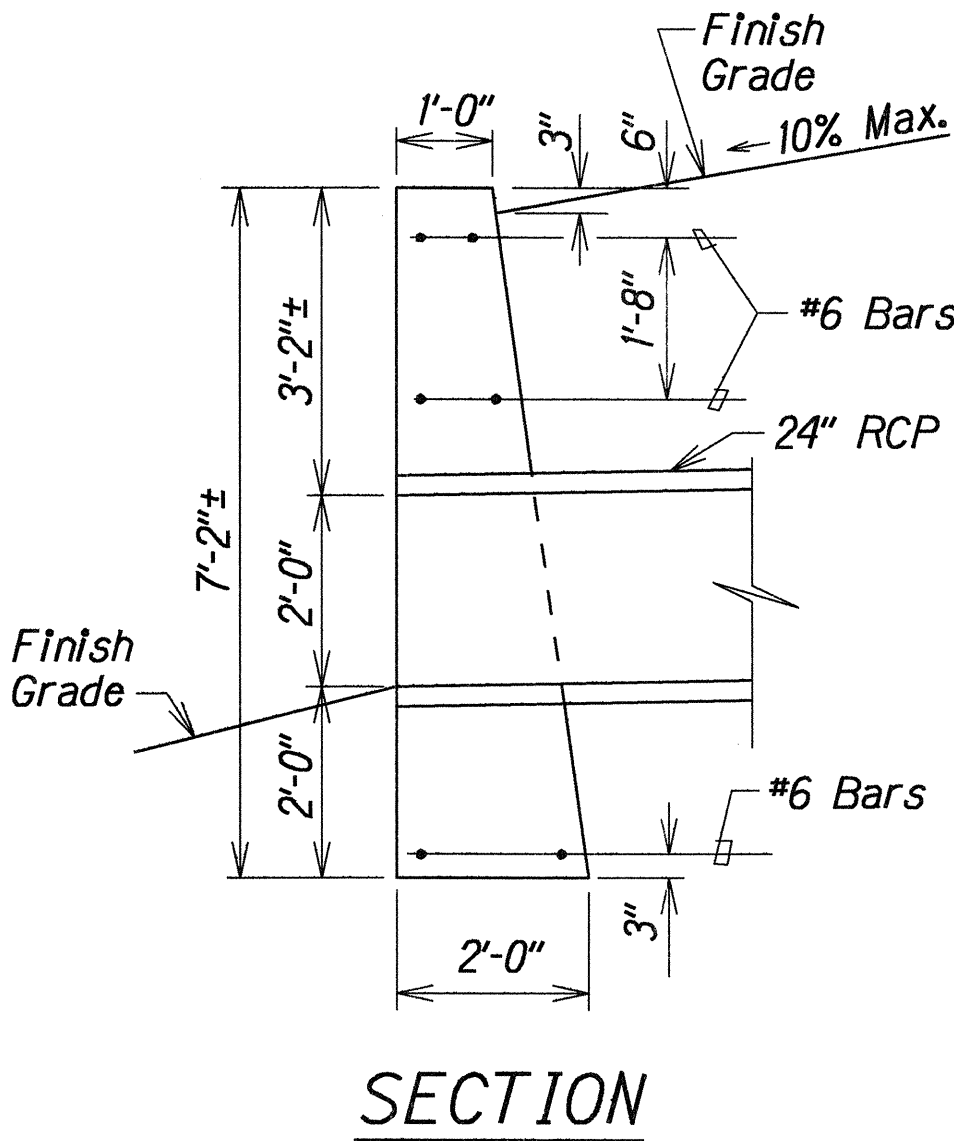
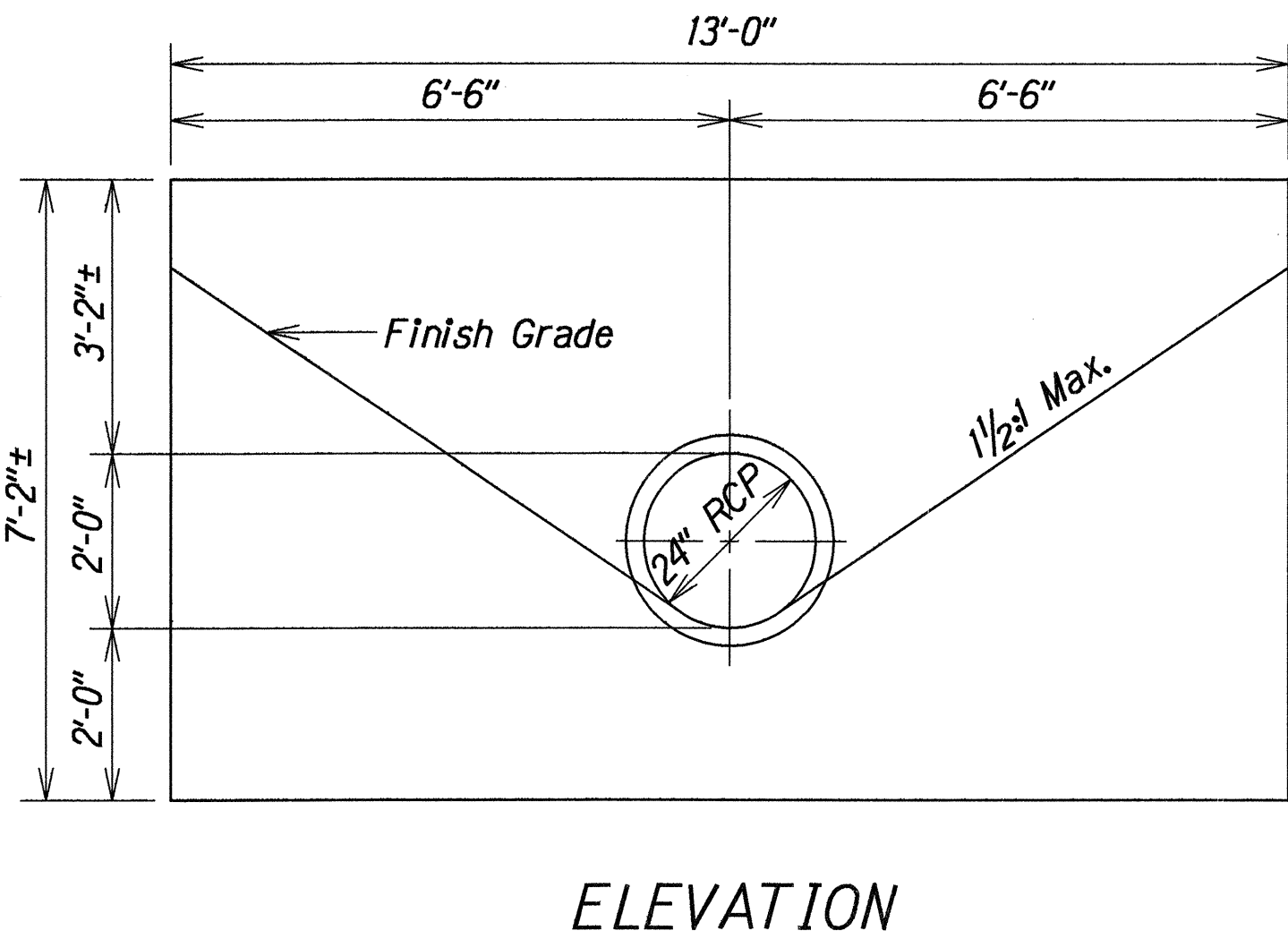
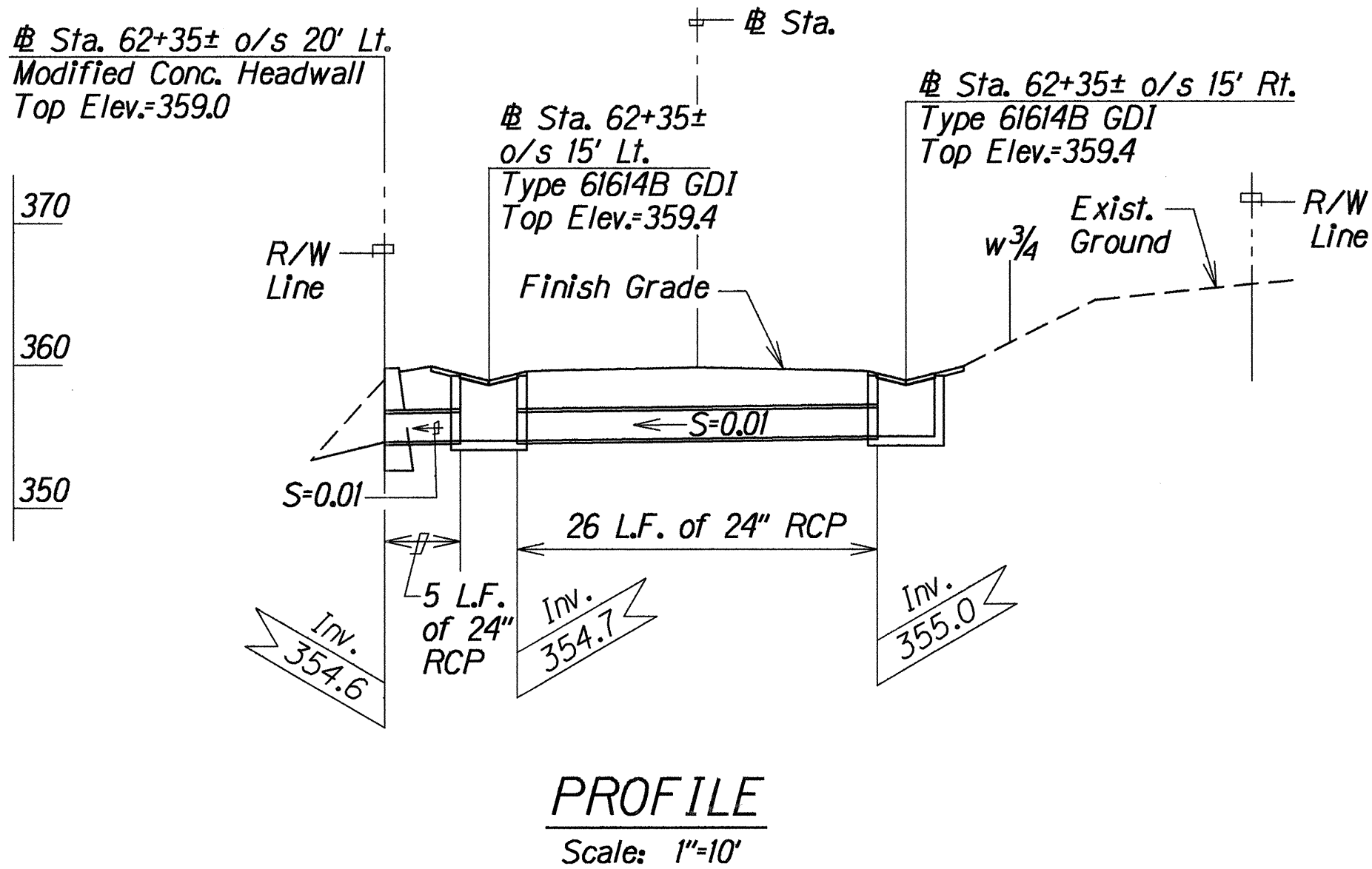
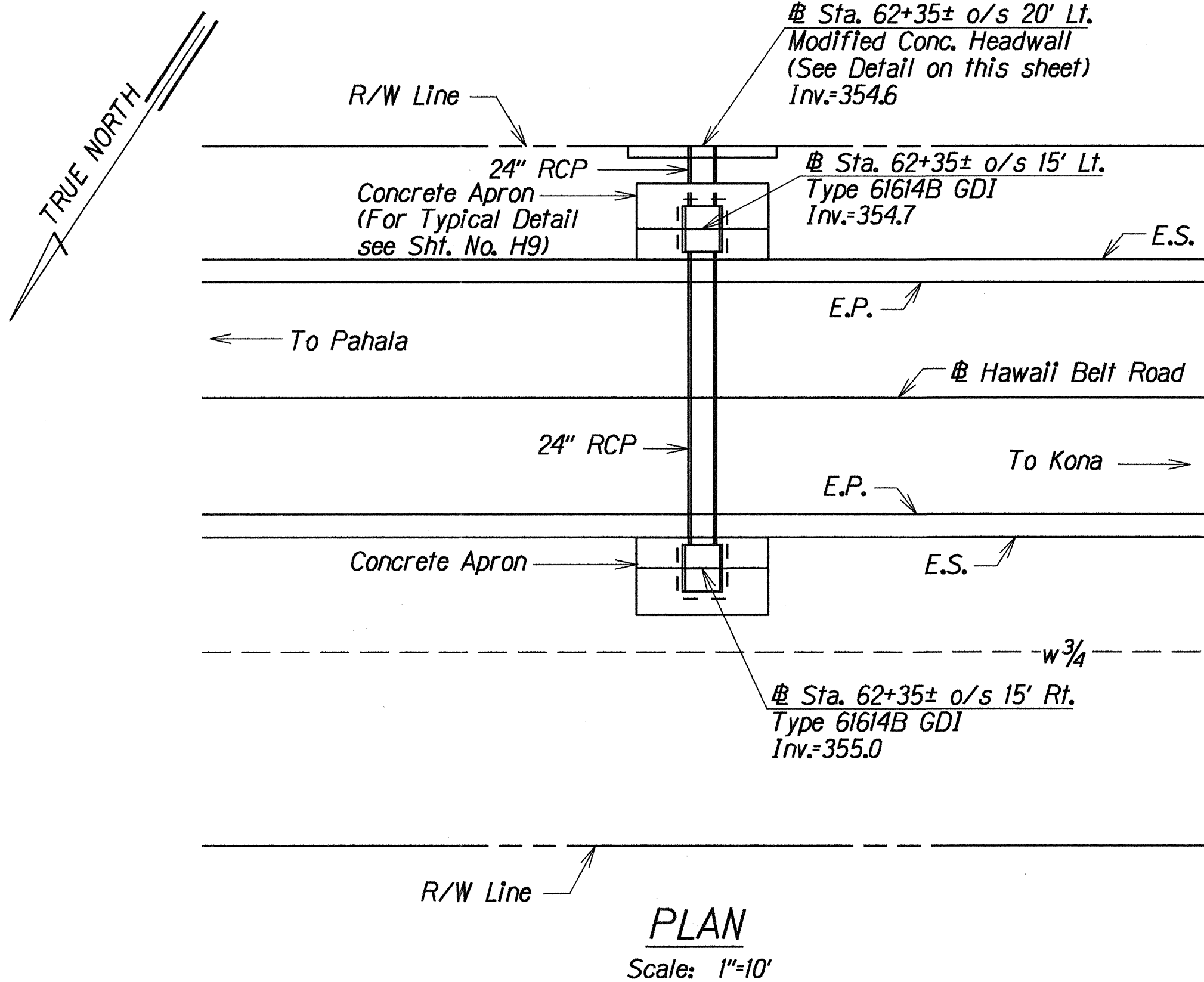


| FED. ROAD DIST. NO. | STATE | PROJ. NO.   | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 28        | 55           |

# DRAINAGE NOTES:

- Existing drainage systems will be functional at all times during construction. The Contractor is to furnish materials, equipment, labor, tools and incidentals necessary to maintain flow. The cost for this work shall be incidental to the various Contract Items.
- The Contractor shall verify the locations of all existing culverts and utilities in the field. Any existing culverts and utilities damaged during construction shall be repaired or replaced by the Contractor at his own expense.
- Demolishing, removing, and disposing existing inlet structure at Baseline Station 184+35± o/s 25' Rt. shall not be paid for separately, but shall be considered incidental to the various Contract Items.
- Arch culvert connection to existing concrete channel at Baseline Station 153+43± will not be paid for separately, but shall be considered incidental to the various Contract Items.
- For Culvert Trench Detail, see Sht. No. H9.
- Concrete shall be Class A unless otherwise noted.
- For added reinforcing around culverts at grated drop inlets, see Standard Plan H-04.
- Chamfer all exposed concrete edges 1".
- Reinforcing Steel for Concrete Jacket shall conform to the requirements of ASTM 615-Grade 60.
- Drainage improvements at Baseline Station 62+35± shall be located at the low point. Exact location of the improvements shall be determined by the Engineer in the field.
- Exact alignment of Riprap Ditch at Baseline Station 273+26 shall be determined by the Engineer in the field.
- Inverts of GDI's and Concrete Headwalls at Baseline Stations 184+35±, 213+00, 264+00 and 360+00 shall be determined in the field.
- For Summary of Estimated Quantities, see Sht. No. H9.
- Asphalt Base Course (ACB) as noted on Sht. Nos. H2, H4, H5 and H9 shall be either Plant Mix Asphalt Concrete Base Course, Recycled Plant Mix Asphalt Concrete Base Course or Plant Mix Glassphalt Concrete Base Course. Selection will be based on the least expensive base course alternative.



