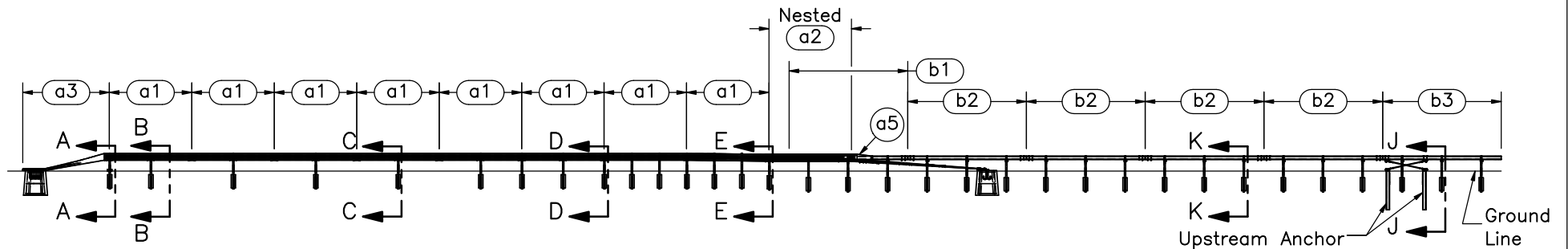


PLAN VIEW



ELEVATION VIEW

- Notes: (1) Test shall be performed according to test designation no. 3-21 using MASH 2016 criteria.  
 (2) The impact location is 8' [2,438] upstream from the leading edge of the transition cover piece (part a5).  
 (3) Critical region is located between post nos. 10 and 27.  
 (4) Upstream anchor posts are placed in  $\phi 3'$  [914] holes, then backfilled and tamped with soil.



Midwest Roadside Safety Facility

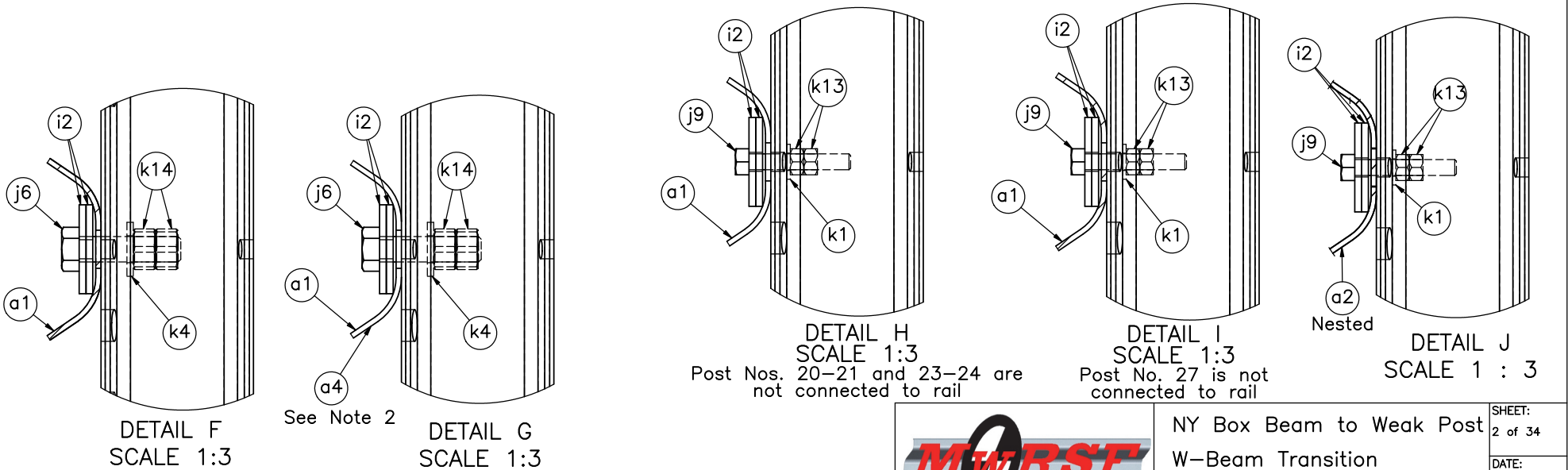
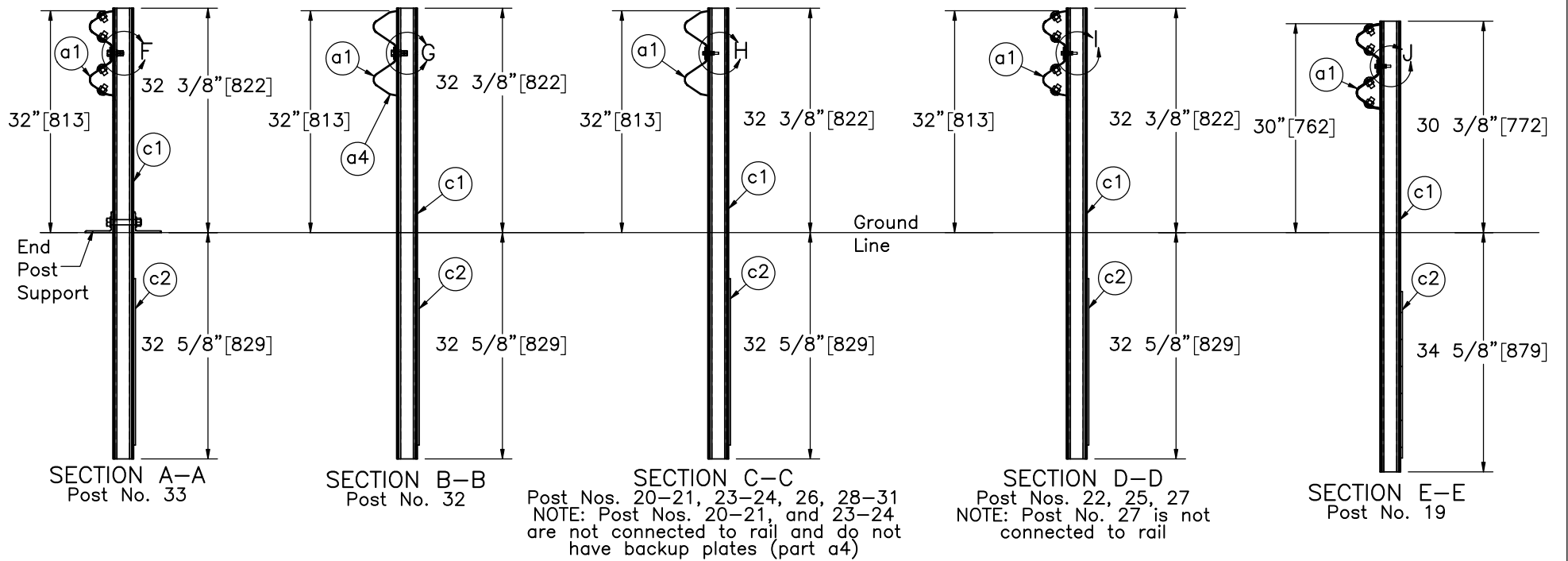
NY Box Beam to Weak Post  
 W-Beam Transition  
 Test No. NYBWT-1

System Layout

DWG. NAME:  
 NYBWT-1\_R16

SCALE: 1:280  
 UNITS: in.[mm]

SHEET:  
 1 of 34  
 DATE:  
 10/30/2023  
 DRAWN BY:  
 JEK/JRD/JJ  
 O  
 REV. BY:  
 KAL/RKF/JC  
 H/



Note: (1) Guardrail bolts (parts j6 and j9) on the downstream side of the web.  
(2) W-Beam back up plate (part no. a4) used on Posts 26, 28-32.



Midwest Roadside Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

W-Beam Post Sections

DWG. NAME:  
NYBWT-1\_R16

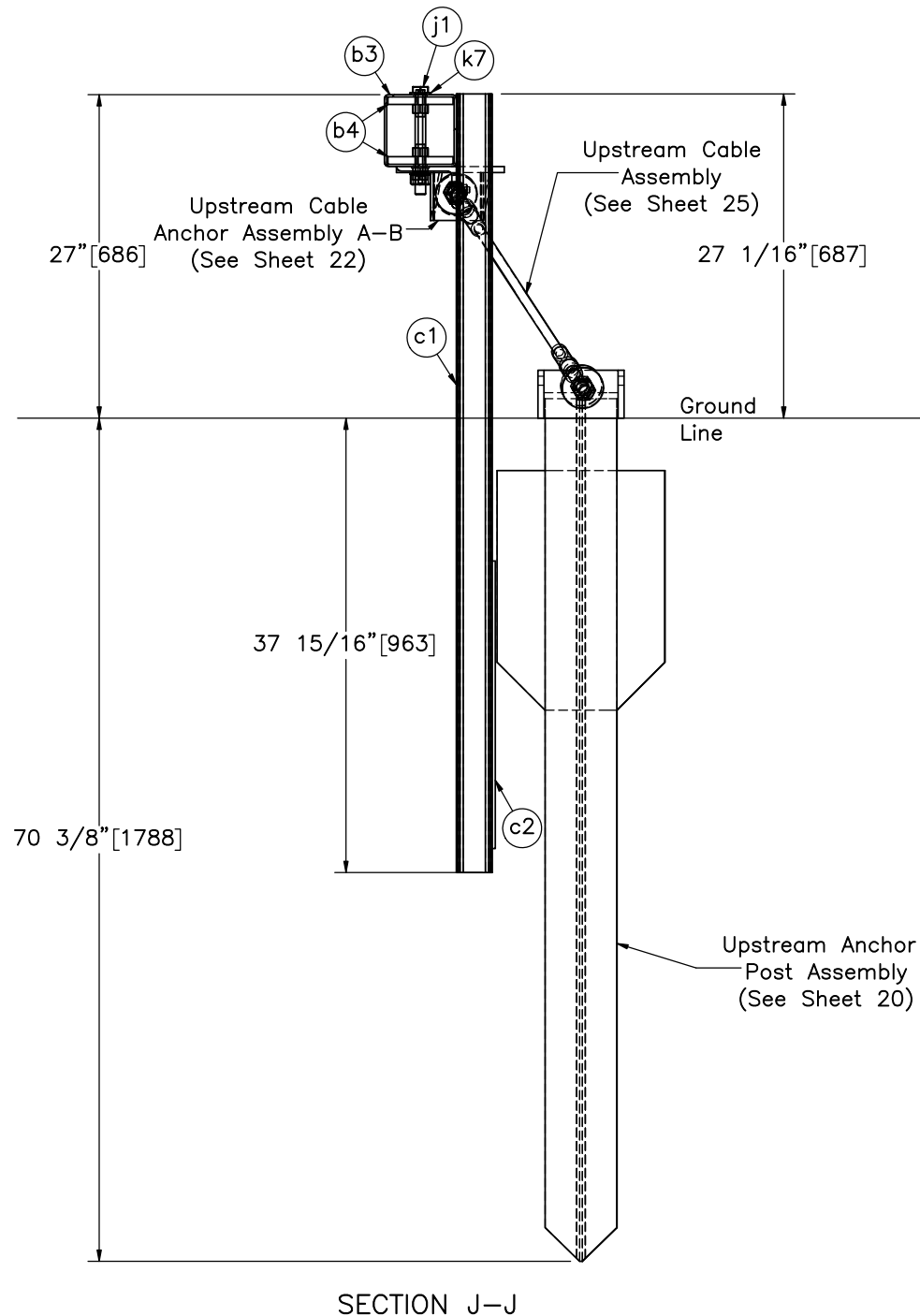
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UNITS: in.[mm]

SHEET:  
2 of 34

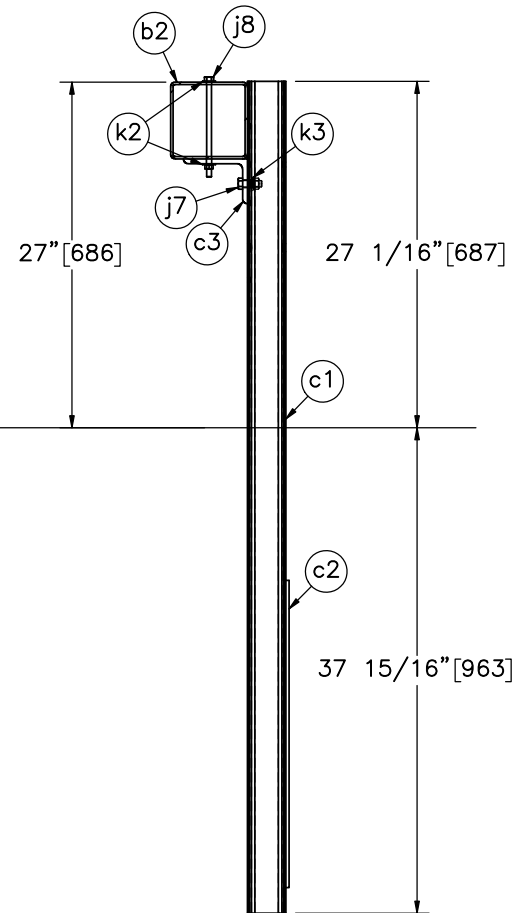
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/



SECTION J-J



SECTION K-K

Note: (1) Box beam post bolts (part j7) on the downstream side of the web.



Midwest Roadside Safety Facility

NY Box Beam to Weak Post W-Beam Transition  
Test No. NYBWT-1

Box Beam Post Sections

DWG. NAME:  
NYBWT-1\_R16

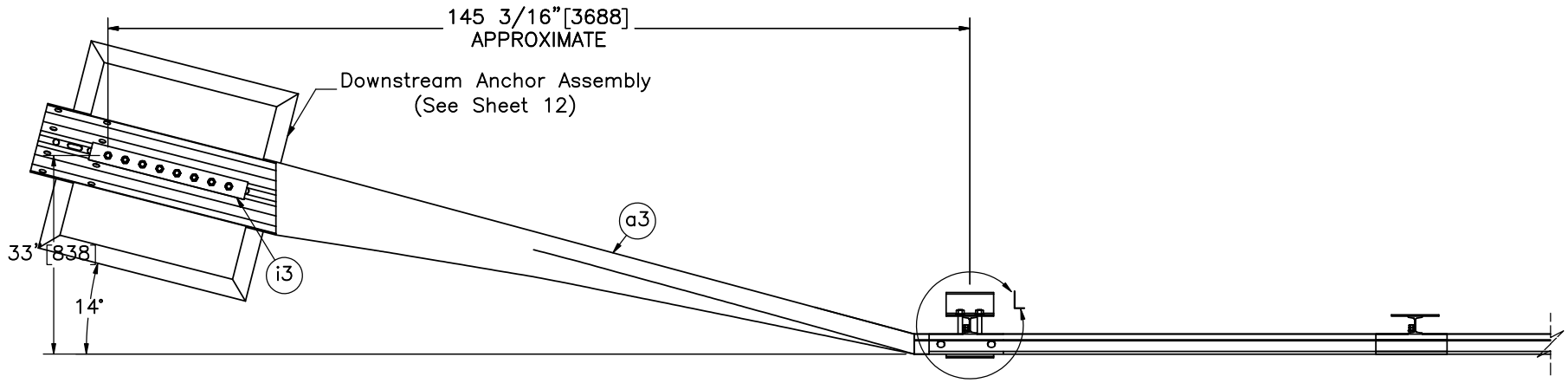
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UNITS: in.[mm]

SHEET:  
3 of 34

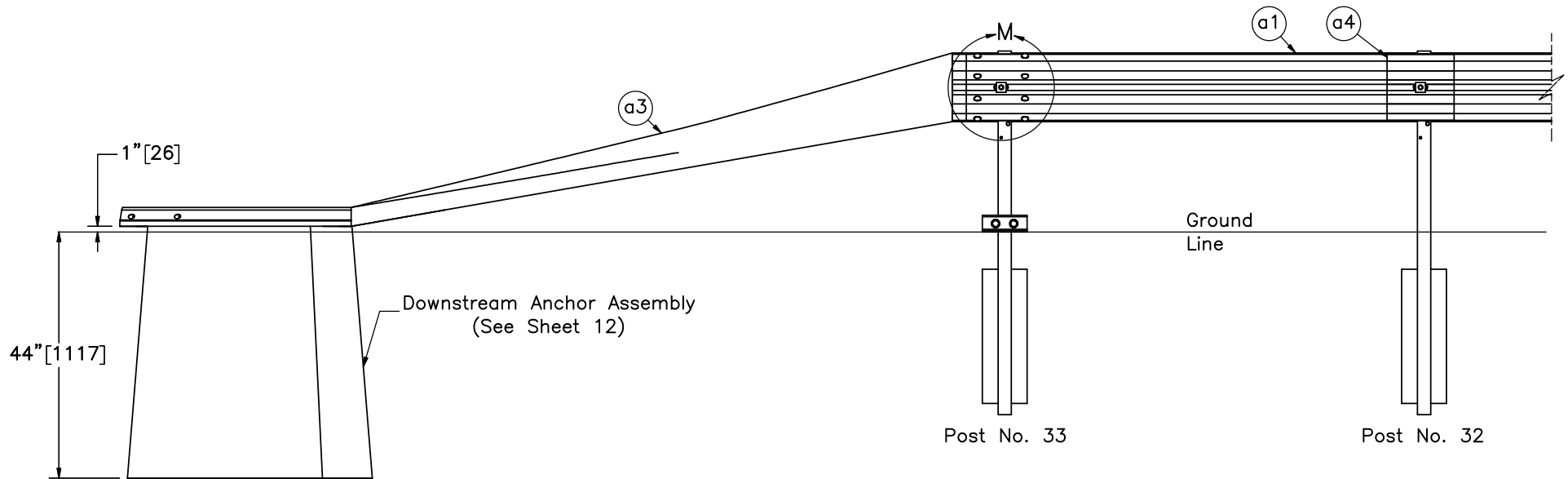
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/



PLAN VIEW



ELEVATION VIEW



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Downstream Anchorage Details

DWG. NAME:  
NYBWT-1\_R16

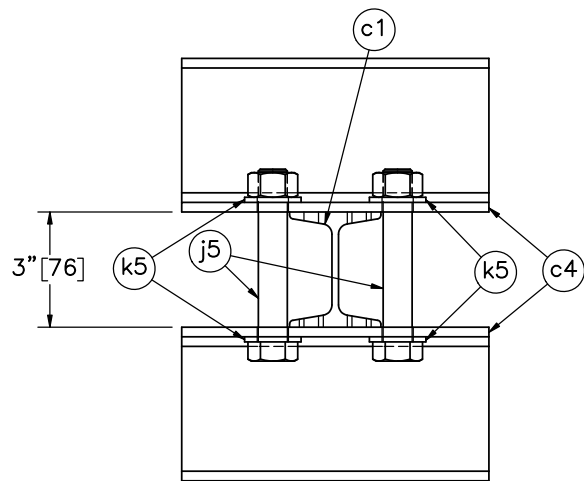
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SHEET:  
4 of 34

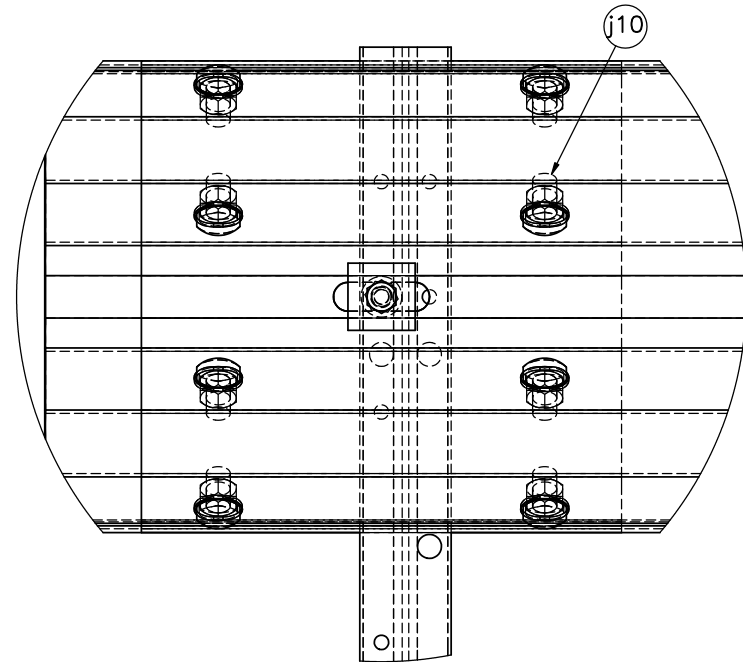
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/



DETAIL L  
END POST SUPPORT  
Post No. 33



DETAIL M

- Notes: (1) Rail and attachment hardware hidden in Detail L for clarity.  
 (2) Bolts on the end post support should be torqued to 100 ft-lb (+20, -0) [135.6 Nm (+27.1, -0)] after post is driven.



