

DATE
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
ORIGINAL
PLAN
NOTE BOOK
Kkmhblqj.dgn
db21d1usr2/lea/ooahu/kkmh/

GENERAL NOTES

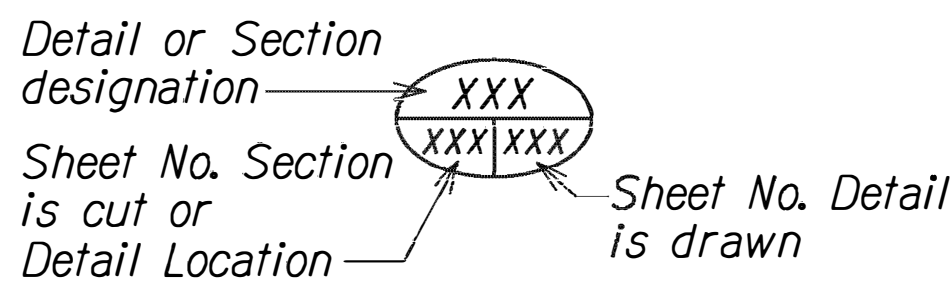
DESIGN SPECIFICATIONS:

- A. AASHTO LRFD Bridge Design Specifications, 7th Edition 2014 including all interim revisions.
- B. State of Hawaii, Department of Transportation, Highways Division, "Design Criteria for Bridges and Structures", August 8, 2014.

MATERIALS:

- A. Structural Concrete for curbs, end posts, and bridge railings shall be a minimum f'c=4,000 psi in 28 days.
- B. Reinforcing Steel: deformed reinforcing bars for concrete reinforcement shall meet the requirements of AASHTO M31M/M31-07 Grade 60 (ASTM A615, Grade 60).
- C. Structural Steel: W-beam structural steel shapes shall conform to ASTM A992. Structural steel plates and bars shall conform to ASTM A36. All structural steel shall be hot-dip galvanized in accordance with ASTM A123.
- D. Guardrail bolts and recessed nuts shall conform to FBB-01-5 from "A Guide to Standardized Highway Barrier Hardware" AASHTO-AGC-ARTBD Joint Committee Task Force 13 Report.
- E. Carriage bolts and nuts shall conform to FBC10-20 from "A Guide to Standardized Highway Barrier Hardware" AASHTO-AGC-ARTBD Joint Committee Task Force 13 Report.
- F. High strength bolts (heavy hex structural bolts) shall conform to ASTM A325, Type 3 unless otherwise specified and hot-dip galvanized in accordance with ASTM A153, Class C.
- G. Bolts (hex and heavy hex bolts) shall conform to ASTM A307 unless otherwise specified and hot-dip galvanized in accordance with ASTM A153, Class C.
- H. Anchor rods shall conform to ASTM F1554, Grade 105, Class 2A and hot-dip galvanized in accordance with ASTM A153, Class C.
- I. Nuts for ASTM A325 bolts and ASTM F1554 anchor rods shall conform to AASHTO M291 (ASTM A5633), Grade DH and hot-dip galvanized in accordance with ASTM A153, Class C.
- J. Nuts for ASTM A307 (hex and heavy hex) bolts shall conform to AASHTO M291 (ASTM A563), Hex Grade A and Heavy Hex Grade A and hot dip galvanized in accordance with ASTM A153, Class C.

SYMBOLS AND ABBREVIATIONS



(X) - Bearing Abutment Seat Line

⊗ - Boring No. & Designation

Abut. Abutment

AC Asphaltic Concrete

Adj. Adjacent

Alt. Alternate

Approx. Approximate

Az. Azimuth

⊕ Baseline

Bal. Balance

Bef., Btwn. Between

B.F. Both Faces

B.F.E. Bottom Footing Elevation

Bk. Back

Blt. Bolt

Bm. Beam

B, Bot., Bott. Bottom

Br. Bridge

Brg., Brgs. Bearing, Bearings

B.V.C. Beginning of Vertical Curve

⊕ Center Line

Cant. Cantilever

C.F. Cubic Feet

ciP Cast in Place

C.I.P. Cast Iron Pipe

C.I.P. Cast Iron Pipe

C.J. Construction Joint

Cl., Clr. Clear

Col. Column

Conc. Concrete

Conn. Connection

Const. Construction

Cont. Continuous

CRM Cement Rubble Masonry

C.Y., Cu. Yd. Cubic Yards

Det. Detail

Dia., ø Diameter

Dim. Dimension

Dwg., Dwgs. Drawing, Drawings

EA, Ea, ea. Each

E.F. Each Face

Elec. Electrical

El., Elev. Elevation

Emb. Embankment

E.P. Edge of Pavement

Eq. Equal

Est. Estimated

E.W. Each Way

Exc. Excavation

Exist. Existing

Exp., (E) Expansion

Ext. Exterior

(F) Fixed

F'c Specified Strength of Concrete

F'ci Strength of Concrete at Time of Initial Prestress

- K. Washers for bolts shall conform to ASTM F436, Type 1 and hot dip galvanized in accordance with ASTM A153, Class C.
- L. Couplers shall satisfy the requirements of Hawaii Standards Specifications For Road And Bridge Construction, 2005 Edition, Section 602.03(E)(X)(b)(3)
- M. Epoxy shall be "Glass Vial" or "Double Cartridge" type. Epoxies that require manual measuring or mixing will not be allowed. Epoxy shall meet the requirements of ASTM C881, Type IV, Grade 3, Class C.
- N. All welding shall be in accordance with the current edition of Bridge Welding Code ANSI/AASHTO/AWS D1.5.
- O. Polyethylene plastic sheeting under concrete slab shall be a minimum of 6 mil thick. Cost for polyethylene plastic sheeting shall be incidental to Very Early Strength Latex Modified Concrete (VESLMC).
- P. Stainless steel reinforcing bars shall be AISI 316L Grade and conform to ASTM A955, Grade 60.
- Q. All stainless steel pipes, plates, threaded rods and nuts for metal railing shall be Type 316L. All Stainless Steel welding shall be in accordance with the current edition of Structural Welding Code - Stainless Steel AWS D1.6.

REFERENCE:

- A. Refer to Standard Plans for additional details and notes not covered by details and typical drawings.

GENERAL:

- A. The Contractor shall conduct his work in such a manner and provide such temporary shoring or other measures as may be necessary to insure the safety of all concerned and to protect existing structures.
- B. In the event of over-excavation, the space between the footing or footing key and ground shall be filled with a minimum of Class D concrete at the Contractor's expense at no cost to the State.
- C. Unless noted otherwise, chamfer all exposed concrete edges three-quarters (¾) of an inch.
- D. The Contractor shall verify all dimensions & grades in the field before commencing with work.
- E. The Contractor shall verify the location of all existing utility lines near the work and notify their respective owners before commencing with work.
- F. All items noted incidental will not be paid for separately.

F.F. Front Face

Fig. Figure

Fin. Finish

Fin. Gr. Finish Grade

Ftg. Footing

Ga. Gage, Gauge

Galv. Galvanized

Gir., G Girder

G.R.P. Grouted Rubble Paving

Gr. Grade

Grd. Ground

(H) Hinge

Horiz. Horizontal

HS High Strength

Ht. Height

Hwy. Highway

I.B. Inbound

I.F. Inside Face

In. Inch

Int. Interior

Inv. Invert

Jt. Joint

L Length

LBS., lb., lbs. Pound, Pounds

L.F., Lin. Ft. Linear Feet

Lg. Long

Longit. Longitudinal

L.S. Lump Sum

Lt. Left

Ltg. Std. Lighting Standard

Max. Mech. Minimum

Misc. Miscellaneous

N North

N.B. Northbound

N.F. Near Face

No., # Number

N.T.S. Not To Scale

O.B. Outbound

o.c. On Center

O.G. Outside Girder

Opn'g Opening

o/s, O/S Offset

P.B. Pull Box

P.C. Point of Curvature

P.C.C. Portland Cement Concrete

Perf. Perforated

PG-() Prestressed Girder-(Type)

PL Plate

P/S Prestressed Strands

Pvmt. Pavement

R Radius

Rdwy Roadway

Ref. Reference

Reinf. Reinforcement

Ret. Retaining

Req'd Required

R.F. Rear Face

Rt. Right

R/W Right Of Way

CONSTRUCTION REQUIREMENTS:

- A. Refer to Hawaii Standard Specifications for Road and Bridge Construction, 2005 edition and Special Provisions.
- B. Except as noted otherwise, all vertical dimensions are measured plumb.
- C. For steel reinforcing , stagger all splices where possible.
- D. Steel reinforcing shall be supported, bent and placed as per LFRD Bridge Design Specifications.
- E. For cast-in-place concrete, minimum reinforcement cover: Concrete cast against earth: 3" Curbs and Railings: 2" Slab top: 2"
- F. At time concrete is placed, reinforcing shall be free from mud, oil laitance or other coatings adversely affecting bond capacity.
- G. Reinforcement, dowels & other embedded items shall be positively secured before pouring.
- H. Minimum clear spacing between parallel bars shall be one and one-half (1½) times the diameter of the bars (for non-bundled bars), but in no case shall the clear distance between the bars be less than one and one-half (1½) times the maximum size of the coarse aggregate.
- I. All dimensions relating to reinforcing bars (e.g. spacing of bars, etc.) are to centers of bars unless noted otherwise.
- J. All footings and concrete slabs shall bear on firm undisturbed natural soils or properly compacted structural fill.

INDEX TO DRAWINGS

SHEET NO.	DESCRIPTION
Q1	General Notes, Symbols And Abbreviations
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Q3	Metal Railling For Box Culvert At Sta. 220+12.72
Q4	Box Culvert At Sta. 337+98.50
Q5	Box Culvert At Sta. 337+98.50
Q6	Type "D2" Endpost Details
Q7	Box Culvert At Sta. 341+47
Q8	Box Culverts At Sta. 337+98.50 And Sta. 341+47
Q9	Modified Delaware Retrofit, Base Plate And Thrie Beam Post Details
Q10	Modified Delaware Retrofit, Metal Guardrail Type 3 Thrie Beam

S South

S.B. Southbound

Sect. Section

SF Square Feet

Shldr. Shoulder

Sht. Sheet

Spc. Space

Spcd. Spaced

Spcg. Spacing

Spec. Specification

Sprd. Spread

Sta. Station

Std. Standard

Stirr. Stirrup

Str. Straight

Struct. Structural

Symm. Symmetrical

T Top

Temp. Temporary

Thk. Thick, Thickness

T.O.D. Top Of Deck

Tot. Total

Transv. Transverse

Typ. Typical

Var. Varies

V.C. Vertical Curve

Vert. Vertical

W West

w/ With

W.W. Wingwall

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GENERAL NOTES, SYMBOLS and ABBREVIATIONS

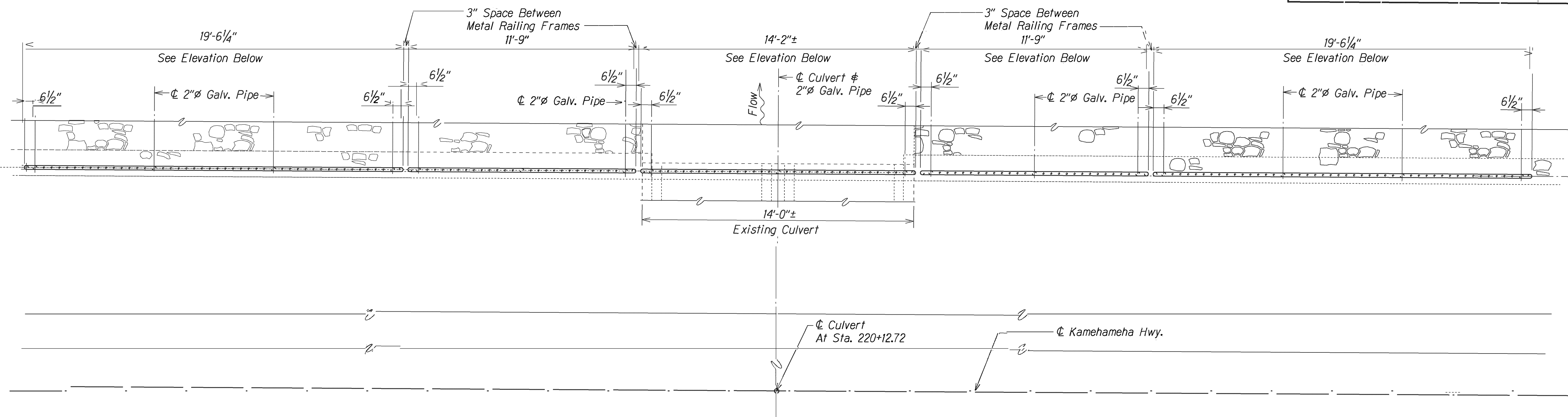
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-K77

Scale: As Noted

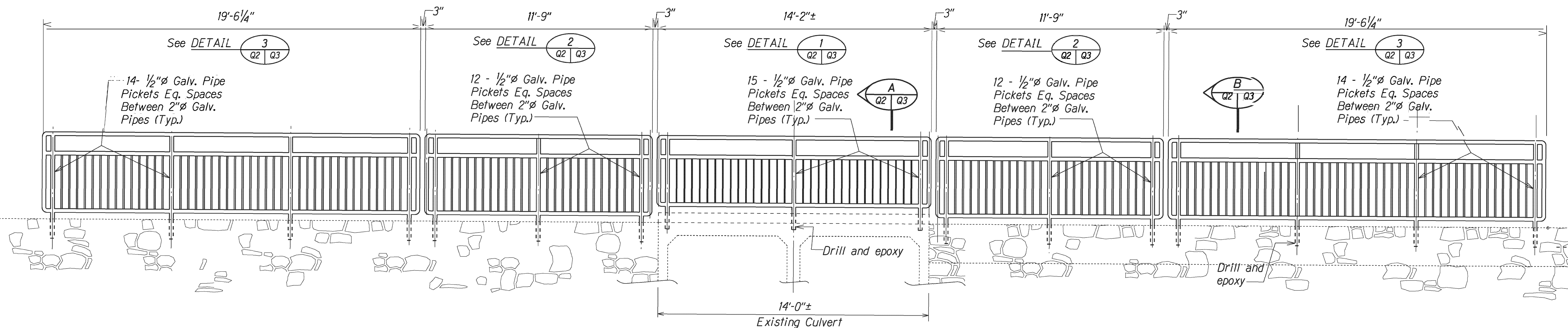
Date: June 2020

SHEET No. Q1 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	53	87



LAYOUT PLAN - MAKAI SIDE



ELEVATION - MAKAI SIDE

METAL RAILING FOR BOX CULVERT AT STA. 220+00

Scale: 3/8" = 1'-0"

NOTE:

- The Contractor shall verify all dimensions and locations of utility line near the structure before commencing with the work.
- Existing metal railing to be removed.
- The spacings between 1/2" galv. metal pipes shall not be more than 4".

