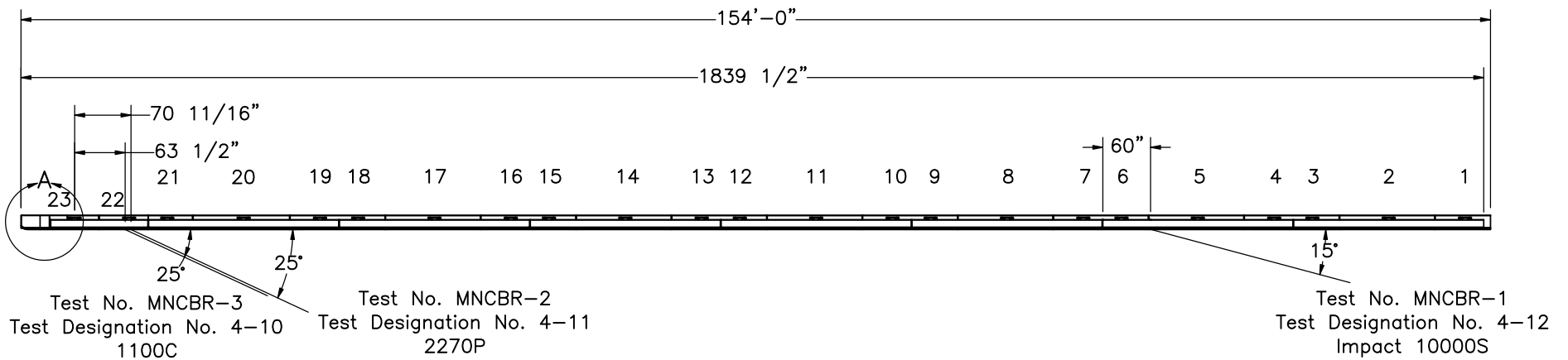
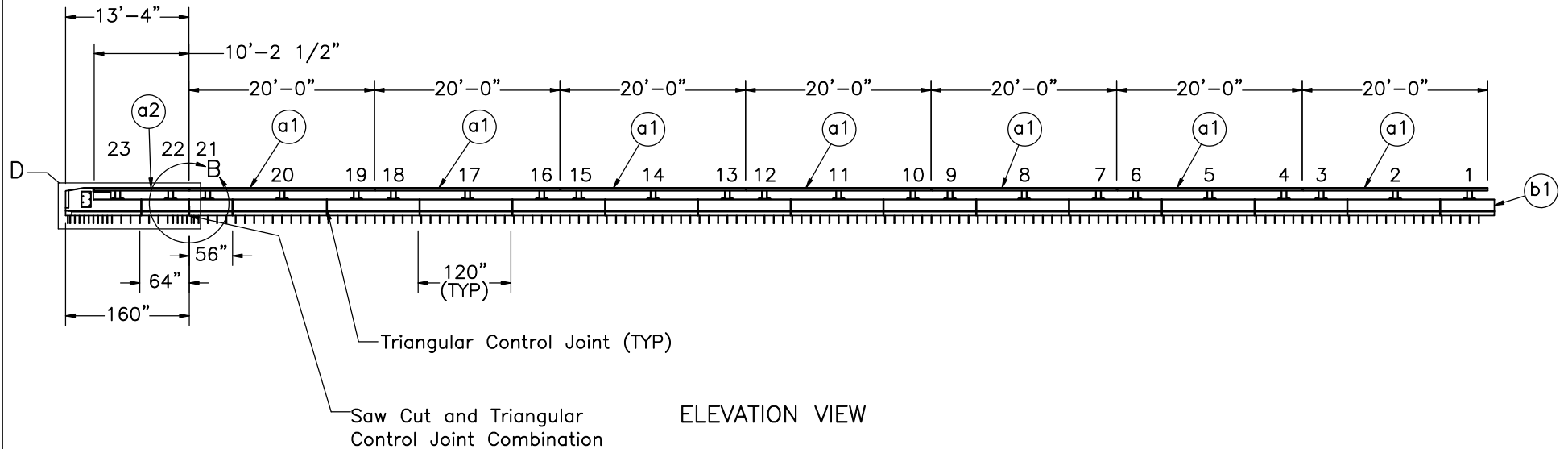




PLAN VIEW



ELEVATION VIEW

- Notes:
- (1) Three crash tests shall be performed according to test designations 4-10, 4-11, and 4-12 using MASH 2016 criteria.
 - (2) The impact location for test 1 is 60" upstream from centerline of splice between post nos. 6 and 7.
 - (3) The impact location for test 2 is 70 11/16" upstream from centerline of post no. 23.
 - (4) The impact location for test 3 is 63 1/2" upstream from centerline of post no. 23.
 - (5) Typical spacing of 1" for gap between adjacent rail segments.
 - (6) 3/4" x 3/4" triangular control joints have a longitudinal spacing of 10'.
 - (7) Clear cover of 2" for all steel reinforcement.



Midwest Roadside
Safety Facility

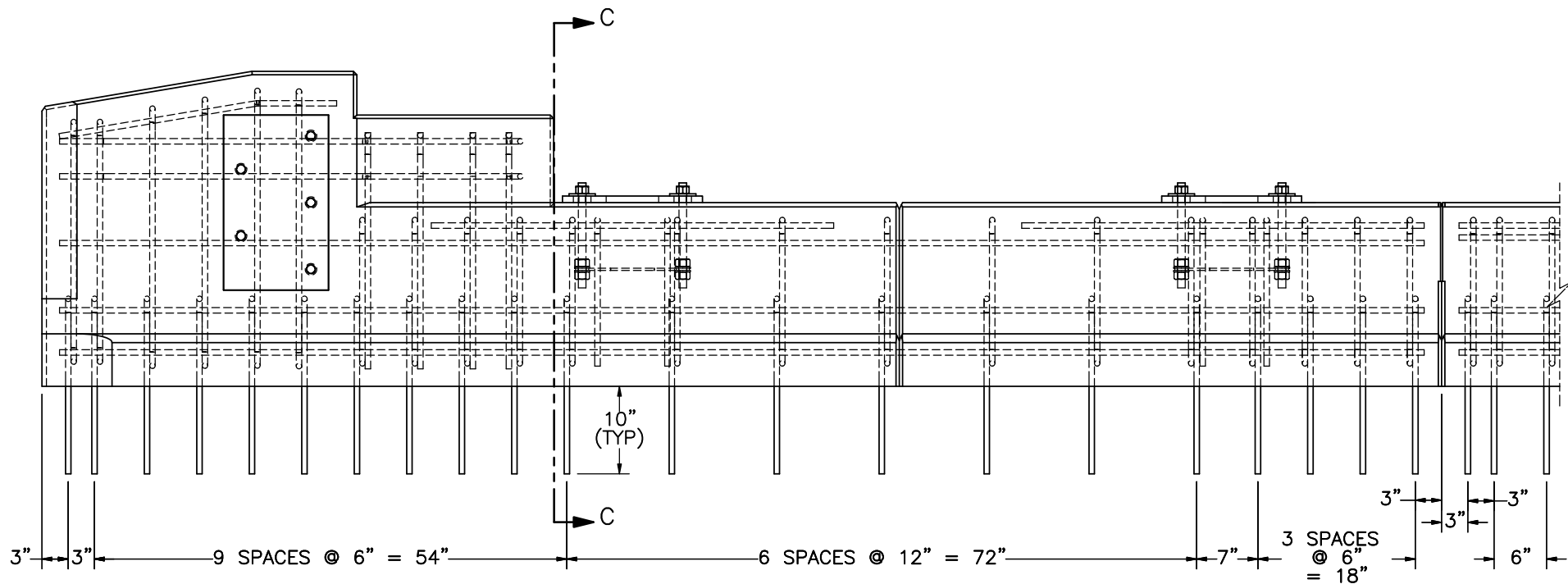
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

System Overview

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:200
UNITS: in.

SHEET:
1 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



DETAIL D
(with reinforcement)

- Notes: (1) Rebar should be epoxy-coated.
(2) Vertical reinforcement is embedded into concrete tarmac using a chemical epoxy adhesive with a minimum bond strength of 1,670 psi.



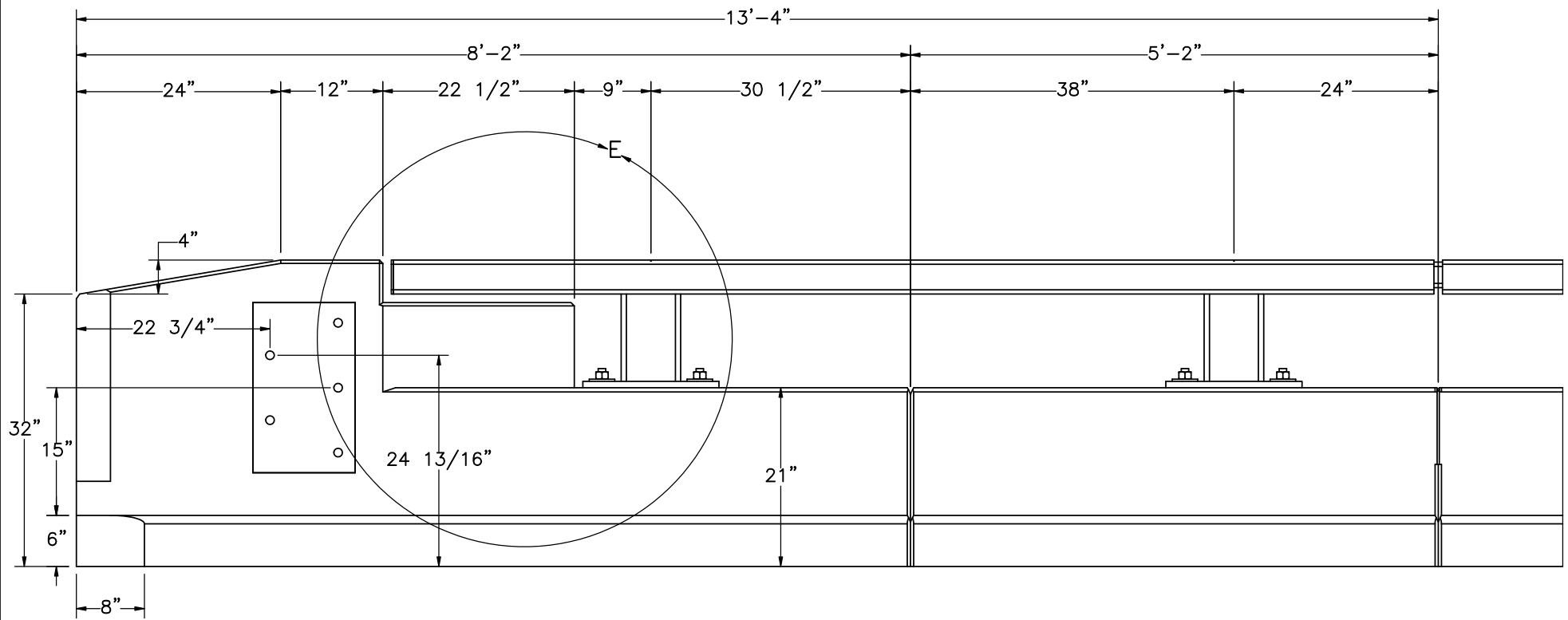
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Parapet Approach Details

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:18
UNITS: in.

SHEET:
2 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



DETAIL D
(without reinforcement)

Notes: (1) Rebar hidden for clarity.



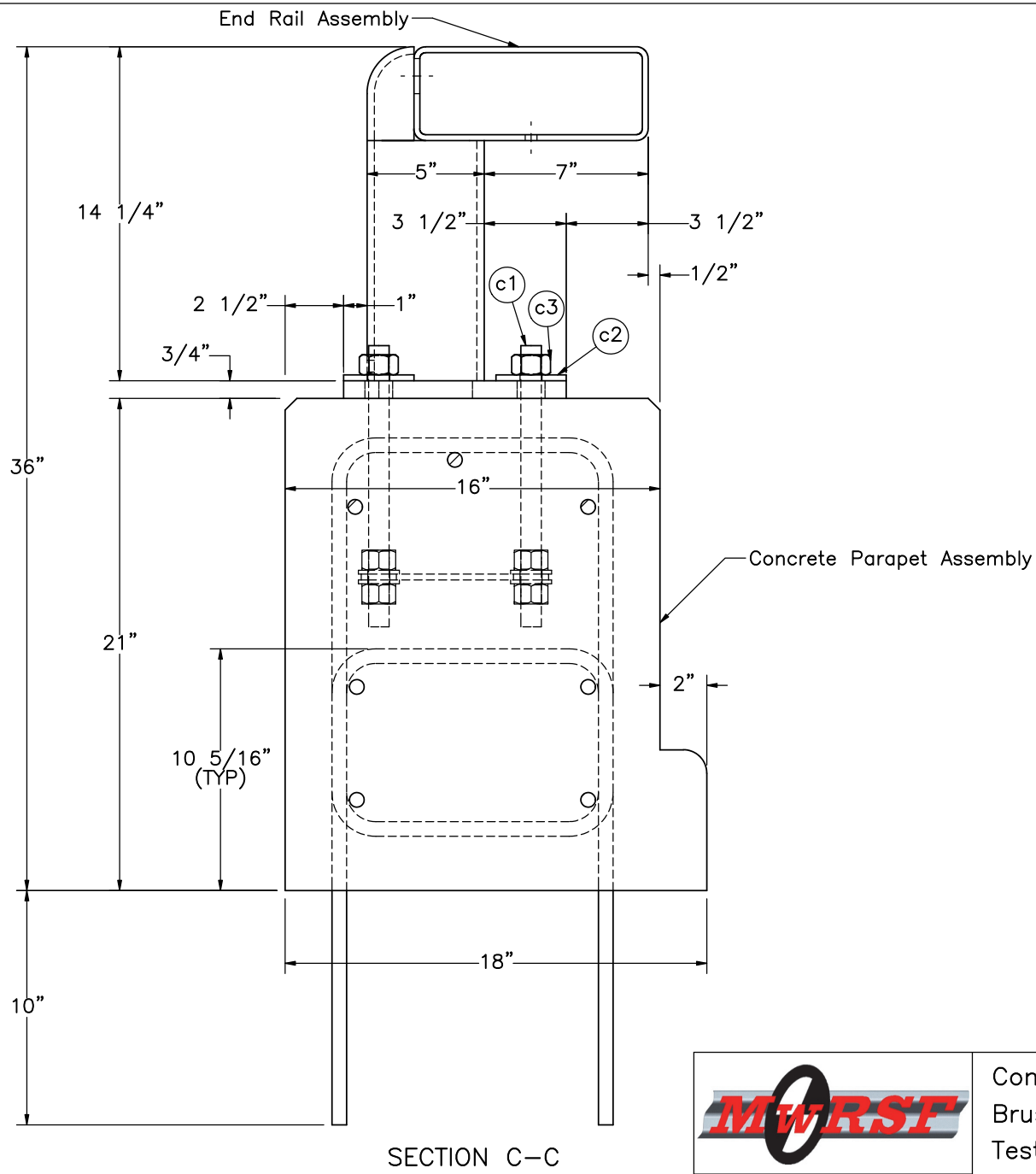
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Parapet Approach Details

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:18
UNITS: in.

SHEET:
3 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



- Notes: (1) Rebar should be epoxy-coated.
 (2) Vertical reinforcement is embedded into concrete tarmac using a chemical epoxy adhesive with a minimum bond strength of 1,670 psi.



