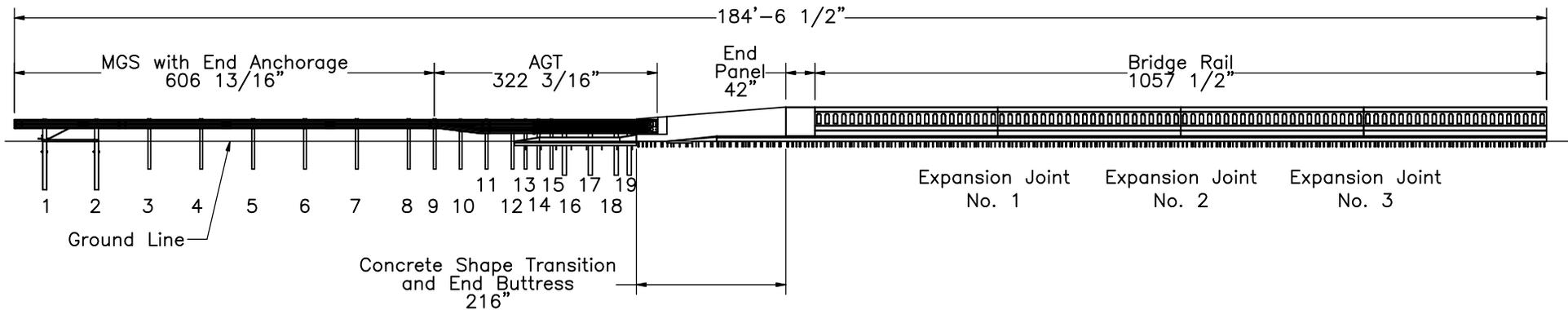


PLAN VIEW



ELEVATION VIEW

- Notes:
- (1) Material quantities listed herein are only for one complete system.
 - (2) Run the curb gutter up to the concrete tarmac if possible. The recommended thickness is similar to underground curb depth.
 - (3) Bridge rail tests to be conducted before AGT tests (H42ST-1 and H42ST-2).
 - (4) Critical region for Test Nos. H42ST-1-2 is located between post nos. 12 and 19.
 - (5) In the critical region, the strong compacted soil trench shall extend 3' further behind the system than it does in the rest of the system.



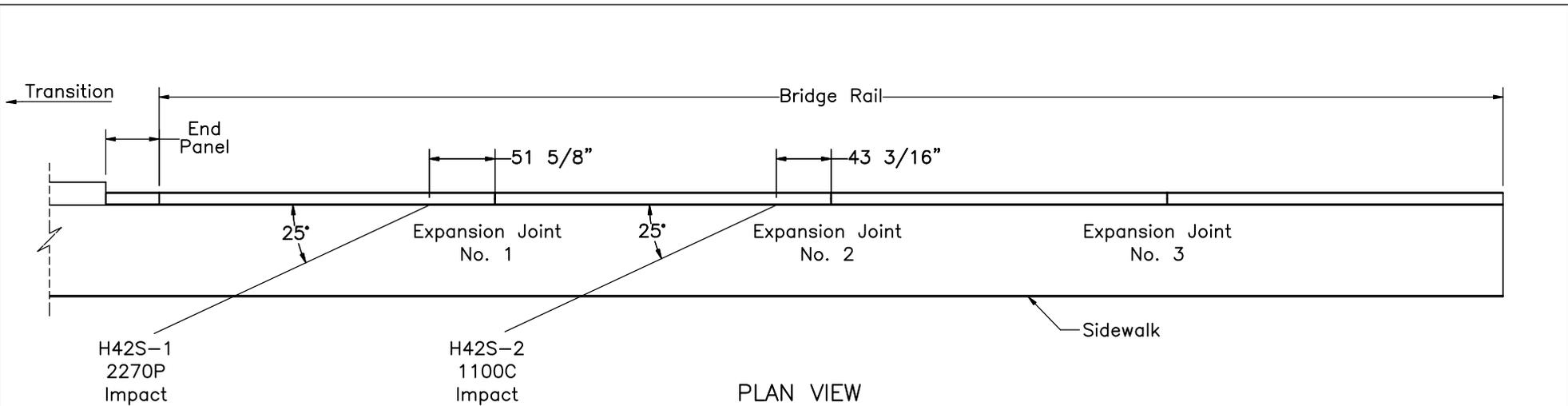
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and H42ST-1-2
System Layout

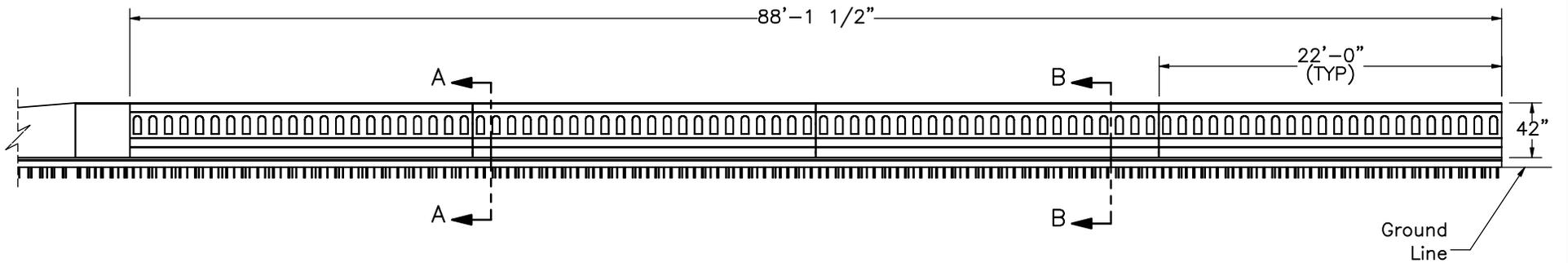
DWG. NAME:
H42S-H42ST_R17

SCALE: 1:225
UNITS: in.

SHEET:
1 of 41
DATE:
10/20/2021
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HR
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PLAN VIEW



ELEVATION VIEW

- Notes:
- (1) Conduct Bridge Rail tests before AGT tests.
 - (2) Test no H42S-1 will be performed according to test designation no. 3-11 of MASH 2016 criteria.
 - (3) The impact location for test no. H42S-1 is 51 5/8" upstream from expansion joint no. 1.
 - (4) Test no. H42S-2 will be performed according to test designation no. 3-10 of MASH 2016 criteria.
 - (5) The impact location for test no. H42S-2 is 43 3/16" upstream from expansion joint no. 2.

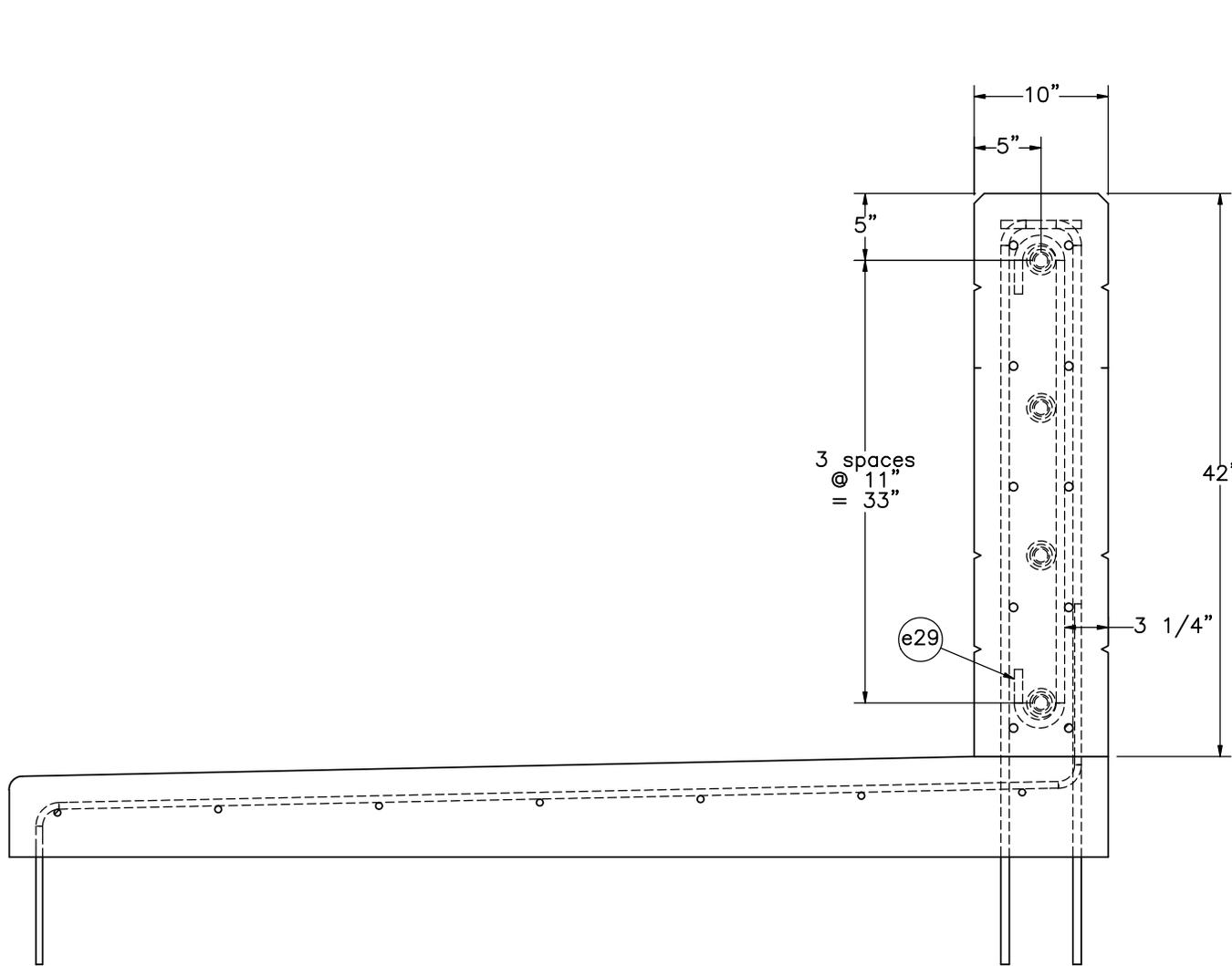


Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Bridge Rail Layout

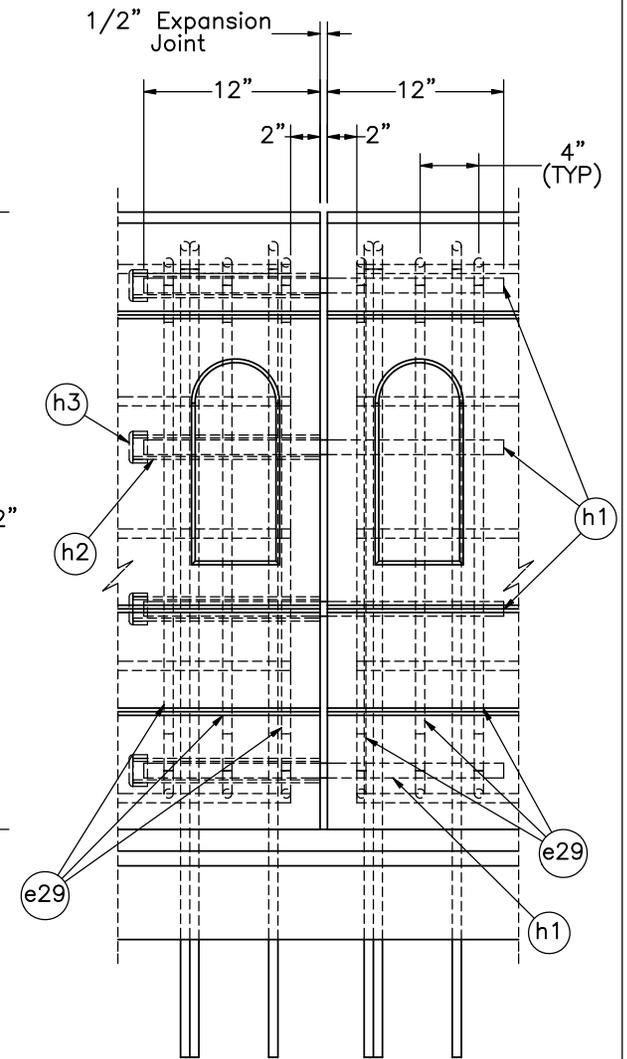
DWG. NAME.
H42S-H42ST_R17

SCALE: 1:120
UNITS: in.

SHEET:
2 of 41
DATE:
10/20/2021
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SECTION A-A



ELEVATION VIEW

- Notes: (1) Smooth dowels (part h1) are cast in place on one side of the expansion joint, and inserted into plastic sleeves (part h2), which are cast into the barrier on the other side of the expansion joint.
- (2) 1/2" expansion joints to be bonded together by premolded joint filler and joint sealer according to specifications.
- (3) PVC tubes and caps (parts h2 and h3) are to be cast on the upstream side of expansion joints.



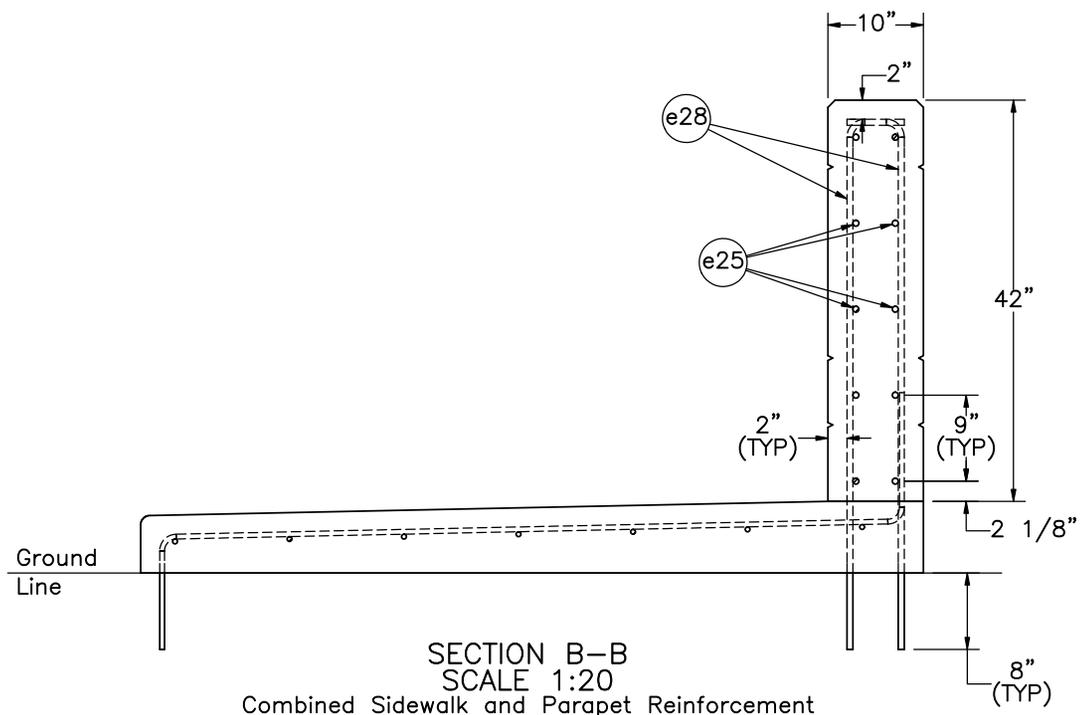
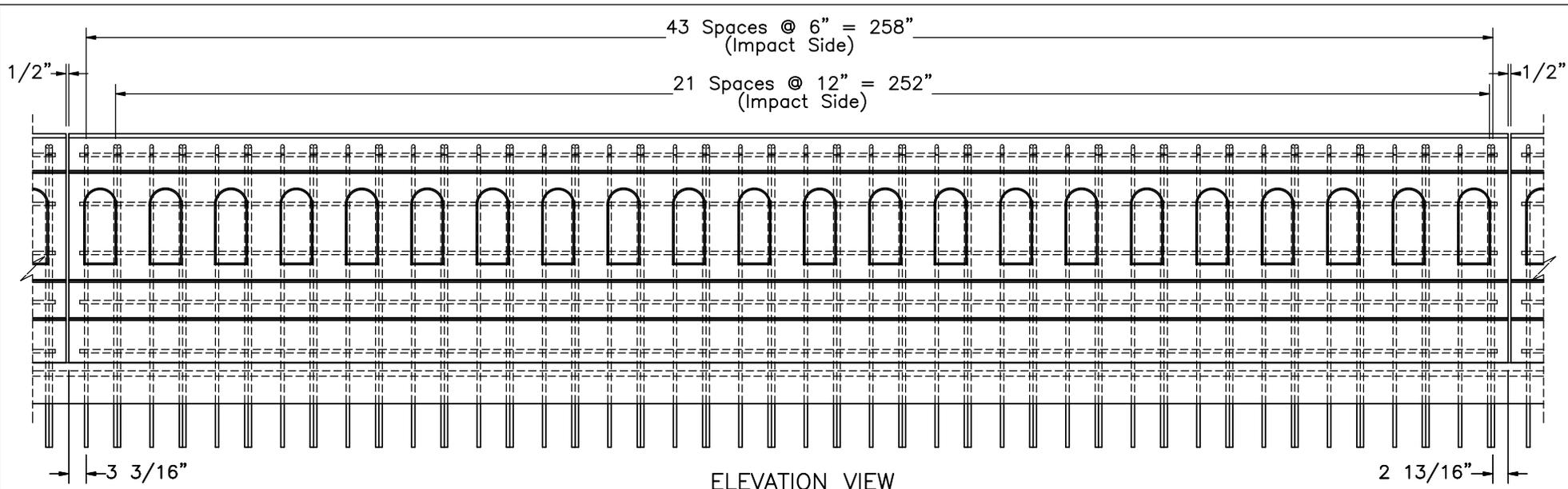
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Expansion Joint Details

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:13
UNITS: in.

SHEET:
3 of 41
DATE:
10/20/2021
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Notes: (1) The lap length is 18" for longitudinal bars.
(2) Expansion Joint rebar not shown.



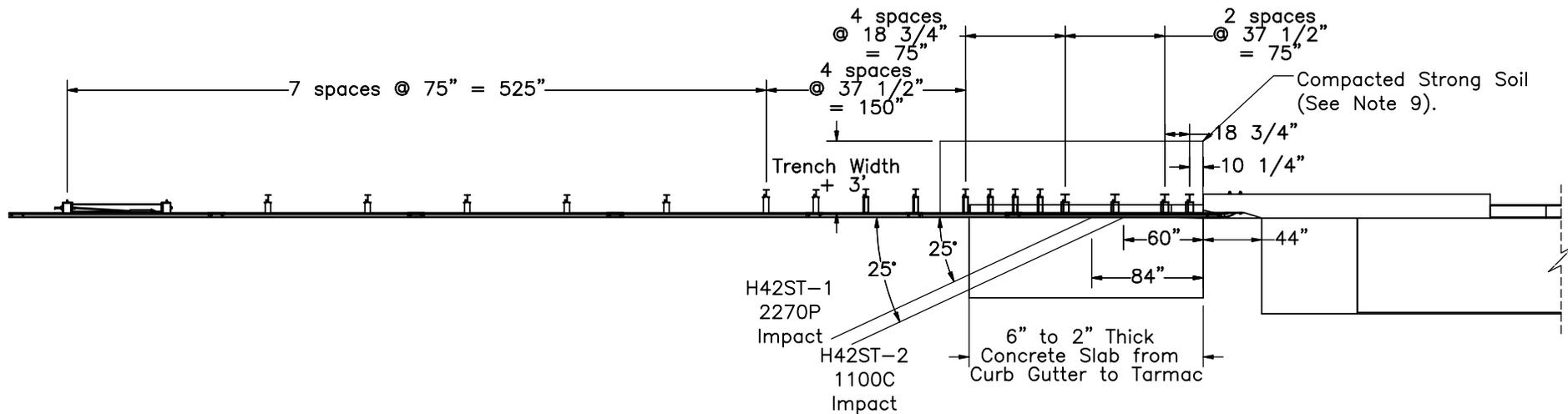
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Parapet Reinforcement

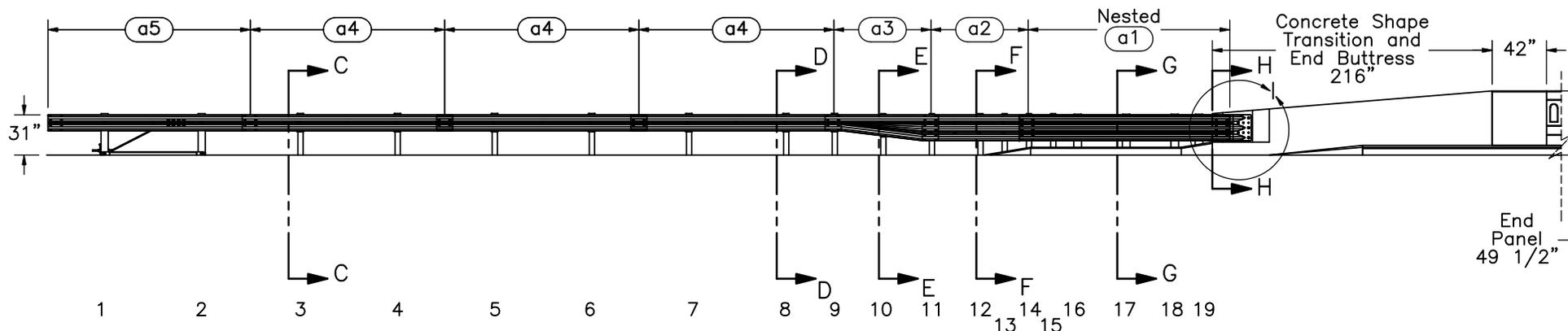
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H42S-H42ST_R17

SCALE: 1:28
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SHEET:
4 of 41
DATE:
10/20/2021
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PLAN VIEW



ELEVATION VIEW

- Notes:
- (1) Conduct bridge rail tests before AGT tests
 - (2) Test no H42ST-1 will be performed according to test designation no. 3-21 of MASH 2016 criteria.
 - (3) The impact location for test no. H42ST-1 is 84" upstream from the concrete buttress.
 - (4) Test no. H42ST-2 will be performed according to test designation no. 3-20 of MASH 2016 criteria.
 - (5) The impact location for test no. H42ST-2 is 60" upstream from the concrete buttress.
 - (6) BCT anchors are placed in 3' diameter holes, then backfilled and tamped with soil.
 - (7) Critical Region is between post nos. 12 and 19
 - (8) Run the curb gutter up to the concrete tarmac if possible. The recommended thickness is similar to the curb depth underground.
 - (9) In the critical region, the strong compacted soil trench shall extend 3' further behind the system than it does in the rest of the system.



