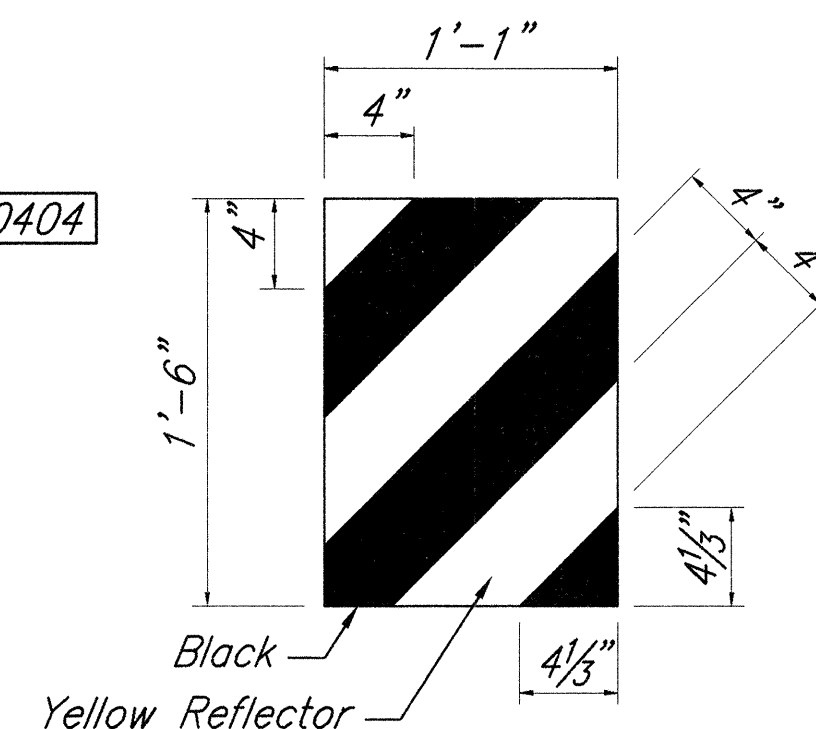
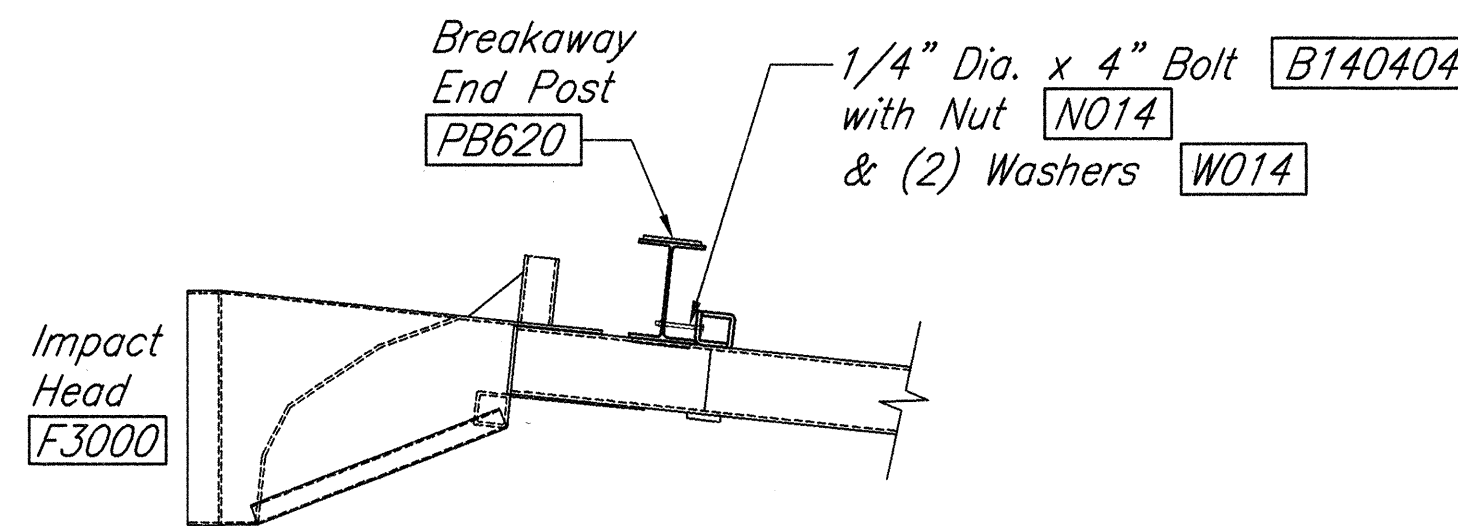
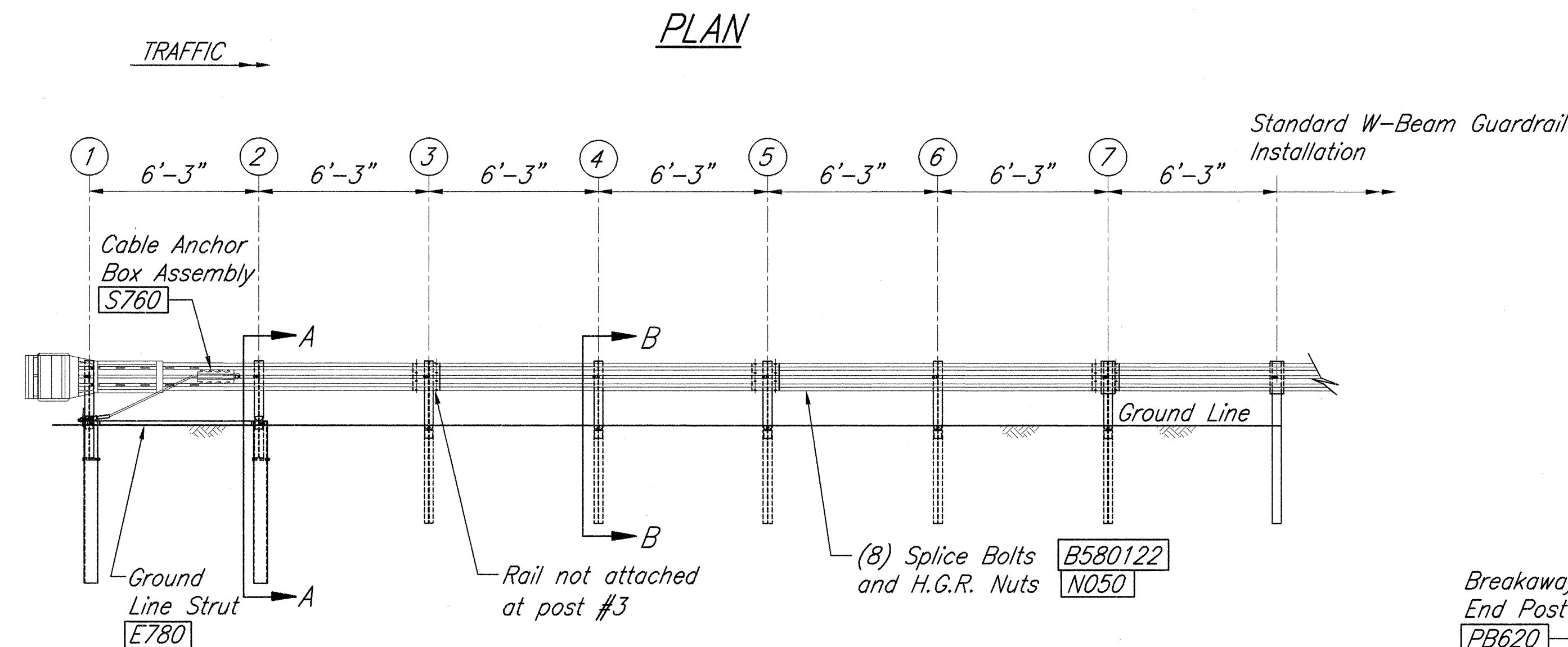
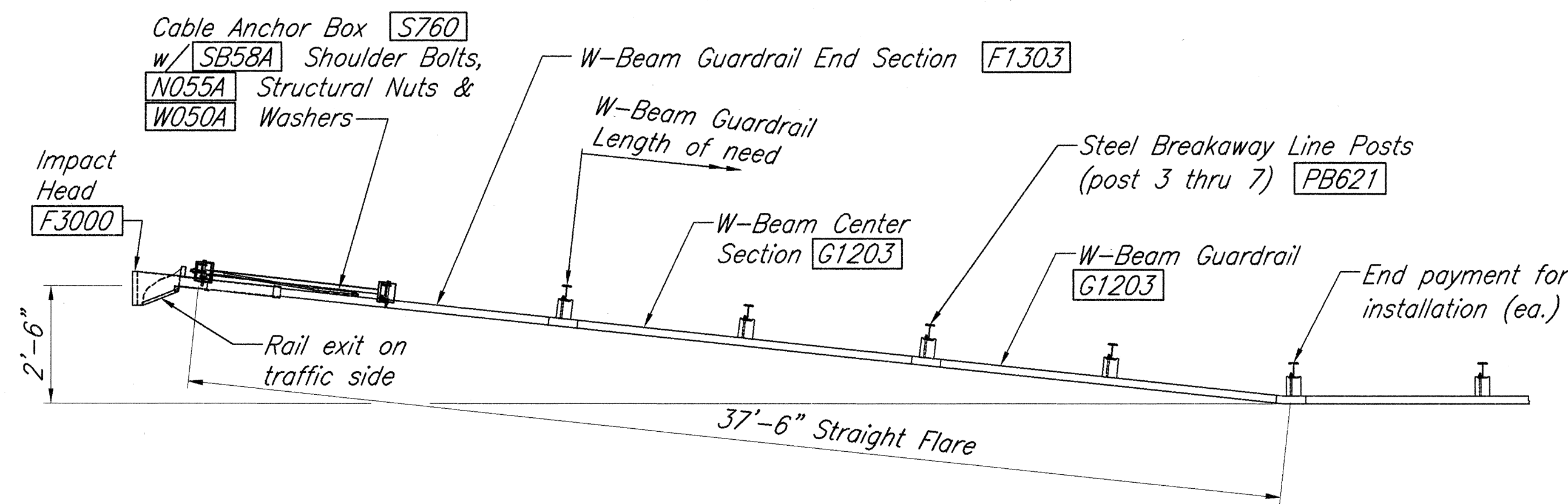
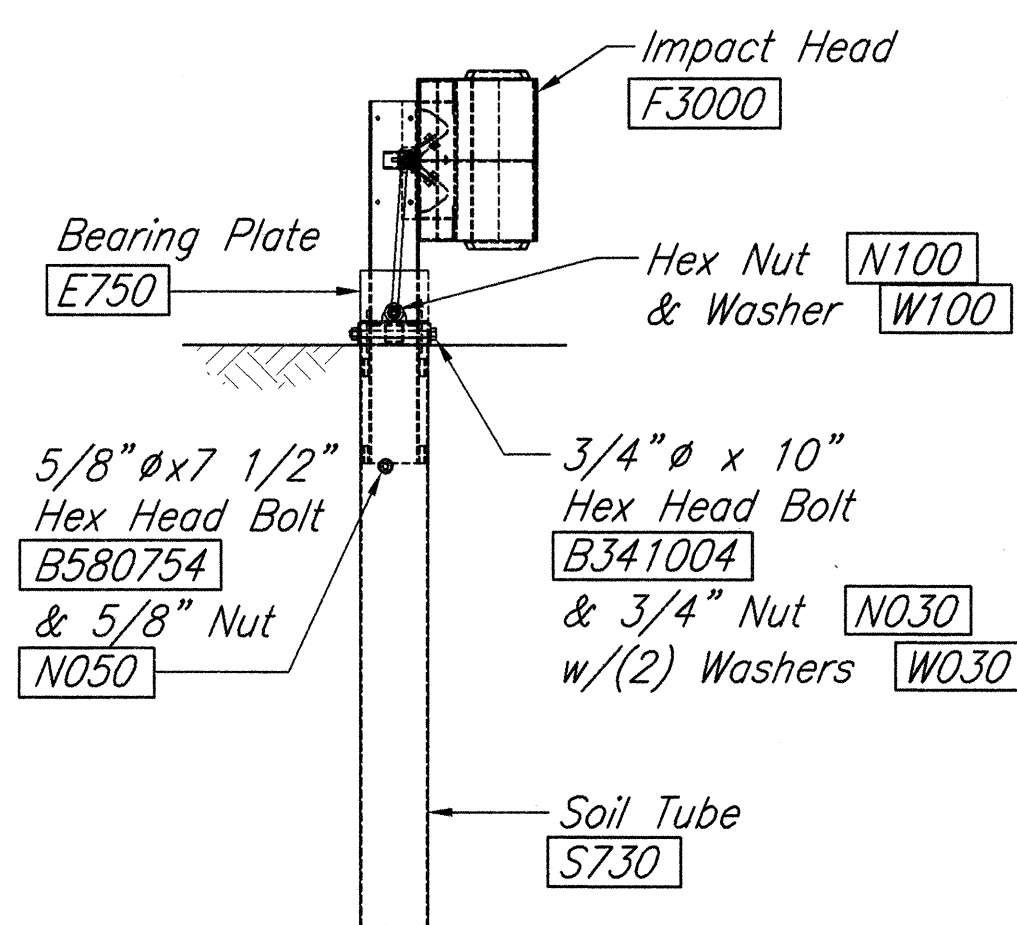
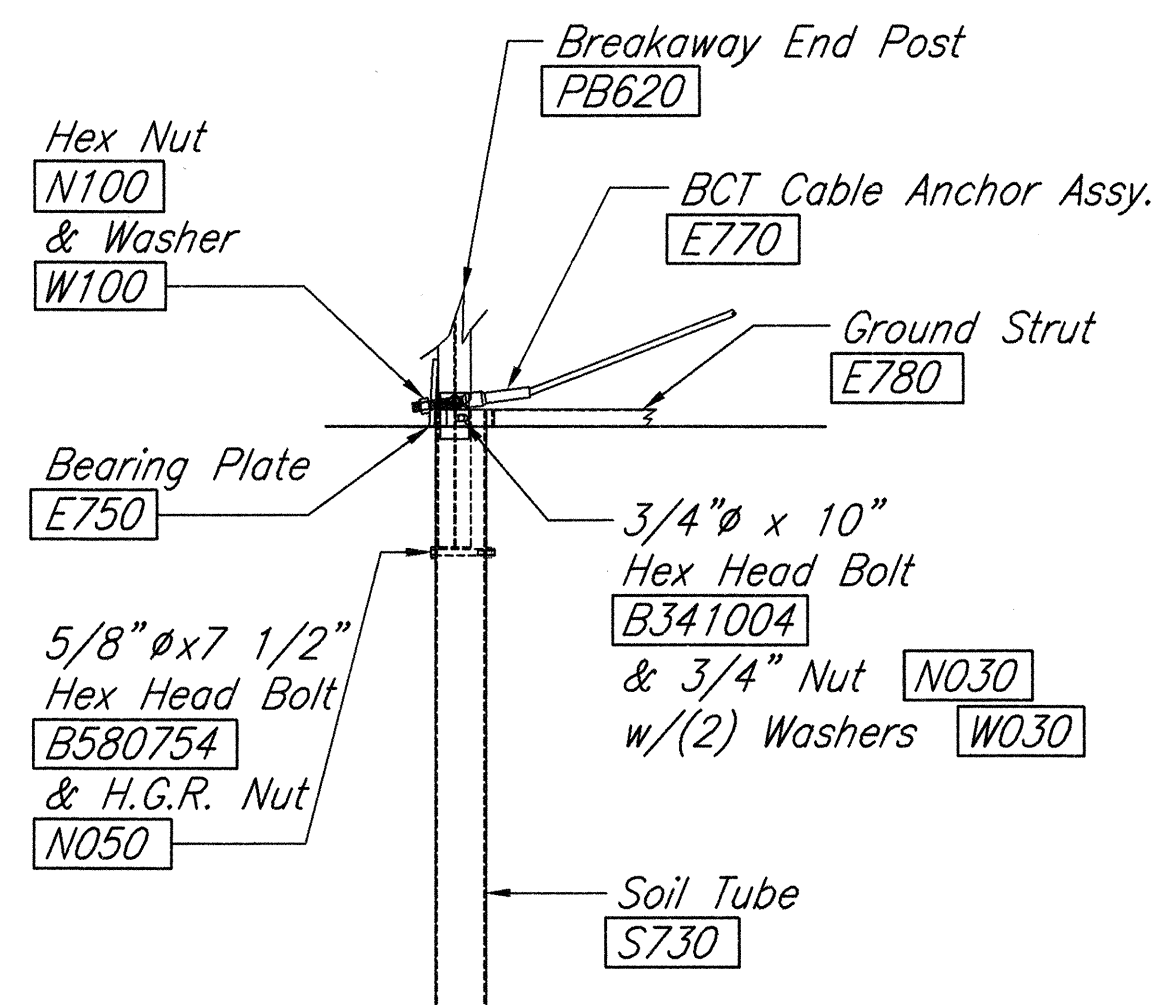




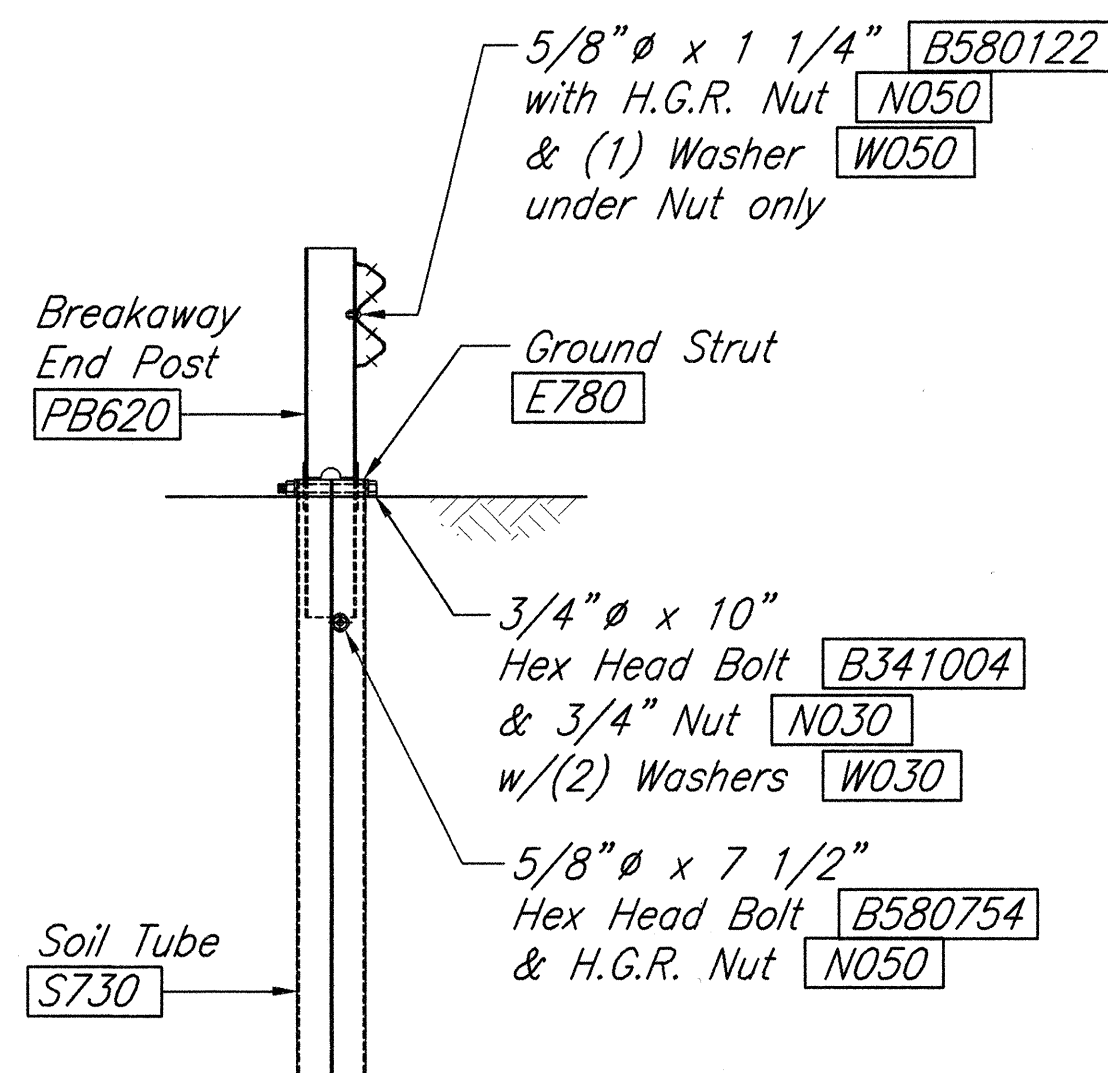
IHRM(R)
IMPACT HEAD REFLECTOR
MARKER INSERT DETAIL



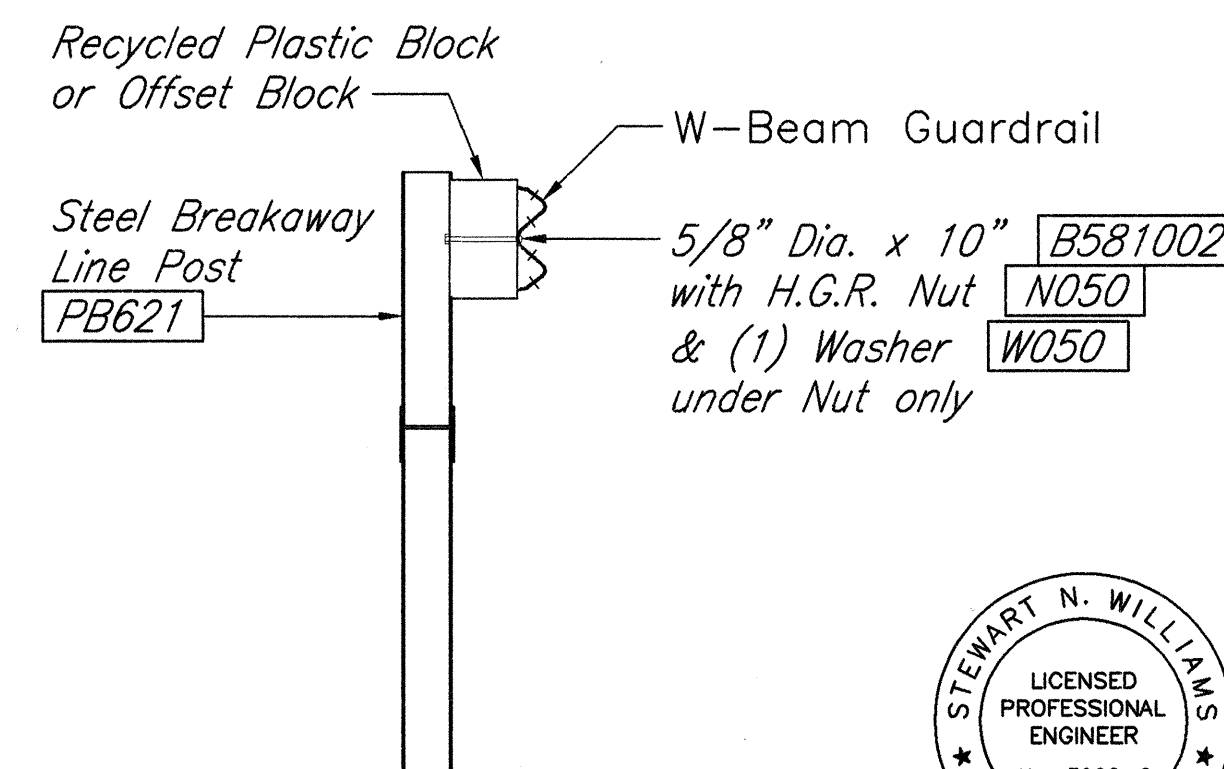
FRONT VIEW OF POST 1



PARTIAL VIEW OF POST 1

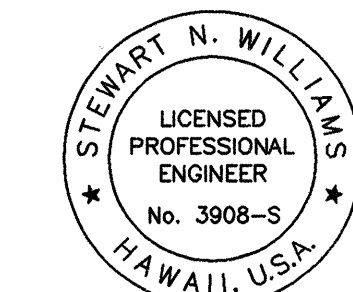
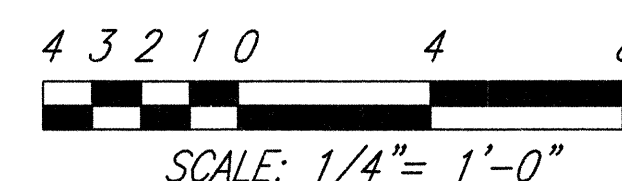


