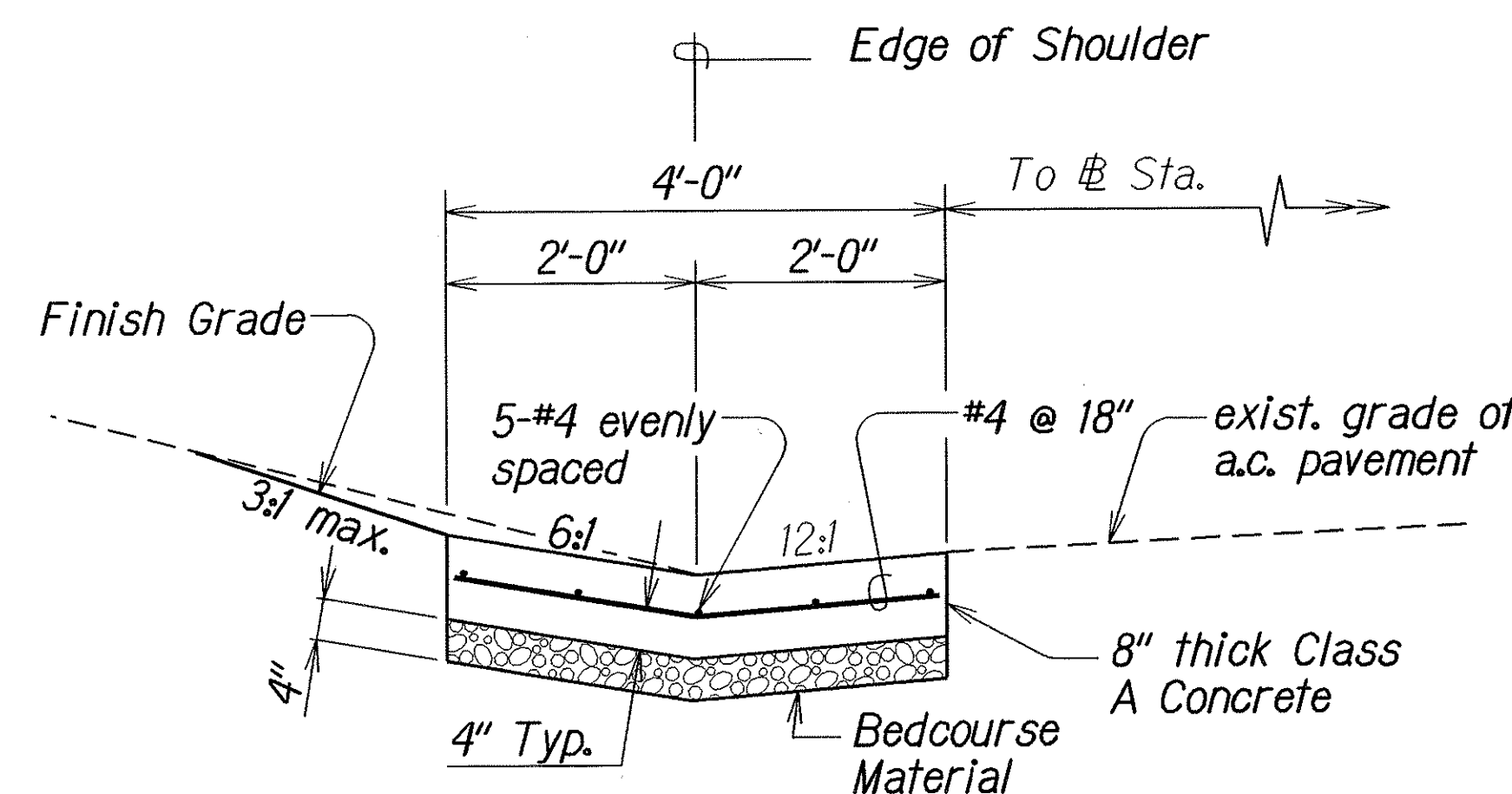
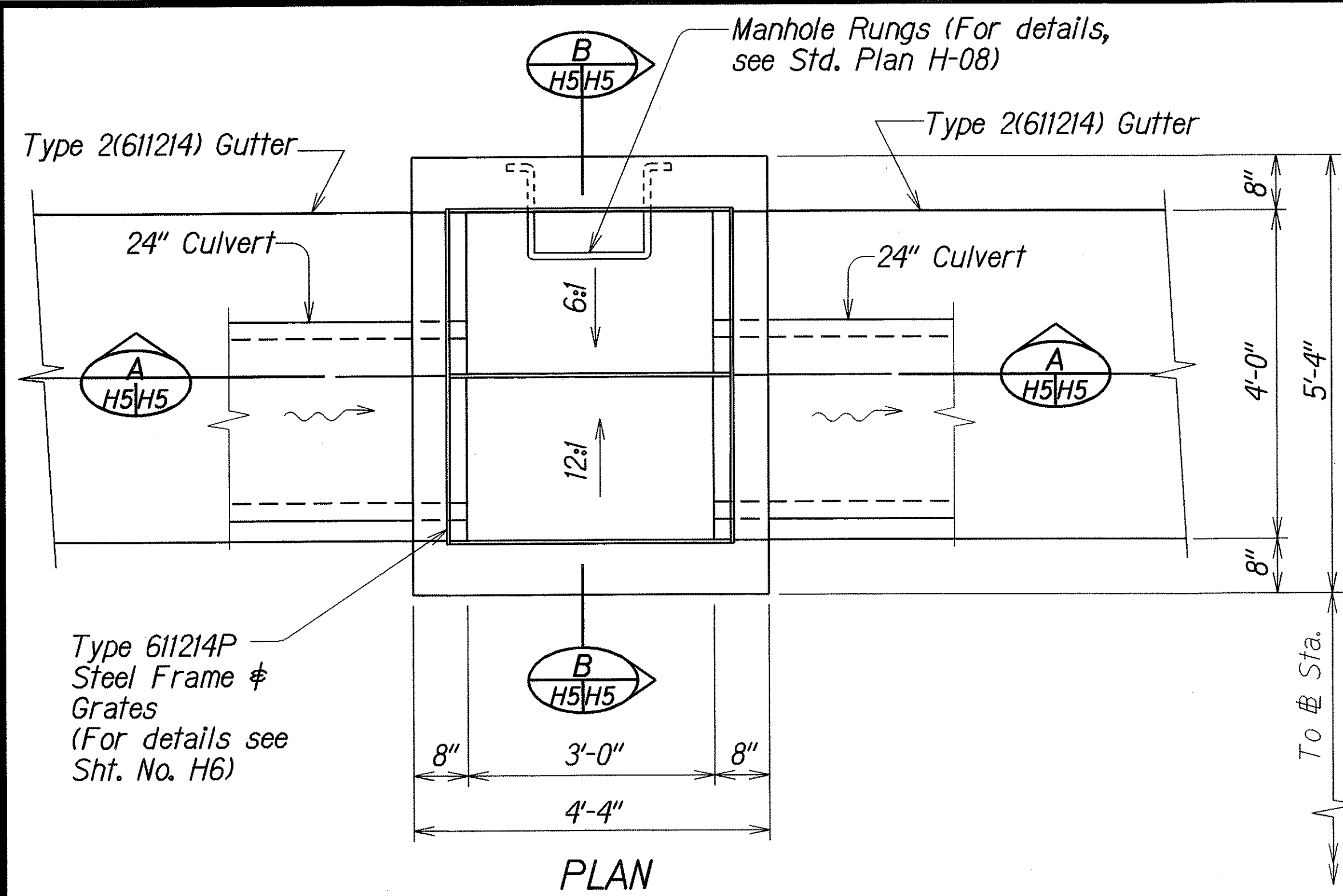
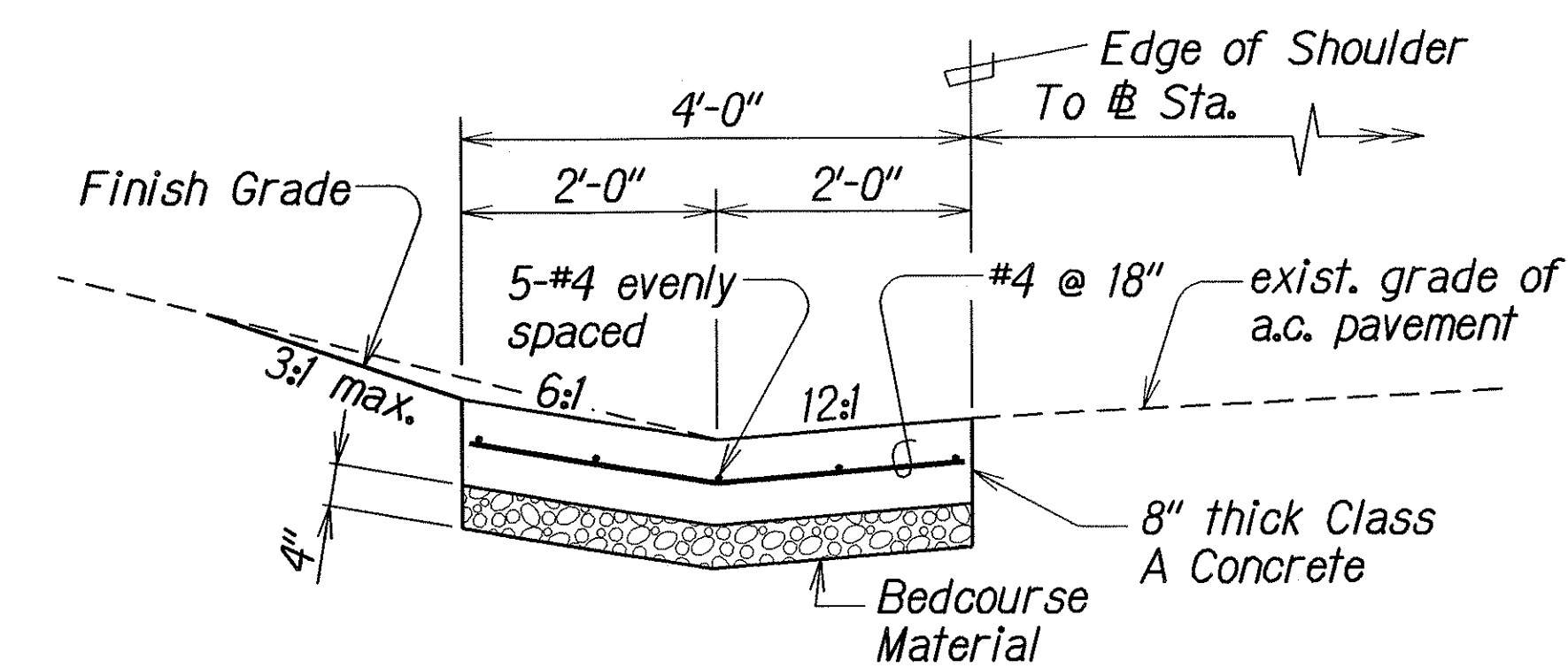