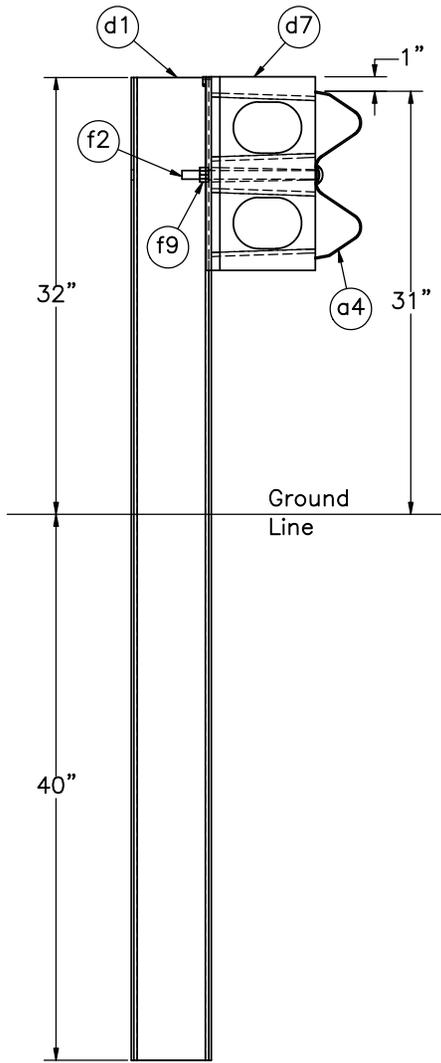
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
AGT and Transition Layout

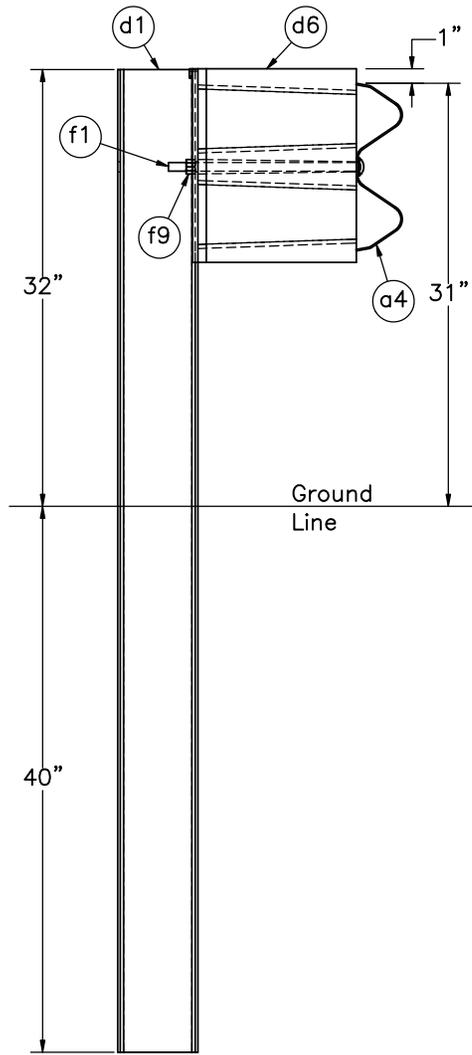
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H42S-H42ST_R17

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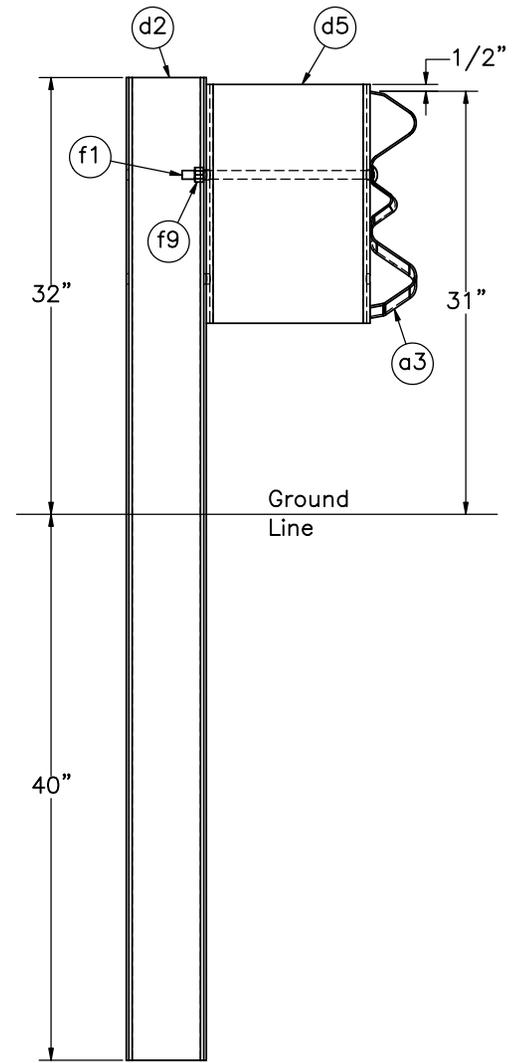
SHEET:
5 of 41
DATE:
10/20/2021
DRAWN BY:
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SECTION C-C
Post Nos. 3-7



SECTION D-D
Post Nos. 8-9



SECTION E-E
Post No. 10

Notes: (1) No bolt placed in the lower hole of post no. 10.
 (2) Guardrail bolts (parts f1 and f2) are on the upstream side of the web.



Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Post Nos. 3-10 Details

DWG. NAME:
H42S-H42ST_R17

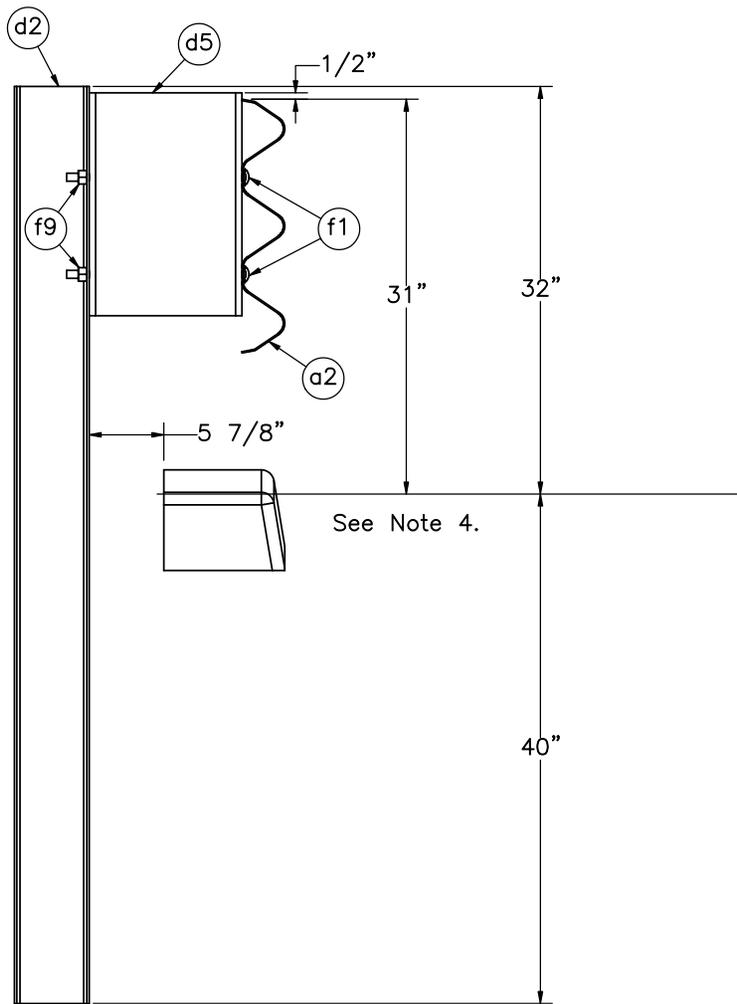
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SHEET:
6 of 41

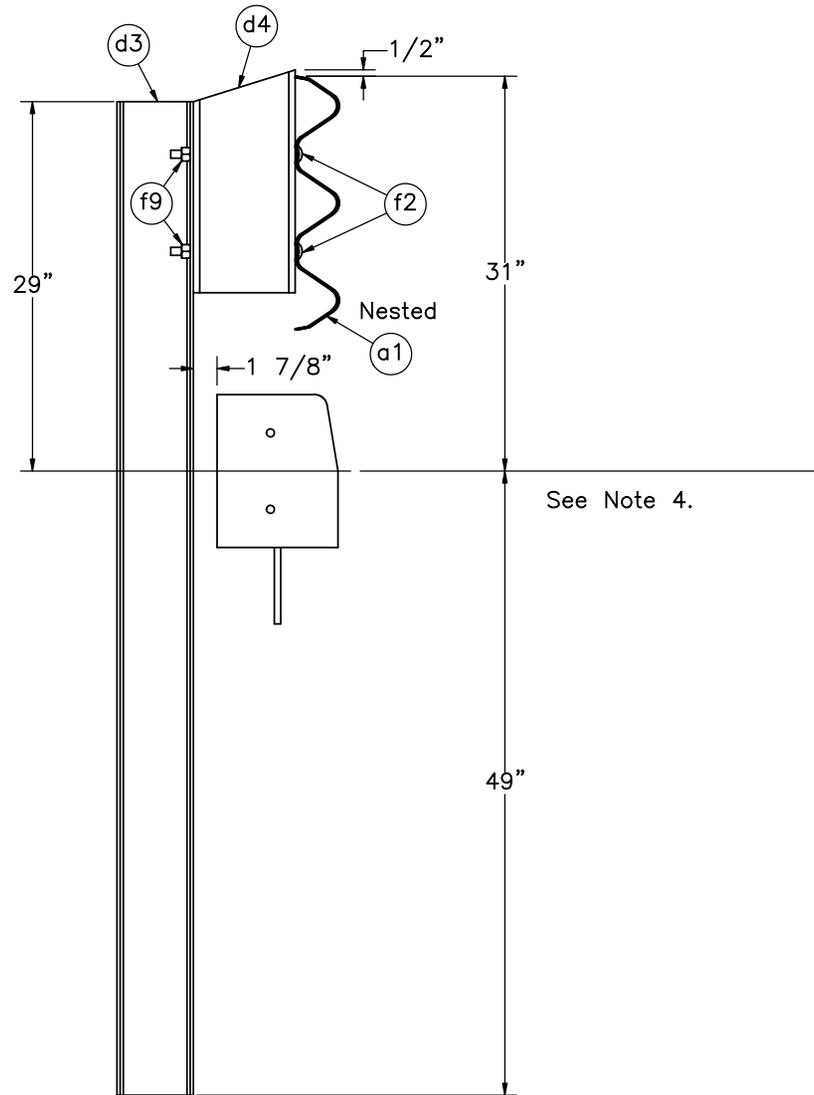
DATE:
10/20/2021

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SECTION F-F



SECTION G-G

- Notes: (1) Guardrail bolts (parts f1 and f2) are on the upstream side of the web.
 (2) Toe of curb is in line with the front of the rail.
 (3) Curb shown in section G-G is in tapered region.
 (4) Curb Gutter hidden in Sections F-F and G-G.



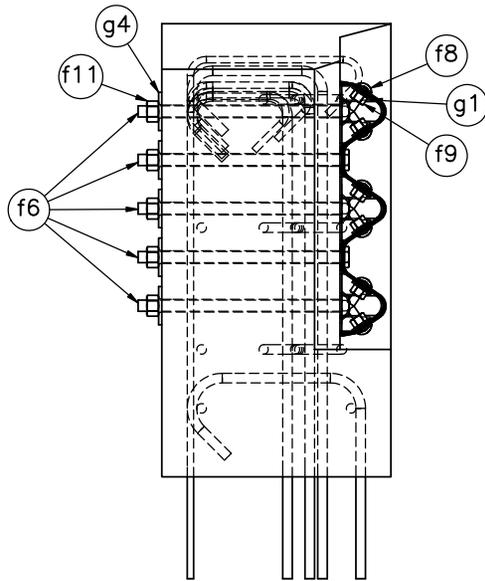
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Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Post Nos. 11-19 Details

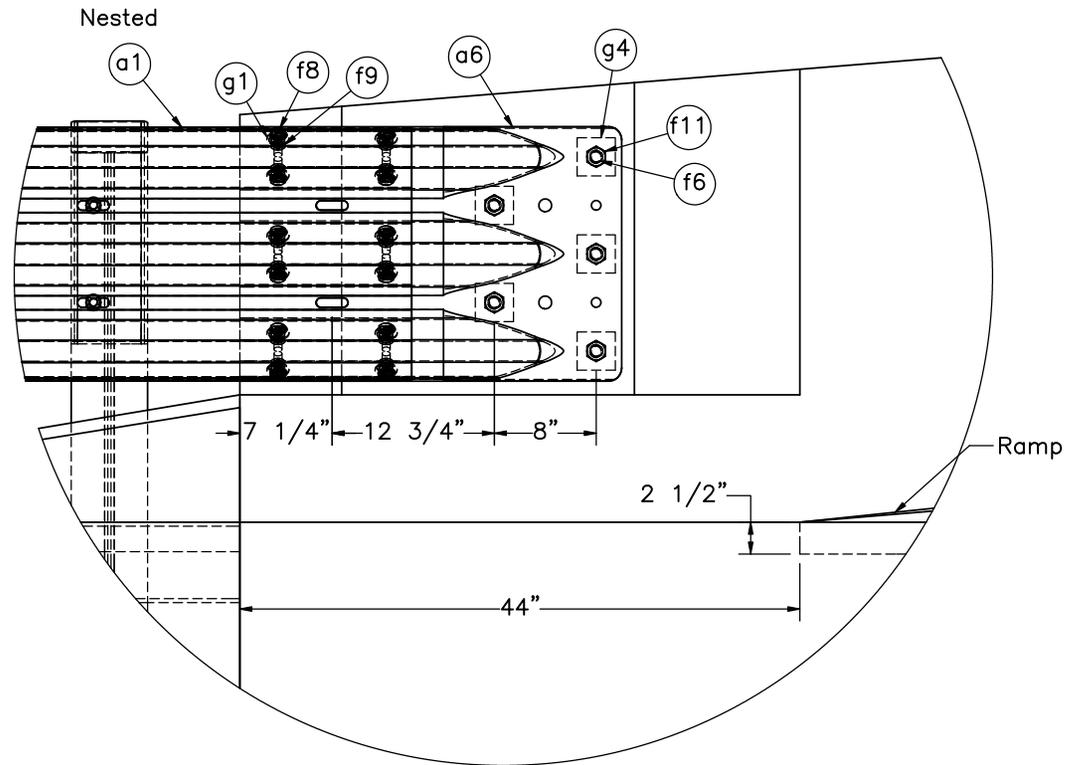
DWG. NAME.
H42S-H42ST_R17

SCALE: 1:15
UNITS: in.

SHEET:
7 of 41
DATE:
10/20/2021
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SECTION H-H



DETAIL I
(Rebar hidden)

- Notes:
- (1) Nested Thrie Beam sections (part a1) sandwich Thrie Beam Connector (part a6) at splice location.
 - (2) Washers (part g1) placed between nuts (part f9) and inner Thrie Beam section (part a1).
 - (3) 1 1/4" Guardrail Bolts (part f3) may be used in place of 2" Guardrail Bolts (part f8) in the nested Thrie Beam splices if the nut (part f9) can be fully threaded onto Part f3.



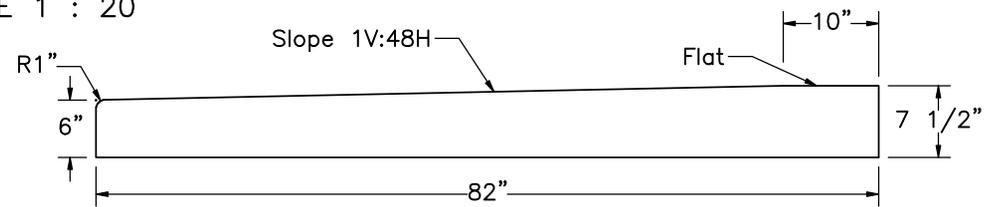
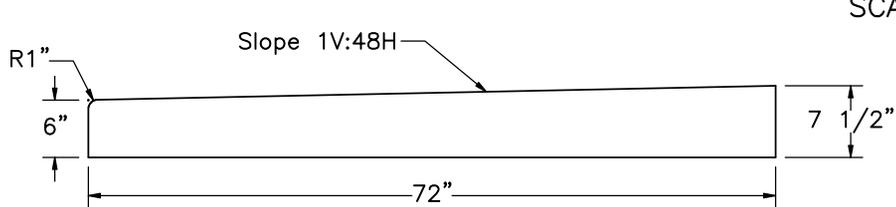
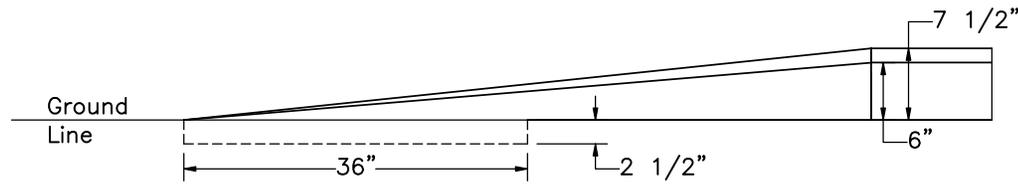
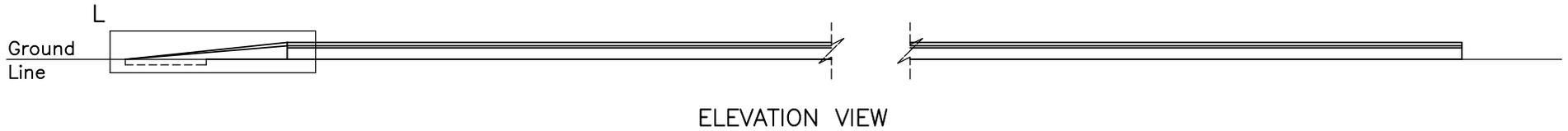
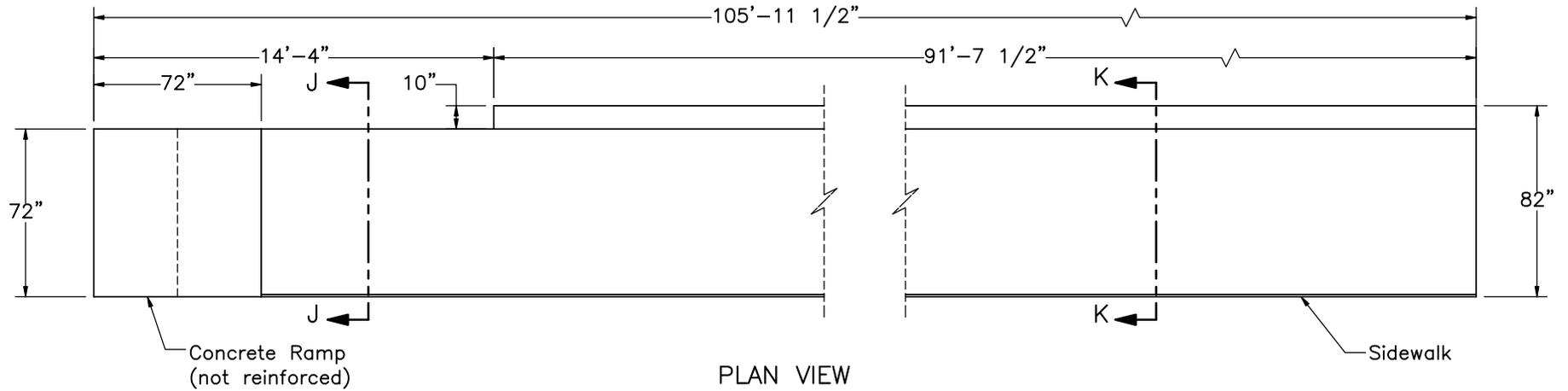
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Transition Buttress and
Terminal Connector

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:15
UNITS: in.

SHEET:
8 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
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Notes: (1) Grind trough in existing concrete tarmac to aid in feathering concrete ramp into approach slab.



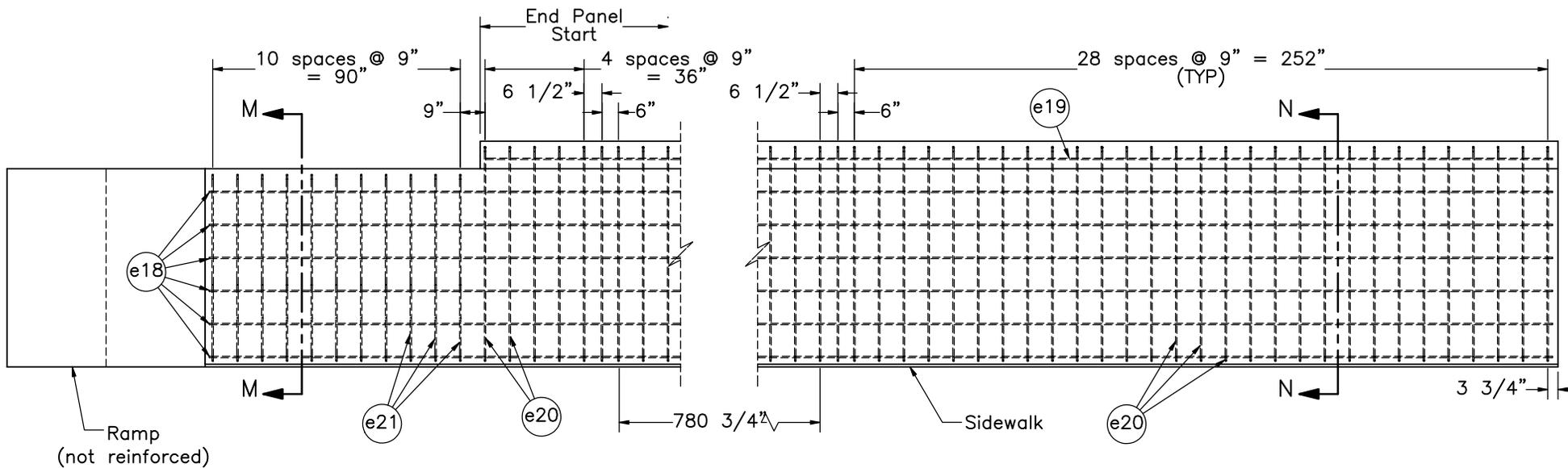
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Sidewalk and Ramp Details

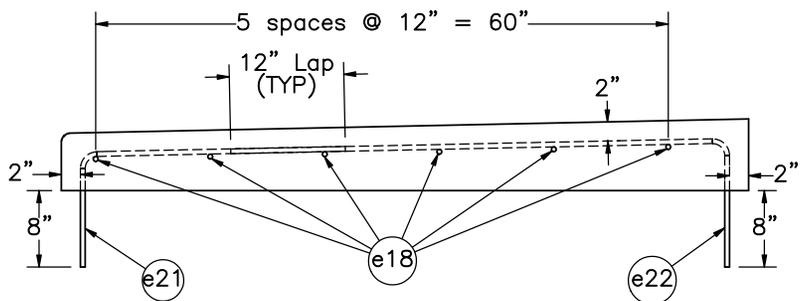
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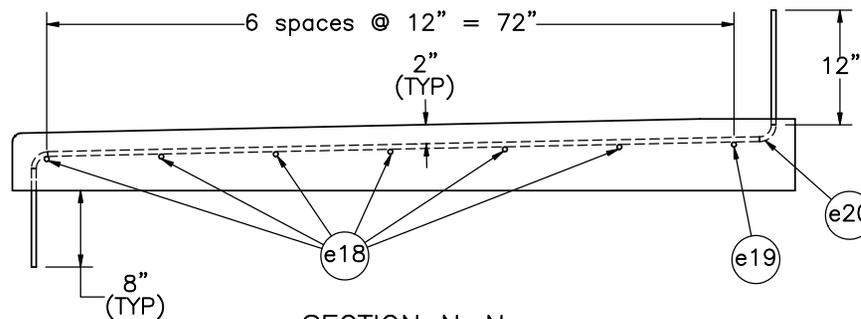
SHEET:
9 of 41
DATE:
10/20/2021
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PLAN VIEW



SECTION M-M
SCALE 1 : 20



SECTION N-N
SCALE 1 : 20

Notes: (1) The lap length is 18" for longitudinal bars, and 12" for embedded rebar.