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
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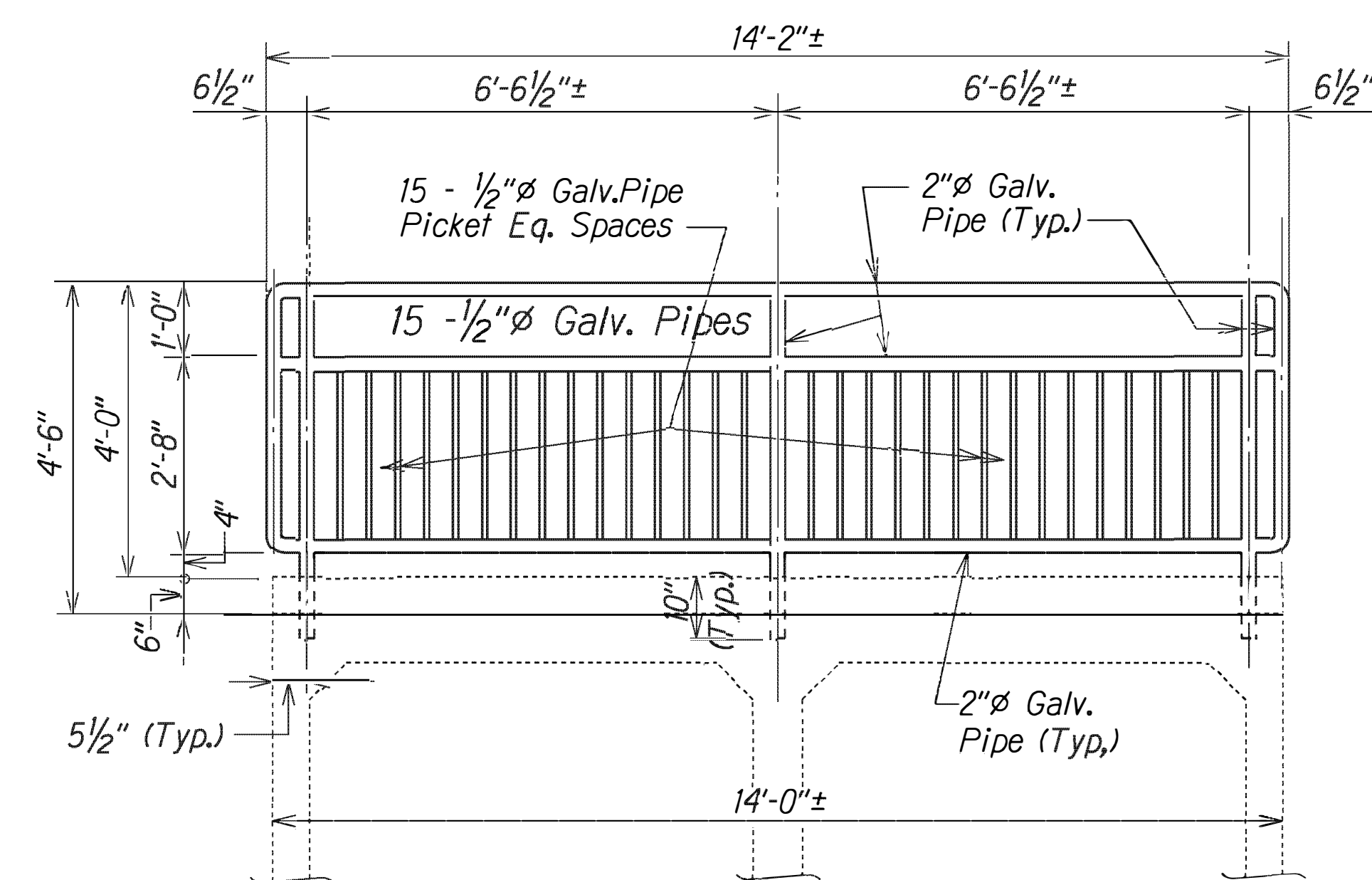
METAL RAILING FOR BOX CULVERT
AT STA. 220+12.72

PLAN AND ELEVATION - MAKAI SIDE
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

Scale: As Noted Date: June 2020

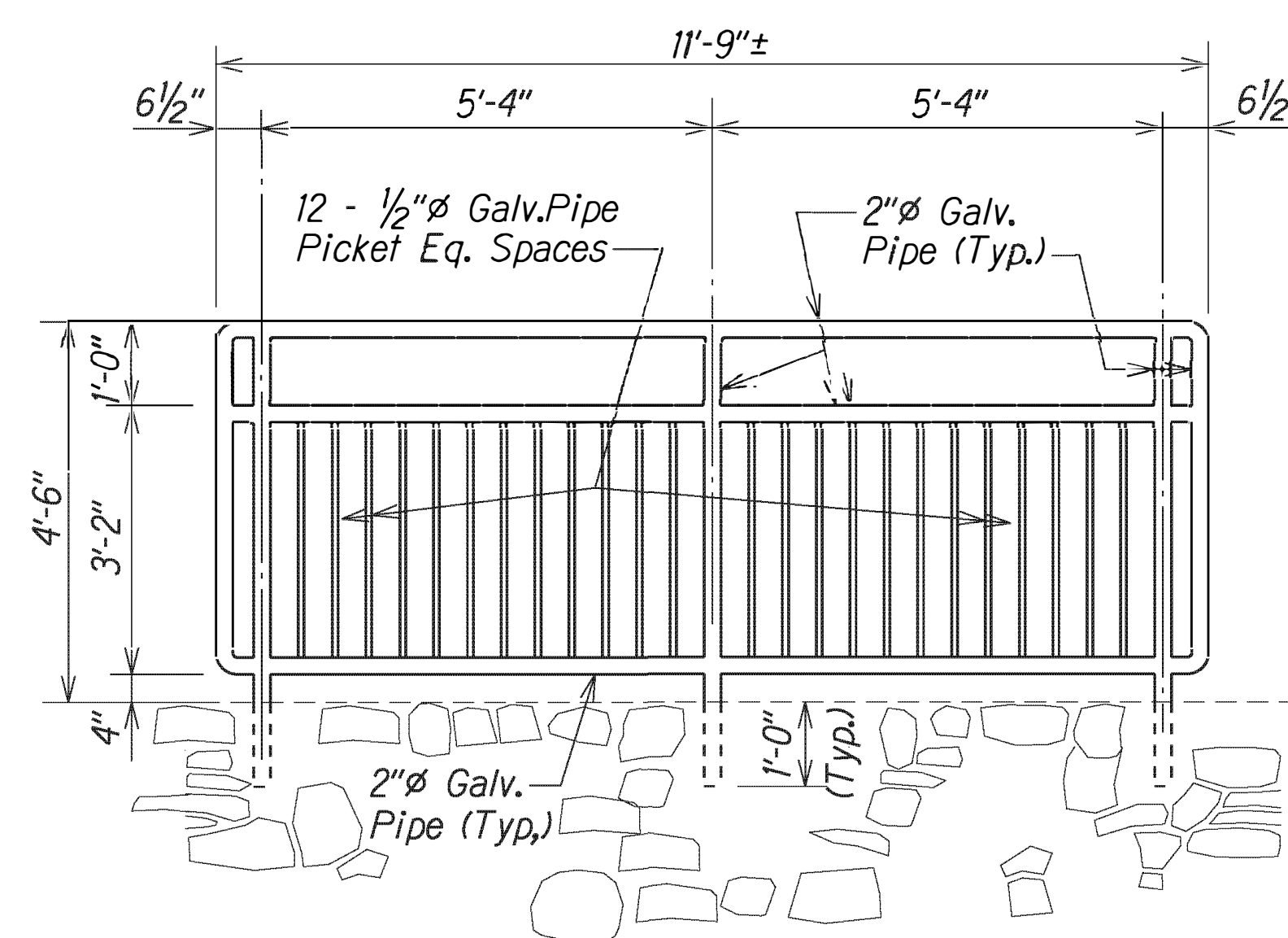
SHEET No. Q2 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	54	87

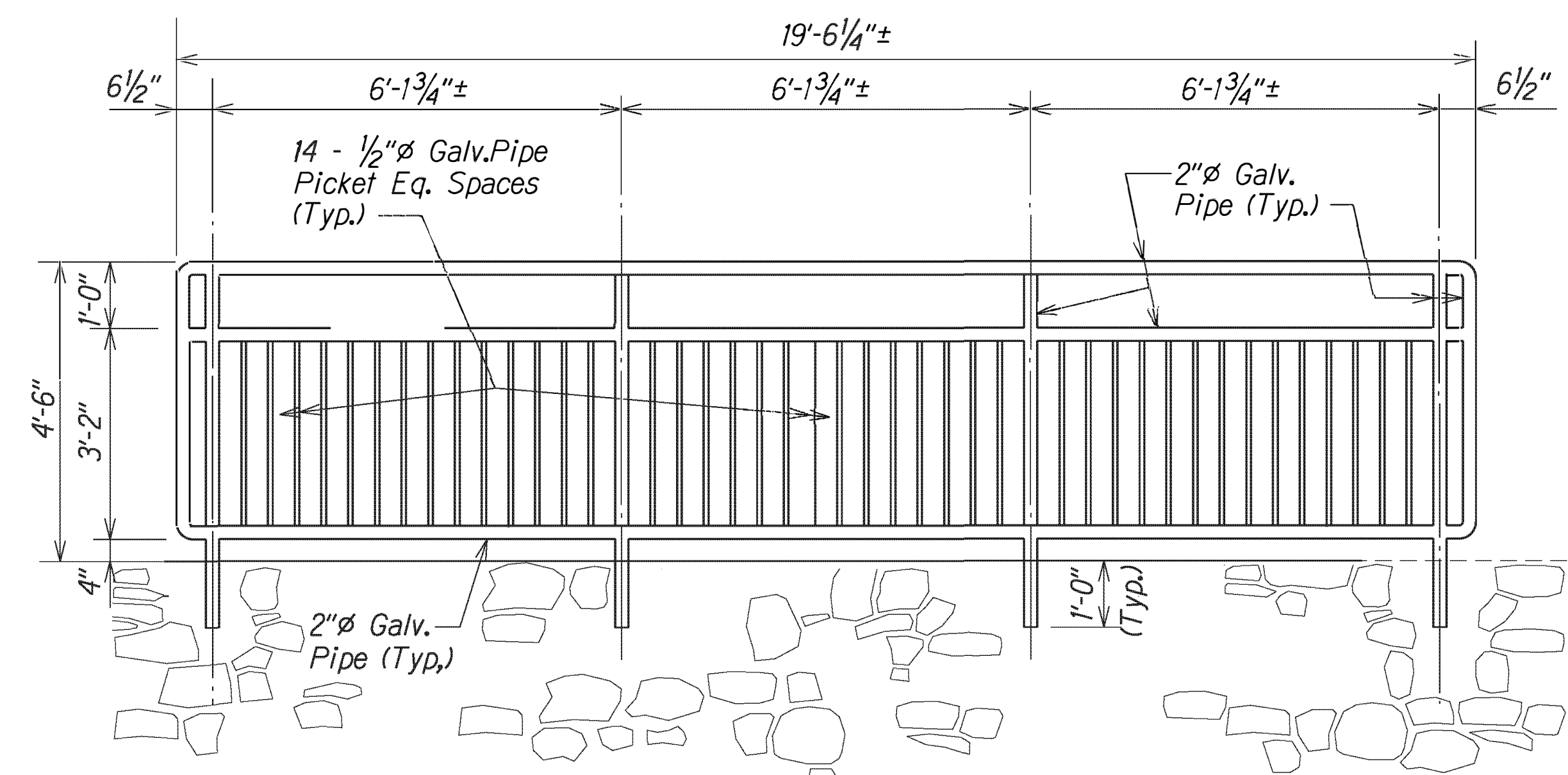


DETAIL 

$\frac{1}{2}'' = 1'-0''$



DETAIL 

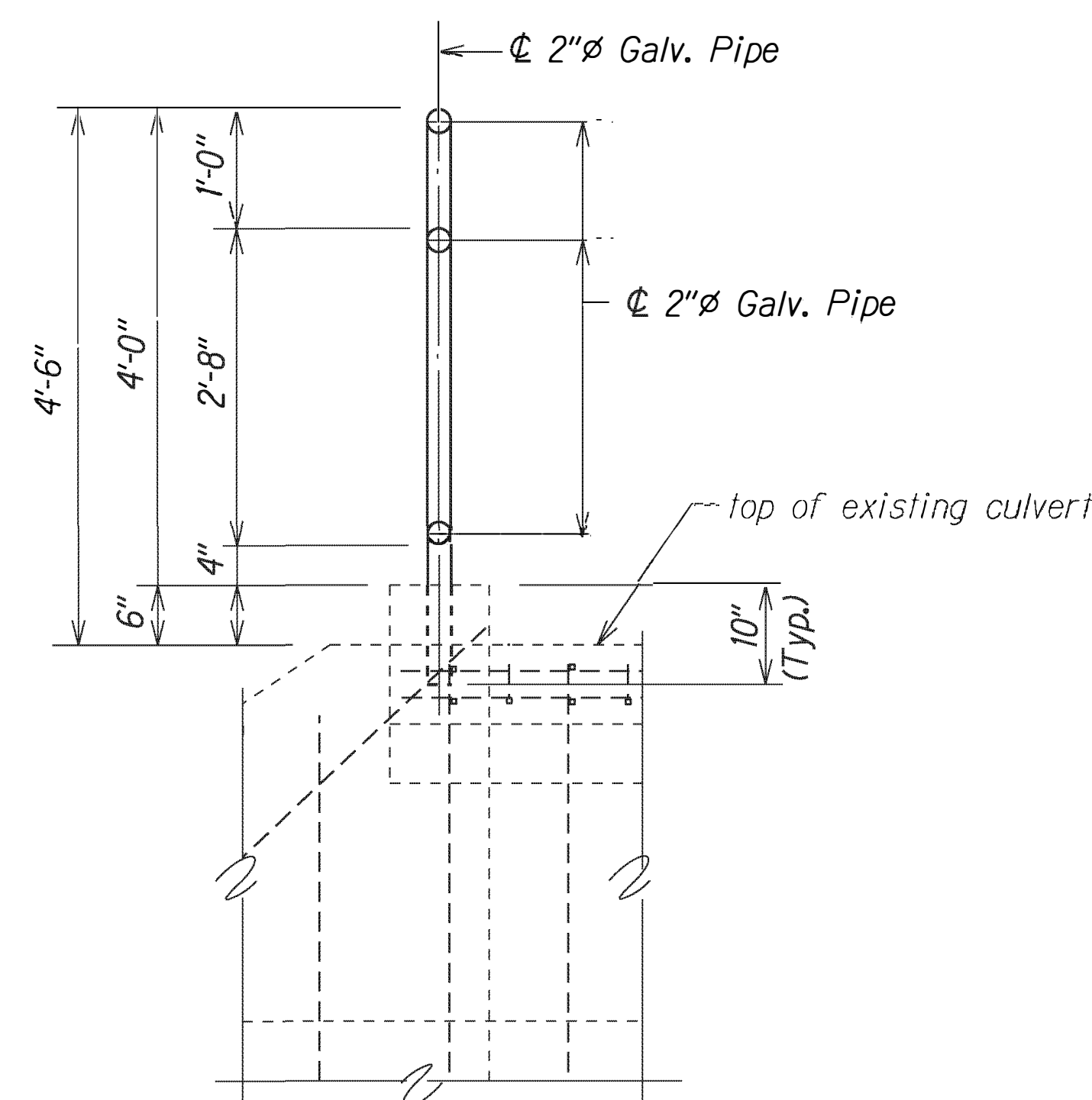


DETAIL  $\frac{1}{2}'' = 1'-0''$

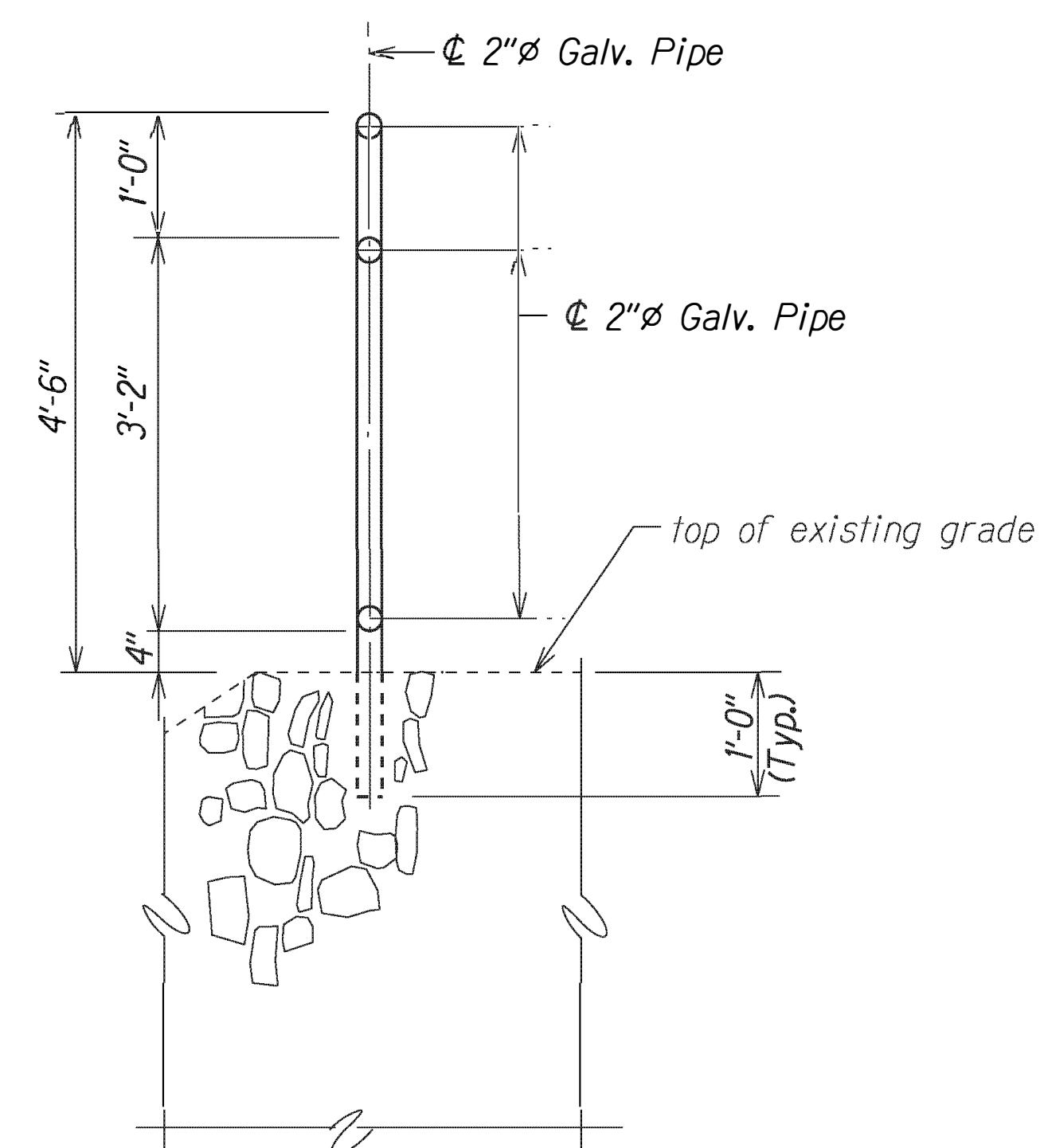
METAL RAILING DETAILS

NOTE:

1. *Pipe rails and pickets shall be in accordance with ASTM A53 Grade B for Standard Weight Pipe (Schedule 40).*
2. *Railing shall be Hot-dipped Galvanized after fabrication.*
3. *Full weld and grind all exposed welds smooth. All pipe diameters are nominal pipe sizes (I.D.)*
4. *Repair damaged zinc-coated surfaces in accordance with Hawaii Standard Specifications Subsection 501.03(GX2) - Repairing Damaged Zinc - Coated Surfaces.*



