12'-6" [3,810] 12 gauge [2.7] Thrie Beam Section	AASHTO M180	ASTM A123 or A653	RTM07e
b4	1	12'-6" [3,810] 12 gauge [2.7] Thrie Beam End Section — Side A	AASHTO M180	ASTM A123 or A653	—
b5	1	12'-6" [3,810] 12 gauge [2.7] Thrie Beam End Section — Side B	AASHTO M180	ASTM A123 or A653	—
b6	2	12'-6" [3,810] 12 gauge [2.7] Bent Thrie Beam Section	AASHTO M180	ASTM A123 or A653	RTM07d
b7	1	6'-3" [1,905] 12-gauge [2.7] Thrie Beam Section	AASHTO M180	ASTM A123 or A653	RTM18a
c1	48	7/16"—14 UNC [M11x1.5], 2 1/2" [64] Long Hex Tap Bolt (Fully Threaded) and Nut	Bolt — ASTM A449 or SAE J429 Gr. 5 Nut — ASTM A563DH or SAE J995 Gr. 5	ASTM A153 or B695 Class 55 or F2329	FBX12b
c2	8	5/8"—11 UNC [M16x2], 10" [254] Long Hex Head Bolt	Bolt — ASTM A307 Gr. A Nut — ASTM A563A	ASTM A153 or B695 Class 55 or F2329	FBX16a
c3	132	5/8"—11 UNC [M16x2], 1 1/4" [32] Long Guardrail Bolt and Nut	Bolt — ASTM A307 Gr. A Nut — ASTM A563A	ASTM A153 or B695 Class 55 or F2329	FBB01
c4	48	5/8"—11 UNC [M16x2], 1 1/2" [38] Long Hex Head Bolt and Nut	Bolt — ASTM A307 Gr. A Nut — ASTM A563A	ASTM A153 or B695 Class 55 or F2329	FBX16a
c5	14	5/8"—11 UNC [M16x2], 18" [457] Long Guardrail Bolt and Nut	Bolt — ASTM A307 Gr. A Nut — ASTM A563A	ASTM A153 or B695 Class 55 or F2329	FBB04
c6	8	7/8"—9 UNC [M22x2.5], 8" [203] Long Hex Head Bolt and Nut	Bolt — ASTM A307 Gr. A Nut — ASTM A563A	ASTM A153 or B695 Class 55 or F2329	—
c7	21	5/8"—11 UNC [M16x2], 10" [254] Long Guardrail Bolt and Nut	Bolt — ASTM A307 Gr. A Nut — ASTM A563A	ASTM A153 or B695 Class 55 or F2329	FBB03
c8	46	16D Double Head Nail	—	—	—



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Bill of Materials

DWG. NAME.
Bullnose-6_R4

SCALE: None
UNITS: In./mm

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4/17/2020
DRAWN BY:
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S/JRF
REV. BY:
JCH/JEK

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
e1	192	7/16" [11] Dia. Plain Round Washer	ASTM F844	ASTM A153 or B695 Class 55 or F2329	FWC12a
e2	118	5/8" [16] Dia. Plain Round Washer	ASTM F844	ASTM A153 or B695 Class 55 or F2329	FWC16a
e3	16	7/8" [22] Dia. Plain Round Washer	ASTM F844	ASTM A153 or B695 Class 55 or F2329	—
f1	8	BCT Timber Post — MGS Height	SYP Grade No. 1 or better (No knots +/- 18" [457] from ground on tension face)	—	PDF04
f2	8	W6x8.5 [W152x12.6] or W6x9 [W152x13.4], 78" [1,981] Long Steel Post	ASTM A992	ASTM A123	—
f3	1	W6x8.5 [W152x12.6] or W6x9 [W152x13.4], 68 5/8" [1,743] Long Steel Post	ASTM A992	ASTM A123	—
g1	12	BCT Anchor Cable Assembly	—		FCA01
g2	6	2 3/8" [60] O.D. x 6" [152] Long BCT Post Sleeve	ASTM A53 Gr. B Schedule 40	ASTM A123	FMM02
g3	3	5/8" Dia. [15.9] x 14.4' [4,389] Long Cable and Swage Button	"Cold Tuff" Button, S-409 Size No. 12 SB, Stock No. 1040395 for 5/8" [16] Dia. (6x19) wire rope (or any similarly sized swage-grip button ferrules)	Wire Rope — Class A Coating	RCM02
g4	6	12 5/8"x5 13/16"x3/16" [321x148x5] Nose Cable Anchor Plate	ASTM A36	ASTM A123	FPA04
g5	9	2 1/4"x3/4" [57x19] 11 gauge [3] U-Bolt Plate Washer	ASTM A1011 CS Type B	ASTM A123	—
g6	9	1/4" [6] Dia. U-Bolt and Nut	U-Bolt — ASTM A307 Gr. A Nut — ASTM A563A	ASTM A153 or B695 Class 55 or F2329	—
h1	2	Ground Strut Assembly	ASTM A36	ASTM A123	PFP01
h2	6	Anchor Bracket Assmbely	ASTM A36	ASTM A123	FPA01



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-6

Bill of Materials

DWG. NAME.
Bullnose-6_R4

SCALE: None
UNITS: In.[mm]

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DATE:
4/17/2020

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JEK/JDJ/AJ
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JCH/JEK

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	5/16/2018	–	Original created from Bullnose-5_R1. Impact location edit.	–	JEK
1	8/2/2018	9	Note edit.	JCH	JDJ
2	12/21/2018	2-3	Post spacing changed in the model. Tables values changes to reflect those in bullnose 1	JEK	AJS
3	4/3/2020	1	Edited note 3	RWB	JRF
4	4/17/2020	4,9	Corrections to post mates affecting total length	RWB	JEK
		22	Part e1 dimension corrections.		