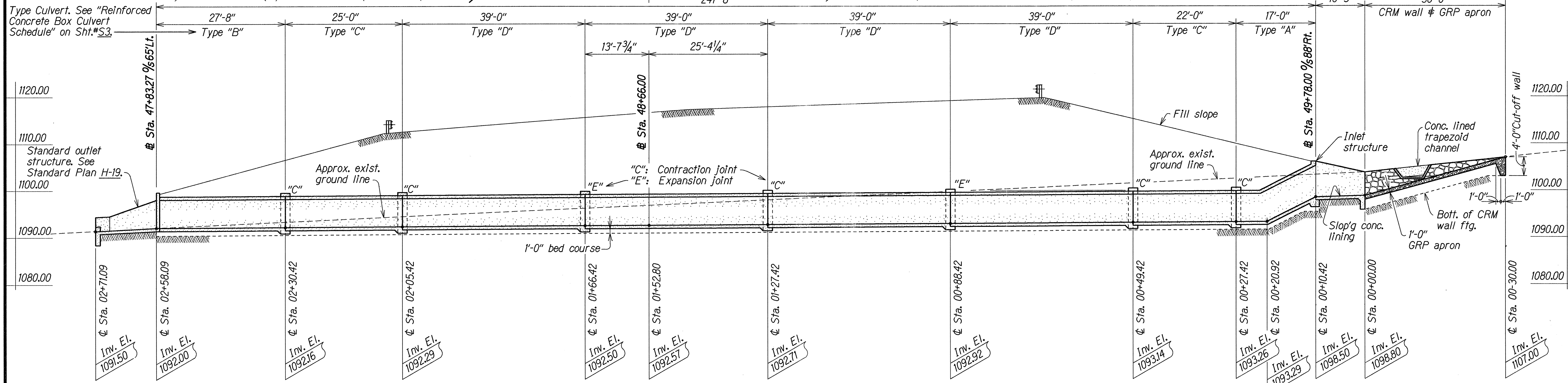
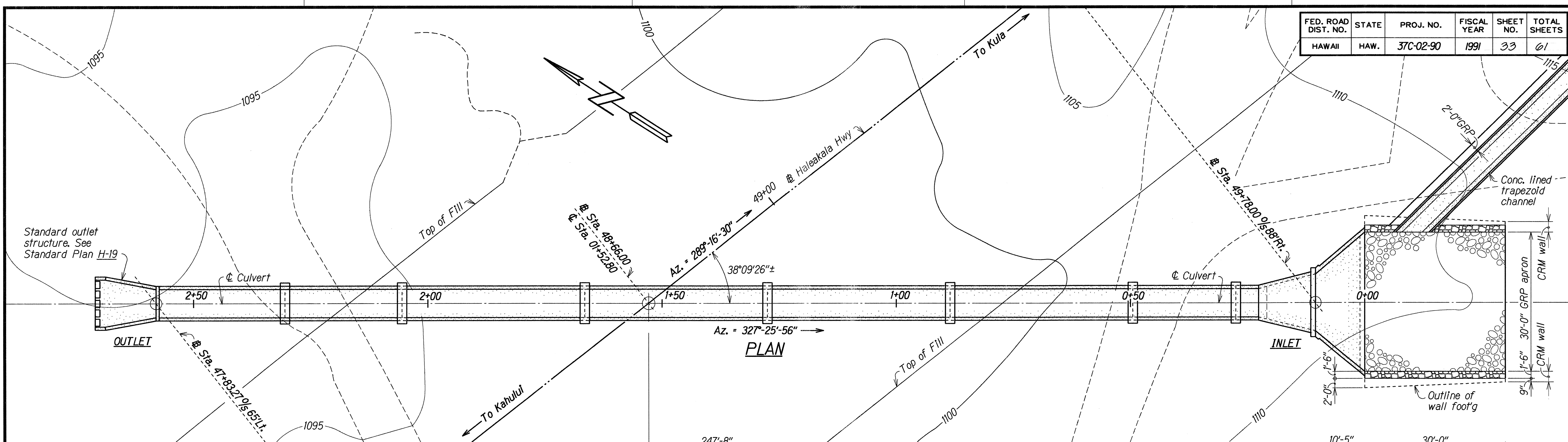


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-02-90	1991	33	61



ELEVATION

6'x6' REINFORCED CONCRETE BOX CULVERT @ STA. 48+66

Scale: 1" = 10'-0"

ORIGINAL PLAN	DATE	BY
NOTED	DATE	BY
DESIGNED BY	DATE	BY
CHECKED BY	DATE	BY

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LAYOUT PLAN AND ELEVATION
6'x6' REINFORCED CONCRETE BOX CULVERT @ STA. 48+66
HALEAKALA HIGHWAY-PUKALANI SECTION-PHASE I
HALIMALE ROAD TO MAKANI ROAD
Project No. 37C-02-90
Scale: As Noted
Date: Nov. 1990

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-02-90	1991	34	61

SYMBOLS AND ABBREVIATION

"Detail" or "Section" designation	
Ⓔ: Base Line	<u>I</u>
Ⓔ: Center Line	Inv. = Invert
<u>A</u>	<u>J</u>
Adj. = Adjacent	Jt. = Joint
Approx. = Approximate	<u>L</u>
<u>B</u>	Lt. = Left
Bal. = Balance	<u>M</u>
Bott. = Bottom	Max. = Maximum
<u>C</u>	Min. = Minimum
Cl. = Clear	<u>Q</u>
Conc. = Concrete	O.C. = On Center
Const. = Construction	<u>R</u>
Cont. = Continuous	RC = Reinforced Concrete
CRM = Concrete Rubble Masonry	Reinf. = Reinforcement (Reinforcing)
C.Y. = Cubic Yards	Roof'g = Roofing
<u>D</u>	Rt. = Right
Det. = Detail	<u>S</u>
Diag. = Diagonal	Sht. = Sheet
<u>E</u>	Spac'd = Spaced
Ea. = Each	Spac'g = Spacing
El. = Elevation	Specs. = Specifications
Exist. (Exist'g) = Existing	Sta. = Station
<u>F</u>	Std. = Standard
Ftg. (Foot'g) = Footing	Stirr. = StIRRup
<u>G</u>	<u>I</u>
GRP = Grouted Rubble Pavement	Typ. = Typical
<u>H</u>	<u>V</u>
Hdwall. = Headwall	Vert. = Vertical
Hor. (Horiz.) = Horizontal	<u>W</u>
Hwy. = Highway	Waterproof'g = Waterproofing

GENERAL STRUCTURAL NOTES:

DESIGN SPECIFICATIONS:

AASHTO Standard Specifications for Highway Bridges (14th Edition)

DESIGN LOADS:

- Vertical earth pressure: 120 pcf
- Lateral earth pressure: 60 pcf

ALLOWABLE DESIGN STRESSES:

- Reinforced Concrete: $f_c = 1,200$ psi
- Reinforcing Steel: $f_c = 20,000$ psi

MATERIALS:

- Reinforced Concrete: Class A
- Reinforcing Steel--ASTM A615, Grade 40
- Asphalt roll roofing shall be ASTM D224 Type II and shall be incidental to Class A concrete.

CONSTRUCTION REQUIREMENTS:

- Refer to Hawaii Standard Specifications for Road and Bridge Construction, 1985 and Special Provisions.
- Except as noted otherwise, all vertical dimensions are measured plumb.