## **MODIFIED CONCRETE HEADWALL DETAILS** Scale: 1/2"=1'-0"

## **DRAINAGE IMPROVEMENTS AT STA. 62+35± (Proj. No. P-1942)**

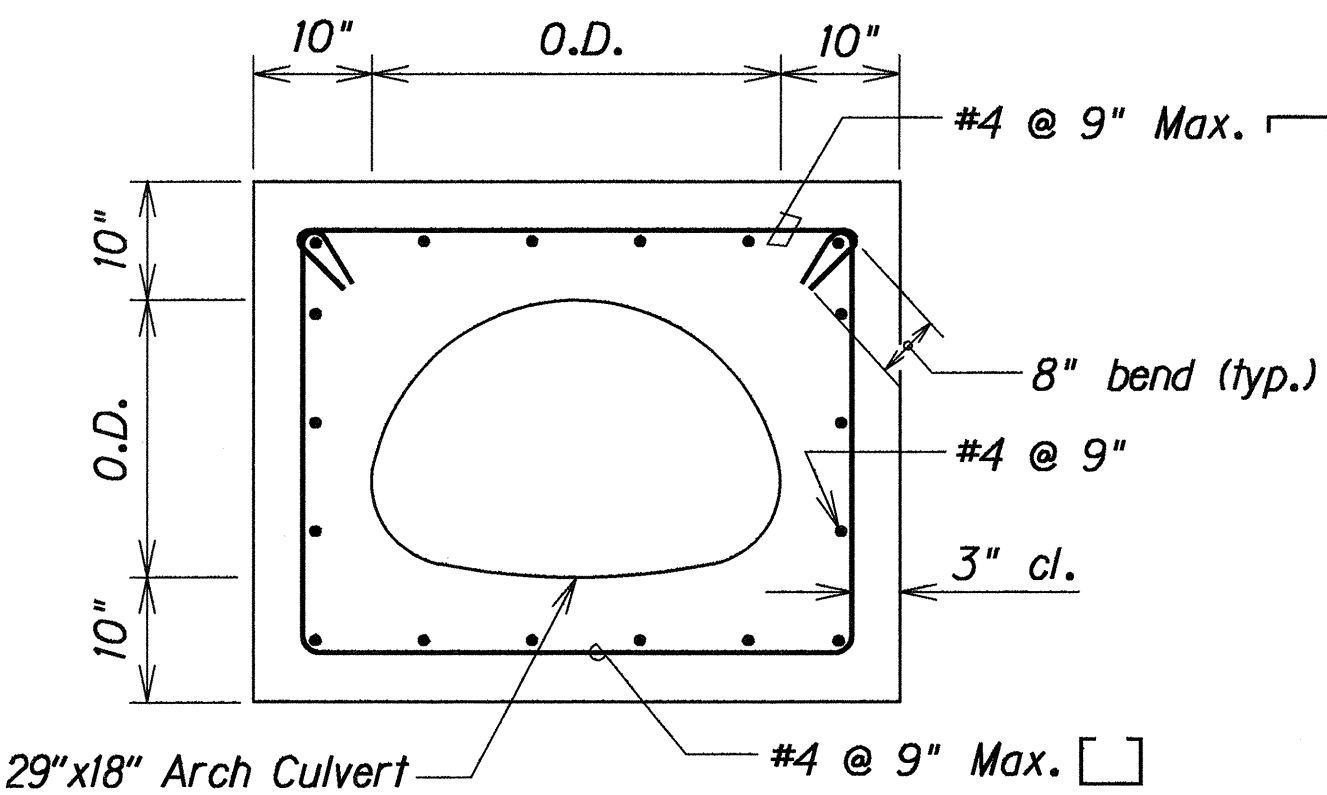
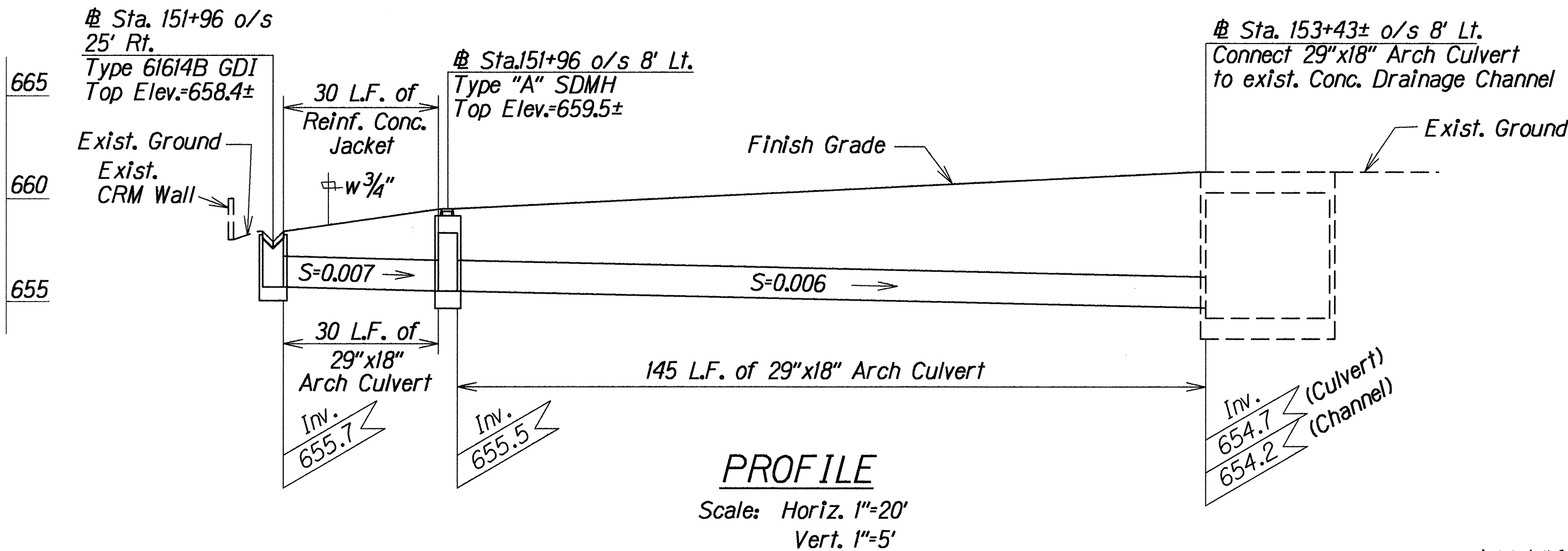
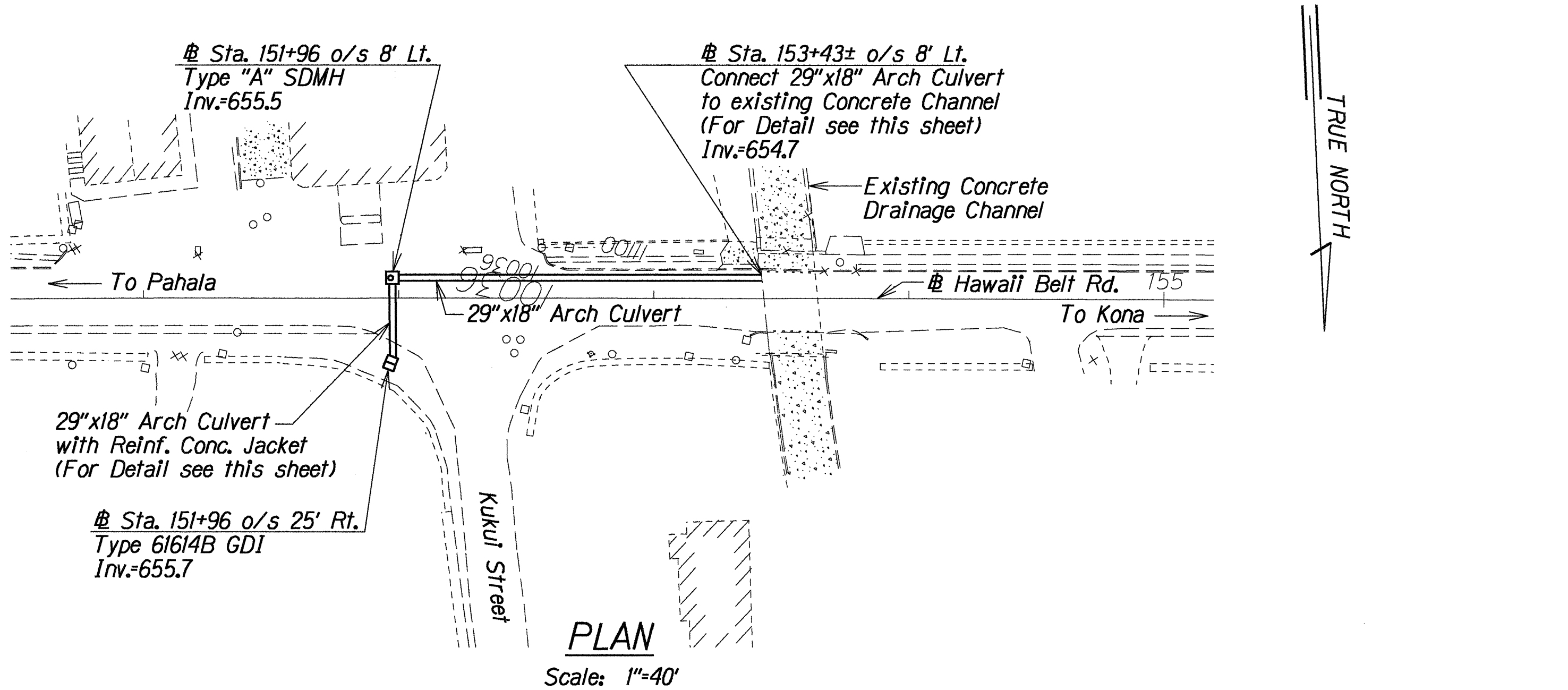
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|---------------|-------------------|------|
| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
| NOTE BOOK     | DRAWN BY          |      |
|               | DESIGNED BY       |      |
|               | CHECKED BY        |      |
|               |                   |      |
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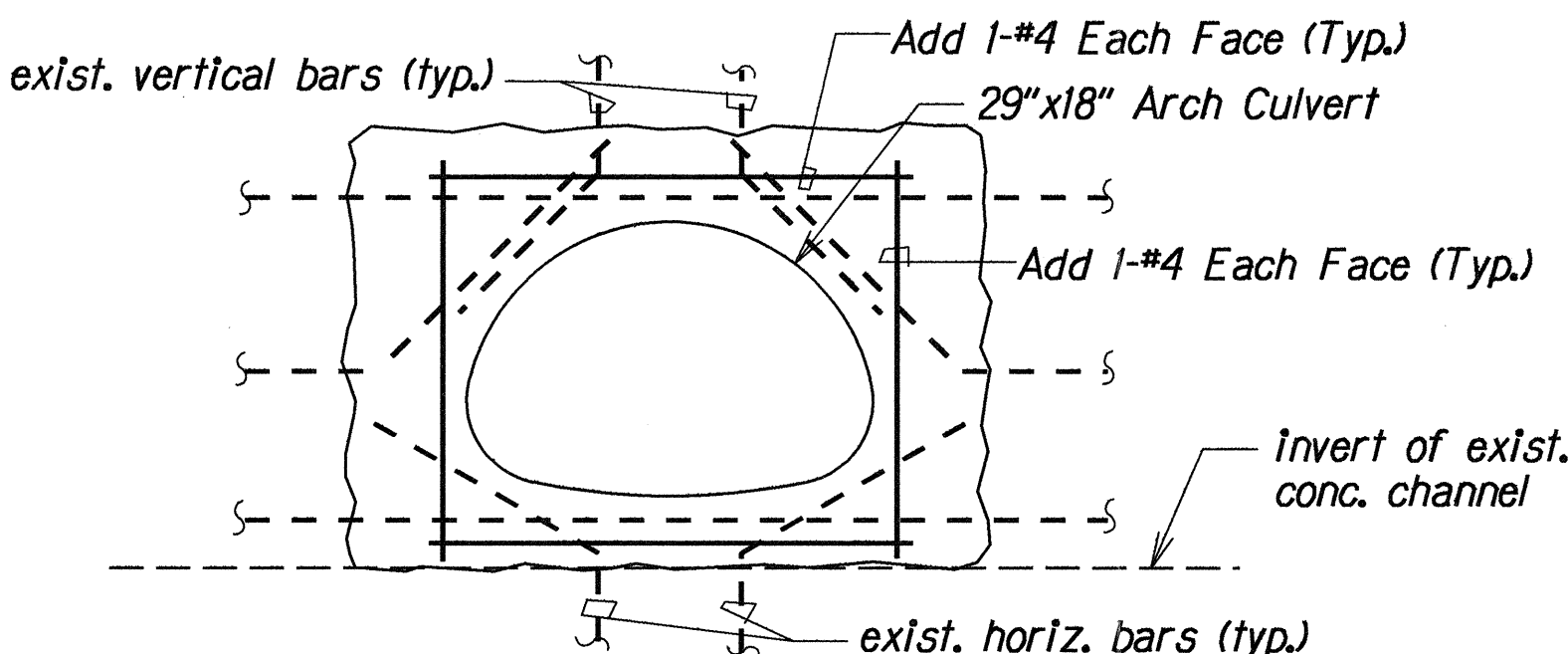
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE PLANS**  
  
HAWAII BELT RD. DRAINAGE EXTENSIONS  
Kahuku to Honuapo  
PROJECT NO. 11EF-02-93M  
Scale: As Shown Date: May 1993  
SHEET No. HI OF 9 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO.   | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 29        | 55           |

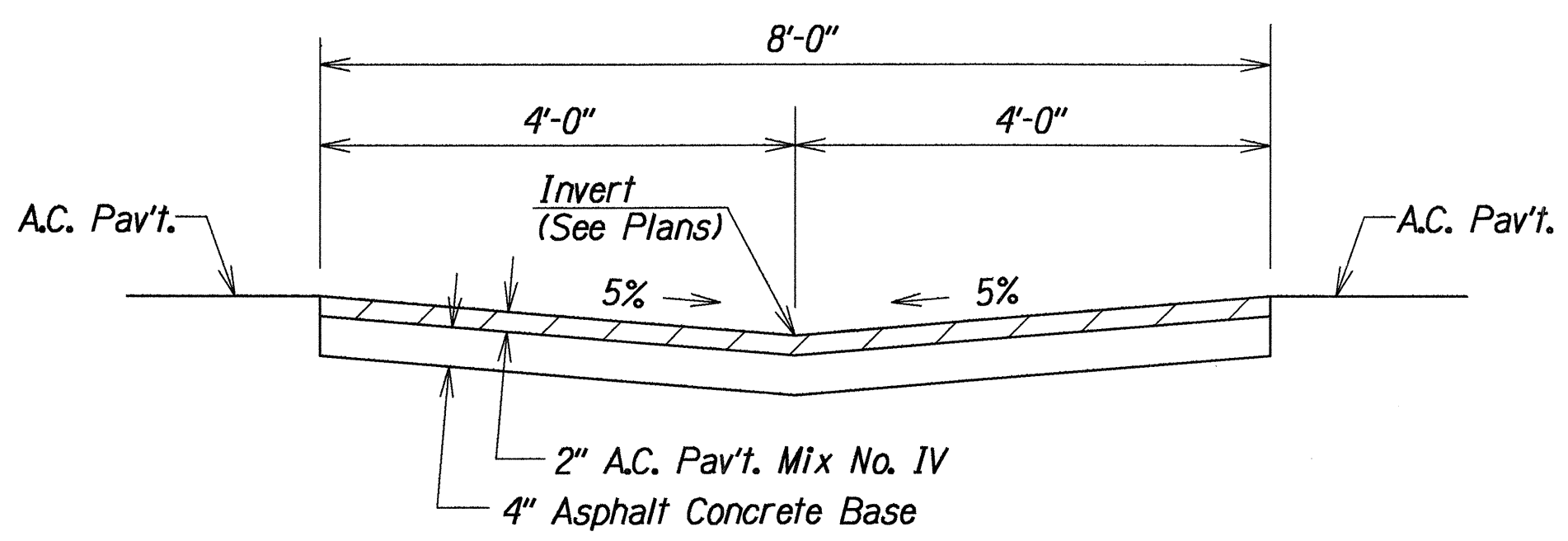
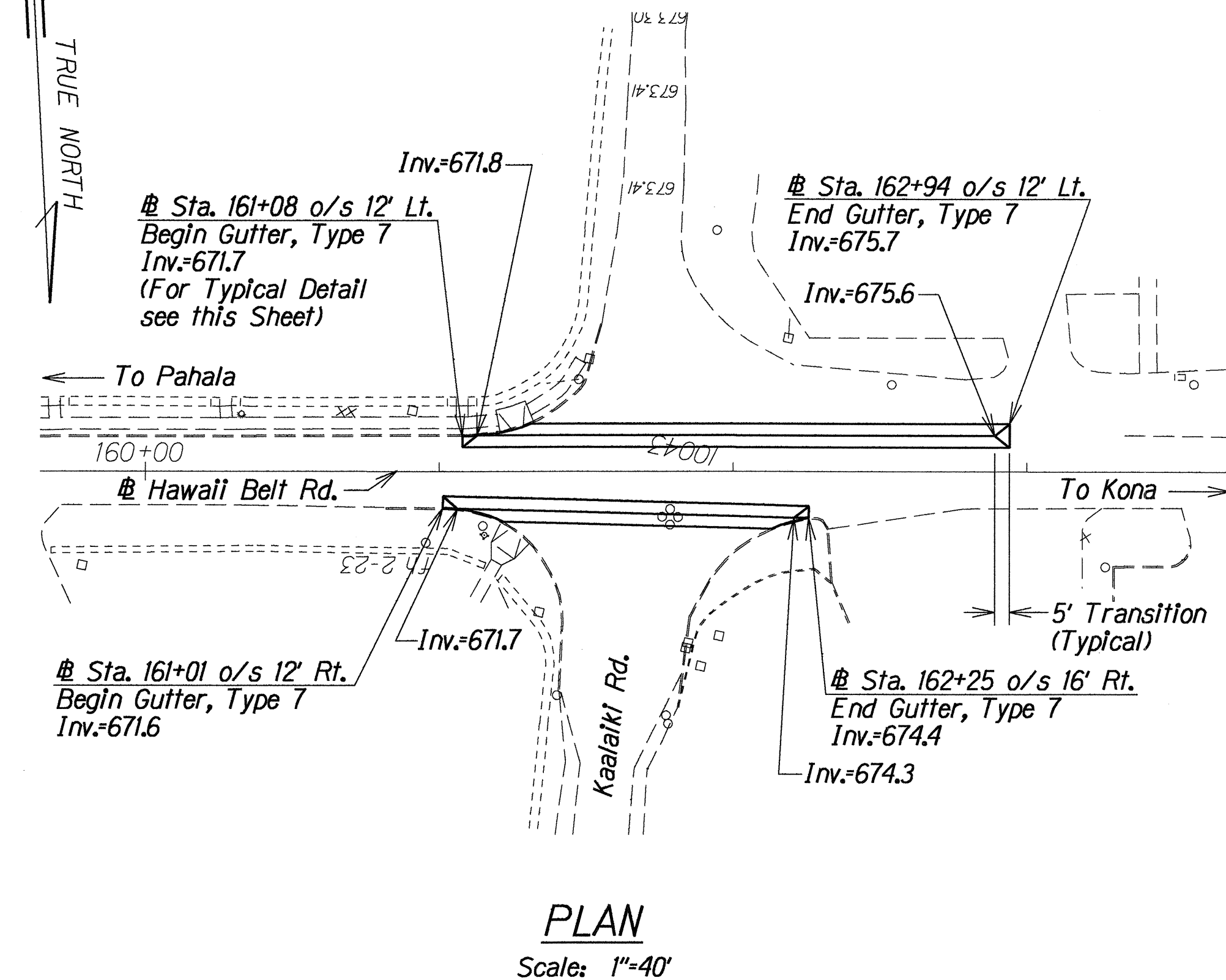


**ELEVATION**  
**REINFORCED CONC. JACKET DETAIL**  
 Scale: 3/4"=1'-0"



**NOTES:**  
 1. Demolish existing reinforced concrete wall to expose reinforcing steel. Cut and bend existing reinforcing steel as necessary to fit 29"x18" CMP Arch Culvert.  
 2. Epoxy coat existing concrete surface.  
 3. Patch wall with epoxy mix concrete.

