

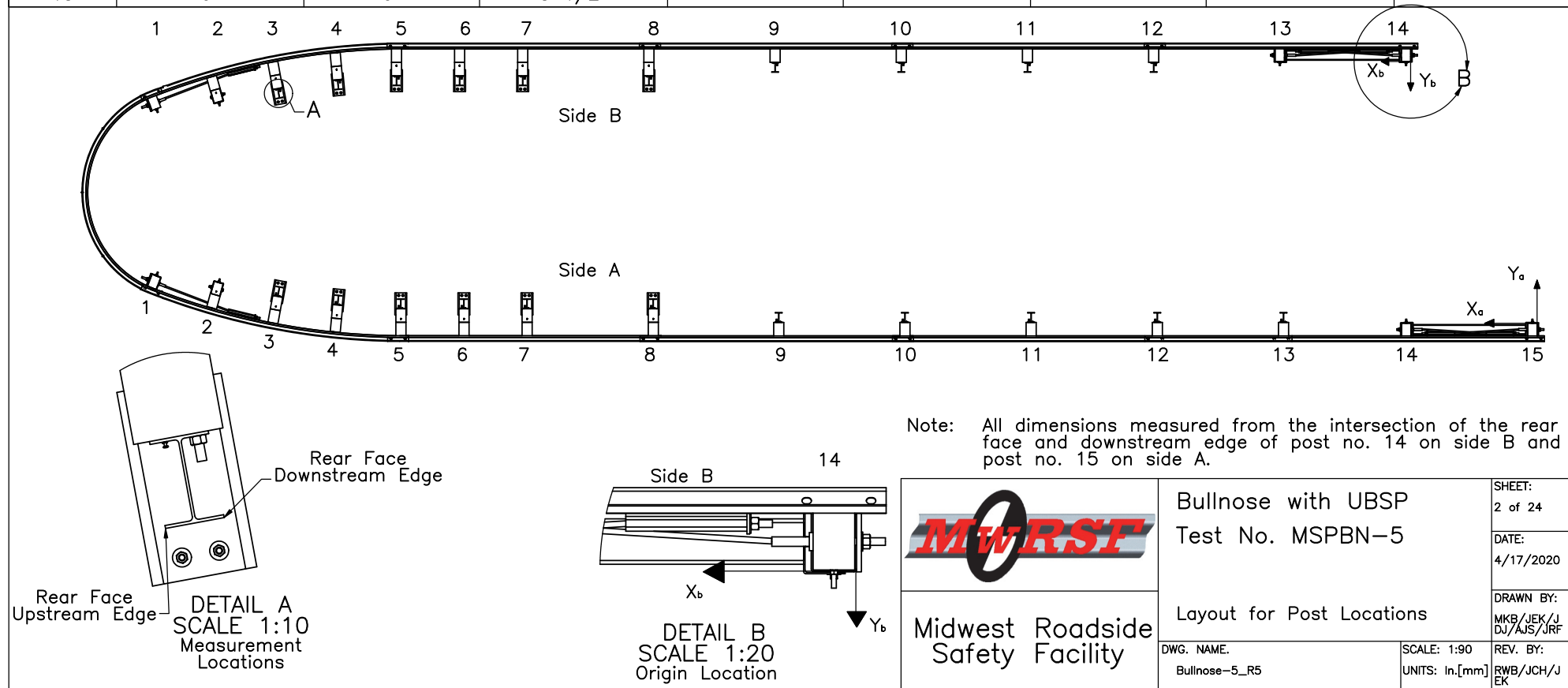
The image contains two technical drawings of a guardrail system, labeled 'PLAN VIEW' and 'ELEVATION VIEW'.

PLAN VIEW: This drawing shows the top-down layout of the guardrail. It features a curved 'Nose' section on the left, labeled 'Side B' on the outer edge and 'Side A' on the inner edge. The nose is defined by a dashed line 'K' and a '1/4 Vehicle Offset'. A 'Vehicle' is shown impacting the nose, with a 'Impact 1100C' point. The main section is a straight line with 15 numbered posts (1 to 15). A dimension of '75" [1905] (TYP)' is shown between posts 9 and 10. A dimension of '37 1/2" [953] (TYP)' is shown between posts 4 and 5. A dimension of 'b5' is shown at the right end. A note 'Begin standard thrie-beam guardrail' points to the transition at post 9.

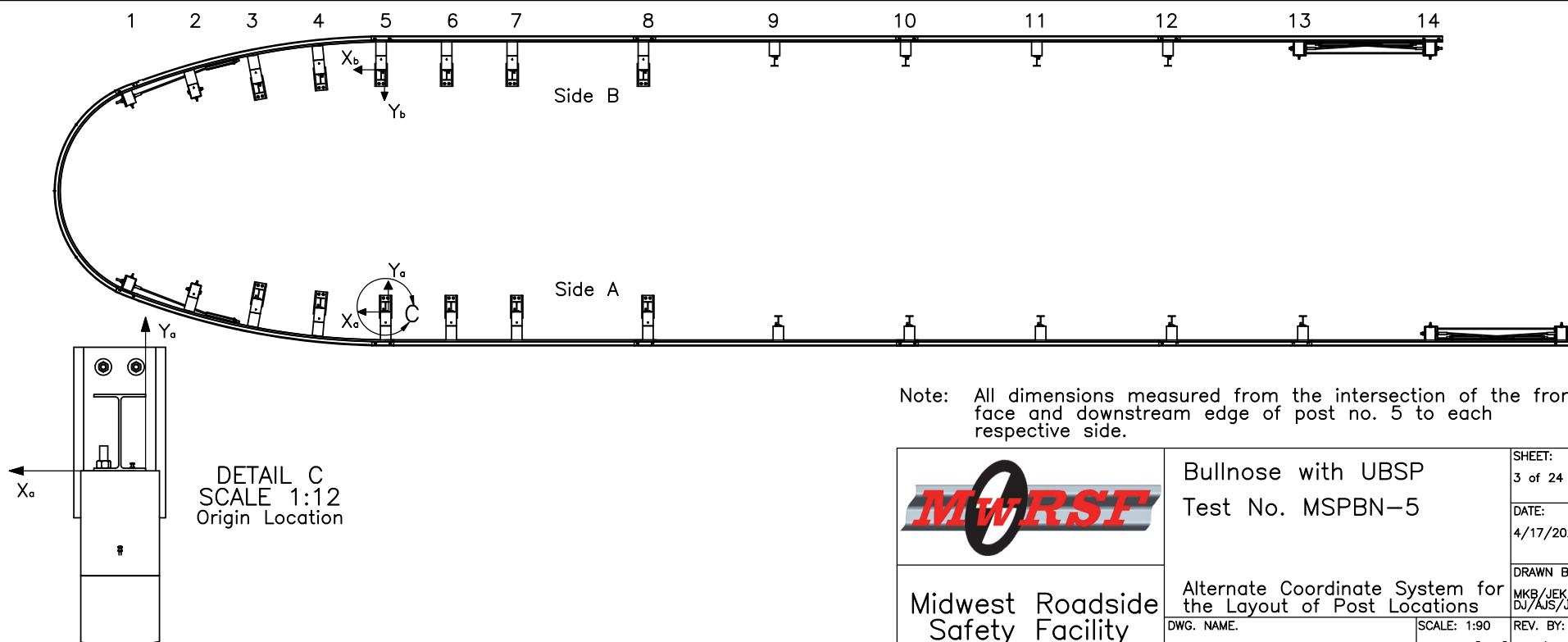
ELEVATION VIEW: This drawing shows the side profile of the guardrail. It features a horizontal line for the 'Ground Line'. The guardrail consists of three horizontal beams. Dimensions 'b2', 'b6', 'b3', 'b1', 'b1', 'b7', and 'b4' are shown above the beams. A dimension of '31 5/8" [803]' is shown between the first and second beams. Labels 'F', 'D', 'E', and 'H' are used to identify specific components or points. A circular detail view is shown on the right end, showing the connection of the beams and posts.

	Bullnose with UBSP Test No. MSPBN-5		SHEET: 1 of 24
			DATE: 4/17/2020
Midwest Roadside Safety Facility	System Layout		DRAWN BY: MKB/JEK/JJ DJ/AJS/JRF
	DWG. NAME: Bullnose-5_R5	SCALE: 1:100 UNITS: In.[mm]	REV. BY: RWB/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	62'-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 3/4"	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"	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"	-	-	-	-	-



Post No.	Rear Face—DS Edge		Rear Face—US 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-5

Alternate Coordinate System for
the Layout of Post Locations

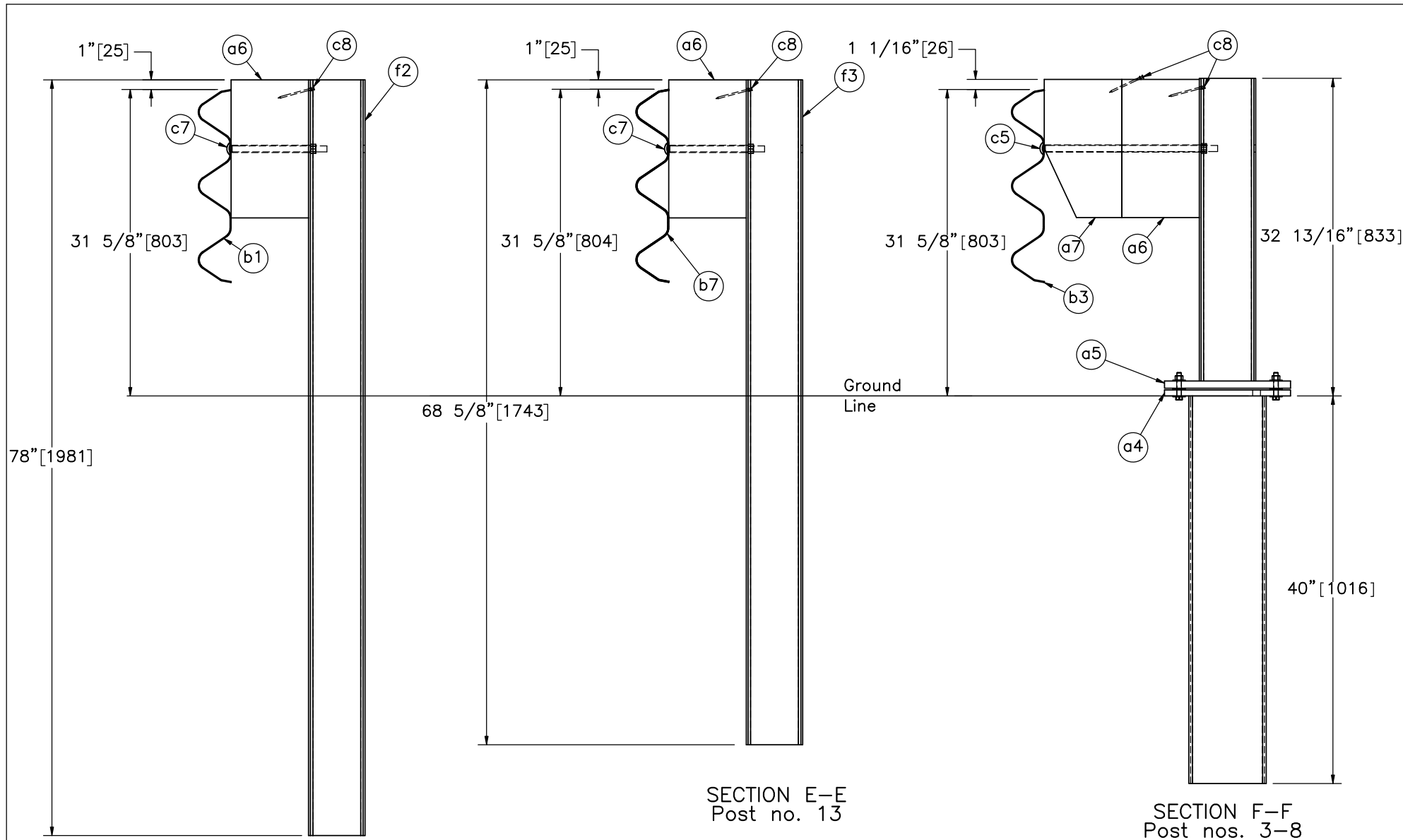
DWG. NAME.
Bullnose-5_R5

SCALE: 1:90
UNITS: In.[mm]