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

End Post Support and W-Beam  
Splice Detail

DWG. NAME:  
NYBWT-1\_R16

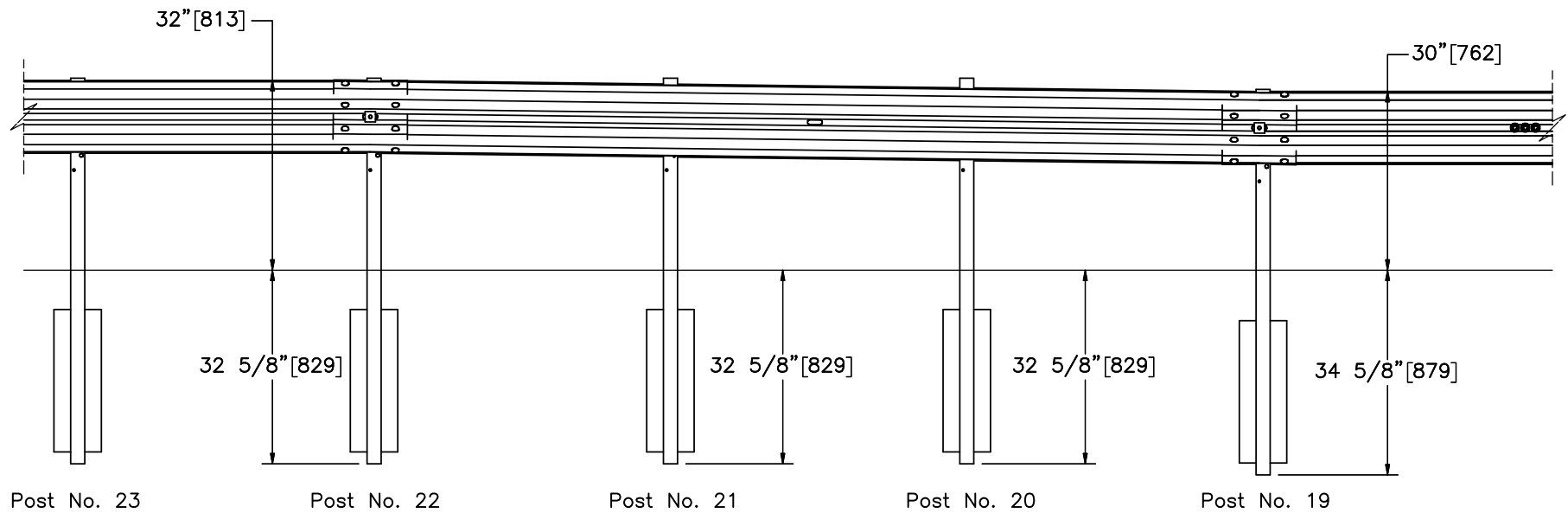
SCALE: 1:5  
UNITS: in.[mm]

SHEET:  
5 of 34


DATE:  
10/30/2023

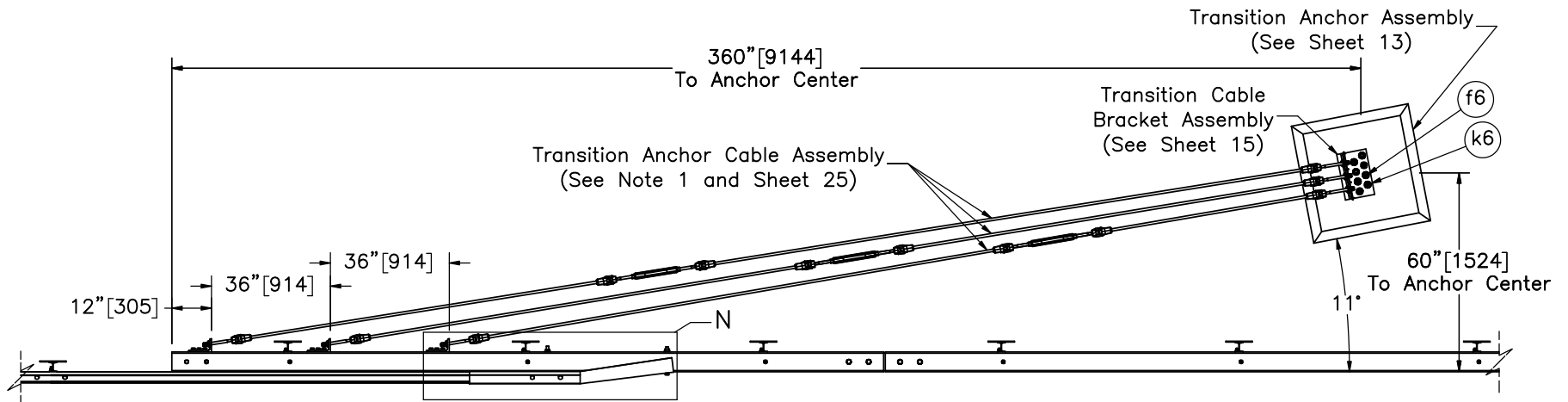
DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/

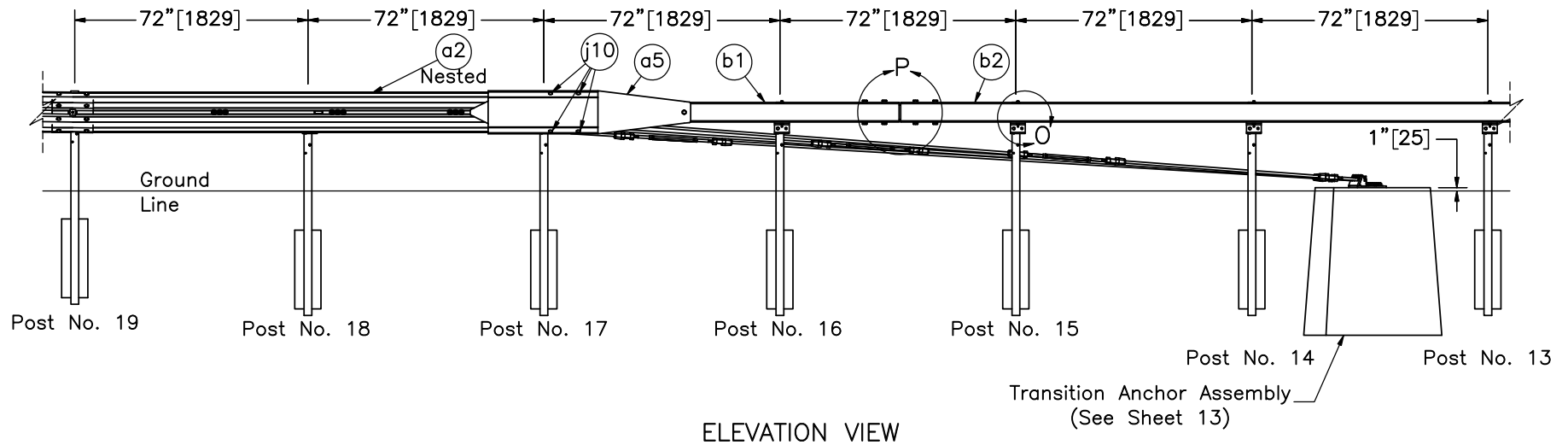


ELEVATION VIEW

	NY Box Beam to Weak Post W-Beam Transition Test No. NYBWT-1		SHEET: 6 of 34
	Rail Elevation Transition Details		DATE: 10/30/2023
Midwest Roadside Safety Facility	DWG. NAME: NYBWT-1_R16	SCALE: 1:28 UNITS: in.[mm]	DRAWN BY: JEK/JRD/JJ O
			REV. BY: KAL/RKF/JC H/



PLAN VIEW



ELEVATION VIEW

Note: (1) The turnbuckles in the transition anchor cable assemblies should be approximately 5' [1.5m], 10' [3.0m], and 15' [4.6m] from the transition cable bracket assembly, with the 5' [1.5m] spacing on the cable nearest the travelway.



Midwest Roadside Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Transition Layout

DWG. NAME:  
NYBWT-1\_R16

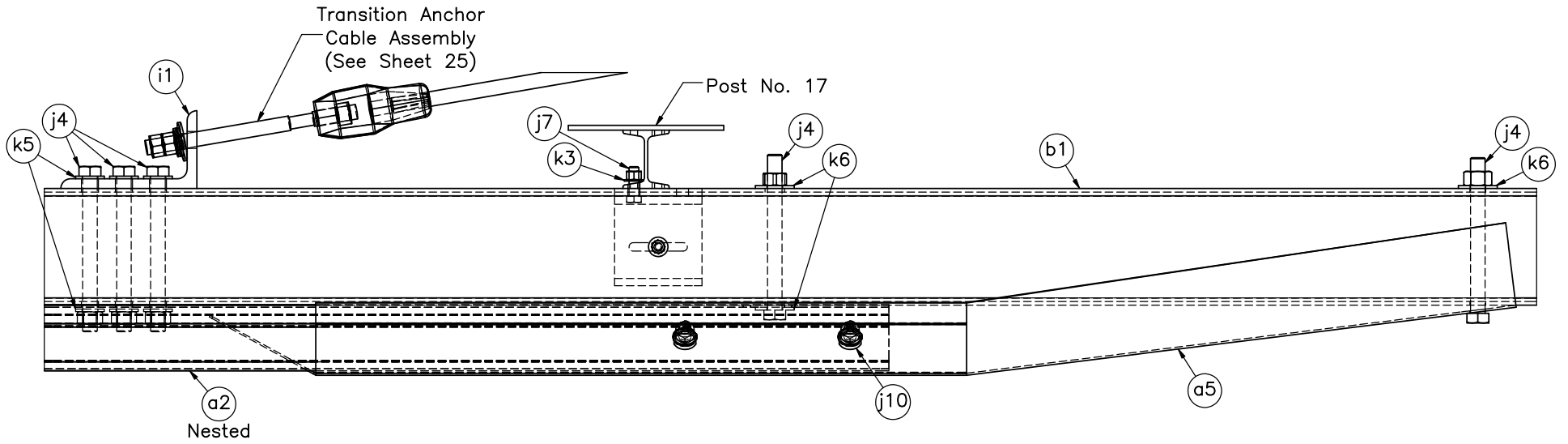
SCALE: 1:50  
UNITS: in.[mm]

SHEET:  
7 of 34

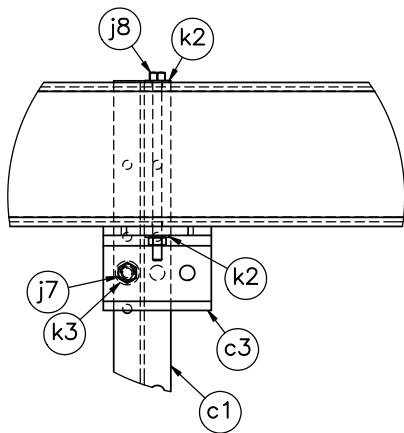
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

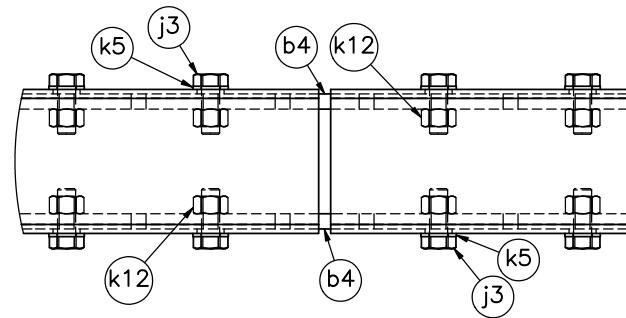
REV. BY:  
KAL/RKF/JC  
H/



DETAIL N



DETAIL O



DETAIL P

Note: (1) Splice plate with tack welded nuts used for testing purposes. A splice plate with tapped holes may be used instead as noted on sheet 30.



Midwest Roadside Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

DWG. NAME:  
NYBWT-1\_R16

SHEET:  
8 of 34

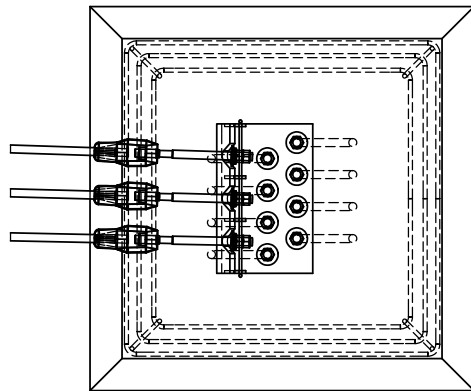
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

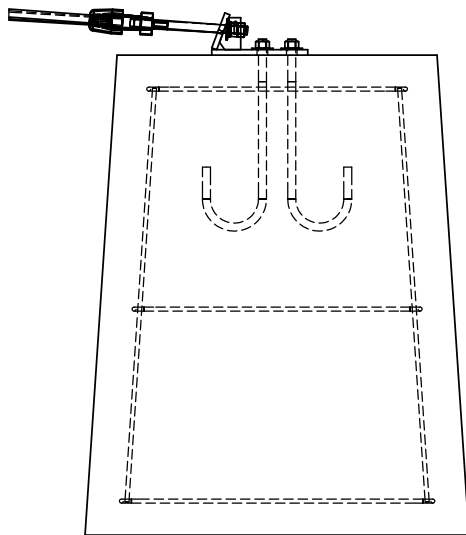
Transition, Post Attachment,  
and Box Splice Details

SCALE: 1:8  
UNITS: in.[mm]  
REV. BY:  
KAL/RKF/JC  
H/

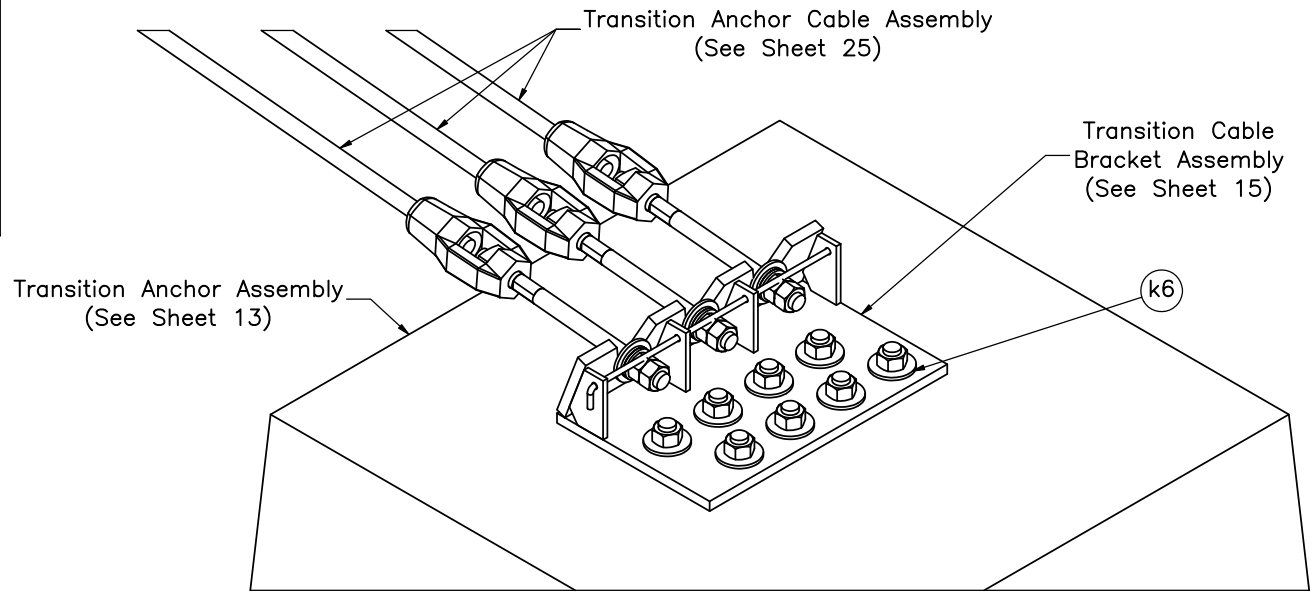




PLAN VIEW



ELEVATION VIEW



ISOMETRIC CROP VIEW  
SCALE 1:8

Note: (1) When constructed, the threaded rods on the Transition Anchor Cable Assembly should have a nearly perpendicular bearing on the Transition Cable Bracket Assembly.



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Cable Bracket Connection  
Details

DWG. NAME:  
NYBWT-1\_R16

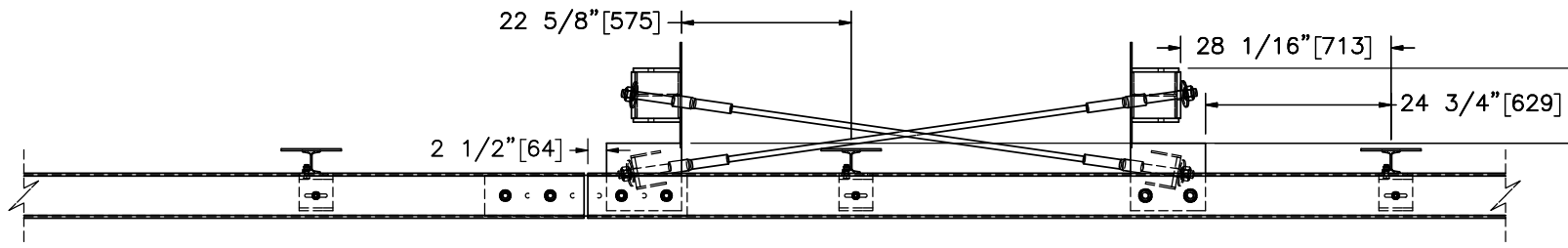
SCALE: 1:18  
UNITS: in./mm

SHEET:  
9 of 34

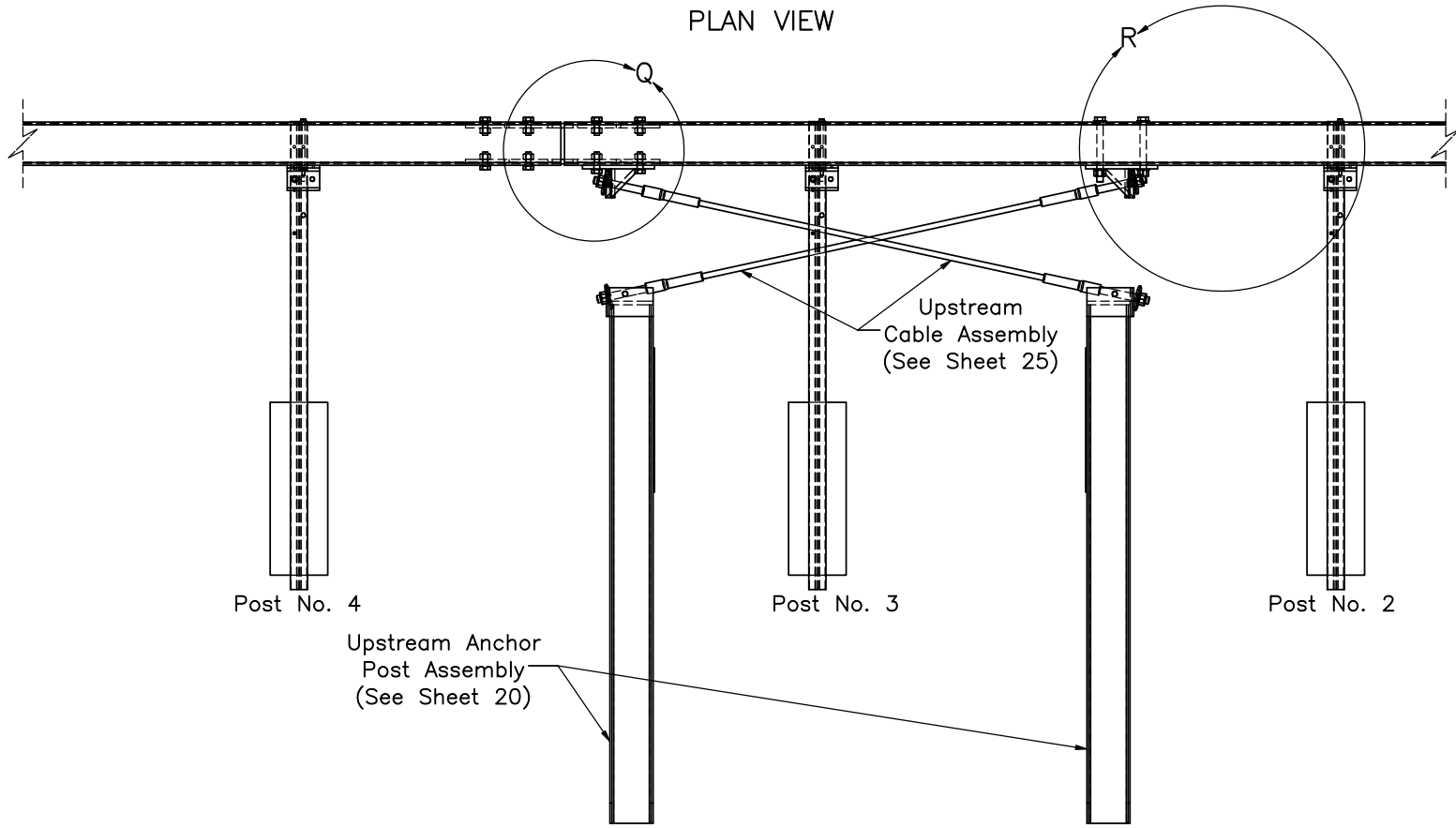
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/