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Profile View

DWG. NAME.
MNCBR-1-3_R32

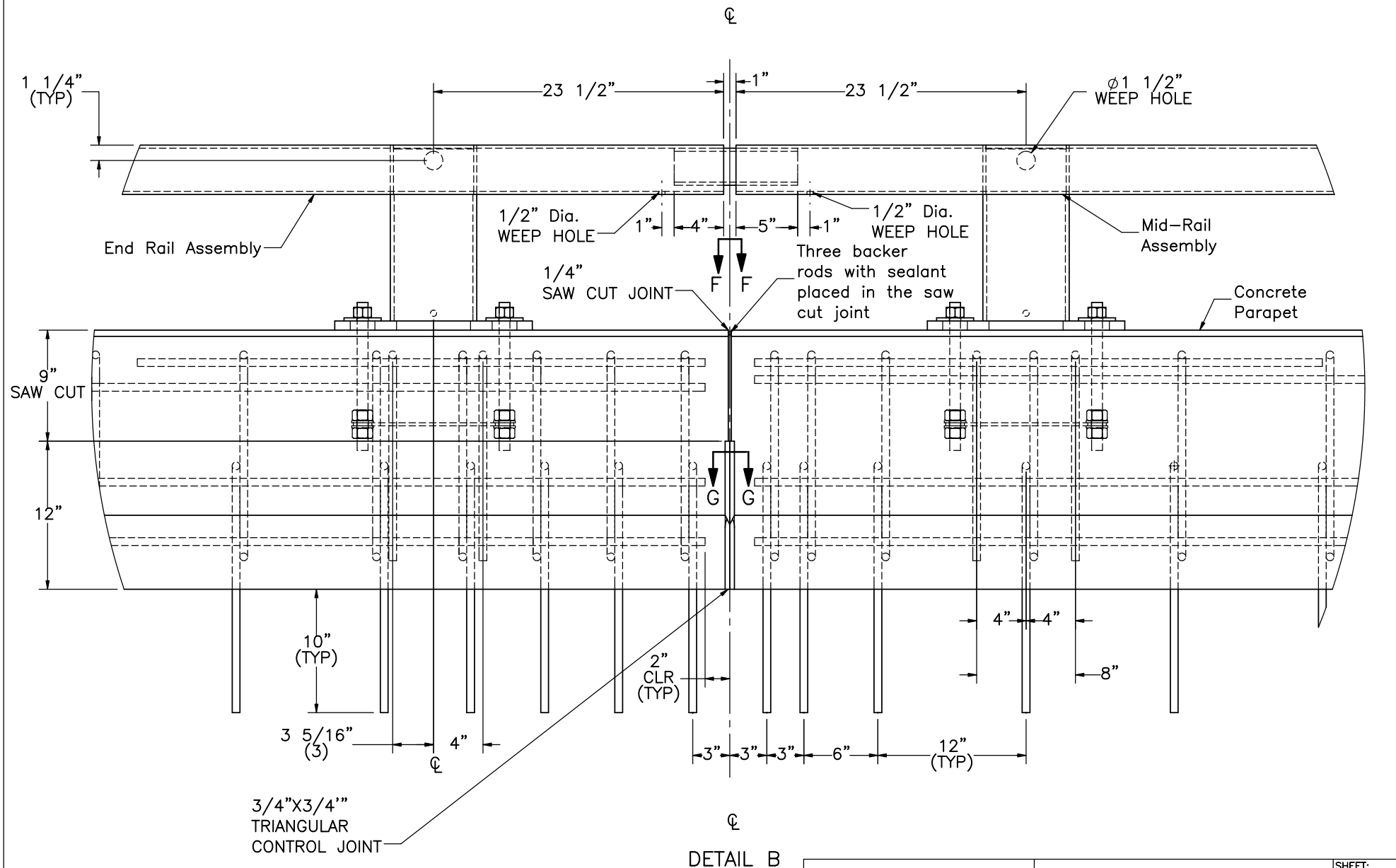
SCALE: 1:7
UNITS: in.

SHEET:
4 of 28

DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GJR

REV. BY:
KAL/JEK/M
AHP/MH/RF



DETAIL B

- Notes:
- (1) Rebar should be epoxy-coated.
 - (2) Vertical reinforcement is embedded into concrete tarmac using a chemical epoxy adhesive with a minimum bond strength of 1,670 psi.
 - (3) Intended dimension to be $4"$ per MNDOT's standard design.



Midwest Roadside
Safety Facility

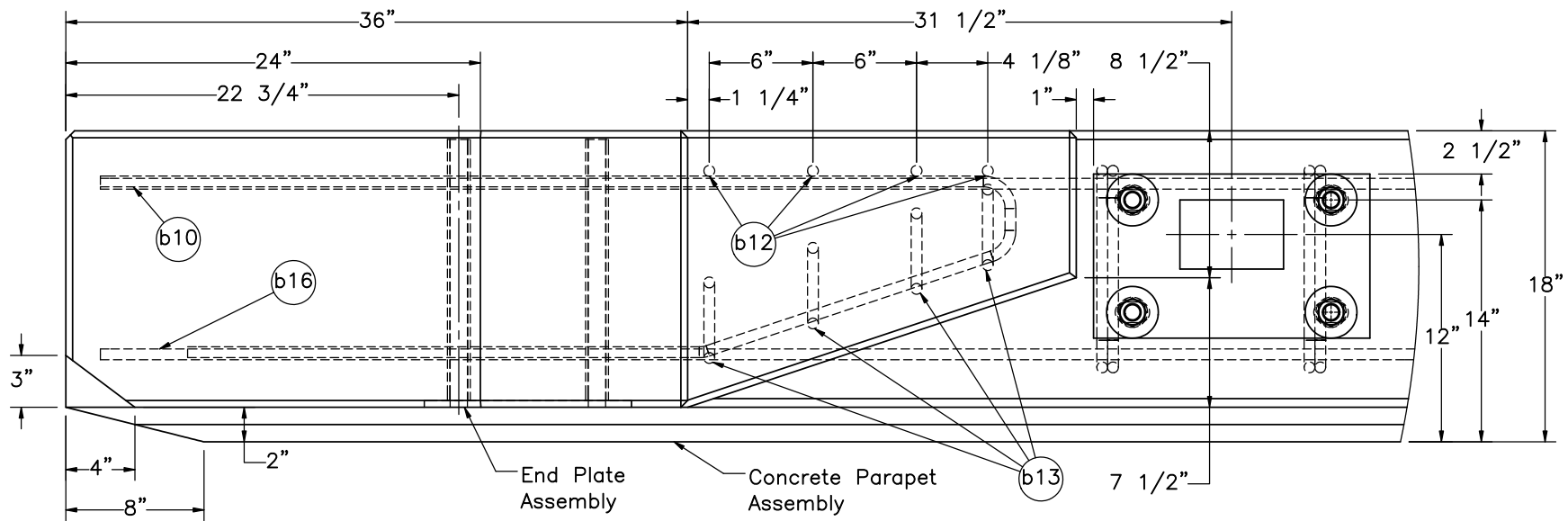
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Parapet Transition Details

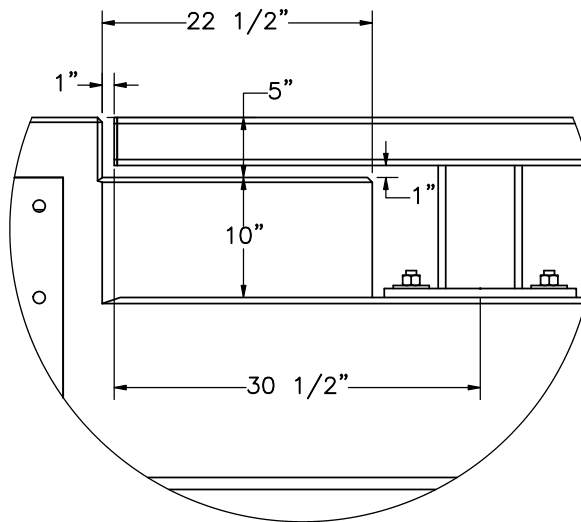
DWG. NAME:
MNCBR-1-3_R32

SCALE: 1:11
UNITS: in.

SHEET:
5 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GHR
REV. BY:
KAL/JEK/M
AHP/MH/RF



DETAIL A
(RAIL HIDDEN FROM VIEW FOR CLARITY)



DETAIL E
SCALE 1:16

(TYP FOR ALL
CONTROL JOINTS)

SECTION G-G
SCALE 1:1

SECTION F-F
SCALE 1:1



Midwest Roadside
Safety Facility

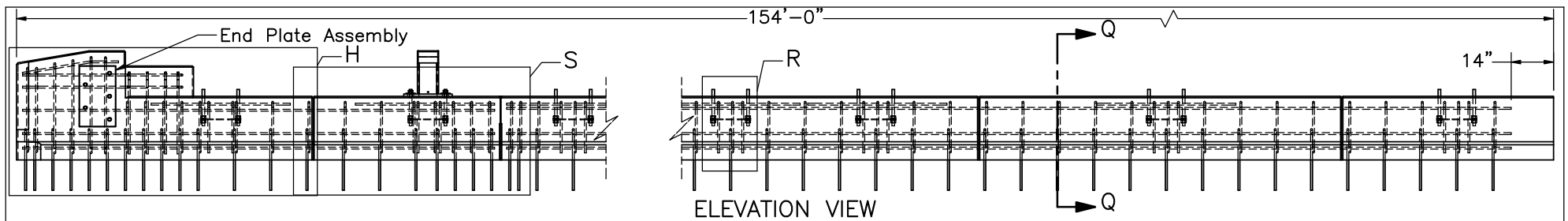
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Parapet Details

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:10
UNITS: in.

SHEET:
6 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



Item No.	QTY.	Description	Material Specification	Treatment Specification
—	1	Concrete Parapet Assembly	—	—
—	1	End Plate Assembly	—	ASTM A123
b1	1	Concrete	Min. f'c = 4000 psi	—
b2	160	#5 Rebar, 50" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b3	1	#5 Rebar, 48" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b4	2	#5 Rebar, 46 3/4" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b5	156	#5 Rebar, 70" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b6	2	#5 Rebar, 100" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b7	1	#5 Rebar, 98" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b8	1	#5 Rebar, 96" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b9	2	#5 Rebar, 90" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b10	2	#5 Rebar, 109 5/16" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b11	2	#5 Rebar, 32" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b12	4	#5 Rebar, 27" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b13	4	#5 Rebar, 33 7/8" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b14	46	#5 Rebar, 45 3/8" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b15	22	#5 Rebar, 46" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b16	6	#5 Rebar, 156" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b17	6	#5 Rebar, 1672" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b18	2	1/4" Dia., 8 5/8" Long Vertical Backer Rod	—	Not Needed
b19	1	1/4" Dia., 15 1/4" Long Horizontal Backer Rod	ASTM D5249 Type 3	Not Needed
c1	92	7/8"—9 UNC, 12" Long Vertical Anchor Rod	ASTM F1554 Gr. 105	ASTM A153
c3	152	7/8"—9 UNC Heavy Hex Nut	ASTM A563DH	ASTM A153
c4	23	13"x8"x1/4" Anchor Plate	ASTM A709 Gr. 50	ASTM A123
c5	184	7/8" Dia. SAE Washer	ASTM A709 Gr. 50	ASTM A153

- Notes: (1) Rebar should be epoxy-coated.
(2) Vertical reinforcement is embedded into concrete tarmac using a chemical epoxy adhesive with a minimum bond strength of 1,670 psi.



Midwest Roadside
Safety Facility

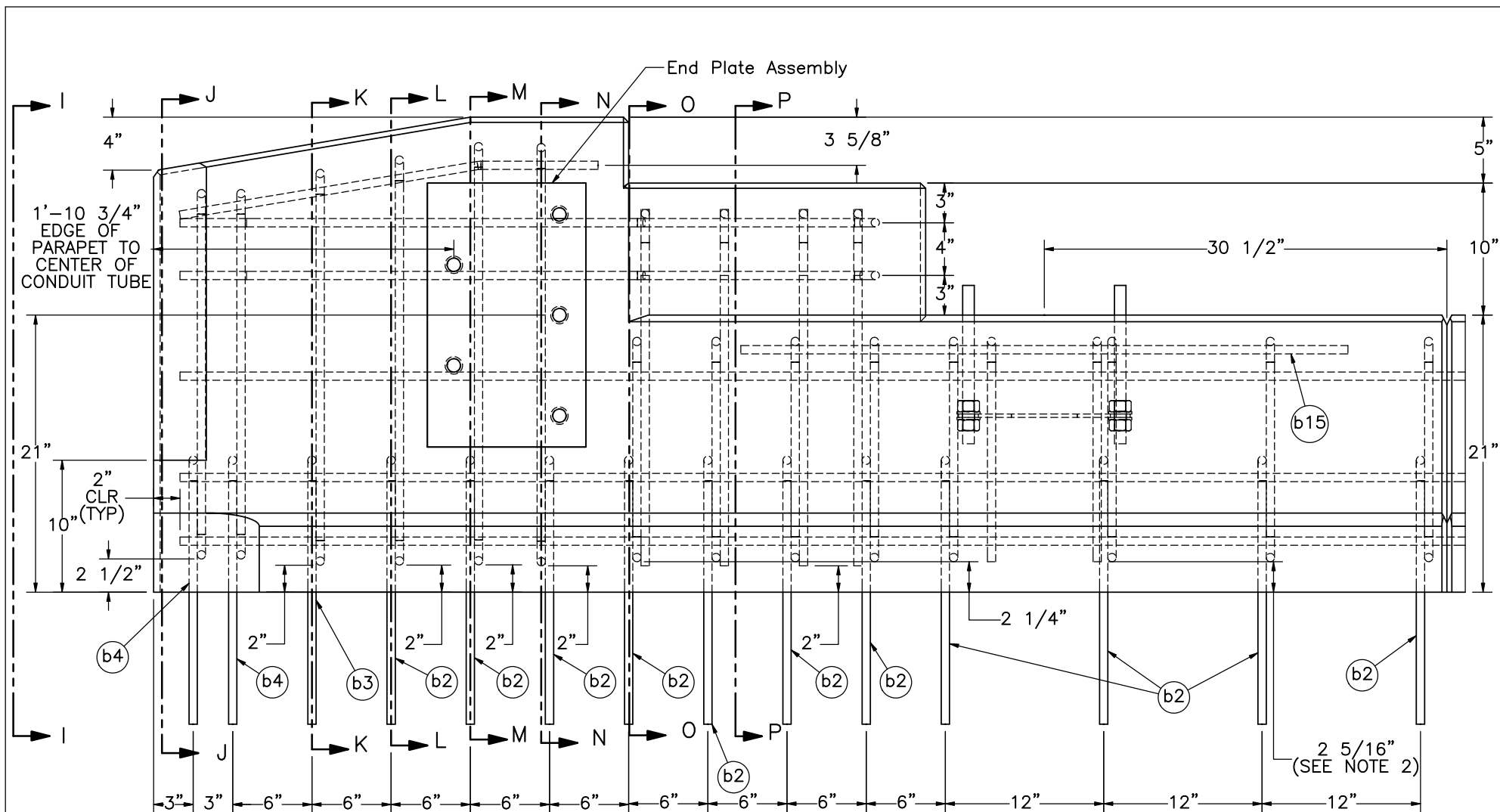
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Concrete Parapet Assembly

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:50
UNITS: in.

SHEET:
7 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GHR
REV. BY:
KAL/JEK/M
AHP/MH/RF



DETAIL H

- Notes:
- (1) All edges are finished with a 1/2" chamfer except where otherwise noted.
 - (2) Clear cover on barrier bottom varies according to provided bar dimensions.
 - (3) Rebar should be epoxy-coated.
 - (4) Vertical reinforcement is embedded into concrete tarmac using a chemical epoxy adhesive with a minimum bond strength of 1,670 psi.



Midwest Roadside
Safety Facility

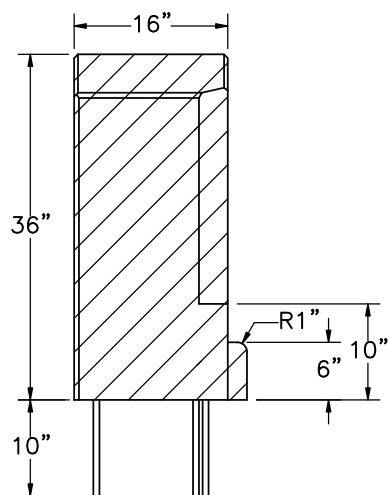
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Parapet Details

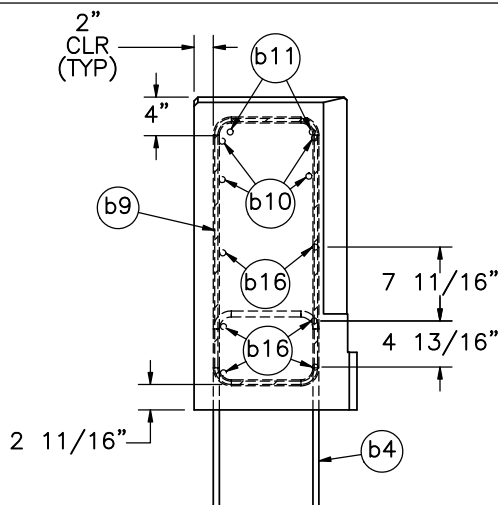
DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:11
UNITS: in.

