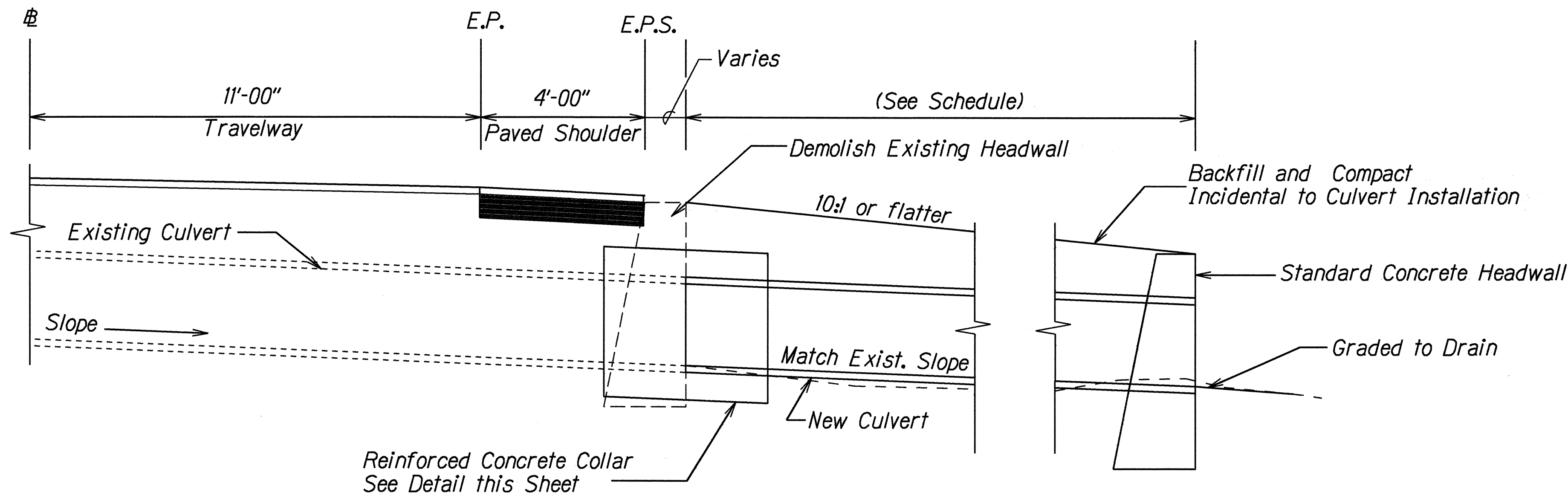
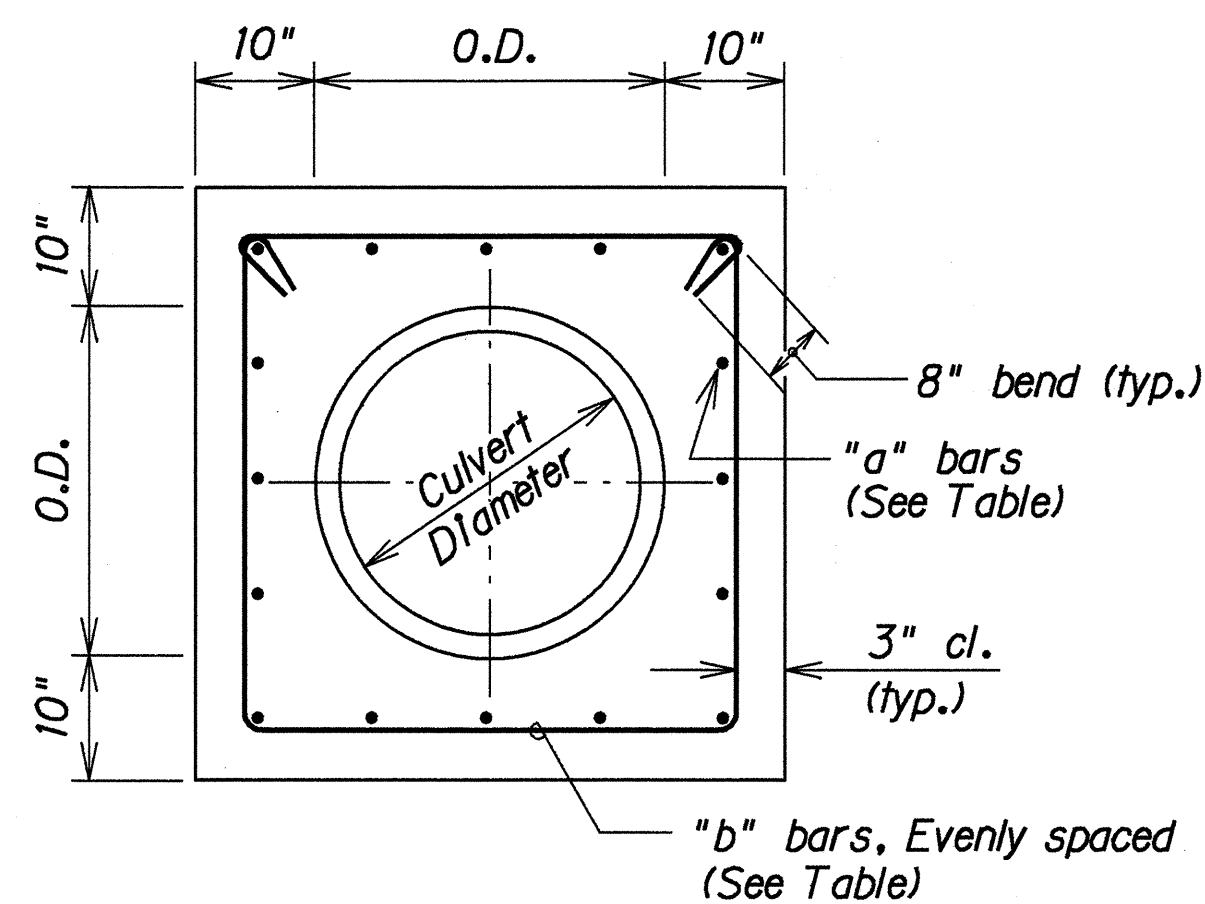
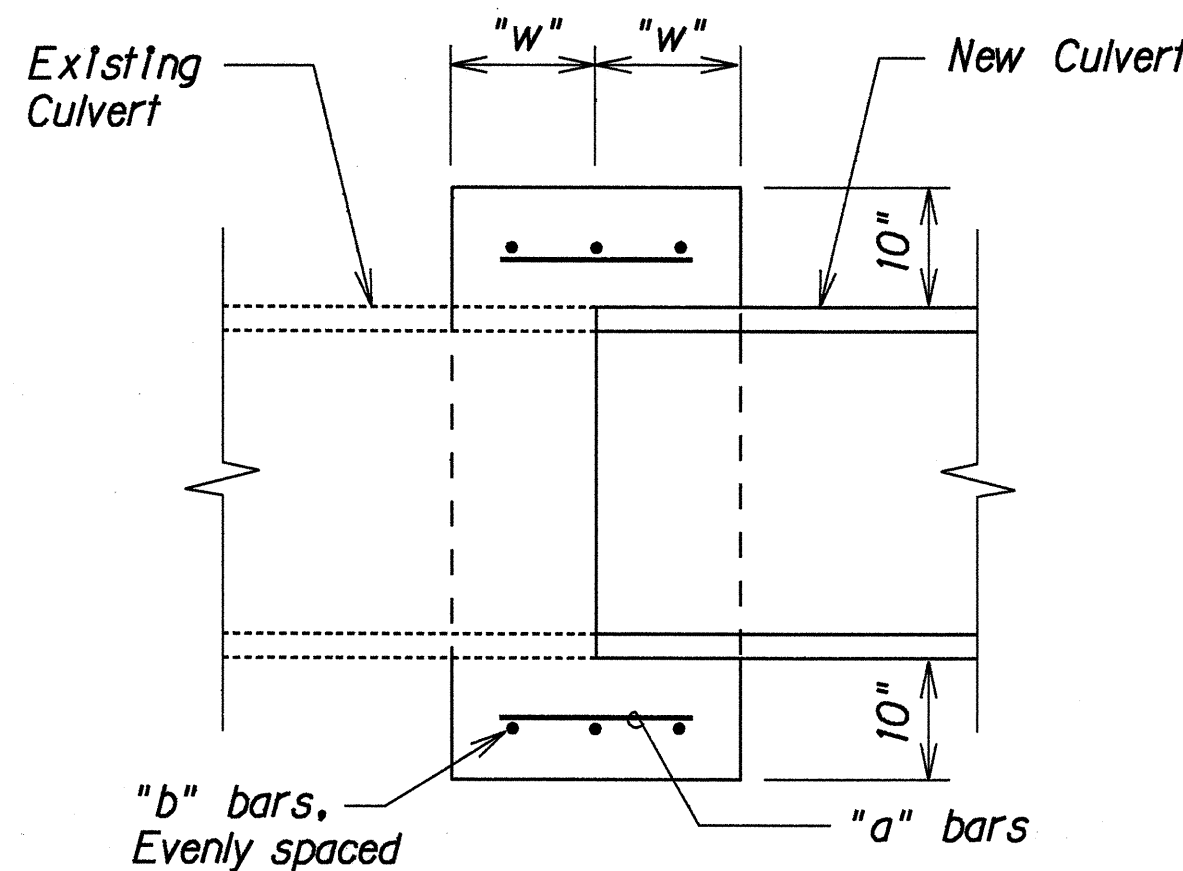




TYPICAL CULVERT EXTENSION DETAIL  
Scale: 1/2"=1'



ELEVATION



SECTION

| Culvert Diameter | "a" bars | "b" bars | "w" |
|------------------|----------|----------|-----|
| 18" to 30"       | #4 @ 9"  | 3- #4    | 12" |
| 36" to 48"       | #5 @ 9"  | 4- #4    | 15" |

Note: Reinforcing Steel for Concrete Collar shall conform to the requirements of ASTM 615-Grade 60.