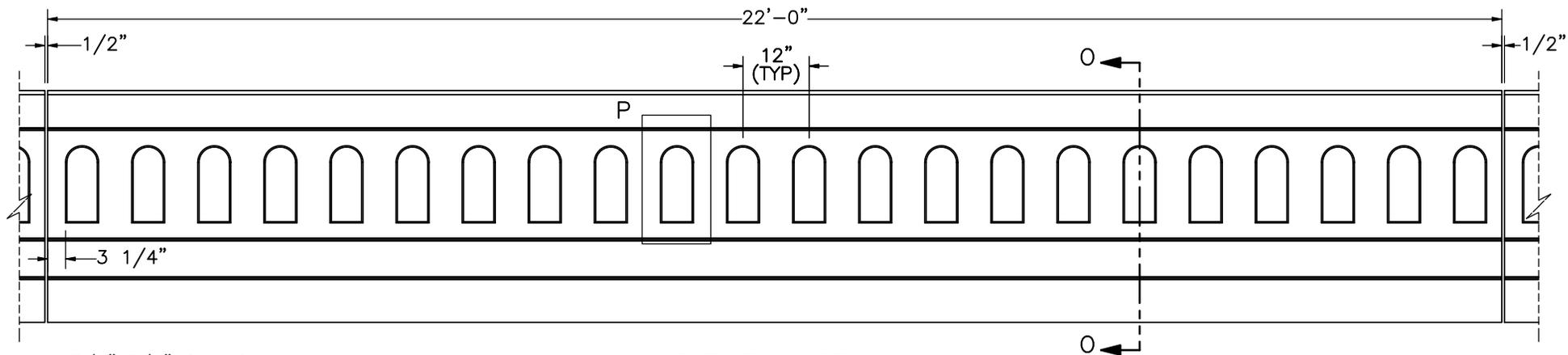
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Sidewalk Reinforcement Detail

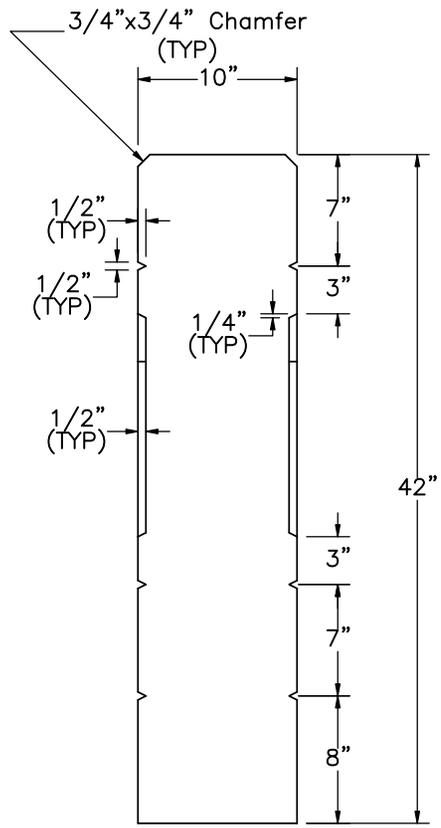
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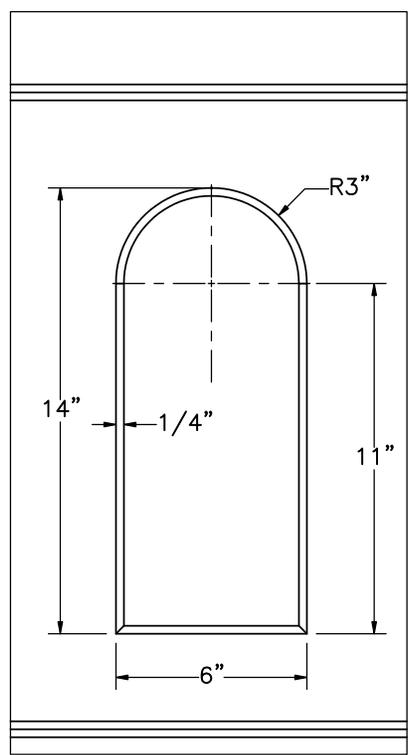
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10 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
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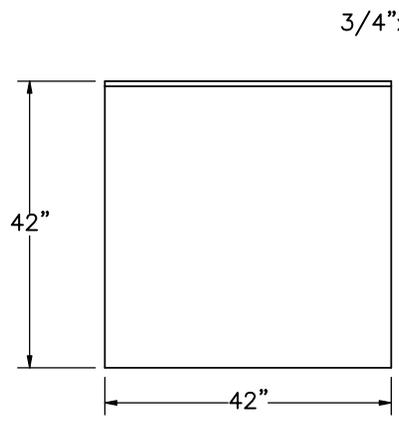
ELEVATION VIEW



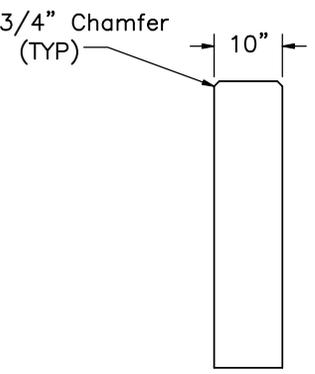
SECTION O-O
SCALE 1 : 12



DETAIL P
SCALE 1 : 6



ELEVATION VIEW



PROFILE VIEW

End Panel

Note: (1) The "Tombstone" dimensions (Detail P) are the same on the front and back of the parapet.



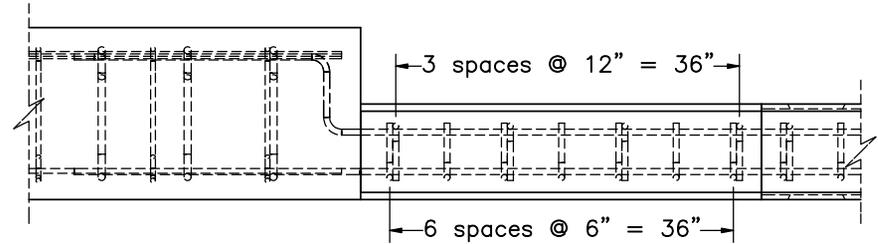
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and H42ST-1-2
Parapet and Endpost Details

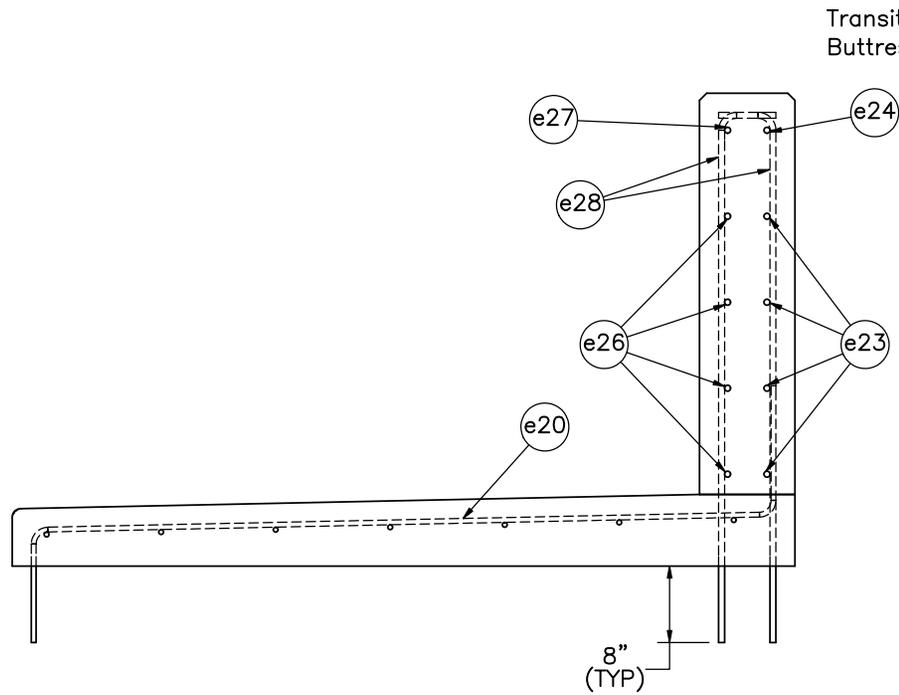
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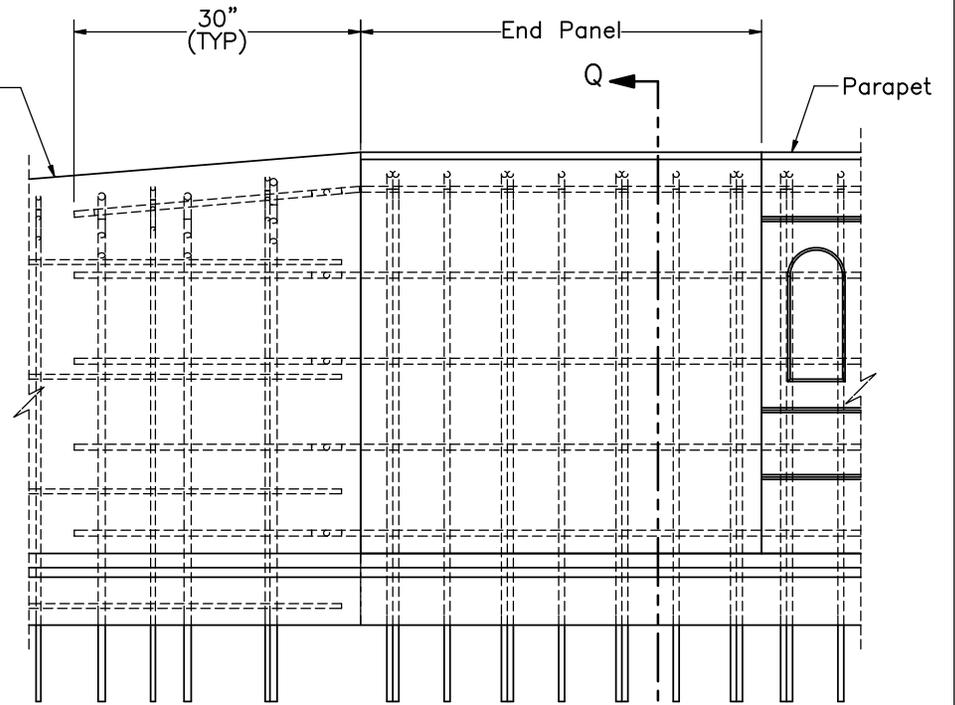
SHEET:
11 of 41
DATE:
10/20/2021
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PLAN VIEW



SECTION Q-Q



ELEVATION VIEW Q

Note: (1) The lap length is 18" for longitudinal bars.



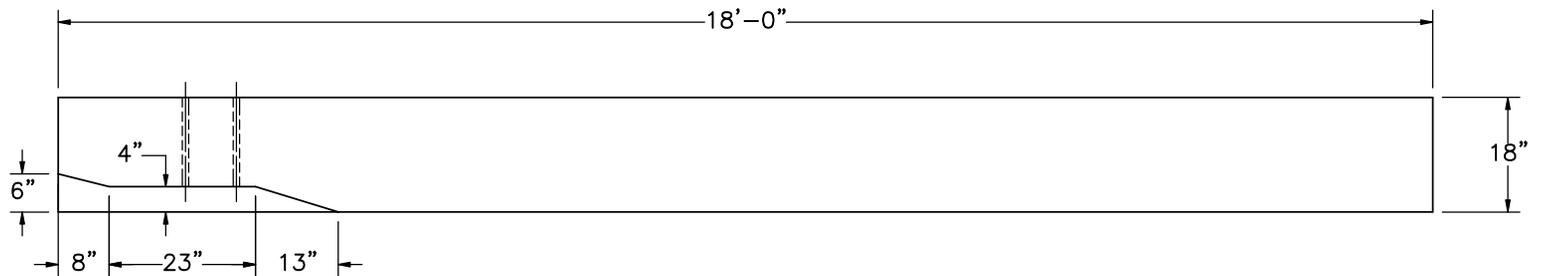
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Endpoint Reinforcement

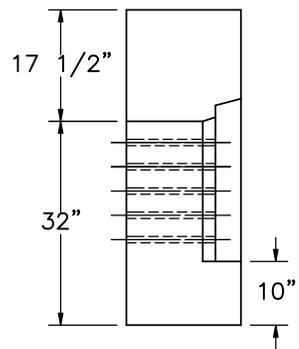
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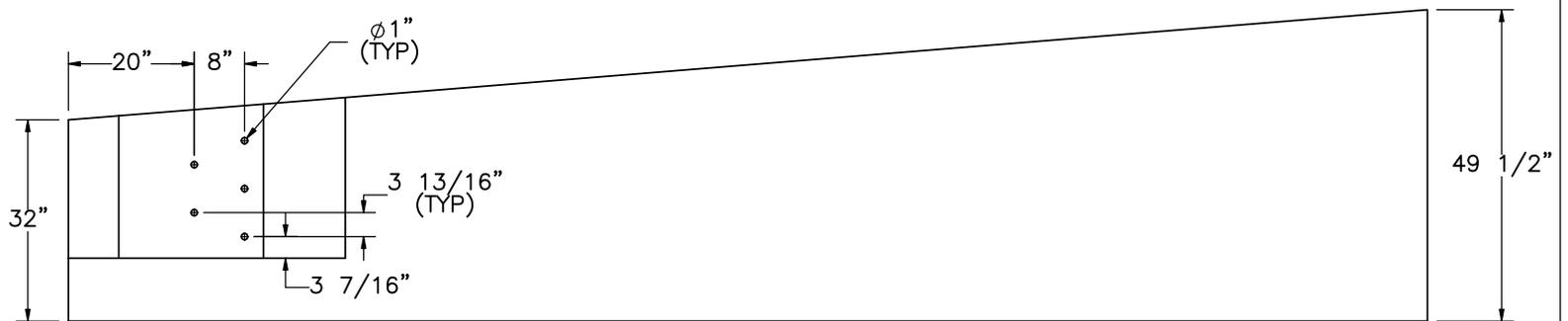
SHEET:
12 of 41
DATE:
10/20/2021
DRAWN BY:
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REV. BY:
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KF/JCH/RN



PLAN VIEW



PROFILE VIEW



ELEVATION VIEW

Note: (1) Five 1" diameter holes are required for placement of 7/8" diameter bolts.



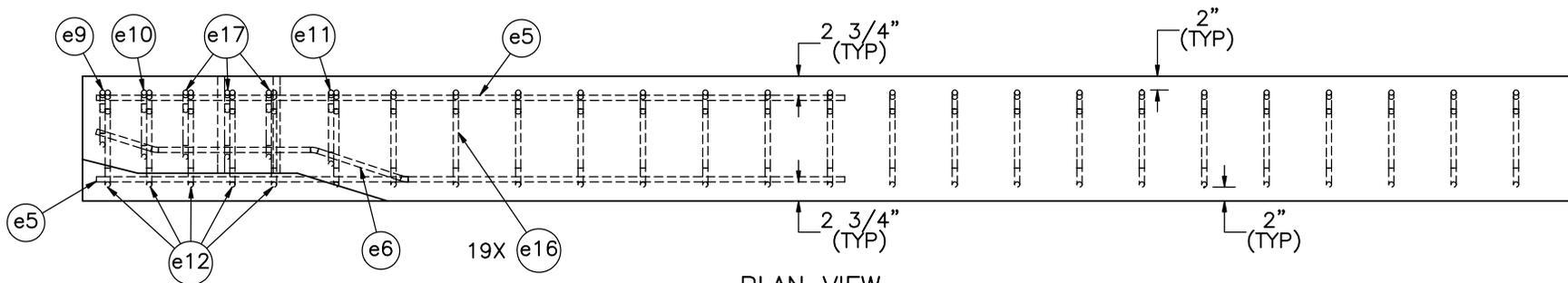
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and H42ST-1-2
Transition Buttress Details

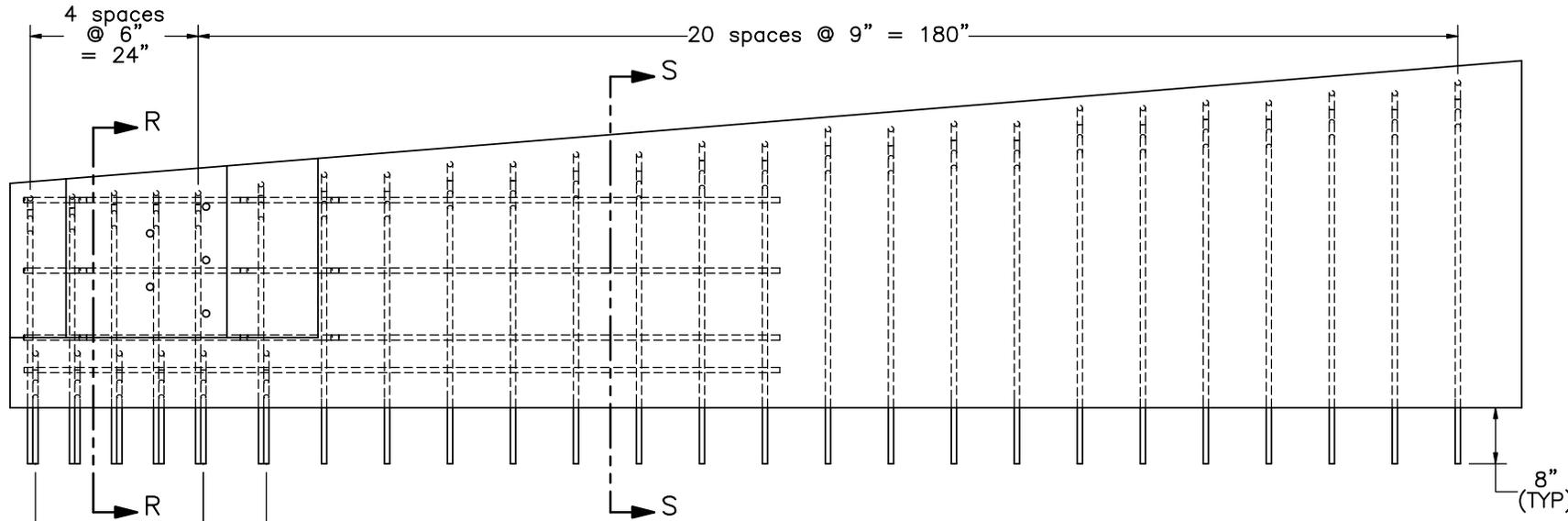
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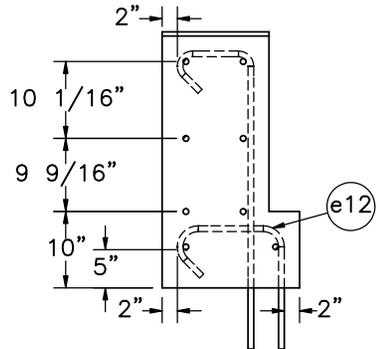
SHEET:
13 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



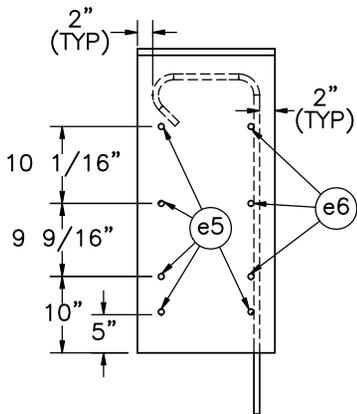
PLAN VIEW



ELEVATION VIEW



SECTION R-R



SECTION S-S

Note: Only #6 rebar is shown on this sheet. #4 rebar details are shown on next sheet.



Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and H42ST-1-2
Transition Buttress Reinforcement Details

DWG. NAME:
H42S-H42ST_R17

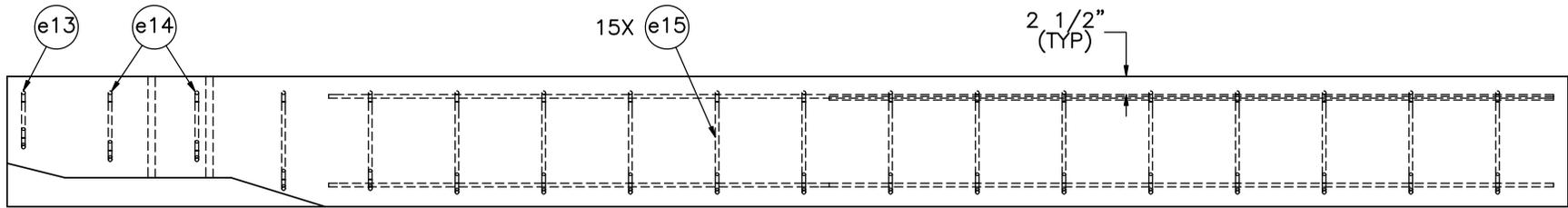
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SHEET:
14 of 41

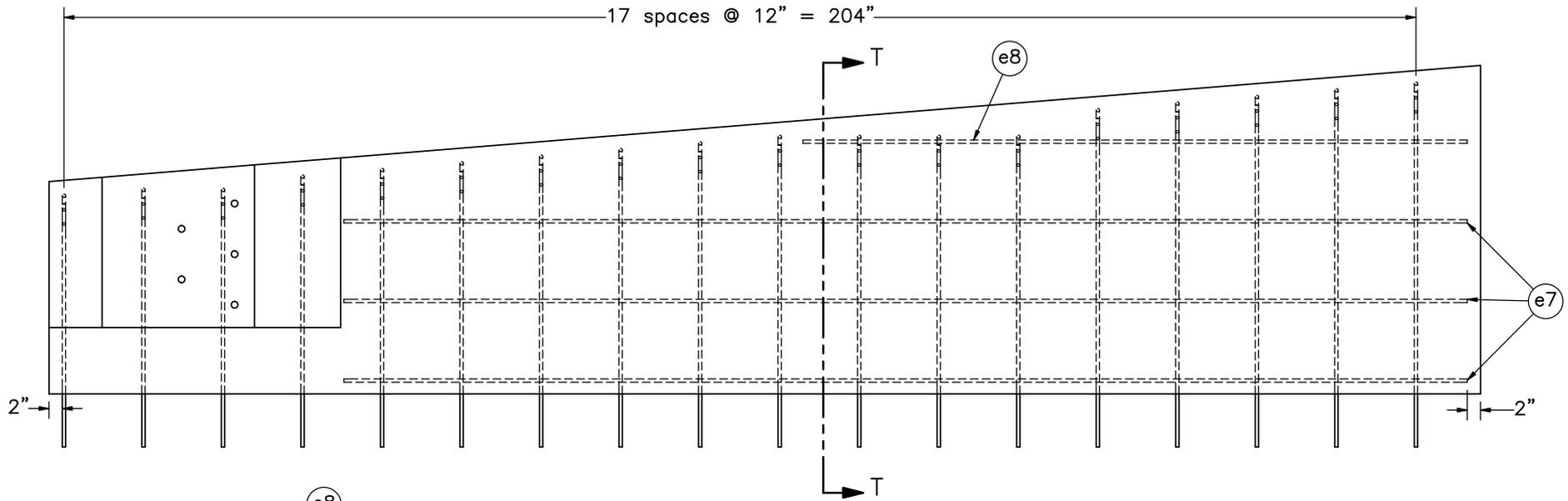
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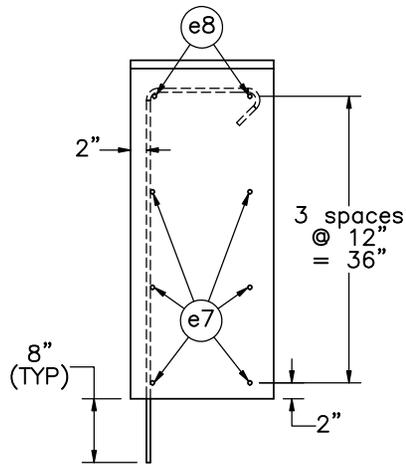
REV. BY:
KAL/SHY/R
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PLAN VIEW



ELEVATION VIEW



SECTION T-T

Notes: (1) Only #4 rebar is shown on this sheet. #6 rebar details are shown on previous sheet.



Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Transition Buttress
Reinforcement Details

DWG. NAME:
H42S-H42ST_R17

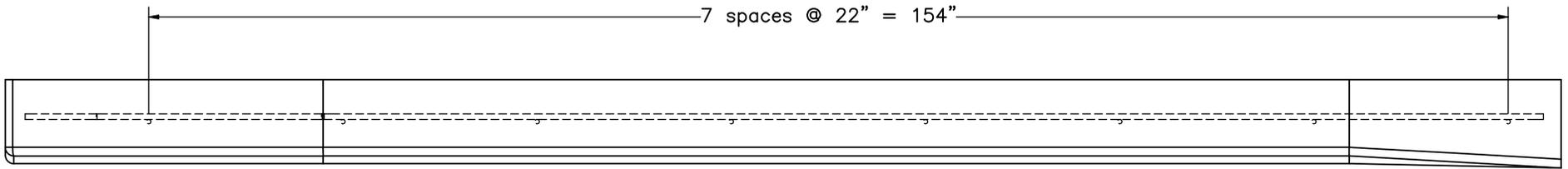
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SHEET:
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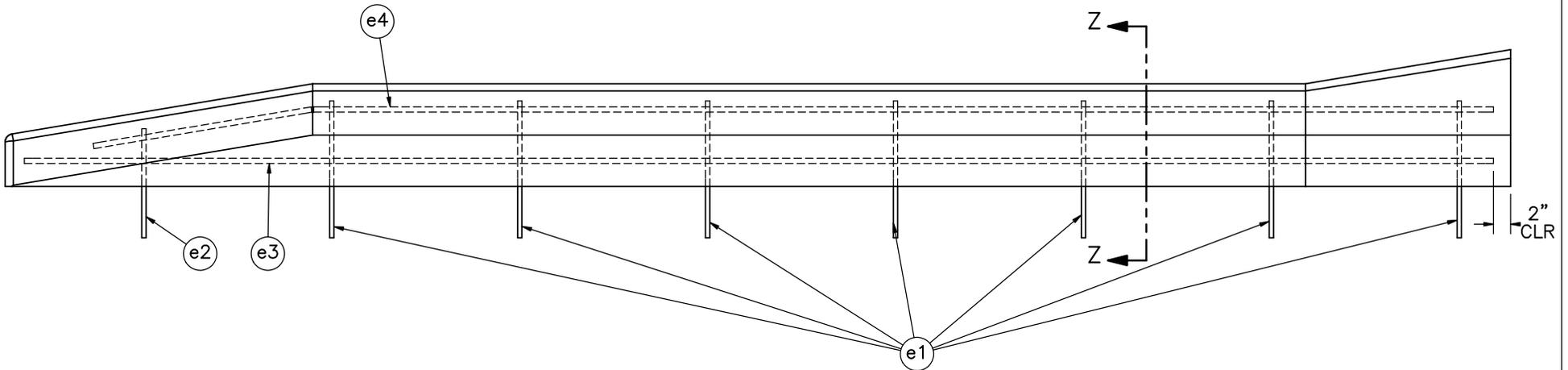
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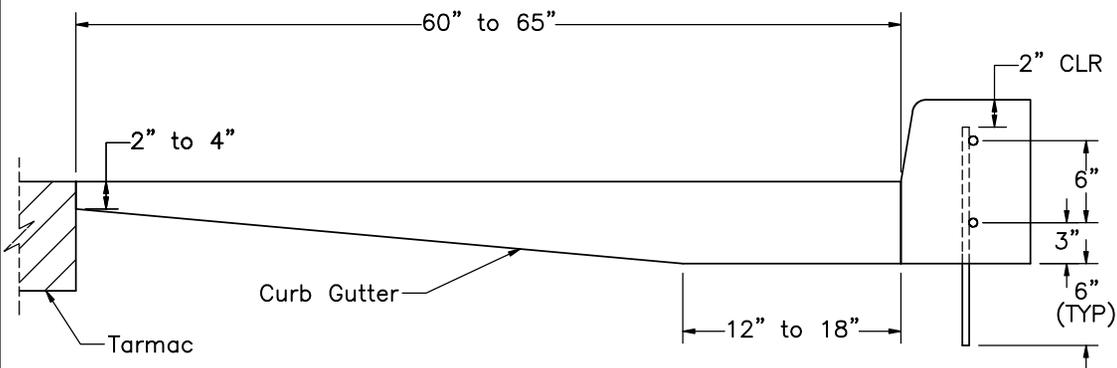
REV. BY:
KAL/SHY/R
KF/JCH/RN



PLAN VIEW



ELEVATION VIEW



SECTION Z-Z
SCALE 1:14

Note: (1) Curb Gutter hidden in Plan and Elevation views.



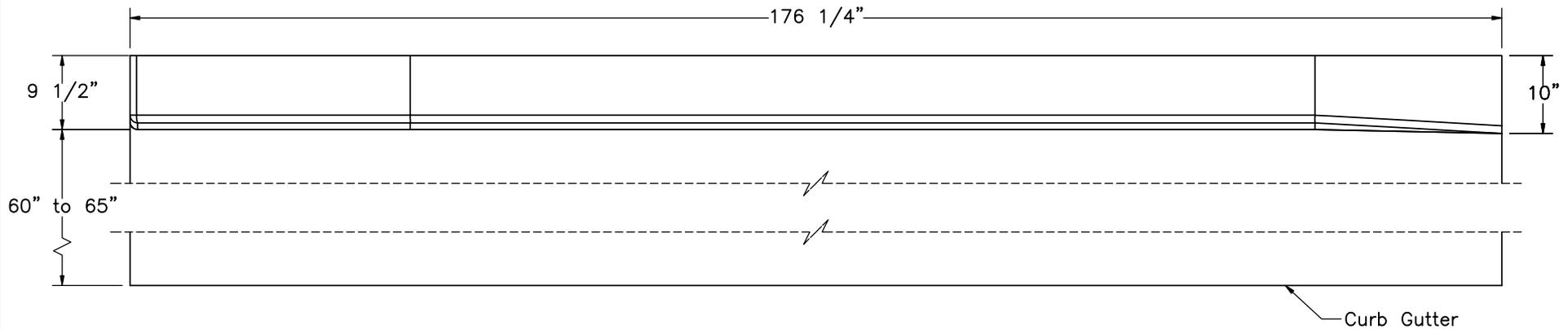
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Curb Reinforcement Details

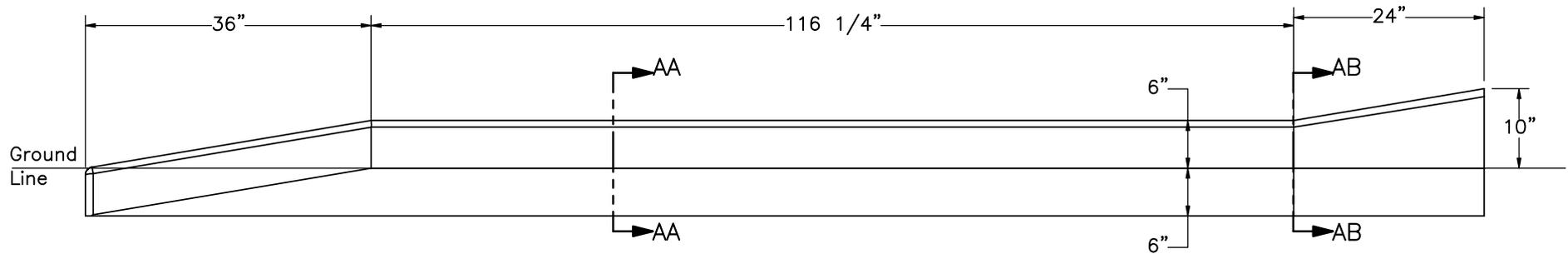
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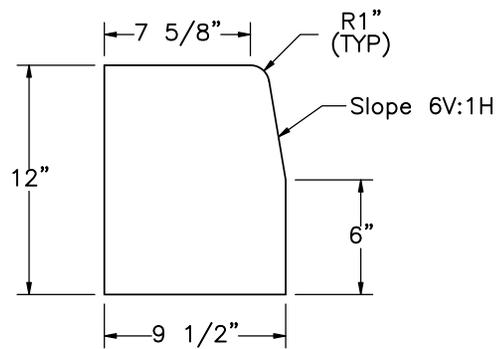
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16 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



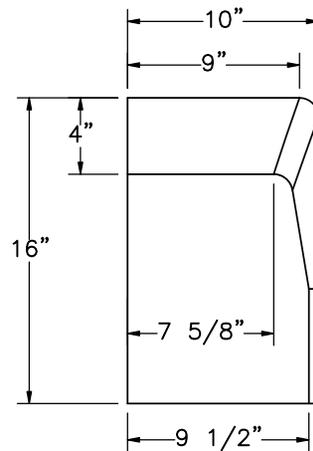
PLAN VIEW



ELEVATION VIEW



SECTION AA-AA
SCALE 1 : 10



SECTION AB-AB
SCALE 1 : 10

Note: (1) Curb Gutter hidden in Elevation View and Sections AA-AA and AB-AB.



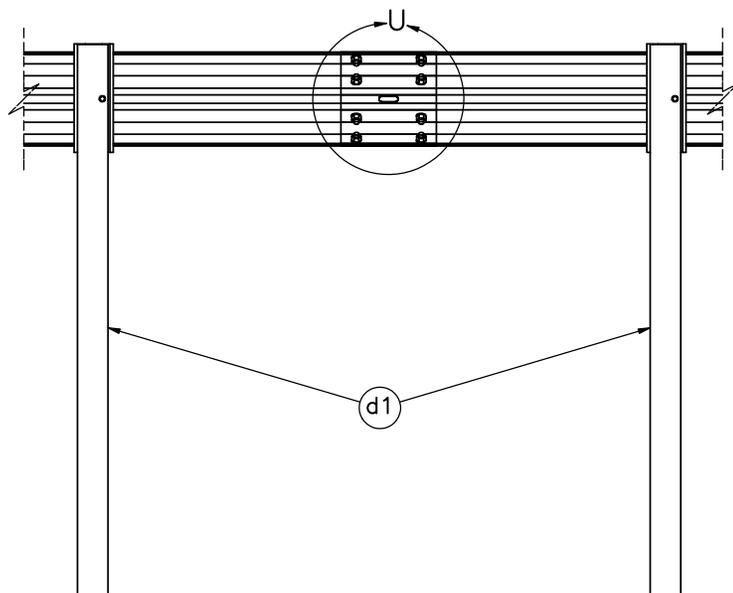
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Curb Details

DWG. NAME.
H42S-H42ST_R17

SCALE: 1:20
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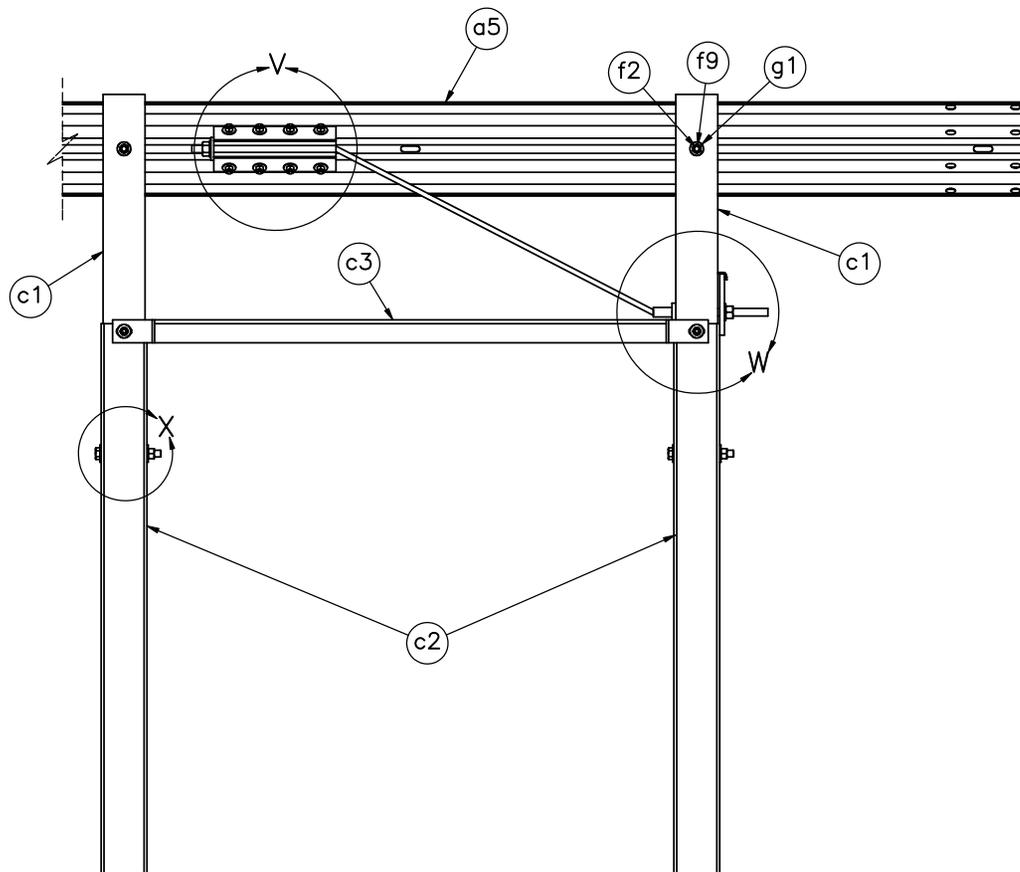
SHEET: 17 of 41
DATE: 10/20/2021
DRAWN BY: LJP/SBW/G HR
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Post 7

Post 6

SPLICE DETAIL
BACKSIDE



Post 2

Post 1

END SECTION
DETAIL BACKSIDE



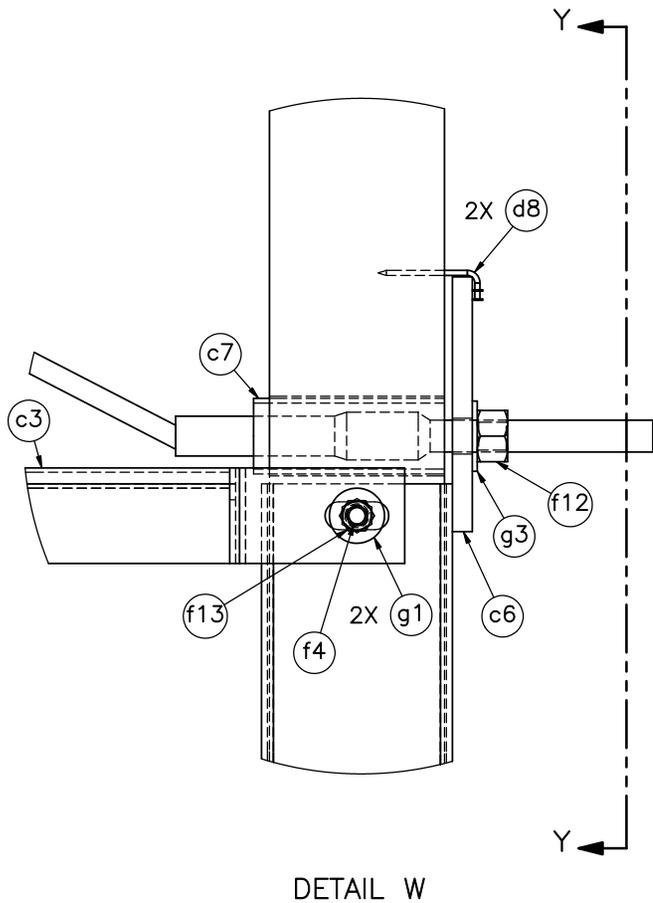
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
End Anchorage Detail

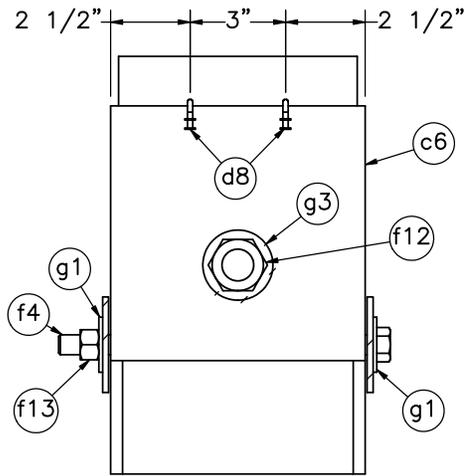
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H42S-H42ST_R17

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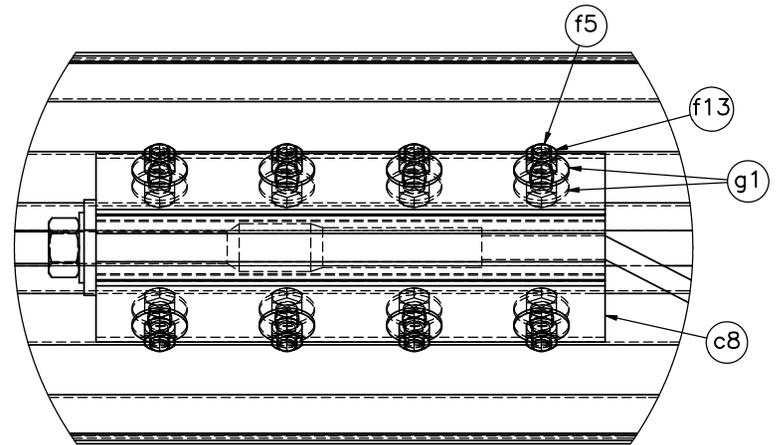
SHEET:
18 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



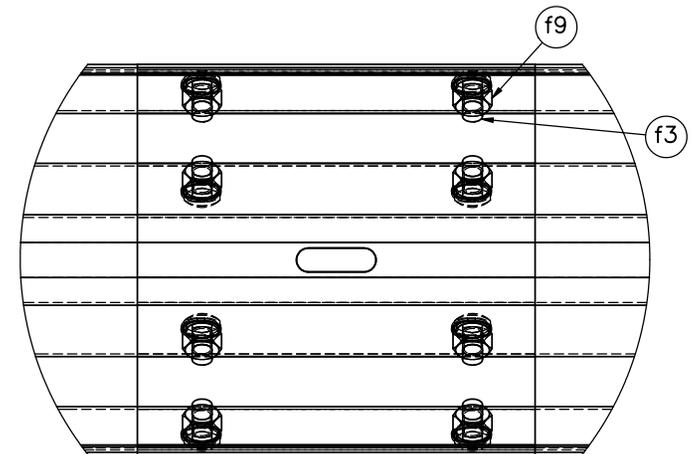
DETAIL W



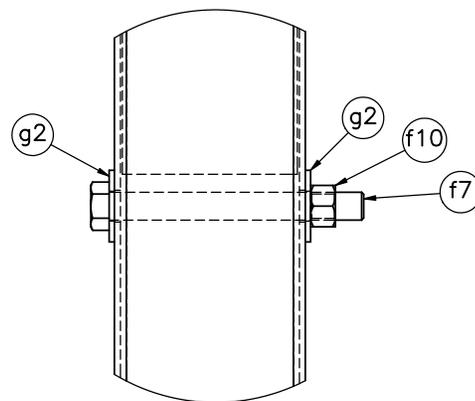
SECTION Y-Y



DETAIL V



DETAIL U



DETAIL X



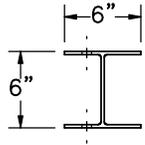
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
BCT Anchor Details

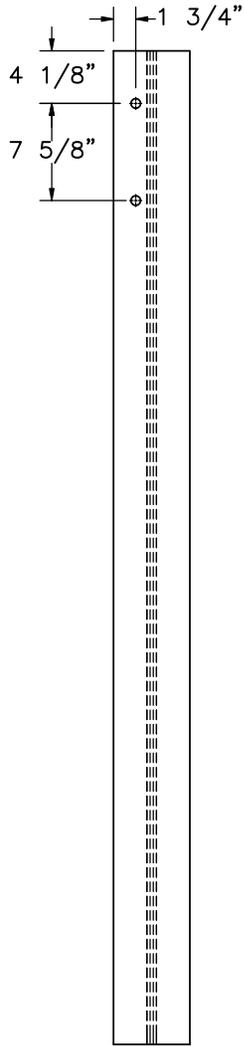
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H42S-H42ST_R17

SCALE: 1:6
UNITS: in.