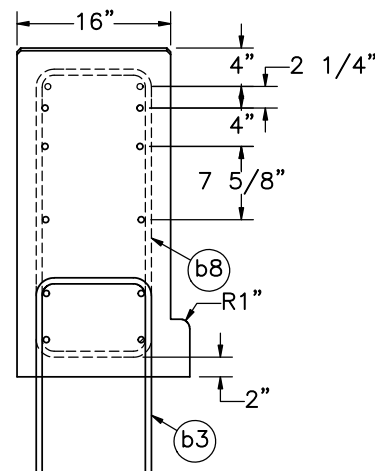
SHEET:
8 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



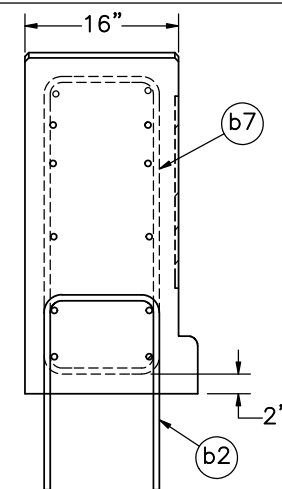
SECTION I-I



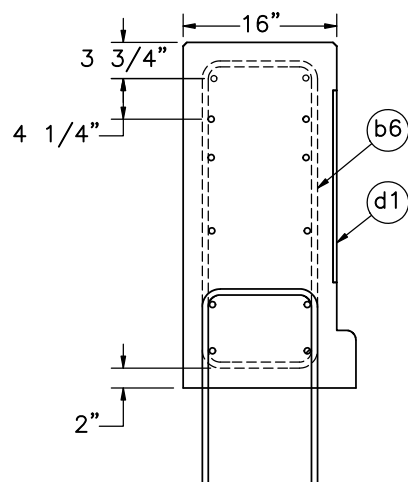
SECTION J-J



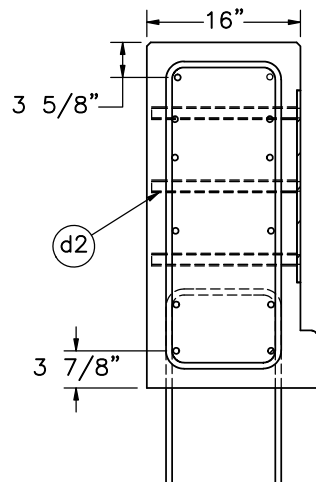
SECTION K-K



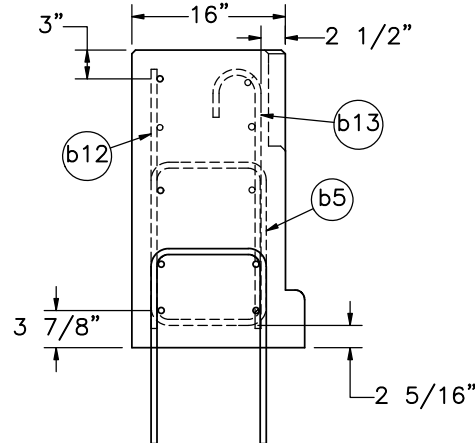
SECTION L-L



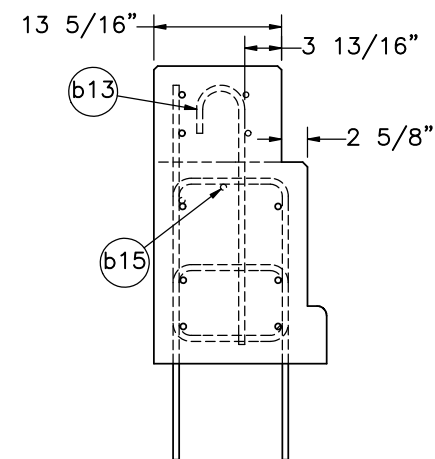
SECTION M-M



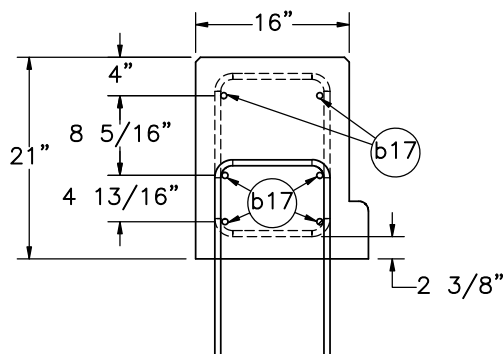
SECTION N-N



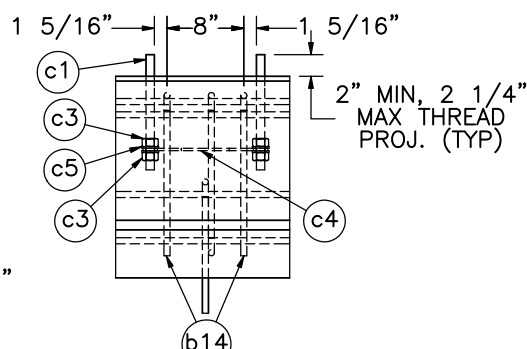
SECTION O-O



SECTION P-P



SECTION Q-Q



DETAIL R

- Notes: (1) Progressive sections note only what changes from previous section.
 (2) Rebar should be epoxy-coated.
 (3) Vertical reinforcement is embedded into concrete tarmac using a chemical epoxy adhesive with a minimum bond strength of 1,670 psi.



Midwest Roadside
Safety Facility

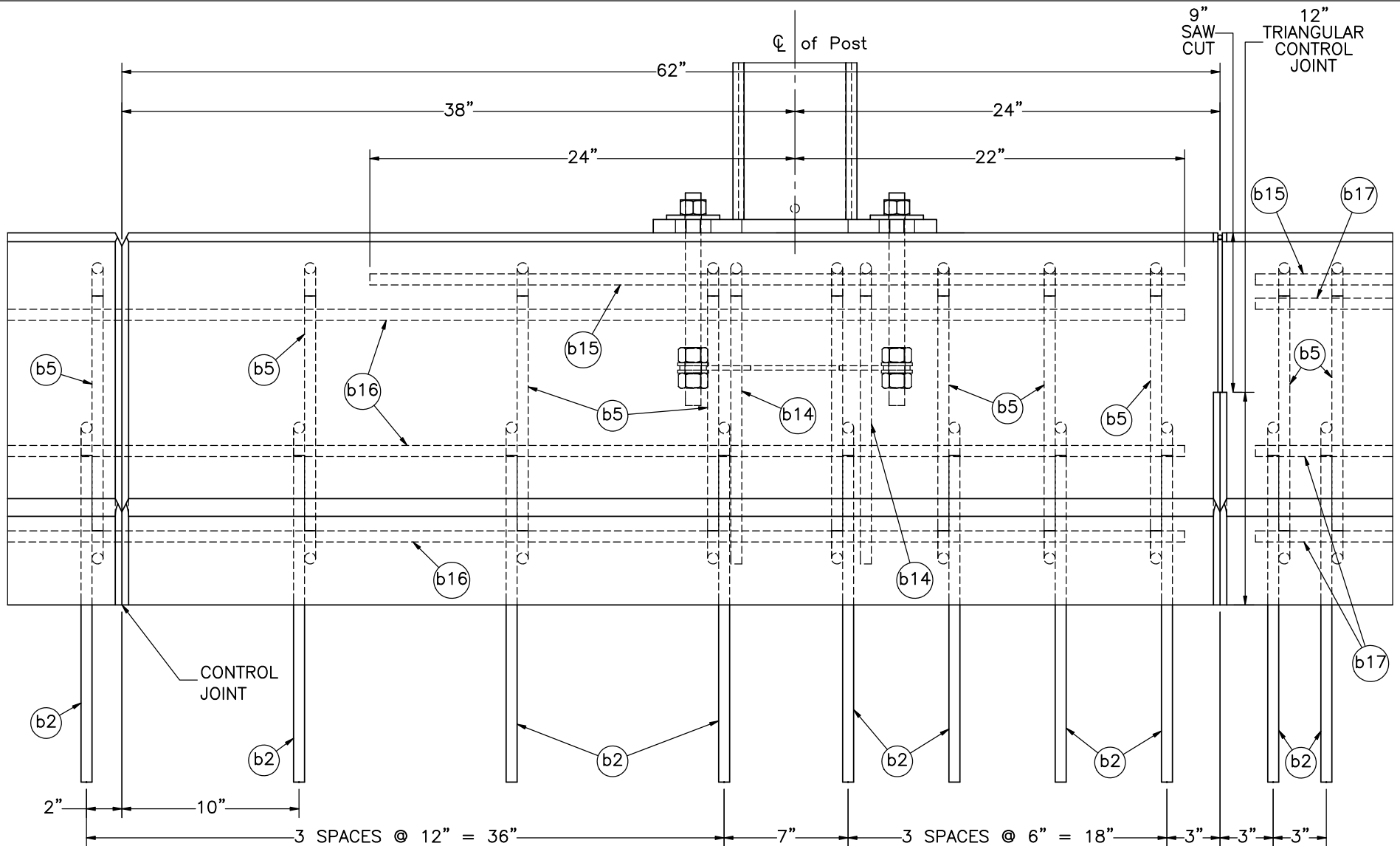
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Rebar and Parapet Details

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:20
UNITS: in.

SHEET:
9 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



DETAIL S

Note: (1) Part b15 should be 2' from centerline of post on either side, except from length close to saw cut joint, 2" clearance must be maintained.



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Additional Parapet Details

DWG. NAME.
MNCBR-1-3_R32

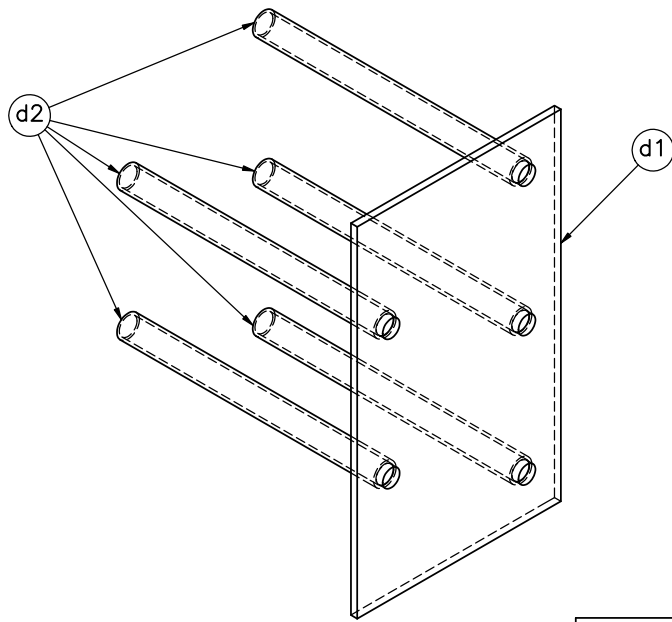
SCALE: 1:8
UNITS: in.

SHEET:
10 of 28

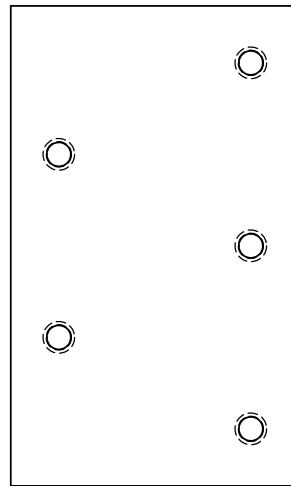
DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR

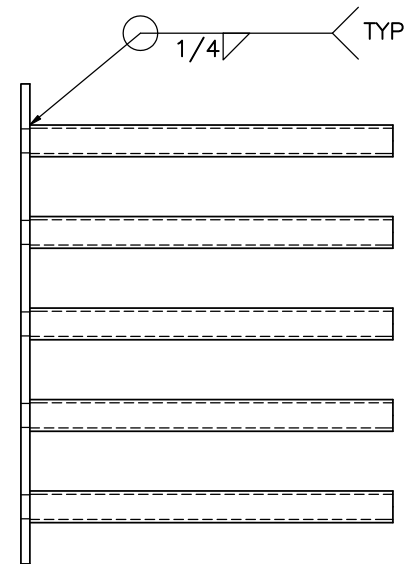
REV. BY:
KAL/JEK/M
AHP/MH/RF



ISOMETRIC VIEW



ELEVATION VIEW



PROFILE VIEW

Item No.	QTY.	Description	Material Specification	Treatment Specification
—	1	End Plate Assembly	—	ASTM A123
d1	1	12"x20"x3/8" End Plate	ASTM A709 Gr. 50	See Assembly
d2	5	1.049" ID 1.68 lb/ft Standard Pipe, 15 1/8" Long	ASTM A53 Schedule 40	See Assembly

MWRSF

Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

End Plate Assembly

DWG. NAME.
MNCBR-1-3_R32

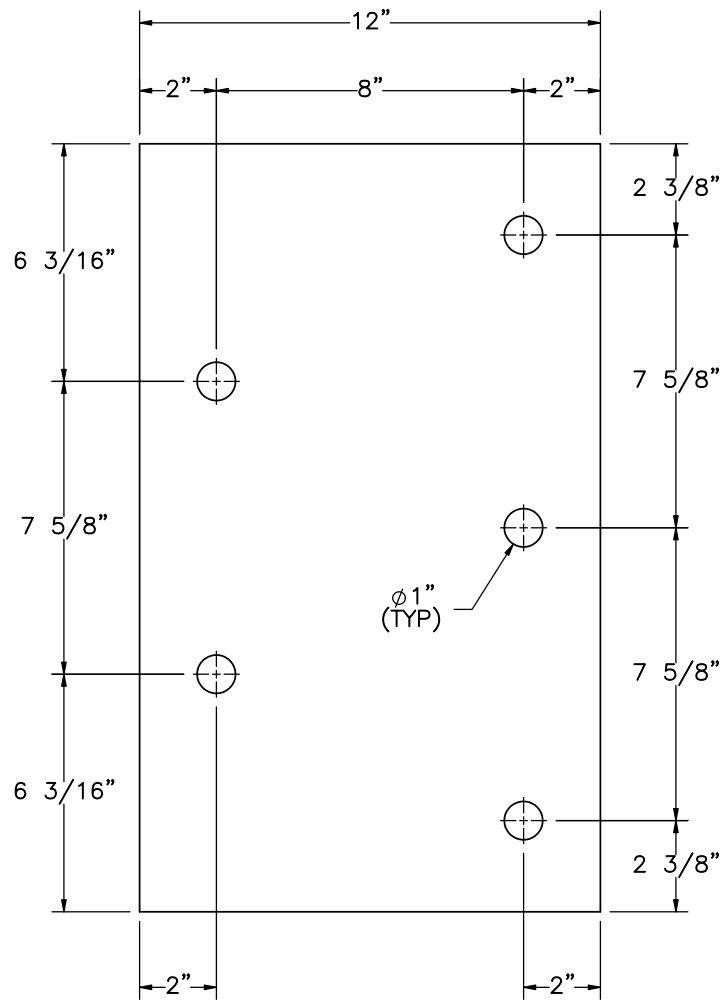
SCALE: 1:8
UNITS: in.

SHEET:
11 of 28

DATE:
1/21/2021

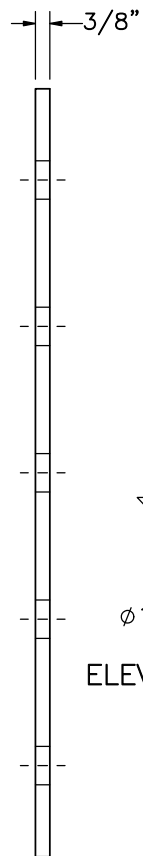
DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GHR

REV. BY:
KAL/JEK/M
AHP/MH/RF

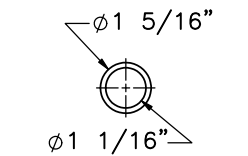


ELEVATION VIEW

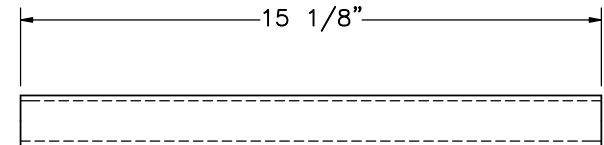
Part d1



PROFILE VIEW



ELEVATION VIEW



PROFILE VIEW

Part d2



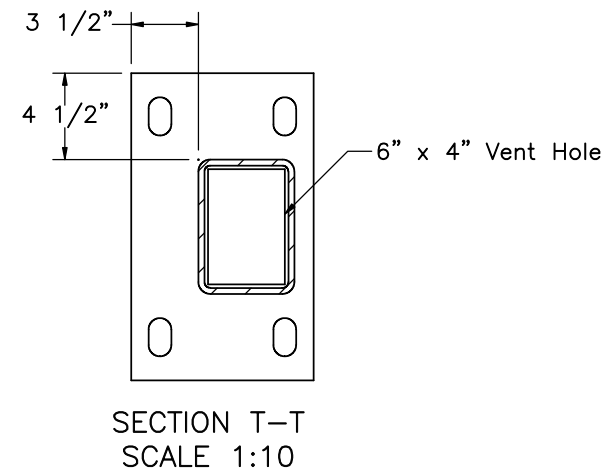
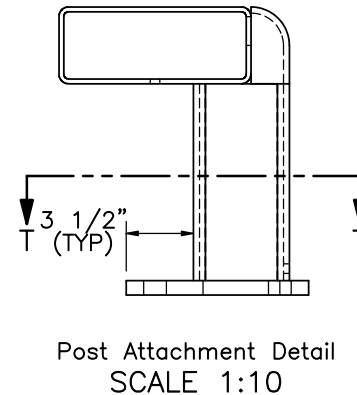
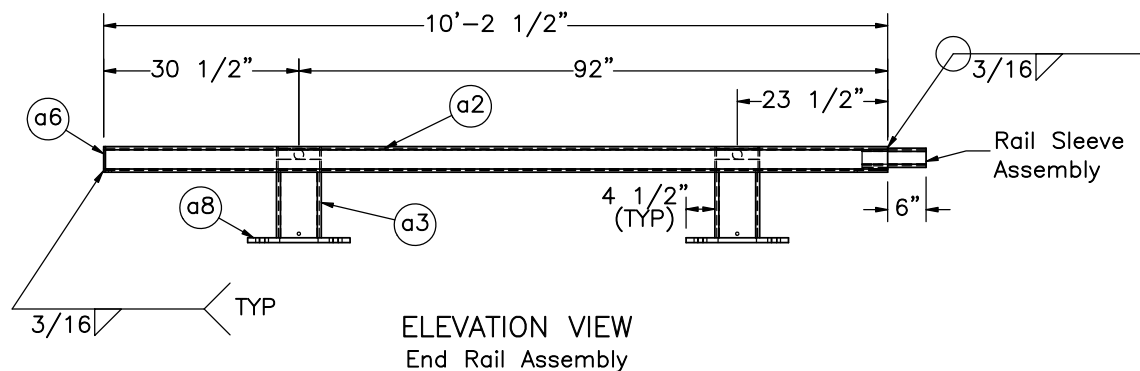
Concrete Parapet with
 Brush Curb and Post Rail
 Test Series MNCBR

End Plate Assembly
 Components

DWG. NAME:
 MNCBR-1-3_R32

SCALE: 1:5
 UNITS: in.

