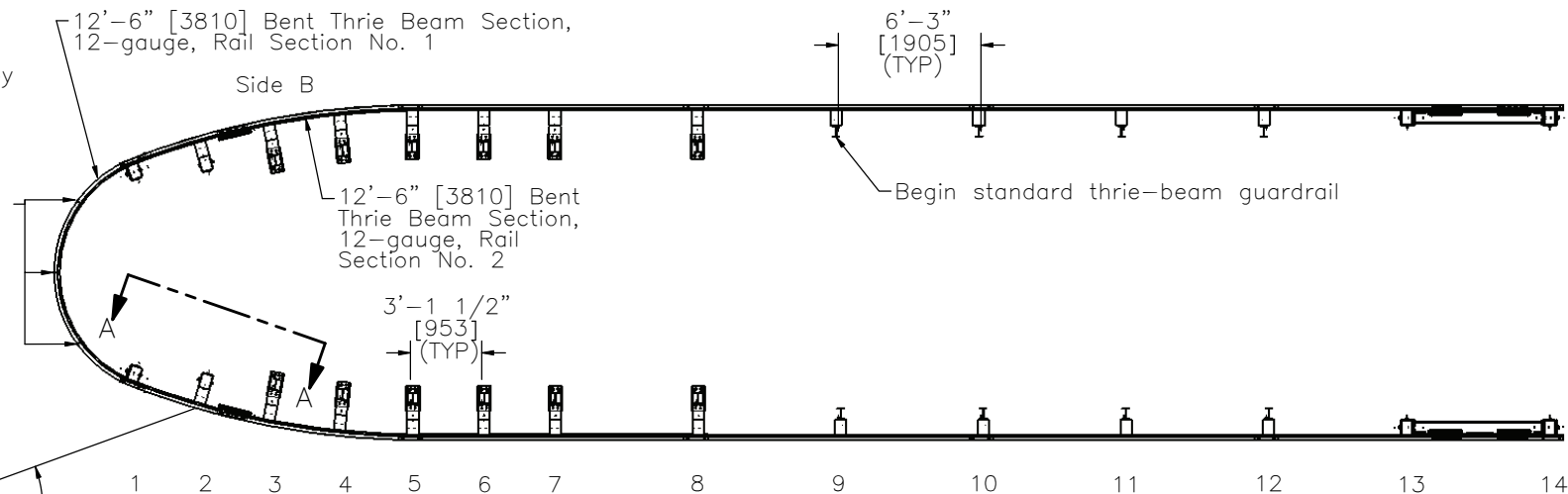
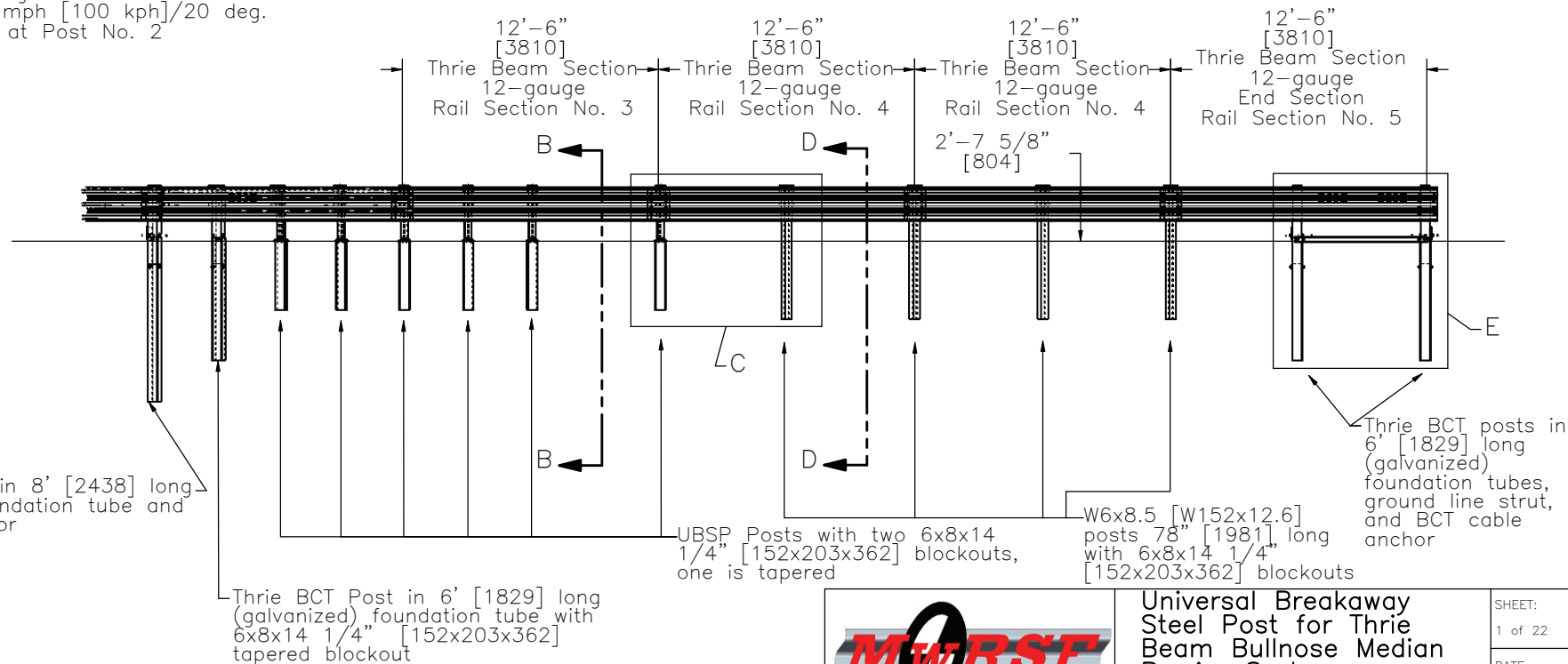


Nose Cable with swagged end buttons attached by two sets of three $\phi 1/4"$ [6.4] U-bolts with 2 Nuts and Plate Washer at middle and quarter points.



PLAN VIEW

NCHRP Report No. 350
Test Designation No. 3-38
2000P/62.1 mph [100 kph]/20 deg.
CIP at Post No. 2



ELEVATION VIEW

Notes: (1) Due to the initial project date and acquisition for some of the construction materials, mill certifications and material specifications are not required in each case but should be obtained when possible.

(2) All posts are to be installed using $\phi 2'$ [610] augered holes with the HE8 compaction method.



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

System Layout

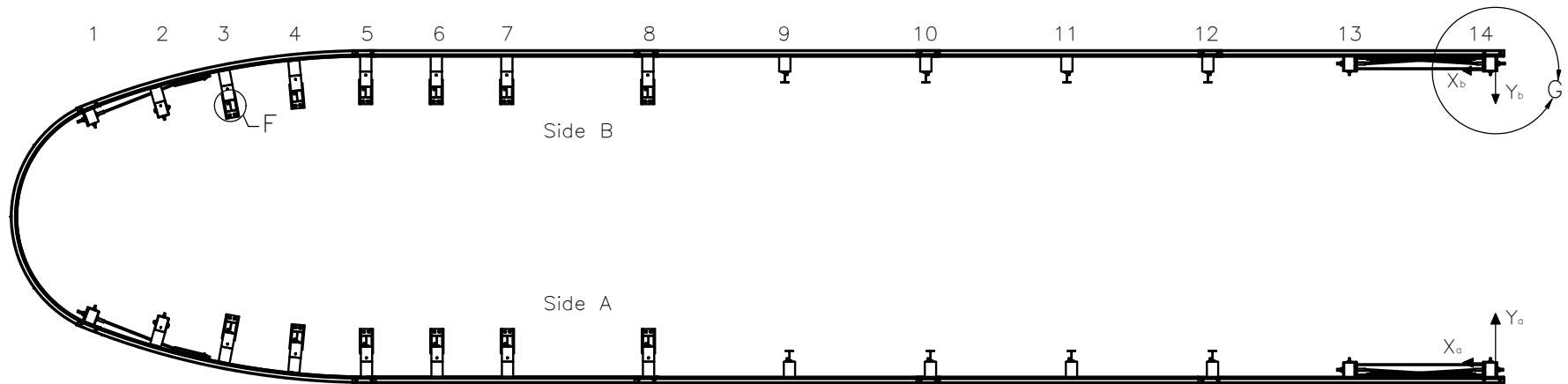
DWG. NAME.
USPBN-2 Bullnose_R8

SCALE: 1:100
UNITS: Inches
[mm]

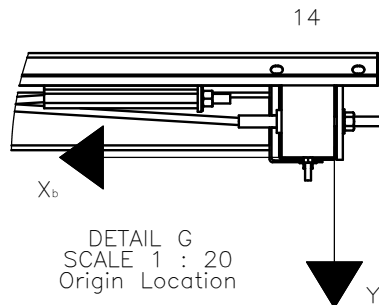
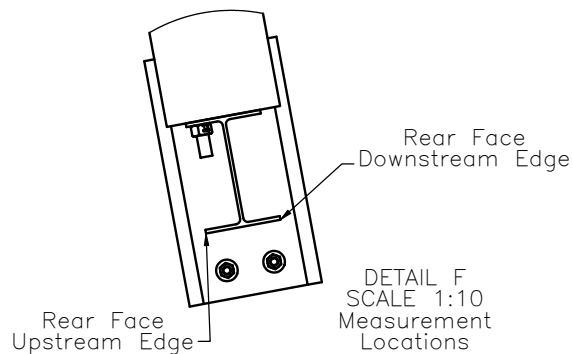
SHEET:
1 of 22
DATE:
7/13/2010
DRAWN BY:
RJT/EAJ

REV. BY:
KAP/RKF/
SWA

Post No.	Side A				Side B			
	Rear Face—D.S. Edge		Rear Face—U.S. Edge		Rear Face—D.S. Edge		Rear Face—U.S. Edge	
	X	Y	X	Y	X	Y	X	Y
1	61'-10 7/8"	2'-3 1/8"	62'-4"	2'-5"	61'-10 7/8"	2'-3 1/8"	62'-4"	2'-5"
2	58'-9 3/4"	1'-11 1/4"	59'-3"	2'-0 3/4"	58'-9 3/4"	1'-11 1/4"	59'-3 1/8"	2'-0 3/4"
3	55'-10 3/8"	1'-9 1/8"	56'-2 1/4"	1'-9 7/8"	55'-10 3/8"	1'-9 1/8"	56'-2 1/4"	1'-9 7/8"
4	52'-11 1/4"	1'-4 1/4"	53'-3 1/8"	1'-4 3/4"	52'-11 1/4"	1'-4 1/4"	53'-3 1/8"	1'-4 3/4"
5	49'-10 1/2"	1'-2 3/8"	50'-2 1/2"	1'-2 3/8"	49'-10 7/8"	1'-2 3/8"	50'-2 7/8"	1'-2 3/8"
6	46'-9"	1'-2 3/8"	47'-1"	1'-2 3/8"	46'-9 3/8"	1'-2 3/8"	47'-1 3/8"	1'-2 3/8"
7	43'-9"	1'-2 3/8"	44'-2 1/2"	1'-2 3/8"	43'-9"	1'-2 3/8"	44'-2 1/2"	1'-2 3/8"
8	37'-6"	1'-2 3/8"	37'-11 1/2"	1'-2 3/8"	37'-6"	1'-2 3/8"	37'-11 1/2"	1'-2 3/8"
9	31'-3"	6 3/8"	31'-8 1/2"	6 3/8"	31'-3"	6 3/8"	31'-8 1/2"	6 3/8"
10	25'-0"	6 3/8"	25'-5 1/2"	6 3/8"	25'-0"	6 3/8"	25'-5 1/2"	6 3/8"
11	18'-9"	6 3/8"	19'-2 1/2"	6 3/8"	18'-9"	6 3/8"	19'-2 1/2"	6 3/8"
12	12'-6"	6 3/8"	12'-11 1/2"	6 3/8"	12'-6"	6 3/8"	12'-11 1/2"	6 3/8"
13	6'-3"	0"	6'-8 1/2"	0"	6'-3"	0"	6'-8 1/2"	0"
14	0"	0"	5 1/2"	0"	0"	0"	5 1/2"	0"



Notes: (1) All dimensions measured from the intersection of the rear face and downstream edge of post no. 14 of each respective side.