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	DE-072-1(48)	2005	10	20

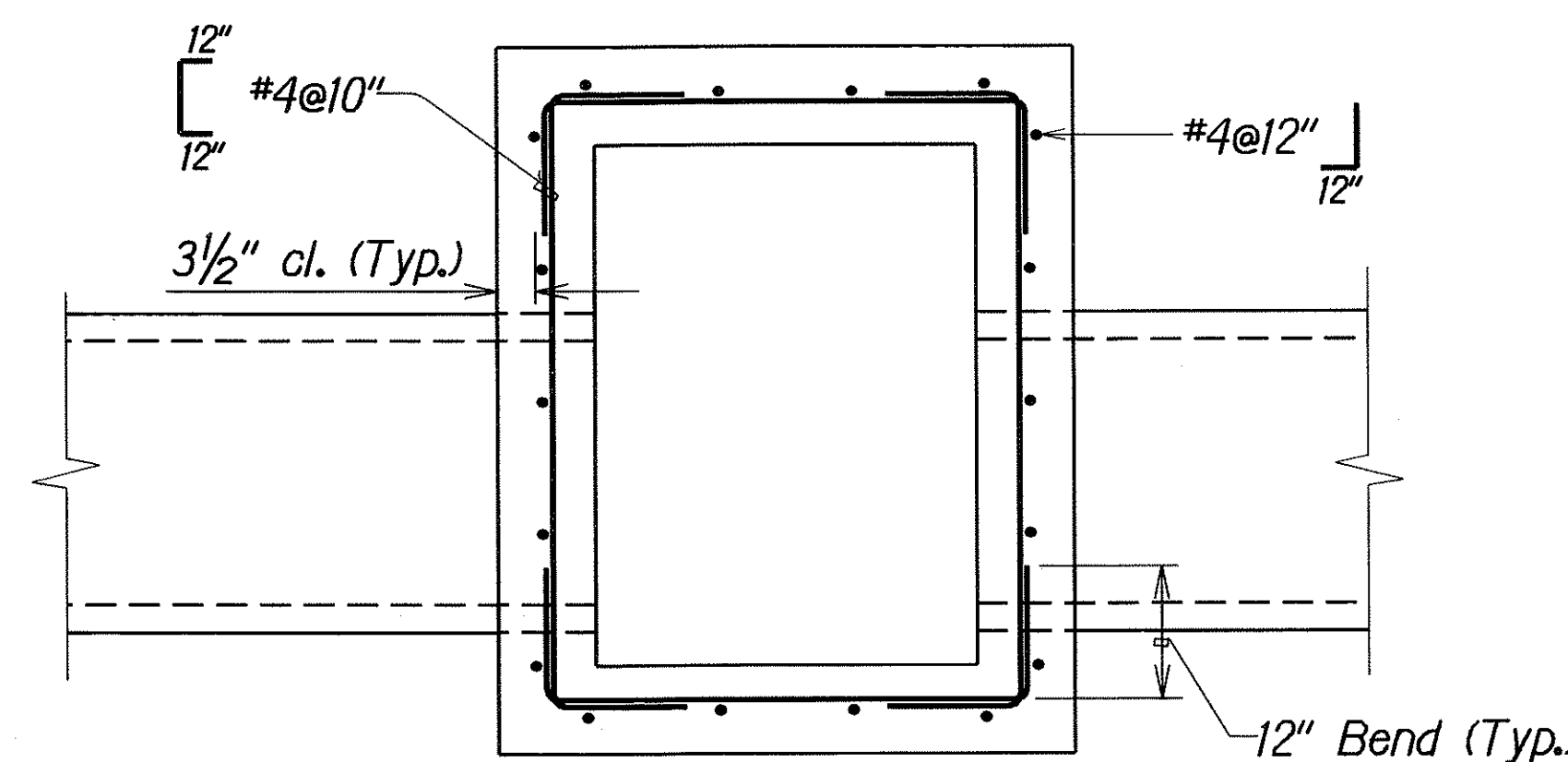


STA. 77+50 LT. to 78+50 LT.