GENERAL NOTES

- Refer to Standard Plans for additional details and notes not covered by details and typical drawings.
- All items noted "Incidental" will not be paid for separately.
- The Contractor shall verify the locations of all utility lines near culverts and notify their respective owners before commencing with work.
- Excavation for culverts shall be accomplished by maintaining as near a vertical cut as possible and it shall be the Contractor's responsibility to maintain the stability of existing earthwork throughout the course of work.
- The Contractor shall be solely responsible for the protection of adjacent property, utilities and existing and new structures from damage due to construction and shall repair any damage at his own expense, to the satisfaction of the Engineer. He 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.
- In the event of over-excavation, the space between the footing and ground shall be filled with a minimum of Class D concrete at the Contractor's expense and as directed by the Engineer.

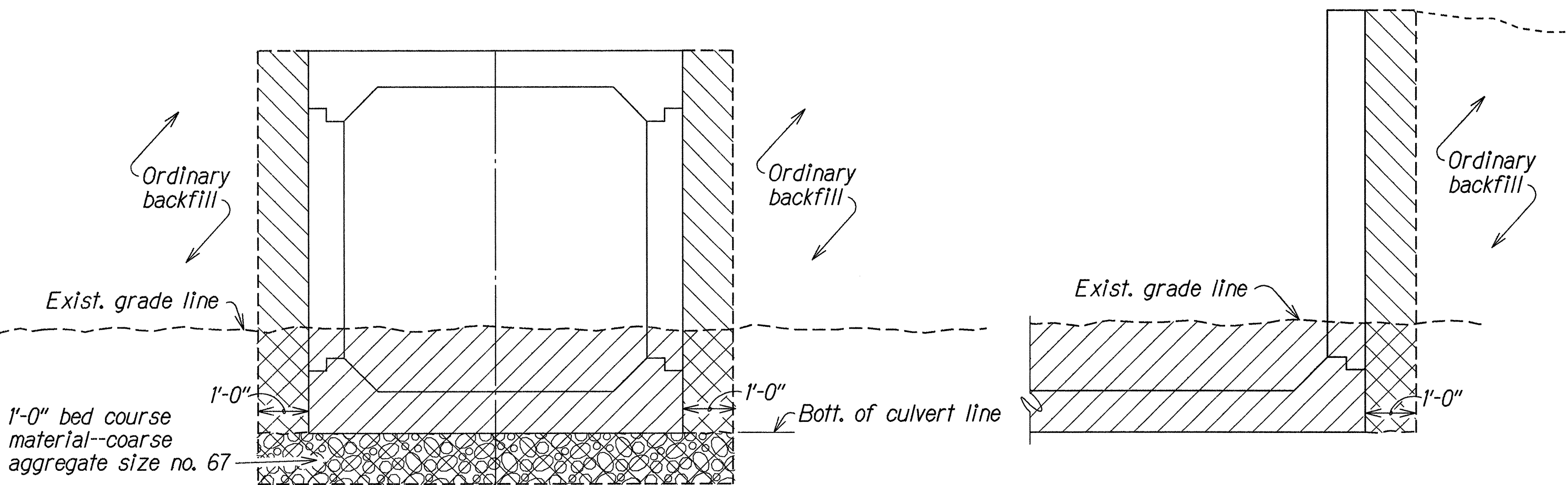
ESTIMATED QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
206.4201	Structure Excavation for Box Culvert (Incl. Tapered Inlet Box) and Inlet and Outlet Structures	Cu. Yd.	249 C.Y.
206.5101	Structure Excavation for Cement Rubble Masonry Wall and Grouted Rubble Paving	Cu. Yd.	159 C.Y.
206.7001	Structure Backfill for Box Culverts (Incl. Tapered Inlet Box) and Inlet and Outlet Structures Excluding Bed Course	Cu. Yd.	173 C.Y.
503.0140	Concrete In Inlet And Outlet Structures	Lump Sum	(27 C.Y.)
503.1030	Concrete In Box Culverts And Collars (Incl. Tapered Inlet Box)	Lump Sum	(201 C.Y.)
508.0200	Cement Rubble Masonry	Cu. Yd.	27 C.Y.
602.0032	Reinforcing Steel In Box Culverts (Incl. Tapered Inlet Box) and Inlet and Outlet Structures	Lump Sum	(34,440 Lbs.)
603.0010	Bed Course Material	Cu. Yd.	86 C.Y.
612.0101	Grouted Rubble Paving	Cu. Yd.	37 C.Y.

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GENERAL NOTES, ESTIMATED QUANTITIES AND STRUCTURE EXCAVATION AND BACKFILL PAY LIMITS	
6'X6' REINFORCED CONCRETE BOX CULVERT @ STA. 48+66	
HALEAKALA HIGHWAY--PUKALANI SECTION--PHASE I HALIMAILE ROAD TO MAKANI ROAD	
Project No. 37C-02-90	
Scale: As Noted	Date: Nov. 1990

SHEET No. S2 OF 5 SHEETS

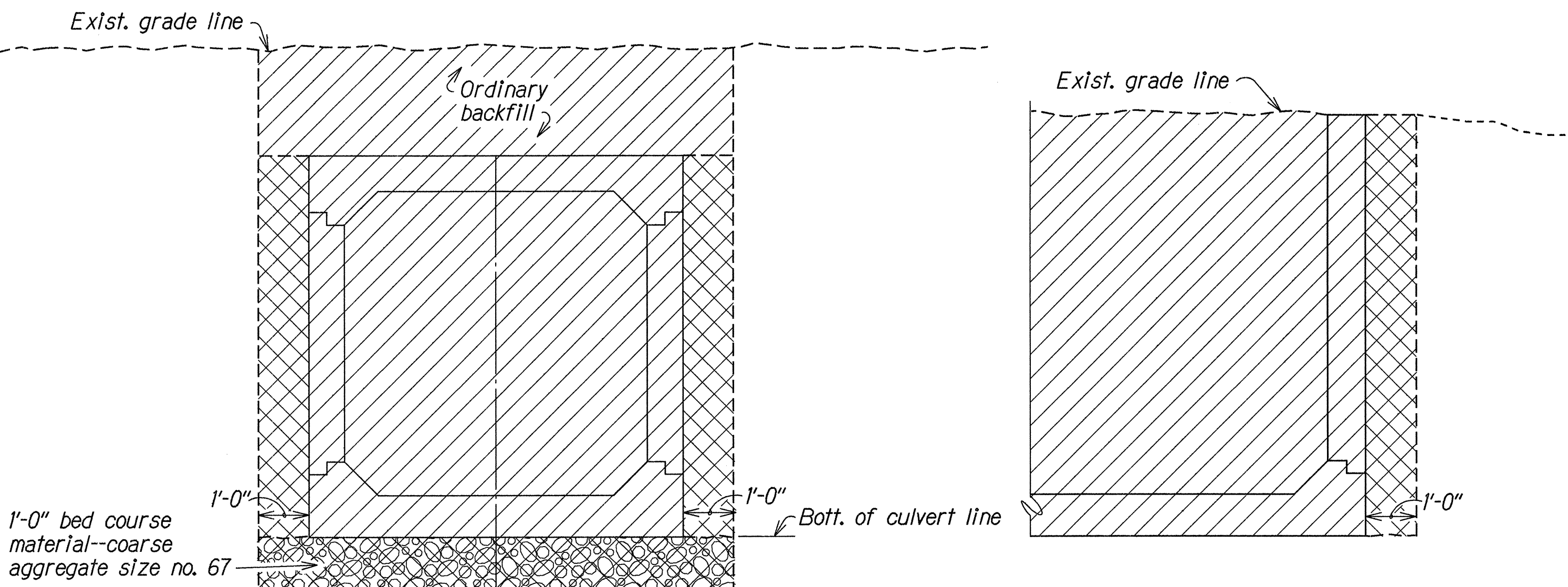
Hatched area shown thus denotes limits of structure excavation.
Hatched area shown thus denotes limits of structure backfill.
Bed course material shall be incidental to structural backfill.