SHEET:
 12 of 28
 DATE:
 1/21/2021
 DRAWN BY:
 JRF/SBW/M
 JW/JEK/LJP
 /GHR
 REV. BY:
 KAL/JEK/M
 AHP/MH/RF



Item No.	QTY.	Description	Material Specification	Treatment Specification
—	1	End Rail Assembly	—	ASTM A123
a2	1	HSS10"x4"x1/4", 10'-2 1/2" Long Tube Rail	ASTM A500 Gr. B	See Assembly
a3	2	HSS 7"x5"x5/16", 10 1/4" Long Tube Post	ASTM A500 Gr. B	See Assembly
a5	4	4"x2"x1/4" Post Plate	ASTM A709 Gr. 50	See Assembly
a6	1	10"x4"x1/4" Rail End Plate	ASTM A709 Gr. 50	See Assembly
a7	2	16"x9 1/2"x3/4" Post Base Plate	ASTM A709 Gr. 50	See Assembly
a8	2	6 1/2"x4 7/8"x5/16" Post Bent Plate	ASTM A709 Gr. 50	See Assembly
a13	1	9"x3"x1/4", 10" Long Rail Sleeve	ASTM A500 Gr. B	See Assembly



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Rail and Post Assemblies
State Standard Drawing

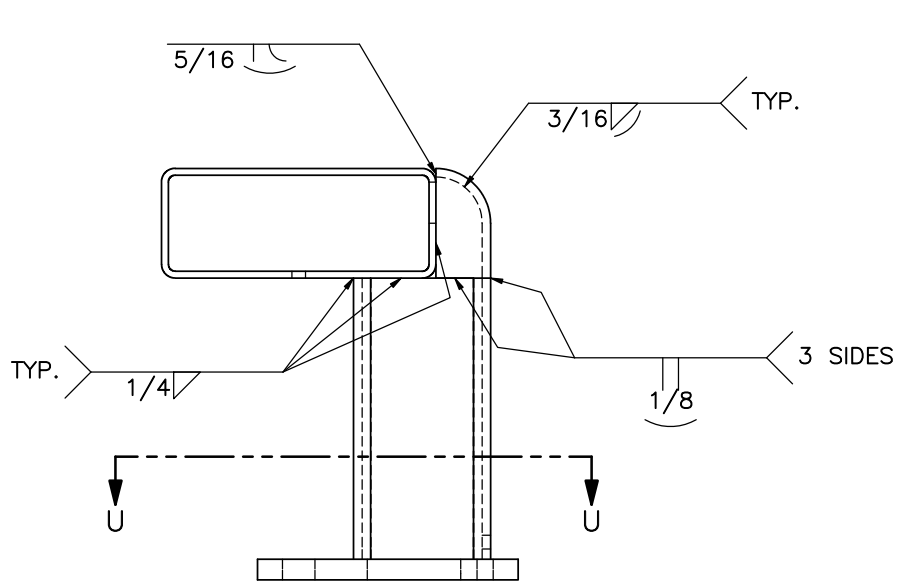
DWG. NAME:
MNCBR-1-3_R32

SCALE: 1:30
UNITS: in.

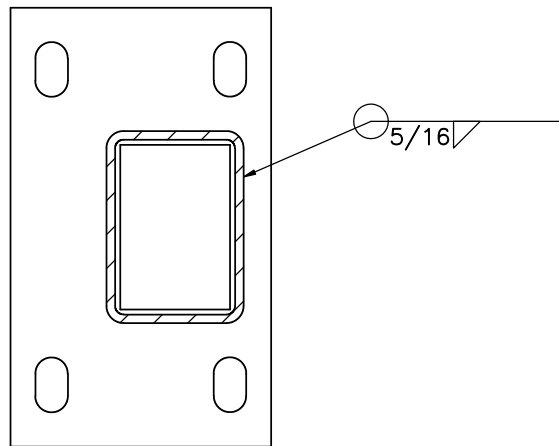
SHEET:
13 of 28

DATE:
1/21/2021

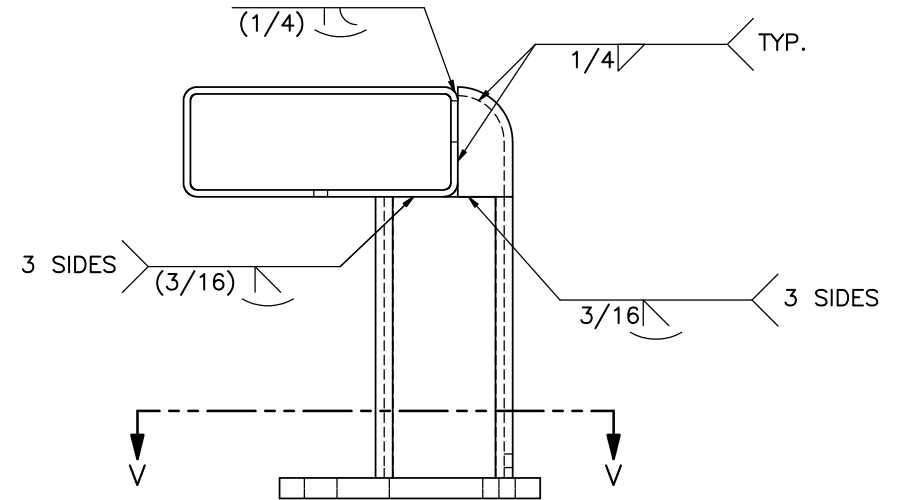
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



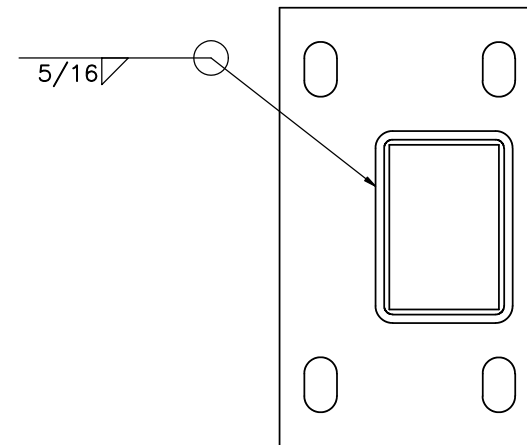
PROFILE VIEW



SECTION U-U
Welding Profile: Option 1



PROFILE VIEW



SECTION V-V
Welding Profile: Option 2

Note: (1) Fabricator can select either welding Option 1 or 2.



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Post Attachment Details

DWG. NAME.
MNCBR-1-3_R32

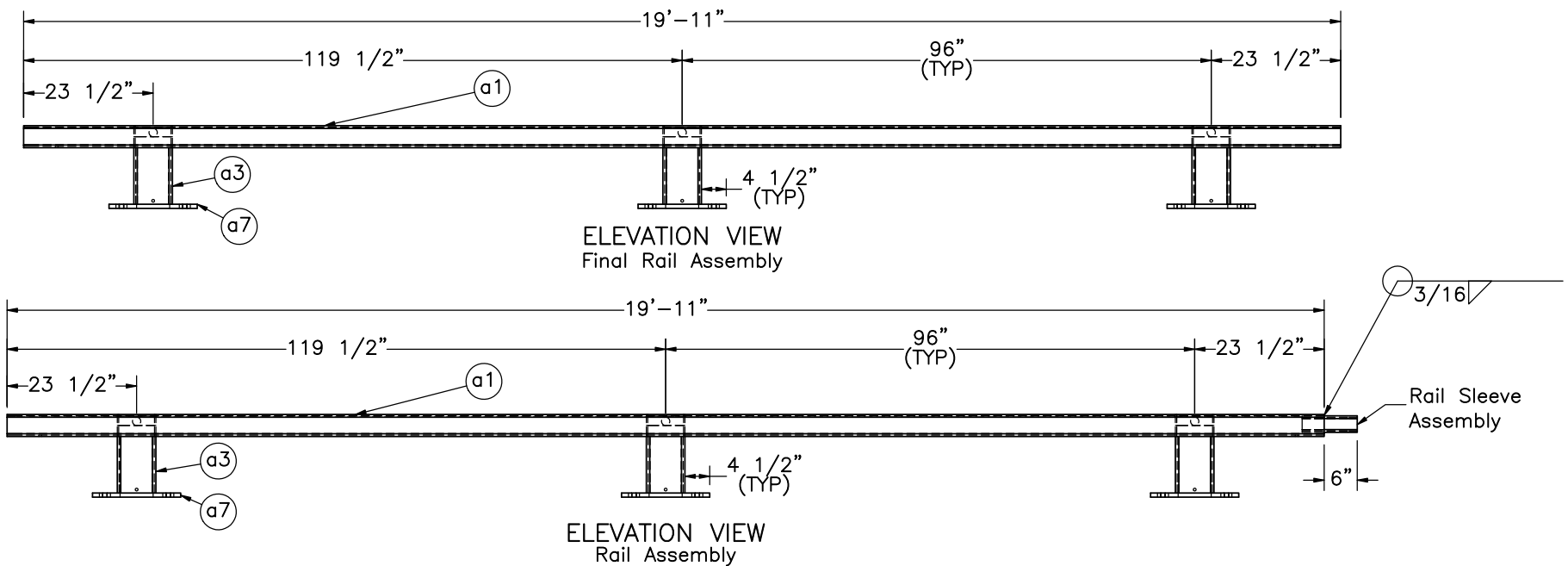
SCALE: 1:7
UNITS: in.

SHEET:
14 of 28

DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GJR

REV. BY:
KAL/JEK/M
AHP/MH/RF



Item No.	QTY.	Description	Material Specification	Treatment Specification
—	1	Final Rail Assembly	—	ASTM A123
a1	1	HSS10"x4"x1/4", 19' 11" Long Tube Rail	ASTM A500 Gr. B	See Assembly
a3	3	HSS 7"x5"x5/16", 10 1/4" Long Tube Post	ASTM A500 Gr. B	See Assembly
a5	6	4"x2"x1/4" Post Plate	ASTM A709 Gr. 50	See Assembly
a7	3	16"x9 1/2"x3/4" Post Base Plate	ASTM A709 Gr. 50	See Assembly
a8	3	6 1/2"x4 7/8"x5/16" Post Bent Plate	ASTM A709 Gr. 50	See Assembly

Item No.	QTY.	Description	Material Specification	Treatment Specification
—	6	Rail Assembly	—	ASTM A123
a1	1	HSS10"x4"x1/4", 19' 11" Long Tube Rail	ASTM A500 Gr. B	See Assembly
a3	3	HSS 7"x5"x5/16", 10 1/4" Long Tube Post	ASTM A500 Gr. B	See Assembly
a5	6	4"x2"x1/4" Post Plate	ASTM A709 Gr. 50	See Assembly
a7	3	16"x9 1/2"x3/4" Post Base Plate	ASTM A709 Gr. 50	See Assembly
a8	3	6 1/2"x4 7/8"x5/16" Post Bent Plate	ASTM A709 Gr. 50	See Assembly
a13	1	HSS 9"x3"x1/4", 10" Long Rail Sleeve	ASTM A500 Gr. B	See Assembly



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Rail Assemblies

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:30
UNITS: in.

SHEET:
15 of 28

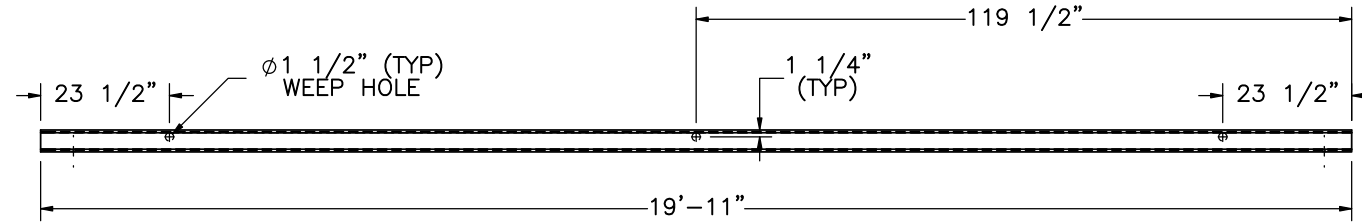
DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GJR

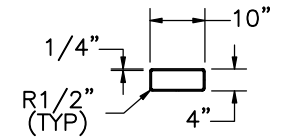
REV. BY:
KAL/JEK/M
AHP/MH/RF



PLAN VIEW



ELEVATION VIEW

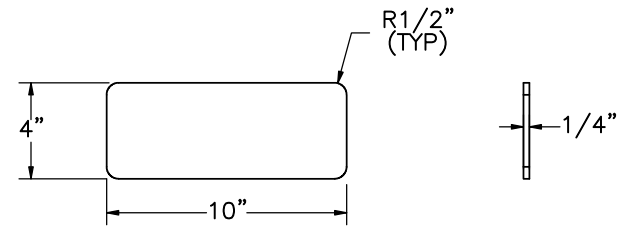


PROFILE VIEW

Part a1



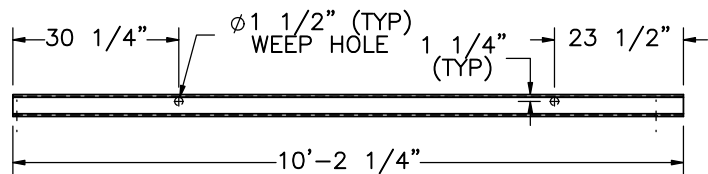
PLAN VIEW



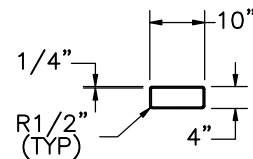
ELEVATION VIEW

PROFILE VIEW

Part a6
SCALE 1:8



ELEVATION VIEW



PROFILE VIEW

Part a2



Midwest Roadside
Safety Facility

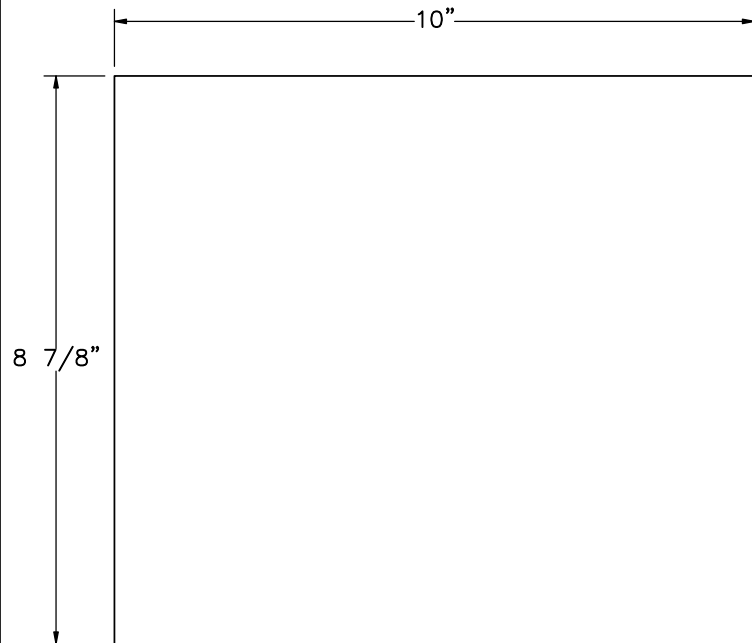
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Rail Components

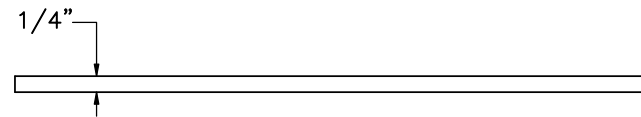
DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:35
UNITS: in.