## TYPICAL DETAILS OF REINFORCED CONCRETE COLLAR

### MISCELLANEOUS DRAINAGE NOTES:

- Existing drainage system will be functional at all times during construction. Contractor is to furnish materials, equipment, labor, tools and incidentals necessary to accomplish maintenance of flow, the cost of which shall be incidental to the various contract items.
- Demolishing and/or removing a portion or the entire existing structure shall not be paid for separately, but shall be considered incidental to the various contract items.
- Culverts within the grated drop inlets shall be cut flush with the inside face of the wall. Above work shall be considered incidental to the various contract items.
- Contractor shall verify the locations of all culverts in the field. Any culvert damaged during construction shall be repaired or replaced by the Contractor at his expense.
- Concrete for grated drop inlets, headwalls and other structures shall be Class "A".
- Inlet and Outlet conditions shall be graded to permit free flow of run-off or as directed by the Engineer. Grading shall be to the satisfaction of the Engineer. Above work shall be considered incidental to the various contract items.
- The Contractor shall provide bedding materials for culvert, Class "C" bedding. Payment for this work will not be paid for separately but will be considered incidental to the appropriate culvert pay items.
- The Contractor's attention is directed to Section 102.05 of the Standard Specifications. It is anticipated that borrow materials will be used to backfill the new drainage structures; culverts, etc. Payment for this work will be considered incidental to various culvert pay items.
- Reinforcing Steel for Concrete Structures will not be paid for separately but shall be considered incidental to various concrete pay items.
- Location and elevations of new structures must be laid out in the field for the Engineer's approval.
- Chamfer all exposed edges 1".
- Quantities are approximate only. Contractor shall conduct an independent survey of worksites to verify and validate pay quantities.
- Reinforced concrete collar will not be paid for separately but shall be considered incidental to installation of culverts.

|               |            |
|---------------|------------|
| DESIGNED BY   | DATE       |
| DRAWN BY      | APRIL 1995 |
| CHECKED BY    |            |
| APPROVED BY   |            |
| NOTED BY      |            |
| QUANTITIES BY |            |
| CHECKED BY    |            |

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

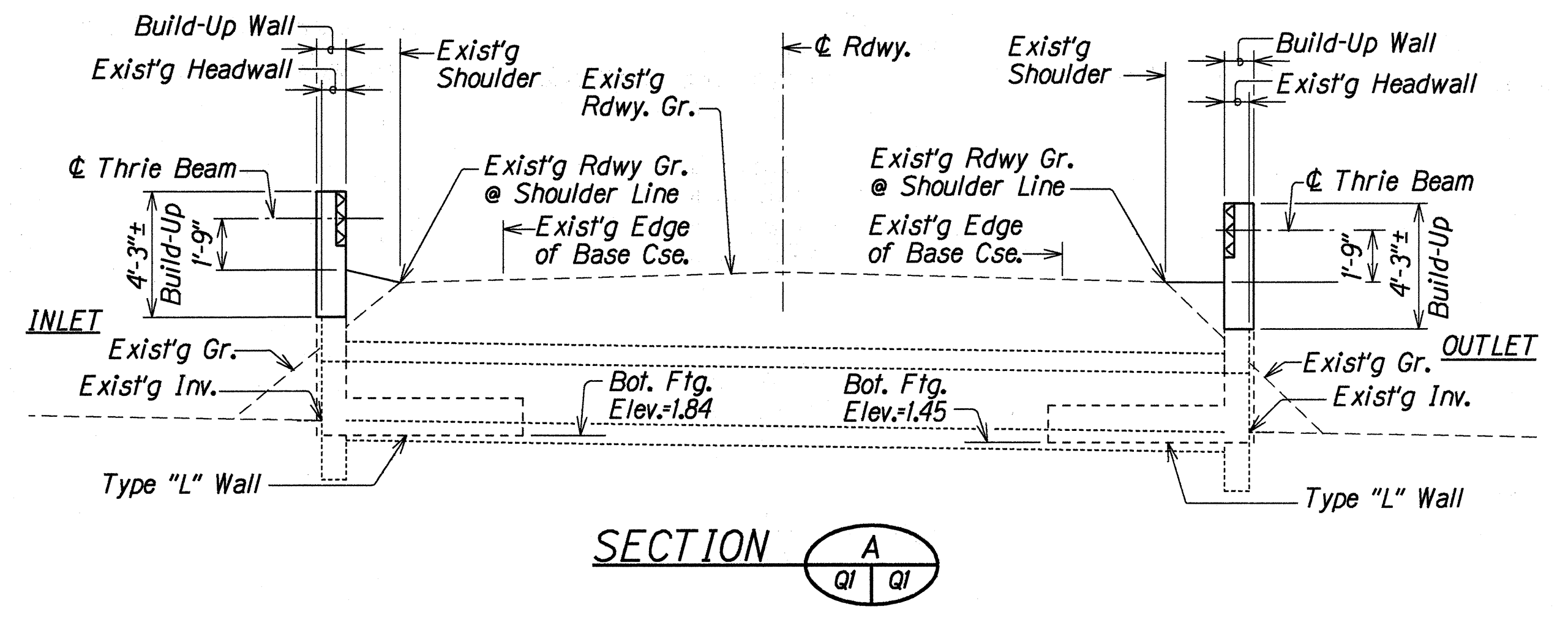
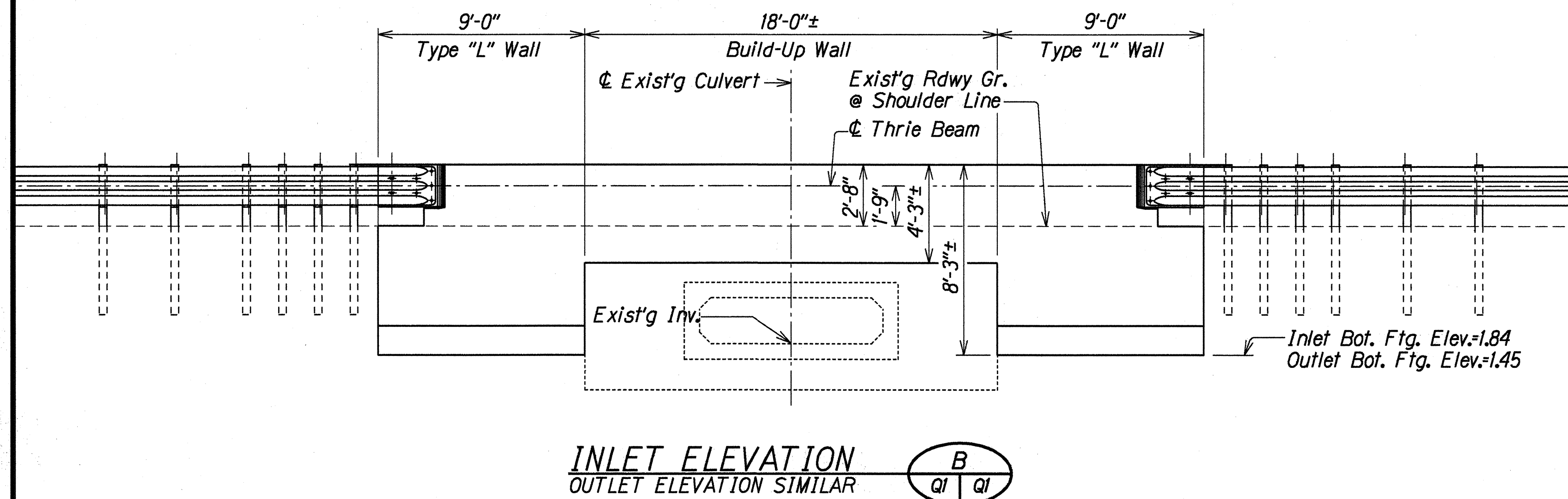
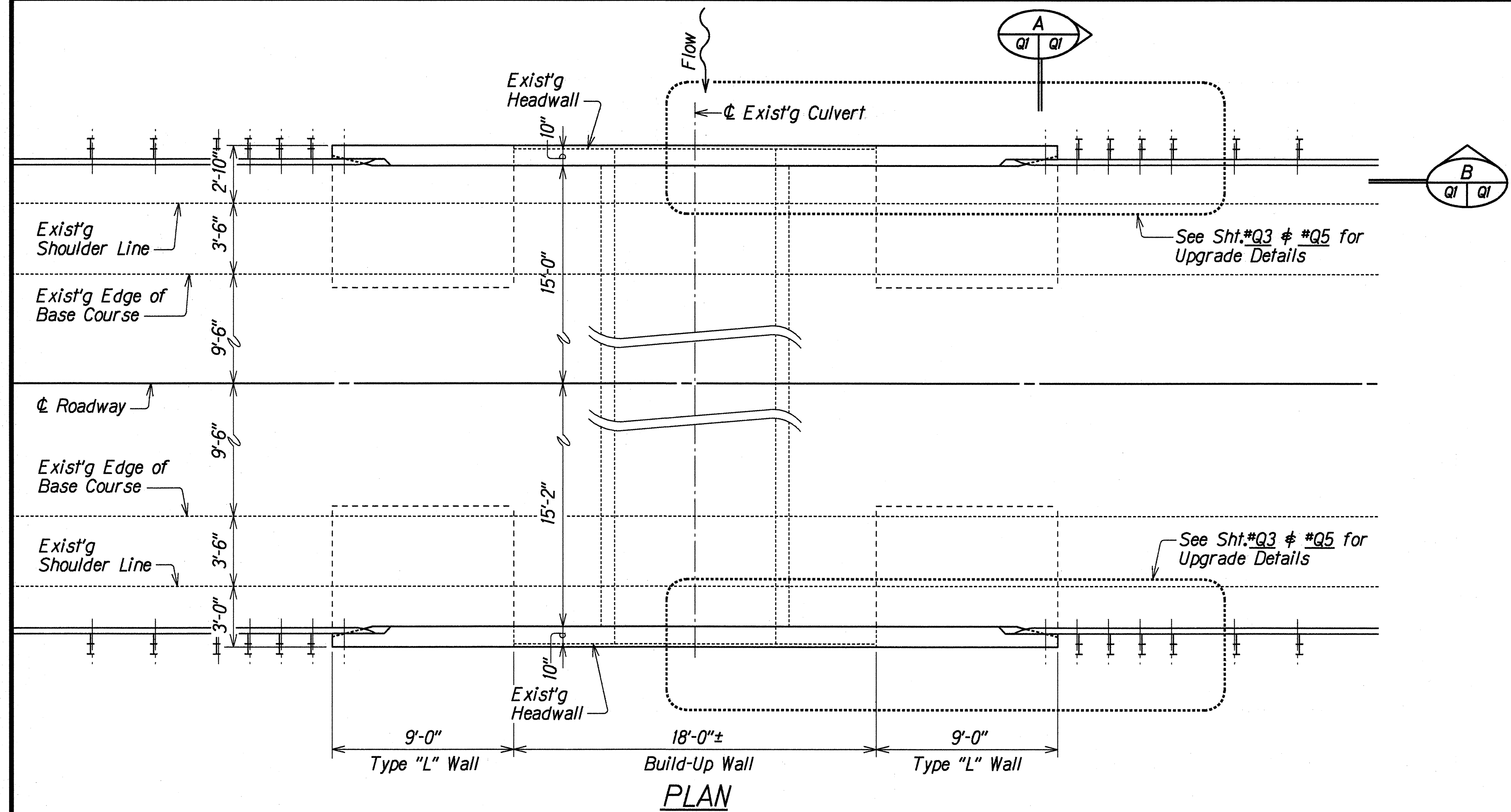
**DRAINAGE DETAILS**