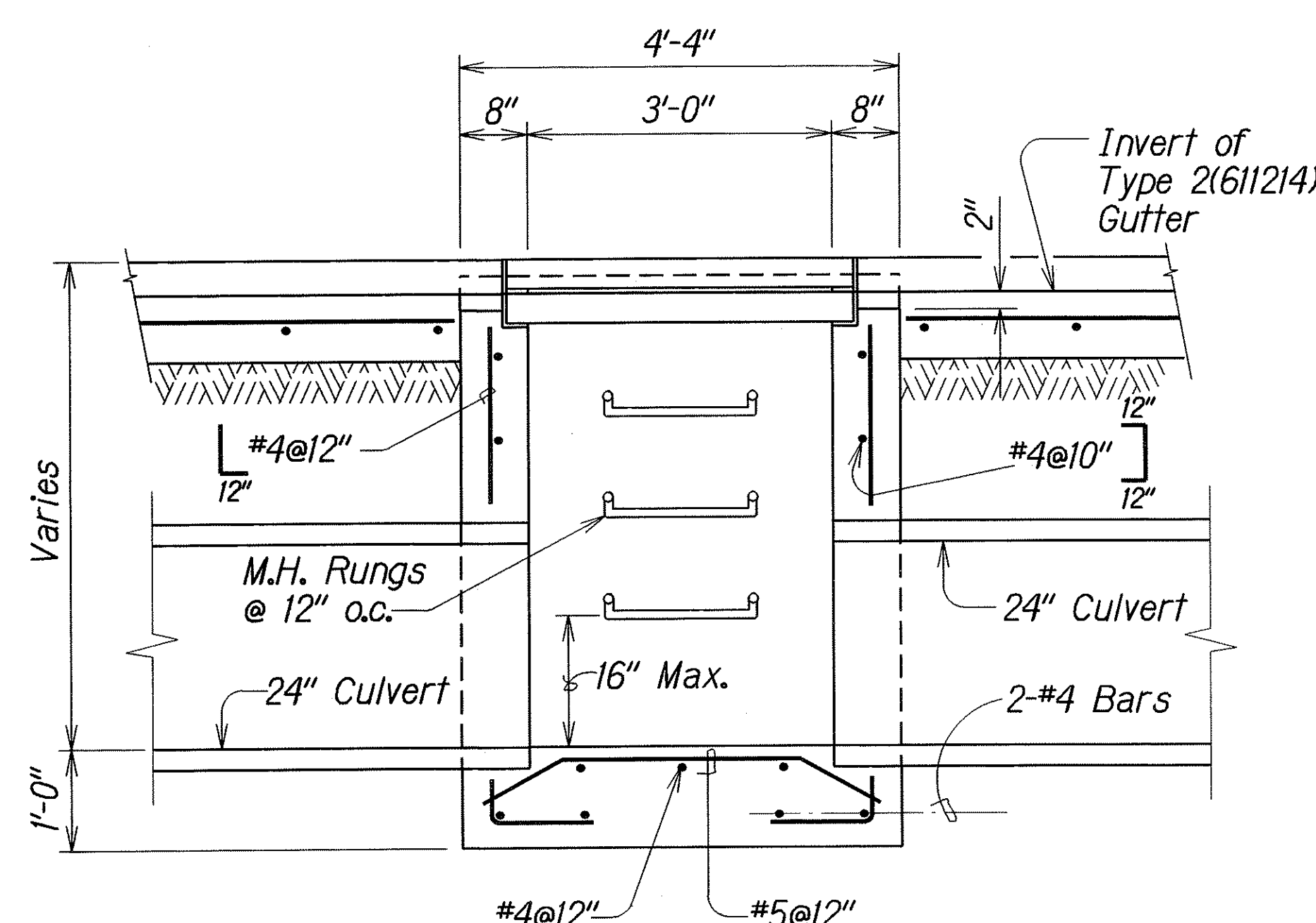
DETAILS OF TYPE 2(611214) GUTTER



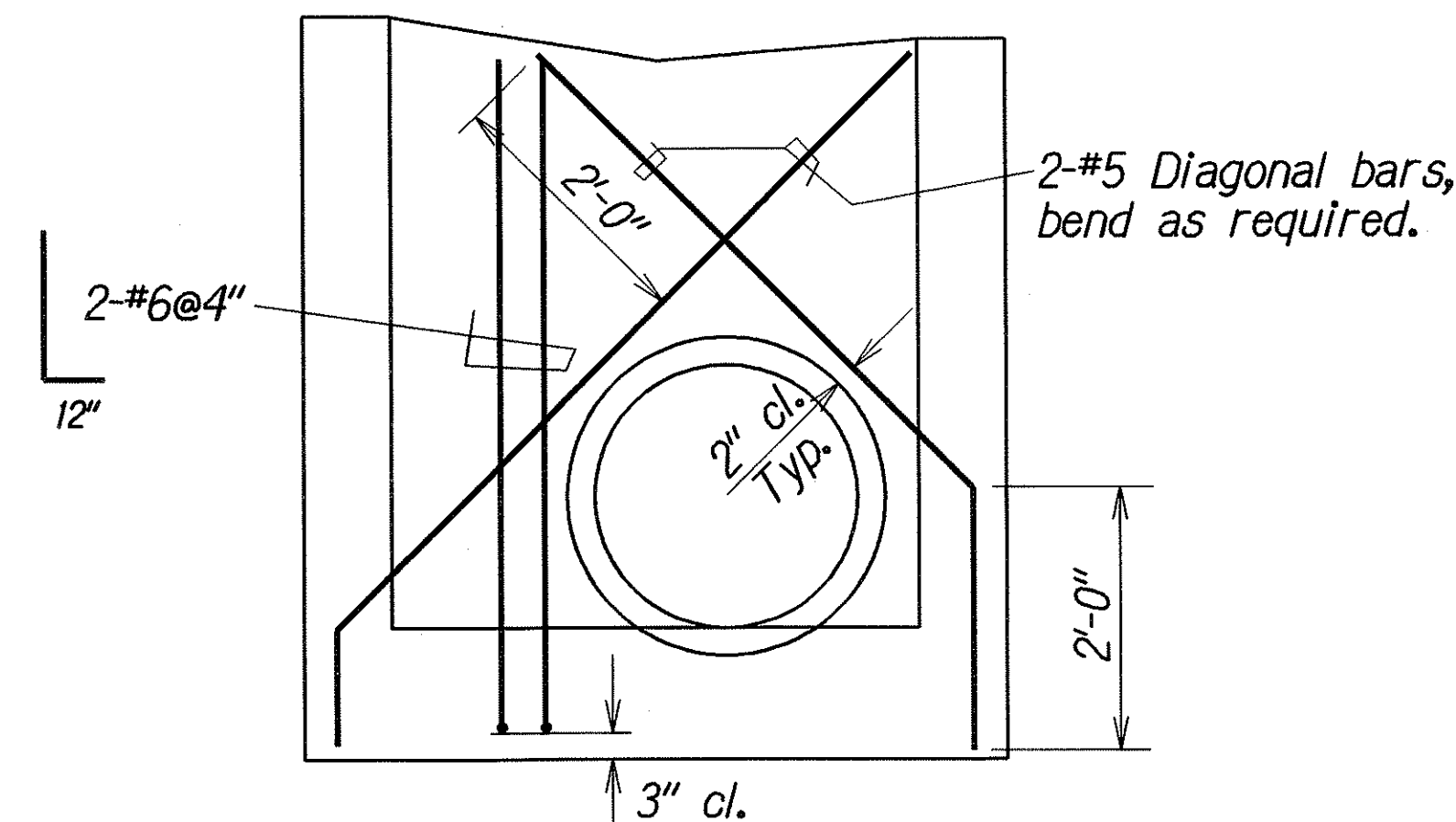
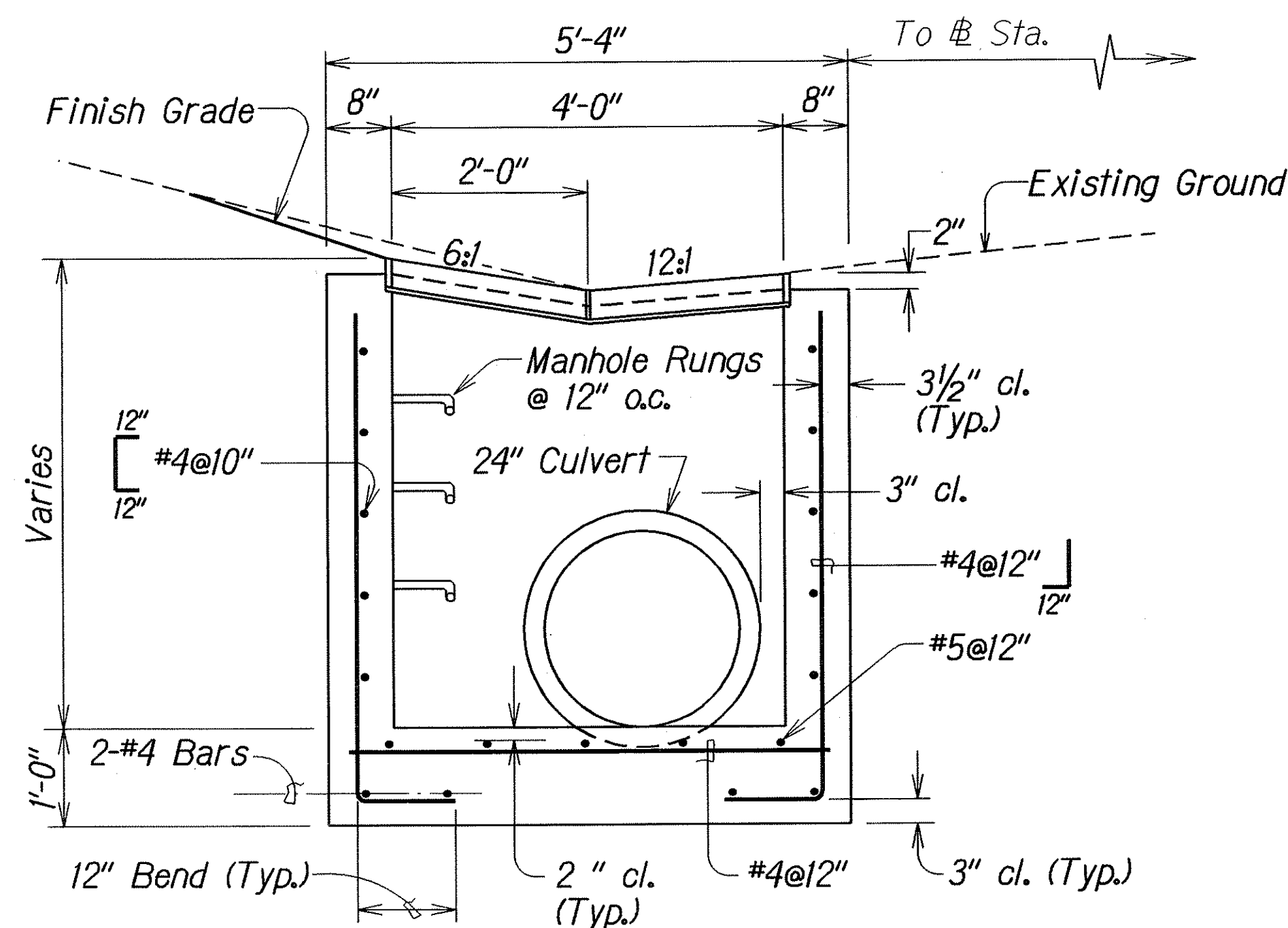
STA. 79+00 LT. to 79+50 LT.



PLAN VIEW OF WALL REINFORCING



DETAILS OF TYPE 611214P GRATED DROP INLET



ADDED REINFORCING FOR CULVERT OPENING

DATE	10/15/03
SURVEY PLOTTED BY	...
DRAWN BY	...
DESIGNED BY	...
CHECKED BY	...
ORIGINAL PLAN	...
NOTE BOOK	...
...	...