SECTION A-A
at Post #2



SECTION B-B

(Typical @ Post 3 - 7)
NOTE: RAIL NOT BOLTED @ POST #3



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OR UNDER MY SUPERVISION
Mitsunaga & Associates, Inc.
Structural Review By

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	31	45

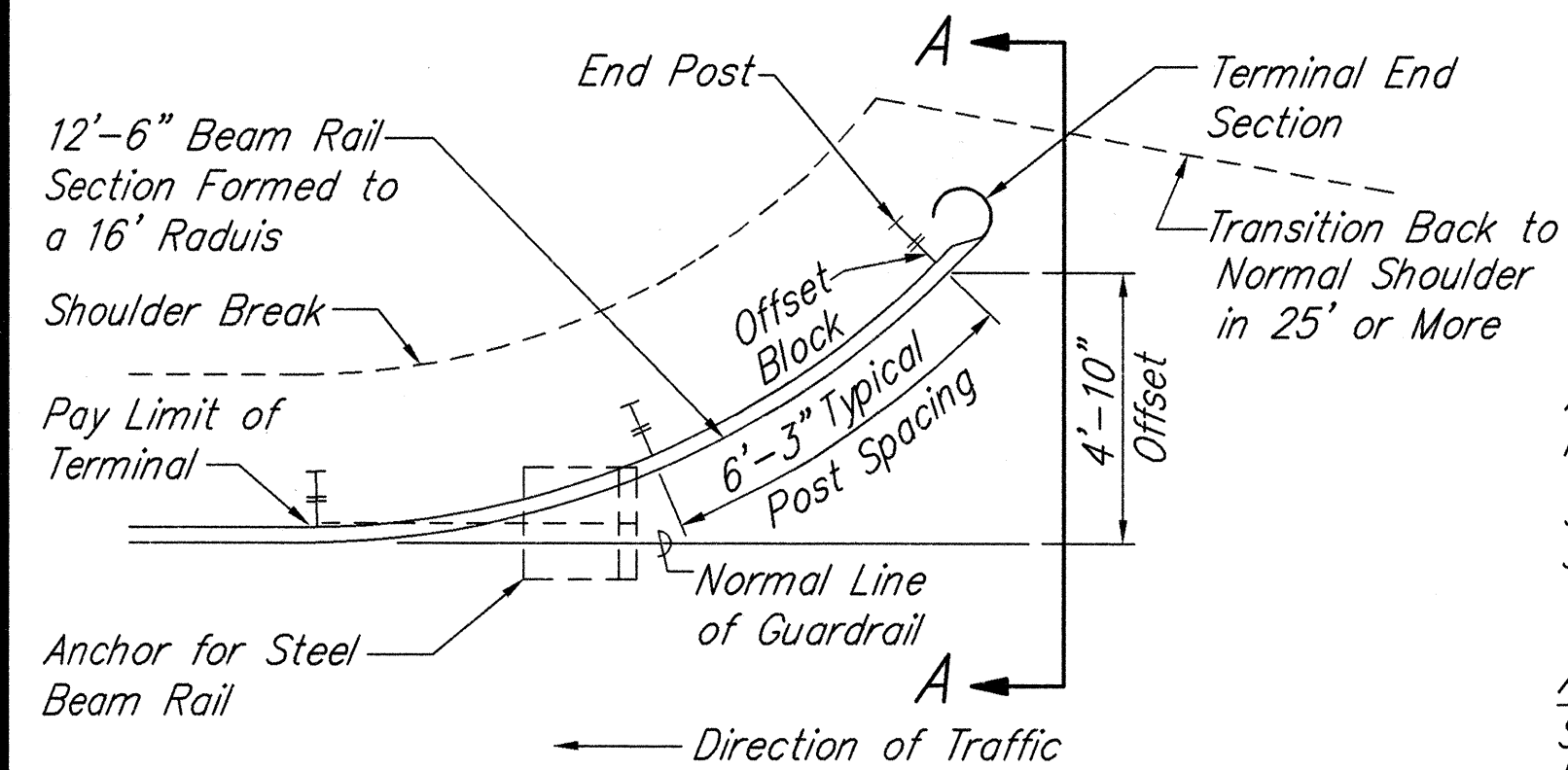
ITEM NO.	QTY.	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
G1203	2	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 72"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BREAKAWAY END POST
PB621	5	STEEL BREAKAWAY LINE POST
	5	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER-IHRM(R) or (L)
HARDWARE		
B580122	25	5/8" Dia. x 1 1/4" SPLICE BOLT, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT
B341004	2	3/4" Dia. x 10" HEX BOLT
B581002	5	5/8" Dia. x 10" H.G.R. BOLT (POST 3 THRU 7)
N050	32	5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, POST 2 THRU 7, 6)
N030	2	3/4" Dia. HEX NUT
W050	6	H.G.R. WASHER
W030	4	3/4" ID WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	1/4" x 4" HEX BOLT
N014	2	1/4" HEX NUT
W014	4	1/4" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	1/2" A325 STRUCTURAL NUT
W050A	16	1 1/16" OD x 9/16" ID A325 STR. WASHER

Foundation Tube Options For Posts 1 & 2
 *6'-0" Split Foundation Tubes S730
 *6'-0" Solid Foundation Tubes E731
 *5'-0" Foundation Tubes S735 W/Soil Plates SP600
 *4'-6" Foundation Tubes E735 W/Soil Plates SP600

ORIGINAL PLAN	DATE
SURVEY PLANNED BY	11/02
DRAWN BY	11/02
DESIGNED BY	11/02
QUANTITIES BY	11/02
CHECKED BY	11/02
NOTE BOOK	
No.	

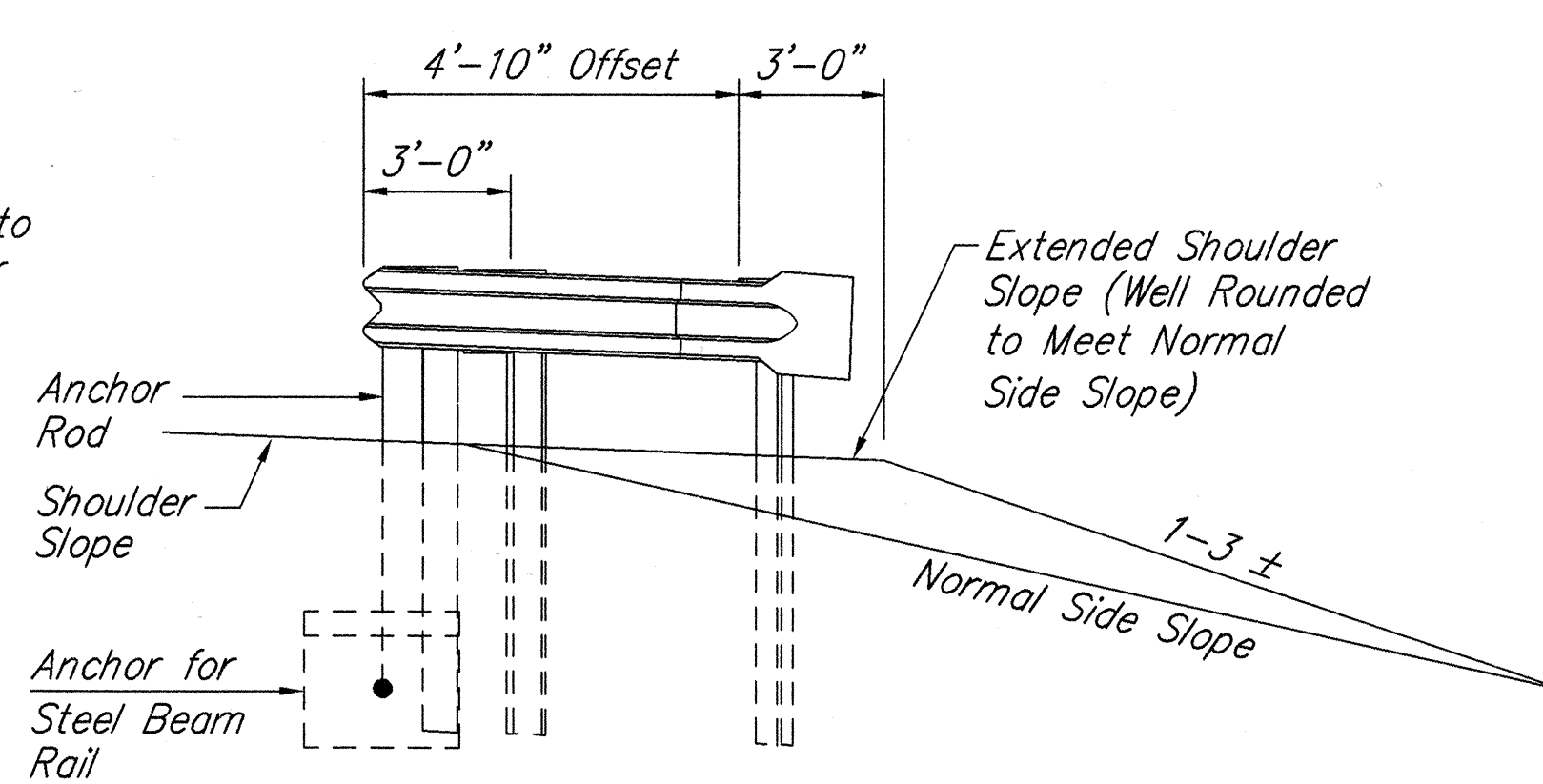
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
FEAT - 350
FLARED ENERGY ABSORBING TERMINAL
SAND ISLAND PARKWAY
BASCULE BRIDGE DECK REPLACEMENT
DISTRICT OF HONOLULU
Federal Aid Project No. NH-064-1(8)
Scale: As Noted
NOVEMBER 2002
SHEET No. 3-23 OF 37 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	31	45

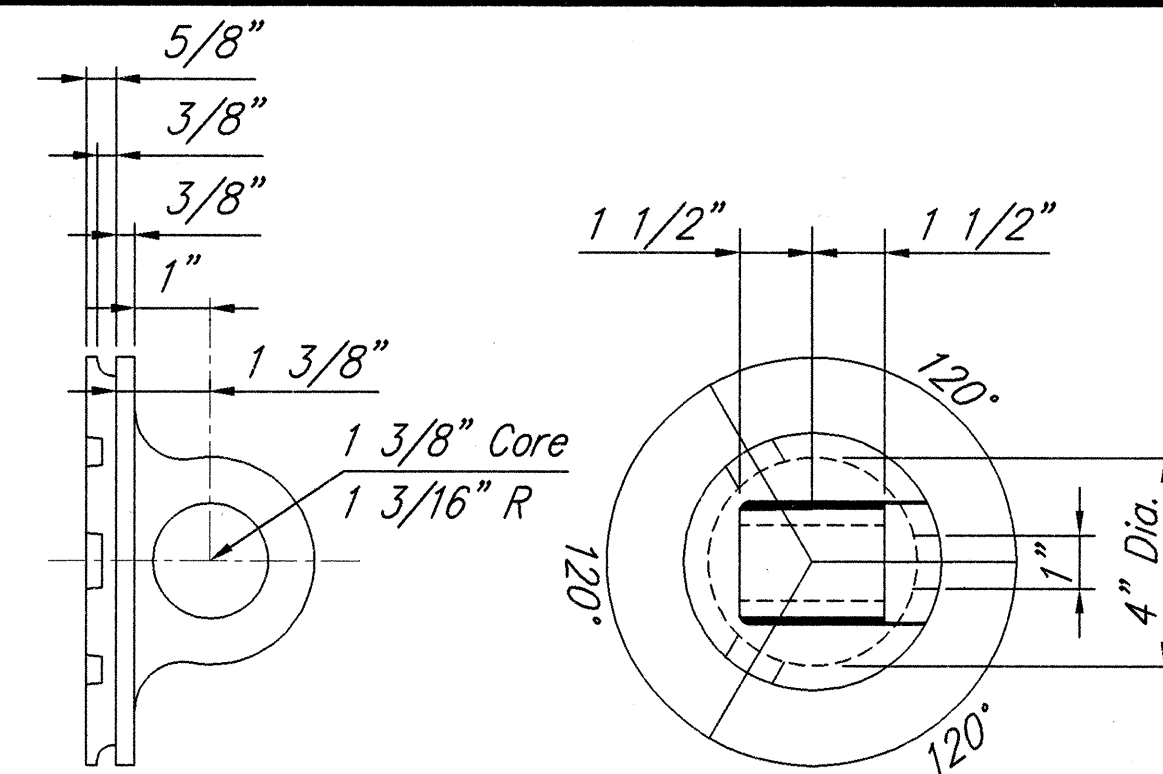


APPROACH END DETAIL

(APPROVED FOR USE WHERE $V < 45$ MPH)

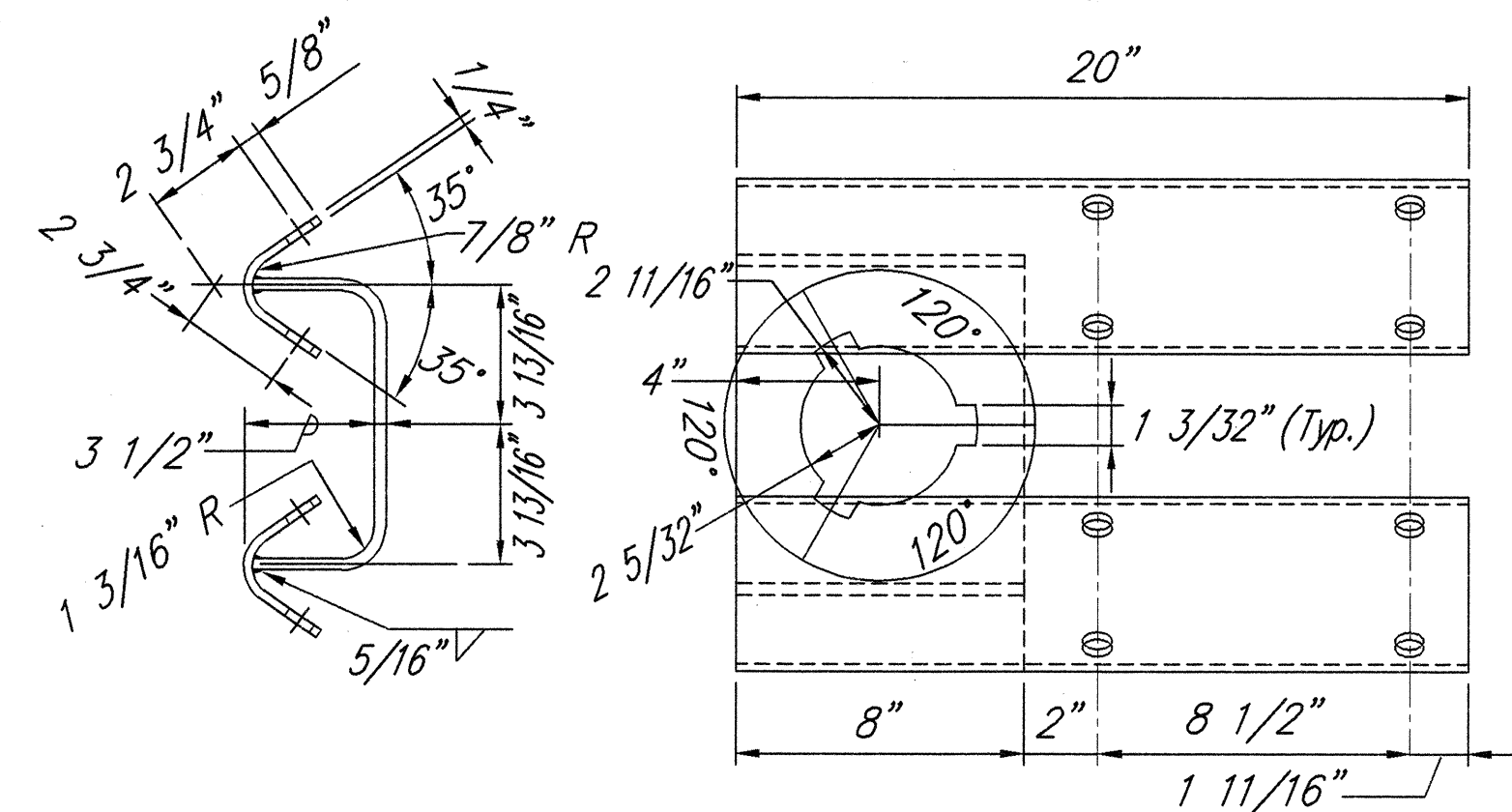


SECTION A-A



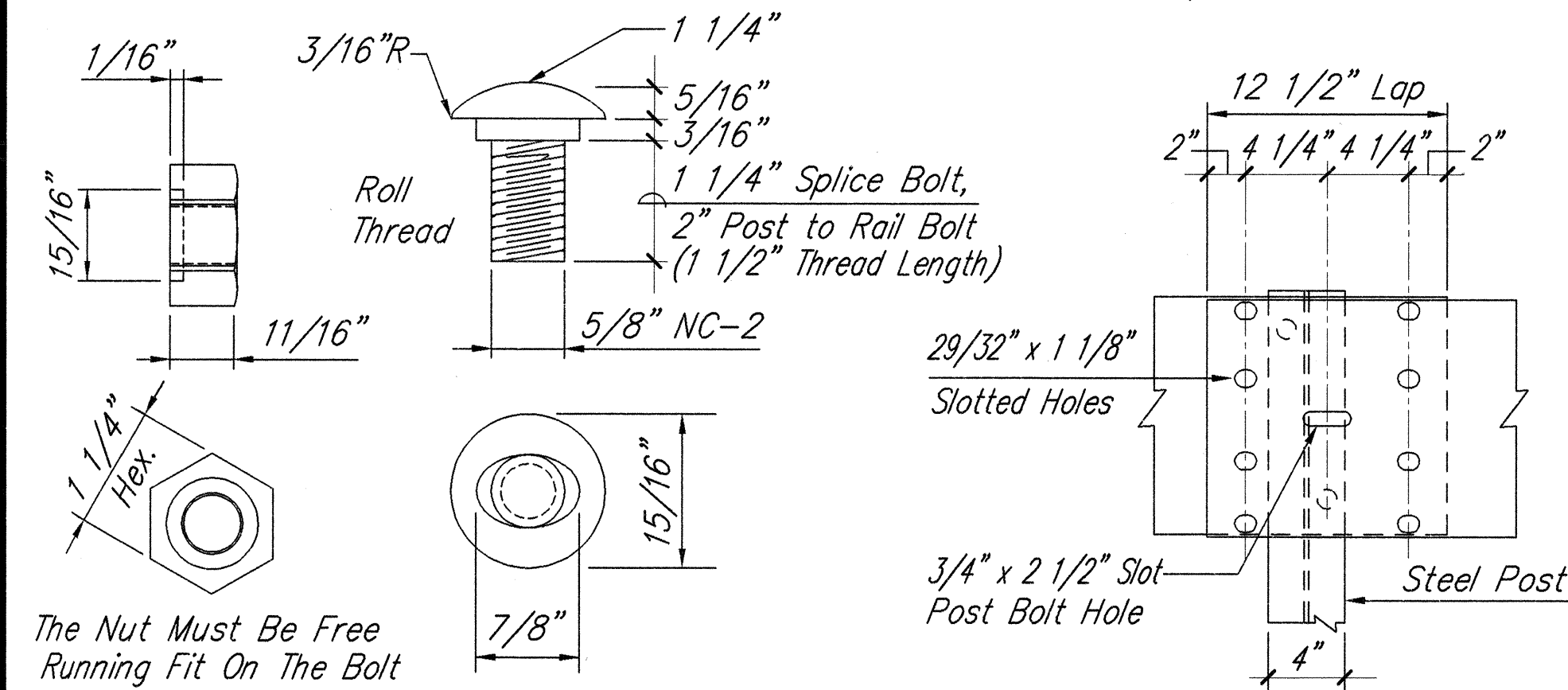
ANCHOR ROD CONNECTOR

(MALLEABLE IRON CASTING OR EQUAL)

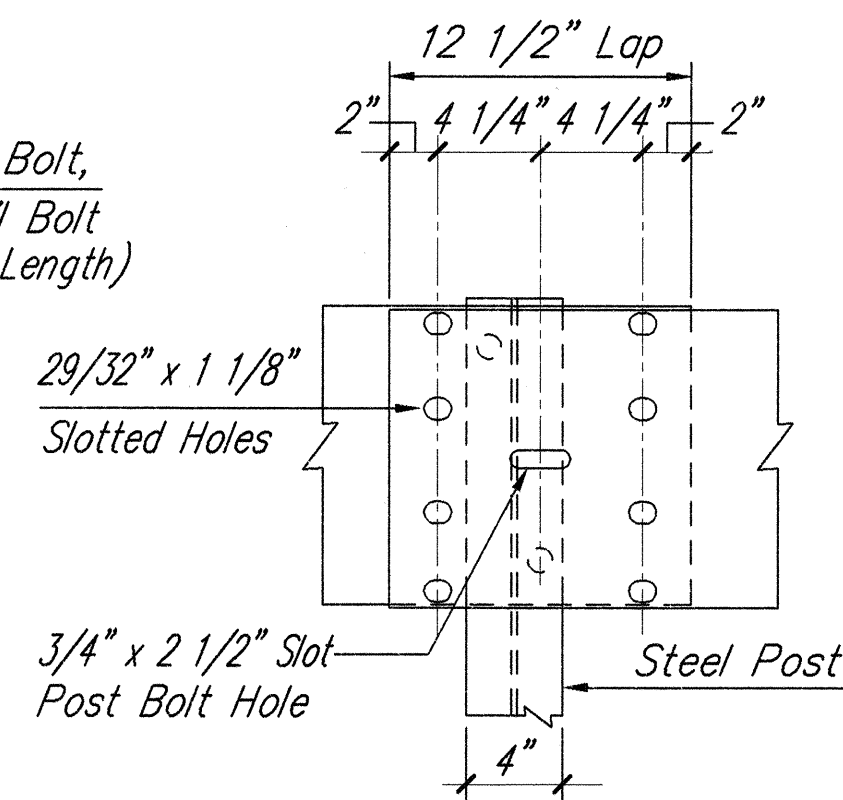


ANCHOR SPIDER

(WELDMENT)