SHEET:
19 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN

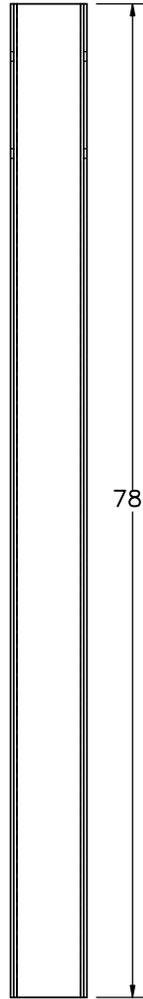


PLAN VIEW

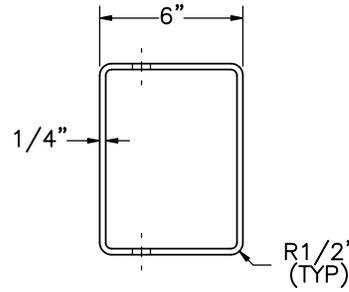


ELEVATION VIEW

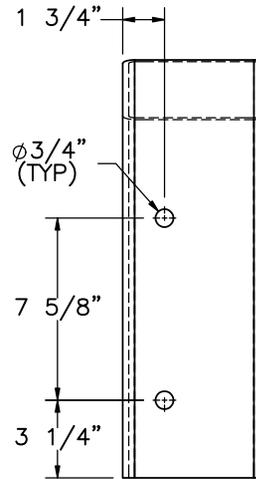
Part d3



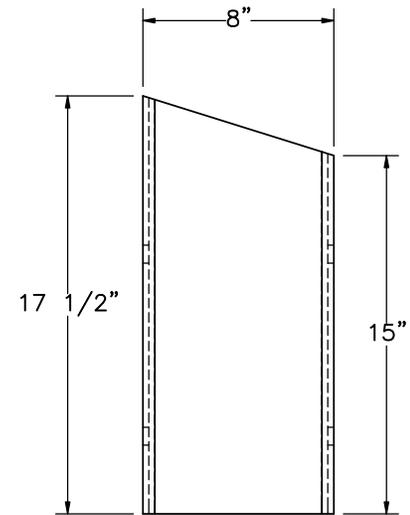
PROFILE VIEW



PLAN VIEW



ELEVATION VIEW



PROFILE VIEW

Part d4
SCALE 1:8



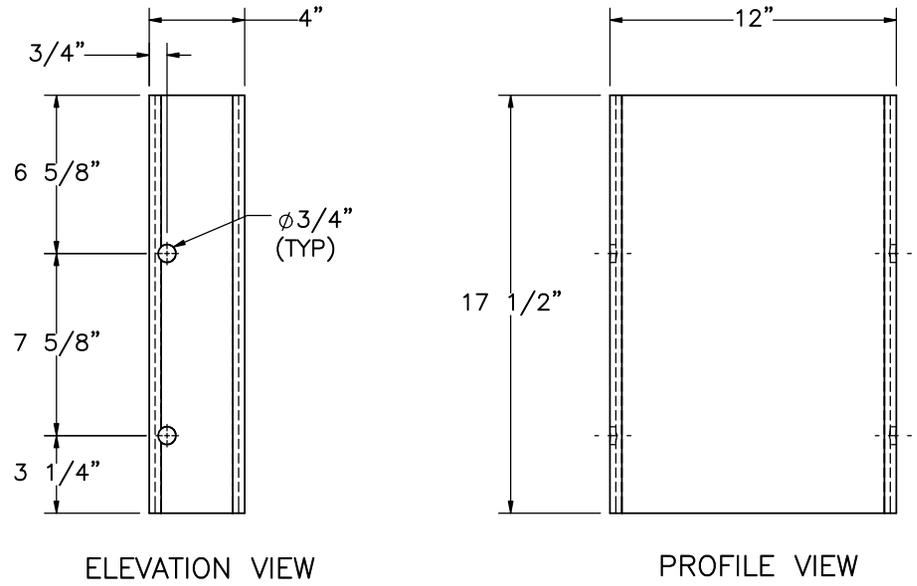
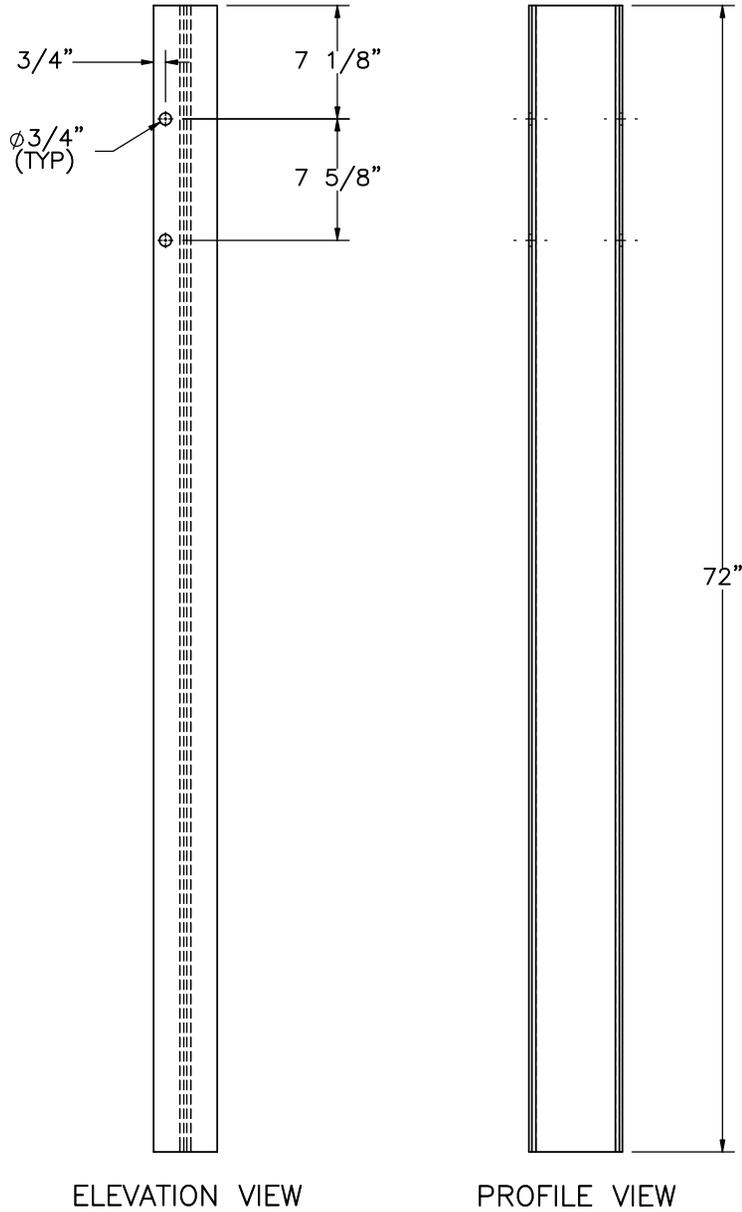
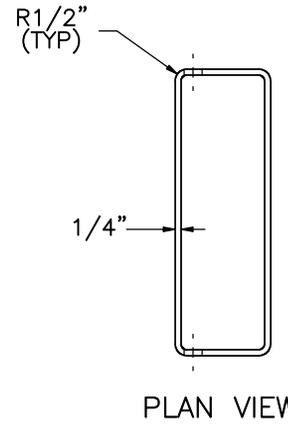
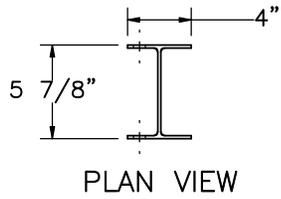
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Post Nos. 16-19 Components

DWG. NAME.
H42S-H42ST_R17

SCALE: 1:15
UNITS: in.

SHEET:
20 of 41
DATE:
10/20/2021
DRAWN BY:
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HR
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Part d5
SCALE 1:8

Part d2



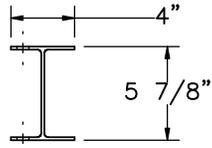
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Post Nos. 10-15 Components

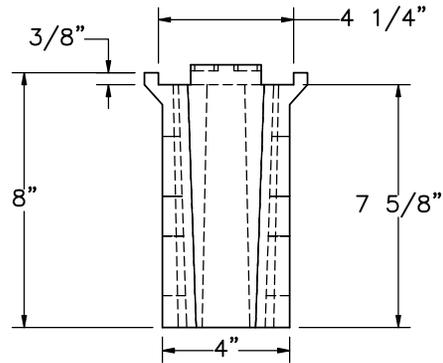
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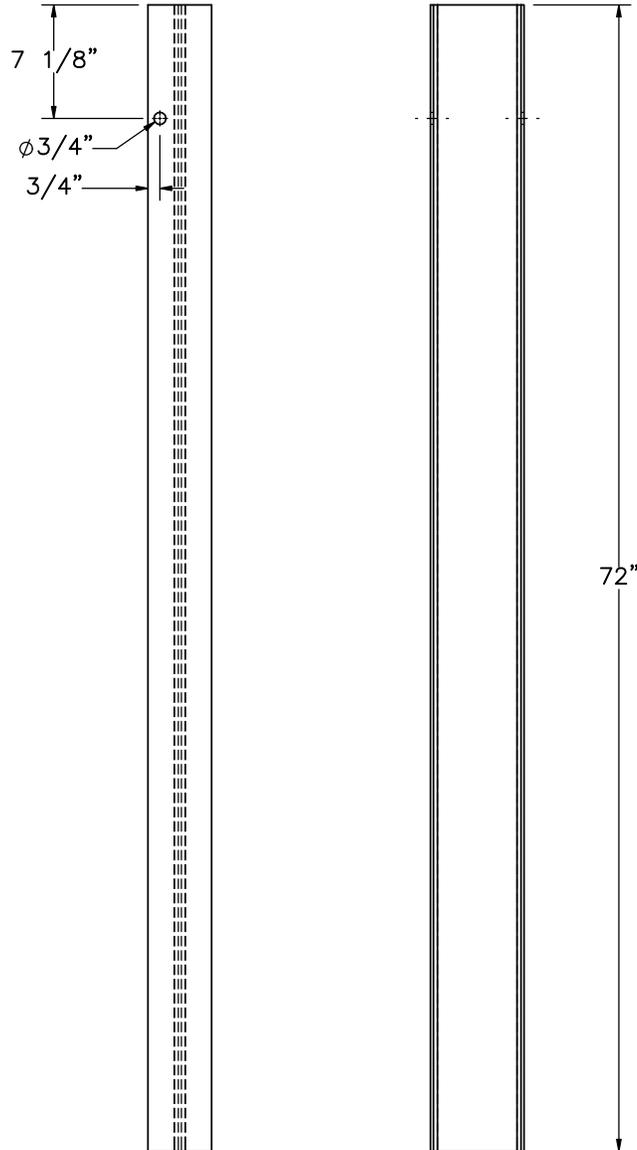
SHEET:
21 of 41
DATE:
10/20/2021
DRAWN BY:
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KAL/SHY/R
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PLAN VIEW



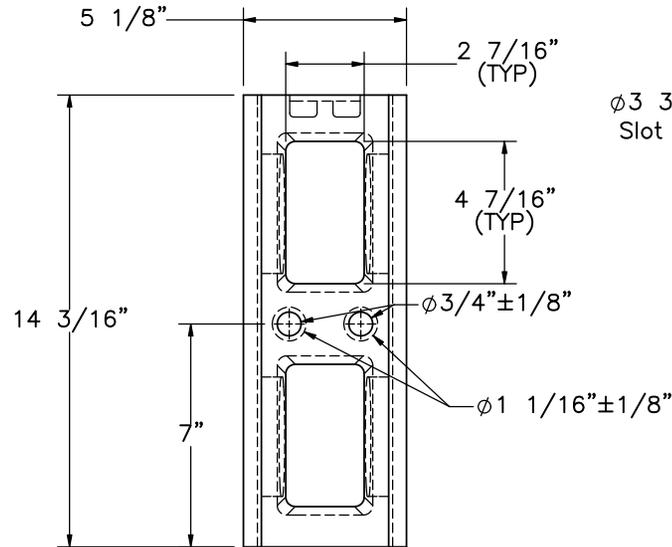
PLAN VIEW



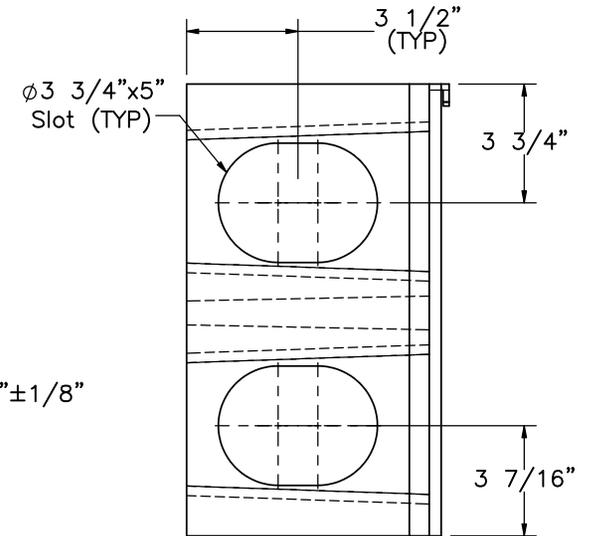
ELEVATION VIEW

PROFILE VIEW

Part d1



ELEVATION VIEW



PROFILE VIEW

Part d7
SCALE 1:6



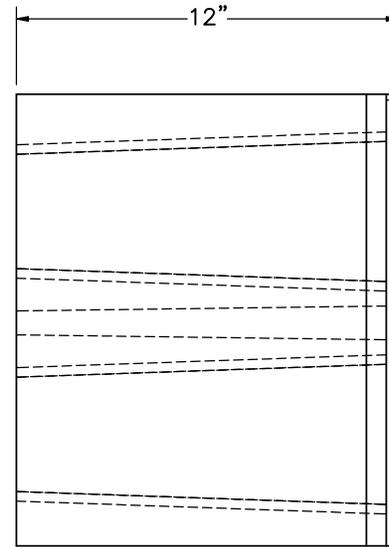
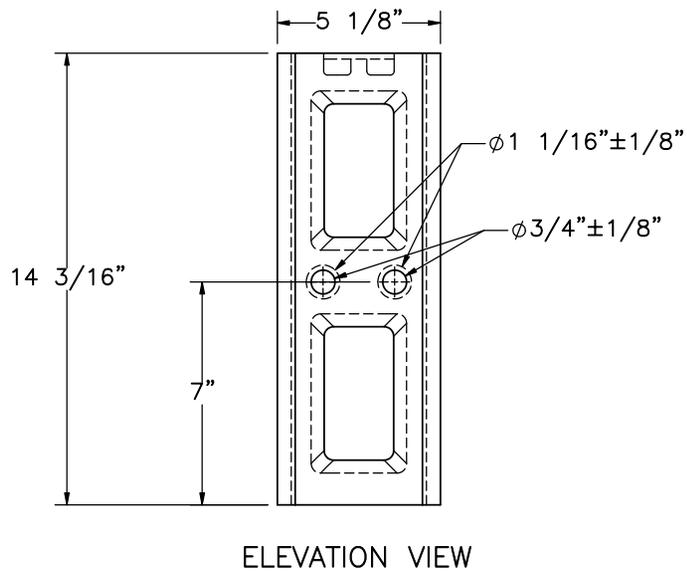
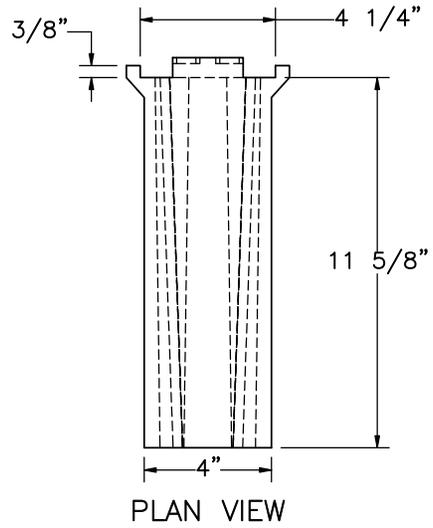
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Post Nos. 3-7 Components

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:12
UNITS: in.

SHEET:
22 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



Part d6



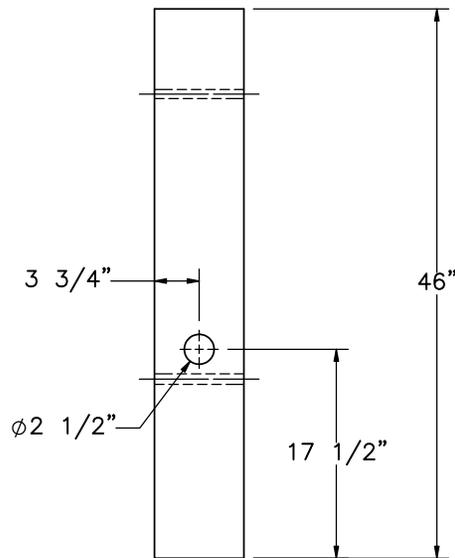
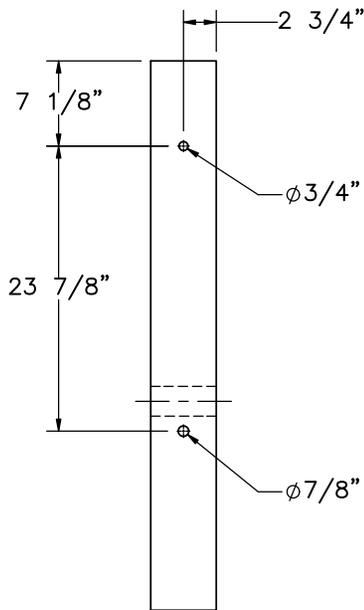
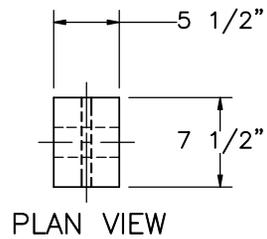
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Post Nos. 8-9 Blockout Details

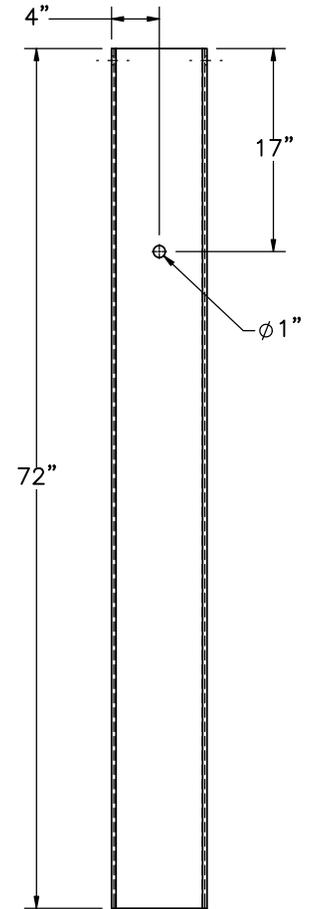
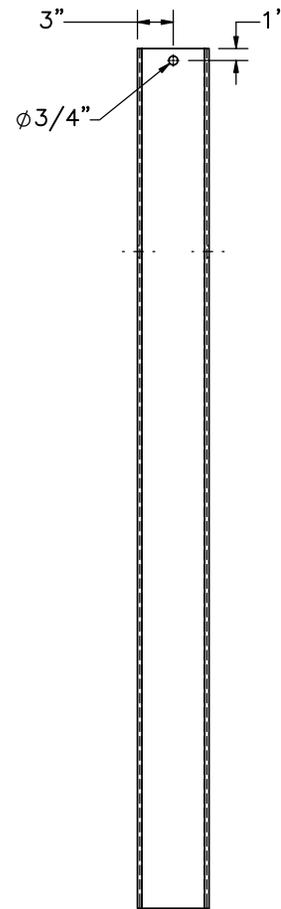
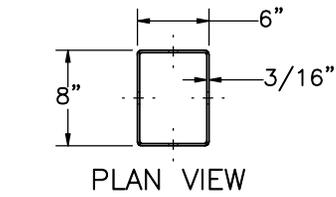
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H42S-H42ST_R17

SCALE: 1:6
UNITS: in.

SHEET: 23 of 41
DATE: 10/20/2021
DRAWN BY: LJP/SBW/G HR
REV. BY: KAL/SHY/R KF/JCH/RN



Part c1



Part c2



Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
BCT Timber Post and
Foundation Tube Details

DWG. NAME:
H42S-H42ST_R17

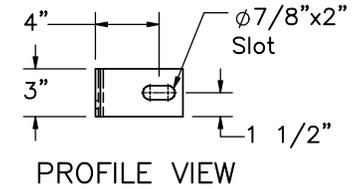
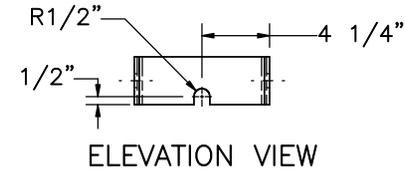
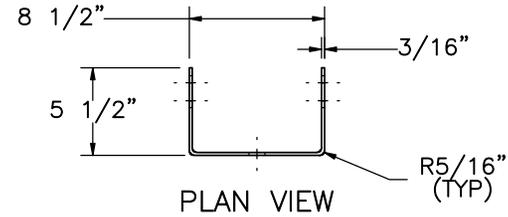
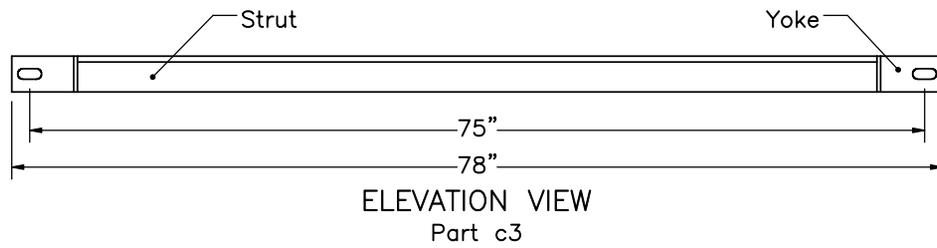
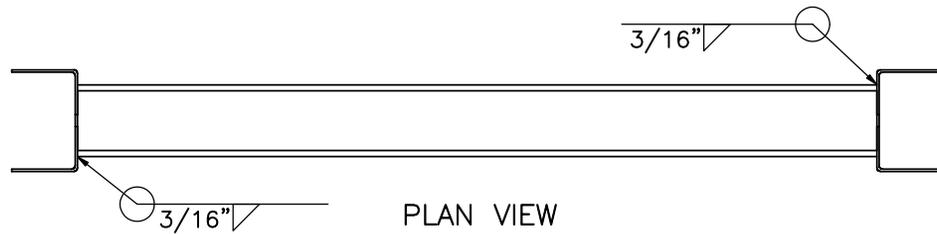
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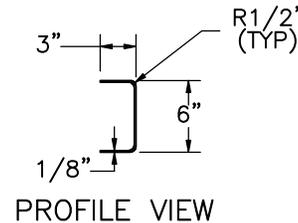
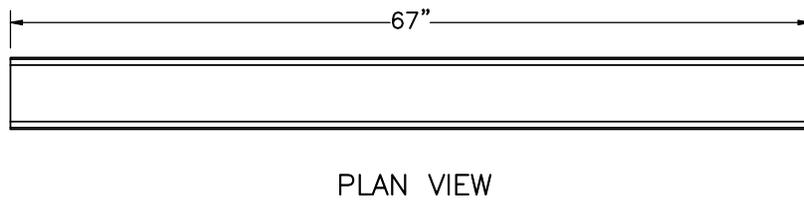
DATE:
10/20/2021

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KF/JCH/RN



Yoke
SCALE 1:12



10 Gauge Strut

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
c3	1	Ground Strut Assembly	ASTM A36	ASTM A123	-
c3-a	1	6"x3" 10 Gauge Strut	ASTM A36	-	-
c3-b	2	Yoke	ASTM A36	-	-

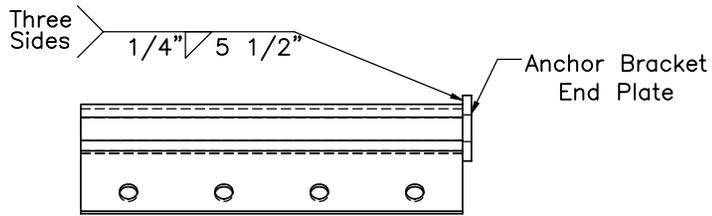
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Ground Strut Details