PLAN VIEW



ELEVATION VIEW



Midwest Roadside Safety Facility

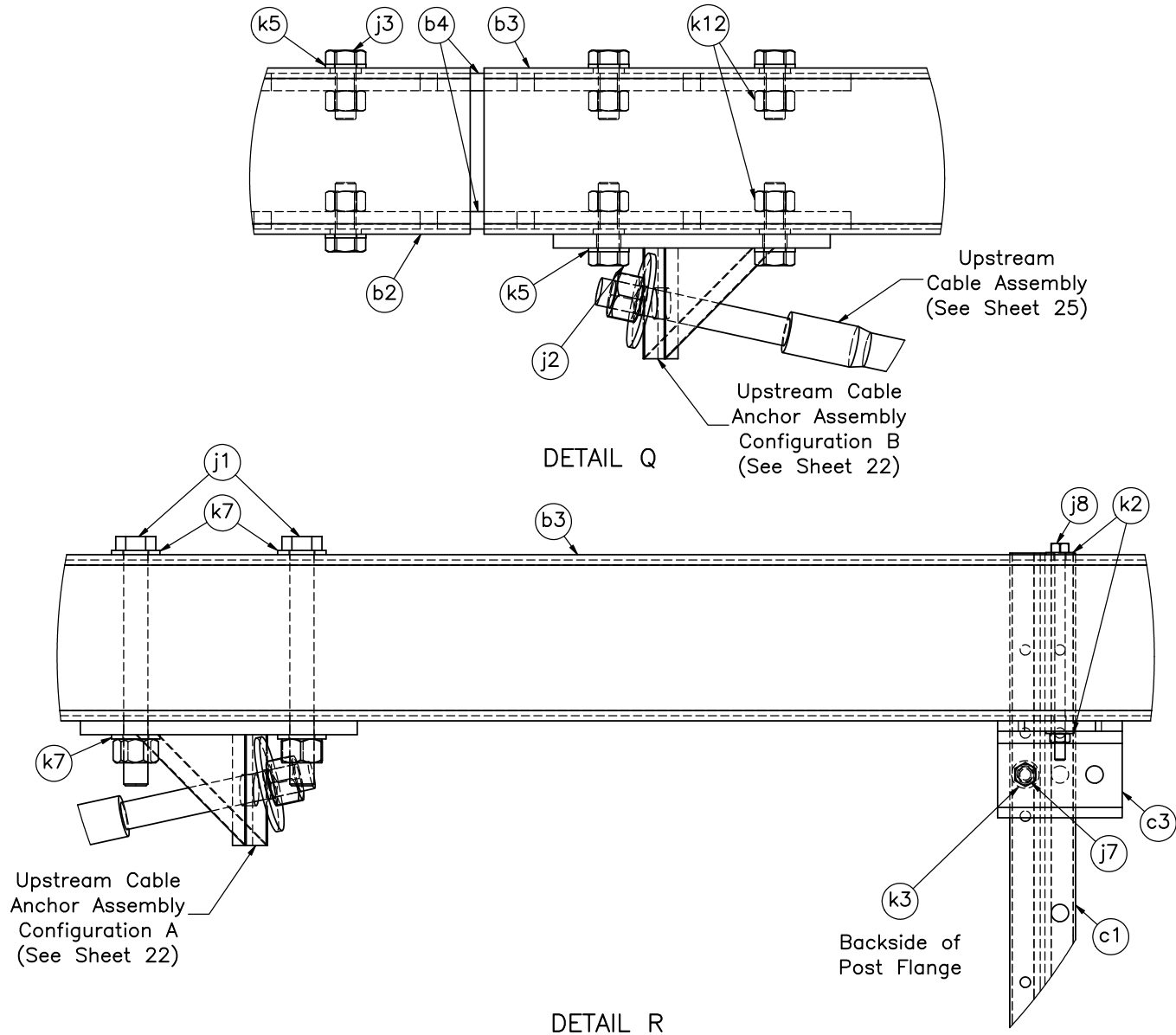
NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Upstream Anchorage Details

DWG. NAME:  
NYBWT-1\_R16

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

SHEET:  
10 of 34  
DATE:  
10/30/2023  
DRAWN BY:  
JEK/JRD/JJ  
O  
REV. BY:  
KAL/RKF/JC  
H/



DETAIL Q

DETAIL R



Midwest Roadside Safety Facility

NY Box Beam to Weak Post W-Beam Transition  
Test No. NYBWT-1

Upstream Anchor Mounting Details

DWG. NAME:  
NYBWT-1\_R16

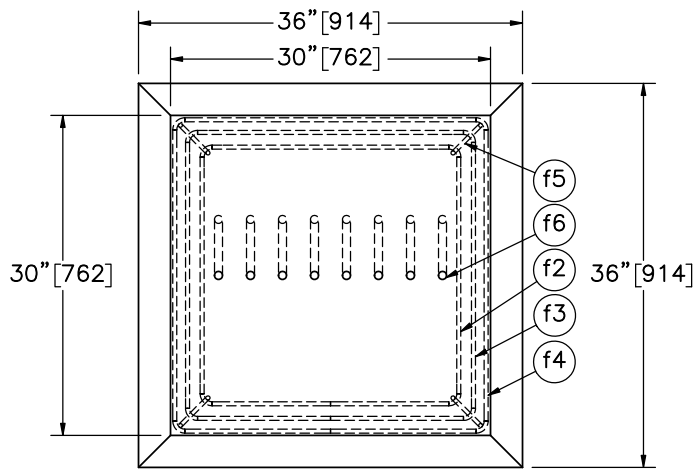
SCALE: 1:6  
UNITS: in./mm

SHEET:  
11 of 34

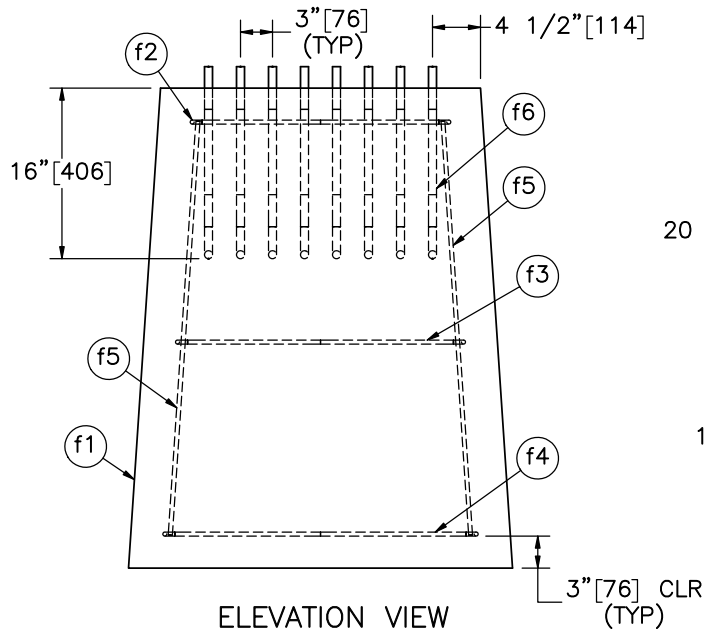
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

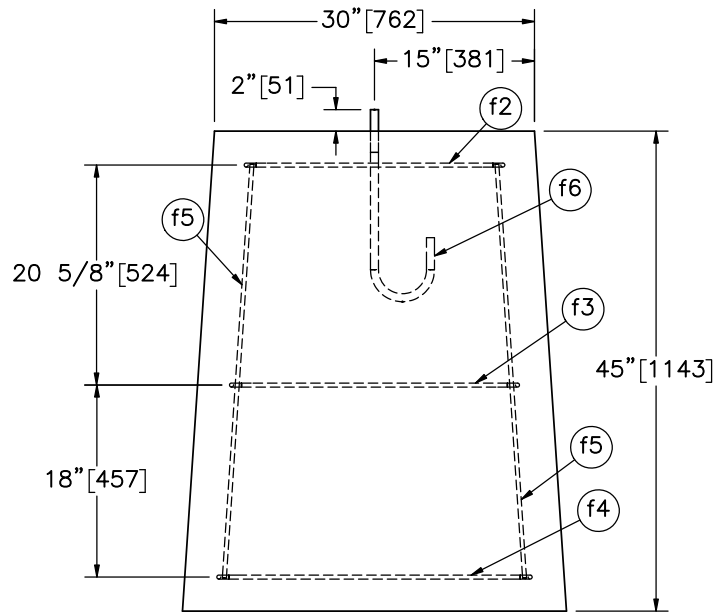
REV. BY:  
KAL/RKF/JC  
H/



PLAN VIEW



ELEVATION VIEW



PROFILE VIEW

Item No.	QTY.	Description	Material Specification	Treatment Specification
-	1	Downstream Anchor Assembly	-	-
f1	1	Concrete	Pre-Cast Class A* Min. $f'_c = 3,000$ psi [20.7 MPa] NE Mix 47BD	-
f2	1	#3 [10] Bar, 106 5/8" [2,708] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f3	1	#3 [10] Bar, 117 5/8" [2,988] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f4	1	#3 [10] Bar, 127 1/8" [3,229] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f5	4	#3 [10] Bar, 39" [991] Long	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f6	8	3/4" [19] Dia. UNC, Hooked Anchor J-Bolt and Nut	J-Bolt - ASTM A307 Gr. C Nut - ASTM A563DH	ASTM A153 or B695 Class 55 or F2329

\* If cast in place, follow Section 501 - Portland Cement Concrete - General of the NY state standards.  
 \*\* Epoxy-coating not necessary for testing purposes.



Midwest Roadside Safety Facility

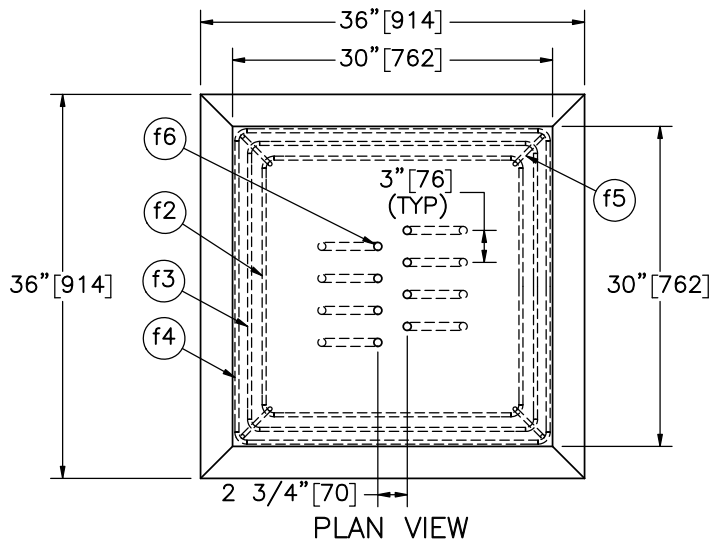
NY Box Beam to Weak Post  
 W-Beam Transition  
 Test No. NYBWT-1

Downstream Anchor Assembly

DWG. NAME:  
 NYBWT-1\_R16

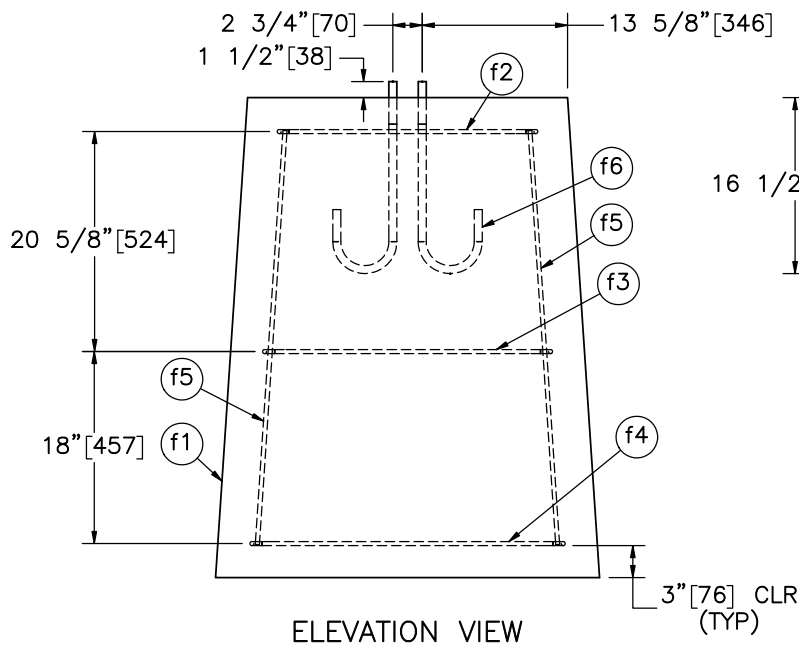
SCALE: 1:18  
 UNITS: in.[mm]

SHEET:  
 12 of 34  
 DATE:  
 10/30/2023  
 DRAWN BY:  
 JEK/JRD/JJO  
 REV. BY:  
 KAL/RKF/JCH

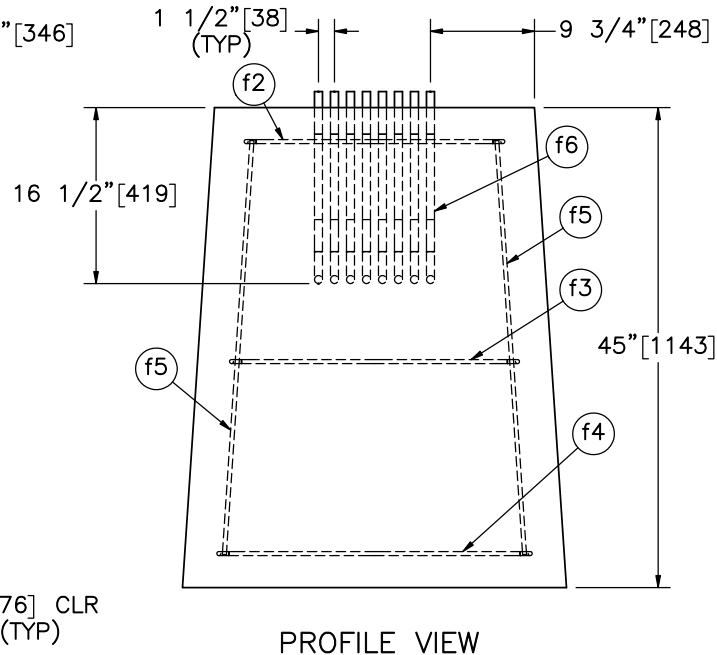


PLAN VIEW

Item No.	QTY.	Description	Material Specification	Treatment Specification
-	1	Transition Anchor Assembly	-	-
f1	1	Concrete	Pre-Cast Class A* Min. $f'_c = 3,000$ psi [20.7 MPa] NE Mix 47BD	-
f2	1	#3 [10] Bar, 106 5/8" [2,708] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f3	1	#3 [10] Bar, 117 5/8" [2,988] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f4	1	#3 [10] Bar, 127 1/8" [3,229] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f5	4	#3 [10] Bar, 39" [991] Long	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **
f6	8	3/4" [19] Dia. UNC, Hooked Anchor J-Bolt and Nut	J-Bolt - ASTM A307 Gr. C Nut - ASTM A563DH	ASTM A153 or B695 Class 55 or F2329



ELEVATION VIEW



PROFILE VIEW

\* If cast in place, follow Section 501 - Portland Cement Concrete - General of the NY state standards.  
 \*\* Epoxy-coating not necessary for testing purposes.



Midwest Roadside Safety Facility

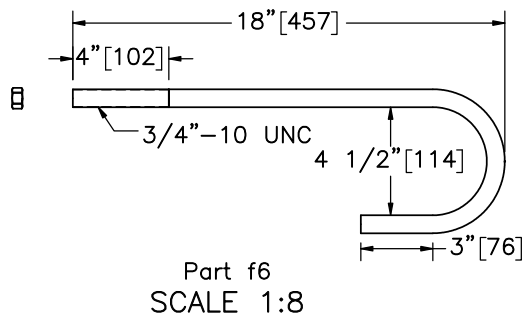
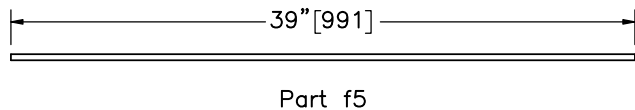
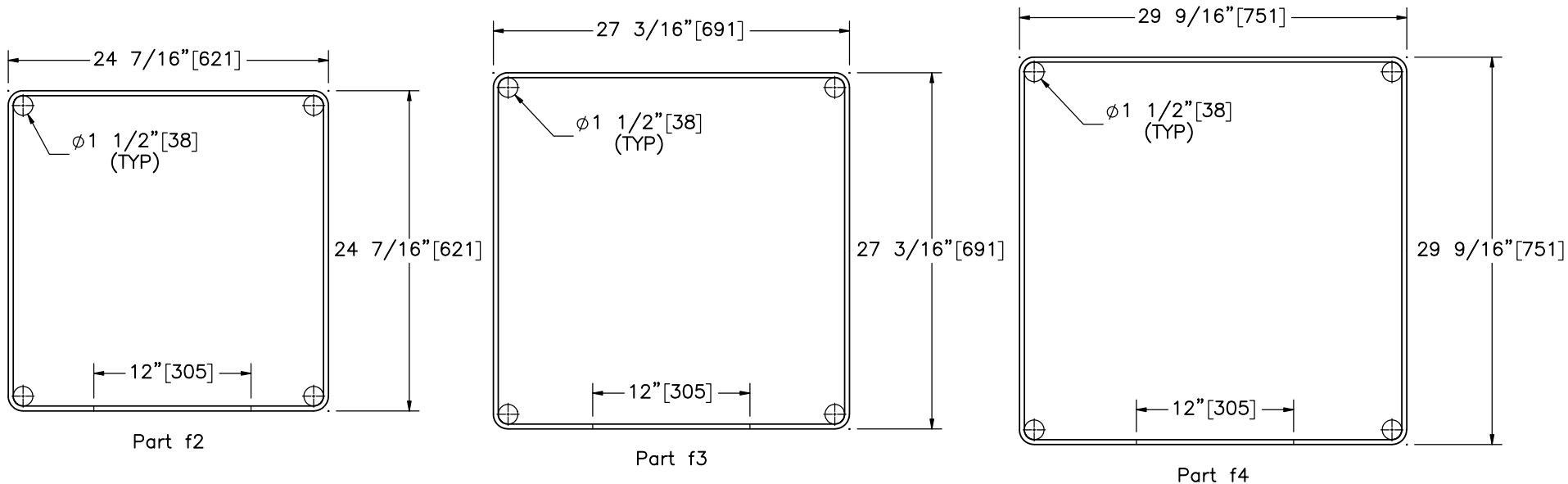
NY Box Beam to Weak Post  
 W-Beam Transition  
 Test No. NYBWT-1

Transition Anchor Assembly

DWG. NAME:  
 NYBWT-1\_R16

SCALE: 1:18  
 UNITS: in.[mm]

SHEET:  
 13 of 34  
 DATE:  
 10/30/2023  
 DRAWN BY:  
 JEK/JRD/JJ  
 O  
 REV. BY:  
 KAL/RKF/JC  
 H/



Note: (1) Epoxy-coating not necessary for testing purposes.