**29"X18" ARCH CULVERT CONNECTION TO EXIST. CONC. CHANNEL DETAIL**  
 Scale: 3/4"=1'-0"



**TYPICAL DETAIL OF GUTTER, TYPE 7 (8' WIDE)**  
 Scale: 3/4"=1'-0"

**DRAINAGE IMPROVEMENTS AT**  
**Sta. 161+01 o/s 12' Rt. TO Sta. 162+94 o/s 12' Lt.**  
 (Proj. No. P-1942)

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

**DRAINAGE PLANS**

**HAWAII BELT RD. DRAINAGE EXTENSIONS**  
 Kahuku to Honuapo  
 PROJECT NO. 11EF-02-93M

Scale: As Shown Date: May 1993  
 SHEET No. H2 OF 9 SHEETS

**DRAINAGE IMPROVEMENTS AT**  
**Sta. 151+96 o/s 25' Rt. TO Sta. 153+43± o/s 8' Lt. (Proj. No. P-1942)**

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| FED. ROAD DIST. NO. | STATE | PROJ. NO.   | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 30        | 55           |

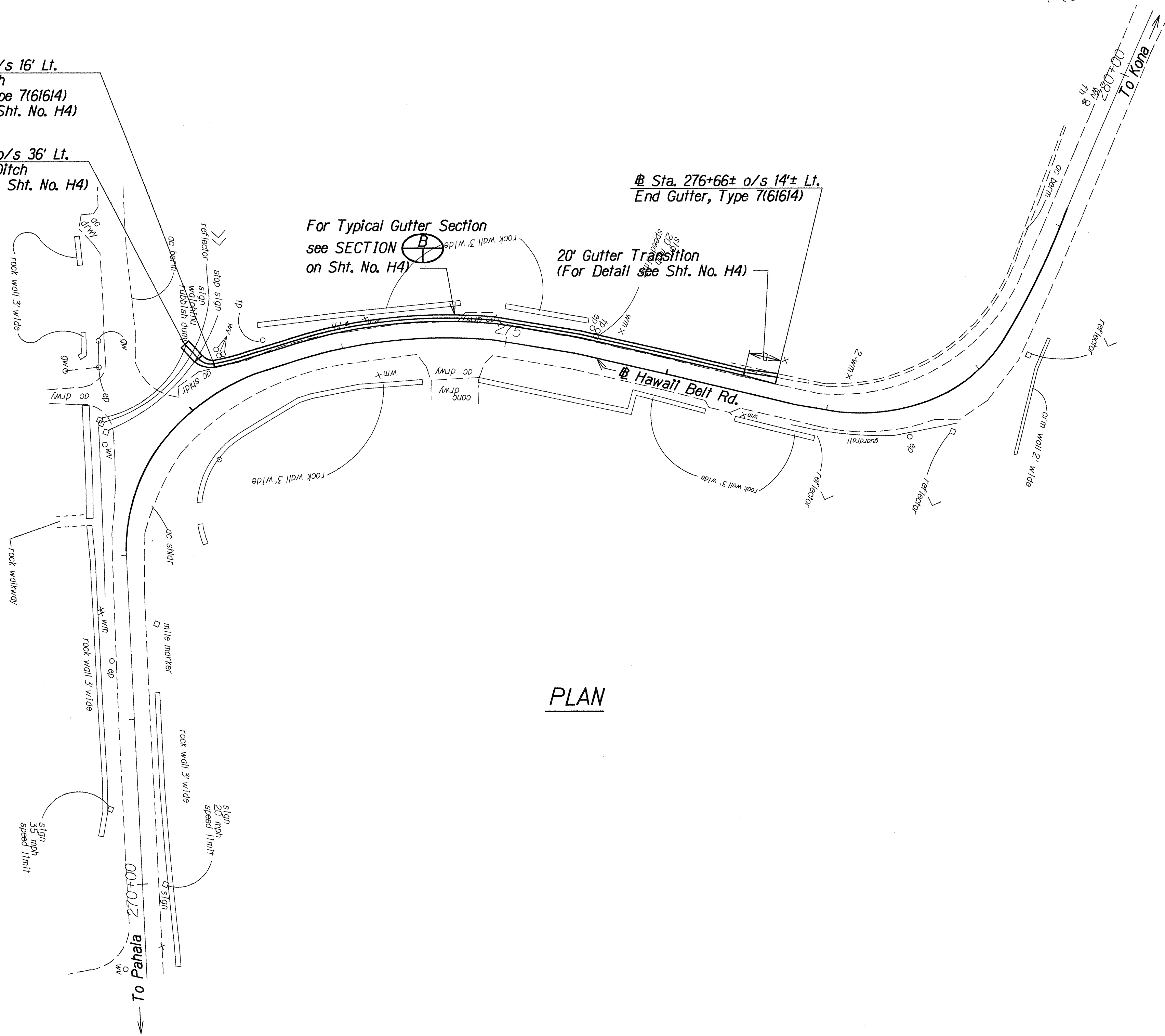
# Sta. 273+26 o/s 16' Lt.  
End Riprap Ditch  
Begin Gutter, Type 7(61614)  
(For Detail see Sht. No. H4)

# Sta. 273+18 o/s 36' Lt.  
Begin Riprap Ditch  
(For Detail see Sht. No. H4)

For Typical Gutter Section  
see SECTION B  
on Sht. No. H4

# Sta. 276+66± o/s 14± Lt.  
End Gutter, Type 7(61614)

20' Gutter Transition  
(For Detail see Sht. No. H4)



PLAN

DRAINAGE IMPROVEMENTS AT

# STA. 273+18 o/s 36' LT. TO # STA. 276+66± o/s 14± LT. (Proj. No. P-1942)

|               |                   |      |
|---------------|-------------------|------|
| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
| NOTE BOOK     | DRAWN BY          |      |
|               | DESIGNED BY       |      |
|               | CHECKED BY        |      |

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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

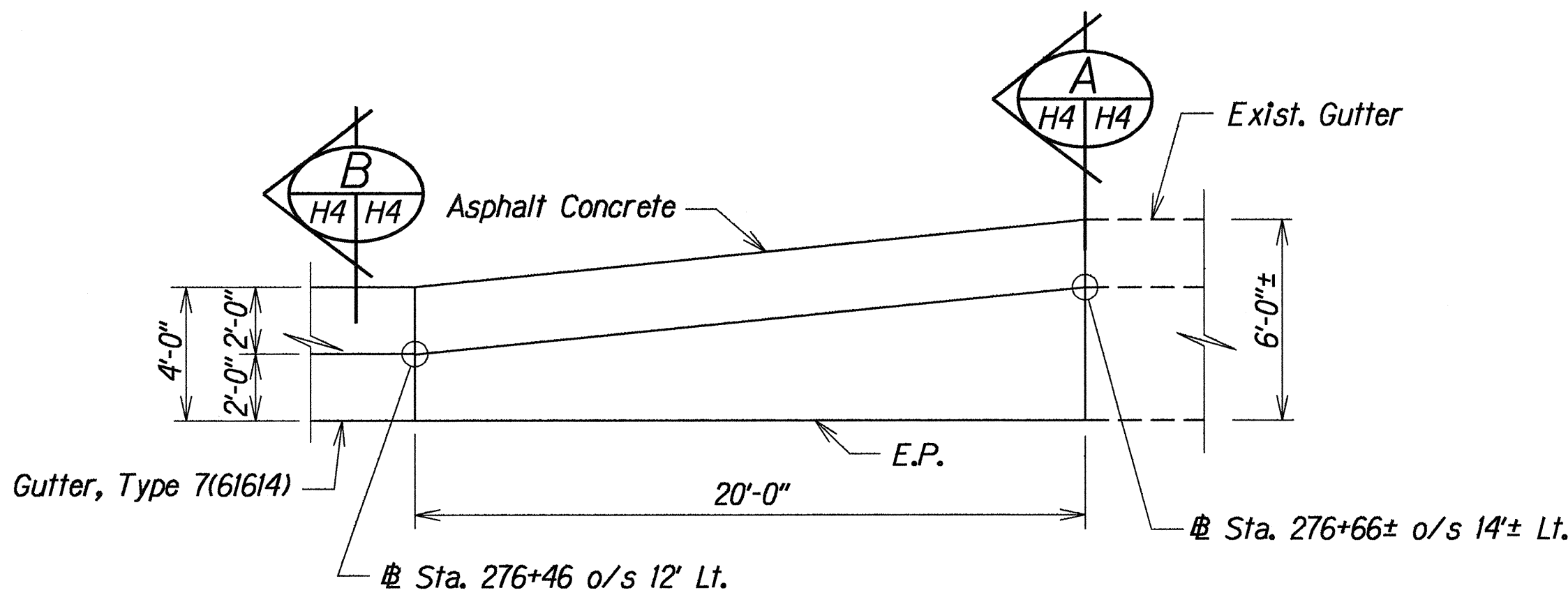
**DRAINAGE PLANS**

HAWAII BELT RD. DRAINAGE EXTENSIONS  
Kahuku to Honuapo  
PROJECT NO. 11EF-02-93M

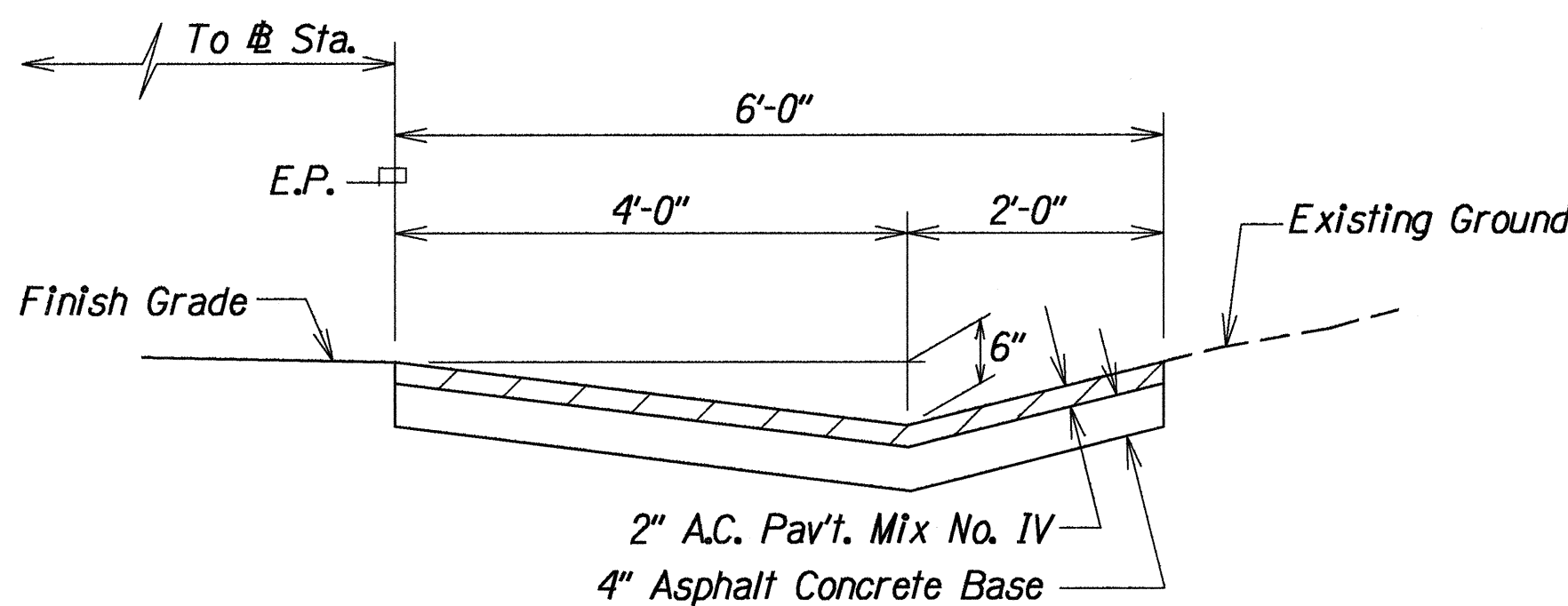
Scale: 1"=40'      Date: May 1993

SHEET No. H3 OF 9 SHEETS

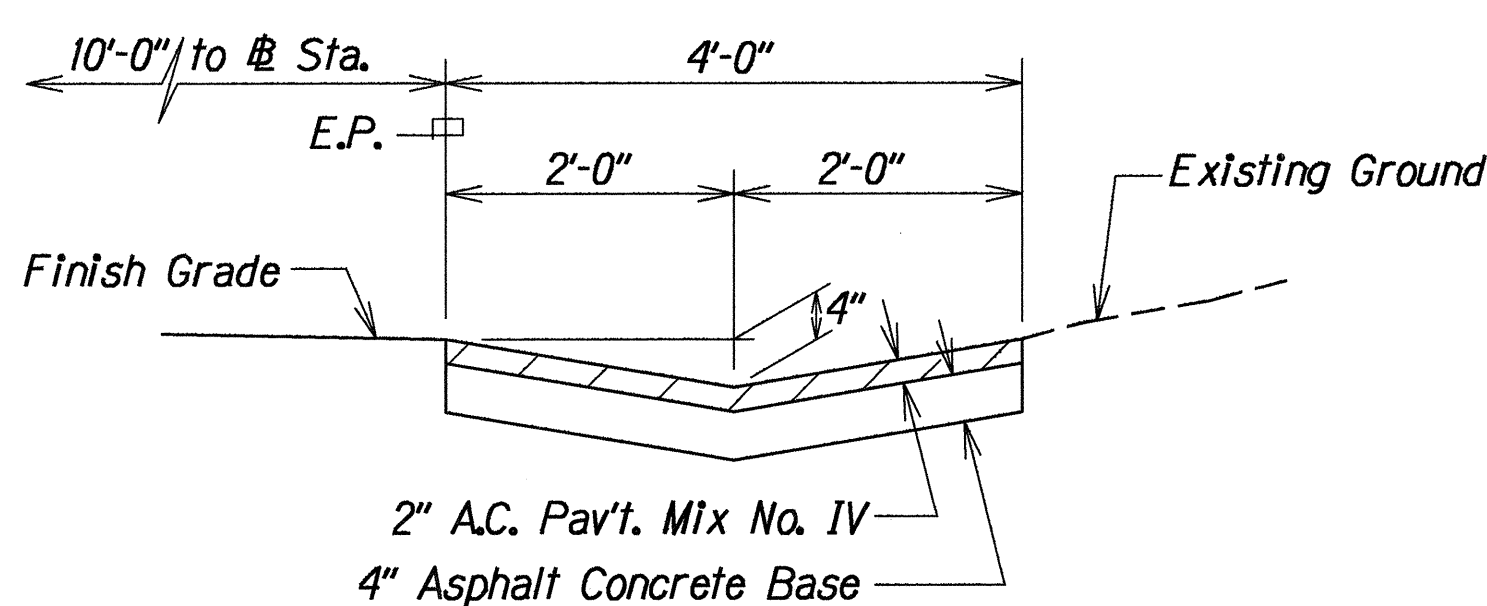
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|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 31        | 55           |



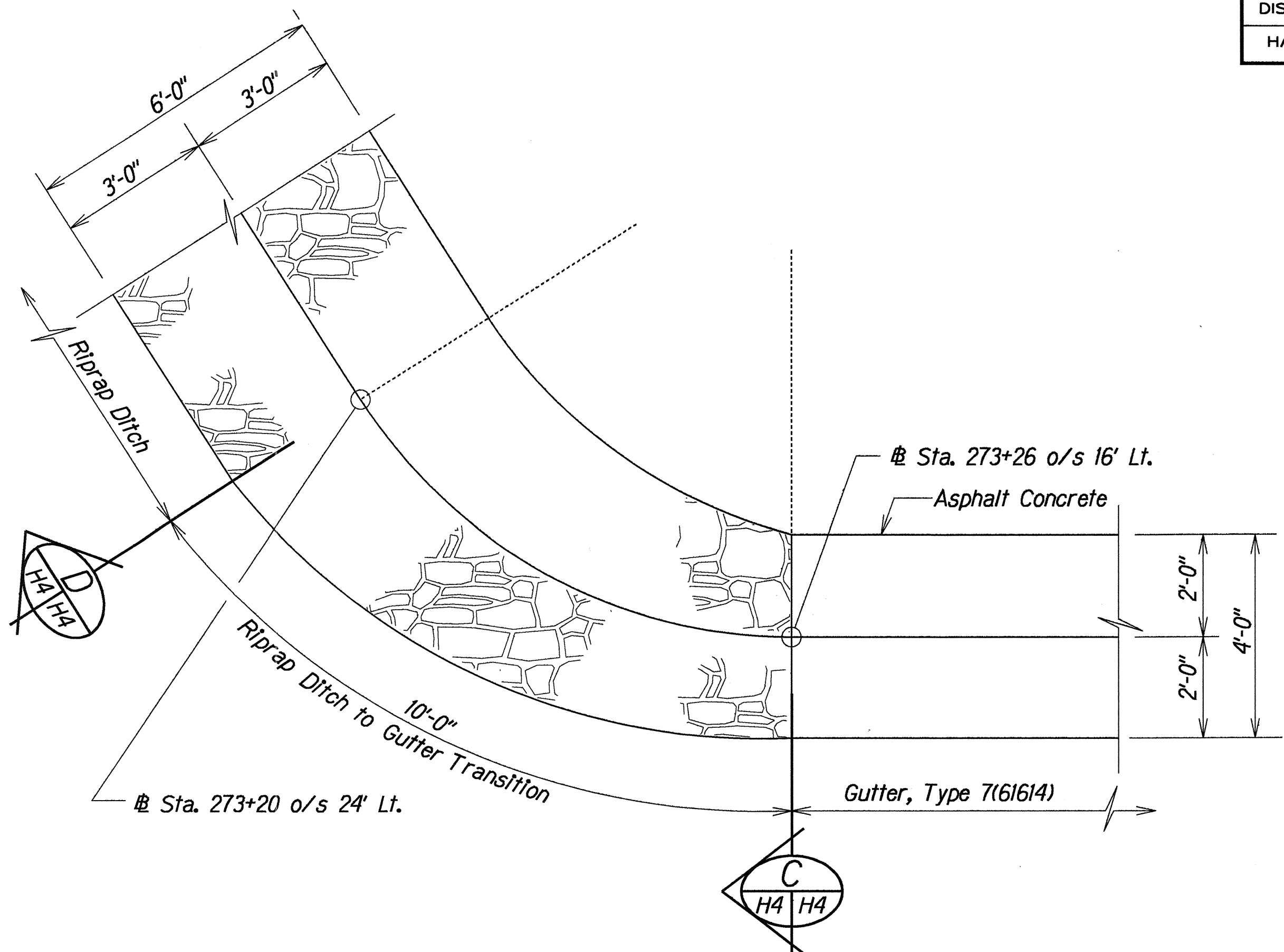
20 L.F. GUTTER TRANSITION  
Scale: 1/4"=1'-0"