KAMEHAMEHA V HIGHWAY RESURFACING  
Kamiloloa Bridge to Kapuokoolau  
Federal-Aid Project No. STP-0450(6)

Scale: As Shown      Date: April, 1995

SHEET No. 1 OF 1 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0450(6)        | 1995        | ADD.5 S-1 | 39           |



# EXISTING 8'x2' CONCRETE CULVERT AT STA. 130+45

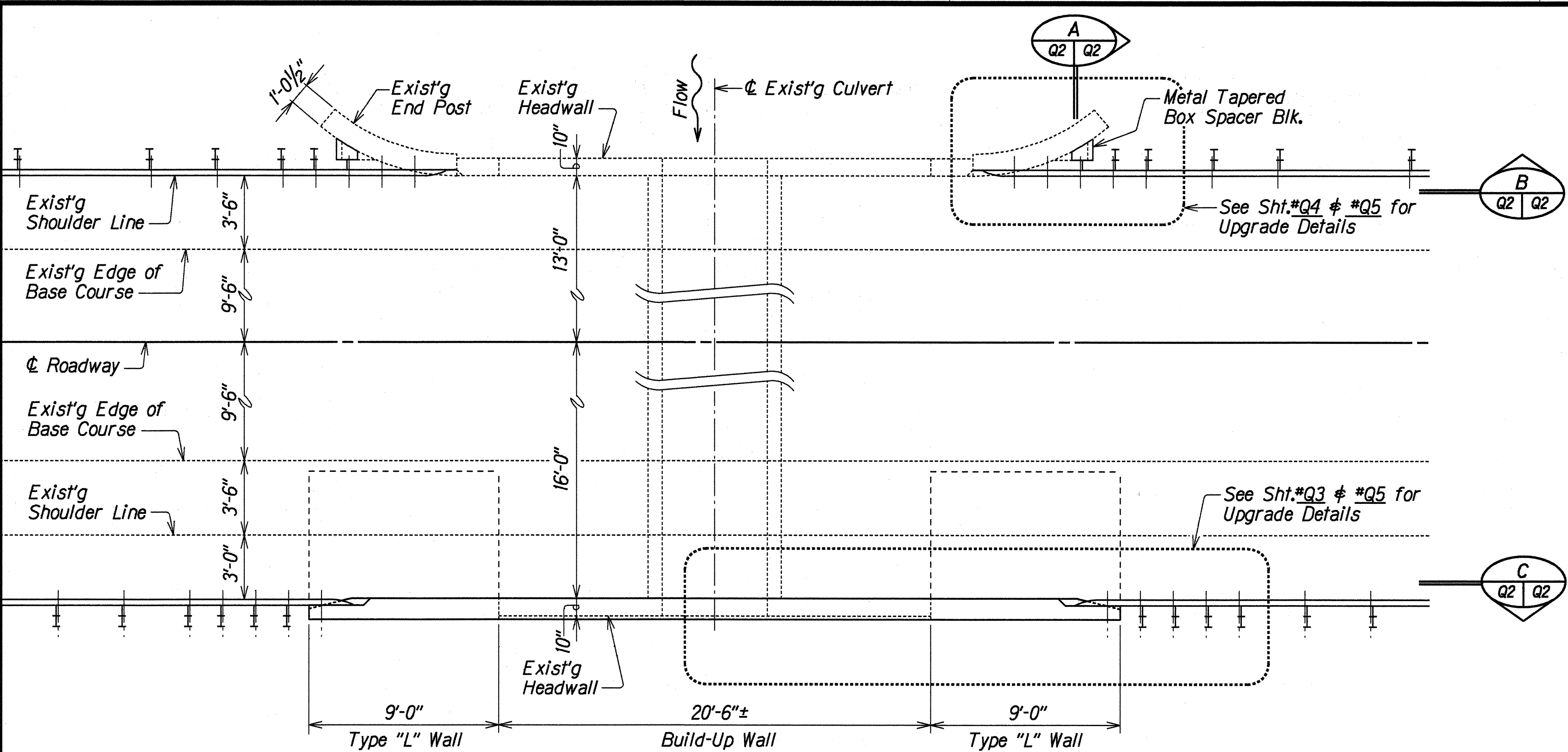
Scale: 1/4" = 1'-0"

|               |          |
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| ORIGINAL PLAN | DATE     |
| DESIGNED BY   | JUL 1995 |
| CHECKED BY    | JUL 1995 |
| NOTED BY      | JUL 1995 |
| DATE          | JUL 1995 |

