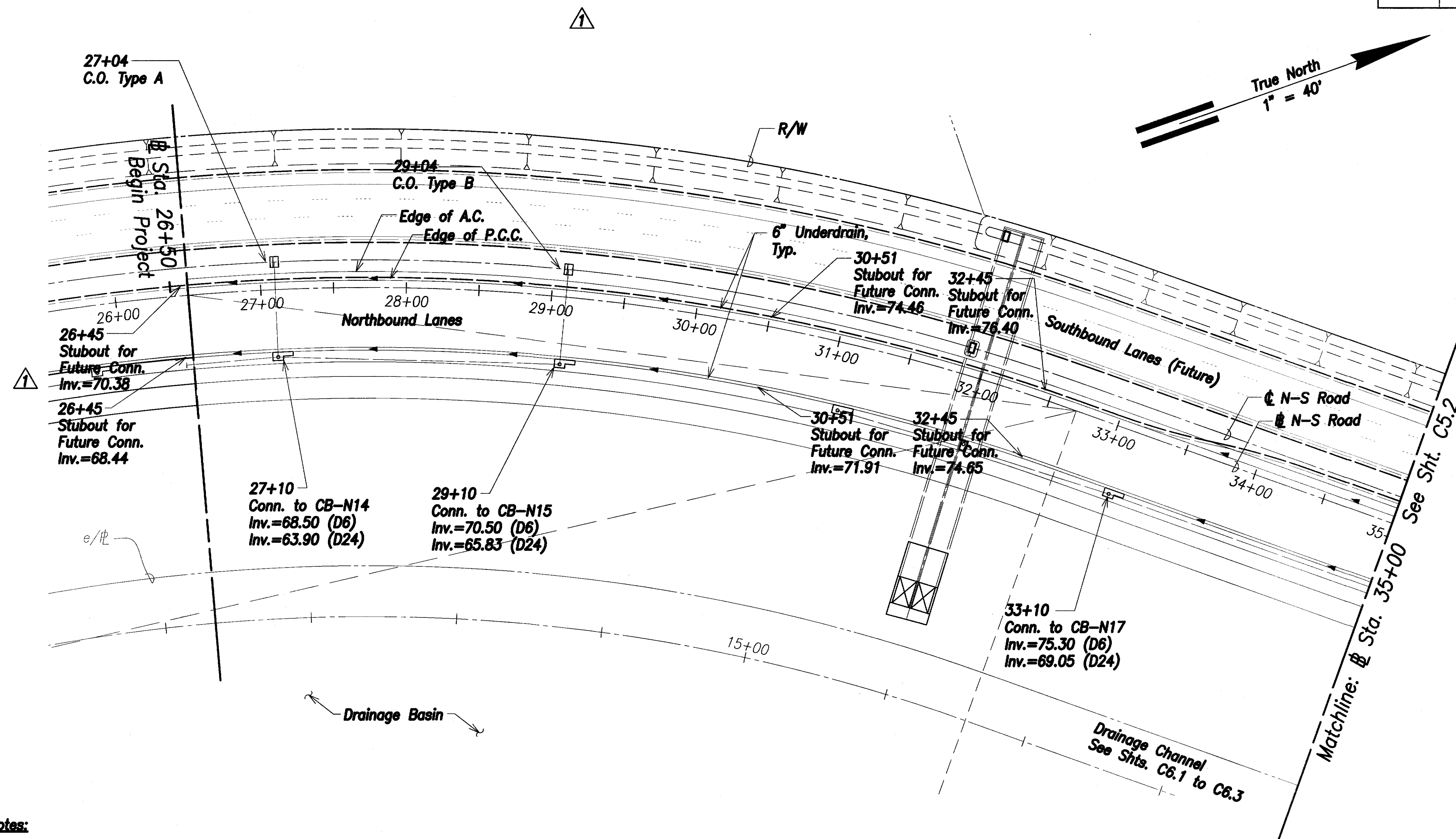


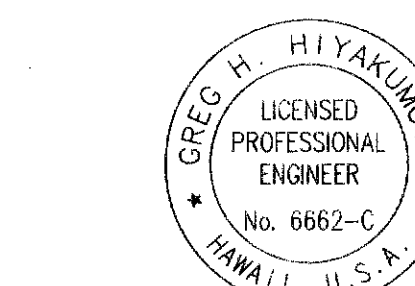
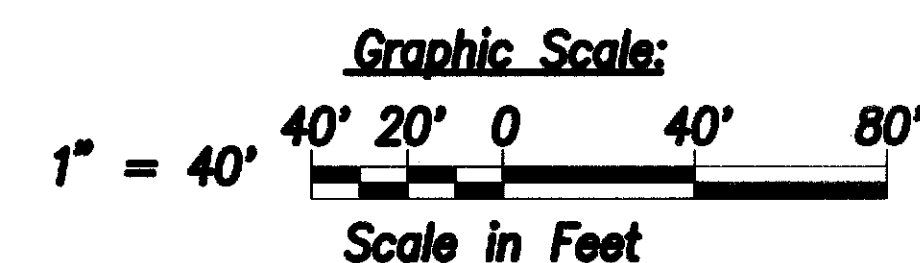
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-8930(1)        | 2005        | CO 31     | 144          |



#### Notes:

- See Detail Sht. C5.6 for Typical Connection Layout to Catch Basins & Drain Inlets
- See Detail Sht. C5.5 for Cleanout (C.O.) Type Details

**Underdrain Plan - Sta. 26+50 to 35+00**  
Scale: 1" = 40'



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE: *[Signature]* April 30, 2008  
EXPIRATION DATE OF THE LICENSE

|         |                                                                                                              |
|---------|--------------------------------------------------------------------------------------------------------------|
| 7/17/06 | Deleted Temp. U/D, provided inverts                                                                          |
| 6/21/06 | Underdrain revised for roadway and culvert deletion. Temp. underdrain adjusted to daylight to extended ditch |
| DATE    | REVISION                                                                                                     |

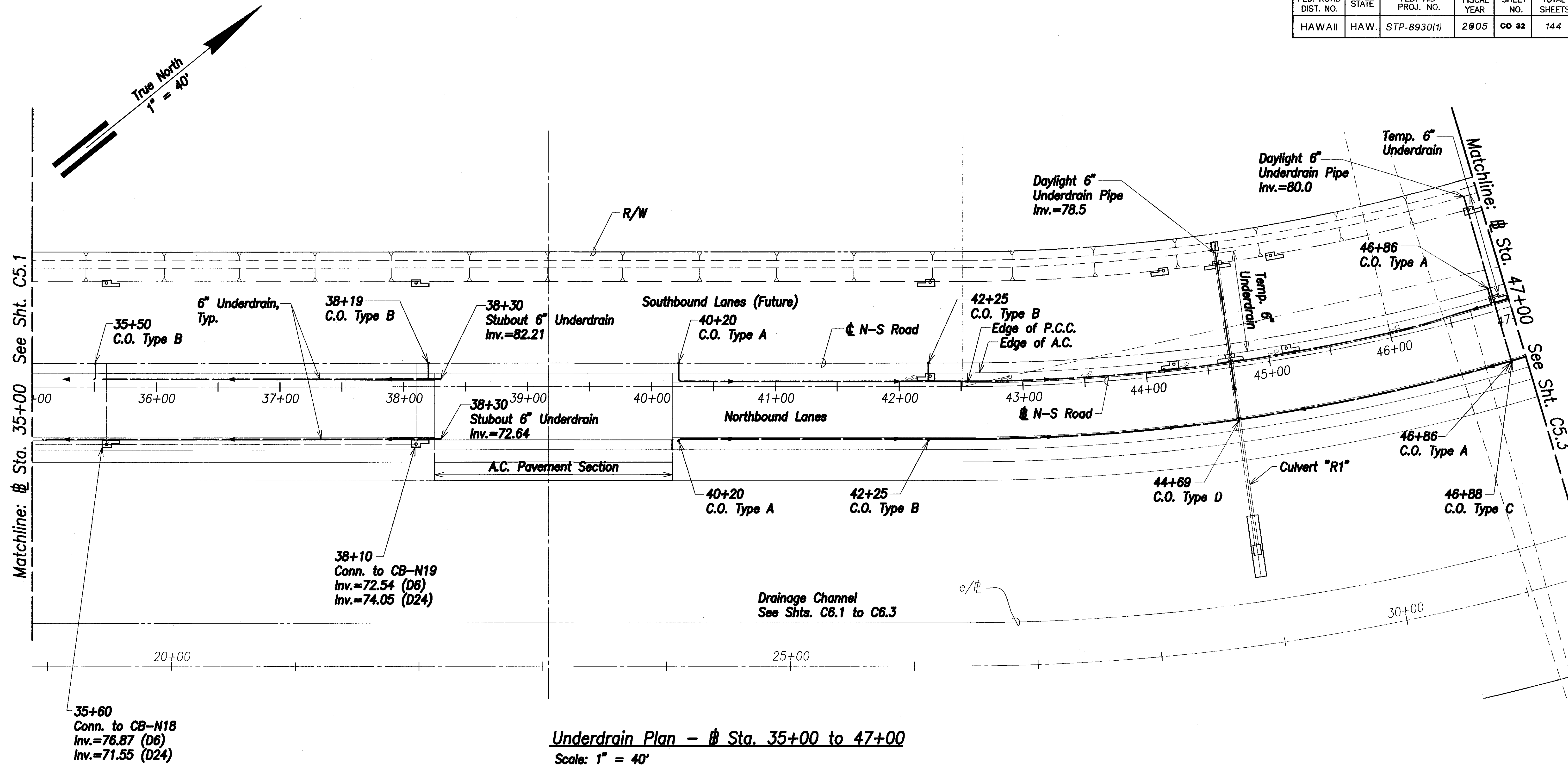
|                                                                      |                    |
|----------------------------------------------------------------------|--------------------|
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION |                    |
| <b>UNDERDRAIN PLAN - 1</b>                                           |                    |
| North-South Road<br>Phase 1A<br>F.A.I. Proj. No. STP-8930(1)         |                    |
| Scale: 1" = 40'                                                      | Date: Dec 22, 2004 |