Bill of Bars

Bar	QTY. (Per Anchor)	Size	Total Unbent Length	Material	Treatment
f2	1	#3 [10]	106 5/8"[2,708]	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934)
f3	1	#3 [10]	117 5/8"[2,988]	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934)
f4	1	#3 [10]	127 1/8"[3,229]	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934)
f5	4	#3 [10]	39"[991]	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934)



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post

W-Beam Transition

Test No. NYBWT-1

Concrete Anchor Components

DWG. NAME:  
NYBWT-1\_R16

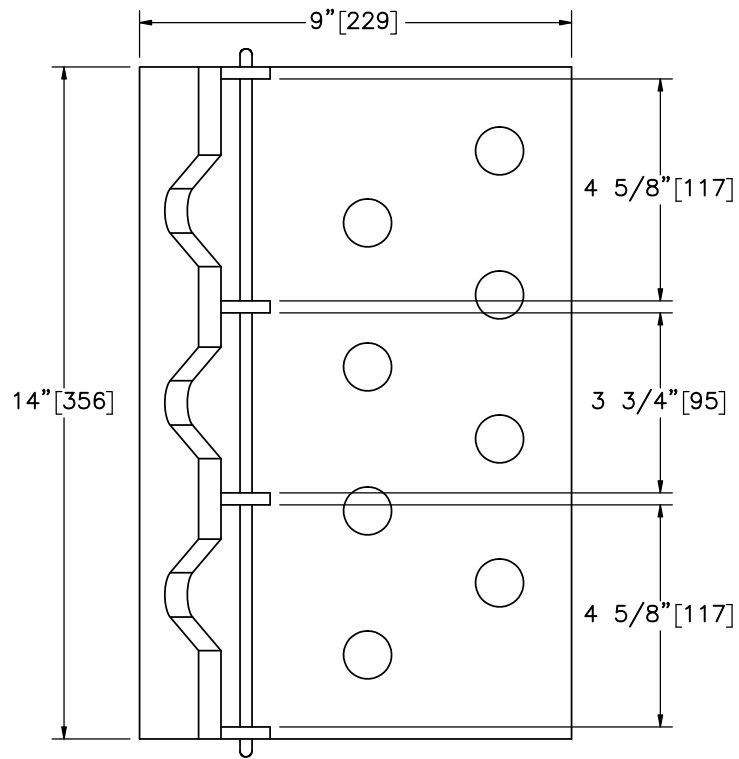
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SHEET:  
14 of 34

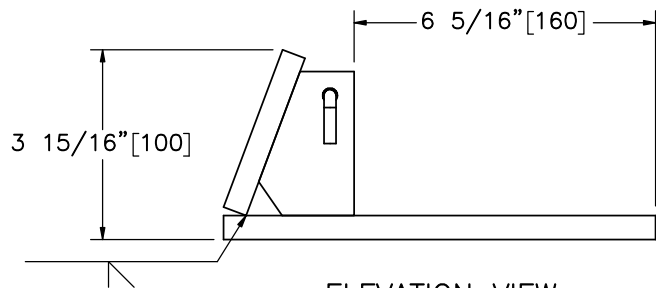
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

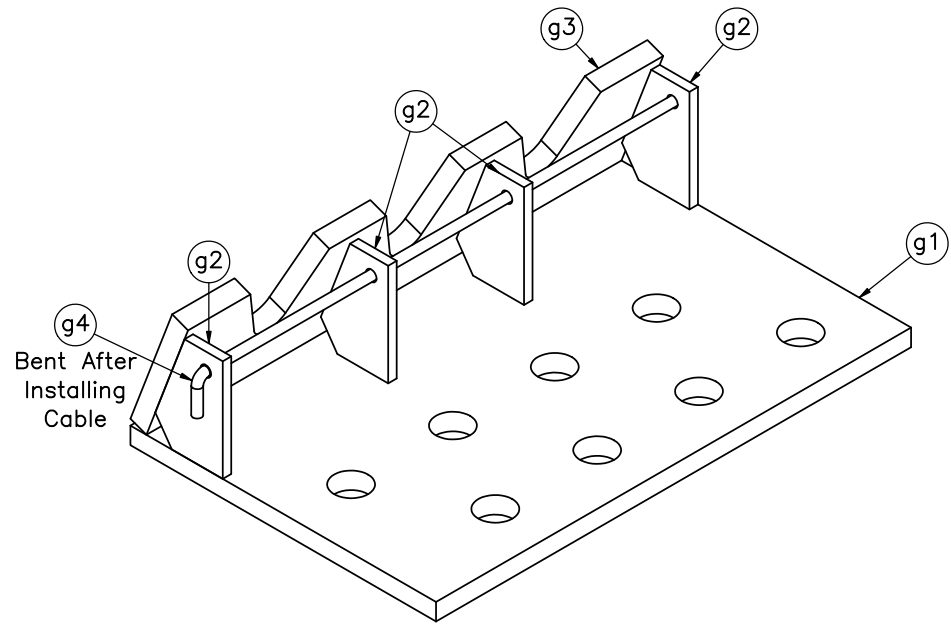
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KAL/RKF/JC  
H/



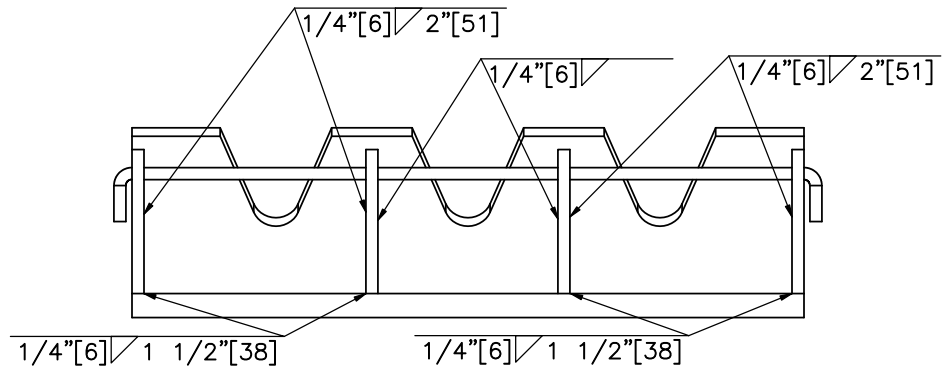
PLAN VIEW




ELEVATION VIEW

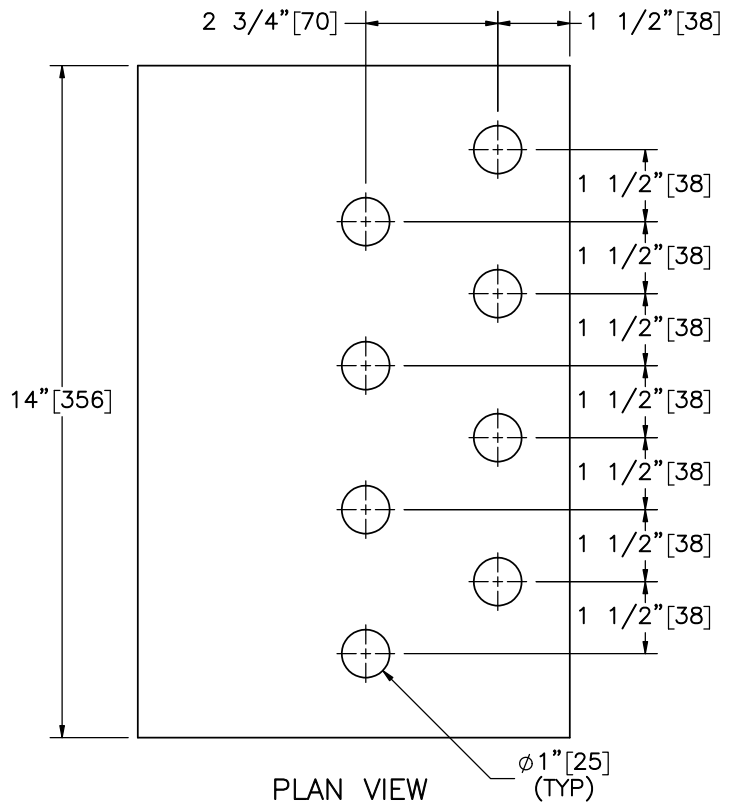


ISOMETRIC VIEW

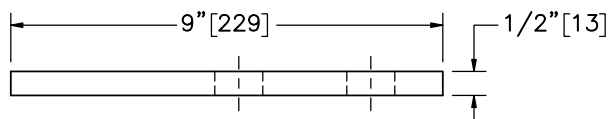


PROFILE VIEW

Item No.	QTY.	Description	Material Specification	Treatment Specification			SHEET: 15 of 34	
-	1	Transition Cable Bracket Assembly	-	ASTM A123		NY Box Beam to Weak Post		
g1	1	14"x9"x1/2" [356x229x13] Cable Anchor Base Plate	ASTM A36	-		W-Beam Transition		DATE: 10/30/2023
g2	4	3"x2"x1/4" [76x51x6] Cable Anchor Gusset	ASTM A36	-	Midwest Roadside Safety Facility	Test No. NYBWT-1		
g3	1	14"x3 1/2"x1/2" [356x89x13] Cable Anchor Top Plate	ASTM A36	-		Transition Cable Bracket Assembly		DRAWN BY: JEK/JRD/JJO
					DWG. NAME: NYBWT-1_R16		SCALE: 1:4	REV. BY: KAL/RKF/JCH
							UNITS: in.[mm]	

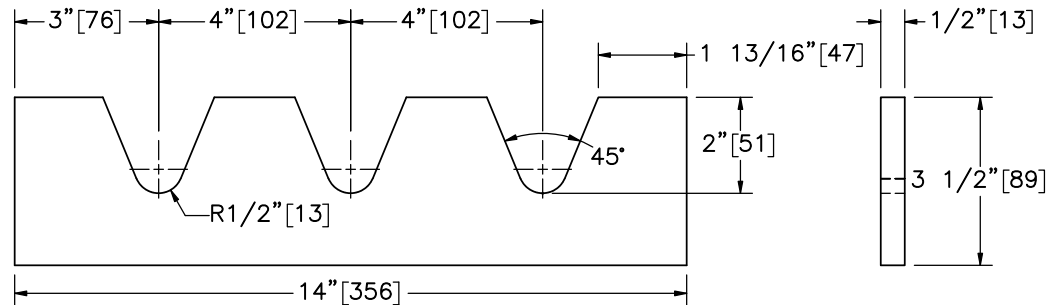


PLAN VIEW



ELEVATION VIEW

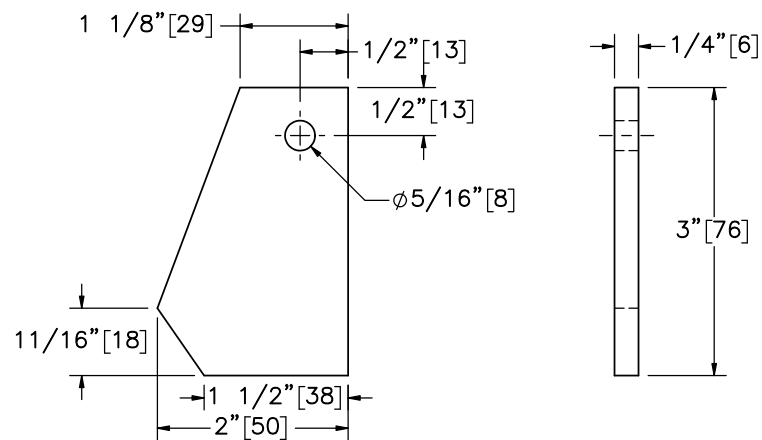
Part g1



ELEVATION VIEW

PROFILE VIEW

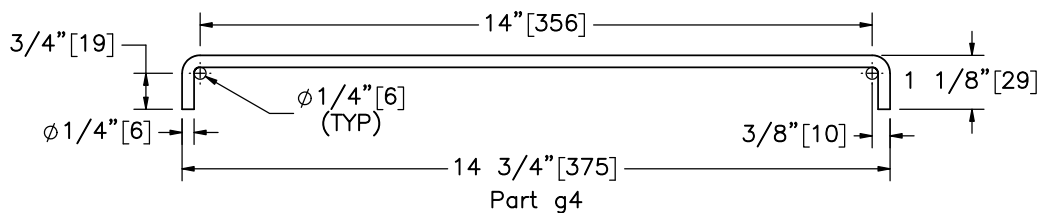
Part g3



ELEVATION VIEW

PROFILE VIEW

Part g2  
SCALE 1:2



Part g4

Note: (1) Part g4 total unbent length is 16 3/8" [416]. Bend after installation.



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Transition Cable Bracket  
Components

DWG. NAME:  
NYBWT-1\_R16

SCALE: 1:4  
UNITS: in.[mm]

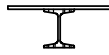
SHEET:  
16 of 34

DATE:  
10/30/2023

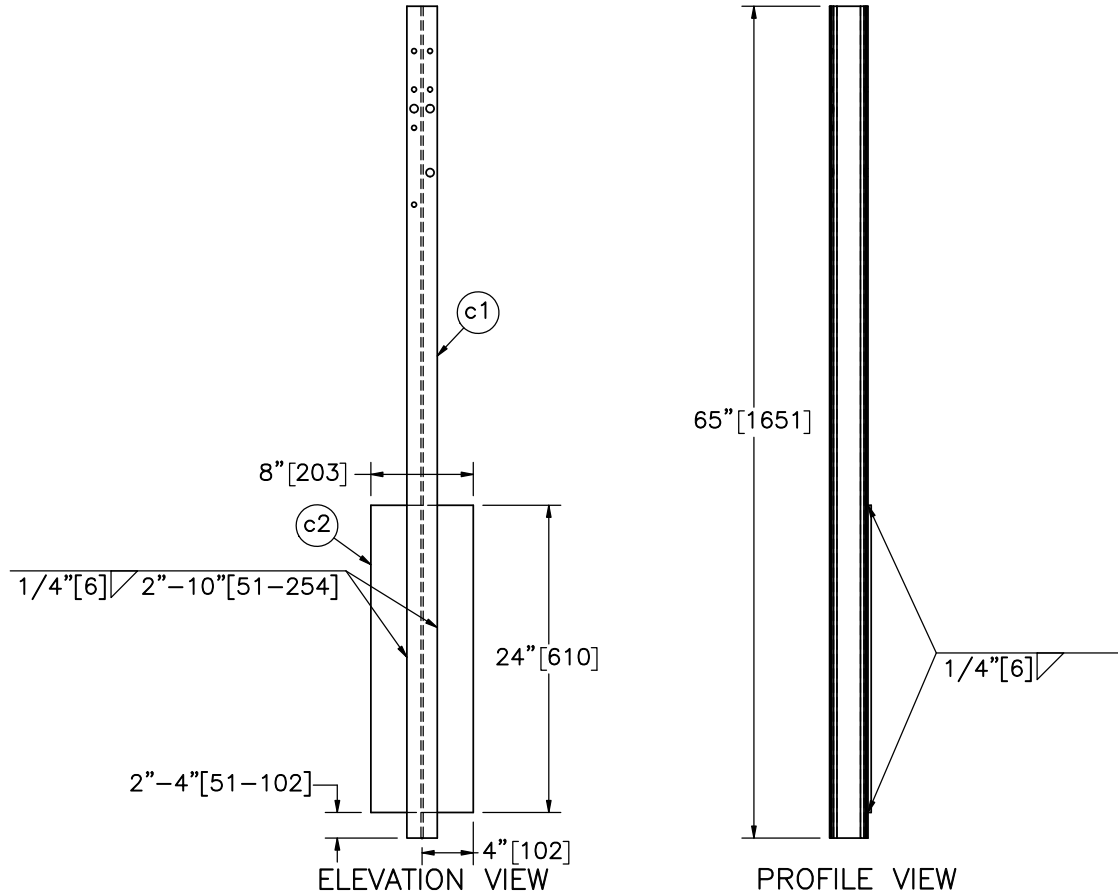
DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/





PLAN VIEW



Post Assembly

Item No.	QTY.	Description	Material Specification	Treatment Specification
-	33	Post Assembly	-	ASTM A123
c1	1	S3x5.7 [S75x8.5], 65" [1,651] Long Post	ASTM A36	-
c2	1	24"x8"x1/4" [610x203x6] Soil Plate	ASTM A36	-



Midwest Roadside Safety Facility

NY Box Beam to Weak Post  
 W-Beam Transition  
 Test No. NYBWT-1  
 Post Assemblies

DWG. NAME:  
 NYBWT-1\_R16

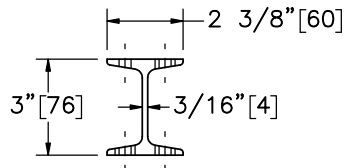
SHEET:  
 17 of 34

DATE:  
 10/30/2023

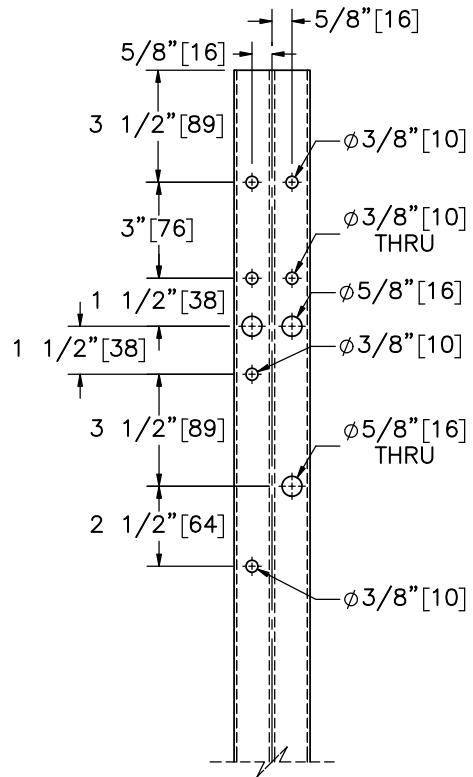
DRAWN BY:  
 JEK/JRD/JJO

REV. BY:  
 KAL/RKF/JCH

SCALE: 1:15  
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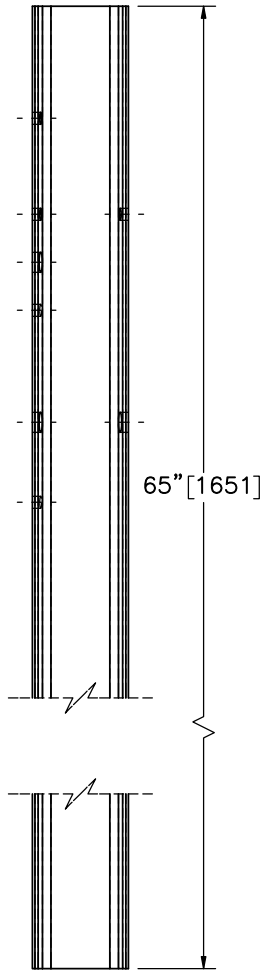


PLAN VIEW

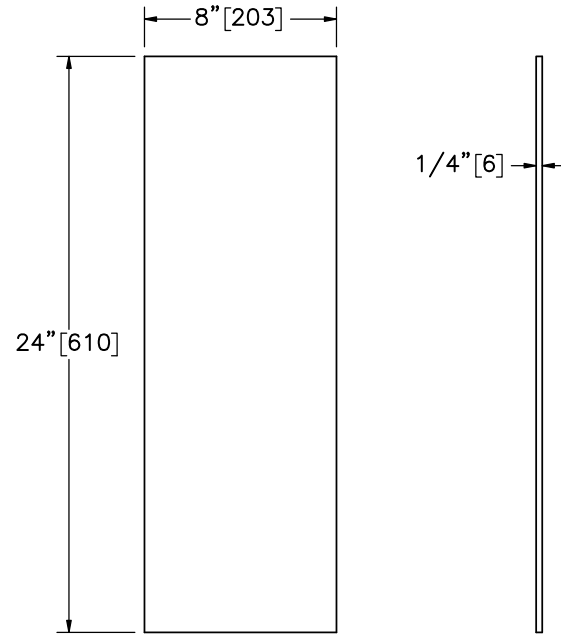


ELEVATION VIEW

Part c1



PROFILE VIEW



ELEVATION VIEW

PROFILE VIEW

Part c2  
SCALE 1:8



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Post Components

DWG. NAME:  
NYBWT-1\_R16

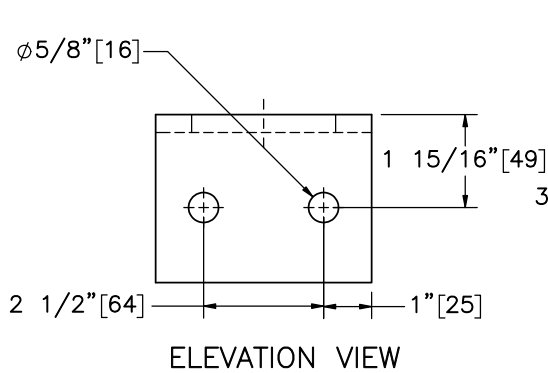
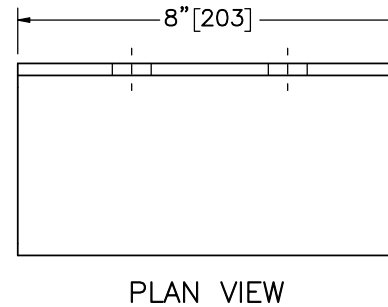
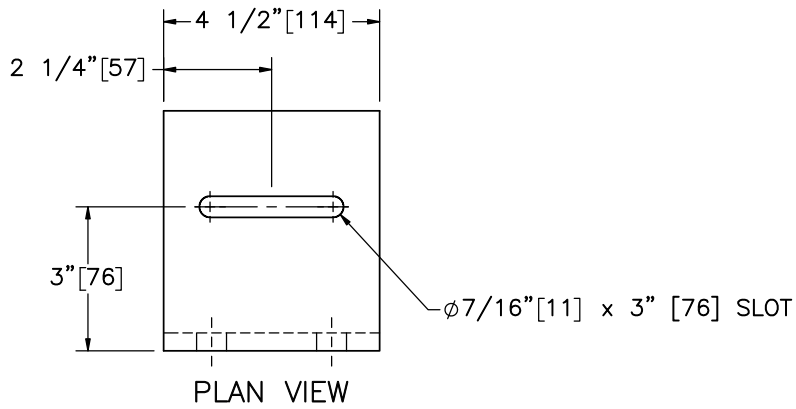
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SHEET:  
18 of 34