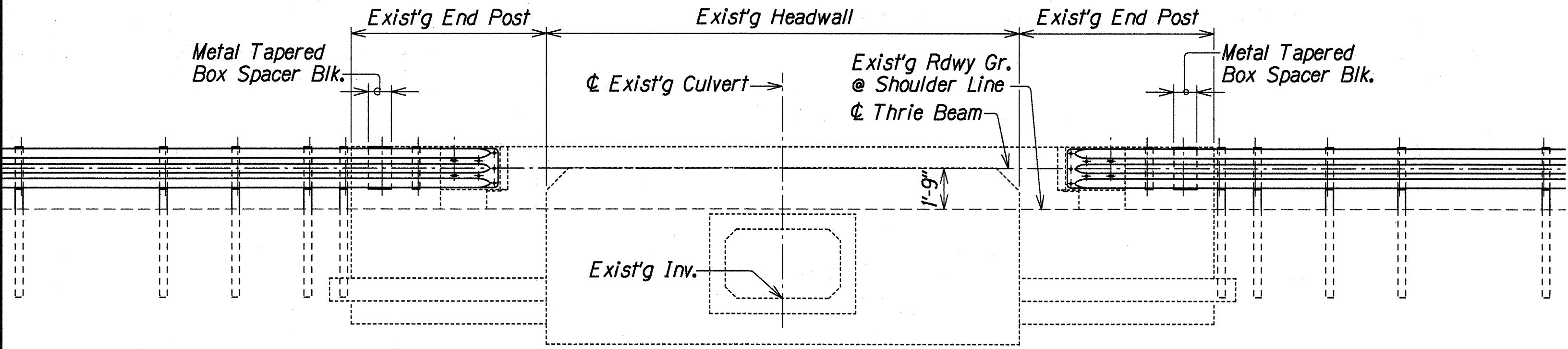
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|-------------------------------------------------------------------------------------------------------------------------|------------------|
| 6/13/95                                                                                                                 | Added sheet      |
| DATE                                                                                                                    | REVISION         |
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION                                                    |                  |
| CONCRETE CULVERT UPGRADE<br>EXISTING 8'x2' CONCRETE CULVERT @ STA. 130+45                                               |                  |
| PLAN AND ELEVATION<br>KAMEHAMEHA V HIGHWAY<br>Resurfacing Kanihiole Bridge to Kapuokoolau<br>FA Project No. STP-0450(6) |                  |
| Scale: As Noted                                                                                                         | Date: June, 1995 |
| SHEET No. Q1 OF 5 SHEETS                                                                                                |                  |

ADD.5 S-1

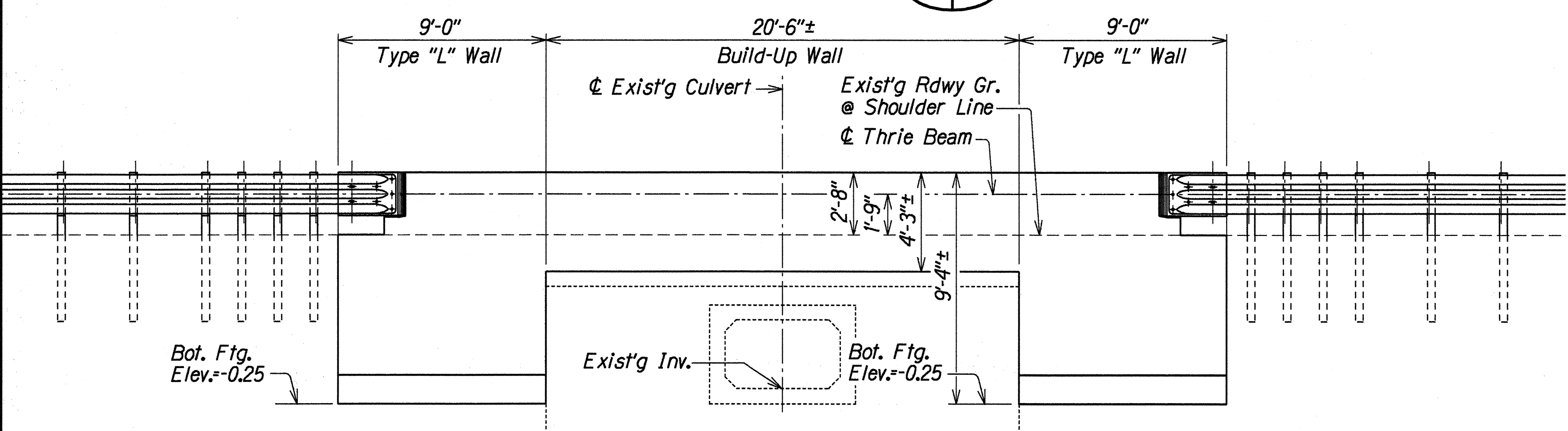
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0450(6)        | 1995        | ADD.5 S-2 | 39           |