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPNB-2]

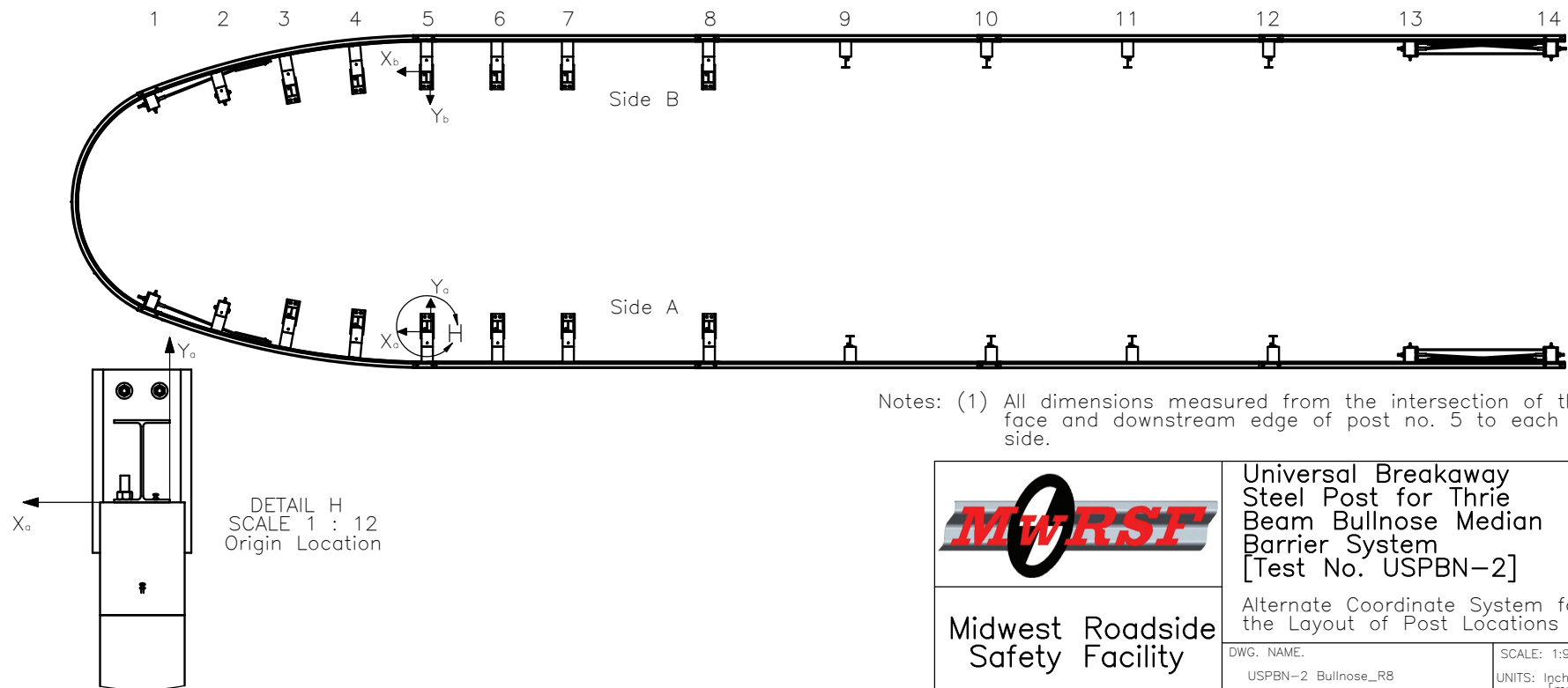
Layout for Post Locations

DWG. NAME.
USPNB-2 Bullnose_RB

SCALE: 1:90
UNITS: Inches
[mm]

SHEET:
2 of 22
DATE:
7/13/2010
DRAWN BY:
RJT/EAJ
REV. BY:
KAP/RKF/
SWA

Post No.	Rear Face—D.S. Edge		Rear Face—U.S. Edge	
	X_a and X_b	Y_a and Y_b	X_a and X_b	Y_a and Y_b
1	12'-0"	1'-6 5/8"	12'-5 1/8"	1'-8 1/2"
2	8'-10 7/8"	1'-2 3/4"	9'-4 1/8"	1'-4 1/4"
3	5'-11 3/8"	1'-0 5/8"	6'-3 1/4"	1'-1 3/8"
4	3'-0 1/4"	7 3/4"	3'-4 1/4"	8 1/8"
5	0"	5 7/8"	4"	5 7/8"



Midwest Roadside
Safety Facility

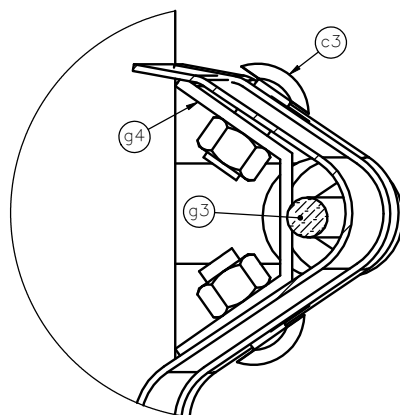
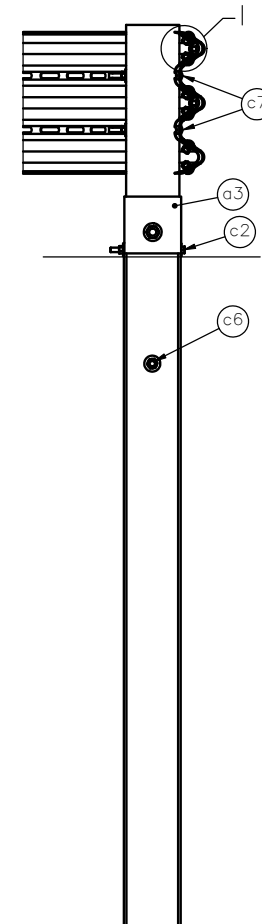
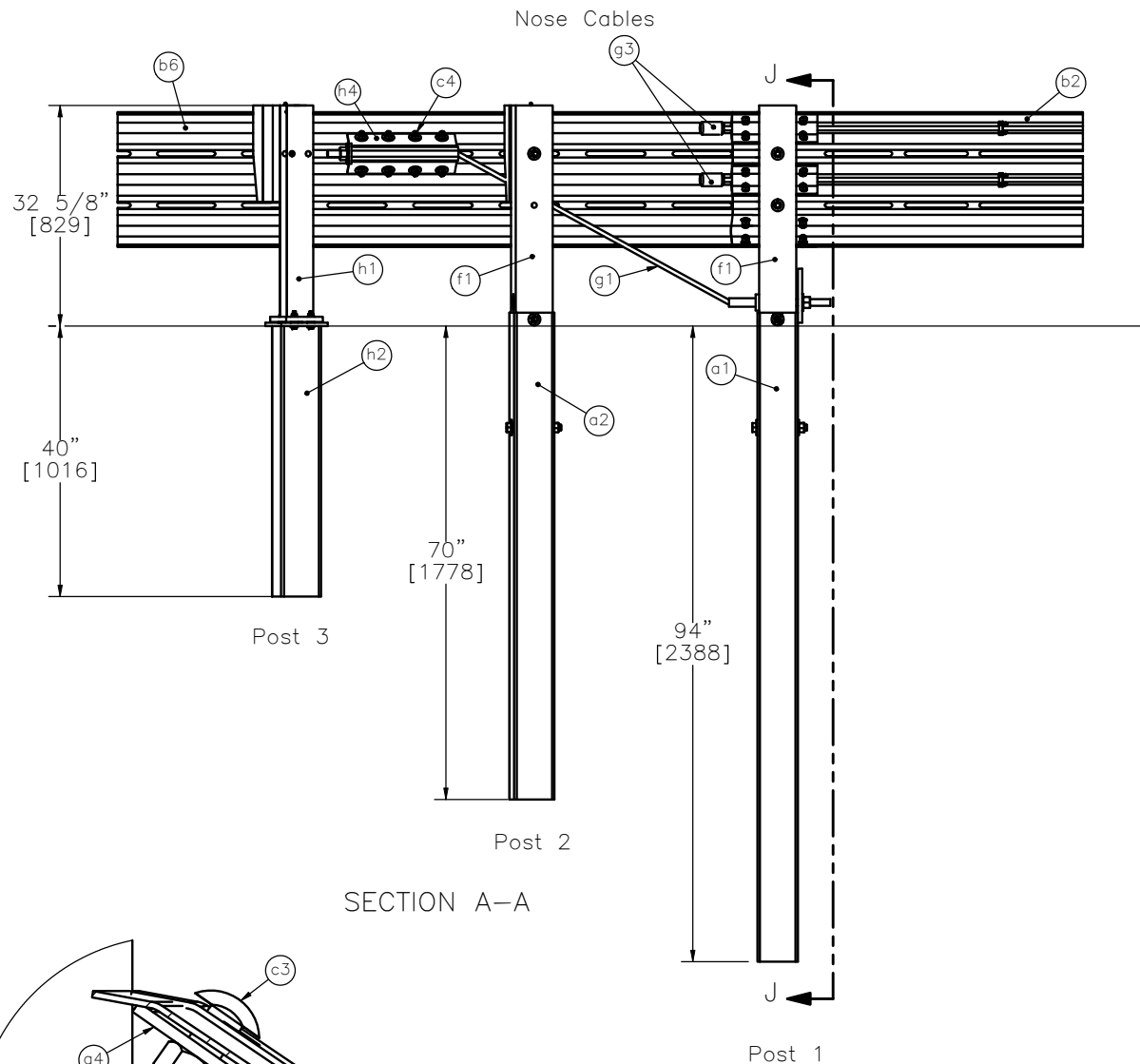
Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

Alternate Coordinate System for
the Layout of Post Locations

DWG. NAME.
USPBN-2 Bullnose_RB

SCALE: 1:90
UNITS: Inches
[mm]

SHEET:
3 of 22
DATE:
7/13/2010
DRAWN BY:
RJT/EAJ
REV. BY:
KAP/RKF/
SWA



DETAIL 1
SCALE 1 : 3

SECTION A-A

SECTION J-J



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

Nose Section Detail

DWG. NAME.

USPBN-2 Bullnose_R8

SCALE: 1:27

UNITS: inches
[mm]

SHEET:

4 of 22

DATE:

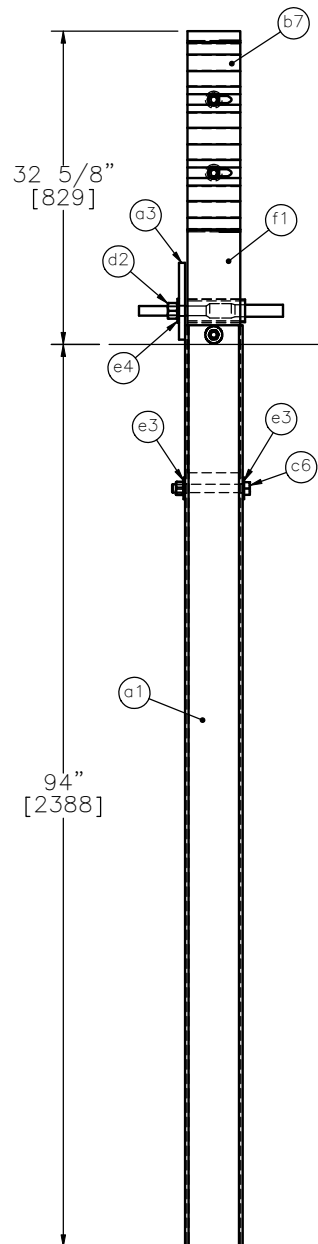
7/13/2010

DRAWN BY:

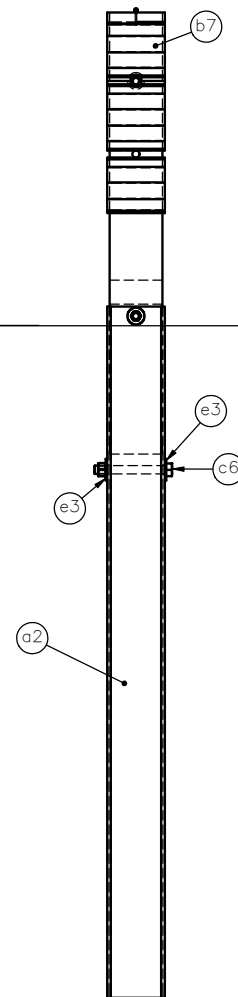
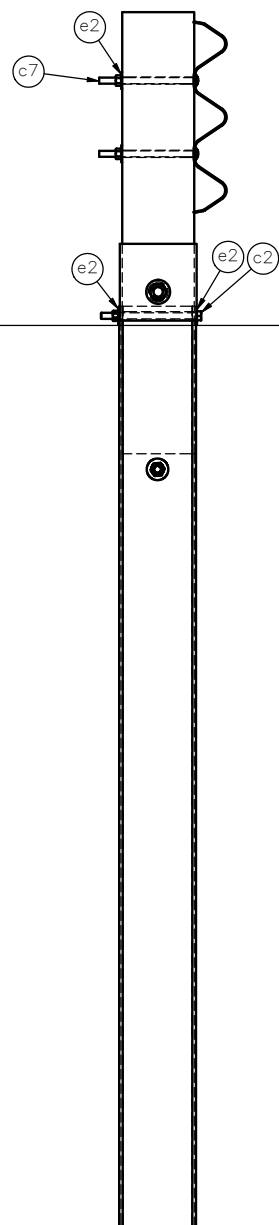
RJT/EAJ

REV. BY:

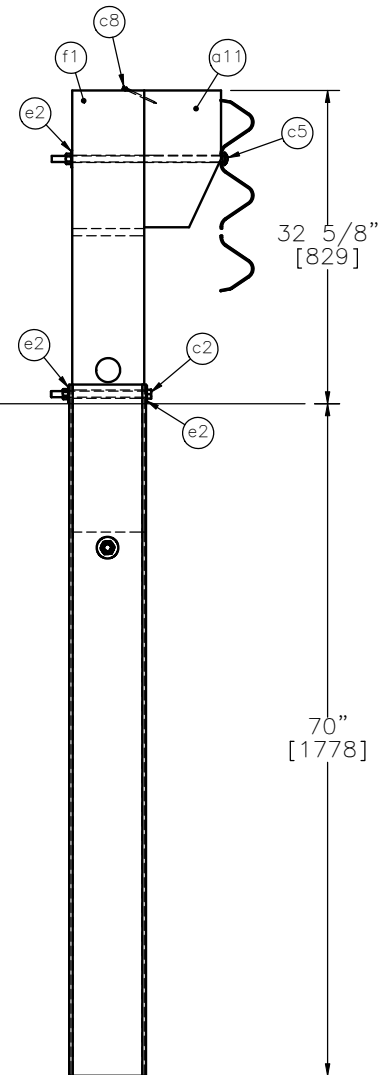
KAP/RKF/
SWA



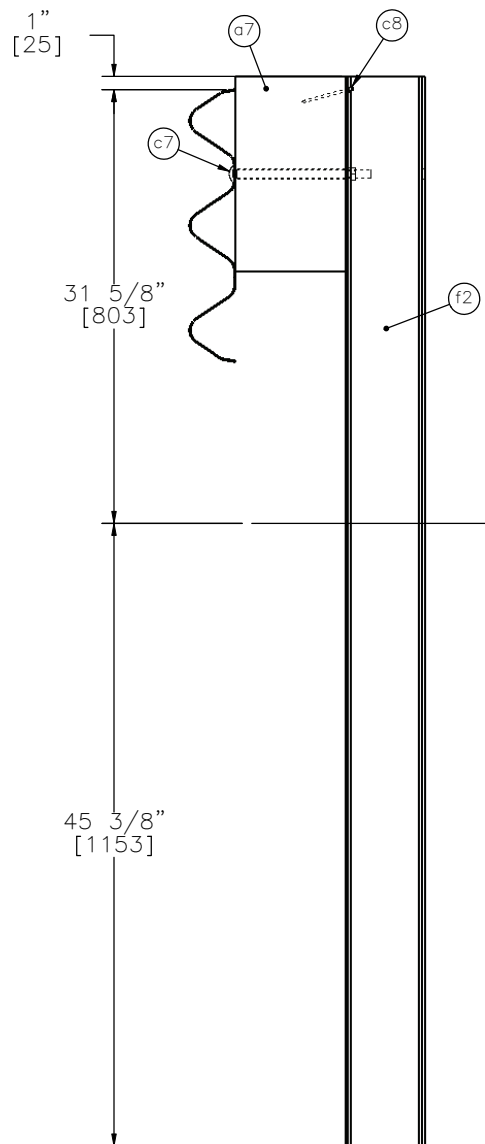
Post 1



Post 2

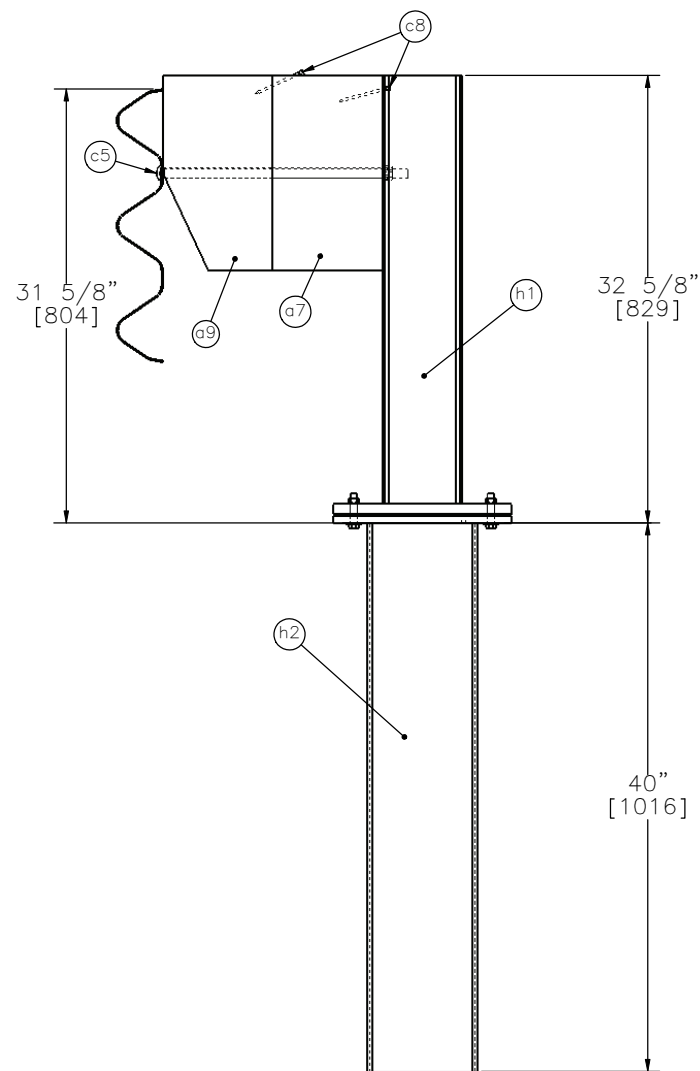


	Universal Breakaway Steel Post for Thrie Beam Bullnose Median Barrier System [Test No. USPBN-2]		SHEET: 5 of 22
	Post Nos. 1 and 2 Details		DATE: 7/13/2010
Midwest Roadside Safety Facility	DWG. NAME: USPBN-2 Bullnose_R8		DRAWN BY: RJT/EAJ
	SCALE: 1:20 UNITS: Inches [mm]		REV. BY: KAP/RKF/SWA



Post Nos. 9-12

SECTION D-D



Post Nos. 3-8

SECTION B-B



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

Post Nos. 3-8 and 9-12
Details

DWG. NAME.

USPBN-2 Bullnose_R8

SCALE: 1:14

UNITS: Inches
[mm]

SHEET:

6 of 22

DATE:

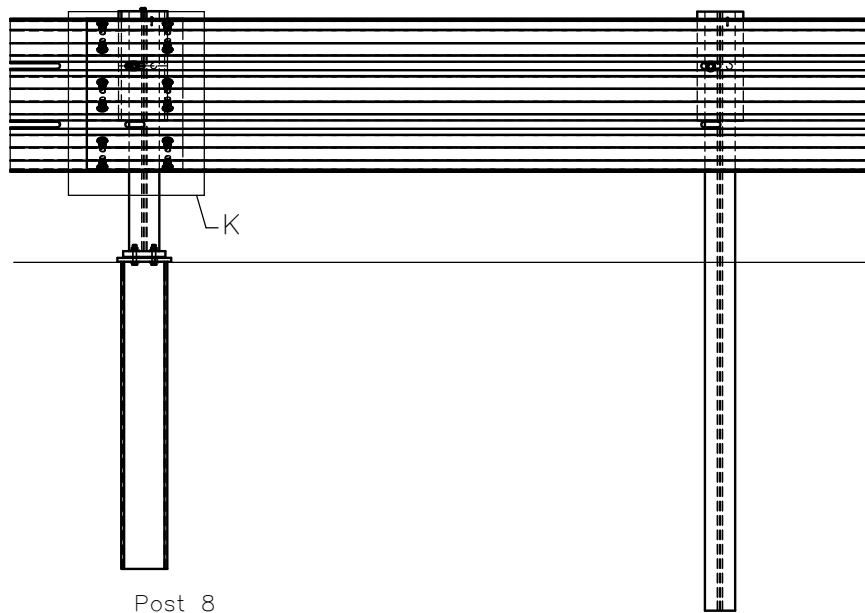
7/13/2010

DRAWN BY:

RJT/EAJ

REV. BY:

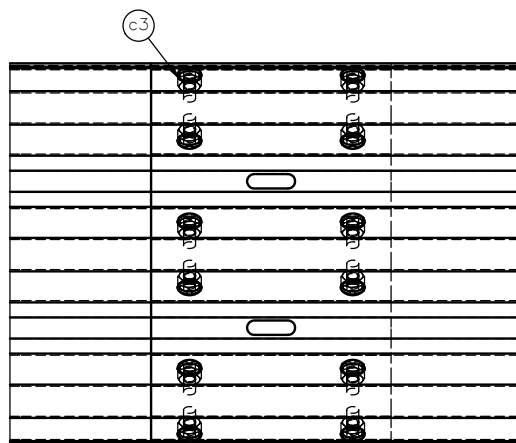
KAP/RKF/
SWA



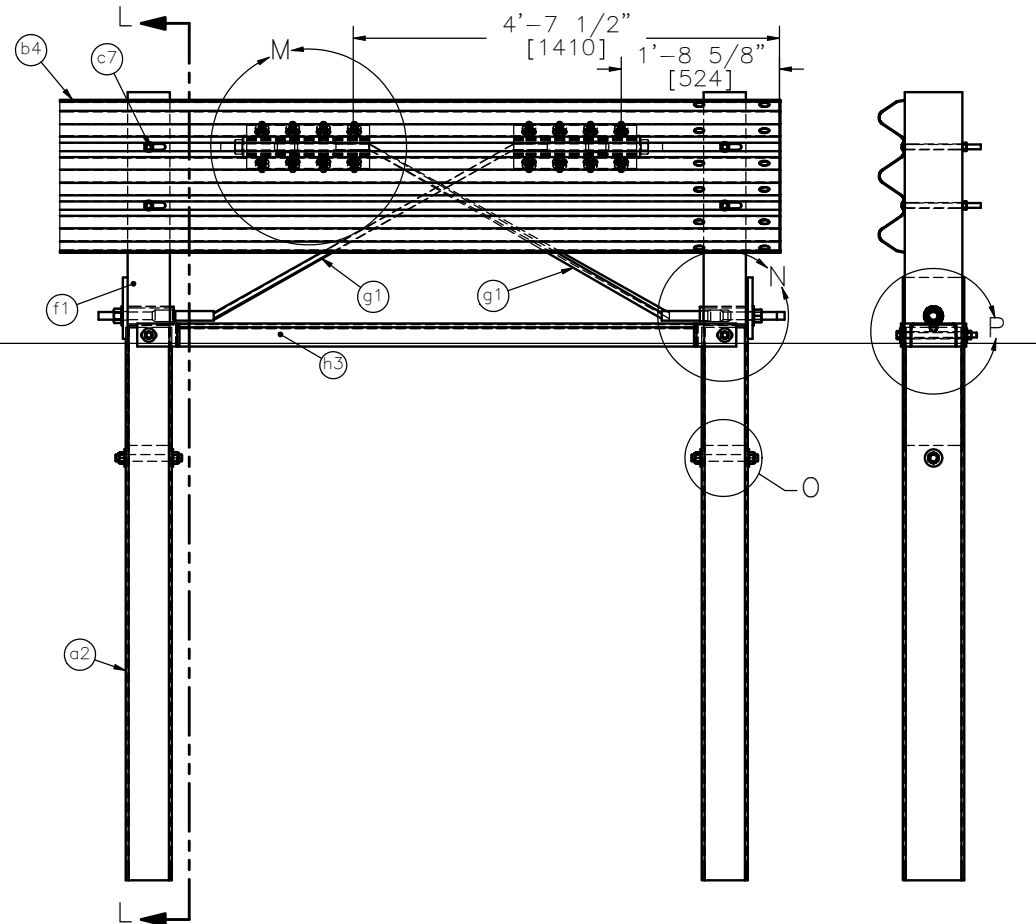
Post 8

Post 9

DETAIL C



DETAIL K
SCALE 1 : 15



Post 13

Post 14

DETAIL E

SECTION L-L



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

End Rail Detail
Splice Detail

DWG. NAME.