@ CULVERT

@ INLET AND OUTLET

Hatched area shown thus denotes limits of structure excavation.
Hatched area shown thus denotes limits of structure backfill.
Bed course material shall be incidental to structural backfill.



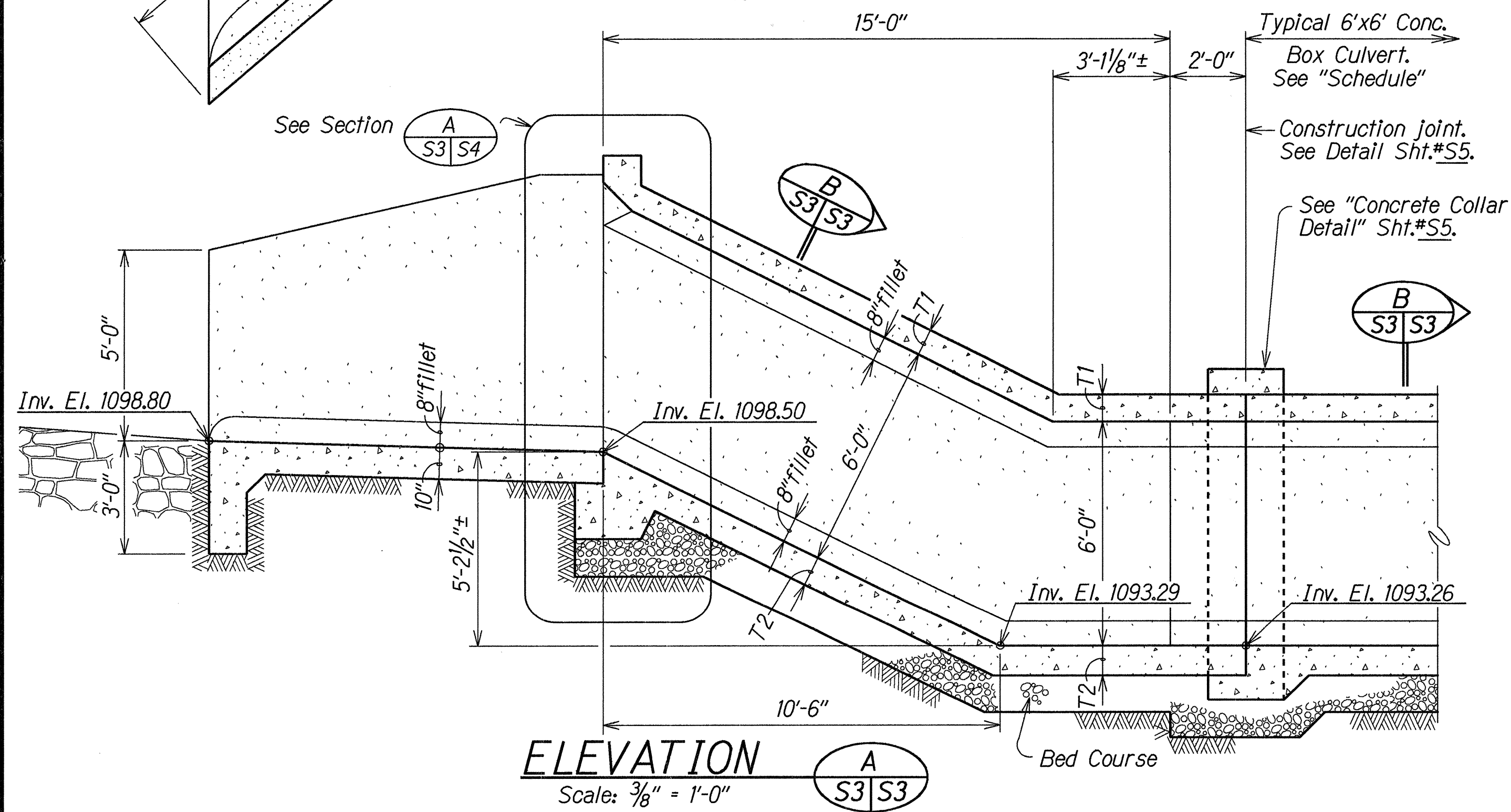
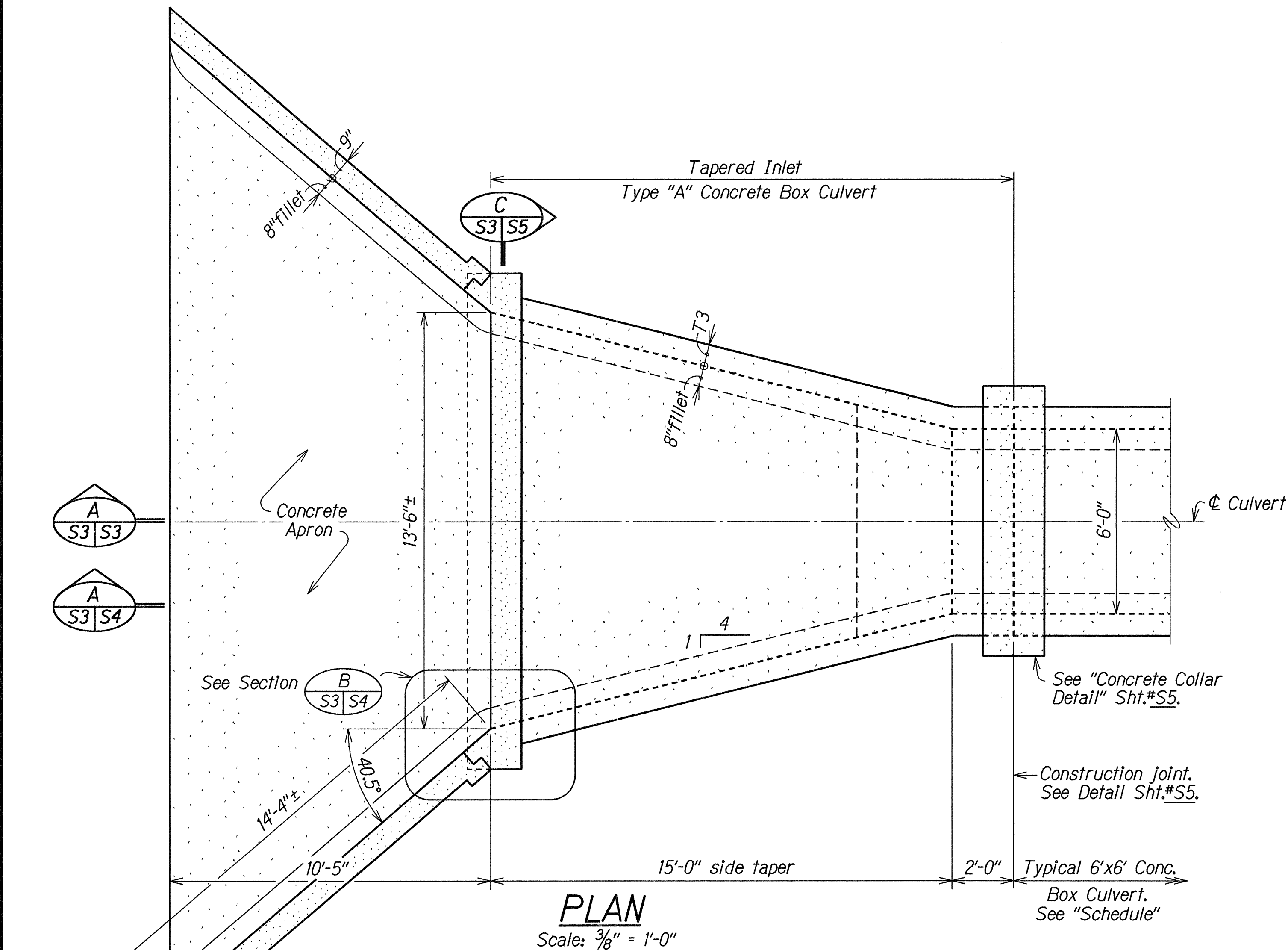
@ CULVERT