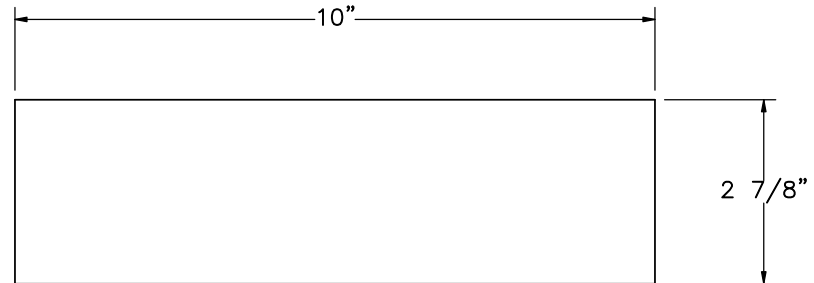
SHEET:
16 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



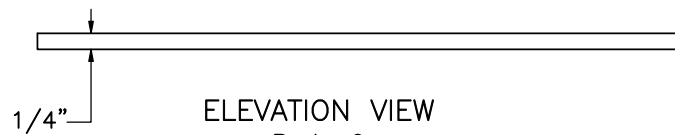
PLAN VIEW



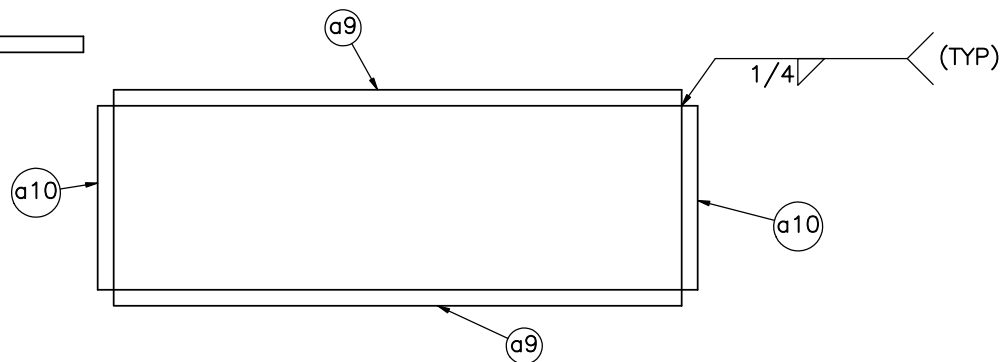
PLAN VIEW



ELEVATION VIEW
Part a10

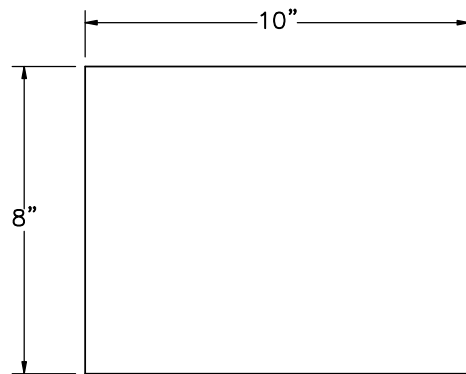


ELEVATION VIEW
Part a9

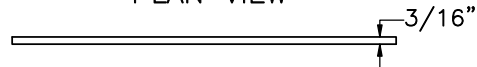


PROFILE VIEW
Rail Sleeve Assembly Option 1

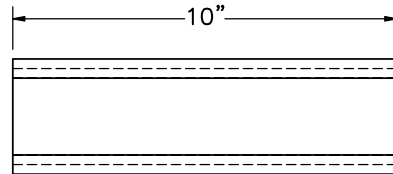
						Concrete Parapet with Brush Curb and Post Rail Test Series MNCBR		SHEET: 17 of 28	
								DATE: 1/21/2021	
Item No.	QTY.	Description	Material Specification	Treatment Specification	Midwest Roadside Safety Facility	Rail Sleeve Assembly Option 1		DRAWN BY: JRF/SBW/MJM/JEK/LJP/GJR	
a4	7	Rail Sleeve Assembly (Option 1)	—	ASTM A123				REV. BY: KAL/JEK/MHP/MH/RF	
a9	2	10"x8 7/8"x1/4" Plate	ASTM A709 Gr. 50	See Assembly		DWG. NAME: MNCBR-1-3_R32		SCALE: 1:3 UNITS: in.	
a10	2	10"x2 7/8"x1/4" Plate	ASTM A709 Gr. 50	See Assembly					



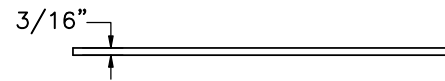
PLAN VIEW



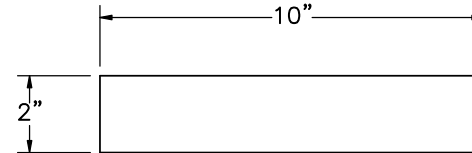
ELEVATION VIEW
Part a11



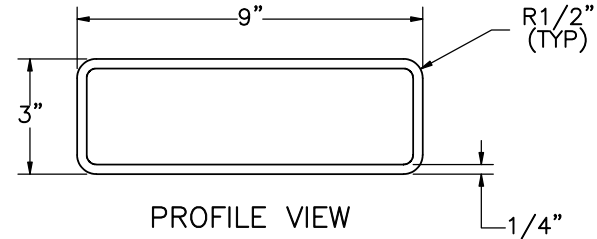
ELEVATION VIEW



PLAN VIEW

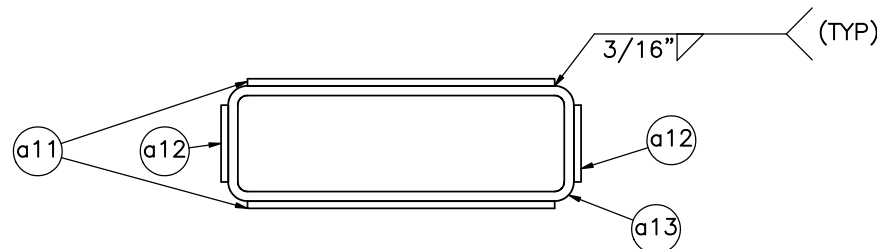


ELEVATION VIEW
Part a12



PROFILE VIEW

Part a13



PROFILE VIEW

Part a4 (Rail Sleeve Assembly Option 2)

Item No.	QTY.	Description	Material Specification	Treatment Specification
a4	7	Rail Sleeve Assembly (Option 2)	—	ASTM A123
a11	2	10"x8"x3/16" Plate	ASTM A709 Gr. 50	See Assembly
a12	2	10"x2"x3/16" Plate	ASTM A709 Gr. 50	See Assembly
a13	1	HSS 9"x3"x1/4", 10" Long Rail Sleeve	ASTM A500 Gr. B	See Assembly



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Rail Sleeve Assembly Option 2

DWG. NAME.
MNCBR-1-3_R32

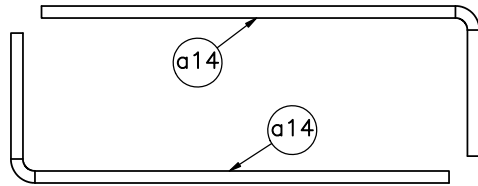
SCALE: 1:5
UNITS: in.

SHEET:
18 of 28

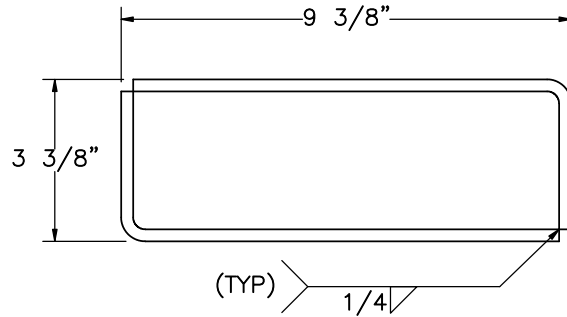
DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GHR

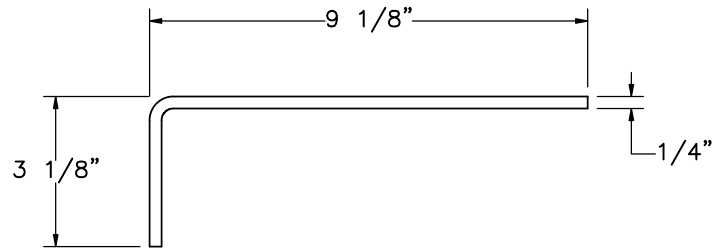
REV. BY:
KAL/JEK/M
AHP/MH/RF



Fit of Assembly

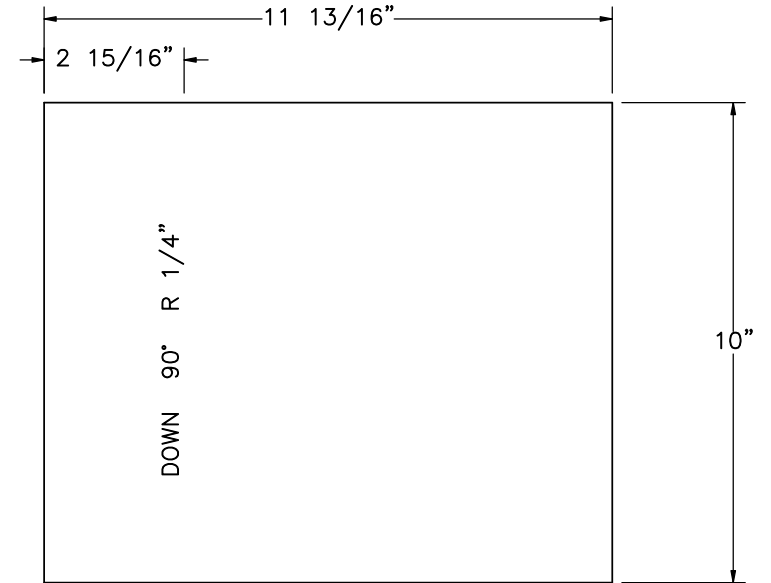


PROFILE VIEW
Rail Sleeve Option 3

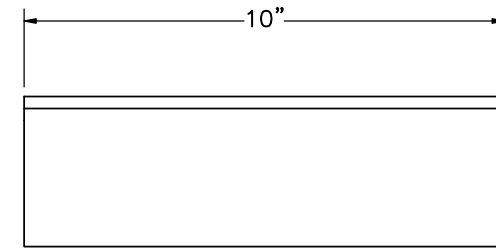


PROFILE VIEW

Part a14



FLAT PATTERN



ELEVATION VIEW

Item No.	QTY.	Description	Material Specification	Treatment Specification
a4	7	Rail Sleeve Assembly (Option 3)	—	ASTM A123
a14	2	10"x11 13/16"x1/4" Rail Sleeve Bent Plate	ASTM A709 Gr. 50	See Assembly



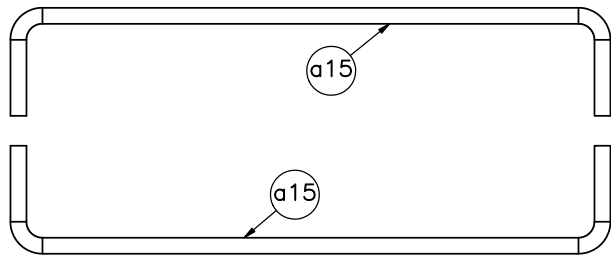
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Rail Sleeve Assembly Option 3

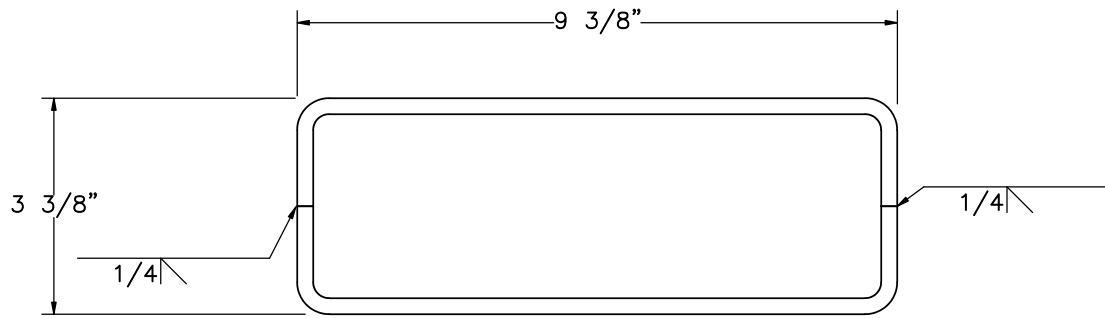
DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:4
UNITS: in.

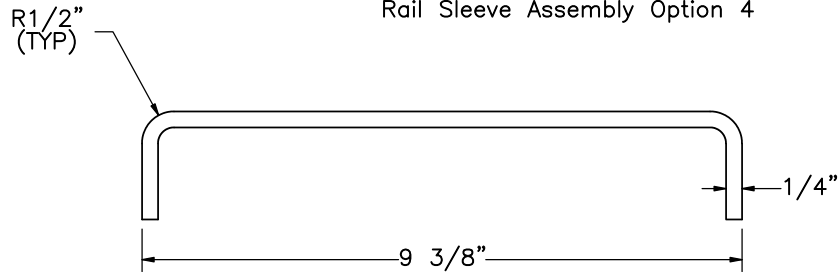
SHEET:
19 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



Fit of Assembly

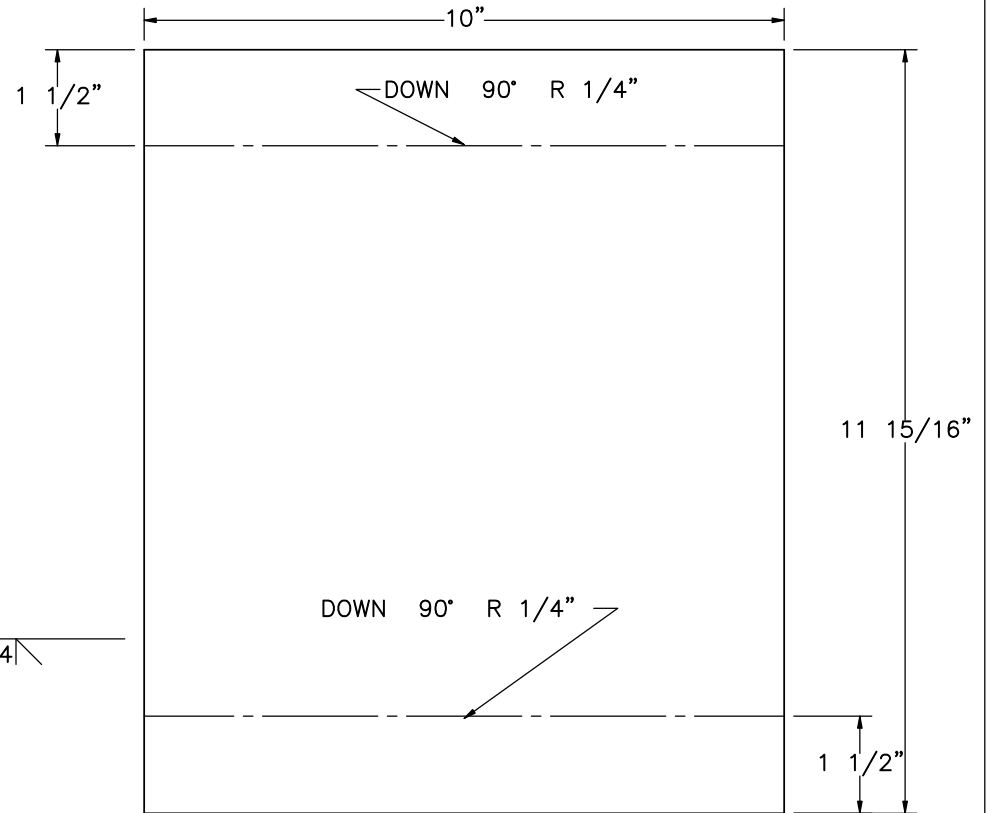


PROFILE VIEW
Rail Sleeve Assembly Option 4



PROFILE VIEW

Part a15



FLAT PATTERN

ELEVATION VIEW

Note: (1) Bevel welds to be ground smooth.