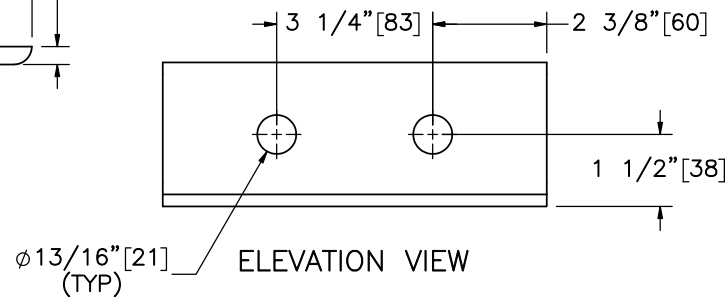
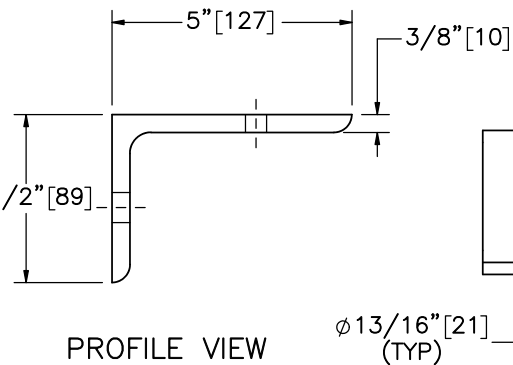
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

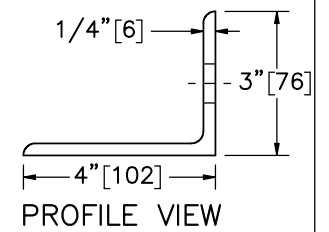
REV. BY:  
KAL/RKF/JC  
H/



Part c3



Part c4



Midwest Roadside  
Safety Facility

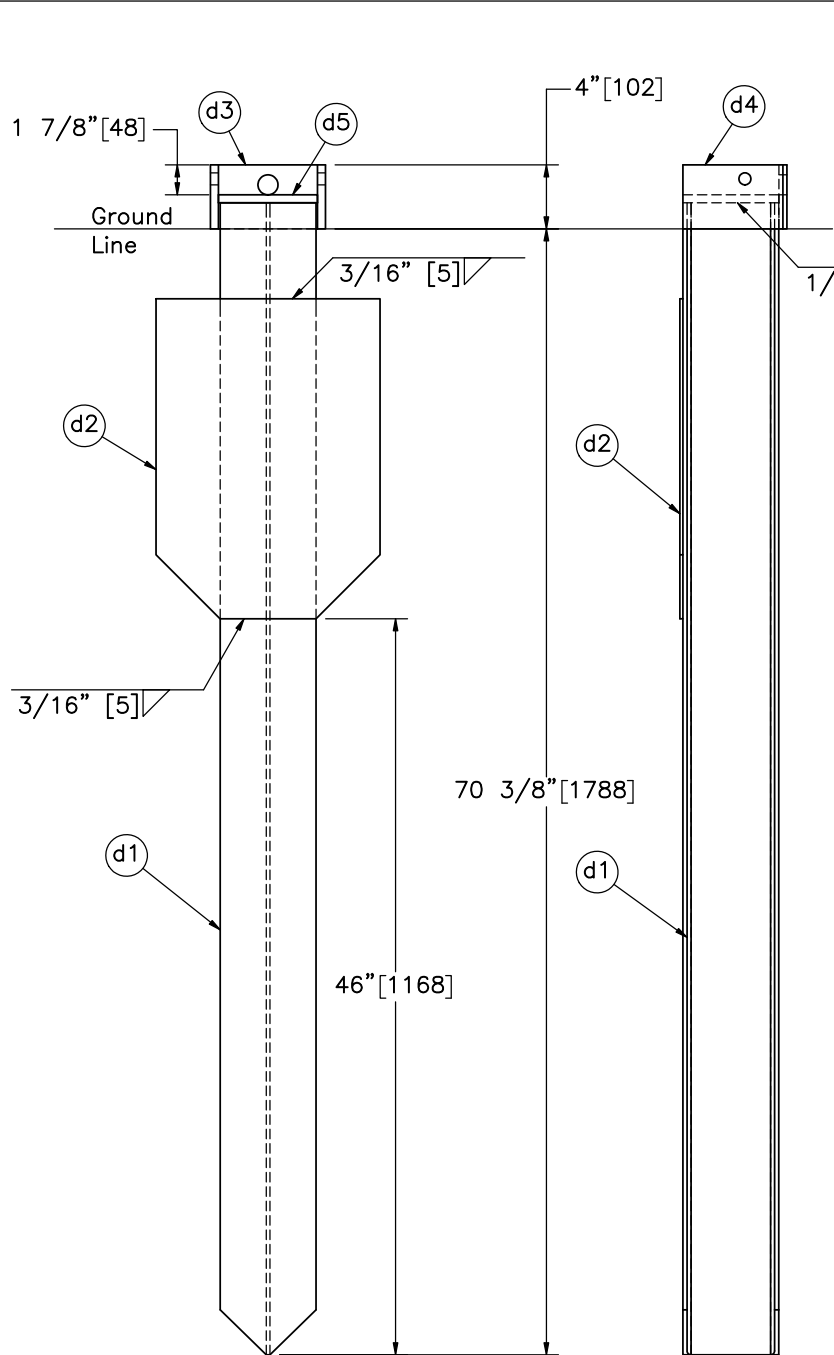
NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Post Components

DWG. NAME:  
NYBWT-1\_R16

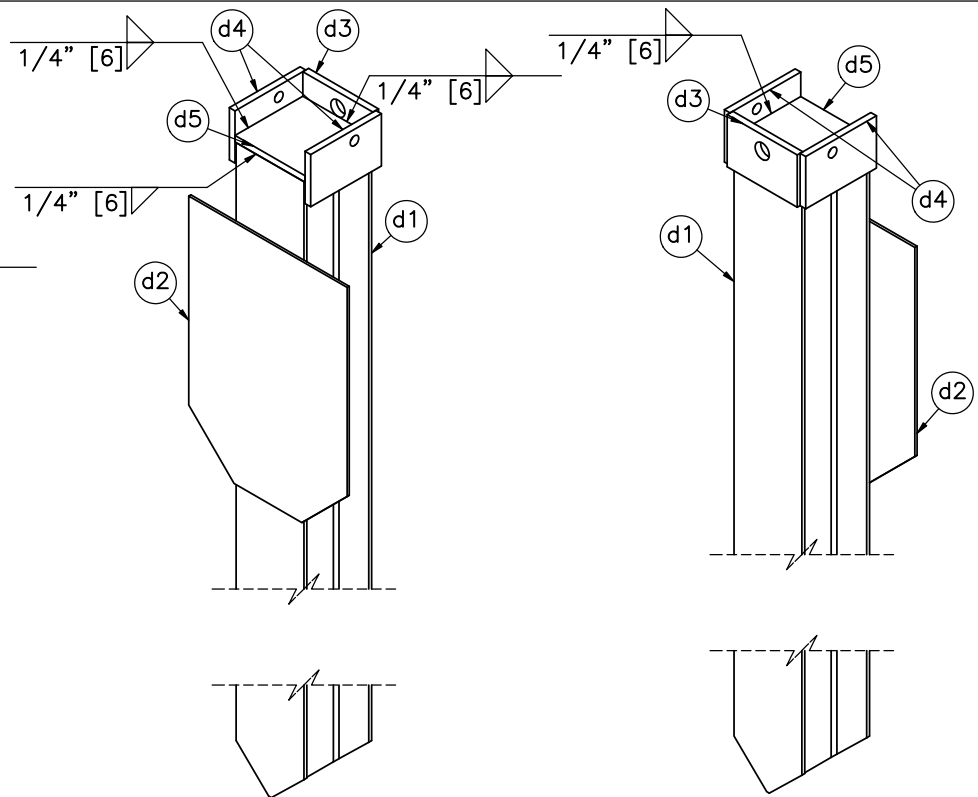
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UNITS: in.[mm]

SHEET:  
19 of 34  
DATE:  
10/30/2023  
DRAWN BY:  
JEK/JRD/JJ  
O  
REV. BY:  
KAL/RKF/JC  
H/



ELEVATION VIEW

PROFILE VIEW



ISOMETRIC VIEWS

Item No.	QTY.	Description	Material Specification	Treatment Specification
-	2	Upstream Anchor Post Assembly	-	-
d1	1	W6x15 [W152x22.3], 72" [1,829] Long Post	ASTM A992 or ASTM A572 Gr. 50	-
d2	1	20"x14"x3/16" [508x356x5] Plate	ASTM A36	-
d3	1	6 3/16"x4"x1/2" [157x102x13] Plate	ASTM A36	-
d4	2	6 1/4"x4"x1/2" [159x102x13] Plate	ASTM A36	-
d5	1	6 3/16"x6"x1/2" [157x152x13] Plate	ASTM A36	-



Midwest Roadside Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Upstream Anchor Post Assembly

DWG. NAME:  
NYBWT-1\_R16

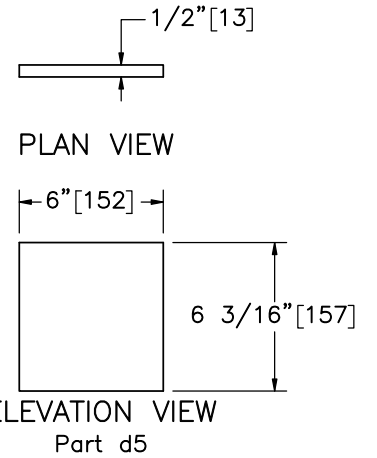
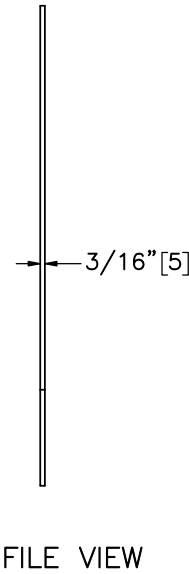
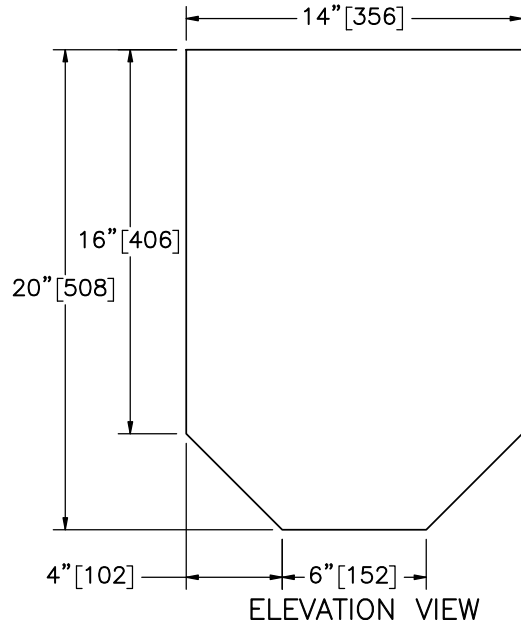
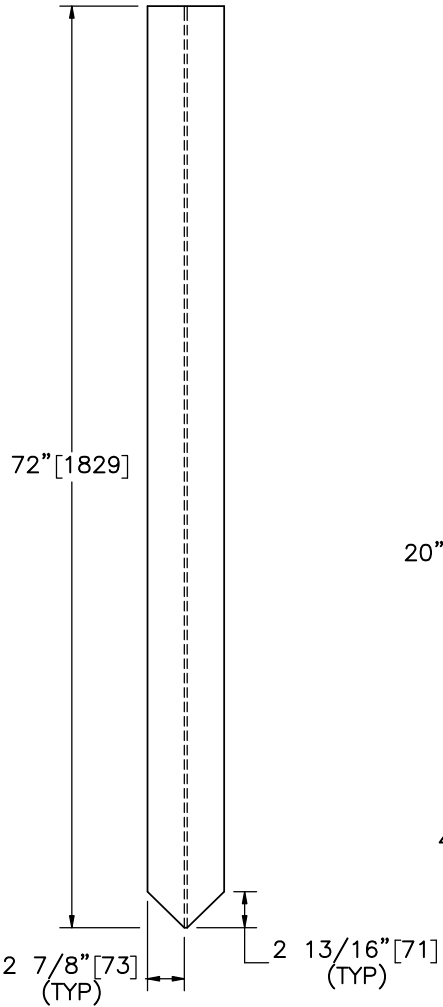
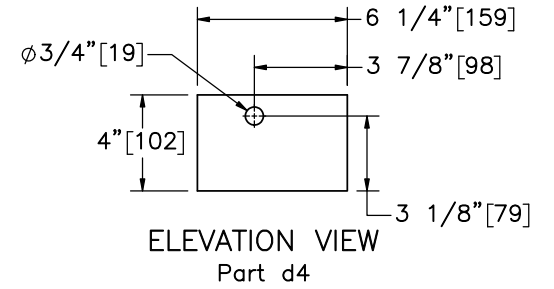
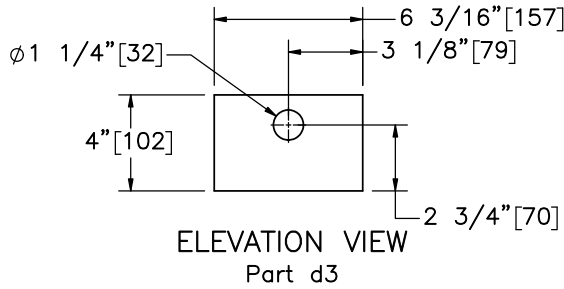
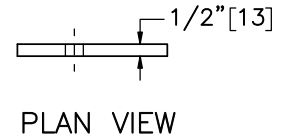
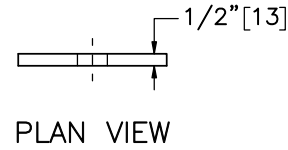
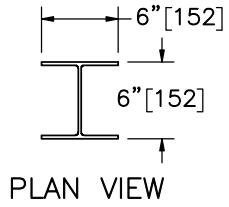
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UNITS: in.[mm]

SHEET:  
20 of 34

DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Upstream Anchor Post  
Components

DWG. NAME:  
NYBWT-1\_R16

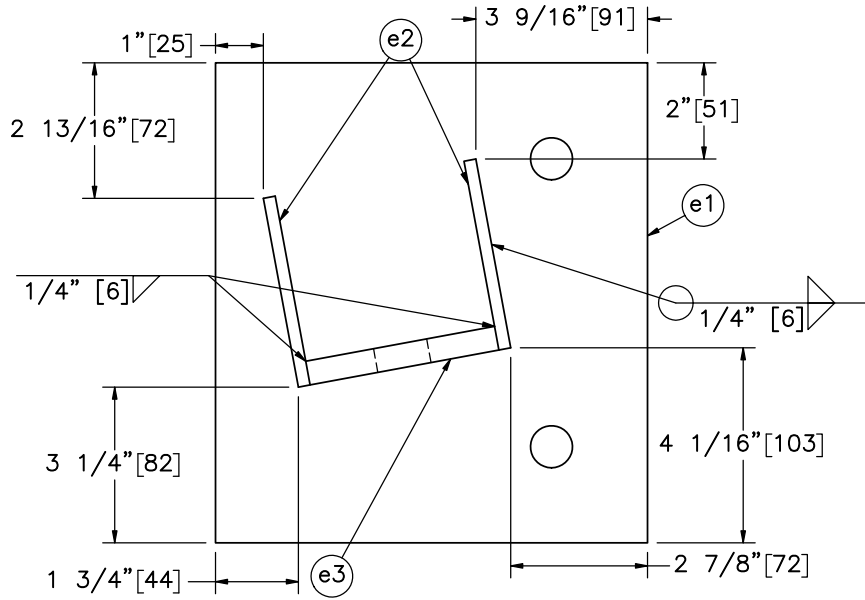
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SHEET:  
21 of 34

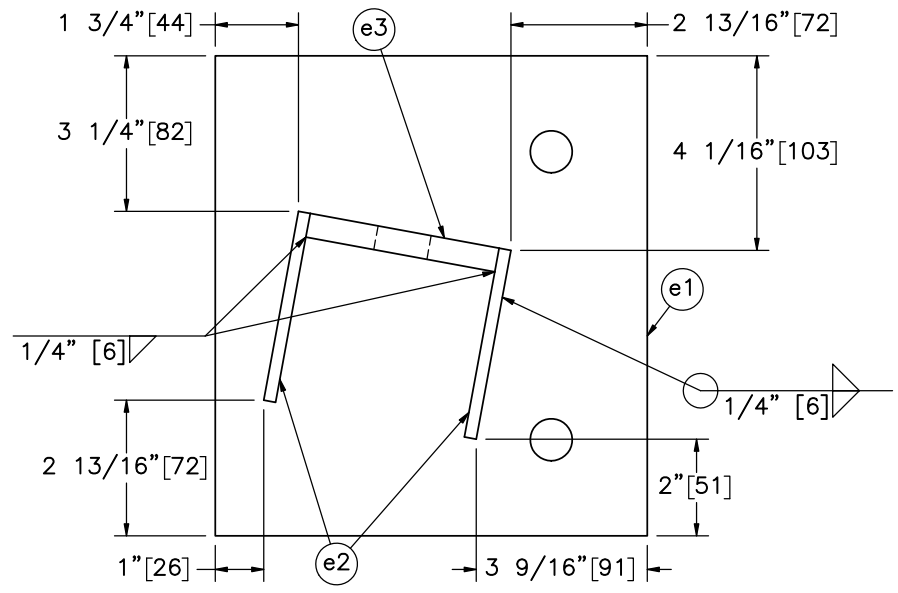
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

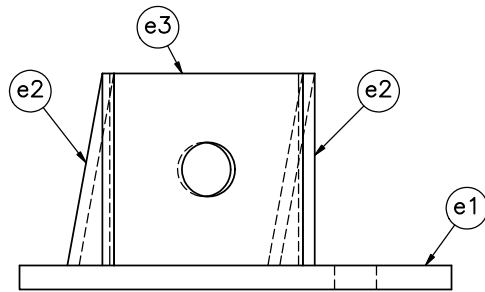
REV. BY:  
KAL/RKF/JC  
H/



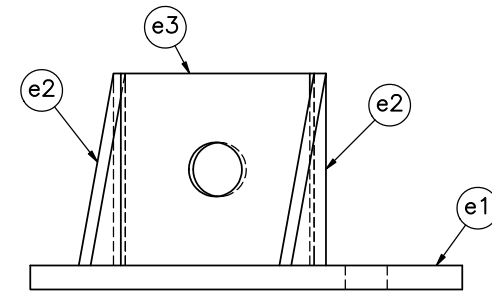
PLAN VIEW



PLAN VIEW




ELEVATION VIEW  
Upstream Cable Anchor Assembly  
Configuration A

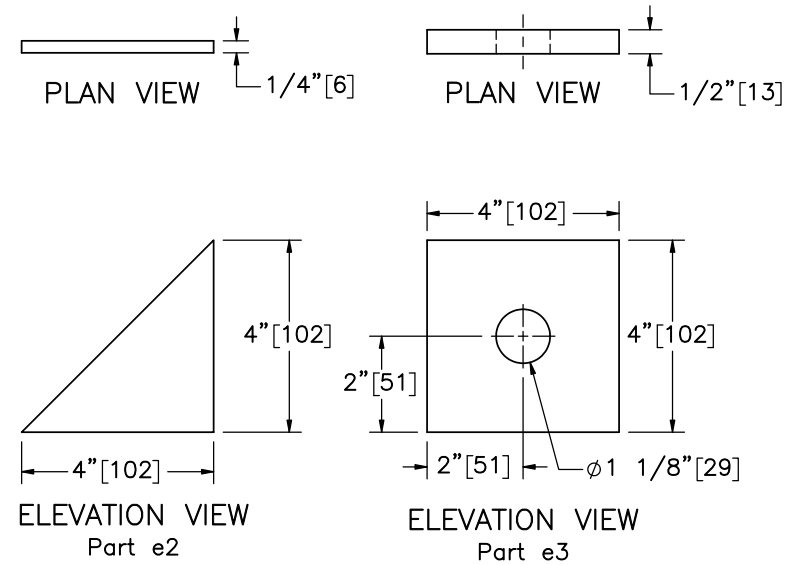
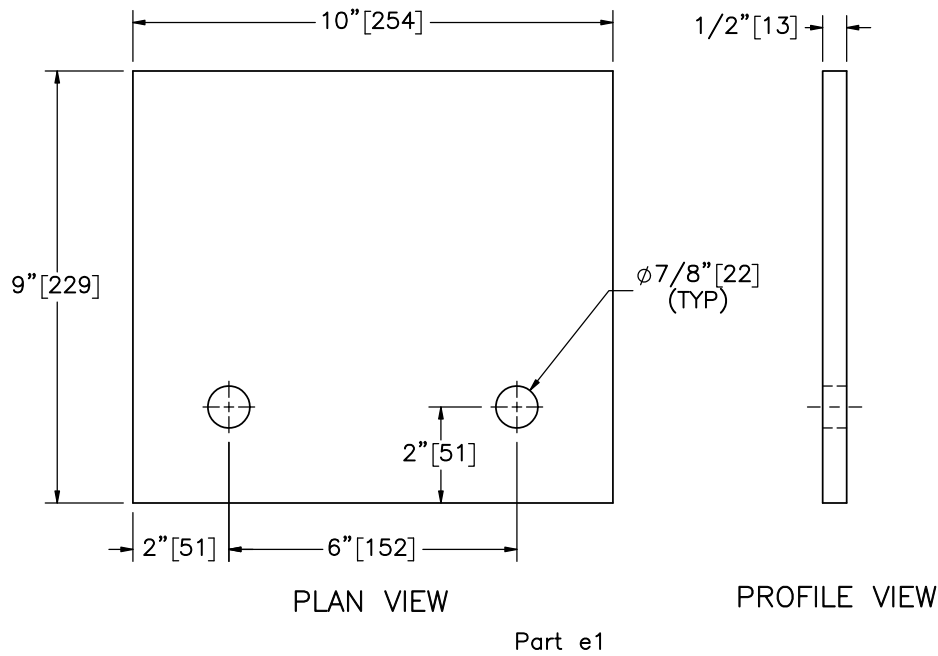


ELEVATION VIEW  
Upstream Cable Anchor Assembly  
Configuration B

\* Galvanization not necessary for testing purposes. Can be painted or spray galvanized if desired.