@ INLET AND OUTLET

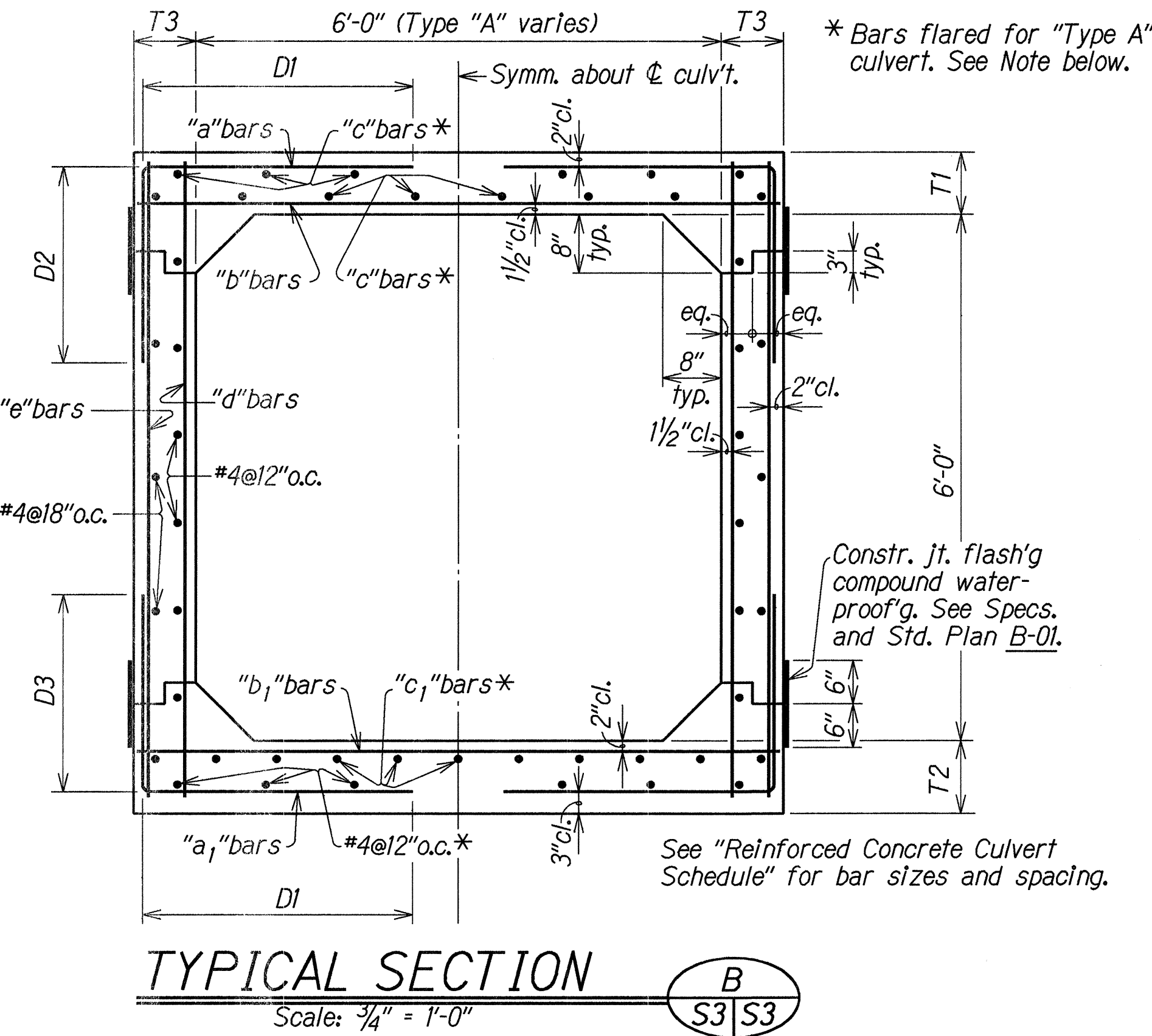
TYPICAL STRUCTURE EXCAVATION AND STRUCTURE BACKFILL PAY LIMITS

ORIGINAL PLAN	DATE
DESIGNED BY	NOV 1990
CHECKED BY	NOV 1990
DESIGNED BY	NOV 1990
CHECKED BY	NOV 1990

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-02-90	1991	35	61



6'x6' REINFORCED CONCRETE BOX CULVERT
@ STA. 48+66 (INLET END)



SPAN AND HEIGHT		6'x6' BOX			
TYPE		A**	B	C	D
CONC.	TOP SLAB	T1	8 1/2"	8 1/2"	10"
	BOTTOM SLAB	T2	9 1/2"	8 1/2"	11 1/2"
	SIDE WALLS	T3	8 1/2"	8 1/2"	9 1/2"
REINFORCING STEEL *	DIMENSION	D1	3'-1"	2'-6"	2'-7"
	DIMENSION	D2	2'-3"	1'-9"	1'-10"
	DIMENSION	D3	2'-2"	1'-8"	1'-11"
	BAR SIZE AND SPACING	"a" bar	#5@6 1/2"	#5@7"	#5@7"
		"b" bar	#6@8"	#5@8 1/2"	#6@9"
		Cont. "c" bar	#4@12"	#4@12"	#4@12"
		"a ₁ " bar	#5@6 1/2"	#5@7"	#5@7"
		"b ₁ " bar	#7@9"	#5@7"	#6@8"
		Cont. "c ₁ " bar	#5@9"	#4@6"	#4@6"
	T3	Vertical (inside face) "d" bar	#4@9"	#4@9"	#4@9"
		Vertical (outside face) "e" bar	#5@6 1/2"	#4@7"	#4@7"
QUAN.	CONCRETE:	C.Y. per linear foot			
	REINFORCING STEEL:	Lbs. per linear foot			

* Note: Where bars are flared, the reinforcing steel spacing given in this table shall be at the widest separation of the flared bars.

** Note: Type A refers to the rectangular shape tapered inlet end of the culverts. See "Plan" and "Elevation" for lengths and location of all types.