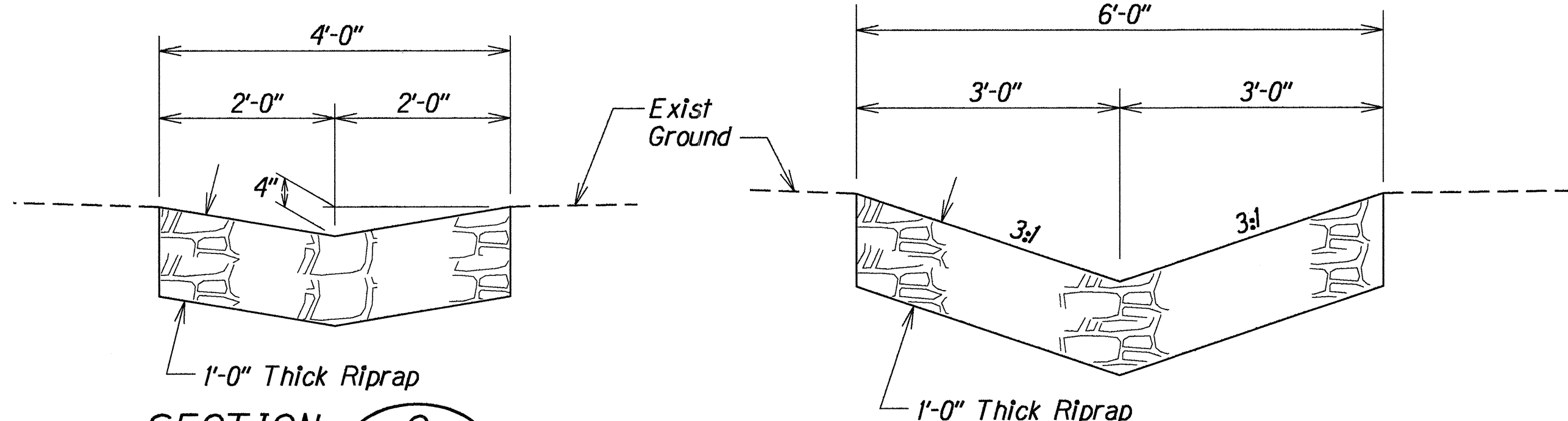
SECTION A  
Scale: 3/4"=1'-0"



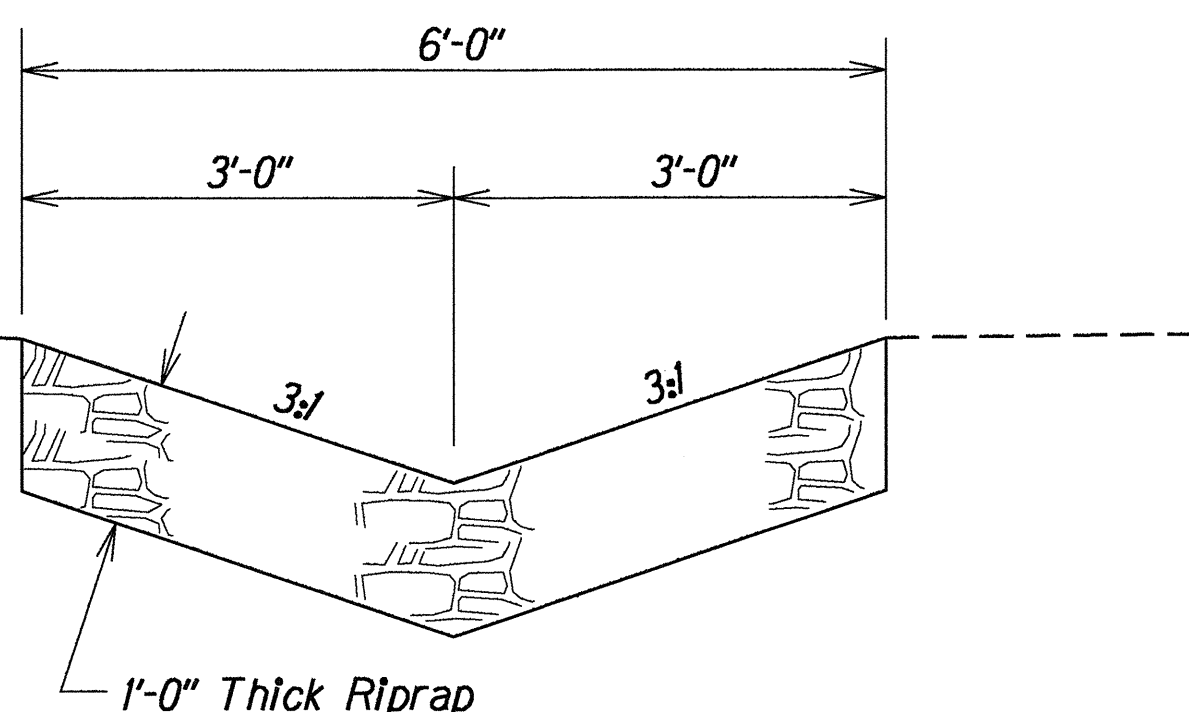
SECTION B  
Scale: 3/4"=1'-0"



10 L.F. DITCH TO GUTTER TRANSITION  
Scale: 1/2"=1'-0"



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



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

DETAILS OF RIPRAP DITCH AND GUTTER, TYPE 7(61614)  
BETWEEN Sta. 273+18 o/s 36' LT. TO Sta. 276+66± o/s 14'± LT. (Proj. No. P-1942)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

DRAINAGE DETAILS

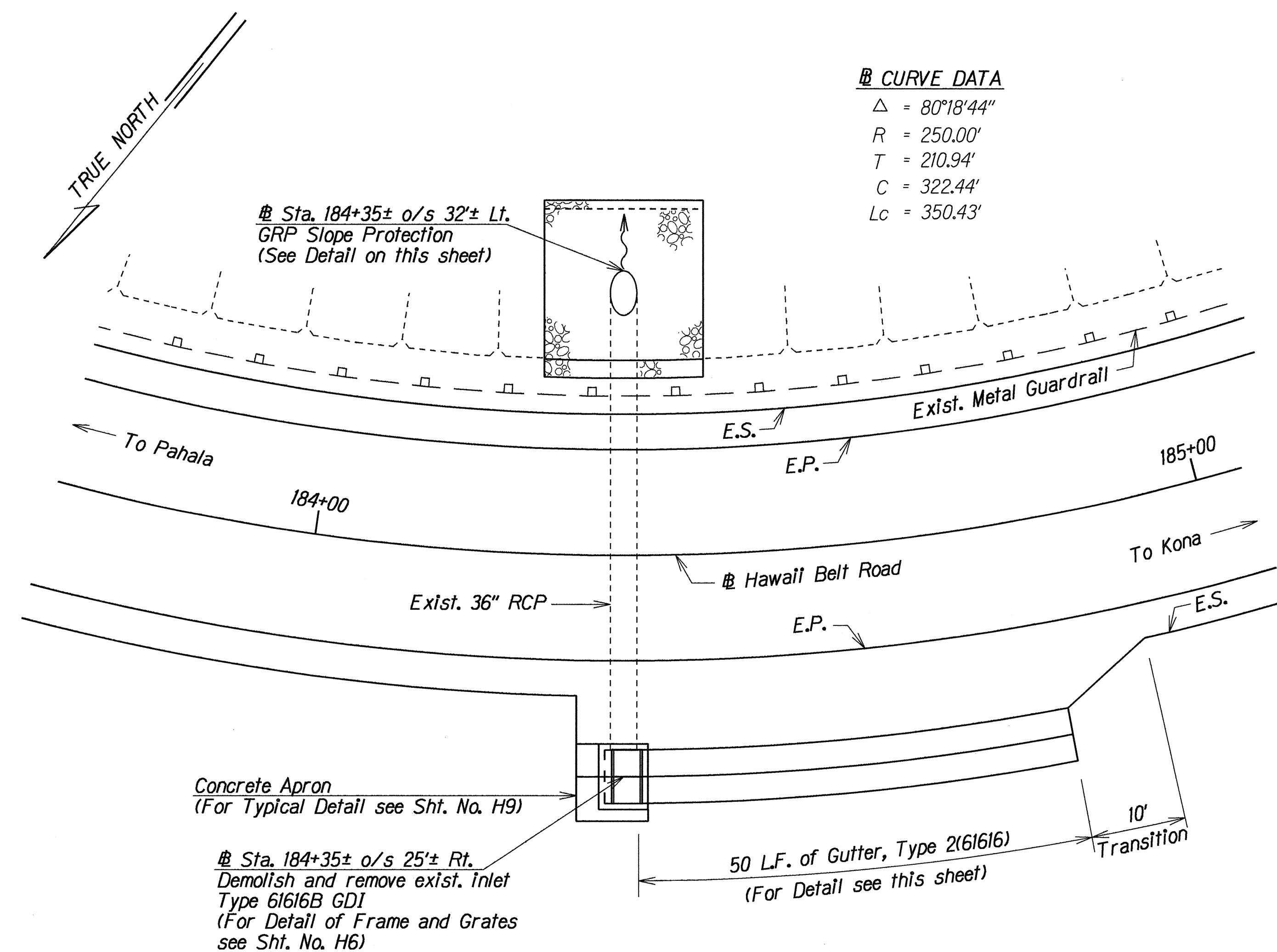
HAWAII BELT RD. DRAINAGE EXTENSIONS  
Kahuku to Honuapo  
PROJECT NO. 11EF-02-93M

Scale: As Shown  
Date: May 1993  
SHEET No. H4 OF 9 SHEETS

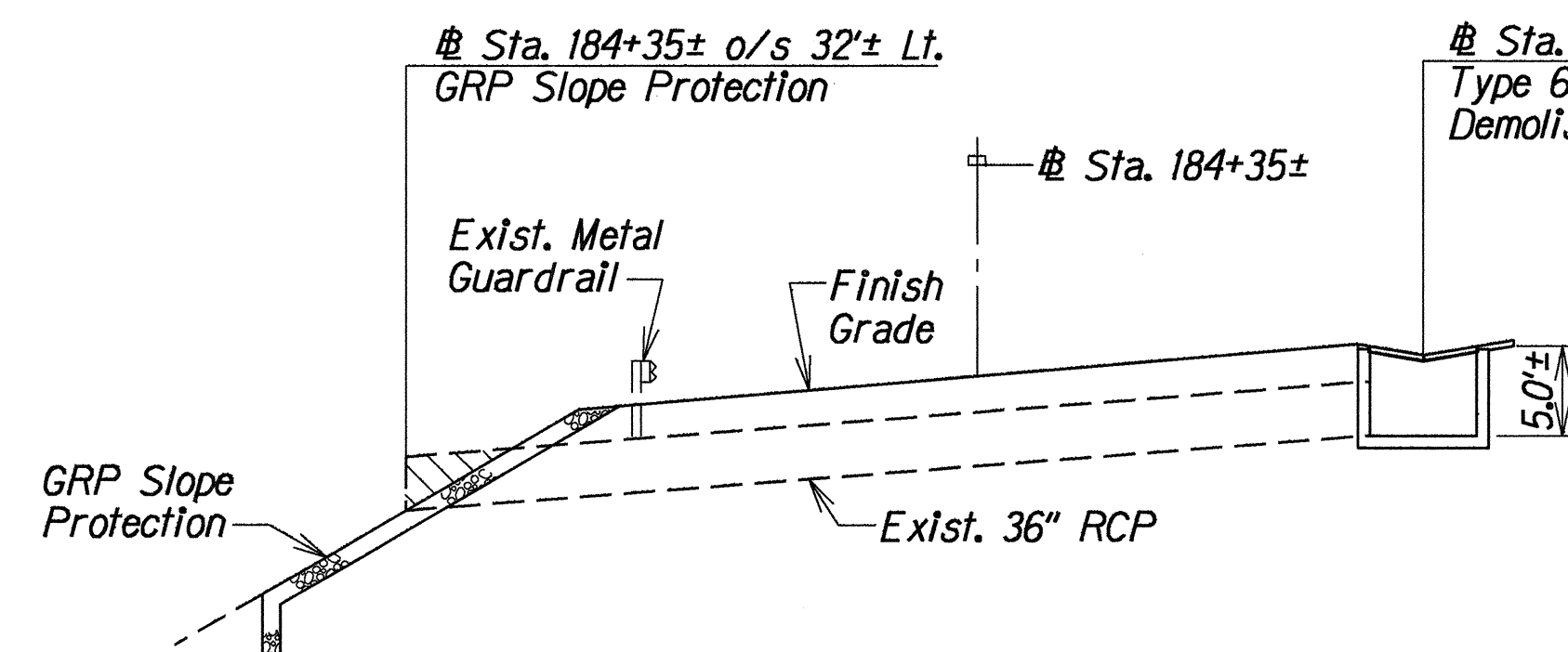
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| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
| NOTE BOOK     | DRAWN BY          |      |
|               | DESIGNED BY       |      |
|               | CHECKED BY        |      |
|               |                   |      |

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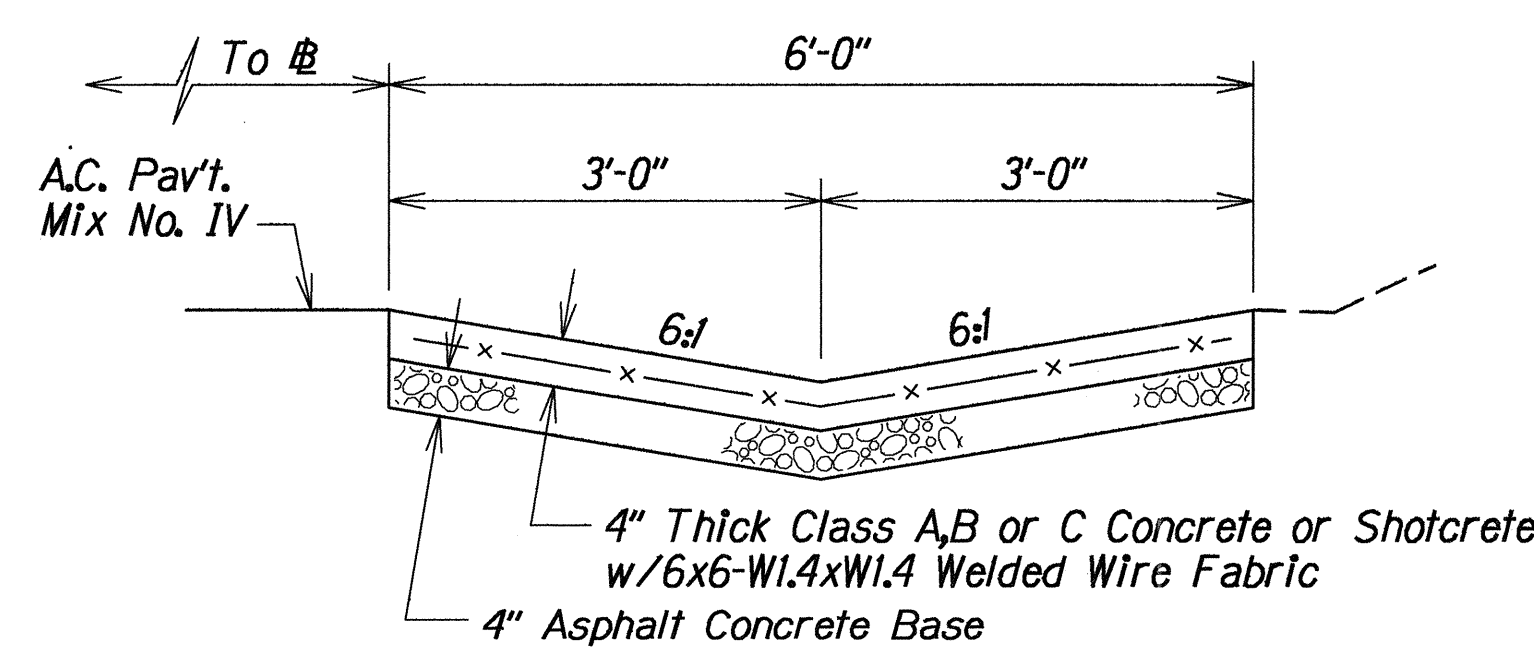
| FED. ROAD DIST. NO. | STATE | PROJ. NO.   | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 32        | 55           |