USPBN-2 Bullnose_R8

SCALE: 1:25

UNITS: Inches
[mm]

SHEET:

7 of 22

DATE:

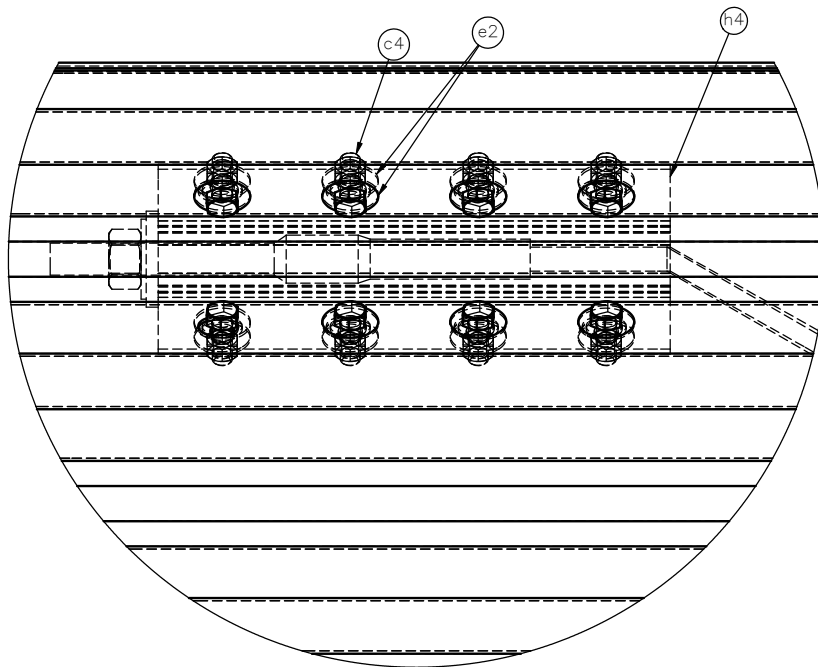
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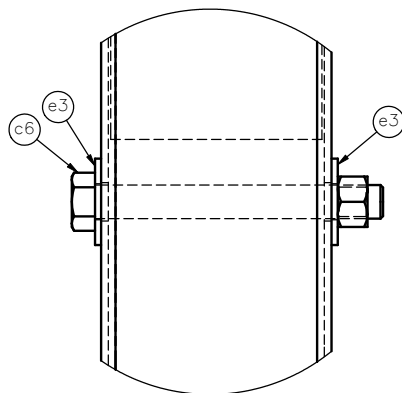
RJT/EAJ

REV. BY:

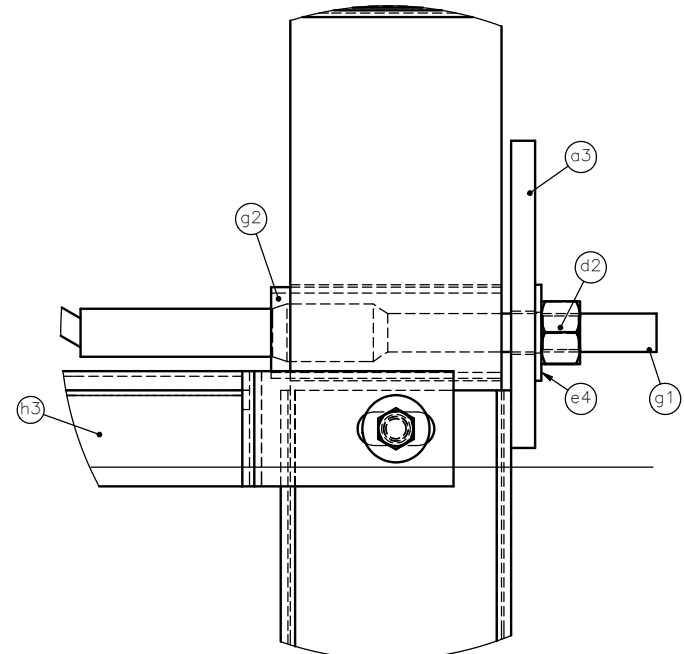
KAP/RKF/
SWA



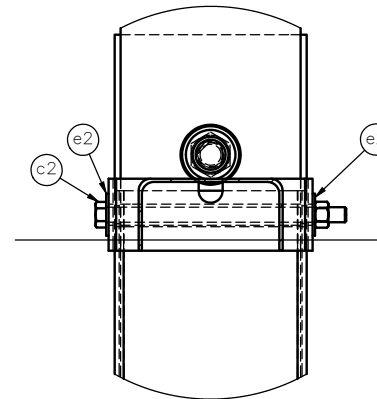
DETAIL M
SCALE 1 : 6



DETAIL O



DETAIL N



DETAIL P
SCALE 1 : 8



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

Anchor Details

DWG. NAME.

USPBN-2 Bullnose_R8

SCALE: 1:5

UNITS: Inches
[mm]

SHEET:

8 of 22

DATE:

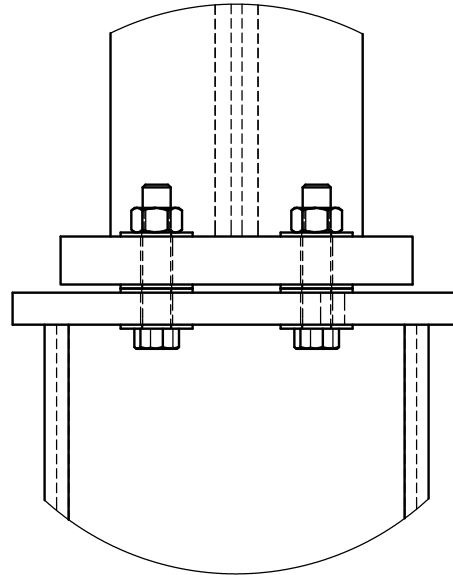
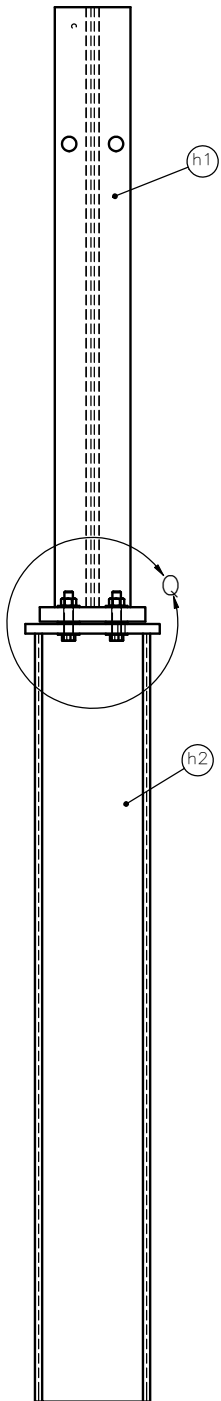
7/13/2010

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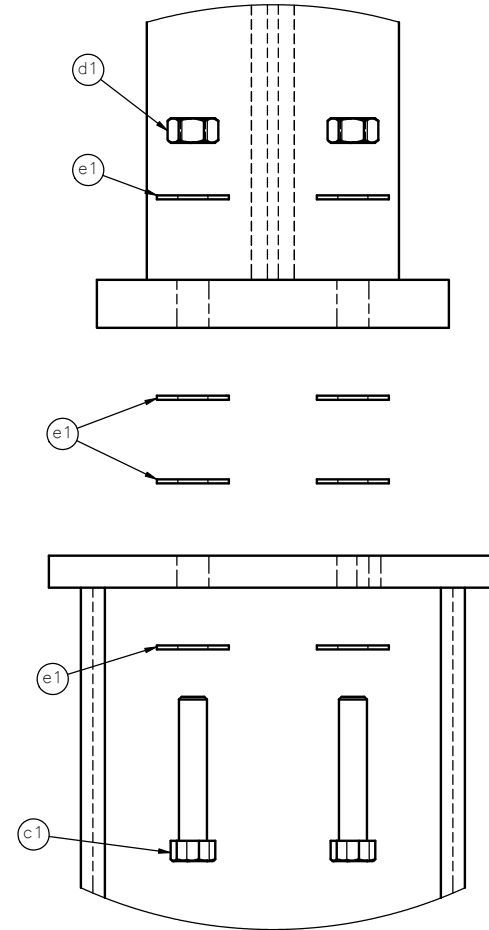
RJT/EAJ

REV. BY:

KAP/RKF/
SWA



DETAIL Q
SCALE 1 : 3



DETAIL Q
(EXPLODED)
SCALE 1 : 3

Note: (1) Vertical through-bolts are to be torqued to approximately 60-75 ft-lbs [81.3-101.7 N-m] for ASTM A325 grade bolts.

Universal Breakaway Steel Post
Post Nos. 3 - 8



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

UBSP Post and Component
Details

DWG. NAME.

USPBN-2 Bullnose_R8

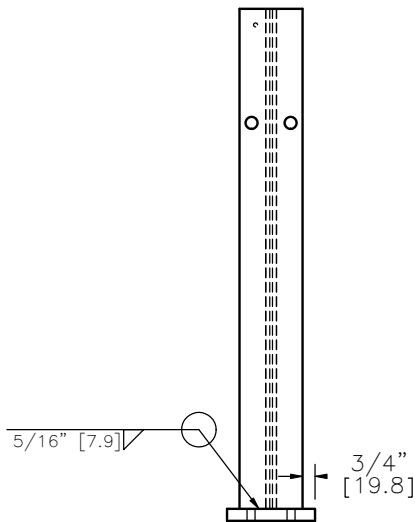
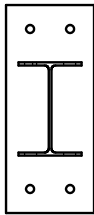
SCALE: 1:10
UNITS: inches
[mm]

SHEET:
9 of 22

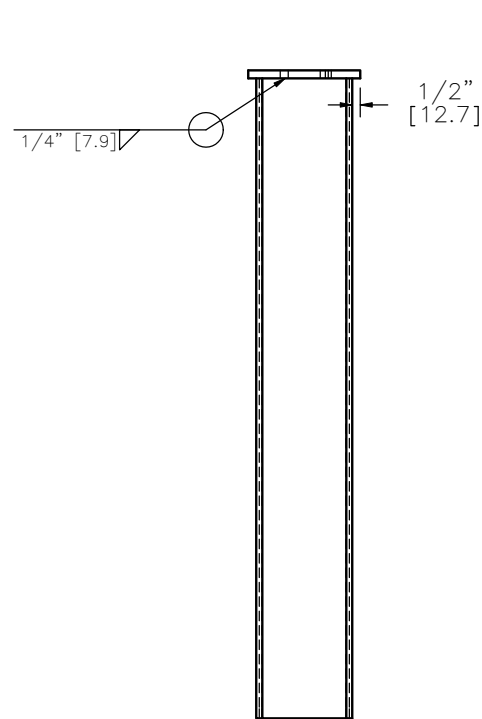
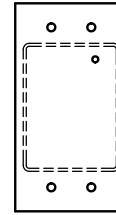
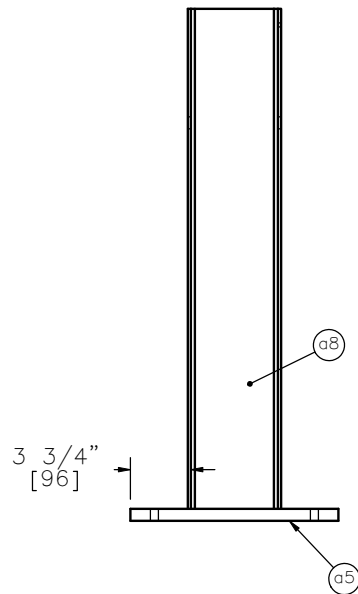
DATE:
7/13/2010

DRAWN BY:
RJT/EAJ

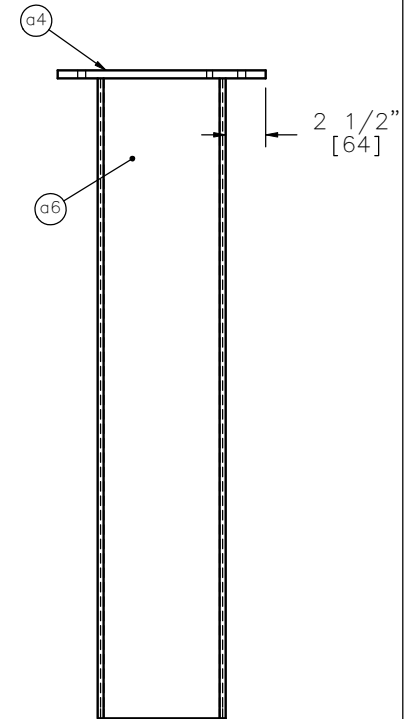
REV. BY:
KAP/RKF/
SWA



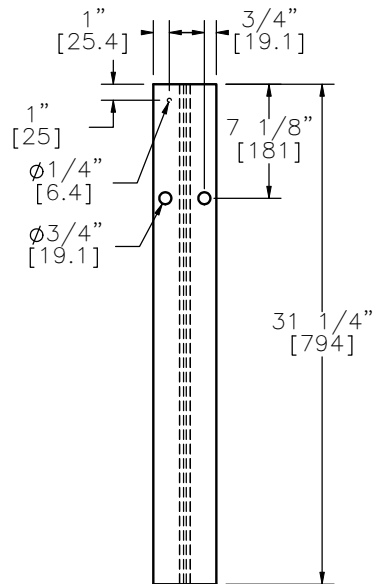
Universal Breakaway Steel Post
Upper Post Assembly
Assembly No. h1



