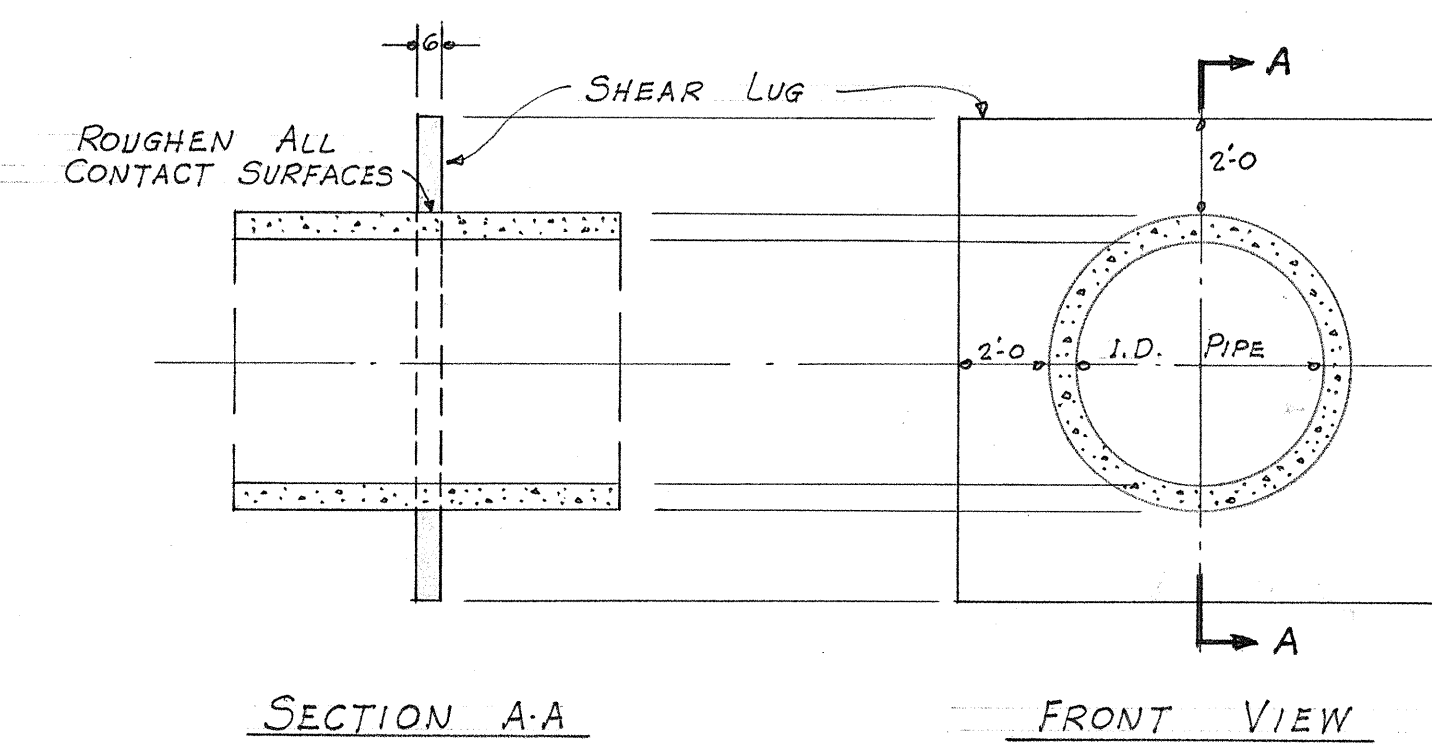
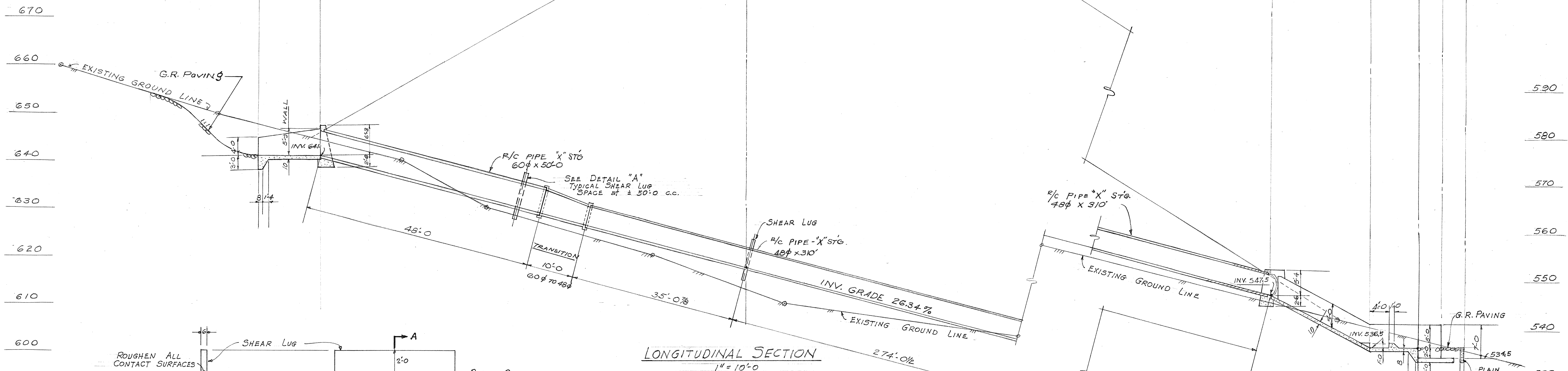
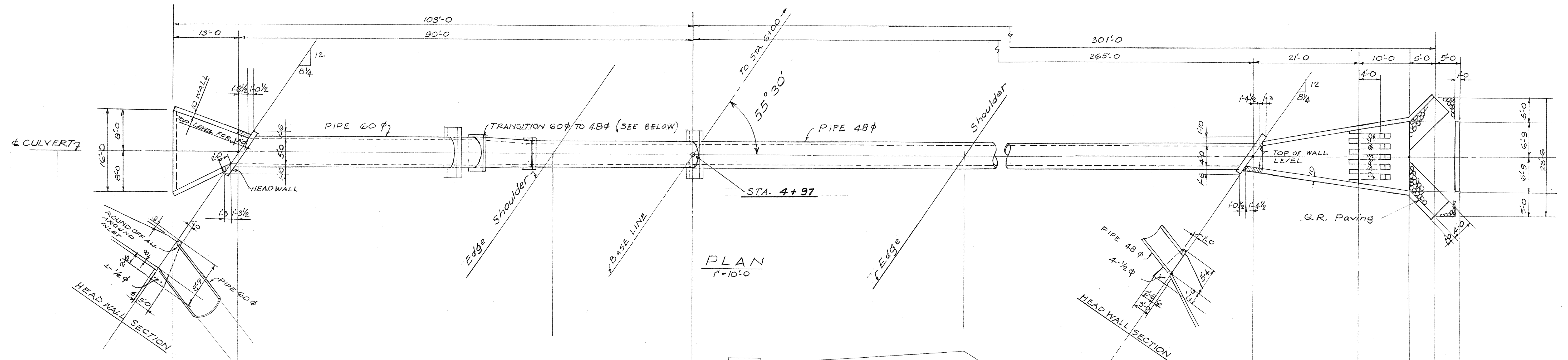
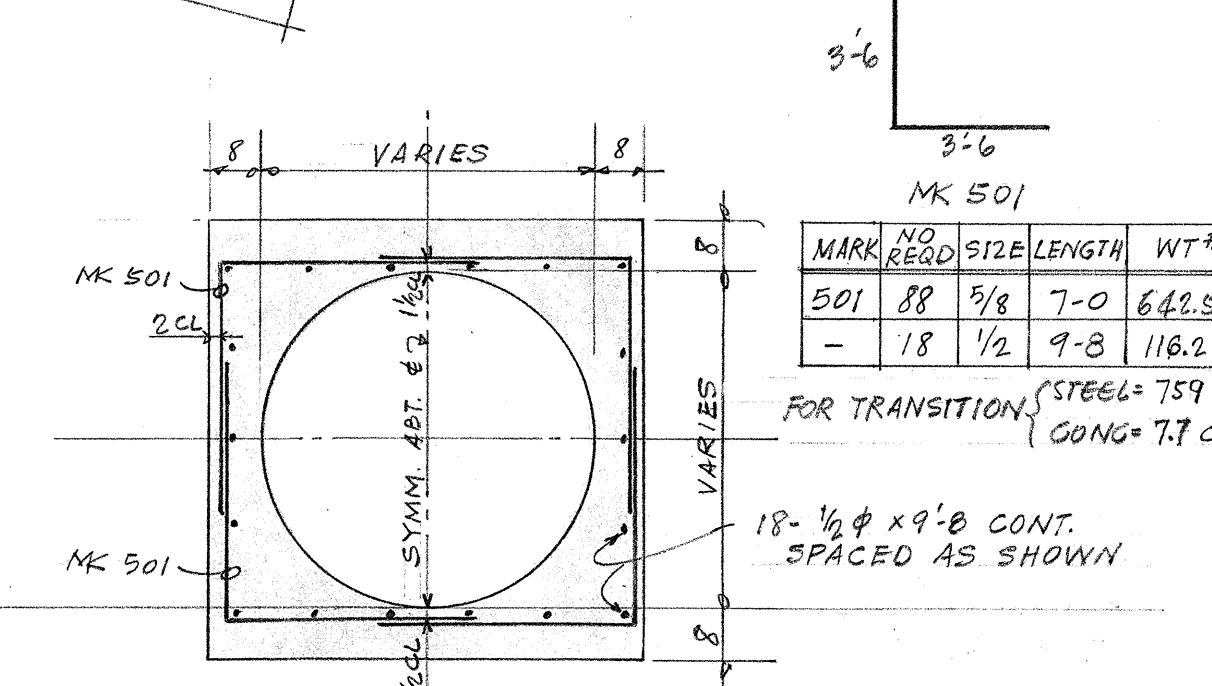
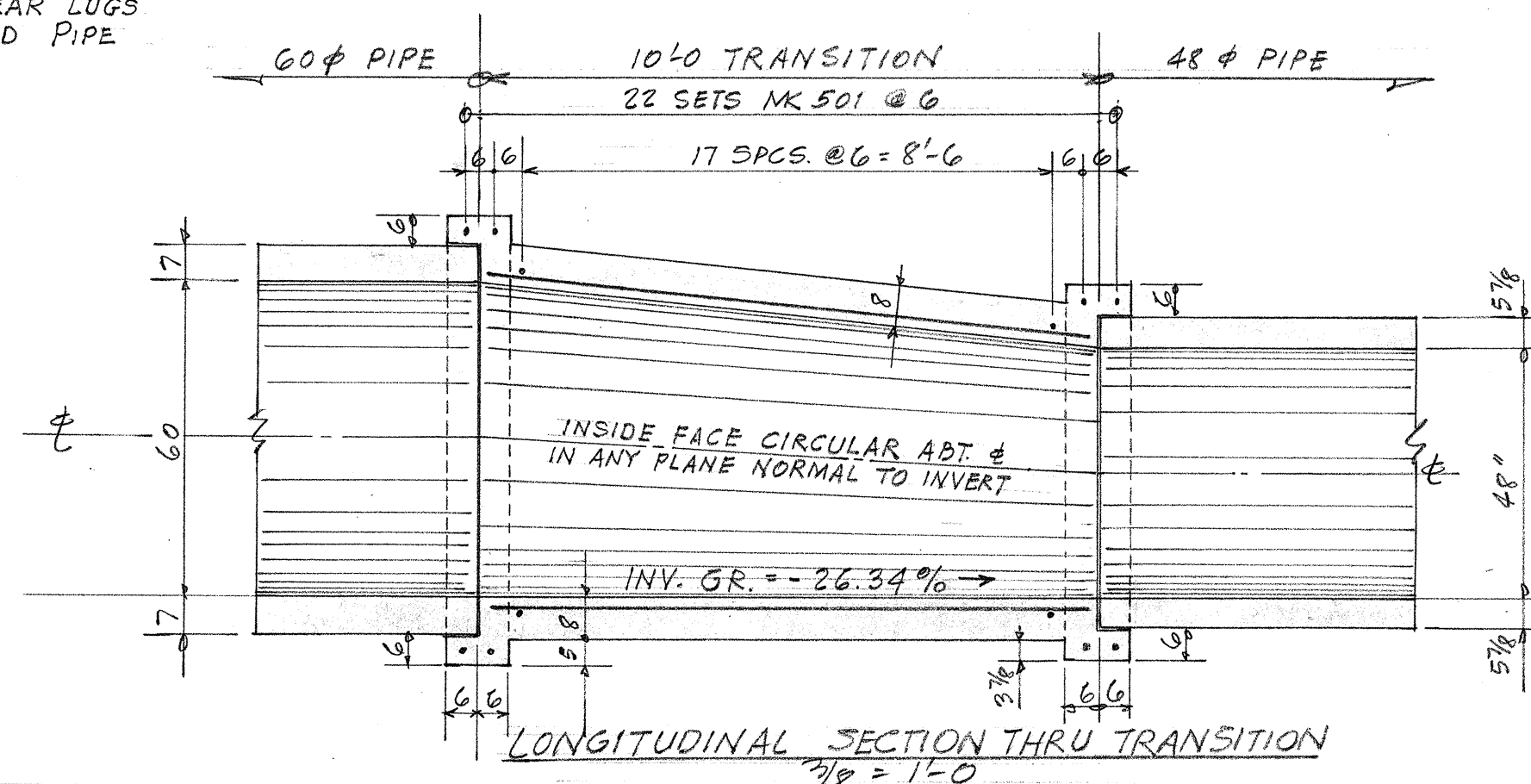




DETAIL "A" TYPICAL SHEAR LUG
1/4" = 1'-0"



WORK THIS SHEET WITH SHEET No. 8

PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEOHE APPROACH ROAD SECTION B
JOB No. 31-52
60" TO 48" REINF. CONC. PIPE CULVERT
B.L. STA. 4+97

ENGINEER: S.O.H. & W.L. DATE: September 22, 1928
DRAFTSMAN: S.Y. CHECKED BY: W.L.W.
SCALE: 1" = 10'-0" TRACER: S.Y.
APPROVED: [Signature] APPROVED: [Signature]
CHIEF ENGINEER BUREAU ENGINEER

W. S.	PROFILE	G. B.
GR. SEC.	F. W. BY:	S. BY:
W. M. BY:		

LIST OF MATERIALS

BENDING DIAGRAMS - ALL DIMENSIONS OUT TO OUT				MARK	NO. REOD	SIZE	LENGTH	REMARKS	LBS. STEEL	C.Y. CONC.	
2'6" 2'6" NK 401				401	42	1/2 φ	5'0"				
						1		15'6"			
						1		4'0"			
						1		6'6"			
						1		9'0"			
						1		11'6"			
						1		12'6"			
						1		12'0"			
						1		11'4"			
						1		10'6"			
		1		10'0"							
		1		9'4"							
		1		8'0"							
		1		6'6"							
		1		4'6"							
		1		2'6"							
		4		11'2"							
		2		16'4"							
		2		14'6"							
		2		13'0"							
		2		11'0"							
		2		9'6"							
		1		8'0"							
		1		7'4"							
		1		5'0"							
		1		2'8"							
		1		15'6"							
		2		14'6"							
		8	1/2 φ	3'6"							
MARK	NO. REOD	SIZE	LENGTH	REMARKS	* STEEL						

CONC.: 60%
STEEL: 390#

FOR SLAB
FOR INLET BOX

60% 15.9

[illegible]

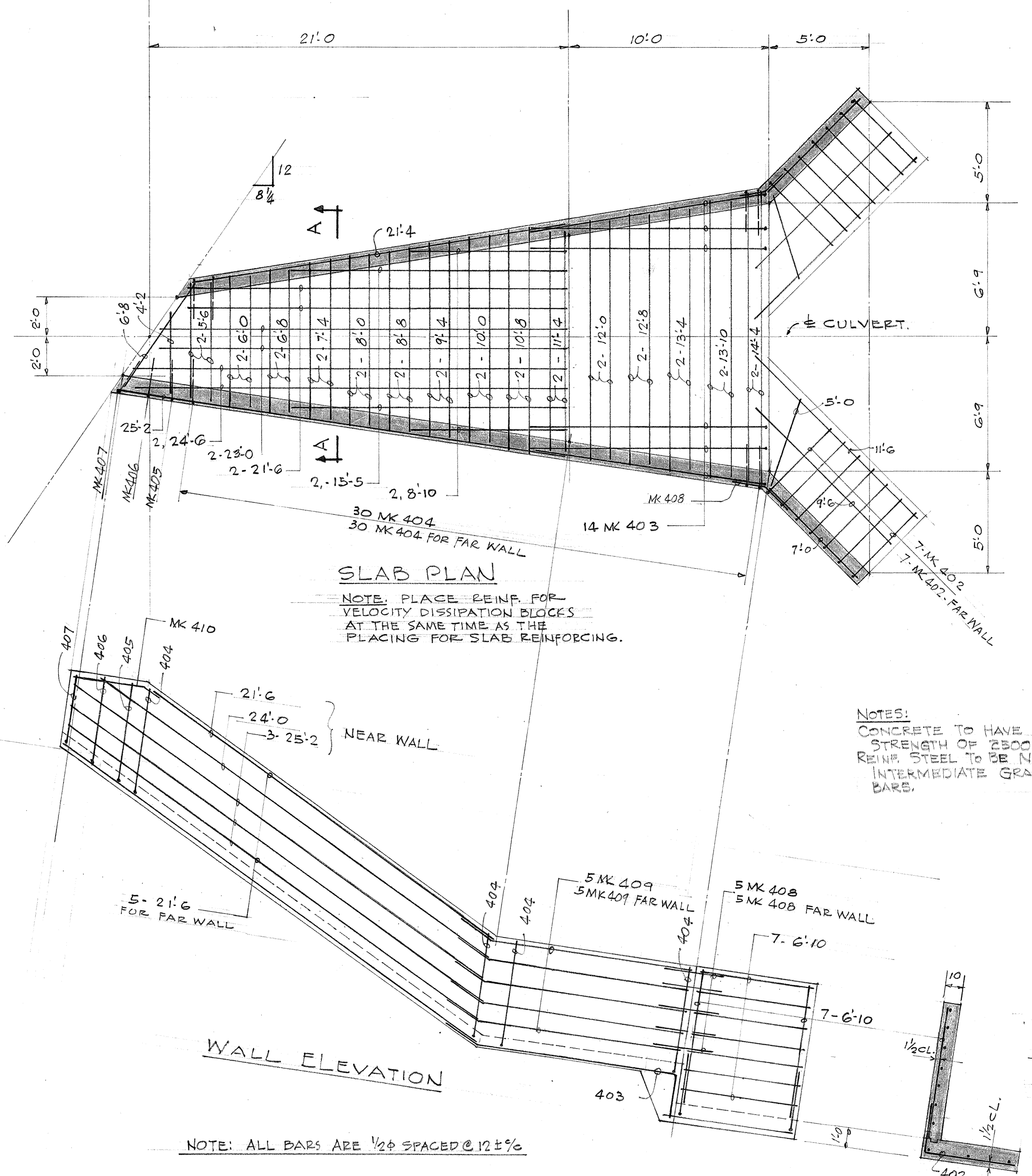
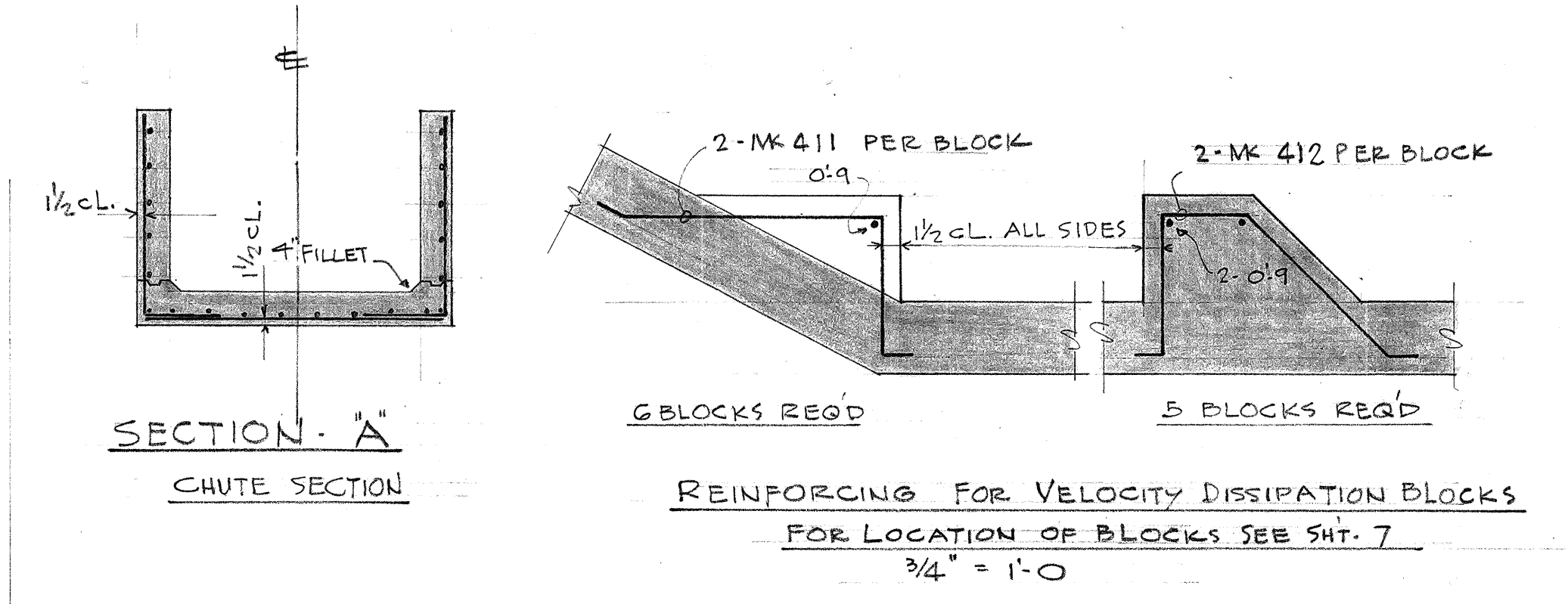
DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEHOE APPROACH ROAD SECTION B
JOB No. 31-52
GO" to 48" REINF. CONC. PIPE CULVERT
B. L. STA. 4+97

ENGINEER <i>S.O.H. & Wilum</i>	DATE <i>September 22, 1952</i>
DRAFTSMAN <i>W. L. Lum</i>	CHECKED BY <i>W. Lum</i>
SCALE <i>As Shown</i>	TRACER <i>W. Lum</i>
APPROVED <i>[Signature]</i>	APPROVED: <i>[Signature]</i>
CHIEF ENGINEER	BUREAU ENGINEER

SHEET No. 8 OF 66 SHEETS

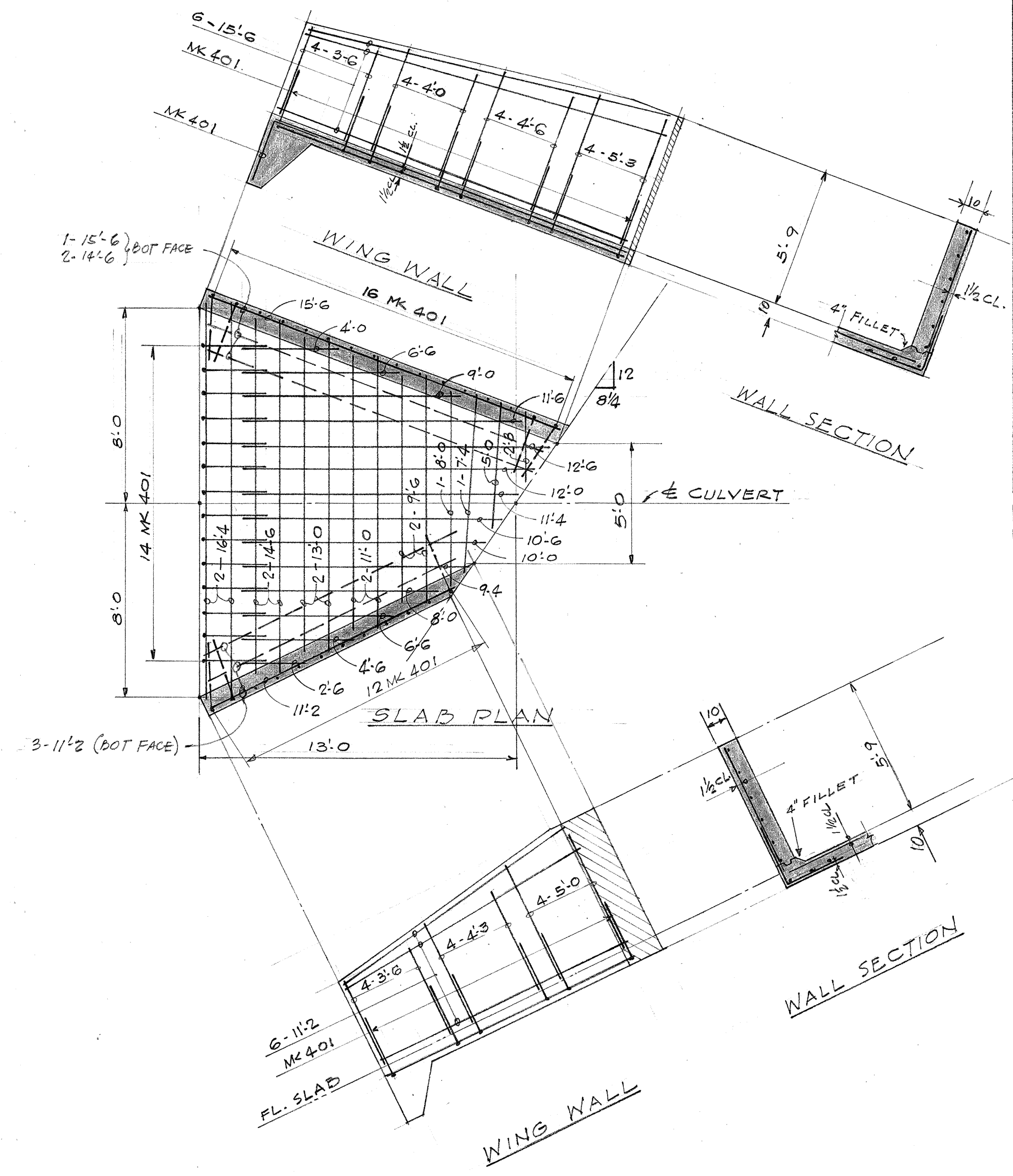
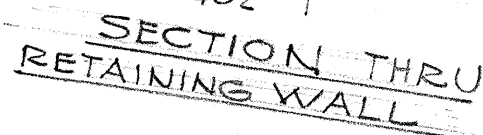
WORK THIS SHEET WITH SHEET No. 7

FILE	POCKET	FOLDER	No.
7	2	2	8

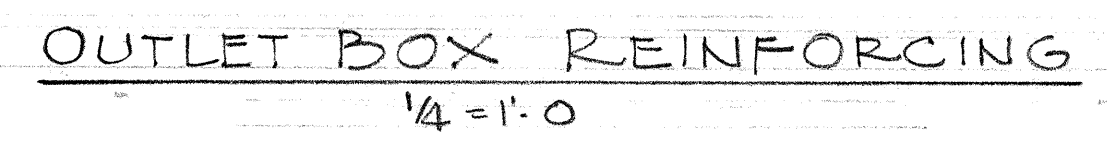
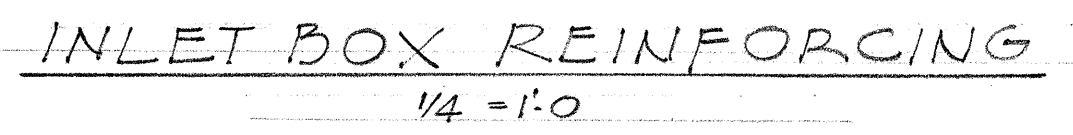


NOTES:
CONCRETE TO HAVE AN ULT. COMP.
STRENGTH OF 2500 PSI @ 28 DAYS.
REINF. STEEL TO BE NEW BILLET,
INTERMEDIATE GRADE DEFORMED
BARS.

GO. 6" STG PIPE REQ'D = 30 LIN. FT.
48. 6" STG PIPE REQ'D = 310 LIN. FT.
TOTAL CONC. REQ'D. = 55 cy.
STEEL " = 2666 #
" STRUC. EXC. " = 520 cy.
" UNCL. " " = 82 cy.
" G.R. PAVING. " = 13 sy.

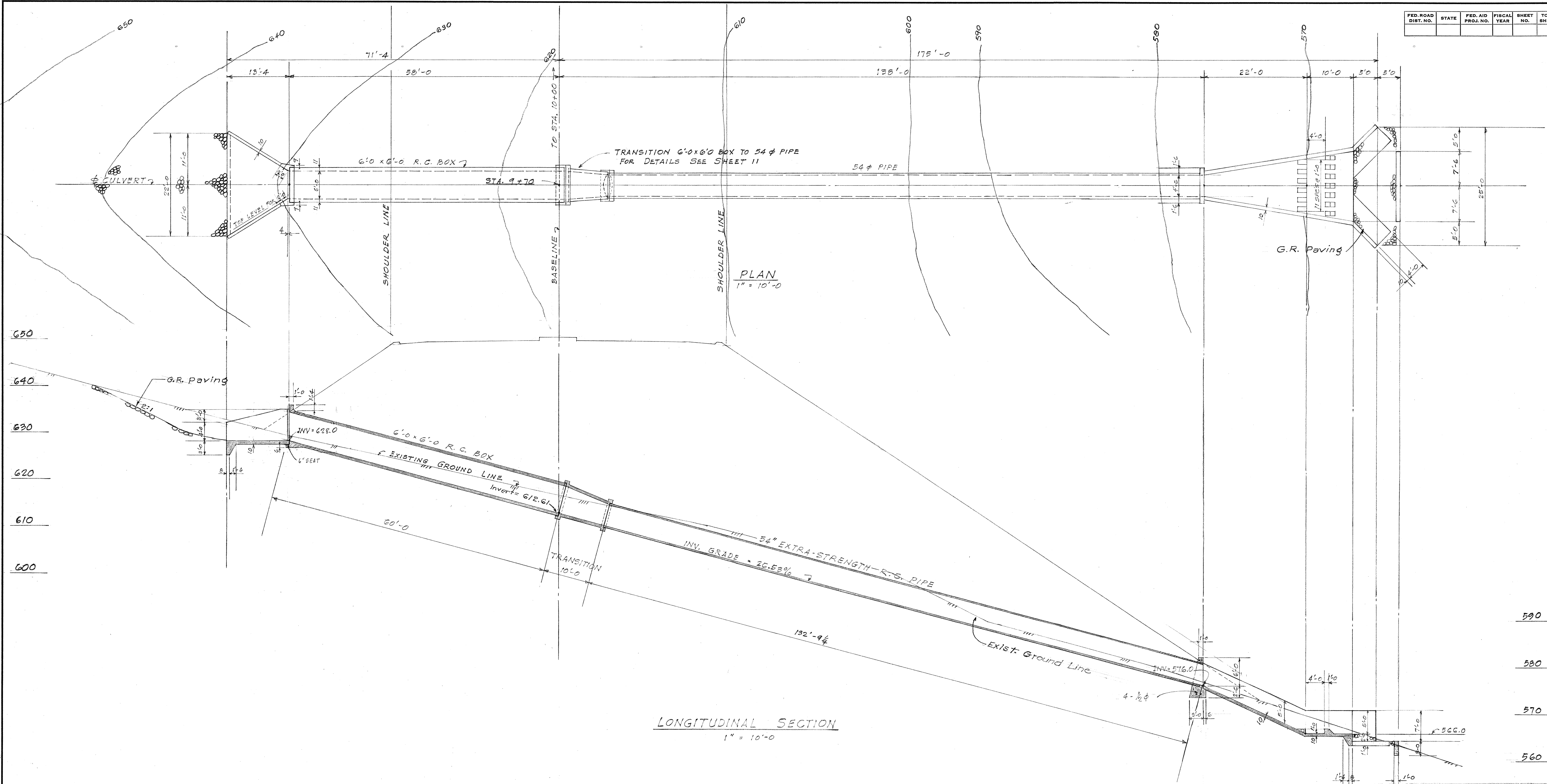


NOTE: ALL BARS ARE
1/2" SPACED @ 12" C.



ORIGINAL PLAN	NOTE BOOK No.	SURVEY PLOTTED BY _____	DATE _____
		DESIGNED BY _____	“
		DRAWN BY _____	“
		TRACED BY _____	“
		QUANTITIES BY _____	“
		QUANTITIES CHECKED BY _____	“
		CHECKED BY _____	“

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS



LONGITUDINAL SECTION
1" = 10'-0"

PLAN
1" = 10'-0"

DIVISION OF ENGINEERING			
DEPARTMENT OF PUBLIC WORKS			
CITY AND COUNTY OF HONOLULU			
BUREAU OF PLANS			
KALIHI TUNNEL			
KANEHOE APPROACH ROAD SECTION B			
TERRITORIAL JOB NO. 31-52			
G'xG' BOX TO 54" R.C. PIPE CULVERT			
B.L. STA. 9+70			
ENGINEER - S.O.H. & R.W.	DATE - September 23, 1932		
DRAFTSMAN - R.W.	CHECKED BY - W. LUM		
SCALE - 1" = 10'	TRACER - R.W.		
APPROVED -	APPROVED -		
CHIEF ENGINEER	BUREAU ENGINEER		
W.S.	PROFILE	C.B.	
CR. SEC.	P.W. BY.	S. BY.	

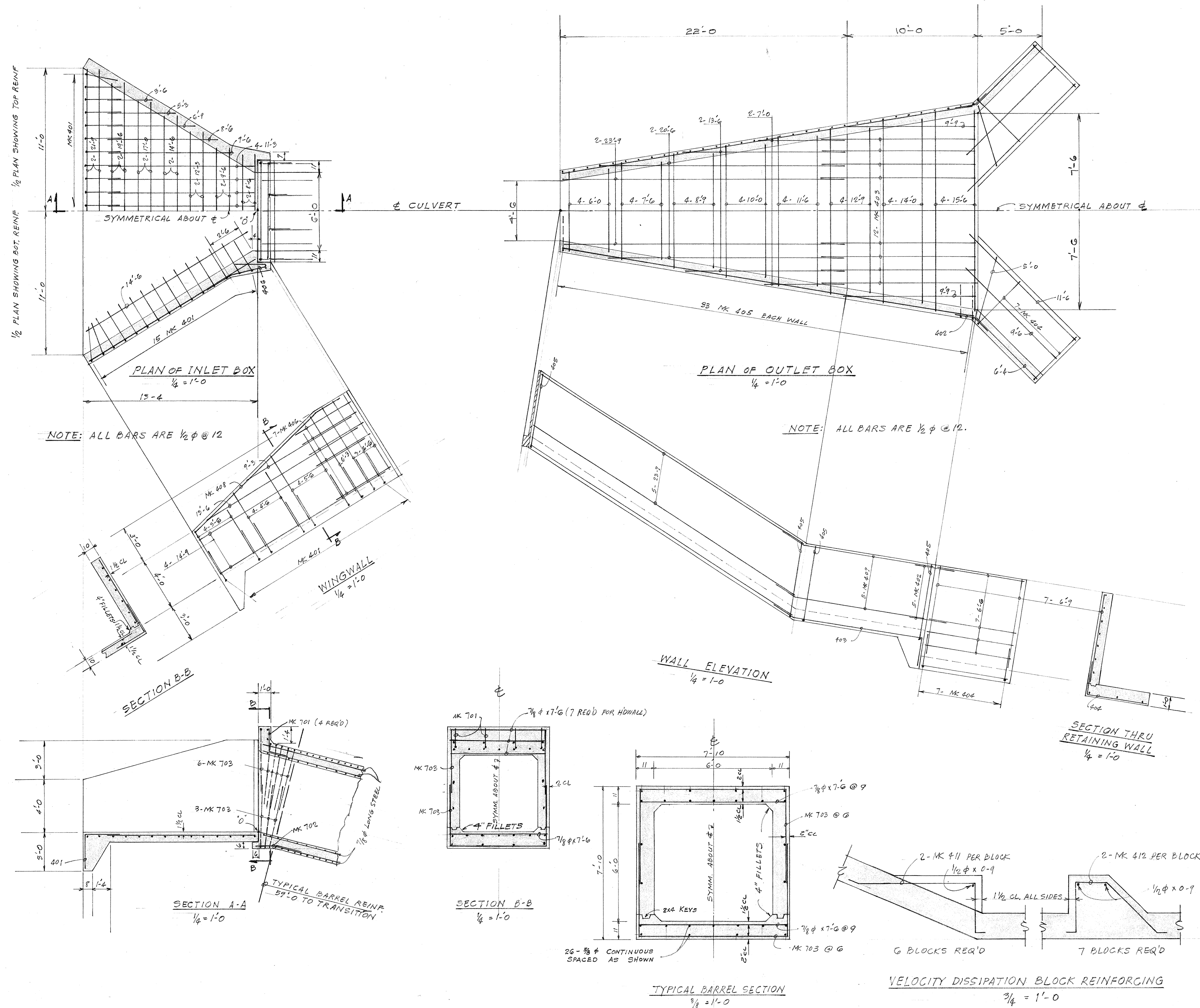
WORK THIS SHEET WITH SHEET No. 10 & 11

SHEET No. 2 OF 66 SHEETS

FILE	POCKET	FOLDER	No.
7	2	2	9

9+70

SURVEY PLOTTED BY	DATE
DESIGNED BY	
DRAWN BY	
TRACED BY	
QUANTITIES CHECKED BY	
CHECKED BY	
NOTE BOOK No.	



LIST OF MATERIALS

BENDING DIAGRAMS	MARK	No. REQ'D	SIZE	LENGTH	REMARKS	STEEL	CONC.
ALL DIMENSIONS OUT TO OUT	401	52	1/2 phi	5'-4"		155.2	
	2	"	21'-9"			29.1	
	2	"	13'-6"			26.0	
	2	"	17'-0"			22.7	
	4	"	14'-6"			38.7	
	2	"	12'-3"			16.4	
	4	"	9'-6"		SLAB	25.4	
	2	"	8'-6"			11.4	
	2	"	3'-6"			4.7	
	2	"	5'-3"			7.0	
	2	"	6'-9"			30	
	2	"	8'-6"			11.4	
	8	"	11'-3"			60.1	
	406	14	1/2 phi	7'-3"		68.0	
	408	2	"	15'-2"		20.2	
	8	"	14'-9"			78.8	
	2	"	13'-6"			18.0	
	2	"	9'-3"			12.4	
	8	"	3'-6"			18.7	
	8	"	4'-6"			24.0	
	8	"	5'-6"			29.4	
	2	"	6'-3"			8.4	
	6	"	6'-6"			26.0	
	701	4	1/2 phi	3'-2"		25.9	
	702	4	"	3'-9"		30.7	
	703	6	"	17'-0"		208.5	
	410	2	1/2 phi	11'-3"		15.0	
	6	"	7'-6"			20.1	
	403	12	1/2 phi	14'-0"		112.2	
	404	14	"	7'-1"		66.2	
	405	66	"	7'-8"		338.7	
	4	"	8'-9"			23.4	
	4	"	10'-0"			26.7	
	6	"	11'-6"			46.1	
	4	"	12'-9"			34.0	
	4	"	14'-0"			37.4	
	4	"	15'-6"			41.4	
	2	"	9'-9"			13.0	
	2	"	9'-6"			12.7	
	2	"	6'-4"			8.5	
	2	"	5'-0"			6.7	
	2	"	23'-9"			31.7	
	2	"	20'-6"			27.4	
	2	"	13'-6"			18.0	
	2	"	7'-0"			9.4	
	4	"	6'-0"			16.0	
	4	"	7'-6"			20.0	
	4	1/2 phi	7'-0"		HEADWALL	18.7	
	402	10	1/2 phi	3'-0"		20.0	
	409	10	"	12'-0"		80.2	
	14	"	6'-6"			60.3	
	14	"	6'-9"			63.1	
	10	"	23'-9"			158.4	
	411	12	1/2 phi	4'-11"		39.4	
	412	14	"	4'-6"		42.1	
	20	"	0'-9"			10.0	
	703	238	3/8 phi	17'-0"		8270.0	
	52	3/8 phi	31'-0"			17100	
	102	3/8 phi	7'-6"			248.4	

SEE PAGE 11 FOR LIST OF MATERIALS FOR TRANSITION!

133 L.F. 54" X 54" R.C. PIPE REQ'D.

NOTES:

1. PLACE DISSIPATION BLOCK REIN. AT PLACING OF FLOOR SLAB REINFORCING.
2. CONCRETE TO HAVE ULTIMATE COMP. STRENGTH OF 2500 PSI AT 28 DAYS.
3. REIN. STEEL TO BE NEW BILLET INTERMEDIATE GRADE DEFORMED BARS.