SHEET:
3 of 24

DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF
REV. BY:
RWB/JCH/J
EK



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

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

DWG. NAME.
Bullnose-5_R5

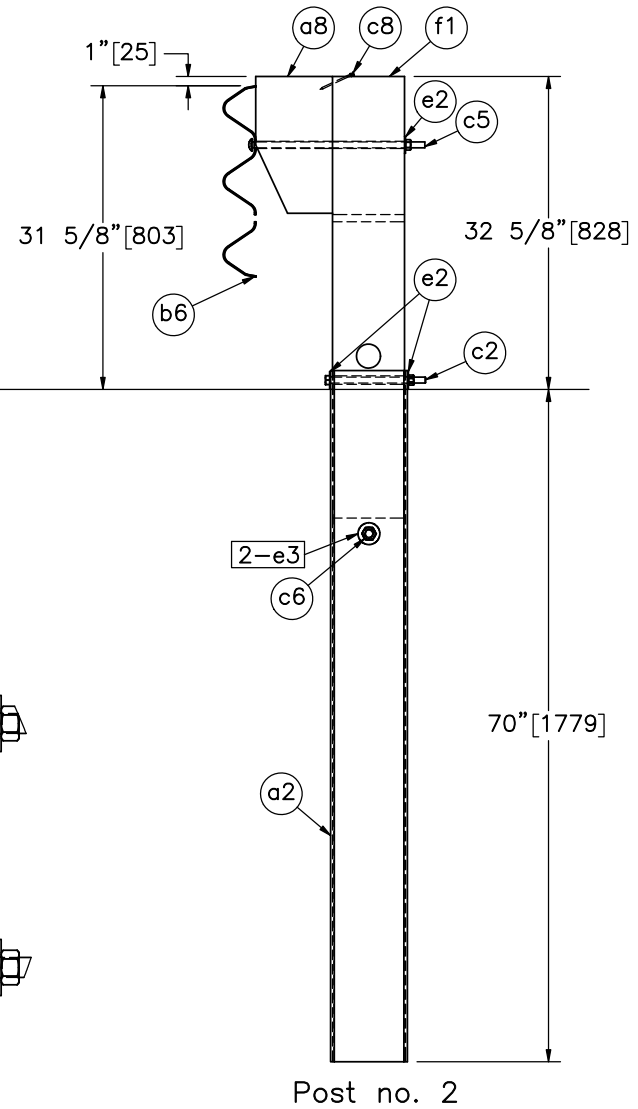
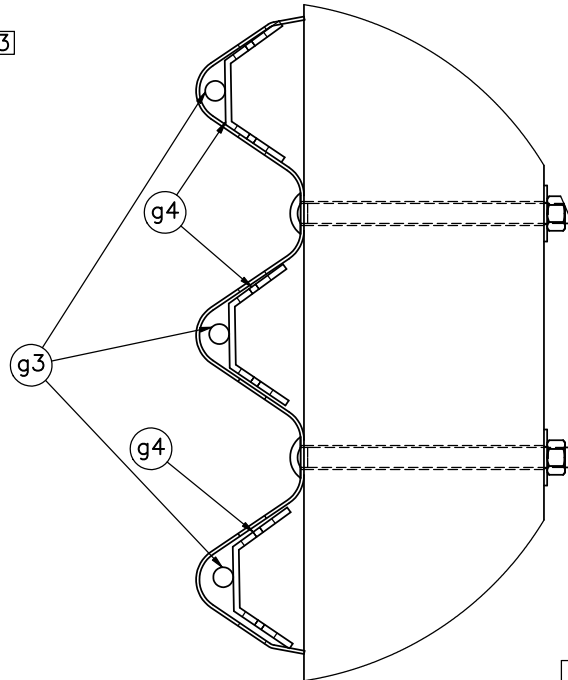
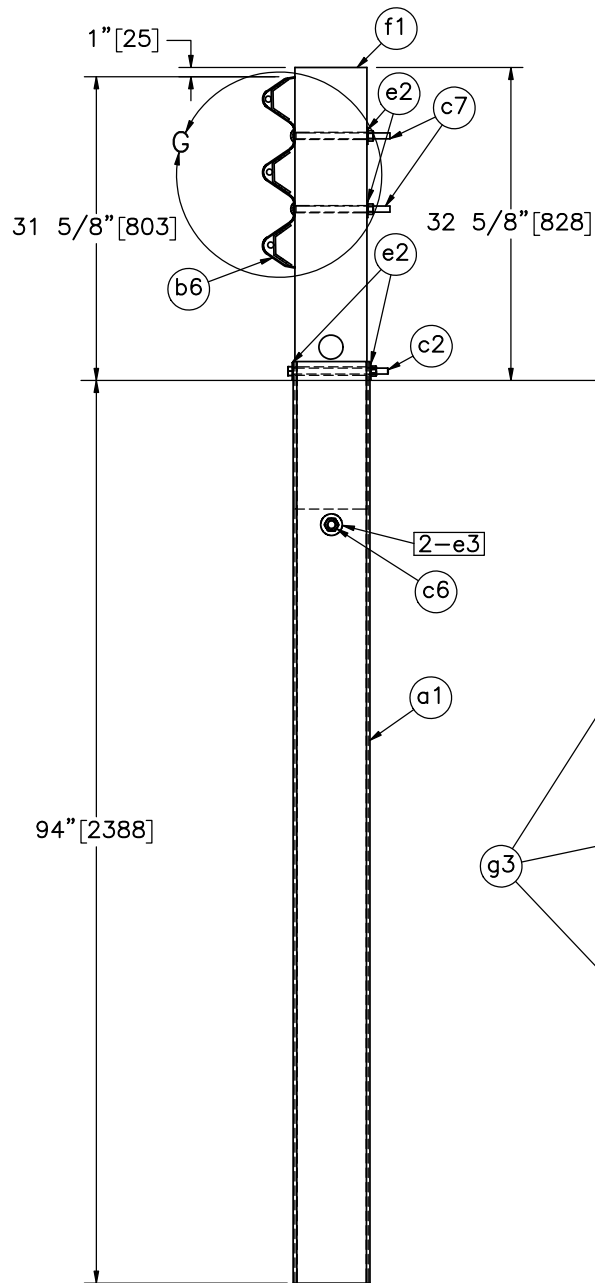
SCALE: 1:14
UNITS: In./mm

SHEET:
4 of 24

DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

REV. BY:
RWB/JCH/J
EK



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

Post Nos. 1 and 2 Details

DWG. NAME.
Bullnose-5_R5

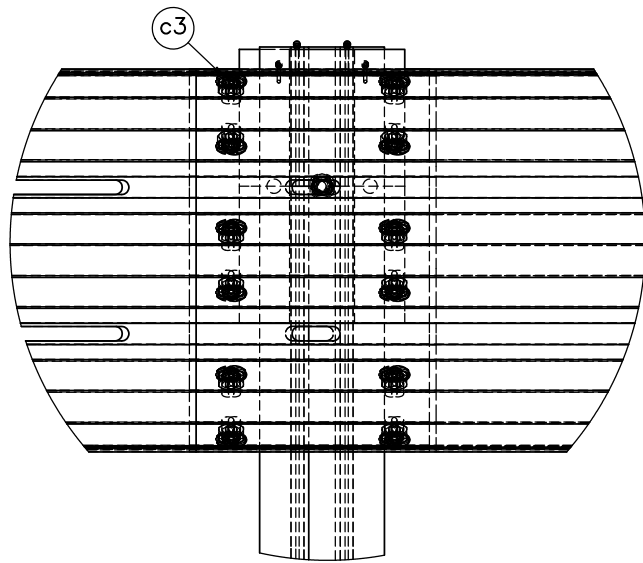
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UNITS: In.[mm]

SHEET:
5 of 24

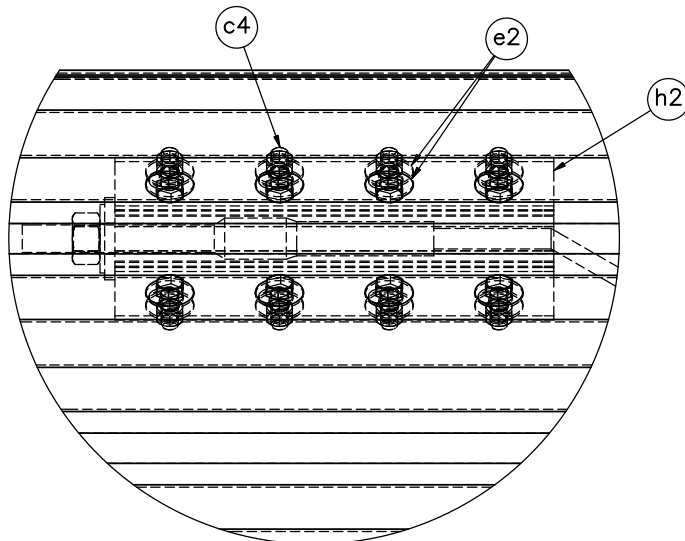
DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

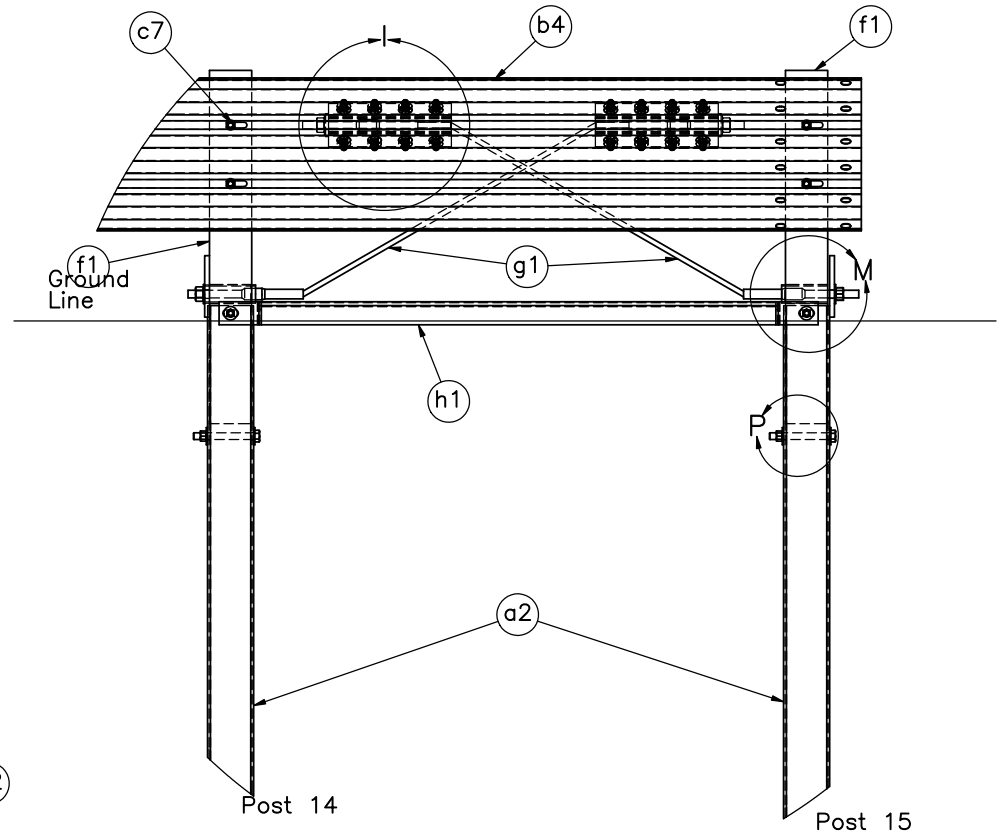
REV. BY:
RWB/JCH/J
EK



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
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Bullnose with UBSP
Test No. MSPBN-5