SHEET No. C5.1 OF SHEETS

"AS-BUILT" CO 31

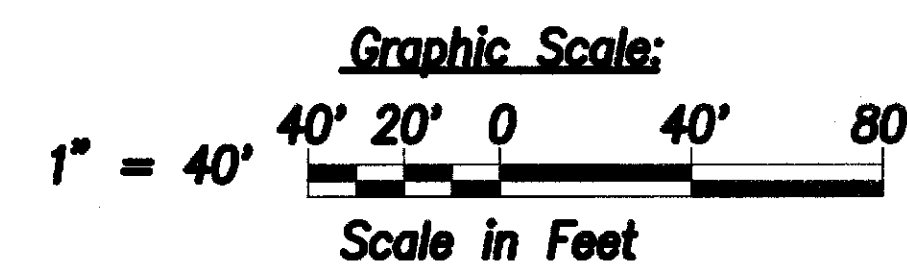
|               |      |
|---------------|------|
| DESIGNED BY   | DATE |
| DRAWN BY      |      |
| CHECKED BY    |      |
| IN CHARGE     |      |
| NOTED BY      |      |
| QUANTITIES BY |      |
| CHECKED BY    |      |
| NO.           |      |

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-8930(1)        | 2005        | CO 32     | 144          |



#### Notes:

- See Detail Sht. C5.6 for Typical Connection Layout Catch Basins
- See Detail Sht. C5.5 for Cleanout (C.O.) Type Details



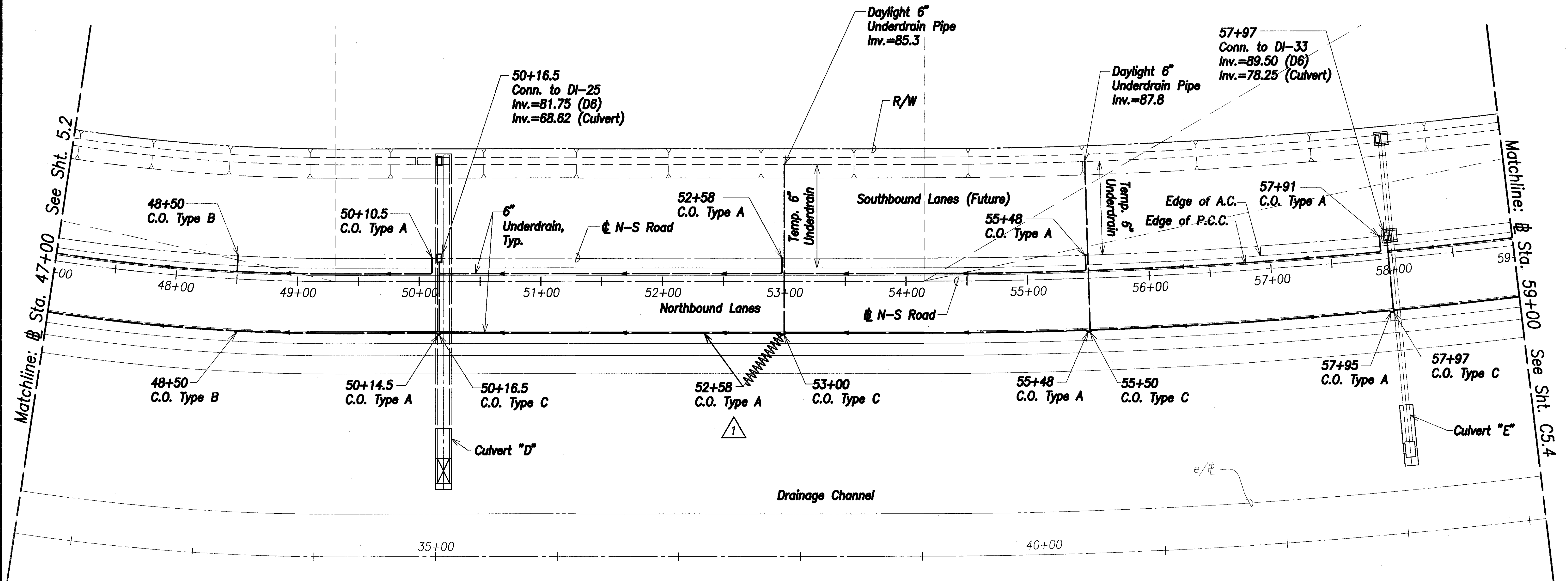
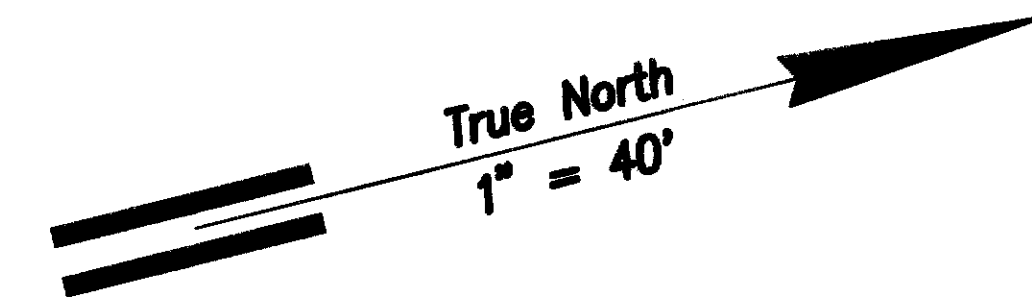
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE: April 30, 2008  
EXPIRATION DATE OF THE LICENSE

| DATE                                                                                                                                                               | REVISION                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 7/17/06                                                                                                                                                            | Added U/D daylight inverts |
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION<br><b>UNDERDRAIN PLAN - 2</b><br>North-South Road<br>Phase 1A<br>F.A.I. Proj. No. STP-8930(1) |                            |
| Scale: 1" = 40'                                                                                                                                                    | Date: Dec 22, 2004         |
| SHEET No. C5.2 OF                                                                                                                                                  | SHEETS                     |

"AS-BUILT" CO 32

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-8930(1)        | 2005        | CO 33     | 144          |

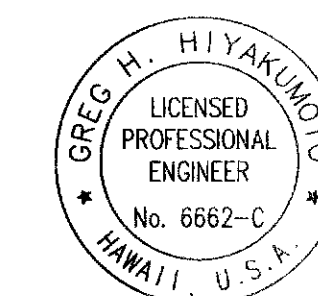
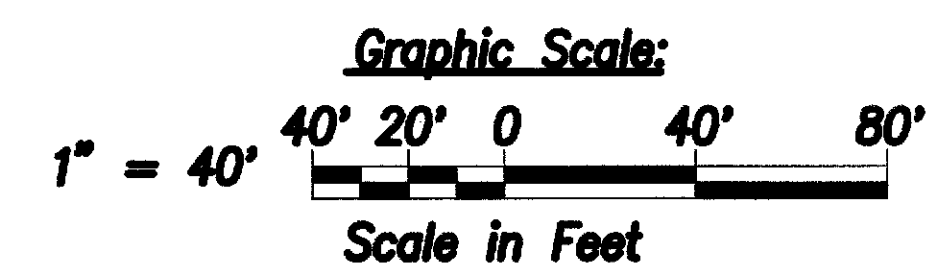


**Underdrain Plan - Sta. 47+00 to 59+00**  
Scale: 1" = 40'

| LEGEND FOR AS-BUILT POSTINGS |                                     |
|------------------------------|-------------------------------------|
| ~~~~~                        | Squiggly line for as-built deletion |
| ==                           | Double line for as-built deletion   |
| Text                         | Text for as-built posting           |