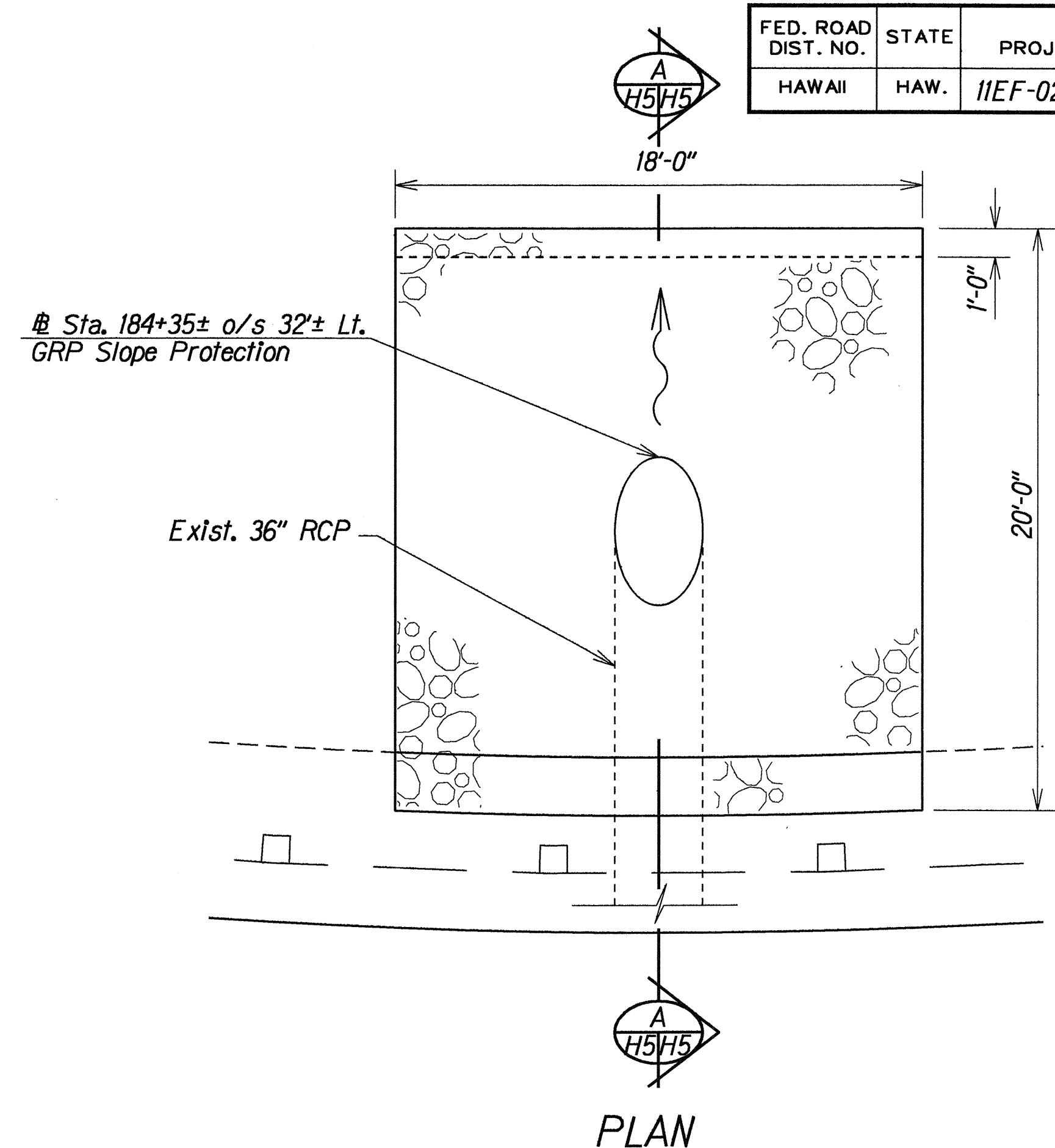
**PLAN**  
Scale: 1"=10'



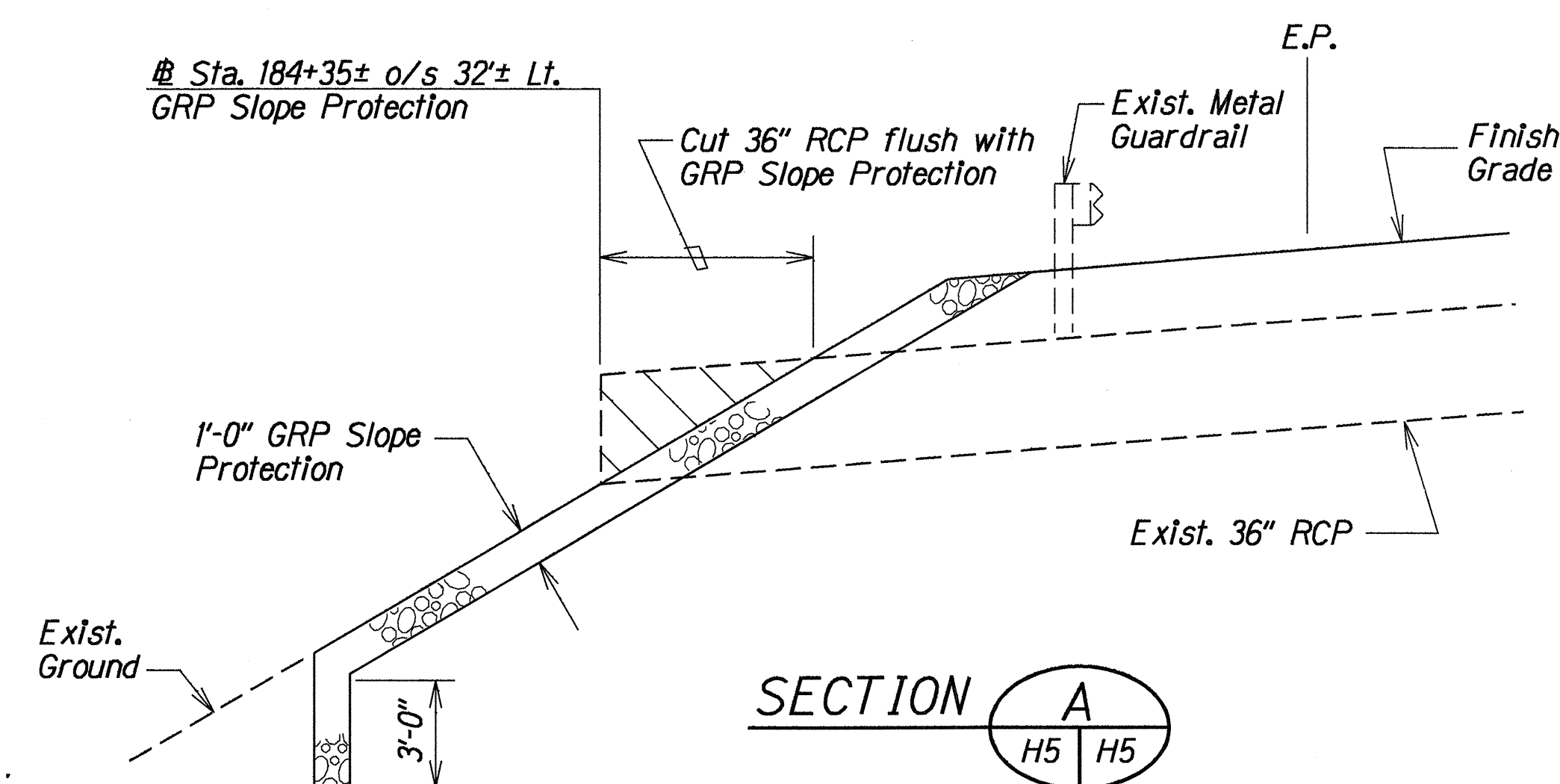
**PROFILE ALONG 36" CULVERT**  
Scale: 1"=10'



**DETAIL OF GUTTER, TYPE 2(61616)**  
Scale: 3/4"=1'-0"



**PLAN**



**SECTION A**  
H5 H5

**DETAILS OF GRP SLOPE PROTECTION**  
Scale: 1/4"=1'-0"

**DRAINAGE IMPROVEMENTS AT STA. 184+35± (Proj. No. P-1829)**

|                   |      |
|-------------------|------|
| ORIGINAL PLAN     | DATE |
| SURVEY PLOTTED BY |      |
| DRAWN BY          |      |
| DESIGNED BY       |      |
| CHECKED BY        |      |
| NOTED BY          |      |
| DATE              |      |

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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE PLANS**

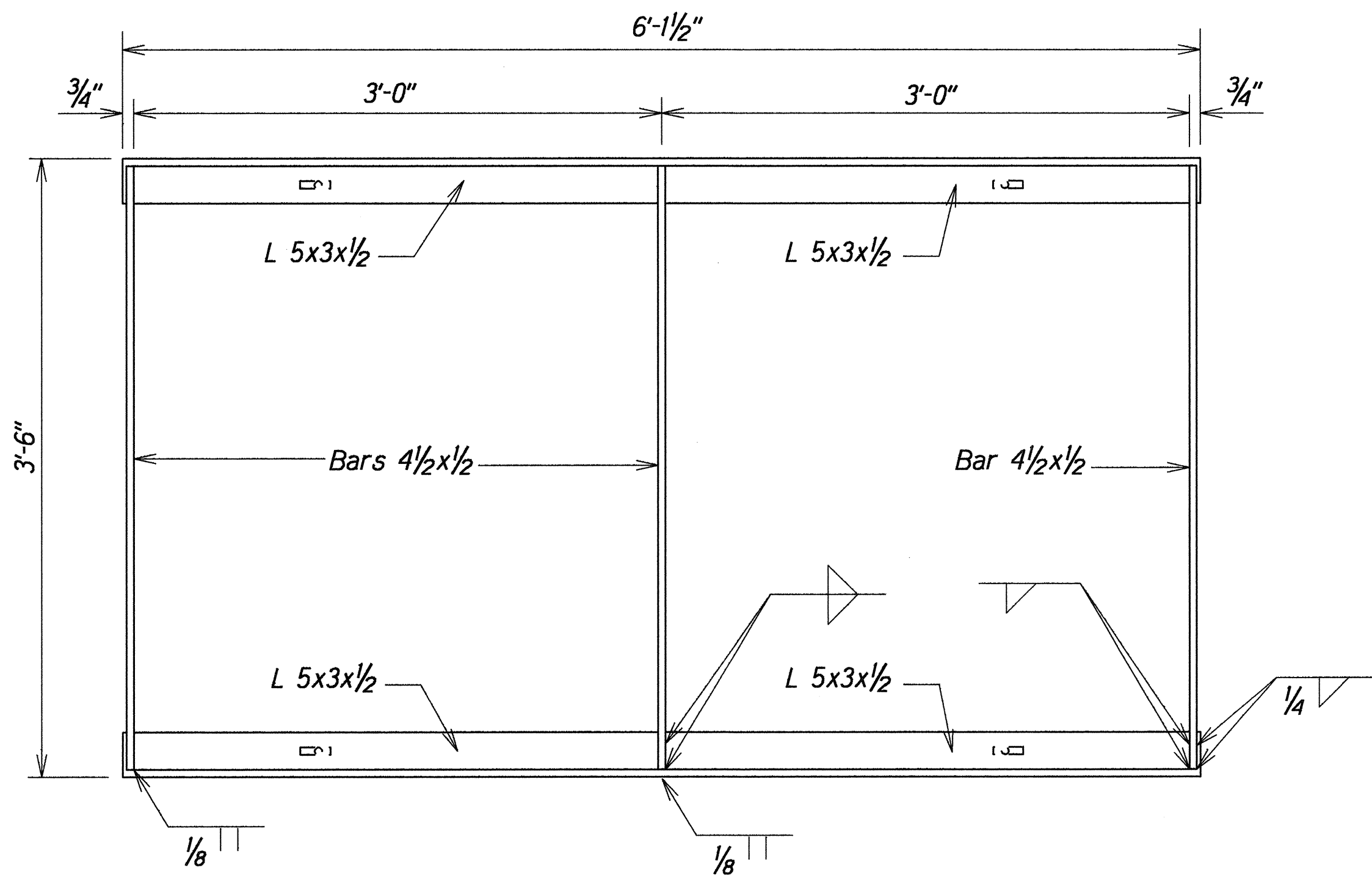
**HAWAII BELT RD. DRAINAGE EXTENSIONS**  
Kahuku to Honuapo  
PROJECT NO. 11EF-02-93M

Scale: As Shown Date: May 1993  
SHEET No. H5 OF 9 SHEETS

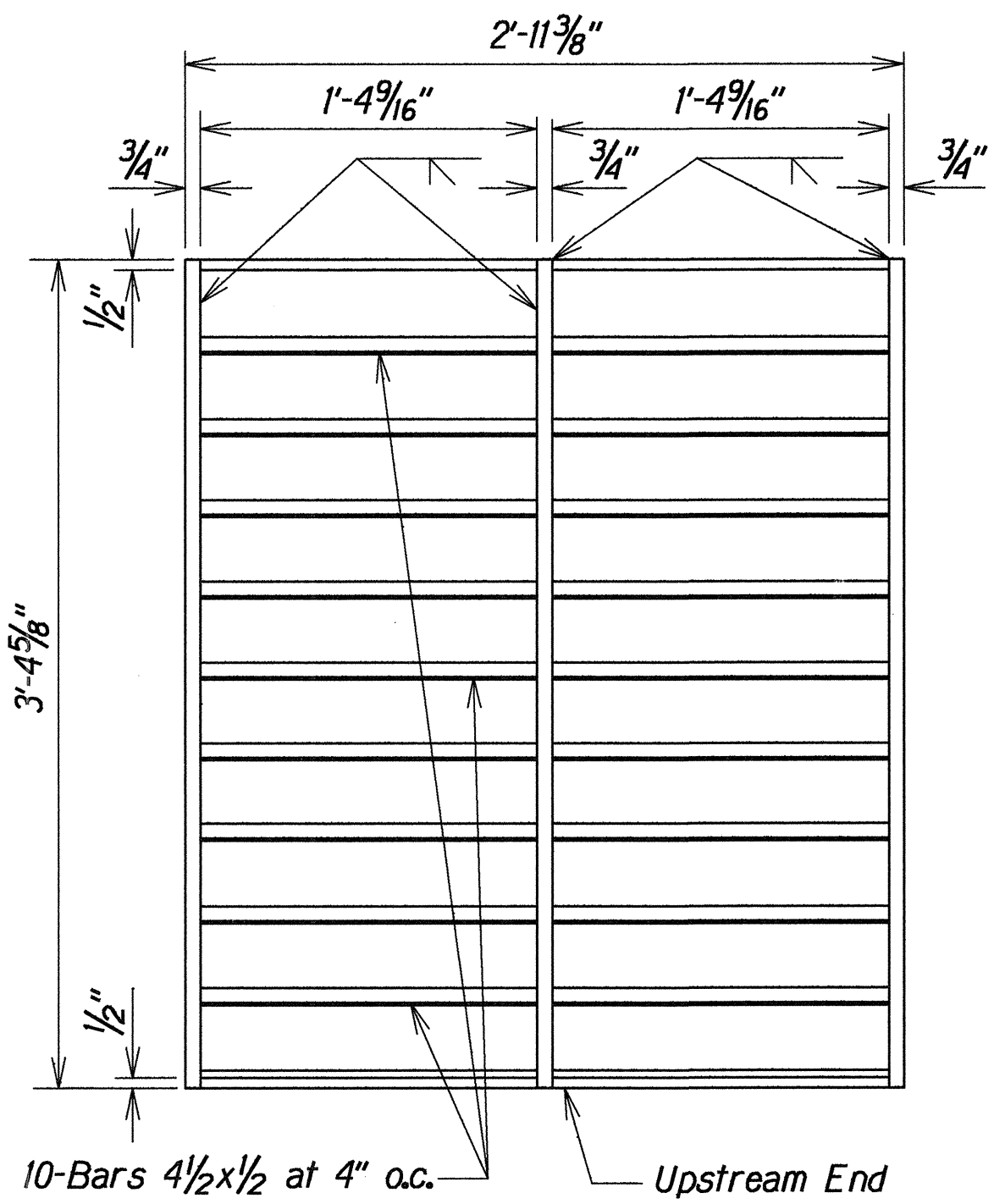
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|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 33        | 55           |

NOTES

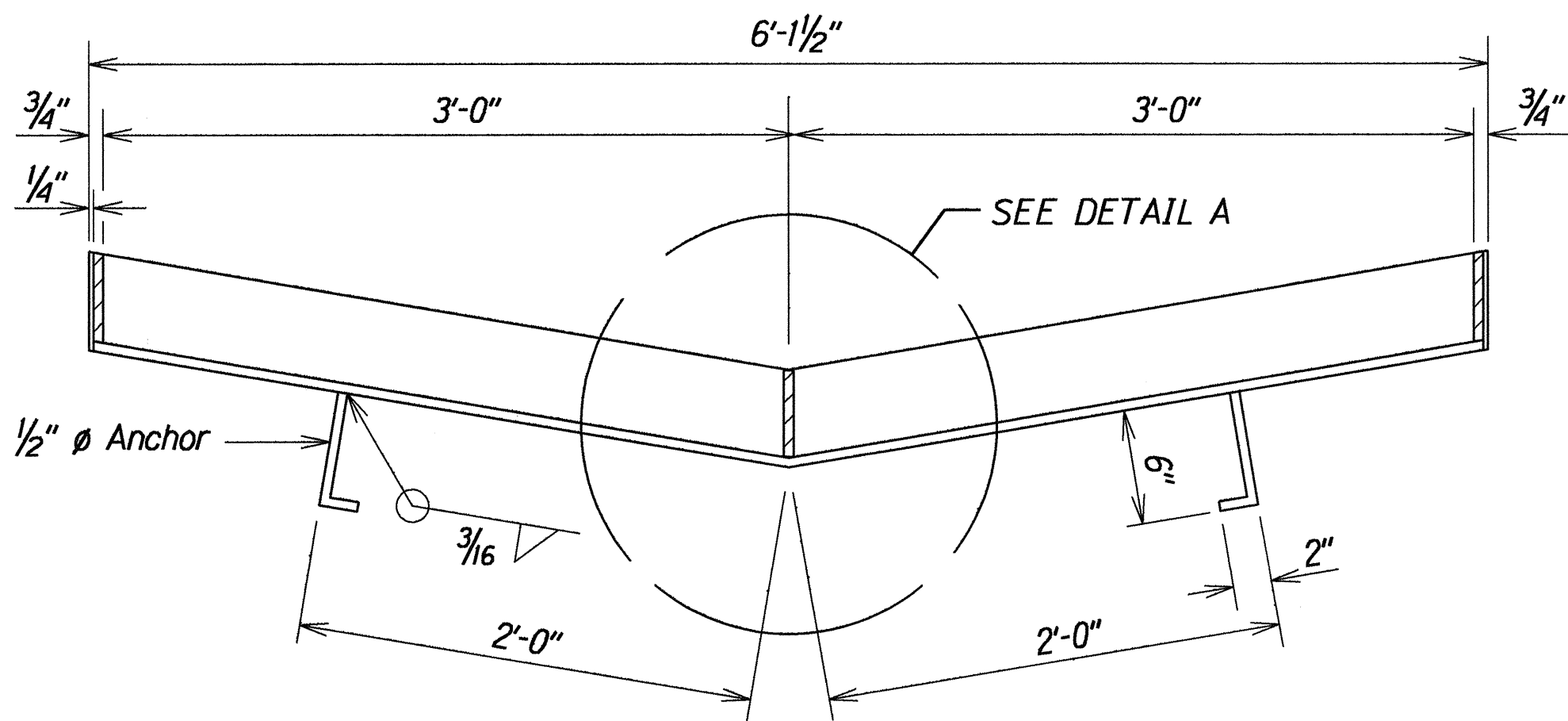
1. All welds  $\frac{5}{16}$ " unless otherwise noted.
2. Frame and Grates shall be hot dip galvanized after fabrication.