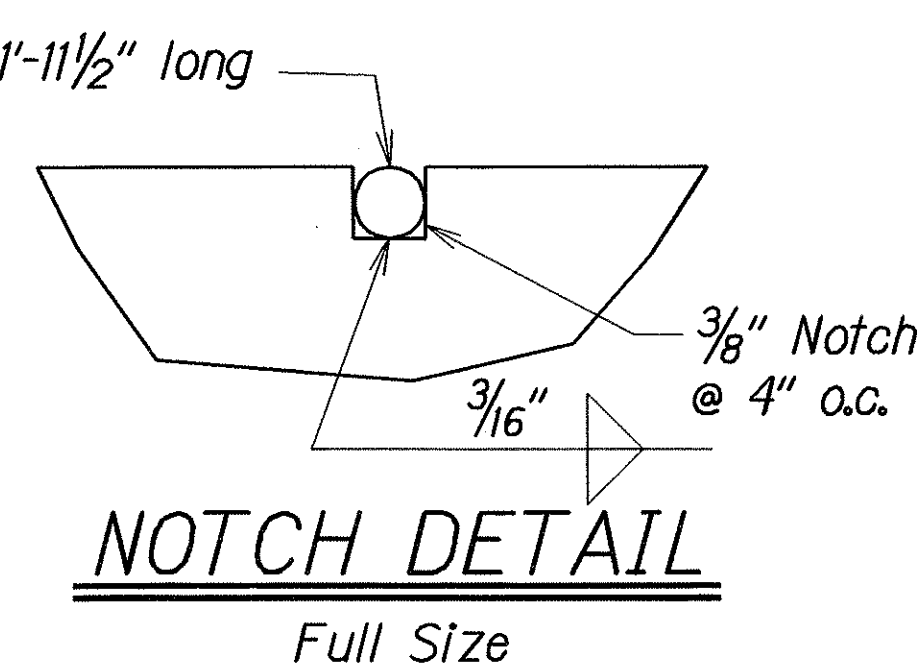
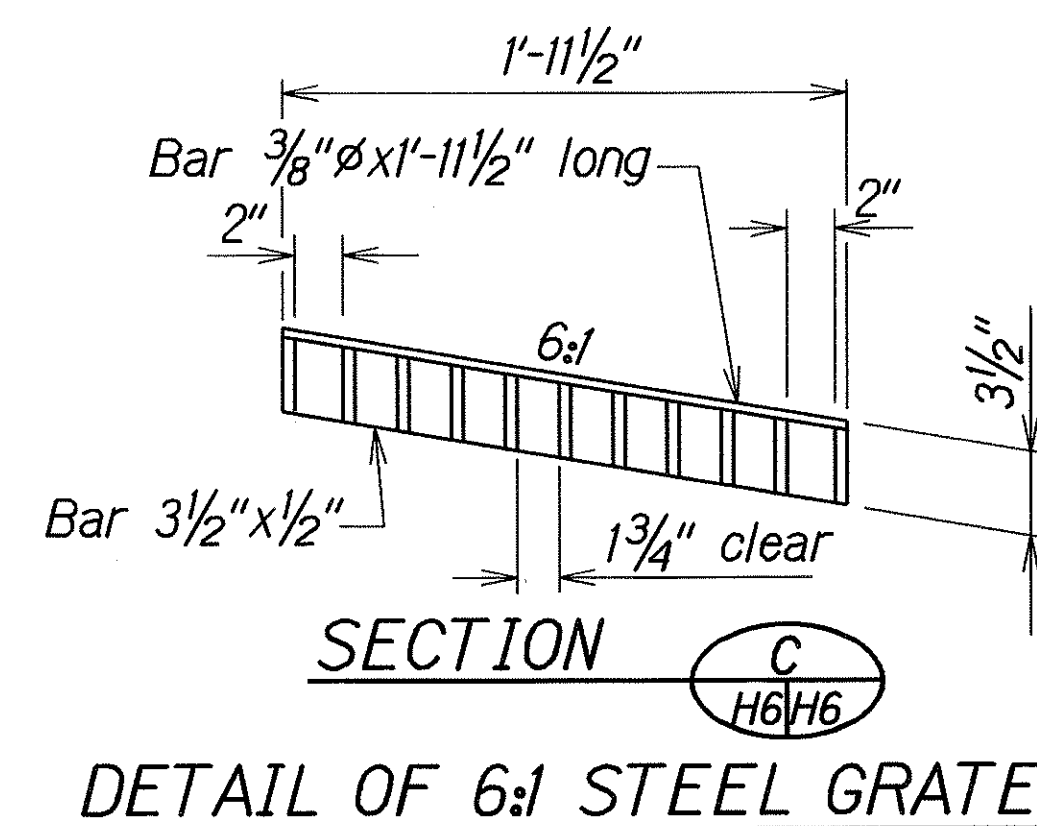
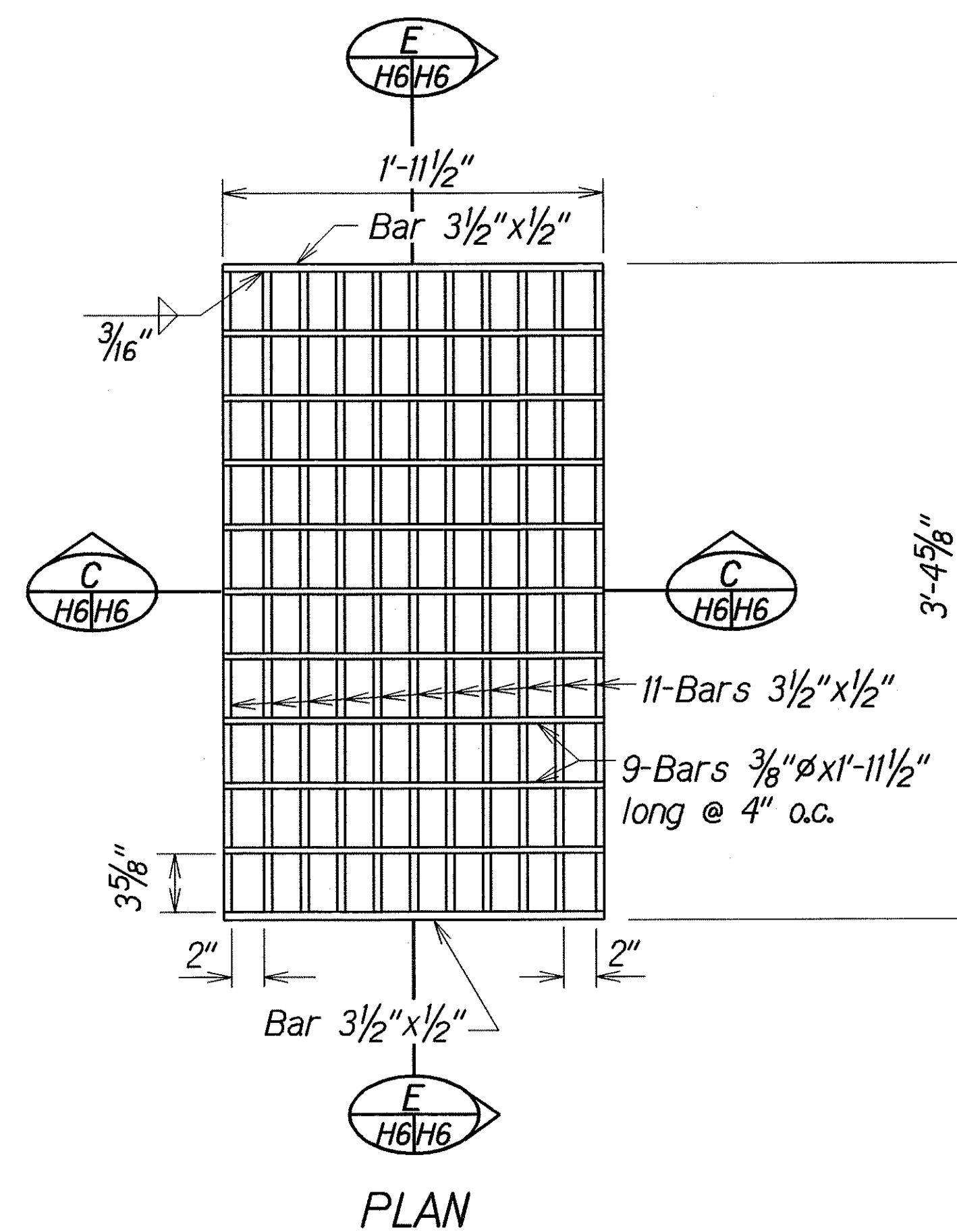
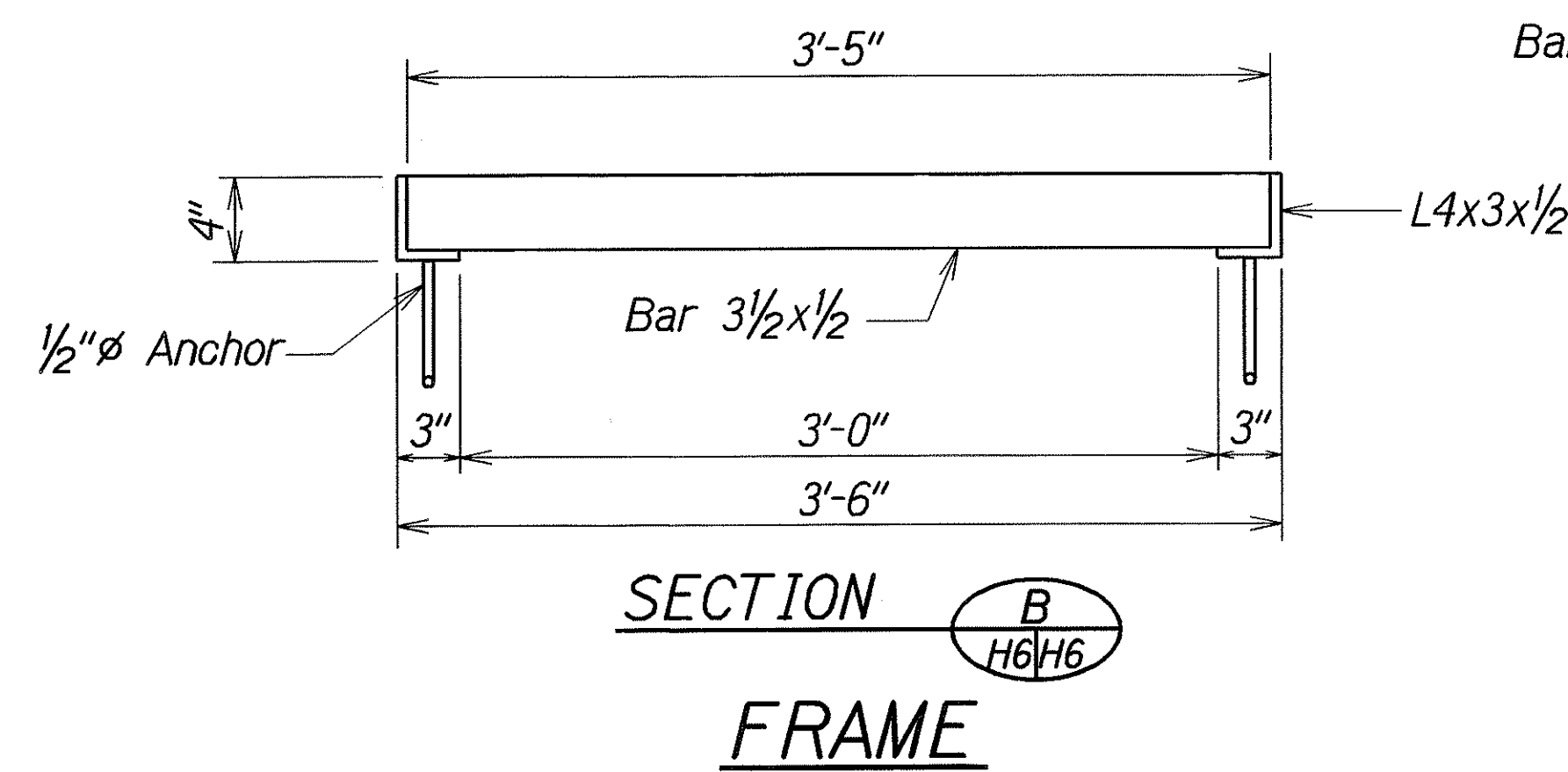
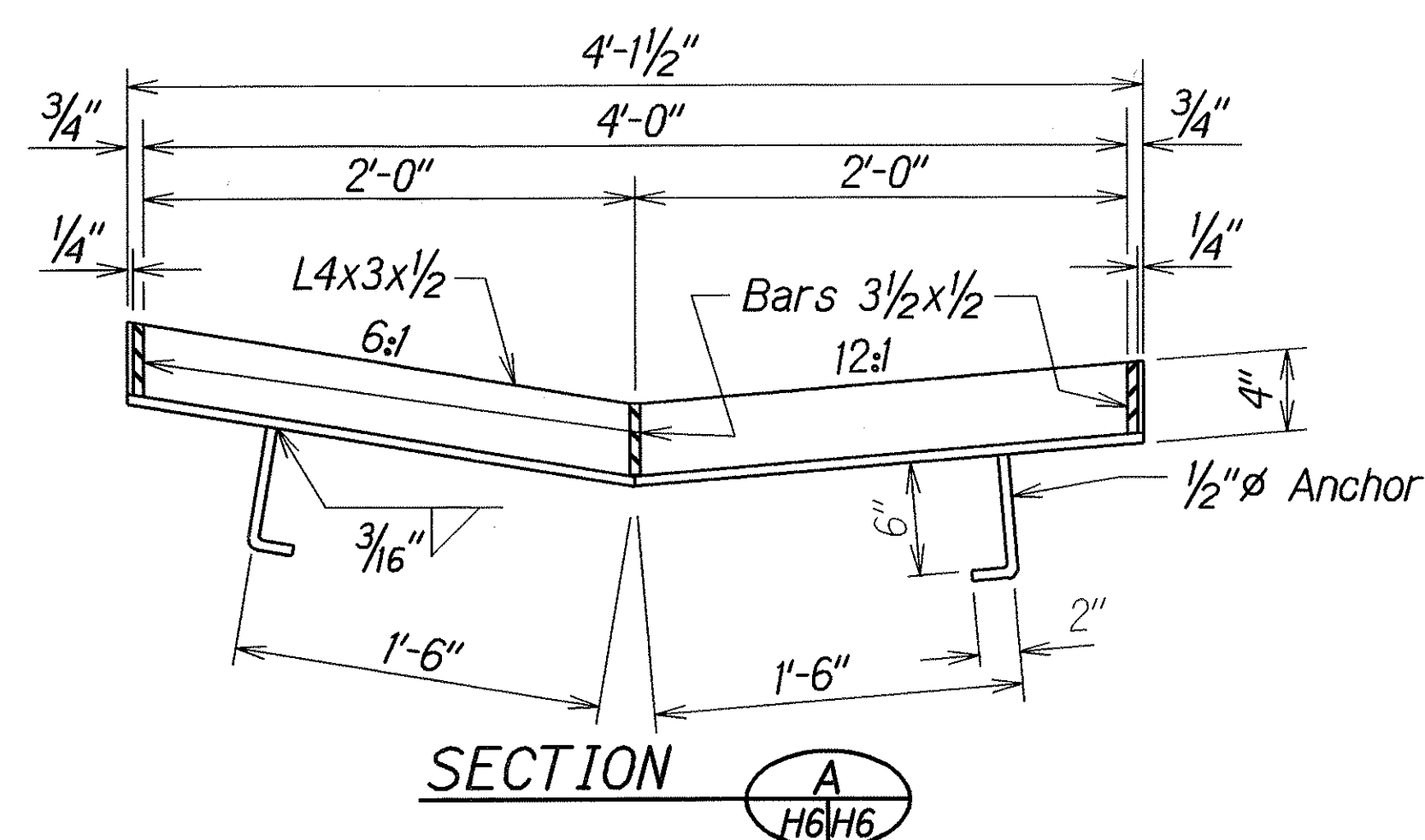
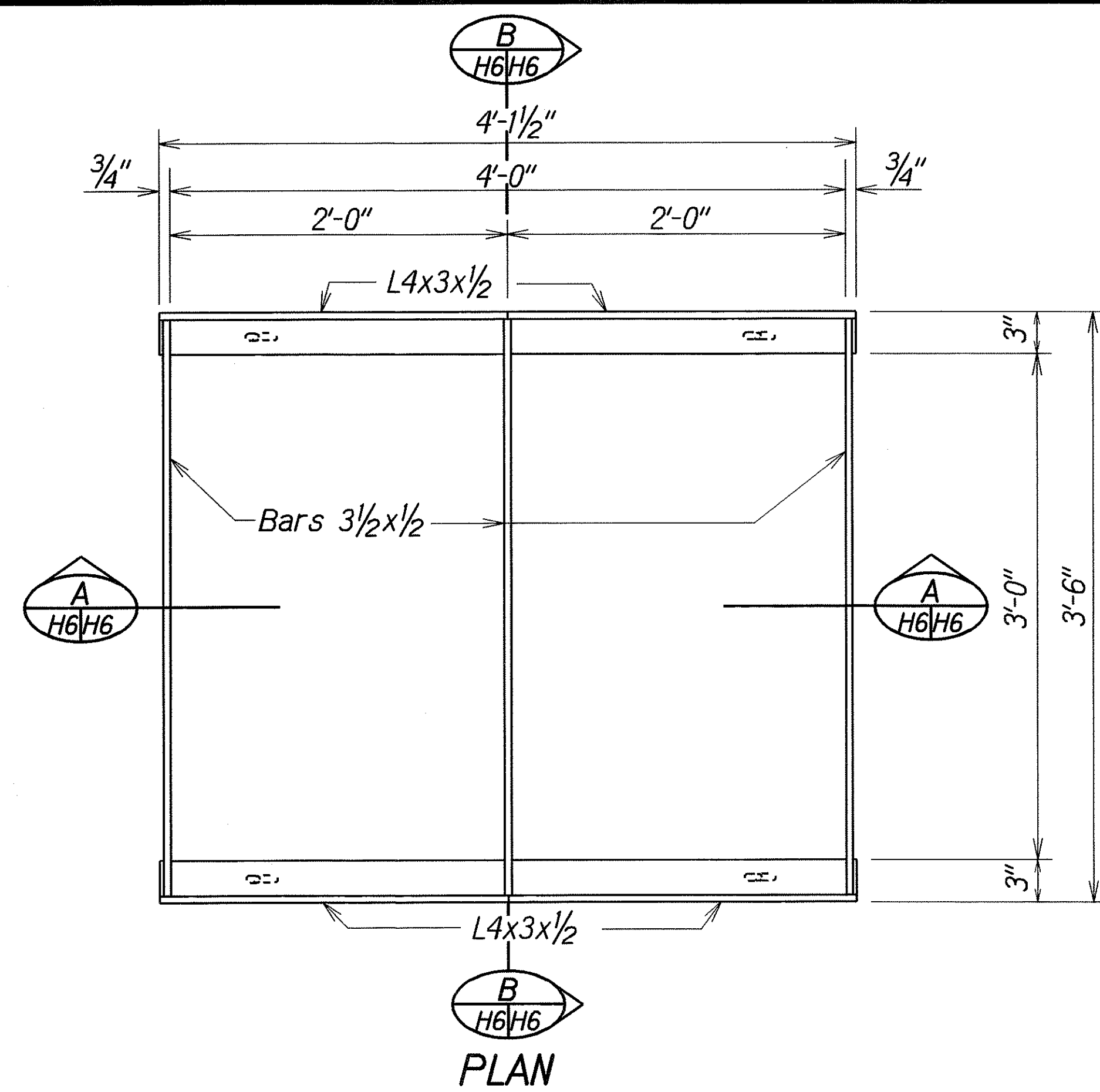
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAIL
KALANIANA'OLE HIGHWAY
DRAINAGE IMPROVEMENTS
Vicinity of Keolu Hills
Fed. Aid Project No. DE-072-1(48)