**Notes:**

- See Detail Sht. C5.6 for Typical Connection Layout to Drain Inlets
- See Detail Sht. C5.5 for Cleanout (C.O.) Type Details



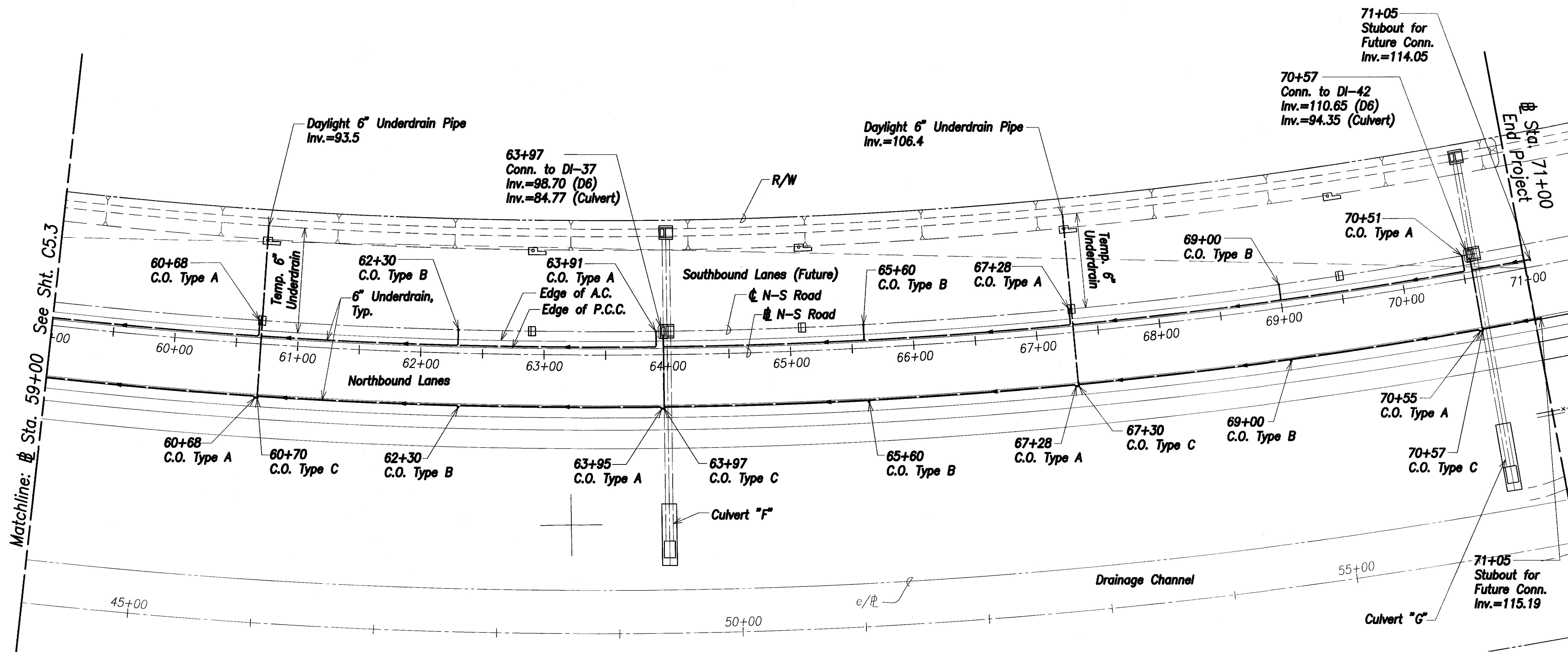
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE: *[Signature]* April 30, 2008  
EXPIRATION DATE OF THE LICENSE

|                                                                                                                                                                    |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 2/26/07                                                                                                                                                            | As Built - RFI 53          |
| 7/17/06                                                                                                                                                            | Added U/D daylight inverts |
| DATE                                                                                                                                                               | REVISION                   |
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION<br><b>UNDERDRAIN PLAN - 3</b><br>North-South Road<br>Phase 1A<br>F.A.I. Proj. No. STP-8930(1) |                            |
| Scale: 1" = 40'                                                                                                                                                    |                            |
| Date: Dec 22, 2004                                                                                                                                                 |                            |
| SHEET No. C5.3 OF SHEETS                                                                                                                                           |                            |

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-8930(1)        | 2005        | CO 34     | 144          |

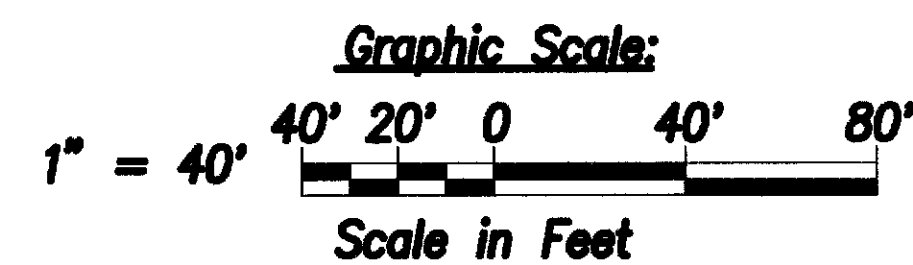
True North  
1" = 40'



**Underdrain Plan - Sta. 59+00 to 71+00**  
Scale: 1" = 40'

**Notes:**

1. See Detail Sht. C5.6 for Typical Connection Layout to Drain Inlets & Catch Basins
2. See Detail Sht. C5.5 for Cleanout (C.O.) Type Details



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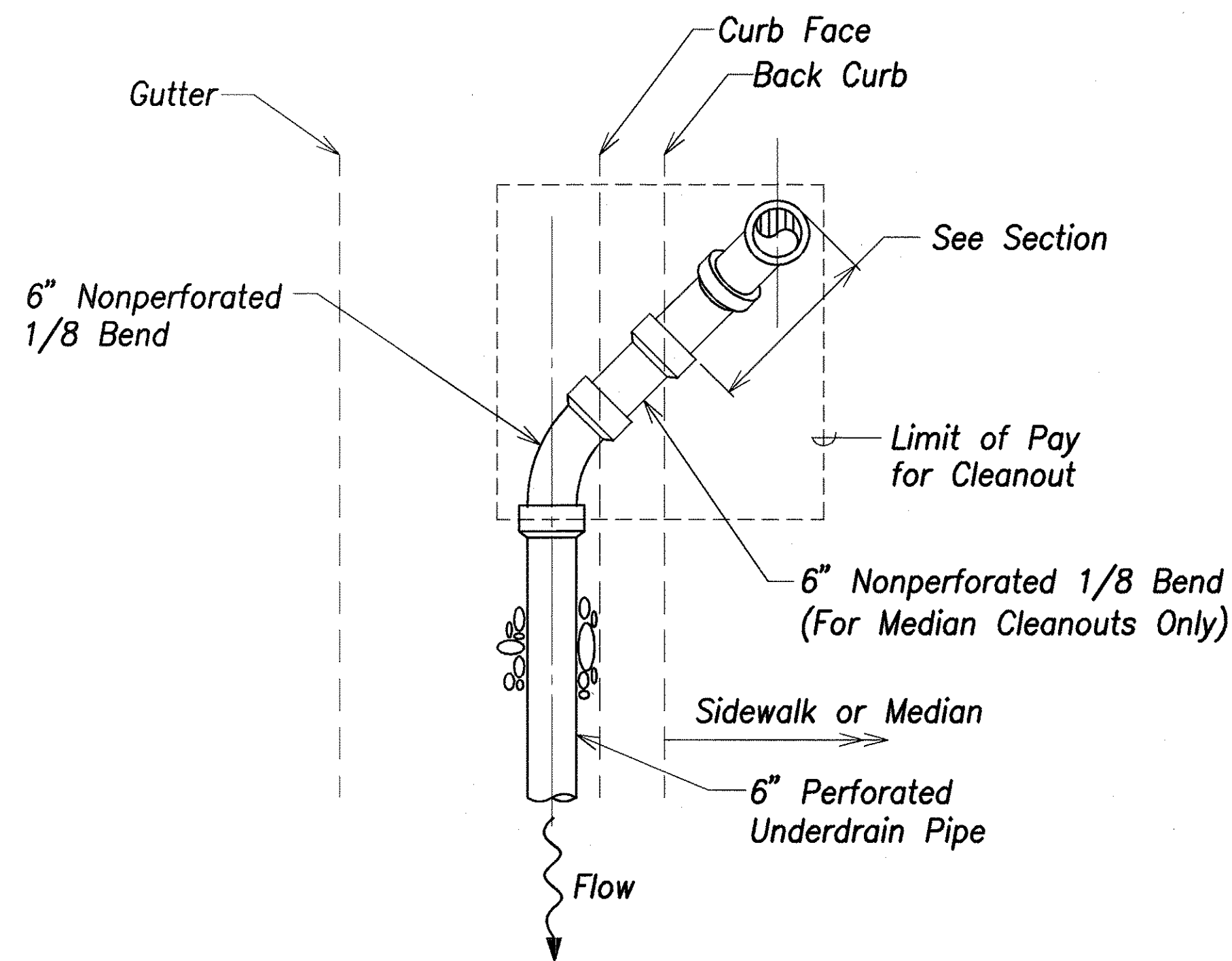
SIGNATURE: [Signature] April 30, 2008  
EXPIRATION DATE OF THE LICENSE

| DATE                                                                                                                                                               | REVISION           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 7/17/06                                                                                                                                                            | Added U/D Inverts  |
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION<br><b>UNDERDRAIN PLAN - 4</b><br>North-South Road<br>Phase 1A<br>F.A.I. Proj. No. STP-8930(1) |                    |
| Scale: 1" = 40'                                                                                                                                                    | Date: Dec 22, 2004 |
| SHEET No. C5.4 OF                                                                                                                                                  | SHEETS             |