REINFORCED CONCRETE BOX CULVERT SCHEDULE

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

PLAN, ELEVATION, AND TYPICAL SECTION

REINF. CONCRETE BOX CULVERT SCHEDULE

6'x6' REINFORCED CONCRETE BOX CULVERT @ STA. 48+66

HALEAKALA HIGHWAY-PUKALANI SECTION-PHASE I

HALTIMALE ROAD TO MAKANI ROAD

Project No. 37C-02-90

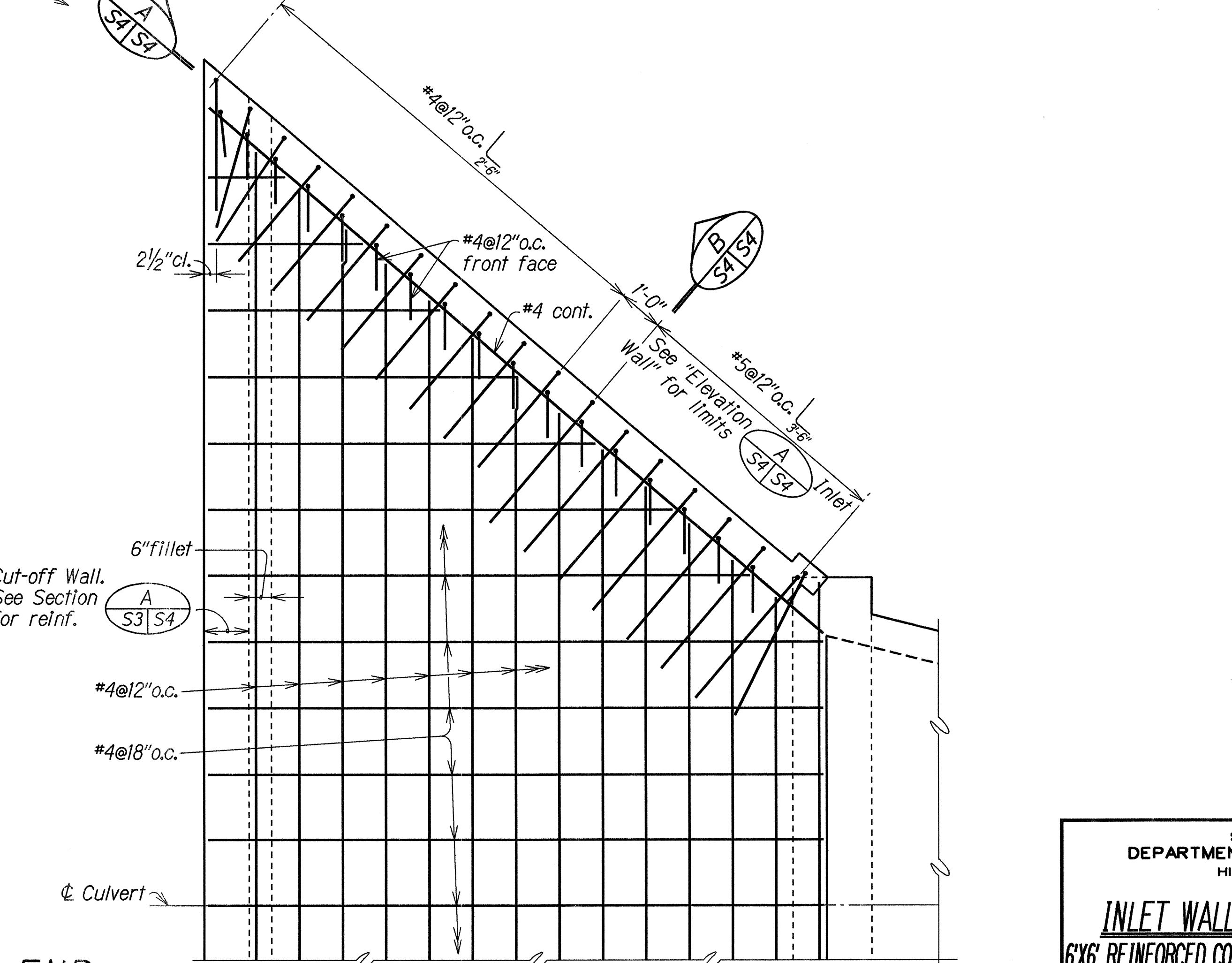
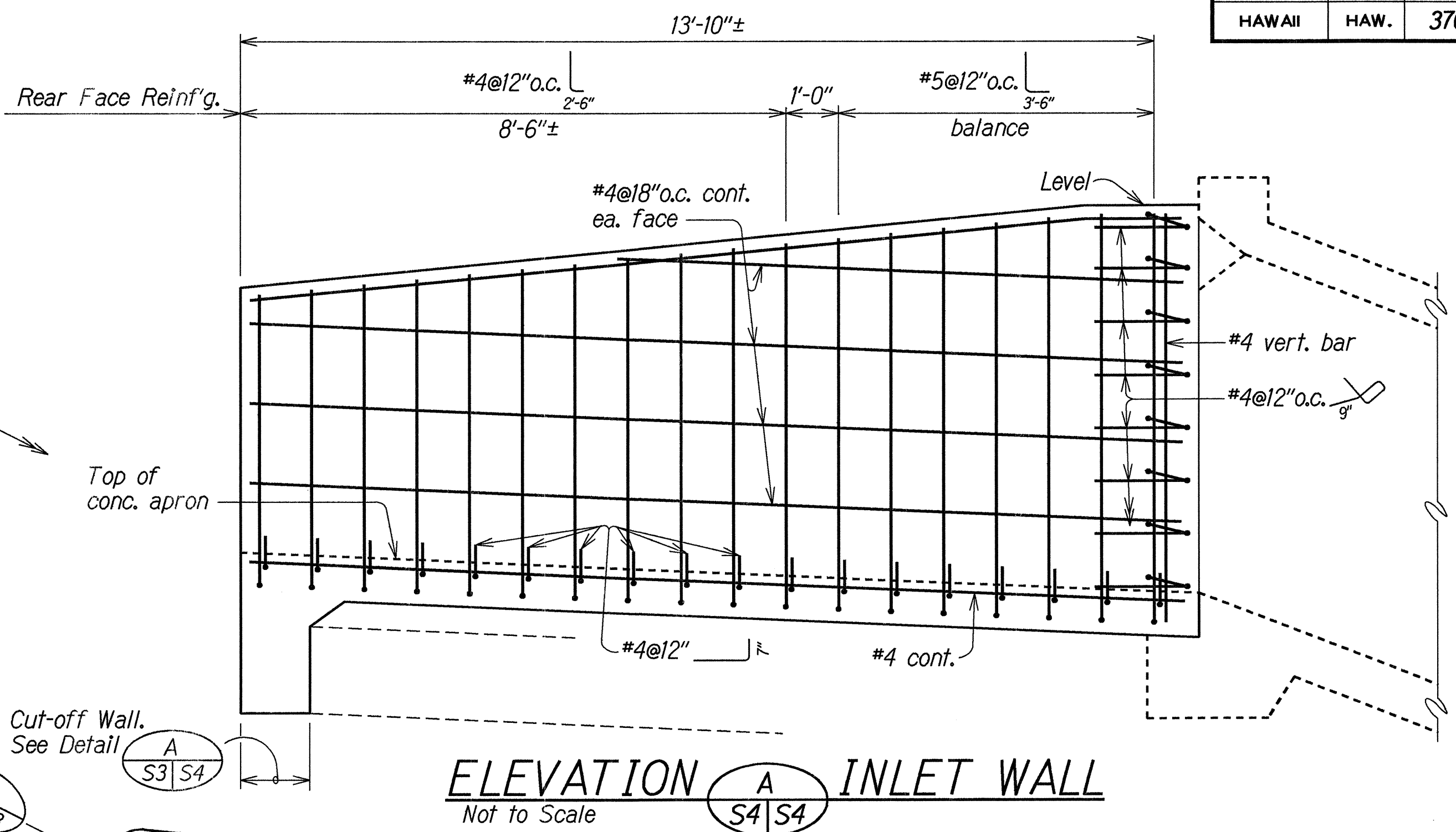
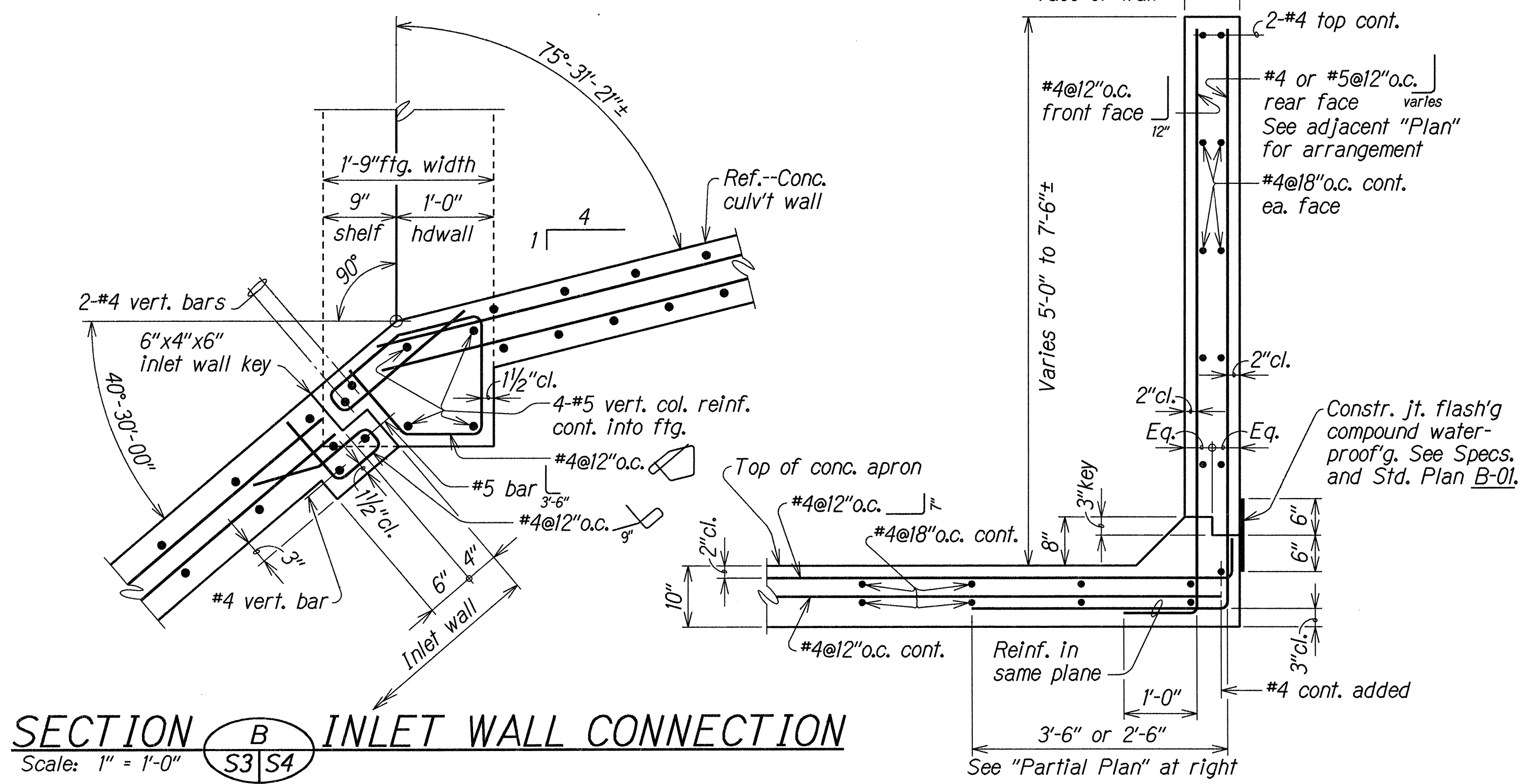
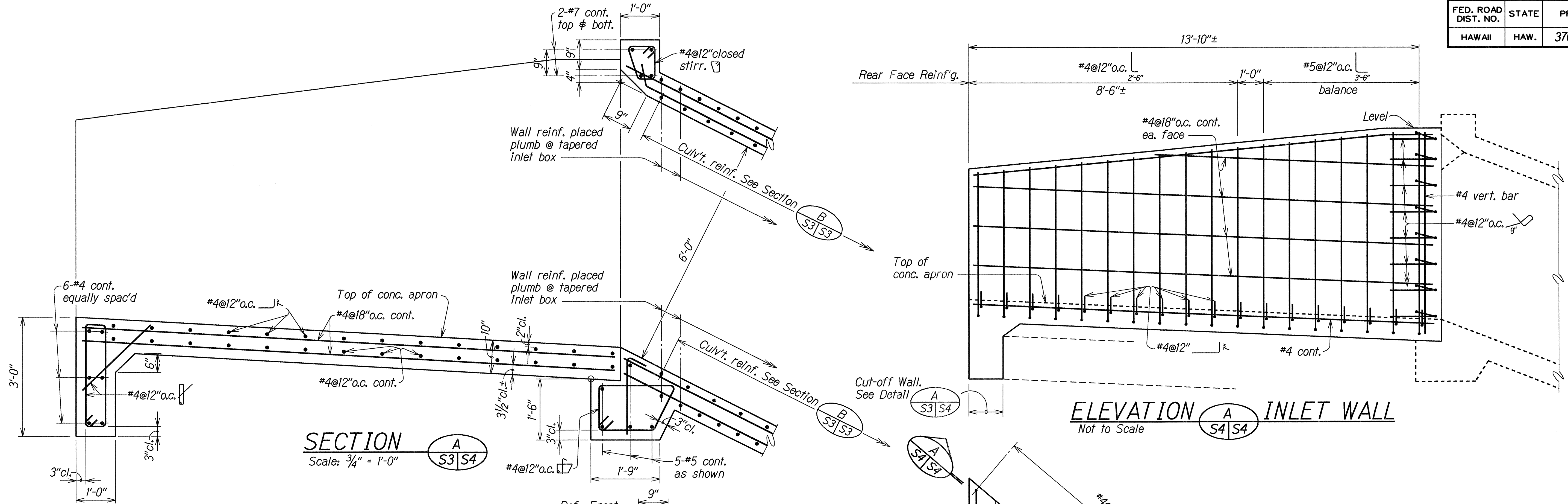
Scale: As Noted