Item No.	QTY.	Description	Material Specification	Treatment Specification
a4	7	Rail Sleeve Assembly (Option 4)	—	ASTM A123
a15	2	10"x11 15/16"x1/4" Rail Sleeve Bent Plate	ASTM A709 Gr. 50	See Assembly



Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Rail Sleeve Assembly Option 4

DWG. NAME.
MNCBR-1-3_R32

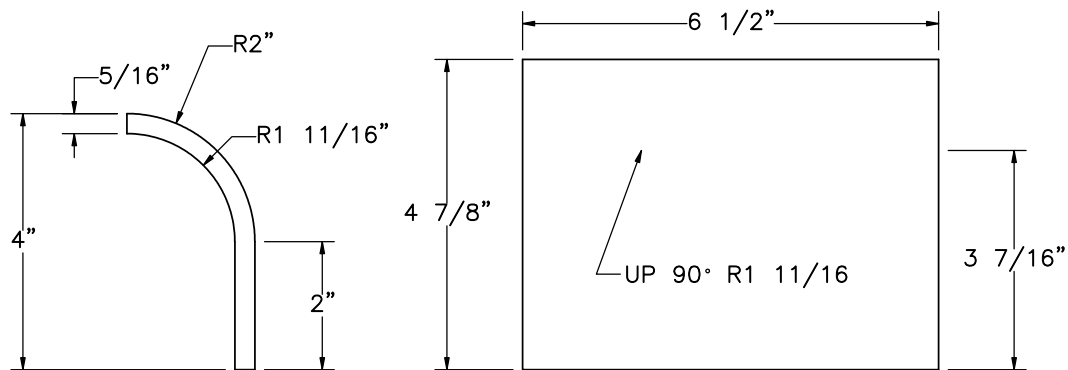
SCALE: 1:3
UNITS: in.

SHEET:
20 of 28

DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR

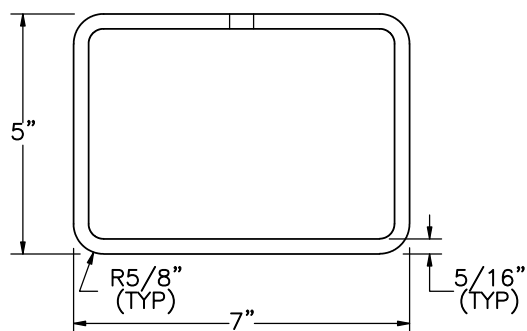
REV. BY:
KAL/JEK/M
AHP/MH/RF



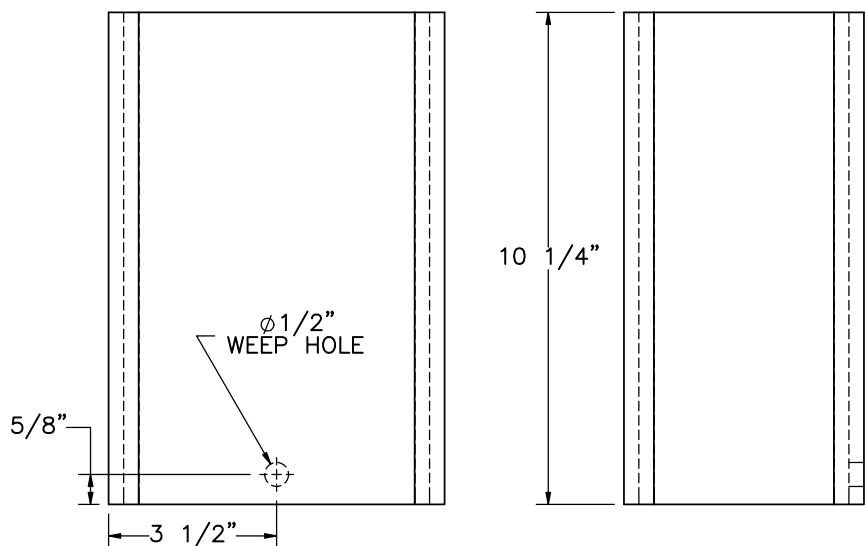
PROFILE VIEW

Part a8

FLAT PATTERN



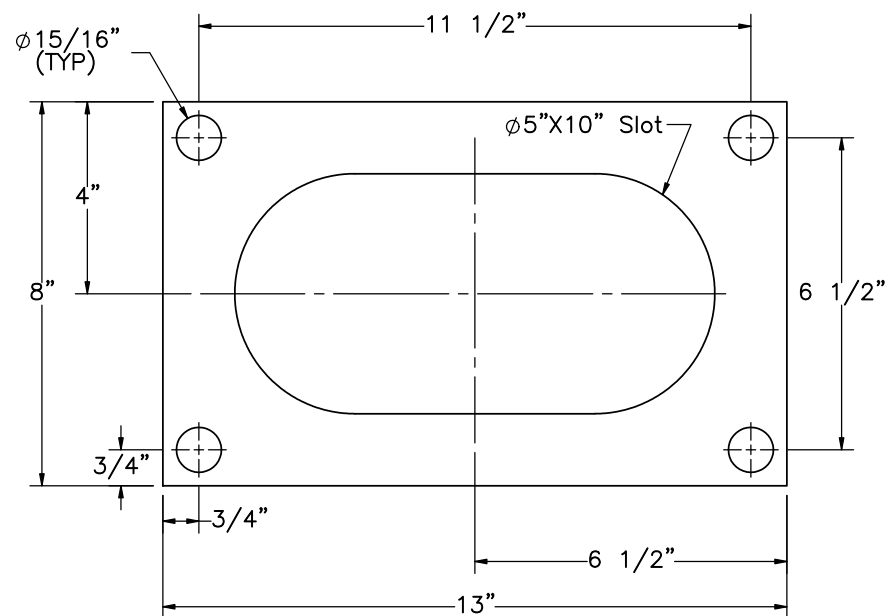
PLAN VIEW



ELEVATION VIEW

Part a3

PROFILE VIEW



PLAN VIEW

ELEVATION VIEWS

Part c4



Midwest Roadside
Safety Facility

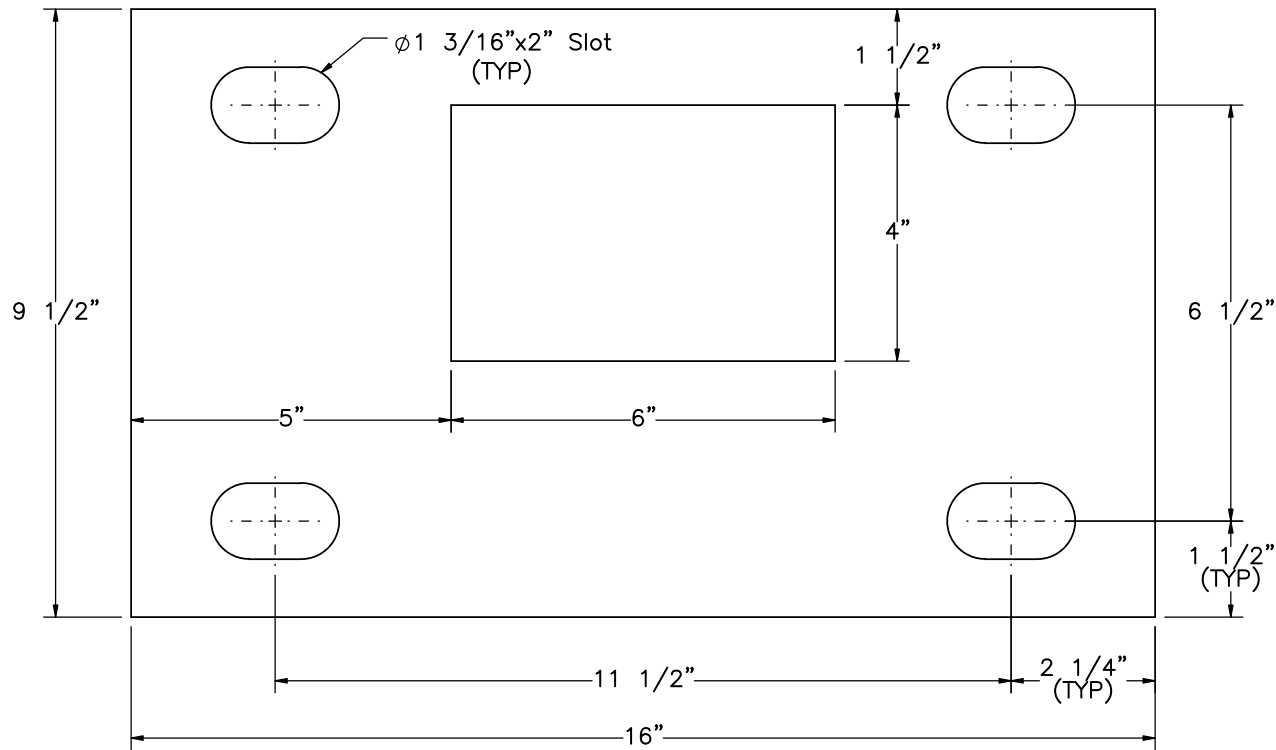
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Post Components

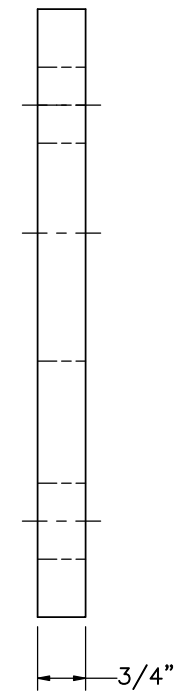
DWG. NAME:
MNCBR-1-3_R32

SCALE: 1:4
UNITS: in.

SHEET:
21 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GHR
REV. BY:
KAL/JEK/M
AHP/MH/RF

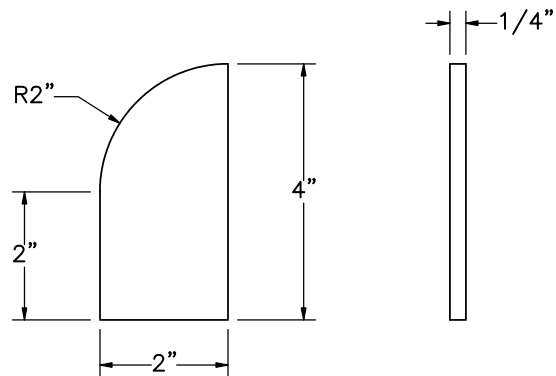


PLAN VIEW

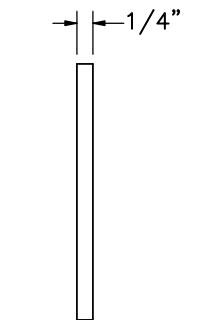


PROFILE VIEW

Part a7



PLAN VIEW



PROFILE VIEW

Part a5



Midwest Roadside
Safety Facility

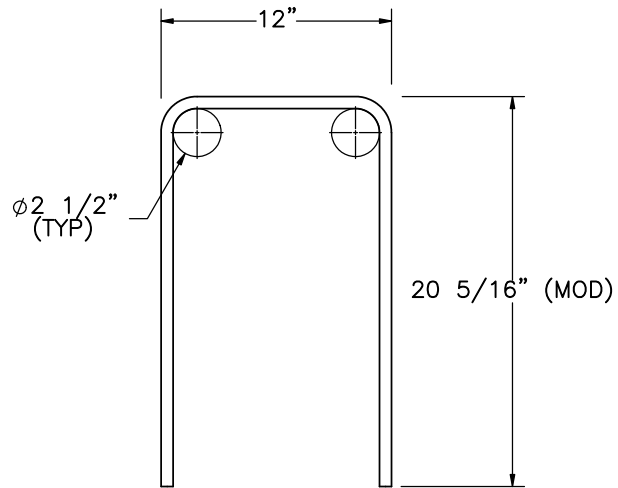
Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Post Components

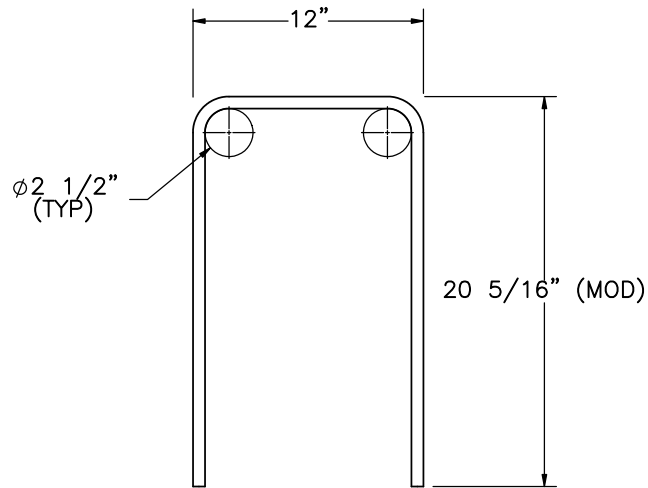
DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:3
UNITS: in.

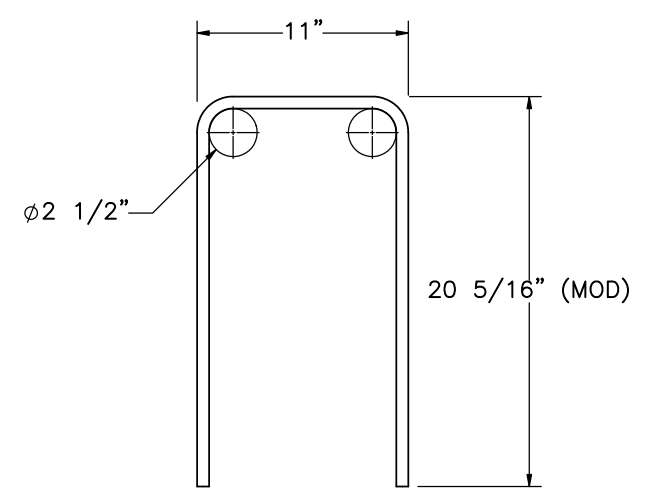
SHEET:
22 of 28
 DATE:
1/21/2021
 DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GJR
 REV. BY:
KAL/JEK/M
AHP/MH/RF



Part b2
R501E (MOD)



Part b3
R502E (MOD)



Part b4
R503E (MOD)

Bar	QTY.	Size	Total Unbent Length	Material Specification	Treatment Specification
b2	160	#5	50"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b3	1	#5	50"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b4	2	#5	49"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)



Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

System Rebar

DWG. NAME.
MNCBR-1-3_R32

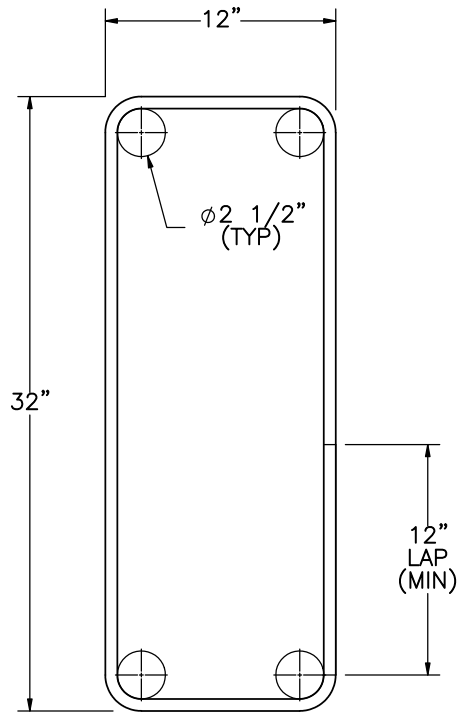
SCALE: 1:10
UNITS: in.