SECTION A
Q2 | Q3



SECTION

B

Q2 | Q3

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	XXX 1997
kkmbbq3.dgn	TRACED BY	
Nc	DESIGNED BY	XXX 1997
	QUANTITIES BY	XXX 1997
	CHECKED BY	XXX 1997

ANB. _____

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

METAL RAILING FOR BOX CULVERT

AT STA. 220+12.72

SECTIONS AND DETAILS

KAMEHAMEHA HIGHWAY REHABILITATION

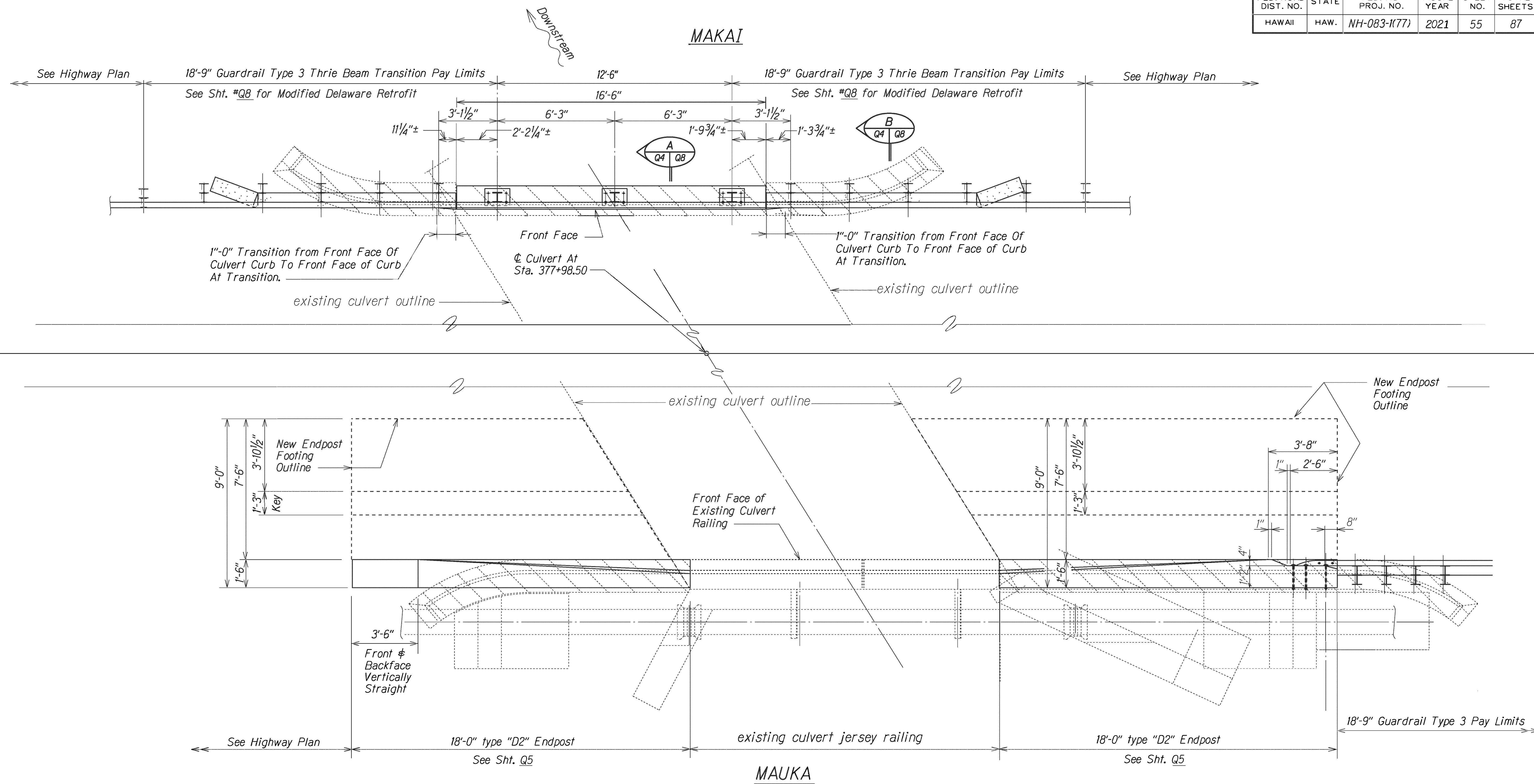
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

Scale: As Noted

Date: June 2020

SHEET No. 03 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-K77	2021	55	87



- NOTE:
1. The Contractor shall verify all dimensions and 12'-6" locations of utility line near the structure before commencing with the work.
 2. Hatched area shown thus \\\ denotes removal of the existing structure.
 3. See Sht. Q6 for Sections of Type "D2" Endpost and Curb detail.

LAYOUT PLAN - CULVERT AT STA. 337+98.50
 Scale: 3/8" = 1'-0"

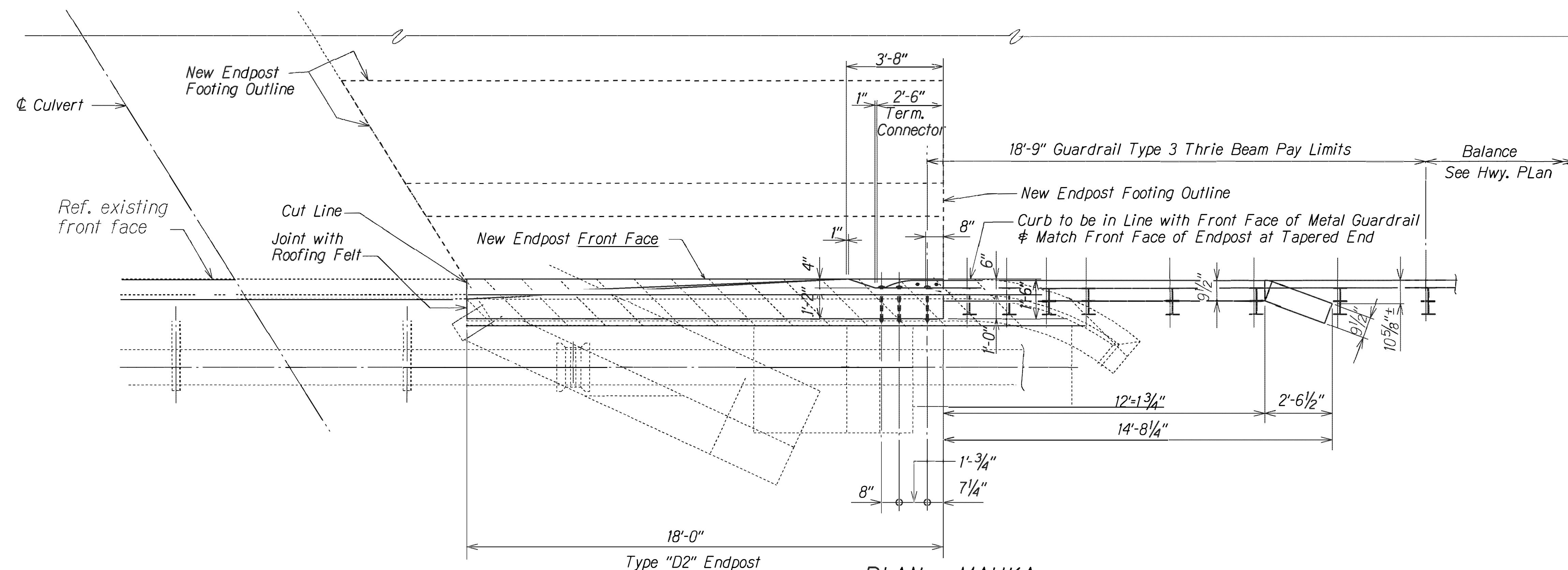
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERT AT STA. 337+98.50
LAYOUT PLAN
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-K77

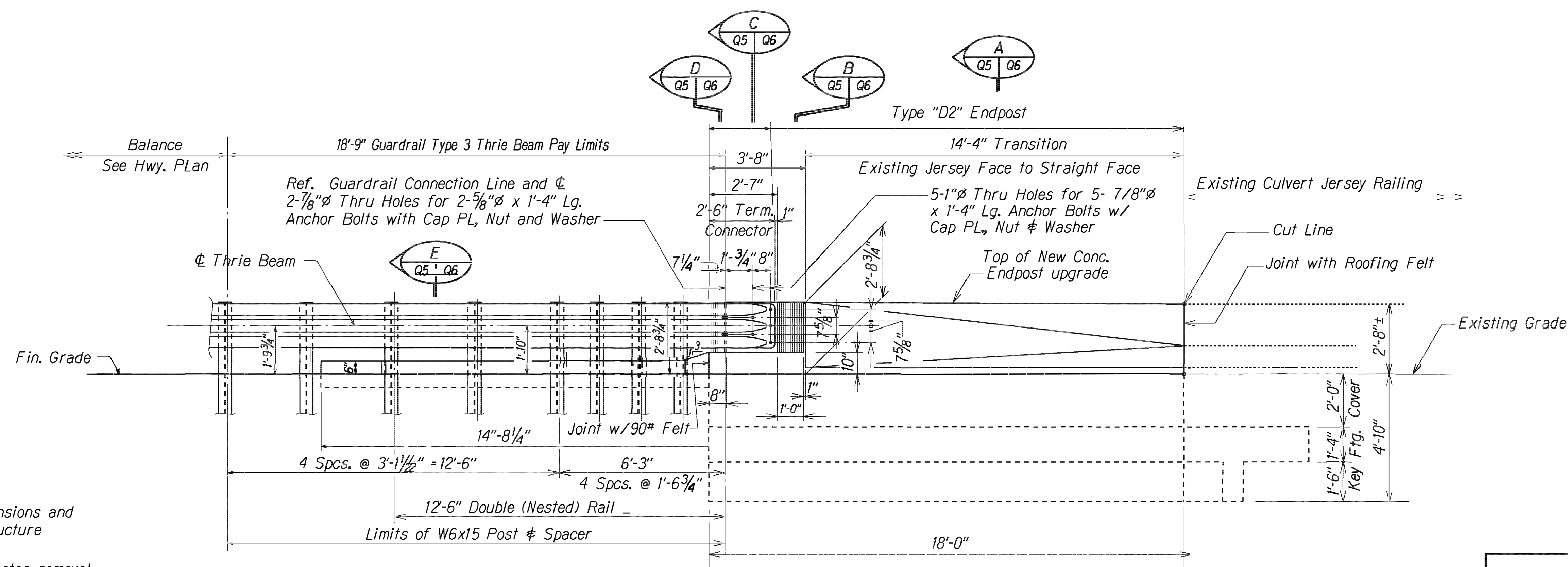
Scale: As Noted
Date: June 2020

SHEET No. Q4 OF 10 SHEETS

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HAWAII	HAW.	NH-083-1(77)	2021	56	87



PLAN - MAUKA

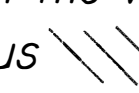


FRONT FACE ELEVATION - MAUKA

TYPE "D2" ENDPOST UPGRADE AT STA. 337+98.50

Scale: 3/8" = 1'-0"

NOTE:

1. The Contractor shall verify all dimensions and locations of utility line near the structure before commencing with the work.
2. Hatched area show thus  denotes removal of the existing structure.
3. The right mauka Type "D2" Endpost (facing the front face of the railing) is not drawn. It is similar to the opposite hand which is drawn on this sheet, except the extreme side from the culvert (3'-6") will be straight vertically. No Terminal Connector will be necessary on that side. See Sht. Q4.

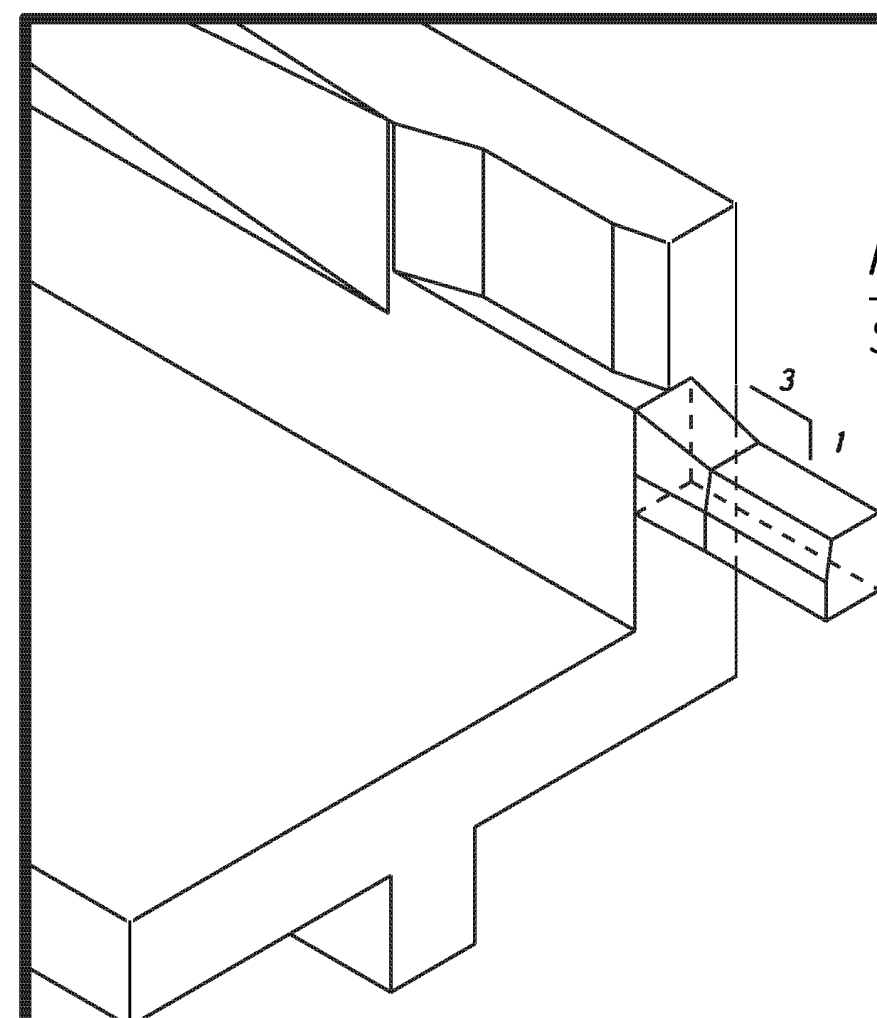
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERT AT STA. 337+98.50
TYPE "D2" ENDPOST UPGRADE
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

Scale: As Noted Date: June 2020

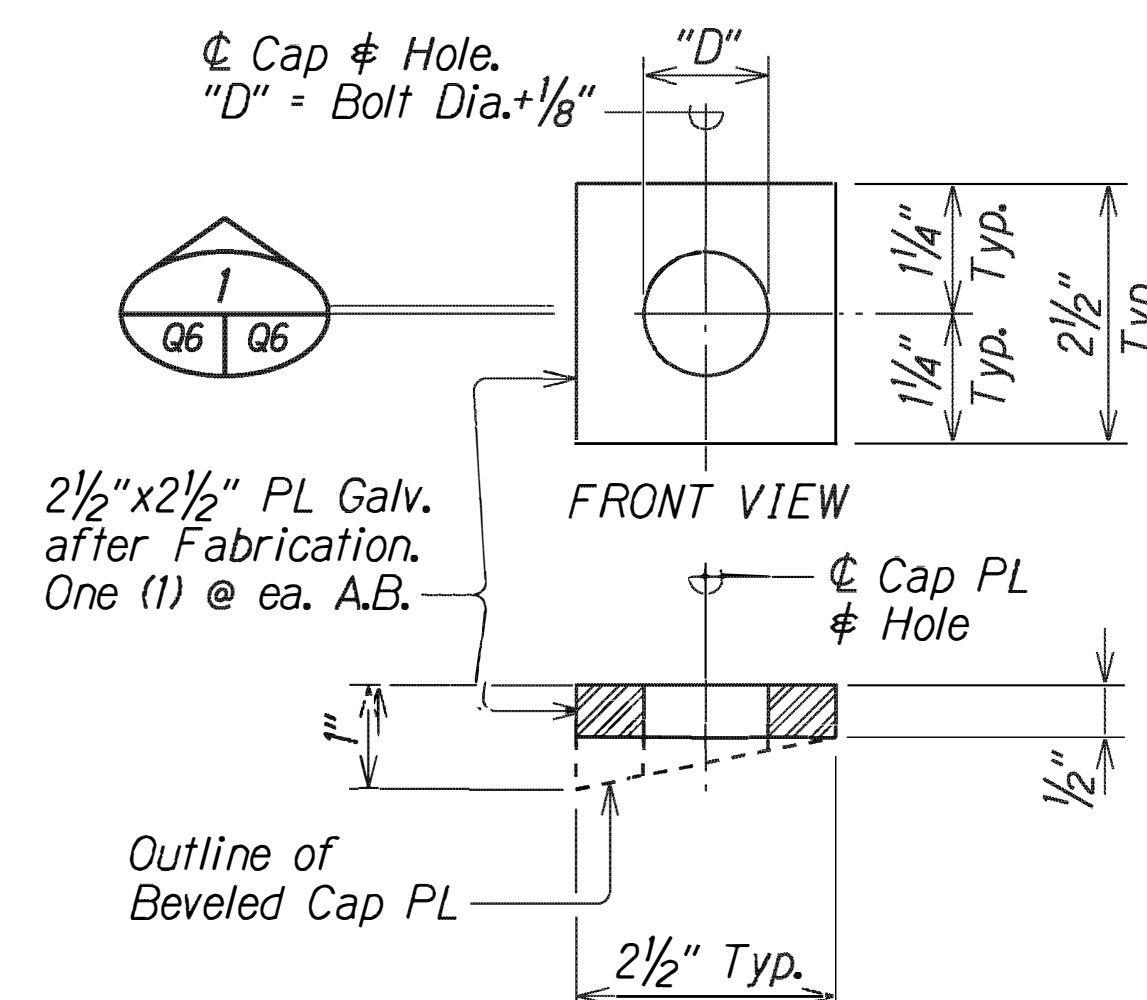
SHEET No. Q5 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	57	87