Universal Breakaway Steel Post
Lower Post Assembly
Assembly No. h2

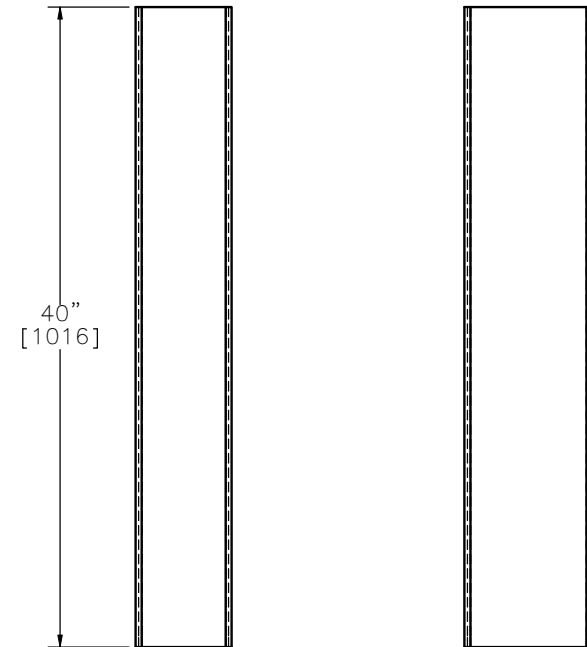
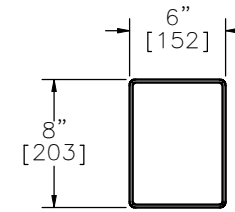


	Universal Breakaway Steel Post for Thrie Beam Bullnose Median Barrier System [Test No. USPN-2]		SHEET: 10 of 22
	Upper and Lower Post Assembly Details		DATE: 7/13/2010
Midwest Roadside Safety Facility		DWG. NAME: USPN-2 Bullnose_R8	DRAWN BY: RJT/EAJ
		SCALE: 1:12 UNITS: Inches [mm]	REV. BY: KAP/RKF/SWA

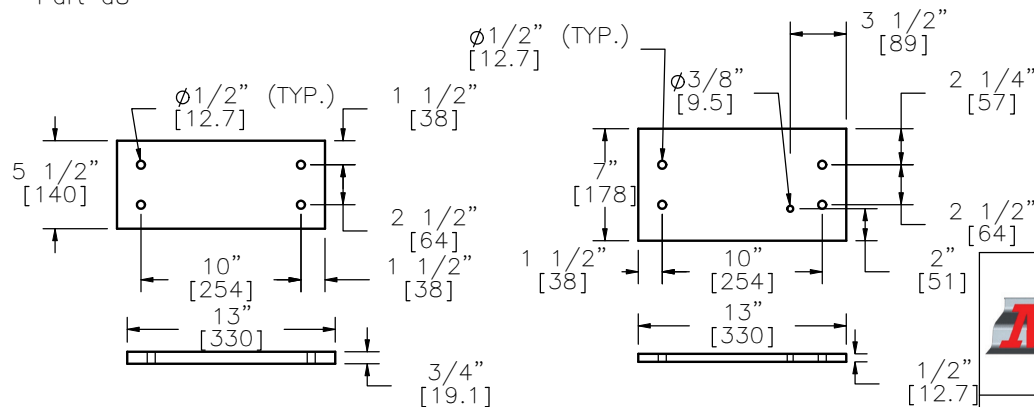


W6x8.5
[W152x12.6]
Part a8

Note: (1) Ø 3/8" [9.5] 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.



TS 6x8x3/16" [152x203x4.8]
Tube
Part a6



Midwest Roadside
Safety Facility

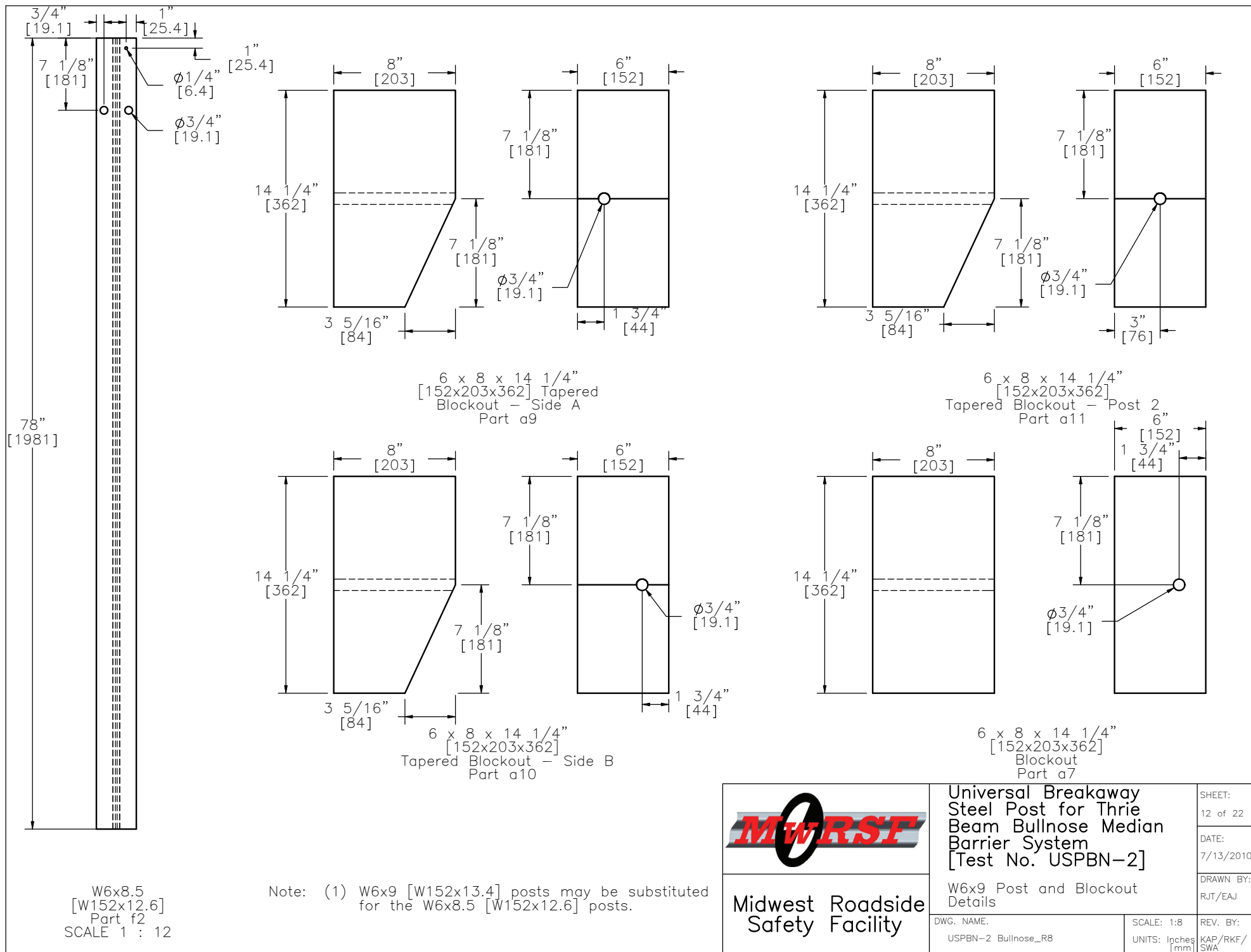
Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

UBSP Component Details

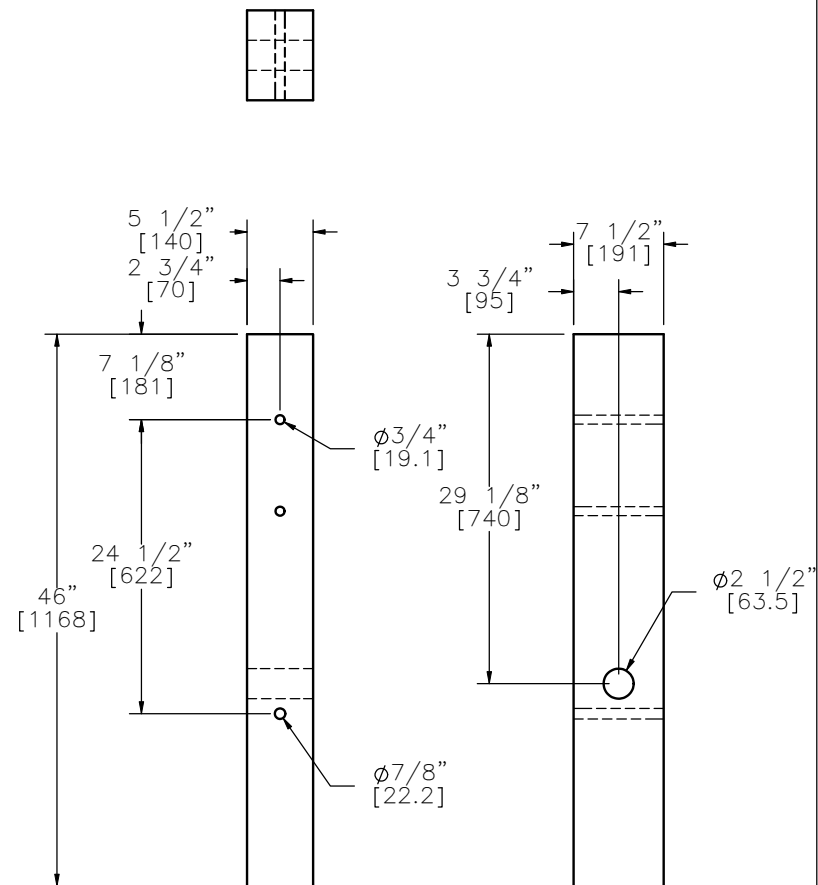
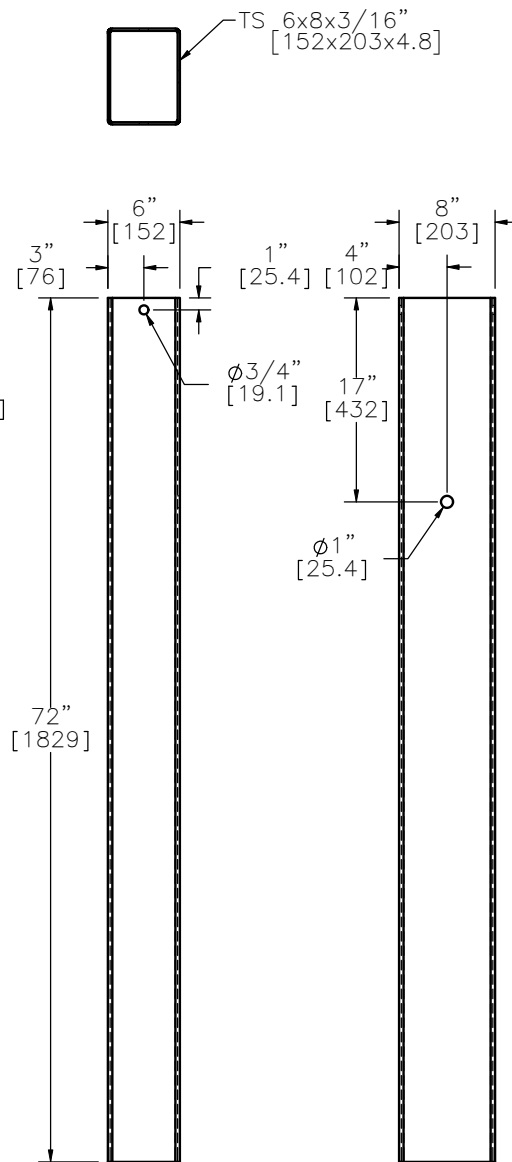
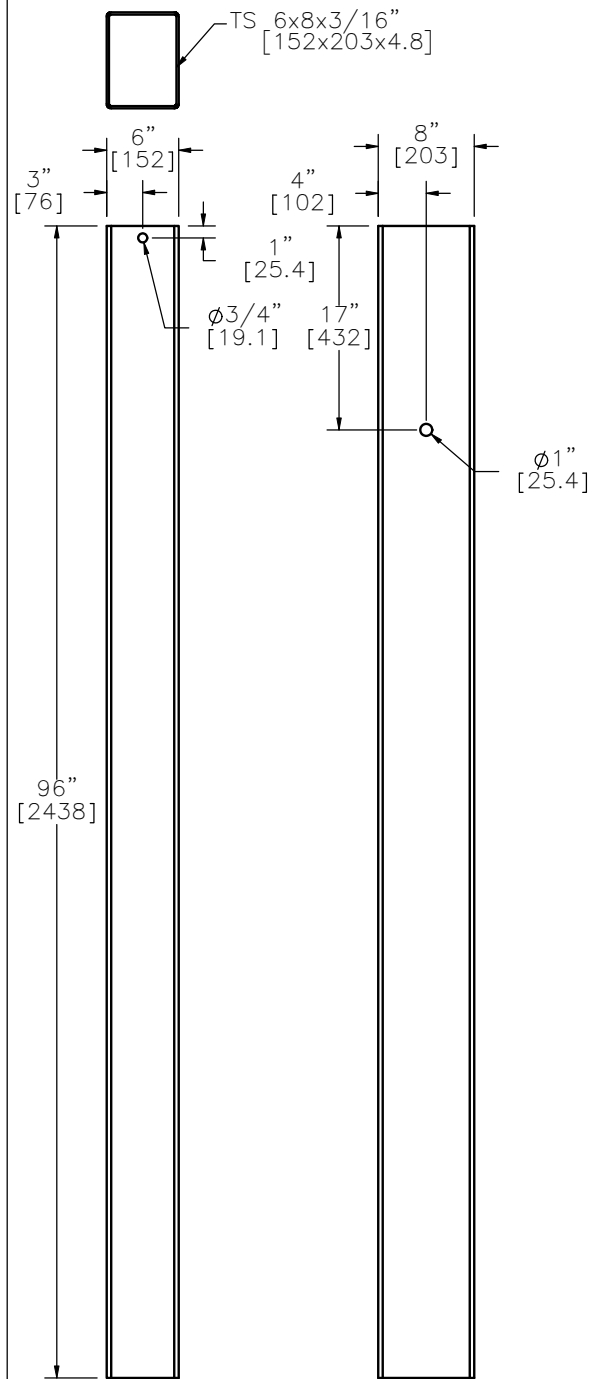
DWG. NAME.
USPBN-2 Bullnose_R8