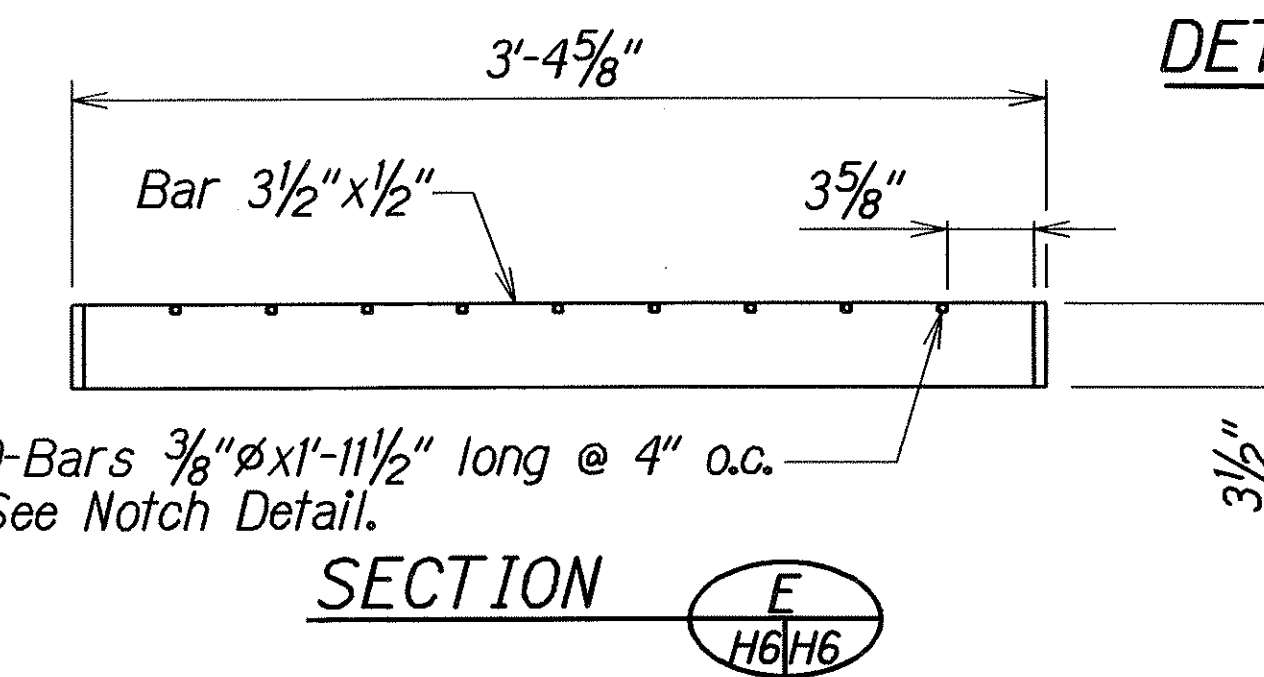
Scale: 3/4"=1'-0" Date: Sep, 2003

SHEET No. H5 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	DE-072-1(48)	2005	11	20



NOTE:
All welds 3/8" unless otherwise noted.