PARTIAL ISOMETRIC VIEW

Scale: Not to Scale

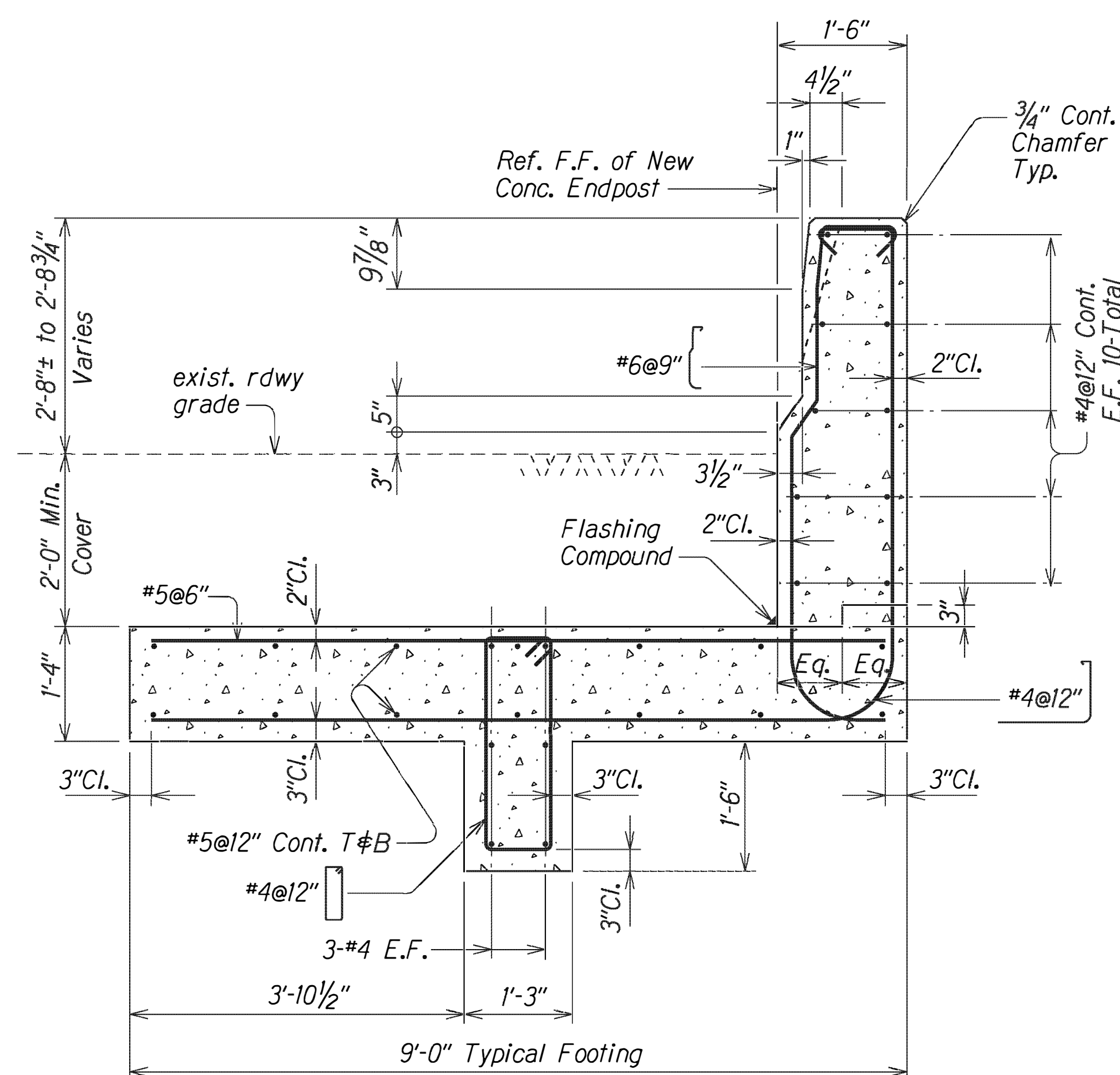


SECTION

1
Q6 Q6

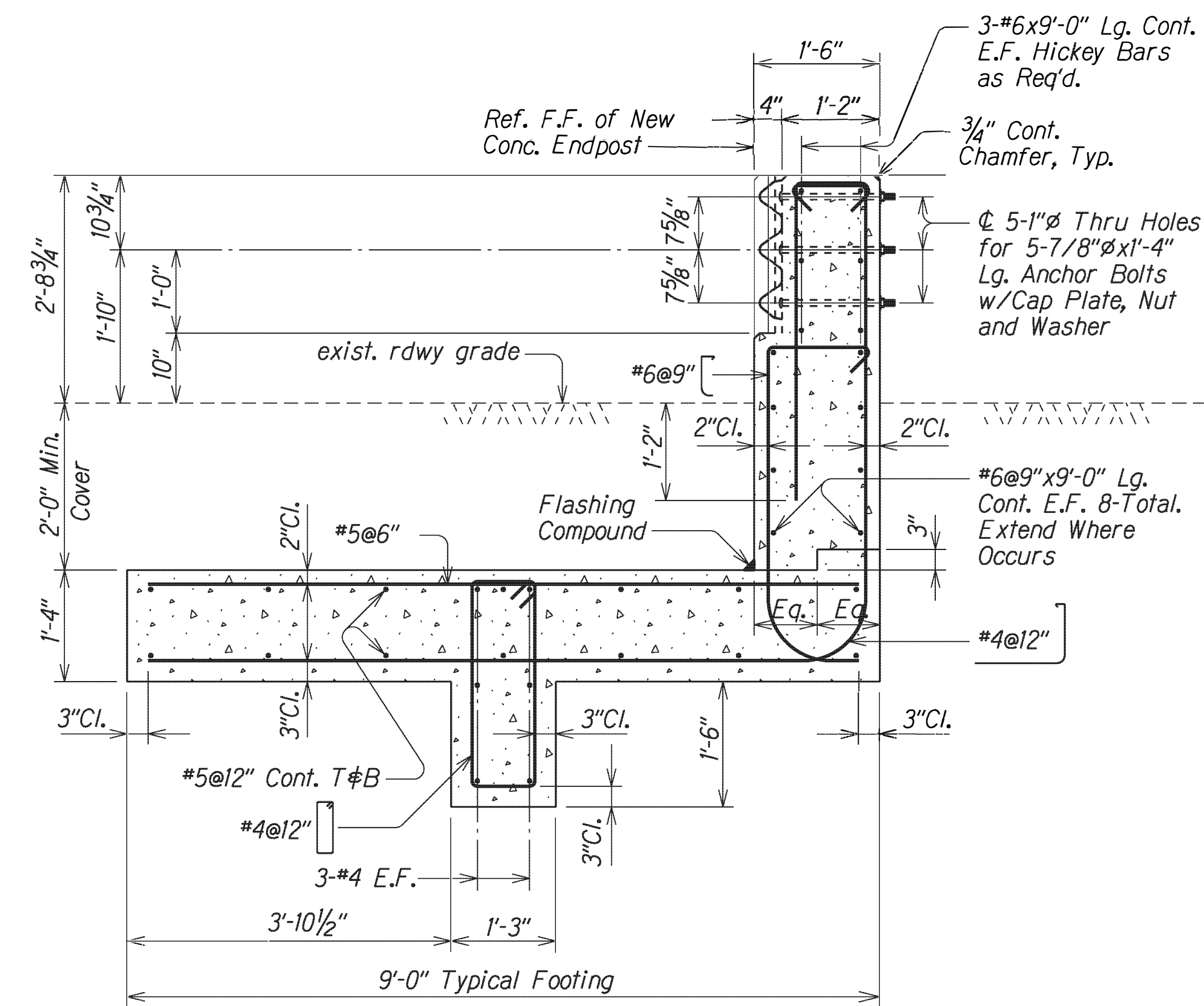
CAP (BEARING) PLATE DETAIL

Scale: 6" = 1'-0"



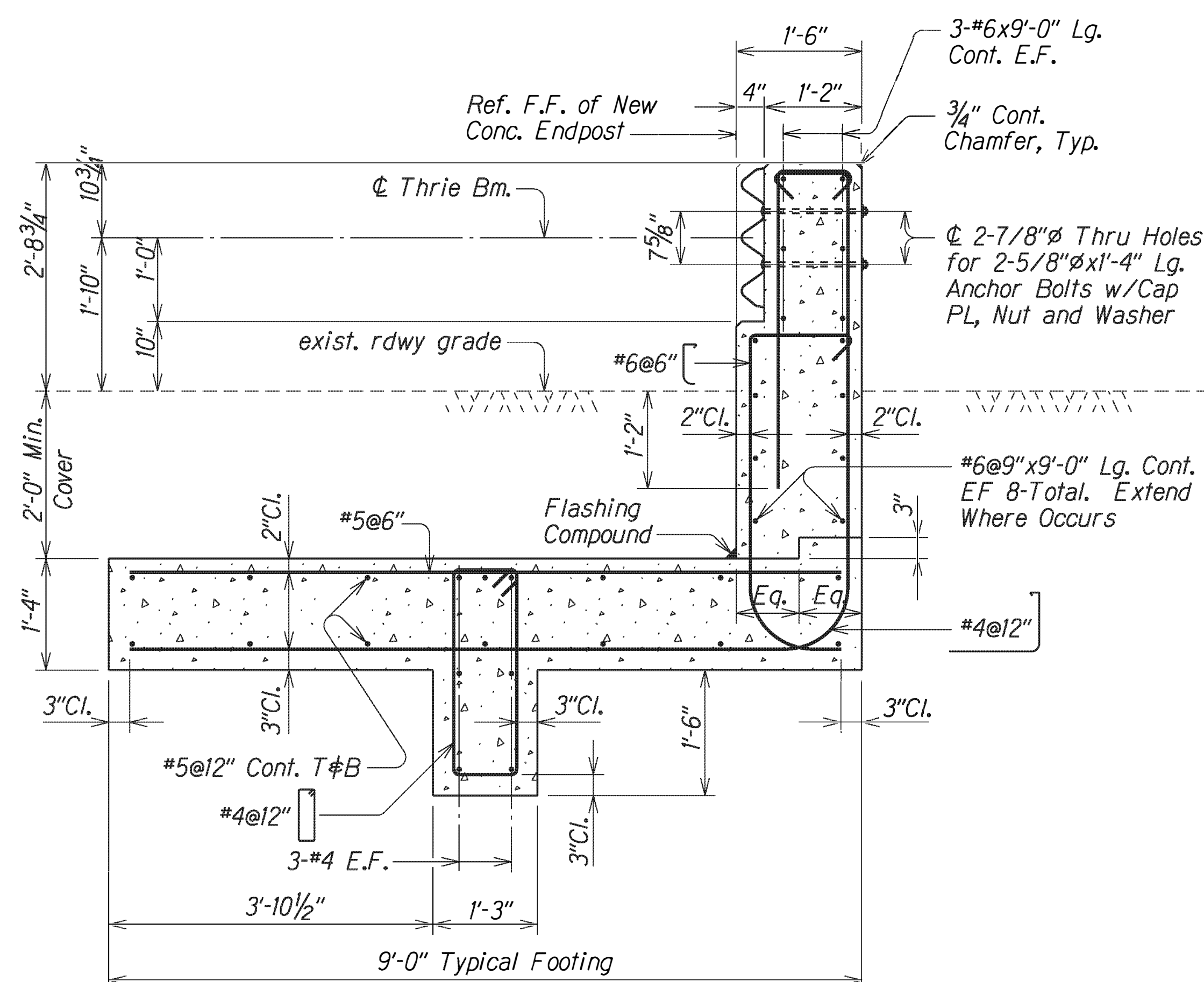
SECTION

Scale: $\frac{3}{4}" = 1'-0"$



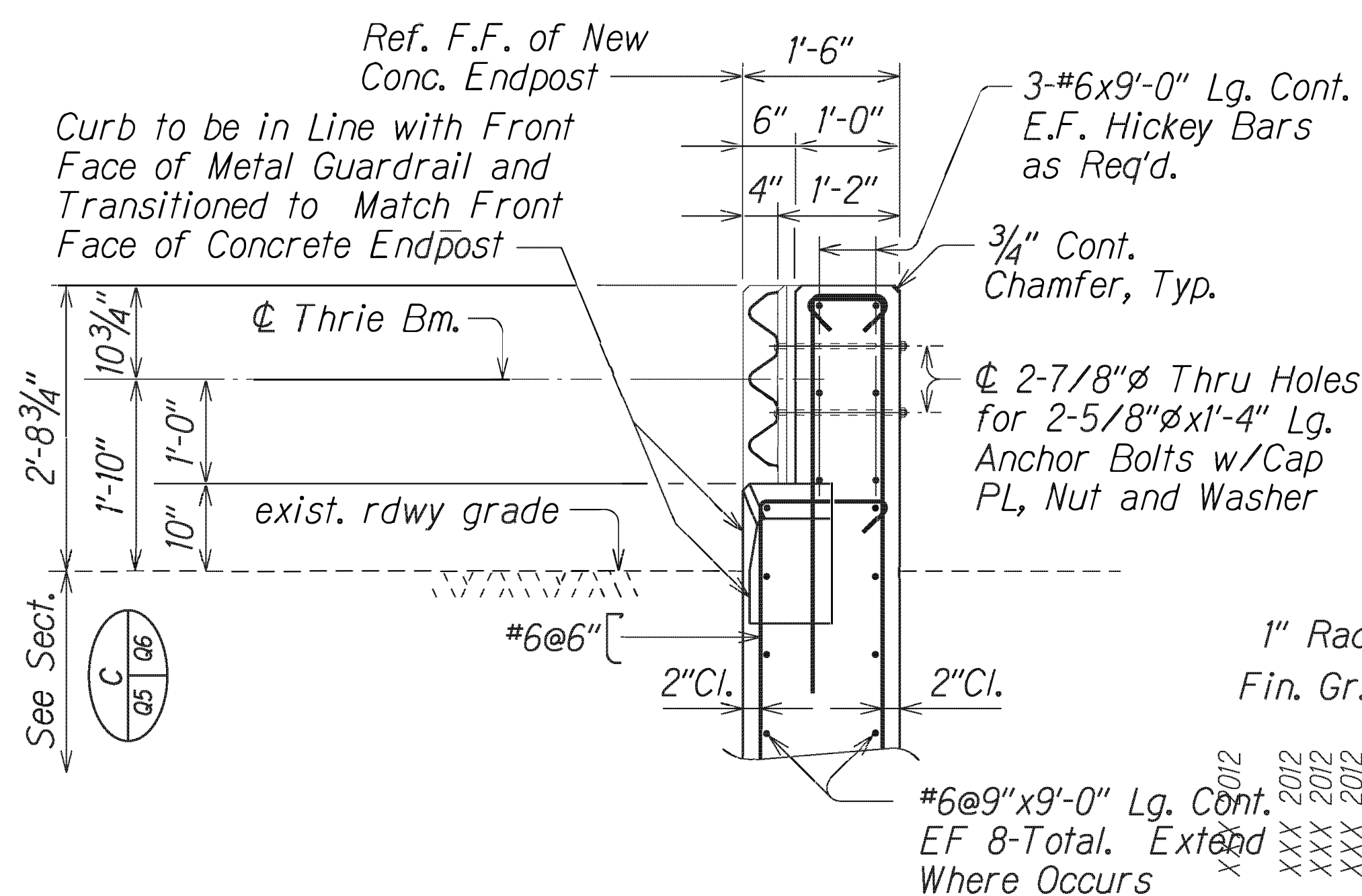
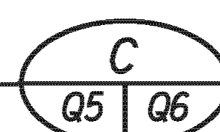
SECTION