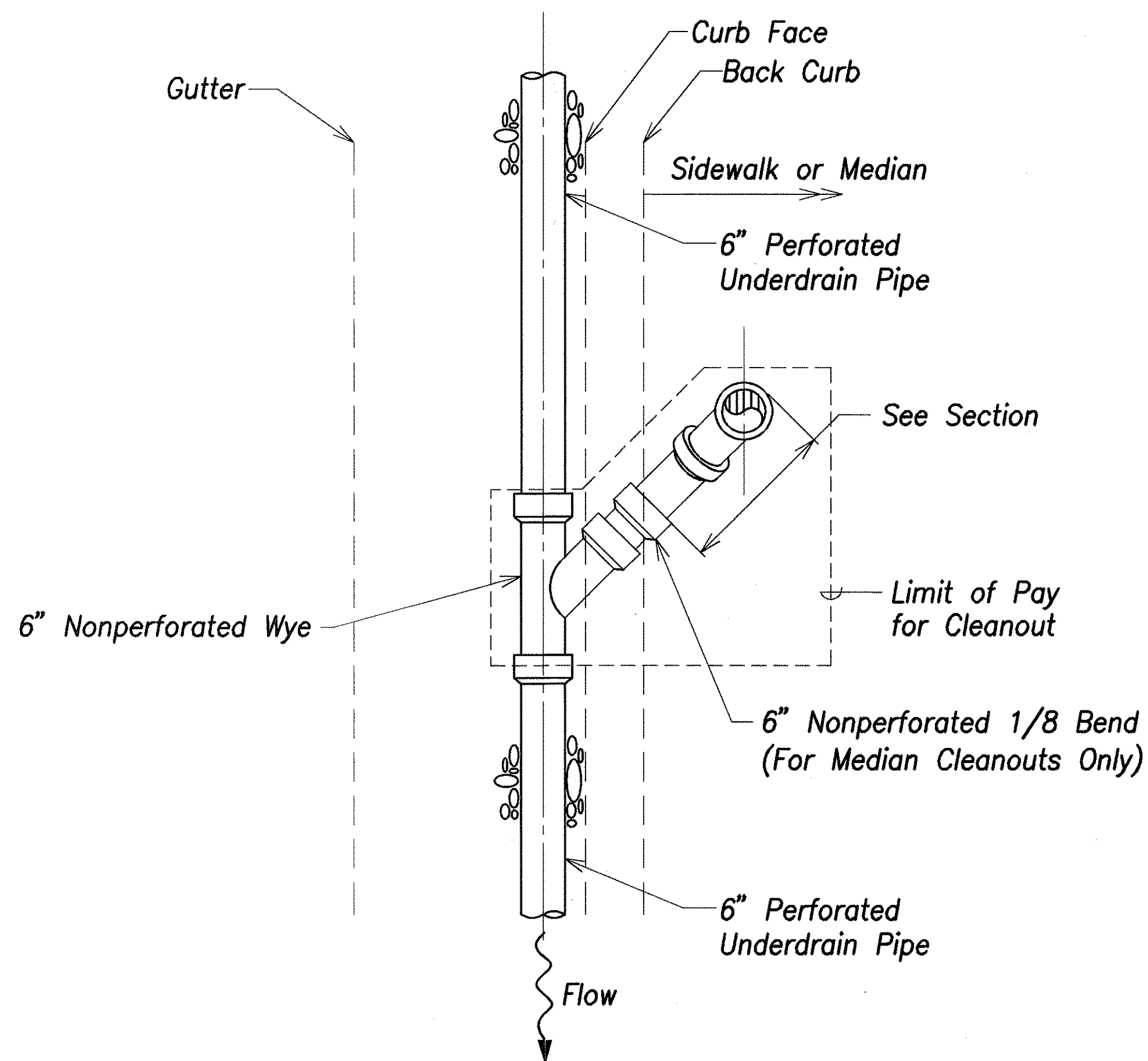
"AS-BUILT" CO 34

|                   |      |
|-------------------|------|
| SURVEY PLOTTED BY | DATE |
| DRAWN BY          |      |
| DESIGNED BY       |      |
| CHECKED BY        |      |
| ORIGINAL PLAN     |      |
| NOTE BOOK         |      |
| No.               |      |

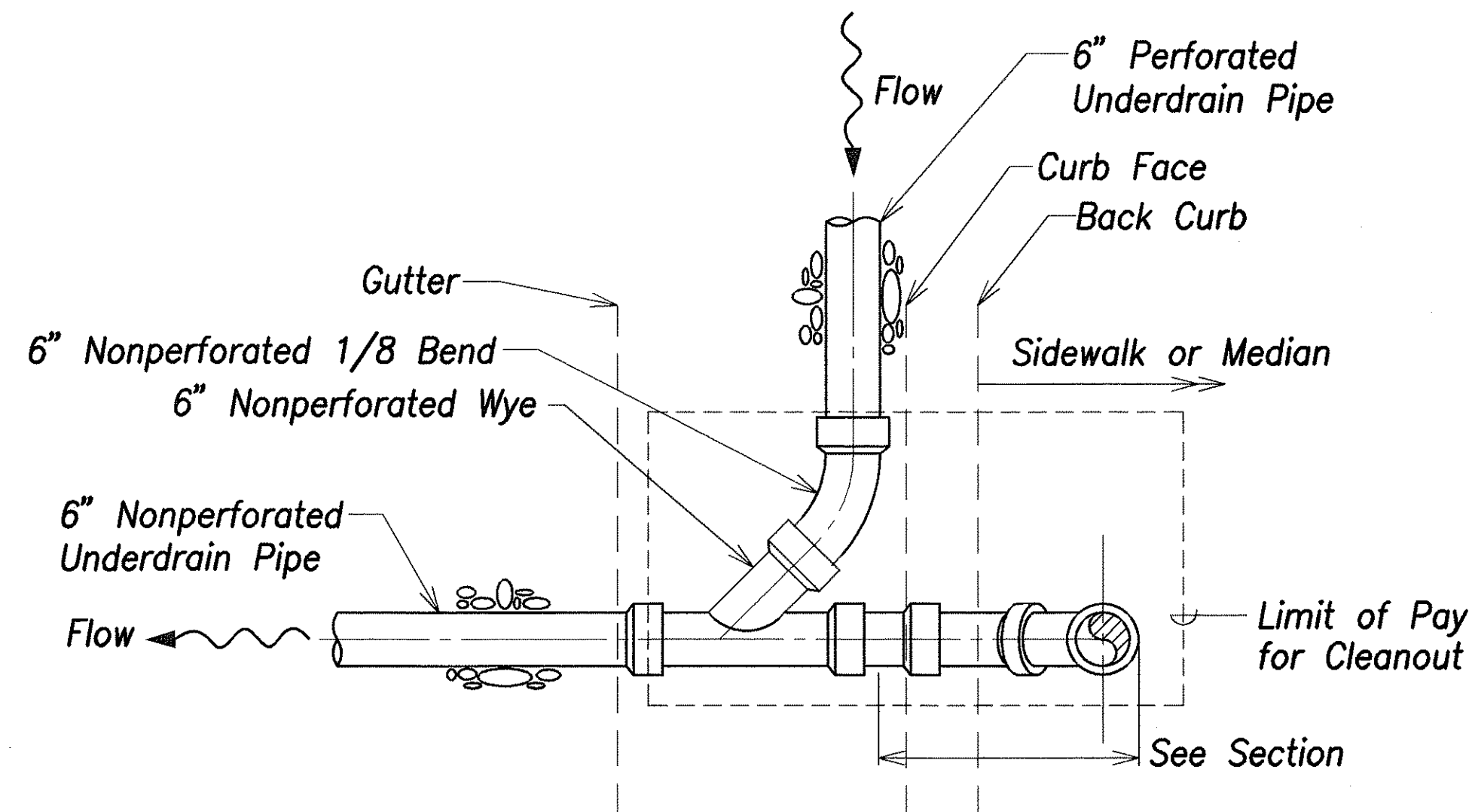
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-8930(1)        | 2005        | 35        | 144          |