SCALE: 1:12
UNITS: Inches
[mm]

SHEET:
11 of 22
DATE:
7/13/2010
DRAWN BY:
RJT/EAJ
REV. BY:
KAP/RKF/
SWA



Universal Breakaway Steel Post for Thrie Beam Bullnose Median Barrier System [Test No. USPBN-2]		SHEET:	12 of 22
		DATE:	7/13/2010
W6x9 Post and Blockout Details		DRAWN BY:	RJT/EAJ
DWG. NAME:	USPBN-2 Bullnose_R8	SCALE: 1:8	REV. BY:
		UNITS: Inches [mm]	KAP/RKF/SWA



BCT (Thrie) Timber Post
Part f1



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

BCT Timber Posts and
Foundation Tube Details

DWG. NAME.

USPBN-2 Bullnose_R8

SCALE: 1:16

UNITS: Inches
[mm]

REV. BY:

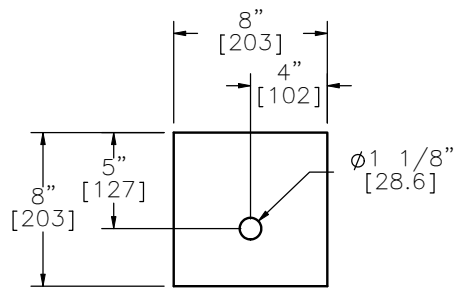
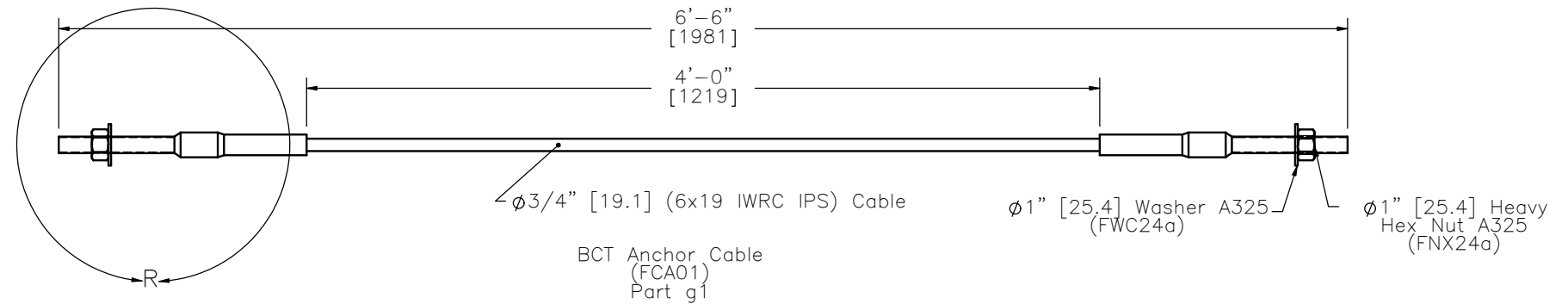
KAP/RKF/
SWA

SHEET:
13 of 22

DATE:
7/13/2010

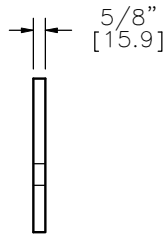
DRAWN BY:
RJT/EAJ

Note: (1) 6x19 and 6x25 IWRC cables are equivalent.

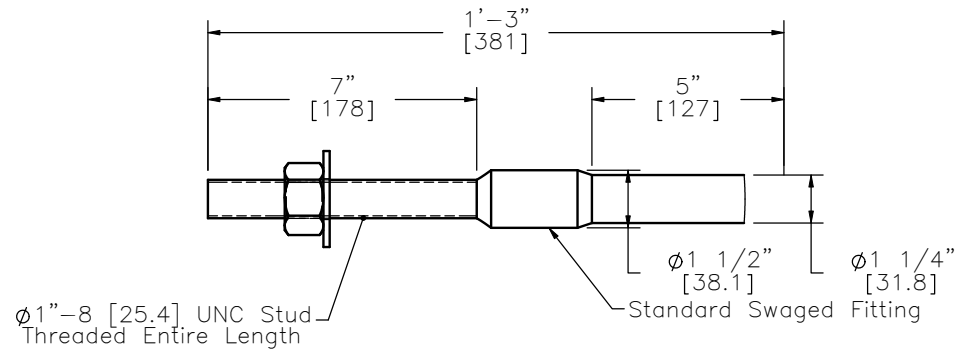


SIDE VIEW

Anchor Cable Bearing Plate
(FPB01)
Part a3



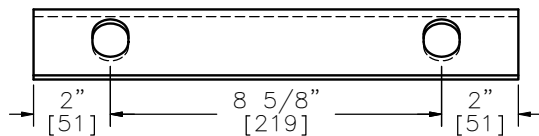
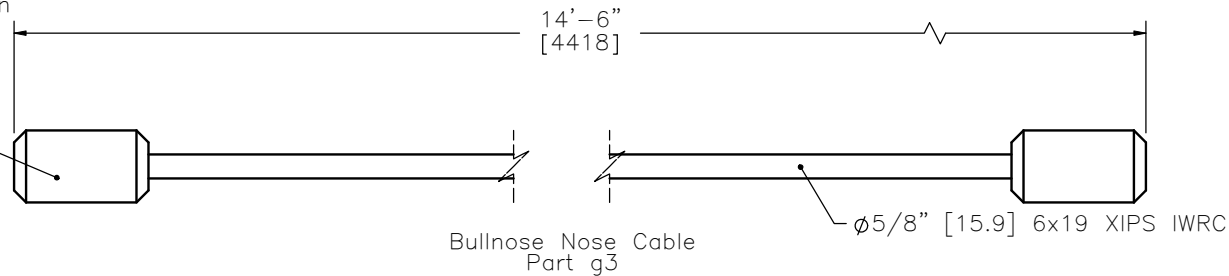
FRONT VIEW



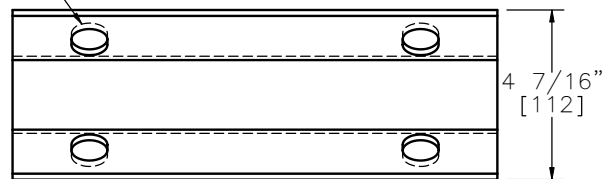
DETAIL R
SCALE 1 : 5

	Universal Breakaway Steel Post for Thrie Beam Bullnose Median Barrier System [Test No. USPB-2]		SHEET: 14 of 22
	BCT Anchor Cable Detail		DATE: 7/13/2010
Midwest Roadside Safety Facility	DWG. NAME: USPB-2 Bullnose_R8		DRAWN BY: RJT/EAJ
	SCALE: 1:10 UNITS: Inches [mm]		REV. BY: KAP/RKF/SWA

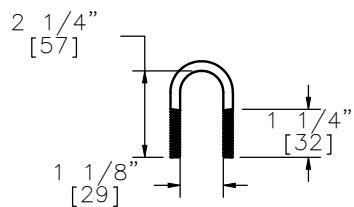
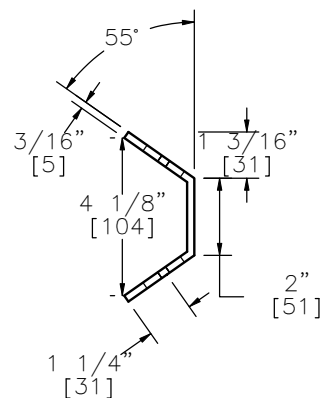
"Cold Tuff" Button, S-409 Size No. 12 SB
 2" [50.8] Stock No. 1040395 for $\phi 5/8$ "
 [15.9] 6x19 XIPS IWRC wire rope (or any
 similarly sized swage-grip button
 ferrules)



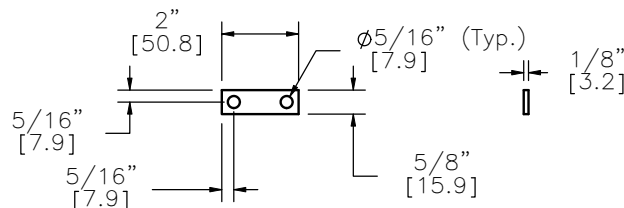
$\phi 1$ " x 1 1/4" [25.4 x 31.8]
 Slots (TYP.)



Nose Cable Anchor Plate
 Part g4



$\phi 1/4$ " [6.4] U-Bolt
 Galvanized A307
 Part g6



$\phi 1/4$ " [6.4] Plate Washer
 Galvanized A307
 Part g5



Midwest Roadside
 Safety Facility

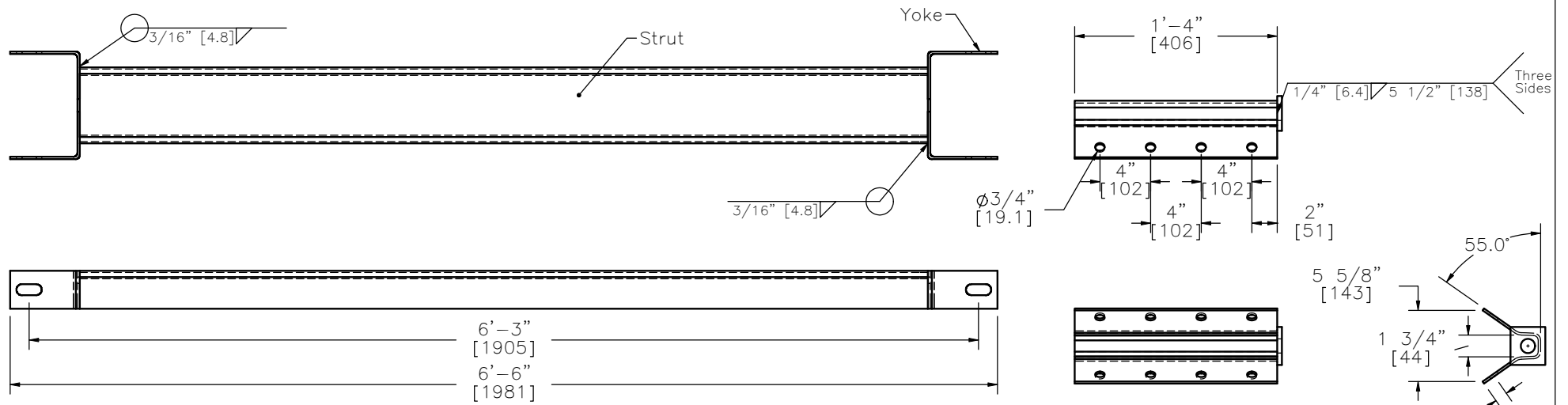
Universal Breakaway
 Steel Post for Thrie
 Beam Bullnose Median
 Barrier System
 [Test No. USPBN-2]

Nose Cable Detail

DWG. NAME.
 USPBN-2 Bullnose_R8

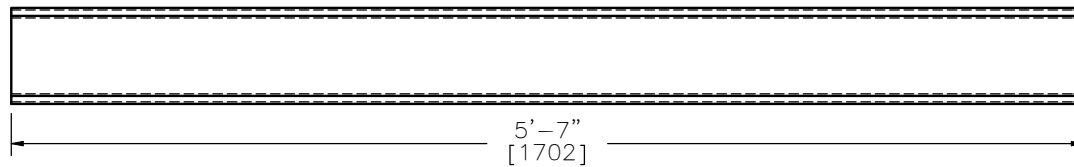
SCALE: 1:5
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 (mm)