Scale: $\frac{3}{4}" = 1'-0"$



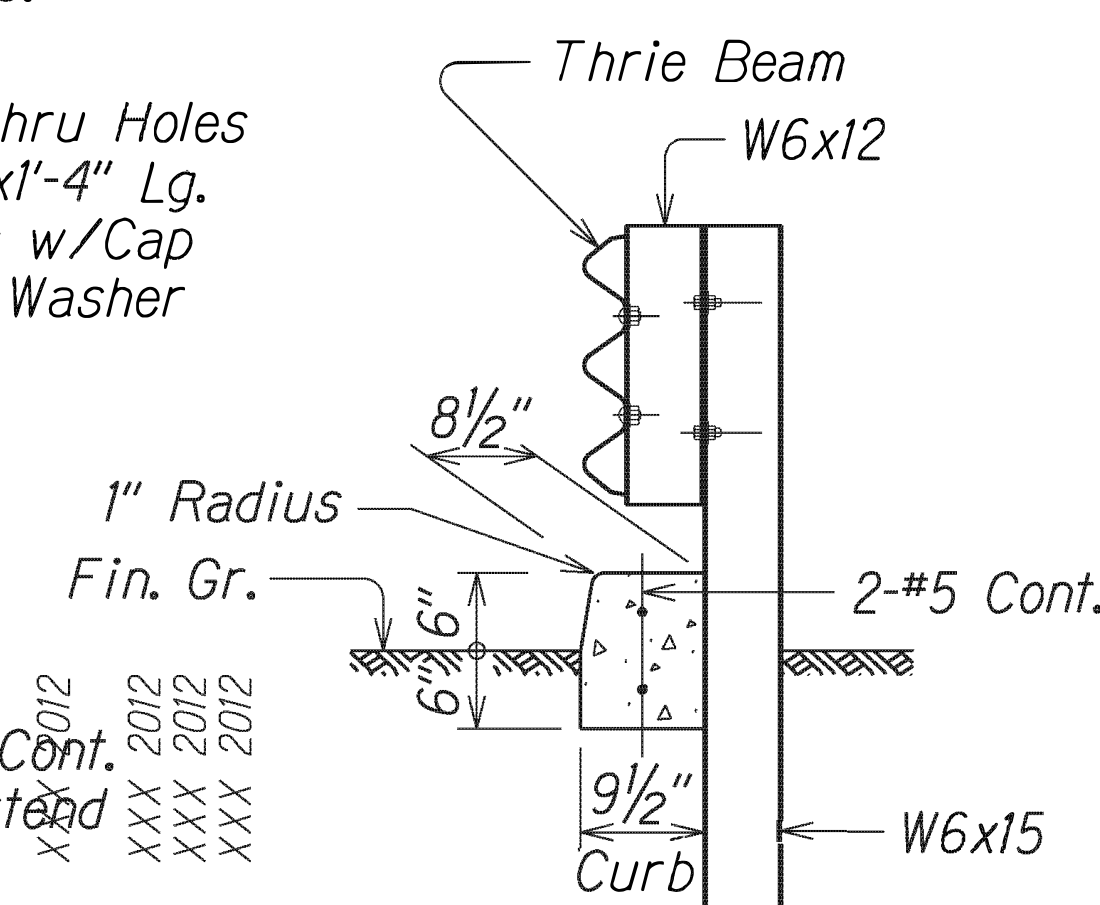
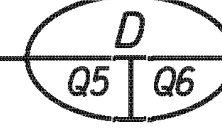
SECTION

Scale: $\frac{3}{4}" = 1'-0"$



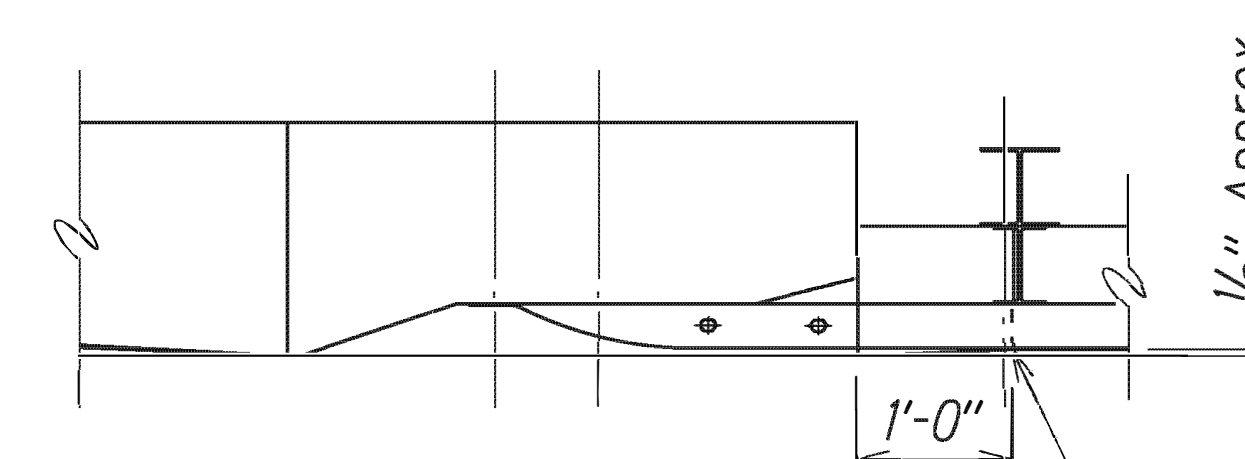
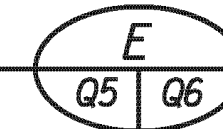
SECTION

Scale: $\frac{3}{4}" = 1'-0"$



SECTION

Scale: $\frac{3}{4}" = 1'-0"$



Curb to be in Line with Front Face of Metal Guardrail and Transitioned to Match Front Face of Concrete Endpost —

PARTIAL PLAN

Scale: $\frac{3}{4}" = 1'-0"$

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

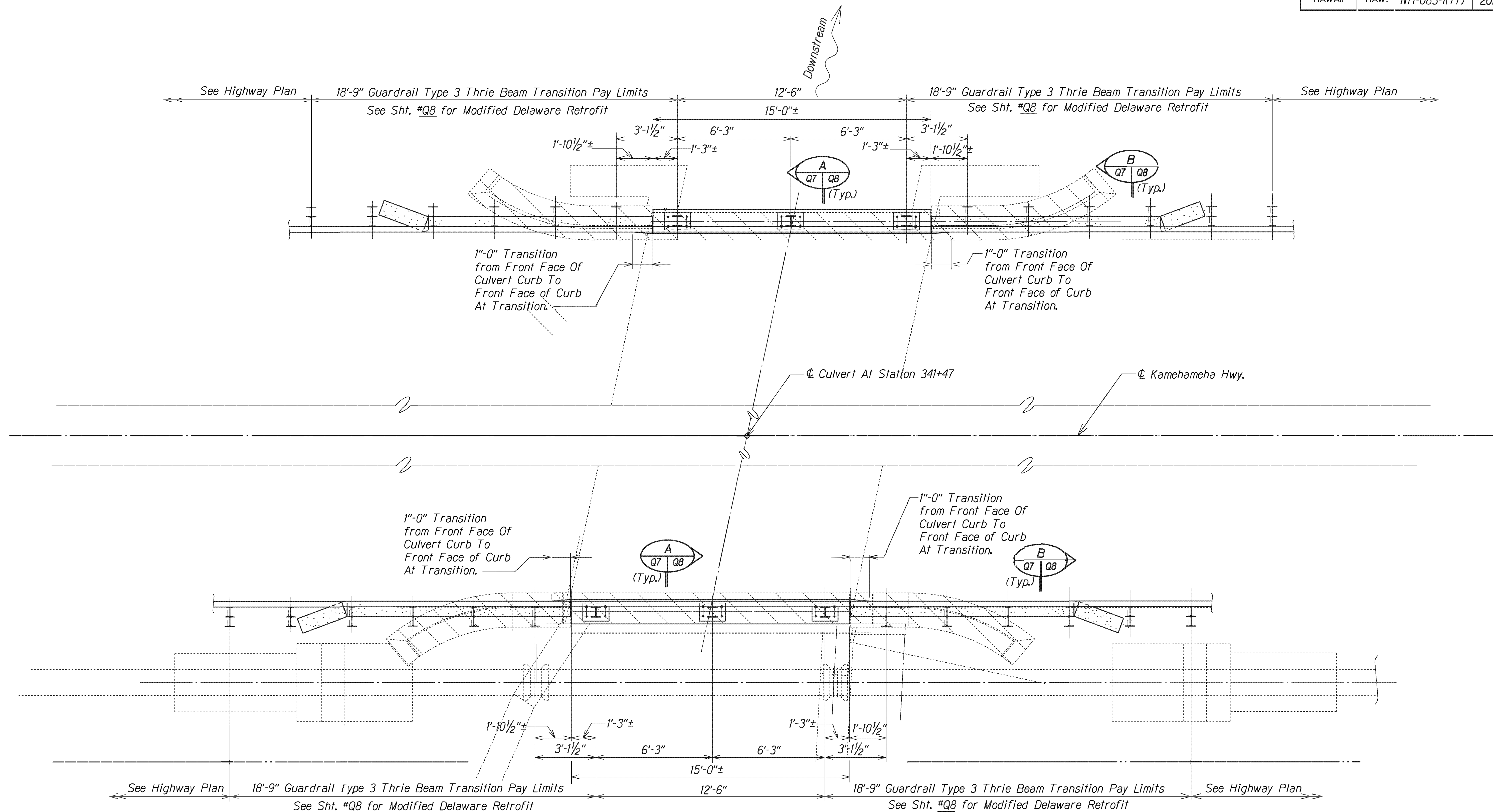
TYPE "D2" ENDPPOST DETAILS
PARTIAL ISOMETRIC VIEW & TYPICAL SECTIONS
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

Scale: As Noted

Date: June 2020

SHEET No. 06 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-K(77)	2021	58	87



- NOTE:
- The Contractor shall verify all dimensions and locations of utility line near the structure before commencing with the work.
 - Hatched area shown thus  denotes removal of the existing structure.

LAYOUT PLAN - CULVERT AT STA. 341+47

Scale: 3/8" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

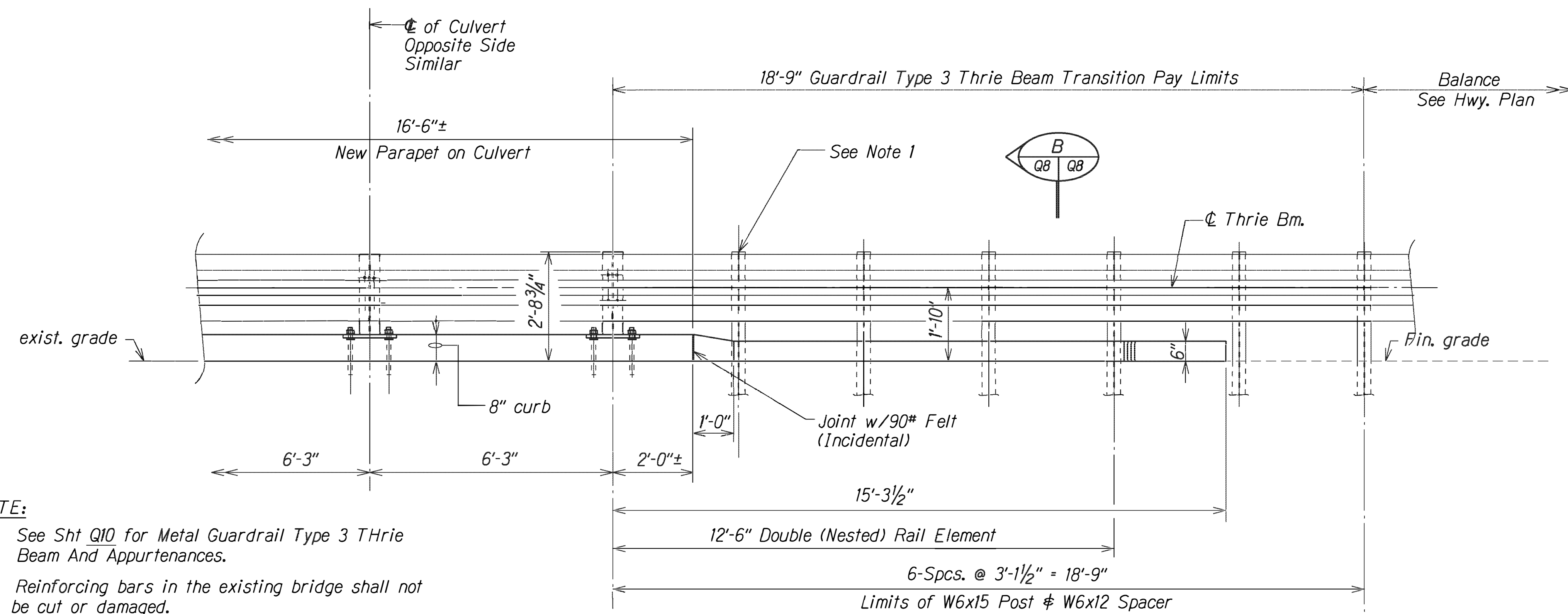
BOX CULVERT AT STA. 341+47
LAYOUT PLAN
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-K(77)

Scale: As Noted

Date: June 2020

SHEET No. Q7 OF 10 SHEETS

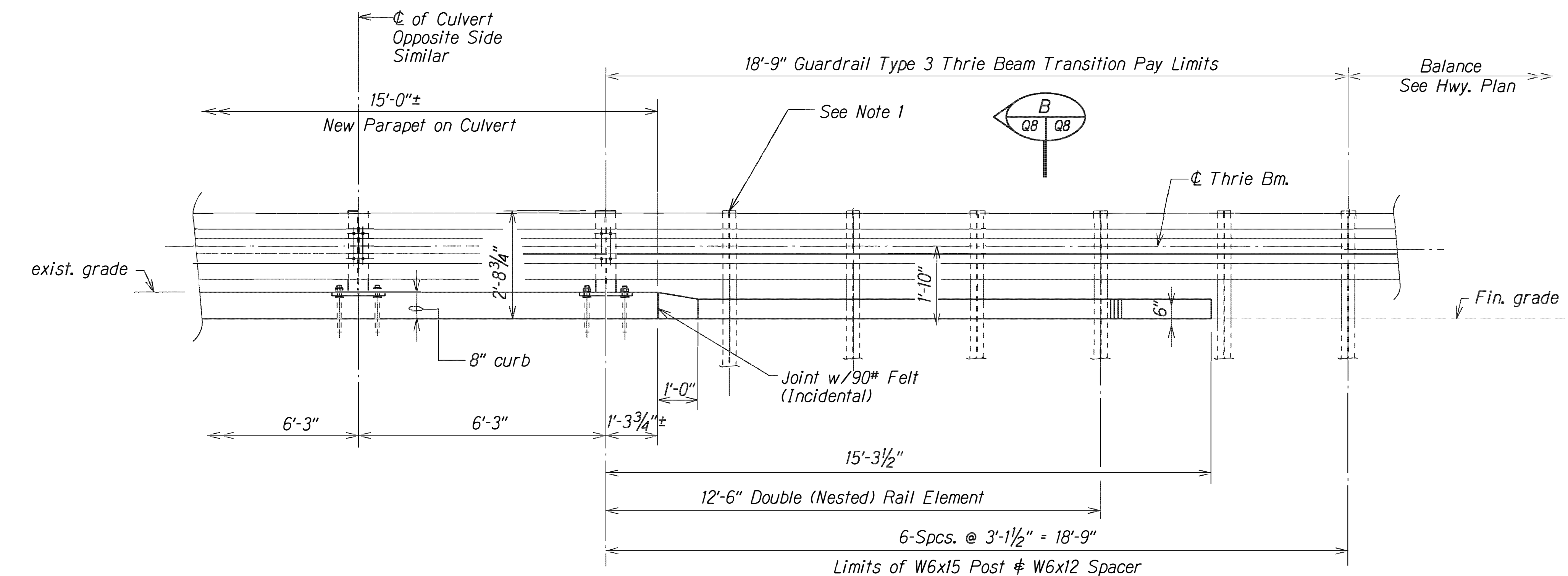
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	59	87



- NOTE:
1. See Sht Q10 for Metal Guardrail Type 3 Thrie Beam And Appurtenances.
 2. Reinforcing bars in the existing bridge shall not be cut or damaged.
 3. The Contractor shall verify all dimensions and locations of utility line near the structure before commencing with the work.
 4. Hatched area shown thus /// denotes removal of the existing structure.
 5. See Q9 for Base PL and Thrie Beam Post details.