Item No.	QTY.	Description	Material Specification	Treatment Specification	 <b>Midwest Roadside Safety Facility</b>	NY Box Beam to Weak Post W-Beam Transition Test No. NYBWT-1	SHEET: 22 of 34
-	1 each	Upstream Cable Anchor Assembly Configuration A-B	-	ASTM A123*			DATE: 10/30/2023
e1	1	10"x9"x1/2" [254x229x13] Box Beam Cable Anchor Base Plate	ASTM A36	-			DRAWN BY: JEK/JRD/JJO
e2	2	4"x4"x1/4" [102x102x6] Box Beam Cable Anchor Gusset	ASTM A36	-			REV. BY: KAL/RKF/JCH
e3	1	4"x4"x1/2" [102x102x13] Box Beam Cable Anchor Mounting Plate	ASTM A36	-			SCALE: 1:4 UNITS: in.[mm]

DWG. NAME:  
NYBWT-1\_R16



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Upstream Cable Anchor  
Components

DWG. NAME:  
NYBWT-1\_R16

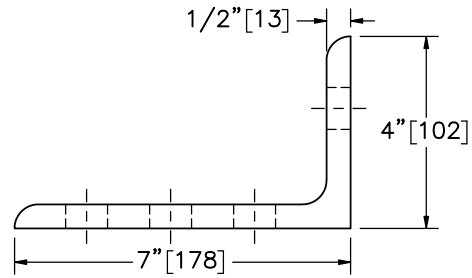
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UNITS: in.[mm]

SHEET:  
23 of 34

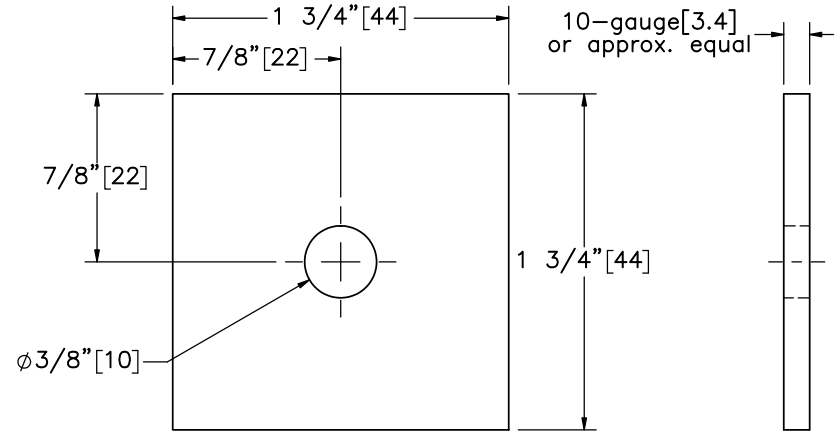
DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/



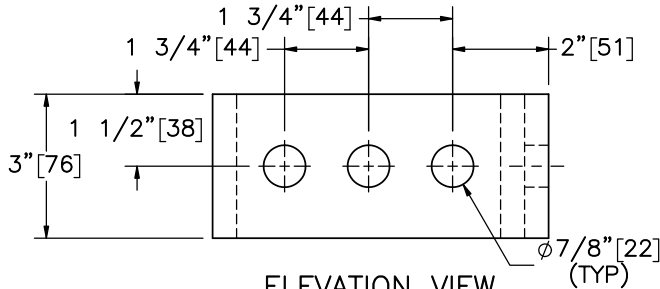
PLAN VIEW



ELEVATION VIEW

PROFILE VIEW

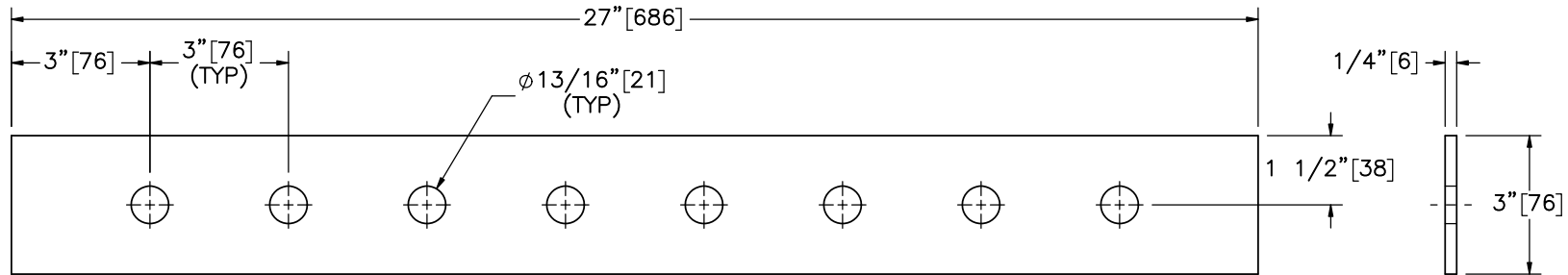
Part i2  
SCALE 1:1



ELEVATION VIEW

PROFILE VIEW

Part i1



PLAN VIEW

PROFILE VIEW

Part i3



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

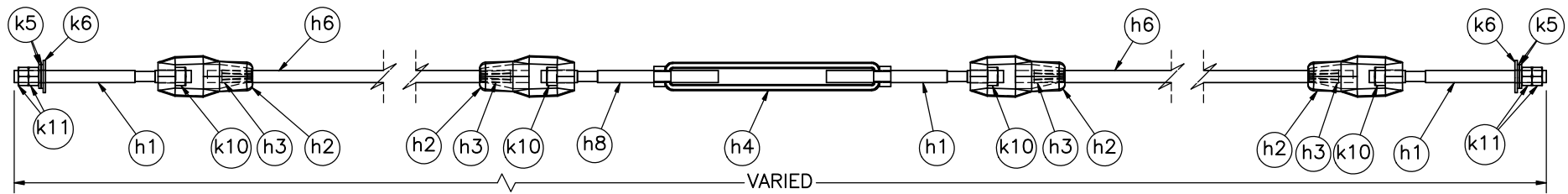
Component Details

DWG. NAME.  
NYBWT-1\_R16

SCALE: 1:4  
UNITS: in.[mm]

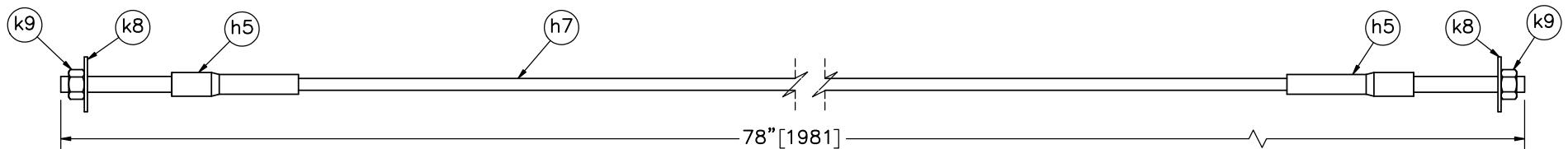
SHEET:  
24 of 34  
DATE:  
10/30/2023  
DRAWN BY:  
JEK/JRD/JJ  
O  
REV. BY:  
KAL/RKF/JC  
H/





Transition Anchor Cable Assembly

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
-	3	Transition Anchor Cable Assembly	-	-	-
h1	3	3/4" [19] Dia. UNC, 11" [279] Long Threaded Rod	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	RCE03
h2	4	Cable End Fitting	ASTM A27 Gr. 70-40 Class 1	ASTM A153 or B695	RCE03
h3	4	Cable Wedge	ASTM A47 Gr. 32510	-	FMM01
h4	1	Crosby Threaded Turnbuckle	Stock No. 1034115	As Supplied	-
h6	2	3/4" [19] Dia. 3x7 IWRC IPS Wire Rope - Various Lengths	ASTM A741 Type 1	Class A Coating	RCM01
h8	1	3/4" [19] Dia. UNC-LH THD, 11" [279] Long Threaded Rod	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	RCE03
k5	4	3/4" [19] Dia. Hardened Flat Washer	ASTM F436	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329	FWC20b
k6	2	3/4" [19] Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC20a
k10	4	3/4" [19] Dia. UNC Square Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNS20
k11	4	3/4" [19] Dia. UNC Hex Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX20a



Upstream Cable Assembly

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
-	2	Upstream Cable Assembly	-	-	-
h5	2	BCT Anchor Cable End Swaged Fitting	Fitting - ASTM A576 Gr. 1035 Stud - ASTM F568 Class C	Fitting - ASTM A153 Stud - ASTM A153 or B695	-
k9	2	1" [25] Dia. UNC Heavy Hex Nut	ASTM A563DH or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX24b
k8	2	1" [25] Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC24a
h7	1	3/4" [19] Dia. 6x19 IWRC IPS Wire Rope	ASTM A741 Type 2	Class A Coating	-

Notes: (1) Total lengths of the three transition anchor cable assemblies are approximately 282" [7,163], 317" [8,052], and 352" [8,941].



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Anchor Cable Details

DWG. NAME:  
NYBWT-1\_R16

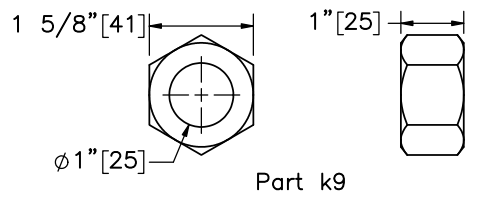
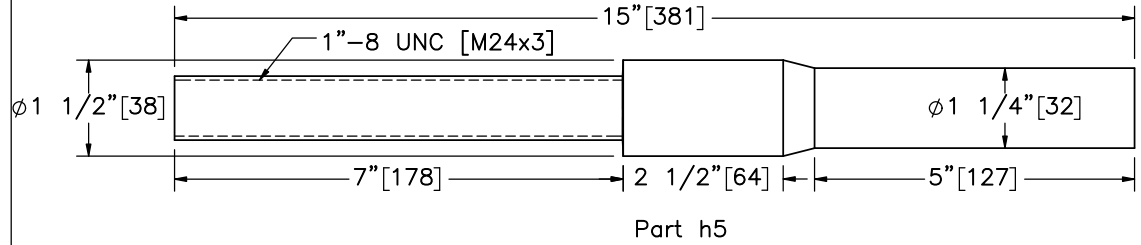
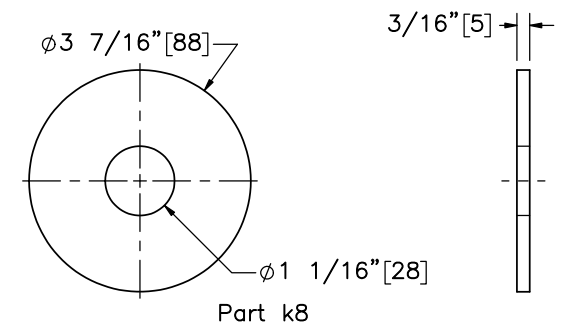
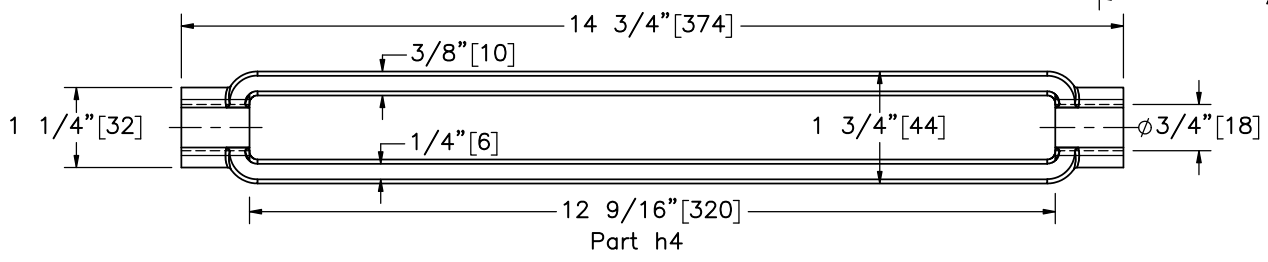
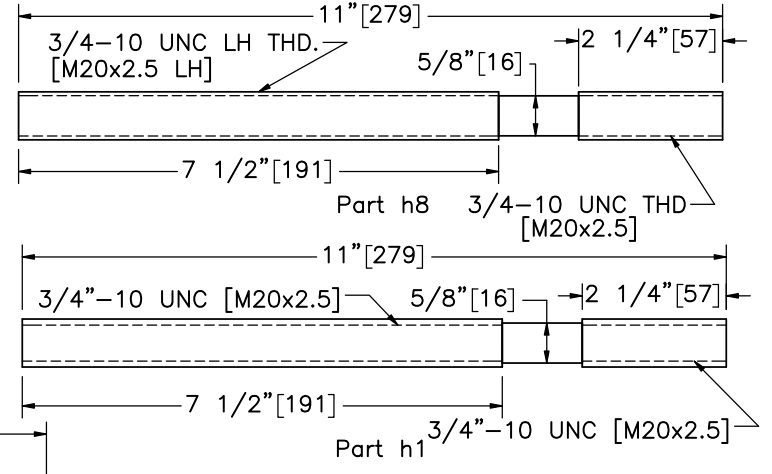
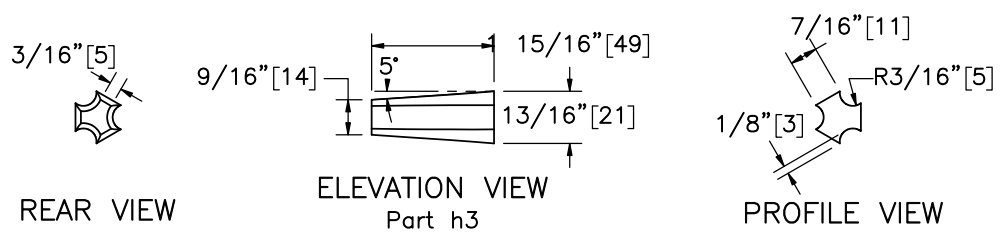
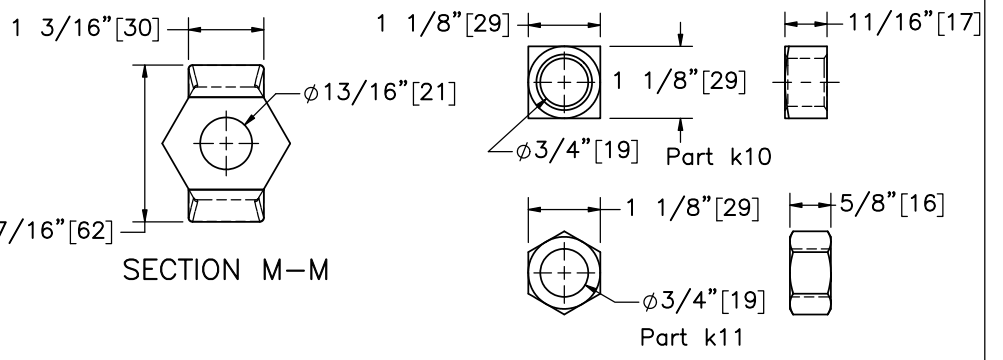
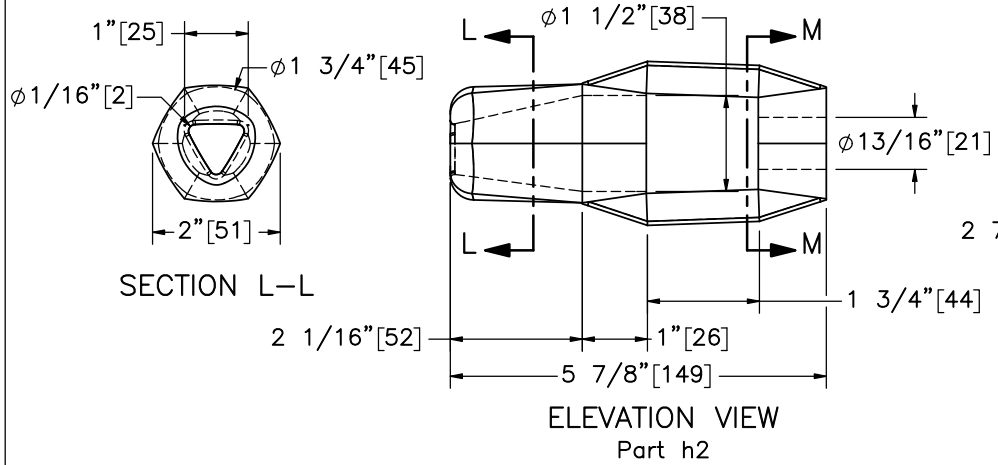
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UNITS: in.[mm]