SHEET:
23 of 28

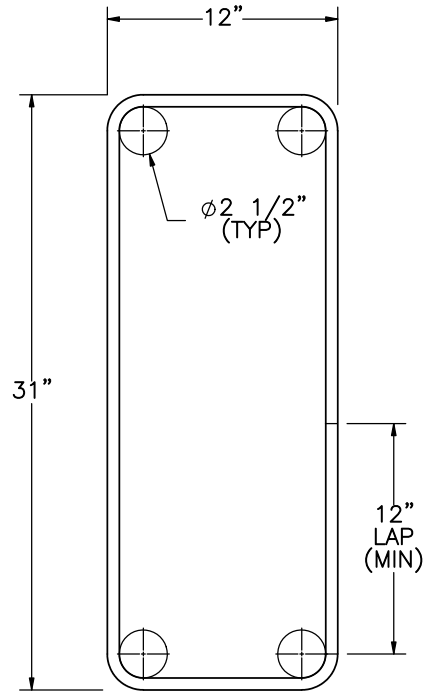
DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GHR

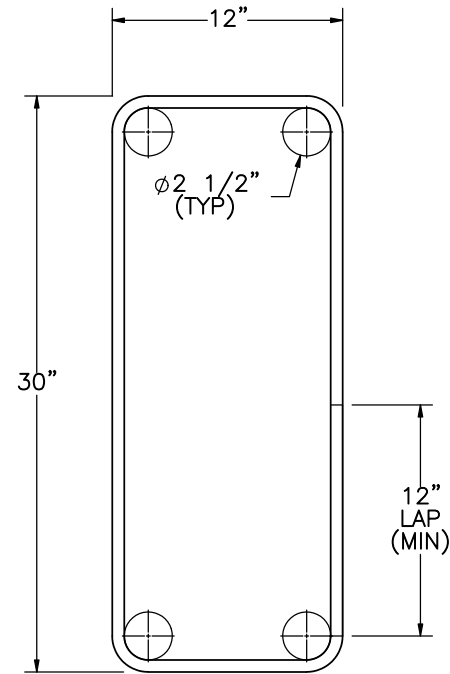
REV. BY:
KAL/JEK/M
AHP/MH/RF



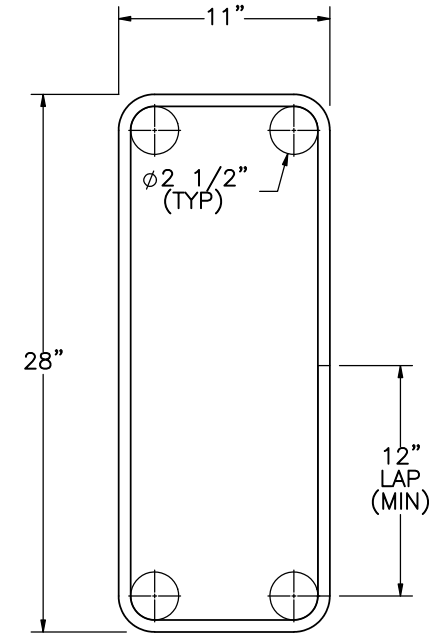
Part b6
R505E



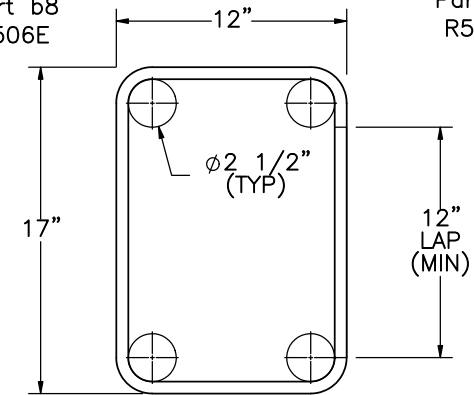
Part b7
R506E



Part b8
R506E



Part b9
R507E



Part b5
R504E

Item No.	QTY.	Size	Total Unbent Length	Material Specification	Treatment Specification
b5	157	#5	70"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b6	2	#5	100"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b7	1	#5	98"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b8	1	#5	96"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b9	2	#5	90"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

System Rebar

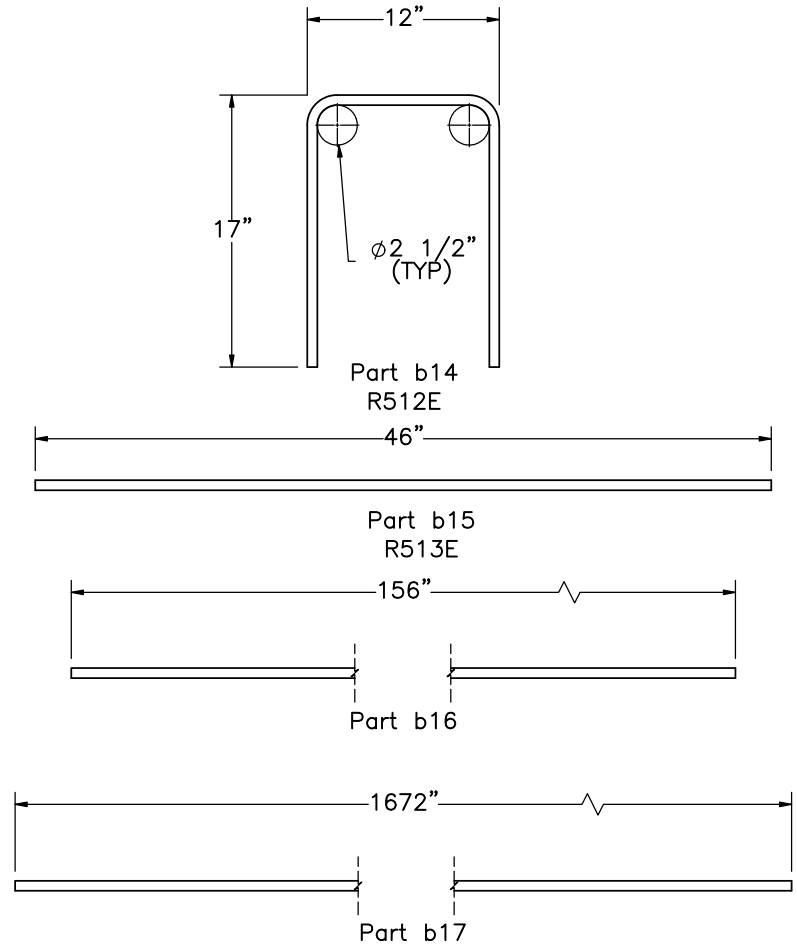
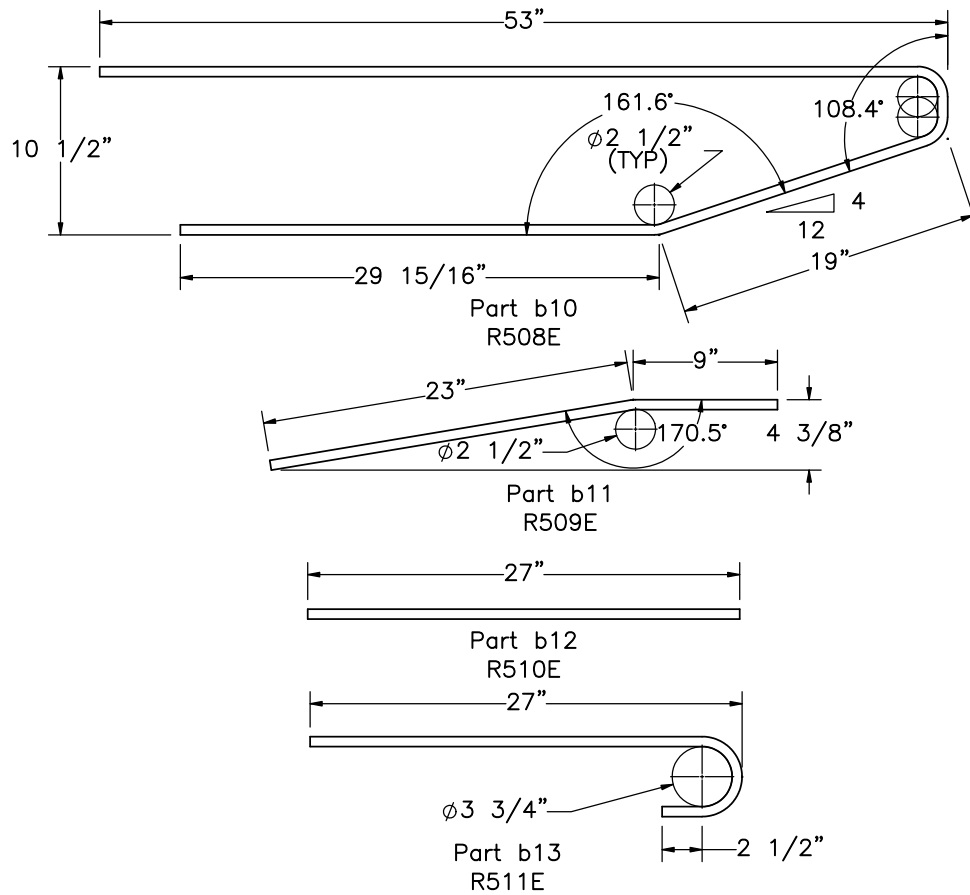
DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:10
UNITS: in.

SHEET:
24 of 28

DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF



Notes: (1) Minimum lap length for longitudinal bars is 3'-1".

Bar	QTY.	Size	Total Unbent Length	Material Specification	Treatment Specification
b10	2	#5	104 1/4"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b11	2	#5	32"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b12	4	#5	27"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b13	4	#5	33 7/8"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b14	46	#5	43 3/8"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b15	22	#5	48"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b16	6	#5	156"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)
b17	6	#5	1672"	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

System Rebar

DWG. NAME.
MNCBR-1-3_R32

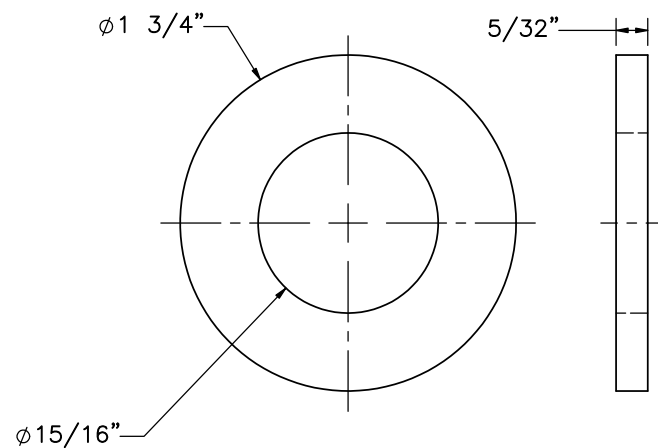
SCALE: 1:12
UNITS: in.

SHEET:
25 of 28

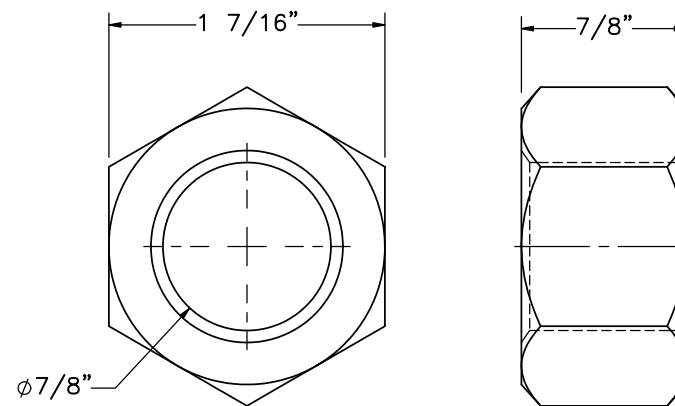
DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR

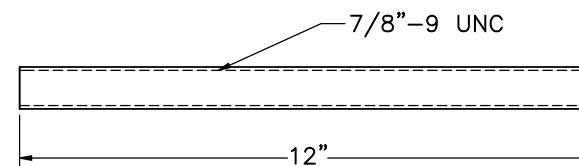
REV. BY:
KAL/JEK/M
AHP/MH/RF



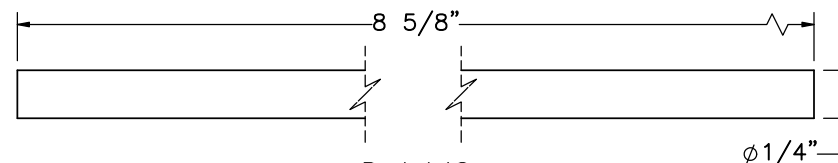
Part c5



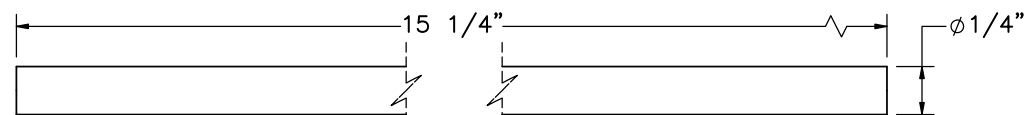
Part c3



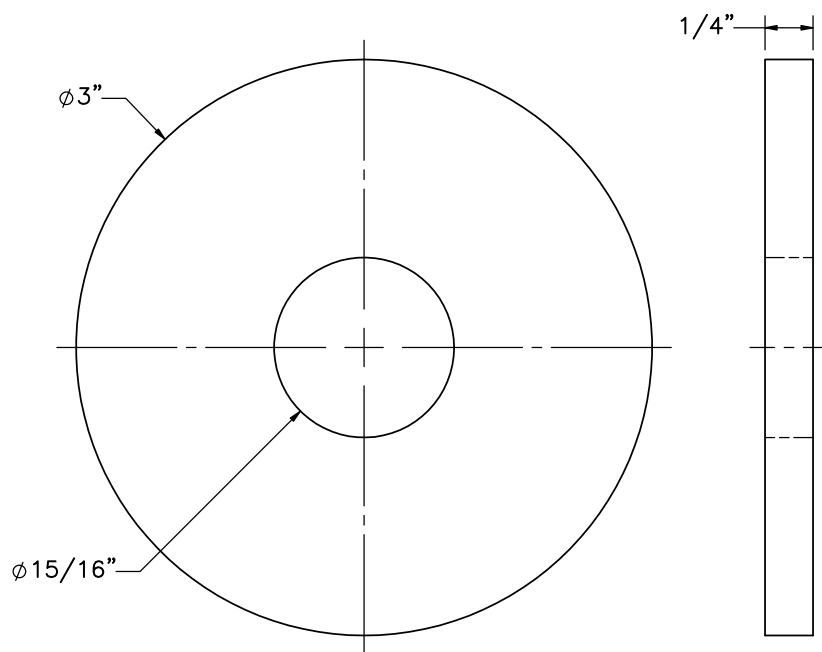
Part c1
SCALE 1:4



Part b18



Part b19



Part c2



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Hardware

DWG. NAME.
MNCBR-1-3_R32

SCALE: 1:1
UNITS: in.

SHEET:
26 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GJR
REV. BY:
KAL/JEK/M
AHP/MH/RF

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
a1	7	HSS10"x4"x1/4", 19' 11" Long Tube Rail	ASTM A500 Gr. B	See Assembly	—
a2	1	HSS10"x4"x1/4", 10'-2 1/4" Long Tube Rail	ASTM A500 Gr. B	See Assembly	—
a3	23	HSS 7"x5"x5/16", 10 1/4" Long Tube Post	ASTM A500 Gr. B	See Assembly	—
a4 ¹	7	HSS 9"x3"x1/4" x10" Rail Sleeve	See Assembly	ASTM A123	—
a5	46	4"x2"x1/4" Post Plate	ASTM A709 Gr. 50	See Assembly	—
a6	1	10"x4"x1/4" Rail End Plate	ASTM A709 Gr. 50	See Assembly	—
a7	23	16"x9 1/2"x3/4" Post Base Plate	ASTM A709 Gr. 50	See Assembly	—
a8	23	6 1/2"x4 7/8"x5/16" Post Bent Plate	ASTM A709 Gr. 50	See Assembly	—
a9 ²	14	10"x8 7/8"x1/4" Plate	ASTM A709 Gr. 50	See Assembly	—
a10 ²	14	10"x2 7/8"x1/4" Plate	ASTM A709 Gr. 50	See Assembly	—
a11 ³	14	10"x8"x3/16" Plate	ASTM A709 Gr. 50	See Assembly	—
a12 ³	14	10"x2"x3/16" Plate	ASTM A709 Gr. 50	See Assembly	—
a13 ³	7	9"x3"x1/4", 10" Long Rail Sleeve	ASTM A500 Gr. B	See Assembly	—
a14 ⁴	14	10"x11 13/16"x1/4" Rail Sleeve Bent Plate	ASTM A709 Gr. 50	See Assembly	—
a15 ⁵	14	10"x11 15/16"x1/4" Rail Sleeve Bent Plate	ASTM A709 Gr. 50	See Assembly	—
b1	1	Concrete	Min. f'c = 4000 psi	—	—
b2	160	#5 Rebar, 50" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b3	1	#5 Rebar, 48" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b4	2	#5 Rebar, 49" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b5	157	#5 Rebar, 70" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b6	2	#5 Rebar, 100" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b7	1	#5 Rebar, 98" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b8	1	#5 Rebar, 96" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b9	2	#5 Rebar, 90" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b10	2	#5 Rebar, 104 1/4" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—

- Note: (1) Rail sleeve assembly will be fabricated using only one option out of the four contained herein.
(2) Rail sleeve assembly option 1 will use parts a9 and a10.
(3) Option 2 will use parts a11, a12, and a13.
(4) Option 3 will use part a14.
(5) Option 4 will use part a15.



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Bill of Materials

DWG. NAME.
MNCBR-1-3_R32

SCALE: None
UNITS: in.

SHEET:
27 of 28
DATE:
1/21/2021
DRAWN BY:
JRF/SBW/M
JM/JEK/LJP
/GHR
REV. BY:
KAL/JEK/M
AHP/MH/RF

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
b11	2	#5 Rebar, 32" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b12	4	#5 Rebar, 27" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b13	4	#5 Rebar, 33 7/8" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b14	46	#5 Rebar, 43 3/8" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b15	22	#5 Rebar, 46" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b16	6	#5 Rebar, 156" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b17	6	#5 Rebar, 1672" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775)	—
b18	2	1/4" Dia., 8 5/8" Long Vertical Backer Rod	ASTM D5249 Type 3	Not Needed	—
b19	1	1/4" Dia., 15 1/4" Long Horizontal Backer Rod	ASTM D5249 Type 3	Not Needed	—
c1	92	7/8"—9 UNC, 12" Long Vertical Anchor Rod	ASTM F1554 Gr. 105	ASTM A153	—
c2	92	3" Dia. x 1/4" Circular Plate Washer	ASTM A709 Gr. 50	ASTM A153	—
c3	276	7/8"—9 UNC Heavy Hex Nut	ASTM A563DH	ASTM A153	FNX22b
c4	23	13"x8"x1/4" Anchor Plate	ASTM F436 TYPE 1	ASTM A153 or B695 CLASS 55	—
c5	184	7/8" Dia. SAE Washer	ASTM A709 Gr. 50	ASTM A153	—
d1	1	12"x20"x3/8" End Plate	ASTM A709 Gr. 50	See Assembly	—
d2	5	1.049" ID 1.68 lb/ft Standard Pipe, 15 1/8" Long	ASTM A53 Schedule 40	See Assembly	—
e1	—	Chemical Adhesive	Min. Bond Strength = 1,670 psi	—	—
e2	—	Joint Sealant	ASTM D5893	—	—



Midwest Roadside
Safety Facility

Concrete Parapet with
Brush Curb and Post Rail
Test Series MNCBR

Bill of Materials

DWG. NAME.
MNCBR-1-3_R32

SCALE: None
UNITS: in.