End Rail Splice Detail

DWG. NAME.
Bullnose-5_R5

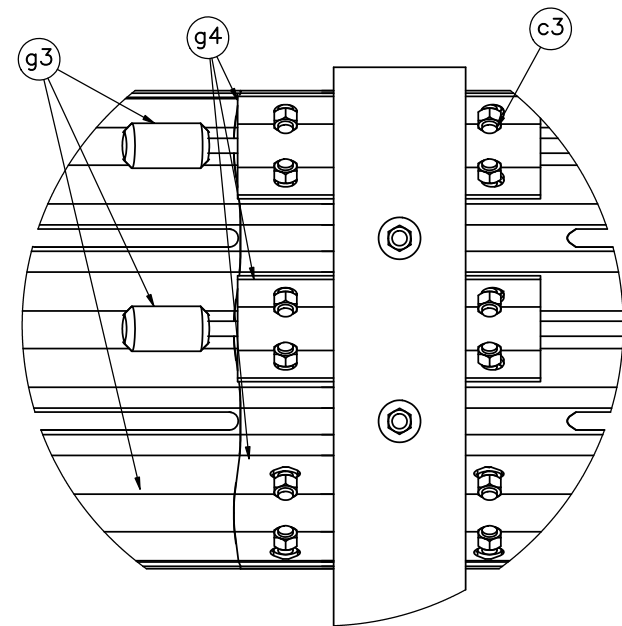
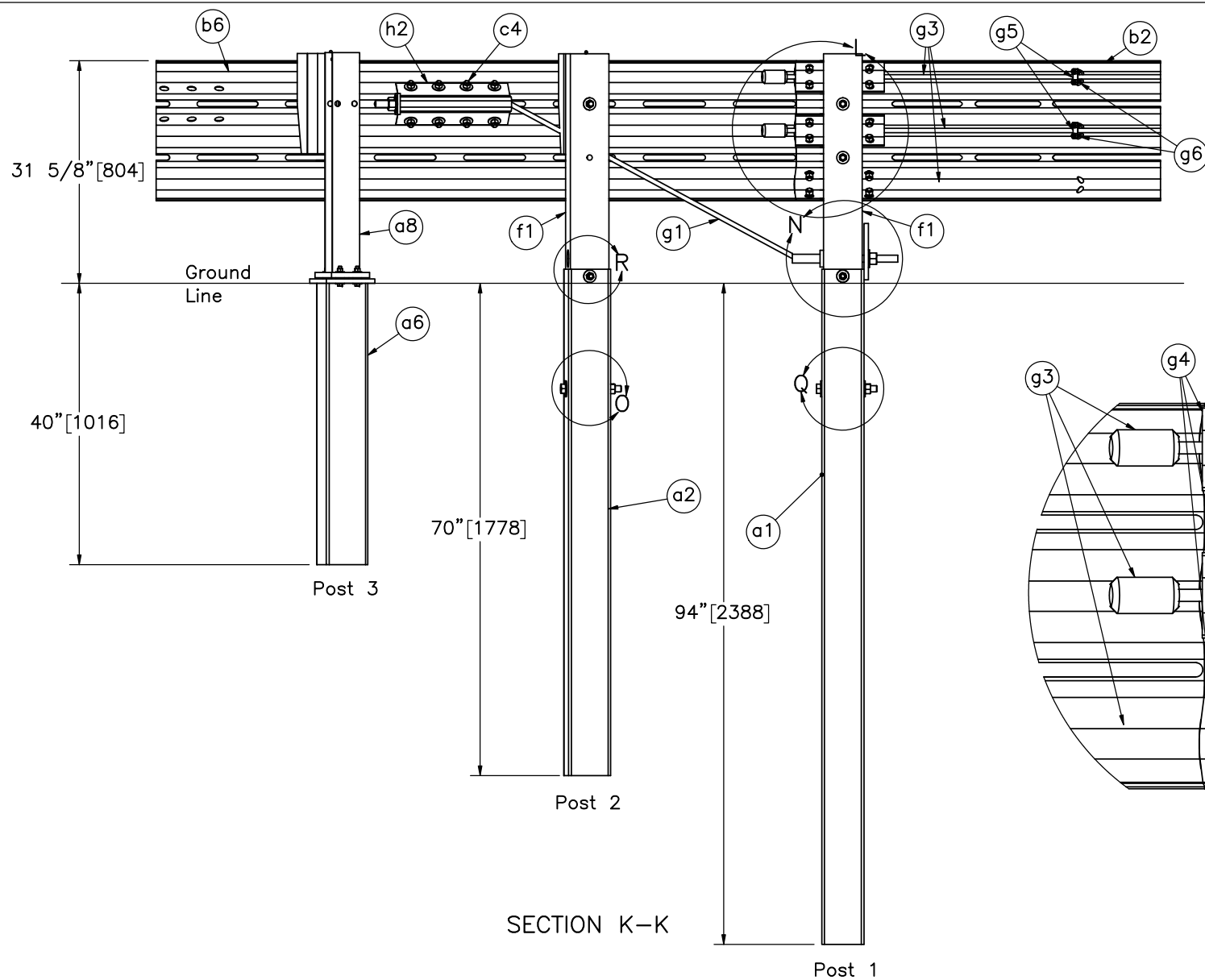
SCALE: 1:25
UNITS: In.[mm]

SHEET:
6 of 24

DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

REV. BY:
RWB/JCH/J
EK



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-5

Nose Section Detail

DWG. NAME.
Bullnose-5_R5

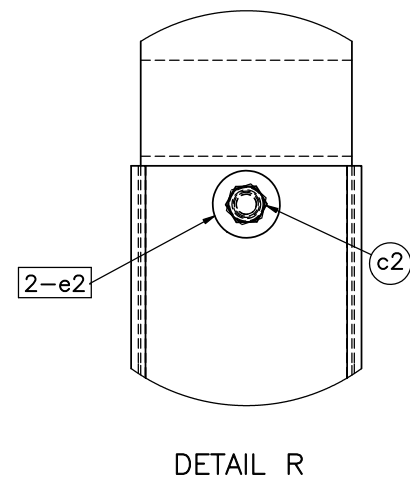
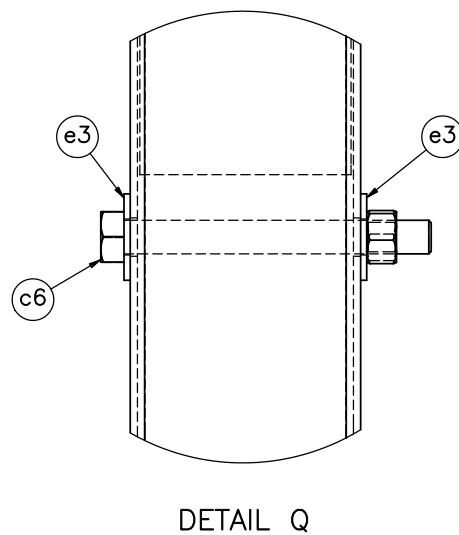
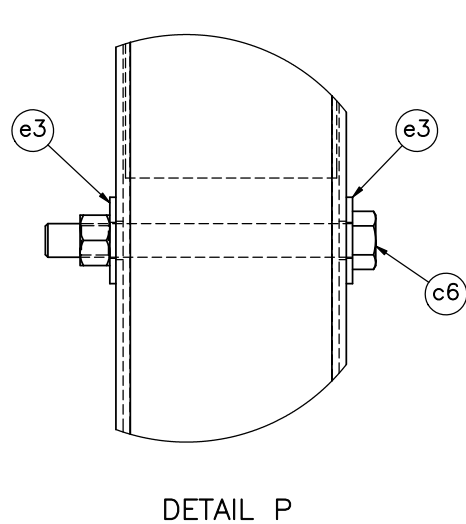
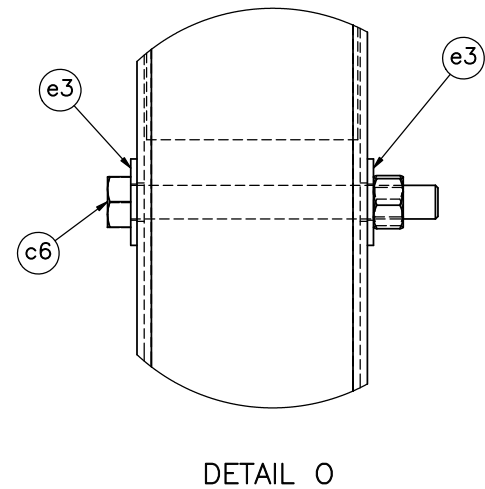
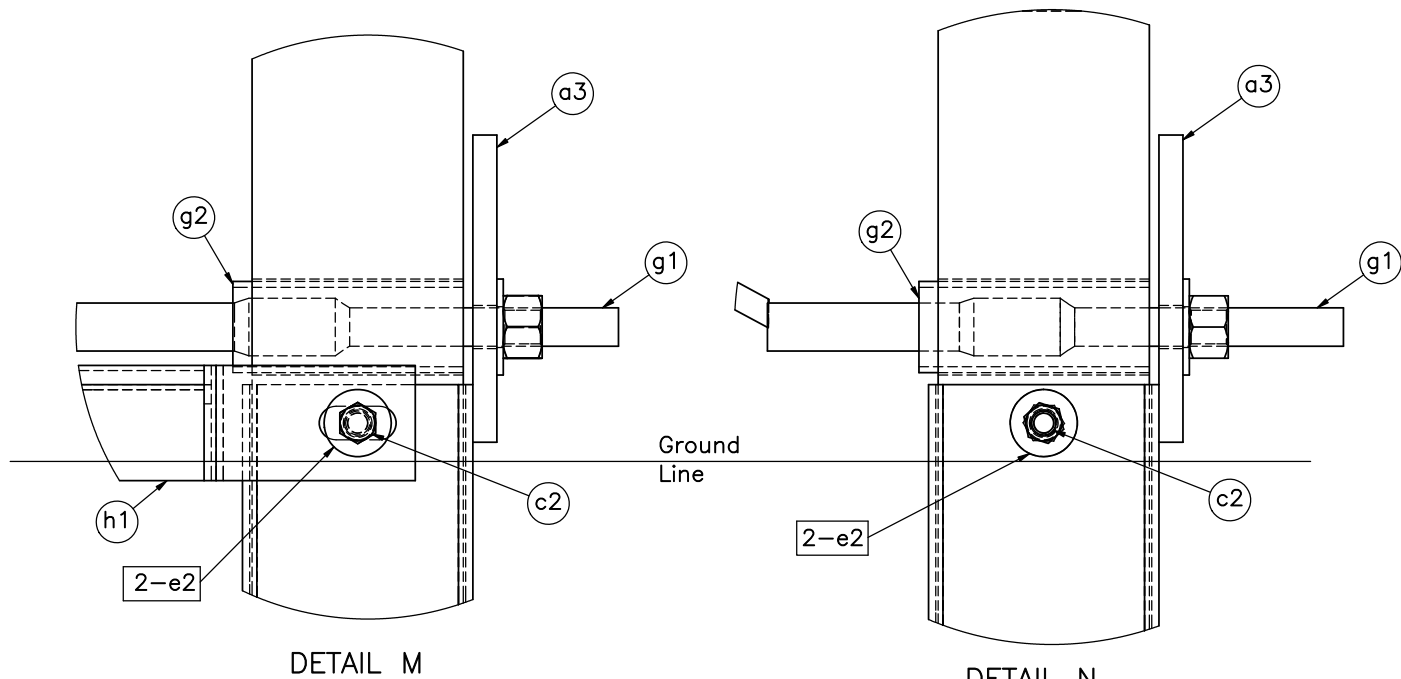
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UNITS: In./mm

SHEET:
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DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