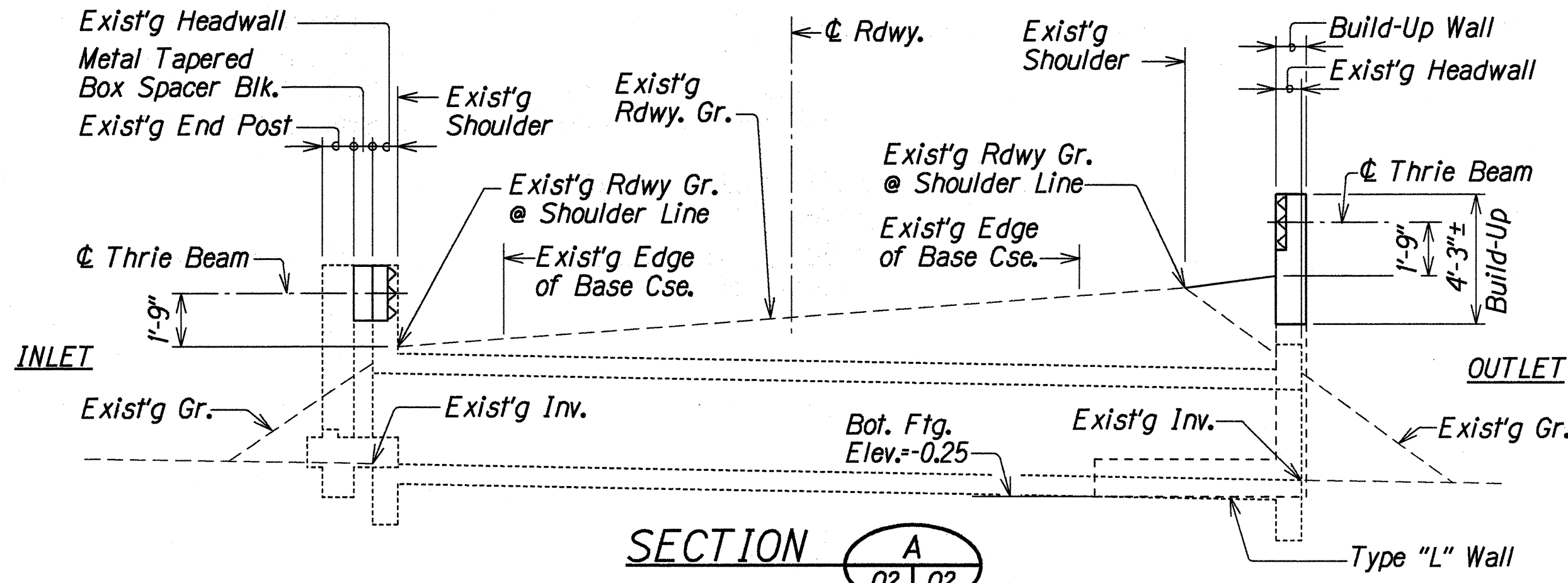
PLAN



INLET ELEVATION



OUTLET ELEVATION



SECTION A

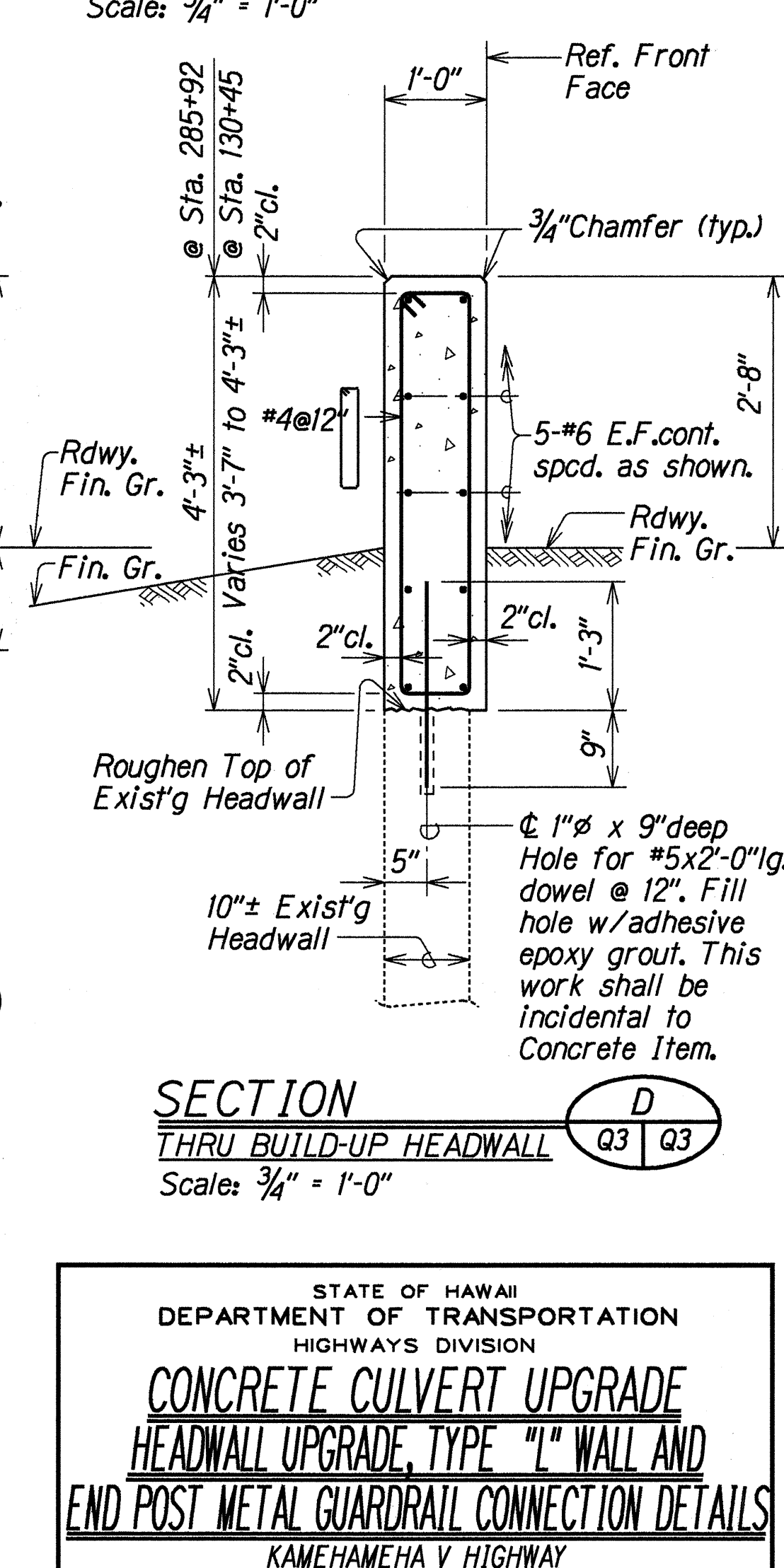
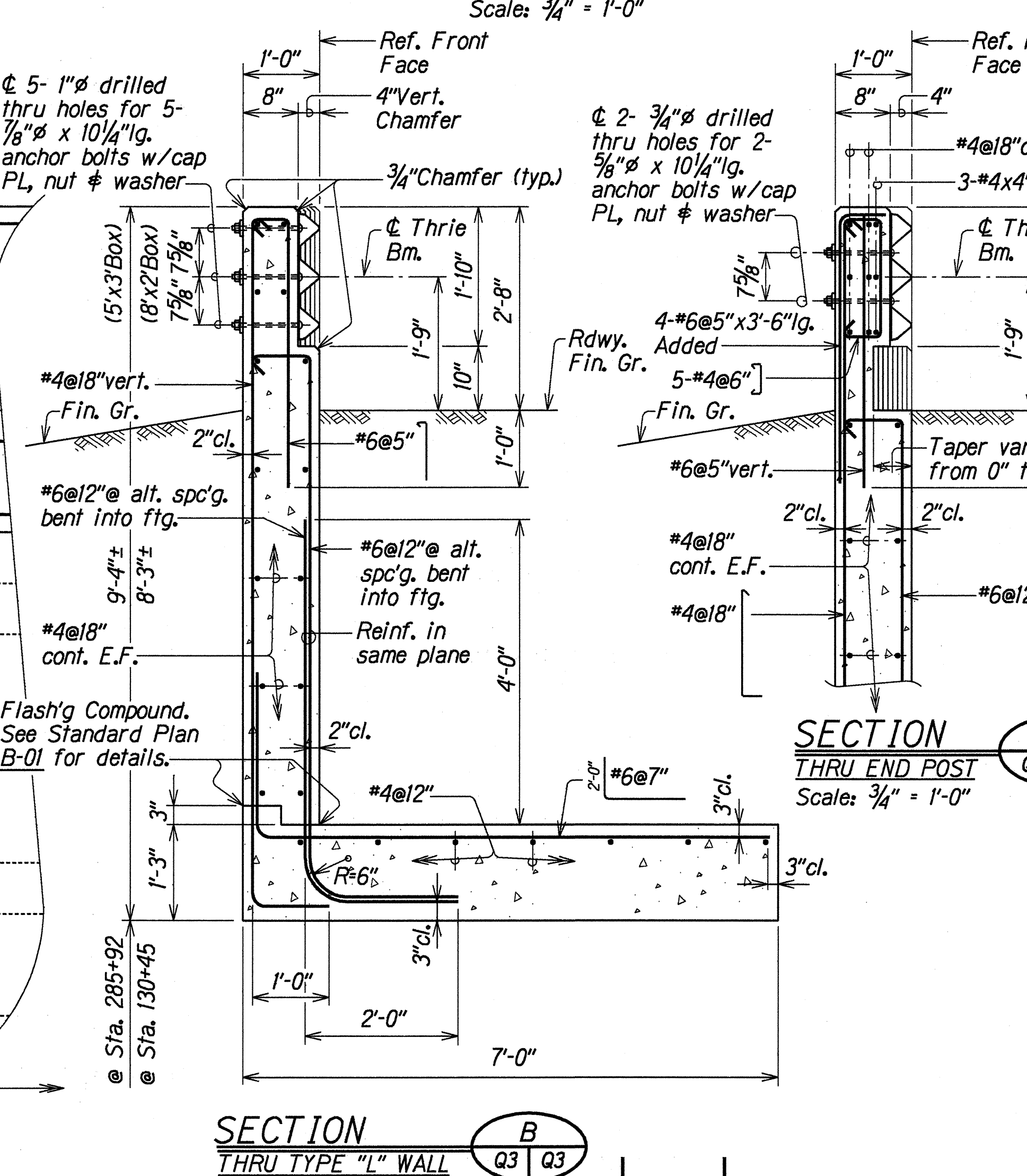