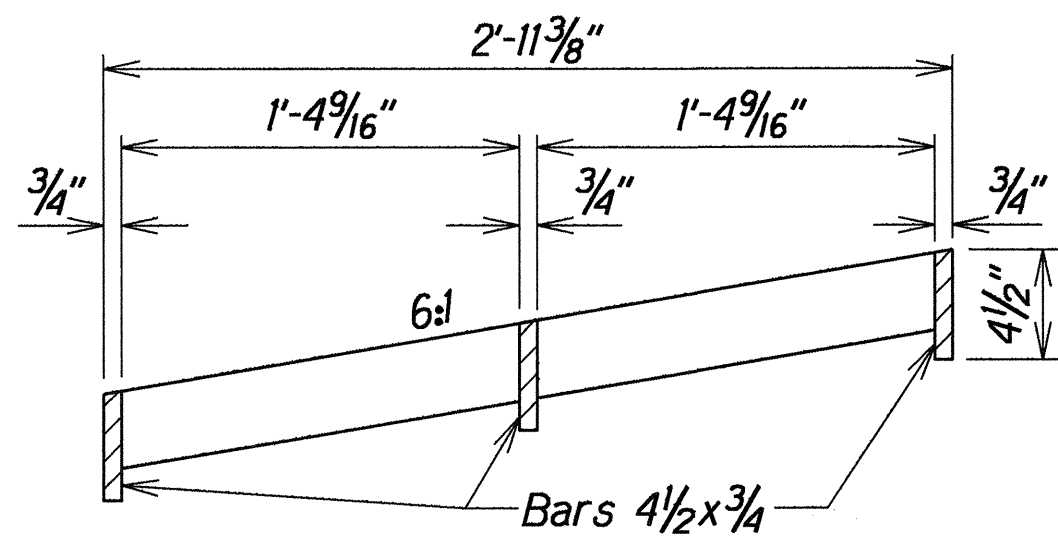
PLAN  
Scale: 1 1/2"=1'-0"



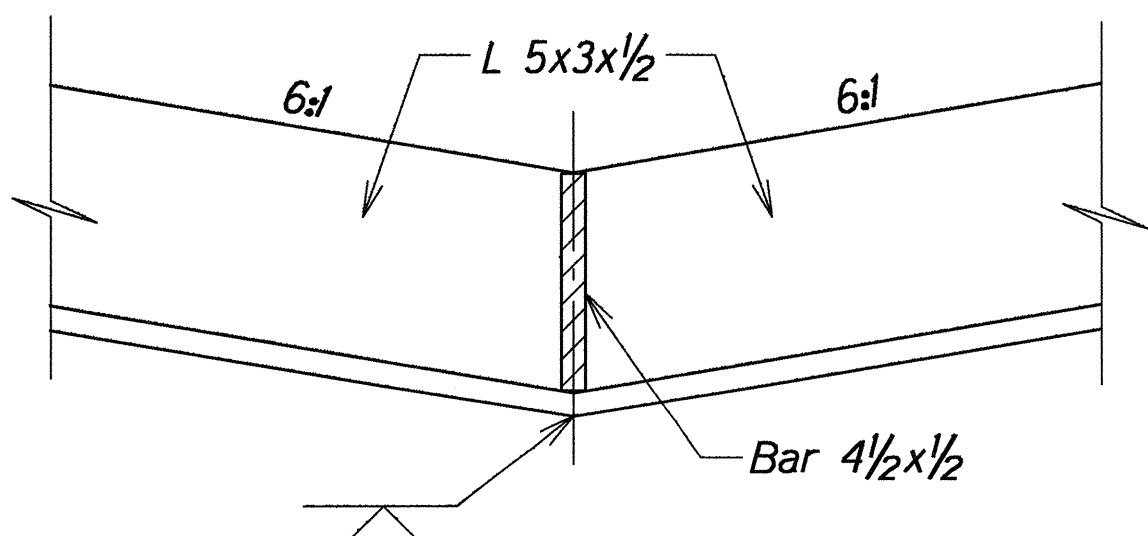
PLAN  
Scale: 1 1/2"=1'-0"



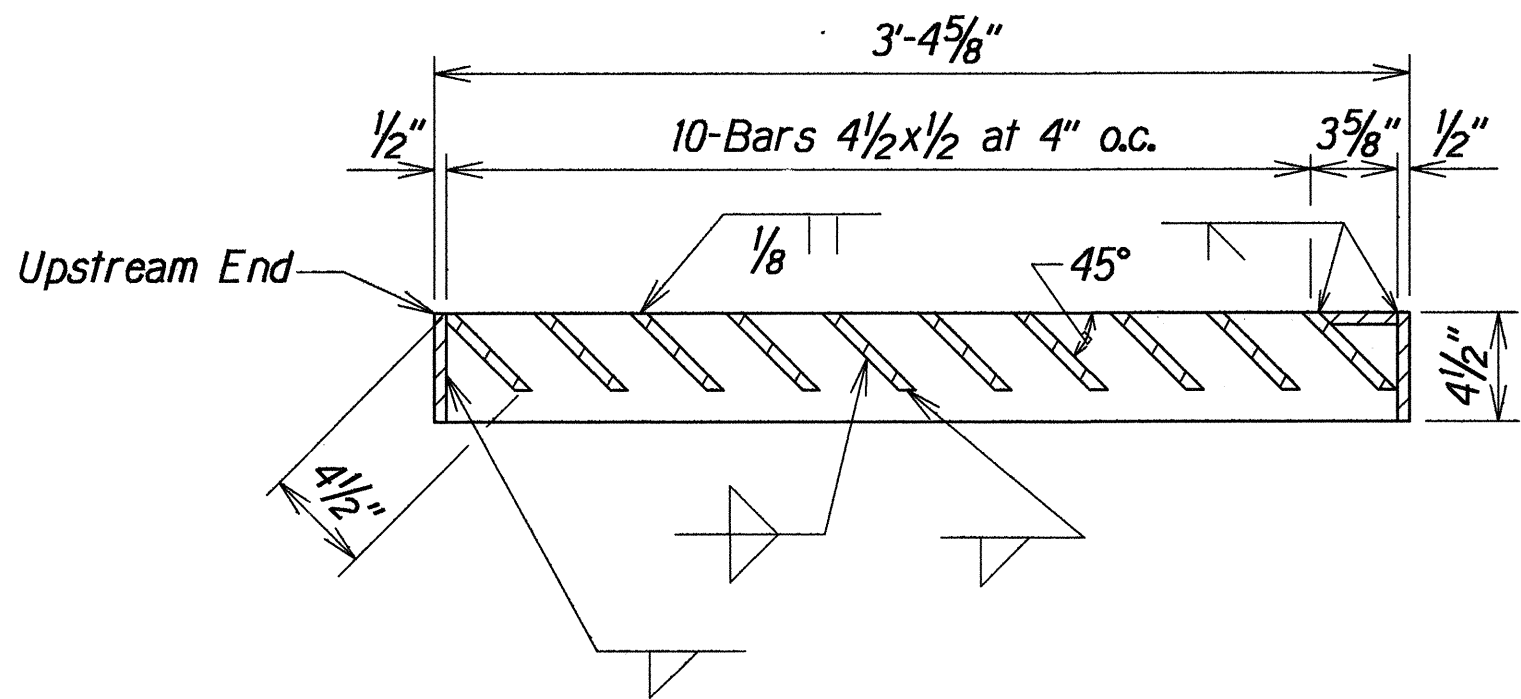
CROSS SECTION  
Scale: 1 1/2"=1'-0"



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



DETAIL A  
Scale: 3"=1'-0"



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

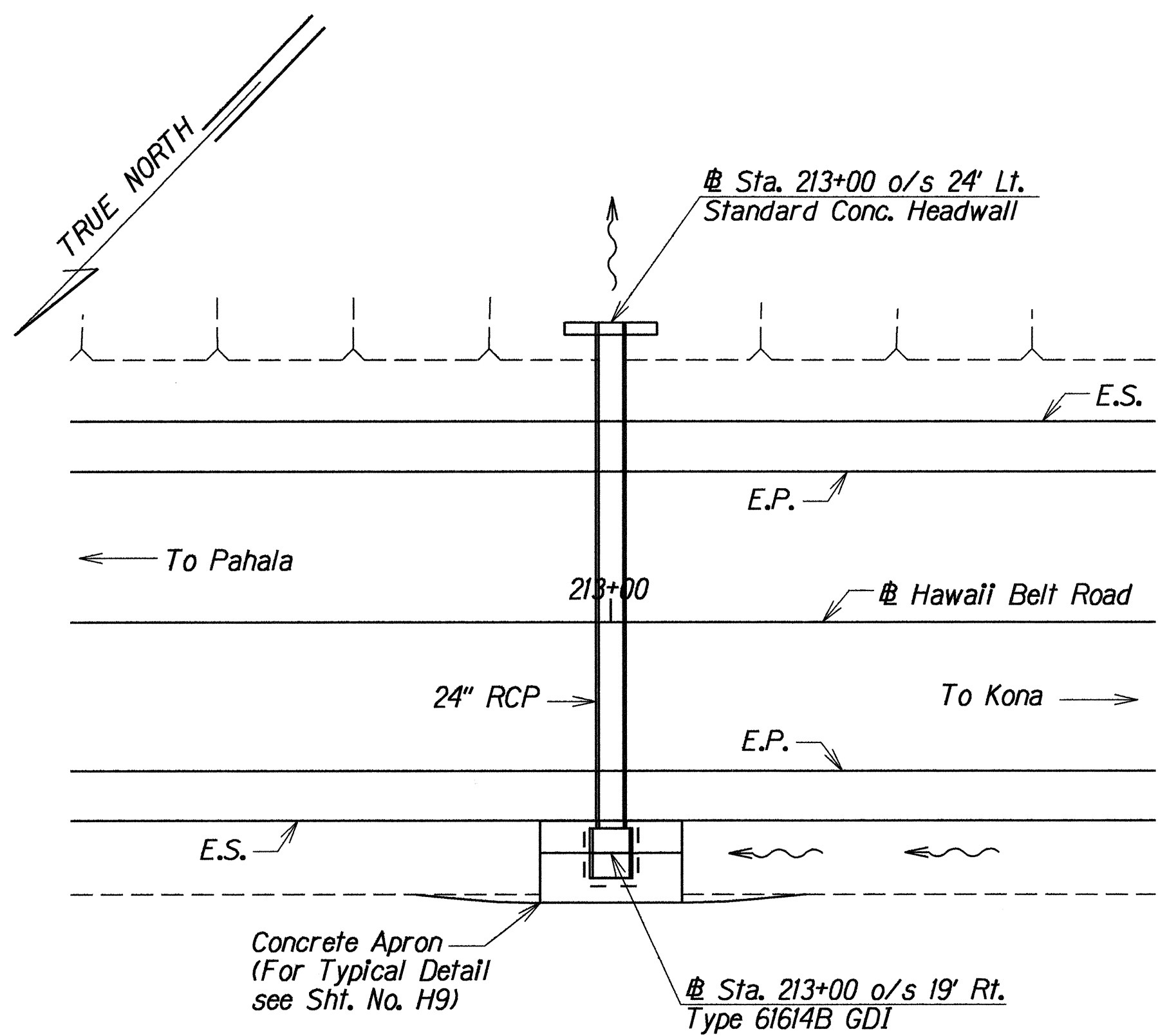
DETAILS OF GRATE

|                                                                      |                |
|----------------------------------------------------------------------|----------------|
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION |                |
| <b>DRAINAGE DETAILS</b>                                              |                |
| HAWAII BELT RD. DRAINAGE EXTENSIONS<br>Kahuku to Honuapo             |                |
| PROJECT NO. 11EF-02-93M                                              |                |
| Scale: As Shown                                                      | Date: May 1993 |
| SHEET No. H6 OF 9 SHEETS                                             |                |

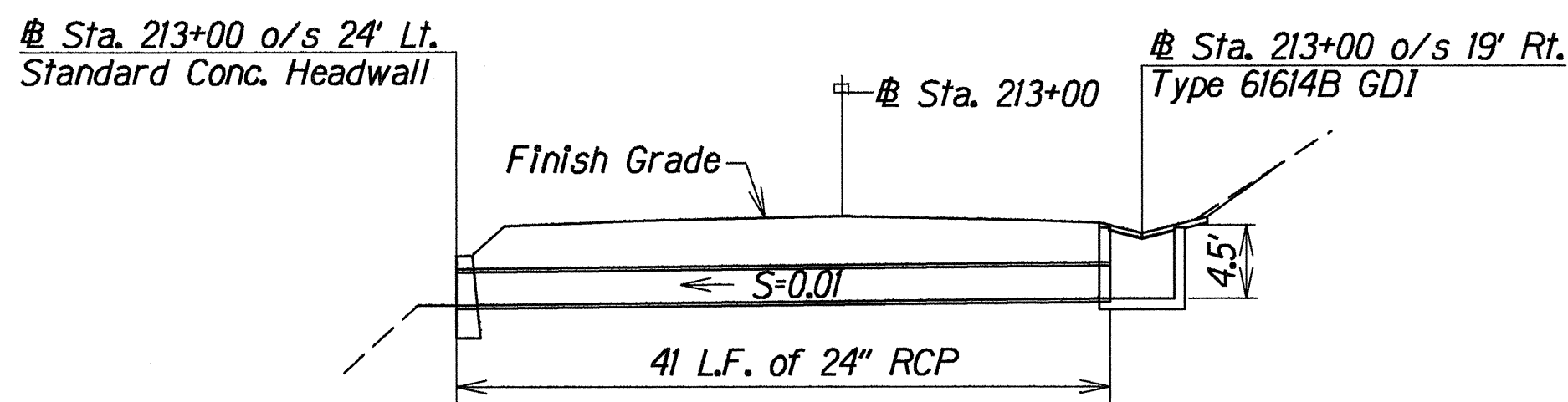
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| DESIGNED BY   | DATE |
| CHECKED BY    |      |
| NOTED BY      |      |
| QUANTITIES BY |      |
| TRACED BY     |      |
| PLANNED BY    |      |
| ORIGINAL PLAN |      |

61616B FRAME AND GRATES

| FED. ROAD DIST. NO. | STATE | PROJ. NO.   | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 34        | 55           |