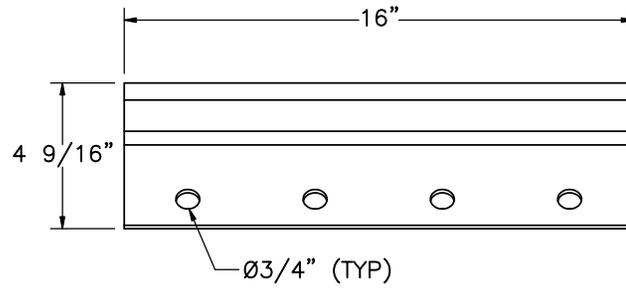
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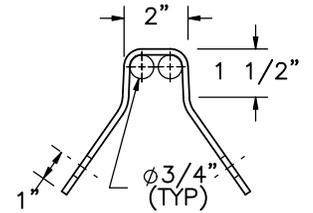
SHEET:
25 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
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PLAN VIEW

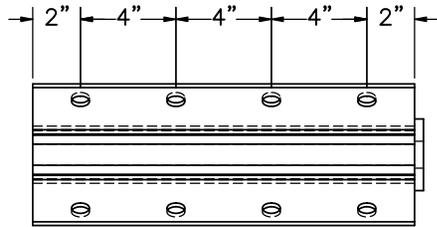


ELEVATION VIEW

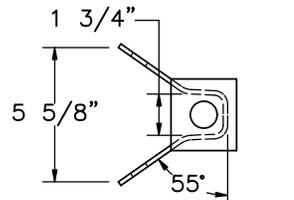


PROFILE VIEW

Anchor Bracket
SCALE 1:6

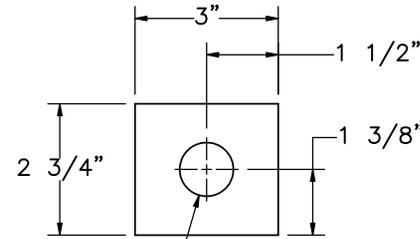


ELEVATION VIEW

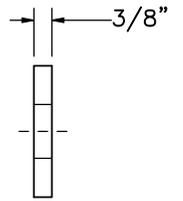


PROFILE VIEW

Part c8



ELEVATION VIEW



PROFILE VIEW

Anchor Bracket End Plate
SCALE 1:4

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
c8	1	Anchor Bracket Assembly	ASTM A36	ASTM A123	FPA01
c8-a	1	Anchor Bracket	ASTM A36	-	-
c8-b	1	Anchor Bracket End Plate	ASTM A36	-	-



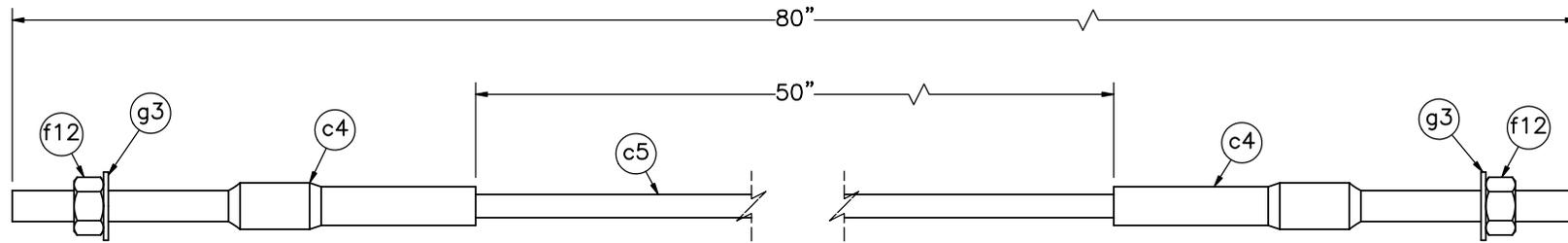
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Anchor Bracket Details

DWG. NAME.
H42S-H42ST_R17

SCALE: 1:8
UNITS: in.

SHEET:
26 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
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Cable Assembly

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
-	1	Cable Assembly	-	-	FCA01
c4	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	-
c5	1	3/4" Dia. 6x19 IWRC IPS Wire Rope	ASTM A741 Type 2	Class A Coating	-
f12	2	1"-8 UNC Heavy Hex Nut	ASTM A563DH or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX24b
g3	2	1" Dia. Plain USS Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC24a



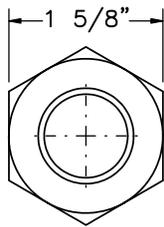
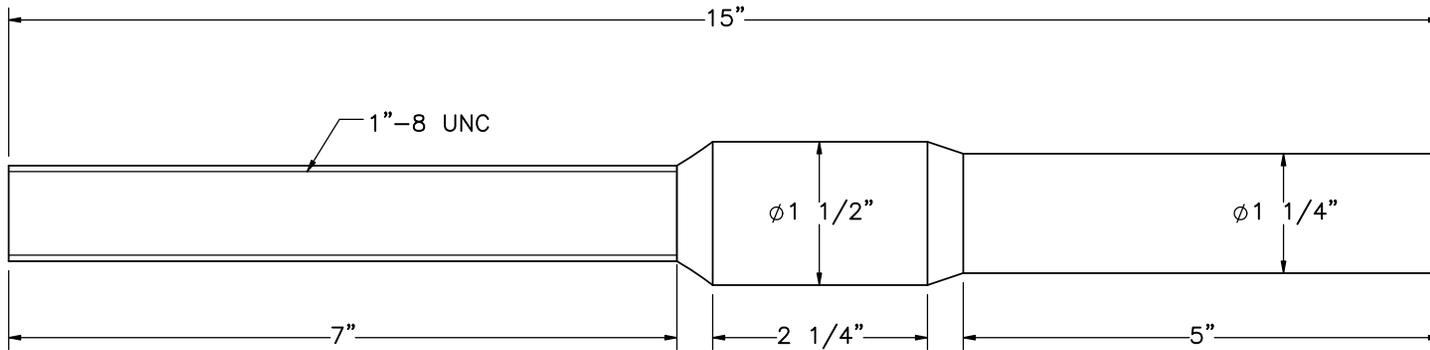
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
BCT Anchor Cable

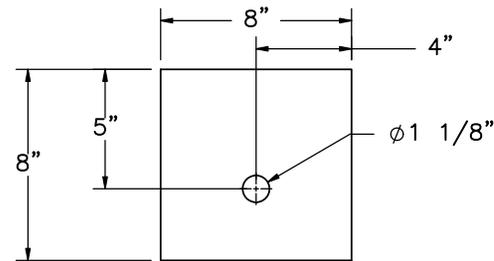
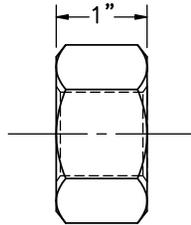
DWG. NAME.
H42S-H42ST_R17

SCALE: 1:6
UNITS: in.

SHEET:
27 of 41
DATE:
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LJP/SBW/G
HR
REV. BY:
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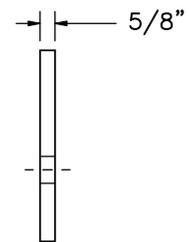


Part f12
SCALE 1:2

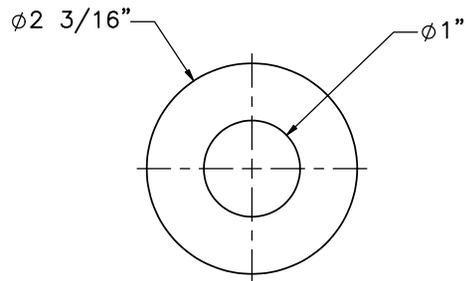


ELEVATION VIEW

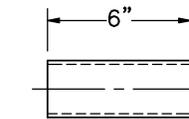
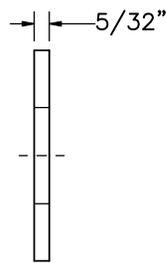
Part c6



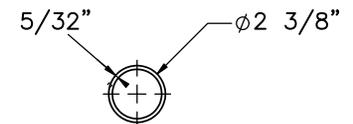
PROFILE VIEW



Part g3
SCALE 1:2



ELEVATION VIEW



PROFILE VIEW

Part c7



Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Cable Assembly and Anchor
Components

DWG. NAME:
H42S-H42ST_R17

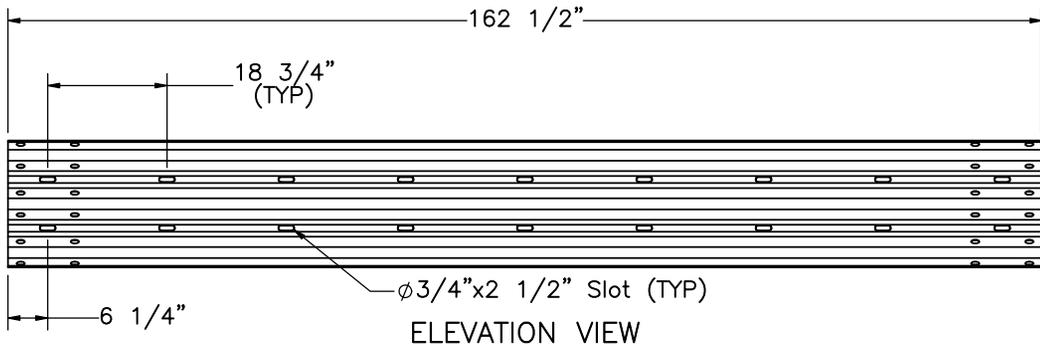
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SHEET:
28 of 41

DATE:
10/20/2021

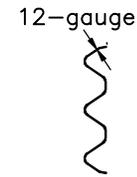
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KAL/SHY/R
KF/JCH/RN

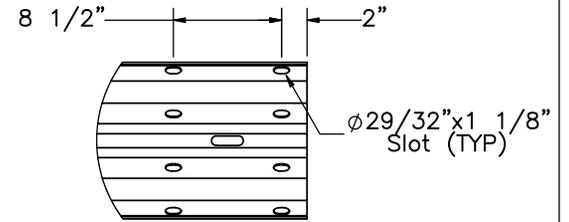


ELEVATION VIEW

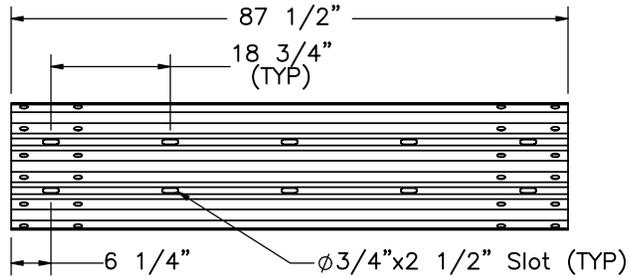
Part a1



PROFILE VIEW



DETAIL AC
SCALE 1:15

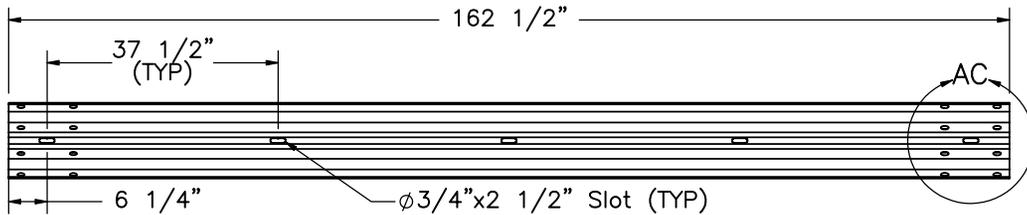


ELEVATION VIEW

Part a2

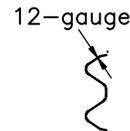


PROFILE VIEW

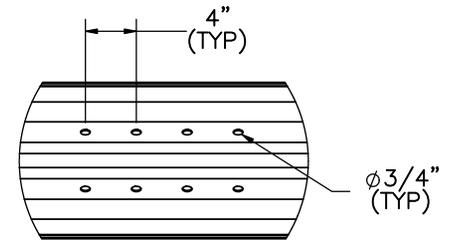


ELEVATION VIEW

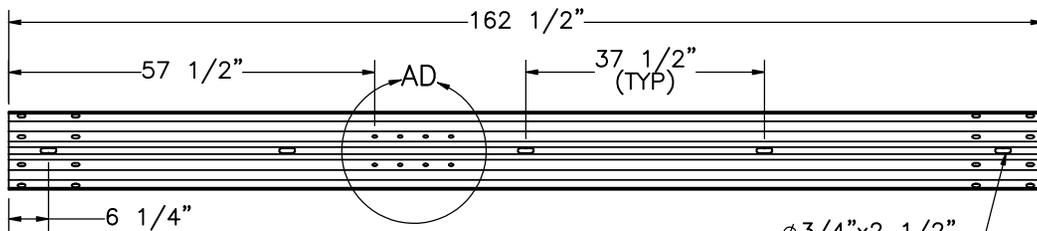
Part a4



PROFILE VIEW



DETAIL AD
SCALE 1:15



ELEVATION VIEW

Part a5

phi 3/4" x 2 1/2"
Slot (TYP)



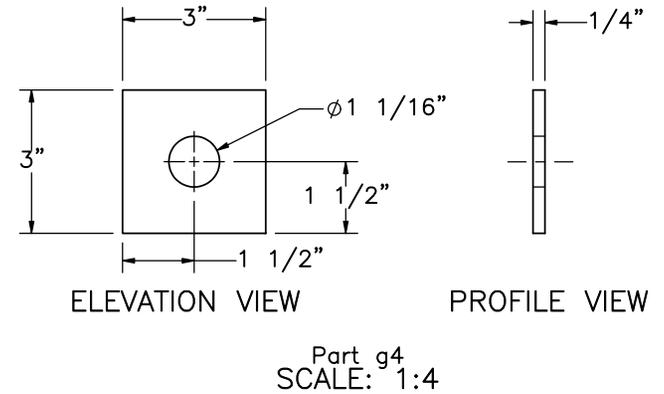
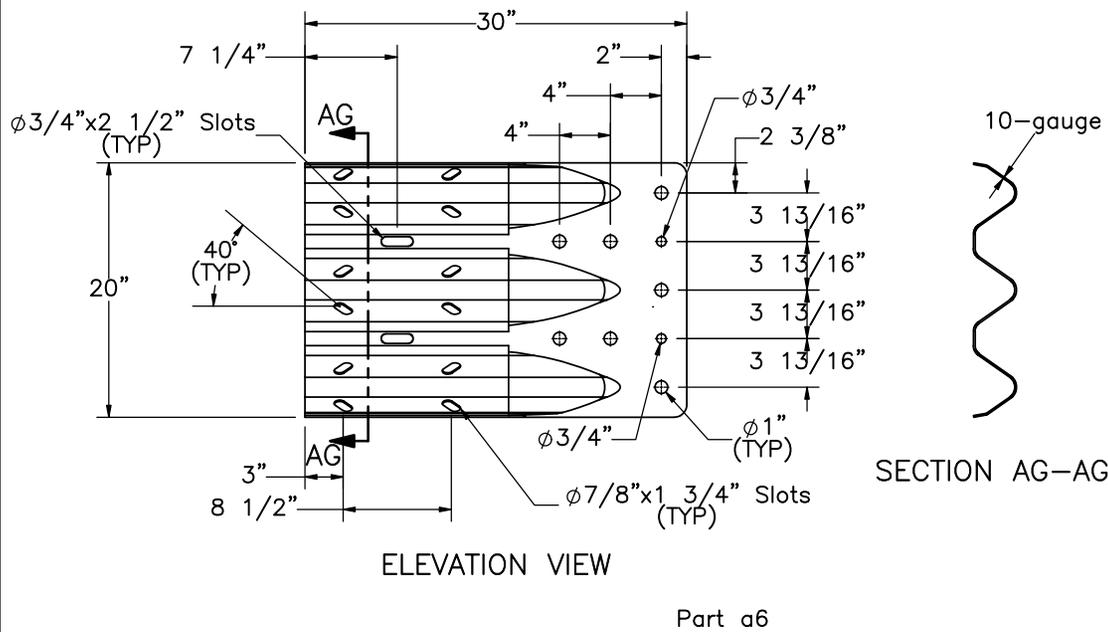
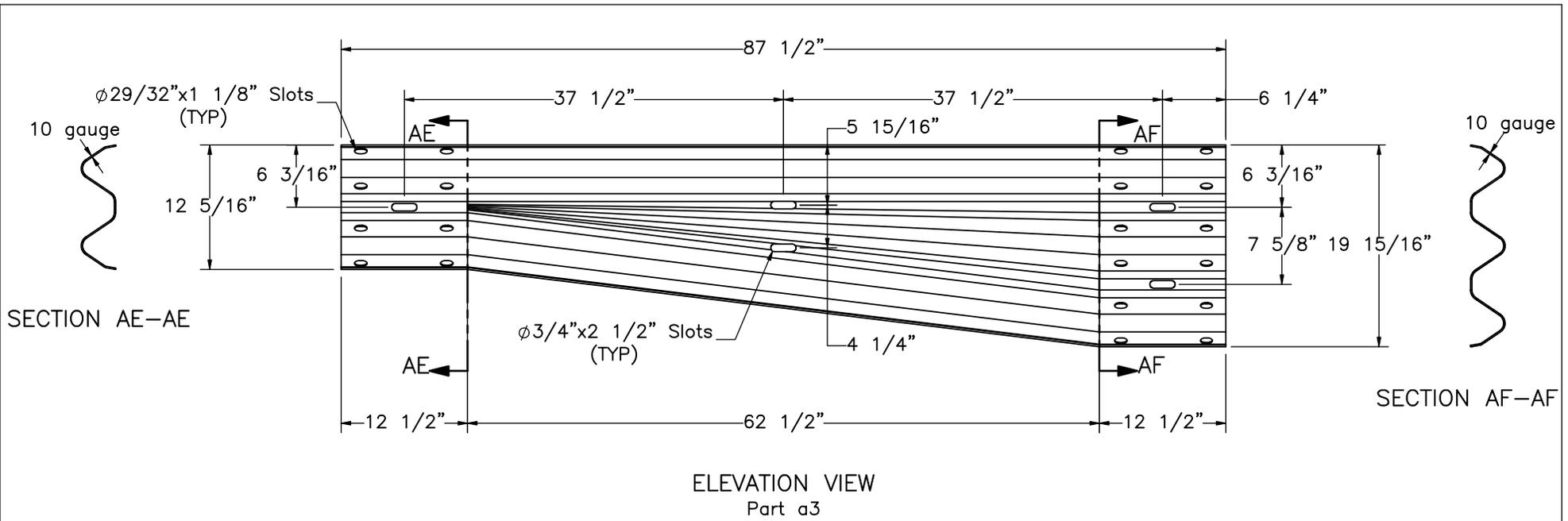
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Guardrail Section Details

DWG. NAME.
H42S-H42ST_R17

SCALE: 1:30
UNITS: in.

SHEET:
29 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



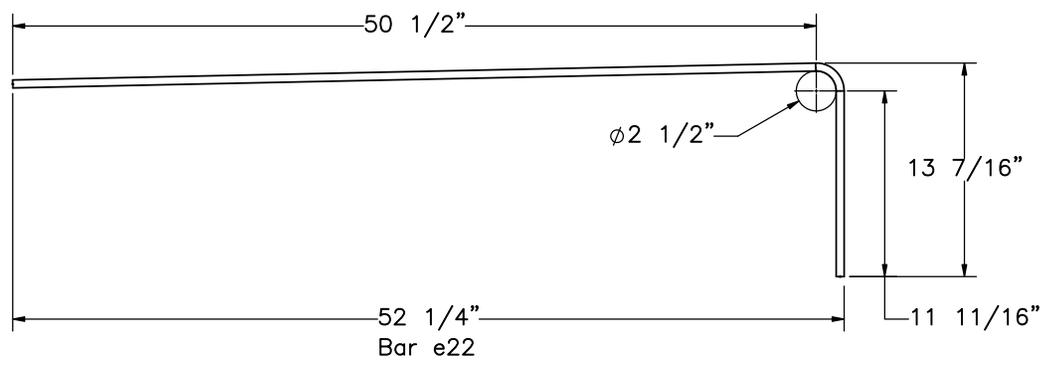
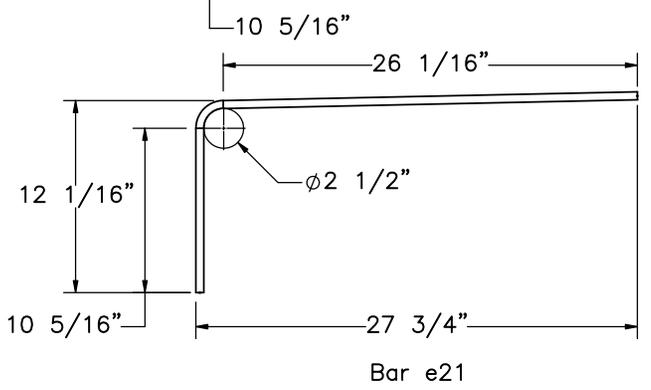
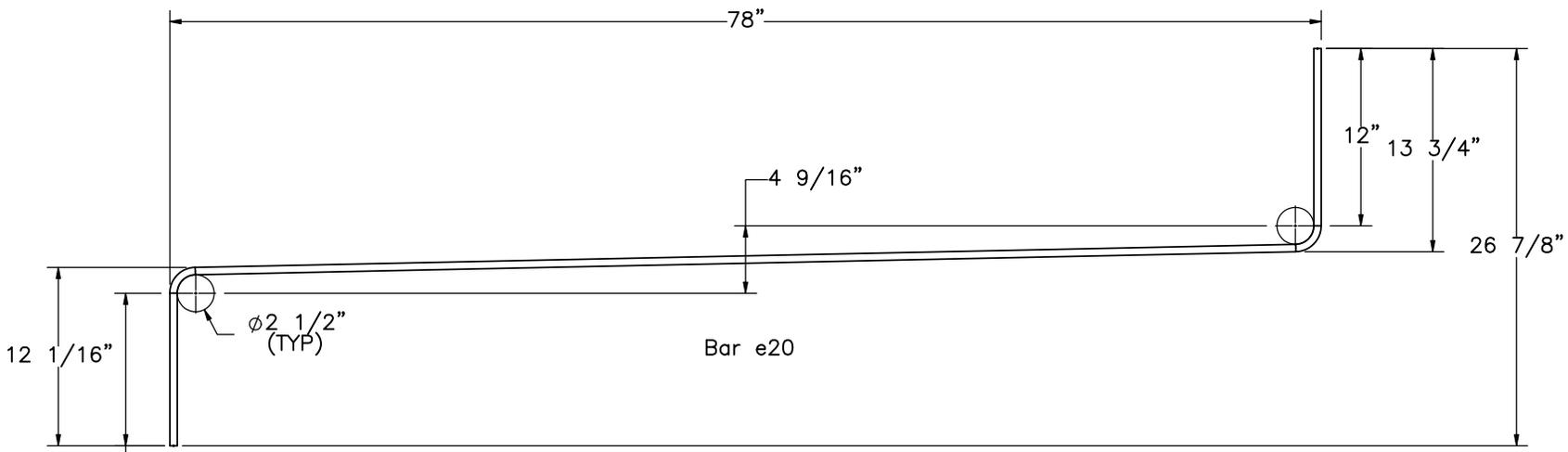
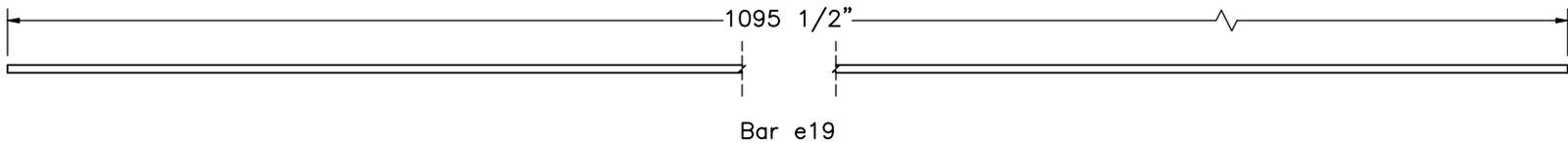
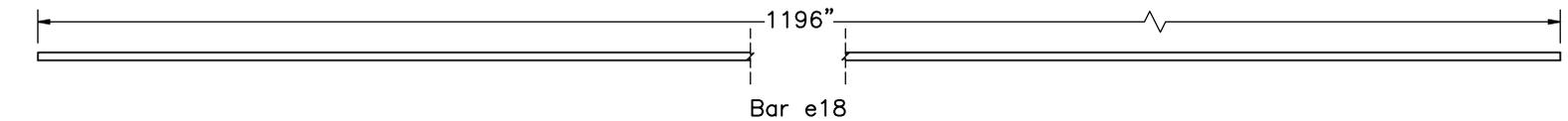
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Rail Transition and Component
Details

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:15
UNITS: in.