SHEET:
 15 of 22
 DATE:
 7/13/2010
 DRAWN BY:
 RJT/EAJ
 REV. BY:
 KAP/RKF/
 SWA

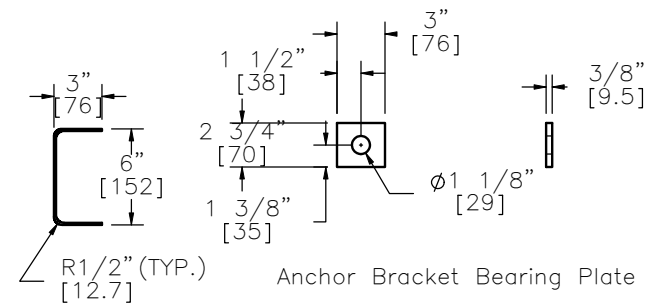


Strut and Yoke Assembly
Assembly h3

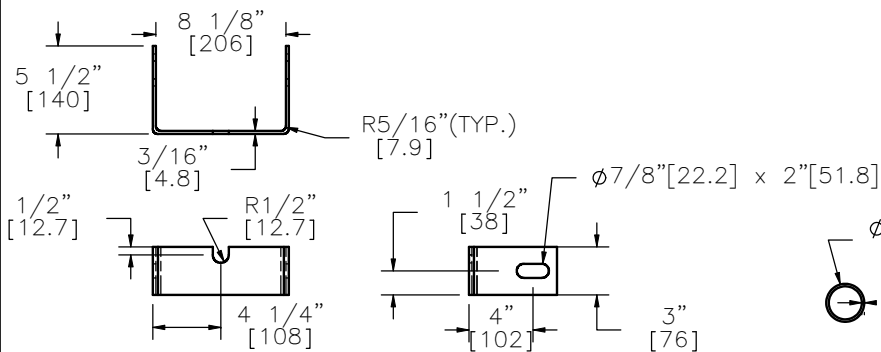
Anchor Bracket
(FPA01)
Assembly h4



Strut
C.R. Channel 6x3 [152x76] 10 Gauge



Anchor Bracket Bearing Plate



Yoke

BCT Post Sleeve
Part g2



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

BCT Anchorage Detail

DWG. NAME.
USPBN-2 Bullnose_R8

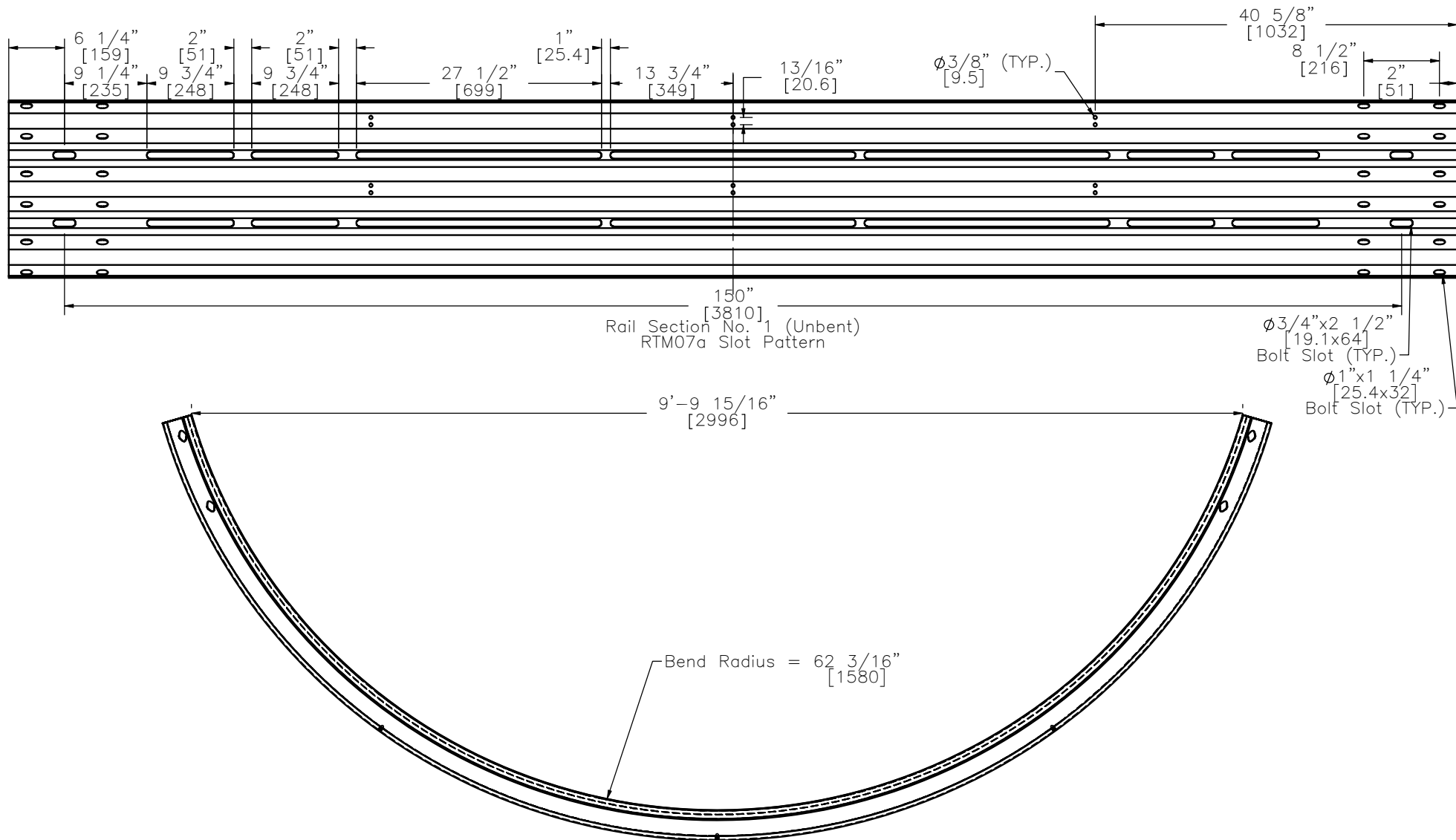
SCALE: 1:12
UNITS: inches
[mm]

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SWA



Rail Section No. 1
Part No. b2



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Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

Rail Section Details
Section No. 1

DWG. NAME:
USPBN-2 Bullnose_R8

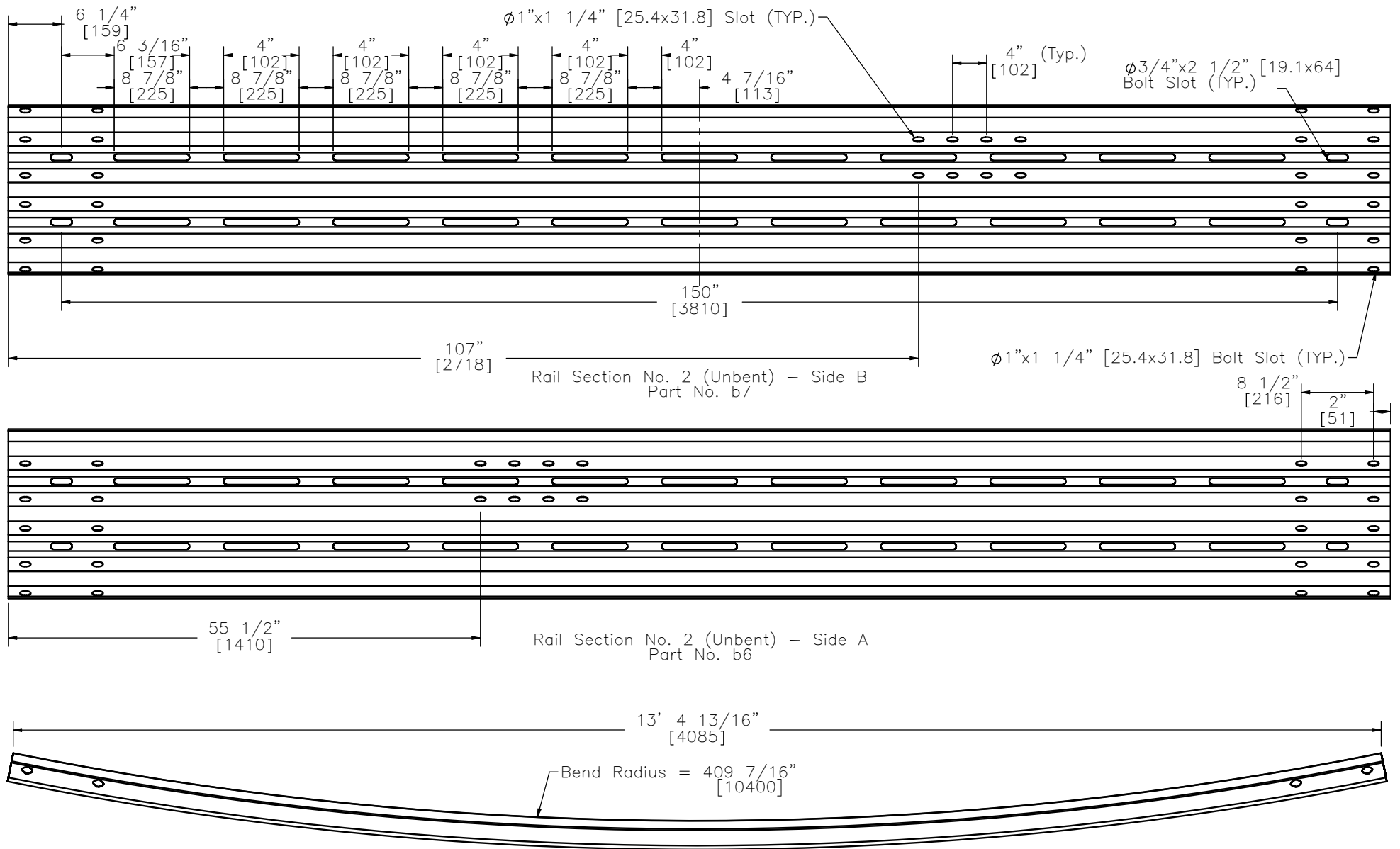
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UNITS: Inches
[mm]

REV. BY:
KAP/RKF/
SWA

SHEET:
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DATE:
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DRAWN BY:
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Rail Section No. 2
RTM07d Slot Pattern



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Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPN-2]

Rail Section Details
Section No. 2

DWG. NAME.

USPN-2 Bullnose_R8

SCALE: 1:16

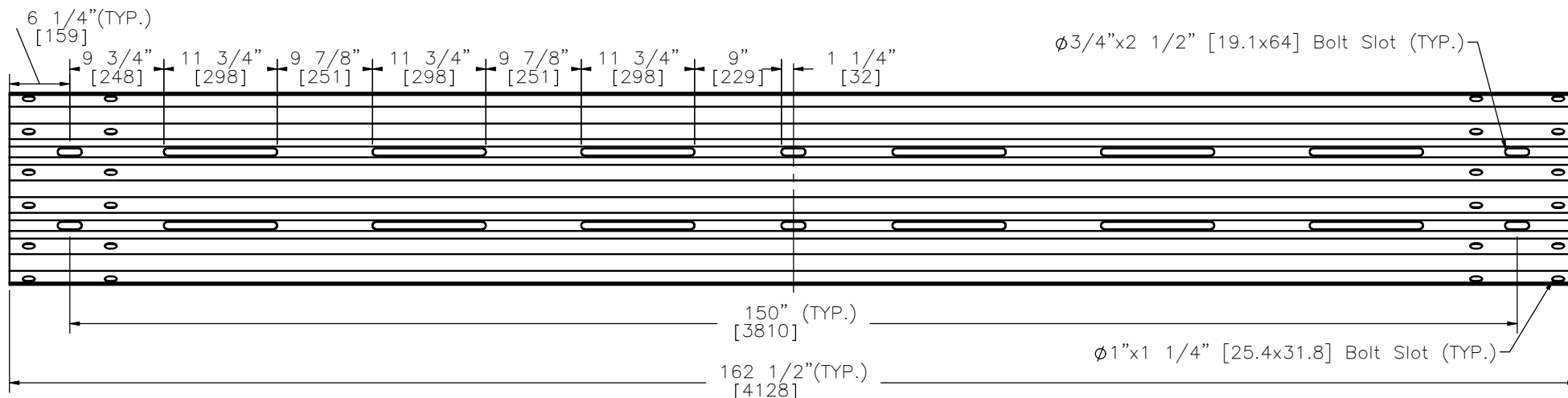
UNITS: Inches
[mm]