REV. BY:
RWB/JCH/J
EK



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



Midwest Roadside
Safety Facility

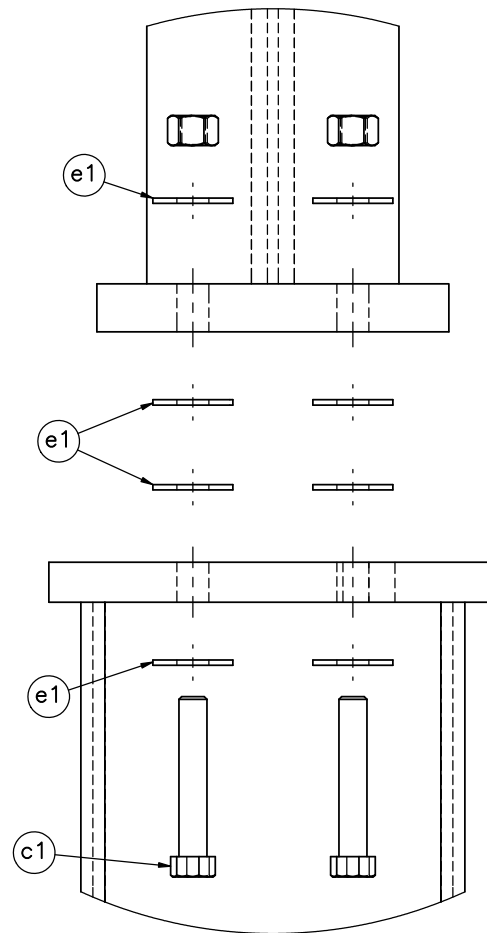
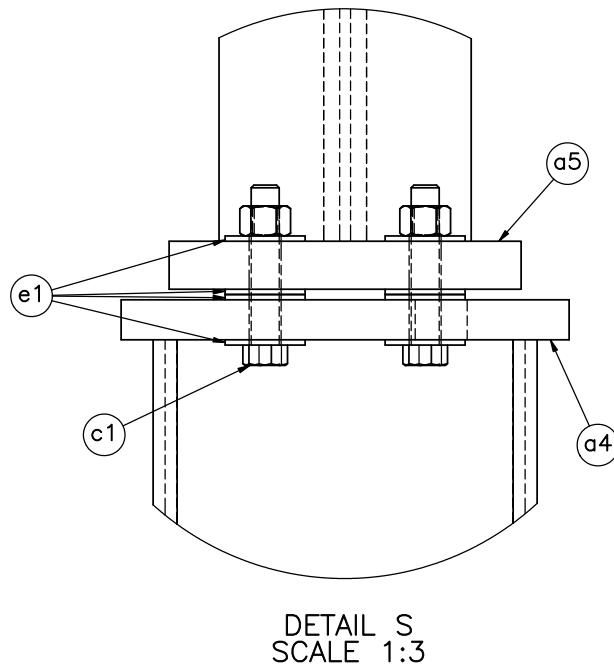
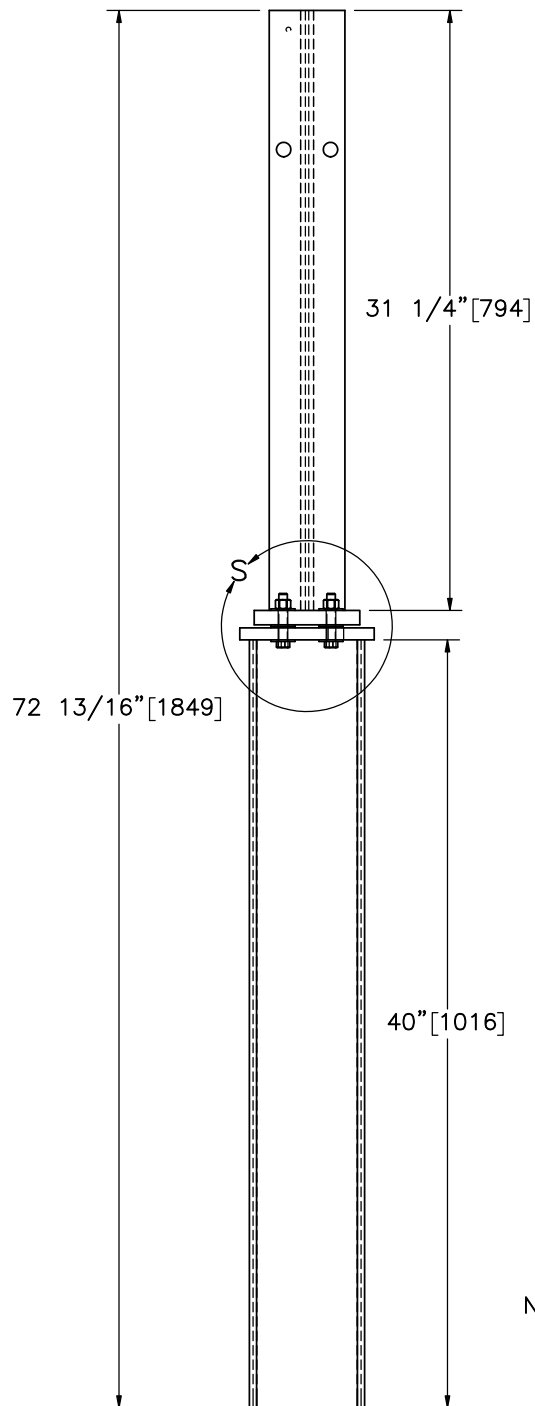
Bullnose with UBSP
Test No. MSPBN-5

Anchor Post Details

DWG. NAME.
Bullnose-5_R5

SCALE: 1:5
UNITS: In./mm

SHEET:
8 of 24
DATE:
4/17/2020
DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF
REV. BY:
RWB/JCH/J
EK



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



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Safety Facility

Bullnose with UBSP
Test No. MSPBN–5

UBSP Post and Component
Details

DWG. NAME.
Bullnose–5_R5

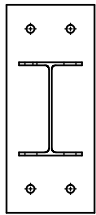
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UNITS: In./mm

SHEET:
9 of 24

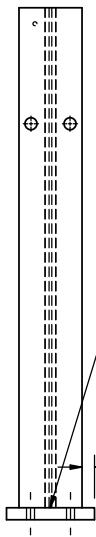
DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

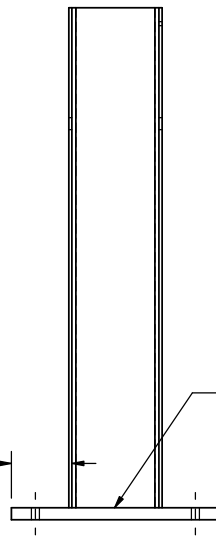
REV. BY:
RWB/JCH/J
EK



PLAN VIEW

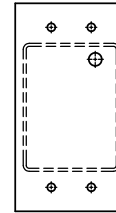


ELEVATION VIEW

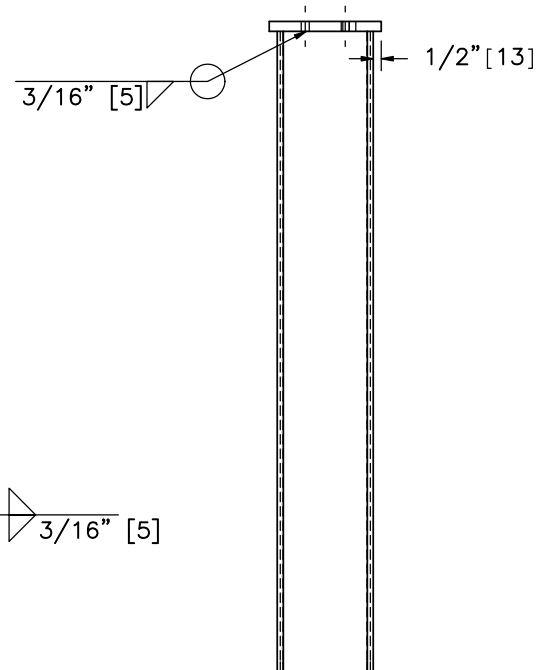


PROFILE VIEW

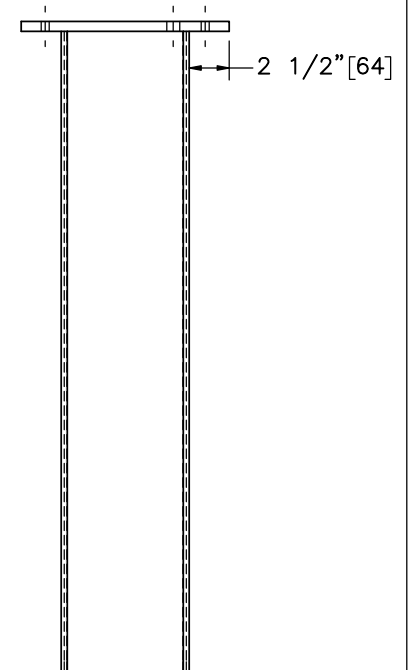
Part a5



PLAN VIEW



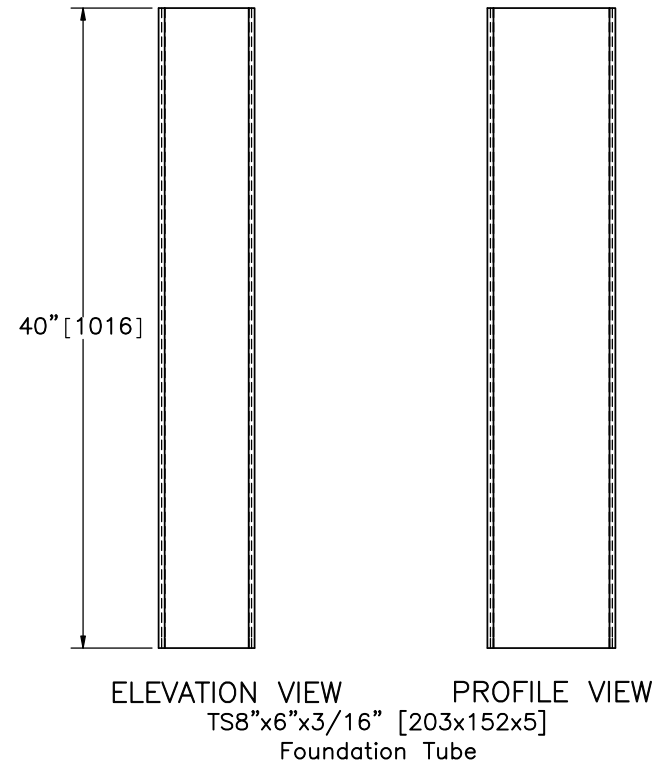
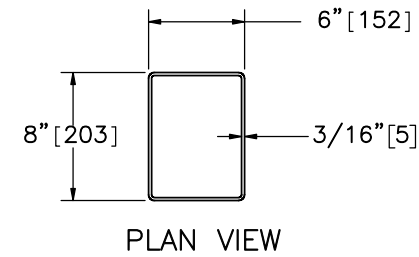
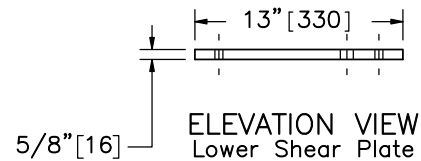
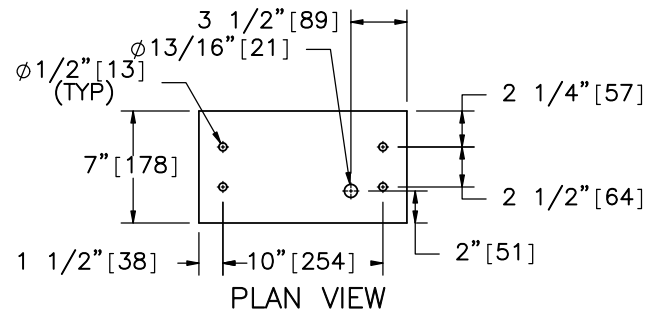
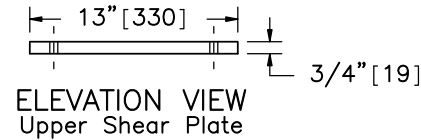
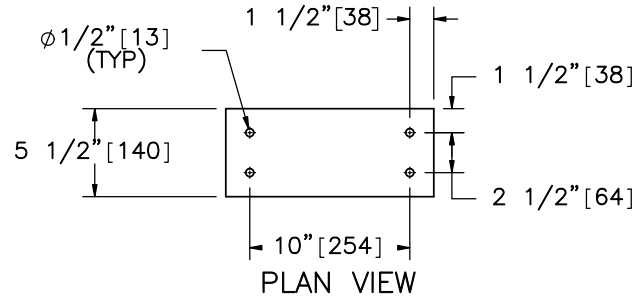
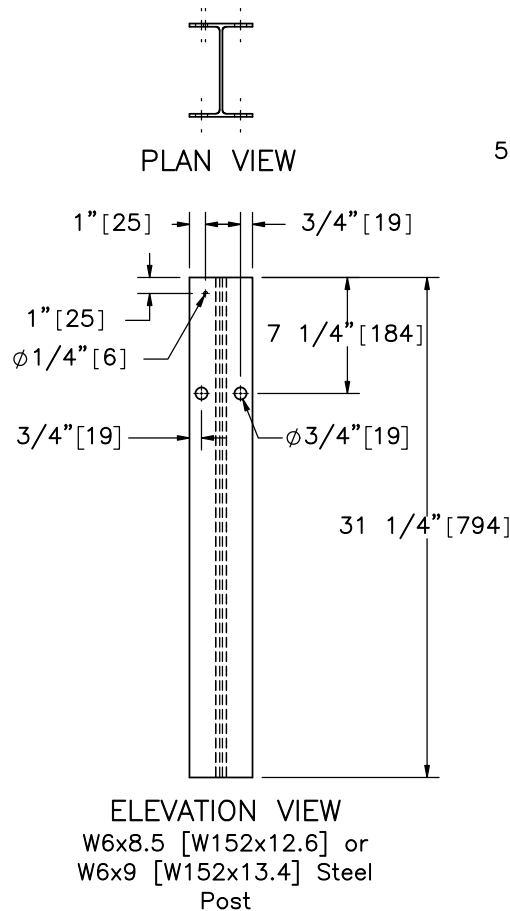
ELEVATION VIEW



PROFILE VIEW

Part a4

	Bullnose with UBSP Test No. MSPBN-5		SHEET: 10 of 24
	Upper and Lower Post Assembly Details		DATE: 4/17/2020
DWG. NAME: Bullnose-5_R5		SCALE: 1:12 UNITS: In.[mm]	DRAWN BY: MKB/JEK/J DJ/AJS/JRF
Midwest Roadside Safety Facility			REV. BY: RWB/JCH/J EK