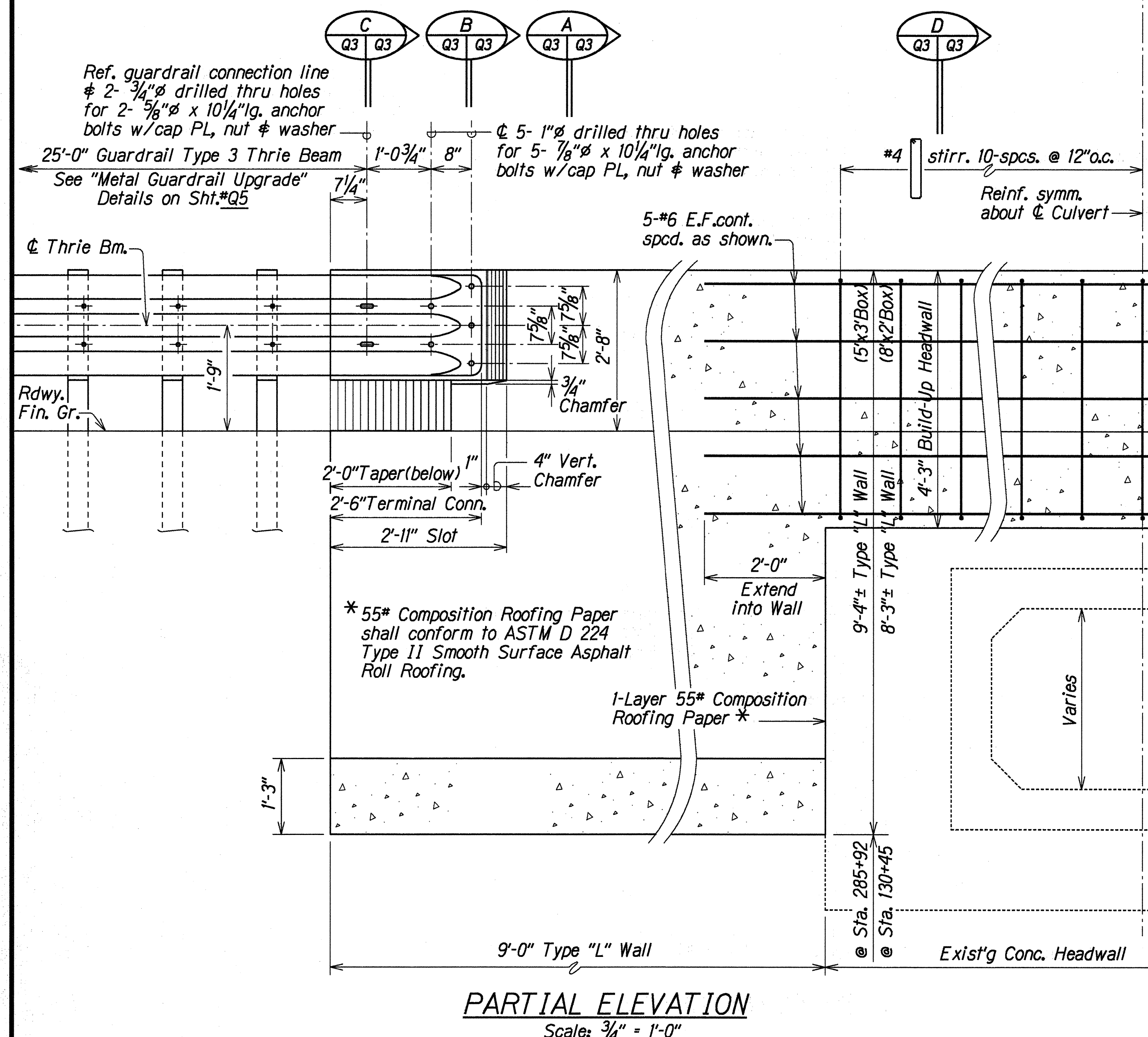
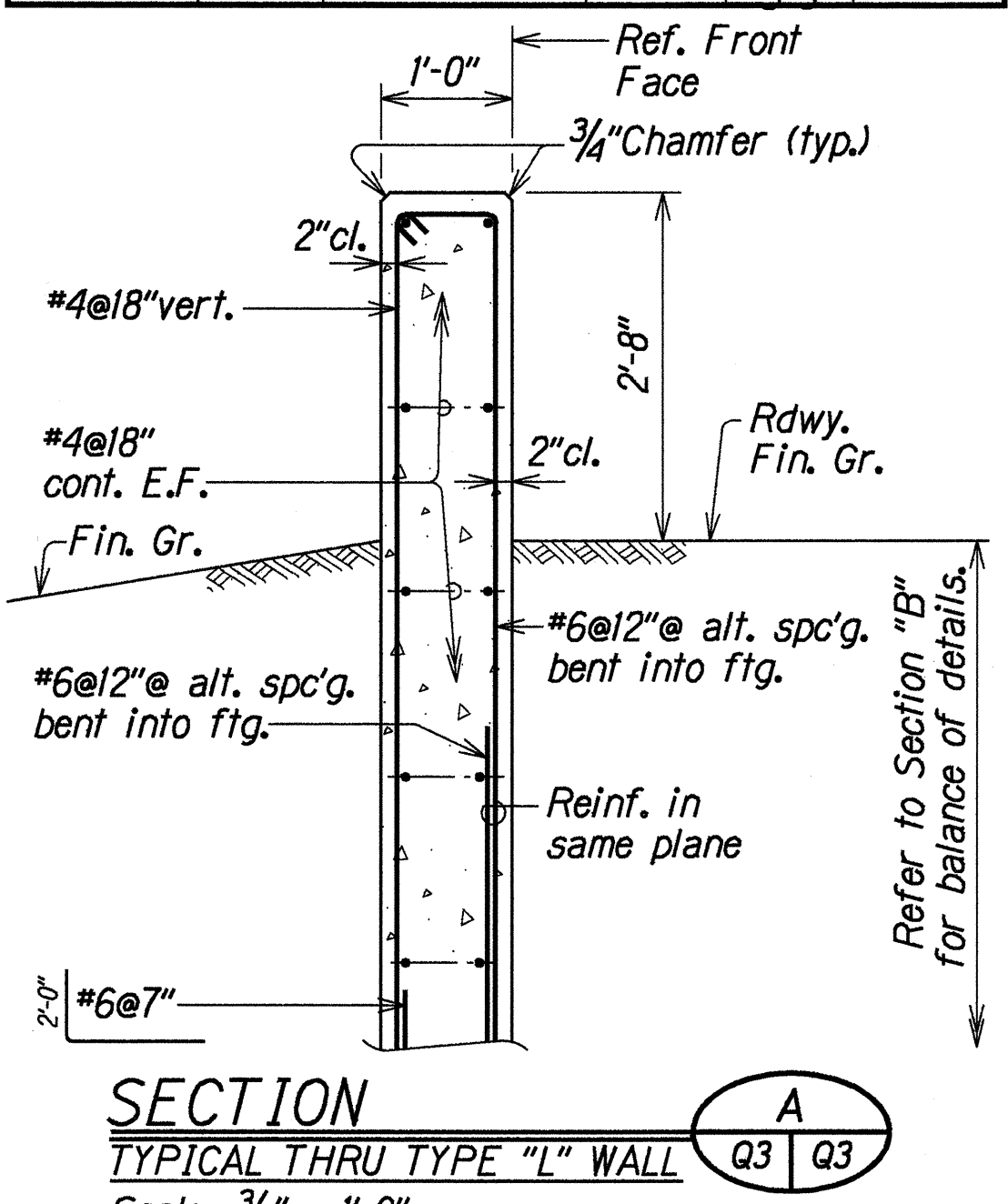
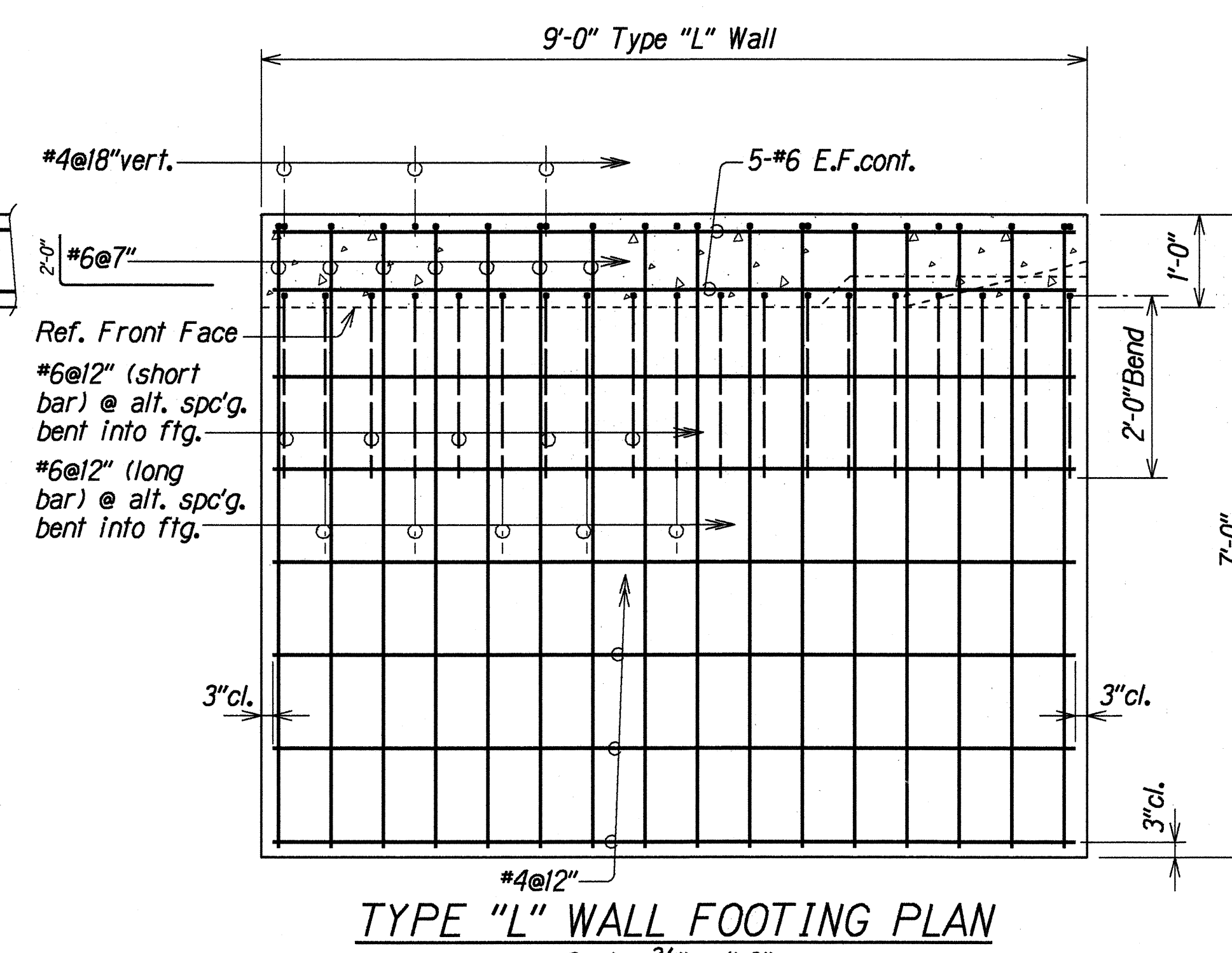
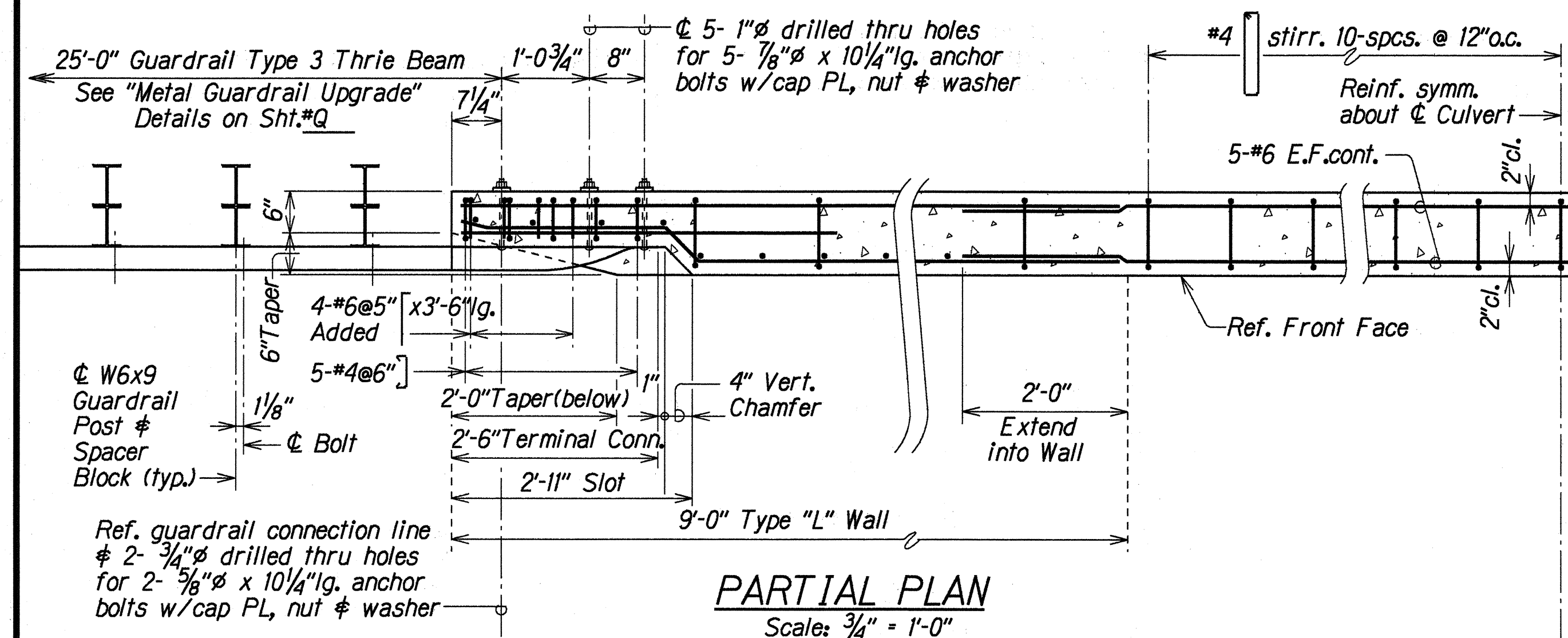
EXISTING 5'x3' CONCRETE CULVERT AT STA. 285+92