SHEET:
28 of 28

DATE:
1/21/2021

DRAWN BY:
JRF/SBW/M
JW/JEK/LJP
/GHR

REV. BY:
KAL/JEK/M
AHP/MH/RF

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	8/14/2019		Original Drawing created from assembly made by Jaryd	—	
1	8/16/2019	1	Changed title block, removed dual units, added potential impact locations, added note about sawcut/control joint, added dimensions, edited notes	KAL	JRF
		2	Changed title block, removed dual units, placed detail A on its own page, edited dimensions, added and edited balloons		
		3	Changed title block, removed dual units, placed detail B on its own page, edited dimensions, added and edited balloons		
		4	Changed title block, removed dual units, placed the profile view on its own page, added a detail view of the control joints		
		5	Changed title block, removed dual units, placed detail C on its own page, edited dimensions, added and edited balloons		
		6	Changed title block, removed dual units, placed section D-D detail F, and detail G on their own page, edited dimensions, added and edited balloons		
		7	Changed title block, removed dual units, added rail components to their own page, edited notes and dimensions		
		8	Changed title block, removed dual units, added parts a4 and c4 to their own page		
		9	Changed title block, removed dual units, added parts a6 and a7 to their own page		
		10	Changed title block, removed dual units, edited dimensions		
		11	Changed title block, removed dual units, edited dimensions		
		12	Changed title block, removed dual units, edited dimensions		
		13	Changed title block, removed dual units, edited part c1		
		BOM	Changed title block, removed dual units, edited description for part c1		
		1	Edited Notes, edited post numbers, added dimensions, added Detail views		
		2	Edited dimensions, added notes		
		3	Edited Dimensions, edited balloons, added notes		

2	8/20/2019	4	Edited dimensions, removed Part balloons, added notes	JEK	JRF
		5	Added page for concrete parapet assembly		
		6	Moved detail view of parapet to this page		
		7	Added page for Parapet Section Views		
		8	Added page for rail assemblies		
		9	Changed Scaling, added view, rearranged views		
		10	Added Centerlines, Edited dimensions, Added View Label, Added Note, Changed views		
		11	Edited Dimensions, Changed Sheet Scale, Added view labels		
		12	Edited Dimensions		
		13	Edited Dimensions		
		14	Edited Dimensions, Added note, views rearranged		
		15	Added Centerline, Edited dimension		
		BOM	Removed "Unbent" from straight rebar, Abbreviated Grade to Gr., Removed date from Hardware guide		
3	9/6/2019	2	Edited dimensions, added part balloons, added notes, and removed hatching	JEK	JRF
		3	Edited dimensions, edited part balloon, added note, edited note		
		4	Removed centermarks, edited dimensions, added section view, and edited note		
		5	Added note		
		6	Added dimensions, and edited note.		
		7	Removed hatching, added note, edited dimensions, and art balloons, and edited section view labels.		
		8	Added part balloons, edited view label note, and edited profile view.		
		9	Edited view labels, rearranged views, and edited dimensions		
		10	Changed projected view.		
		11			
		12	Removed tangent edges, edited dimension, edited bar length.		
		13	Removed tangent edges, edited dimension, edited bar length.		
		14	Edited bar lengths, edited dimension, edited model view, and edited note.		
		15	Edited dimensions and edited thread note		

		BOM	Edited descriptions material specs.		
4	9/11/2019	4	Edited note.	JEK	JRF
		5	Edited descriptions.		
		6	Edited note.		
		7	Moved note, added period, moved part balloons, added dimension, and moved section views.		
		8	Added view labels, and rearranged views.		
		9	Rearranged views, added dimensions, and relabelled part numbers		
		10	Edited model, and edited dimension.		
		11	Edited part number.		
		13	Edited Total Unbent Lengths.		
		15	Edited label.		
		BOM	Edited Descriptions		
5	9/13/2019	5	Fixed alignment of table	JEK	JRF
		9	Realigned view labels		
		10	Added dimension.		
		15	Rescaled part views		
		BOM	Edited descriptions, and hardware guide designator		
6	11/18/2019	2	Edited dimensions, added note, and changed bent rebar to straight embedment bars.	MAHP	SBW, JRF
		3	Added dimensions, added note		
		4	Added End Plate Assembly		
		5	Added End Plate Assembly to Bill of Materials, and added note		
		6	Added Assembly, and added notes.		
		7	Added notes, and edited dimensions		
		9	Added page, and added assembly views		
		10	added page, and added component views		
		14	Changed rebar		
		15	Rearranged views, and edited Bill of Bars		
		16	Removed part and rearranged views		
		BOM	Added parts d1, d2, and e1; and edited treatment specifications and descriptions		

7	12/6/2019	3	Added spacing dimensions	JEK	JRF
		4	Moved note arrow.		
		5	Added line for assembly to bill of materials. Added a call out to the end plate assembly. Edited treatment specs.		
		6	Added dimensions for spacings.		
		7	Added dimension.		
		8	Added Page, rearranged views		
		9	Added Page		
		14	Removed part b2 and rearranged views, edited unbent lengths for each bar.		
		16	Rearranged views, and edited unbent lengths, and removed part b19.		
		BOM	Edited descriptions, edited treatment specs, and resized table.		
8	12/9/20198	1	Edited Impact Notes, and edited title block.	JEK	JRF
		3	Removed duplicate dimensions.		
		5	Added end plate subassembly to bill of materials, and adjusted spacing of table.		
		8	Edited part balloons, and edited treatment spec in Bill of materials		
		14	Edited unbent lengths.		
		BOM	Edited descriptions		
9	12/11/2019	8	Changed assembly description and title block view description.	JEK	JRF
10	1/16/2020	4	Added detail D to show clearance between rail and parapet. Added dimensions from curb to centerline of post 19 and centerlines of guardrail connections.	MAHP, JEK	MJM
		10	Updated welding descriptions.		
		13	Added centerline of 6x4 hole to profile view of part a8.		
		BOM	Updated material specification and treatment specification of rebar to ASTM A706 Gr 60 and ASTM A775 respectively. Added Joint Sealant and material specification.		
		1	Filled in impact notes, and updated impact locations, test numbers, and test designations.		

11	1/17/2020	5	Edited assembly bill of materials to change Material spec from ASTM A706 to A615, and added back part b4 as the rebar piece it used to be	JEK, MAHP	JRF
		6	Edited part balloons to match a part in the bill of materials		
		10	Added assembly bills of materials for each rail assembly		
		11	Added page to fit the next two rail assemblies		
		15	Updated material spec to ASTM A615		
		16	Updated material spec to ASTM A616		
		17	Updated material spec to ASTM A617		
		BOM	Updated material spec for rebar to ASTM A618, fixed joint sealant duplicate and edited material spec for joint sealant. Also changed page scale to none		
12	1/23/2020	4	Top slope distance changed 26" -> 24".	MAHP	JEK
		9	Dimension adds.		
		10	Post position on base plate changed (closer to front). BOM edits (look, treatment).		
		11	BOM edits (look, treatment).		
		14	Part a8 edits.		
		BOM	Treatment: a1-a8		
		1	Adjusted max rail length from 24' to 20'		
		3	Added section F-F		
		4	Added Section view F-F and changed section depth of section view E-E for added clarity. Added and edited dimensions		
		6	Added and edited dimensions. Changed sheet scale. Changed spacing of sections K-K and L-L.		
		7	Edited Spacing and dimensions of horizontal rebar as to not overlap with each other.		
		8	Added page and detail Q		
		9	Changed material specs for part d2.		
		10	Added dimensions.		
		11	Removed Mid-Rail assembly and added section R-R.		

13	2/24/2020	12	Changed rail length and added part a9 to all rail assemblies.	MAHP	JRF
		13	Removed part a3		
		14	Edited part a3 and added a9		
		16	Edited part notes to show state standard designations. Edited width of part b4 from 8 5/8" to 11". Edited unbent length for b4.		
		17	Edited part notes to show state standard designations. Edited width of part b8 from 10" to 12". Edited width of part b9 from 8" to 11". Edited unbent lengths for b8 and b9.		
		18	Edited part notes to show state stanard designation.		
		BOM	Added line for part a8. Edited description for part a8. Reordered table (a9 became a8). Added part b4 back into BOM.		
14	3/2/2020	4	Edited Scale note for section F-F and adjusted boundary of detail D.	JEK	JRF
		7	Removed hatching from section M-M.		
		8	Added notes and dimensions.		
		11	Added part balloons to post attachment detail.		
		18	Added dimensions for part b10 and edited unbent lengths for b10 and b14. Removed state standards designations for b16 and b17.		
		BOM	Edited descriptions for a2, a3, a4, a8, b8, b10, and b14. Edited material specs for b18, and b19.		
15	3/3/2020	1	Edited dimensions.	MAHP	JRF
		2	Edited spacing of longitudinal bars.		
		6	Added dimensions.		
		7	Added dimensions.		
		9	Removed inch abbreviation from weld note		
		12	Added page and added section views S-S and T-T.		
		17	Edited part b3 to have a width of 12", and changed unbent length from 45 3/8" to 43 3/8".		
		19	Edited height dimension of part b14 to 17" from 18" and changed unbent length form 45 3/8" to 43 3/8".		

		BOM	Edited descriptions for part b3 and b14.		
16	3/19/2020	2	Adjusted rebar locations, removed duplicated dimensions.	MH	SBW
		3	Added new page to show parapet approach.		
		4	Edited dimensioning on splices, edited spacing on embedded rebar.		
		5	Adjusted detail D to display dimensioning to center of post. Adjusted dimensioning in detail C of rail parapet for clarity and to better reflect state standard plans.		
		6	Extended view Q. Changed embedded rebar spacing in detail G and Q. Updated Quantities on parts b2 and b5.		
		7	Changed rebar spacing. Added dimensioning to center of post.		
		8	Adjusted rebar locations, to better reflect state standards. Edited dimensions on sections I-I, J-J, K-K, and L-L.		
		9	Added a demarcation line to show the post's center line. Added dimensioning from control join to control joint, added dimensioning to center of post, and added dimensioning to rebar from the control joints. Edited rebar spacing.		
		12	Added and edited dimensioning on end rail assembly.		
		14	changed total length on both assemblies from 20' to 19' – 11". Edited a1 part description to reflect length change.		
		15	Changed part a1's length.		
		16	Turned on sketch visibility for part a8.		
		18	Edited dimensioning on parts b2, b3, and b4. Edited quantity on part b2.		
		19	Edited quantity on part b5.		
		20	Edited dimensioning on part b13.		
		BOM	Updated description on part a1, updated quantities on parts b2 and b5.		
		—	Changed all detail and section labels to match new order and additional details.		
		2	Moved section B-B to page 4. Moved view from page 3 to 2, detailing only rebar spacing. Added section line B.		

17	3/25/2020	3	Added detail A to show concrete parapet approach details and dimensions. Edited note to say "epoxy-coated". Edited concrete buttress to shift the position of the control joint 2" DS. Edited system assembly to change rebar anchor spacing to reflect new state plans.	RF/MH	MJM
		4	Added section B-B. Everything thing moved one page. Edited note to say "epoxy-coated".		
		5	Expanded detail C view to show entirety of part b15 and moved part b15 to comply with 2" clearance. Edited note to say "epoxy-coated". Moved part b14 of second US post so as not to overlap with part b2. Part b14 is now 3 5/16" US of centerline of post.		
		8	Added section line P. Edited note (3) to say "epoxy-coated".		
		9	Added section P-P. Adjusted part b11 to be tangent to other rebar.		
		10	Added dimensions to part b15 to show its spacing relative to centerline of post and clearance to saw cut. Added note detailing part b15 placement.		
18	3/26/2020	1	Edited detail labels.	MH	MJM
		2	Removed rail post, but kept rail anchors in downstream parapet approach. Edited dimensions. Edited section label.		
		3	Added length dimensions to detail D.		
		9	Moved section labels for clarity.		
19	3/30/2020	1	Edited test designation descriptions. Edited note no. 5.	RF/MH	MJM
		2	Added detail label. Edited note 1 and added note 2.		
		3	Edited detail label. Removed note 1.		
		4	Edited note 1 and added note 2. Added parapet dimension.		
		5	Edited note 1 and added note 2.		
		6	Adjusted part b11 to be straight.		
		7	Edited note 1 and added note 2.		
		8	Edited note 3 and added note 4.		
		9	Edited note 2 and added note 3. Edited section views for clarity of position of part b11.		
		2	Adjusted notes to align.		

20	4/14/2020	3	Added concrete buttress height dimension. Adjusted 4 1/2" dimension to show 4".	MH	MJM
		8	Adjusted 4 1/2" dimension to show 4".		
		13	Omitted weld notes in post attachment detail and section detail T.		
		14	Edited all weld notes according to MDOT comments.		
21	4/15/2020	3	Edited concrete buttress dimension so that bottom reference for 4" chamfer height was to the top of smaller chamfer.	MH	MJM
22	4/23/2020	14	Removed the text aurora and ironworks, welding profile option 1 and 2	MH	MJM
23	4/27/2020	2,4,5,7,8,9	Edited notes to correct spelling of reinforcement.	RF/MH	MJM
		5	Added note 3.		
24	5/12/2020	1	Edited post nos. in notes 2, 3, and 4.	MH	LJP
		5	Added (TYP) to 12" spacing dimension.		
25	5/22/2020	1	Edited note 2 to give correct post nos. Edited sketch of impact location for MNCBR-1 to reflect this change.	MH	LJP
		13	Changed a4 balloon to "rail sleeve assembly"		
		15	Changed a4 balloon to "rail sleeve assembly"		
		16	Removed views of part a4		
		17	New sheet showing assembly options for rail sleeve. Created parts a9, a10, a11, a12, and a13.		
26	5/29/2020	17	Added subassembly BOM's.	MH	LJP
		BOM	a4 description		
27	6/19/2020	17	Edited weld notes	MH	JRF
		18	Added Page, Added Rail Sleeve option 2 assembly and component views		
		19	Added Page, Added Rail Sleeve option 3 assembly and component views. Changed thicknesses of parts a9 and a10		
		20	Added Page, Added Rail Sleeve option 4 assembly and component views		

		BOM	Added note to bottom and to denote the different options for the rail sleeve assembly		
28	7/28/2020	1	Edited notes 1 and 7 for clarity.	RKF & MH	SBW
		2	Edited reinforcement note, edited note 2 for clarity		
		3	Added dimensioning, edited reinforcement note		
		4	Edited note 2 for clarity		
		5	Edited note 3 for clarity		
		7	Edited note 2 for clarity		
		8	Edited note 4 for clarity		
		9	Dimensioned radius on section K-K, adjusted section depth on sections J-J through M-M to prevent rebar overlap.		
		10	Edited note for clarity		
		14	Edited note for clarity		
		15	reordered items in both BOMs		
		17	Adjusted material specs for a4, a9 and a10		
		19	Added fit view, adjusted material specs for a4 and a14		
		20	Added fit view, adjusted material specs for a4 and a15		
		BOM	Adjusted material specs for a9, a10, a14 and a15. Adjusted treatment specs for a4. Edited notes 3, 4 and 5 for clarity. Changed description of part e1 to chemical adhesive and edited material spec for clarity.		
29	9/25/2020	1	Adjusted material specs for a9, a10, a11, a12, a14 and a15	MHP	CJN
		BOM	Adjusted material specs for a9, a10, a11, a12, a14, a15 and c4. Adjusted treatment specs for c4.		
30	1/5/2021	4	Added various dimensions for clarity.	RKF	LJP
		9	Added top parapet width dimensions.		
31	1/11/2021	–	Added 1' to upstream end of parapet. (not reinforced)	MHP	LJP
32	1/21/2021	18	Changed weld to 3/16" from 1/4. Changed profile view balloon from a9 to a11.	KAL	GHR
		20	Added Bend Lines to Flat Pattern.		
		18, BOM	Changed Parts a11 and a12 thickness from 3/8" to 3/16".		

		13,15, 18, BOM	Changed a13 description to "9"x3"x1/4", 10" Long Rail Sleeve"		
--	--	----------------------	---	--	--