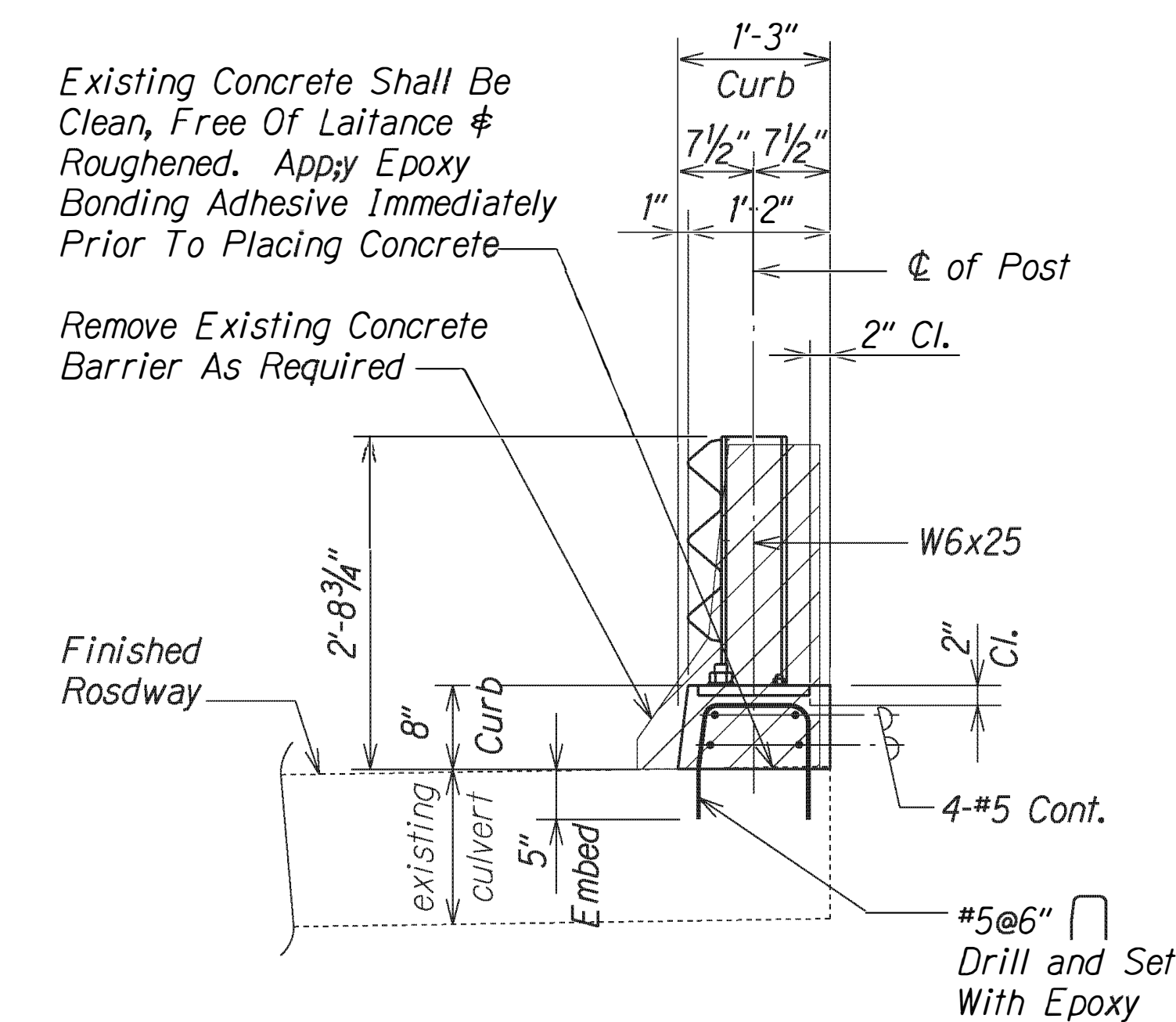
ELEVATION AT CULVERT STA. 337+98.50 (MAKAI)

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



ELEVATION - CULVERT AT STA. 341+47 (MAUKA & MAKAI)

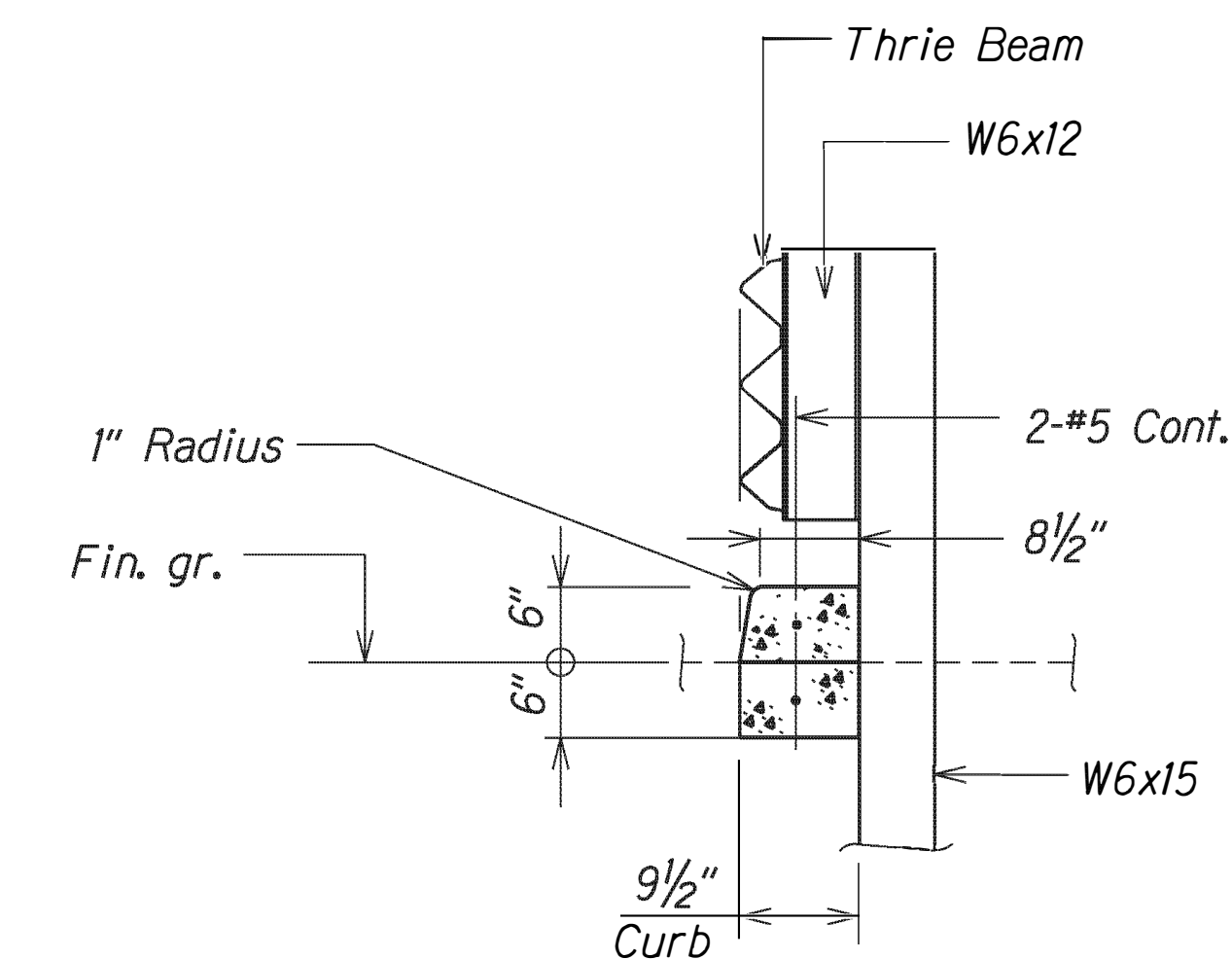
Scale: 1/2" = 1'-0"



SECTION A

Scale: 3/4" = 1'-0"

Q4, Q7



SECTION B

Scale: 3/4" = 1'-0"

Q4, Q7

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

BOX CULVERTS

AT STA. 337+98.50 & STA. 341+47

MOD. DELAWARE RETROFIT ELEVS & SECTIONS

KAMEHAMEHA HIGHWAY REHABILITATION

Vicinity of Kapuhi Street to Dairy Road.

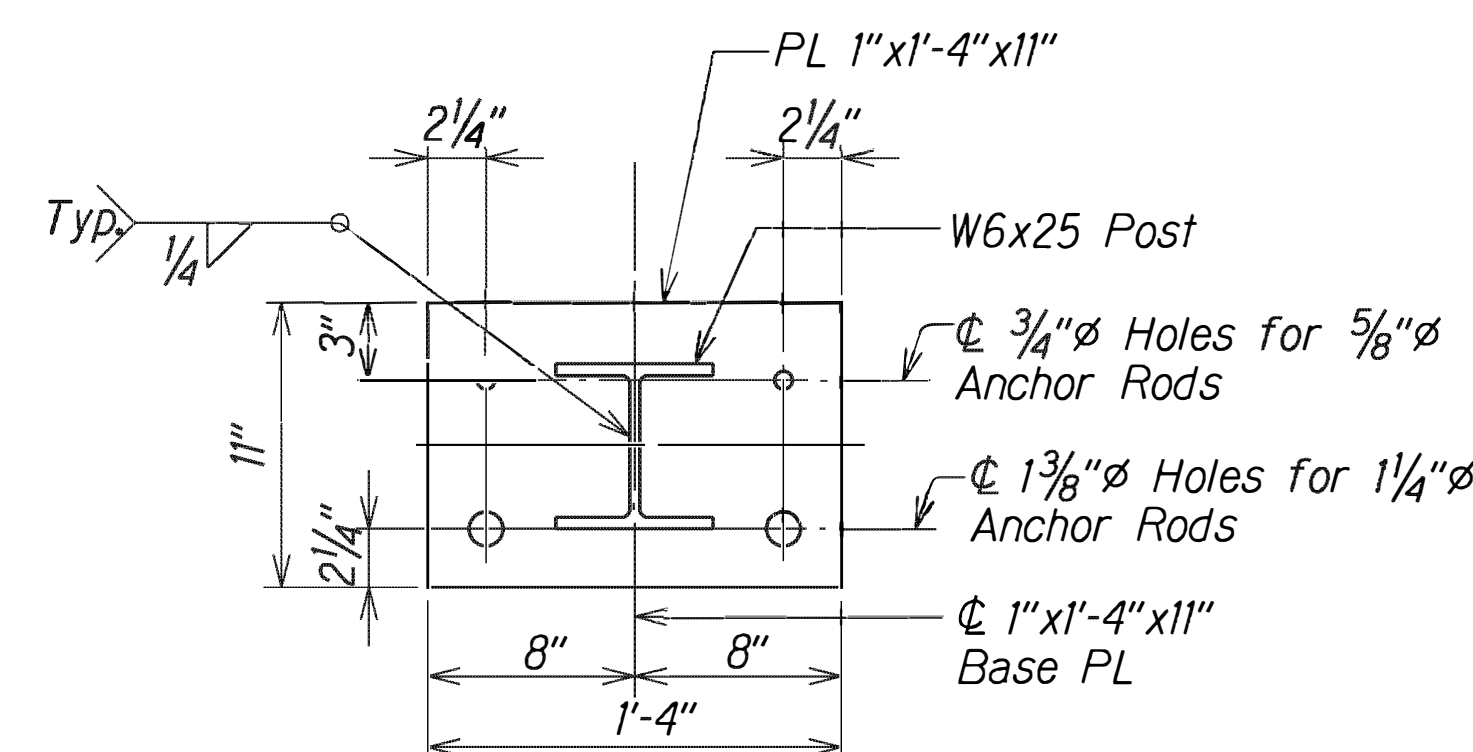
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Scale: As Noted