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

|               |          |
|---------------|----------|
| DATE          | JUL 1995 |
| DESIGNED BY   | JUL 1995 |
| DRAWN BY      | JUL 1995 |
| CHECKED BY    | JUL 1995 |
| ORIGINAL PLAN | JUL 1995 |
| NOTE BOOK     | JUL 1995 |
| QUANTITIES BY | JUL 1995 |
| CHECKED BY    | JUL 1995 |

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| 6/13/95                                                              | Added sheet      |
| DATE                                                                 | REVISION         |
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION |                  |
| CONCRETE CULVERT UPGRADE                                             |                  |
| EXISTING 5'x3' CONCRETE CULVERT @ STA. 285+92                        |                  |
| PLAN AND ELEVATION                                                   |                  |
| KAMEHAMEHA V HIGHWAY                                                 |                  |
| Resurfacing Kamiloloa Bridge to Kapuokoolau                          |                  |
| FA Project No. STP-0450(6)                                           |                  |
| Scale: As Noted                                                      | Date: June, 1995 |
| SHEET No. Q2 OF 5 SHEETS                                             |                  |

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0450(6)        | 1995        | ADD.5 S-3 | 39           |



|               |          |
|---------------|----------|
| DESIGNED BY   | DATE     |
| DRAWN BY      | JUL 1995 |
| CHECKED BY    | JUL 1995 |
| NOTED BY      | JUL 1995 |
| QUANTITIES BY | JUL 1995 |
| ORIGINAL PLAN | JUL 1995 |

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
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**CONCRETE CULVERT UPGRADE  
HEADWALL UPGRADE, TYPE "L" WALL AND  
END POST METAL GUARDRAIL CONNECTION DETAILS**

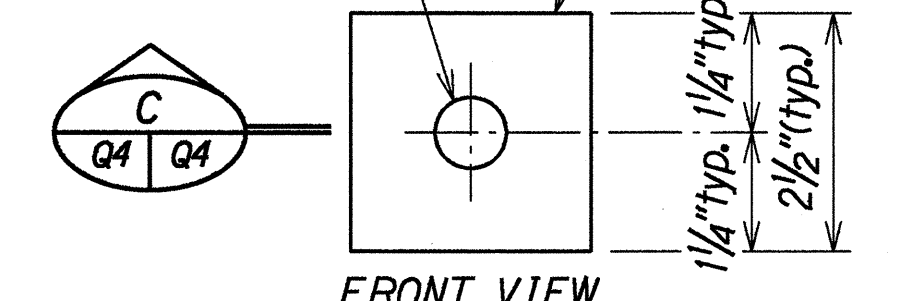
KAMEHAMEHA V HIGHWAY  
Resurfacing Kamiloloa Bridge to Kapuokoolau  
FA Project No. STP-0450(6)

Scale: As Noted Date: June, 1995

SHEET No. Q3 OF 5 SHEETS

Technical drawing showing a cross-section of a bolt and nut assembly. The drawing includes the following dimensions and notes:

- Top dimension:  $2\frac{1}{2}"$  (typ.)
- Top note: Cap PL  $\neq$  Hole
- Right side dimension:  $\frac{1}{2}"$  typ.
- Bottom note: Provide Flat Bearing Surface for Cap PL on Rear Face of Exist'g End Post Perpendicular to Bolt (typ.)



**DETAIL**  
Not to Scale

Typ.  $\frac{1}{4}$ "thk. Steel PL (typ.)

Ref. Front Face of End Post

Typ. at Corners. See Detail

$\frac{1}{4}$ "thk. Steel PL (typ.)

$\frac{1}{8}$ "  $\frac{1}{8}$ "

6" 6"

1'-0"

PLAN

Front PL 1'-0"

Back PL (on curve) 1'-2 $\frac{1}{16}$ "

$\frac{1}{4}$ "thk. Steel PL (typ.)

1'-9 $\frac{1}{2}$ "

5 $\frac{3}{4}$ " 5" 5" 5 $\frac{3}{4}$ "

$\phi$  4 1 $\frac{3}{16}$ " $\phi$  Holes in Front PL for Post Bolts.

1 $\frac{1}{8}$ " 1 $\frac{1}{8}$ "

ELEVATION

[illegible]

Technical drawing of a bridge deck cross-section showing the removal of existing concrete and the installation of a new metal tapered box spacer block and W6x9 beam.

**Dimensions and Annotations:**

- Top:**
  - $1'-0\frac{1}{2}" \pm$  Exist'g End Post
  - Varies from  $4\frac{3}{16}"$  to  $1'-0\frac{1}{8}"$
- Left Side:**
  - Remove  $\phi$  Grind Smooth Exist'g Intermediate Conc. Support Block
  - 5" (vertical dimension)
  - 5" (vertical dimension)
- Center:**
  - $\phi$  Thrie Bm.
- Right Side:**
  - Ref. Front Face
  - 7 $\frac{5}{8}"$  (vertical dimension)
  - W6x9x1'-9 $\frac{1}{2}"$  Ig. Met. Spr. Blk.
  - 1'-9" (vertical dimension)
- Bottom:**
  - Fin. Rdwy. Grade
- Internal Labels:**
  - Metal Tapered Box Spacer Block. See Detail
  - Remove Exist'g W6x9 x 1'-1 $\frac{1}{2}"$  Ig. Mtl. Spr. Blk.  $\phi$  Type 3 "W" Beam

Technical drawing of a bridge pier cross-section showing dimensions and construction details. The drawing includes the following annotations:

- Top Dimensions:**
  - $1'-0\frac{1}{2}" \pm$  Exist'g End Post
  - $3\frac{3}{8}"$
  - $3\frac{1}{4}"$  Chamfer
- Vertical Dimensions (Left Side):**
  - $7\frac{5}{8}"$
  - $7\frac{5}{8}"$
- Vertical Dimensions (Right Side):**
  - $3\frac{3}{8}"$
  - $1'-2\frac{1}{4}"$  Exist'g Slot
  - $1'-10"$  New Slot
  - $3\frac{3}{8}"$
  - $1'-9"$
- Internal Features:**
  - $\phi$  Thrie Bm.
  - $3\frac{1}{4}"$  Chamfer
  - Fin. Rdwy. Grade
- Notes:**
  - Remove Exist'g Type 3 "W" Beam Terminal Connector & Bolts \*
  - $\phi$  5-  $1"-1\phi$  drilled thru holes for 5-  $\frac{7}{8}"\phi$  x  $1'-3\frac{1}{2}"$ lg. anchor bolts w/cap PL, nut & washer
  - Remove hatched portion of Exist'g End Post Slab

|                  |                   |          |
|------------------|-------------------|----------|
| ORIGINAL<br>PLAN | SURVEY PLOTTED BY | DATE     |
| NOTE BOOK        | DRAWN BY          | JUN 1995 |
|                  | DESIGNED BY       | JUN 1995 |
|                  | QUANTITIES BY     | JUN 1995 |
|                  | CHECKED BY        | JUN 1995 |