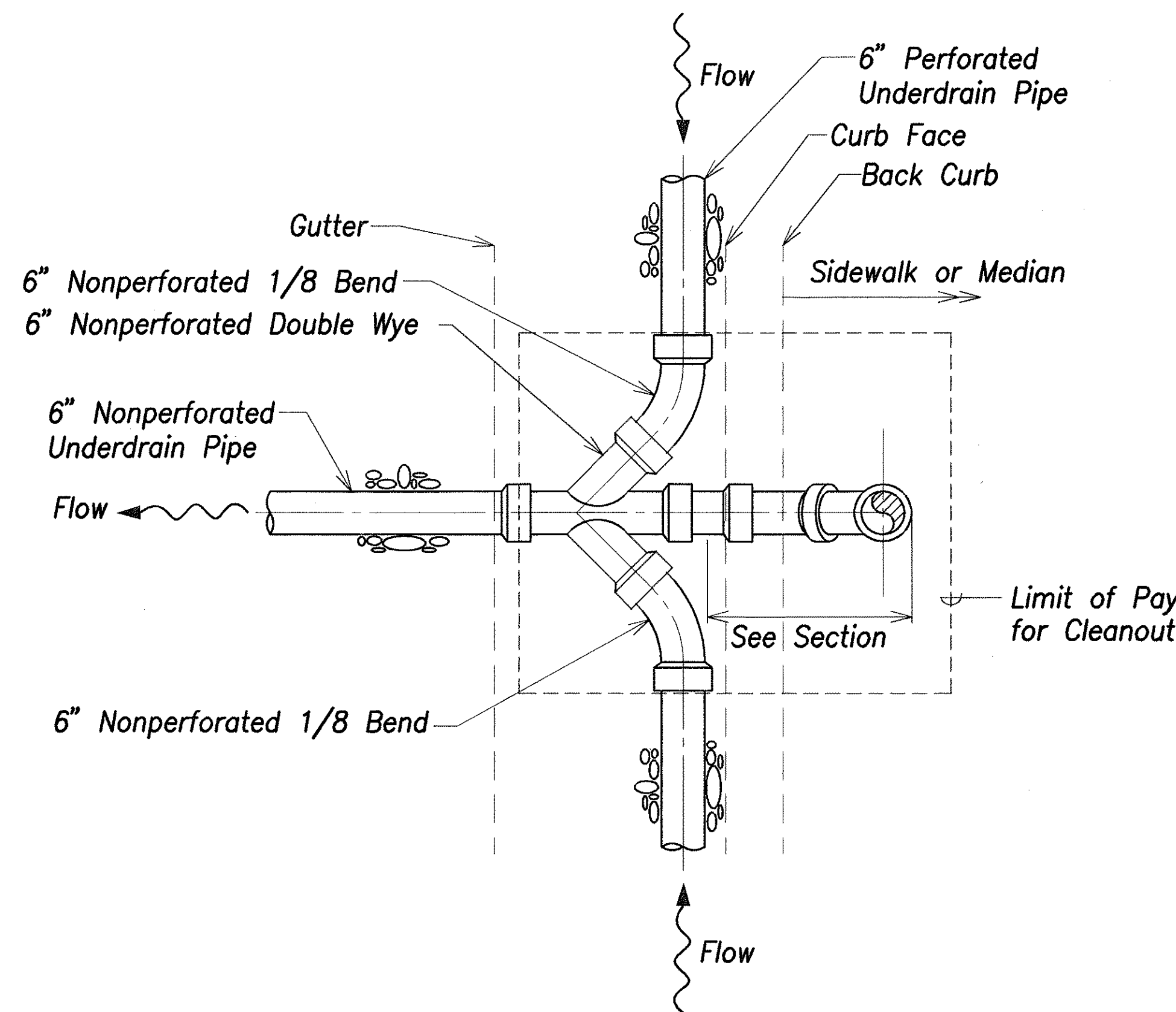
Underdrain Cleanout Type A  
Not To Scale



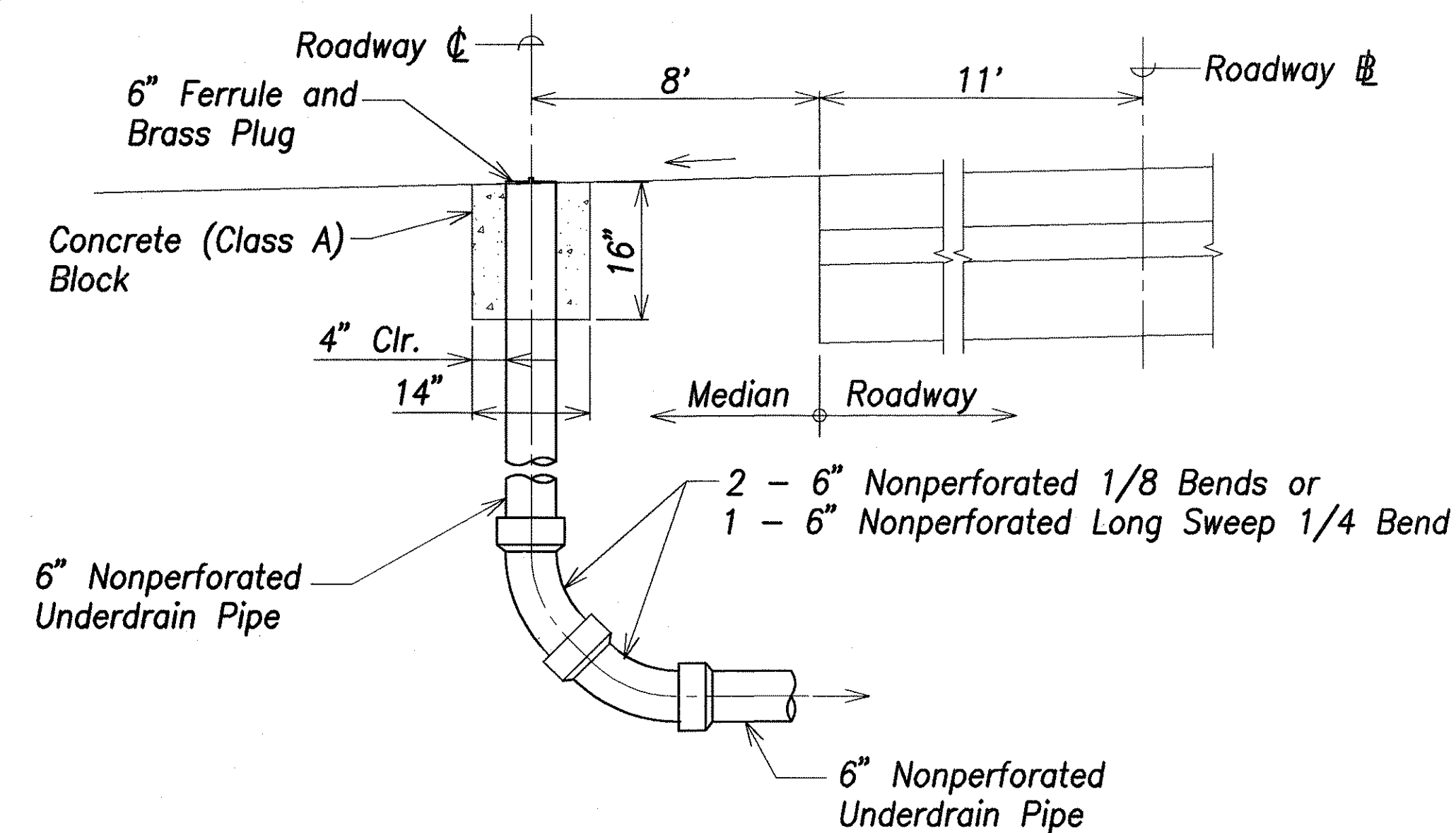
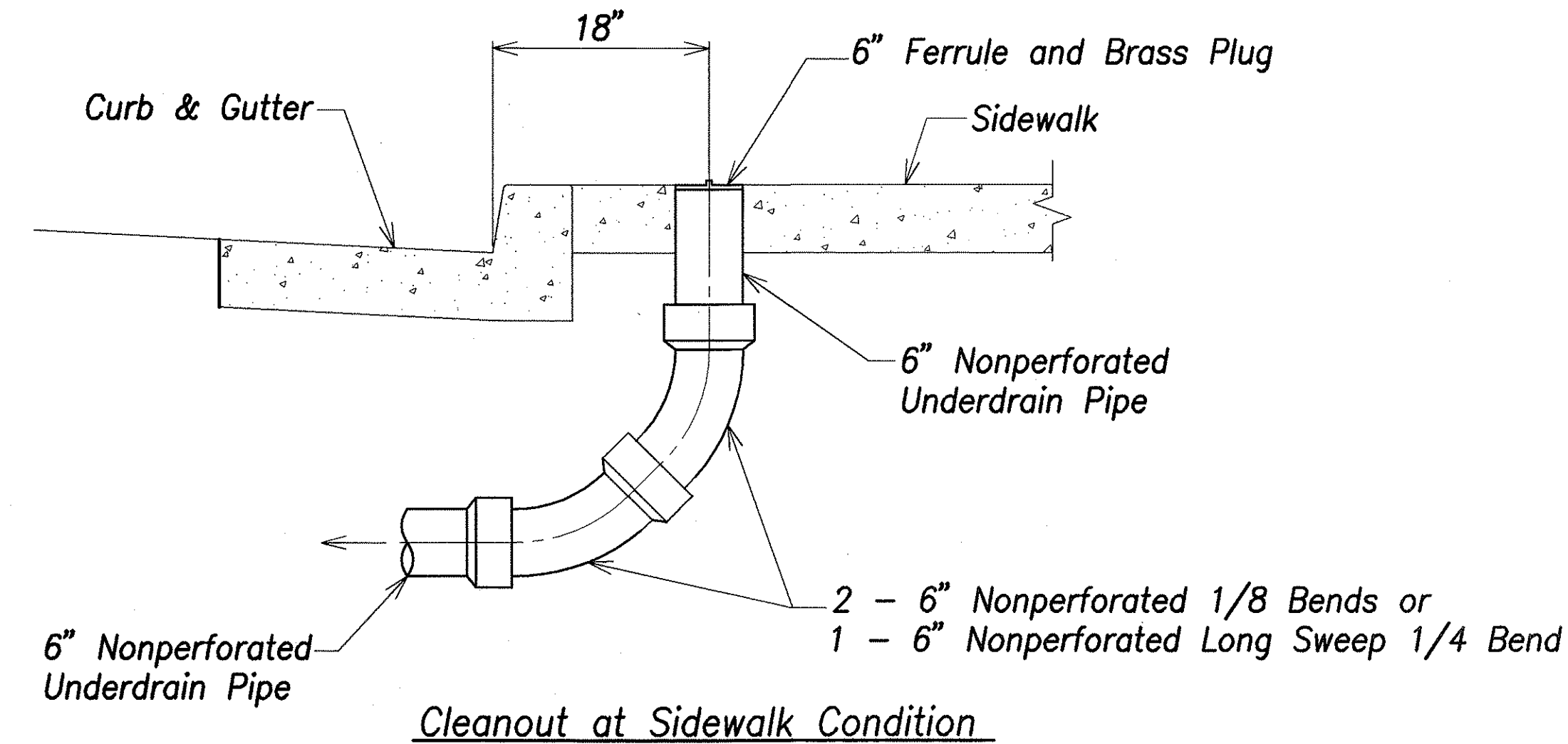
Underdrain Cleanout Type B  
Not To Scale