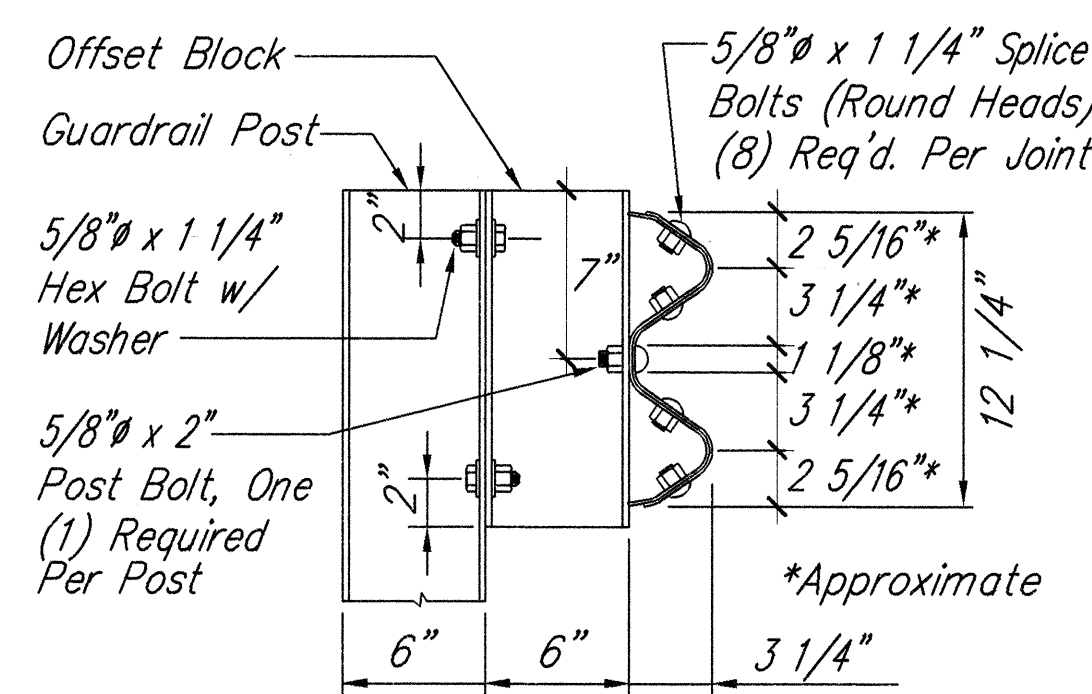


BOLT & NUT DETAILS



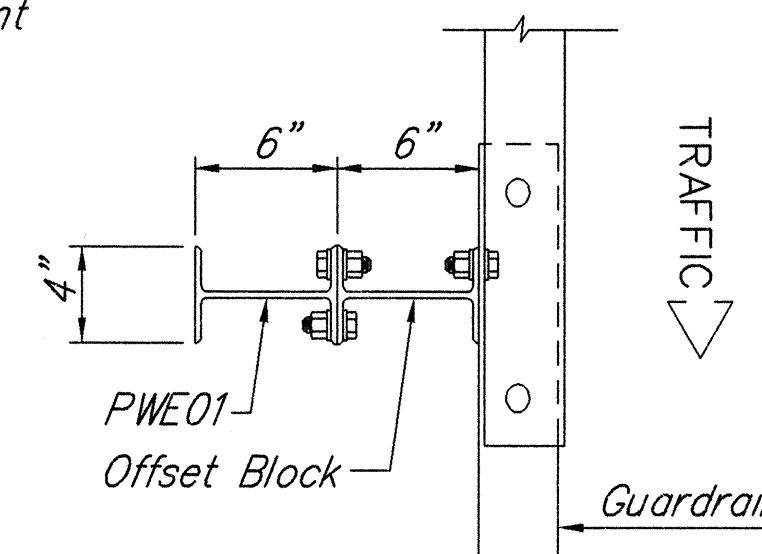
ELEVATION OF GUARDRAIL

SPLICE AT POST

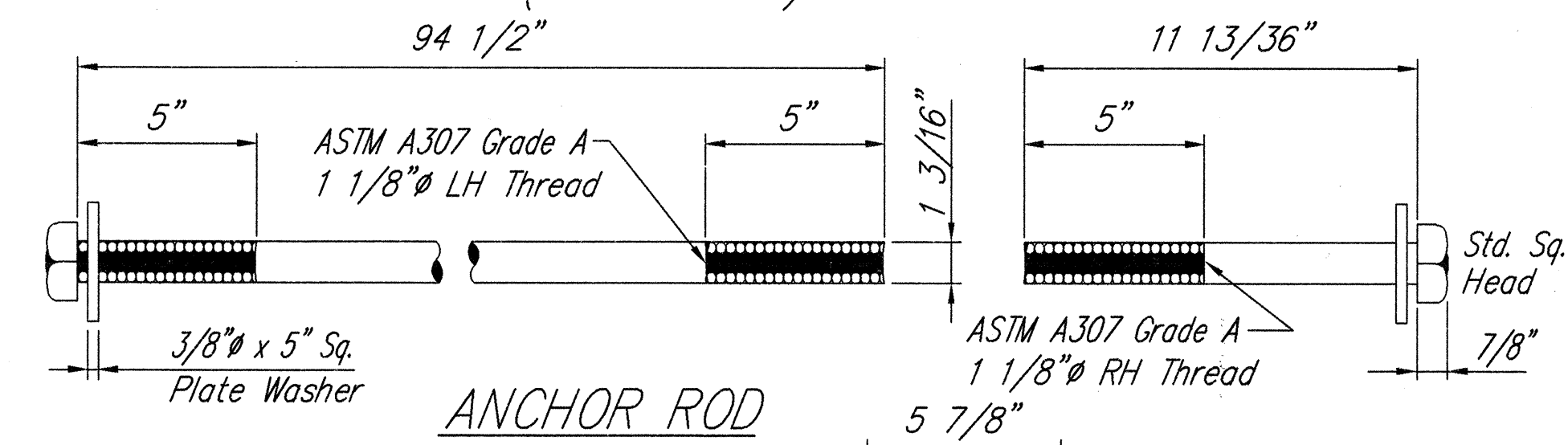


CROSS SECTION

GUARDRAIL SPLICE



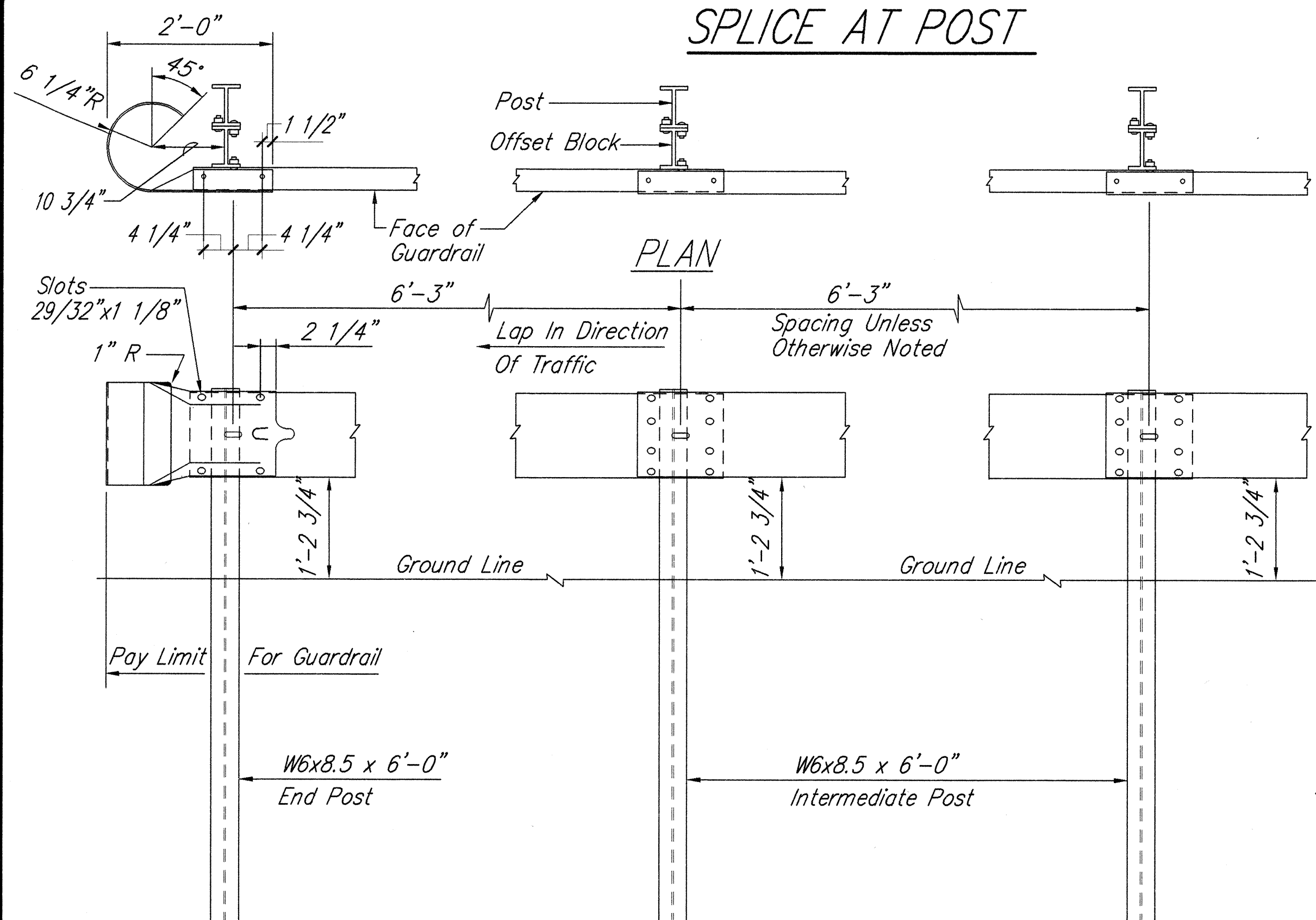
PLAN



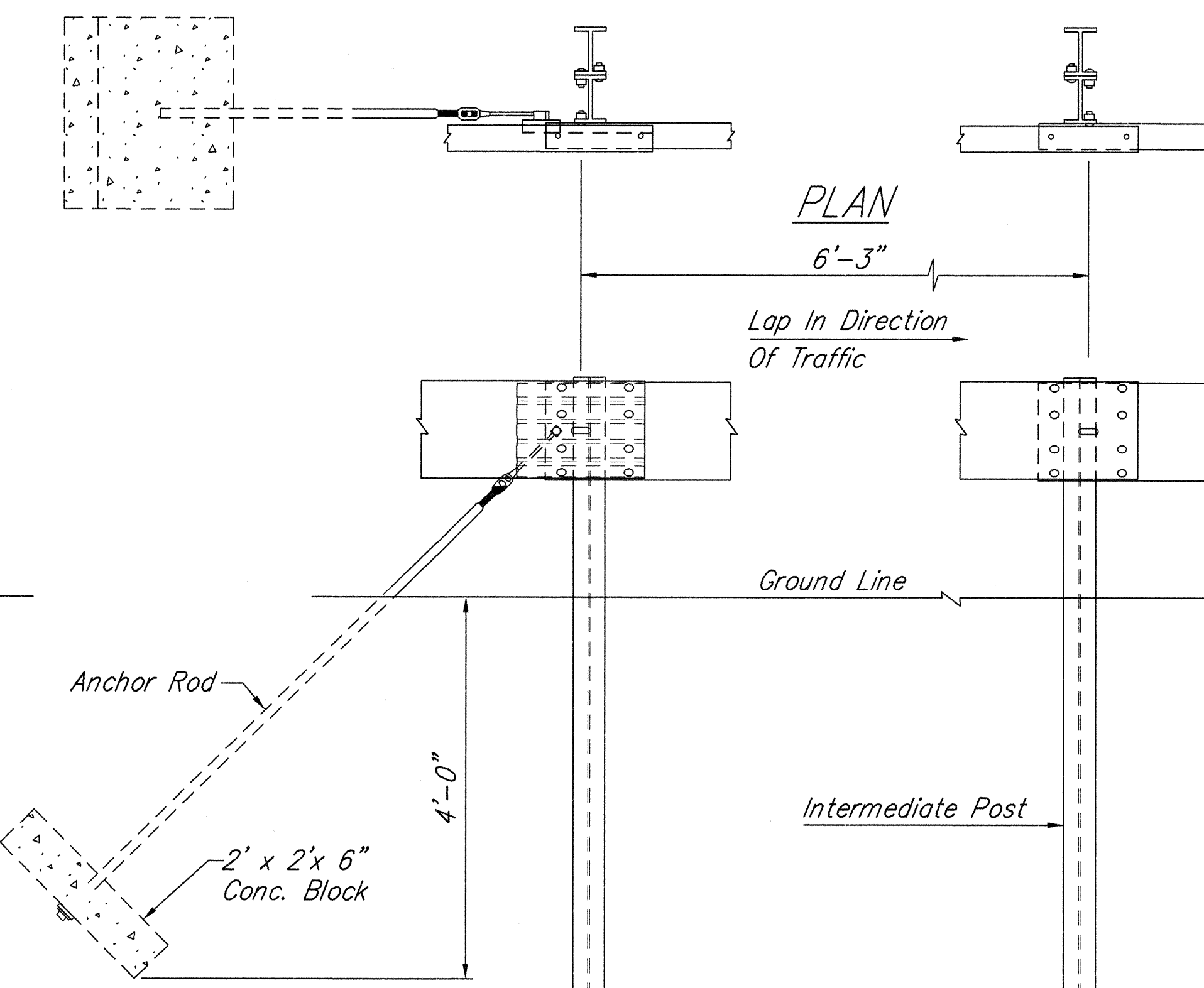
ANCHOR ROD

TURNBUCKLE

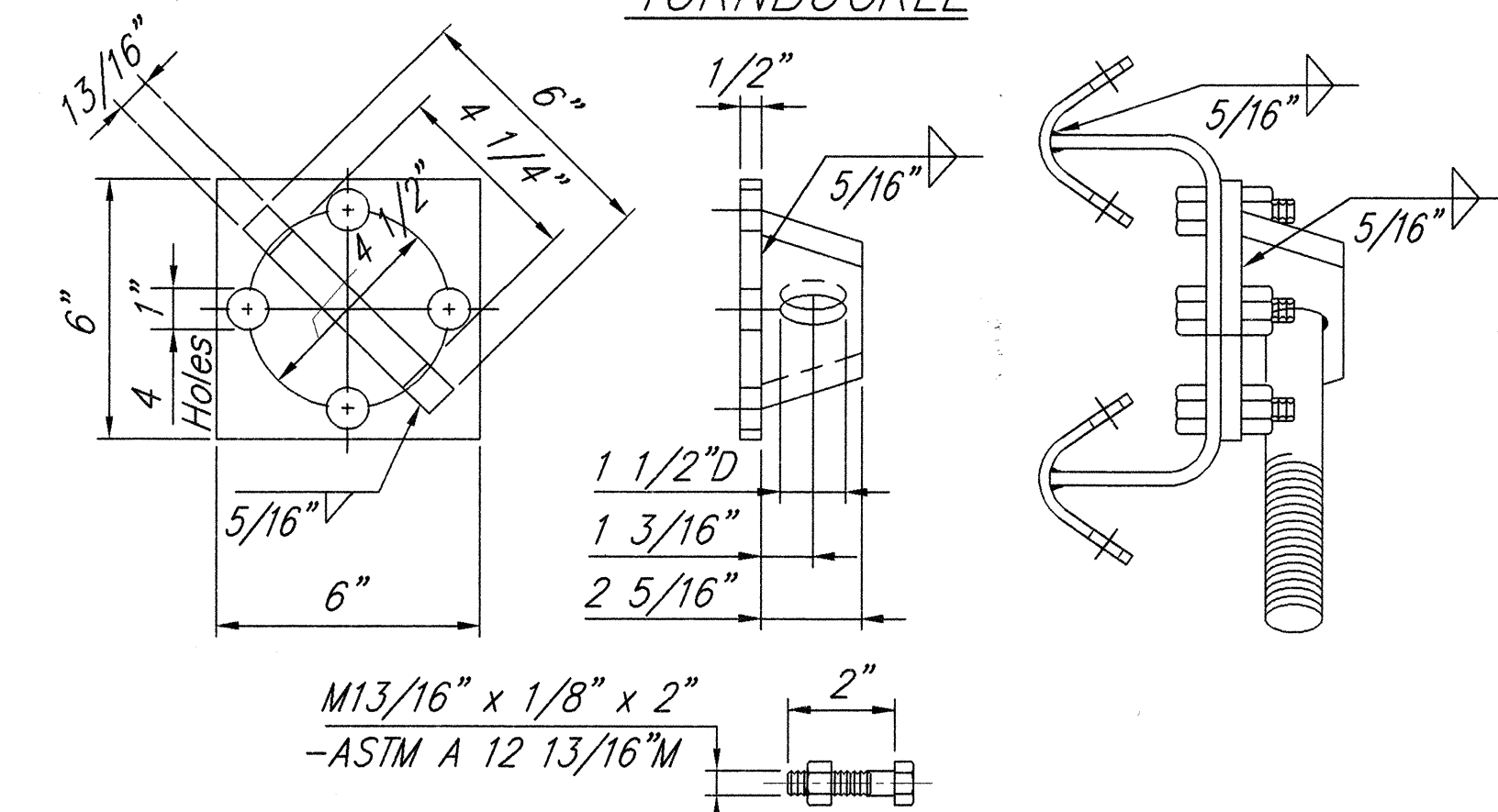
Note: Tensile Strength 60,916 psi Applied Through Assembly



ASSEMBLY ELEVATION

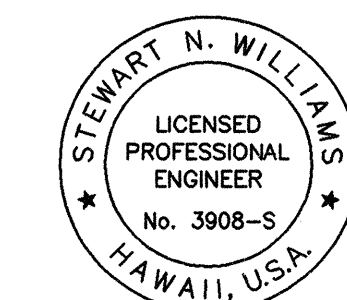


ANCHOR FOR STEEL BEAM RAIL



ALTERNATE ANCHOR ROD CONNECTOR

DATE	11/02
DESIGNED BY	S. WILLIAMS
CHECKED BY	R. KILGUS
QUANTITIES BY	S. WILLIAMS
NO.	