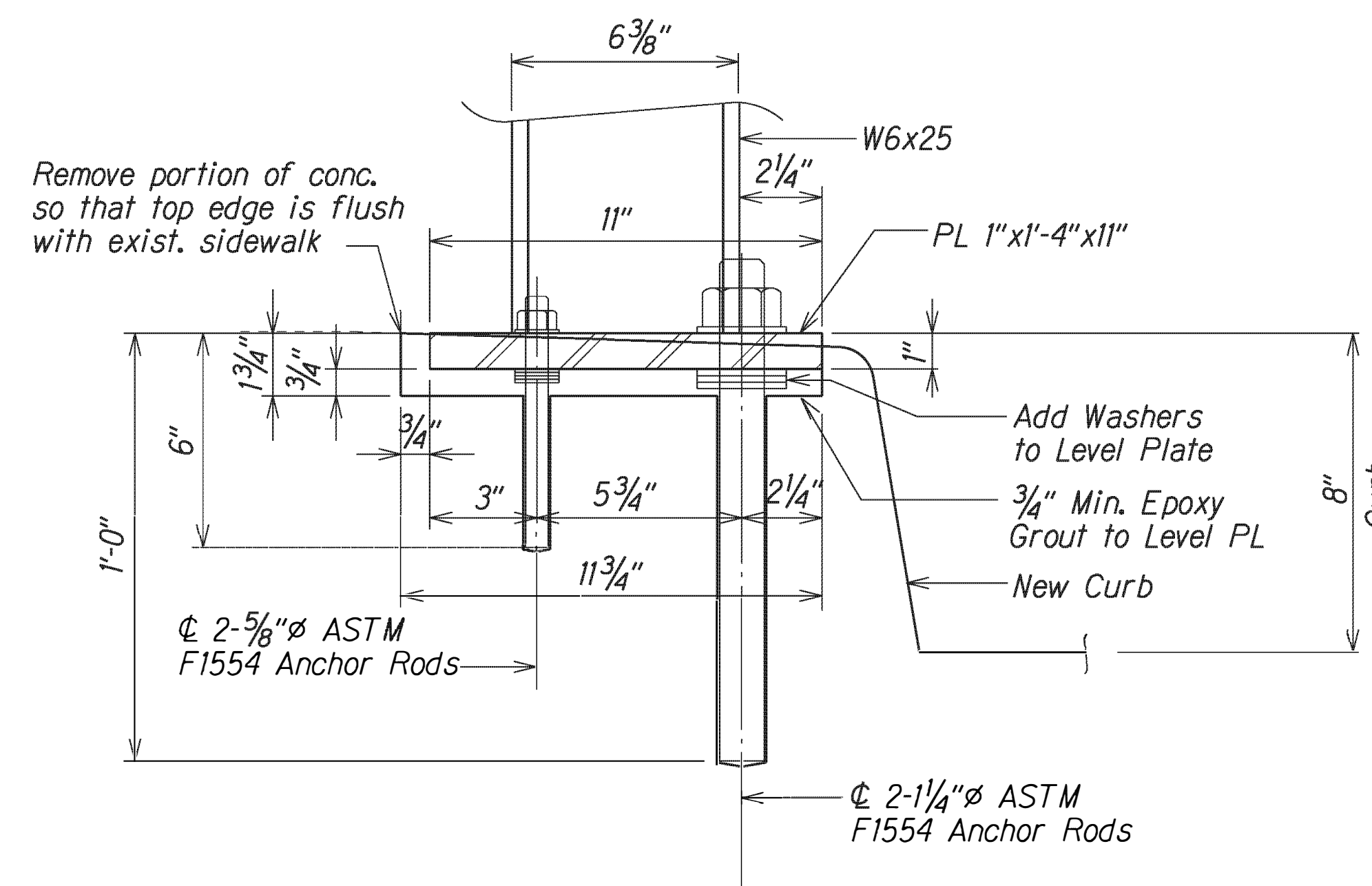
Date: June 2020

SHEET No. Q8 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	60	87

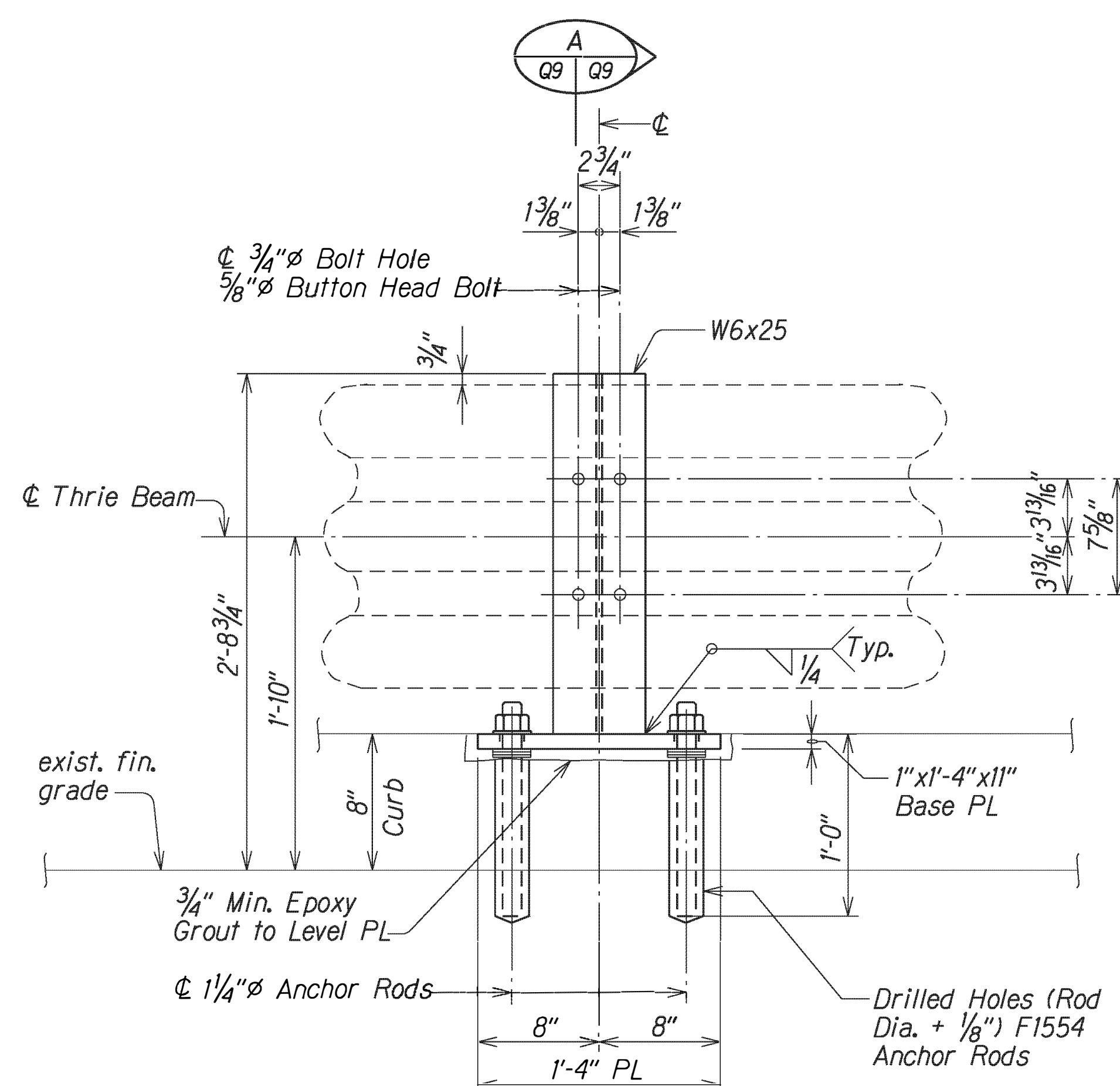


PLAN



TYPICAL THRIE BEAM POST DETAIL

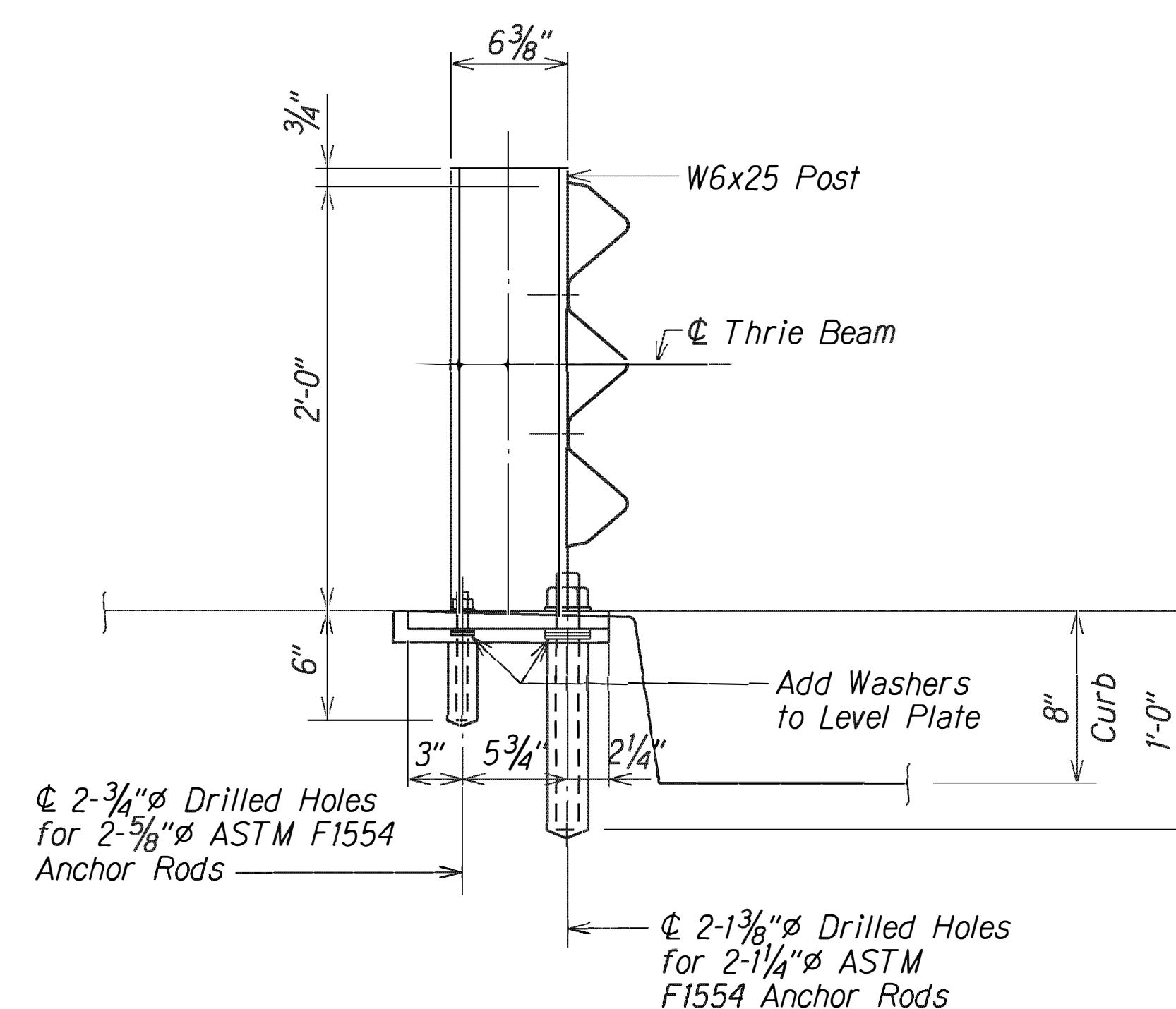
Scale: 3"=1'-0"



ELEVATION

BASE PL DETAIL

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



SECTION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MODIFIED DELAWARE RETROFIT
BASE PLATE AND THRIE BEAM POST DETAILS
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083(177)