Underdrain Cleanout Type C  
Not To Scale



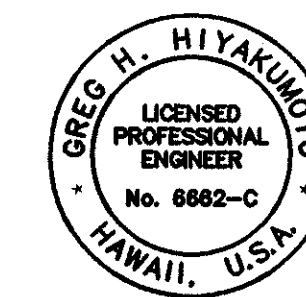
Underdrain Cleanout Type D  
Not To Scale



Cleanout at Median Condition

Section  
Not To Scale

|                   |       |
|-------------------|-------|
| DATE              | _____ |
| SURVEY PLOTTED BY | _____ |
| DRAWN BY          | _____ |
| DESIGNED BY       | _____ |
| QUANTITIES BY     | _____ |
| CHECKED BY        | _____ |
| ORIGINAL PLAN     | _____ |
| NOTE BOOK         | _____ |
| No.               | _____ |



THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION.  
DATE OF  
SIGNATURE 12/22/04 LICENSE EXPIRY APR 30, 2008

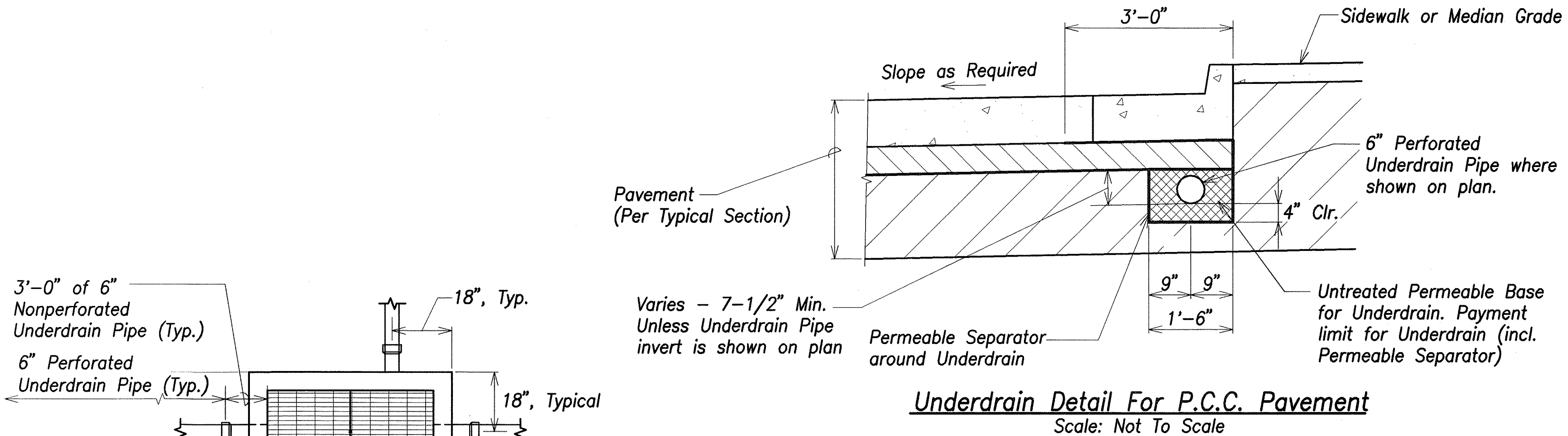
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

UNDERDRAIN DETAILS - 1

North-South Road  
Phase 1A  
F.A.I. Proj. No. STP-8930(1)

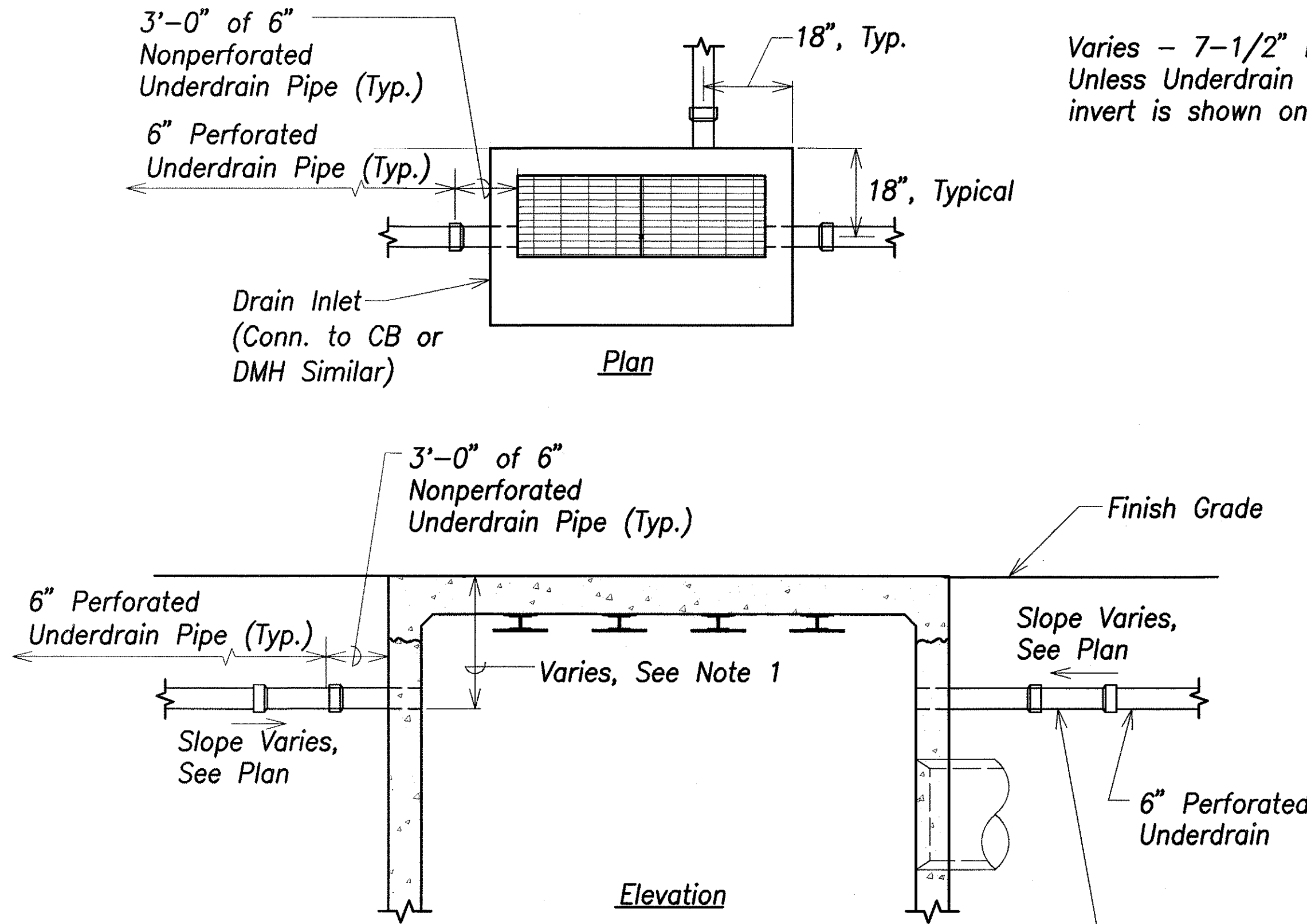
Not to Scale Date: Dec 22, 2004  
SHEET No. C5.5 OF 59 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-8930(1)        | 2005        | 36        | 144          |