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-5

UBSP Component Details

DWG. NAME.
Bullnose-5_R5

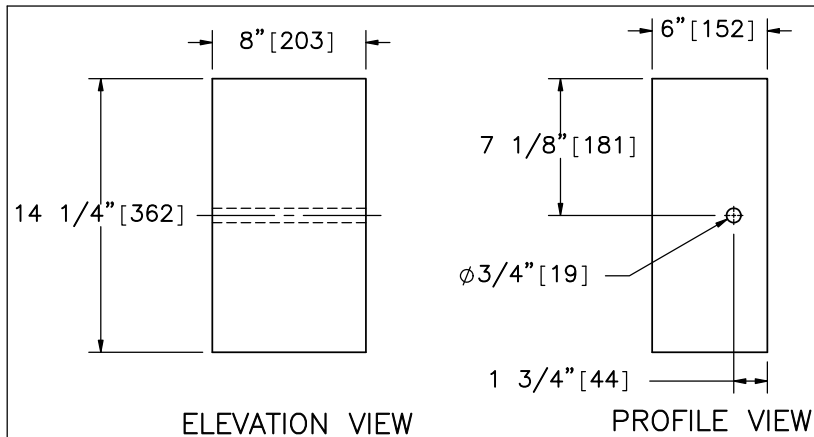
SCALE: 1:12
UNITS: In./mm

SHEET:
11 of 24

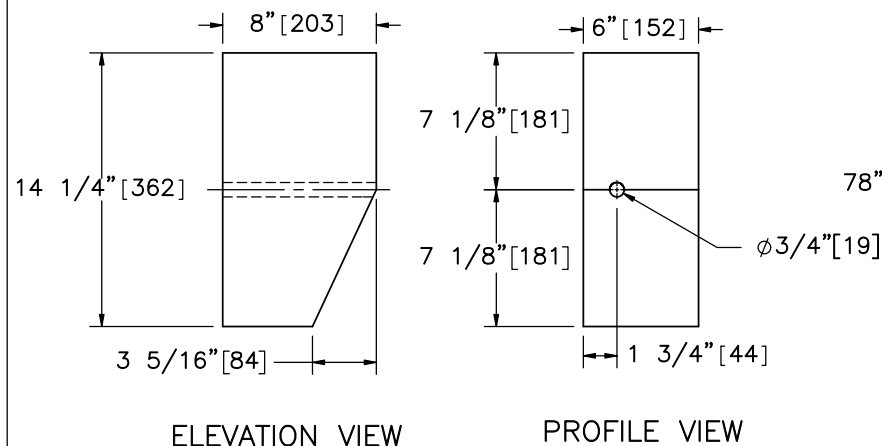
DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

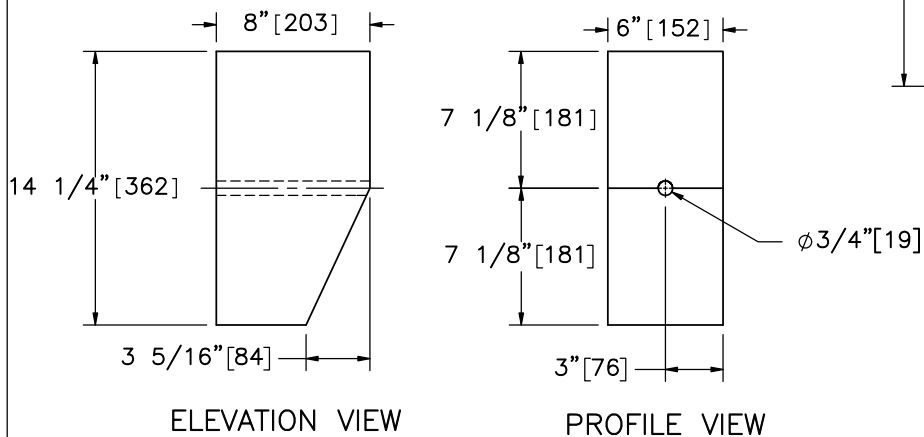
REV. BY:
RWB/JCH/J
EK



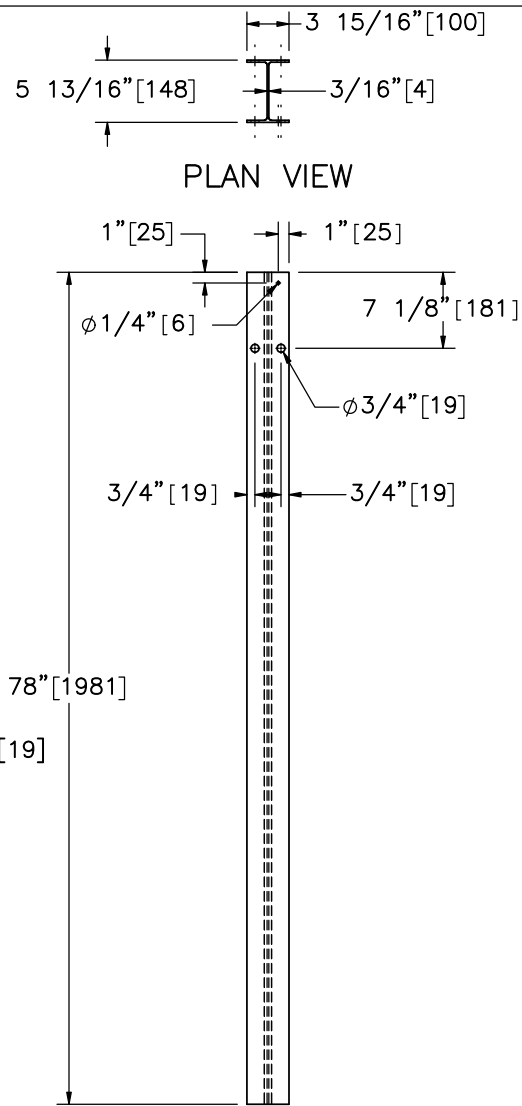
Part a6



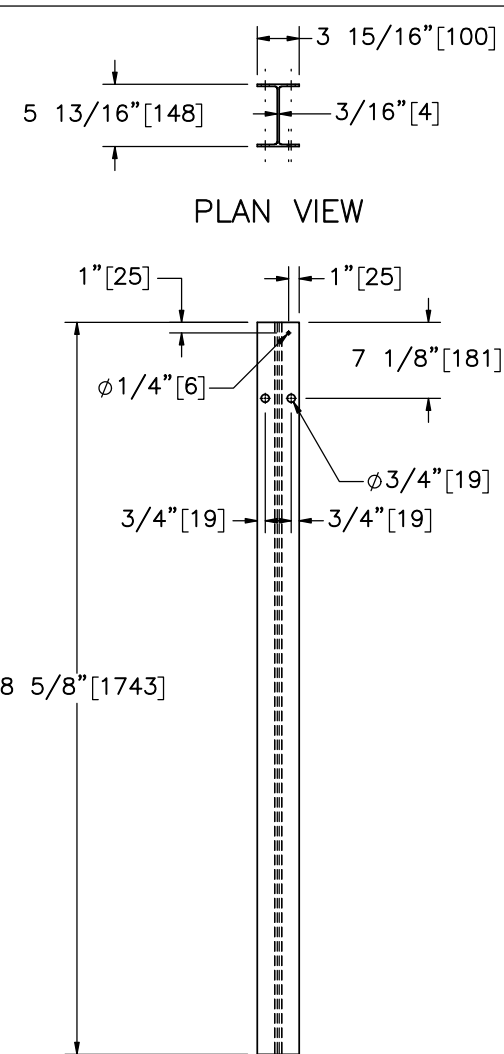
Part a7



Part a8



SCALE 1:18
Part f2



SCALE 1:18
Part f3



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

W6x9 Post and Blockout
Details

DWG. NAME:
Bullnose-5_R5

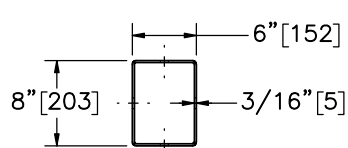
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UNITS: In./mm

SHEET:
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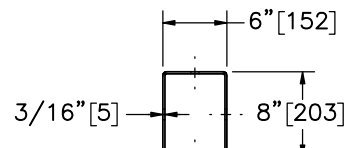
DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

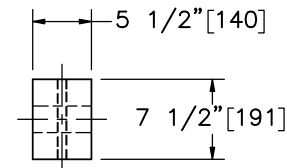
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RWB/JCH/J
EK