TOTAL CONC. REQ'D. = 103 CY.
TOTAL STEEL REQ'D. = 14,708 #
STRUC. EXC. REQ'D. = 341 CY.
UNCL. EXC. " = 119 CY.
G.R. PAVING " = 115 SY.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEOHE APPROACH ROAD SECTION B
JOB NO. 31-52
6'x6' BOX TO 54" REIN. CONC. PIPE CULVERT
B.L. STA. 9+70

ENGINEER: S.O.H. & R.W.
DRAFTSMAN: R.W.
SCALE: AS SHOWN
APPROVED: [Signature]
CHIEF ENGINEER

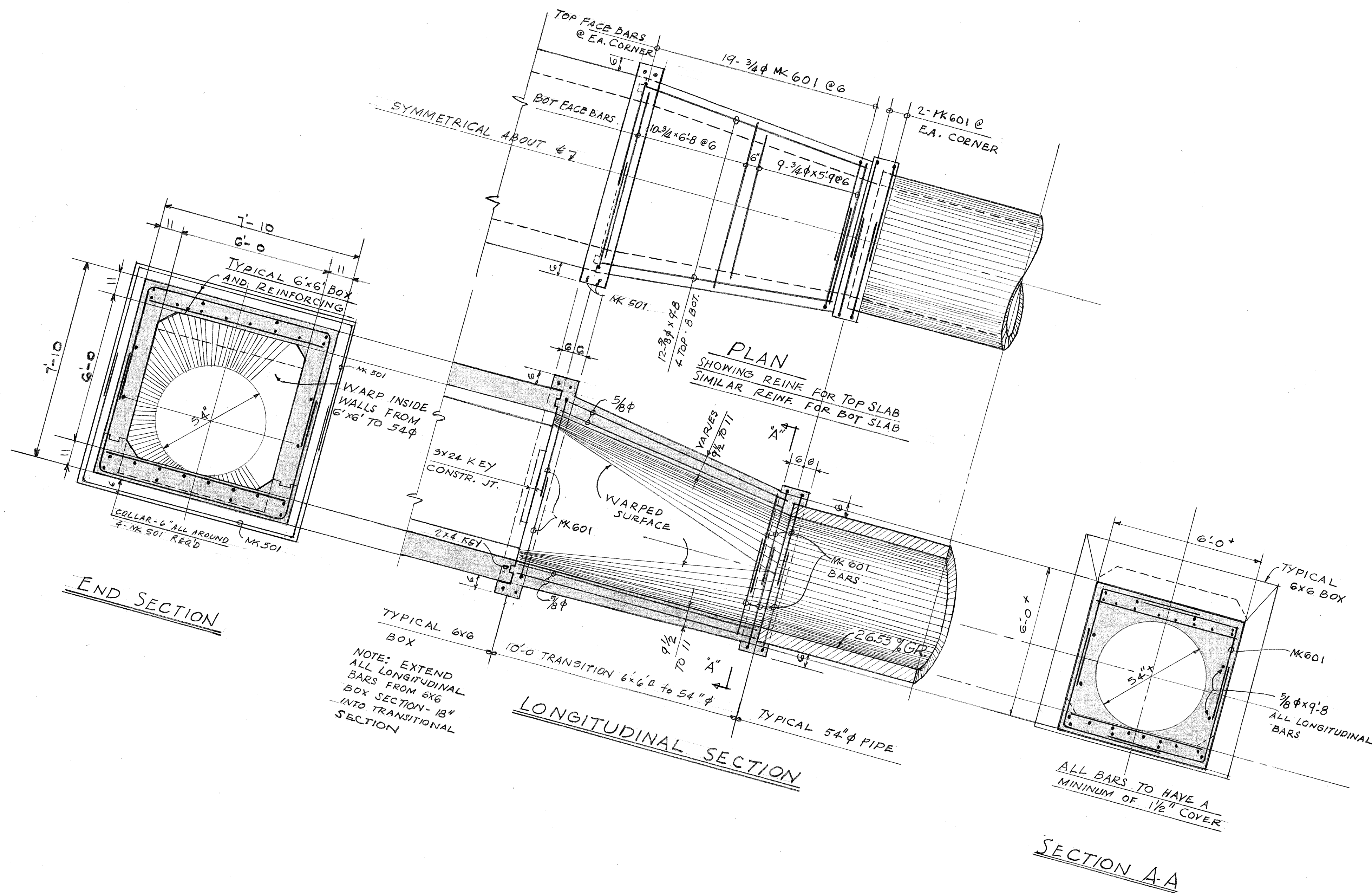
DATE: September 22, 1952
CHECKED BY: M. LUT.
TRACER: R.W.
APPROVED: [Signature]
BUREAU ENGINEER

W. S. [] PROFILE [] C. B. []
OR SEC. [] F. B. [] S. BY: []
W. M. BY: [] F. W. BY: [] S. BY: []

WORK THIS SHEET WITH SHEETS No. 9 & 11

FILE	POCKET	FOLDER	No.
7	2	2	10

Sheet No. 10 of 66 Sheets



LIST OF MATERIALS						
BENDING DIAGRAM ALL DIMENSIONS OUT TO OUT	MARK	NO.	SIZE	LENGTH	REMARK	STEEL CONC.
	601	84	3/4"	8-0		1009
		20	"	6-8		200
		18	"	5-9		155
		28	5/8"	9-8		282
	501	4	"	19-0	COLLAR	79
					TOTAL	1725 11.5'

TRANSITION DETAIL
FOR BOX TO PIPE SECTIONS
3/8 = 1'-0

PROPERTY OF DIVISION OF ENGINEERING

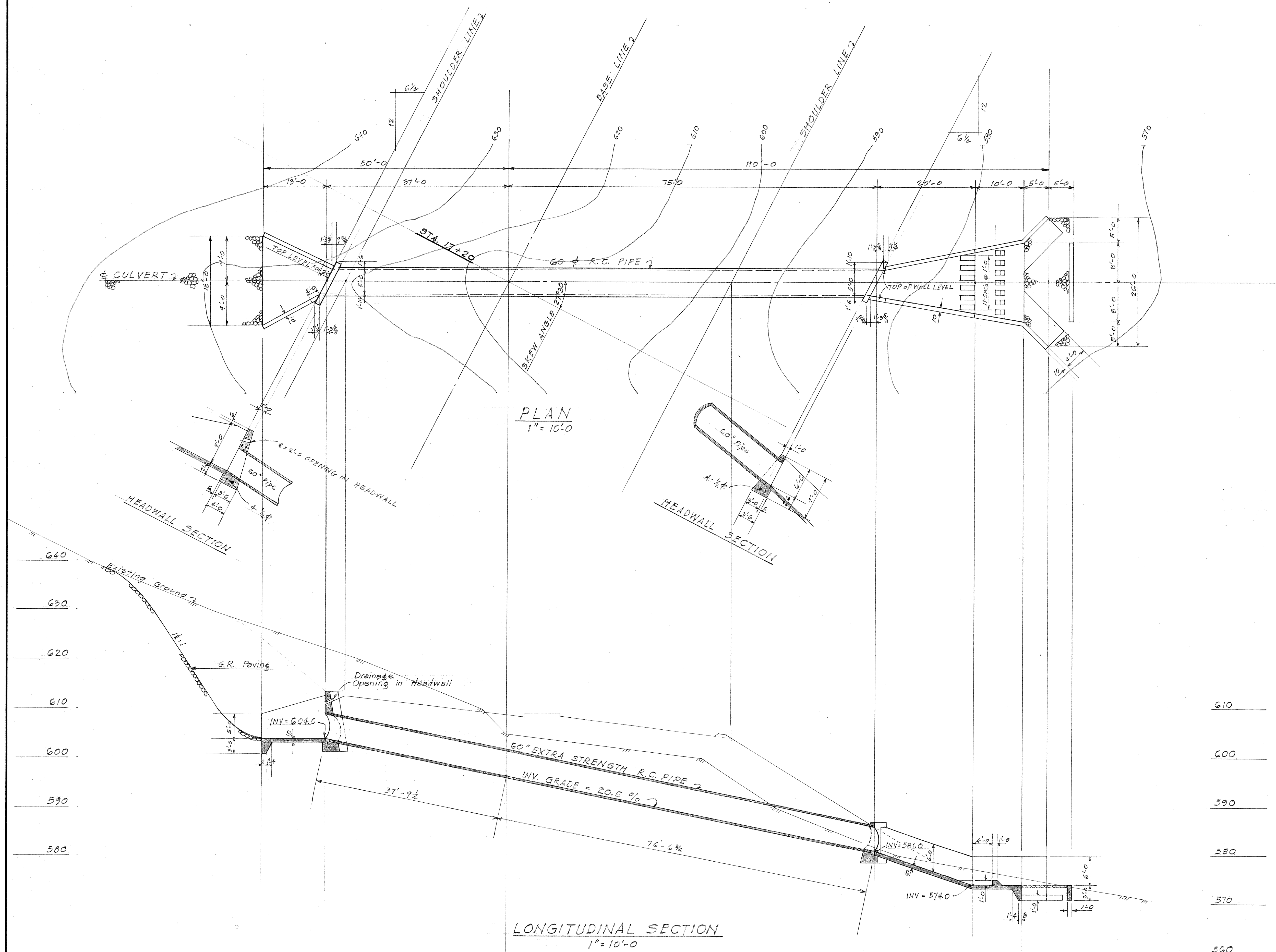
DEPARTMENT OF PUBLIC WORKS CITY AND COUNTY OF HONOLULU BUREAU OF PLANS KALIHI TUNNEL KANEHOE APPROACH ROAD SECTION B JOB No. 31-52 6'x6' BOX TO 54" REINF. CONC. PIPE CULVERT B.L. STA. 2+70		
ENGINEER S.O.H. & W.L.	DATE September 23, 1952	
DRAFTSMAN W.L.	CHECKED BY M.L. LUD	
SCALE As Shown	TRACER S.Y.	
APPROVED: <i>[Signature]</i>	APPROVED: <i>[Signature]</i>	
CHIEF ENGINEER	BUREAU ENGINEER	
W. S.	PROFILE	C. B.
CR. SEC.	F. B.	S. B.
W. M. BY:	F. W. BY:	S. BY:

WORK THIS SHEET WITH SHEETS No. 9 & 10

FILE	POCKET	FOLDER	No.
7	2	2	11

Sheet No. 11 of 66 Sheets

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS

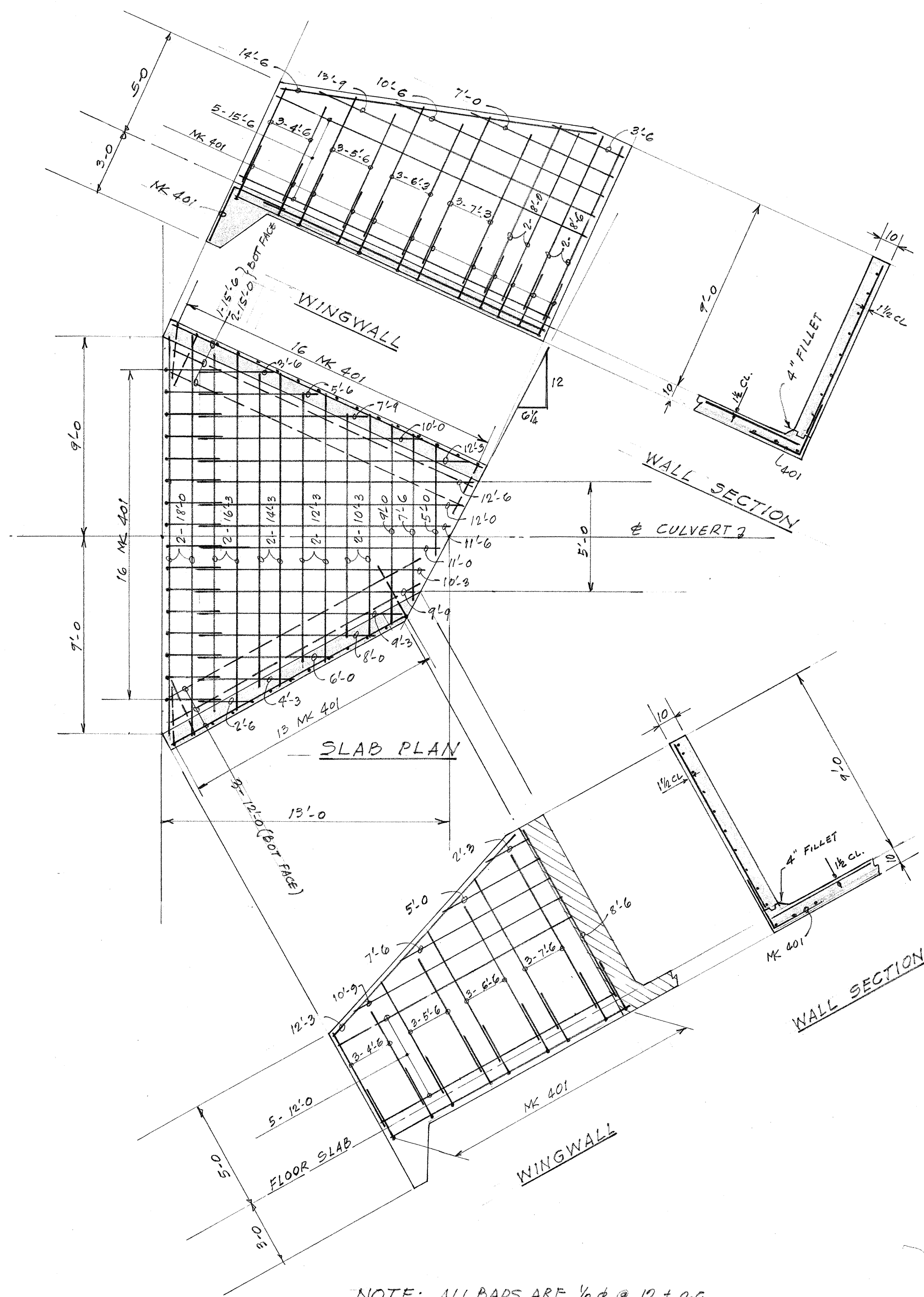
PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS CITY AND COUNTY OF HONOLULU BUREAU OF PLANS KALIHI TUNNEL KANEHOE APPROACH ROAD SECTION B JOB NO. 31-52 DEPARTMENT GO" REINF. CONC. PIPE CULVERT B. L. STA. 17+20	
ENGINEER <i>SCH. R.W.</i> DRAFTSMAN <i>R.W.</i> SCALE <i>1" = 10'</i> APPROVED <i>[Signature]</i> CHIEF ENGINEER	DATE <i>September 22, 1952</i> CHECKED BY <i>W. L. UY</i> TRACER <i>R.W.</i> APPROVED <i>[Signature]</i> BUREAU ENGINEER
W. S. GR. SEC. W. M. BY:	PROFILE F. B. F. W. BY:
G. B. S. B. S. BY:	

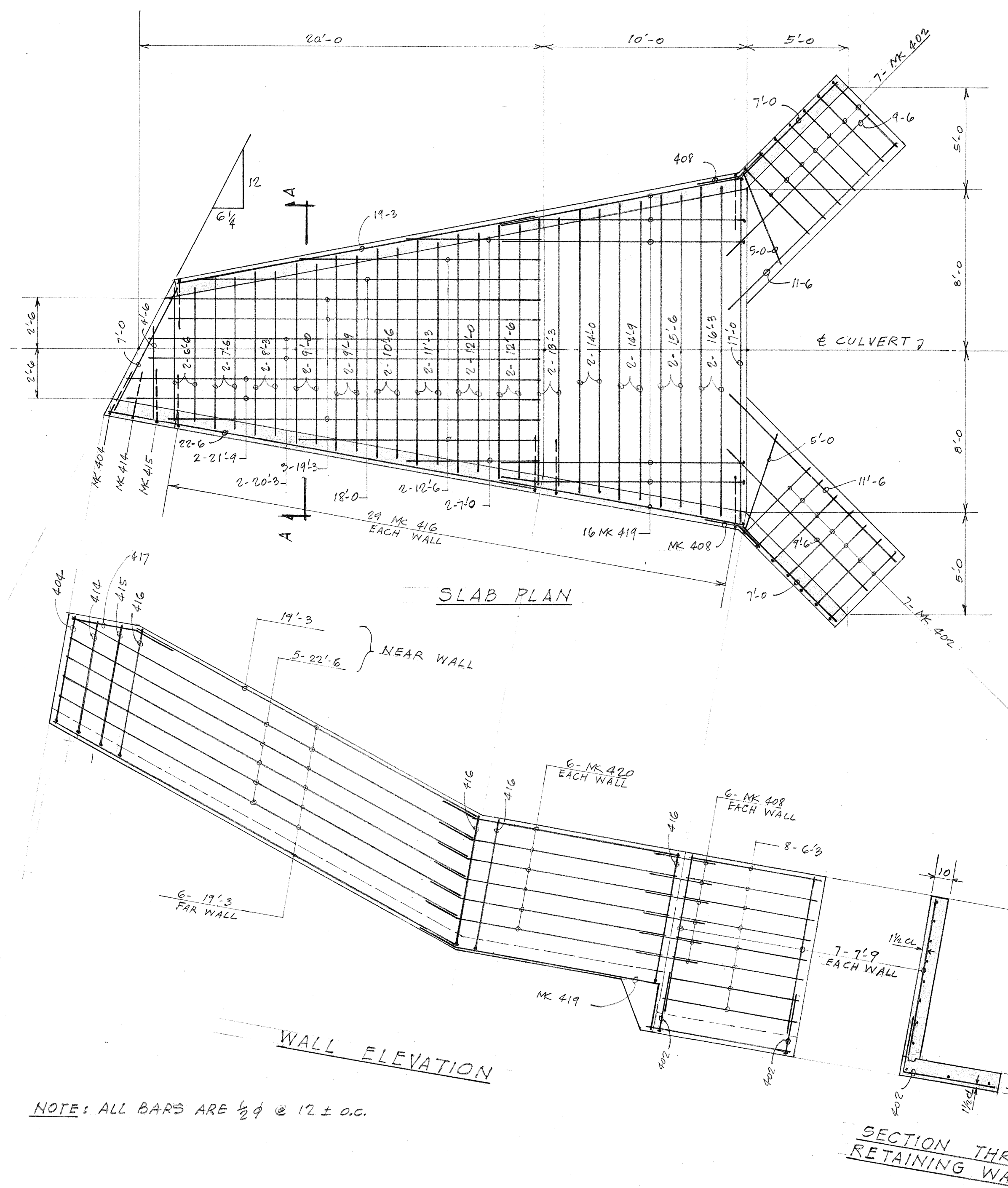
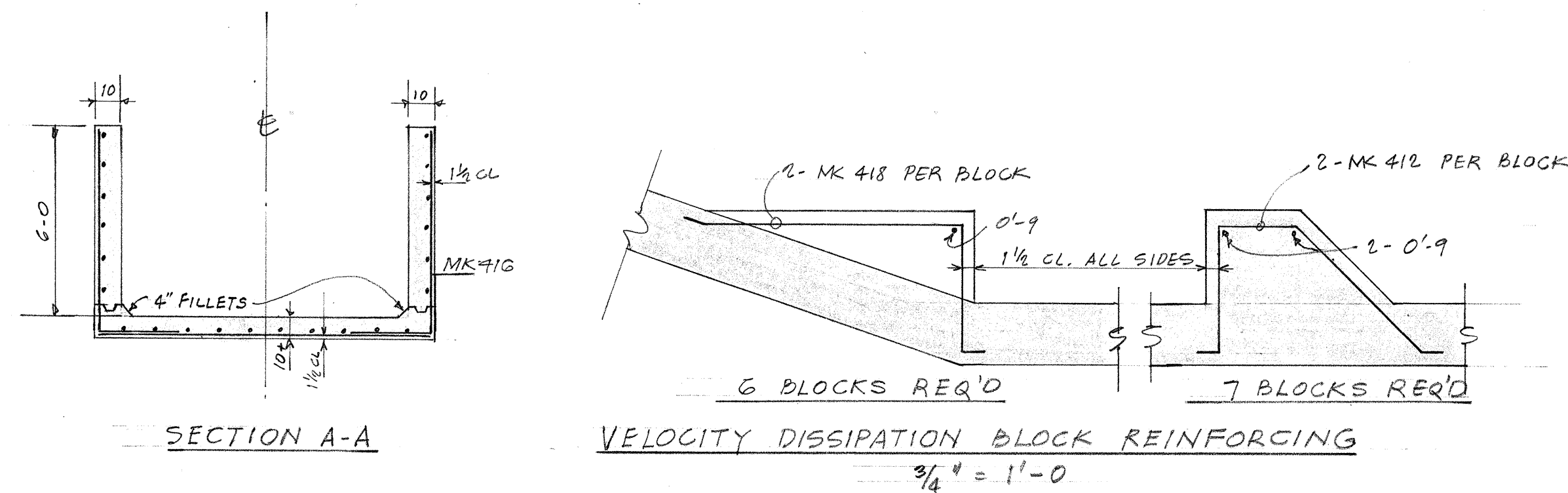
WORK THIS SHEET WITH SHEET No. 13

SHEET No. 12 OF 66 SHEETS

FILE	POCKET	FOLDER	No.
7	2	2	12



INLET BOX REINFORCING
1/4 = 1'-0



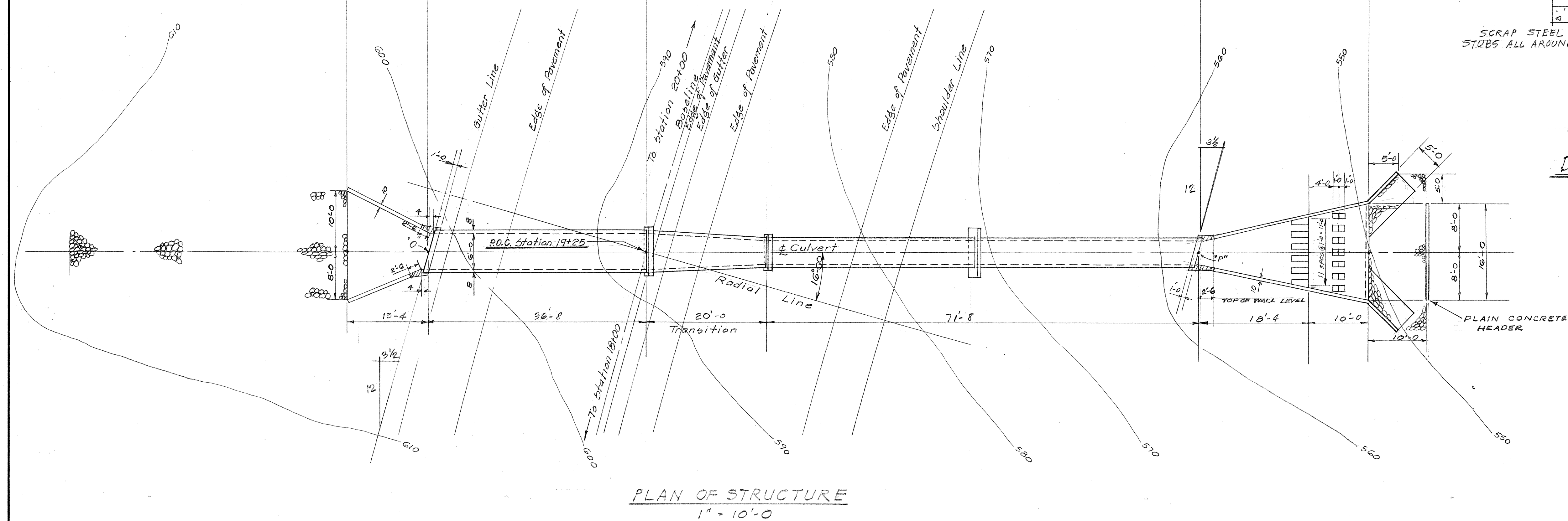
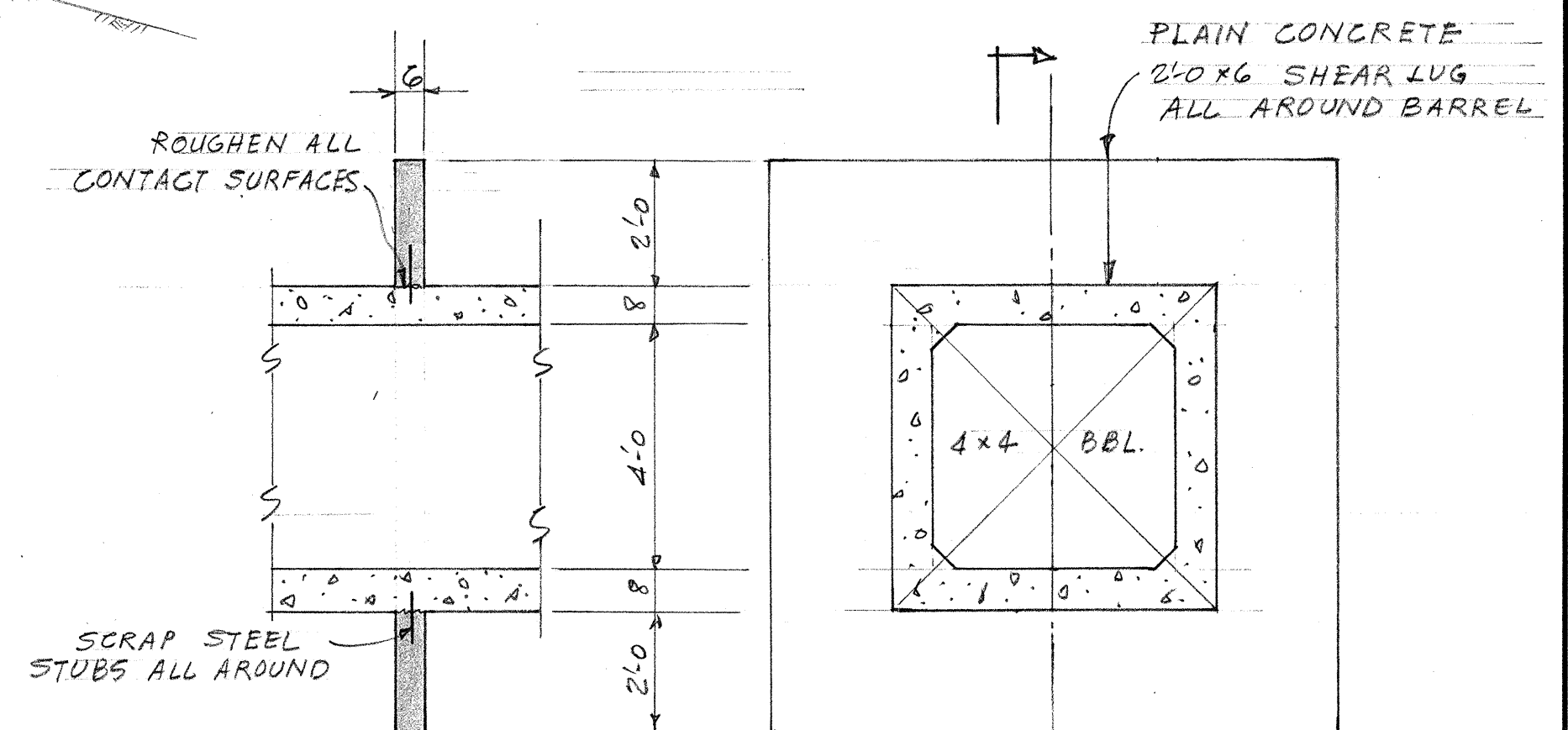
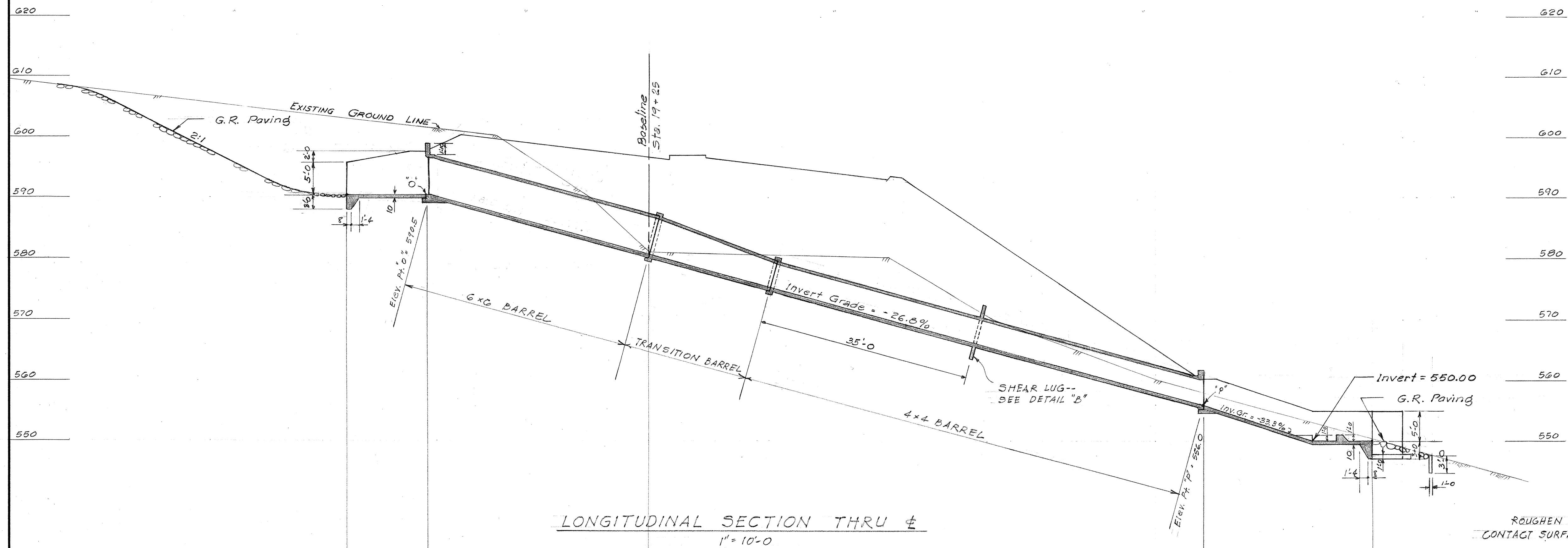
NOTE: ALL BARS ARE 1/2" @ 12 ± O.C.

OUTLET BOX REINFORCING
1/4 = 1'-0

WORK THIS SHEET WITH SHEET No. 12

LIST OF MATERIALS										
BENDING DIAGRAM ALL DIMENSIONS OUT TO OUT				MARK	NO. REQ'D	SIZE	LENGTH	REMARKS	LBS. STEEL	C.Y. CONC.
				401	45	1/2 φ	5'-0			
					2	1/2 φ	18'-0			
					2		16'-3			
					2		14'-3			
					3		12'-3			
					3		10'-3			
					1		9'-0			
					1		7'-6			
					1		5'-0			
					1		3'-6			
				402	45	1/2 φ	7'-2			
					2	1/2 φ	7'-0			
					2		5'-0			
					2		9'-6			
					2		11'-6			
					4		8'-6			
					12		3'-0			
					12		12'-3			
					1		5'-4			
					16		6'-3			
				403	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
					2		12'-0			
				405	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				406	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				407	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				408	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				409	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				410	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				411	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				412	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
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				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
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					2		10'-6			
					2		11'-3			
				414	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				415	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
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					2		9'-9			
					2		10'-6			
					2		11'-3			
				416	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				417	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				418	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				419	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				420	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				421	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				422	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				423	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				424	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				425	45	1/2 φ	13'-9			
				404	1	1/2 φ	7'-10			
				414	1		8'-2			
				415	1		8'-8			
				416	58		8'-10			
					2		8'-3			
					2		9'-0			
					2		9'-9			
					2		10'-6			
					2		11'-3			
				426	45	1/2 φ	13'-9			