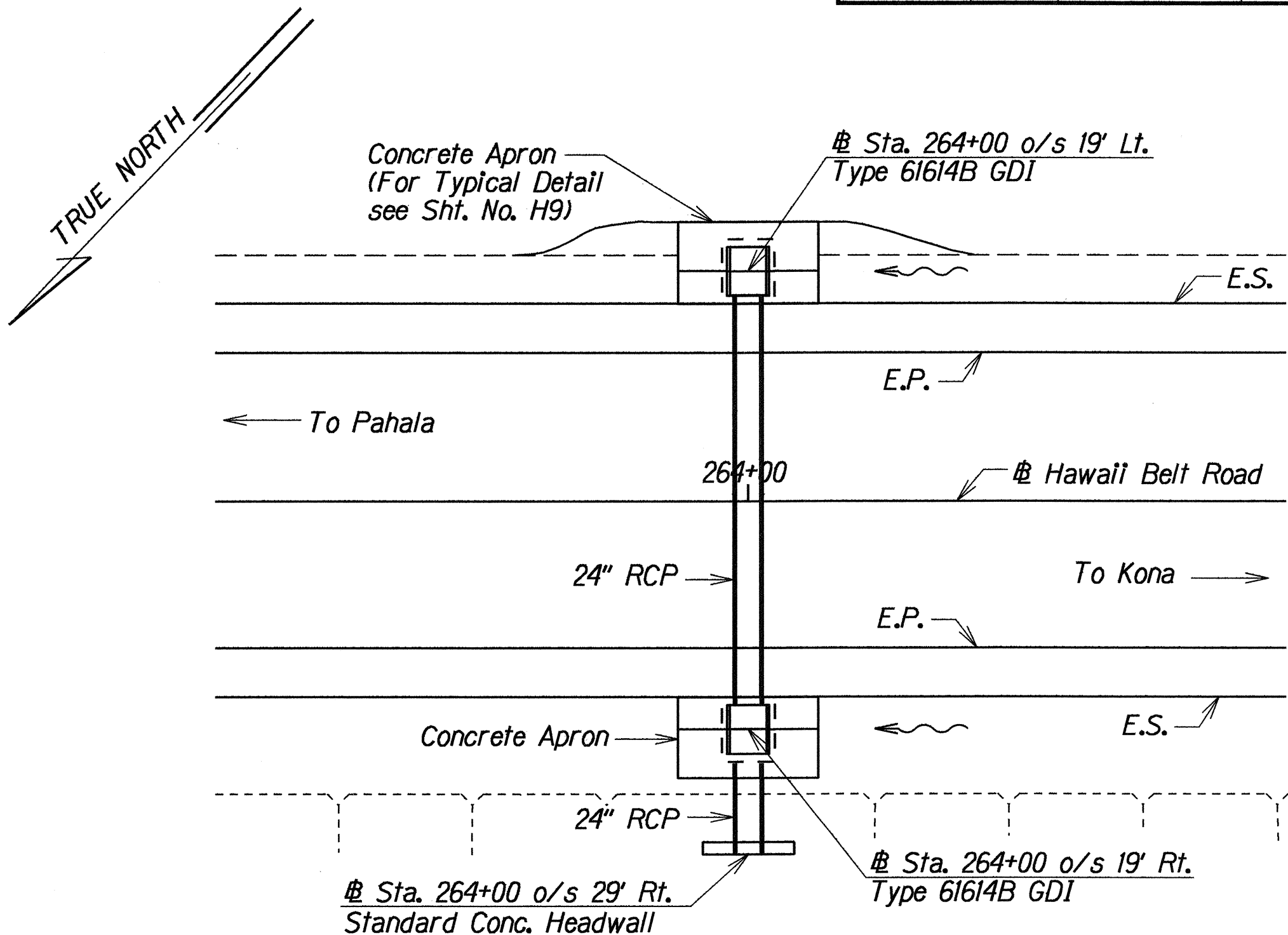
PLAN



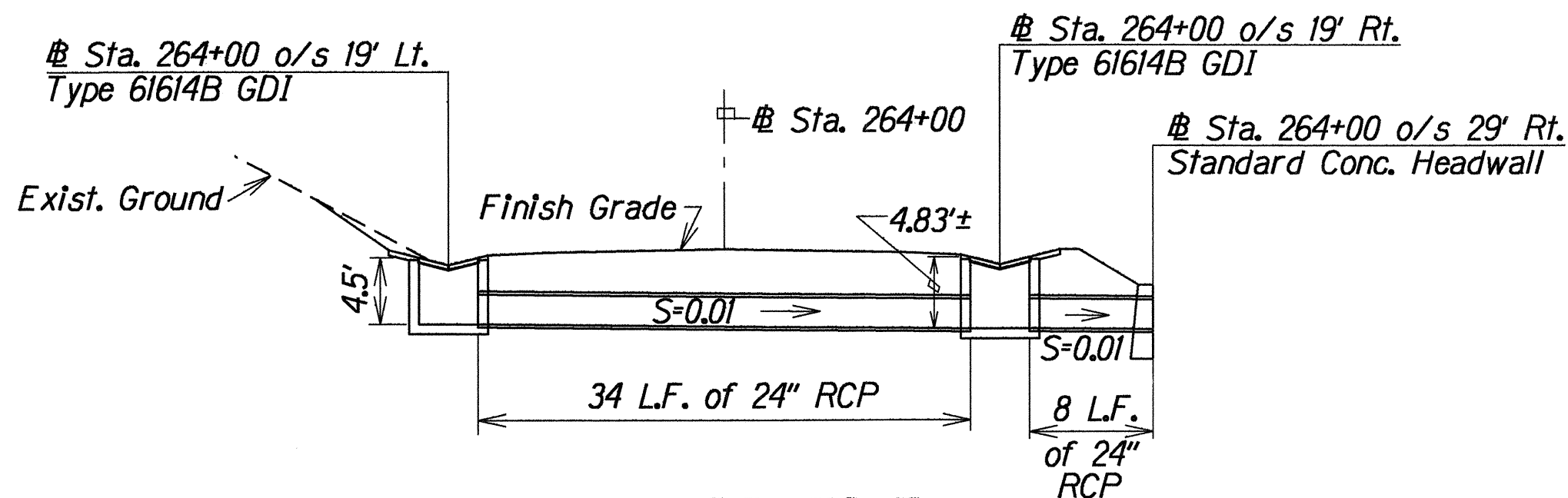
PROFILE

DRAINAGE IMPROVEMENTS AT STA. 213+00  
(Proj. No. P-1829)

Scale: 1"=10'



PLAN



PROFILE

DRAINAGE IMPROVEMENTS AT STA. 264+00  
(Proj. No. P-1829)

Scale: 1"=10'

|               |                   |      |
|---------------|-------------------|------|
| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
| NOTE BOOK     | DRAWN BY          |      |
|               | DESIGNED BY       |      |
|               | CHECKED BY        |      |
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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

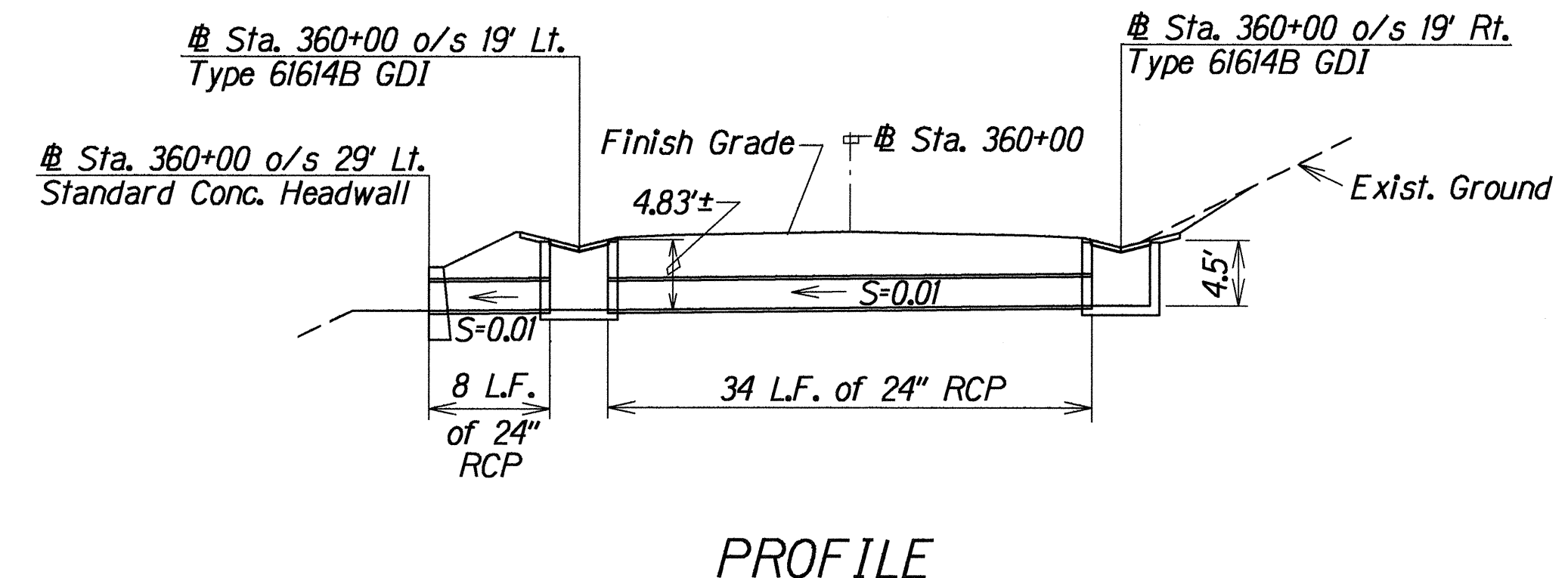
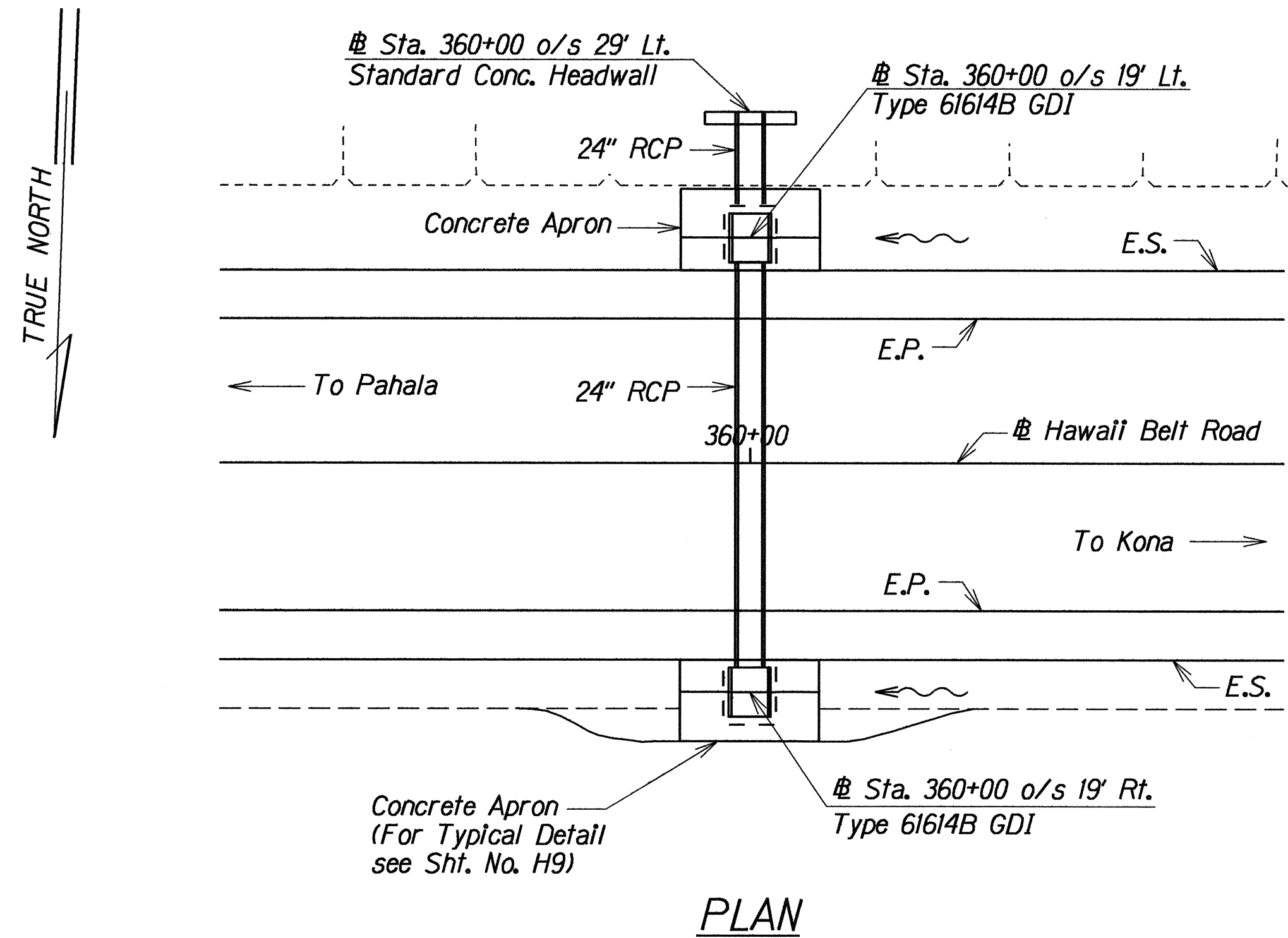
DRAINAGE PLANS

HAWAII BELT RD. DRAINAGE EXTENSIONS  
Kahuku to Honuapo  
PROJECT NO. 11EF-02-93M

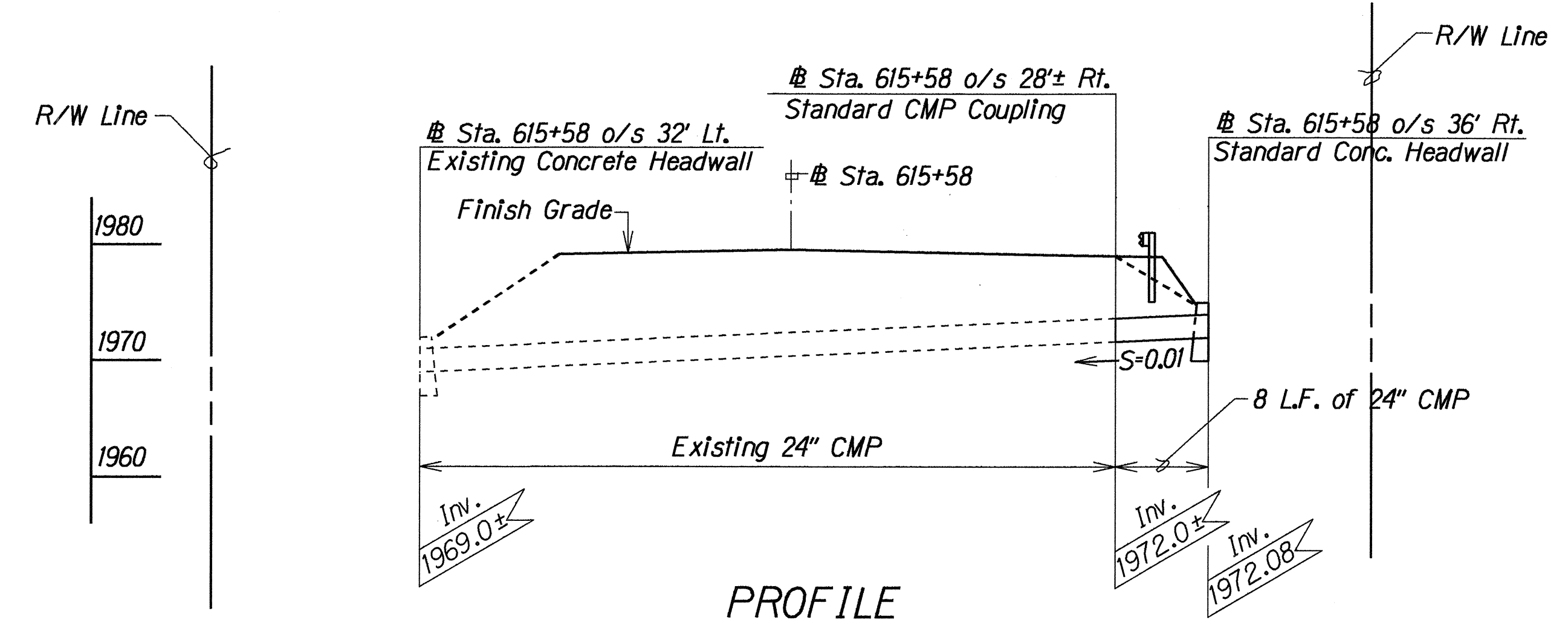
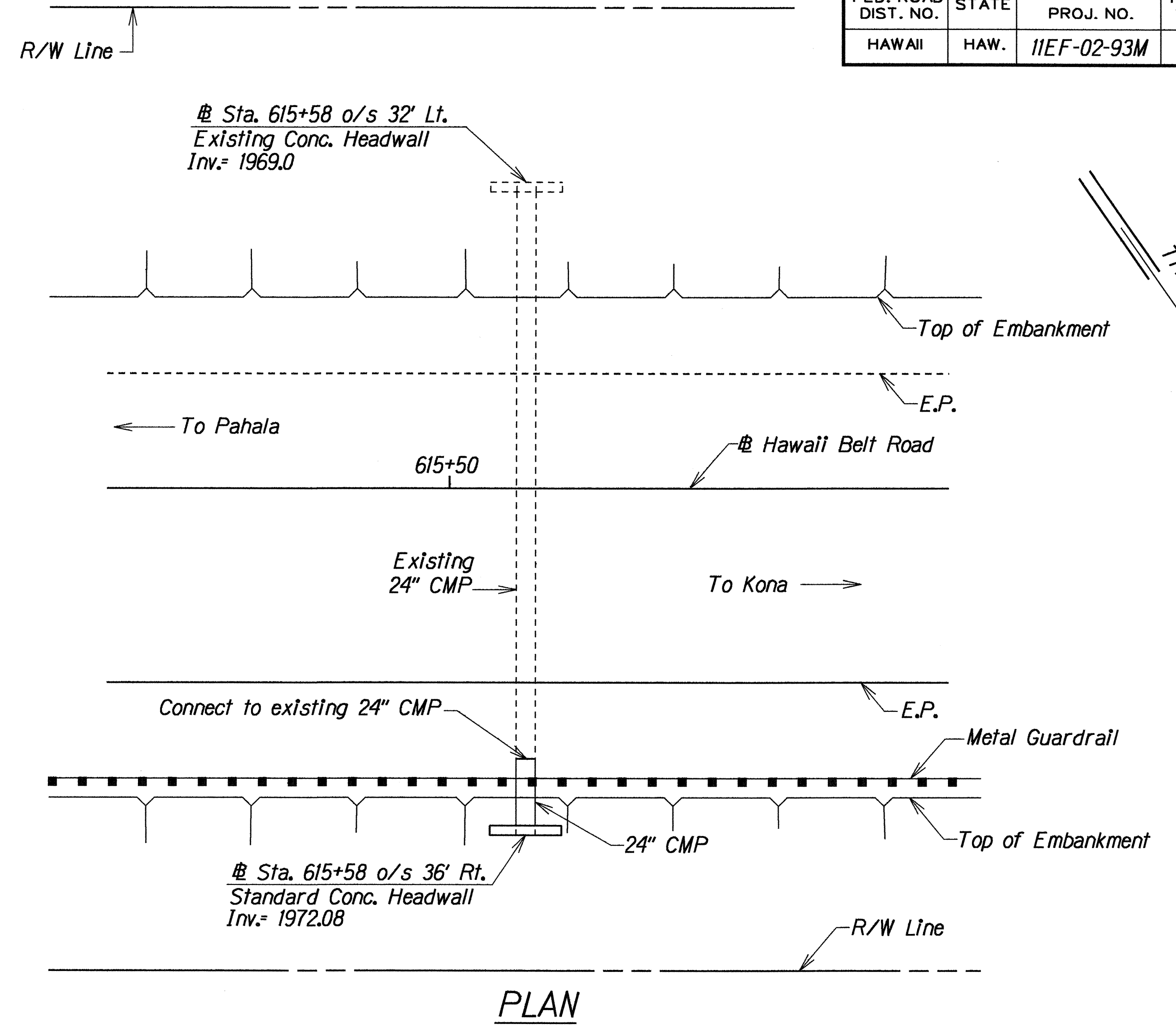
Scale: As Shown
Date: May 1993