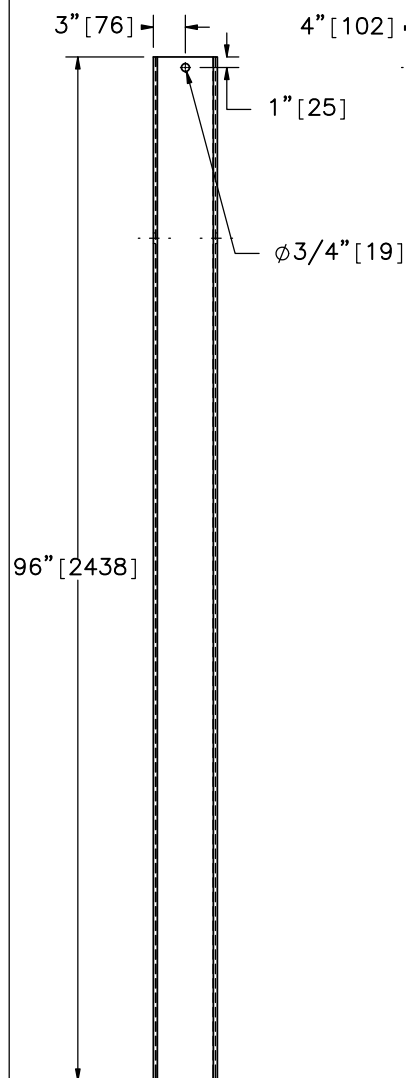
PLAN VIEW



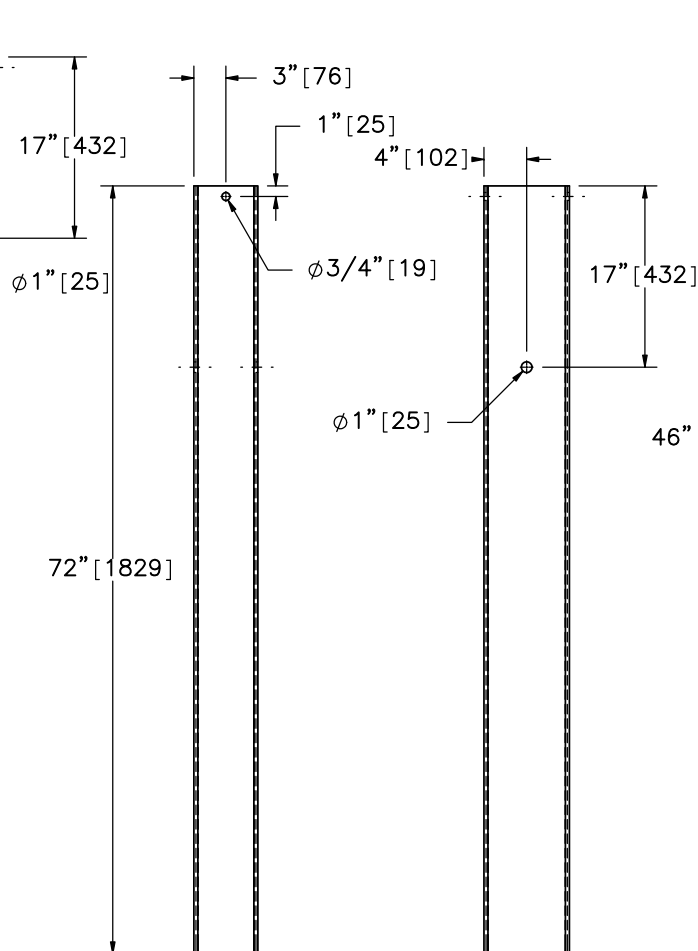
PLAN VIEW



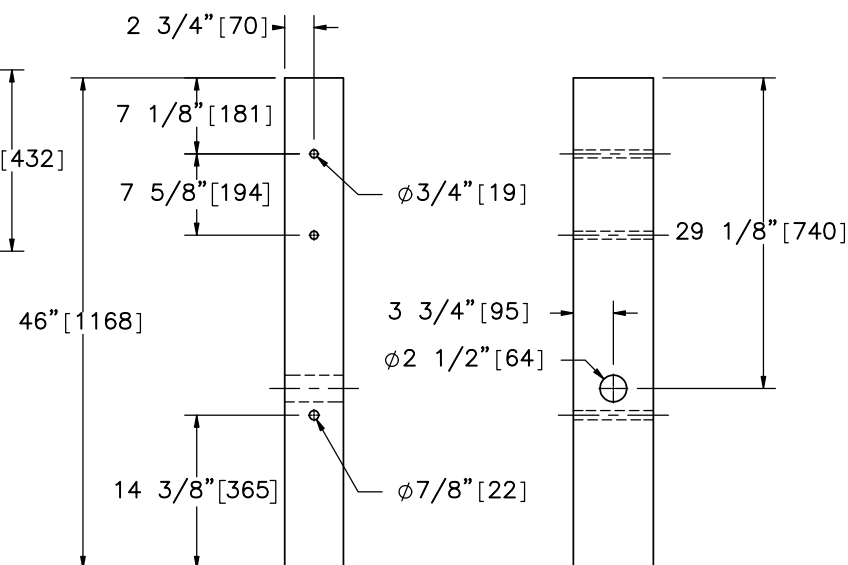
PLAN VIEW



ELEVATION VIEW PROFILE VIEW
Part a1



ELEVATION VIEW PROFILE VIEW
Part a2



ELEVATION VIEW PROFILE VIEW
Part f1



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

BCT Timber Posts and
Foundation Tube Details

DWG. NAME:
Bullnose-5_R5

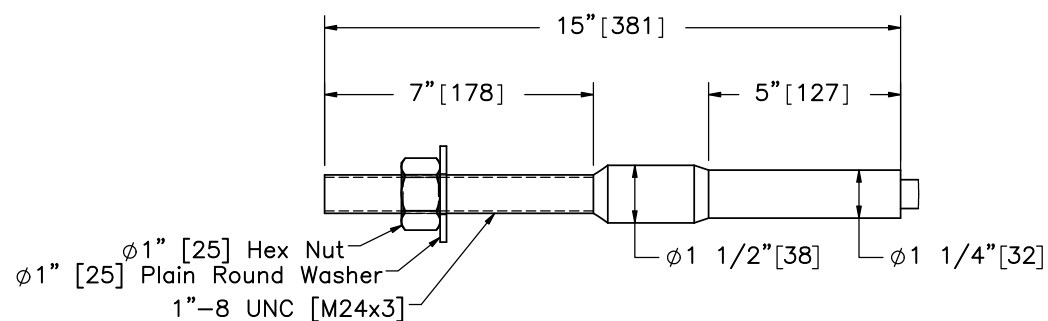
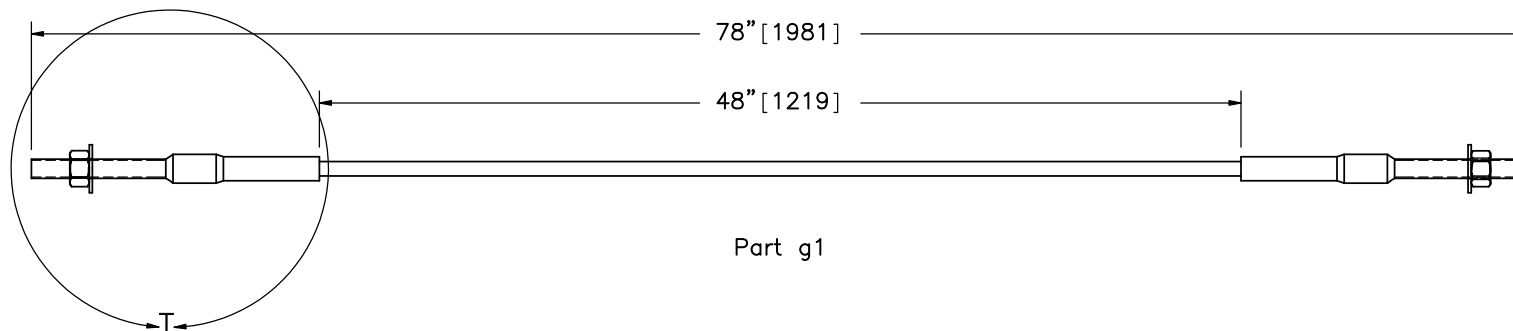
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UNITS: In./mm

SHEET:
13 of 24

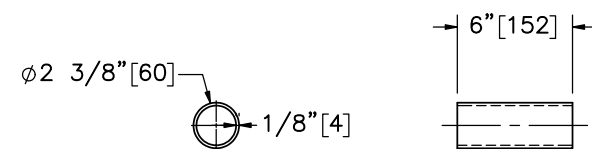
DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

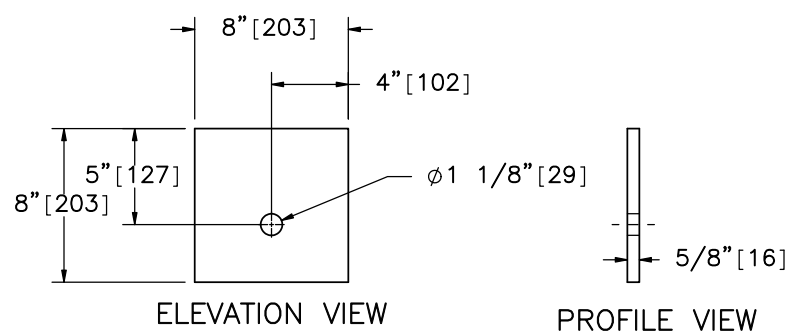
REV. BY:
RWB/JCH/J
EK



DETAIL T
SCALE 1:5



ELEVATION VIEW PROFILE VIEW
Part g2



Part a3



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

BCT Anchor Cable Detail

DWG. NAME.
Bullnose-5_R5

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

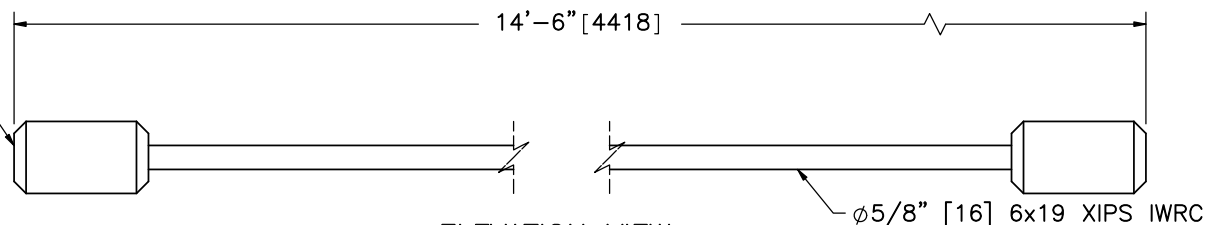
SHEET:
14 of 24

DATE:
4/17/2020

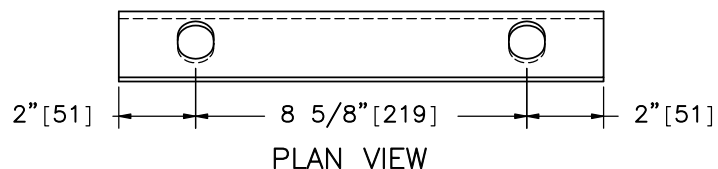
DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

REV. BY:
RWB/JCH/J
EK

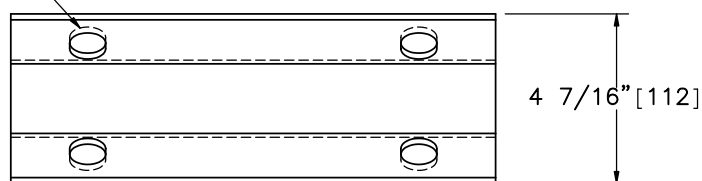
"Cold Tuff" Button, S-409
Size No. 12 SB, Stock No.
1040395 for $\phi 5/8"$ [16]
(6x19) wire rope (or any
similarly sized swage-grip
button ferrules)



ELEVATION VIEW
Part g3

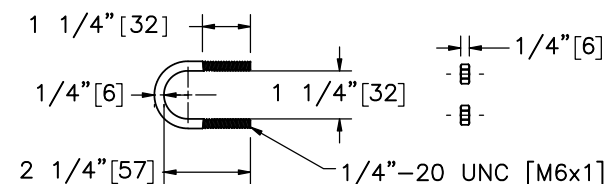


$\phi 29/32"$ x 1 1/8" [23x29]
Slot (TYP)