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS

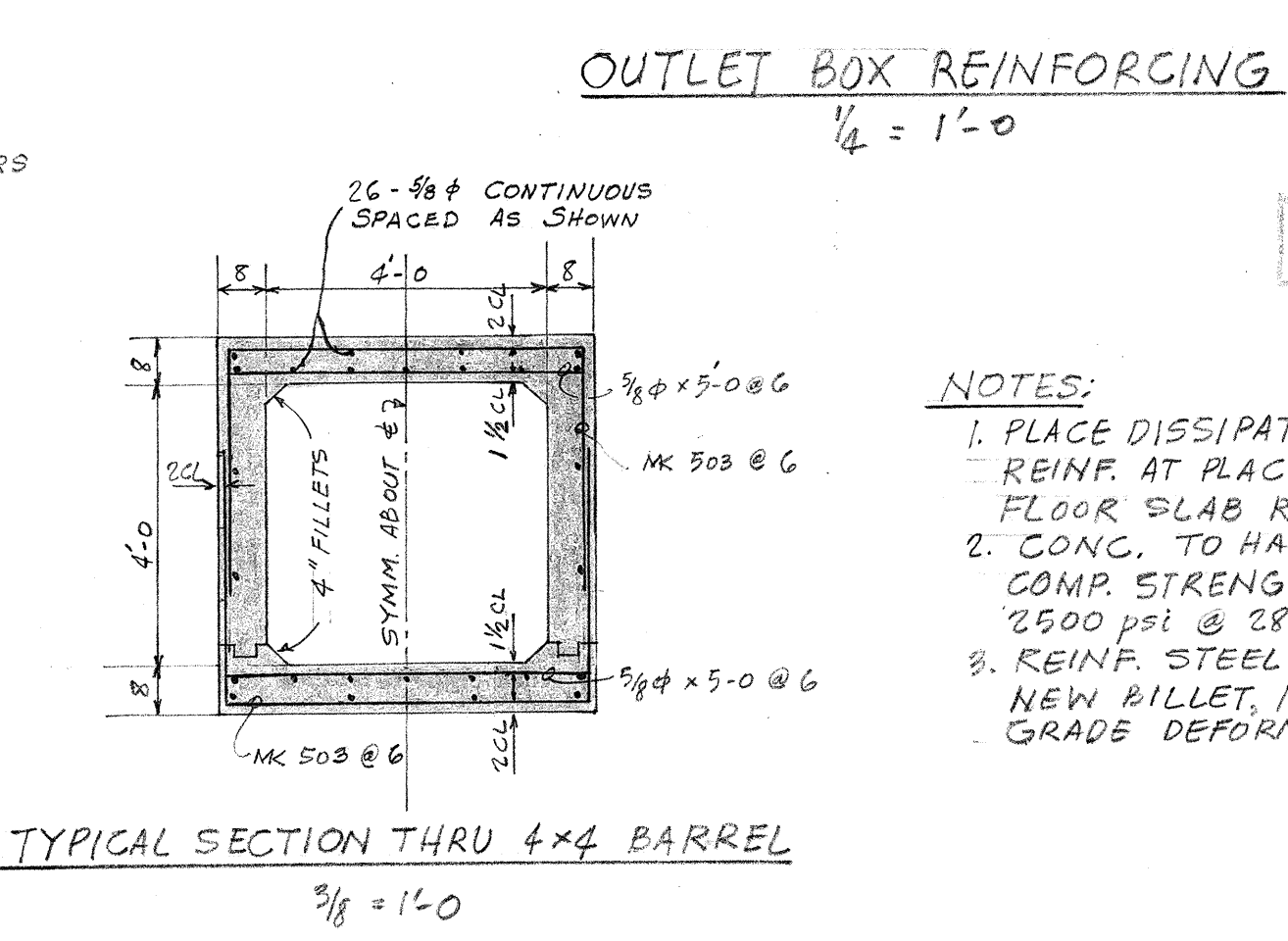
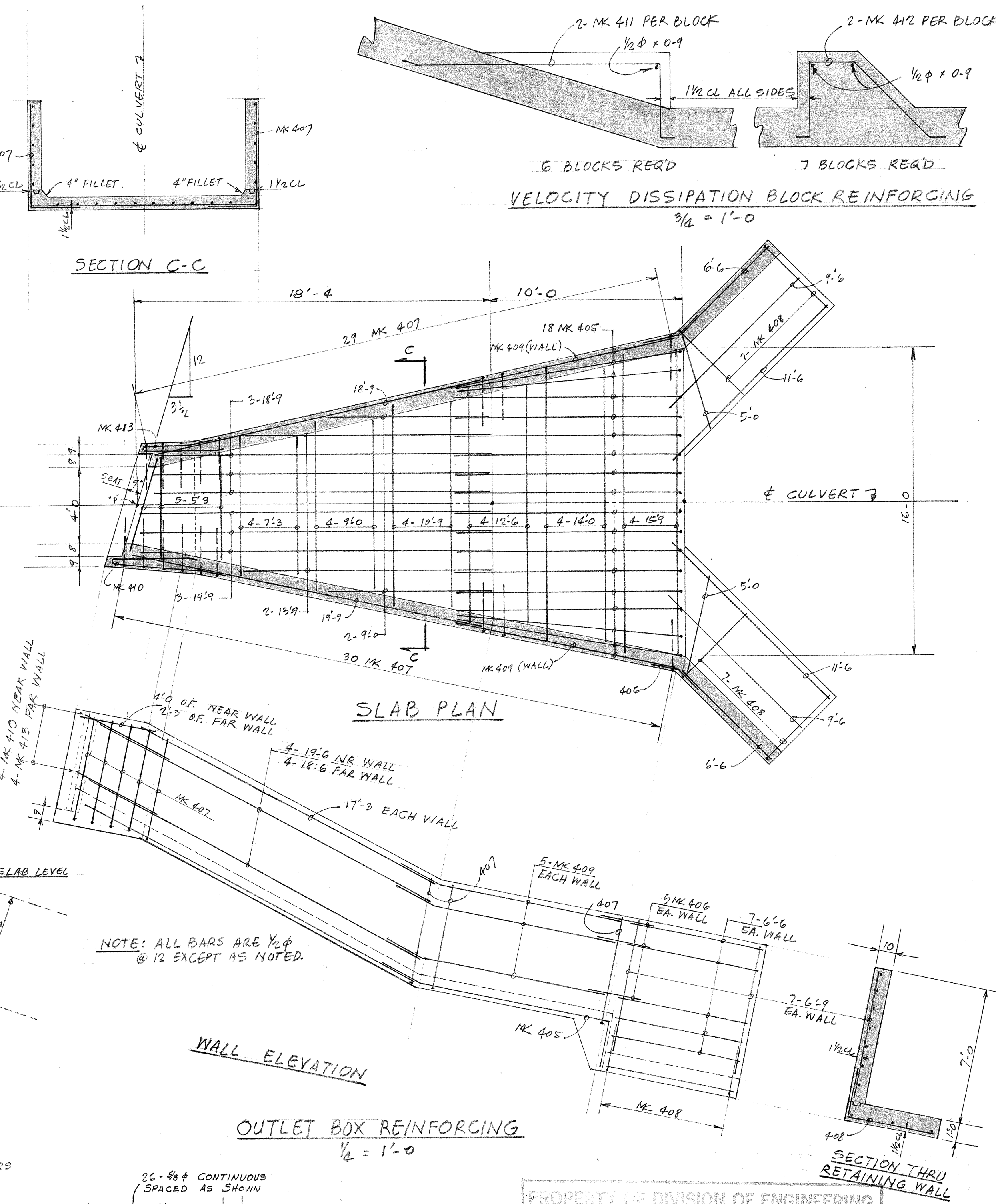
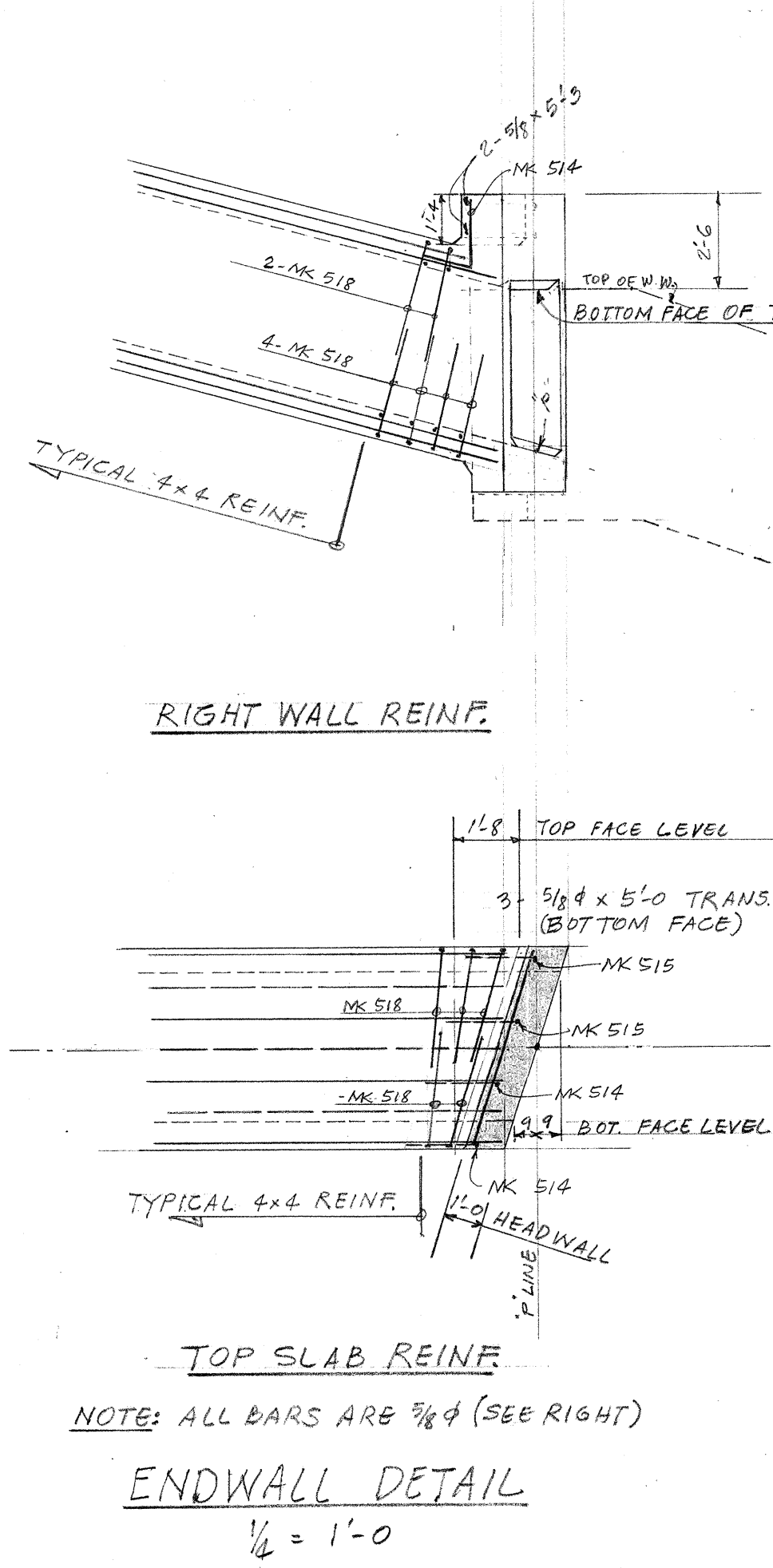
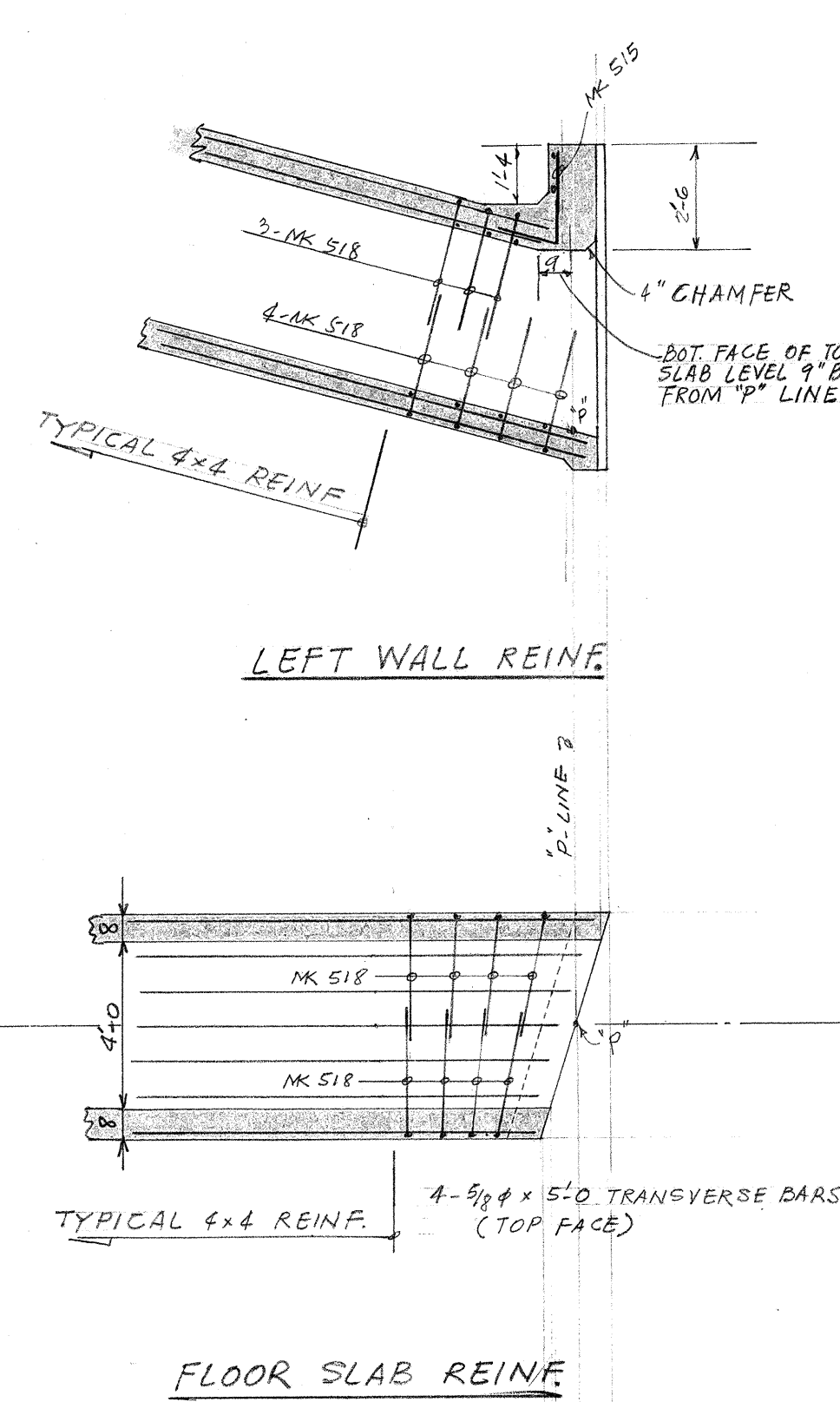
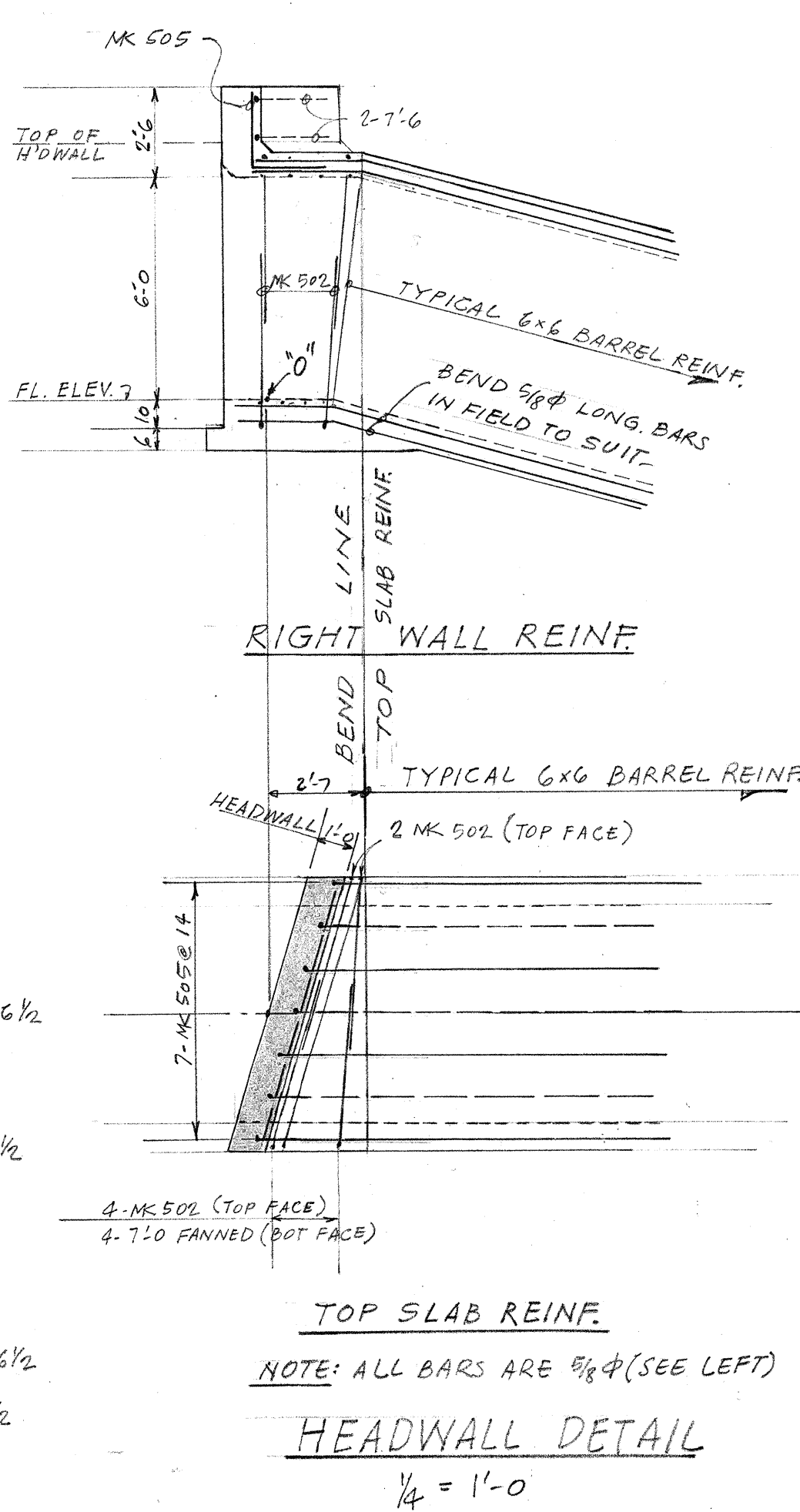
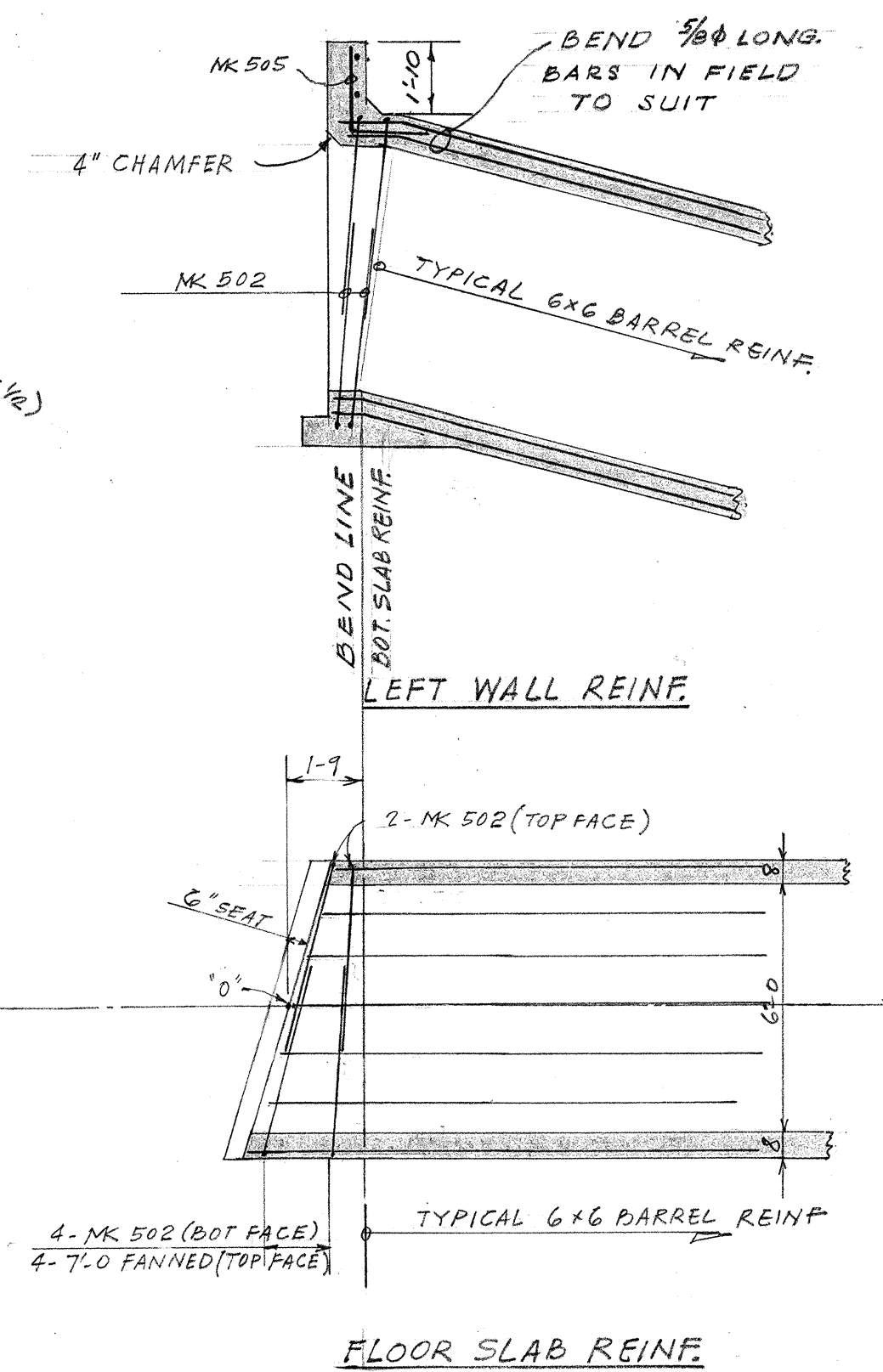
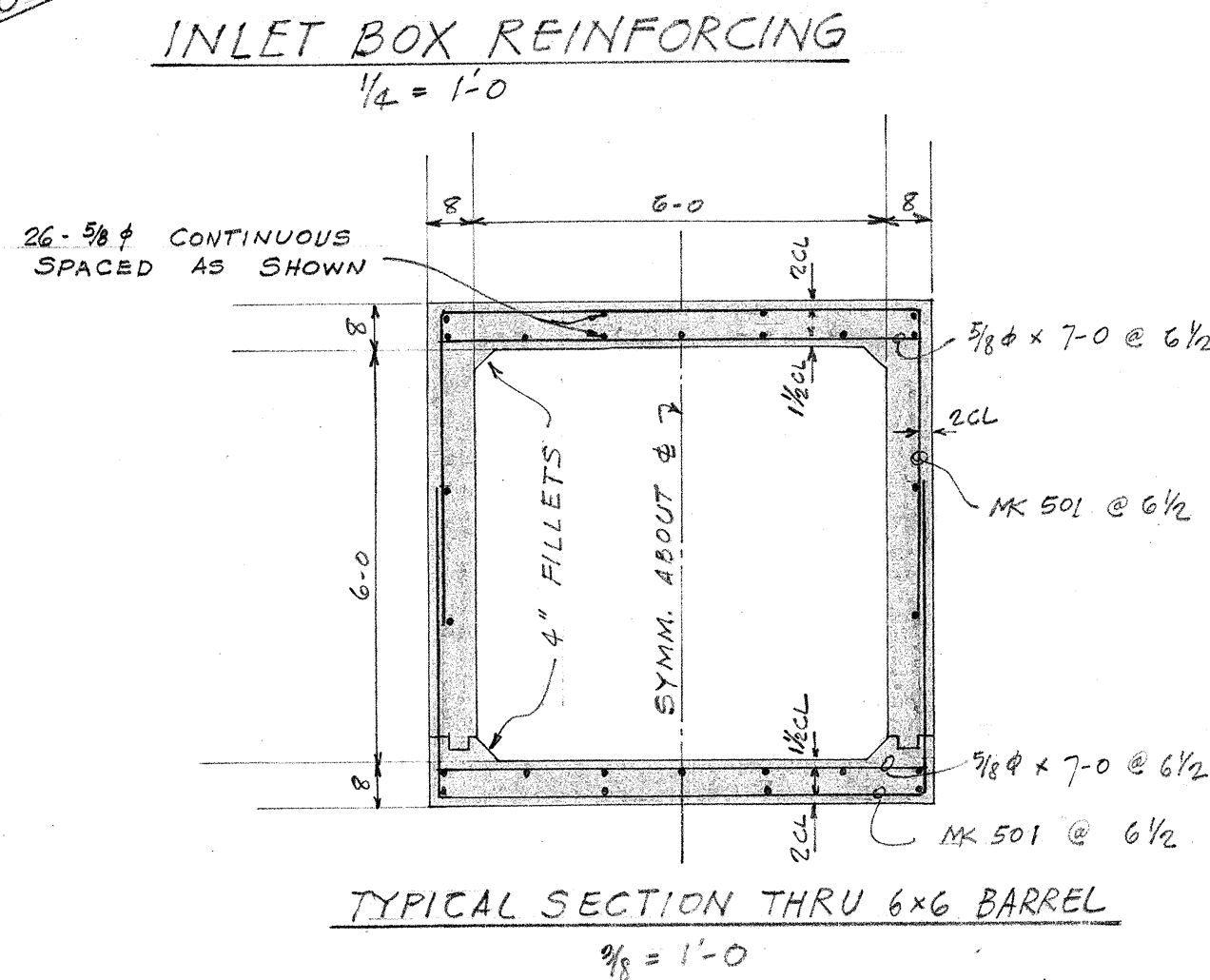
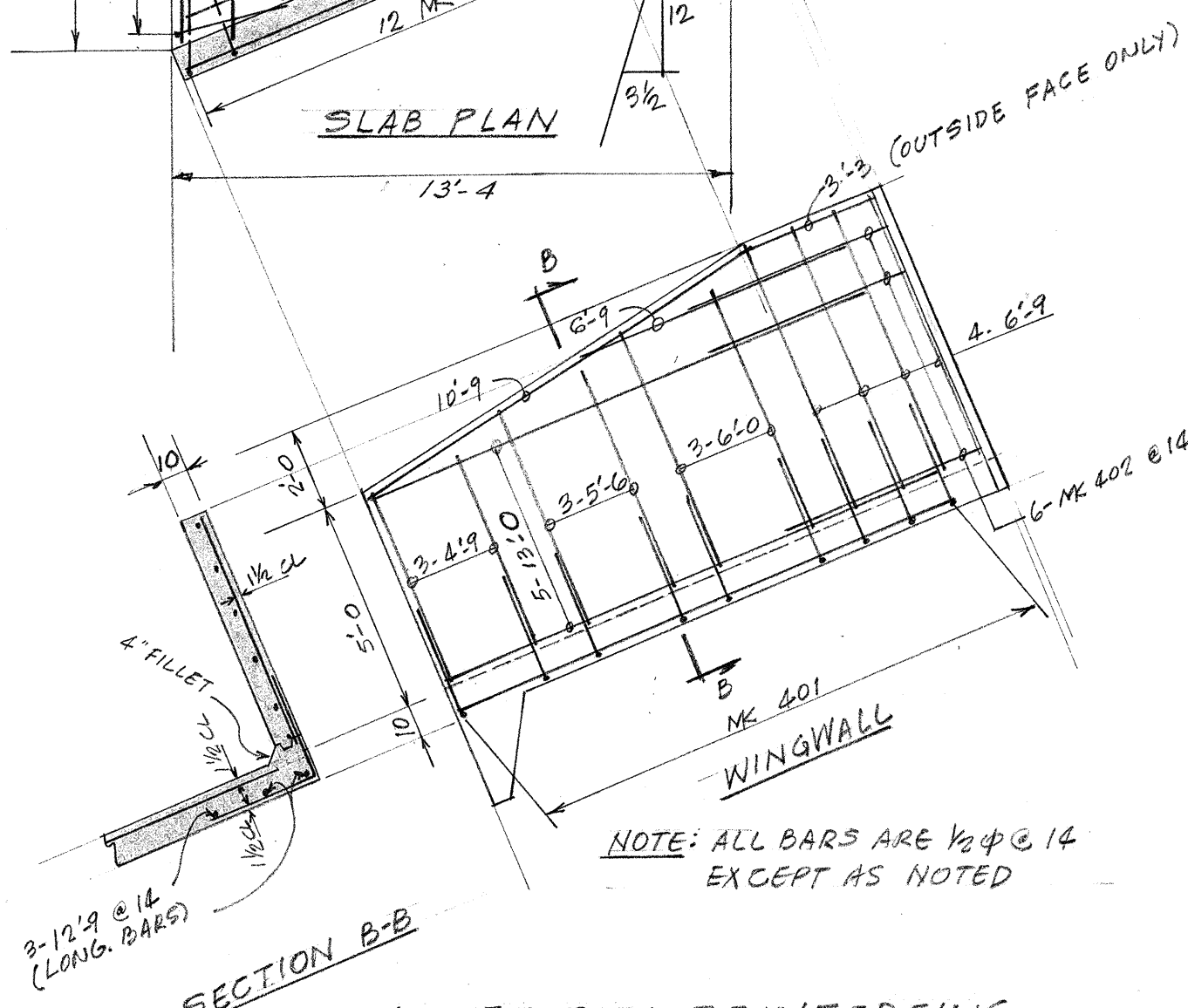
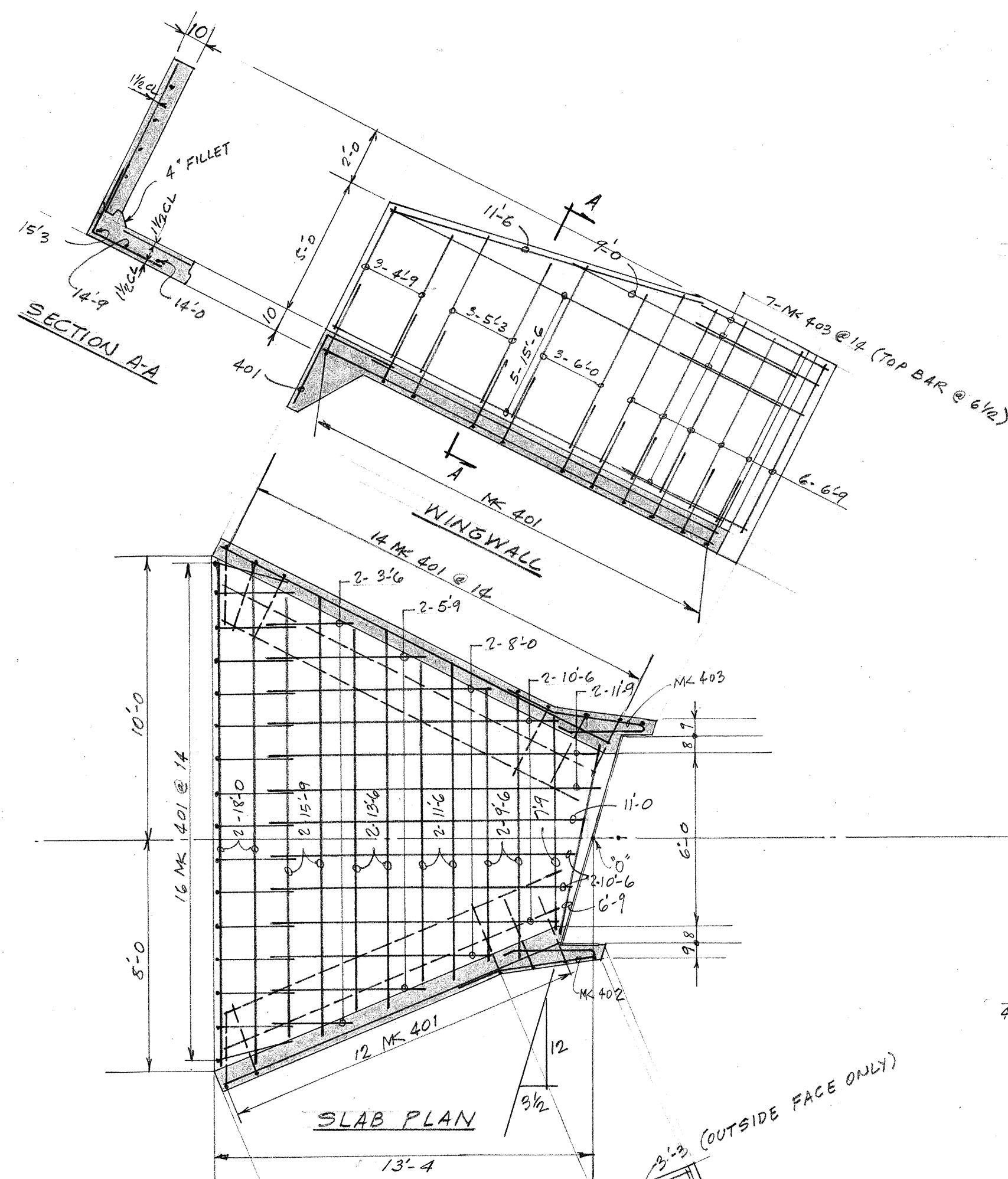


WORK THIS SHEET WITH SHEETS NO. 15 & 16

DIVISION OF ENGINEERING			
DEPARTMENT OF PUBLIC WORKS CITY AND COUNTY OF HONOLULU			
BUREAU OF PLANS			
KALIHI TUNNEL			
KANEHOE APPROACH ROAD SECTION B			
TERRITORIAL JOB NO. 31-52			
6x6 TO 4x4 REIN. CONC. BOX CULVERT			
B. L. STA. 19+25			
ENGINEER - J. S. S. Y.	DATE - September 22, 1932		
DRAFTSMAN - J. S. S. Y.	CHECKED BY - W. L. V. M.		
SCALE - 1" = 10'	TRACER - J. S. S. Y.		
APPROVED - [Signature]	APPROVED - [Signature]		
CHIEF ENGINEER	BUREAU ENGINEER		
W. S. [Signature]	PROFILE	G. B. [Signature]	
W. M. BY.	F. W. BY.	S. B. [Signature]	

SHEET NO. 14 OF 66 SHEETS

FILE	POCKET	FOLDER	No.
7	2	2	14



- NOTES:
1. PLACE DISSIPATION BLK. REIN. AT PLACING OF FLOOR SLAB REIN.
 2. CONC. TO HAVE ULT. COMP. STRENGTH OF 2500 PSI @ 28 DAYS
 3. REIN. STEEL TO BE NEW RILEY, INTER. GRADE DEFORMED BARS.

PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEHOE APPROACH ROAD SECTION B
JOB NO. 31-52
6'x6' TO 4'x4' REIN. CONC. BOX CULVERT
B. L. STA. 19+25

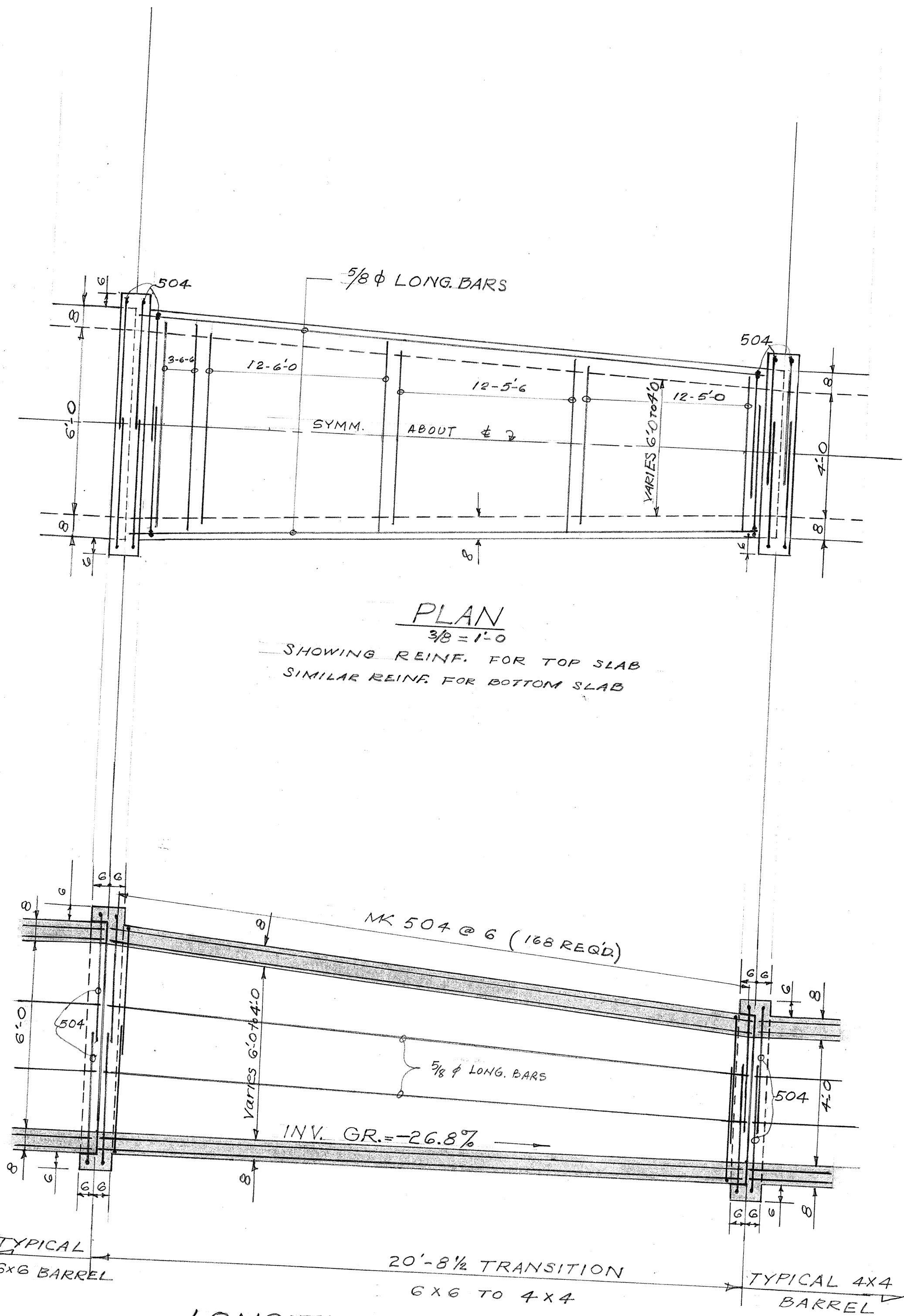
ENGINEER: S.O.H. & R.W. DATE: September 22, 1952
DRAFTSMAN: R.W. CHECKED BY: W.L.
SCALE: As Shown TRACER: R.W.
APPROVED: [Signature] APPROVED: [Signature]
CHIEF ENGINEER BUREAU ENGINEER

W.S.	PROFILE	C.B.
CR. SEC.	F.W. BY:	S.B.
W.M. BY:		S. BY:

WORK THIS SHEET WITH SHEETS NO. 14 & 16

FILE	POCKET	FOLDER	NO.
7	2	2	15

LIST OF MATERIALS



BENDING DIAGRAMS	MARK	NO	SIZE	LENGTH	REMARKS	STEEL	CONC.
ALL DIMENSIONS OUT TO OUT	401	42	1/2"	5'-4		149.6	
		2	"	18'-0		24.0	
		2	"	15'-9		21.0	
		2	"	13'-6		18.0	
		2	"	11'-6		15.4	
		2	"	9'-6		12.7	
		1	"	7'-9		5.8	
		1	"	6'-9		4.5	
		2	"	3'-6		4.7	
		2	"	5'-9		7.7	
		2	"	8'-0		10.7	
		2	"	10'-6		14.0	
		2	"	11'-9		15.7	
		1	"	11'-0		7.4	
		2	"	10'-6		14.0	
		1	"	15'-3		10.8	
		1	"	14'-9		9.9	
		1	"	14'-0		9.4	
		3	"	12'-9		25.6	
		3	"	5'-6		11.0	
		3	"	5'-3		10.6	
		6	"	6'-0		24.0	
		11	"	6'-9		49.6	
		1	"	11'-6		7.7	
		1	"	9'-0		6.0	
		402	6	"	8'-1	32.4	
		403	7	"	8'-1	37.8	
		6	"	4'-9		19.0	
		1	"	10'-9		7.2	
		5	"	15'-0		51.8	
		1	"	3'-3		2.2	
		5	"	13'-0		43.4	
		502	12	5/8"	9'-2	114.8	
		505	7	"	3'-0	21.9	
		8	"	7'-0		58.4	
		2	"	7'-6		15.6	
		504	172	5/8"	8'-0	1435.2	
				"	6'-6	40.7	
				"	6'-0	150.2	
				"	5'-6	137.7	
				"	5'-0	125.2	
				"	20'-6	555.9	

BENDING DIAGRAMS	MARK	NO	SIZE	LENGTH	REMARKS	STEEL	CONC.
	405	18	1/2"	14'-6		174.3	
	408	14	"	7'-1		66.3	
		5	"	5'-3		17.6	
		4	"	7'-3		19.4	
		6	"	9'-0		36.1	
		4	"	10'-9		28.7	
		4	"	12'-6		33.4	
		4	"	14'-0		37.4	
		4	"	15'-9		42.1	
		4	"	18'-9		50.1	
		4	"	19'-9		52.8	
		2	"	13'-9		18.4	
		2	"	6'-6		8.7	
		2	"	9'-6		12.7	
		2	"	11'-6		15.4	
		2	"	5'-0		6.7	
	407	59	"	7'-10		308.7	
	406	10	1/2"	3'-0		20.0	
	410	4	"	10'-9		28.7	
	413	4	"	8'-3		22.0	
		4	"	19'-6		52.0	
		4	"	18'-6		49.5	
		14	"	6'-9		63.1	
		14	"	6'-6		60.8	
	409	10	"	11'-9		78.5	
		1	"	4'-0		2.7	
		1	"	2'-3		1.5	
		2	"	17'-3		23.0	
	514	2	5/8"	3'-6		7.3	
	515	2	"	3'-9		7.8	
		7	"	5'-0		30.5	
	518	13	"	6'-0		81.5	
		2	"	5'-3		11.0	
	501	142	5/8"	16'-2		2394.4	
		52	"	25'-0		1247.4	
		142	5/8"	7'-0		929.7	
	503	296	5/8"	11'-8		3601.8	
		282	"	5'-0		1470.6	
		78	"	20'-0		2115.2	
	411	12	1/2"	6'-2		49.4	
	412	14	"	4'-5		41.3	
		20	"	0'-9		10.0	

TOTAL STEEL REQ'D. = 16,743 #
TOTAL CONC. REQ'D. = 112 c.y.
TOTAL STRUCT. EXC. REQ'D. = 430 c.y.
TOTAL UNCL. EXC. REQ'D. = 246 c.y.
TOTAL G.R. PAVING REQ'D. = 124 sy.

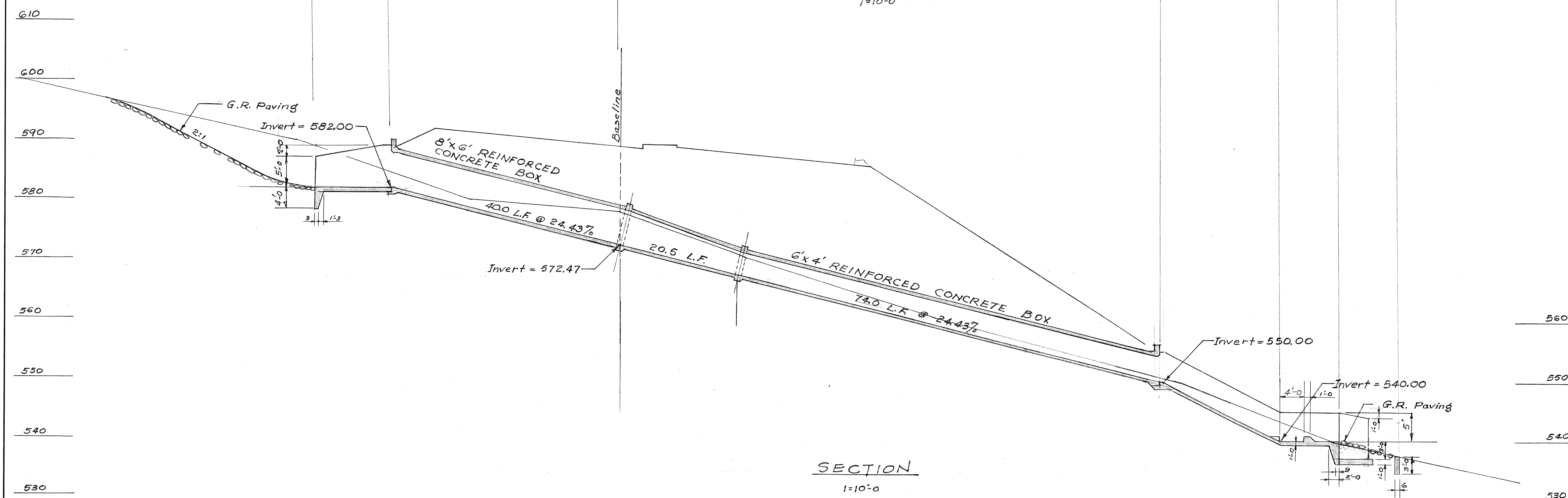
PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHU TUNNEL
KANEHOE APPROACH ROAD SECTION B
JOB No. 31-52
6'x6' TO 4'x4' REINF. CONC. BOX CULVERT
B.L. STA. 17+25
ENGINEER S.O.H. F.W. DATE September 22, 1958
DRAFTSMAN G.H. CHECKED BY W.L.M.
SCALE TRACER G.H.
APPROVED [Signature] BUREAU ENGINEER
W.S. PROFILE G.B.
CR. SEC. F.B. S.B.
W.M.BY F.W.BY S.BY

WORK THIS SHEET WITH SHEETS No. 14 & 15

FILE	POCKET	FOLDER	No.
7	2	2	16

Sheet No. 16 of 66 Sheets



DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEHOE APPROACH ROAD SECTION 8
JOB No. 31-52
8'x6'to 6'x4' REINF. CONC. BOX CULVERT
B. L. STA. 20+50