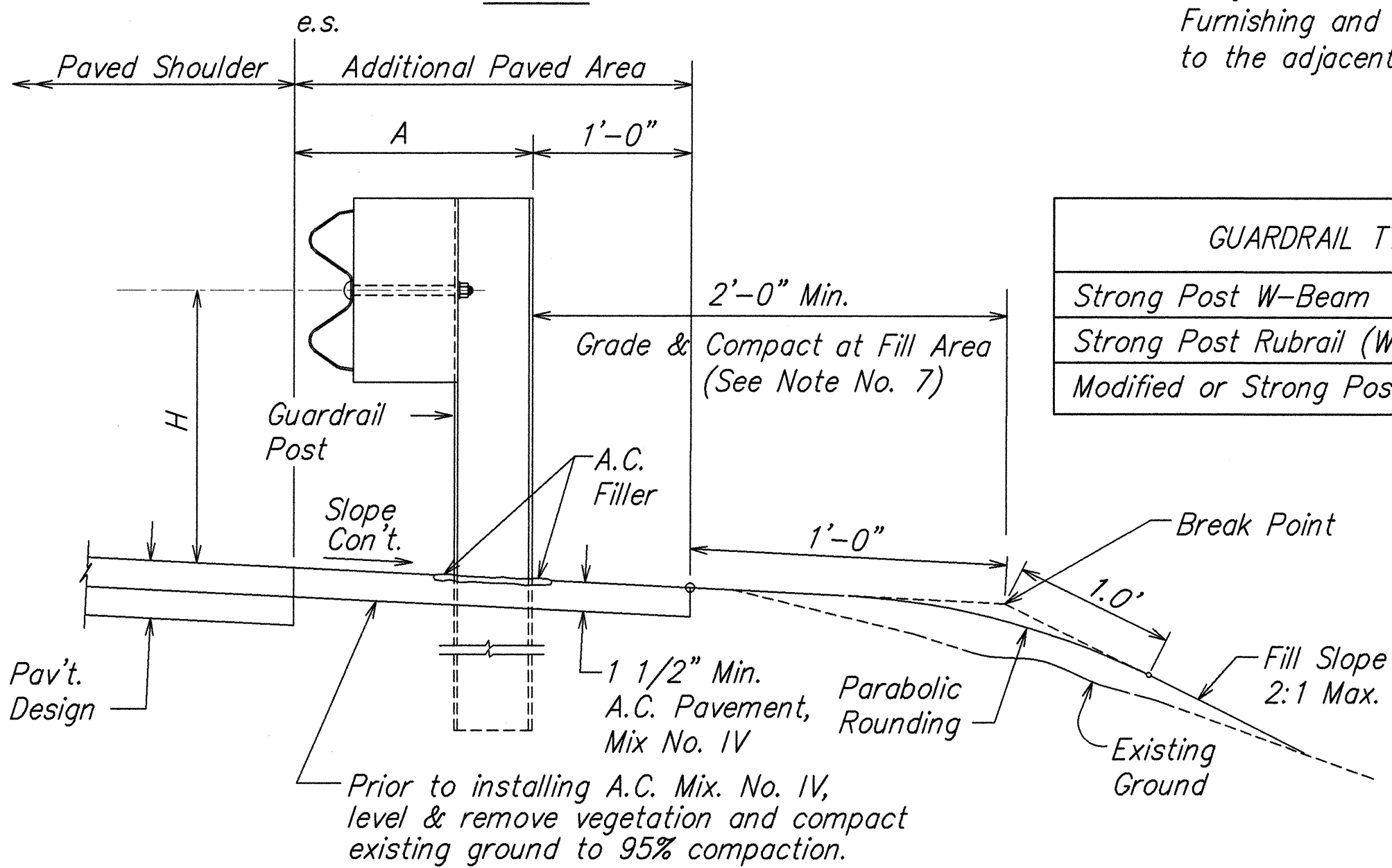
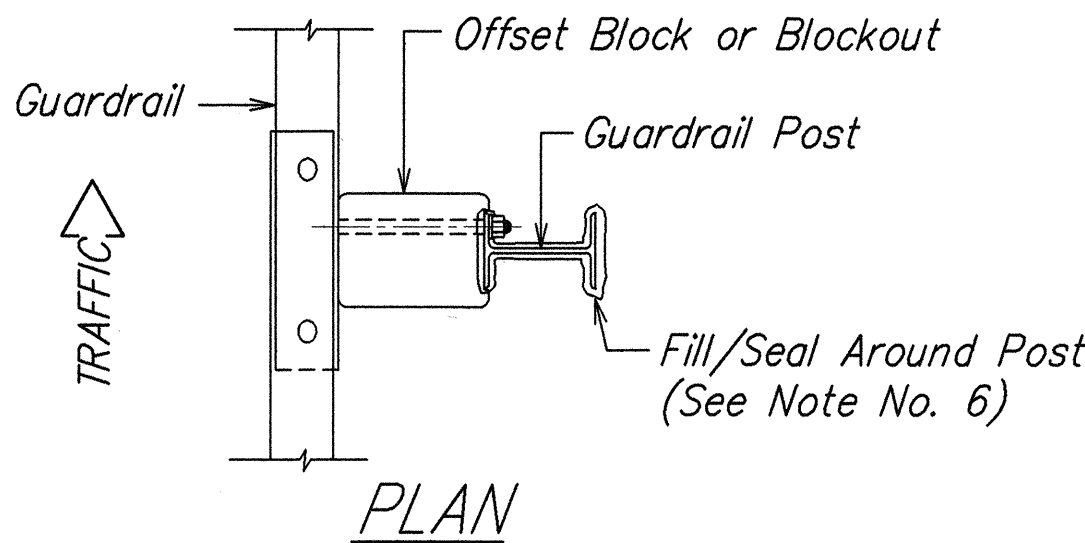
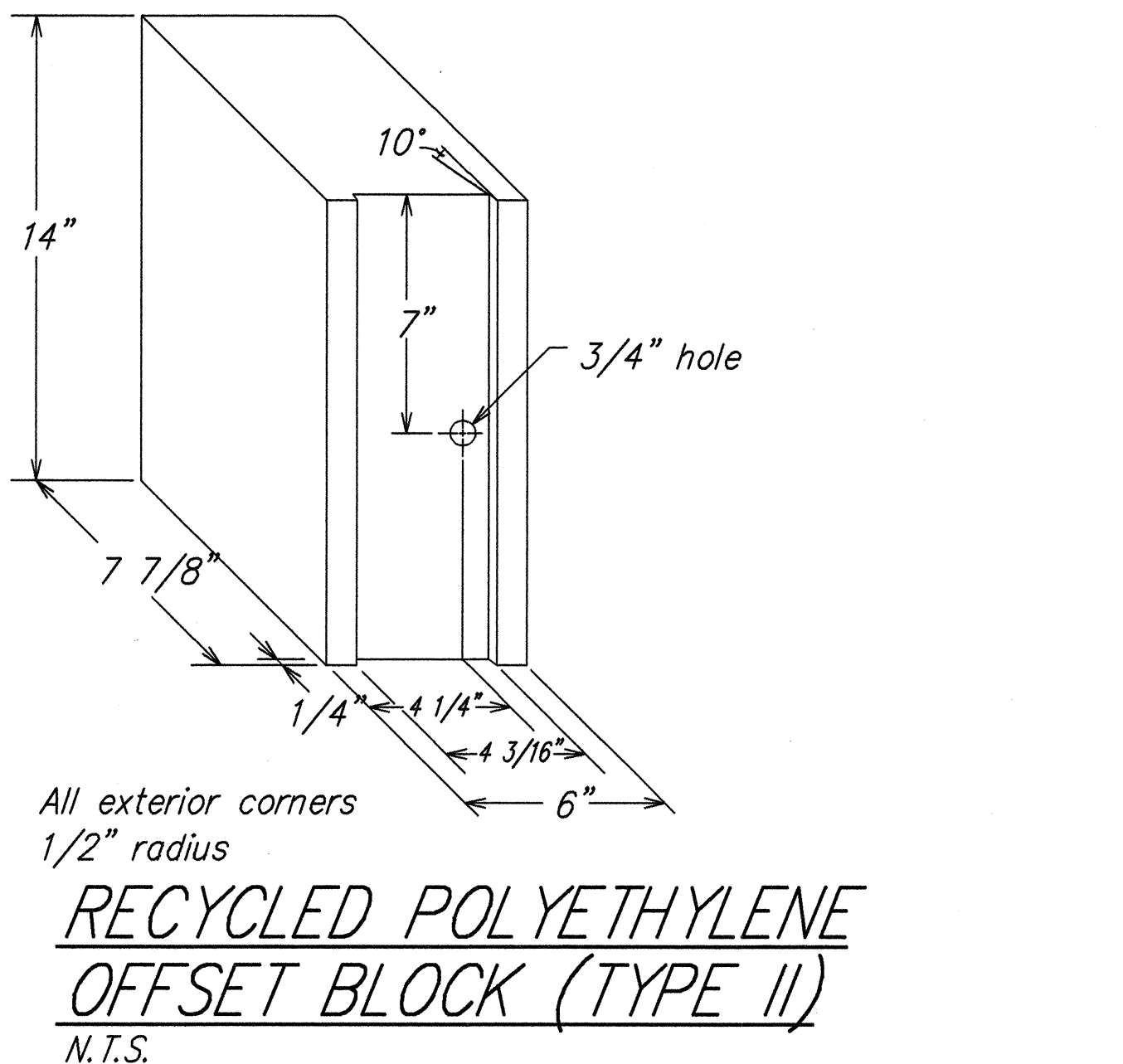
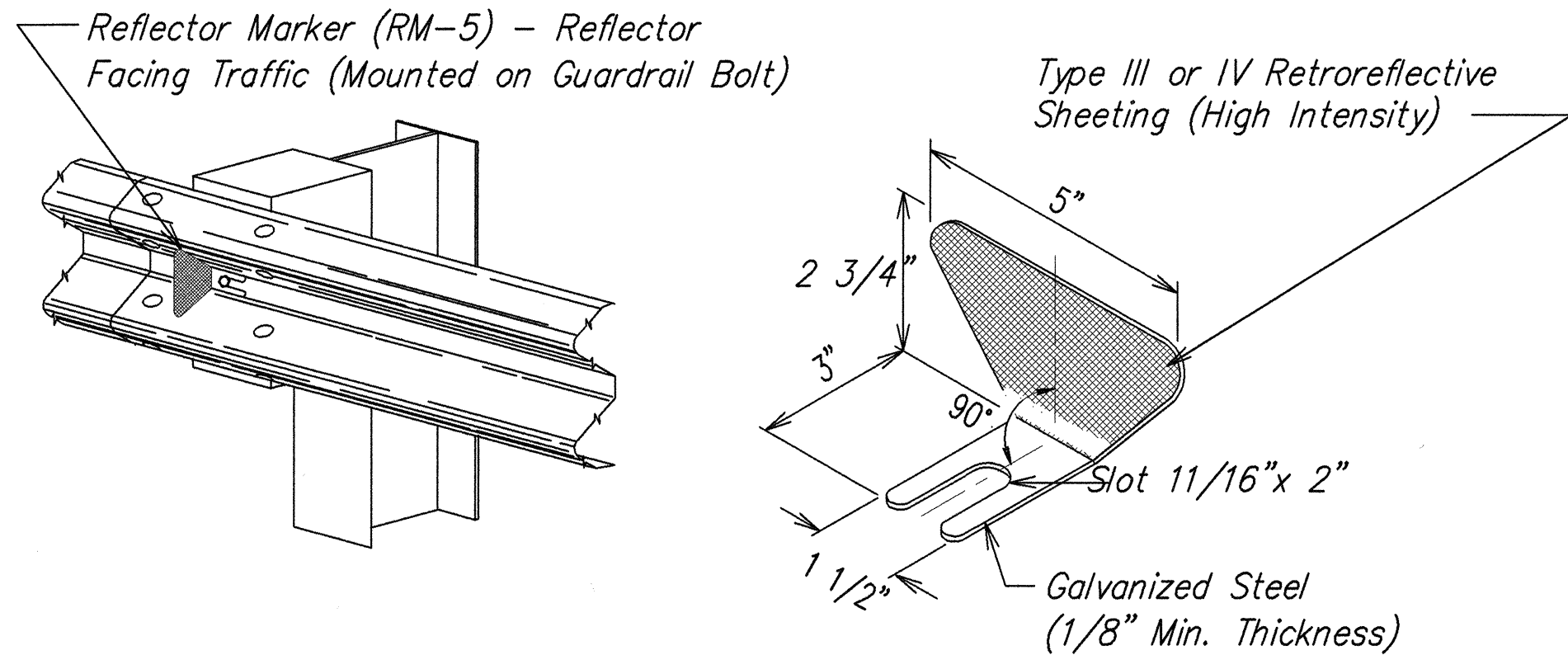
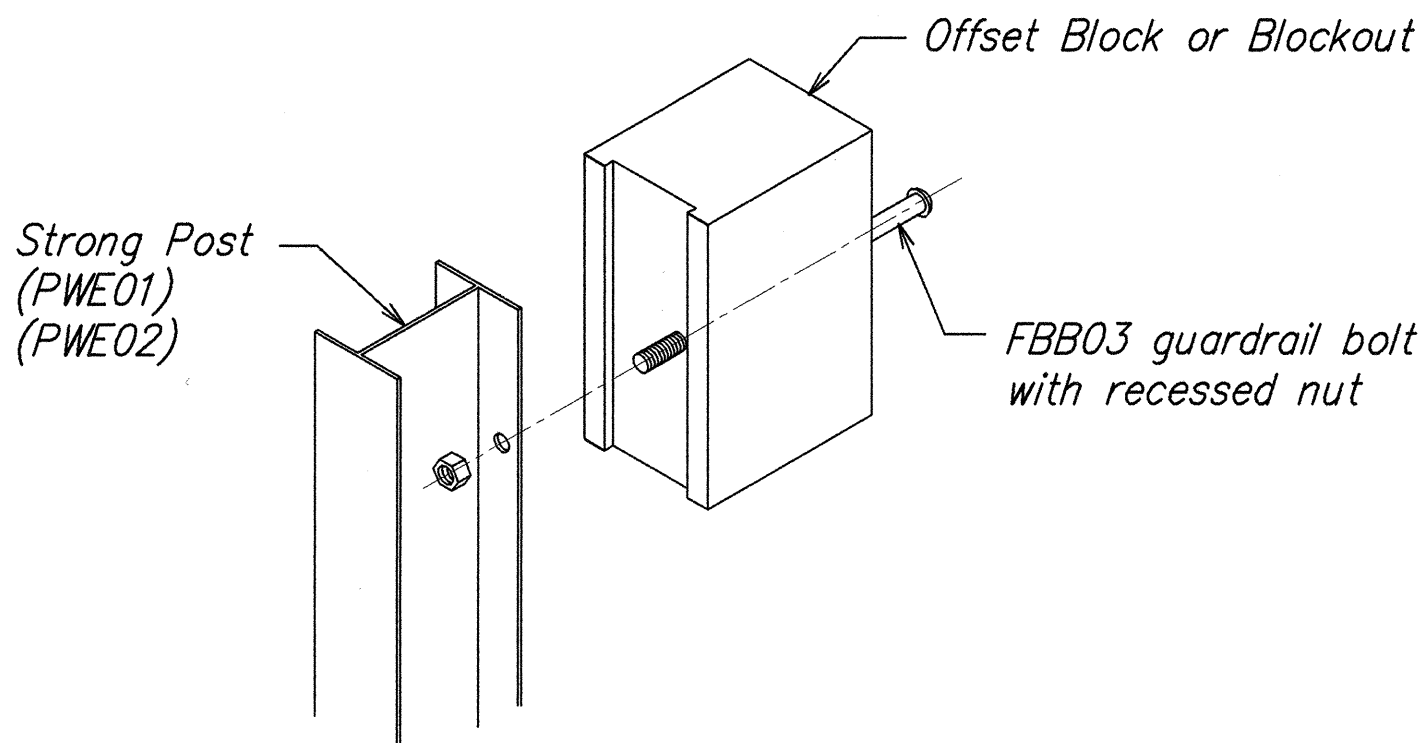
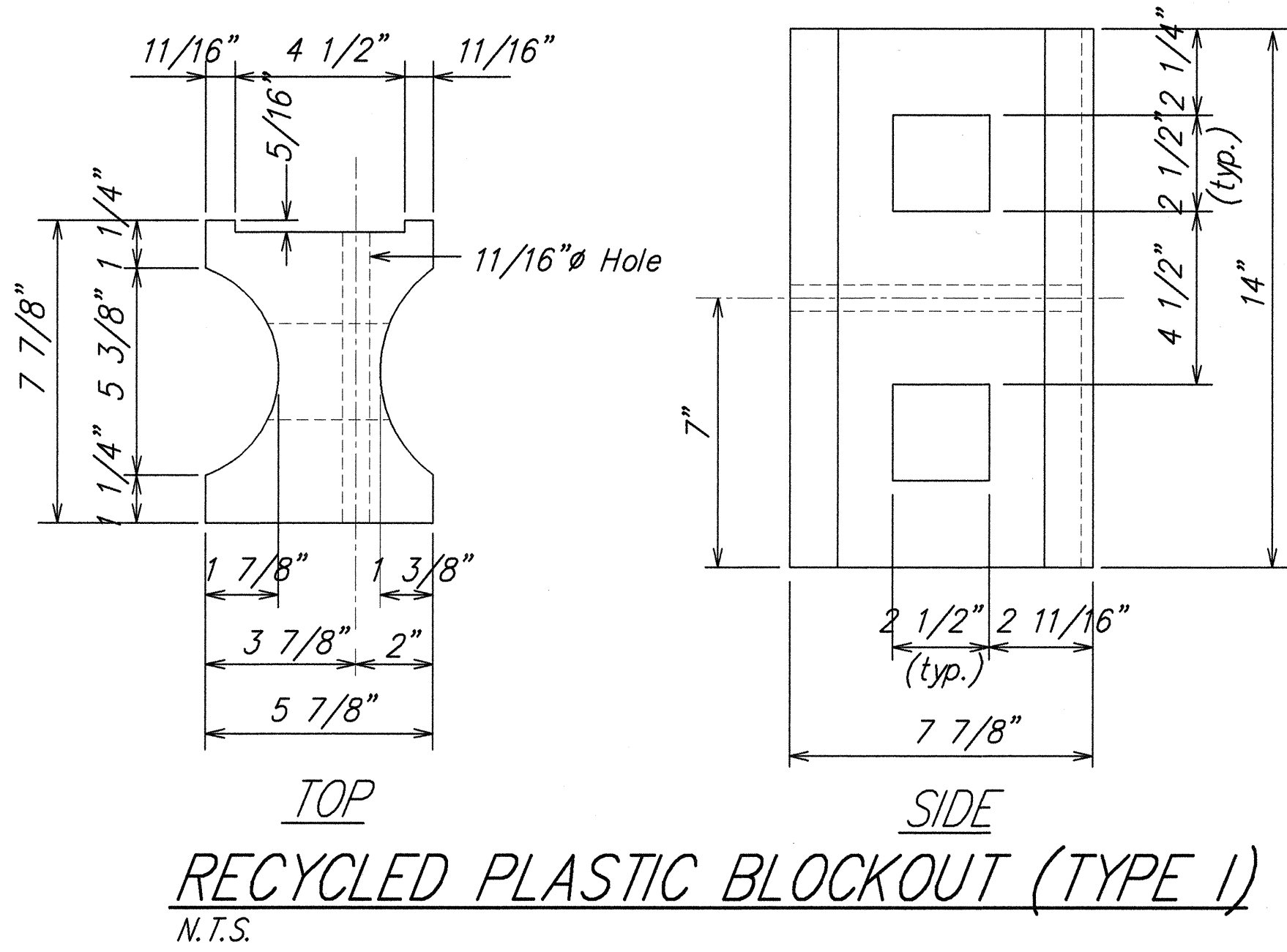


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Mitsunaga & Associates, Inc.
Structural Review By

12/05/02	Added Sheet
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
TYPE G-1d TL-2 TERMINAL	
SAND ISLAND PARKWAY BASCULE BRIDGE DECK REPLACEMENT DISTRICT OF HONOLULU Federal Aid Project No. NH-064-1(8) Scale: As Noted	
NOVEMBER 2002	
SHEET No. S-23A OF 37 SHEETS	

ADD 31S-1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	32	45



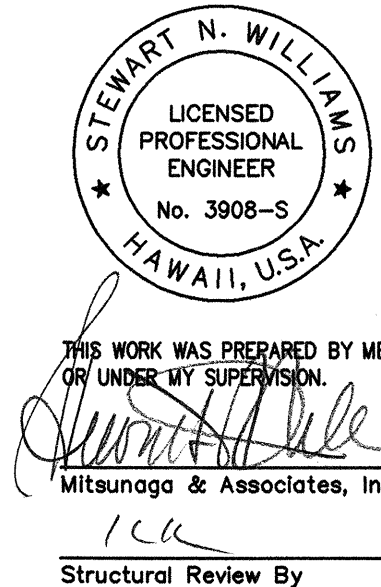
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 5/8"	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"

TYPICAL GUARDRAIL INSTALLATION
 N.T.S.

GENERAL NOTES

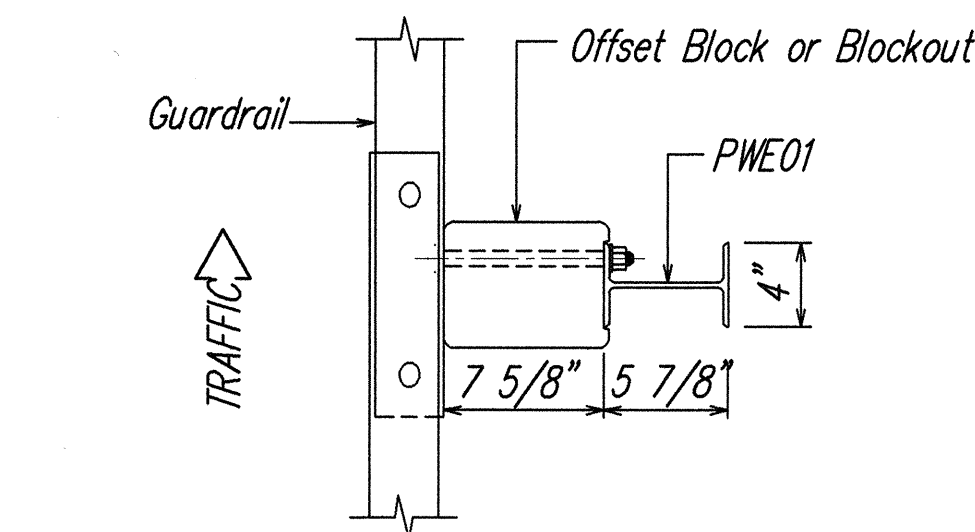
- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM02b, etc.) shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware", a report prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee, Subcommittee On New Highway Materials, Task Force 13 Report. Dimensions of fasteners, posts and rail elements have been converted from metric units into their present form.
- The Recycled Plastic Block or Offset Block shall be approved by the State.
- All New Guardrail System (System consists of total length of guardrail including both end treatment) shall include the additional paved area.
- After the guardrail posts are installed in the paved area, the Contractor shall fill/seal around each guardrail post and all cracks in the paved area caused during the guardrail post installation. If required by the inspector/engineer, the Contractor shall tamper the paved area around the guardrail post prior to filling/sealing. All costs associated with this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
- When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
- New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
- Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. RM-5's shall not be installed on Terminal Sections. Furnishing and installing of each RM-5 shall be considered incidental to the adjacent guardrail system.

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	11/02
QUANTITIES BY	11/02
CHECKED BY	11/02
ORIGINAL PLAN	
NOTE BOOK	
No.	

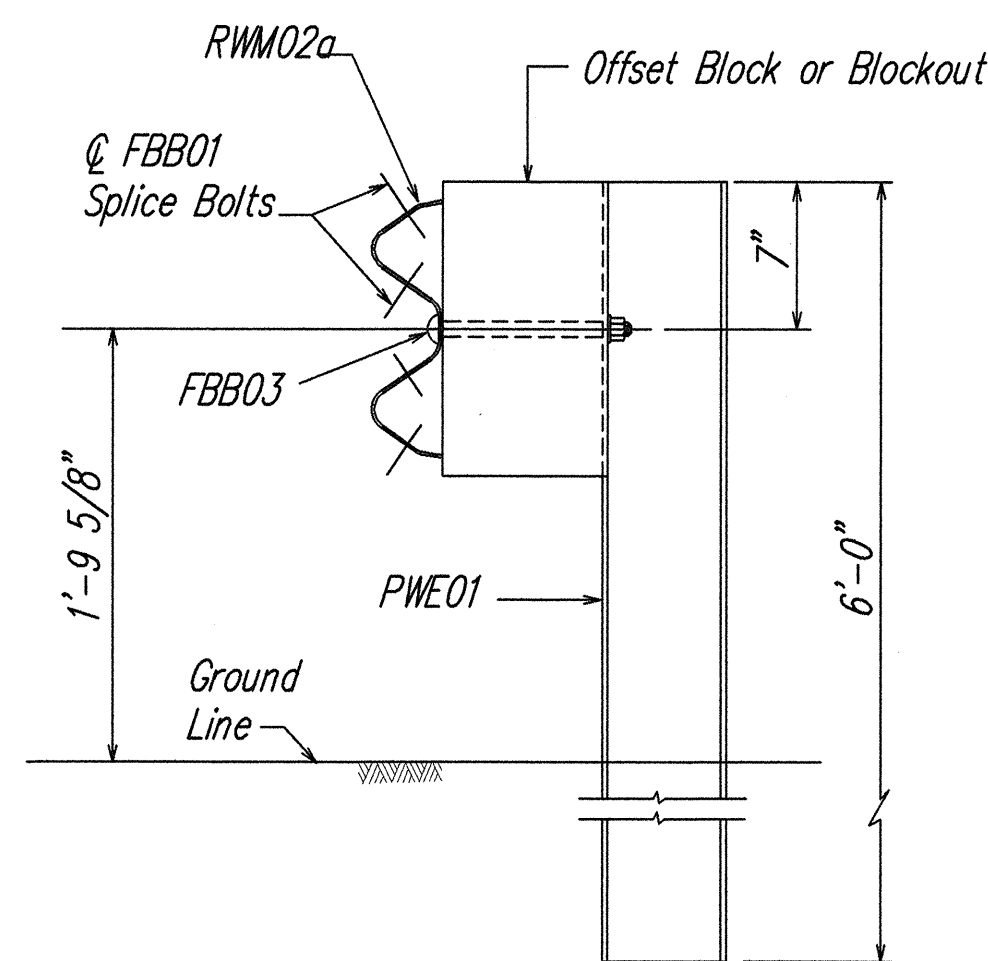


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL DETAILS & NOTES
SAND ISLAND PARKWAY
BASCULE BRIDGE DECK REPLACEMENT
DISTRICT OF HONOLULU
Federal Aid Project No. NH-064-1(8)
Scale: As Noted
NOVEMBER 2002
SHEET No. S-24 OF 37 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	33	45



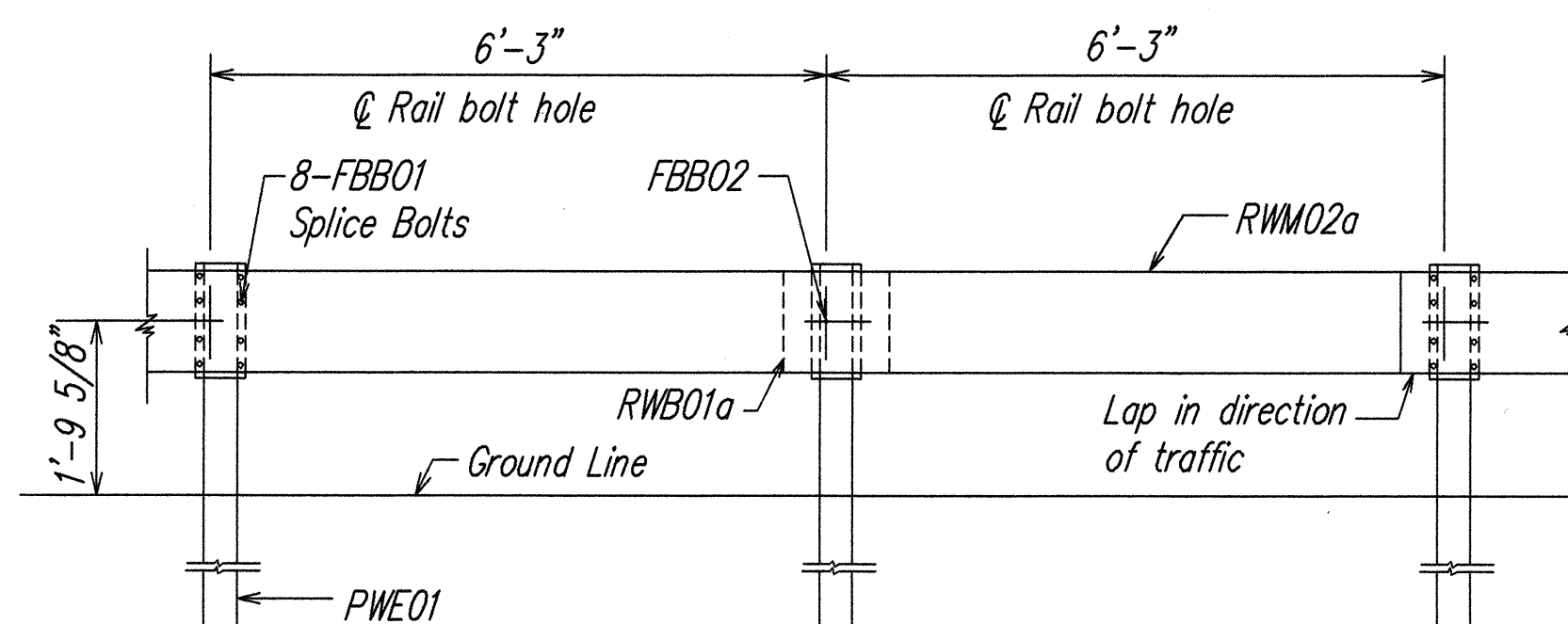
PLAN



ELEVATION

STRONG POST W-BEAM GUARDRAIL (SGR04a)

N.T.S.

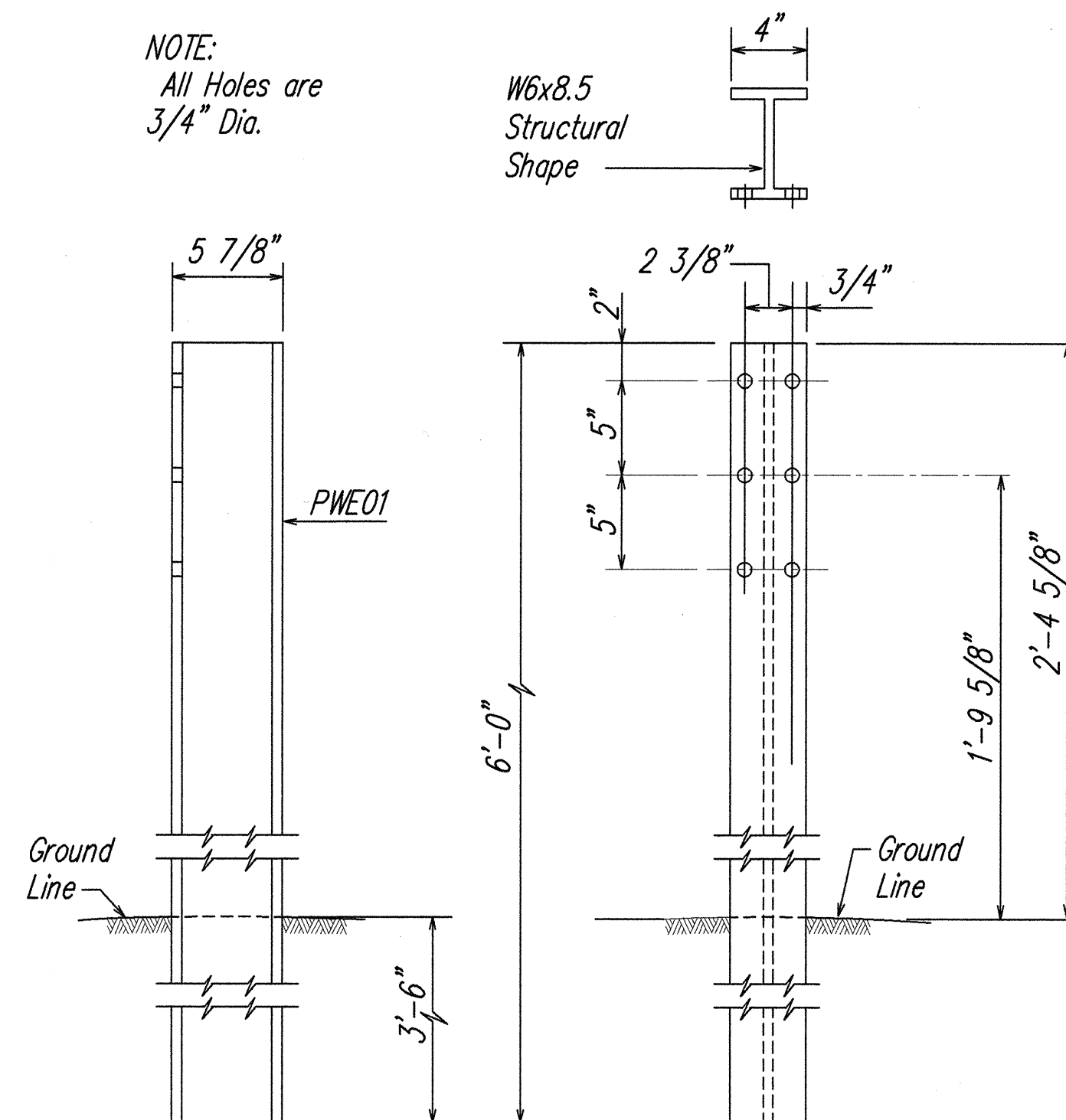


ELEVATION

STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

N.T.S.