GRATE

DETAILS OF TYPE "611214P" STEEL FRAME AND GRATES

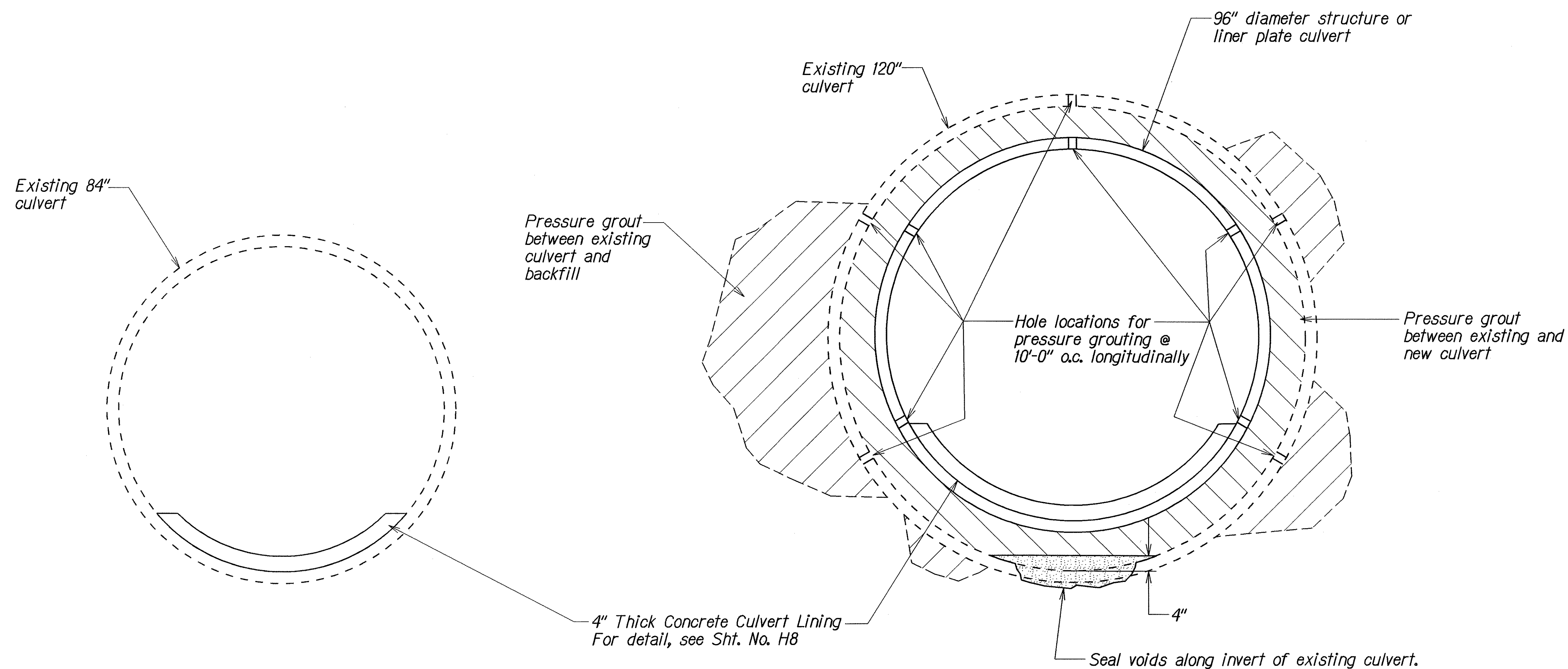
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAIL
KALANIANA'OLE HIGHWAY
DRAINAGE IMPROVEMENTS
Vicinity of Keolu Hills
Fed. Aid Project No. DE-072-1(48)

Scale: 1/2"=1'-0" Date: Sep, 2003

SHEET No. H6 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	DE-072-1(48)	2005	12	20



Note: Contractor shall seal voids along the existing invert prior to pressure grouting between the existing culvert and backfill.

TYPICAL CULVERT SECTION LOOKING DOWNSTREAM

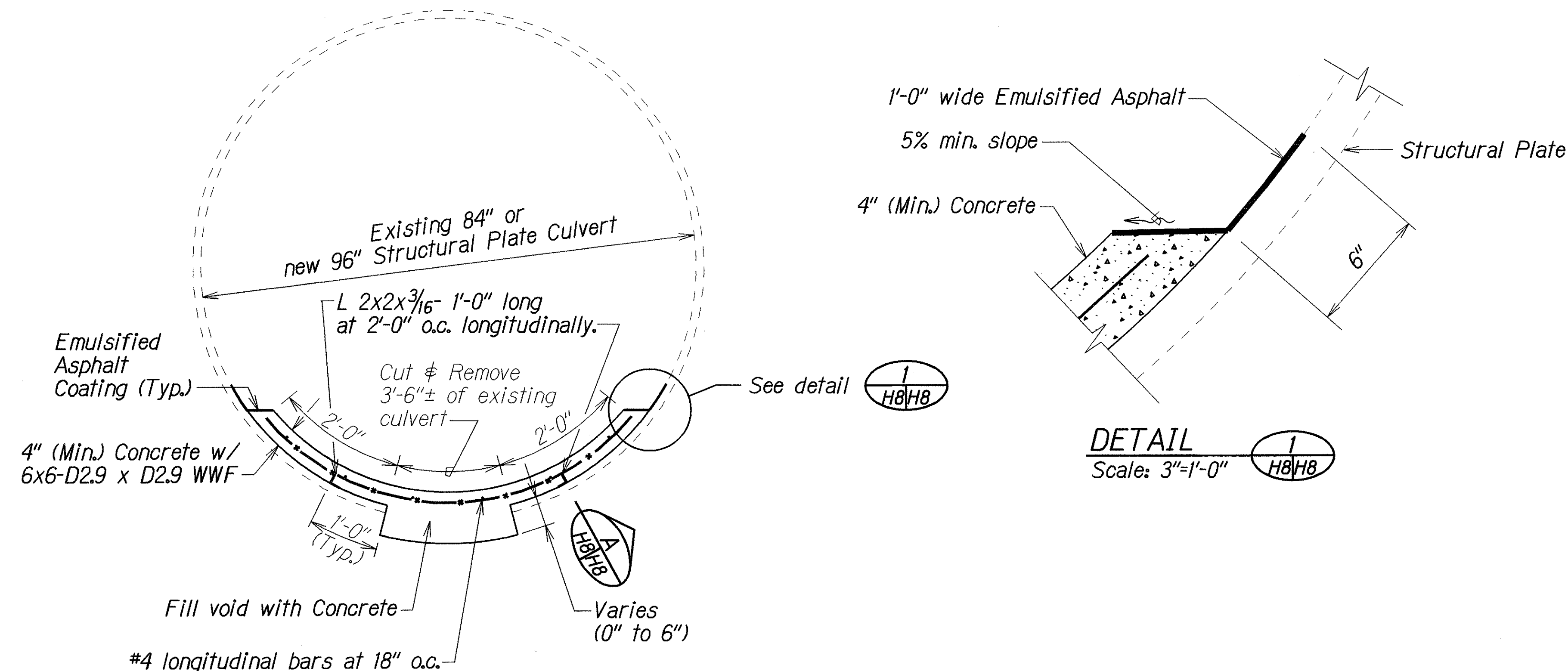
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	12/1/00
02/01/00	DESIGNED BY	
02/01/00	QUANTITIES BY	
02/01/00	CHECKED BY	

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>DRAINAGE DETAIL</u>	
<u>KALANIANA'OLE HIGHWAY</u>	
<u>DRAINAGE IMPROVEMENTS</u>	
<u>Vicinity of Keolu Hills</u>	
<u>Fed. Aid Project No. DE-072-1(48)</u>	
Scale: 3/4"=1'-0"	Date: Sep, 2003
SHEET No. H7 OF 10 SHEETS	

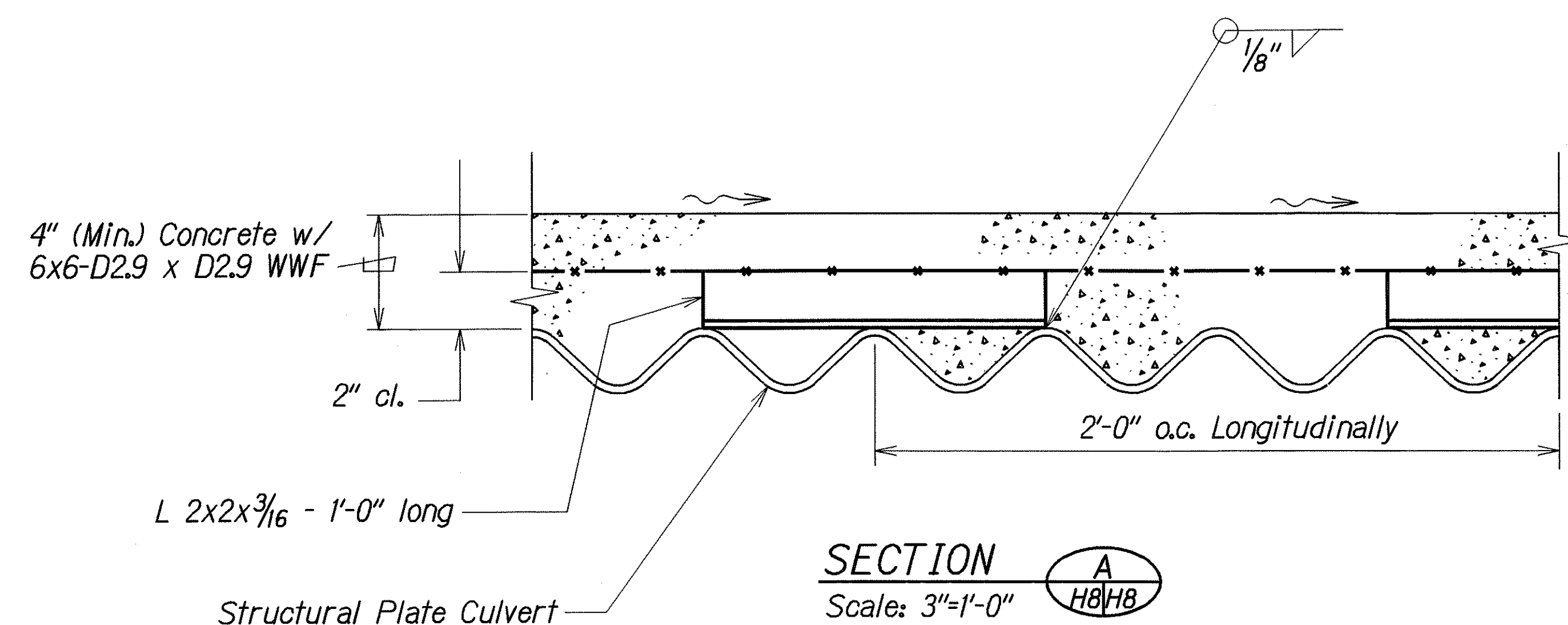
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	DE-072-1(48)	2005	13	20