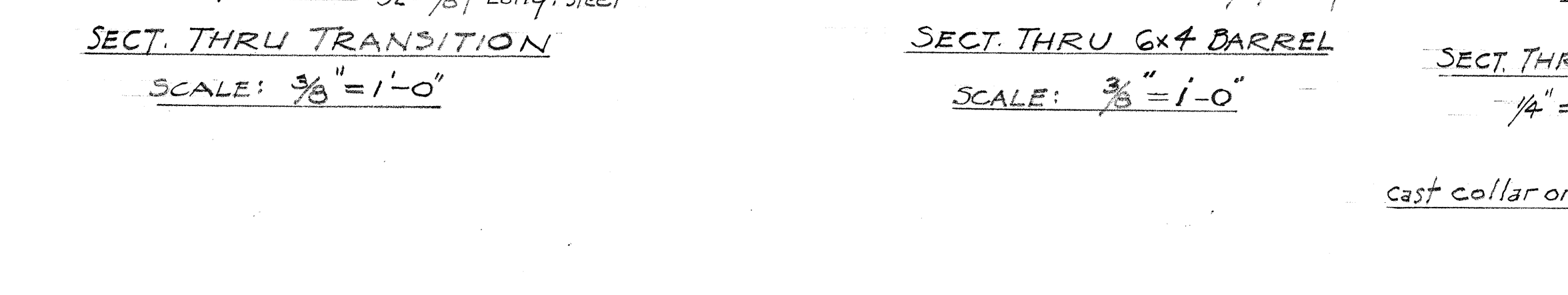
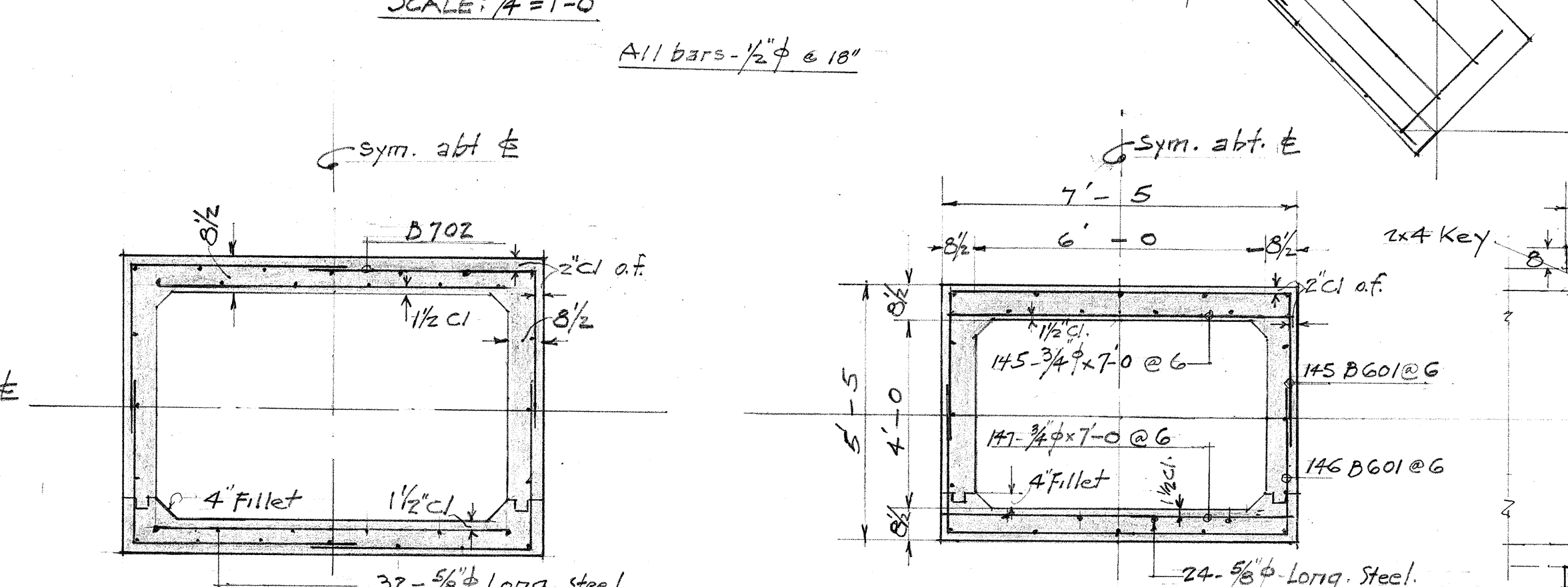
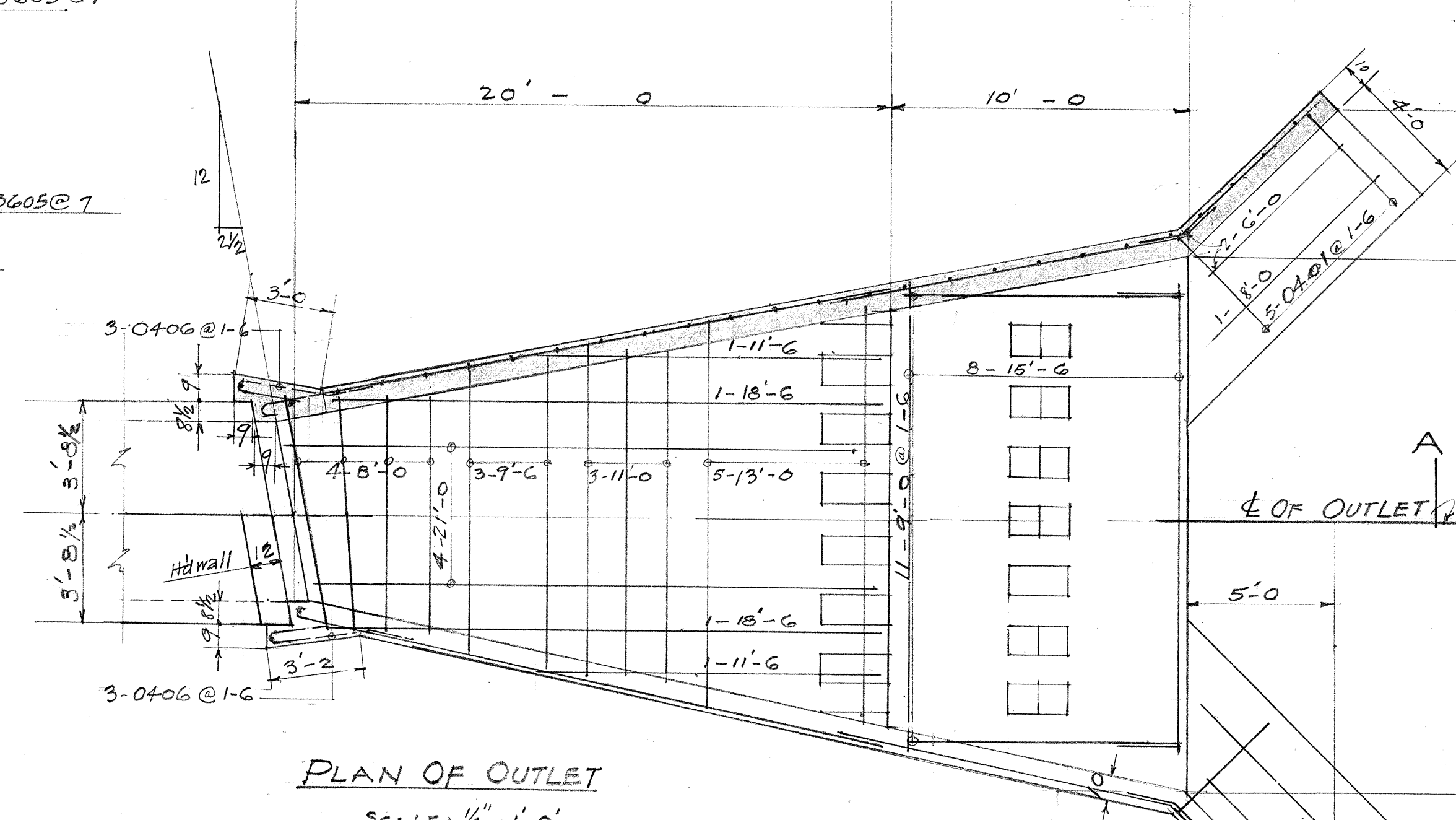
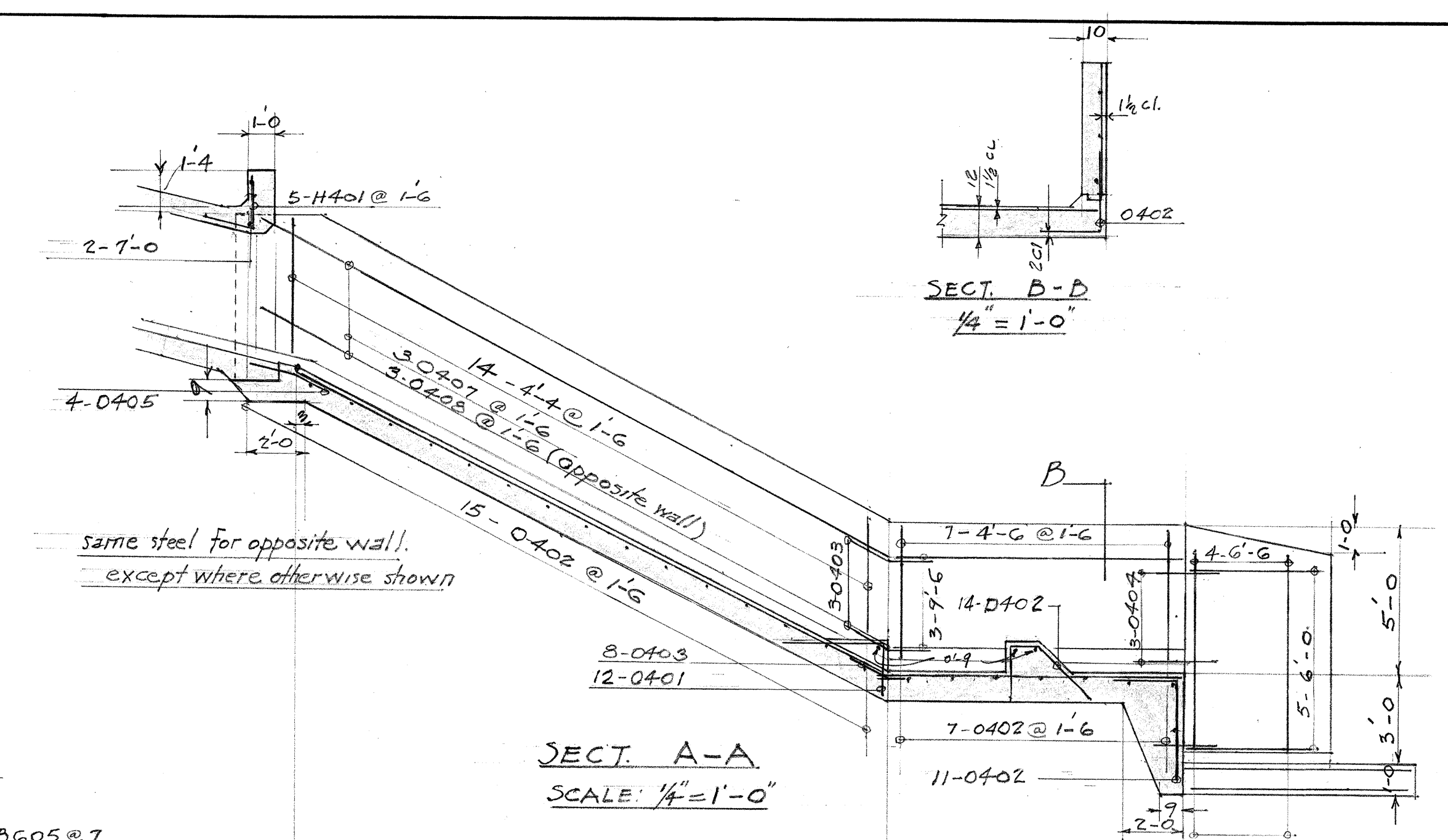
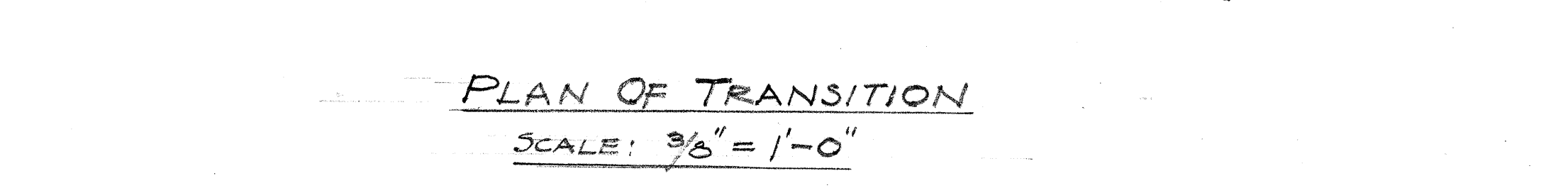
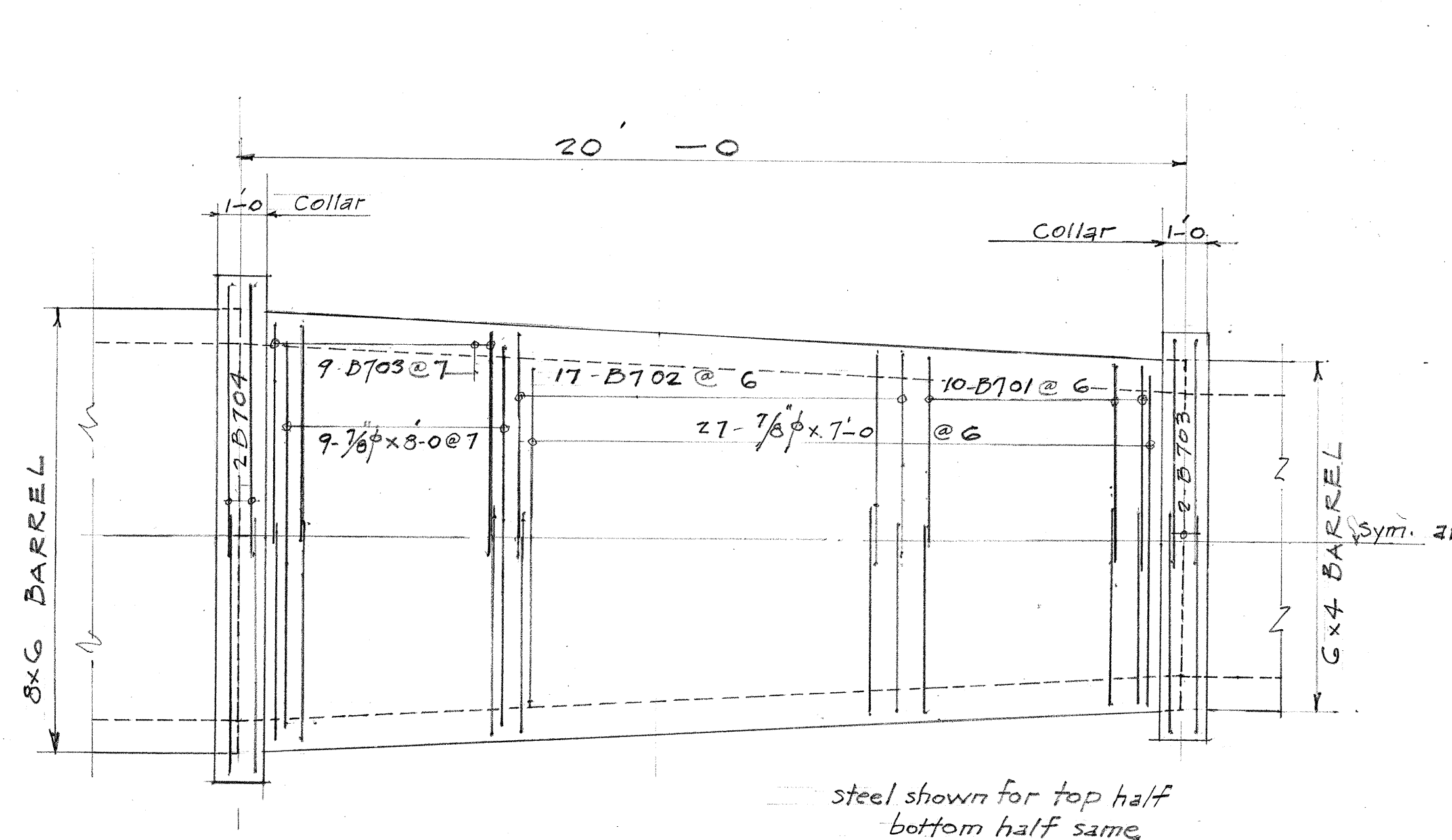
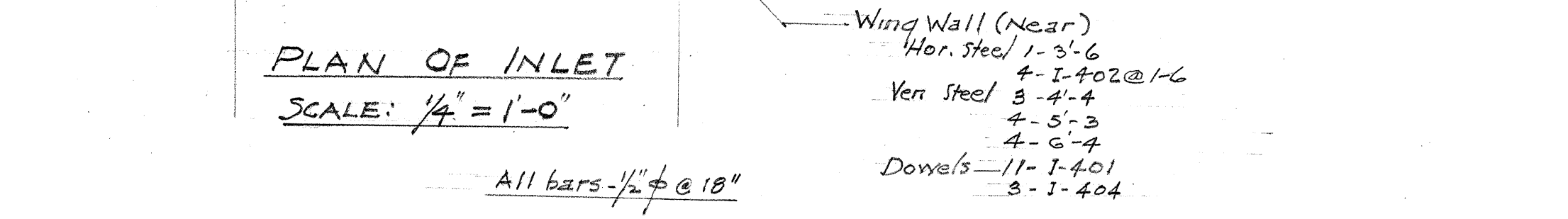
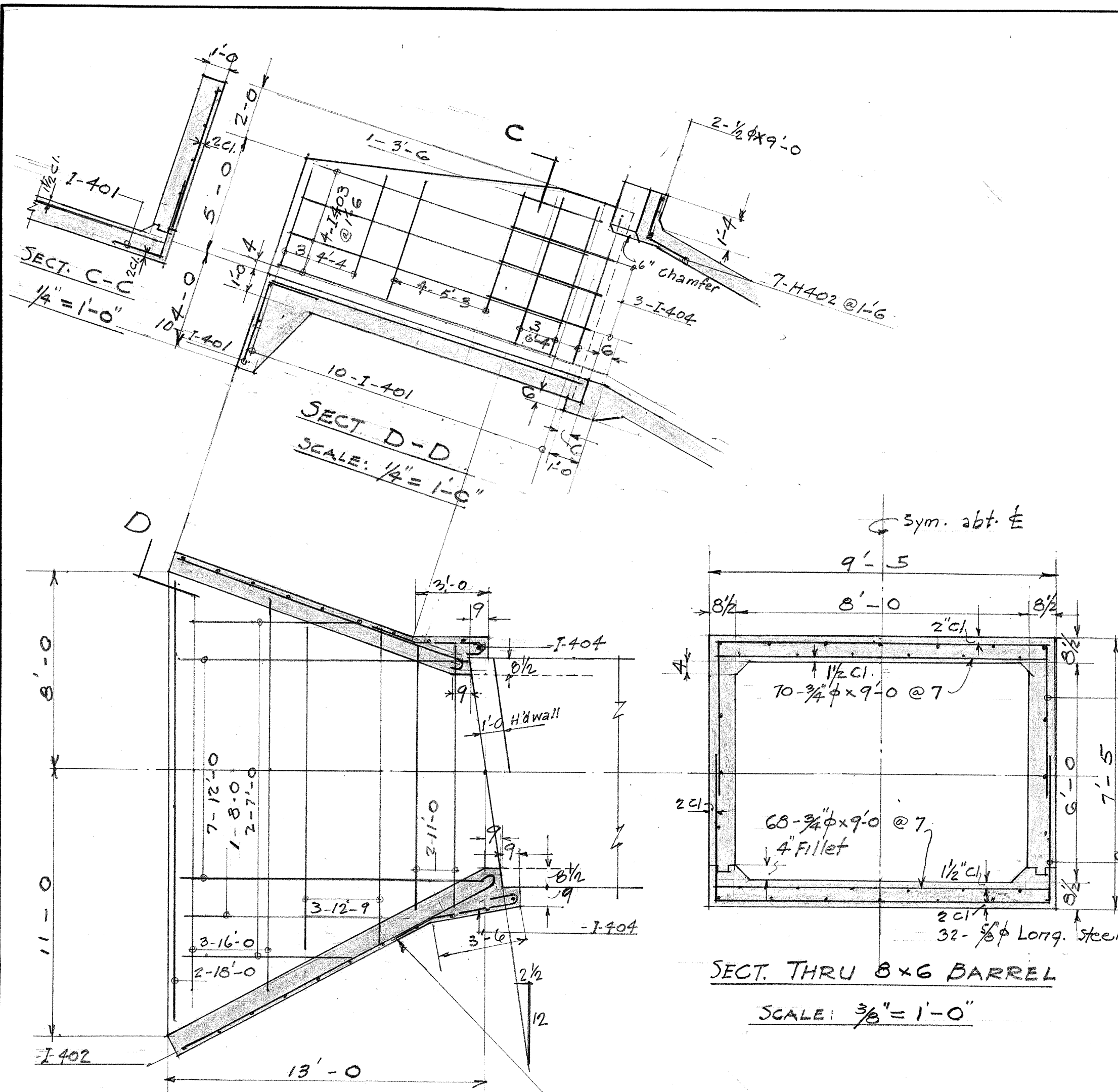
ENGINEER S.O.H. & J.S.S.Y. DATE September 28, 1954
DRAFTSMAN S.Y. CHECKED BY W. Lum
SCALE 1" = 10' TRACER S.Y.
APPROVED: [Signature] APPROVED: [Signature]
CHIEF ENGINEER [Signature] BUREAU ENGINEER

W.S.	PROFILE	C.B.
CR. SEC.	F.B.	S.B.
W.M. BY	F.W. BY	S.B. BY

WORK THIS SHEET WITH SHEET No. 18

FILE	POCKET	FOLDER	No.
7	2	2	17

Sheet No. 17 of 66 Sheets



STEEL SCHEDULE									
STRAIGHT BARS				BENT BARS				BENDING DIAGRAM	
No.	SIZE	LGTH	WT.	MARK	No.	SIZE	LGTH	WT.	
1	1/2 φ	6-0	10.0	0-401	10	1/2 φ	7-0	46.8	
2	1/2 φ	8-0	10.7	-402	55	5-8	808.3		
11	9-0	60.1	-403	14	3-0	28.1			
2	11-6	15.4	-404	6	3-0	12.0			
2	18-6	24.7	-405	4	3-0	8.0			
4	21-0	50.1	-406	6	6-6	26.1			
8	15-6	82.8	-407	3	24-6	49.1			
5	13-0	43.4	-408	3	23-0	40.1			
3	11-0	22.0							
3	9-6	19.0	H-401	5	3-0	10.0			
4	8-0	21.4							
10	6-0	40.1	B-601	291	3/4 φ	13-0	508.1		
6	9-6	38.1							
8	6-6	34.7	B-701	40	1/2 φ	7-6	61.32		
14	4-6	42.1	-702	68	8-0	1111.9			
28	4-4	81.0	-703	44	8-6	94.84			
2	7-0	9.4	-704	8	10-0	163.5			
292	3/4 φ	7-0	3070.1						
24	5/8 φ	72-6	1814.8	B-605	139	3/4 φ	17-0	354.92	
18	1/2 φ	8-0	294.3	I-401	31	1/2 φ	5-8	117.4	
32	5/8 φ	20-0	667.5	-402	4	15-0	40.1		
138	1/2 φ	9-0	1685.5	-403	4	12-6	33.4		
32	5/8 φ	39-6	1318.4	-404	6	6-6	26.1		
2	1/2 φ	9-0	12.0	H-402	7	3-6	10.4		
7	12-0	50.1							
1	8-0	5.3	D-401	12	1/2 φ	4-5	34.7		
2	7-0	9.4	D-402	14	"	4-9	44.4		
2	18-0	24.0							
3	16-0	32.1							
3	12-9	25.0							
2	11-0	14.7							
2	3-6	4.7							
6	4-4	17.4							
8	5-3	28.1							
7	6-4	29.0							
20	0-9	10.0							
				TOTAL	23,331				

TOTAL STEEL REQD. = 23,331#
 " CONC. " = 155 cy.
 " STRUCT. EXC. REQD = 311 cy.
 " UNCL. " = 114 cy.
 " G.R. PAVING REQD = 114 sq.

PROPERTY OF DIVISION OF ENGINEERING

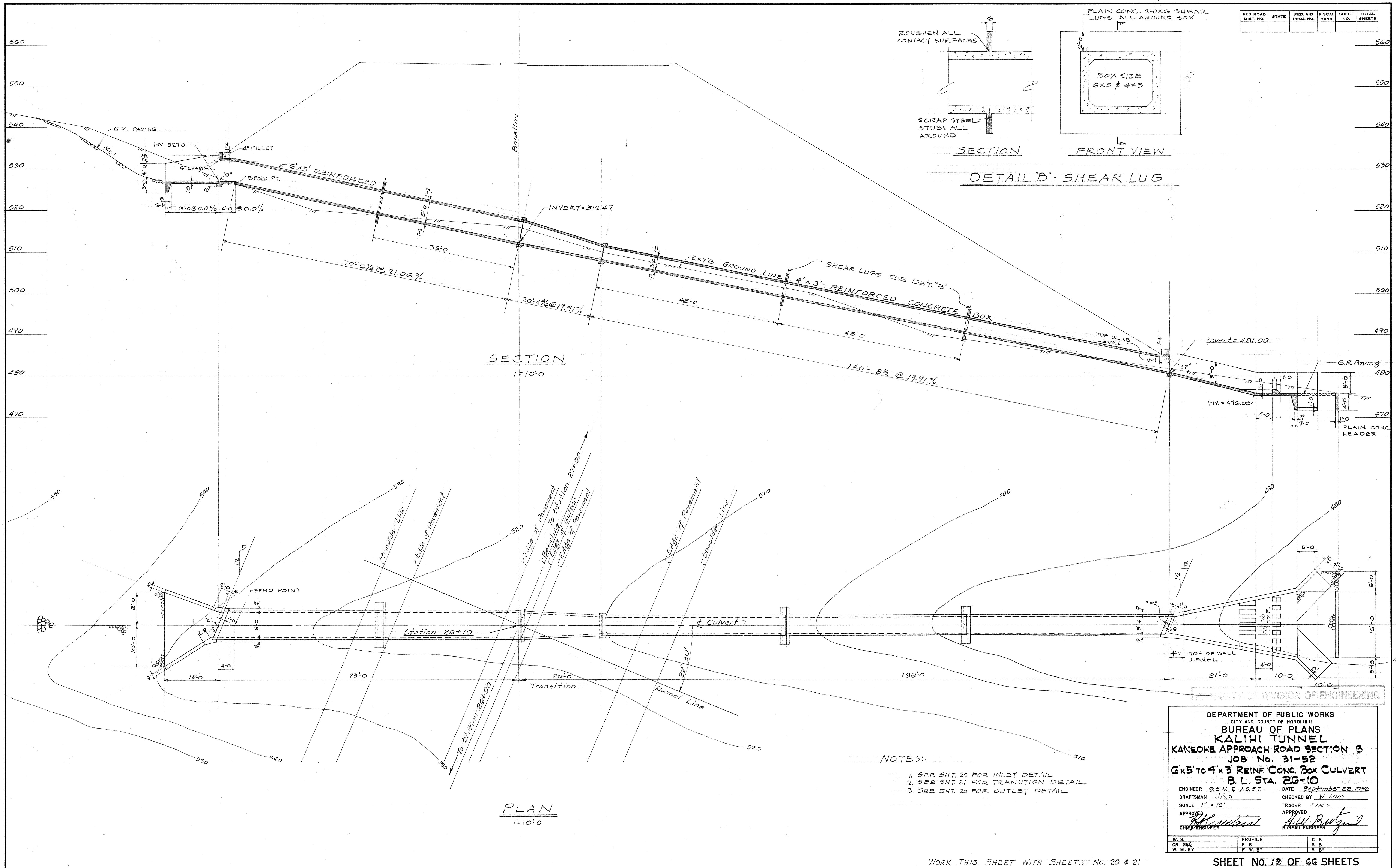
DEPARTMENT OF PUBLIC WORKS
 CITY AND COUNTY OF HONOLULU

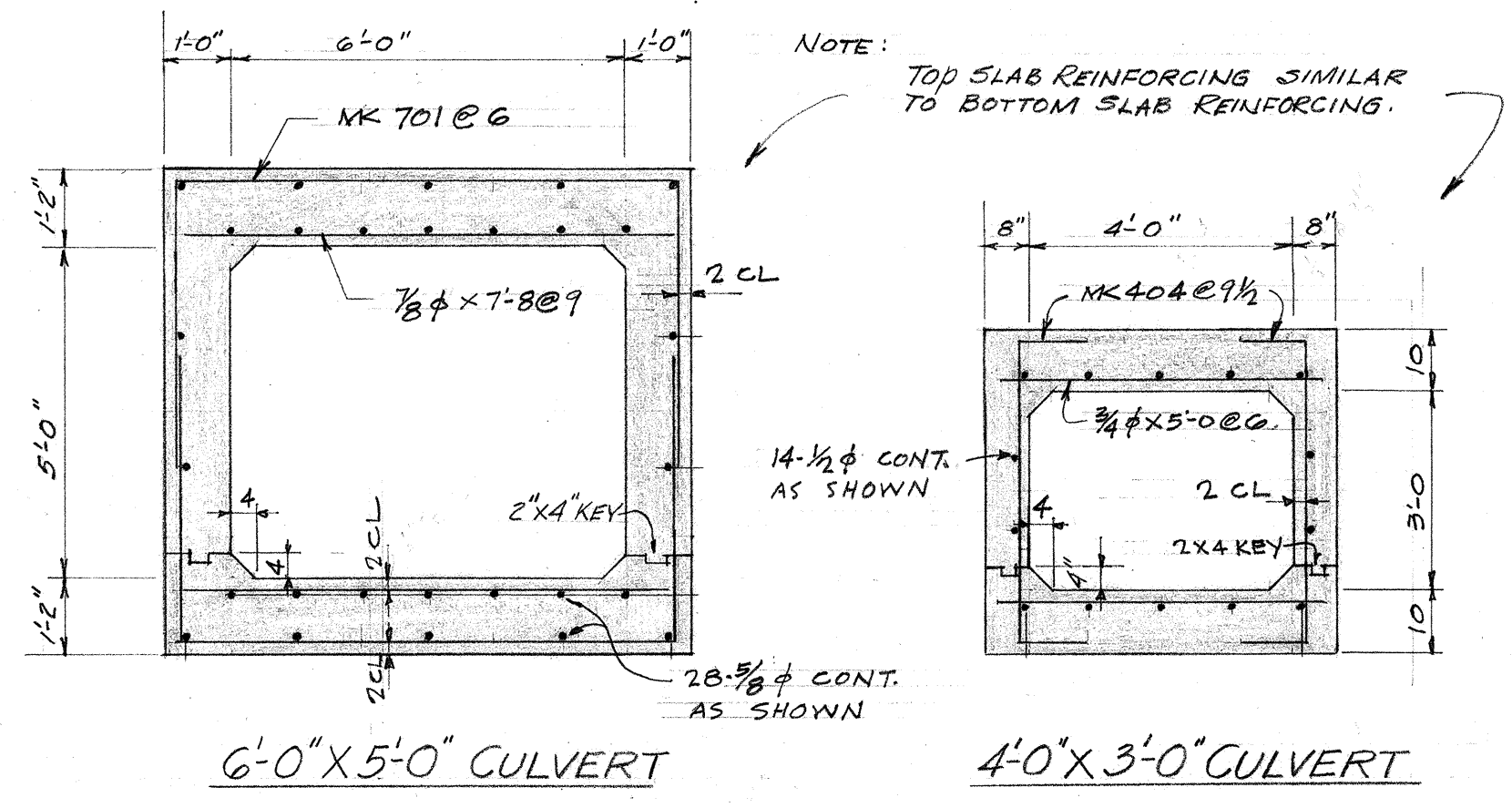
BUREAU OF PLANS
KALIHI TUNNEL
 KANEHOE APPROACH ROAD SECTION B
 JOB No. 31-52
 8'x6' to 6'x4' REINF. CONC. BOX CULVERT
 STA. 20+50

ENGINEER S.O. LUM, P.E.
 DRAFTSMAN T.B.H.
 SCALE As Shown
 APPROVED [Signature]
 CIVIL ENGINEER

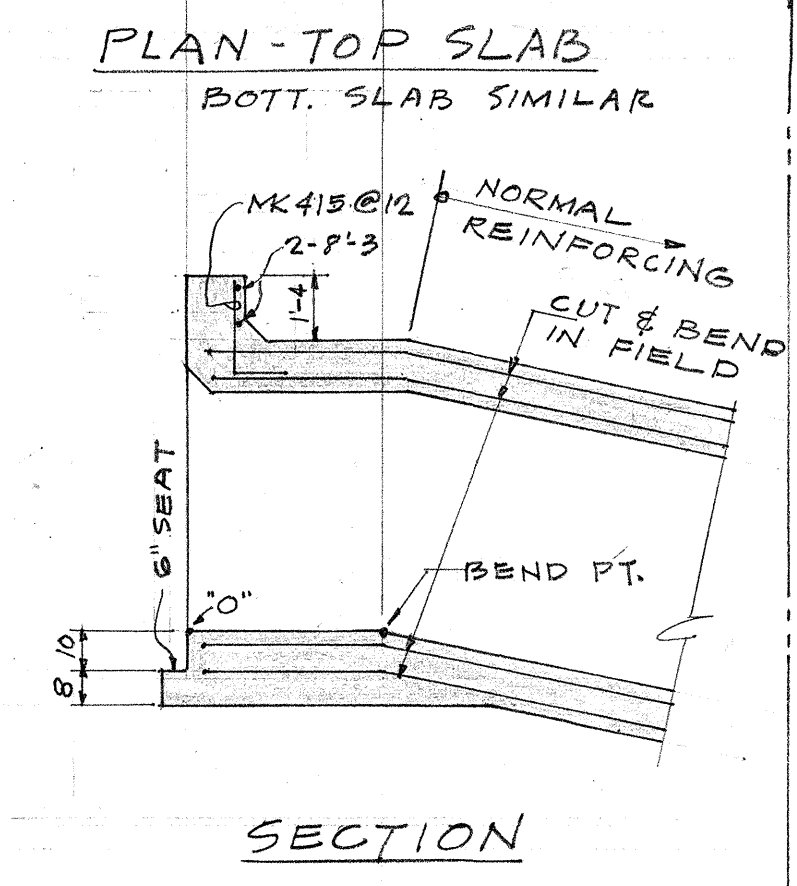
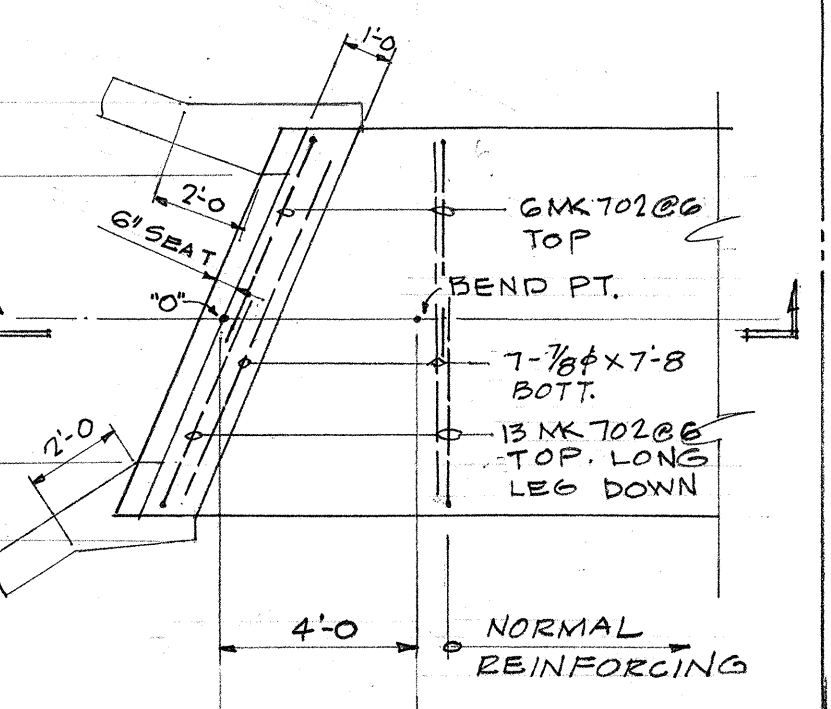
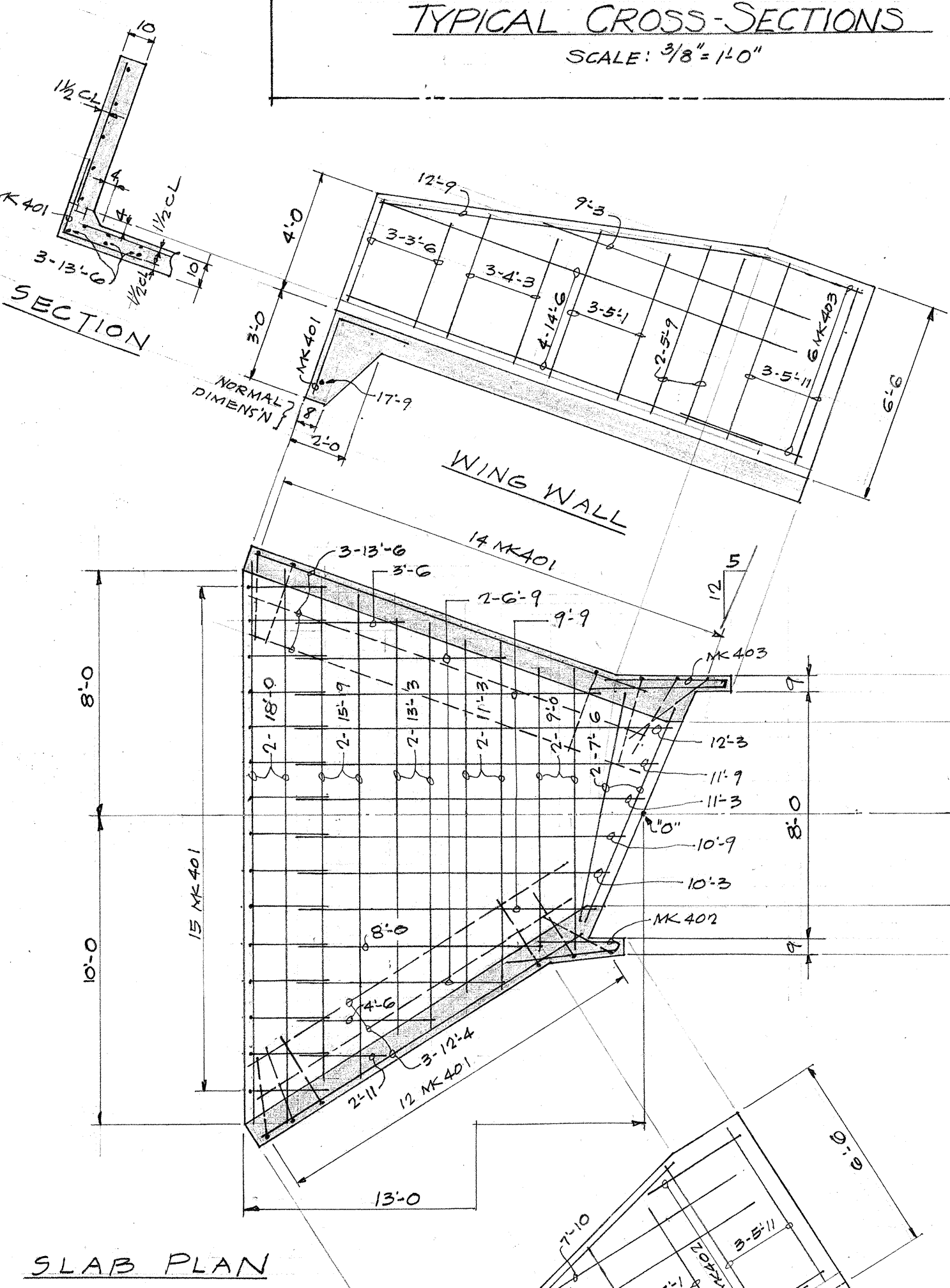
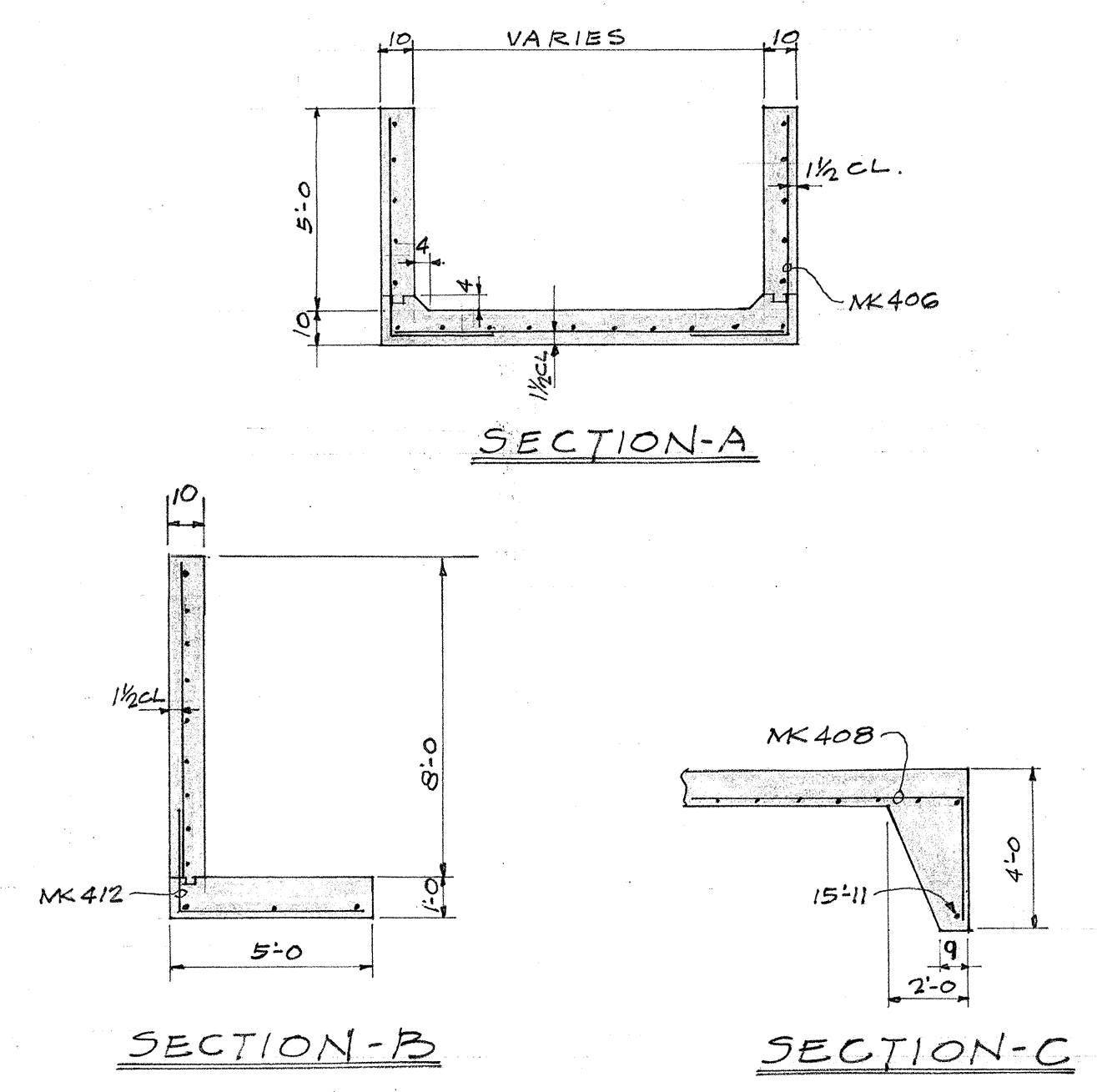
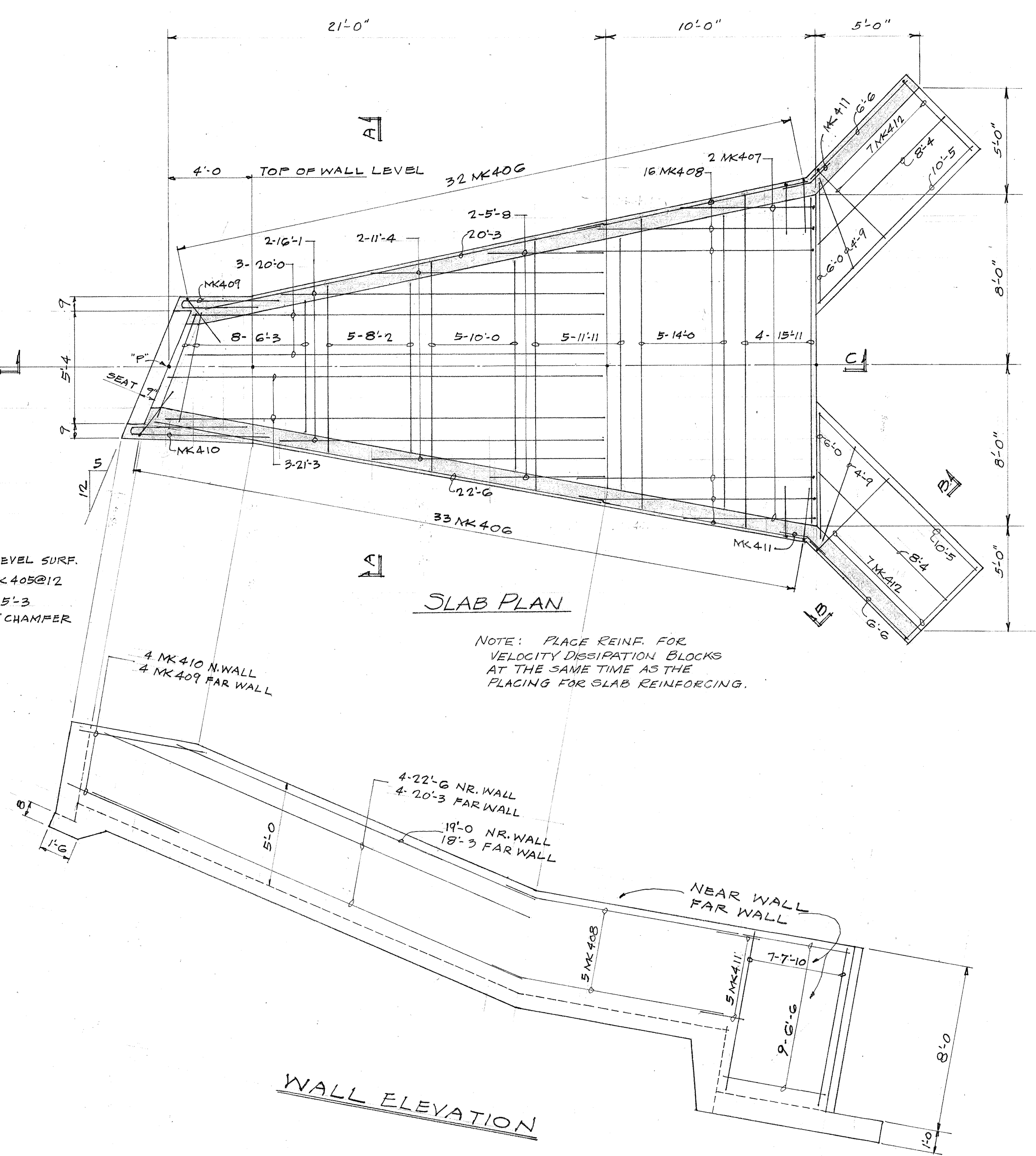
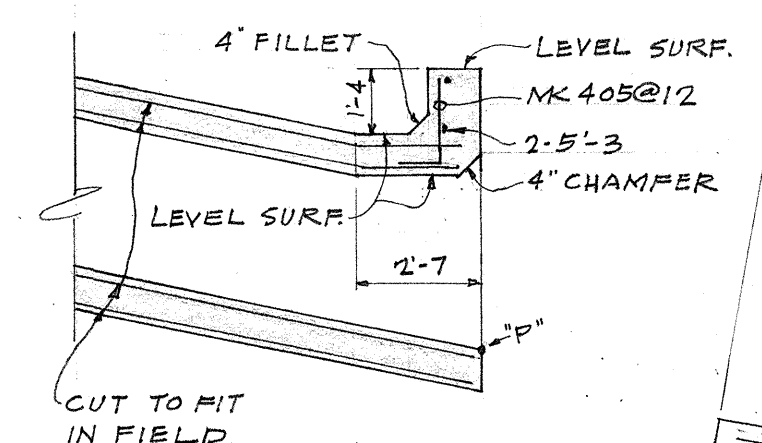
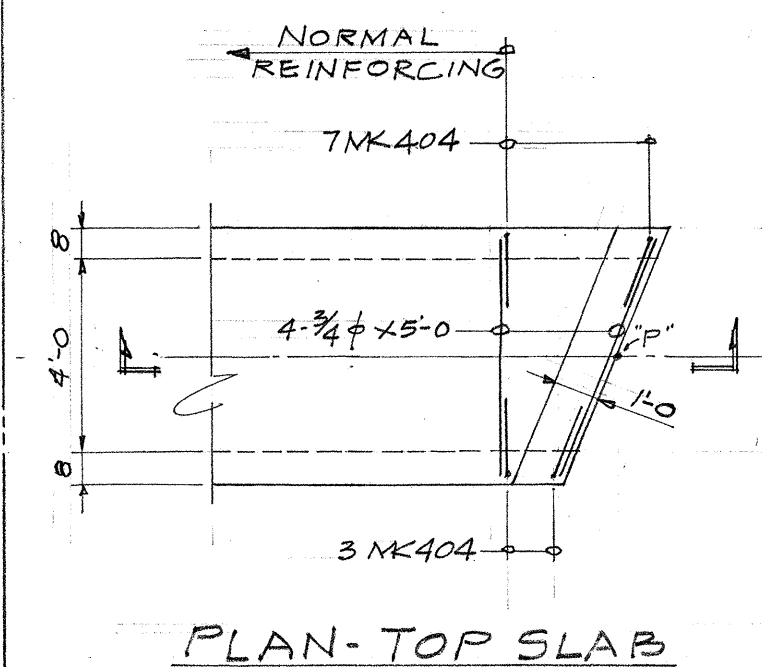
DATE September 23, 1988
 CHECKED BY: H. Lum
 TRACER T.B.H.
 APPROVED [Signature]
 BUREAU ENGINEER

W.S. CR. SEC. W.M. BY: PROFILE F.B. BY: C.B. S.B. S.B.