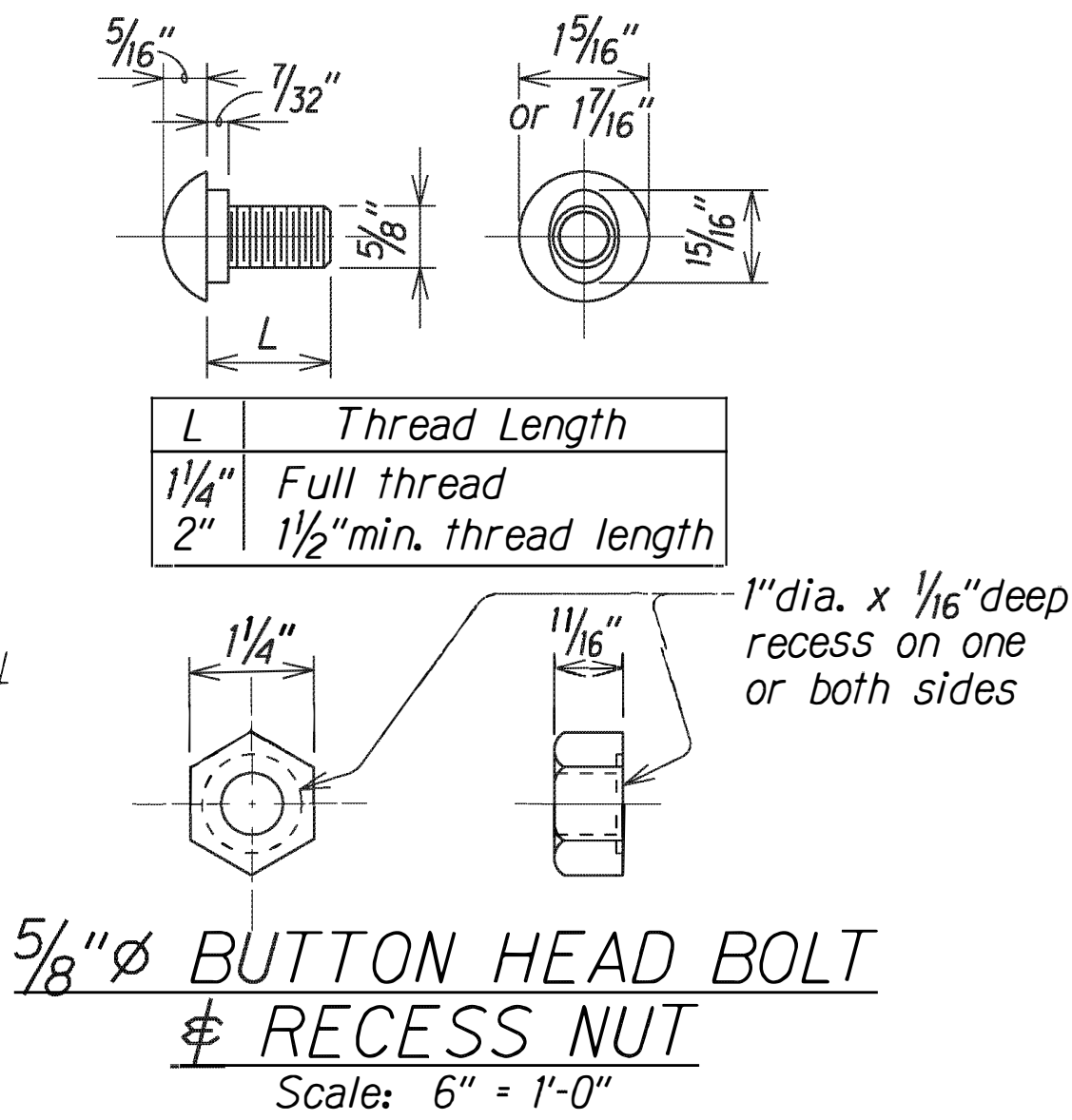
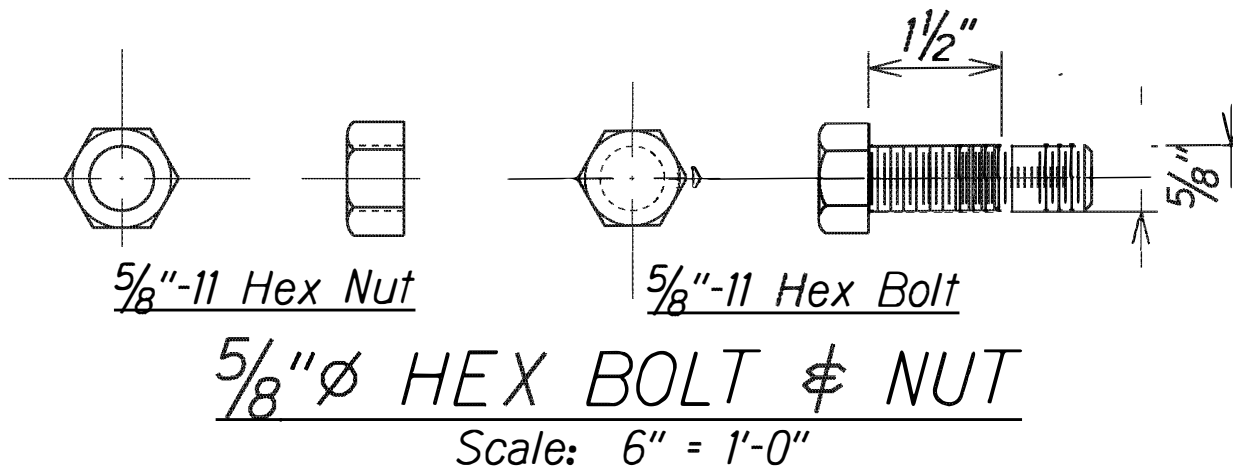
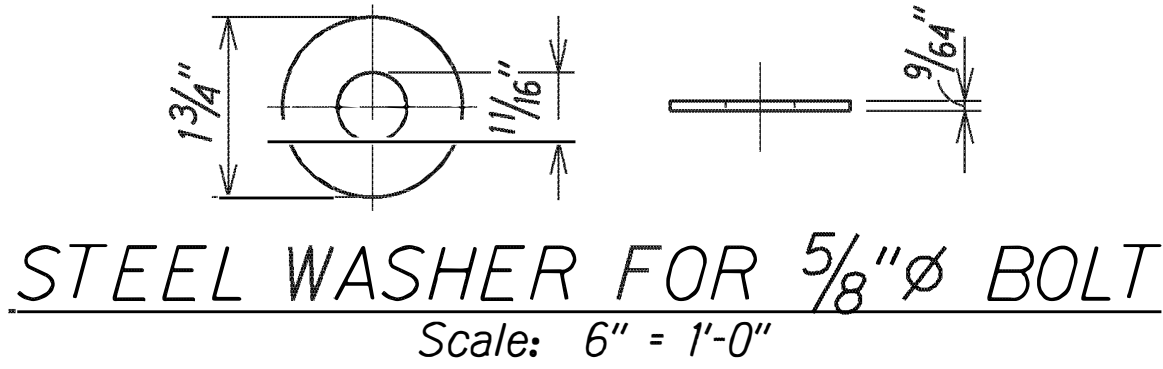
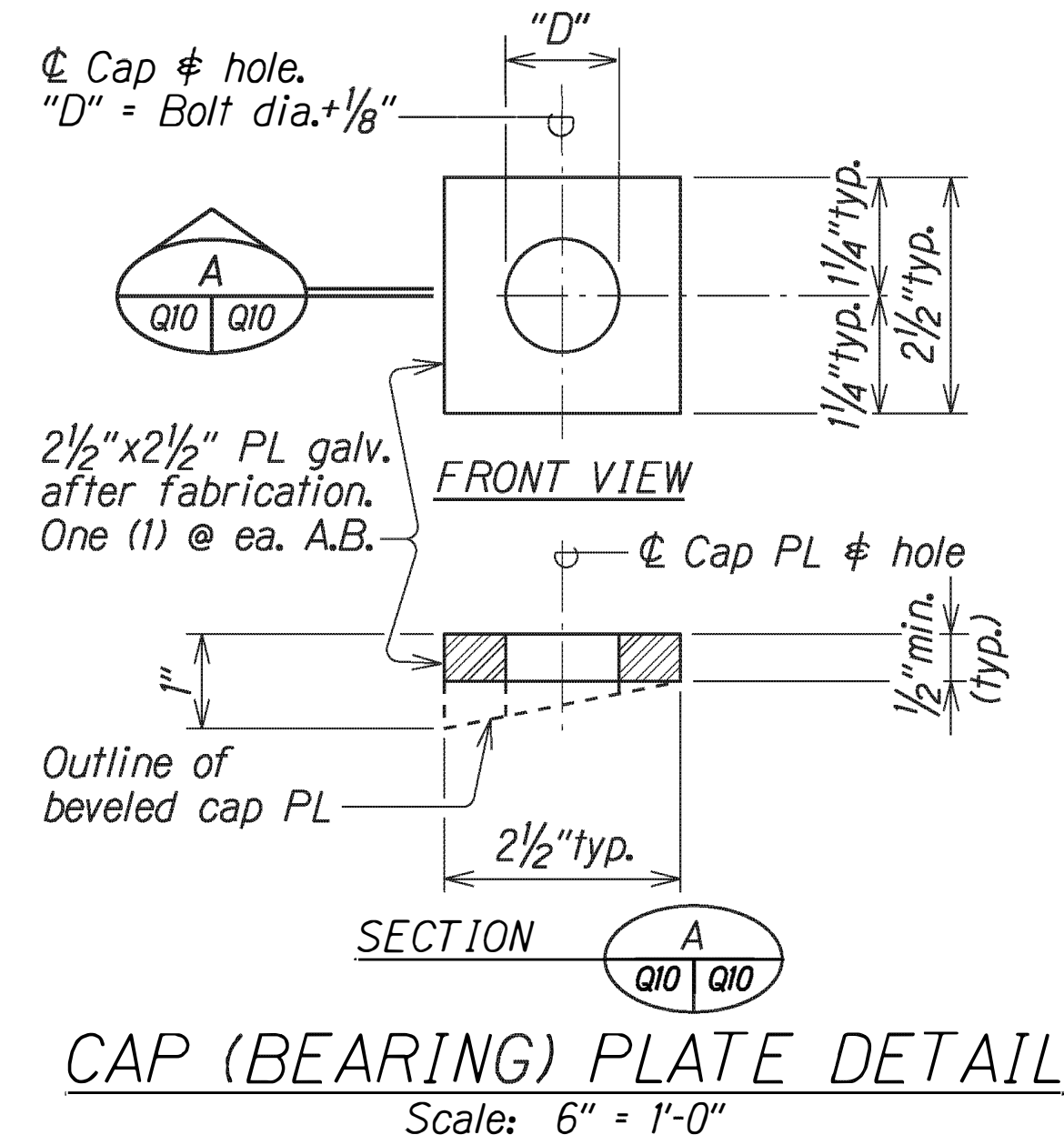
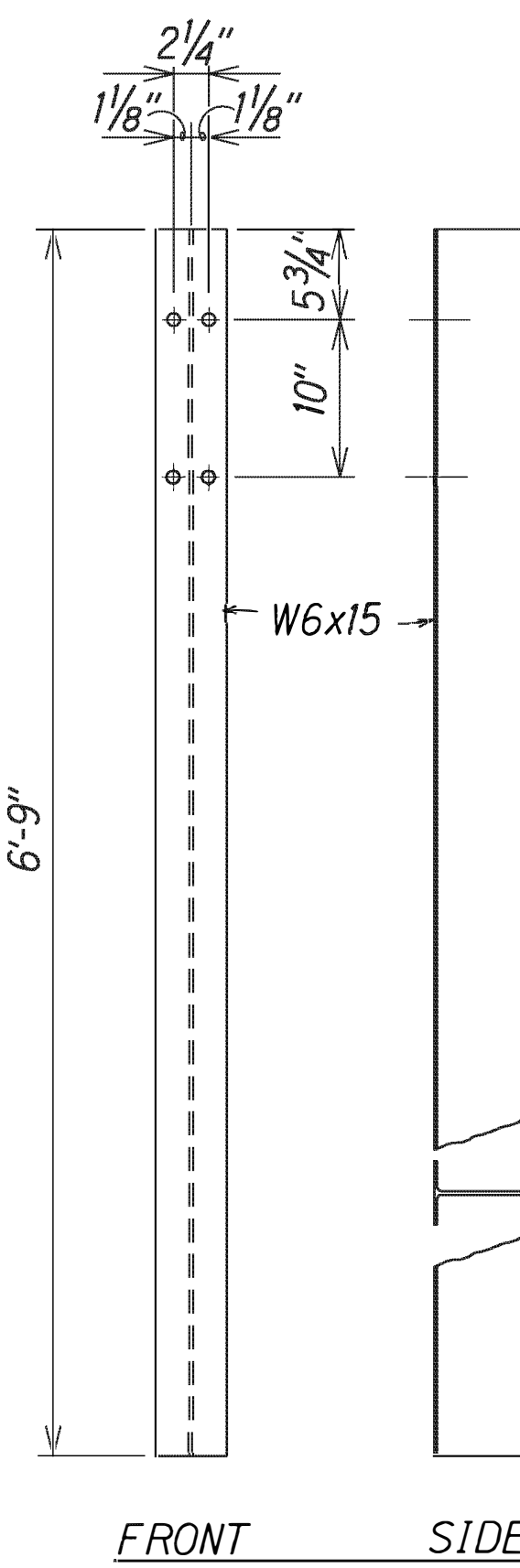
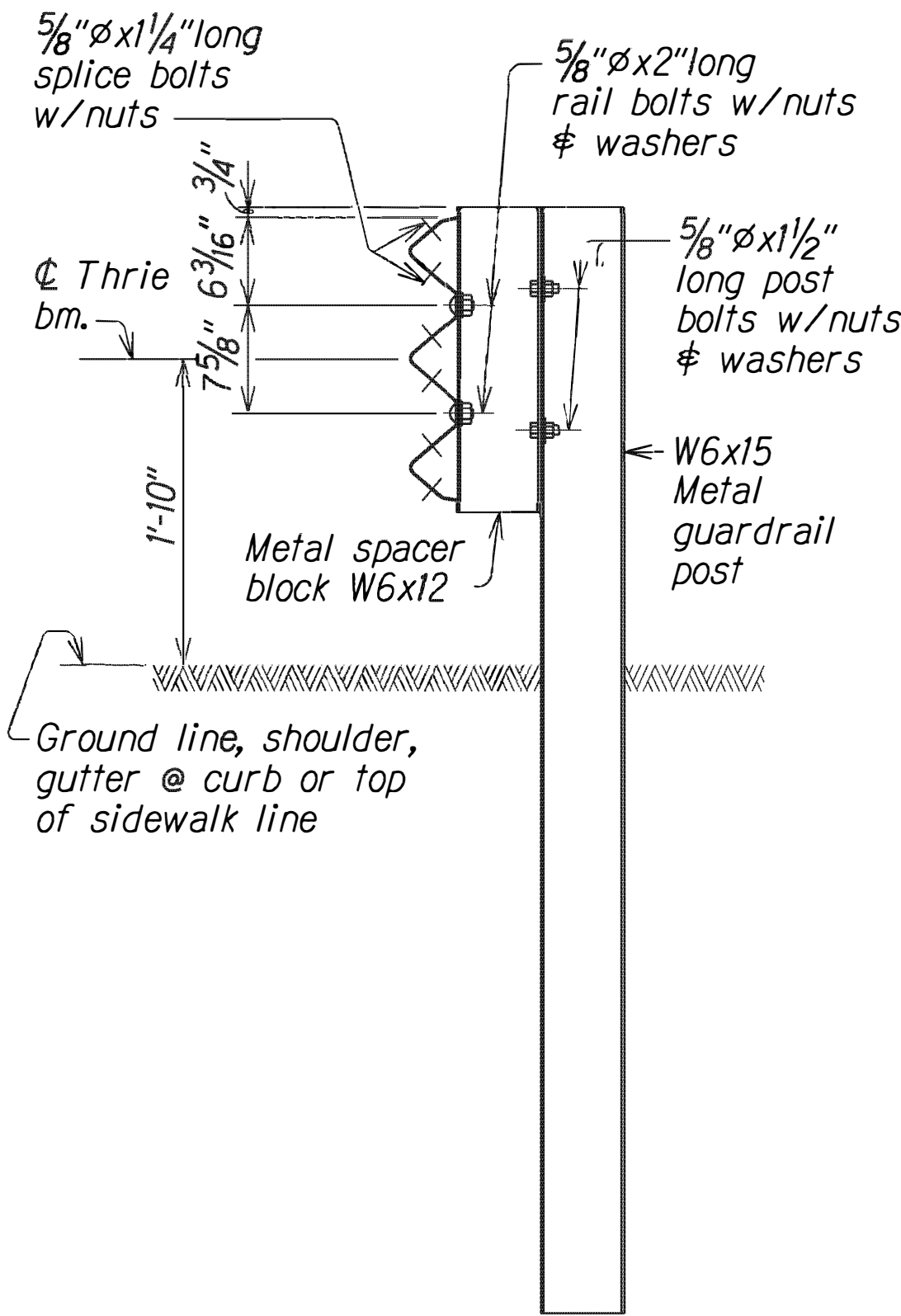
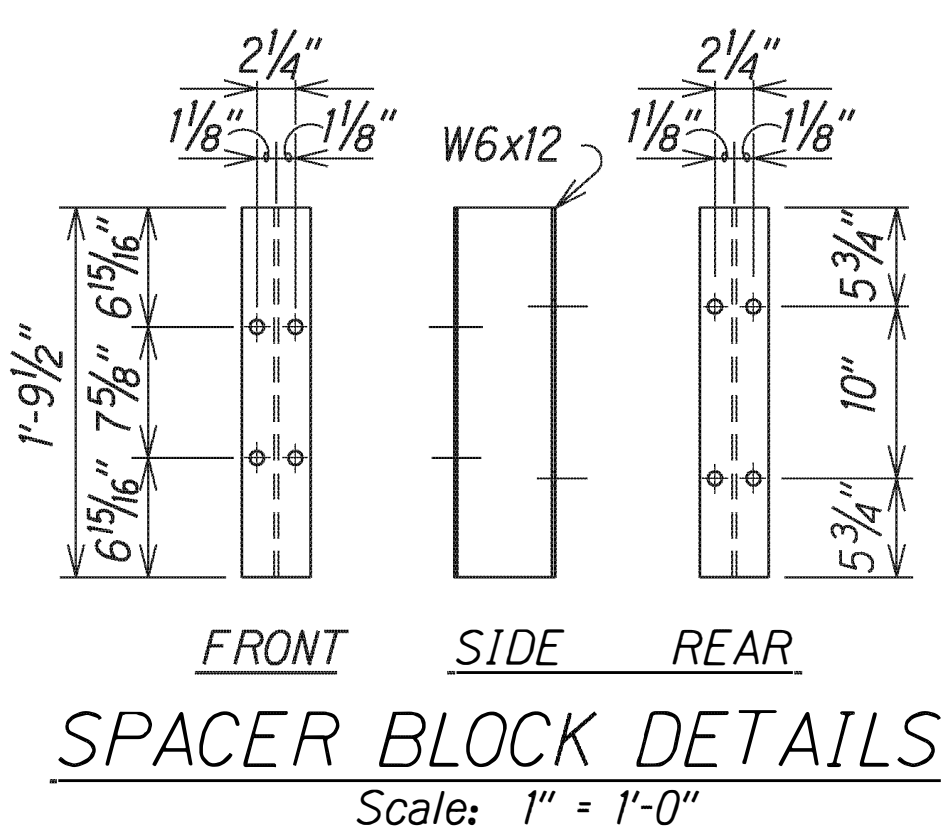
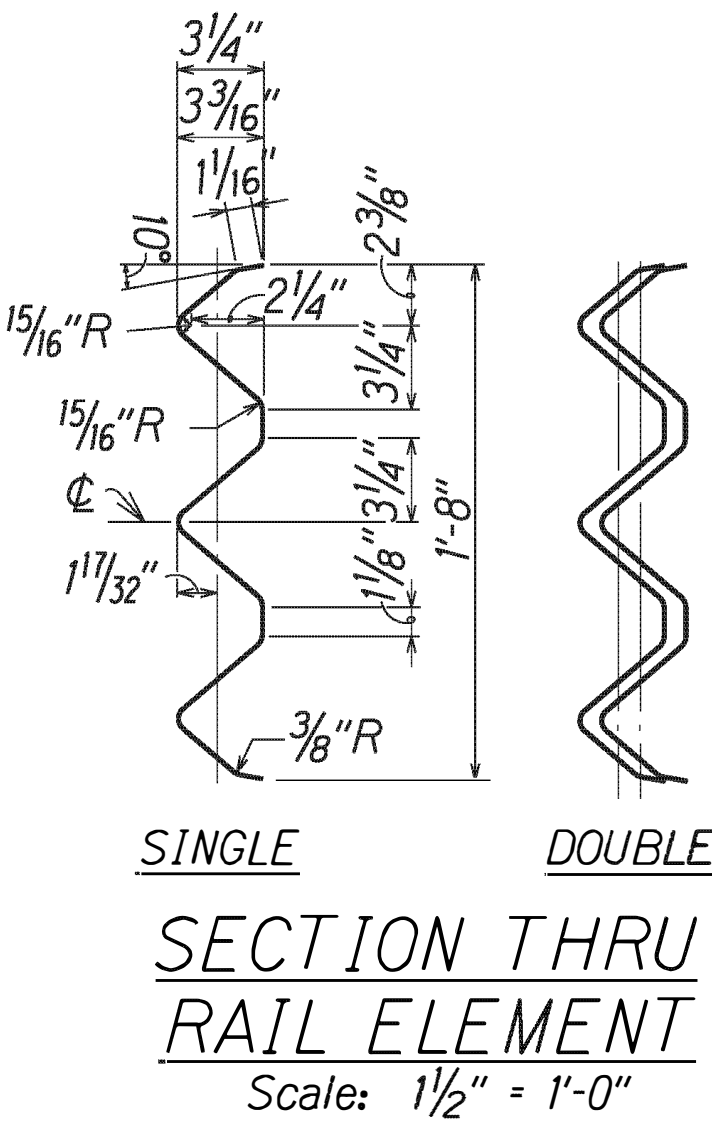
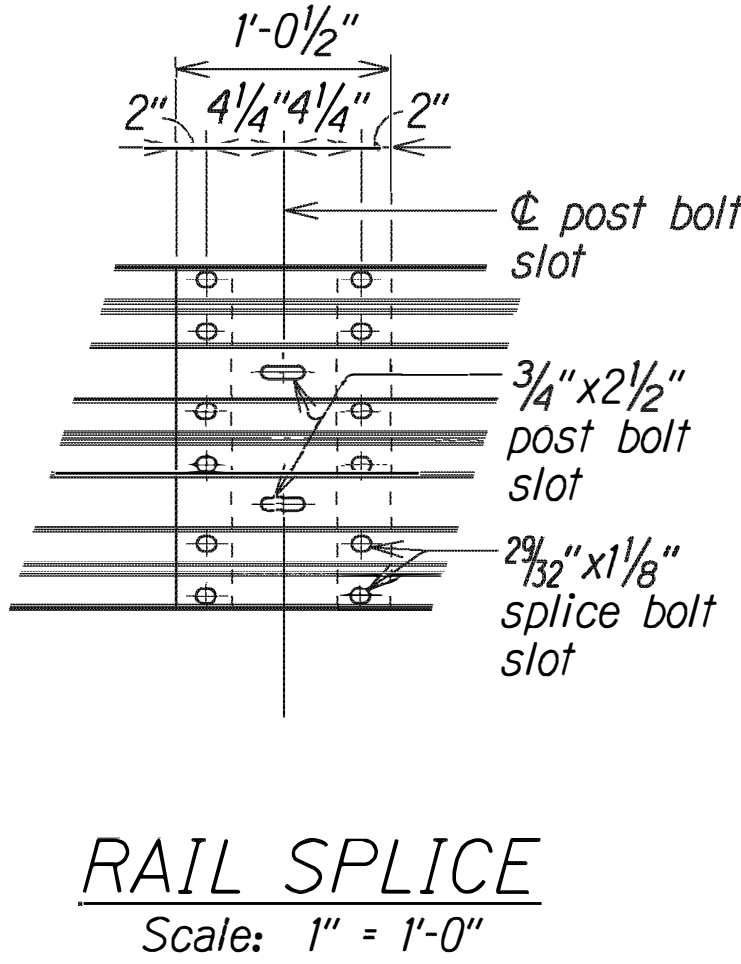
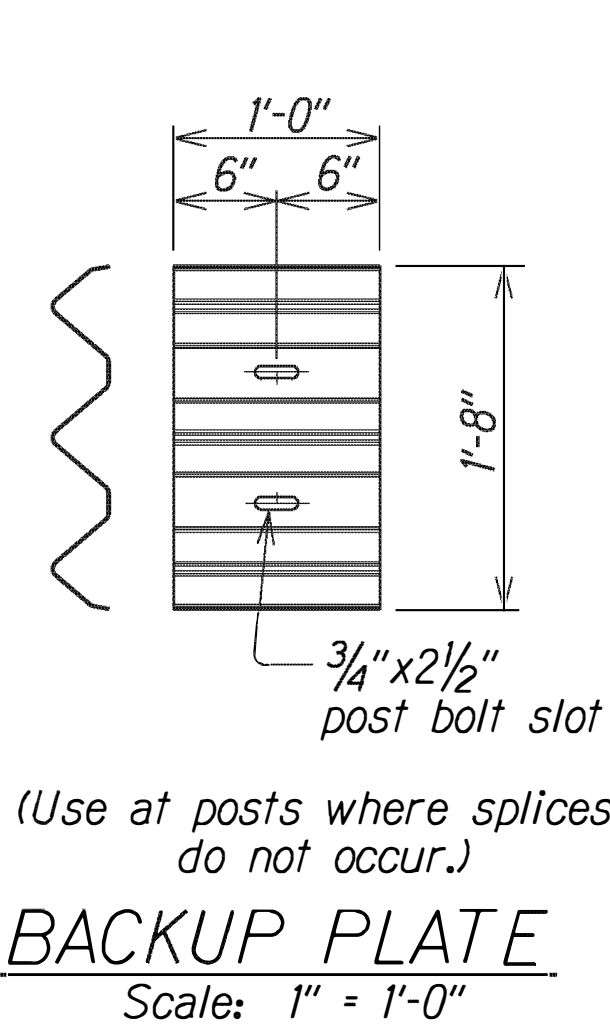
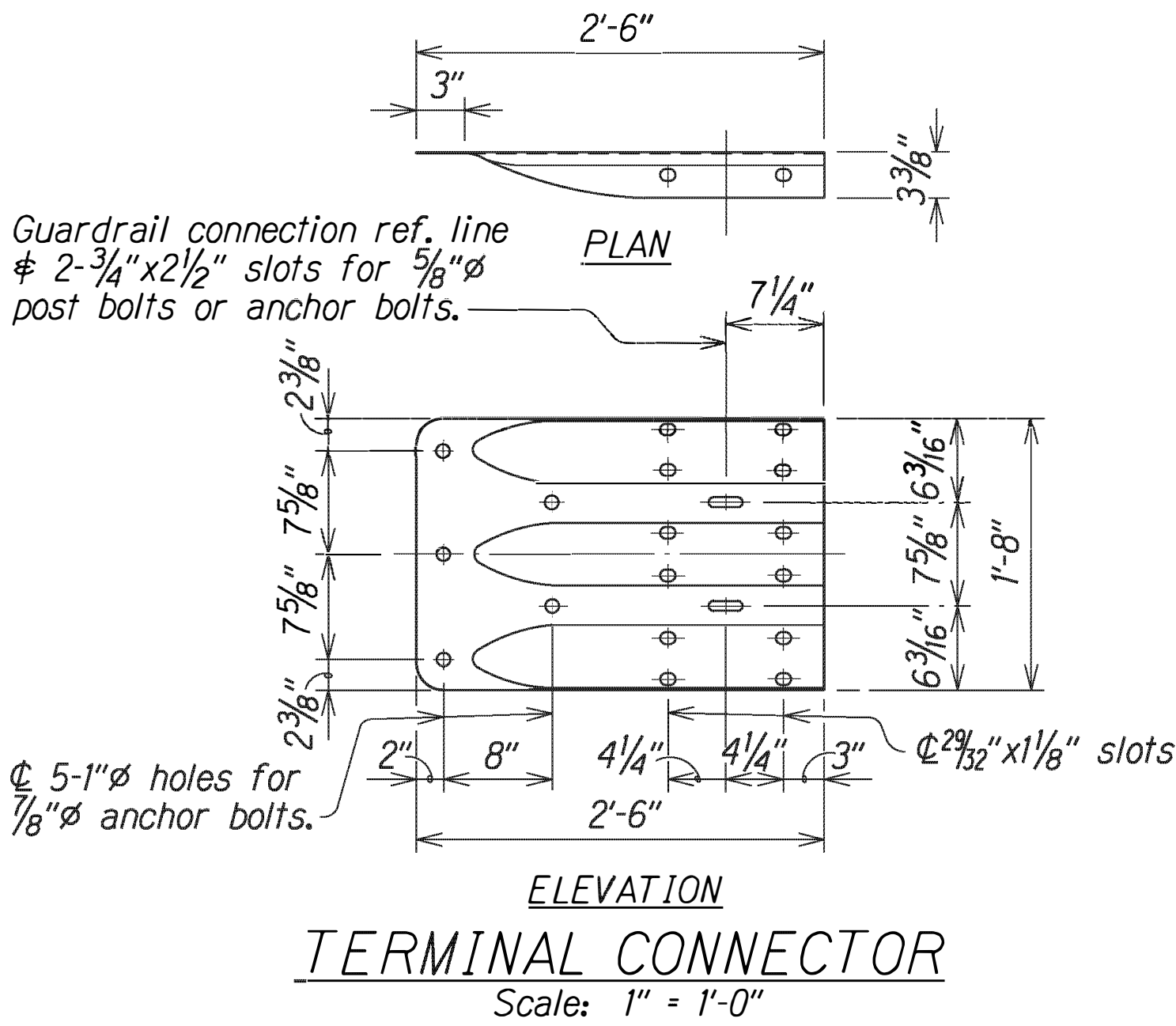
Scale: As Noted Date: June 2020

SHEET No. 60 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	61	87

NOTES:

- A. The work necessary to connect guardrail to concrete end post shall include all labor, materials, 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.
- I. 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.
- J. Where double (nested) beam occur, 12" "Back-up Plate" not required.
- K. Heads of through anchor bolts shall be placed on the traffic side of the rail.
- L. All steel shapes, rails and plates shall conform to ASTM A 36 specifications.



TYPICAL SECTION
METAL GUARDRAIL ON METAL POST
WITH METAL SPACER BLOCK
Scale: 1" = 1'-0"

POST DETAILS
Scale: 1" = 1'-0"

METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MODIFIED DELAWARE RETROFIT
METAL GUARDRAIL TYPE 3 THRIE BEAM
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. 83B-01-12M

Scale: As Noted Date: June 2020
SHEET No. Q10 OF 10 SHEETS