SHEET No. H7 OF 9 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO.   | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|-------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 11EF-02-93M | 1993        | 35        | 55           |



**DRAINAGE IMPROVEMENTS AT STA. 360+00**  
 (Proj. No. P-1829)  
 Scale: 1"=10'



**DRAINAGE IMPROVEMENTS AT STA. 615+58**  
 (Proj. No. P-2129)  
 Scale: 1"=10'

| DATE    | REVISION                                   |
|---------|--------------------------------------------|
| 6/16/93 | Added Drainage Improvements at Sta. 615+58 |

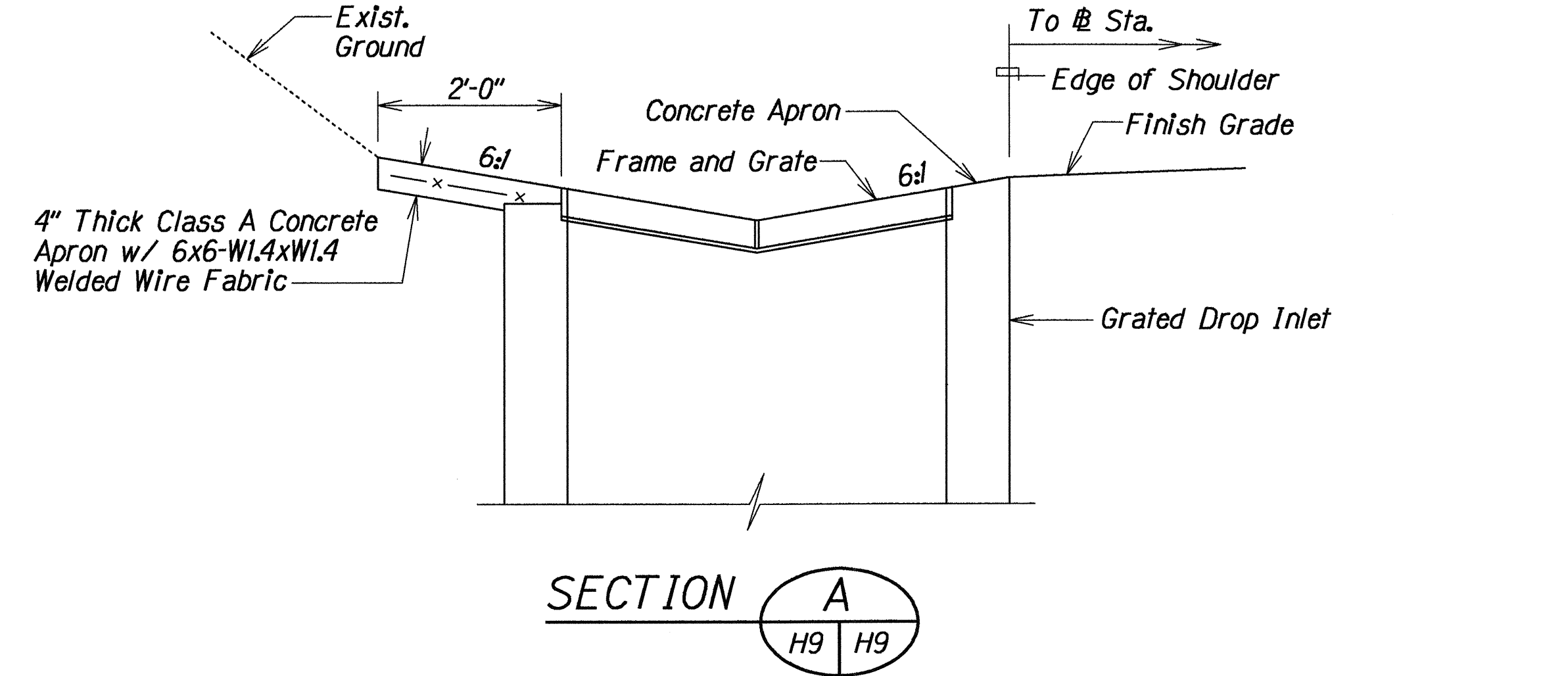
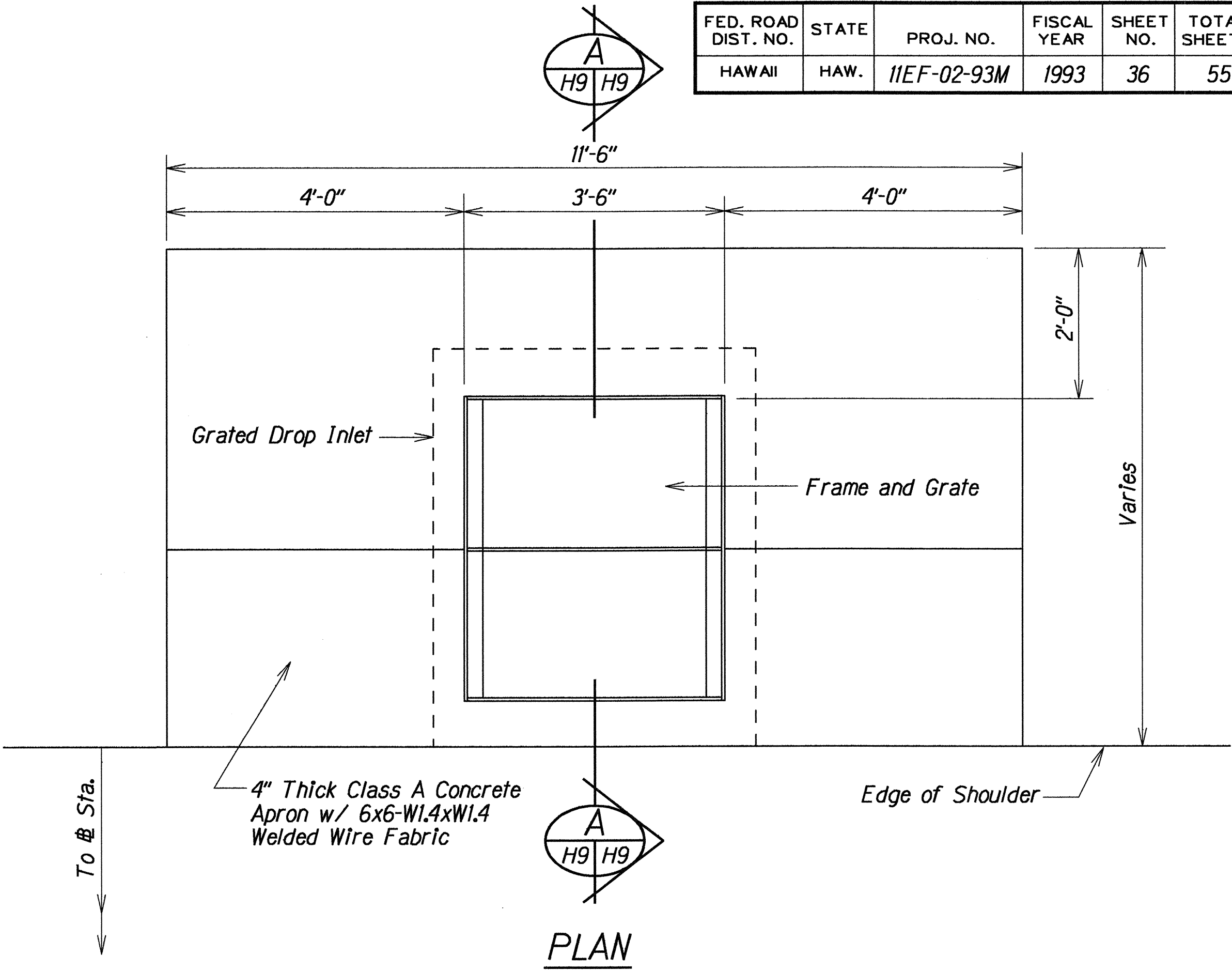
STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

**DRAINAGE PLANS**  
 HAWAII BELT RD. DRAINAGE EXTENSIONS  
 Kahuku to Honuapo  
 PROJECT NO. 11EF-02-93M  
 Scale: As Shown Date: May 1993  
 SHEET No. H8 OF 9 SHEETS

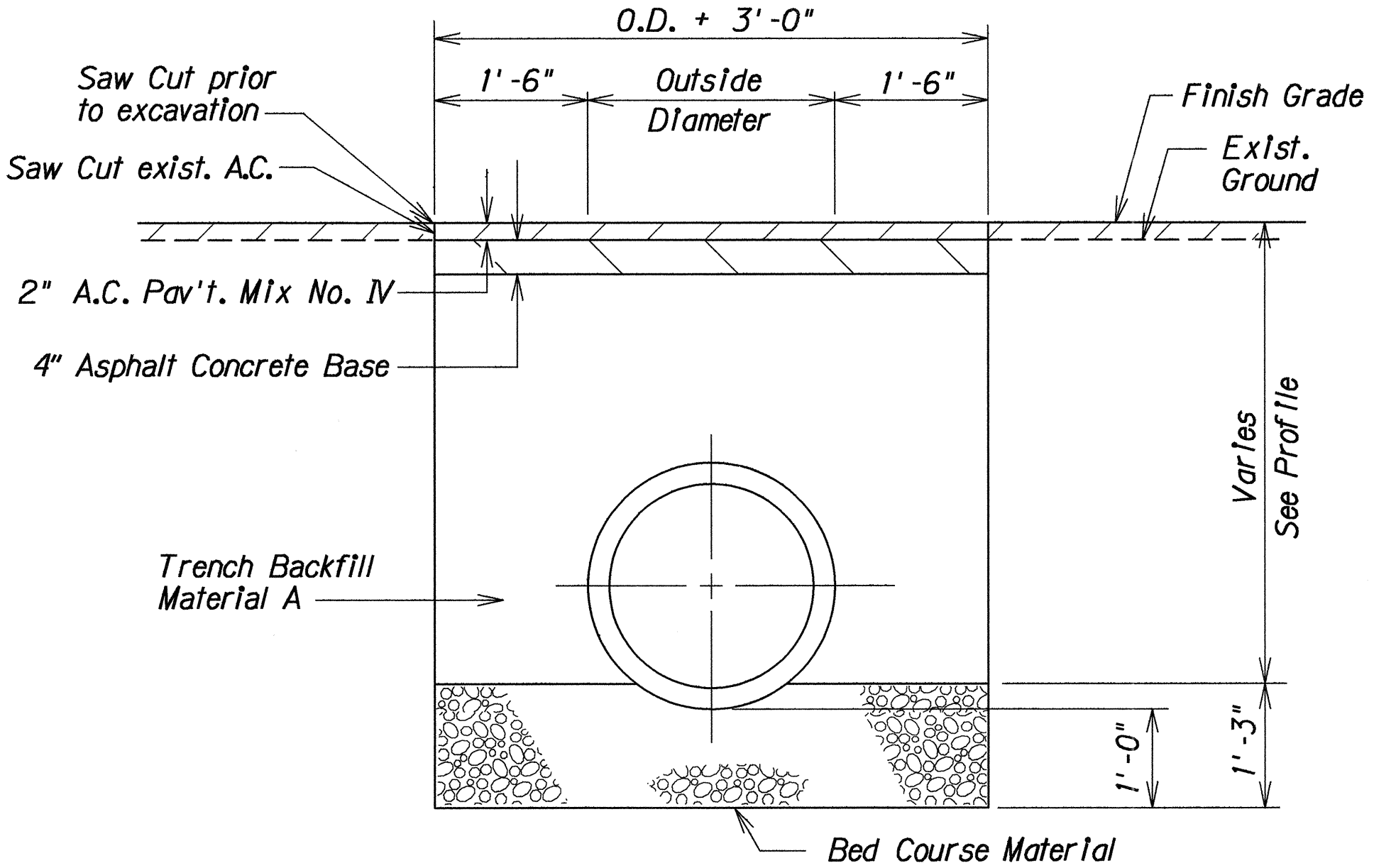
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 DRAWN BY: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_  
 NOTE BOOK: \_\_\_\_\_  
 2hbrtp105.dgn

DRAINAGE SUMMARY

| ITEM NO.            | UNIT USED           | 206                                      | 503                                  | 503                                                 | 602                                   | 603                             | 603                                         | 603                            | 603                             | 604                                   | 604                                   | 604                                   | 604                               | 609                    | 609                          | 609                          | 611              | 612                             |
|---------------------|---------------------|------------------------------------------|--------------------------------------|-----------------------------------------------------|---------------------------------------|---------------------------------|---------------------------------------------|--------------------------------|---------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-----------------------------------|------------------------|------------------------------|------------------------------|------------------|---------------------------------|
|                     |                     | 2020                                     | 0020                                 | 8704                                                | 1020                                  | 0010                            | 1010                                        | 1020                           | 9120                            | 2330                                  | 2332                                  | 2343                                  | 5024                              | 2216                   | 8614                         | 8615                         | 0100             | 0200                            |
| # STATION (FROM)    | # STATION (TO)      | CY                                       | CY                                   | LF                                                  | LB                                    | CY                              | LF                                          | LF                             | LF                              | EA                                    | EA                                    | EA                                    | EA                                | LF                     | LF                           | LF                           | CY               | CY                              |
|                     |                     | Structure Excavation for Drainage System | Class A Concrete for Drainage System | Reinforced Concrete Jacket for 29"x18" Arch Culvert | Reinforcing Steel for Drainage System | Bed Course Material for Culvert | 24-Inch Reinforced Concrete Pipe, Class III | 24-Inch CMP, Sht. "I" = 0.079" | 29"x18" CAP- Arch, "I" = 0.105" | Type 61614B GDI, 200 Feet to 299 Feet | Type 61614B GDI, 400 Feet to 499 Feet | Type 61616B GDI, 500 Feet to 499 Feet | Type A SDMH, 400 Feet to 499 Feet | Gutter, Type 2 (61616) | Gutter, Type 7 (4-Foot Wide) | Gutter, Type 7 (8-Foot Wide) | Hand-Laid Riprap | Grouted Rubble Slope Protection |
| 62+35± o/s 15' Rt.  | 62+35± o/s 20' Lt.  | 40                                       | 5                                    |                                                     | 113                                   | 7                               | 31                                          |                                |                                 |                                       | 2                                     |                                       |                                   |                        |                              |                              |                  |                                 |
| 151+96 o/s 25' Rt.  | 153+43± o/s 8' Lt.  | 172                                      |                                      | 30                                                  |                                       | 44                              |                                             | 175                            | 1                               |                                       |                                       | 1                                     |                                   |                        |                              |                              |                  |                                 |
| 161+08 o/s 12' Lt.  | 162+94 o/s 12' Lt.  |                                          |                                      |                                                     |                                       |                                 |                                             |                                |                                 |                                       |                                       |                                       |                                   |                        | 186                          |                              |                  |                                 |
| 161+01 o/s 12' Rt.  | 162+25 o/s 16' Rt.  |                                          |                                      |                                                     |                                       |                                 |                                             |                                |                                 |                                       |                                       |                                       |                                   |                        | 124                          |                              |                  |                                 |
| 273+18 o/s 36' Lt.  | 276+66± o/s 14' Lt. |                                          |                                      |                                                     |                                       |                                 |                                             |                                |                                 |                                       |                                       |                                       |                                   | 342                    |                              | 8                            |                  |                                 |
| 184+35± o/s 25± Rt. | 184+35± o/s 32± Lt. |                                          |                                      |                                                     |                                       | 4                               |                                             |                                |                                 |                                       |                                       | 1                                     | 50                                |                        |                              |                              |                  | 15                              |
| 213+00 o/s 24' Lt.  | 213+00 o/s 19' Rt.  | 49                                       | 2                                    |                                                     | 43                                    | 10                              | 41                                          |                                |                                 |                                       | 1                                     |                                       |                                   |                        |                              |                              |                  |                                 |
| 264+00 o/s 19' Lt.  | 264+00 o/s 29' Rt.  | 50                                       | 2                                    |                                                     | 43                                    | 11                              | 42                                          |                                |                                 |                                       | 2                                     |                                       |                                   |                        |                              |                              |                  |                                 |
| 360+00 o/s 29' Lt.  | 360+00 o/s 19' Rt.  | 50                                       | 2                                    |                                                     | 43                                    | 11                              | 42                                          |                                |                                 |                                       | 2                                     |                                       |                                   |                        |                              |                              |                  |                                 |
| 615+58 o/s 32' Lt.  | 615+58 o/s 36' Rt.  | 6                                        | 2                                    |                                                     | 43                                    | 2                               |                                             | 8                              |                                 |                                       |                                       |                                       |                                   |                        |                              |                              |                  |                                 |
| TOTAL               |                     | 367                                      | 13                                   | 30                                                  | 285                                   | 89                              | 156                                         | 8                              | 175                             | 1                                     | 7                                     | 1                                     | 1                                 | 50                     | 342                          | 310                          | 8                | 15                              |



TYPICAL DETAIL - CONCRETE APRON



TYPICAL CULVERT TRENCH DETAIL

DATE: \_\_\_\_\_  
DRAWN BY: \_\_\_\_\_  
CHECKED BY: \_\_\_\_\_  
NOTE BOOK: \_\_\_\_\_  
2hbrhd101.dgn

6/16/93 Revised Drainage Summary.  
DATE REVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**DRAINAGE DETAILS**  
HAWAII BELT RD. DRAINAGE EXTENSIONS  
Kahuku to Honuapo  
PROJECT NO. 11EF-02-93M  
Scale: 3/4"=1'-0" Date: May 1993  
SHEET No. H9 OF 9 SHEETS