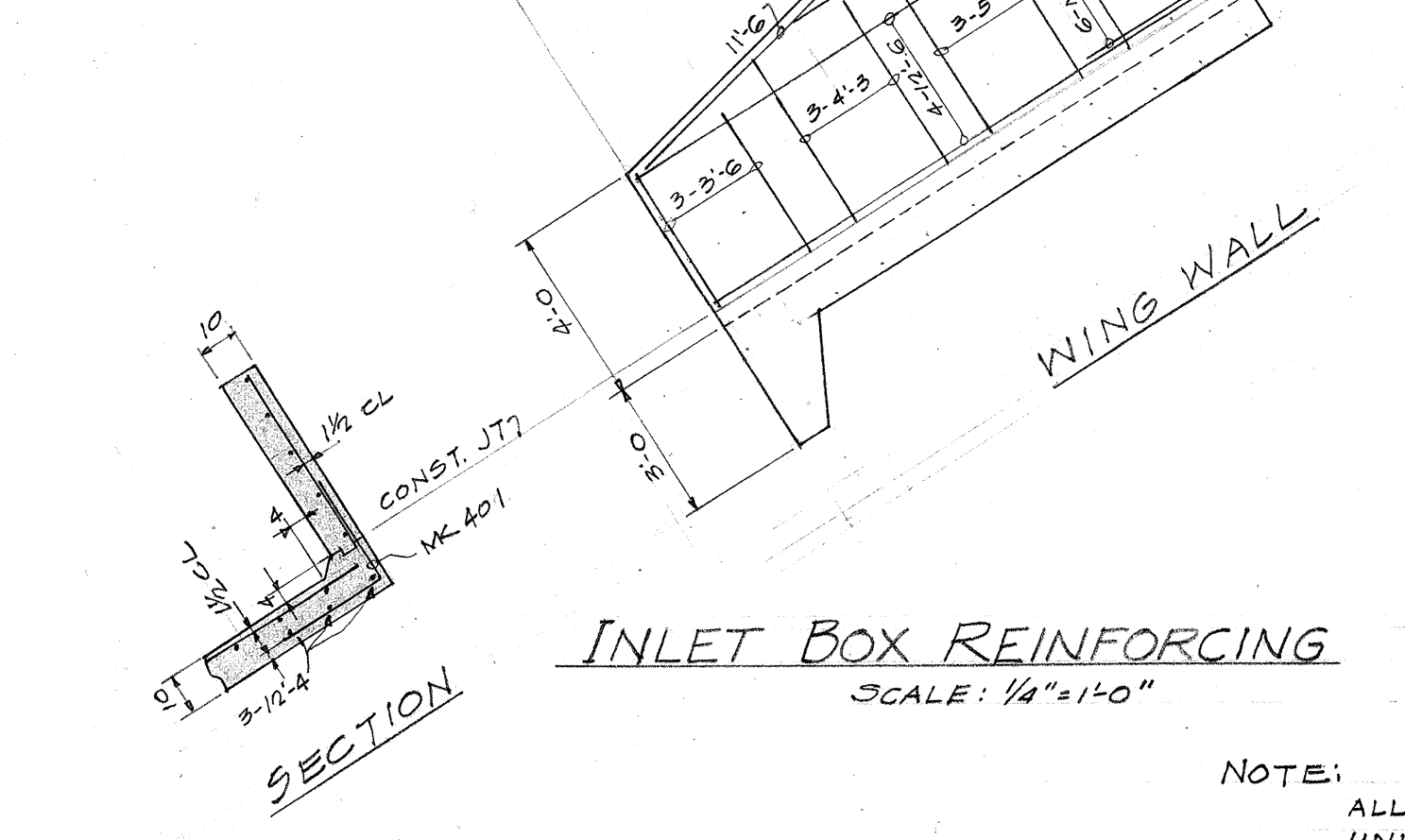




TYPICAL CROSS-SECTIONS
SCALE: 3/8" = 1'-0"



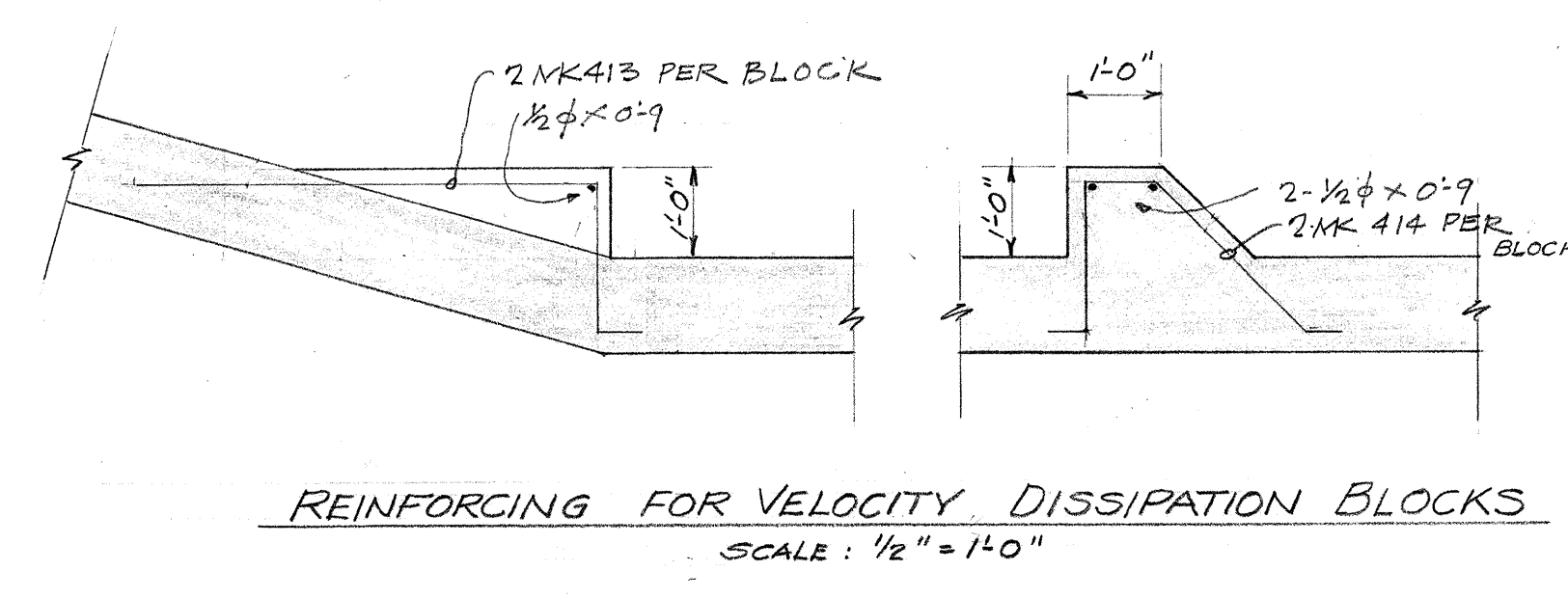
- NOTE:
1. CONCRETE TO HAVE ULTIMATE COMP. STRENGTH OF 2500 PSI @ 28 DAYS.
 2. REINF. STEEL TO BE INTER. GRADE, NEW BILLET DEFORMED BARS.
 3. ALL BARS TO BE 1/2" @ 12" UNLESS NOTED.



INLET BOX REINFORCING
SCALE: 1/4" = 1'-0"

NOTE: ALL BARS 1/2" @ 14" UNLESS OTHERWISE NOTED.

WALL ELEVATION

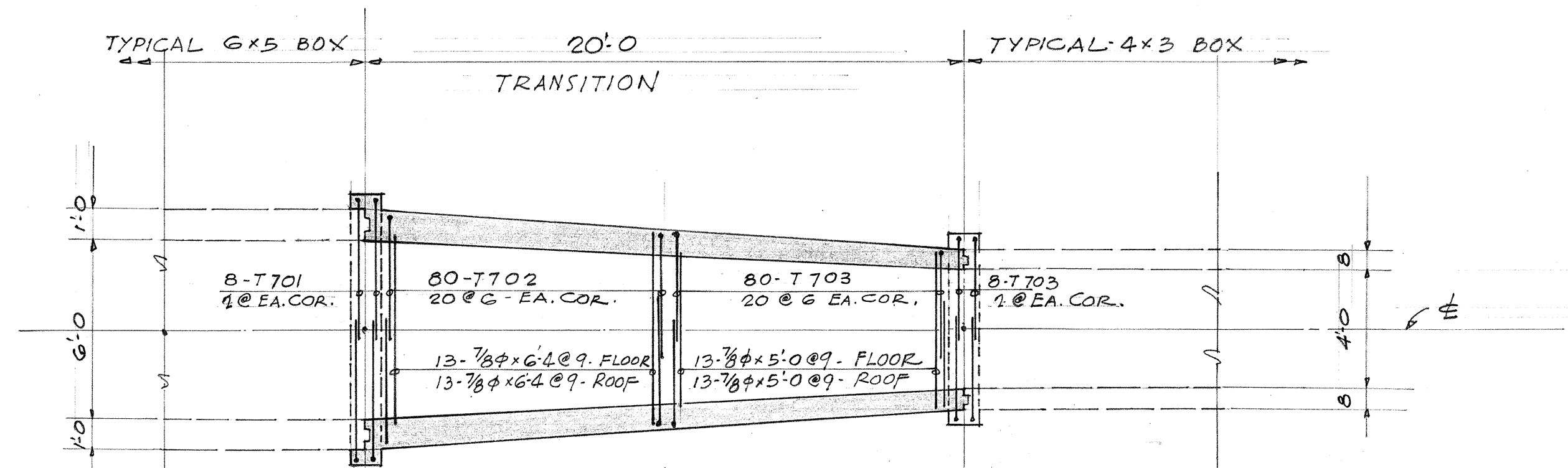


OUTLET BOX REINFORCING
SCALE: 1/4" = 1'-0" UNLESS NOTED

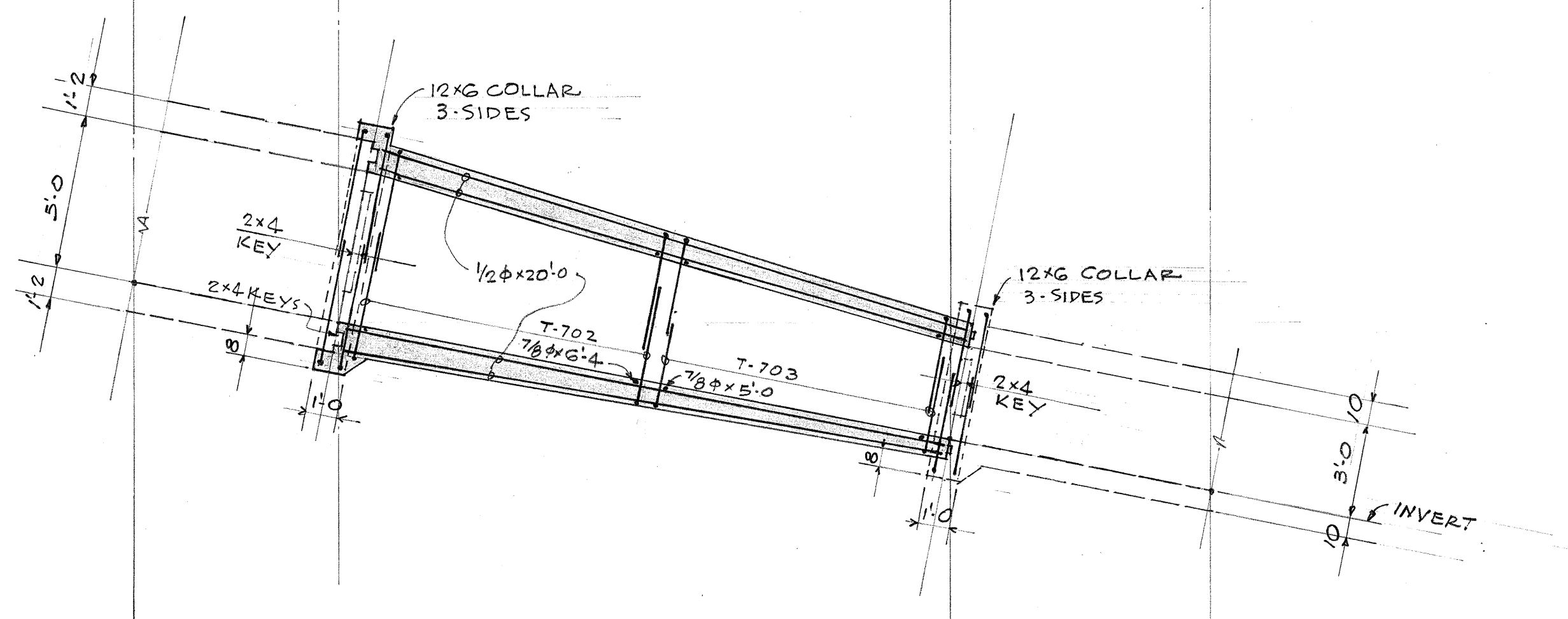
PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS CITY AND COUNTY OF HONOLULU			
BUREAU OF PLANS			
KALIHI TUNNEL			
KANE OHE APPROACH ROAD SECTION B			
JOB No. 31-52			
6'x5' to 4'x3' REINF. CONC. BOX CULVERT			
B.L. STA. 26+10			
ENGINEER	S.O.H. & J.R.O.	DATE	September 28, 1952
DRAFTSMAN	J.R.O.	CHECKED BY	H. Lum
SCALE	As Shown	TRACER	J.R.O.
APPROVED	[Signature]	APPROVED	[Signature]
CHIEF ENGINEER		BUREAU ENGINEER	
W.S.	PROFILE	C.B.	
CR. SEC.	F.B.	S.B.	
W.M.B.Y.	F.W.B.Y.	S.B.Y.	

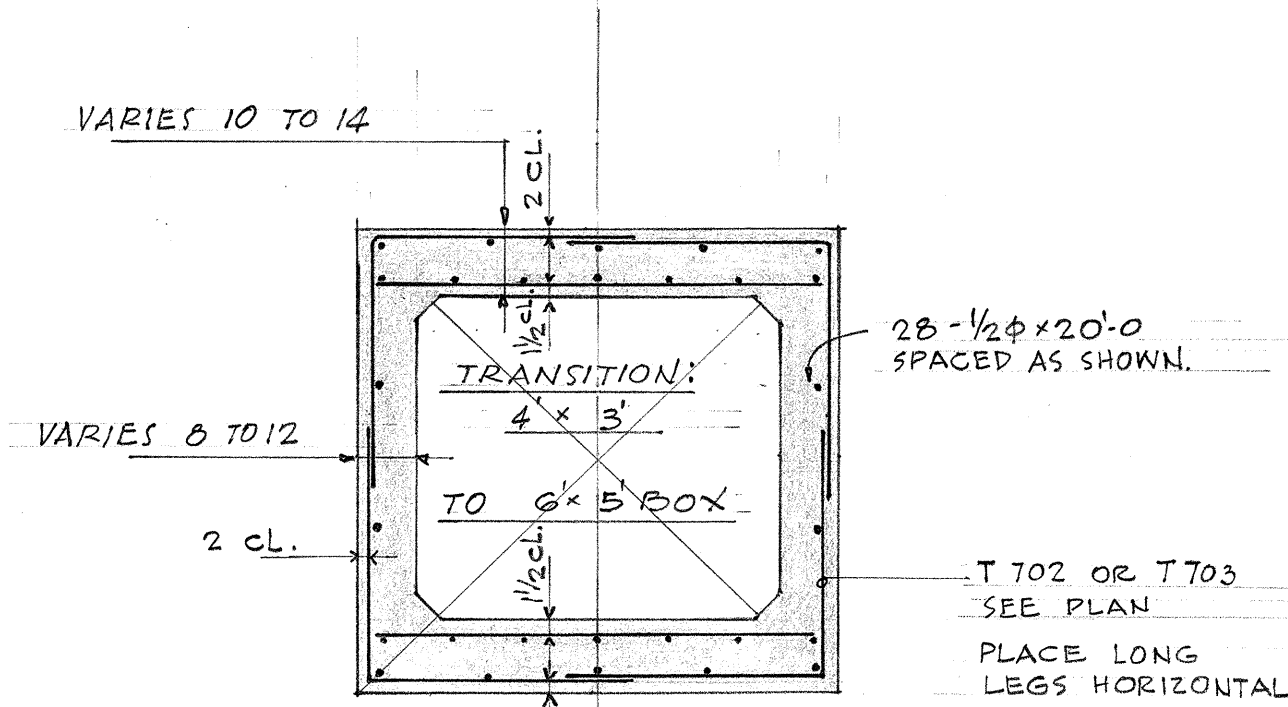
FILE	POCKET	FOLDER	No.
7	2	2	20



PLAN
FLOOR SLAB OF TRANSITION
ROOF SLAB-SIMILAR



LONGITUDINAL SECTION



SECTION THRU TRANSITION

TRANSITION DETAILS

LIST OF MATERIALS

BENDING DIAGRAM	MARK	NO. REQ'D	SIZE	LGTH	REMARKS	LBS. STEEL	C.Y. CONC.
	401	41	1/2"	5'-0"			
		3	3/4"	17'-9"			
		2	1/2"	15'-9"			
		2	1/2"	11'-3"			
		2	1/2"	9'-0"			
		2	1/2"	7'-6"			
		3	3/4"	12'-4"			
		3	3/4"	13'-6"			
		1	1/2"	6'-9"			
		2	1/2"	9'-9"			
		1	1/2"	11'-9"			
		1	1/2"	10'-9"			
		1	1/2"	10'-3"			
		1	1/2"	8'-0"			
		1	1/2"	4'-6"			
		1	1/2"	2'-11"			
		1	1/2"	5'-3"			
		1	1/2"	9'-0"			
		1	1/2"	3'-0"			
		1	1/2"	4'-3"			
		1	1/2"	5'-1"			
		1	1/2"	5'-11"			
		1	1/2"	7'-10"			
		1	1/2"	11'-6"			
		1	1/2"	12'-4"			
		1	1/2"	5'-3"			
		1	1/2"	9'-0"			
		1	1/2"	5'-9"			
		1	1/2"	7'-3"			
		1	1/2"	12'-9"			
		38	7/8"	8'-8"			
		9	1/2"	6'-4"			
		2	1/2"	8'-3"			
		286	1/8"	16'-4"			
		200	1/8"	7'-8"			
		28	5/8"	40'-0"	LONG. STEEL		
		28	7/8"	38'-0"			
		8	1/2"	8'-10"			
		80	1/2"	8'-0"			
		88	1/2"	5'-8"			
		26	7/8"	6'-4"			
		26	1/2"	5'-0"			
		28	1/2"	20'-0"			
		372	1/2"	6'-4"			
		560	3/4"	5'-0"			
		42	1/2"	40'-0"	LONG. STEEL		
		14	1/2"	22'-0"			
		6	1/2"	2'-10"			
		2	1/2"	5'-3"			

LIST OF MATERIALS

BENDING DIAGRAMS	MARK	NO.	SIZE	LGTH	REMARKS	LBS. STEEL	C.Y. CONC.
	406	65	1/2"	7'-2"			
	407	2	1/2"	4'-4"			
	408	10	1/2"	14'-1"			
	409	1	1/2"	8'-6"			
	410	1	1/2"	11'-3"			
	411	2	1/2"	3'-0"			
	412	14	1/2"	6'-10"			
		2	1/2"	5'-8"			
		2	1/2"	11'-4"			
		3	1/2"	16'-1"			
		3	1/2"	20'-0"			
		3	1/2"	21'-3"			
		1	1/2"	20'-3"			
		1	1/2"	22'-6"			
		8	1/2"	6'-3"			
		5	1/2"	8'-2"			
		5	1/2"	10'-0"			
		5	1/2"	11'-11"			
		5	1/2"	14'-0"			
		5	1/2"	15'-11"			
		2	1/2"	6'-0"			
		2	1/2"	4'-9"			
		2	1/2"	6'-6"			
		2	1/2"	8'-4"			
		2	1/2"	10'-5"			
		14	1/2"	5'-7"			
		12	1/2"	7'-1"			
		20	1/2"	8'-9"			
		1	1/2"	18'-3"			
		16	1/2"	6'-6"			
		4	1/2"	11'-3"			
		4	1/2"	8'-6"			
		10	1/2"	14'-1"			
		10	1/2"	3'-0"			
		14	1/2"	6'-10"			
		4	1/2"	22'-6"			
		5	1/2"	20'-3"			

TOTAL STEEL REQ'D ----- 28,510 LBS.
 " CONCRETE REQ'D ----- 220 C.Y.
 " STRUC. EXCAVATION ----- 254 C.Y.
 " UNCLASSIFIED EXC. ----- 129 C.Y.
 " G.R. PAVING ----- 102 SQ. YDS.

PROPERTY OF DIVISION OF ENGINEERING

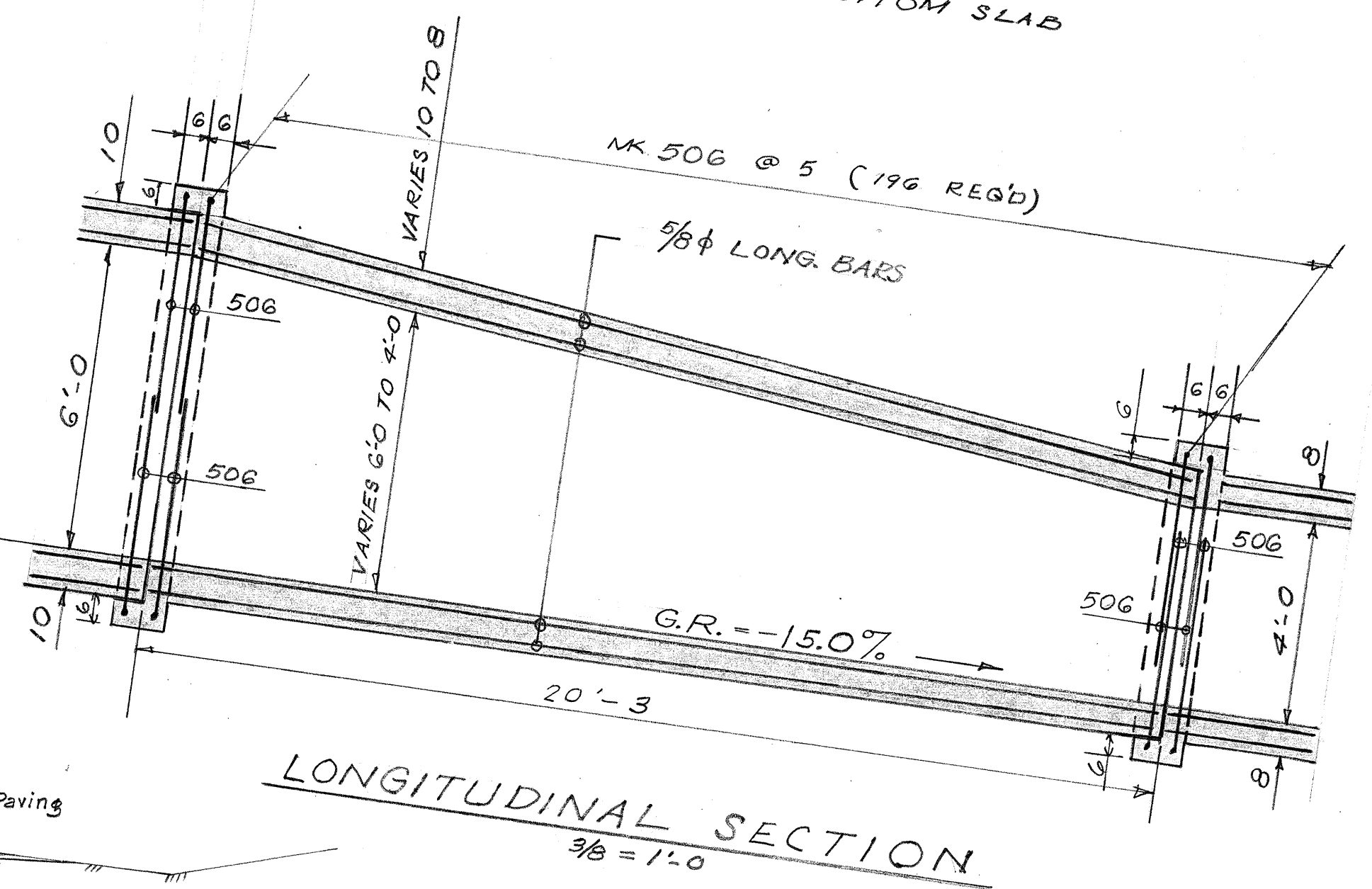
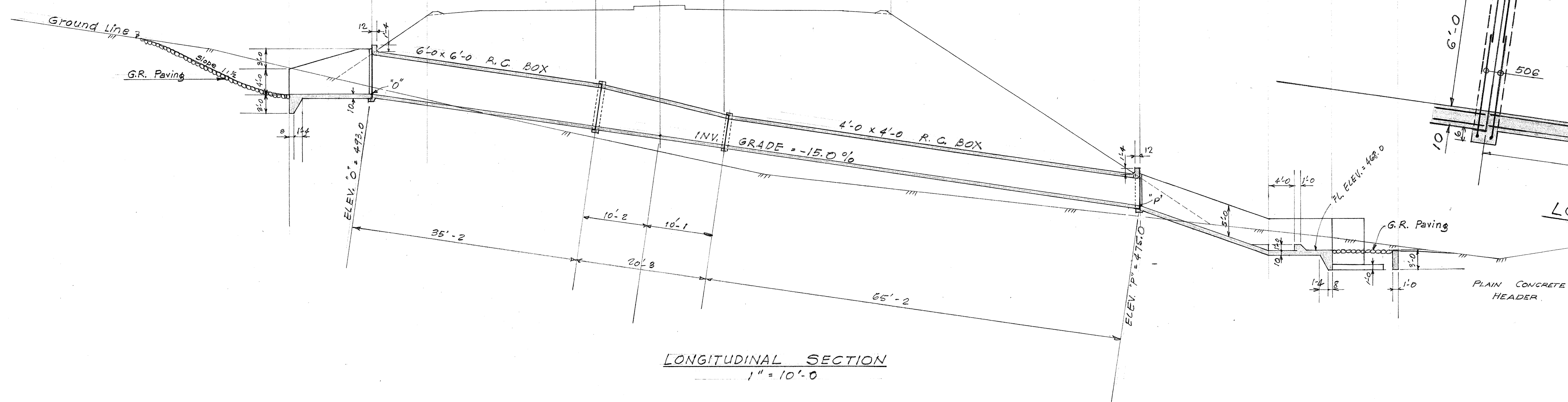
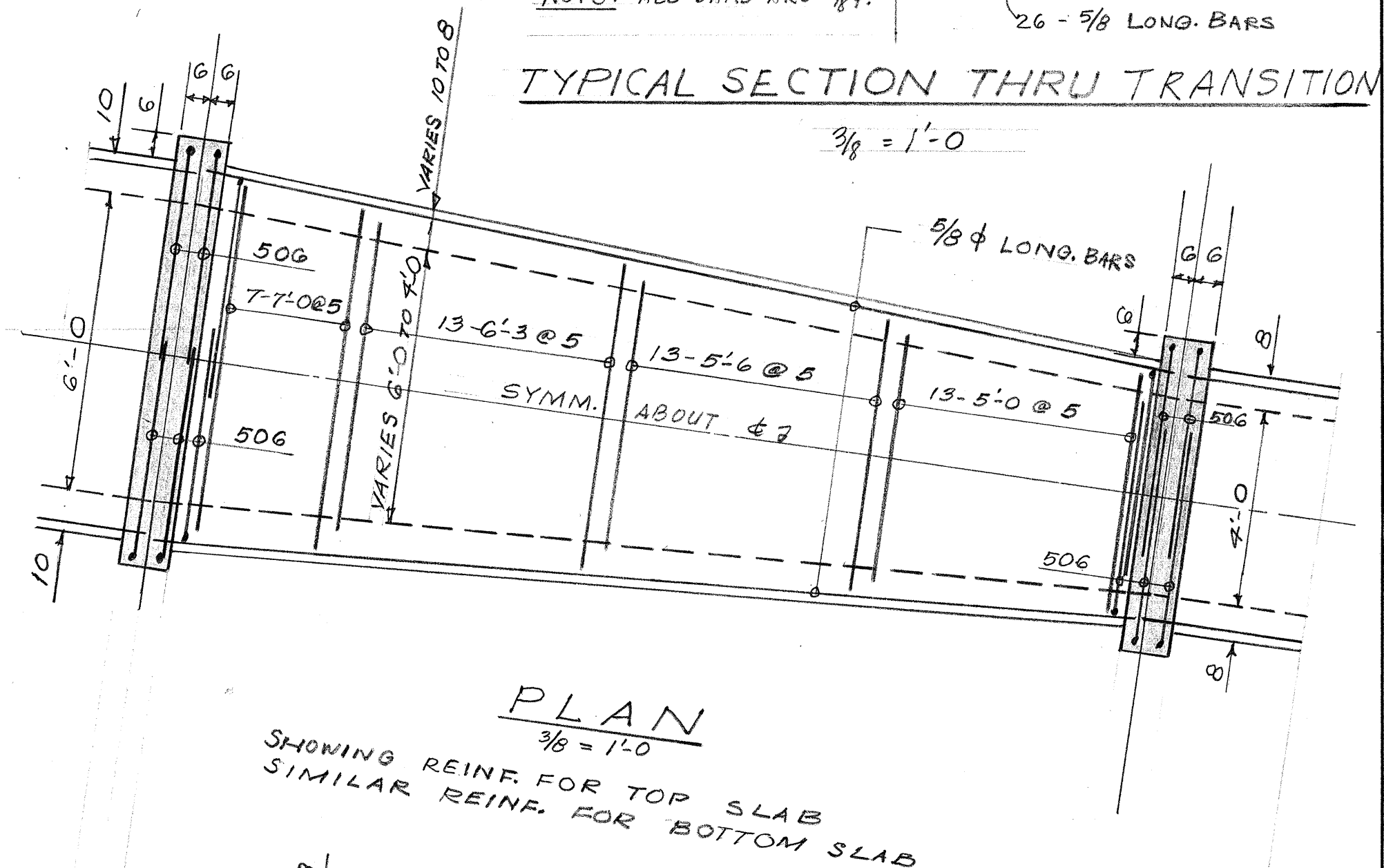
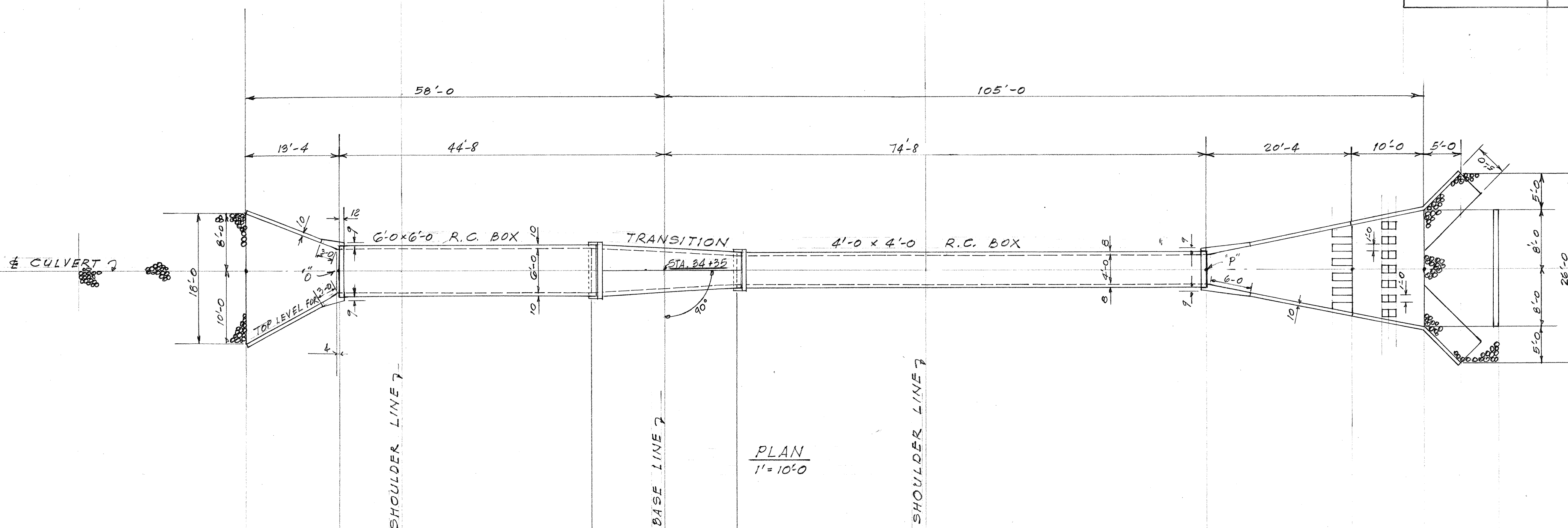
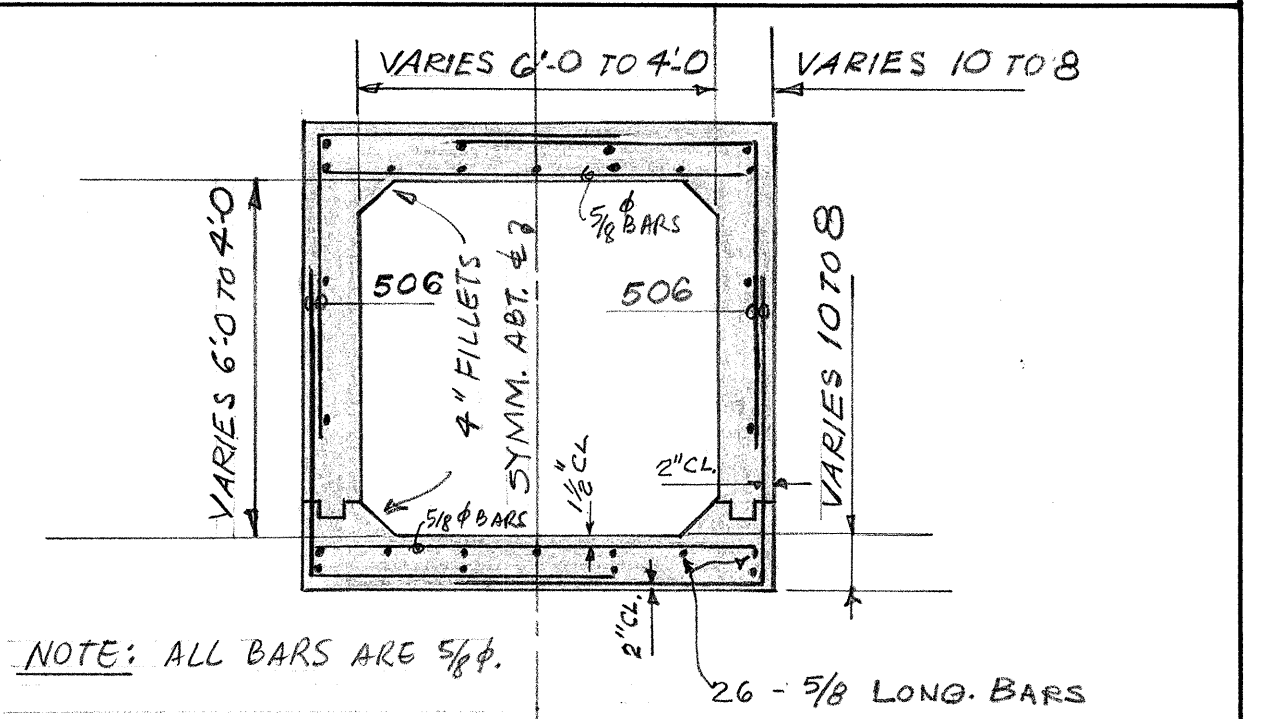
DEPARTMENT OF PUBLIC WORKS
 CITY AND COUNTY OF HONOLULU
 BUREAU OF PLANS
KALIHI TUNNEL
 KANEHOE APPROACH ROAD SECTION B
 JOB No. 31-52
 6x5 to 4x3 REINFC. CONC. BOX CULVERT
 B.L. STA. 26+10
 ENGINEER S.O.H. & J.R.O. DATE September 22, 1922
 DRAFTSMAN J.R.O. CHECKED BY W. LUM
 SCALE AS SHOWN TRACER J.R.O.
 APPROVED BY [Signature] APPROVED BY [Signature]
 CHIEF ENGINEER BUREAU ENGINEER
 W. S. OR. SEC. F. B. S. B. W. M. BY: F. W. BY: S. BY:

WORK THIS SHEET WITH SHEETS No. 19 & 20

FILE	POCKET	FOLDER	NO.
7	2	2	21

Sheet No. 21 of 66 Sheets

MATERIALS FOR TRANSITION						
BENDING DIAGRAM	MARK	NO.	SIZE	LENGTH	REMARKS	QTY
	506	204	5/8"	8'-6"		1808.6
	26	"	20-0			542.4
	14	"	7-0			102.2
	26	"	6'-3"			169.5
	26	"	5'-6"			142.2
	26	"	5'-0"			135.6
TOTAL						2908*

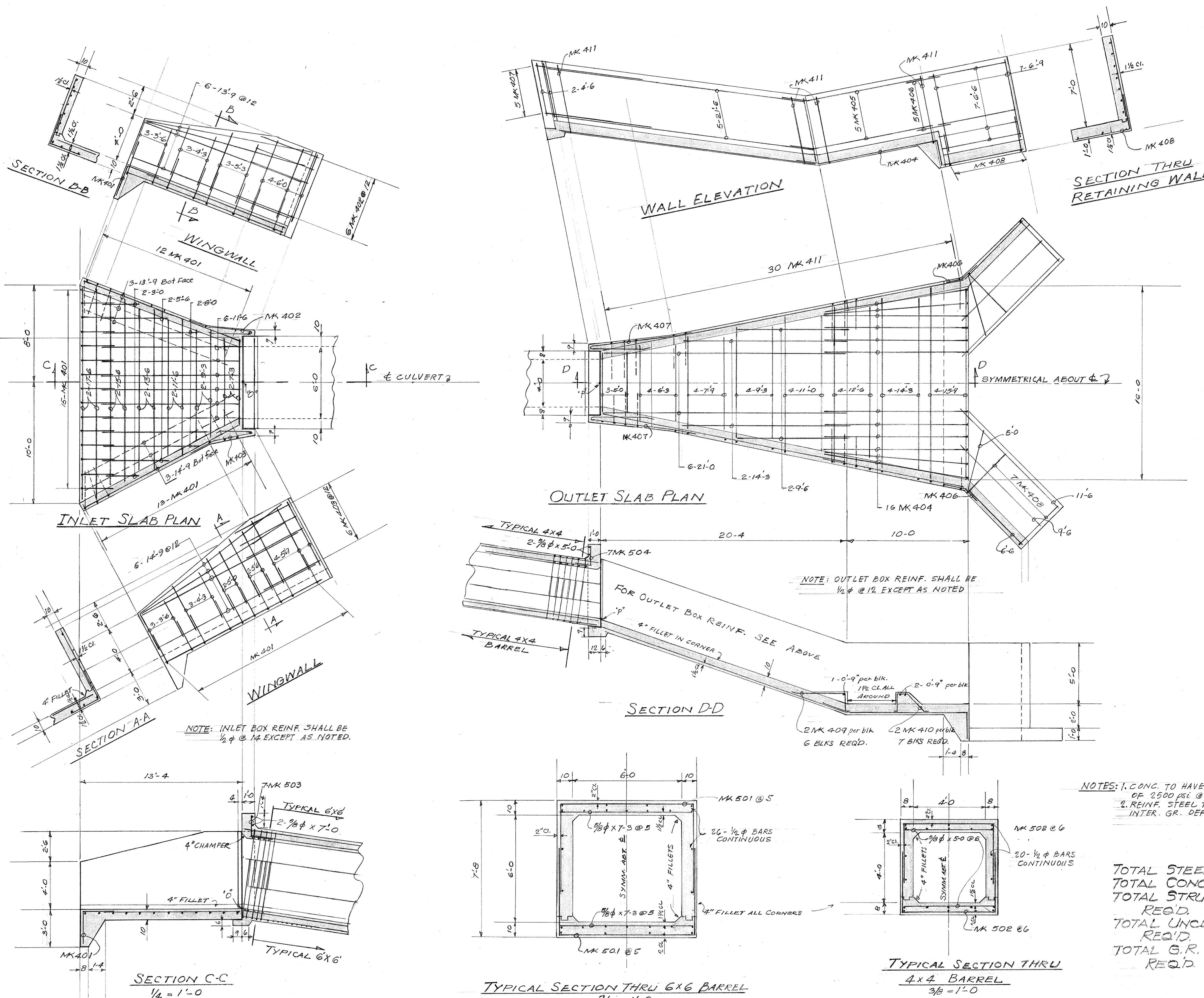


DIVISION OF ENGINEERING
 DEPARTMENT OF PUBLIC WORKS
 CITY AND COUNTY OF HONOLULU
 BUREAU OF PLANS
 KALIHU TUNNEL
 KANEHOE APPROACH ROAD SECTION B
 JOB No. 31-52
 6'x6' to 4'x4' REINF. CONC. BOX CULVERT
 B.L. STA. 34+35
 ENGINEER: S.O.H. R. DATE: September 22, 1952
 DRAFTSMAN: R.W. S. Y. CHECKED BY:
 SCALE: TRACER: R.W. S. Y.
 APPROVED: [Signature] APPROVED: [Signature]
 CHIEF ENGINEER BUREAU ENGINEER

WORK THIS SHEET WITH SHEET NO. 23

FILE	POCKET	FOLDER	No.
7	2	2	22

Sheet No. 22 of 66 Sheets



BENDING DIAGRAMS	MARK	NO.	SIZE	LENGTH	REMARKS	1BS. STEEL	EX. CONC.
2'-8	401	40	1/2"	5'-4		142.5	
		2		17'-6		23.4	
		2		15'-6		20.7	
		2		13'-6		18.0	
		2		11'-6		15.4	
		2		9'-3		12.4	
		2		7'-3		9.7	
		3		13'-9		27.6	
		2		3'-0		4.0	
		2		5'-6		7.3	
		2		8'-0		10.7	
		6		11'-6		46.1	
		3		14'-9		29.6	
		402	6	1/2"	8'-9	35.1	
		6		13'-9		55.1	
		3		3'-6		7.0	
		3		4'-8		8.5	
		3		5'-3		10.5	
		4		6'-0		16.0	
		403	6	1/2"	8'-1	32.4	
		6		14'-9		59.1	
		3		3'-6		7.0	
		3		4'-3		8.5	
		2		5'-0		6.7	
		2		5'-6		7.3	
		4		5'-9		15.4	
		503	7	5/8"	3'-3	23.8	
		2		7'-0		14.6	
		404	16	1/2"	14'-0	149.5	
		408	14		7'-1	66.3	
		411	60		8'-0	321.0	
		3		5'-0		10.0	
		4		6'-3		10.7	
		4		7'-9		20.7	
		4		9'-3		24.7	
		4		11'-0		29.4	
		4		12'-6		33.6	
		4		14'-3		38.1	
		4		15'-9		42.1	
		6		21'-0		84.2	
		2		14'-3		19.0	
		4		9'-6		25.4	
		2		5'-0		6.7	
		2		11'-6		15.4	
		2		6'-0		8.7	
		405	10	1/2"	12'-0	80.3	
		406	10		3'-0	20.0	
		407	10		13'-3	88.5	
		4		4'-6		12.0	
		10		21'-6		143.6	
		14		6'-6		60.8	
		14		6'-9		63.1	
		504	7	5/8"	2'-9	20.0	
		2		5'-0		10.4	
		501	172	5/8"	16'-0	501.8	
		172		7'-3		1300.6	
		52	1/2"	19'-6		677.4	
		502	264	5/8"	11'-8	3212.4	
		264		5'-0		1376.8	
		60	1/2"	23'-6		941.9	
		409	12	1/2"	6'-2	49.4	
		410	14		4'-11	46.0	
		20		0'-9		10.0	

NOTES: 1. CONC. TO HAVE AN ULT. STRENGTH OF 2500 PSI @ 28 DAYS
2. REINF. STEEL TO BE NEW BILLET INTER. GR. DEFORMED BARS.