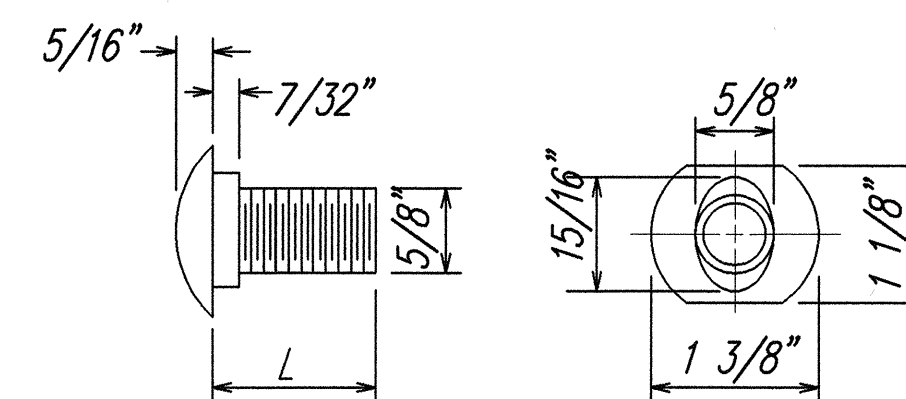
NOTE:
All Holes are
3/4" Dia.



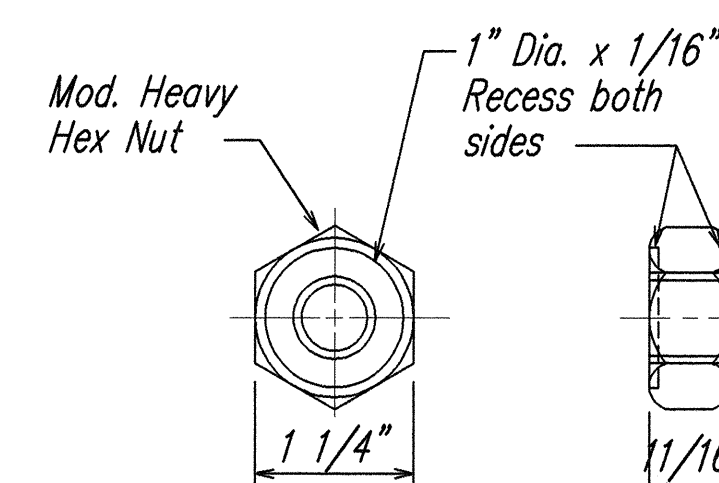
SIDE

W-BEAM STRONG POST (PWE01)

N.T.S.

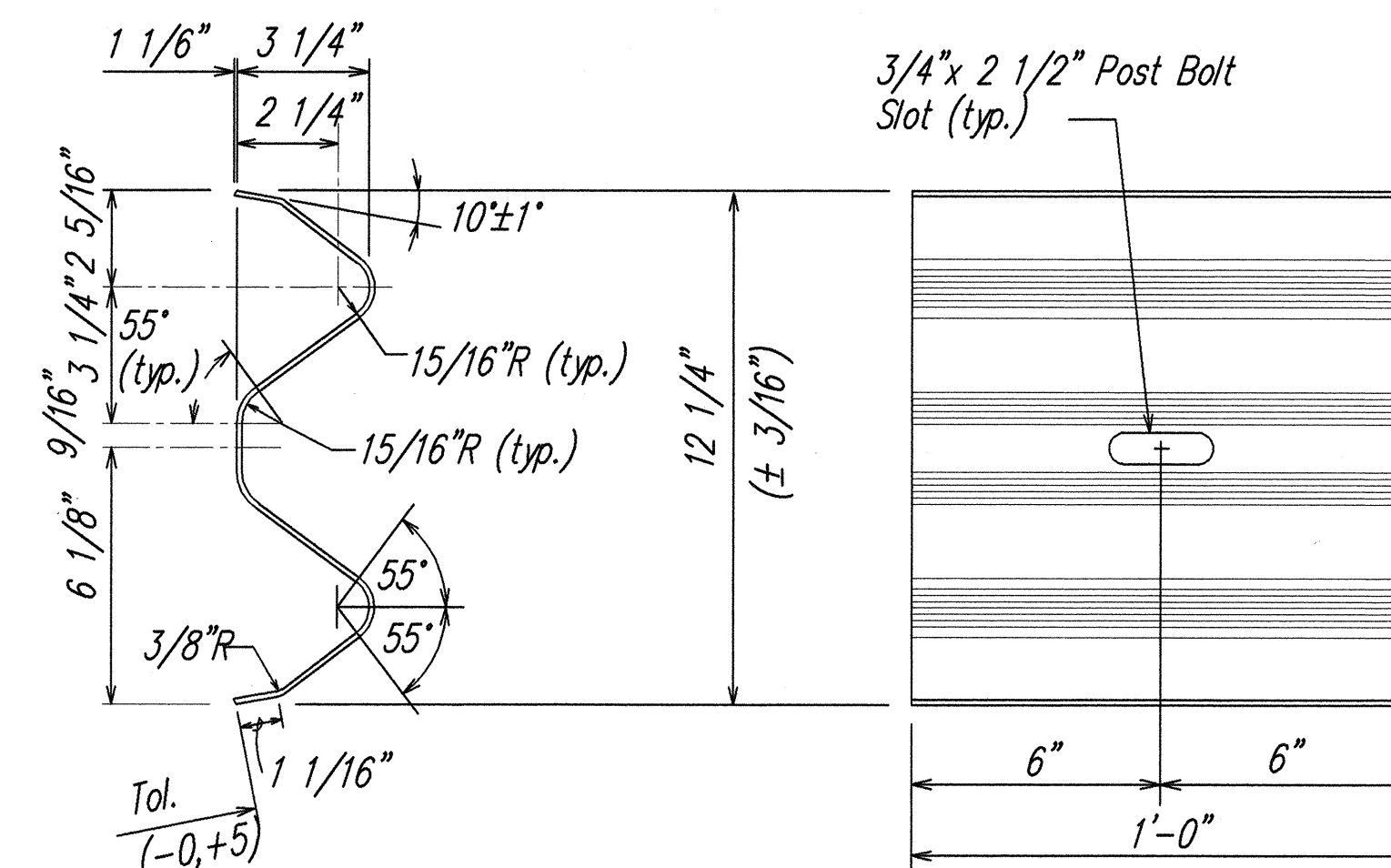


DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"



GUARDRAIL BOLTS AND RECESSED NUT

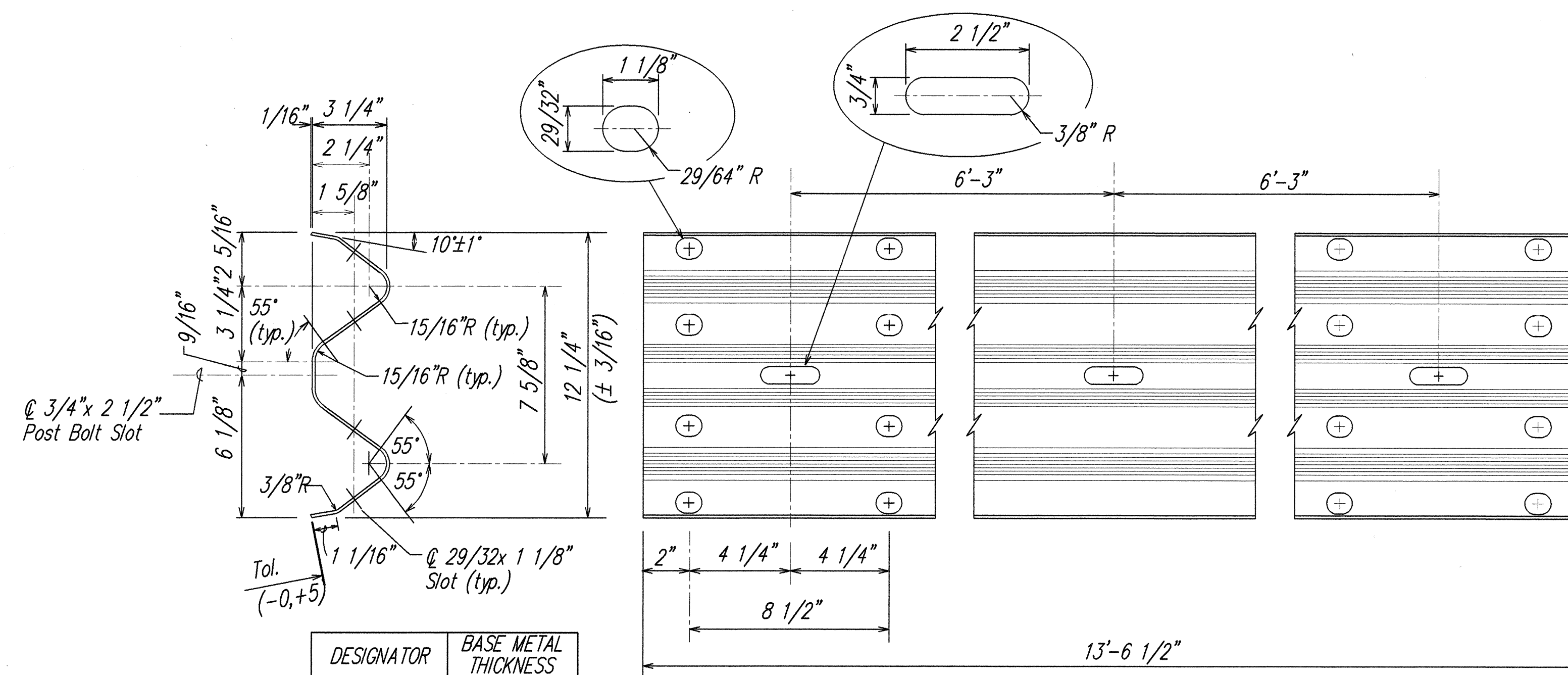
N.T.S.



DESIGNATOR	BASE METAL THICKNESS
RWB01a	12" GAUGE

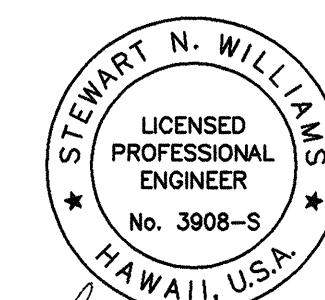
W-BEAM BACK-UP-PLATE (RWB01a)

N.T.S.



2 SPACE W-BEAM GUARDRAIL (RWM02a)

N.T.S.



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Stewart N. Williams
Mitsunaga & Associates, Inc.
11/02
Structural Review By

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

**SAND ISLAND PARKWAY
BASCULE BRIDGE DECK REPLACEMENT
DISTRICT OF HONOLULU**

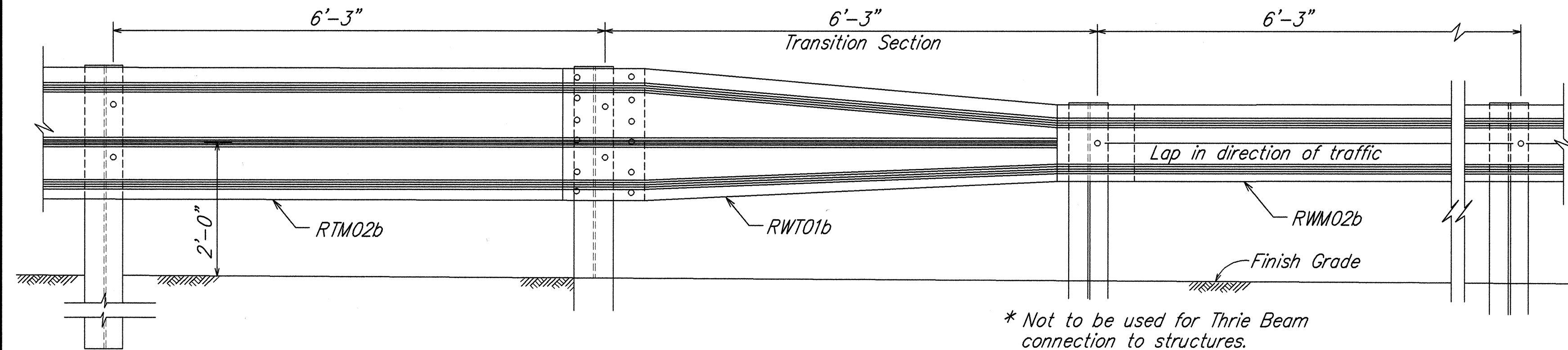
Federal Aid Project No. NH-064-1(8)

Scale: As Noted
NOVEMBER 2002

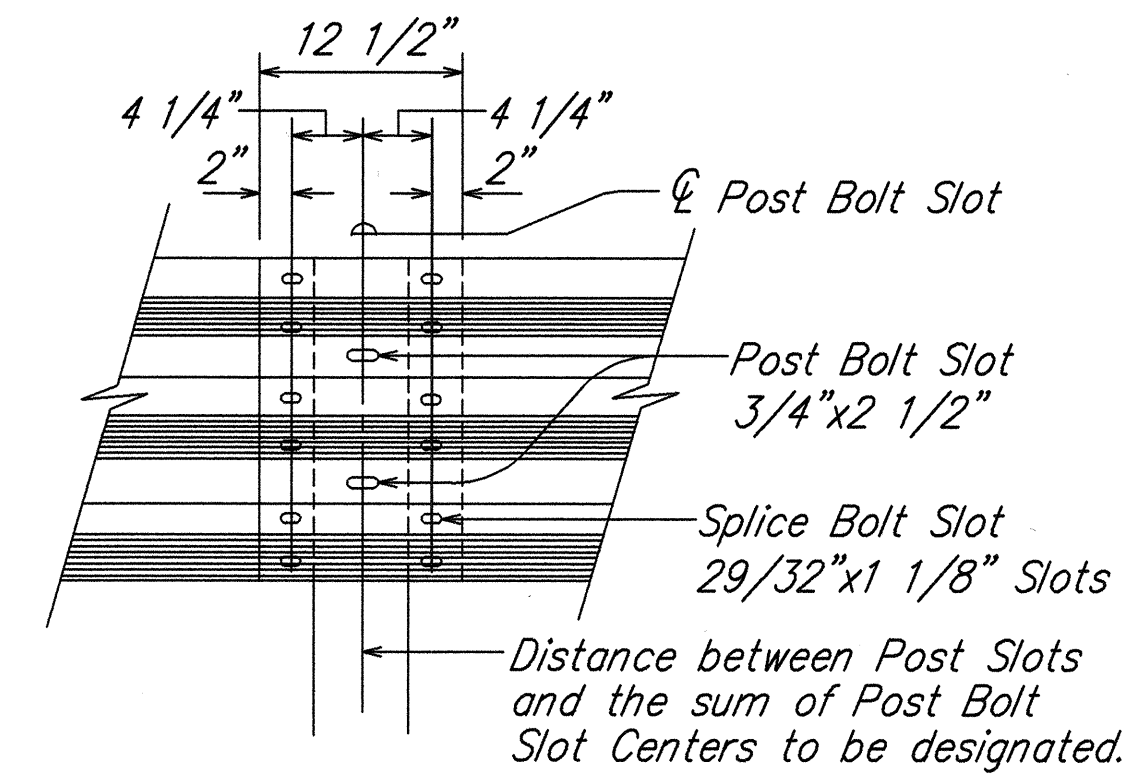
SHEET No. **S-25** OF **37** SHEETS

ORIGINAL PLAN	DATE
SURVEY OBTAINED BY	
DRAWN BY	
DESIGNED BY	11/02
QUANTITIES BY	11/02
CHECKED BY	11/02
NOTE BOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	33	45

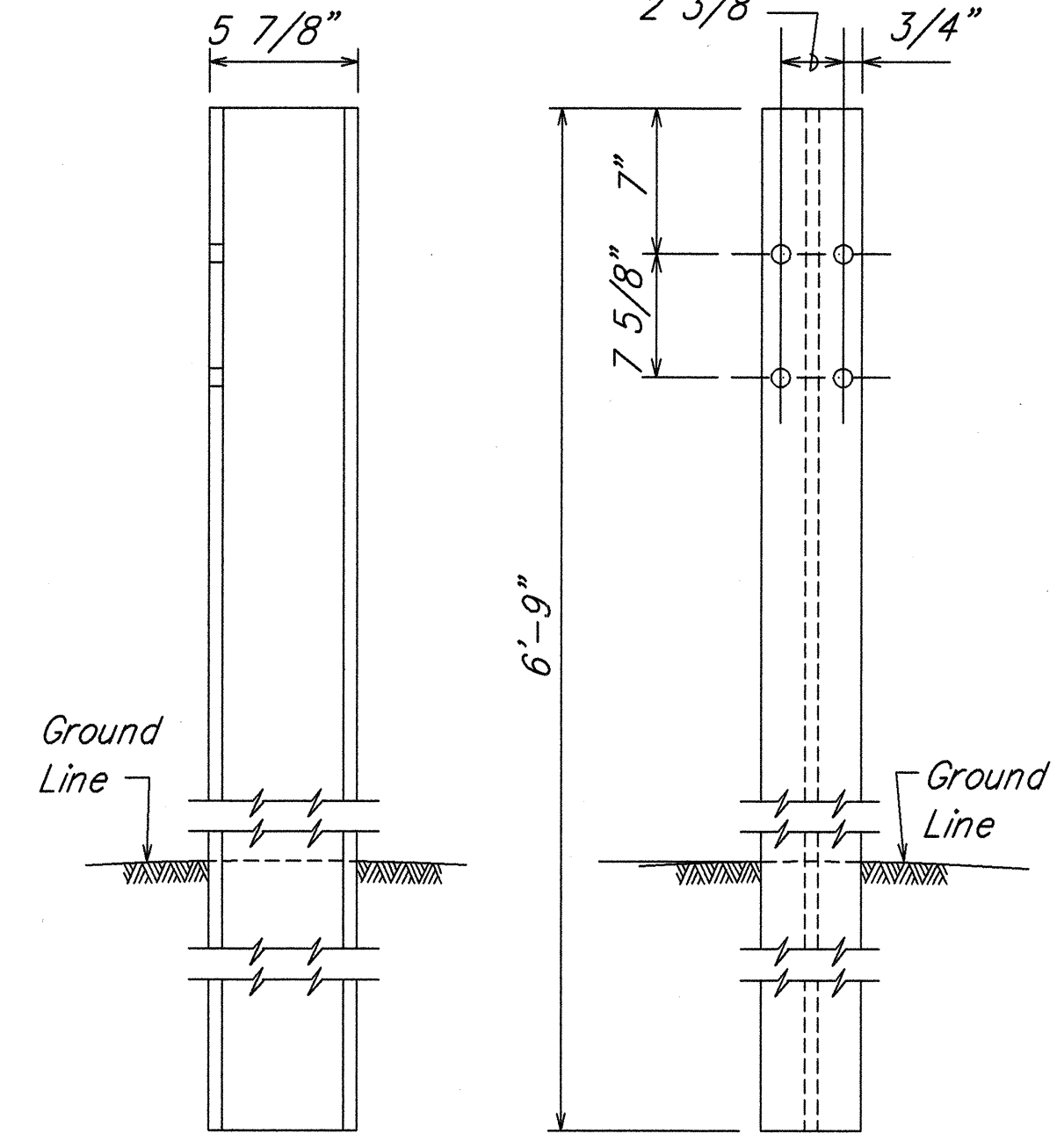
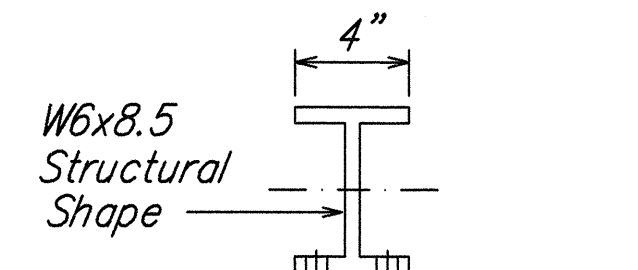


TRANSITION SECTION *



RAIL SPLICE

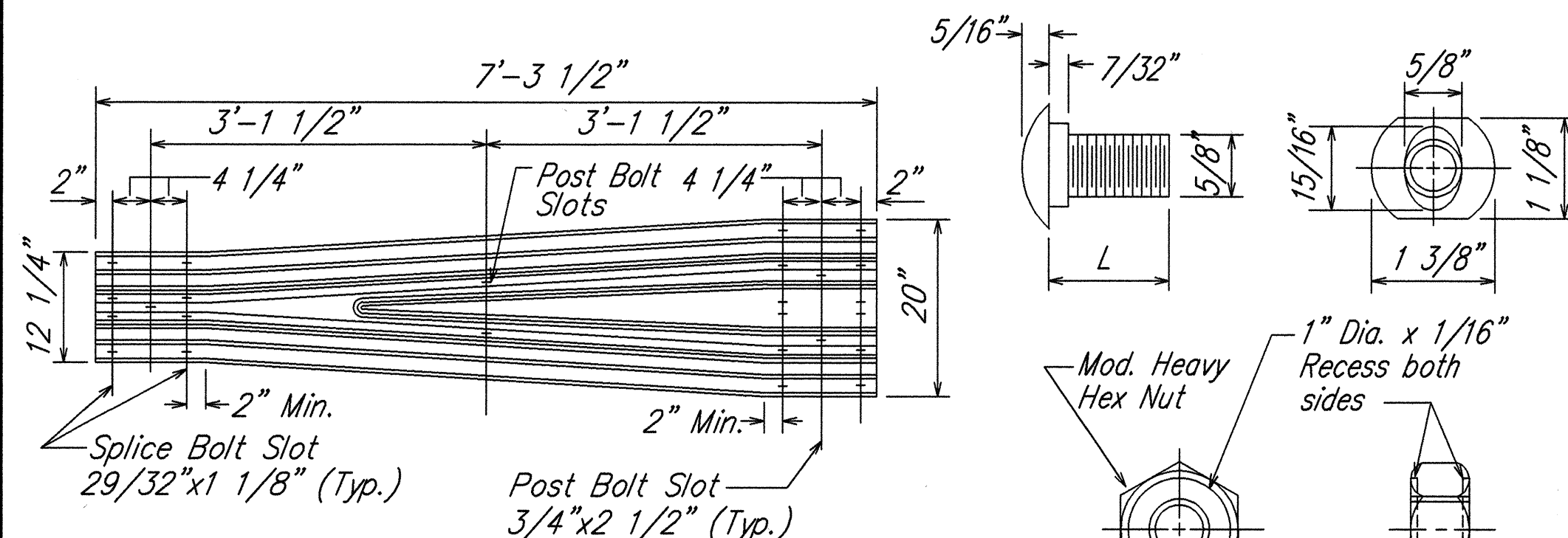
NOTE:
All Holes are
3/4" Dia.