Date: Nov. 1990

SHEET No. S3 OF 5 SHEETS

ORIGINAL PLAN	DATE	SEP 1990
DESIGN FILE	DESIGNED BY	SMA
QUANTITIES BY	CHECKED BY	DOO
DATE	DATE	SEP 1990

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-02-90	1991	36	61



6'x6' REINFORCED CONCRETE BOX CULVERT @ STA. 48+66 INLET END

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

INLET WALL AND APRON DETAILS

6'x6' REINFORCED CONCRETE BOX CULVERT @ STA. 48+66

HALEAKALA HIGHWAY--PUKALANI SECTION--PHASE I

HALIMAILA ROAD TO MAKANI ROAD

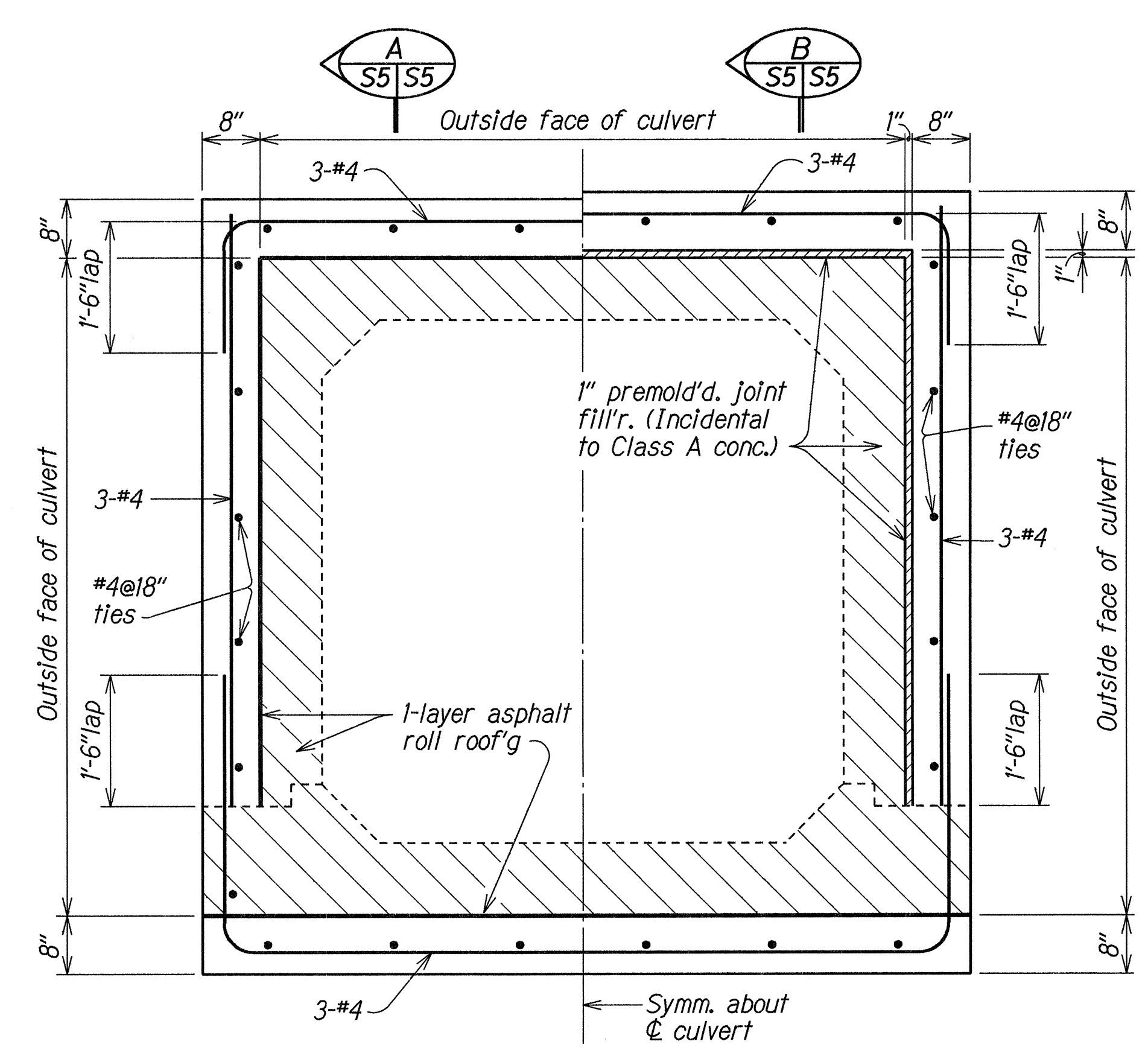
Project No. 37C-02-90

Scale: As Noted

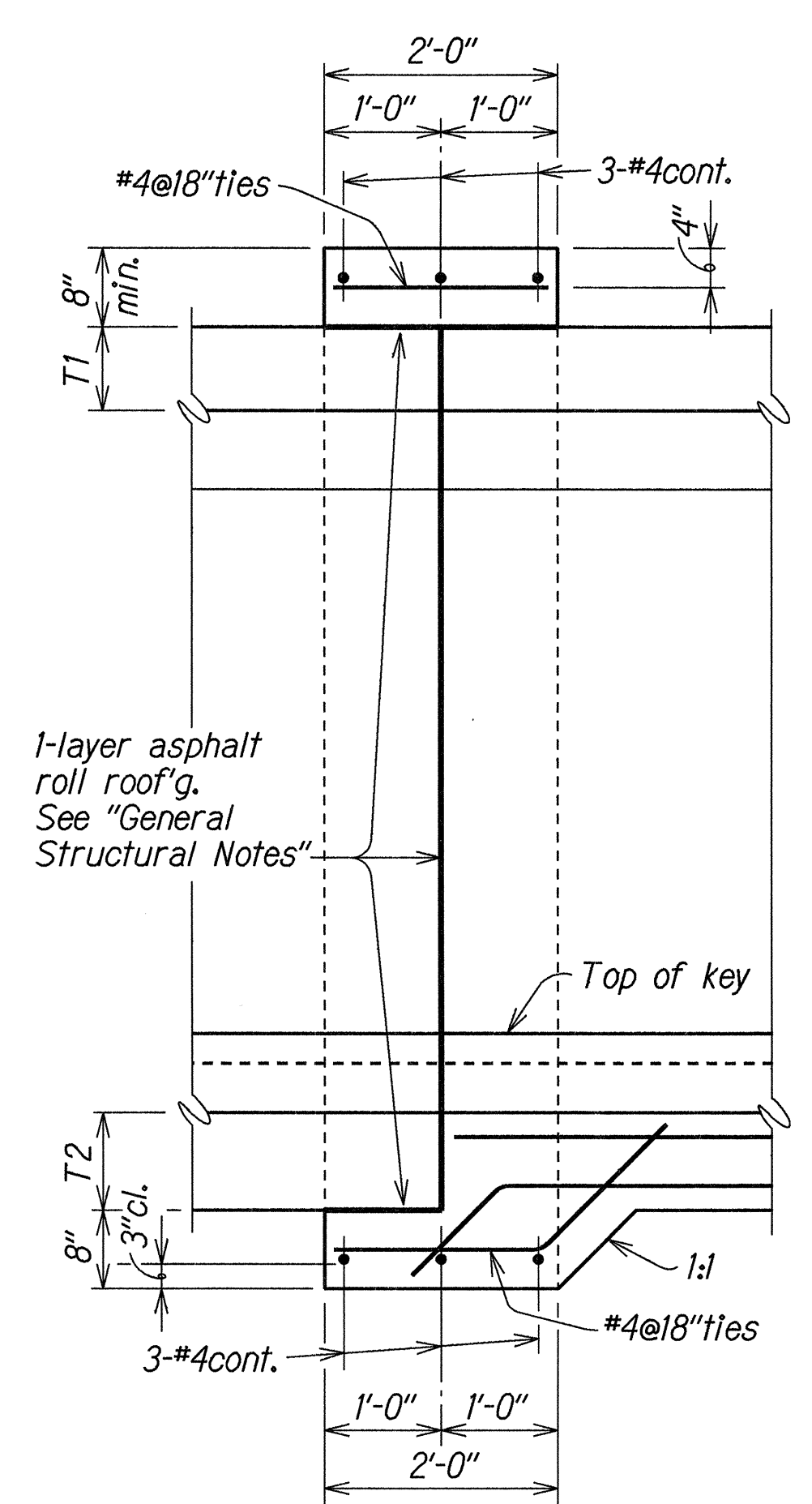
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DESIGNED BY	NOV 1990
CHECKED BY	NOV 1990
QUANTITIES BY	NOV 1990
PLANNED BY	NOV 1990
ORIGINAL PLAN	NOV 1990