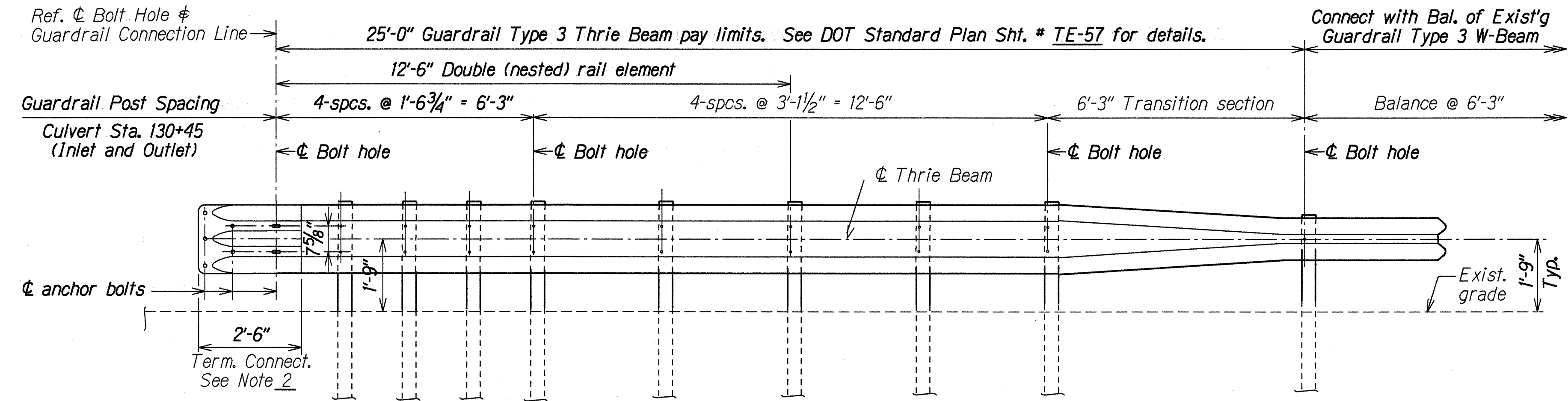
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

CONCRETE CULVERT UPGRADE  
END POST METAL GUARDRAIL CONNECTION DETAILS

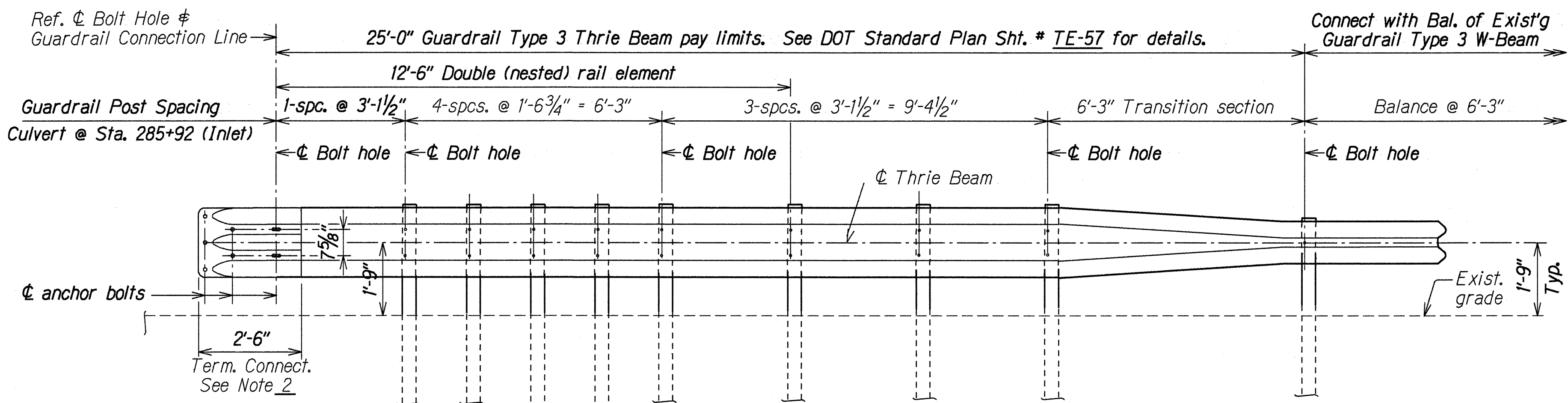
KAMEHAMEHA V HIGHWAY  
Resurfacing Kamiloloa Bridge to Kapuokoolau  
FA Project No. STP-0450(6)

|                                                                                                  |             |                            |                  |
|--------------------------------------------------------------------------------------------------|-------------|----------------------------|------------------|
| <br>6/13/95 | Added sheet | FA Project No. STP-0450(6) |                  |
|                                                                                                  |             | Scale: As Noted            | Date: June, 1995 |
| DATE                                                                                             | REVISION    | SHEET No. Q4 OF 5 SHEETS   |                  |

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0450(6)        | 1995        | ADD.5 S-5 | 39           |



AT EXISTING 8'x2' CONCRETE CULVERT AT STA. 130+45

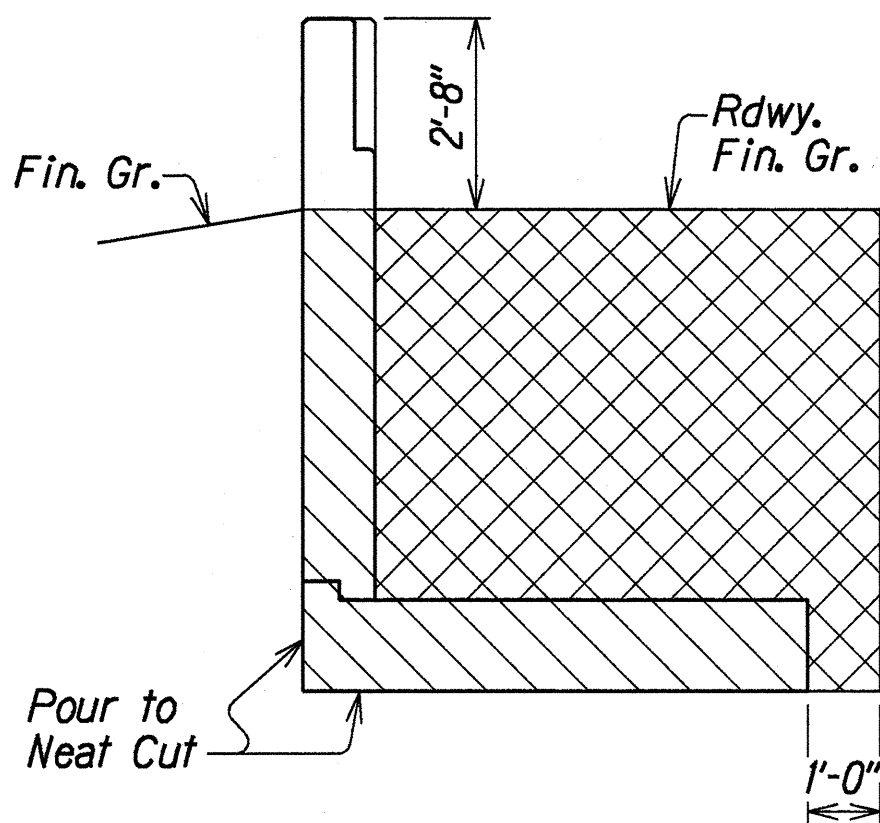


AT EXISTING 5'x3' CONCRETE CULVERT AT STA. 295+92

TYPICAL TYPE 3 THRIE BEAM METAL GUARDRAIL UPGRADE  
Scale: 1/2"=1'-0"

NOTES:

- 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 shall be incidental to the metal guardrail and will not be paid for separately.
- See "DOT Standard Plan" Sht. #TE-57 for guardrail Type 3 thrie beam details and Sht. #TE-50 & #TE-51 for W beam metal guardrail details. Lap terminal connector and rail element in direction of traffic to prevent snagging.
- Where double (nested) beam occur, 12" "Back-up Plate" not required.
- Drilling of through holes, shall be filled with mastic during placement of bolts - except as noted otherwise.
- Anchor bolt imbedment length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max.) is attained.



- denotes Limits of Structure Excavation
- denotes Limits of Structure Backfill

LIMITS OF STRUCTURE  
EXCAVATION AND BACKFILL  
Not to Scale

|               |          |
|---------------|----------|
| DESIGNED BY   | DATE     |
| DRAWN BY      | JUN 1995 |
| CHECKED BY    | JUN 1995 |
| NOTED BY      | JUN 1995 |
| QUANTITIES BY | JUN 1995 |
| ORIGINAL PLAN | JUN 1995 |

|                                                                                                          |                  |
|----------------------------------------------------------------------------------------------------------|------------------|
| 6/13/95                                                                                                  | Added sheet      |
| DATE                                                                                                     | REVISION         |
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION                                     |                  |
| CONCRETE CULVERT UPGRADE<br>TYPICAL TYPE 3 THRIE BEAM GUARDRAIL<br>UPGRADE AND EXPANSION SECTION DETAILS |                  |
| KAMEHAMEHA V HIGHWAY<br>Resurfacing Kamiloloa Bridge to Kapukoolau<br>FA Project No. STP-0450(6)         |                  |
| Scale: As Noted                                                                                          | Date: June, 1995 |
| SHEET No. Q5 OF 5 SHEETS                                                                                 |                  |