SHEET:  
25 of 34

DATE:  
10/30/2023

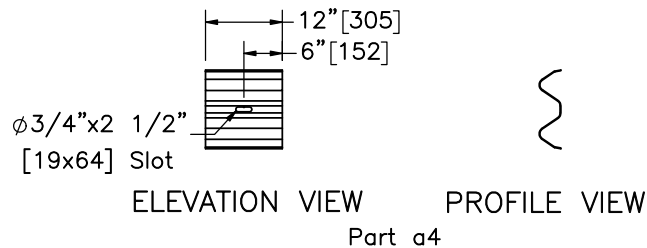
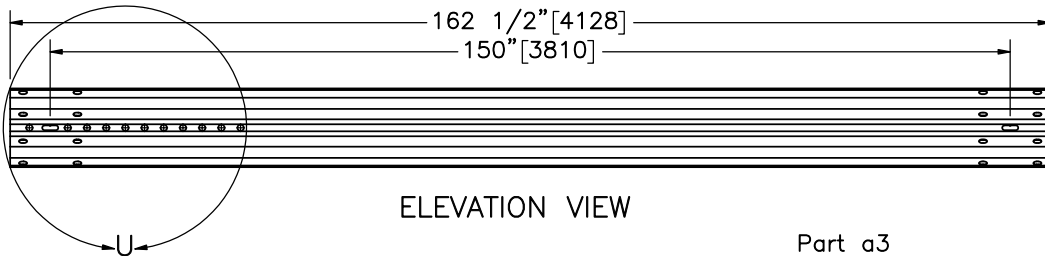
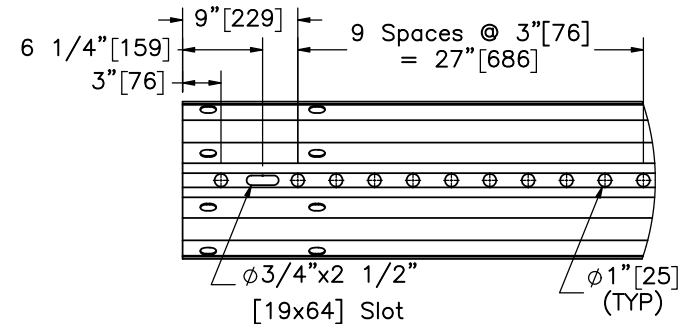
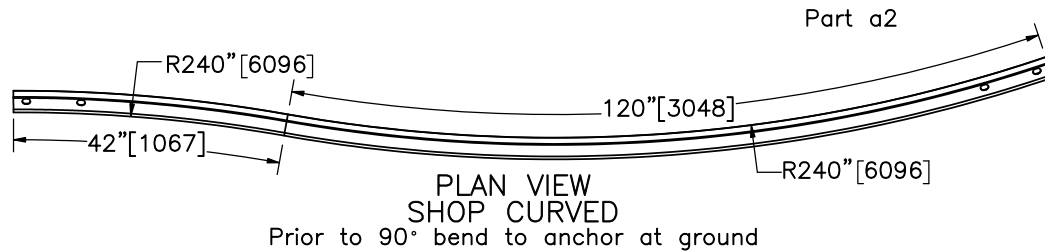
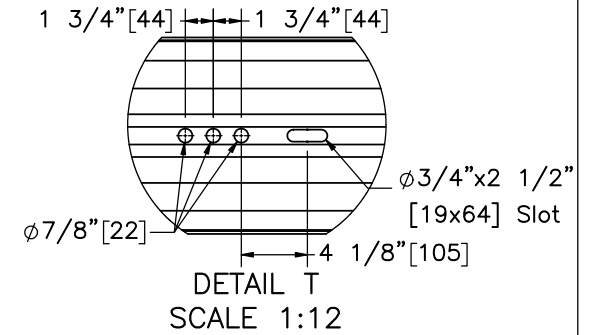
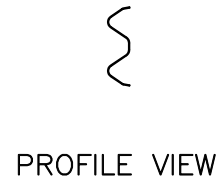
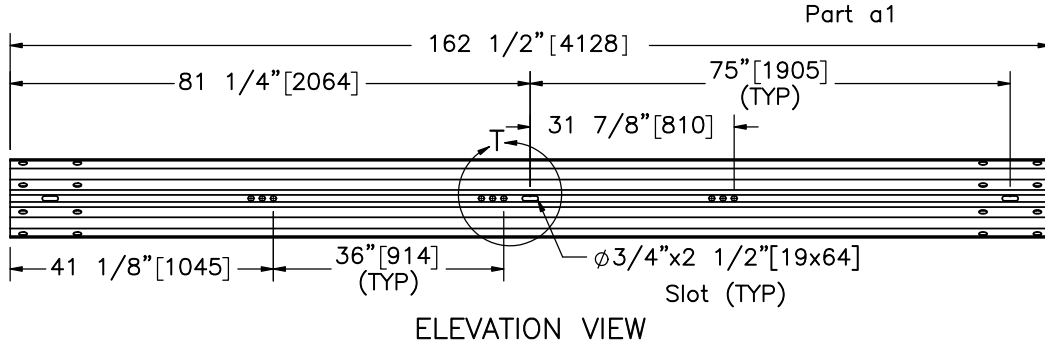
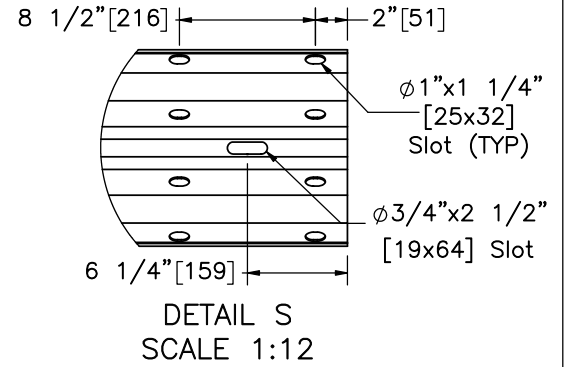
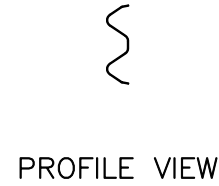
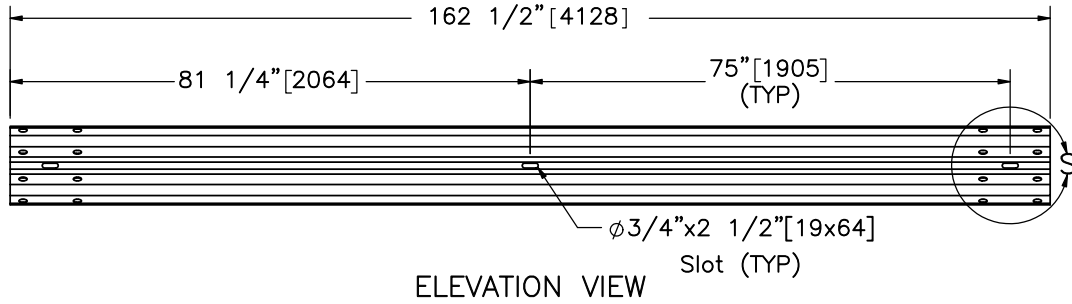
DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H/



Note: (1) Flattened portion of part h1 & h8 not necessary.

	NY Box Beam to Weak Post		SHEET: 26 of 34
	W-Beam Transition		DATE: 10/30/2023
Test No. NYBWT-1		DRAWN BY: JEK/JRD/JJO	
Cable Anchor Components		REV. BY: KAL/RKF/JCH	
Midwest Roadside Safety Facility		DWG. NAME: NYBWT-1_R16	SCALE: 1:3 UNITS: in.[mm]



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post

W-Beam Transition

Test No. NYBWT-1

W-Beam Rail Sections

DWG. NAME.  
NYBWT-1\_R16

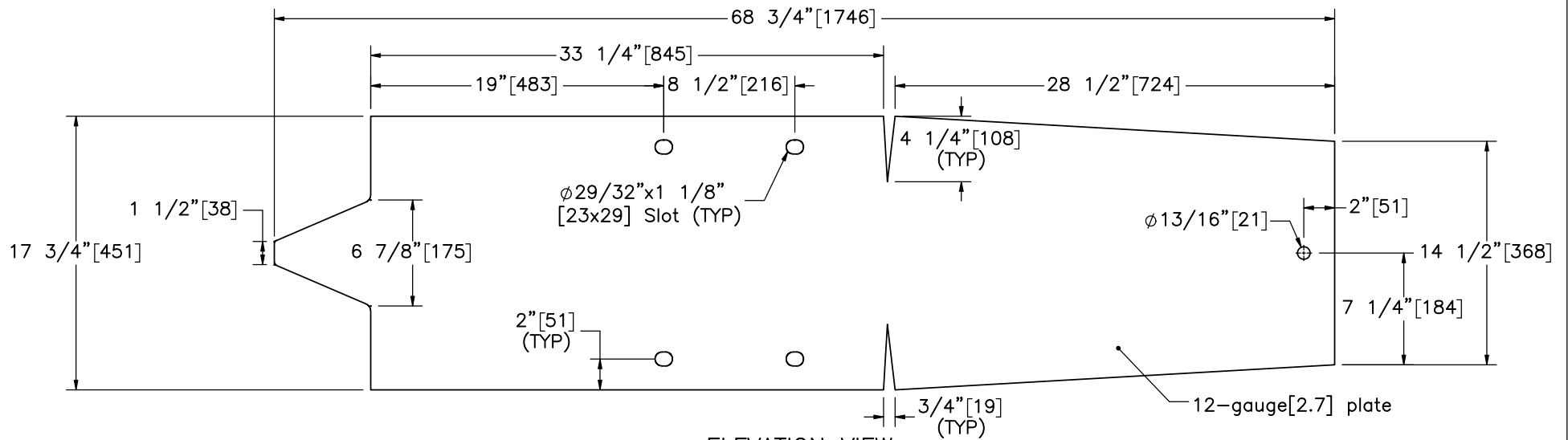
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SHEET:  
27 of 34

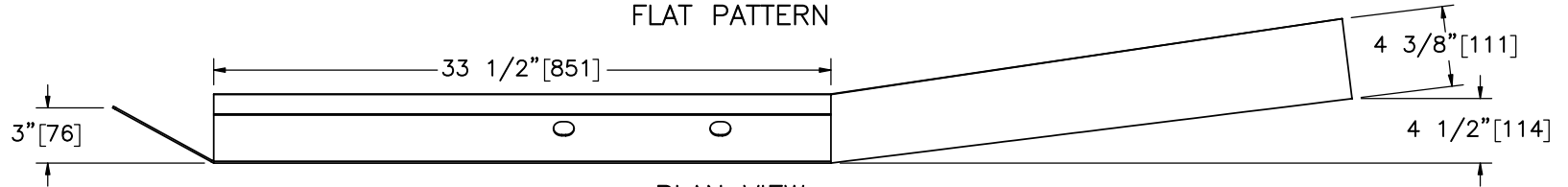
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10/30/2023

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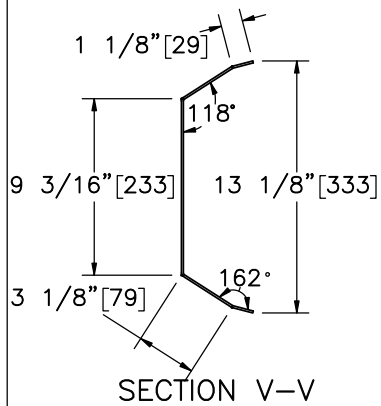
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KAL/RKF/JC  
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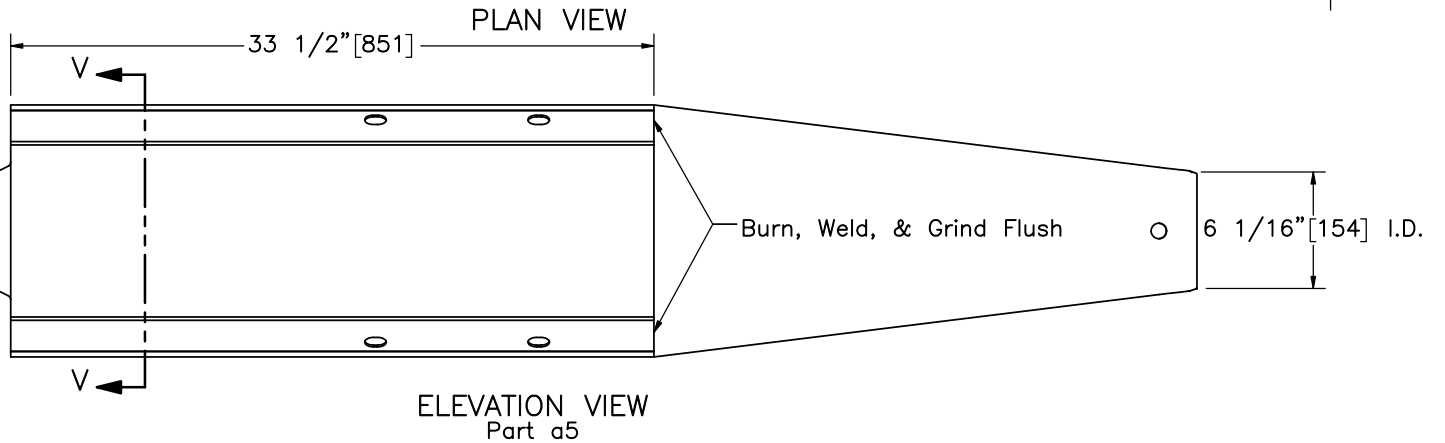
ELEVATION VIEW  
FLAT PATTERN



PLAN VIEW



SECTION V-V



ELEVATION VIEW  
Part a5



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

W-Beam to Box Beam  
Transition Cover

DWG. NAME:  
NYBWT-1\_R16

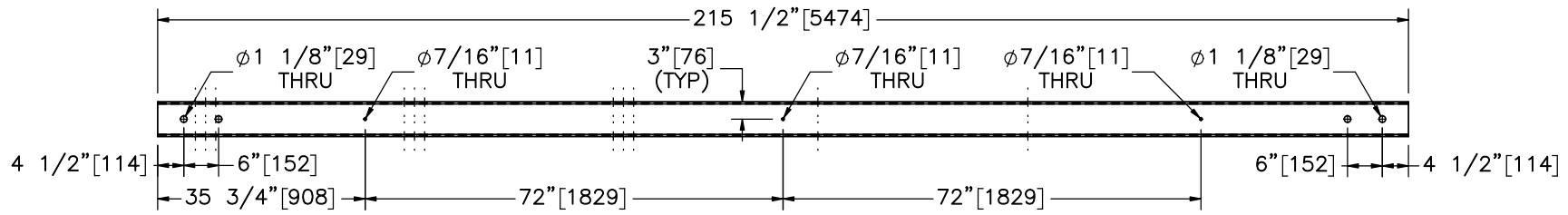
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SHEET:  
28 of 34

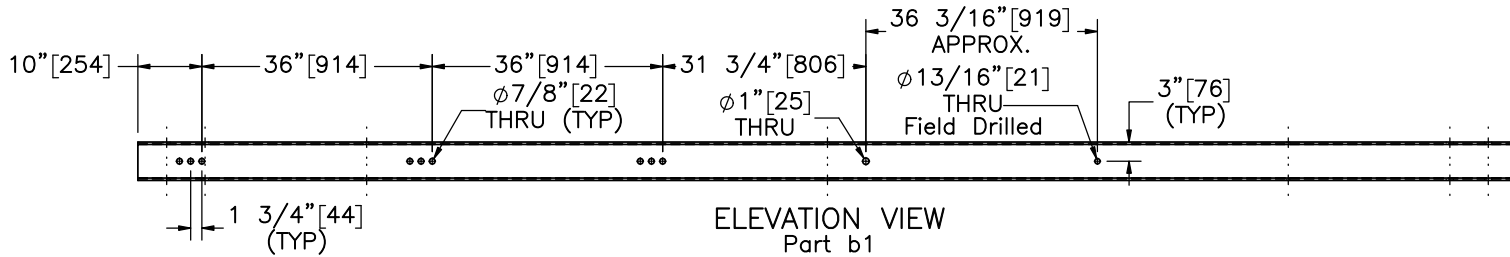
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10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
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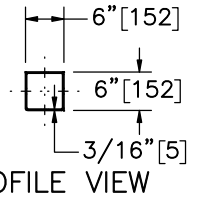
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KAL/RKF/JC  
H/



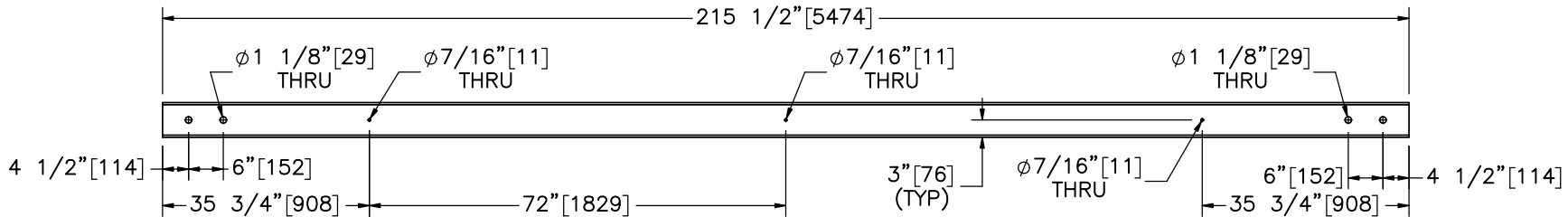
PLAN VIEW



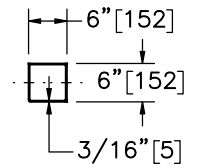
ELEVATION VIEW  
Part b1



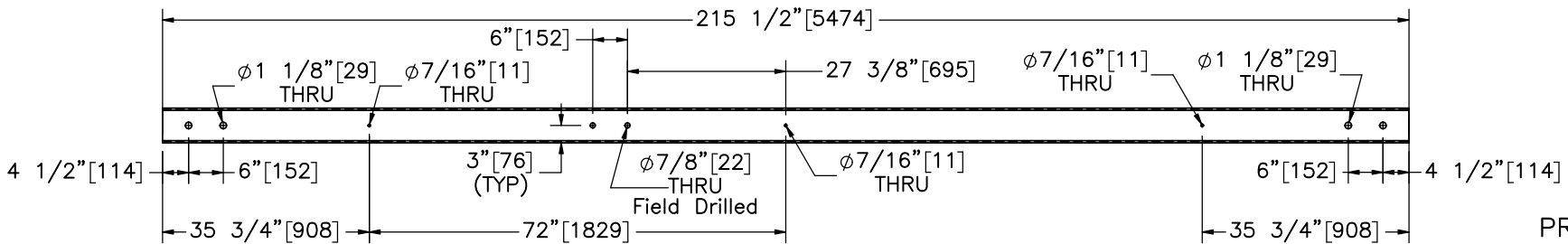
PROFILE VIEW



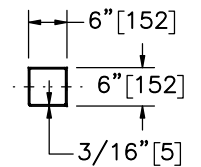
PLAN VIEW  
Part b2



PROFILE VIEW



PLAN VIEW  
Part b3



PROFILE VIEW



Midwest Roadside  
Safety Facility

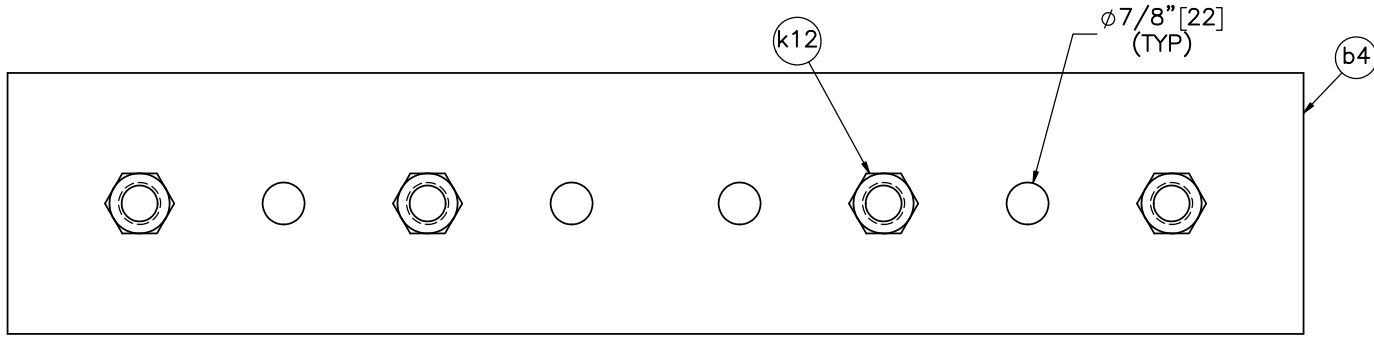
NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Box Beam Rail Sections

DWG. NAME:  
NYBWT-1\_R16

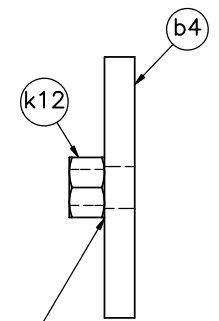
SCALE: 1:30  
UNITS: in.[mm]

SHEET:  
29 of 34  
DATE:  
10/30/2023  
DRAWN BY:  
JEK/JRD/JJ  
O  
REV. BY:  
KAL/RKF/JC  
H



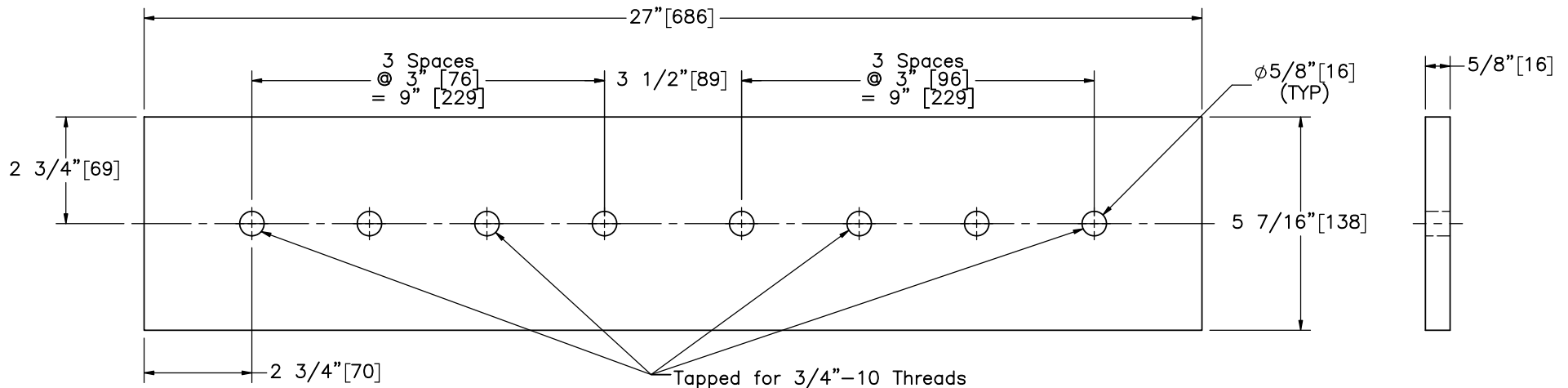
ELEVATION VIEW

Assembled Splice Plate and Nuts



PROFILE VIEW

Tack weld all nuts to splice plates prior to assembly.