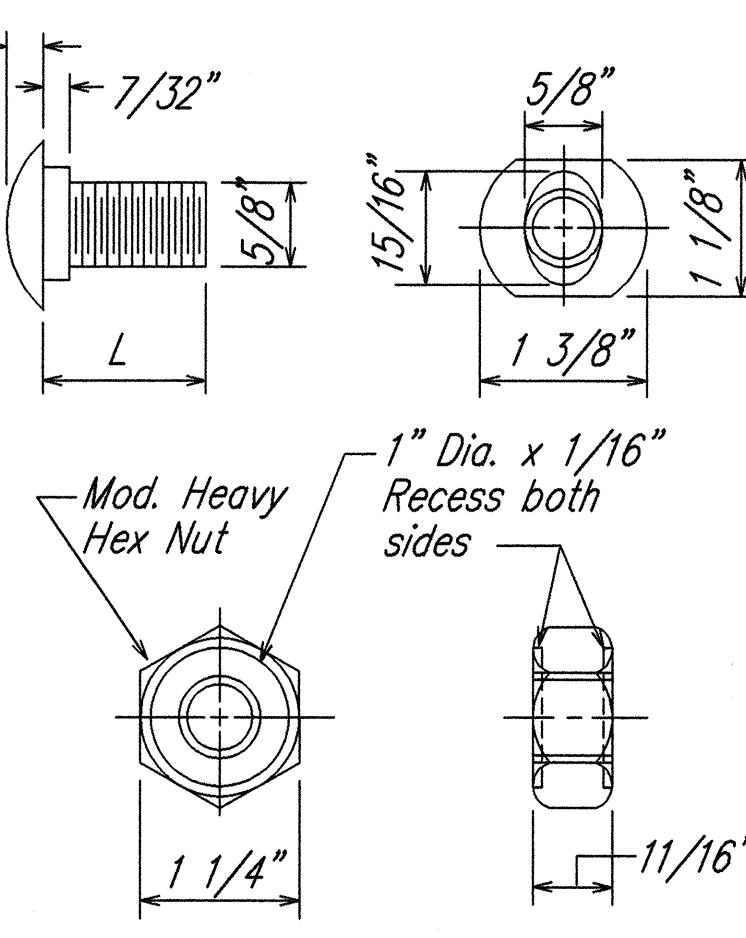
SIDE

FRONT

THRIE-BEAM STRONG POST FOR PLASTIC SPACER BLOCKS

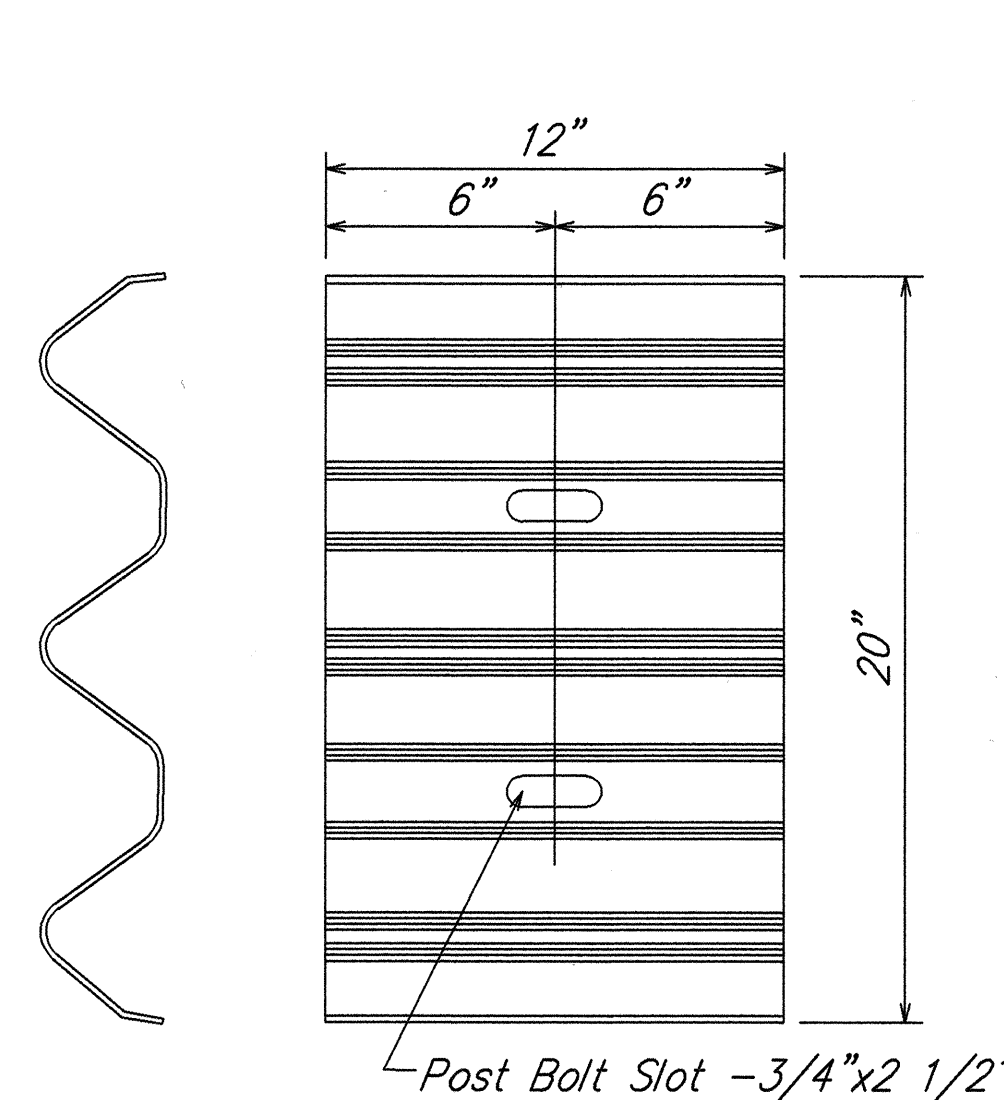


TRANSITION SECTION (RWT01b)



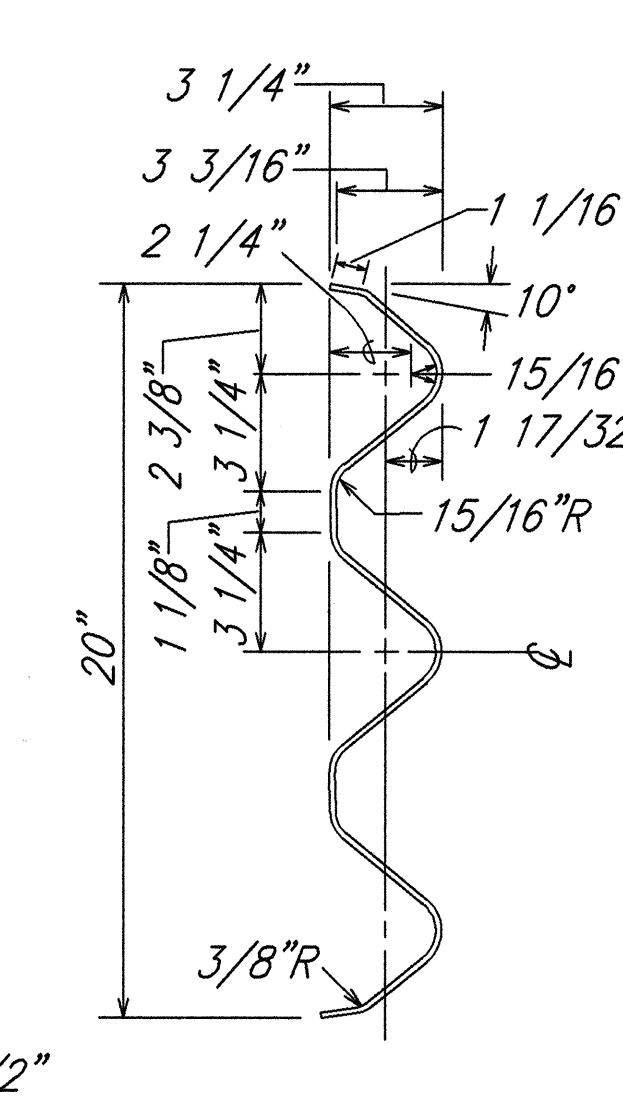
DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

GUARDRAIL BOLTS AND RECESSED NUT

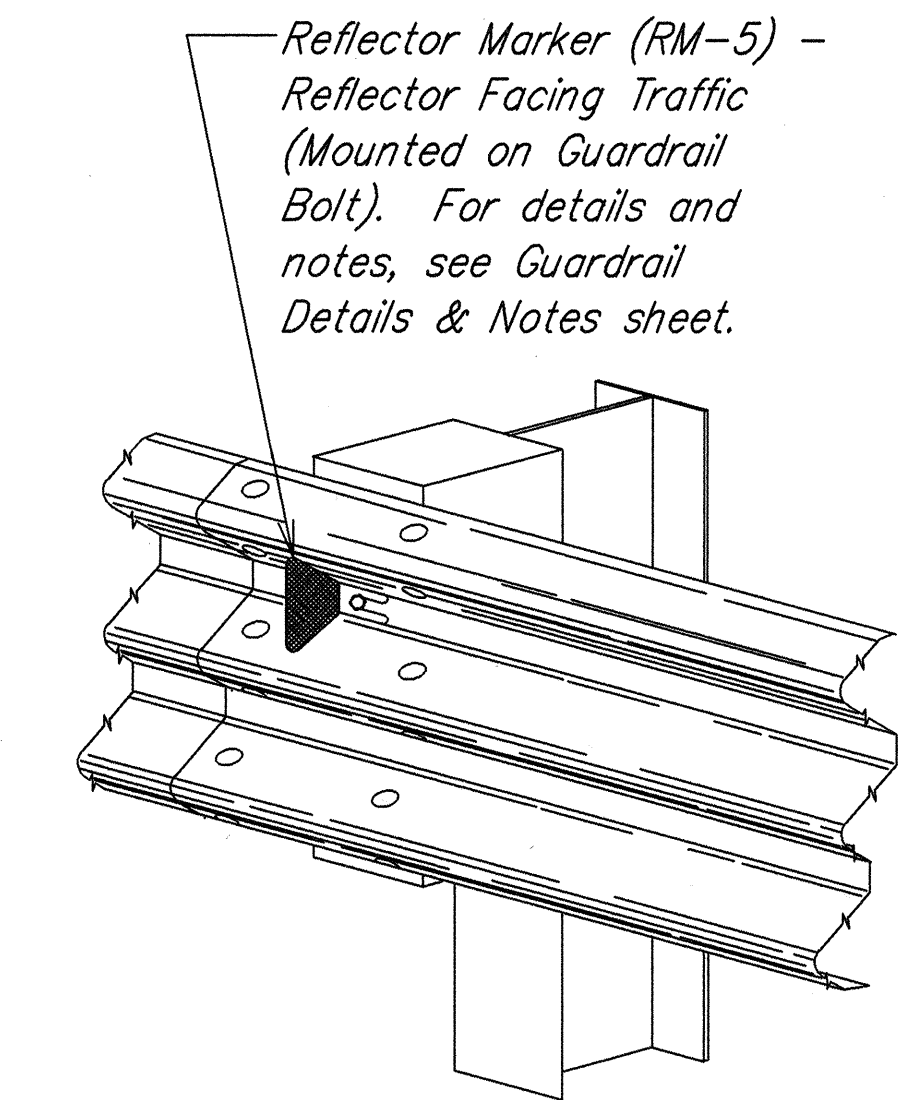


BACKUP PLATE (RTB01b)

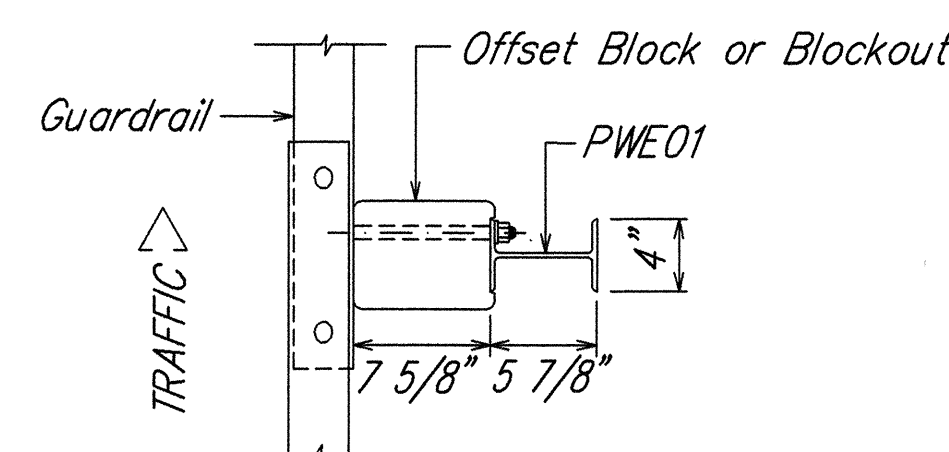
(Use at Posts where Splices do not occur)



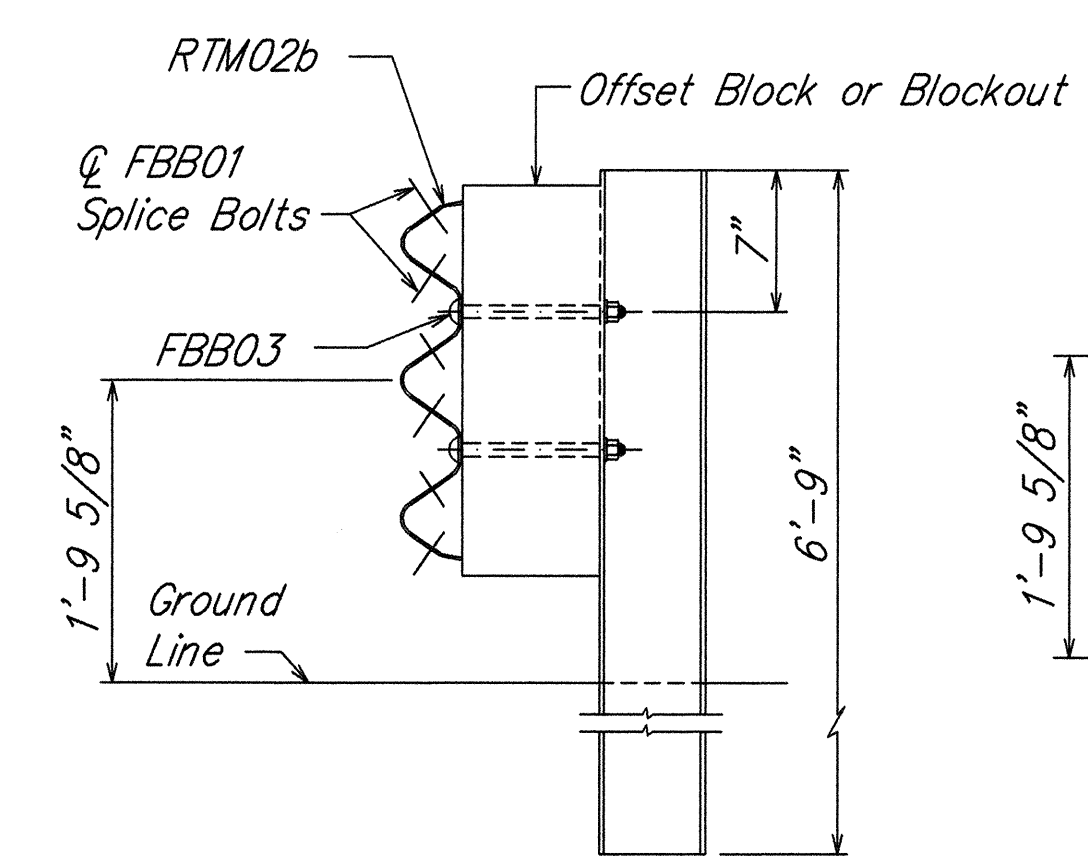
SECTION THRU RAIL ELEMENT (RTM02b)



TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)

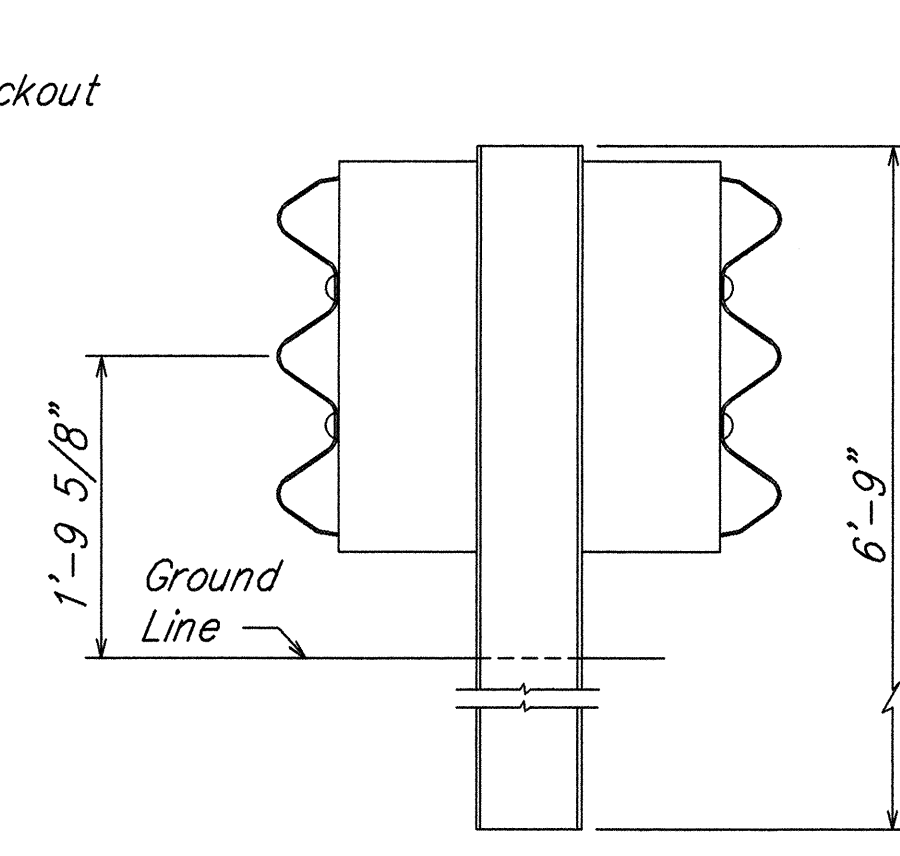


PLAN



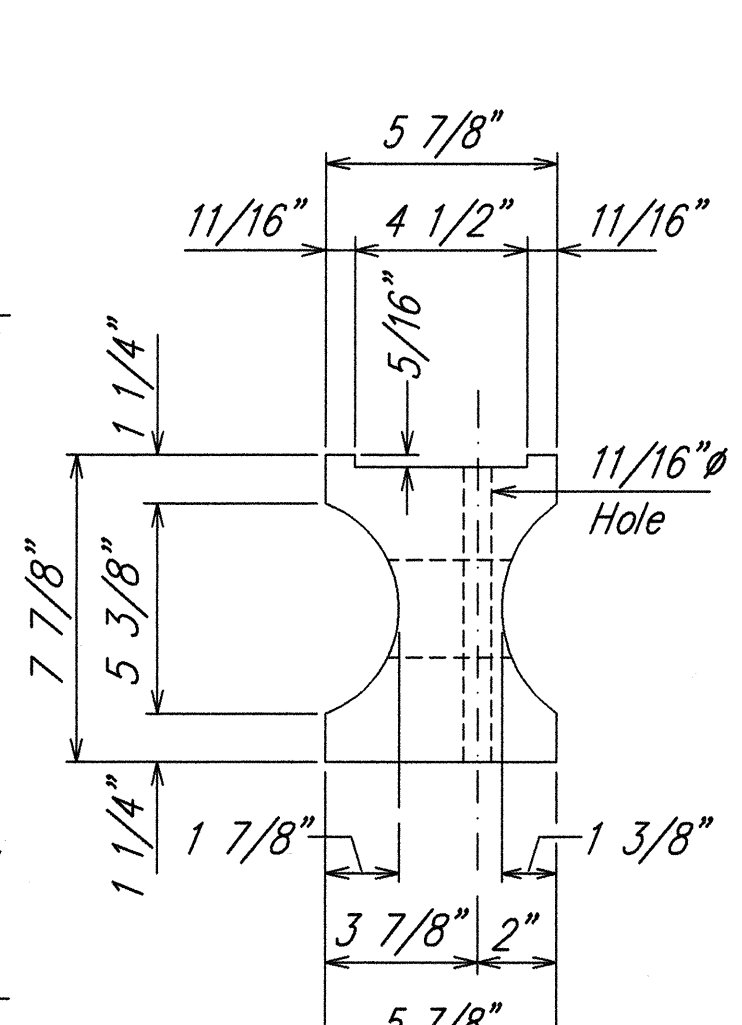
ELEVATION

STRONG POST THRIE-BEAM GUARDRAIL (SGR09a)



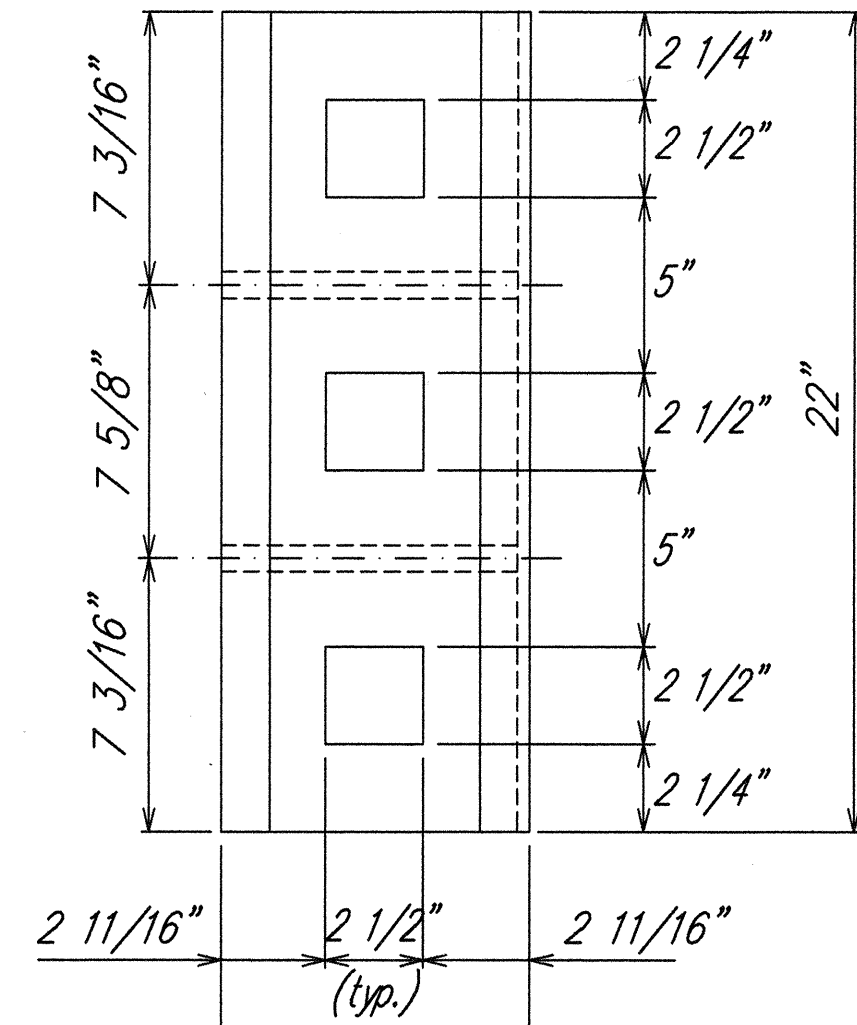
ELEVATION

STRONG POST THRIE-BEAM MEDIAN GUARDRAIL (SGM09a)