SHEET:
30 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



BILL OF BARS

Item No.	Size	QTY	Unbent Length	Material Specification
e18	#4	6	1196"	ASTM A615 Gr. 60
e19	#4	1	1095 1/2"	ASTM A615 Gr. 60
e20	#4	125	101 9/16"	ASTM A615 Gr. 60
e21	#4	11	50 11/16"	ASTM A615 Gr. 60
e22	#4	11	64 1/2"	ASTM A615 Gr. 60



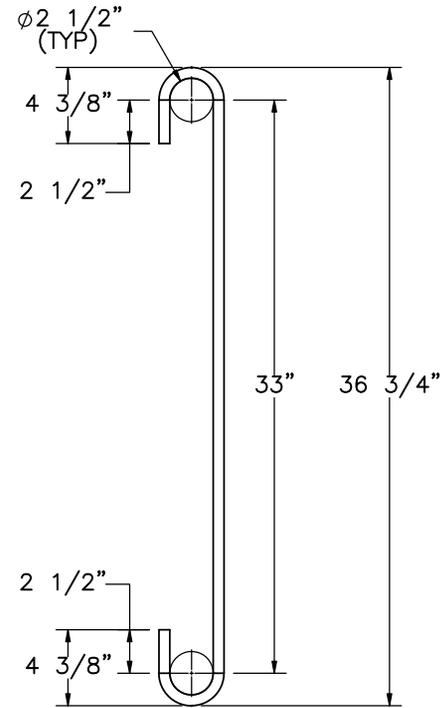
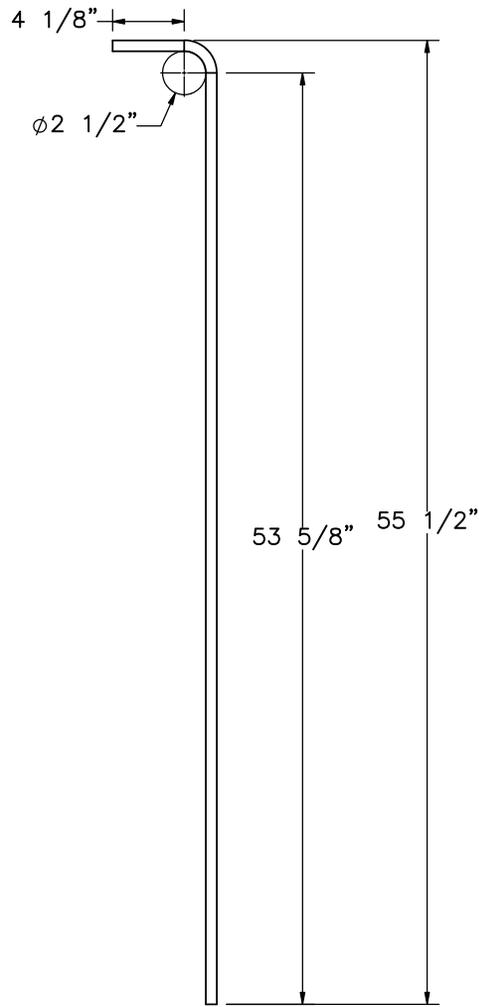
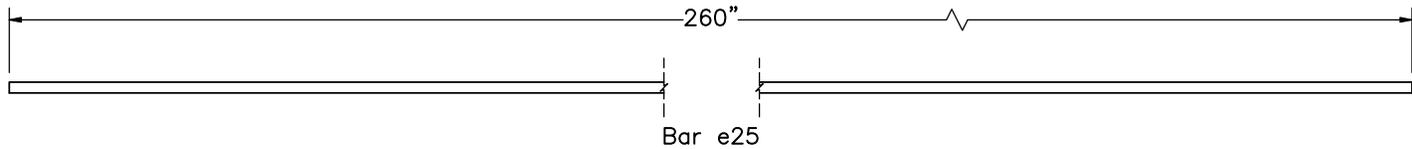
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Sidewalk Rebar Details

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:12
UNITS: in.

SHEET:
31 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



BILL OF BARS				
Item No.	Size	QTY	Unbent Length	Material Specification
e25	#5	30	260"	ASTM A615 Gr. 60
e28	#5	275	60 3/16"	ASTM A615 Gr. 60
e29	#5	18	47 13/16"	ASTM A615 Gr. 60



Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Parapet Reinforcement Details

DWG. NAME:
H42S-H42ST_R17

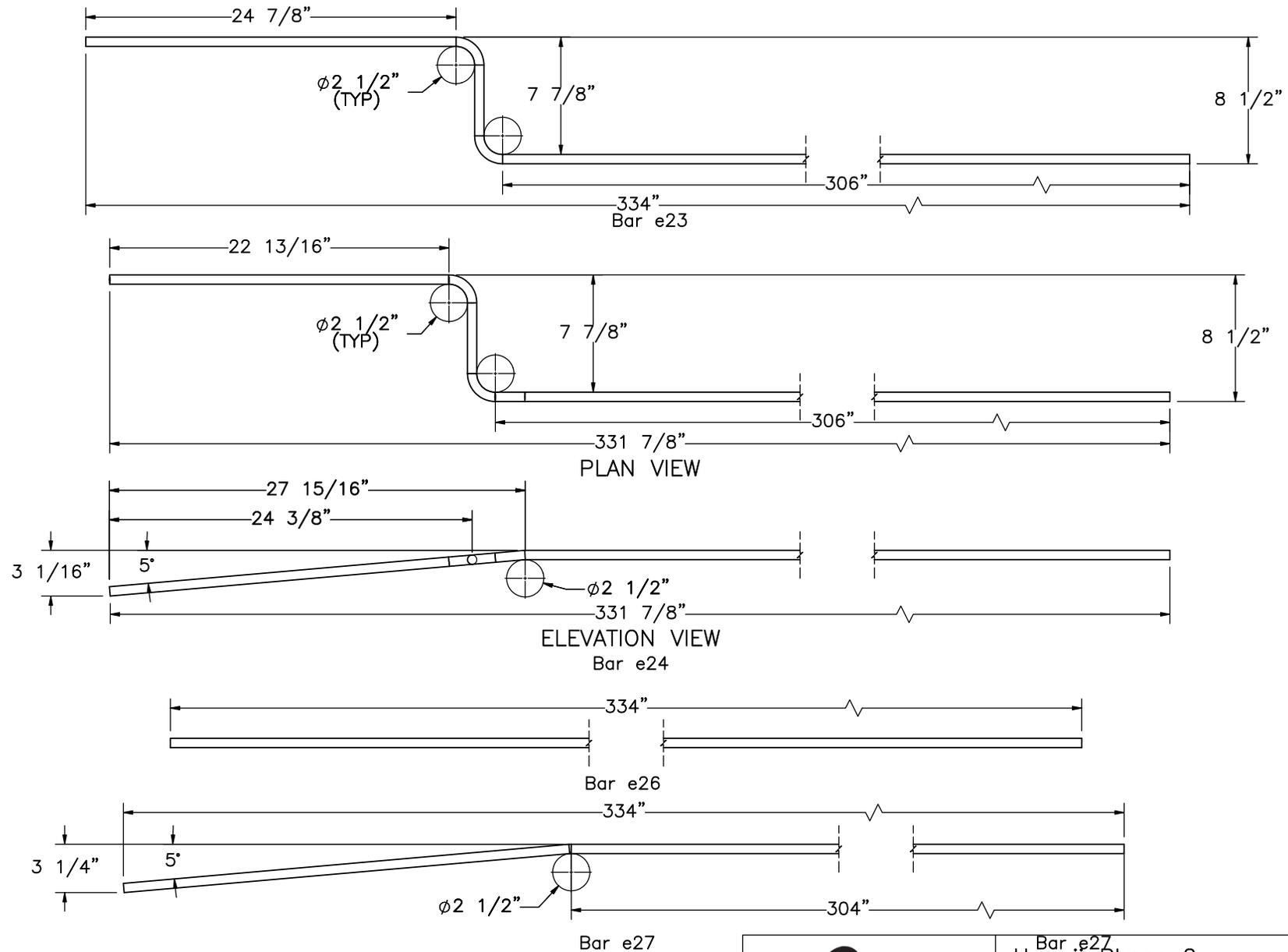
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UNITS: in.

REV. BY:
KAL/SHY/R
KF/JCH/RN

SHEET:
32 of 41

DATE:
10/20/2021

DRAWN BY:
LJP/SBW/G
HR



BILL OF BARS

Item No.	Size	QTY	Unbent Length	Material Specification
e23	#5	4	340 9/16"	ASTM A615 Gr. 60
e24	#5	1	340 5/8"	ASTM A615 Gr. 60
e26	#5	4	334"	ASTM A615 Gr. 60
e27	#5	1	334 1/8"	ASTM A615 Gr. 60



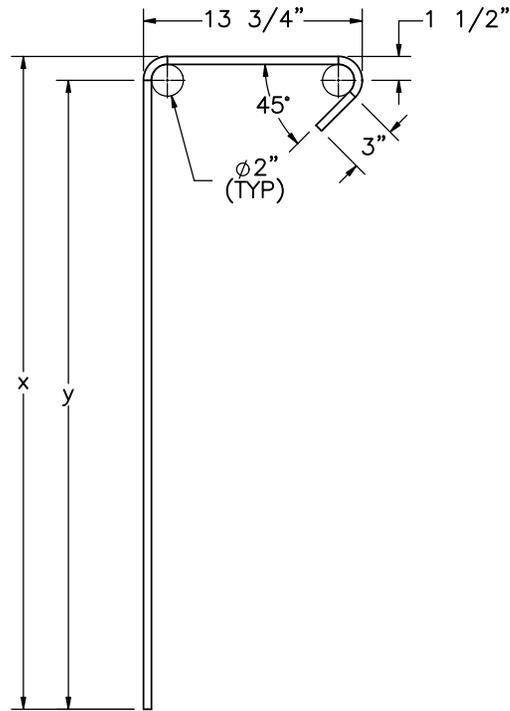
Midwest Roadside Safety Facility

Bar e27
Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
End Post Reinforcement Details

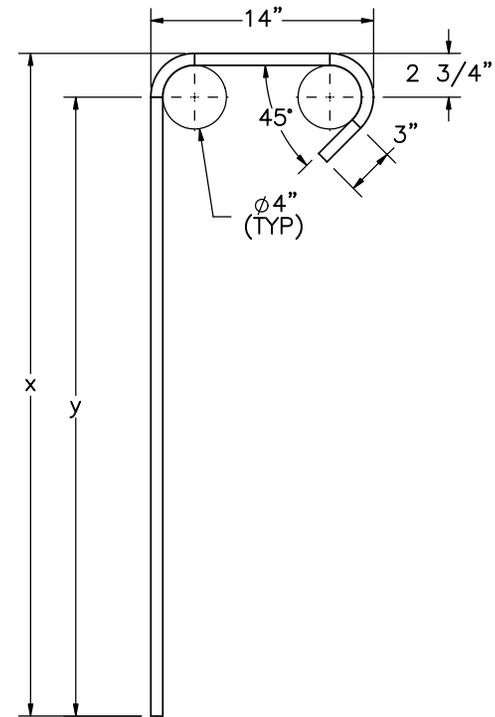
DWG. NAME:
H42S-H42ST_R17

SCALE: 1:10
UNITS: in.

SHEET:
33 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
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Part e15
#4 Vertical Stirrup



Part e16
#6 Vertical Stirrup

#4 Vertical Stirrups

Height (x)	QTY	Height (y)	Unbent Length
41"	1	39 1/2"	58 1/8"
42"	1	40 1/2"	59 1/8"
43"	1	41 1/2"	60 1/8"
44"	1	42 1/2"	61 1/8"
45"	1	43 1/2"	62 1/8"
46"	1	44 1/2"	63 1/8"
47"	4	45 1/2"	64 1/8"
51"	1	49 1/2"	68 1/8"
52"	1	50 1/2"	69 1/8"
53"	1	51 1/2"	70 1/8"
54"	1	52 1/2"	71 1/8"
55"	1	53 1/2"	72 1/8"

#6 Vertical Stirrups

Height (x)	QTY	Height (y)	Unbent Length
41 5/8"	2	38 7/8"	59 3/4"
43 1/8"	2	40 3/8"	61 1/4"
44 1/2"	2	41 3/4"	62 5/8"
46"	2	43 1/4"	64 1/8"
47 1/2"	2	44 3/4"	65 5/8"
48 7/8"	2	46 1/8"	67"
50 3/8"	2	47 5/8"	68 1/2"
51 7/8"	2	49 1/8"	70"
53 1/4"	2	50 1/2"	71 3/8"
54 3/4"	1	52 3/4"	72 7/8"



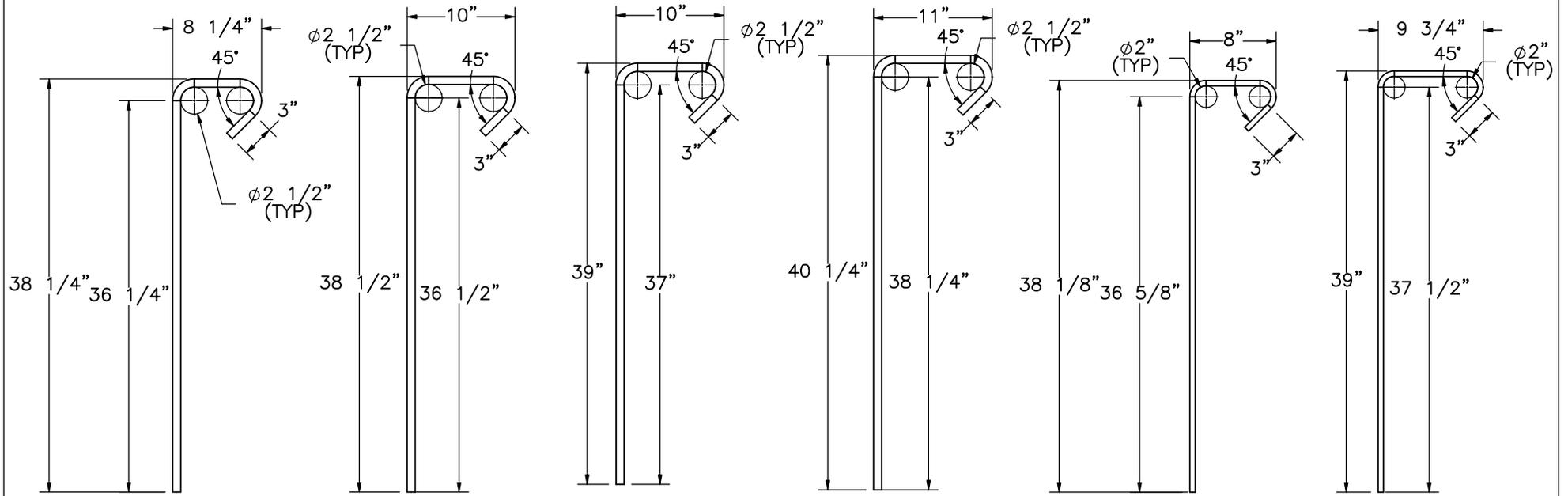
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Transition Buttress Vertical
Stirrups

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:12
UNITS: in.

SHEET:
34 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
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Bar e9

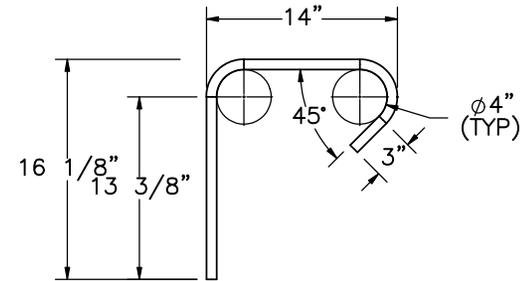
Bar e10

Bar e17

Bar e11

Bar e13

Bar e14



Bar e12

BILL OF BARS

Part No.	Size	QTY	Unbent Length	Material Specification
e9	#6	1	49 7/8"	ASTM A615 Gr. 60
e10	#6	1	51 7/8"	ASTM A615 Gr. 60
e11	#6	1	54 5/8"	ASTM A615 Gr. 60
e12	#6	6	34 3/16"	ASTM A615 Gr. 60
e13	#4	1	49 9/16"	ASTM A615 Gr. 60
e14	#4	2	52 1/8"	ASTM A615 Gr. 60
e17	#6	3	52 3/8"	ASTM A615 Gr. 60



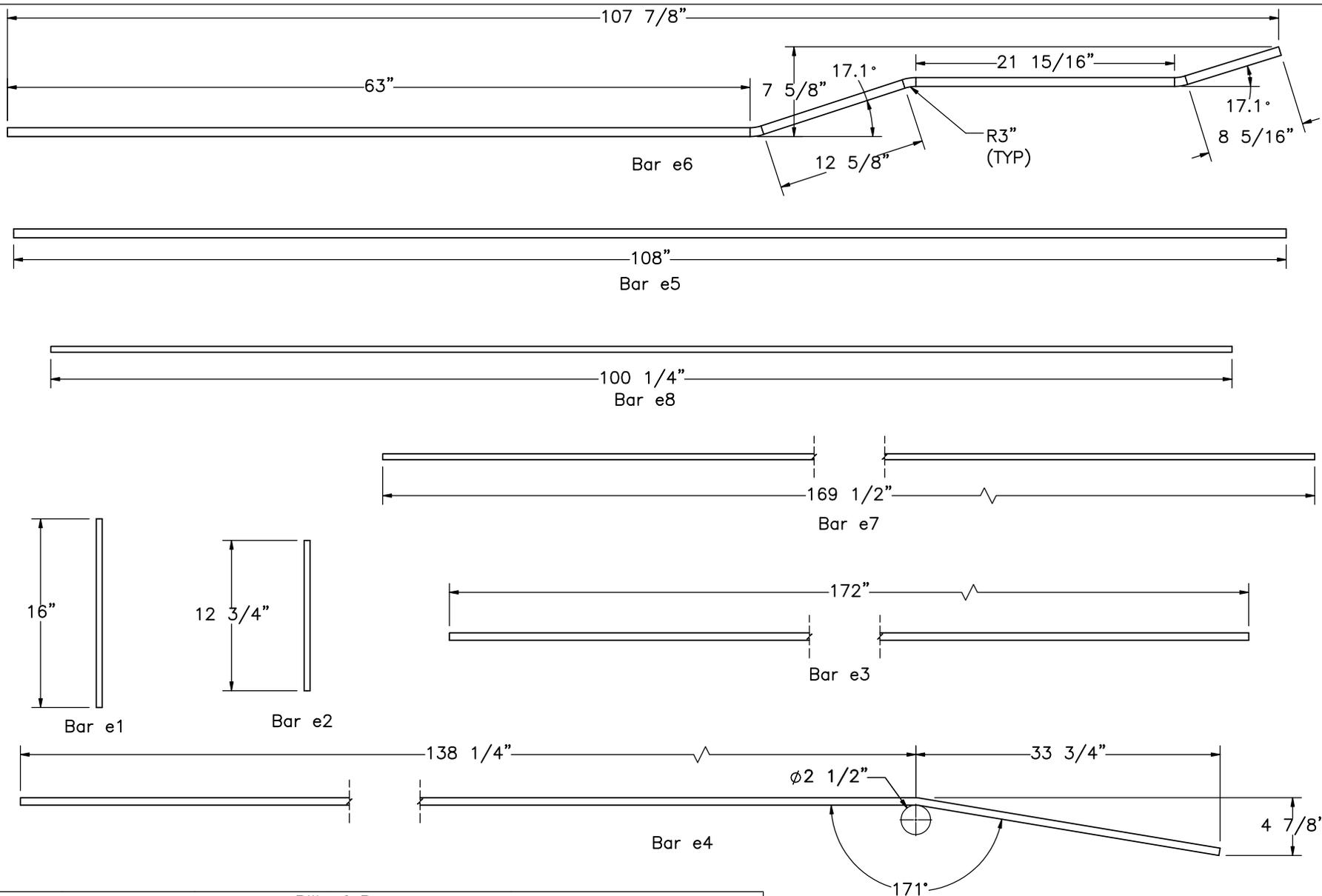
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Transition Buttress End
Reinforcement

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:14
UNITS: in.

SHEET:
35 of 41
DATE:
10/20/2021
DRAWN BY:
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HR
REV. BY:
KAL/SHY/R
KF/JCH/RN



Bill of Bars

Part No.	Bar No.	Qty.	Unbent Length	Material Specification
e1	#4	7	16"	ASTM A615 Gr. 60
e2	#4	1	12 3/4"	ASTM A615 Gr. 60
e3	#5	1	172"	ASTM A615 Gr. 60
e4	#5	1	164 1/4"	ASTM A615 Gr. 60
e5	#6	5	108"	ASTM A615 Gr. 60
e6	#6	3	109"	ASTM A615 Gr. 60
e7	#4	6	169 1/2"	ASTM A615 Gr. 60
e8	#4	2	100 1/4"	ASTM A615 Gr. 60



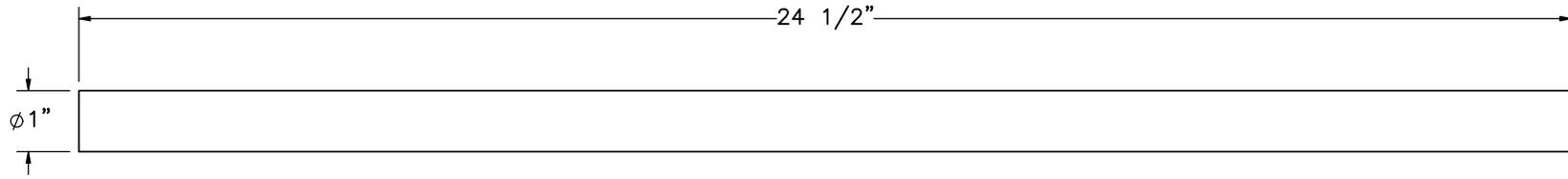
Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and H42ST-1-2
Longitudinal Buttress and Curb Reinforcement Details

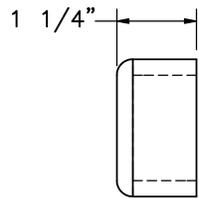
DWG. NAME:
H42S-H42ST_R17

SCALE: 1:12
UNITS: in.