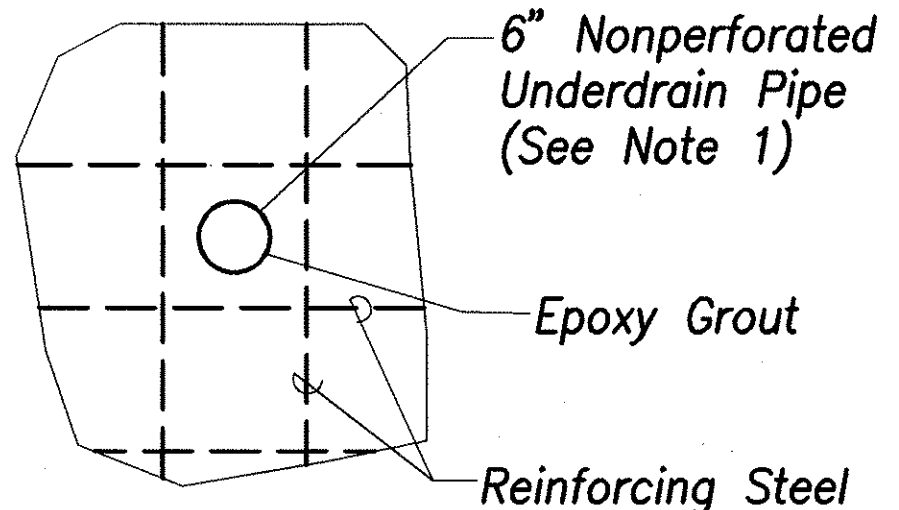


**Underdrain Note:**

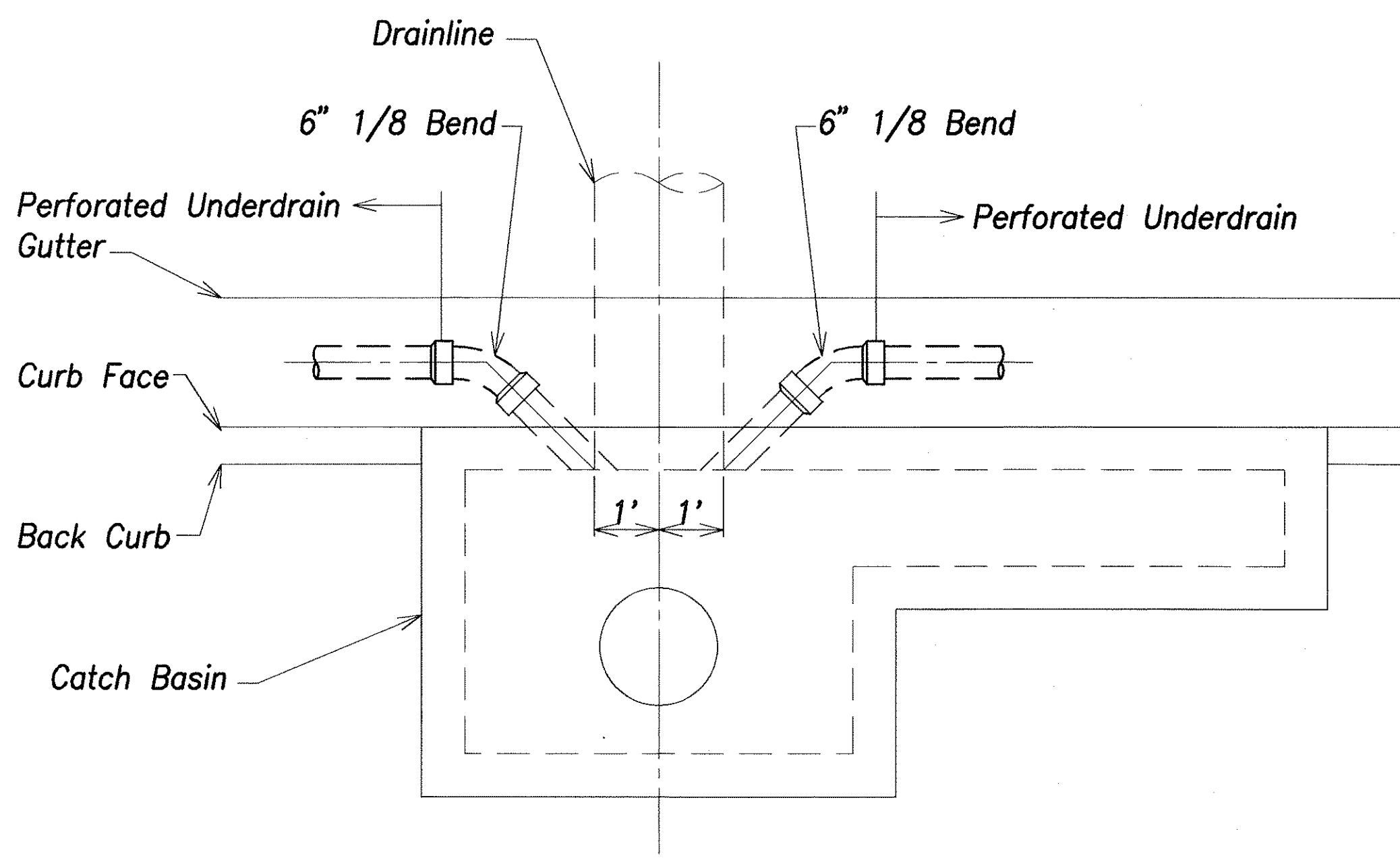
At locations where invert elevations indicate that the underdrain invert will be lower than 7 1/2" below Untreated Permeable Base Course, the Contractor shall allow for the required excavation and material at no additional cost to the State.



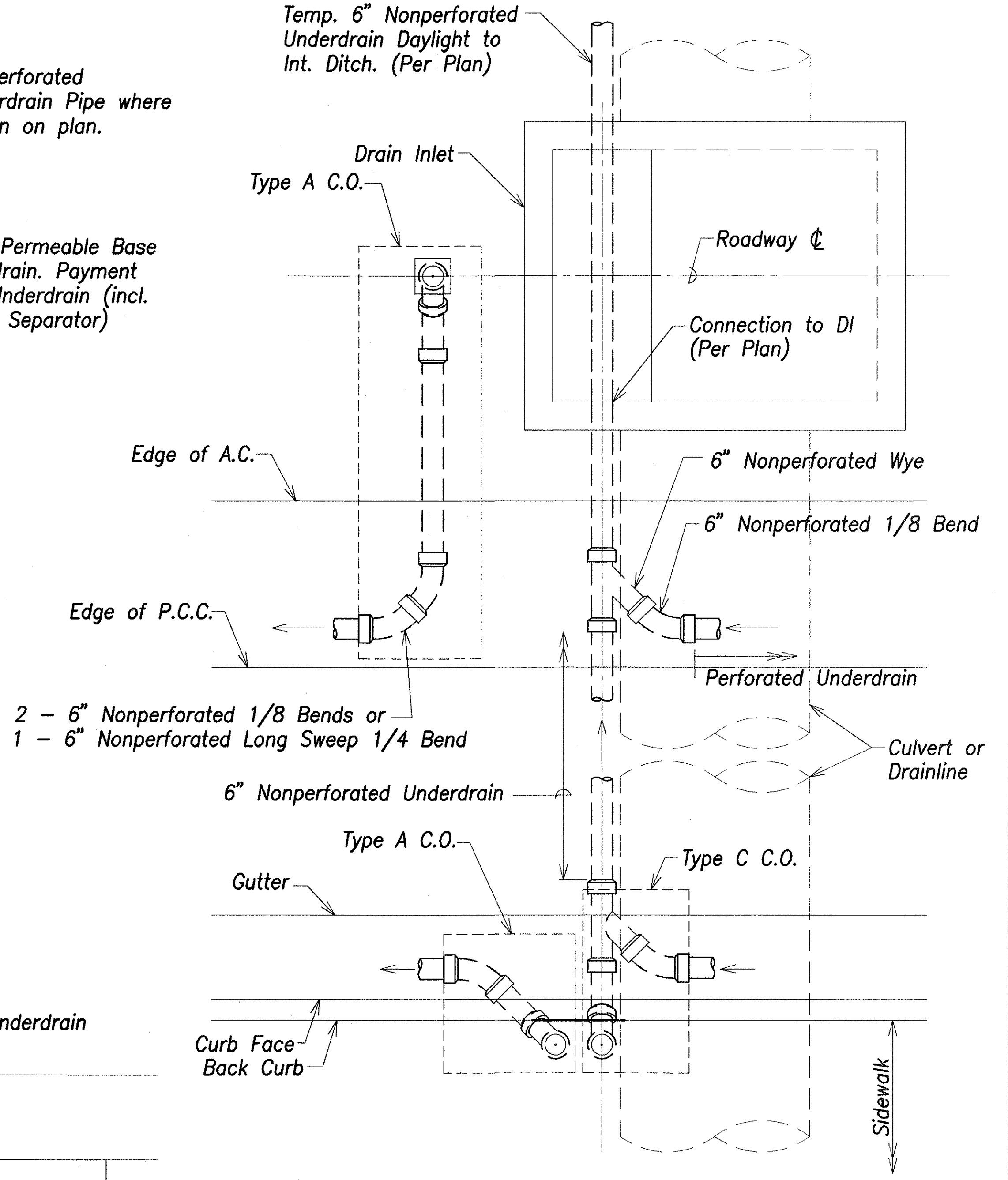
- Notes:**
1. The exact invert location of the Underdrain Connection shall be adjusted to pass between the Reinforcing Steel.
  2. 6" Nonperforated Underdrain Pipe Connections at drainage structure, including 3 LF Nonperforated Underdrain Pipe at each connection, shall be incidental to the cost of other contract items.