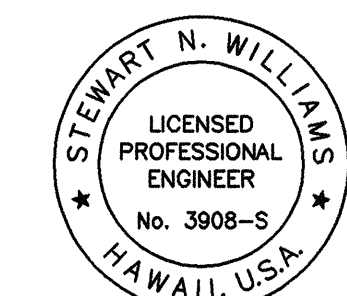
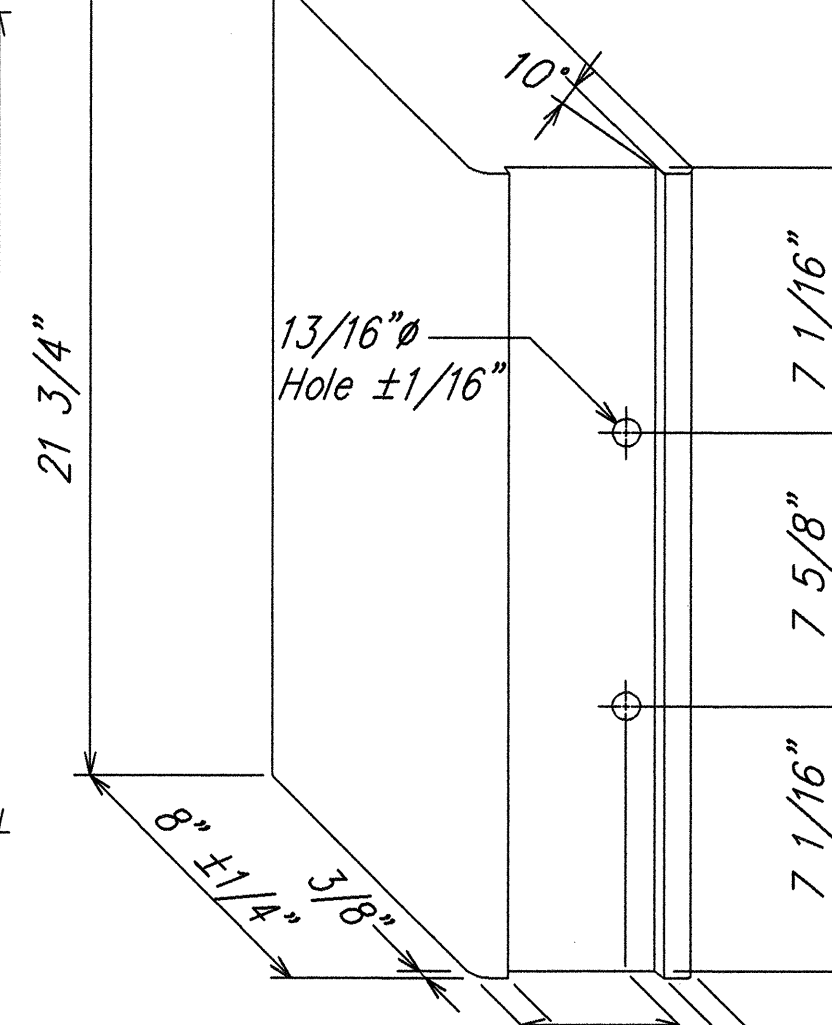
TOP

MODIFIED 6X8X22 PLASTIC BLOCKOUT (TYPE I - THRIE)



SIDE

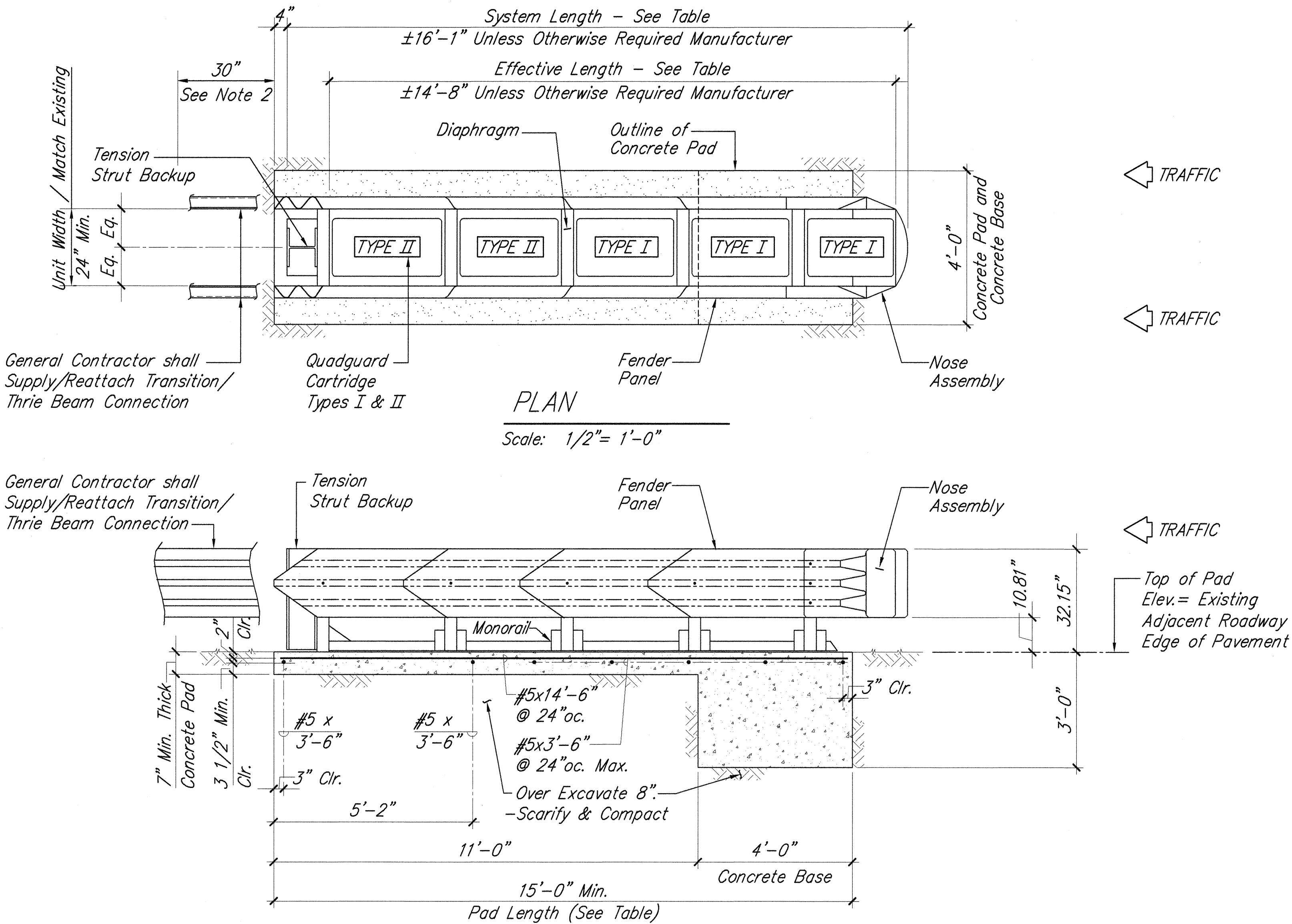
RECYCLED POLYETHYLENE THRIE-BEAM OFFSET BLOCK (TYPE II - THRIE)



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Mitsunaga & Associates, Inc.
Structural Review By

12/05/02	Added Sheet
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STRONG POST THRIE-BEAM GUARDRAIL SAND ISLAND PARKWAY BASCULE BRIDGE DECK REPLACEMENT DISTRICT OF HONOLULU Federal Aid Project No. NH-064-1(8) Scale: As Noted NOVEMBER 2002	
SHEET No. 8-25A OF 37 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	34	45



NOTES:

- In Compliance with the AASHTO 1996 Roadside Design Guide, manufacturer recommends removal of all curbs and islands to ensure proper impact performance.
- Provision shall be made for Rear Fender Panels to slide rearward upon Impact 30" min.
- 7" minimum reinforced 4000 PSI concrete pad with 4'-0"x4'-0"x3'-0" Deep Concrete Base Are Required.
- See the "Quadguard System Design Manual" coded ENE 820-7/96 for a description of its impact performance characteristics and design limitations before placing a system at a given site. Information and copies of above manual are available by calling Customer Service Department at (312) 467-6750.
- The Contractor shall supply a transition from the Quadguard System to the Thrie Beam Guardrail.

TERMINAL IMPACT ATTENUATOR NOTES:

- The Details Shown Here are for the Assembly of a Quadguard System. The Contractor Shall Use This System, TAU II, or an Approved Equivalent.
- The Contractor Shall be Responsible for Providing the Concrete Pad, Transition Piece to Thrie Beam, Tension Strut Backup Assembly, and Any Other Materials Called For in These Details. All Work Related to the Construction of the Terminal Impact Attenuator Shall Comply with the Manufacturer's Specifications and the Special Provisions Sect. 693.

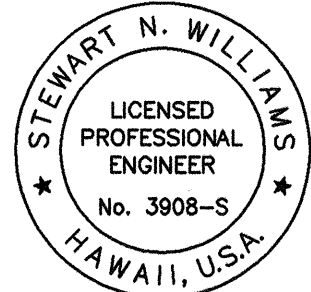
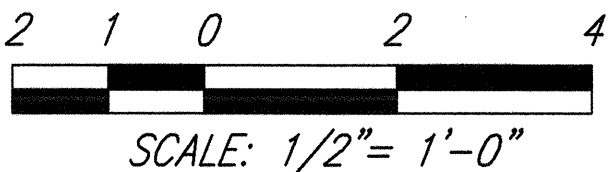
SURVEY PLOTTED BY	DATE
DRAWN BY	11/02
DESIGNED BY	11/02
QUANTITIES BY	11/02
CHECKED BY	11/02
ORIGINAL PLAN	
NOTE BOOK	
No.	

TYPICAL QUADGUARD SYSTEM DIMENSIONS				
BAYS	24" WIDTH MODEL # GREY	SYSTEM LENGTH ft - in	EFFECTIVE LENGTH ft - in	PAD LENGTH ft - in
4	QS2404G	16'-1"	14'-8"	15'-0"

TYPICAL TERMINAL IMPACT ATTENUATOR DETAILS

Scale: 1/2" = 1'-0"

GRAPHIC SCALE:



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Stewart N. Williams
 Mitsunaga & Associates, Inc.
 Structural Review By

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

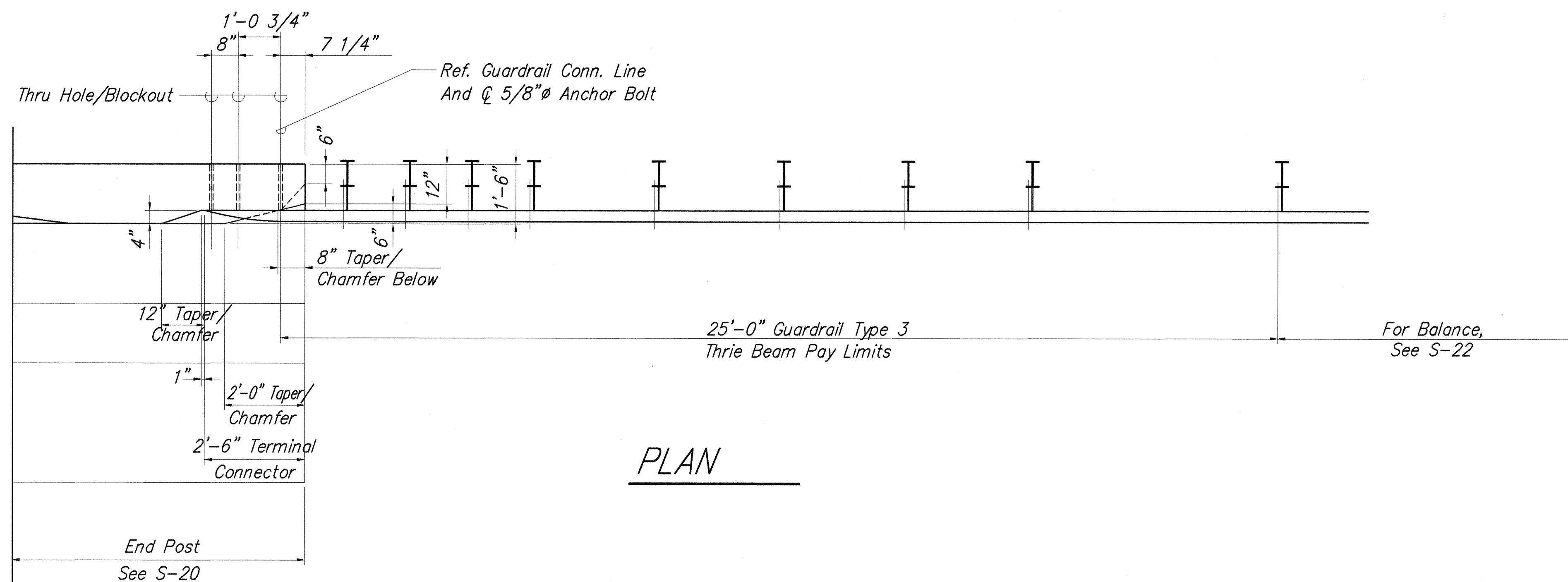
TERMINAL IMPACT ATTENUATOR DETAILS

**SAND ISLAND PARKWAY
 BASCULE BRIDGE DECK REPLACEMENT
 DISTRICT OF HONOLULU
 Federal Aid Project No. NH-064-1(8)**

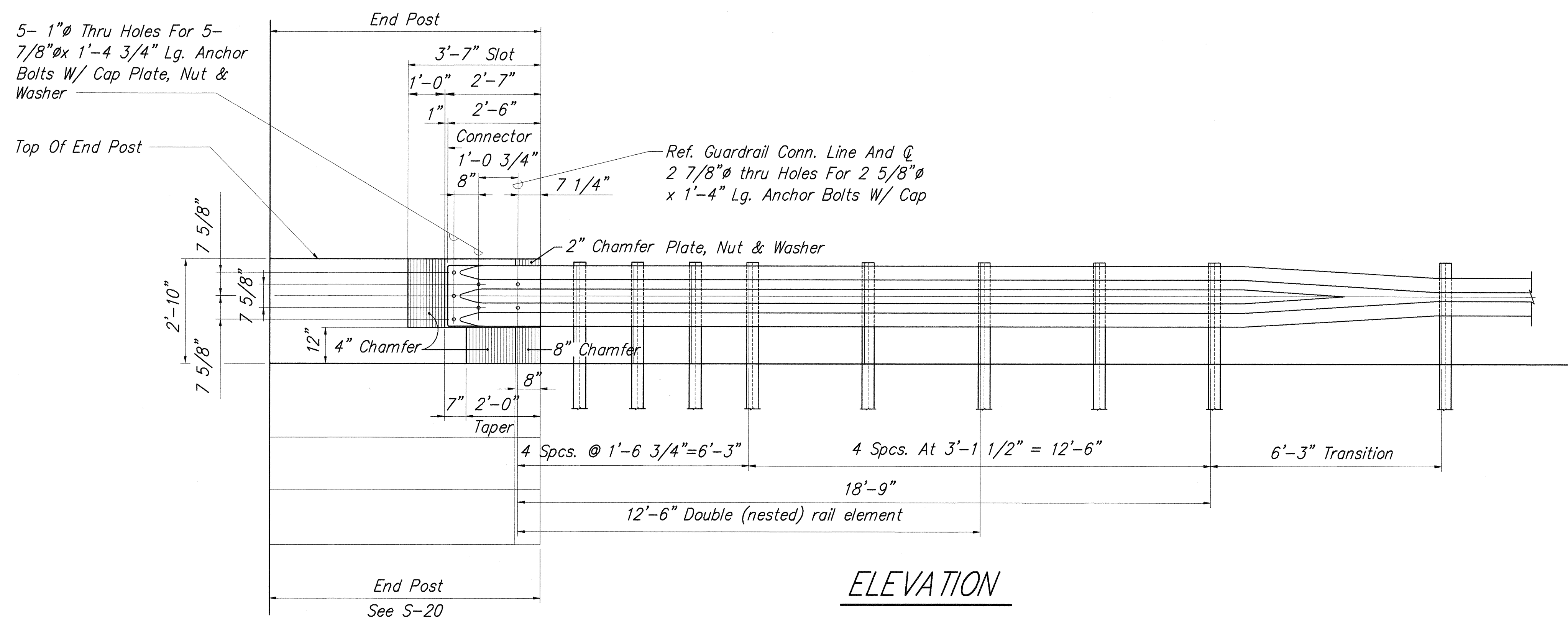
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 NOVEMBER 2002

SHEET No. 3-26 OF 37 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	35	45



PLAN

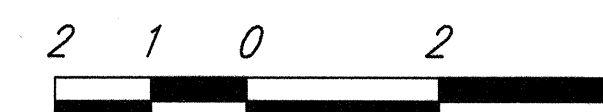


ELEVATION

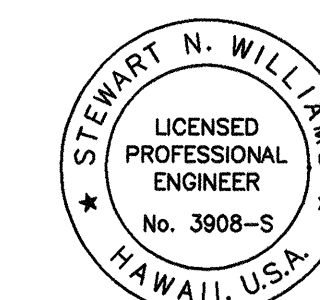
TYPICAL THRIE BEAM PLAN AND ELEVATION

Scale: 1/2" = 1'-0"

GRAPHIC SCALE:



SCALE: 1/2" = 1'-0"



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THRIE BEAM & APPURTENANCE DETAILS

**SAND ISLAND PARKWAY
 BASCULE BRIDGE DECK REPLACEMENT
 DISTRICT OF HONOLULU**

Federal Aid Project No. NH-064-1(8)

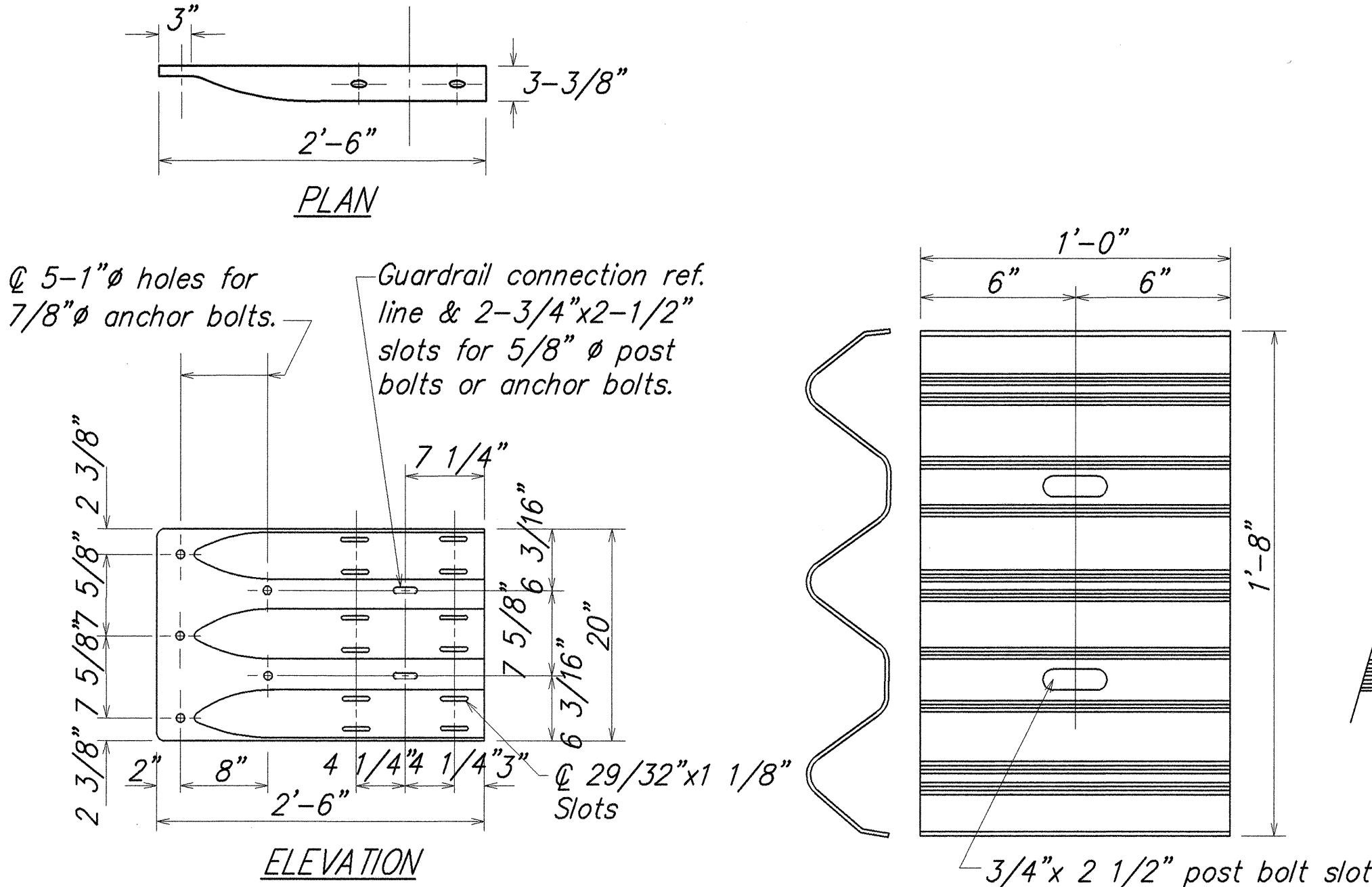
Scale: As Noted NOVEMBER 2002

SHEET No. **S-27** OF **37** SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-064-1(8)	2002	36	45

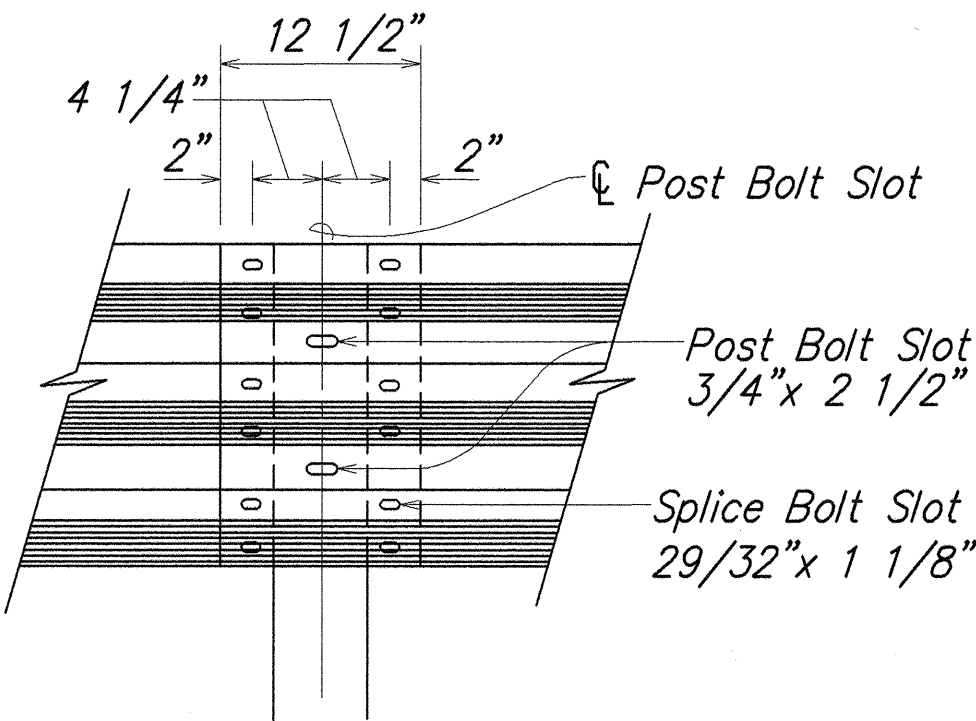
NOTES:

- A. The work necessary to double nest the guardrail and to connect guardrail to concrete end post shall include all labor, materials (including the double nest), tools, equipment and incidentals necessary to complete the work and will not be paid for separately.
- B. Lap terminal connector and rail element in direction of traffic to prevent snagging.
- C. All anchor bolts shall be high strength bolts conforming to the requirements of ASTM 325 and Standard Specification, Section 713.04.
- D. Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max.) is attained.
- E. "Terminal Connector", "Transition Section" and thrie beam shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M 180, Type II, Class B.
- F. "Terminal Connector" and standard spacer, including all anchor bolts, cap PL, nuts and washers, shall be hot-dip galvanized after fabrication.
- G. Cap PL shall be fabricated from ASTM A 36.
- H. First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.
- J. Double (nest 1st panel) thrie beam elements at all end post connections, except on highways with one-way traffic pattern, use single thrie beam elements at end post on trailing end only.
- K. Where double (nested) beam occur, 12" Back-up Plate" not required.
- L. Heads of through anchor bolts shall be placed on the traffic side of the rail.
- M. All steel shapes, rails and plates shall conform to ASTM A 36 Specifications.