NOTES:

- The culvert surface shall be cleaned of all dirt, rust, scale, and other foreign materials. Corroded sections shall be cut and removed, not to exceed 50-feet in length.
- The Contractor shall provide adequate bracing for the culvert. The Contractor shall, at his own expense, consult with a Geotechnical Engineer to determine the required amount of bracing based on his construction methodology.
- Angle irons shall be welded to the structural plate culvert at two-feet on-centers longitudinally. Welded wire fabric steel reinforcement shall be placed two inches above the crest of the corrugations. The welded wire fabric shall be lapped a minimum of six inches.
- #4 rebars shall be placed longitudinally at 18-inches on-center and shall be lapped a minimum of 18-inches between concrete pours.
- The culvert surface to be in contact with the epoxy shall be clean and dry. The epoxy bonding agent shall be applied just before the placement of the concrete. Any excess bonding agent that collects in pockets shall be removed.
- The concrete for the culvert lining shall have a minimum 28-day strength of 4,000 psi. Coarse aggregate no. 67 (3/4 inch to No. 4) shall be used. The total free water shall not exceed 285 pounds per cubic yard of concrete and the water cement ratio shall not exceed 0.45. The slump of concrete shall be 3 to 5 inches. The Contractor shall proportion the concrete lining mix to provide a workable mix of uniform composition and consistency. Water-reducing, water-reducing and retarding, or high range water reducing admixtures may be used as needed to achieve the desired slump and workability. No water shall be added at the jobsite.
- Voids under the structural plate shall be filled with concrete. The concrete shall be troweled to form a smooth, dense surface finish.
- The concrete culvert lining shall be scored 3/4-inch deep laterally along the crest of the corrugations, 20-feet (max) on-center.
- Apply one-foot wide coating of Emulsified Asphalt to the score lines on the existing concrete lining, to both edges of the new concrete lining, and to the 3/4-inch scores after the new concrete lining has cured. The finished coating shall be a continuous film free of voids, gaps or pin holes.
- All construction joints shall be perpendicular to the surface and to the full depth of the concrete lining.



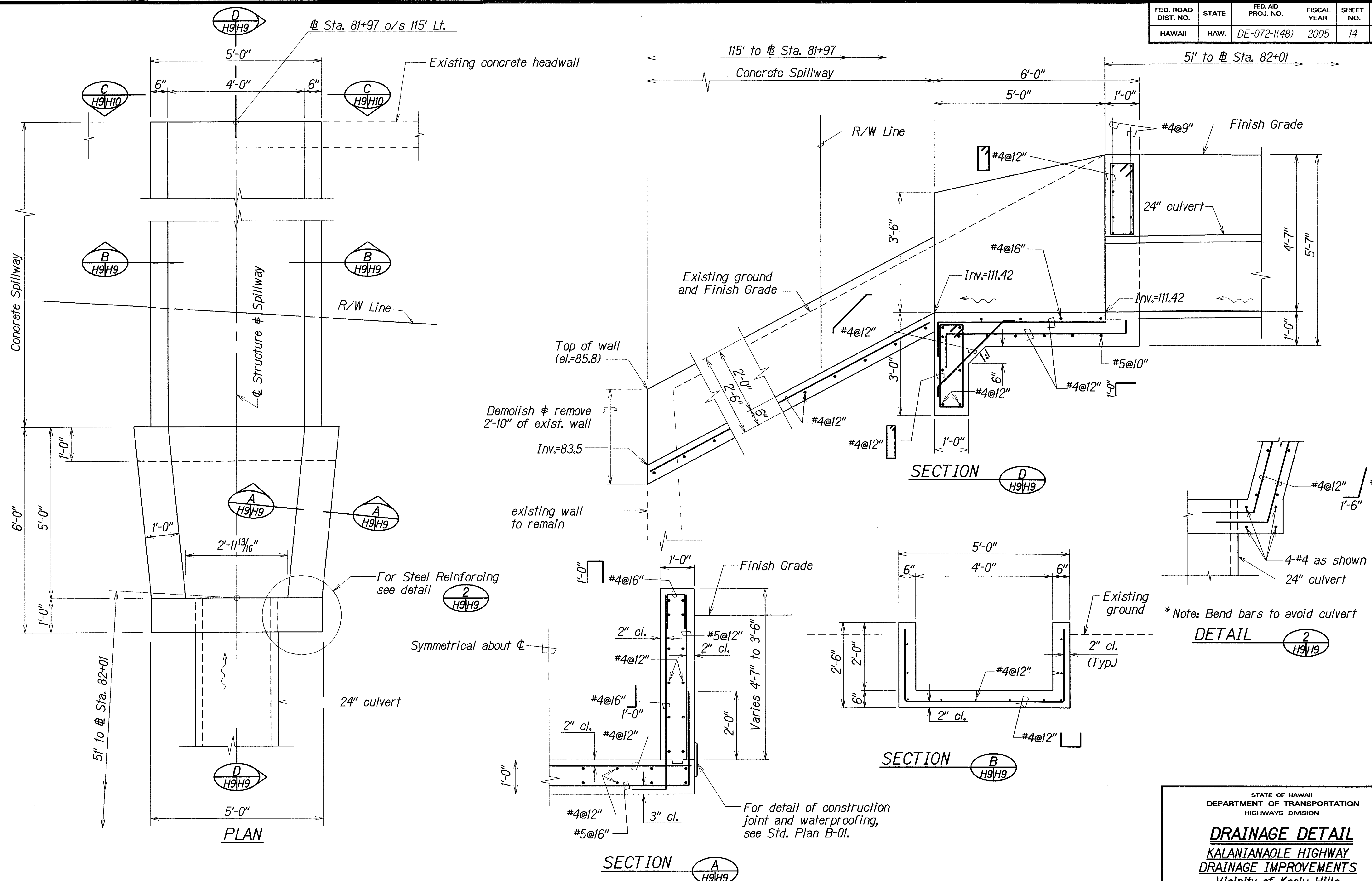
TYPICAL SECTION OF CULVERT
Scale: 3/4"=1'-0"



DETAILS OF CONCRETE CULVERT LINING

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
DRAINAGE DETAIL	
KALANIANA'OLE HIGHWAY	
DRAINAGE IMPROVEMENTS	
Vicinity of Keolu Hills	
Fed. Aid Project No. DE-072-1(48)	
Scale: 3/4"=1'-0"	Date: Sep, 2003
SHEET No. H8 OF 10 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	DE-072-1(48)	2005	14	20



DETAILS OF TYPE "1" OUTLET STRUCTURE AND CONCRETE SPILLWAY AT STA. 82+01 O/S 51' LT.

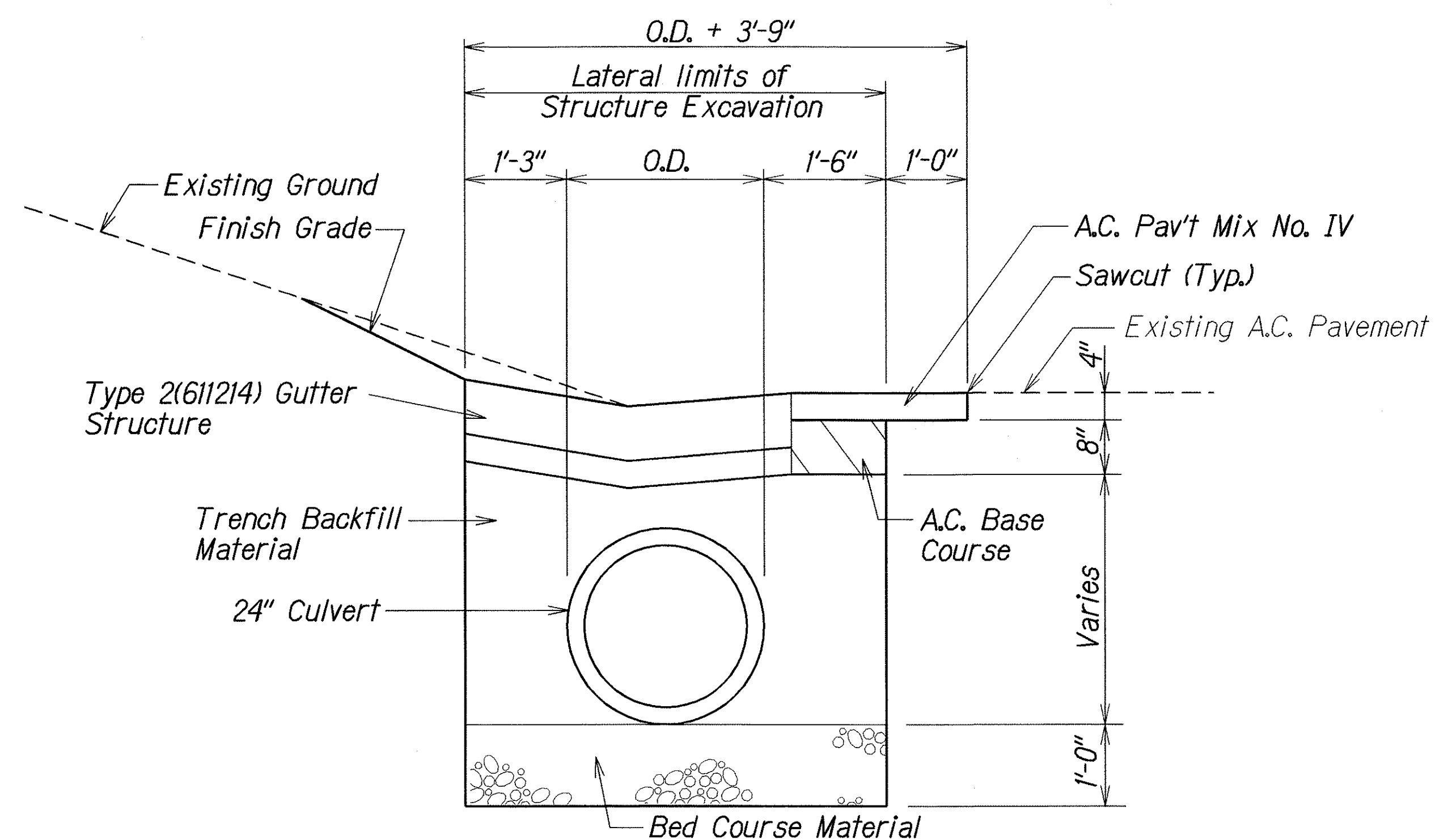
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAIL
KALANIANA'OLE HIGHWAY
DRAINAGE IMPROVEMENTS
Vicinity of Keolu Hills
Fed. Aid Project No. DE-072-1(48)