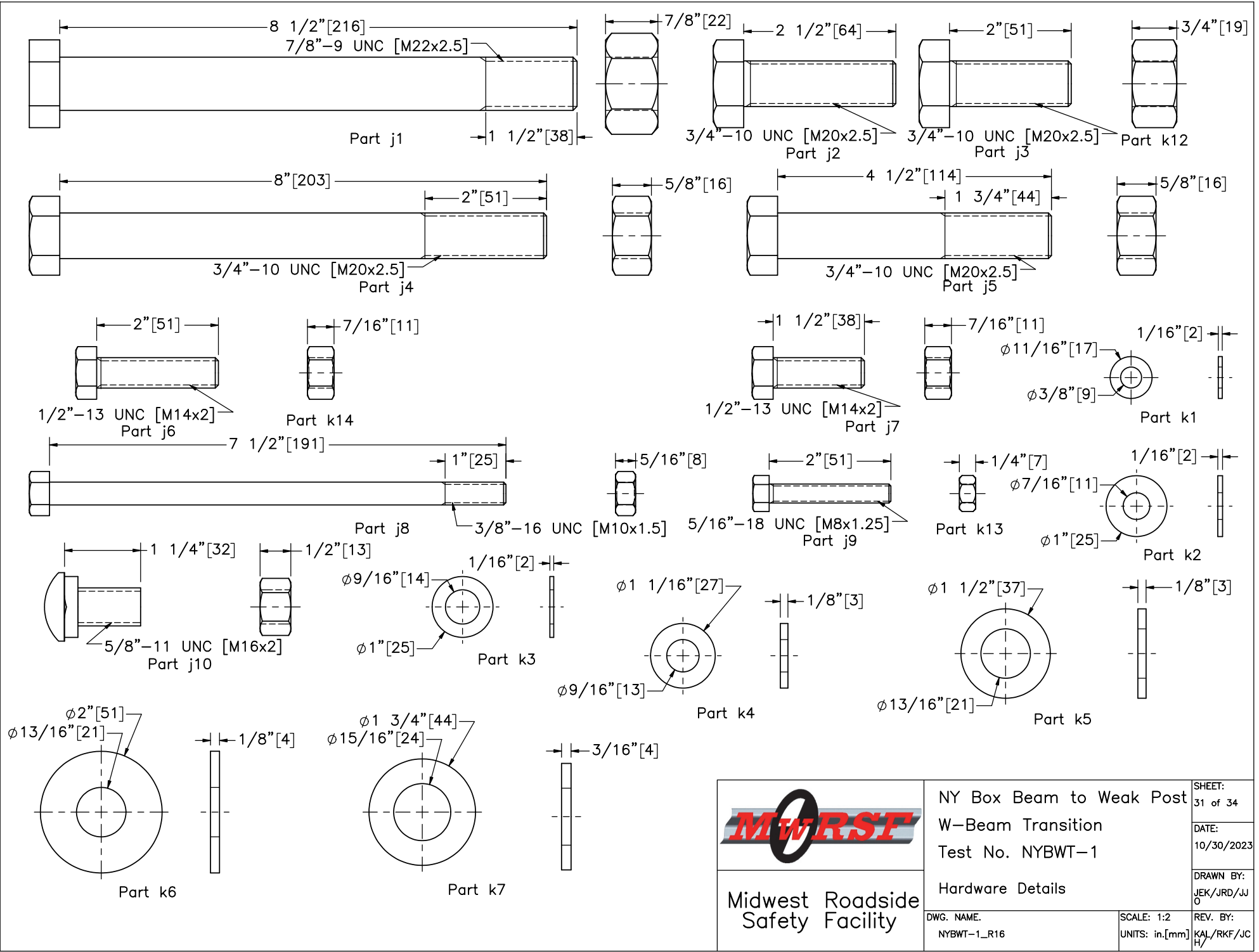
ELEVATION VIEW

Alternative Splice Plate With Tapped Holes

PROFILE VIEW

Note: Splice plate with tapped holes may be used instead of splice plate with tack welded nuts.

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide	 Midwest Roadside Safety Facility	NY Box Beam to Weak Post W-Beam Transition		SHEET: 30 of 34
-	10	Splice Plate with Tack Welded Nuts	-	ASTM A123	-		Test No. NYBWT-1	Box Beam Splice Plate Details	
b4	1	27"x5 7/16"x5/8" [686x138x16] Splice Plate	ASTM A36	-	-	DWG. NAME: NYBWT-1_R16 SCALE: 1:4 UNITS: in.[mm]	DRAWN BY: JEK/JRD/JJO		REV. BY: KAL/RKF/JCH
k12	4	3/4" [19] Dia. UNC Heavy Hex Nut	ASTM A563DH or equivalent	-	FNX20b				



Midwest Roadside Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Hardware Details

DWG. NAME:  
NYBWT-1\_R16

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

SHEET:  
31 of 34

DATE:  
10/30/2023

DRAWN BY:  
JEK/JRD/JJ  
O

REV. BY:  
KAL/RKF/JC  
H

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
a1	8	12'-6" [3,810] 12-gauge [2.7] W-Beam Section	AASHTO M180	ASTM A123 or A653	RWM02a
a2	2	12'-6" [3,810] 12-gauge [2.7] W-Beam Section	AASHTO M180	ASTM A123 or A653	-
a3	1	12'-6" [3,810] 12-gauge [2.7] W-Beam Curved Section	AASHTO M180	ASTM A123 or A653	RWM11a
a4	6	12" [305] 12-gauge [2.7] W-Beam Backup Plate	AASHTO M180	ASTM A123 or A653	RWB01a
a5	1	W-Beam to Box Beam Transition Cover, 12-gauge [2.7]	ASTM A36	ASTM A123 or A653	-
b1	1	TS6"x6"x3/16" [152x152x5], 215 1/2" [5,474] Long Box Beam	ASTM A500 Gr. B	ASTM A123	-
b2	4	TS6"x6"x3/16" [152x152x5], 215 1/2" [5,474] Long Box Beam	ASTM A500 Gr. B	ASTM A123	-
b3	1	TS6"x6"x3/16" [152x152x5], 215 1/2" [5,474] Long Box Beam	ASTM A500 Gr. B	ASTM A123	-
b4	10	27"x5 7/16"x5/8" [686x138x16] Splice Plate	ASTM A36	-	-
c1	33	S3x5.7 [S75x8.5], 65" [1,651] Long Post	ASTM A36	-	-
c2	33	24"x8"x1/4" [610x203x6] Soil Plate	ASTM A36	-	-
c3	18	5"x3 1/2"x3/8" [127x89x10], 4 1/2" [114] Long L-Bracket	ASTM A36	ASTM A123	-
c4	2	4"x3"x1/4" [102x76x6], 8" [203] Long L-Bracket	ASTM A36	ASTM A123	-
d1	2	W6x15 [W152x22.3], 72" [1,829] Long Post	ASTM A992 or ASTM A572 Gr. 50	-	-
d2	2	20"x14"x3/16" [508x356x5] Plate	ASTM A36	-	-
d3	2	6 3/16"x4"x1/2" [157x102x13] Plate	ASTM A36	-	-
d4	4	6 1/4"x4"x1/2" [159x102x13] Plate	ASTM A36	-	-
d5	2	6 3/16"x6"x1/2" [157x152x13] Plate	ASTM A36	-	-
e1	2	10"x9"x1/2" [254x229x13] Box Beam Cable Anchor Base Plate	ASTM A36	-	-
e2	4	4"x4"x1/4" [102x102x6] Box Beam Cable Anchor Gusset	ASTM A36	-	-
e3	2	4"x4"x1/2" [102x102x13] Box Beam Cable Anchor Mounting Plate	ASTM A36	-	-
f1	2	Concrete	Pre-Cast Class A* Min. f'c = 3,000 psi [20.7 MPa] NE Mix 47BD	-	-
f2	2	#3 [10] Bar, 106 5/8" [2,708] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **	-
f3	2	#3 [10] Bar, 117 5/8" [2,988] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **	-
f4	2	#3 [10] Bar, 127 1/8" [3,229] Long Unbent	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **	-

\* If cast in place, follow Section 501 - Portland Cement Concrete - General of the NY state standards.

\*\* Epoxy-coating not necessary for testing purposes.



Midwest Roadside  
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NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Bill of Materials

DWG. NAME.  
NYBWT-1\_R16

SCALE: None  
UNITS: in.[mm]

SHEET:  
32 of 34  
DATE:  
10/30/2023  
DRAWN BY:  
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REV. BY:  
KAL/RKF/JC  
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Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
f5	8	#3 [10] Bar, 39" [991] Long	ASTM A615 Gr. 60 or A996 Gr. 60	Epoxy-Coated (ASTM A775 or A934) **	-
f6	16	3/4" [19] Dia. UNC, Hooked Anchor J-Bolt and Nut	J-Bolt - ASTM A307 Gr. C Nut - ASTM A563DH	ASTM A153 or B695 Class 55 or F2329	FRH20a
g1	1	14"x9"x1/2" [356x229x13] Cable Anchor Base Plate	ASTM A36	-	-
g2	4	3"x2"x1/4" [76x51x6] Cable Anchor Gusset	ASTM A36	-	-
g3	1	14"x3 1/2"x1/2" [356x89x13] Cable Anchor Top Plate	ASTM A36	-	-
g4	1	1/4" [6] Dia., 16 3/8" [416] Long Brass Rod	ASTM B16-00	-	-
h1	9	3/4" [19] Dia. UNC, 11" [279] Long Threaded Rod	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	RCE03
h2	12	Cable End Fitting	ASTM A27 Gr. 70-40 Class 1	ASTM A153 or B695	RCE03
h3	12	Cable Wedge	ASTM A47 Gr. 32510	-	FMM01
h4	3	Crosby Threaded Turnbuckle	Stock No. 1034115	As Supplied	-
h5	4	BCT Anchor Cable End Swaged Fitting	Fitting - ASTM A576 Gr. 1035 Stud - ASTM F568 Class C	Fitting - ASTM A153 Stud - ASTM A153 or B695	-
h6	6	3/4" [19] Dia. 3x7 IWRC IPS Wire Rope - Various Lengths	ASTM A741 Type 1	Class A Coating	RCM01
h7	2	3/4" [19] Dia. 6x19 IWRC IPS Wire Rope - Various Lengths	ASTM A741 Type 2	Class A Coating	-
h8	3	3/4" [19] Dia. UNC=LH THD, 11" [279] Long Threaded Rod	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	RCE03
i1	3	7"x4"x1/2" [178x102x13], 3" [76] Long L-Bracket	ASTM A36	ASTM A123	-
i2	20	1 3/4"x1 3/4"x10-gauge [44x44x3.4] Square Washer	ASTM A36	ASTM A123	-
i3	1	27"x3"x1/4" [686x76x6] Washer Plate	ASTM A36	ASTM A123	-
j1 *	2	7/8"-9 UNC [M22x2.5], 8 1/2" [216] Long Heavy Hex Head Bolt and Nut	Bolt - ASTM F3125 Gr. A325 Type 1 or equivalent Nut - ASTM A563DH or equivalent	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329 or F2833 Gr. 1	FBX22b
j2 *	2	3/4"-10 UNC [M20x2.5], 2 1/2" [64] Long Fully Threaded Heavy Hex Head Bolt	Bolt - ASTM F3125 Gr. A325 Type 1 or equivalent Nut - ASTM A563DH or equivalent	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329 or F2833 Gr. 1	FBX20b
j3	38	3/4"-10 UNC [M20x2.5], 2" [51] Long Fully Threaded Heavy Hex Head Bolt	Bolt - ASTM F3125 Gr. A325 Type 1 or equivalent Nut - ASTM A563DH or equivalent	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329 or F2833 Gr. 1	FBX20b
j4	11	3/4"-10 UNC [M20x2.5], 8" [203] Long Hex Head Bolt and Nut	Bolt - ASTM A307 Gr. A or equivalent Nut - ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX20a
j5	2	3/4"-10 UNC [M20x2.5], 4 1/2" [114] Long Hex Head Bolt and Nut	Bolt - ASTM A307 Gr. A or equivalent Nut - ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX20a
j6	2	1/2"-13 UNC [M14x2], 2" [51] Fully Threaded Long Hex Head Bolt	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX14a

\* If using the alternate splice plates with tapped holes, these hex bolts can be 1/2" [13] shorter.



Midwest Roadside  
Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Bill of Materials

DWG. NAME:  
NYBWT-1\_R16

SCALE: None  
UNITS: in.[mm]

SHEET:  
33 of 34

DATE:  
10/30/2023

DRAWN BY:  
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REV. BY:  
KAL/RKF/JC  
H/

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
j7	18	1/2"-13 UNC [M14x2], 1 1/2" [38] Long Fully Threaded Hex Head Bolt and Nut	Bolt - ASTM A307 Gr. A or equivalent Nut - ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX14a
j8	18	3/8"-16 UNC [M10x1.5], 7 1/2" [191] Long Hex Head Bolt and Nut	Bolt - ASTM A307 Gr. A or equivalent Nut - ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX10a
j9	8	5/16"-18 UNC [M8x1.25], 2" [51] Long Fully Threaded Hex Head Bolt	Bolt - ASTM A307 Gr. A or equivalent Nut - ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX08a
j10	76	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
k1	8	5/16" [8] Dia. Hardened Flat Washer	ASTM F436	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329	-
k2	36	3/8" [10] Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC10a
k3	18	1/2" [13] Dia. Plain Narrow Round Washer	SAE Low Carbon Gr. 2	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329	-
k4	2	1/2" [13] Dia. Hardened Flat Washer	ASTM F436	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329	FWC14b
k5	74	3/4" [19] Dia. Hardened Flat Washer	ASTM F436	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329	FWC20b
k6	17	3/4" [19] Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC20a
k7	4	7/8" [22] Dia. Hardened Flat Washer	ASTM F436	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329	FWC22b
k8	4	1" [25] Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC24a
k9	4	1" [25] Dia. UNC Heavy Hex Nut	ASTM A563DH or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX24b
k10	12	3/4" [19] Dia. UNC Square Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNS20
k11	12	3/4" [19] Dia. UNC Hex Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX20a
k12*	40	3/4" [19] Dia. UNC Heavy Hex Nut	ASTM A563DH or equivalent	-	FNX20b
k13	16	5/16" [8] Dia. UNC Hex Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX08a
k14	4	1/2" [13] Dia. UNC Hex Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX14a

\* If using the alternate splice plates with tapped holes, these additional hex nuts are not required.

Washer	Washer Series	Inside Diameter			Outside Diameter			Thickness		
		Basic	Tolerance		Basic	Tolerance		Basic	Max.	Min.
			Plus	Minus		Plus	Minus			
3/4"	Regular (k5)	0.812"	0.03"	0.007"	1.469"	0.03"	0.007"	0.134"	0.16"	0.108"
	Wide (k6)	0.812"	0.03"	0.007"	2"	0.03"	0.007"	0.165"	0.192"	0.136"



Midwest Roadside Safety Facility

NY Box Beam to Weak Post  
W-Beam Transition  
Test No. NYBWT-1

Bill of Materials

DWG. NAME:  
NYBWT-1\_R16

SCALE: None  
UNITS: in.[mm]

SHEET:  
34 of 34  
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10/30/2023  
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REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	1/18/2018	-	Originated from drawing NYBoxRail_10. Major changes to system, based off of NY sheet 606-20, sheets it references, and NY Standards.	-	JEK
1	1/19/2018	2	Detail enlarged. Spaces added to notes between post numbers. Additional note added to Section B. Labels added (rail). General shift.	KAL	JEK
		5	Note 2 edit. Label added (post).		
		6	Dimensions to anchor center labeled as such. Splice bolts on transition piece all labeled. Note 1 edit.		
		7	Labels added.		
		10-11	Material edit: f1.		
		13	Welds added. Assembly material removed.		
		15	Table formatting edit.		
		16	Note added.		
		17	Assembly galv removed.		
		19	Assembly material and galv edit. Note added. General shift.		
		22	Notes edited, lengths rounded up to nearest inch.		
		25	Dim shift.		
		26	Dim shift. Part label shifts.		
		27	Labels added. Assembly/alternative labels edited.		
	BOM	Material: f1.			
2	1/19/2018	1	HFT Anchor and a5 labels added. Note 3, 4 edits. Dim adds.	RKF	JEK
		2	Minor text edits.		
		6	Dim adds. General shift.		
		15	Minor text edit.		
3	1/24/2018	-	New page: 8. Sheet number references edited on multiple pages.	RKF	JEK
		3	HFT Anchor shifted further behind system. General shift.		
		8	New page. Cable bracket connection/check for interference.		
		9	HFT Anchor shifted further behind system. General shift.		
		10	Upstream Cable Anchor Assembly A and B flipped locations.		
4	1/24/2018	11-13	Notes added.	KAL	JEK
		BOM	Material: a5,f1. Treat: f2-f5. Notes added to BOM1.		
5	1/26/2018	-	Post nos. 29, 31, 33, 35 removed. Section/Detail re-lettering.	KAL	JEK
		1	Post renumbering. Dim edits/shifts/adds.		

5	1/26/2018	2	Post number in notes edited. Label add. Detail E added.	KAL	JEK
		4	Post no. edits.		
		5	Post no. edit.		
		8	Note add.		
		13	Lap length edits. Total length edits: f2-f4.		
		16	Weld edits. Qty: W-Beam Post Assem. Post no. edit. General shift.		
		17	Optional note for holes removed. Note edit.		
		BOM	Qty: c1-2, i2, j9, k1, k13. Description: f2-4.		
6	2/16/2018	-	HFT Anchor/upstream anchor bracket shifts.	JCH/KAL	JEK
		9	Downstream HFT Anchor shift. Upstream Cable Anchor Assembly shift. Dim shifts. Dim edits. Detail shift. General shift.		
		10	Bolt j1 orientation flip. General shift.		
		20	Orientation/view edits. General shift.		
		23	Cable length dimension for the upstream cable edited. Note 2 removed.		
		27	Part b3 edit: field drilled hole locations. General shift.		
		29	Metric thread equivalents added.		
		BOM	Description: h7, j1-10.		
7	3/2/2018	BOM	Description: h6.	KAL/JCH	JEK
8	3/5/2018	17	Several holes in part c1 made optional. Note 1 edit.	KAL/JCH	JEK
9	3/6/2018	-	Part c1 split into two parts with different holes/hole locations. Part c1-c5 renumbering. New sheet: 18.	JCH/KAL	JEK
		16	Part numbers in table edits. Post in assems edited.		
		17	Post edits. Post add. General shift.		
		18	New sheet. Components from 17 moved here.		
		BOM	New: c1/c2 split (from c1). Renumbered: c2-5. Items shifted between pages to fit.		
10	3/19/2018	-	Drawing renamed from NY_Trans_Box-W to NYBWT-1. Universal post used. Embedment depth changes because of post length edit.	KAL/JCH	JEK
		11-12	Note edit.		
		16	Post configurations combined/replaced with universal post version. Table edits.		
		17	Holes added back into post and recombined into one post/part no. Post lengthened. Changes to match NY universal post.		
		25	Metric thread equivalents added.		
		BOM	Removed: c2. Renumbered: c2-c5. Description: c1. Material: f1. Note edit.		

11	4/20/2018	BOM	Mtrl: f1.	KAL/JCH	JEK
12	5/1/2018	-	Part j6 replaced with j4. Part k4 replaced with k6.	KAL/JCH	JEK
		28	Part b1 edit (hole size).		
		30	Removed: j6, k4. Edit: j9.		
		BOM	Removed: j6, k4. Qty: j4, k6. Description: j9.		
13	5/3/2018	27	Part a5 edits.	KAL	JEK
		28	Part b1 edit. Dim edits. (Field drilled and approx)		
14	5/11/2018	-	New sheet: 6. Section/Detail relettering. Connection hardware on posts 32 and 33 changed. Sheet numbers corrected in notes throughout.	KAL	JEK
		2	Section Adds. Note edits. Detail Adds.		
		31	New: j6, k4, k14.		
		BOM	New: j6, k4, k14. Qty: j9, k1, k12, k13.		
15	8/23/2019	-	HFT anchor assembly renamed to upstream anchor post assembly.	KAL	JRD
		1	Edited upstream anchor annotation and note 4.		
		3	Edited upstream anchor post assembly annotation.		
		10	Edited upstream anchor post assembly annotation.		
		20	Renamed sheet and BOM to upstream anchor post assembly.		
		21	Renamed sheet to upstream anchor post components.		
16	10/30/2023	ALL	Changed description to "NY Box Beam to Weak Post"	KAL	JJO
		2	Corrected a4 backing plate location, updated detail views I & J		
		8	Added splice plate note.		
		25	Updated transition anchor cable to show correct LH threaded part in turnbuckle.		
		26	Added threaded rod detail part no h8.		
		BOM	Updated BOM with part no. h8.		