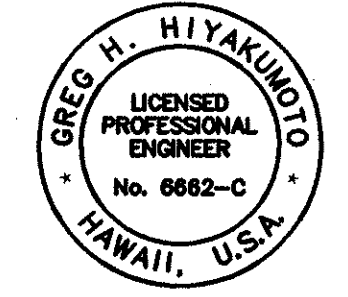
**Underdrain Connection to DI, CB or DMH**  
Not To Scale



**Connection Detail - Catch Basin**  
Not To Scale



**Connection Detail - Drain Inlet**  
Not To Scale



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DATE OF LICENSE EXPIRY: APR 30, 2006

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**UNDERDRAIN DETAILS - 2**

North-South Road  
Phase 1A  
F.A.I. Proj. No. STP-8930(1)

Not to Scale Date: Dec 22, 2004

SHEET No. C5.6 OF 59 SHEETS

|             |      |
|-------------|------|
| DESIGNED BY | DATE |
| DRAWN BY    |      |
| CHECKED BY  |      |
| NOTED BY    |      |
| APPROVED BY |      |
| DATE        |      |

## UNDERDRAIN SUMMARY

### ESTIMATED QUANTITIES

| FED. ROAD<br>DIST. NO. | STATE | FED. AID<br>PROJ. NO. | FISCAL<br>YEAR | SHEET<br>NO. | TOTAL<br>SHEETS |
|------------------------|-------|-----------------------|----------------|--------------|-----------------|
| HAWAII                 | HAW.  | STP-8930(1)           | 2005           | 37           | 144             |

| ITEM NO.     |                                    |                     | 605.0006                          | 605.0106                              |
|--------------|------------------------------------|---------------------|-----------------------------------|---------------------------------------|
| SHEET NUMBER | FROM & STATION NO./<br>STATION NO. | TO &<br>STATION NO. | 6-INCH PERFORATED UNDERDRAIN PIPE | 6-INCH NON-PERFORATED UNDERDRAIN PIPE |
|              | UNIT                               |                     | LIN. FT.                          | LIN. FT.                              |
| C5.1         | 26+45                              | 35+00               | 1908.40                           |                                       |
| C5.2         | 35+00                              | 47+00               | 2075.50                           |                                       |
| C5.2         | 44+69                              |                     |                                   | 136.29                                |
| C5.2         | 46+88                              |                     |                                   | 139.25                                |
| C5.3         | 47+00                              | 59+00               | 2435.27                           |                                       |
| C5.3         | 50+16.5                            |                     |                                   | 59.25                                 |
| C5.3         | 53+00                              |                     |                                   | 139.25                                |
| C5.3         | 55+50                              |                     |                                   | 139.25                                |
| C5.3         | 57+97                              |                     |                                   | 59.25                                 |
| C5.4         | 59+00                              | 71+05               | 2483.73                           |                                       |
| C5.4         | 60+70                              |                     |                                   | 139.25                                |
| C5.4         | 63+97                              |                     |                                   | 59.25                                 |
| C5.4         | 67+30                              |                     |                                   | 139.25                                |
| C5.4         | 70+57                              |                     |                                   | 59.25                                 |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              |                                    |                     |                                   |                                       |
|              | TOTAL                              |                     | 8902.90                           | 1069.54                               |

|  | SHEET<br>NUMBER | ITEM NO.      | 605.2010        | 605.2020        | 605.2030        | 605.2040        |
|--|-----------------|---------------|-----------------|-----------------|-----------------|-----------------|
|  |                 | & STATION NO. | CLEANOUT TYPE A | CLEANOUT TYPE B | CLEANOUT TYPE C | CLEANOUT TYPE D |
|  |                 | UNIT          | EACH            | EACH            | EACH            | EACH            |
|  | C5.1            | 27+04         | 1               |                 |                 |                 |
|  | C5.1            | 31+83         | 1               |                 |                 |                 |
|  | C5.2            | 35+50         |                 | 1               |                 |                 |
|  | C5.2            | 38+19         |                 | 1               |                 |                 |
|  | C5.2            | 40+20         | 2               |                 |                 |                 |
|  | C5.2            | 42+25         |                 | 2               |                 |                 |
|  | C5.2            | 44+69         |                 |                 |                 | 1               |
|  | C5.2            | 46+86         | 2               |                 |                 |                 |
|  | C5.2            | 46+88         |                 |                 | 1               |                 |
|  | C5.3            | 48+50         |                 | 2               |                 |                 |
|  | C5.3            | 50+10.5       | 1               |                 |                 |                 |
|  | C5.3            | 50+14.5       | 1               |                 |                 |                 |
|  | C5.3            | 50+16.5       |                 |                 | 1               |                 |
|  | C5.3            | 52+58         | 2               |                 |                 |                 |
|  | C5.3            | 53+00         |                 |                 | 1               |                 |
|  | C5.3            | 55+48         | 1               |                 |                 |                 |
|  | C5.3            | 55+50         |                 |                 | 1               |                 |
|  | C5.3            | 57+91         | 1               |                 |                 |                 |
|  | C5.3            | 57+95         | 1               |                 |                 |                 |
|  | C5.3            | 57+97         |                 |                 | 1               |                 |
|  | C5.4            | 60+68         | 2               |                 |                 |                 |
|  | C5.4            | 60+70         |                 |                 | 1               |                 |
|  | C5.4            | 62+30         |                 | 1               |                 |                 |
|  | C5.4            | 63+91         | 1               |                 |                 |                 |
|  | C5.4            | 63+95         | 1               |                 |                 |                 |
|  | C5.4            | 63+97         |                 |                 | 1               |                 |
|  | C5.4            | 65+60         |                 | 2               |                 |                 |
|  | C5.4            | 67+28         | 2               |                 |                 |                 |
|  | C5.4            | 67+30         |                 |                 | 1               |                 |
|  | C5.4            | 69+00         |                 | 2               |                 |                 |
|  | C5.4            | 70+51         | 1               |                 |                 |                 |
|  | C5.4            | 70+55         | 1               |                 | 1               |                 |
|  | C5.4            | 70+57         |                 |                 | 1               |                 |
|  |                 | TOTAL         | 21              | 11              | 9               | 1               |

|                  |                         |            |
|------------------|-------------------------|------------|
| ORIGINAL<br>PLAN | SURVEY PLOTTED BY _____ | DATE _____ |
| NOTE BOOK        | DRAWN BY _____          | BY _____   |
|                  | TRACED BY _____         | BY _____   |
|                  | DESIGNED BY _____       | BY _____   |
|                  | QUANTITIES BY _____     | BY _____   |
|                  | CHECKED BY _____        | BY _____   |
| No. _____        |                         |            |

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

## UNDERDRAIN SUMMARY

North-South Road  
Phase 1A  
F.A.I. Proj. No. STP-8930(1)

Date: Dec 22, 2004

**SHEET No. C5.7 OF 59 SHEETS**