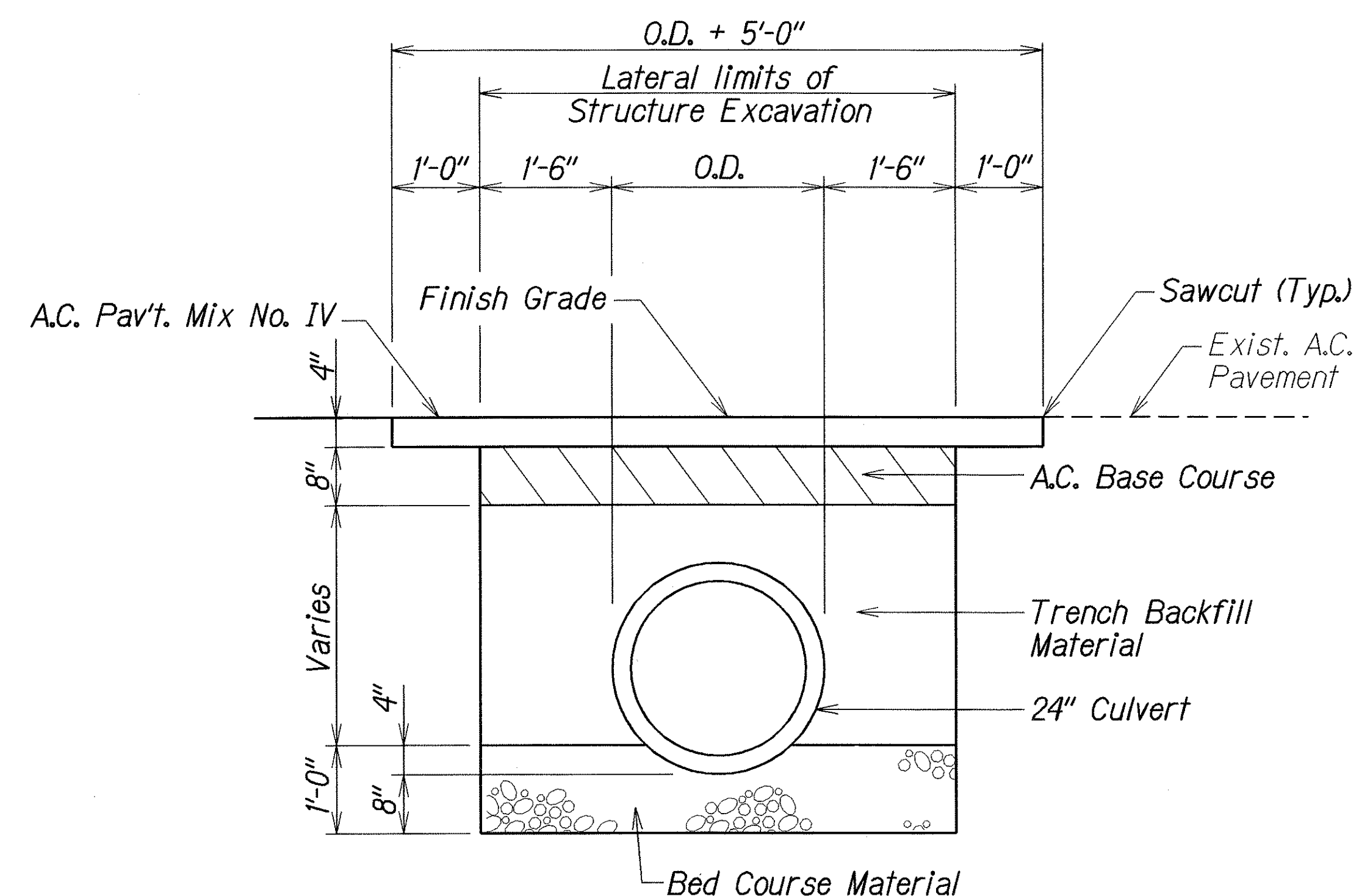
Scale: 3/4"=1'-0" Date: Sep, 2003

SHEET No. H9 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	DE-072-1(48)	2005	15	20

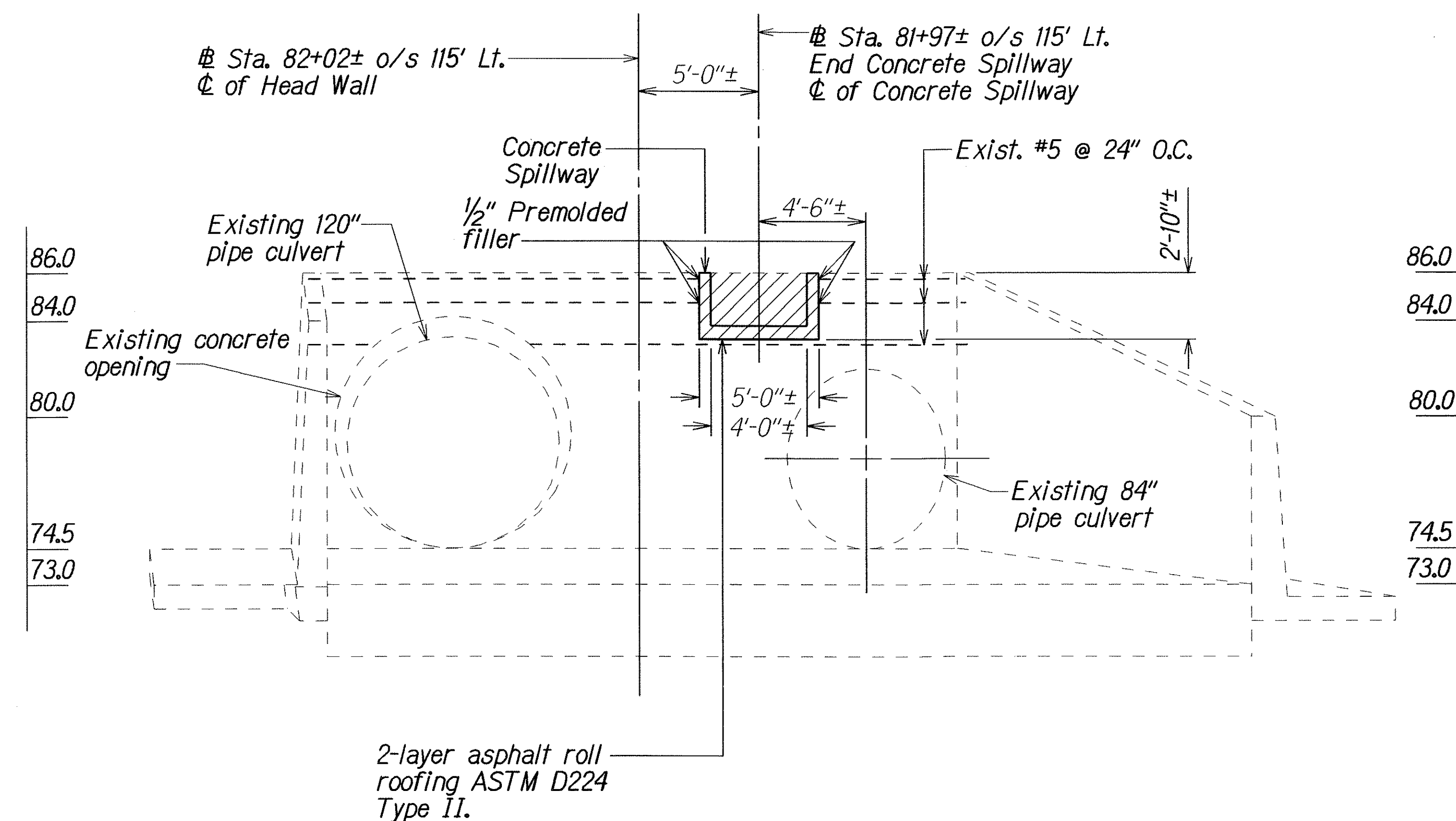


STA. 78+00 LT. TO STA. 79+50 LT.

~~STA. 79+50 LT. TO STA. 82+01 LT.~~

DETAILS OF CULVERT TRENCH RESTORATION

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



SECTION C
Scale: $\frac{1}{4}" = 1'-0"$ H9/H10

DETAILS OF TYPE "I" OUTLET STRUCTURE AND
CONCRETE SPILLWAY AT # STA. 82+01 O/S 5' LT.

ORIGINAL PLAN	SURVEY PLOTTED BY _____ DATE <u>7/10/03</u>
NOTE BOOK	DRAWN BY <u>LBC</u> _____
<u>North</u>	TRACED BY _____
<u>44444100.0gn</u>	DESIGNED BY <u>CM</u> _____
	QUANTITIES BY _____
	CHECKED BY _____

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAIL
KALANIANA'OLE HIGHWAY
DRAINAGE IMPROVEMENTS
Vicinity of Keolu Hills
Fed. Aid Project No. DE-072-1(K48)

Scale: As Shown Date: Sep, 2003

SHEET No. *H10* OF *10* SHEETS