SHEET:
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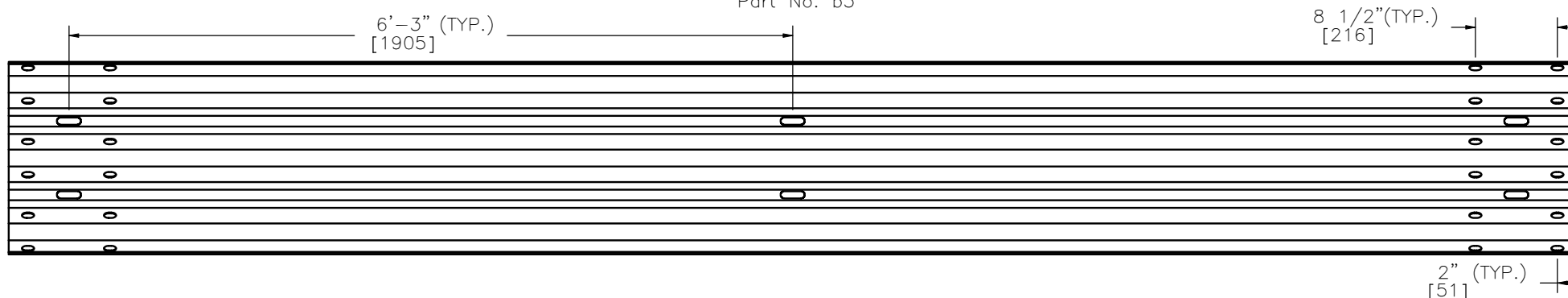
DATE:
7/13/2010

DRAWN BY:
RJT/EAJ

REV. BY:
KAP/RKF/
SWA



12'-6" [3810] Thrie Beam Section, 12 gauge
 Rail Section No. 3
 RTM07e Slot Pattern
 Part No. b3



12'-6" [3810] Thrie Beam Section, 12 gauge
 Rail Section No. 4
 Part No. b1



Midwest Roadside
 Safety Facility

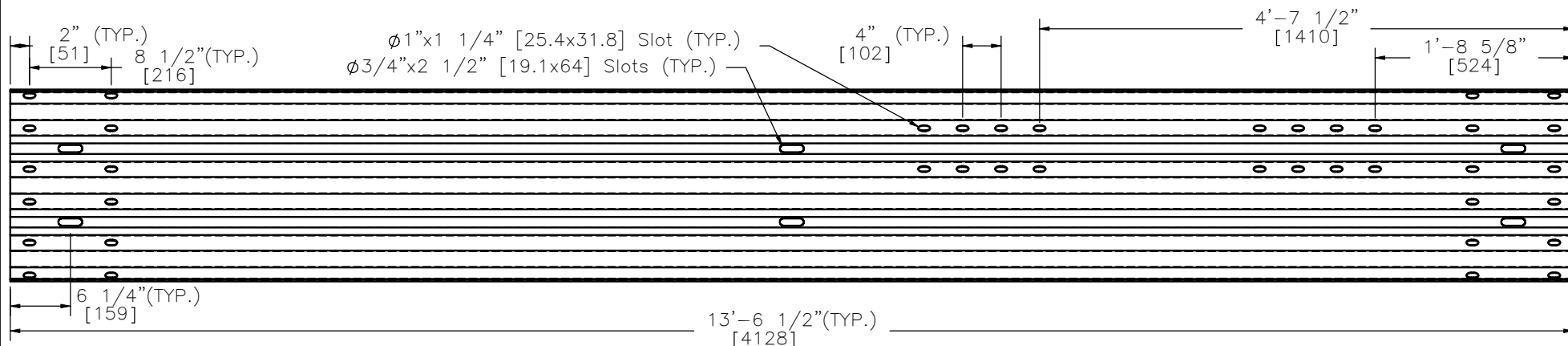
Universal Breakaway
 Steel Post for Thrie
 Beam Bullnose Median
 Barrier System
 [Test No. USPBN-2]

Rail Section Details
 Section Nos. 3 and 4

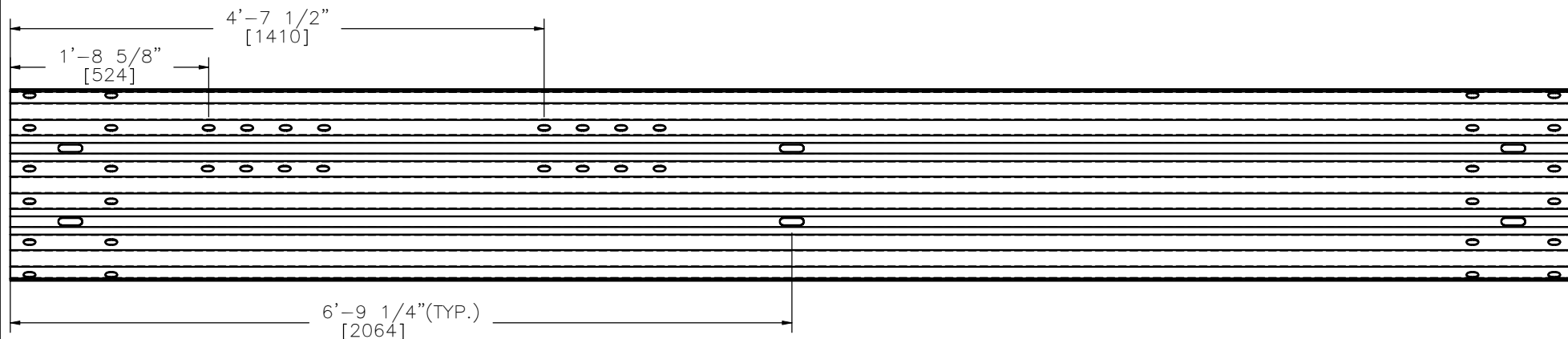
DWG. NAME:
 USPBN-2 Bullnose_R8

SCALE: 1:16
 UNITS: inches
 [mm]

SHEET:
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 DRAWN BY:
 RJT/EAJ
 REV. BY:
 KAP/RKF/
 SWA



12'-6" [3810] Thrie Beam End Section, 12 gauge
Rail Section No. 5 - Side A
Part No. b4



12'-6" [3810] Thrie Beam End Section, 12 gauge
Rail Section No. 5 - Side B
Part No. b5



Midwest Roadside
Safety Facility

Universal Breakaway
Steel Post for Thrie
Beam Bullnose Median
Barrier System
[Test No. USPBN-2]

Rail Section Details
Section No. 5

DWG. NAME.

USPBN-2 Bullnose_R8

SCALE: 1:16

UNITS: inches
[mm]

REV. BY:

KAP/RKF/
SWA

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DRAWN BY:

RJT/EAJ

UBSP-2 Bullnose				
Item No.	QTY.	Description	Material Specification	Hardware Guide
a1	2	96" [2438] Foundation Tube	ASTM A500 Grade B	PTE07
a2	6	72" [1829] Foundation Tube	ASTM A500 Grade B	PTE06
a3	6	8 x 8 x 5/8" [203 x 203 x 15.9] Anchor Bearing Plate	ASTM A36	FPB01
a4	12	13 x 7 x 1/2" [330 x 178 x 13] Lower Shear Plate	ASTM A36	—
a5	12	13 x 5 1/2 x 3/4" [330 x 140 x 19] Upper Shear Plate	ASTM A36	—
a6	12	6 x 8 x 3/16" [152 x 203 x 5] x 40" [1016] Foundation Tube	ASTM A500 Grade B	—
a7	20	6 x 8 x 14 1/4" [152 x 203 x 362] Blockout	SYP Grade No.1 or better	PDB09
a8	12	W6x8.5 [W152 x 12.6] x 31 1/4" [794] (W6x9 [W152 x 13.4] can be substituted)	ASTM A36 (ASTM A992)	—
a9	6	6 x 8 x 14 1/4" [152 x 203 x 362] Tapered Blockout — Side A	SYP Grade No.1 or better	Blockout with Offset Holes
a10	6	6 x 8 x 14 1/4" [152 x 203 x 362] Tapered Blockout — Side B	SYP Grade No.1 or better	Blockout with Offset Holes
a11	2	6 x 8 x 14 1/4" [152 x 203 x 362] Tapered Blockout — Post 2	SYP Grade No.1 or better	PDB12
b1	4	12'-6" [3810] Thrie Beam Section No. 4	12 gauge AASHTO M180	RTM02a
b2	1	Bent 12'-6" [3810] Thrie Beam Section No. 1 — Radius 62 3/16" [1580]	12 gauge AASHTO M180	RTM07a
b3	2	12'-6" [3810] Thrie Beam Section No. 3 with Extra Slots	12 gauge AASHTO M180	RTM07e
b4	1	12'-6" [3810] Thrie Beam End Section No. 5 — Side A	12 gauge AASHTO M180	—
b5	1	12'-6" [3810] Thrie Beam End Section No. 5 — Side B	12 gauge AASHTO M180	—
b6	1	Bent 12'-6" [3810] Thrie Beam Section No. 2 — Radius 409 7/16" [10400] — Side A	12 gauge AASHTO M180	RTM07d
b7	1	Bent 12'-6" [3810] Thrie Beam Section No. 2 — Radius 409 7/16" [10400] — Side B	12 gauge AASHTO M180	RTM07d
c1	48	7/16" Dia. [11.1] UNC-14 x 2 1/2" [64] long Hex Tap Bolts (Fully Threaded)	SAE Grade 5/ASTM A325	—
c2	8	5/8" Dia. [15.9] x 10" [254] long Hex Head Bolt and Nut	ASTM A307	FBX16a
c3	120	5/8" Dia. [15.9] x 1 1/2" [38] long Guardrail Bolt and Nut	ASTM A307	FBB01
c4	48	5/8" Dia. [15.9] x 1 1/2" [38] long Hex Head Bolt	ASTM A307	FBX16a
c5	14	5/8" Dia. [15.9] x 18" [457] long Guardrail Bolt and Nut	ASTM A307	FBB04
c6	8	7/8" Dia. [22.2] x 7 1/2" [191] long Hex Head Bolt and Nut	ASTM A307	FBX22a
c7	20	5/8" Dia. [15.9] x 10" [254] long Guardrail Bolt and Nut	ASTM A307	FBB03
c8	34	16D Double Head Nail	—	—

	Universal Breakaway Steel Post for Thrie Beam Bullnose Median Barrier System [Test No. USPBN-2]		SHEET: 21 of 22
	Bill of Materials		DATE: 7/13/2010
			DRAWN BY: RJT/EAJ
DWG. NAME. USPBN-2 Bullnose_R8		SCALE: None UNITS: Inches [mm]	REV. BY: KAP/RKF/ SWA

UBSP-2 Bullnose				
Item No.	QTY.	Description	Material Specification	Hardware Guide
d1	48	7/16" Dia. [11.1] Hex Nut	ASTM A563DH Galvanized	—
d2	12	1" Dia. [25.4] Hex Nut	ASTM A563DH	—
e1	192	7/16" Dia. [11.1] Flat Washer	ASTM F436 Gr. 1 Galvanized	—
e2	118	5/8" Dia. [15.9] Flat Washer	ASTM F436 Gr. 1 Galvanized	FWC16a
e3	16	7/8" Dia. [22.2] Flat Washer	ASTM F436 Gr. 1 Galvanized	FWC22a
e4	12	1" Dia. [25.4] Flat Washer	ASTM F436 Gr. 1	FWC24a
f1	8	BCT Thrie Post	SYP Grade No. 1 or better (No knots, 18" [457] above or below ground line and on tension face)	PDF04
f2	8	W6x8.5 [W152x12.6] x 78" [1981] long (W6x9 [W152 x 13.4] can be substituted)	ASTM A36 (ASTM A992)	—
g1	6	BCT Cable 6'-6" [1981] Long	6x19 or 6x25 Cable IWRC IPS	FCA01
g2	6	2 3/8" [60] O.D. x 6" [152] long BCT Post Sleeve	ASTM A53 Grade B Schedule 40	FMM02
g3	2	Bullnose Nose Cable 5/8" Dia. [15.9] x 14.4' [4389] Long	"Cold Tuff" Button, S-409 Size No. 12 SB 2 7/8" [73] Stock No. 1040395 for 5/8" [16] Dia. (6x25) wire rope (or any similarly sized swage-grip button ferrules)	—
g4	4	Nose Cable Anchor Plates 12 5/8" [321] x 5 13/16" [148]	ASTM A36	—
g5	6	1/4" Dia. [6.4] U-Bolt Plate Washer	Zinc Coated or Galvanized ASTM A307	—
g6	6	1/4" Dia. [6.4] U-Bolt	Zinc Coated or Galvanized ASTM A307	—
g7	12	1/4" Dia. [6.4] Hex Nut	Zinc Coated or Galvanized ASTM A307	—
h1	12	UBSP Post — Top Assembly	—	—
h2	12	UBSP Post — Bottom Assembly	—	—
h3	2	Strut and Yoke Assembly	ASTM A36 Galvanized	—
h4	6	Anchor Bracket Assembly	ASTM A36	FPA01
 Midwest Roadside Safety Facility Universal Breakaway Steel Post for Thrie Beam Bullnose Median Barrier System [Test No. USPBN-2] Bill Of Materials DWG. NAME. USPBN-2 Bullnose_R8 SCALE: None UNITS: Inches [mm] SHEET: 22 of 22 DATE: 7/13/2010 DRAWN BY: RJT/EAJ REV. BY: KAP/RKF/SWA				