TOTAL STEEL REQ'D. = 12,719#
TOTAL CONC. REQ'D. = 102 cy.
TOTAL STRUCT. EXC. REQ'D. = 226 cy.
TOTAL UNCL. EXC. REQ'D. = 36 cy.
TOTAL G.R. PAVING REQ'D. = 85 sy.

SEE SHEET 23 FOR LIST OF MATERIALS FOR TRANSITION SECTION

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHU TUNNEL
KANEHOE APPROACH ROAD SECTION B
JOB NO. 31-52
6'x6' to 4'x4' REINF. CONC. BOX CULVERT
B.L. STA. 34+35

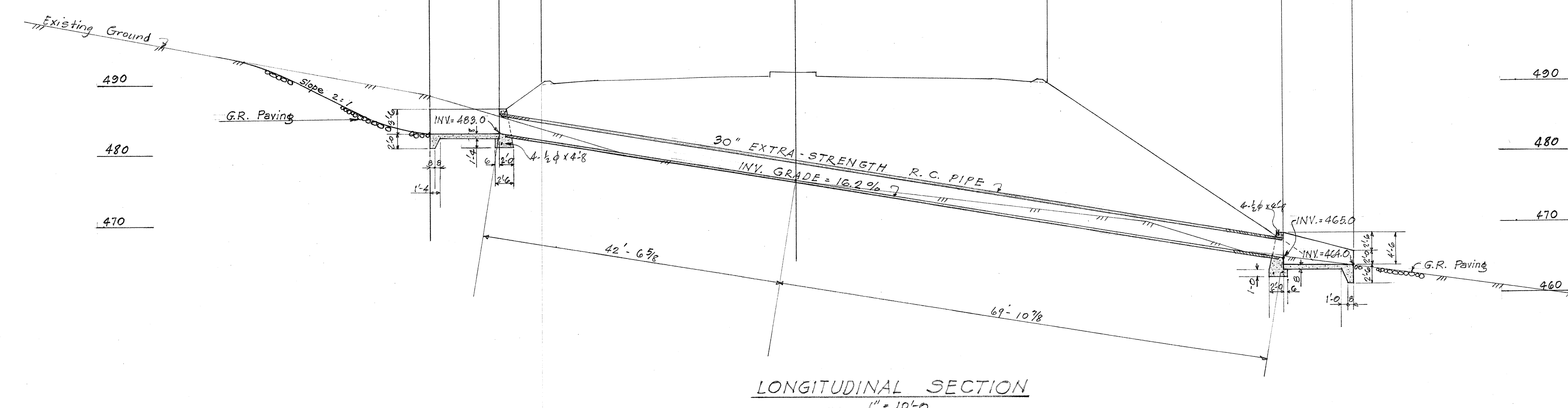
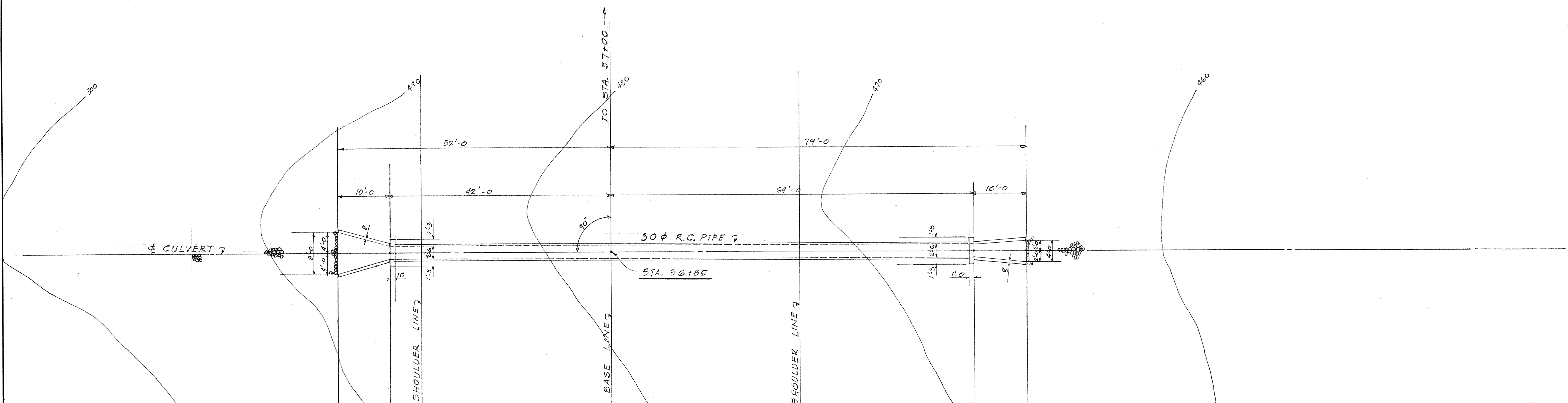
ENGINEER: S.O.H. & R.W.
DRAFTSMAN: S.Y.
SCALE: AS SHOWN
APPROVED: [Signature]
CHECKED BY: W. LUM
TRACER: S.Y.
APPROVED: [Signature]
BUREAU ENGINEER

DATE: September 22, 1952

W.S. OR SEC. F.W. BY. PROFILE F.W. BY. C.B. S.B. S.B.

WORK THIS SHEET WITH SHEET No. 22

FILE	POCKET	FOLDER	No.
7	2	2	23



PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEHOE APPROACH ROAD SECTION B
JOB No. 31-52
30" REINF. CONC. PIPE CULVERT
B.L. STA. 36+85

ENGINEER: S.O.H.E. R.W. DATE: September 22, 1952
DRAFTSMAN: R.W. CHECKED BY: W. LUM
SCALE: 1" = 10' TRACER: R.W.
APPROVED: [Signature] APPROVED: [Signature]
CHIEF ENGINEER BUREAU ENGINEER

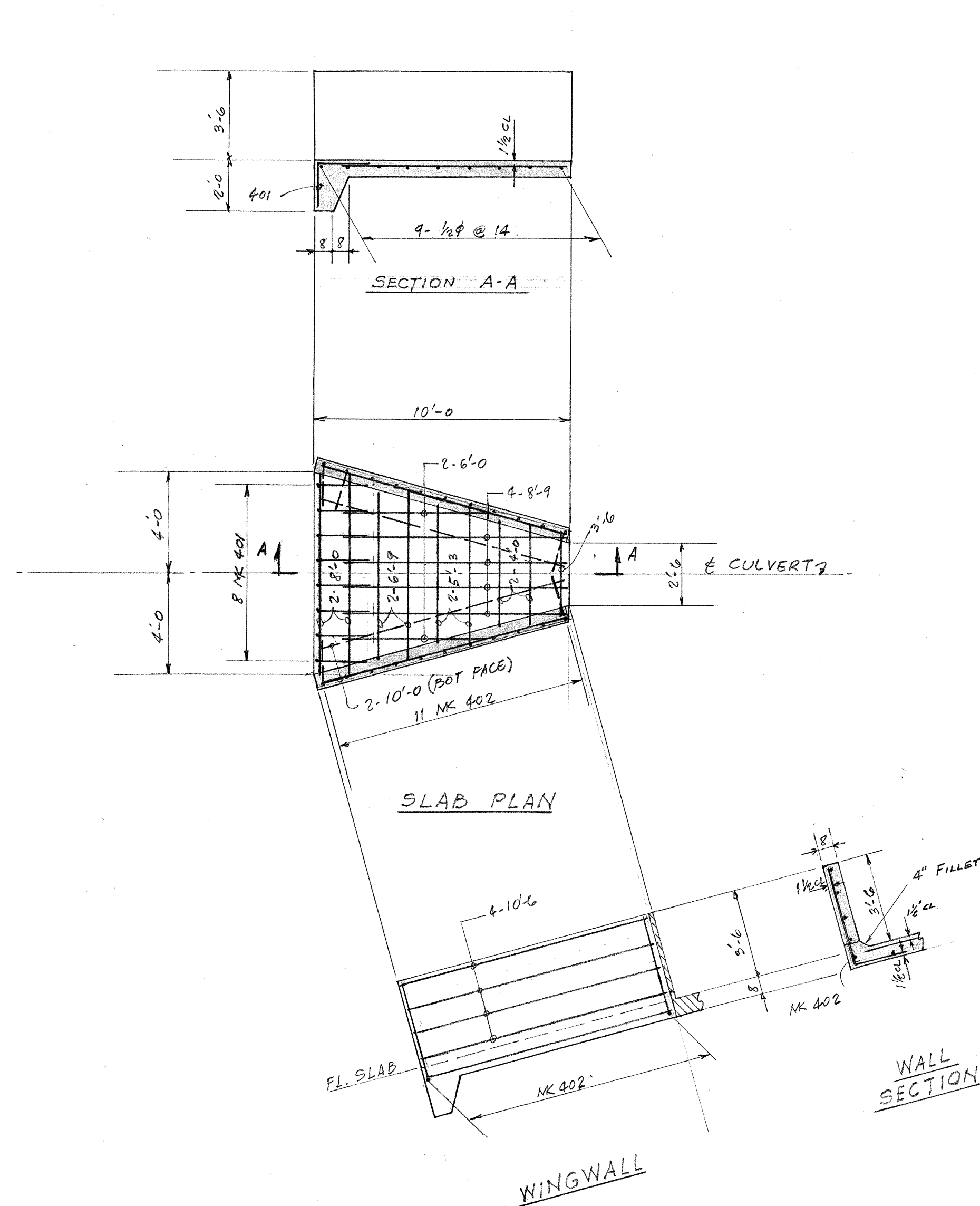
W.S.	PROFILE	G.B.
CR. SEC.	F.B.	S.B.
W.M. BY:	F.W. BY:	S. BY:

WORK THIS SHEET WITH SHEET No 25

FILE	POCKET	FOLDER	No.
7	2	2	24

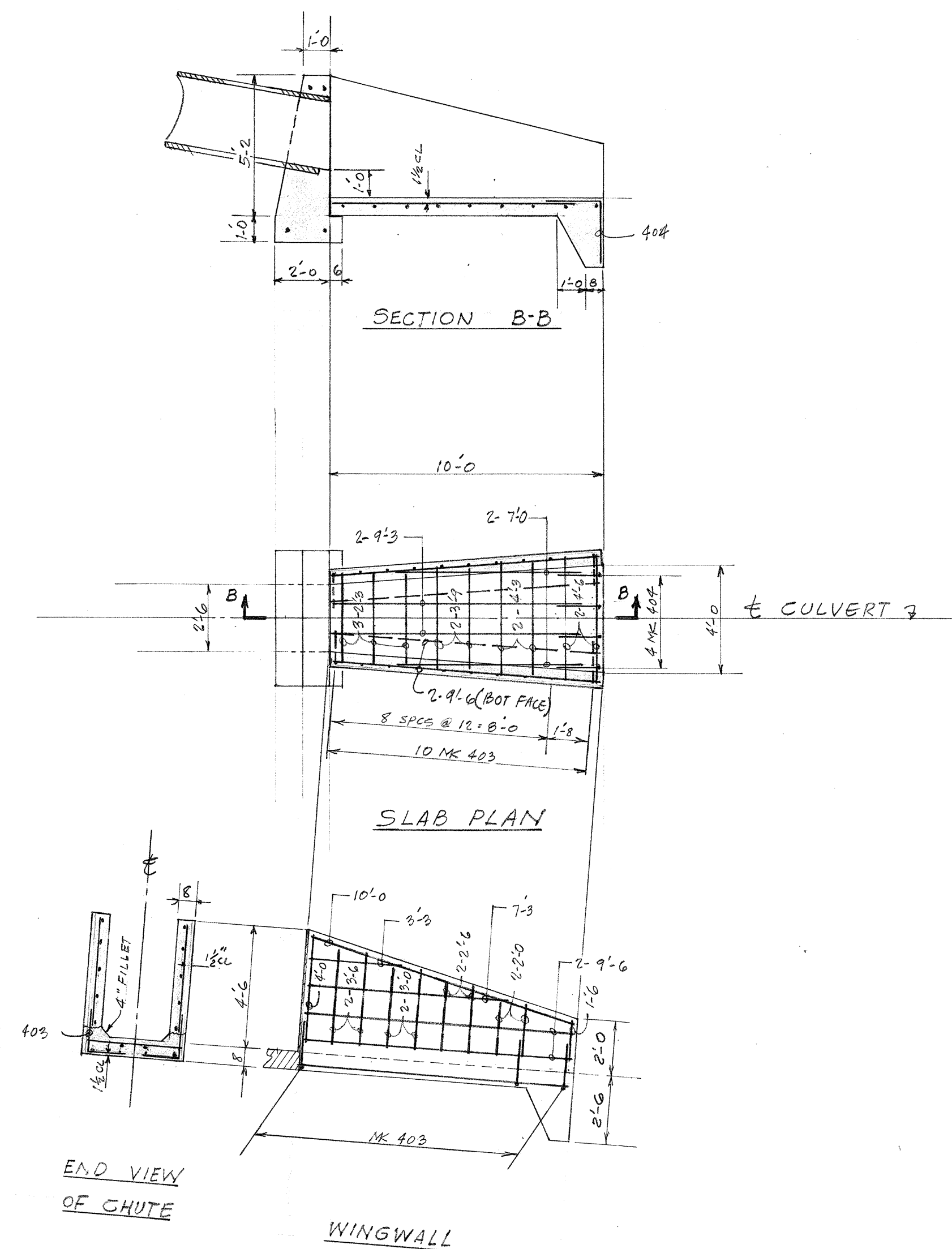
Sheet No. 24 of 66 Sheets

30" of 0 36+85



NOTES: 1. BOX IS SYMMETRICAL ABOUT ϕ .
2. ALL BARS ARE $\frac{1}{2}$ ϕ @ 12" O.C.
EXCEPT AS NOTED.

INLET BOX REINFORCING
 $\frac{1}{4} = 1'-0$



NOTES: 1. BOX IS SYMMETRICAL ABOUT ϕ .
2. FLOOR SLAB BARS ARE $\frac{1}{2}$ ϕ @ 14" O.C.
EXCEPT AS NOTED.
3. WINGWALL BARS ARE $\frac{1}{2}$ ϕ @ 12" O.C.
EXCEPT AS NOTED.

OUTLET BOX REINFORCING
 $\frac{1}{4} = 1'-0$

NOTES: 1. CONC. TO HAVE ULTIMATE COMP.
STRENGTH OF 2500psi @ 28 DAYS
2. REINF. STEEL TO BE NEW BILLET,
INT. GRADE DEFORMED BARS.

LIST OF MATERIALS									
BENDING DIAGRAMS ALL DIMENSIONS OUT-TO-OUT	MARK	NO REQ'D	SIZE	LENGTH	REMARKS	LBS STEEL	C.Y. CONC.		
	401	8	$\frac{1}{2}$ ϕ	3'-8"		196			
	402	22		5'-6"		81.0			
	2			6'-9"		9.0			
	2			5'-3"		7.0			
	2			4'-0"		5.3			
	1			3'-6"		2.3			
	2			8'-0"		10.7			
	2			6'-0"		8.0			
	4			8'-9"		23.4			
	4			10'-0"		26.7			
	8			10'-6"	WALLS 56#	56.1			
	4			4'-8"	HD WALL 13#	12.5			
						262	4.9		
	403	20	$\frac{1}{2}$ ϕ	2'-11"		32.3			
	404	4		3'-11"		10.6			
	2			4'-3"		12.3			
	2			7'-0"		9.4			
	2			8'-3"		6.5			
	2			3'-9"		5.0			
	2			4'-3"		5.7			
	2			4'-6"		6.0			
	4			9'-6"		25.4			
	4		$\frac{1}{2}$ ϕ	3'-6"		9.4			
	4			3'-0"		8.0			
	4			2'-6"		6.7			
	4			2'-0"		5.3			
	2			1'-6"		2.0			
	2			10'-0"		13.4			
	2			3'-3"		4.3			
	2			7'-3"		9.7			
	4			4'-0"		25.4			
	2			4'-0"		5.3			
	4		$\frac{1}{2}$ ϕ	4'-8"	HD WALL = 13#	12.5			
						216	4.3		

TOTAL CU. YDS. OF CONC. REQ'D. = 9 c.y.
TOTAL WT. OF STEEL REQ'D. = 478 #
TOTAL STRUC. EXC. REQ'D. = 54 c.y.
" UNCL. EXC. " = 44 c.y.
" G.R. PAVING " = 50 s.y.

113 L.F. 30" X. STG. R.C. PIPE REQ'D.

PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHU TUNNEL
KANEHOE APPROACH ROAD SECTION B
JOB No. 31-52
30" REINF. CONC. PIPE CULVERT
B. L. STA. 36+85

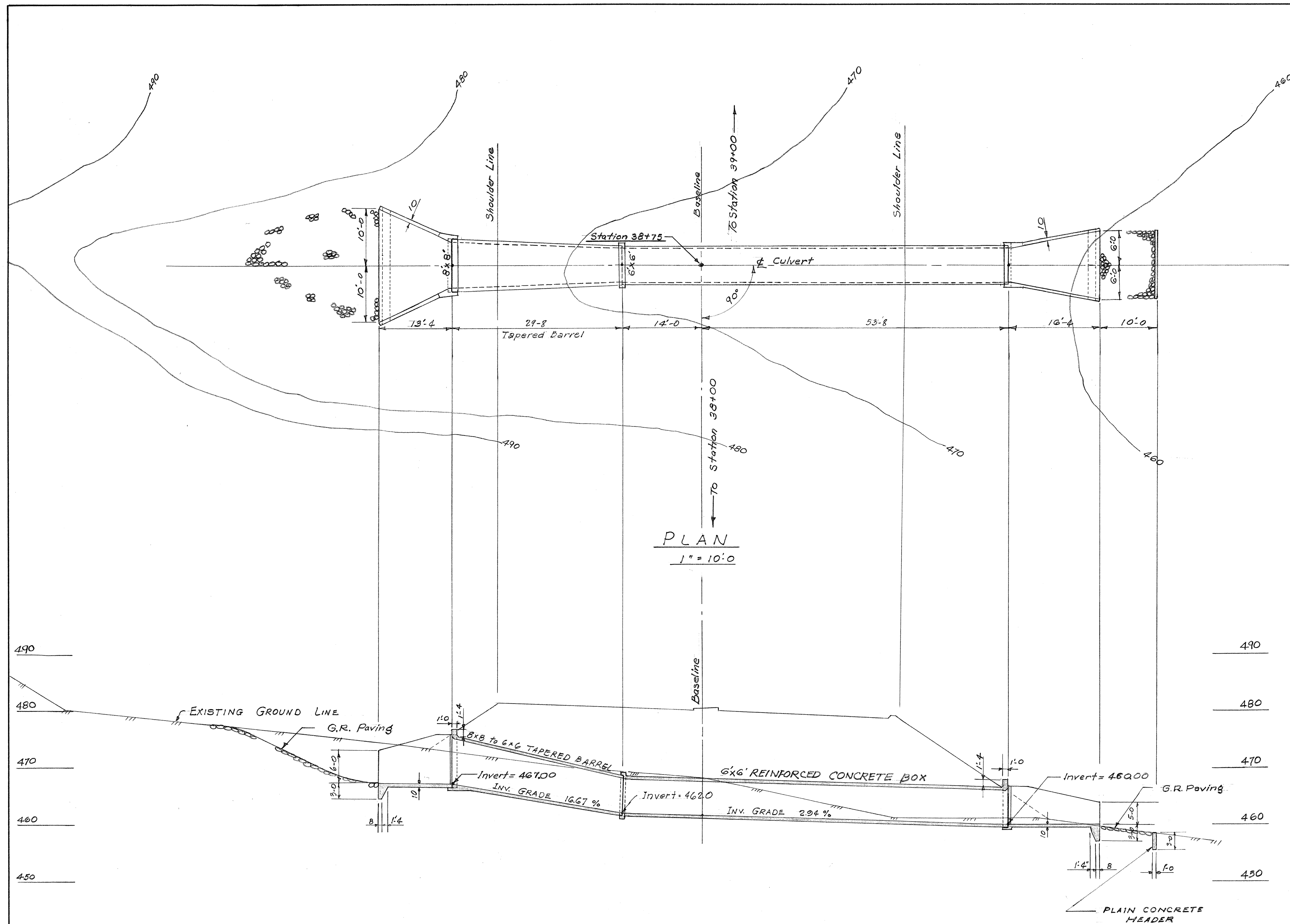
ENGINEER: S.O.M.E. R.W. DATE: September 22, 1952
DRAFTSMAN: R.W. CHECKED BY: W.L.W.
SCALE: 1/4" = 1'-0" TRACER: R.W.
APPROVED: *[Signature]* APPROVED: *[Signature]*
CHIEF ENGINEER BUREAU ENGINEER

W. S. PROFILE C. B.
OR. SEC. F. B. S. B.
W. M. BY: F. W. BY: S. BY:

WORK THIS SHEET WITH SHEET No. 24

FILE	POCKET	FOLDER	No.
7	2	2	25

Sheet No. 25 of 66 Sheets



LONGITUDINAL SECTION
1" = 10'-0"

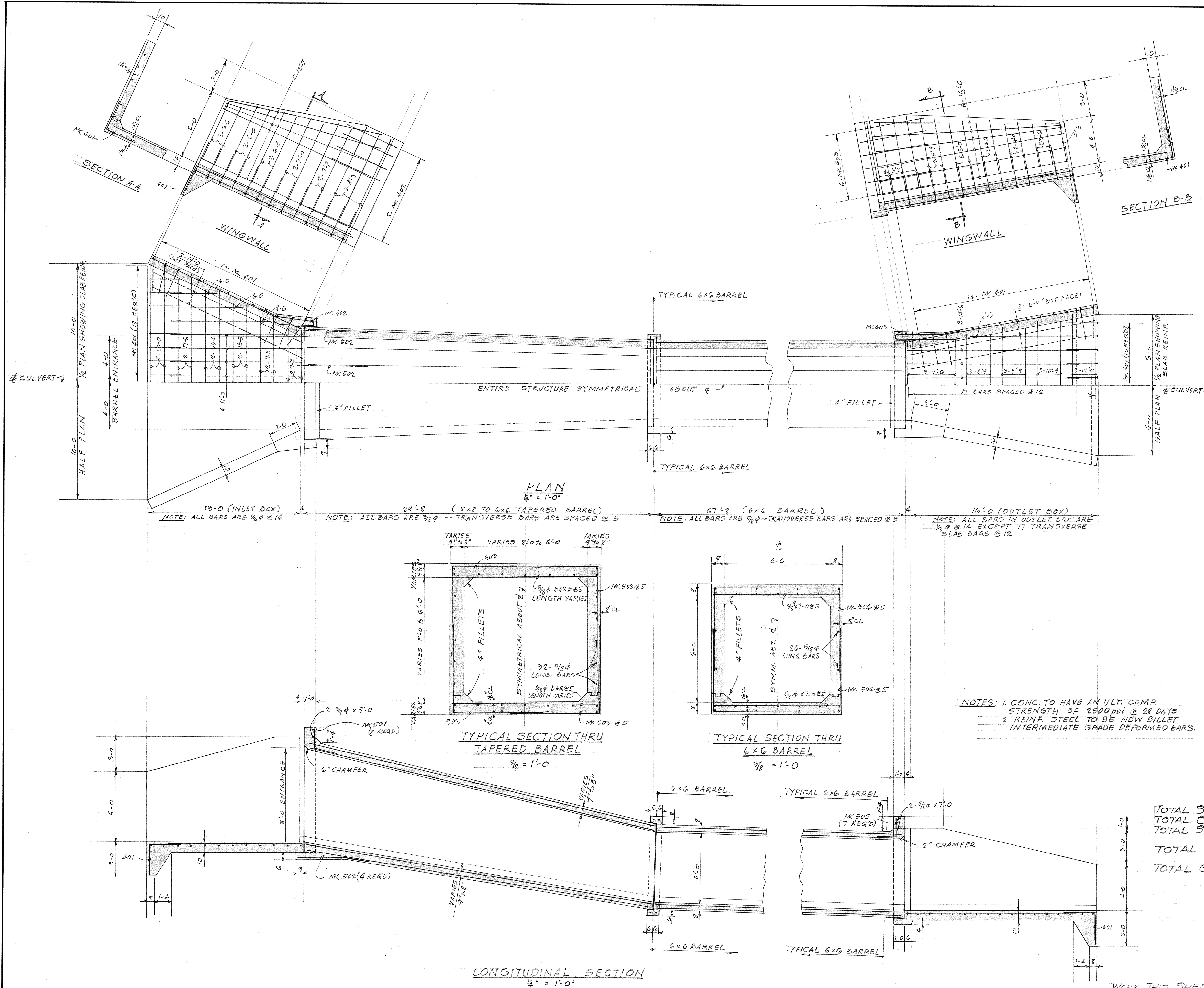
PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS CITY AND COUNTY OF HONOLULU		
BUREAU OF PLANS		
KALIHI TUNNEL		
KANEHOE APPROACH ROAD SECTION B		
JOB No. 31-52		
8x8 TO 6x6 REINF. CONC. BOX CULVERT		
B.L. STA. 38+75		
ENGINEER <i>J. S. S. Y.</i>	DATE <i>September 22, 1952</i>	
DRAFTSMAN <i>J. S. S. Y.</i>	CHECKED BY <i>W. L. LUM</i>	
SCALE <i>1" = 10'</i>	TRACER <i>S. Y.</i>	
APPROVED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	
CHIEF ENGINEER	BUREAU ENGINEER	
W. S.	PROFILE	G. B.
OR. SEC.	F. B.	S. B.
W. M. BY	F. W. BY	S. BY

WORK THIS SHEET WITH SHEET No. 27

FILE	POCKET	FOLDER	No.
7	2	2	26

Sheet No. 26 of 66 Sheets



LIST OF MATERIALS											
BENDING DIAGRAMS	MARK	NO.	SIZE	LENGTH	REMARKS	LB. STEEL	CU. CONC.				
 NK 401	401	44	1/2 φ	5-4	SLAB	156.8					
		2		20-0			26.7				
		2		17-6			23.4				
		2		15-6			20.7				
		2		13-3			17.7				
		10		11-3			15.2				
		2		9-3			12.4				
		6		4-0			56.0				
		2		4-0			5.3				
		2		6-0			9.0				
 NK 402	402	16	1/2 φ	7-11	SLAB	11.4					
		4		5-6			8.6				
		4		6-0			9.0				
		4		6-6			9.4				
		4		7-0			9.7				
		4		7-9			10.1				
		6		8-3			10.5				
		16		13-9			10.9				
		7		14-3			11.3				
		4		15-0			11.7				
 NK 403	501	7	5/8 φ	4-3	SLAB	31.1					
	502	4		6-0			25.0				
		2		9-0			18.8				
	401	38	1/2 φ	5-4		SLAB	135.4				
		5		7-6				25.1			
		3		8-9				17.6			
		3		9-9				19.6			
		3		10-9				21.6			
		3		12-0				24.0			
		6		14-6				58.1			
	2		9-3		12.4						
	6		16-0		64.1						
 NK 501	403	12	1/2 φ	11-0	SLAB		88.2				
		8		6-3			33.4				
		4		5-9			15.4				
		4		5-0			13.4				
		4		4-6			12.0				
		4		4-0			10.7				
		4		3-6			9.4				
		2		3-3			4.3				
		12		16-0			122.3				
	505	7	5/8 φ	3-4		SLAB	24.4				
	2		7-0		14.6						
503	292	5/8 φ	10-0	SLAB	3045.5						
	16		30-0				500.0				
	16		30-0				509.0				
504	326	5/8 φ	16-6		SLAB		5610.3				
	52		35-0					1898.3			
	326		7-0					2380.0			
	18	5/8 φ	9-0				SLAB	169.0			
	18		8-9						169.3		
	18		8-6					159.6			
	18		8-3					154.9			
	18		8-0			150.2					
	18		7-9			145.5					
	18		7-6			140.8					
	18		7-3		136.1						
	18		6-9								
	18		6-6								
	18		6-3								
	18		6-0								
	18		5-9								
	18		5-6								
	18		5-3								
	18		5-0								
	18		4-9								
	18		4-6								
	18		4-3								
	18		4-0								
	18		3-9								
	18		3-6								
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PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIH! TUNNEL
KANE OHE APPROACH ROAD SECTION B
JOB No. 31-52
8x8' TO 6x6' REINF. CONC. BOX CULVERT
B. L. STA. 38+75

ENGINEER... S.O.H. & R.W. DATE September 22, 1952
DRAFTSMAN... R.W. CHECKED BY... M. LUTT
SCALE... AS SHOWN TRACER... R.W.
APPROVED... APPROVED...
CHIEF ENGINEER... BUREAU ENGINEER...

W. S. CR. SEC. F. B. W. M. BY
O. B. S. B. S. BY

WORK THIS SHEET WITH SHEET No. 26

FILE POCKET FOLDER NO.
7 2 2 27

Sheet No. 27 of 66 Sheets

REINFORCING STEEL SCHEDULE

BENDING DIAGRAMS

The bending diagrams show the layout of reinforcement bars for a concrete slab. The diagrams are as follows:

- B601:** A horizontal bar with a vertical hook at each end. Dimensions: 11'-4" horizontal, 2'-0" vertical.
- B603:** A horizontal bar with a vertical hook at each end. Dimensions: 10'-3" horizontal, 1'-11" vertical, 1'-4" horizontal.
- H401:** A horizontal bar with a vertical hook at each end. Dimensions: 10'-3" horizontal, 1'-11" vertical, 1'-4" horizontal.
- NW 501, NW 502:** A horizontal bar with a vertical hook at each end. Dimensions: 10'-3" horizontal, 1'-11" vertical, 1'-4" horizontal.
- NW 401:** A horizontal bar with a vertical hook at each end. Dimensions: 10'-3" horizontal, 1'-11" vertical, 1'-4" horizontal.
- AG 601, AG 602, AG 603, AG 604, AG 605, AG 606:** A horizontal bar with a vertical hook at each end. Dimensions: 10'-3" horizontal, 1'-11" vertical, 1'-4" horizontal.
- A401, A402, A403, A404, A405, A406, A407, A408, A409, A410, A411, A412, A413:** A horizontal bar with a vertical hook at each end. Dimensions: 10'-3" horizontal, 1'-11" vertical, 1'-4" horizontal.
- C401, C402:** A horizontal bar with a vertical hook at each end. Dimensions: 10'-3" horizontal, 1'-11" vertical, 1'-4" horizontal.

BENT BARS

MARK	NO	SIZE	LGTH	WT.
B601	140	$\frac{3}{4}\phi$	16'-10"	3539.7
B603	280	"	14'-3"	5993.0
H401	84	$\frac{1}{2}\phi$	3'-3"	52.1
NW 501	18	$\frac{5}{8}\phi$	7'-0"	131.4
NW 502	18	"	7'-0"	131.4
NW 401	18	$\frac{1}{2}\phi$	18'-5"	221.4
AG 601	10	$\frac{3}{4}\phi$	14'-3"	214.0
AG 602	10	"	12'-7"	189.0
AG 603	10	"	11'-4"	170.2
AG 604	10	"	10'-4"	155.2
AG 605	18	"	10'-0"	270.4
AG 606	10	"	10'-7"	254.3
A401	2	$\frac{1}{2}\phi$	18'-8"	24.9
A414	2	"	14'-8"	19.6
C401	23	$\frac{1}{2}\phi$	6'-8"	102.5

STRAIGHT BARS

MARK	NO	SIZE	LGTH	WT.
B602	280	$\frac{3}{4}\phi$	11'-4"	4766.3
B501	150	$\frac{5}{8}\phi$	20'-0"	3129.0
B401	70	$\frac{1}{2}\phi$	11'-2"	582.2
B402	140	"	10'-0"	935.2
B403	90	"	20'-0"	1202.4
H501	6	$\frac{5}{8}\phi$	11'-4"	70.9
NW 601	18	$\frac{3}{4}\phi$	8'-4"	225.3
NW 602	18	"	9'-0"	243.3
NW 603	18	"	10'-0"	270.4
NW 604	80	"	10'-9"	322.9
NW 417	18	$\frac{1}{2}\phi$	14'-9"	177.4
A402	18	$\frac{1}{2}\phi$	17'-9"	213.4
A403	4	"	11'-0"	29.4
A404	4	"	6'-0"	16.0
A405	2	"	20'-8"	27.6
A406	2	"	19'-0"	25.4
A407	2	"	17'-2"	22.9
A408	2	"	15'-10"	21.2
A409	2	"	14'-0"	18.7
A410	3	"	12'-8"	25.4
A411	10	"	14'-9"	157.6
A412	7	"	12'-0"	56.1
A413	5	"	13'-0"	43.4
C402	3	"	20'-0"	40.1
C403	3	"	12'-0"	24.0

TOTAL WT. 11,469.1

TOTAL WT. 12,586.5

NOTES:
Concrete to have an ultimate compressive strength of 2500# per sq. in. @ 28 days.
Reinf. steel to be new billet intermediate grade deformed bars.