SHEET:
36 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/GHR
REV. BY:
KAL/SHY/RKF/JCH/RN

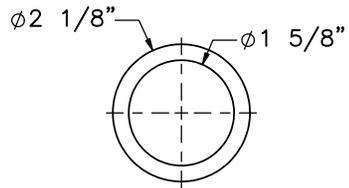


ELEVATION VIEW
Part h1

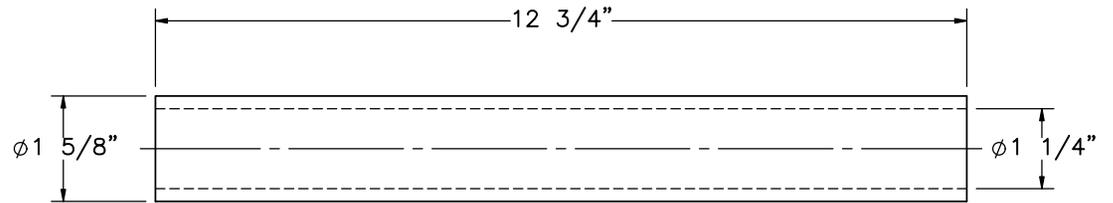


ELEVATION VIEW

Part h3



PROFILE VIEW



ELEVATION VIEW
Part h2



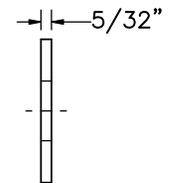
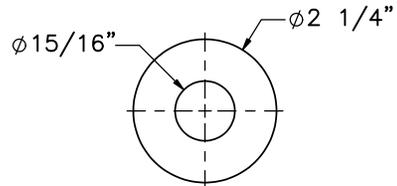
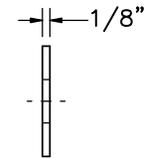
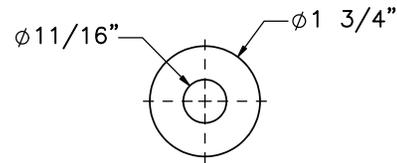
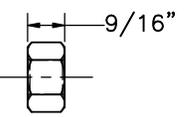
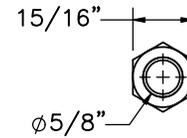
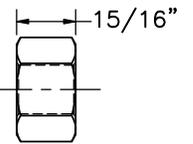
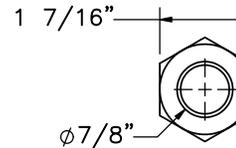
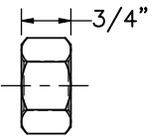
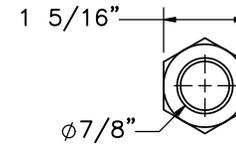
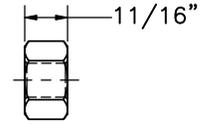
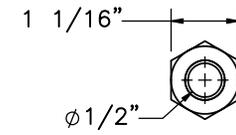
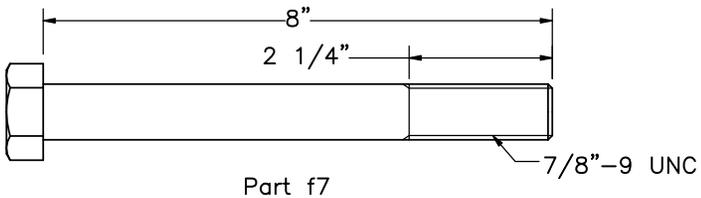
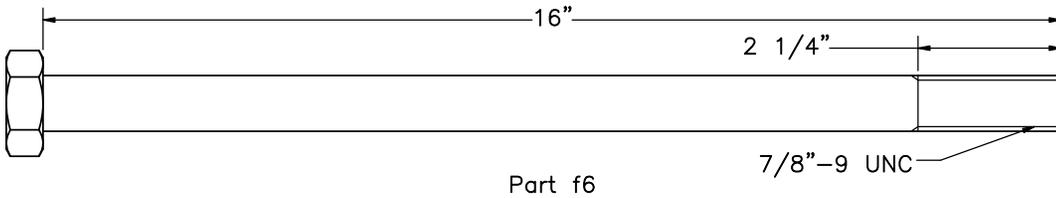
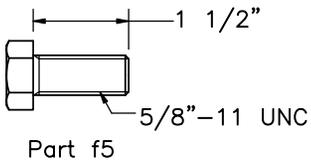
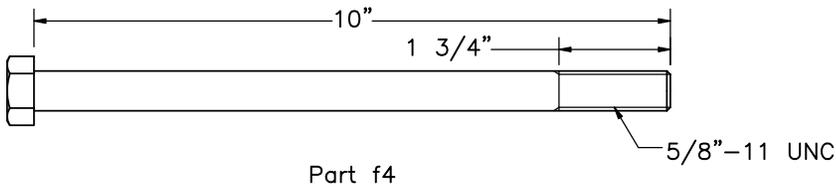
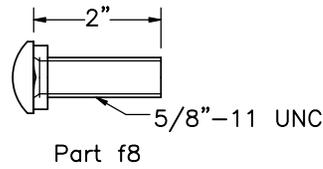
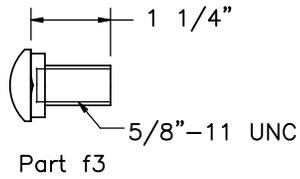
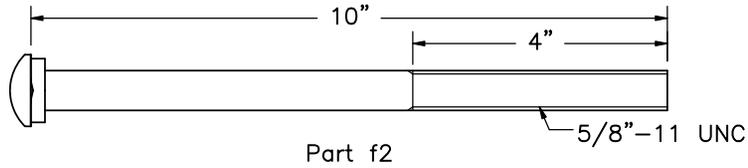
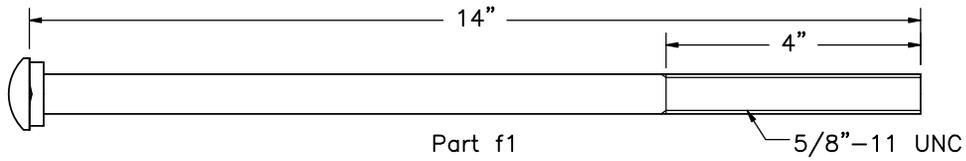
Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Expansion Joint Components

DWG. NAME.
H42S-H42ST_R17

SCALE: 1:3
UNITS: in.

SHEET:
37 of 41
DATE:
10/20/2021
DRAWN BY:
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Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Hardware

DWG. NAME:
H42S-H42ST_R17

SCALE: 1:3
UNITS: in.

SHEET:
38 of 41
DATE:
10/20/2021
DRAWN BY:
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HR
REV. BY:
KAL/SHY/R
KF/JCH/RN

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
a1	2	12'-6" 12-gauge Thrie Beam Section	AASHTO M180	ASTM A123 or A653	RTM08a
a2	1	6'-3" 12-gauge Thrie Beam Section	AASHTO M180	ASTM A123 or A653	RTM19a
a3	1	6'-3" 10-gauge W-Beam to Thrie-Beam Asymmetric Transition Section	AASHTO M180 Min. yield strength = 50 ksi Min. ultimate strength = 70 ksi	ASTM A123 or A653	RWT02
a4	3	12'-6" 12-gauge W-Beam MGS Section	AASHTO M180	ASTM A123 or A653	RWM04a
a5	1	12'-6" 12-gauge W-Beam MGS End Section	AASHTO M180	ASTM A123 or A653	RWM14a
a6	1	10-gauge Thrie Beam Terminal Connector	AASHTO M180 Min. yield strength = 50 ksi Min. ultimate strength = 70 ksi	ASTM A123 or A653	RTE01b
b1	-	Concrete*	Min. f'c = 4,000 psi	-	-
c1	2	BCT Timber Post - MGS Height	SYP Grd. No. 1 or better (No knots +/- 18" from ground on tension face)	AASHTO M133	PDF01
c2	2	72" Long Foundation Tube	ASTM A500 Gr. B	ASTM A123	PTE06
c3	1	Ground Strut Assembly	ASTM A36	ASTM A123	-
c4	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	-
c5	1	3/4" 6x19 IWRC IPS Wire Rope	ASTM A741 Type 2	Class A Coating	FCA01
c6	1	8"x8"x5/8" Anchor Bearing Plate	ASTM A36	ASTM A123	FPB01
c7	1	2 3/8" O.D. x 6" Long BCT Post Sleeve	ASTM A53 Gr. B Schedule 40	ASTM A123	FMM02
c8	1	Anchor Bracket Assembly	ASTM A36	ASTM A123	FPA01
d1	7	W6x8.5 or W6x9, 72" Long Steel Post	ASTM A992 Gr. 50	**ASTM A123	PWE06
d2	6	W6x8.5 or W6x9, 72" Long Steel Post	ASTM A992 Gr. 50	**ASTM A123	PWE06
d3	4	W6x15, 78" Long Steel Post	ASTM A992 Gr. 50	**ASTM A123	-
d4	4	17 1/2" Long, 8"x6"x1/4" Steel Blockout	ASTM A500 Gr. B	**ASTM A123	-
d5	6	17 1/2" Long, 12"x4"x1/4" Steel Blockout	ASTM A500 Gr. B	**ASTM A123	-
d6	2	14 3/16"x12"x5 1/8" Composite Recycled Blockout	Mondo Polymer MGS14SH or Equivalent	-	-
d7	5	14 3/16"x8"x5 1/8" Composite Recycled Blockout	Mondo Polymer GB14SH2 or Equivalent	-	-
d8	2	16D Double Head Nail	-	-	-

* NE Mix 47B15/1PF4000HW was used for testing purposes.

** Component does not need to be galvanized for testing purposes.

Note: (1) Quantities listed herein are only for one complete system.

 Midwest Roadside Safety Facility	Hawaii Phase 2 Systems 3 and 4 Test Nos. H42S-1-2 and H42ST-1-2 Bill of Materials	SHEET: 39 of 41
	DWG. NAME: H42S-H42ST_R17	SCALE: None UNITS: in.

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
e1	7	#4 Rebar, 16" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e2	1	#4 Rebar, 12 3/4" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e3	1	#5 Rebar, 172" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e4	1	#5 Rebar, 164 1/4" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e5	5	#6 Rebar, 108" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e6	3	#6 Rebar, 109" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e7	6	#4 Rebar, 169 1/2" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e8	2	#4 Rebar, 100 1/4" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e9	1	#6 Rebar, 49 7/8" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e10	1	#6 Rebar, 51 7/8" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e11	1	#6 Rebar, 54 5/8" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e12	6	#6 Rebar, 34 3/16" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e13	1	#4 Rebar, 49 1/2" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e14	2	#4 Rebar, 52 1/8" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e15	15	#4 Rebar, Vertical Stirrup Varying Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e16	19	#6 Rebar, Vertical Stirrup Varying Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e17	3	#6 Rebar, 52 3/8" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e18	6	#4 Rebar, 1196" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e19	1	#4 Rebar, 1095 1/2" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e20	125	#4 Rebar, 101 9/16" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e21	11	#4 Rebar, 50 11/16" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e22	11	#4 Rebar, 64 1/2" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e23	4	#5 Rebar, 340 9/16" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e24	1	#5 Rebar, 340 9/16" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e25	30	#5 Rebar, 260" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e26	4	#5 Rebar, 334" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e27	1	#5 Rebar, 334 1/8" Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e28	275	#5 Rebar, 60 1/4" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-
e29	18	#5 Rebar, 47 13/16" Total Unbent Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	-



Midwest Roadside
Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and
H42ST-1-2
Bill of Materials

DWG. NAME:
H42S-H42ST_R17

SCALE: None
UNITS: in.

SHEET:
40 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
f1	13	5/8"–11 UNC, 14" Long Guardrail Bolt	ASTM A307 Gr. A	ASTM A153 or B695 Class 55 or F2329	FBB06
f2	15	5/8"–11 UNC, 10" Long Guardrail Bolt	ASTM A307 Gr. A	ASTM A153 or B695 Class 55 or F2329	FBB03
f3	44	5/8"–11 UNC, 1 1/4" Long Guardrail Bolt	ASTM A307 Gr. A	ASTM A153 or B695 Class 55 or F2329	FBB01
f4	2	5/8"–11 UNC, 10" Long Hex Head Bolt	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX16a
f5	8	5/8"–11 UNC, 1 1/2" Long Hex Head Bolt	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX16a
f6	5	7/8"–9 UNC, 16" Long Heavy Hex Head Bolt	ASTM F3125 Gr. A325 or equivalent	ASTM A153 or B695 Class 55 or F1136 Gr. 3 or F2329 or F2833 Gr. 1	FBX22b
f7	2	7/8"–9 UNC, 8" Long Hex Head Bolt	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX22b
f8	24	5/8"–11 UNC, 2" Long Guardrail Bolt	ASTM A307 Gr. A	ASTM A153 or B695 Class 55 or F2329	FBB02
f9	96	5/8"–11 UNC Heavy Hex Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX16b
f10	2	7/8"–9 UNC Hex Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX22a
f11	5	7/8"–9 UNC Heavy Hex Nut	ASTM A563DH	ASTM A153 or B695 Class 55 or F2329	FNX22b
f12	2	1"–8 UNC Heavy Hex Nut	ASTM A563DH or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX24b
f13	10	5/8"–11 UNC Hex Nut	ASTM A563A or equivalent	ASTM A153 or B695 Class 55 or F2329	FNX16a
g1	46	5/8" Dia. Plain USS Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC16a
g2	4	7/8" Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC20a
g3	2	1" Dia. Plain USS Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC24a
g4	5	3"x3"x1/4" or 3 1/2"x3 1/2"x1/4" Square Washer Plate	ASTM A572 Gr. 50	ASTM A123	FWR09
h1	12	#8 Smooth Rebar, 24 1/2" Total Length	ASTM A615 Gr. 60	Epoxy-Coated (ASTM A775 or A934)	–
h2	20	1 1/4" Dia. 12 3/4" Long PVC Pipe	Schedule 80 PVC Gr. 12454	–	–
h3	20	1 5/8" Dia. PVC Cap	Schedule 80 PVC Gr. 12454	–	–
i1	–	Epoxy Adhesive	Hilti HIT RE-500 V3	–	–
i2	–	Expansion Joint Filler	AASHTO M33, M153, or M213	–	–
i3	–	Expansion Joint Sealant	AASHTO M173, M282, M301, ASTM D3581, or ASTM D5893	–	–
–	–	Coarse Crushed Limestone (Well Graded Gravel)	–	–	–



Midwest Roadside Safety Facility

Hawaii Phase 2
Systems 3 and 4
Test Nos. H42S-1-2 and H42ST-1-2
Bill of Materials

DWG. NAME:
H42S-H42ST_R17

SCALE: None
UNITS: in.

SHEET:
41 of 41
DATE:
10/20/2021
DRAWN BY:
LJP/SBW/G
HR
REV. BY:
KAL/SHY/R
KF/JCH/RN

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	7/17/2020	-	Original drawing created from HWTT-1 and H42BR.	-	LJP
1	7/20/2020	-	Changed drawing name to H42S-H42ST. Switched sheets 2 and 3. Reordered sheets to have BR before AGT.	KAL	LJP
		1	Labeled each section of the system. Fixed impact label.		
		2	Labeled each section of the system. Fixed impact notes.		
		5	Removed views of ramp. Added elevation view and detail O.		
		10	Edited sheet title and note.		
		11	Edited sheet title and note.		
		27	Changed underground slope to a dashed line.		
2	8/19/2020	28	Changed underground slope to a dashed line.	SY	LJP
		3	Moved start of concrete ramp 44" downstream.		
		4	Added clear cover and rebar dimensions. Added ramp to view and labeled it.		
		5	Edited sidewalk cutout dimensions.		
		6	Edited lateral sidewalk reinforcement to line up with vertical parapet reinforcement.		
		7	Added parapet rebar to detail C.		
		8	Changed end post to sit on top of sidewalk. Added sidewalk to section P. Added bend to top longitudinal rebar in buttress. Edited rebar to extend from parapet to buttress.		
		9	Changed end post height to 42".		
		10	Added clear cover dimensions. Edited vertical stirrup heights. Edited longitudinal rebar spacing.		
		11	Edited vertical stirrup heights.		
		12	Changed height of upstream end of buttress to 32".		
		30	Changed length of bars e17 and e18. Changed height dimensions of bars e19 and e20.		
		31	Added bars e22 and e25. Edited rebar dimensions.		
		32	Updated stirrup heights and unbent lengths.		
		33	Edited rebar dimensions.		
34	Edited reabr dimensions.				
		3	Added rail part nos.		
		7	Removed "parapet rebar hidden" note		

3	9/9/2020	8	Fixed part no. for end post stirrups.	SY/KAL	LJP
		10	Aligned section views.		
		11	Removed #6 bars. Extended e7 bars to 169.5".		
		16	Moved detail W to sheet 17. Added part balloons for anchorage hardware.		
		26	Added groundline to detail X.		
		31	Separated parapet and end post rebar into two sheets.		
		32	Added elevation view of bar e22 to show downward bend. Added bend diameters.		
		BOM	Changed length of e22 to correct length.		
4	9/16/2020	10	Replaced several e10 bars with new bars e17 (1/2" taller than e10). Increased height of top e5 and e6 bars by 1/2" to avoid bolt hole.	SY	LJP
		34	Added view of bar e17.		
5	10/12/2020	All	Rearranged sheets 4-12	SHY, KAL, RFK	SBW
		1	Added note on curb gutter, designated expansion joints, renamed system sections and added system section notes in elevation view. Edited note 1 for clarity.		
		2	Shifted both impact notes over one expansion joint to the right. Labeled expansion joints. Edited notes 2 and 4 for clarity and to reflect proper impact locations.		
		3	Added concrete slab note to plan view. Dimensioned sidewalk width.		
		4	Added note 1 about grinding through existing tarmac.		
		5	Added rebar lap note. Added dims in section L		
		7	Removed profile view. Increased scale of section A. Added dimensions to Section A. Added note on #4 rebar lap length.		
		8	Edited note 1 for clarity.		
		9	Added note on #4 rebar lap length.		
		12	Added note on #4 rebar lap length.		
		15	Edited notes 1 and 2 for clarity.		
		17	Rearranged details. Added section view of cable bearing plate.		
18	Removed note 1				

		26	Added part ballon in section x		
		30	Split part e21 into two parts.		
		BOM	Adjusted description of part a3 and b1. Adjusted Material Specs on part a3, d1, d2, and d3. Adjusted Treatment on all e series parts and h1. Removed note on epoxy coated rebar.		
6	10/16/2020	1	Eddited test designation wording in plan view.	SHY, KAL, RFK	CJN
		2	Edited test designation wording in plan view.		
		3	Edited test designation wording in plan view.		
		5	Added note on #4 rebar lap length. Changed lap length to 12" from 24". Changed "overlap" to "lap length" on section L-L.		
		7	Edited note 1.		
		9	Edited note 1.		
		11	Added part balloon for e16		
		12	Added part balloon for e15		
		30	Changed bent length for Bar e21		
		BOM	Corrected spelling for parts a3, and h1.		
7	10/19/2020	2	Edited notes 2 and 4.	SHY, KAL, RFK	CJN
		11	Removed a #4 bar from plan view for clarity.		
		14	Edited note 3.		
		32	Removed negative sign from unbent length for e23.		
		BOM	Widdened cells for d6, and g4. Moved comment regarding galvanized components for clarity.		
8	11/2/2020	26	Added text labels to Plan view and Elevation View	SHY, KAL, RFK	CJN
9	12/1/2020	-	Flipped system for testing purposes.	JCH	LJP
		1	Edited H42ST impact locations to be measured from the end of the buttress.		
10	1/11/2021	4	Added 1" fillet to front edge of sidewalk.	SHY	LJP
		6	Deleted profile view of parapet and added section O.		
		All	Switched H42S-1 and H42S-2, switched H42ST-1 and H42ST-2, relettered section and detail view lettering, edited sheet format on all pages.		

11	5/10/2021	1	Added note 3, renamed end panel to end post, switched test numbering.	JCH, RKF, KAL, RN	SBW
		2	Added note reordered all notes, renamed end post to end panel, switched test numbering.		
		3	Added note reordered all notes, added note to concrete transistion and end panel, switched test numbering.		
		5	Added dimensions, added note on end panel.		
		6	Added additional panels to view, to show expansion joint.		
		7	Added additional panels to view, to show expansion joint.		
		8	Changed Detail C to a regular view.		
		9	Added note on end panel to view, added view lables.		
		30	Added dimensioning to parts e20, e21, and e22.		
		31	Added dimensioning to parts e28 and e29.		
		32	Added dimensioning to all parts on page.		
		33	Added dimensioning to all parts on page, added additional columns to both tables.		
		35	Added dimensioning to part e6.		
		BOM	Changed description of soil to Coarse Crushed Limestone (Well Graded Gravel)		
12	5/24/2021	7	Moved pg. 7 to after pg. 3.	KAL	GHR
		8	Moved pg. 8 to after pg. 2.		
		13	Moved pg. 13 to after pg. 5.		
		14	Moved pg. 14 to after pg. 6.		
		15	Moved pg. 15 to after pg. 7.		
		11	Added detail and deminsions showing the cast concrete pattern.		
		23	Added Assembly Bill of Materials.		
		24	Added page for anchor bracket details. Added assembly Bill of Materials.		
		BOM	Added part numbers to epoxy adhesive, expansion joint filler, and expansion joint sealant. Updated HWG references.		
13	6/25/2021	2,3,4	Added dimension from top of sidewalk to top of parapet	RN/JCH	GHR
		All	Edited the pattern cast into the concrete to lower the bottom 2 grooves and the tombstone 2 inches		
14	7/29/2021	1	Added dimensions to elevation view.	JCH	GHR
		3,4	Added dimension for bridge rail width.		

		13	Added Center marks to holes		
15	8/4/2021	9	Corrected spelling on ramp note.	RKF	GHR
		21, 26	Increased center mark size.		
		28	Increased curb slope from 1V:3H to 1V:6H		
16	10/6/2021	-	Added Curb Gutter to model.	RKF/JCH	GHR
		1	Added post #'s. Added notes on critical reigion, additional trench, and curb gutter.		
		5	Added notes on critical reigion, additional trench, and curb gutter.		
		7	Corrected notes.		
		27	Added Curb Gutter to Section Z-Z.		
		28	Added Curb Gutter to Plan View.		
		BOM	Added concrete mix note.		
17	10/20/2021	3	Labeled Expansion Joint	JCH/RN	GHR
		5	Noted Part a1 is nested.		
		7	Added "Nested" to part a1 balloon. Added references to note 4.		
		8	Added "Nested" to part a1 balloon. Added Notes on splice construction.		
		16-28	Moved sheet 27 to after page 15. Moved sheet 28 to after page 16. Renumbered and renamed pages 16-28.		
		BOM	Corrected HWG and treatment callouts.		
		Rev. History	Corrected Spelling in Rev.6, pgs. 1-3 and Rev. 7, pg. 2. Removed extra space between Rev. 9 and 10.		