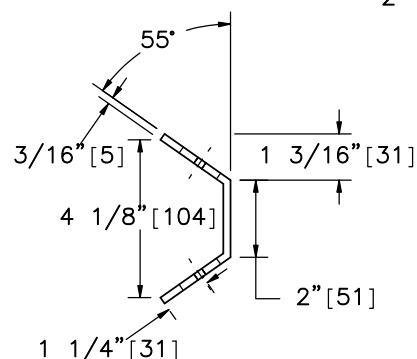


ELEVATION VIEW

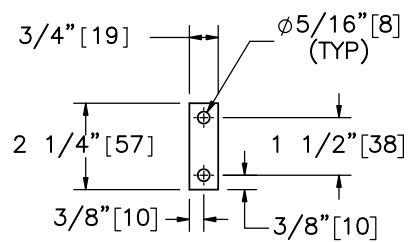
Part g4



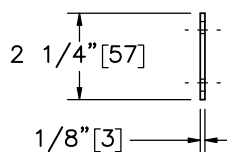
Part g6



PROFILE VIEW



ELEVATION VIEW



PROFILE VIEW

Part g5



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

Nose Cable Detail

DWG. NAME.
Bullnose-5_R5

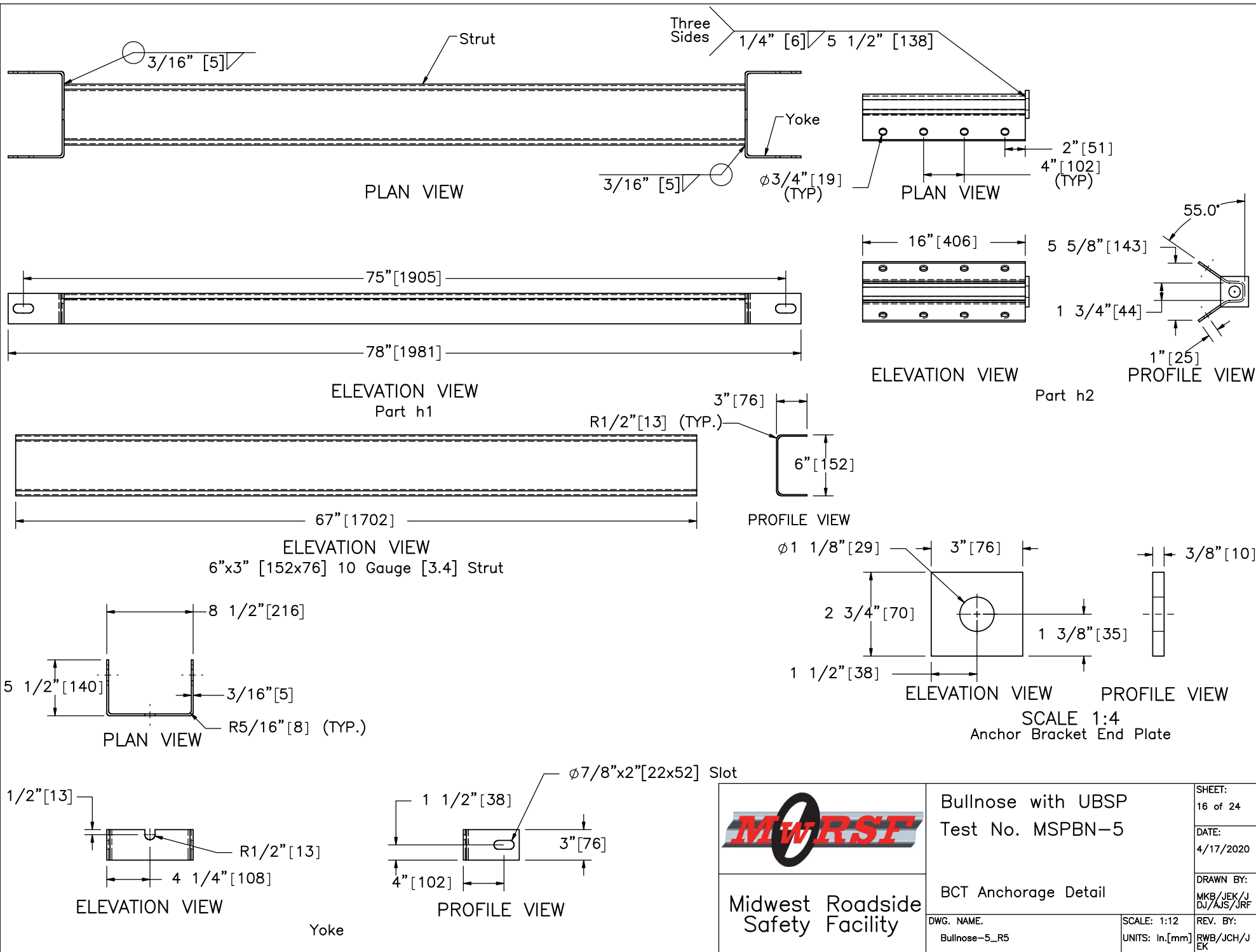
SCALE: 1:5
UNITS: In./mm

SHEET:
15 of 24

DATE:
4/17/2020

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DJ/AJS/JRF

REV. BY:
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EK



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

BCT Anchorage Detail

DWG. NAME.
Bullnose-5_R5

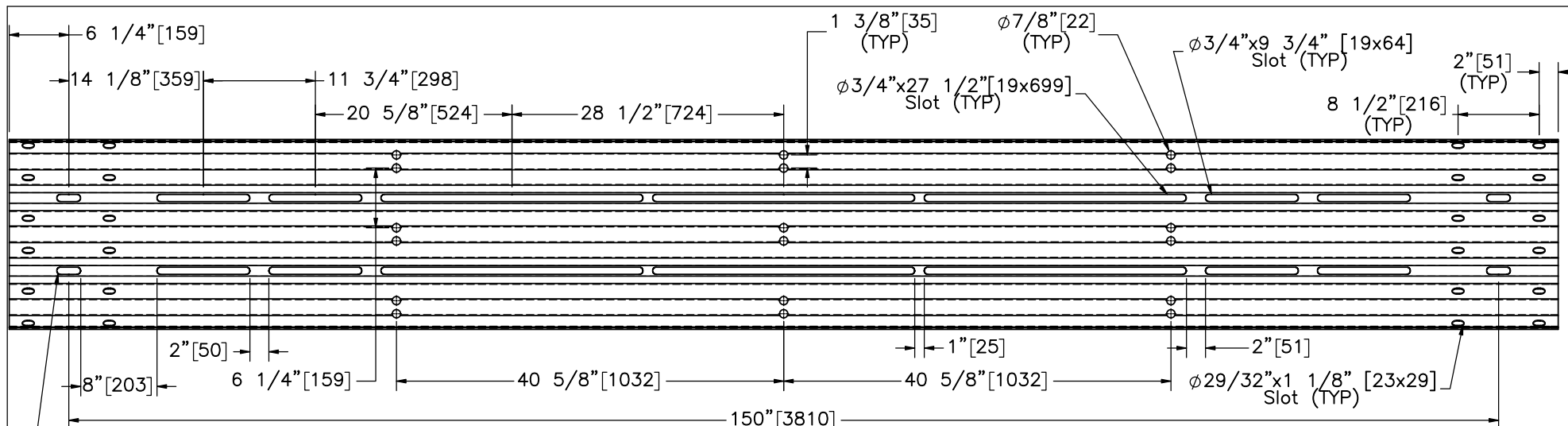
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UNITS: In.[mm]

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16 of 24

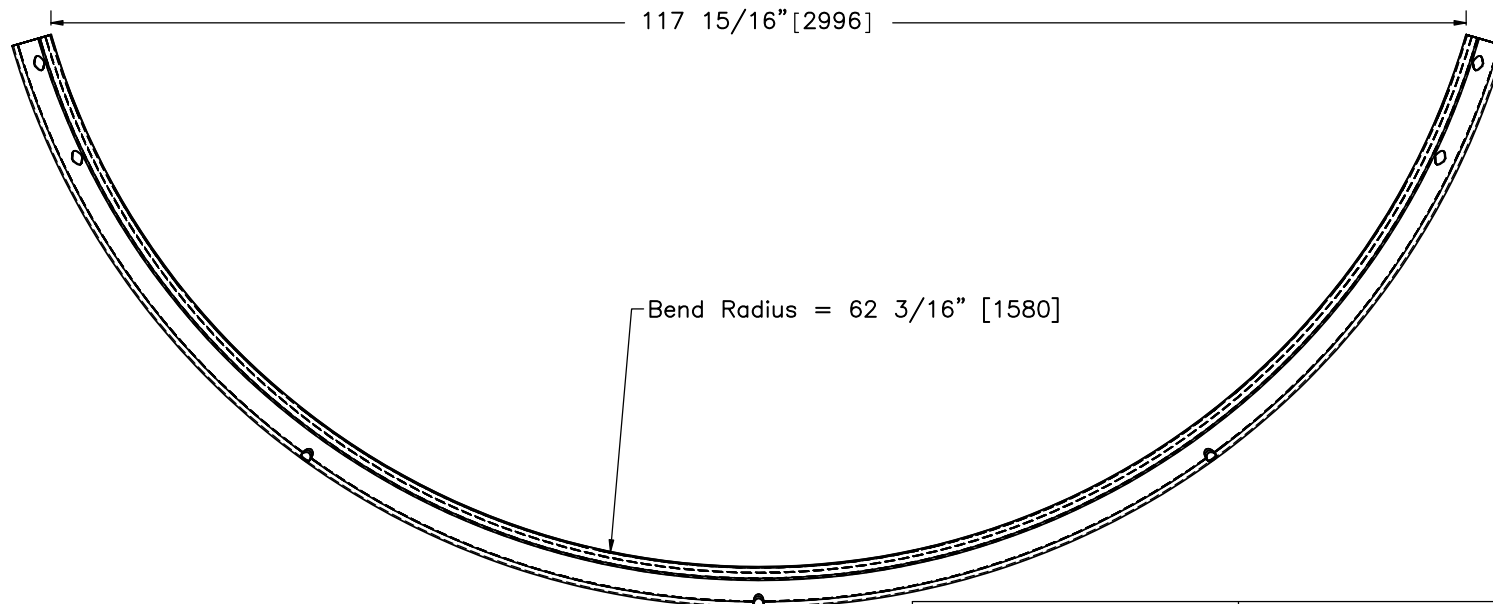
DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

REV. BY:
RWB/JCH/J
EK



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



PLAN VIEW
 Part b2



Midwest Roadside
 Safety Facility

Bullnose with UBSP
 Test No. MSPBN-5

Rail Section Details
 Section No. 1

DWG. NAME:
 Bullnose-5_R5

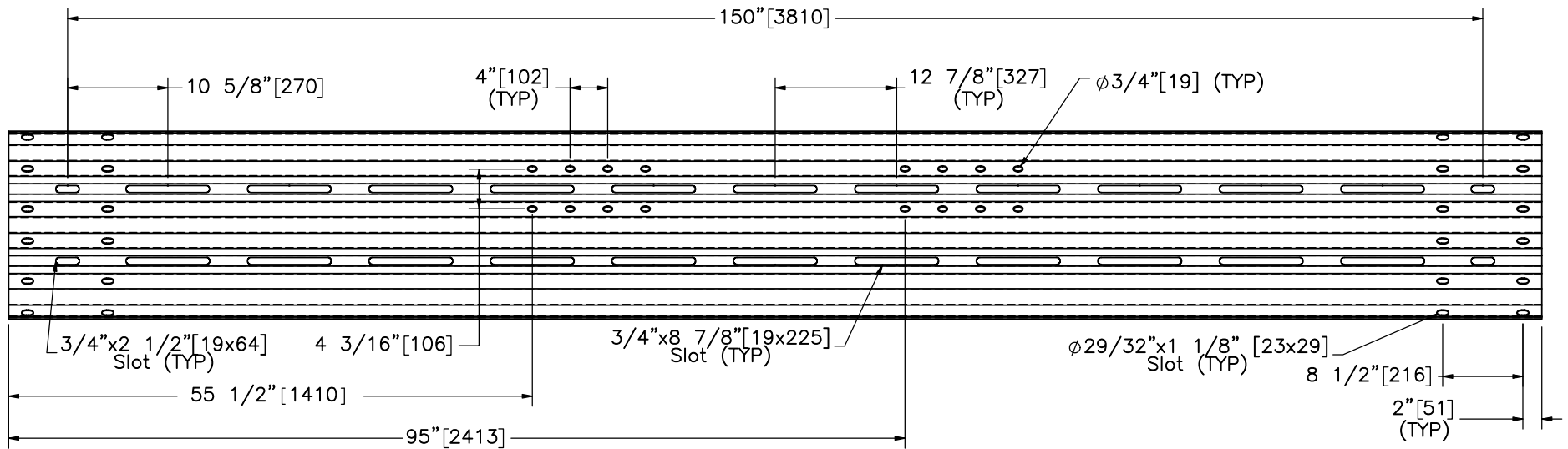
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 UNITS: In.[mm]

SHEET:
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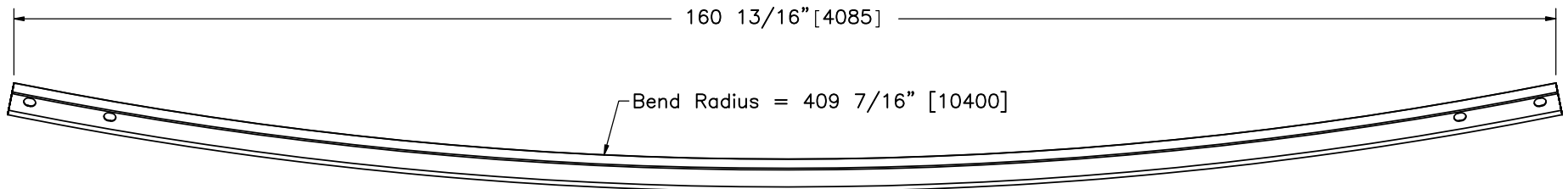
DATE:
 4/17/2020