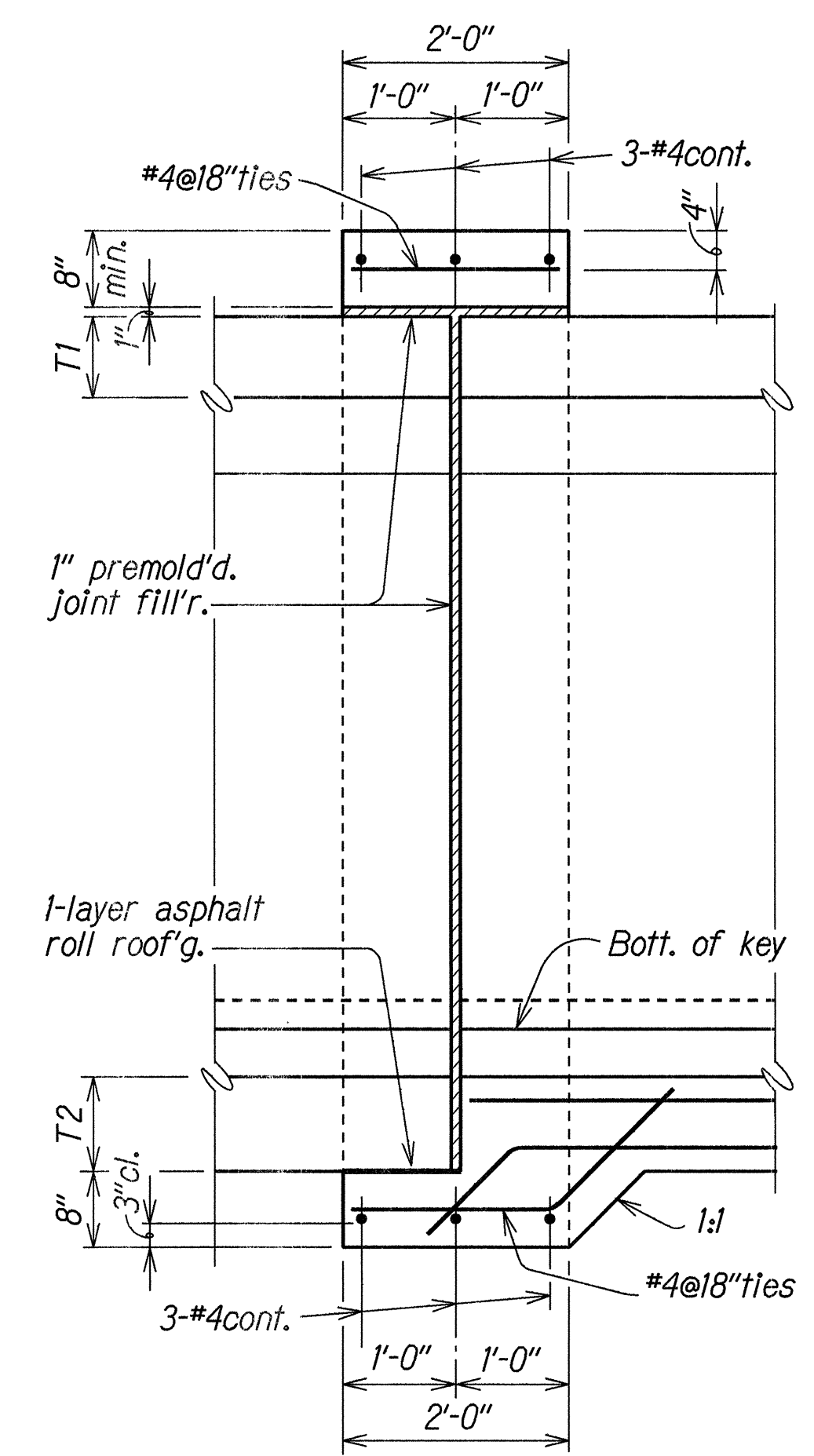
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HAWAII	HAW.	37C-02-90	1991	37	61



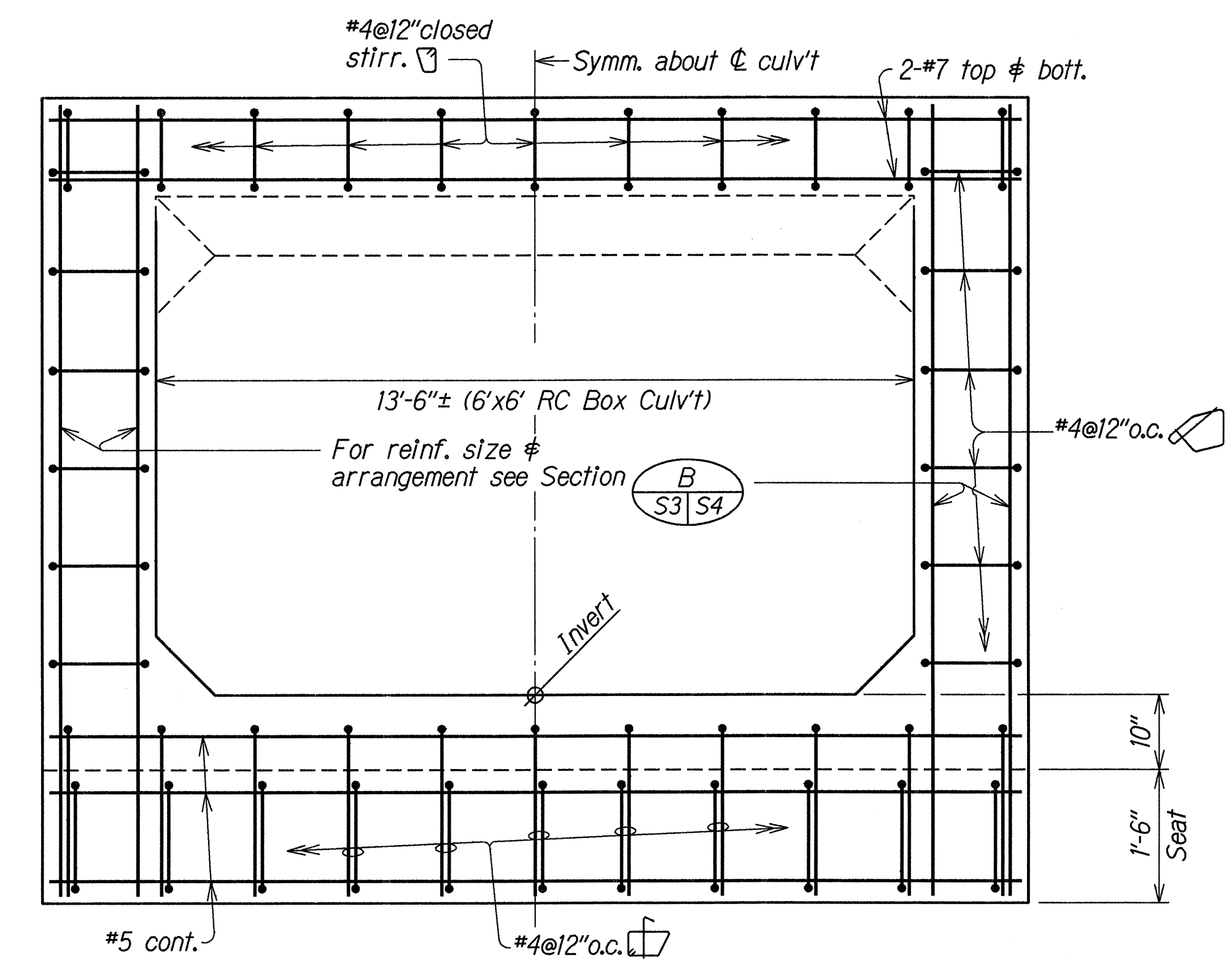
HALF-SECTION @ CONSTRUCTION JOINT HALF-SECTION @ EXPANSION JOINT



SECTION A S5 S5



SECTION B S5 S5



HEADWALL--TYPICAL SECTION C S3 S5

CONCRETE COLLAR DETAIL
Scale: 3/4" = 1'-0"

6'X6' REINFORCED CONCRETE BOX CULVERT DETAILS
@ STA. 48+66

ORIGINAL PLAN	DESIGNED BY	DATE
PLAN	DESIGNED BY	DATE
DESIGNED BY	DATE	
QUANTITIES BY	DATE	
CHECKED BY	DATE	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCRETE COLLAR DETAILS AND
HEADWALL TYPICAL SECTION
6'X6' REINFORCED CONCRETE BOX CULVERT @ STA. 48+66
HALEAKALA HIGHWAY--PUKALANI SECTION--PHASE I
HALTIMALE ROAD TO MAKANI ROAD
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