DEPARTMENT OF PUBLIC WORKS
 CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEHOE APPROACH ROAD SECTION B
 TERRITORIAL HIGHWAY DEPARTMENT
JOB No. 31-52
10' x 10' REIN. CONC. Box CULVERT
B.I. STA. 43+00
 ENGINEER *S. H. B. B. B.* DATE *September 22, 1922*
 DRAFTSMAN *J. J. B.* CHECKED BY *W. L. L.*
 SCALE *1" = 10'* TRACER *J. J. B.*
 APPROVED: *[Signature]* APPROVED: *[Signature]*
 CHIEF ENGINEER BUREAU ENGINEER

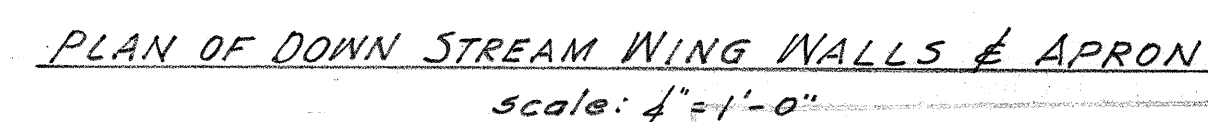
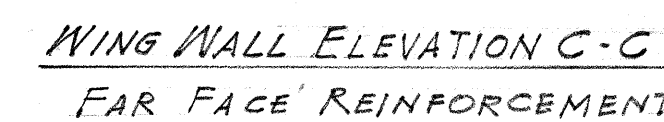
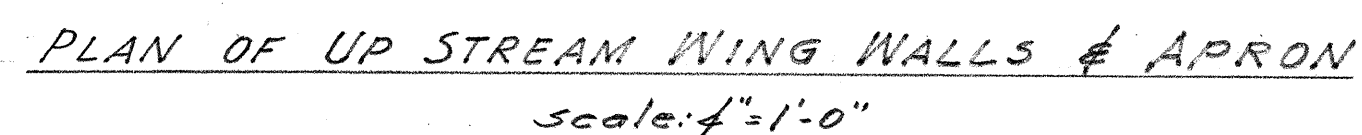
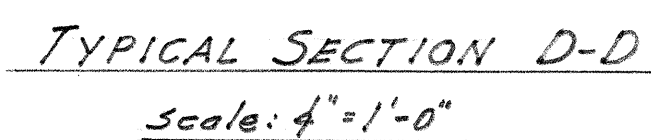
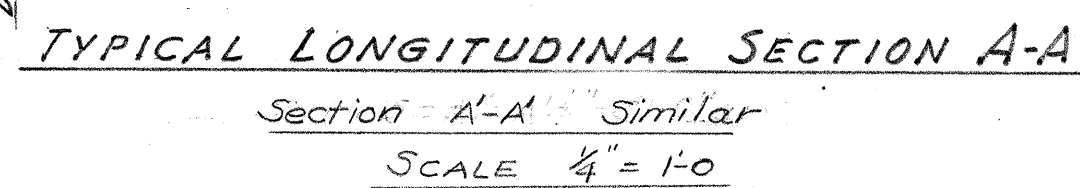
W. S.	PROFILE	C. B.
CR. SEC.	F. B.	S. B.
W. M. BY:	F. W. BY:	S. BY:

FILE	POCKET	FOLDER	No.
7	2	2	28

SHEET No. 28 OF 66 SHEETS

10-A

ORIGINAL PLAN	SURVEY PLOTTED BY _____		DATE _____
	DESIGNED BY _____		" _____
NOTE BOOK No. _____	DRAWN BY _____		" _____
	TRACED BY _____		" _____
	QUANTITIES BY _____		" _____
	QUANTITIES CHECKED BY _____		" _____
CHECKED BY _____		" _____	



PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEHOE APPROACH ROAD SECTION 13
JOB No. 31-52
10'x10' REINF. CONC. BOX CULVERT
B.L. STA. 43+00

ENGINEER S. H. E. C. Y. P. DATE September 28, 1952
DRAFTSMAN C. Y. P. CHECKED BY W. L. W.
SCALE As Shown TRACER C. Y. P.
APPROVED: _____ APPROVED: _____
Richardson W. L. W.
CHIEF ENGINEER BUREAU ENGINEER

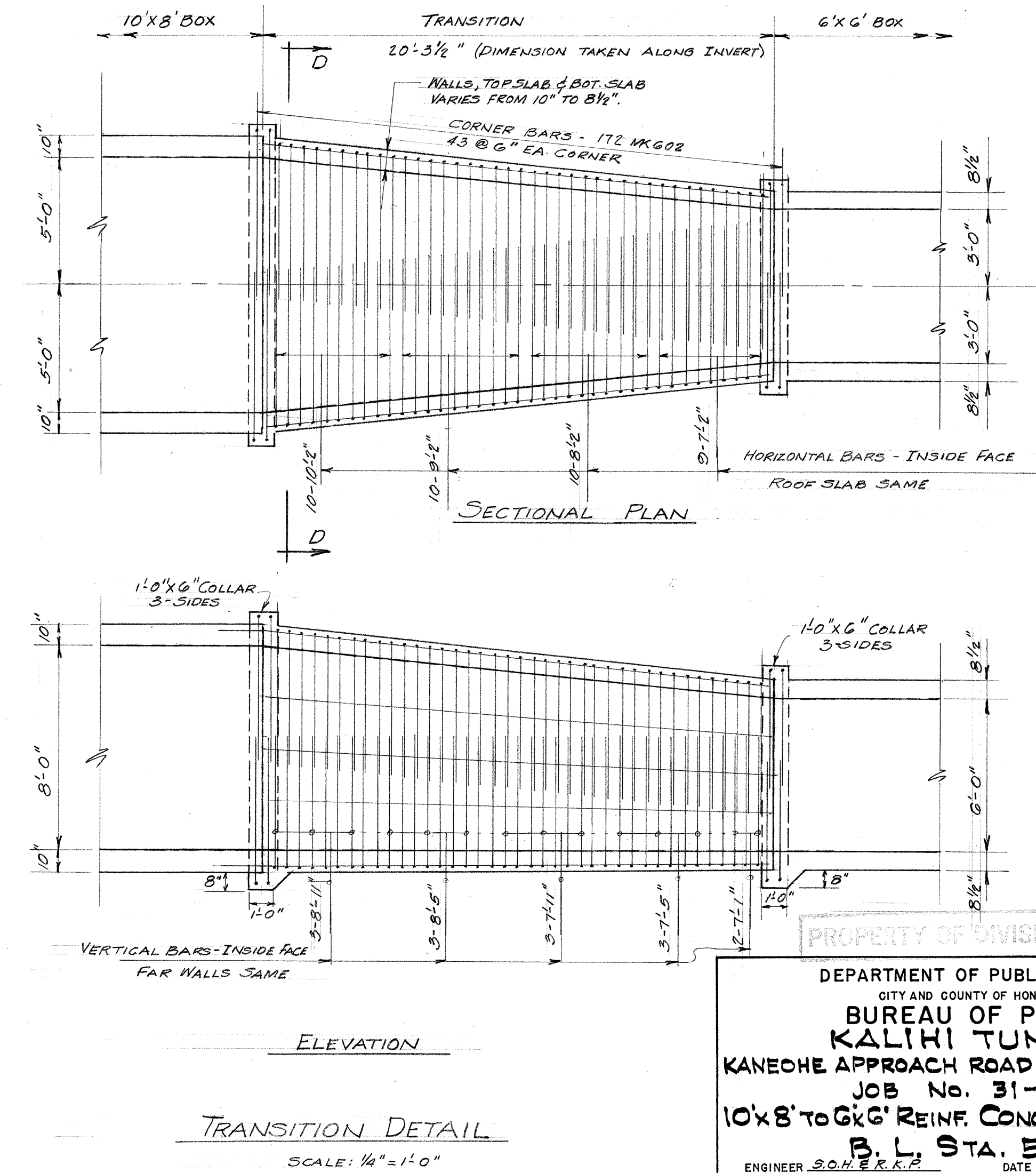
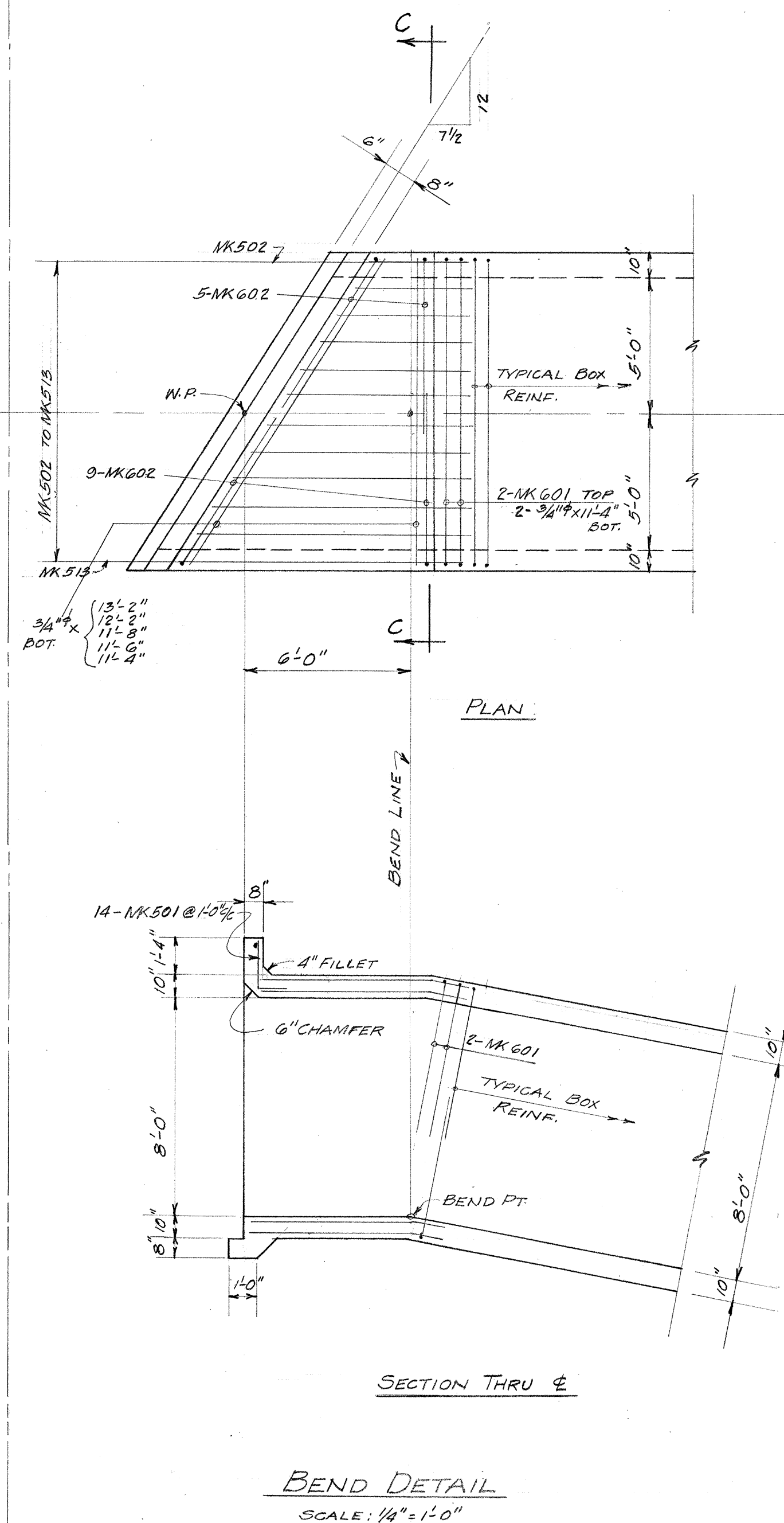
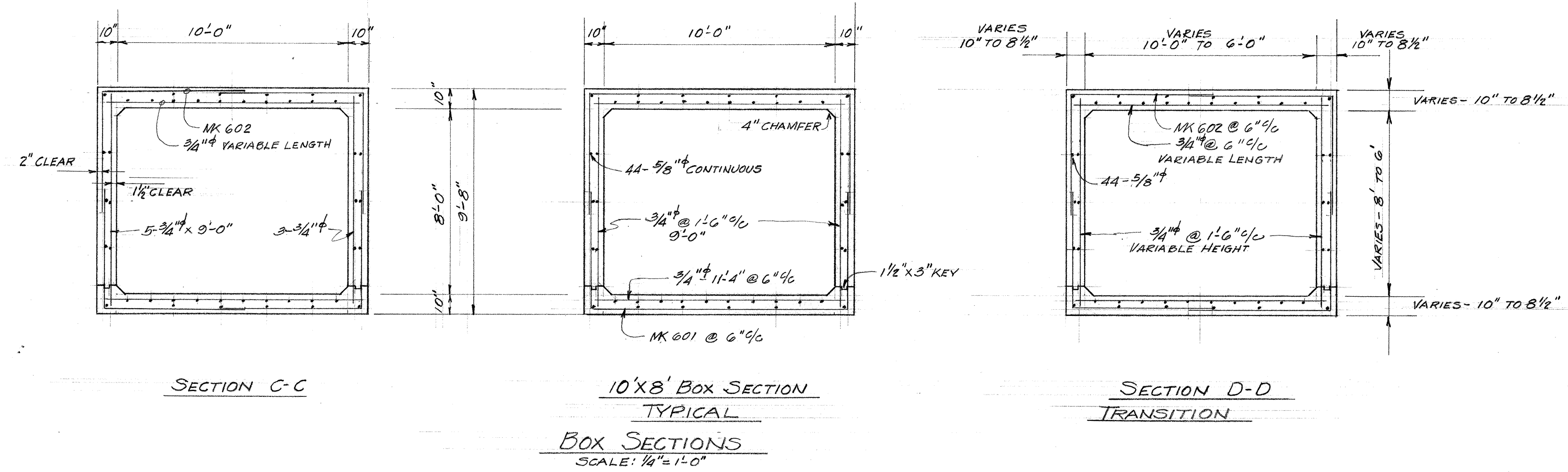
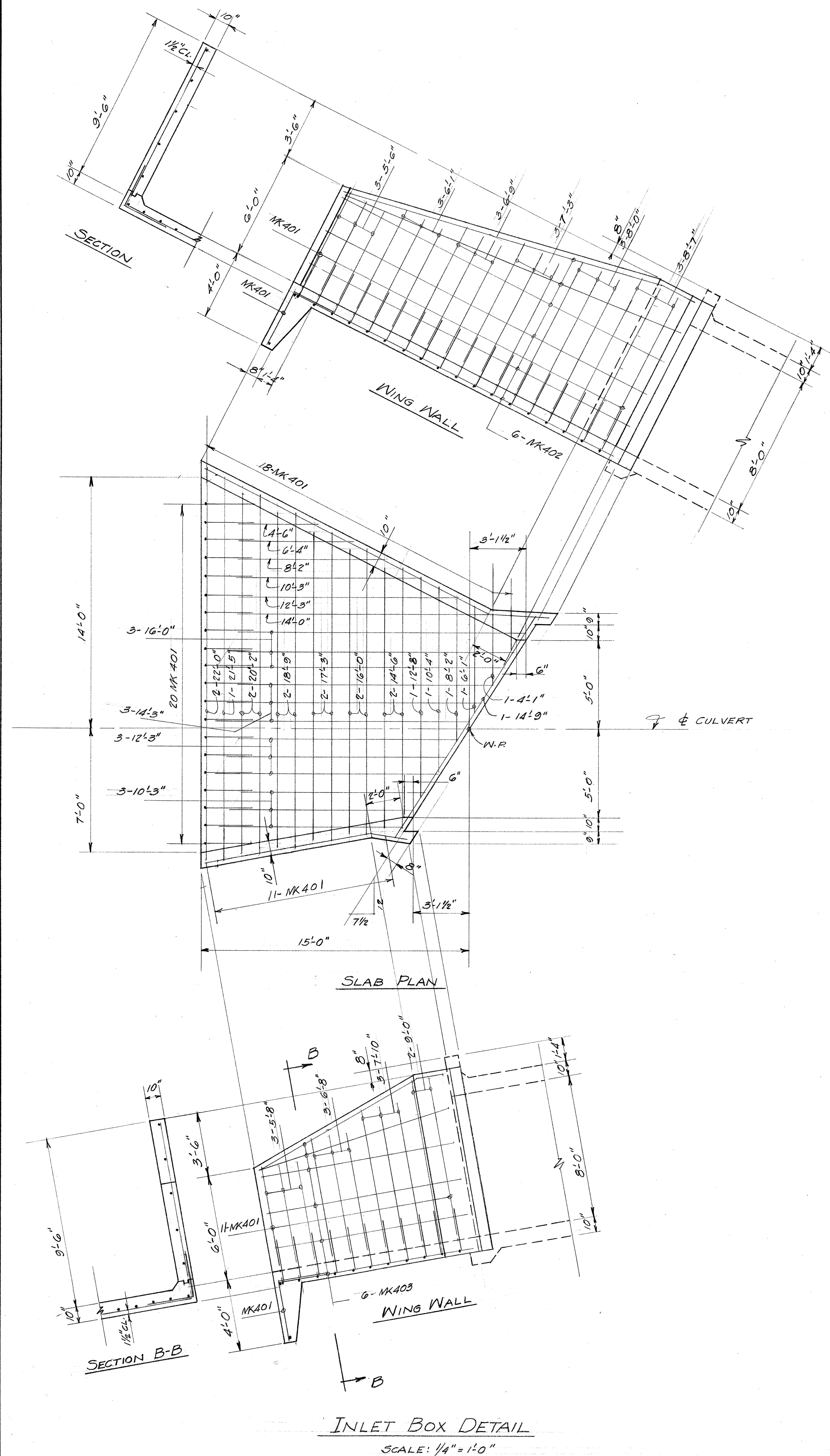
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CR. SEC.	F. B.	S. B.
W. M. BY:	F. W. BY:	S. BY:

WORK THIS SHEET WITH SHEET No. 28

FILE	POCKET	FOLDER	No.
7	2	2	29

Sheet No. 29 of 66 Sheets

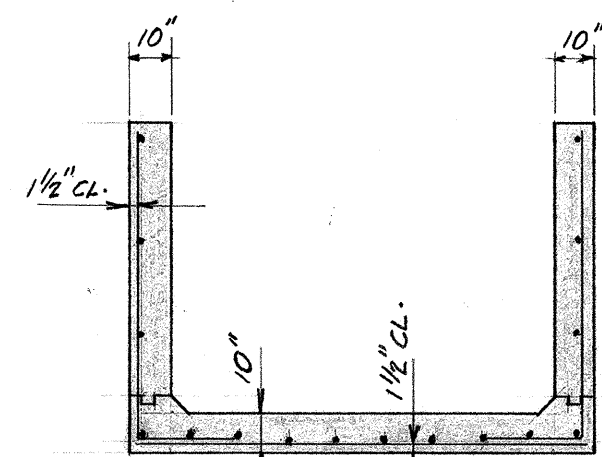
Sta. 43+00



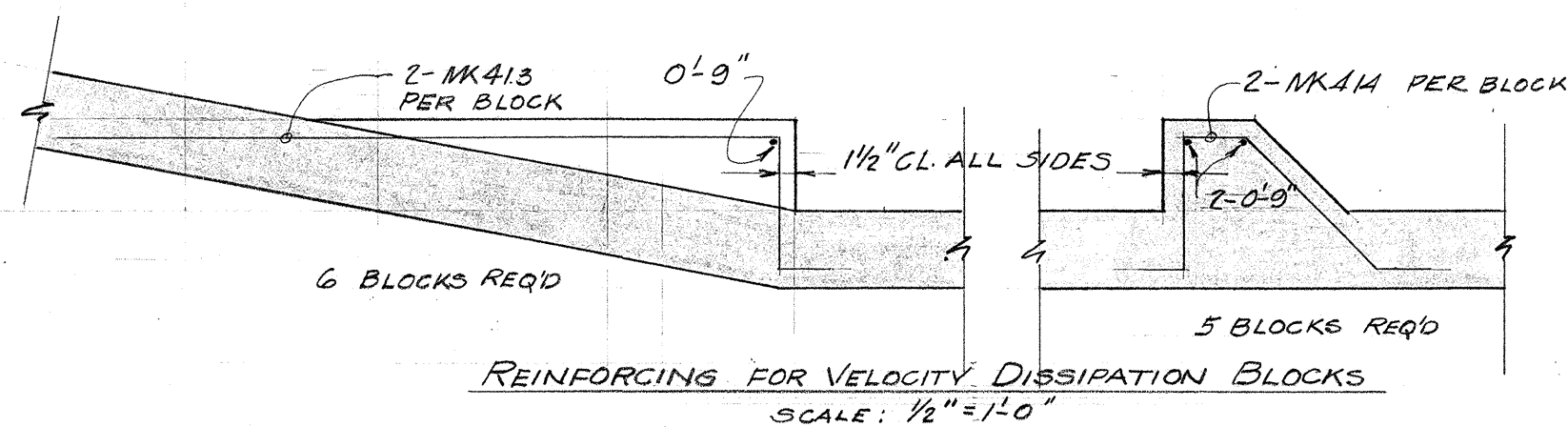
DEPARTMENT OF PUBLIC WORKS
 CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
 KANEHOE APPROACH ROAD SECTION B
 JOB No. 31-52
 10'x8' to G&G' REINF. CONC. BOX CULVERT
 B. L. STA. 50+35

ENGINEER S. H. R. K. P. DATE SEPTEMBER 22, 1952
 DRAFTSMAN R. K. P. CHECKED BY W. L. LUTT
 SCALE As Shown TRACER R. K. P.
 APPROVED: [Signature] APPROVED: [Signature]
 CHIEF ENGINEER BUREAU ENGINEER

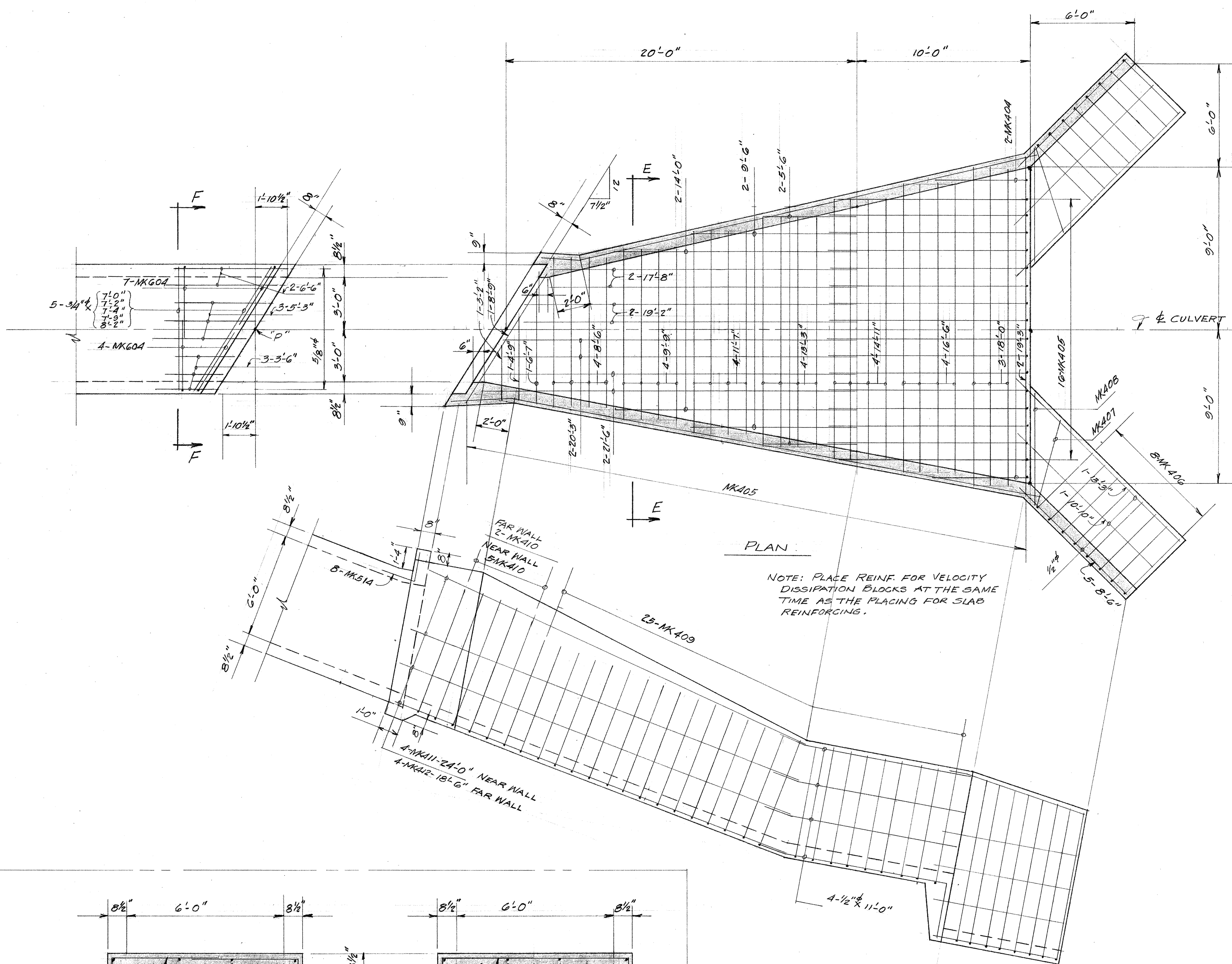
W. S.	PROFILE	C. B.
CR. SEG.	F. B.	S. B.
W. S. BY	F. W. BY	S. W. BY



SECTION E-E
SCALE: 1/4" = 1'-0"



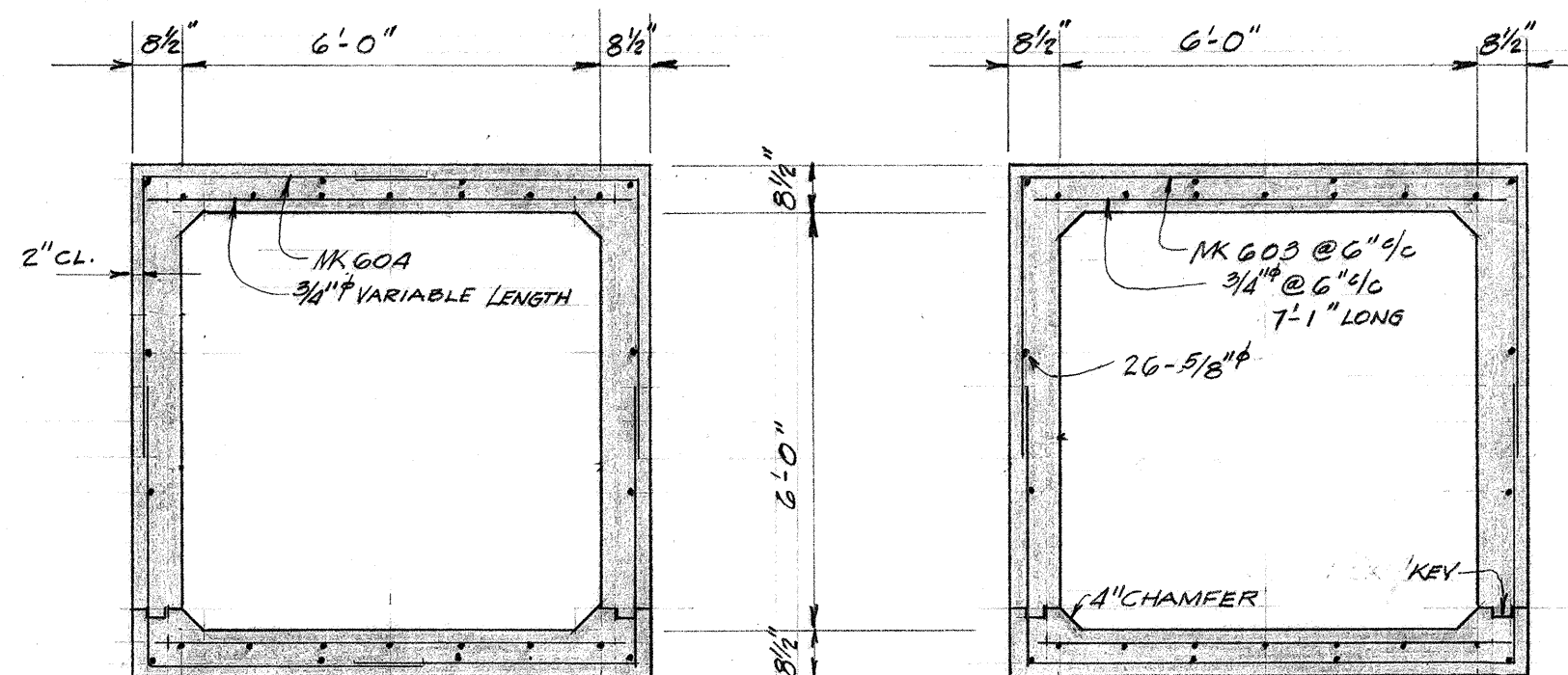
REINFORCING FOR VELOCITY DISSIPATION BLOCKS
SCALE: 1/2" = 1'-0"



NOTE: PLACE REINF. FOR VELOCITY DISSIPATION BLOCKS AT THE SAME TIME AS THE PLACING FOR SLAB REINFORCING.

ELEVATION

OUTLET BOX REINFORCING
SCALE: 1/4" = 1'-0"

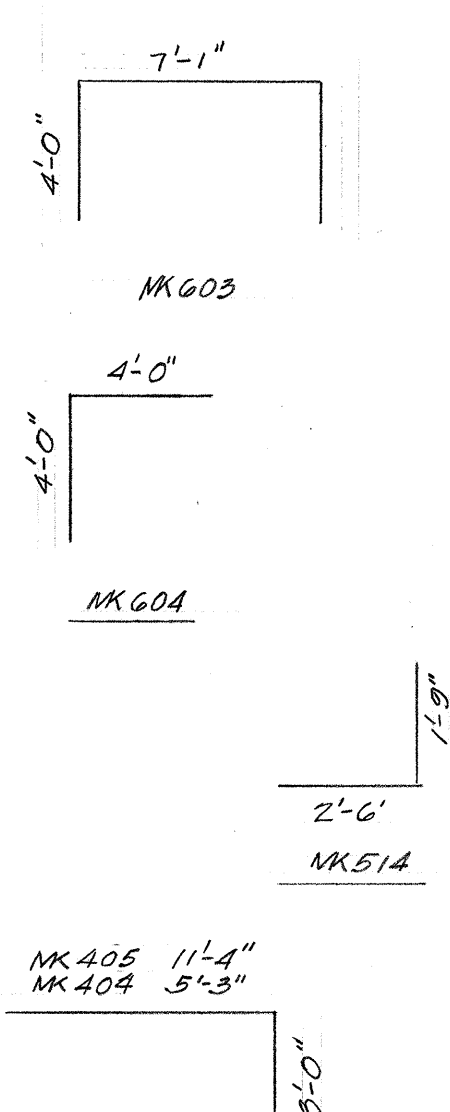
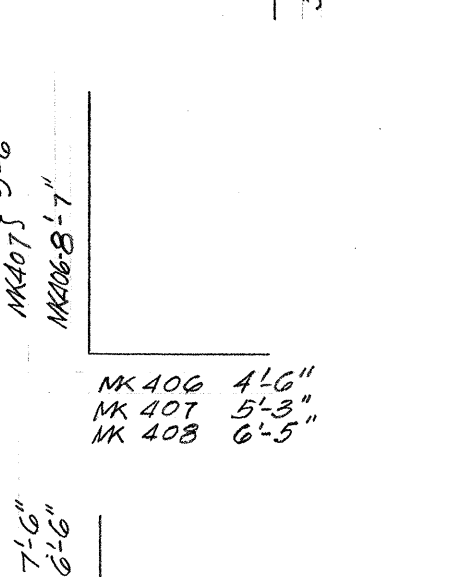
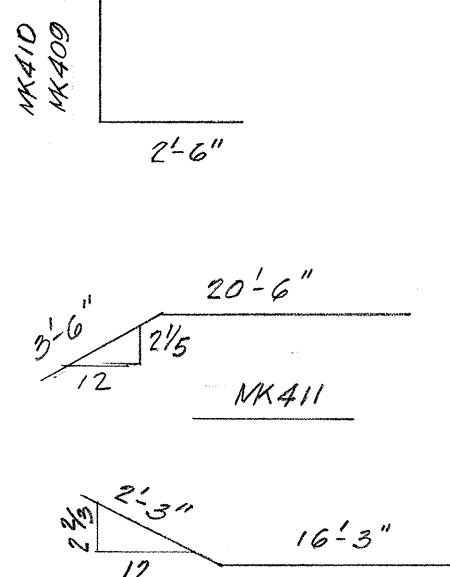
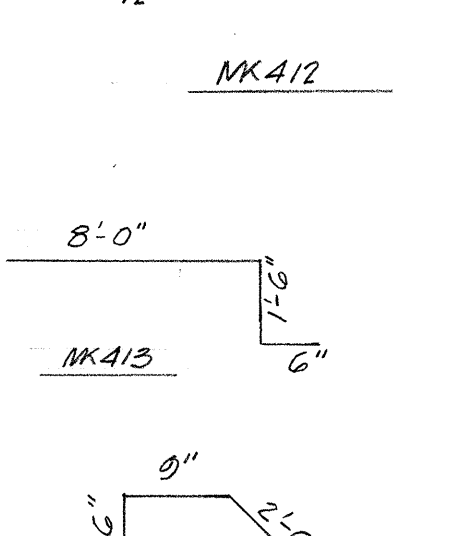
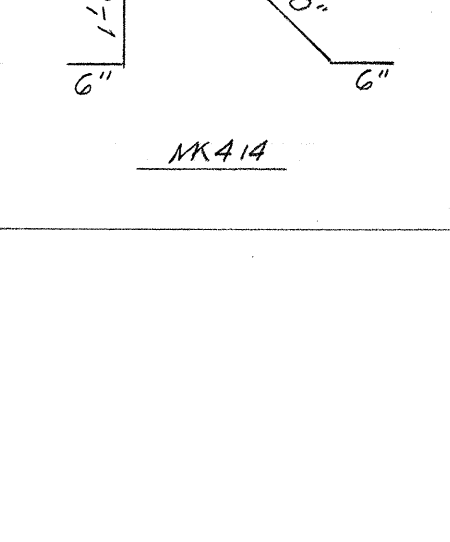


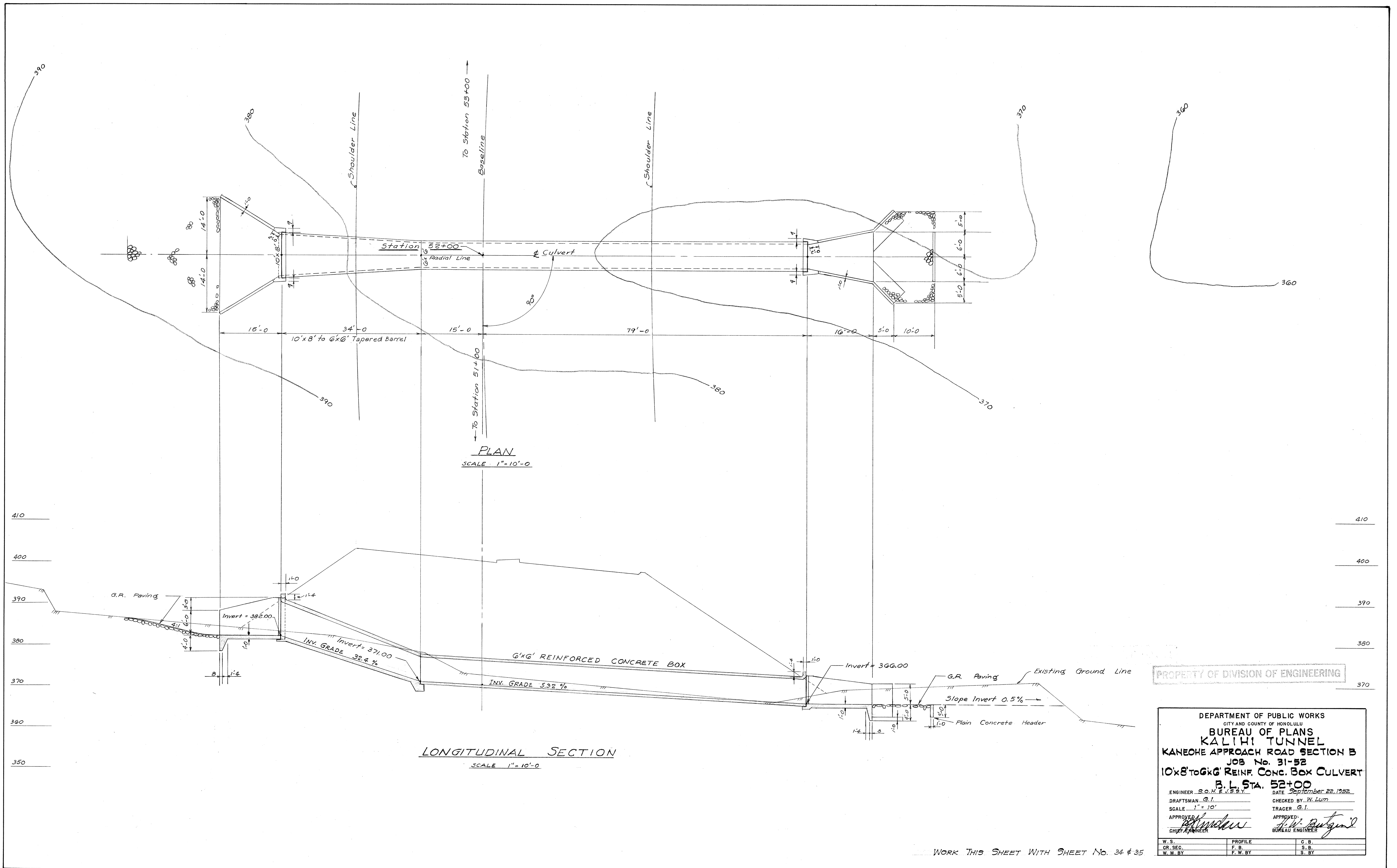
SECTION F-F

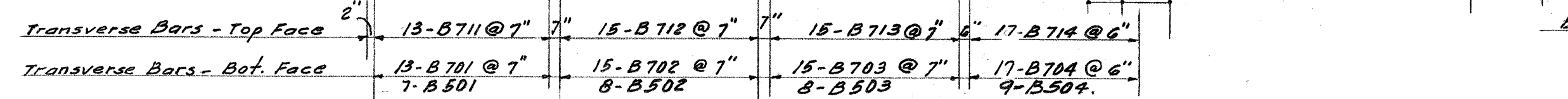
SCALE: 3/8" = 1'-0"

G'XG' BOX SECTION

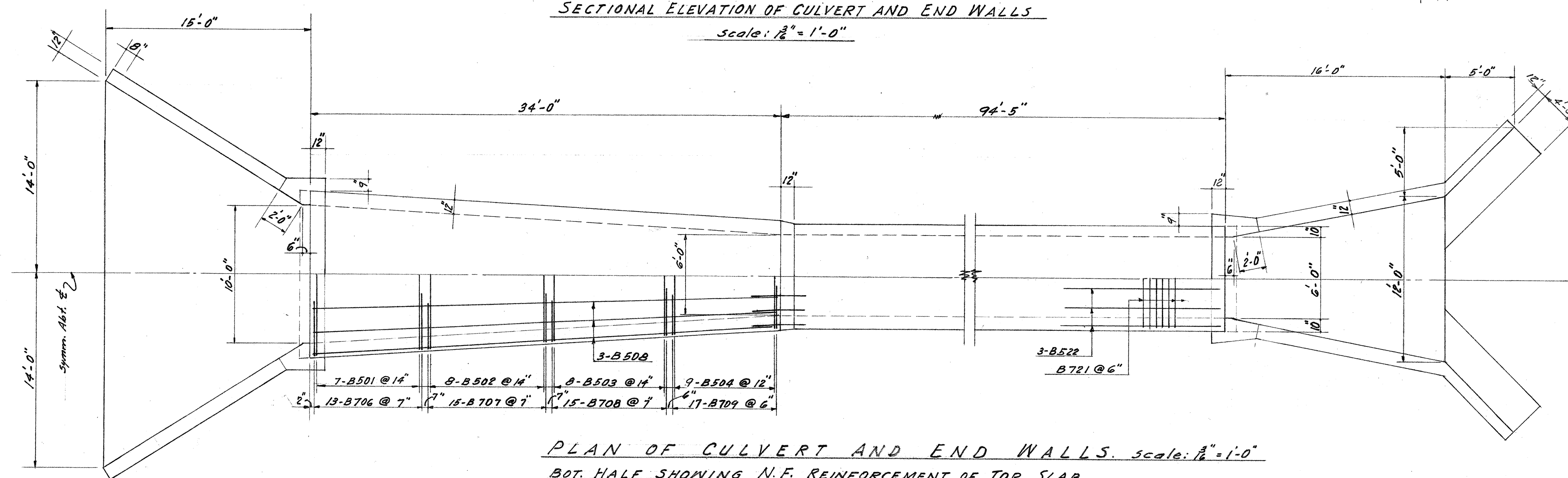
LIST OF MATERIAL

BENDING DIAGRAM ALL DIMENSIONS OUT TO OUT		MARK	NO. REQ'D	SIZE	LENGTH	REMARKS	LB. STEEL	C.Y. CONC.
		MK603	282	3/4"	15'-11"	6'x6' BOX		
			282	3/4"	7'-1"			
		MK604	26	5/8"	7'-1"			
			44	3/4"	8'-0"			
			2		7'-0"			
			2		7'-2"			
			2		7'-4"			
			2		7'-6"			
			2		8'-2"			
			12	5/8"	3'-6"			
			8		5'-3"			
			6		6'-6"			
		MK514	8		4'-3"			
		MK405	2	1/2"	8'-3"			
			16		14'-4"			
			2		5'-6"			
			2		9'-6"			
			2		14'-0"			
			2		17'-8"			
			2		19'-2"			
			2		20'-3"	OUTLET BOX		
			2		21'-6"			
			1		8'-9"			
			1		3'-2"			
			1		4'-9"			
			1		6'-7"			
			4		8'-6"			
			4		9'-0"			
			4		11'-7"			
			4		13'-3"			
			4		14'-11"			
			4		16'-6"			
			3		18'-0"			
			2		19'-3"			
		MK406	16		13'-1"			
		MK407	2		14'-9"			
		MK408	2		15'-11"			
			2		13'-3"			
			2		10'-10"			
			10		8'-6"			
			50		9'-0"			
		MK409	7		10'-0"			
		MK410	4		24'-0"			
		MK411	4		18'-6"			
			8		11'-0"			
		MK413	12		10'-0"			
		MK414	10		13'-6"			
			16		0'-9"			

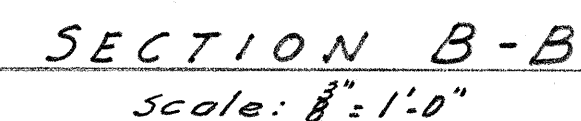
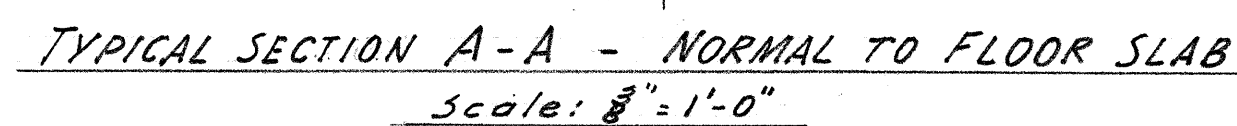




SECTIONAL ELEVATION OF CULVERT AND END WALLS
Scale: $\frac{3}{8}" = 1'-0"$



PLAN OF CULVERT AND END WALLS. Scale: $\frac{1}{8}" = 1'-0"$
BOT. HALF SHOWING N.F. REINFORCEMENT OF TOP SLAB



NOTES:
1. CONC. TO HAVE AN ULT. COMP STRENGTH
OF 2500 psi @ 28 DAYS.
2. REINF. STEEL TO BE NEW BILLET INTER.
GRADE DEFORMED BARS.

REINFORCING STEEL SCHEDULE

BENT BARS					STRAIGHT BARS					BENDING DIAGRAMS	
MARK	NO.	SIZE	LENGTH	WT.	MARK	NO.	SIZE	LENGTH	WT.		
B701	26	3/4	8-7	496	B711	26	3/4	10-11	580		
B702	30	"	8-1	496	B712	30	"	9-8	593		
B703	30	"	7-7	465	B713	30	"	8-8	532		
B704	34	"	7-1	492	B714	34	"	7-7	527		

B706	26	3 ϕ	12-6	G64							B701	4-3
B707	30	"	11-5	700	B621	380	2 ϕ	7-4	4184		B702	3-9
B708	30	"	10-4	G33							B703	3-3
B709	34	"	9-3	G13	B501	14	5 ϕ	10-11	150		B704	2-9

B505	34	7 1/2	17-0	1320	4	B502	16	"	2-8	161			
B721	380	7 1/2	17-0	1320	4	B503	16	"	8-8	145		B706	4-3
						B504	18	"	7-7	142		B707	2-9
B505	6	5 1/2	3-0	10		B506	2	"	7-7	16		B708	3-3
B507	7	"	3-0	58		B508	14	"	36-6	533		B709	2-9

B509	16	11	35-6	502				
B510	54		5-0	282				
B511	2	11-9		25				
B-522	64		20-0	2287	9	10	10	

B422	66	"	32-6	2257	B-706	B-707	B-708	B-709
B401	64	24	6-6	278				
B402	64	"	4-9	203				
B403	24	"	36-0	577				
B421	30	"	32-6	651				

H401	13	2φ	3-8	32	H501	3	58φ	11-9	37
H402	8	"	3-7	19	H502	3	"	7-5	23

	TOTAL	30,358
--	-------	--------

7-4
B 721

A diagram showing a right-angled triangle. The vertical side is labeled '4' and the horizontal side is labeled '6'. The hypotenuse is labeled '1-6'.