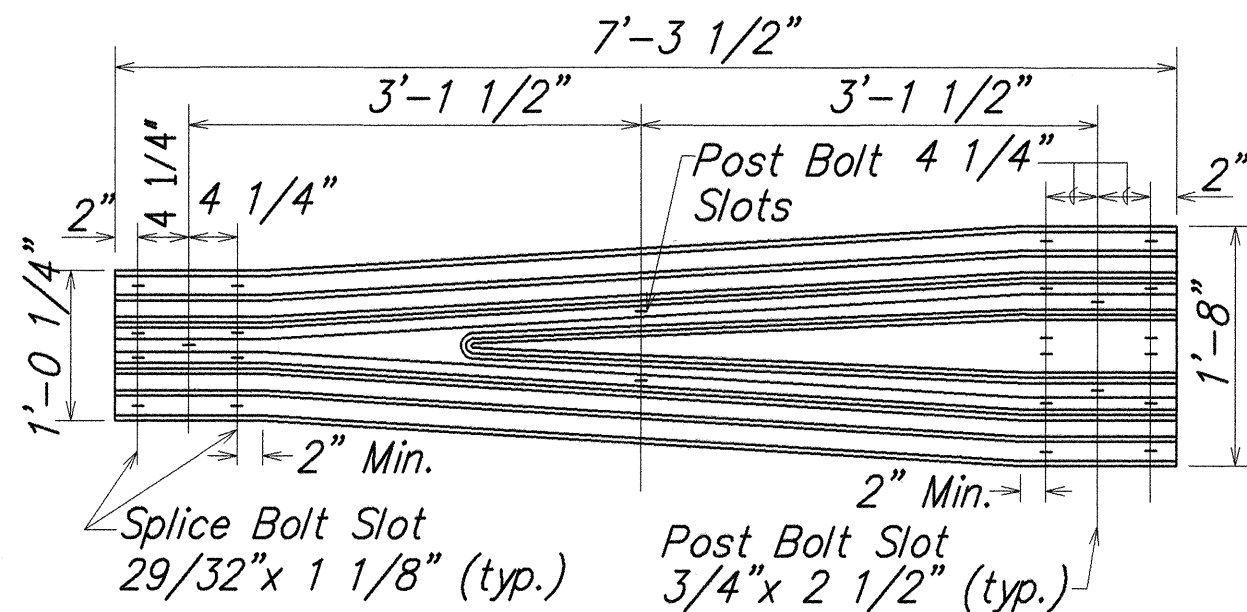


TERMINAL CONNECTOR
N.T.S.

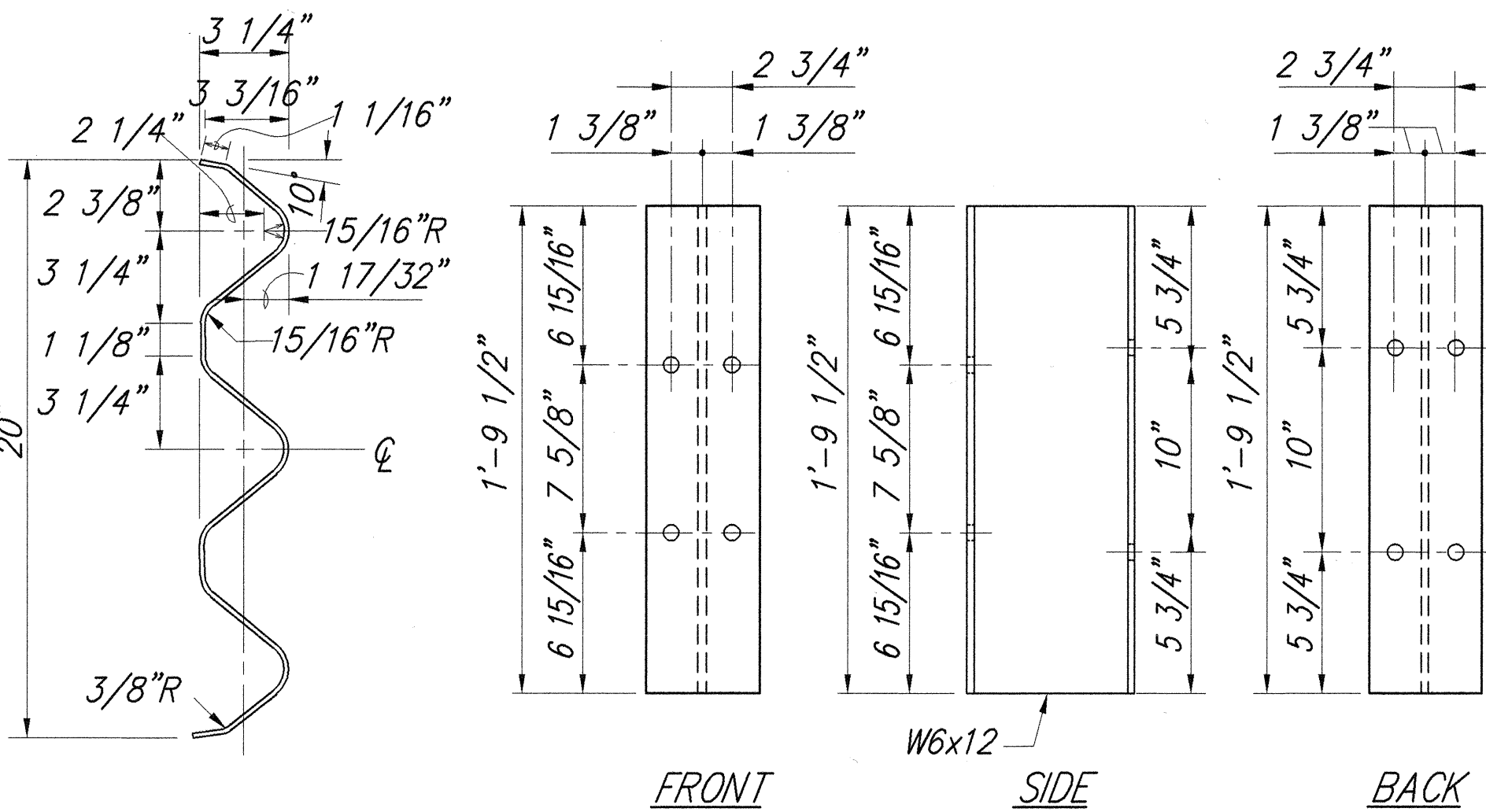
BACKUP PLATE
N.T.S.
(Use at posts where splices do not occur.)



RAIL SPLICE
N.T.S.

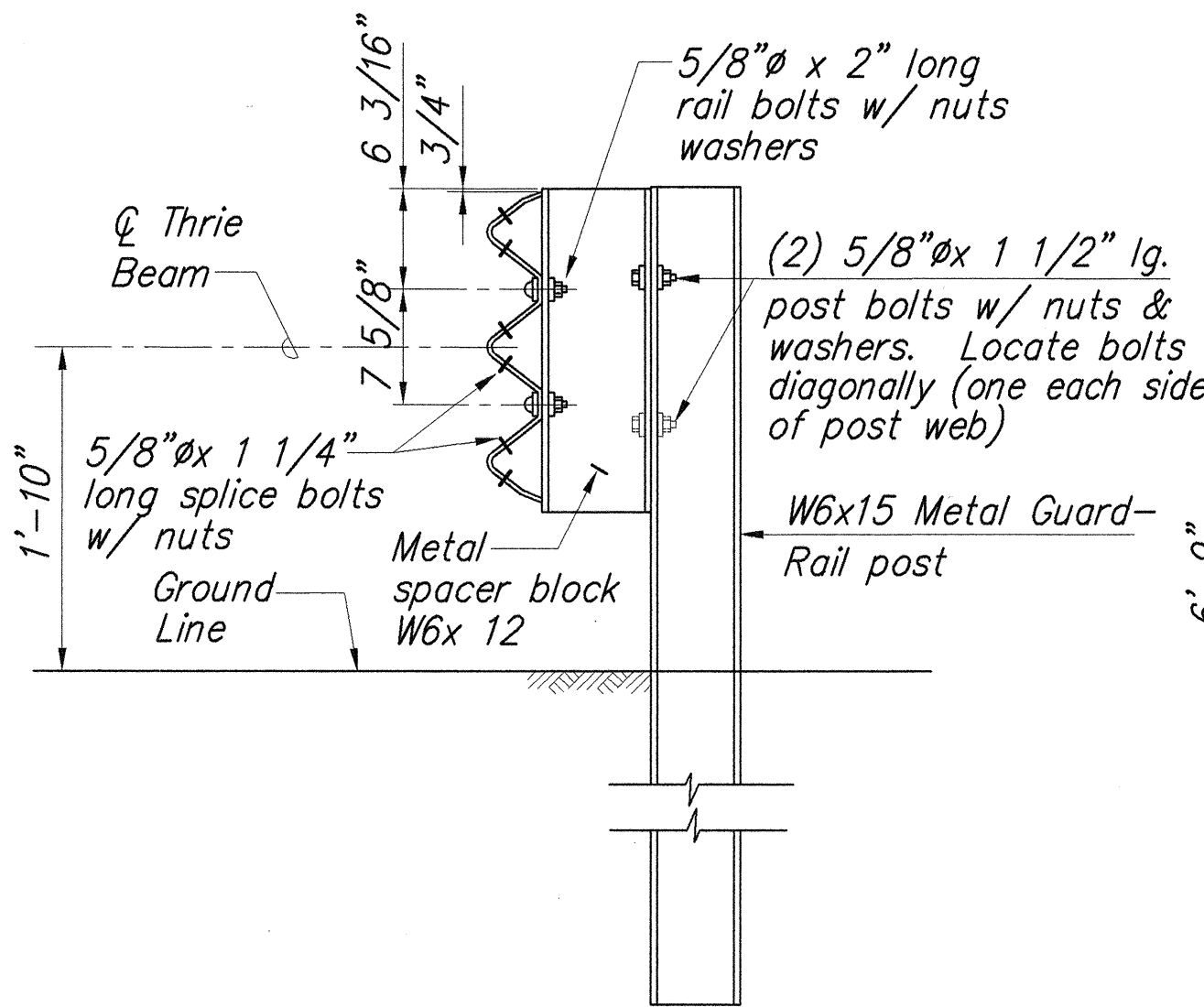


TRANSITION SECTION
N.T.S.

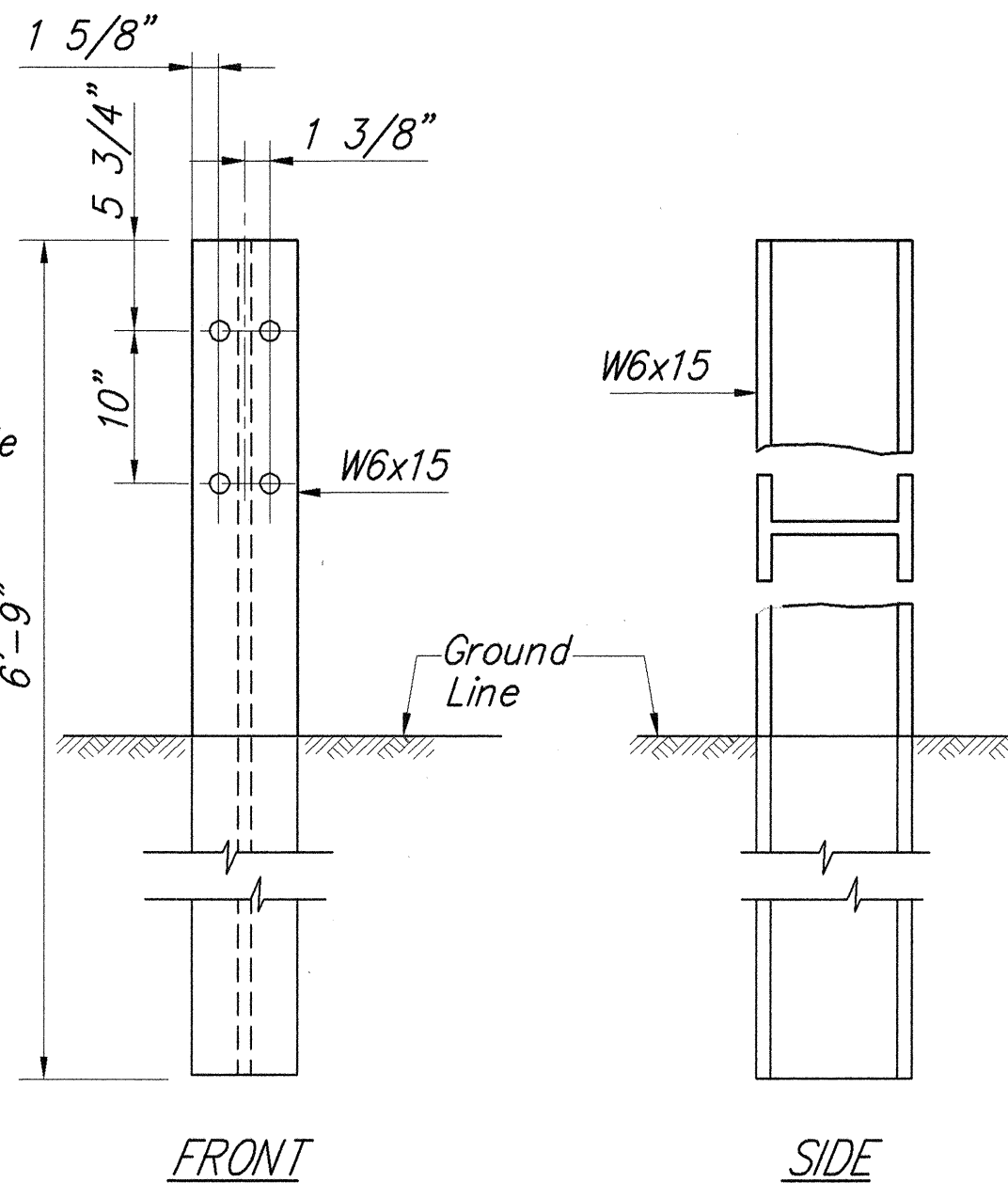


SECTION THRU
RAIL ELEMENT
N.T.S.

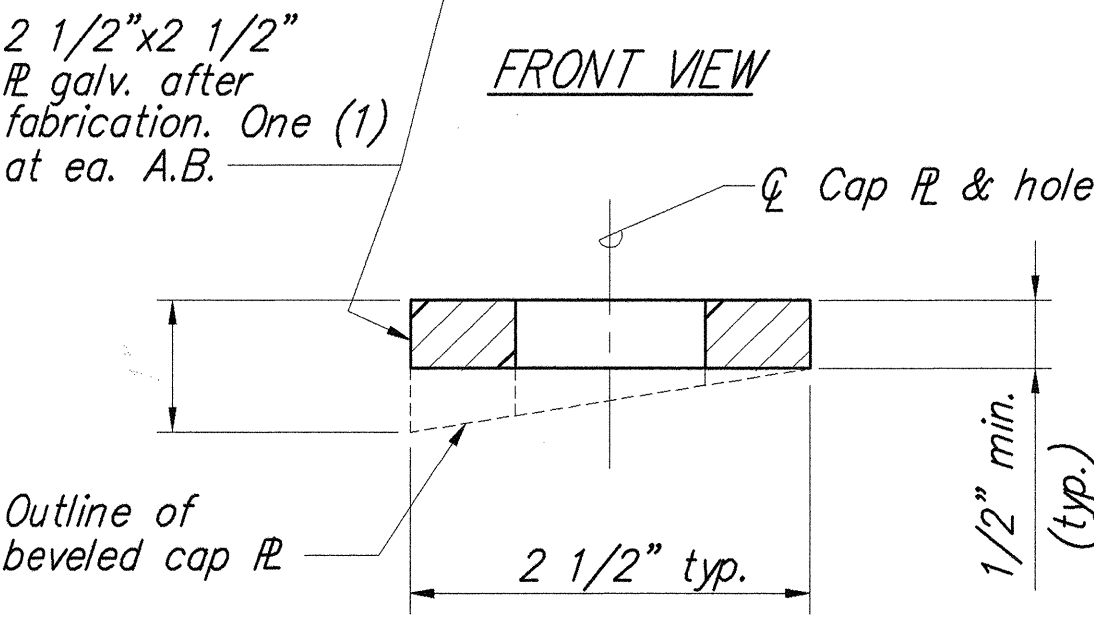
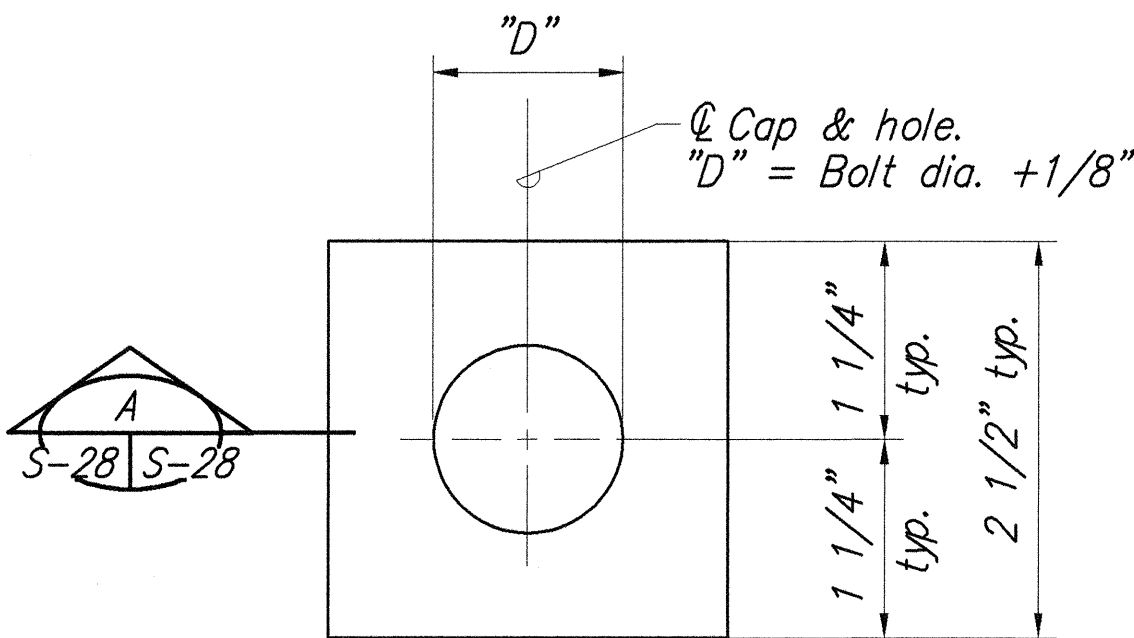
SPACER BLOCK
N.T.S.



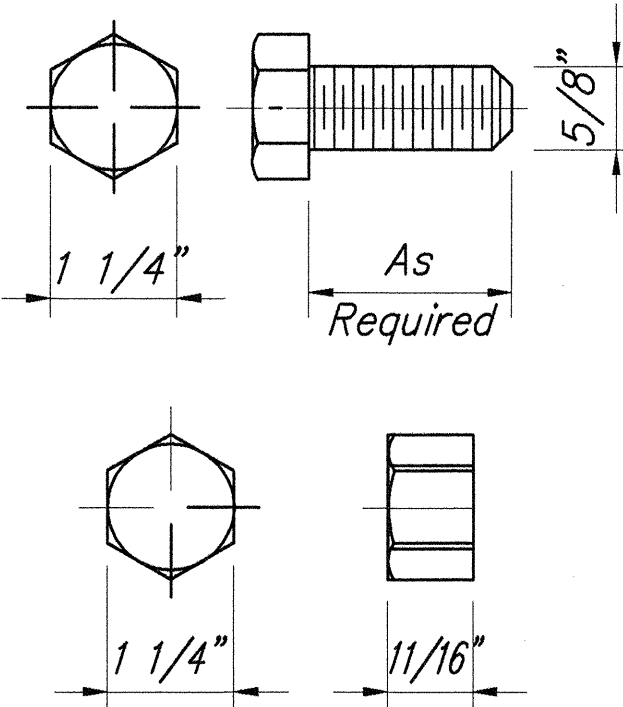
METAL GUARDRAIL ON METAL POST
WITH METAL SPACER BLOCK
N.T.S.



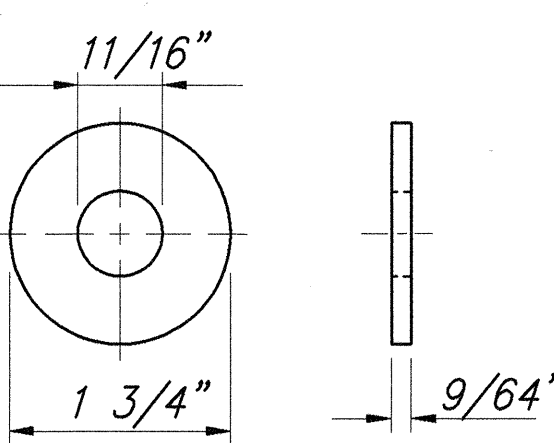
POST DETAILS
N.T.S.



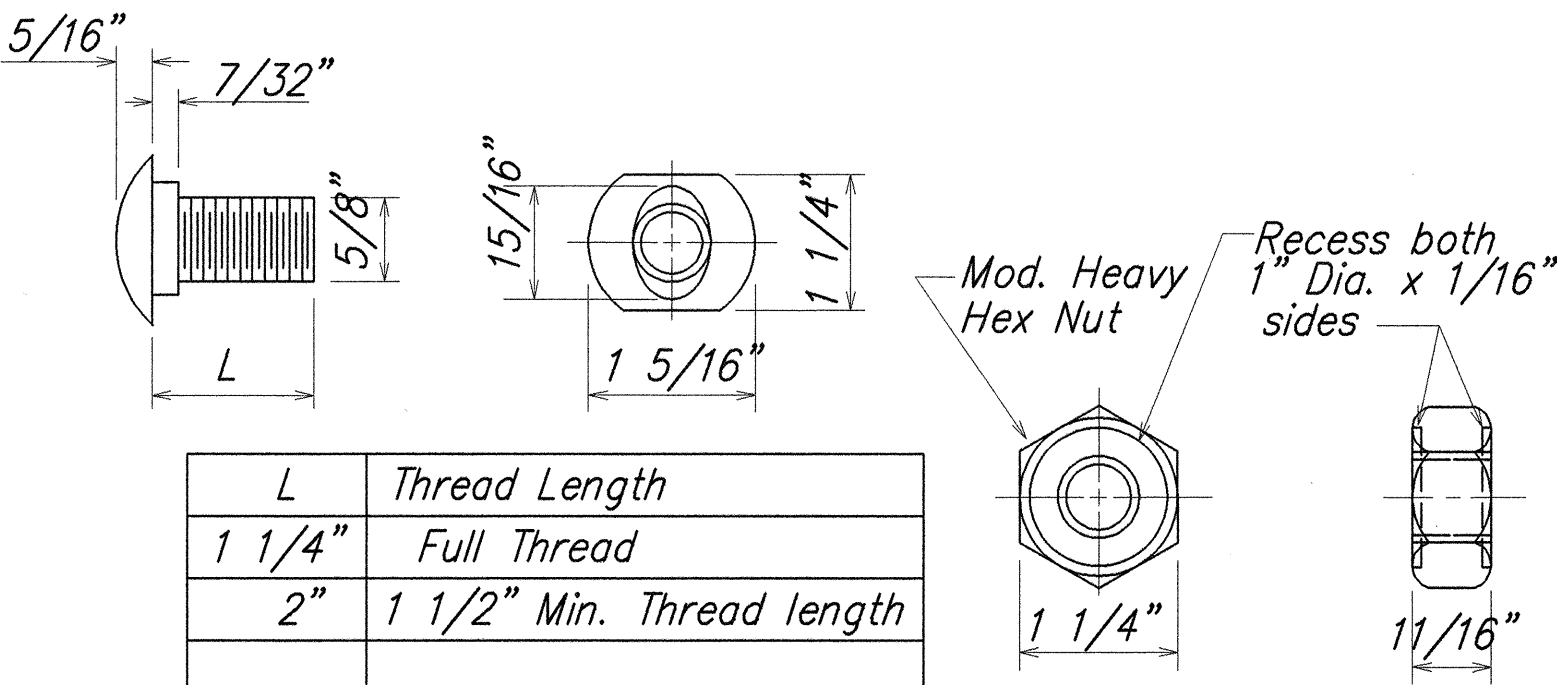
CAP (BEARING) PLATE DETAIL
N.T.S.



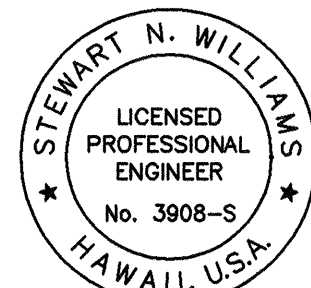
5/8" HEX BOLT & NUT
N.T.S.



STEEL WASHER
FOR 5/8" BOLT
N.T.S.



GUARDRAIL BOLTS AND RECESSED NUT
N.T.S.



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Mitsunaga & Associates, Inc.
12/12
Structural Review By

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

THRIE BEAM & APPURTENANCE DETAILS
SAND ISLAND PARKWAY
BASCULE BRIDGE DECK REPLACEMENT
DISTRICT OF HONOLULU
Federal Aid Project No. NH-064-1(8)
Scale: As Noted
NOVEMBER 2002

SHEET No. 8-28 OF 37 SHEETS

DATE	BY
11/02	DESIGNED BY S. WILLIAMS
11/02	QUANTITIES BY S. WILLIAMS
11/02	CHECKED BY K. KALANI