DRAWN BY:
 MKB/JEK/J
 DJ/AJS/JRF

REV. BY:
 RWB/JCH/J
 EK



ELEVATION VIEW
NON-RADIUSED
Part b6



PLAN VIEW
Part b6



Midwest Roadside
Safety Facility

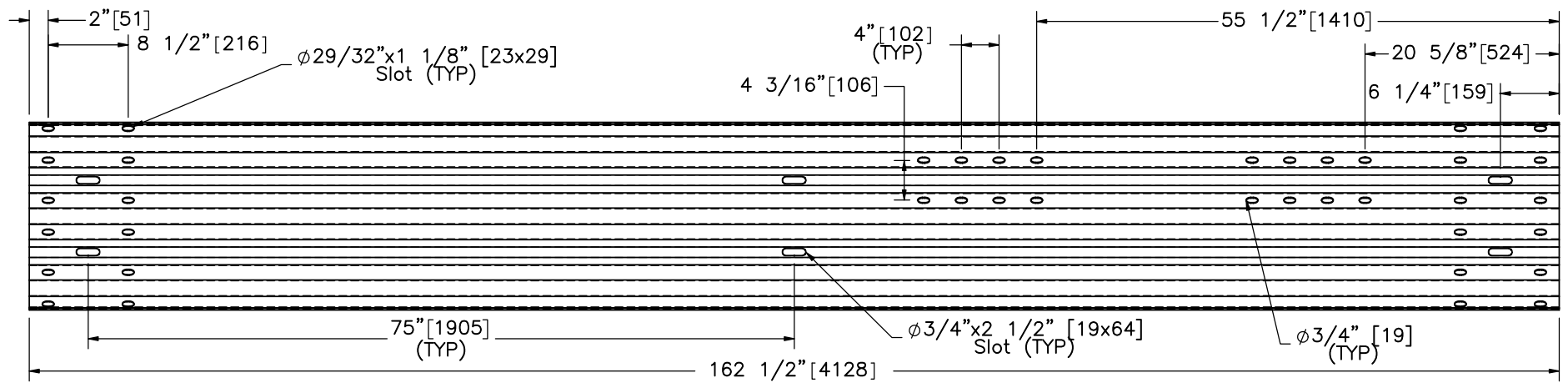
Bullnose with UBSP
Test No. MSPBN-5

Rail Section Details
Section No. 2

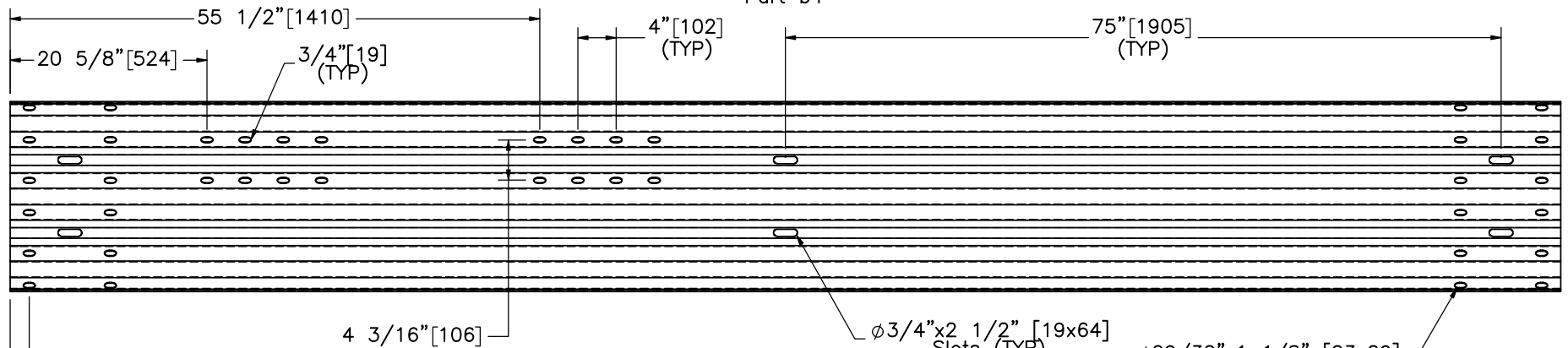
DWG. NAME.
Bullnose-5_R5

SCALE: 1:17
UNITS: In./mm

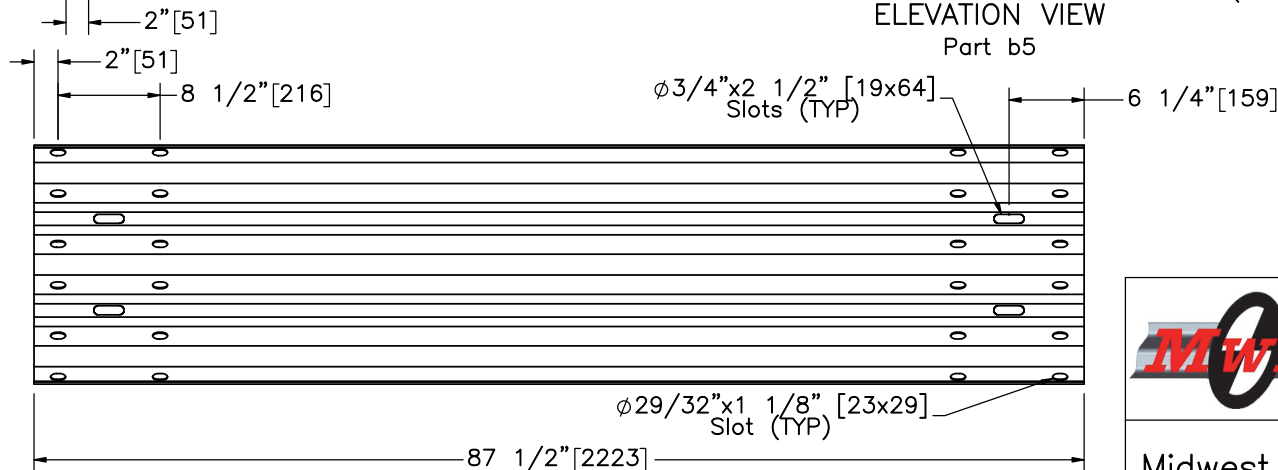
SHEET:
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DJ/AJS/JRF
REV. BY:
RWB/JCH/J
EK



ELEVATION VIEW
Part b4



ELEVATION VIEW
Part b5



ELEVATION VIEW
Part b7



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

Rail Section Details
Section Nos. 5 and 6

DWG. NAME.

Bullnose-5_R5

SCALE: 1:17

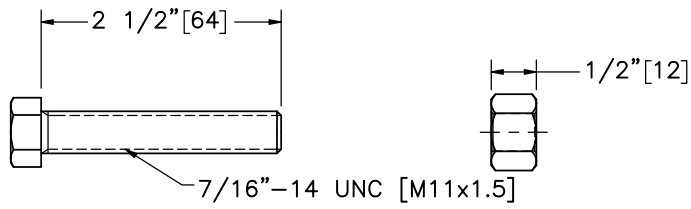
UNITS: In.[mm]

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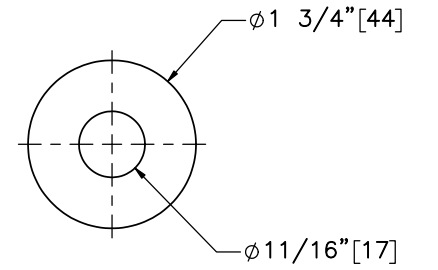
DATE:
4/17/2020

DRAWN BY:
MKB/JEK/J
DJ/AJS/JRF

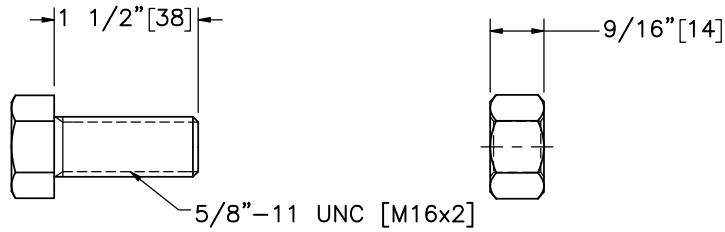
REV. BY:
RWB/JCH/J
EK



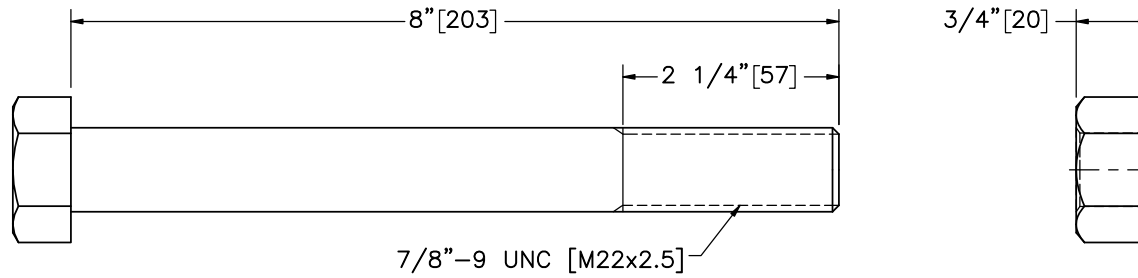
Part c1



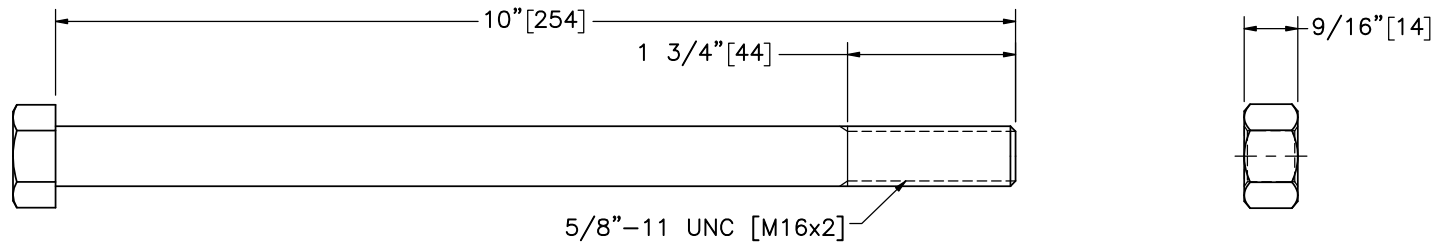
Part e2



Part c4



Part c6



Part c2



Midwest Roadside
Safety Facility

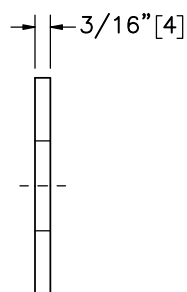
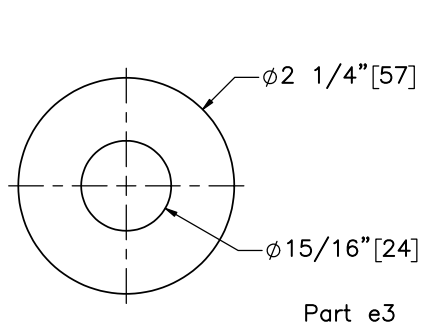
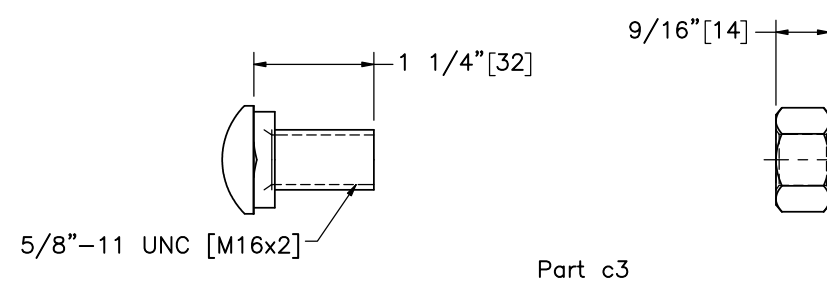
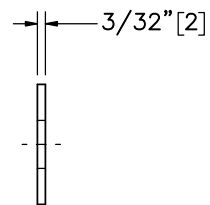
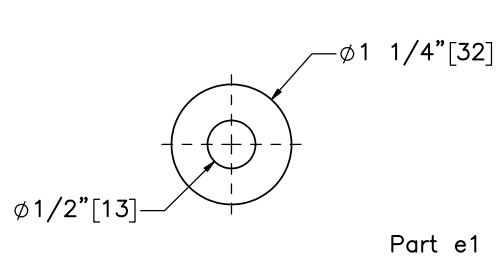
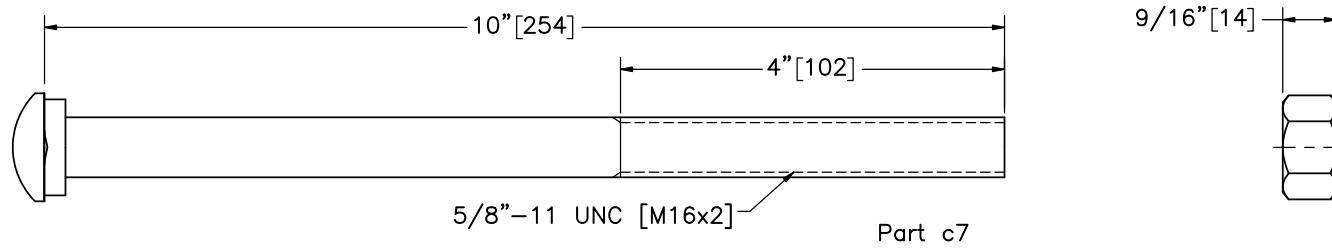
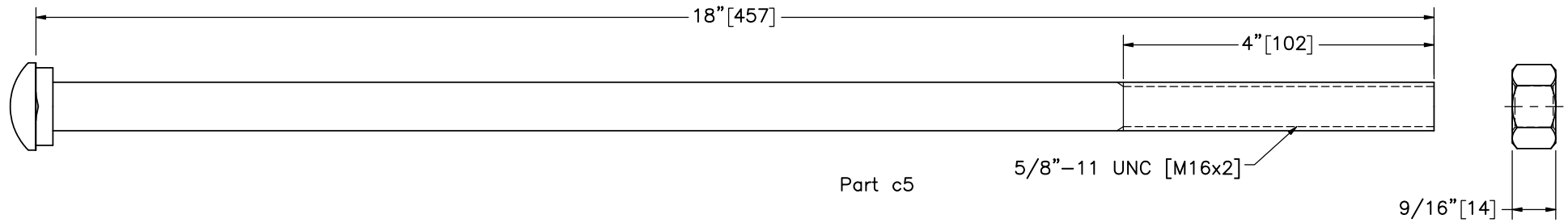
Bullnose with UBSP
Test No. MSPBN-5

System Hardware

DWG. NAME.
Bullnose-5_R5

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

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RWB/JCH/J
EK



Midwest Roadside
Safety Facility

Bullnose with UBSP
Test No. MSPBN-5

System Hardware

DWG. NAME.
Bullnose-5_R5

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

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DRAWN BY:
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DJ/AJS/JRF

REV. BY:
RWB/JCH/J
EK

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
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-5

Bill of Materials

DWG. NAME.
Bullnose-5_R5

SCALE: None
UNITS: In.[mm]

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REV. BY:
RWB/JCH/J
EK

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	2	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	4	12 5/8"x5 13/16"x3/16" [321x148x5] Nose Cable Anchor Plate	ASTM A36	ASTM A123	FPA04
g5	6	2 1/4"x3/4" [57x19] 11 gauge [3] U-Bolt Plate Washer	ASTM A1011 CS Type B	ASTM A123	—
g6	6	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-5

Bill of Materials

DWG. NAME.
Bullnose-5_R5

SCALE: None
UNITS: In.[mm]

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EK

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	5/3/2018	–	Original created from Bullnose-4_R7.	–	MKB
		5	Added a third nose cable and anchor plate to post no.1		
1	5/9/2018	11	Lower shear plate edit (hole size).	RWB	JEK
2	8/2/2018	9	Note edit.	JCH	JDJ
3	12/20/2018	2–3	Post spacing fixed in model. Tables altered to reflect changes in bullnose 1	JEK	AJS
4	4/2/2020	1	Edited note 3 and 4	RWB	JRF
5	4/17/2020	4,9	Corrections to post mates affecting total length	RWB	JEK
		22	Part e1 dimension corrections.		