12
B505
1-6

2-6

4" d' 5-8 12 4
B507 2-0

							H401	H402
--	--	--	--	--	--	--	------	------

TOTAL	STEEL	REQ'D.	=	32,939 [#]
TOTAL	CONC.	REQ'D.	=	281 c.y.
TOTAL	STRUC. EXC.	REQ'D.	=	265 c.y.
TOTAL	UNCL. EXC.	REQ'D.	=	215 c.y.
TOTAL	G.R. PAVING	REQ'D.	=	89 s.y.

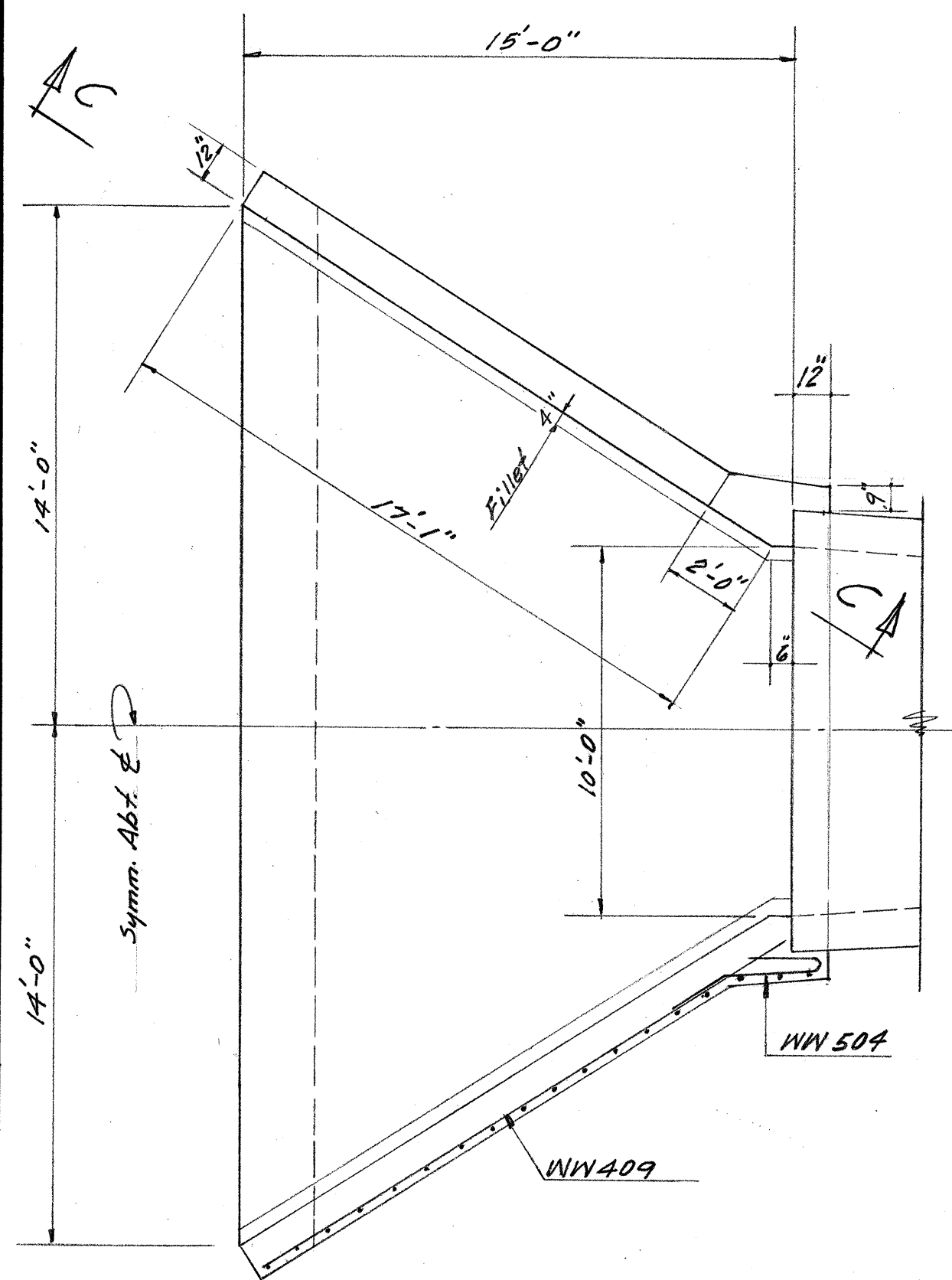
PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS CITY AND COUNTY OF HONOLULU BUREAU OF PLANS KALIHI TUNNEL KANEOHE APPROACH ROAD SECTION B JOB No. 31-52 10X8 TO 6X6 REINF. CONC. BOX CULVERT B. L. STA. 52+00	
ENGINEER <i>S. O. H. & S. K. P.</i>	DATE <i>September 22, 1952</i>
DRAFTSMAN <i>S. K. P.</i>	CHECKED BY <i>W. Lum</i>
SCALE <i>As Shown</i>	TRACER <i>S. K. P.</i>
APPROVED <i>[Signature]</i>	APPROVED <i>[Signature]</i>
CHIEF ENGINEER	BUREAU ENGINEER

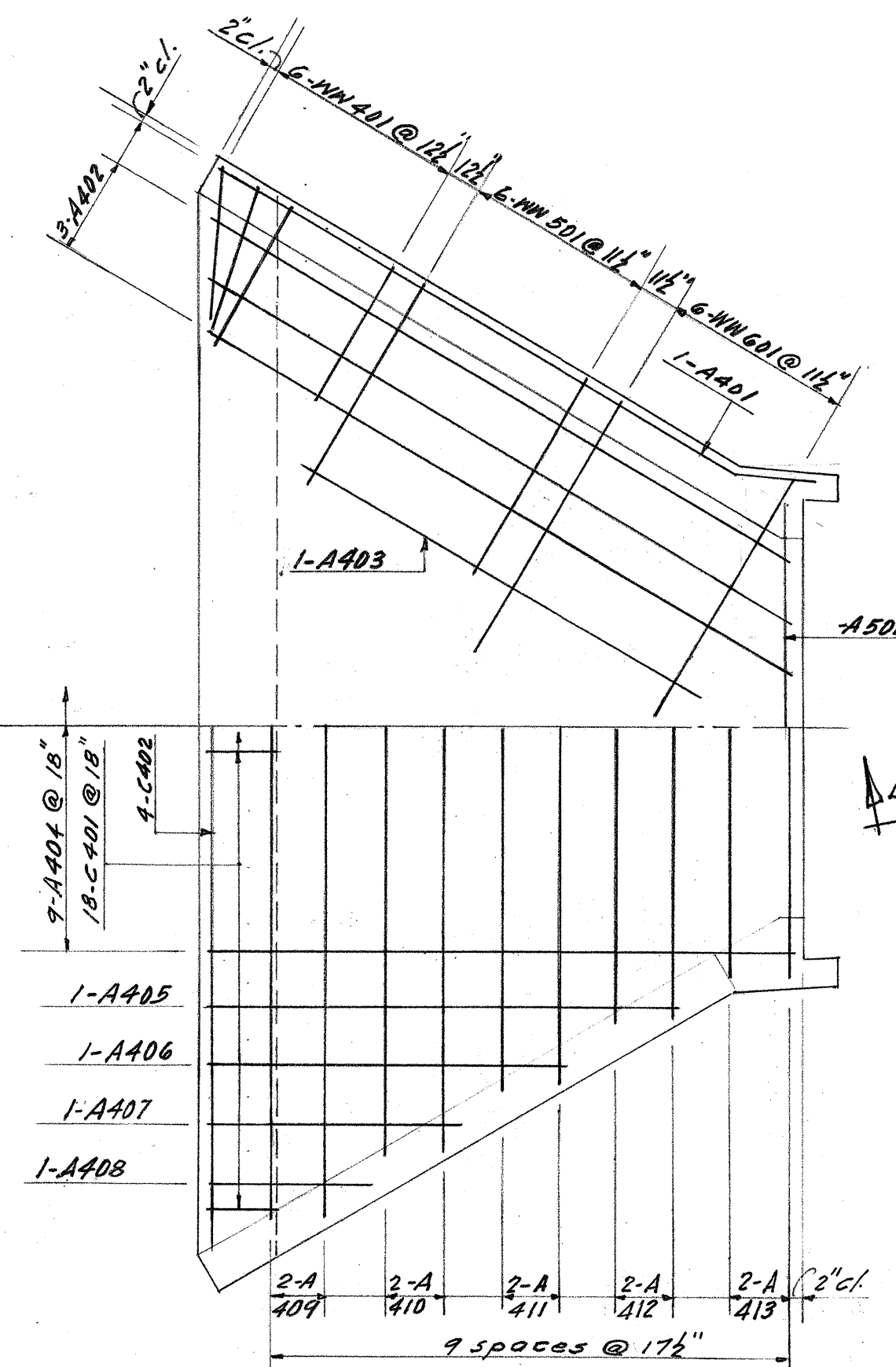
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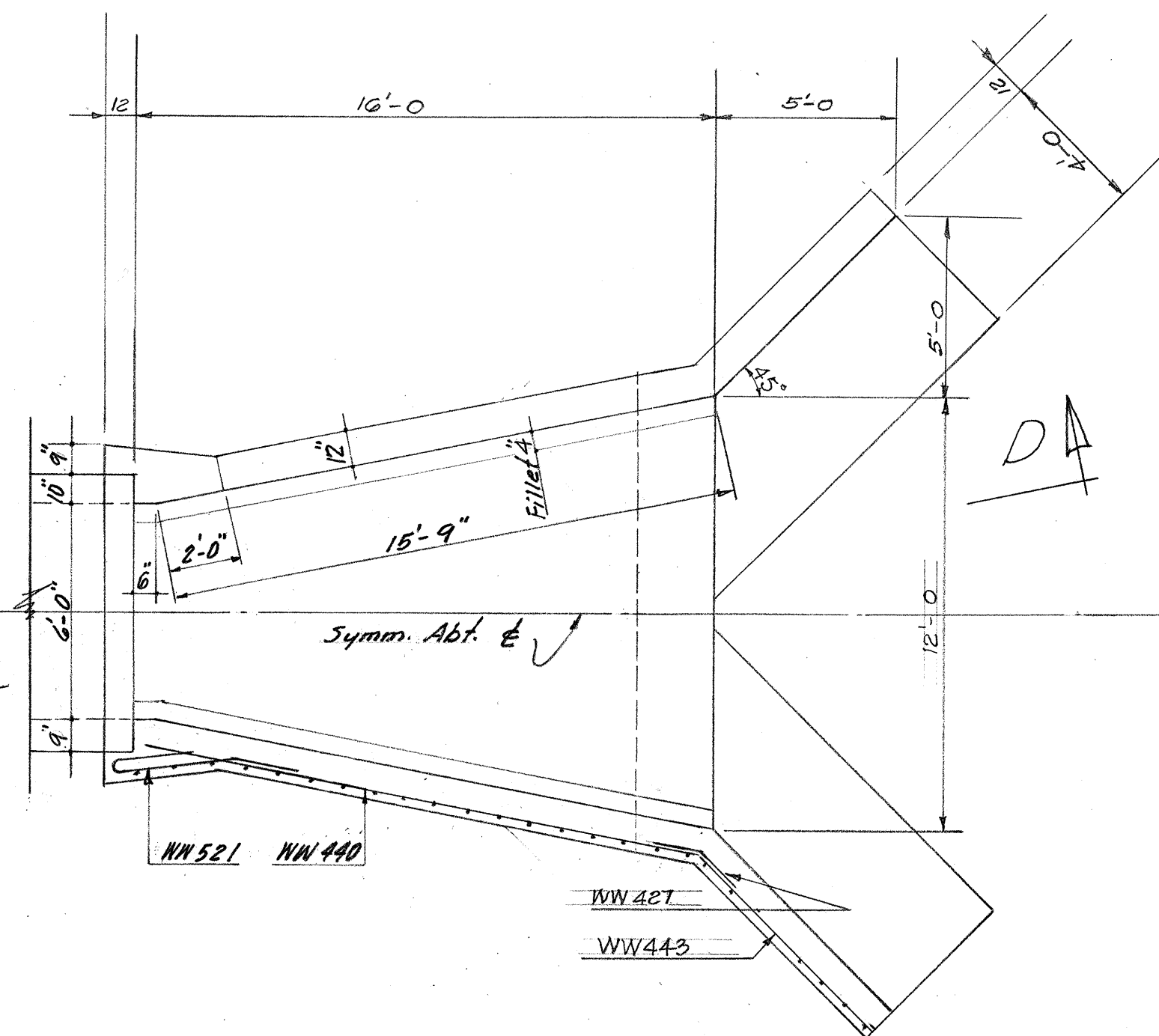
Sheet No. 34 of 66 Sheets



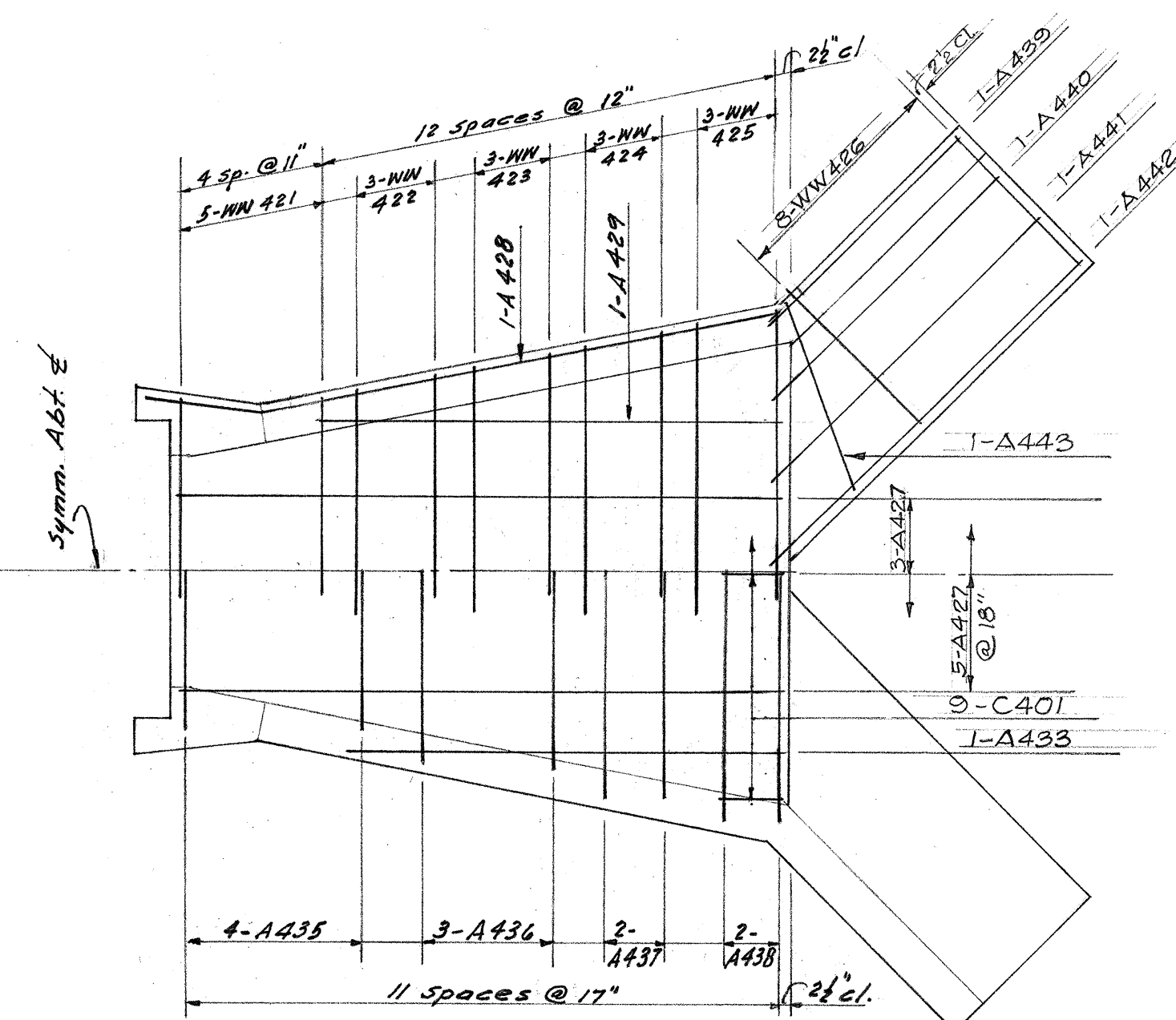
PLAN OF UP STREAM WING WALLS & APRON
Scale: 4"=1'-0"



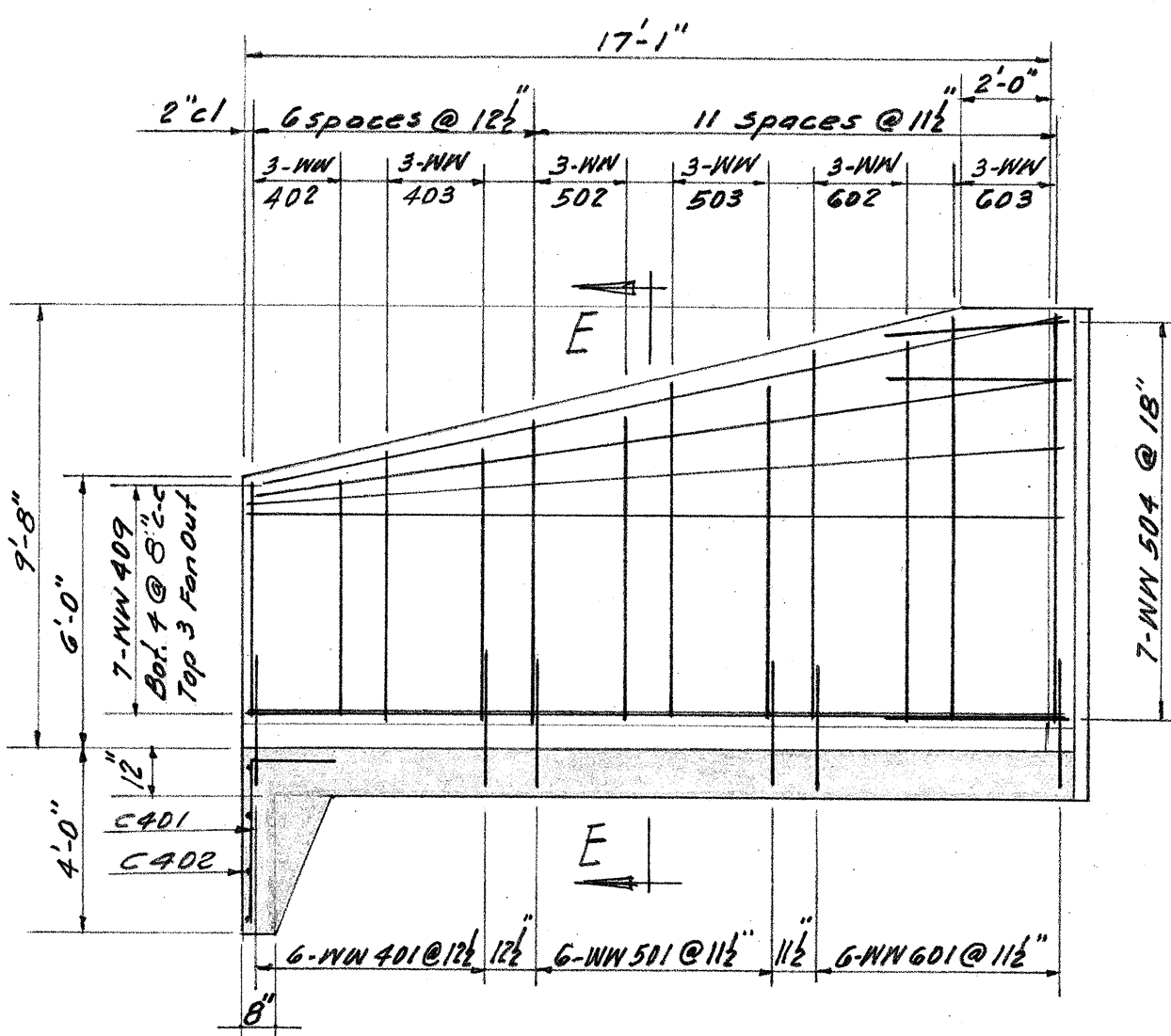
PLAN OF UP STREAM APRON REINFORCEMENT
TOP HALF SHOWING F.F. BOT. HALF SHOWING N.F.



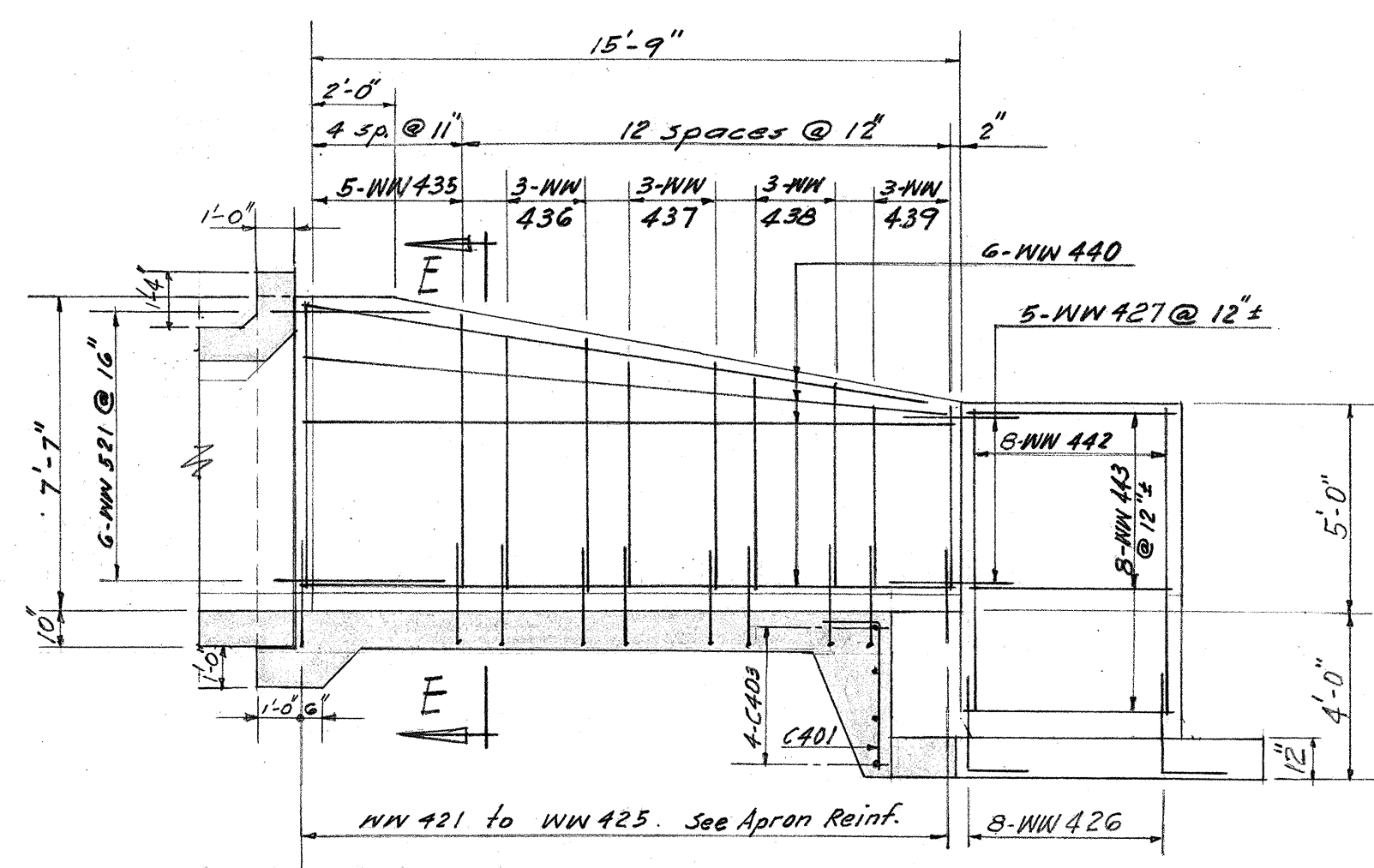
PLAN OF DOWN STREAM WING WALLS & APRON
Scale: 4"=1'-0"



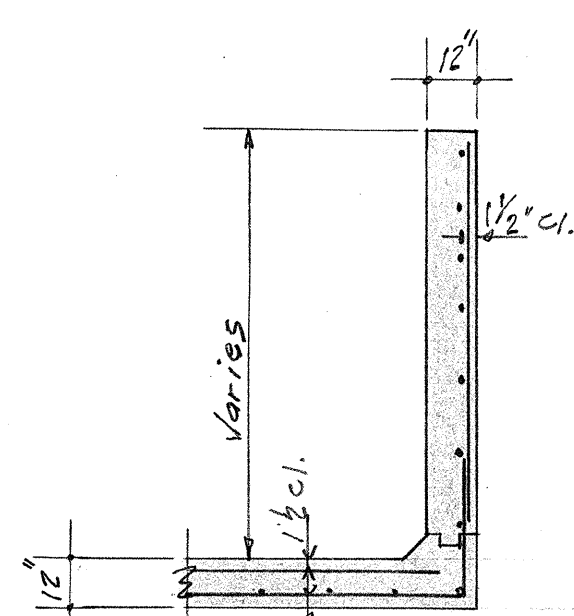
PLAN OF DOWN STREAM APRON REINFORCEMENT
TOP HALF SHOWING F.F. BOT. HALF SHOWING N.F.



UP STREAM WING WALL ELEVATION C-C
Scale: 4"=1'-0"



DOWN STREAM WING WALL ELEVATION D-D
Scale: 4"=1'-0"



TYPICAL SECTION E-E
Scale: 4"=1'-0"

REINFORCING STEEL SCHEDULE

Bent Bars					Straight Bars					Bending Diagrams					
Mark	No.	Size	Lgth.	Wt.	Mark	No.	Size	Lgth.	Wt.						
NW 601	12	3/4"	11-4	203	NW 602	6	3/4"	8-0	72						
NW 501	12	3/4"	7-5	118	NW 603	6	"	9-0	81						
NW 504	14	"	6-6	95	NW 502	6	3/4"	7-0	44						
NW 521	12	"	6-10	85	NW 503	6	"	7-6	47						
NW 401	12	3/4"	7-3	58	NW 402	6	3/4"	5-4	21						
NW 421	10	"	8-3	55	NW 403	6	"	5-9	23						
NW 422	6	"	9-0	36	NW 409	14	"	17-2	160						
NW 423	6	"	9-8	39	NW 435	10	"	6-11	46						
NW 424	6	"	10-4	41	NW 436	6	"	6-4	25						
NW 425	6	"	11-0	44	NW 437	6	"	5-9	23						
NW 426	16	"	7-6	80	NW 438	6	"	5-2	21						
NW 427	10	"	2-6	17	NW 439	6	"	4-7	19						
					NW 440	12	"	16-0	128						
					NW 442	16	"	7-5	79						
					NW 443	16	"	6-11	74						
A 401	2	3/4"	17-5	23	A 501	1	3/4"	12-2	13						
A 428	2	"	16-7	22	A 402	6	3/4"	17-4	67						
					A 403	2	"	12-0	16						
					A 404	9	"	14-8	88						
					A 405	2	"	12-0	16						
					A 406	2	"	9-8	13						
					A 407	2	"	6-8	9						
					A 408	2	"	3-6	5						
					A 409	2	"	26-0	35						
					A 410	2	"	22-0	29						
					A 411	2	"	13-0	24						
					A 412	2	"	14-0	19						
					A 413	2	"	13-6	18						
					A 427	8	"	15-8	84						
					A 433	2	"	11-4	15						
					A 435	4	"	8-8	23						
					A 436	3	"	10-4	21						
					A 437	2	"	12-0	16						
					A 438	2	"	13-8	17						
					A 439	2	"	7-0	9						
					A 440	2	"	8-1	11						
					A 441	2	"	9-2	12						
					A 442	2	"	10-3	14						
					A 429	2	"	12-0	16						
					A 443	4	"	5-0	7						
					C 402	4	3/4"	28-0	75						
					C 403	4	"	12-8	32						
C 401	27	3/4"	5-4	96	Total					2581*					

PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHU TUNNEL
KANEHE APPROACH ROAD SECTION B
JOB NO. 31-52
10x8 to 6x6 REINF. CONC. BOX CULVERT
B.L. STA. 52+00

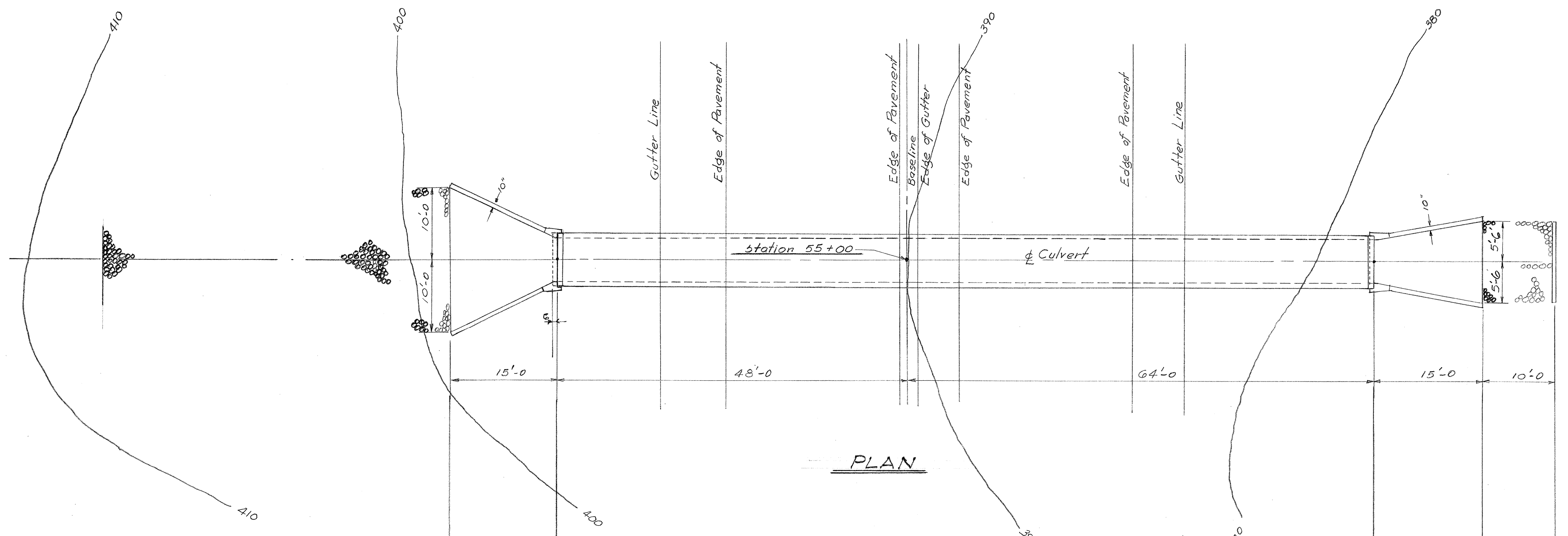
ENGINEER: S.O.H. & C.Y.R. DATE: September 22, 1952
DRAFTSMAN: C.Y.R. CHECKED BY: W. Lum
SCALE: AS SHOWN TRACER: C.Y.R.
APPROVED: [Signature] APPROVED: [Signature]
CHIEF ENGINEER: [Signature] BUREAU ENGINEER: [Signature]

W. S. CR. SEC. F. B. W. M. BY. PROFILE F. B. F. W. BY. C. B. S. B. S. BY.

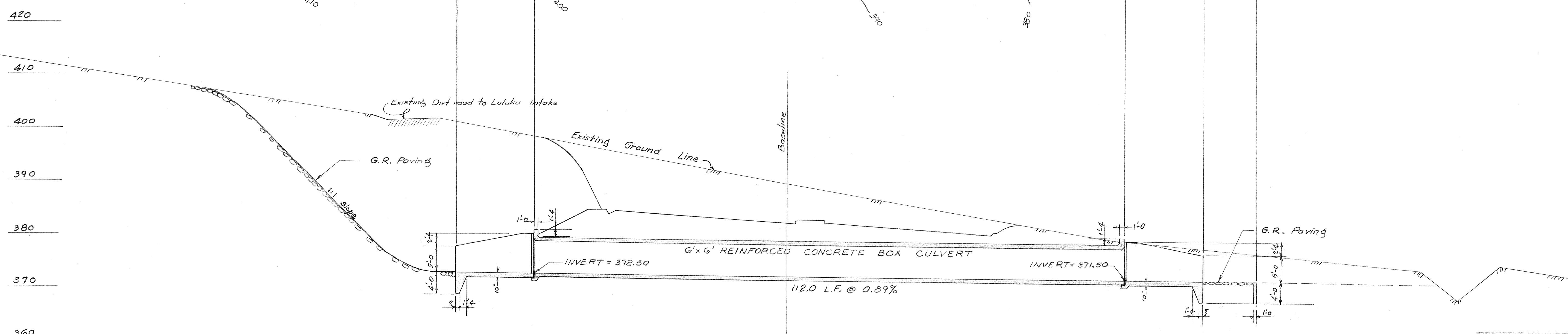
WORK THIS SHEET WITH SHEET NOS. 33 & 34

FILE	POCKET	FOLDER	No.
7	2	2	35

Sheet No. 35 of 66 Sheets



PLAN



LONGITUDINAL SECTION
1" = 10'-0"

PROPERTY OF DIVISION OF ENGINEERING

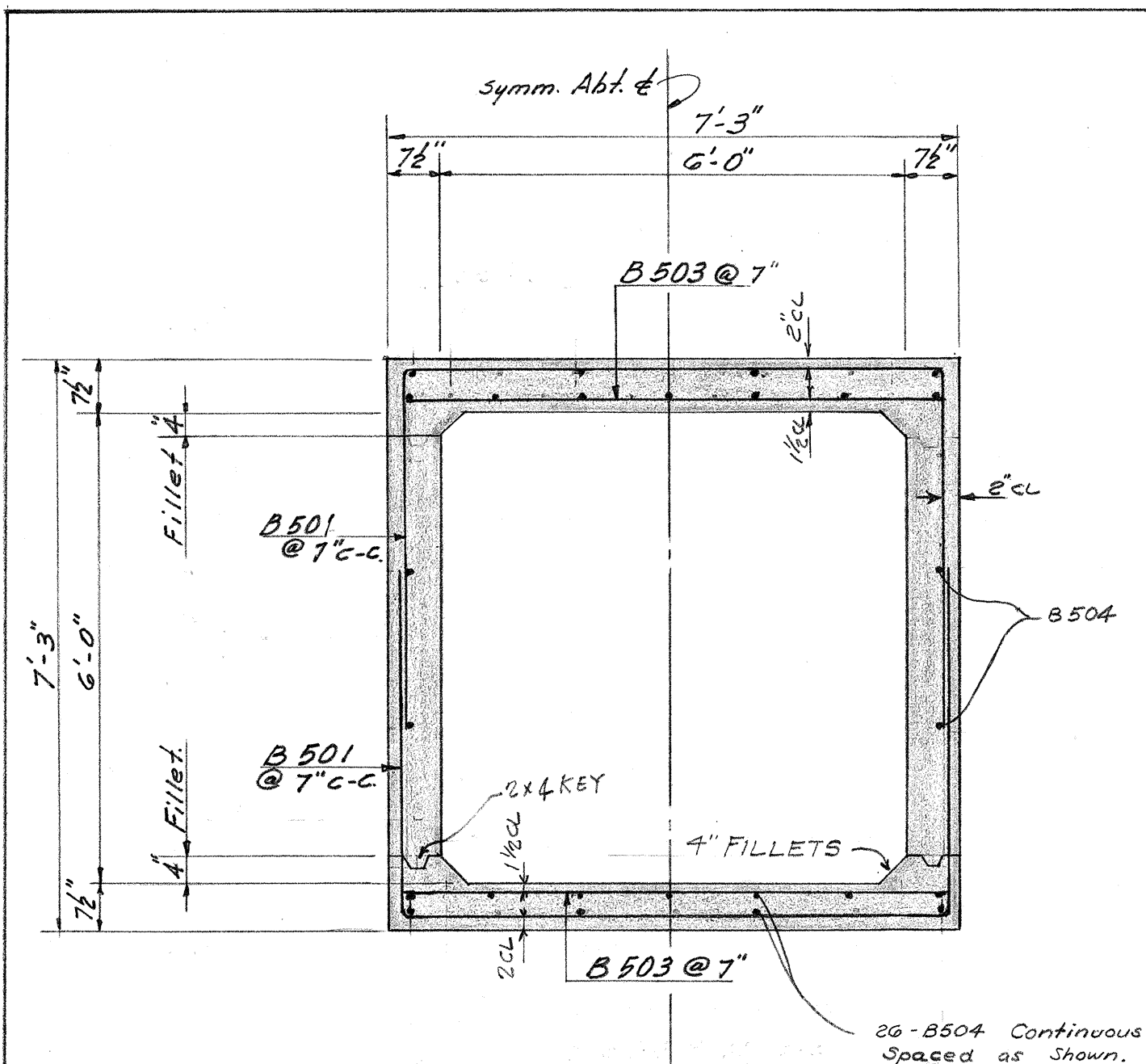
DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHI TUNNEL
KANEHOE APPROACH ROAD SECTION B
JOB No. 31-52
6'x6' REINF. CONC. BOX CULVERT
B.L. STA. 55+00

ENGINEER: G. H. J. S. B. Y. DATE: September 22, 1952
DRAFTSMAN: G. L. CHECKED BY: W. L. G. M.
SCALE: 1" = 10' TRACER: G. L.
APPROVED: [Signature] APPROVED: [Signature]
CHIEF ENGINEER BUREAU ENGINEER

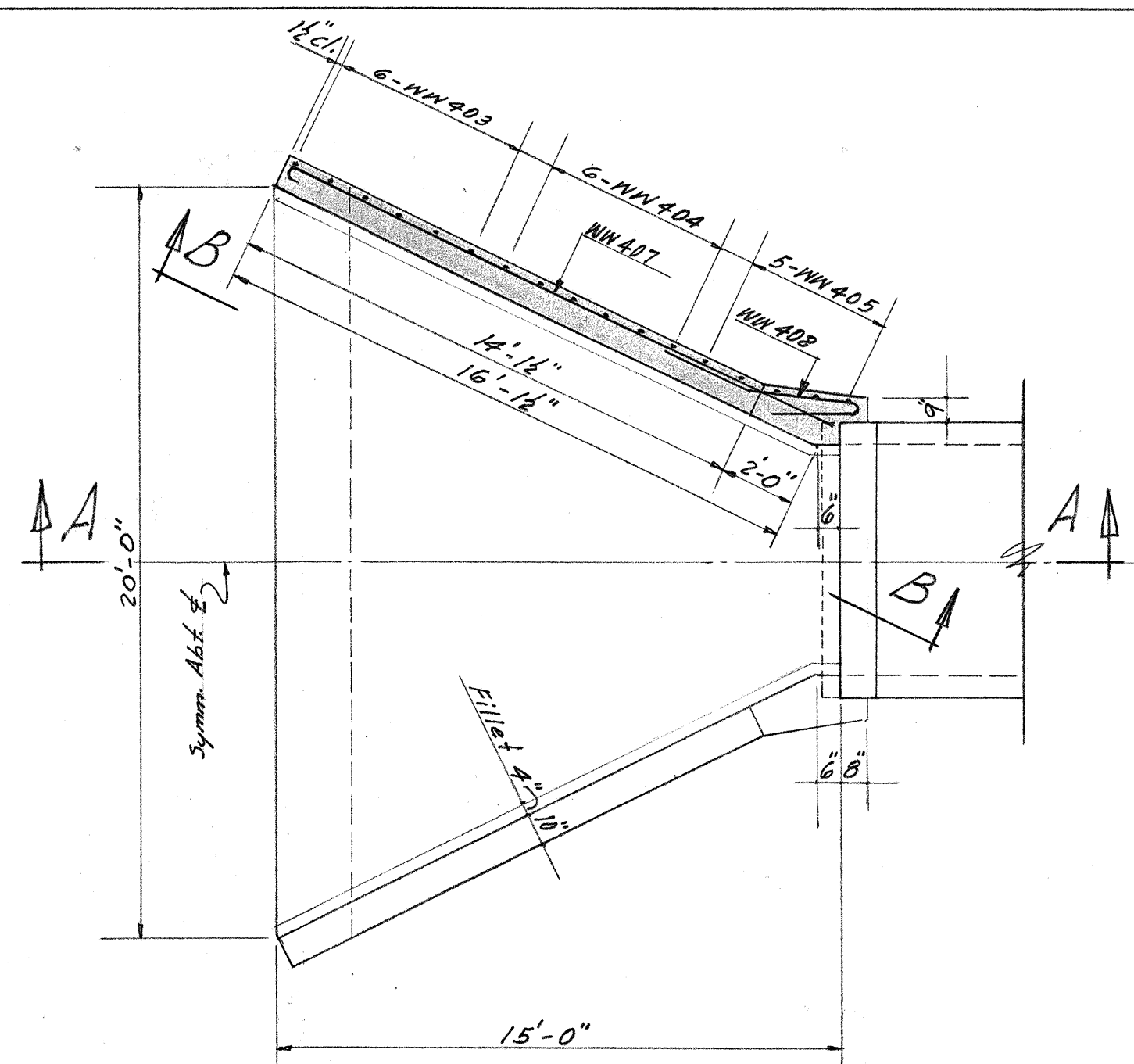
W. S.	PROFILE	C. B.
OR. SEC.	F. B.	S. B.
W. M. BY	F. W. BY	S. BY

WORK THIS SHEET WITH SHEET No. 37

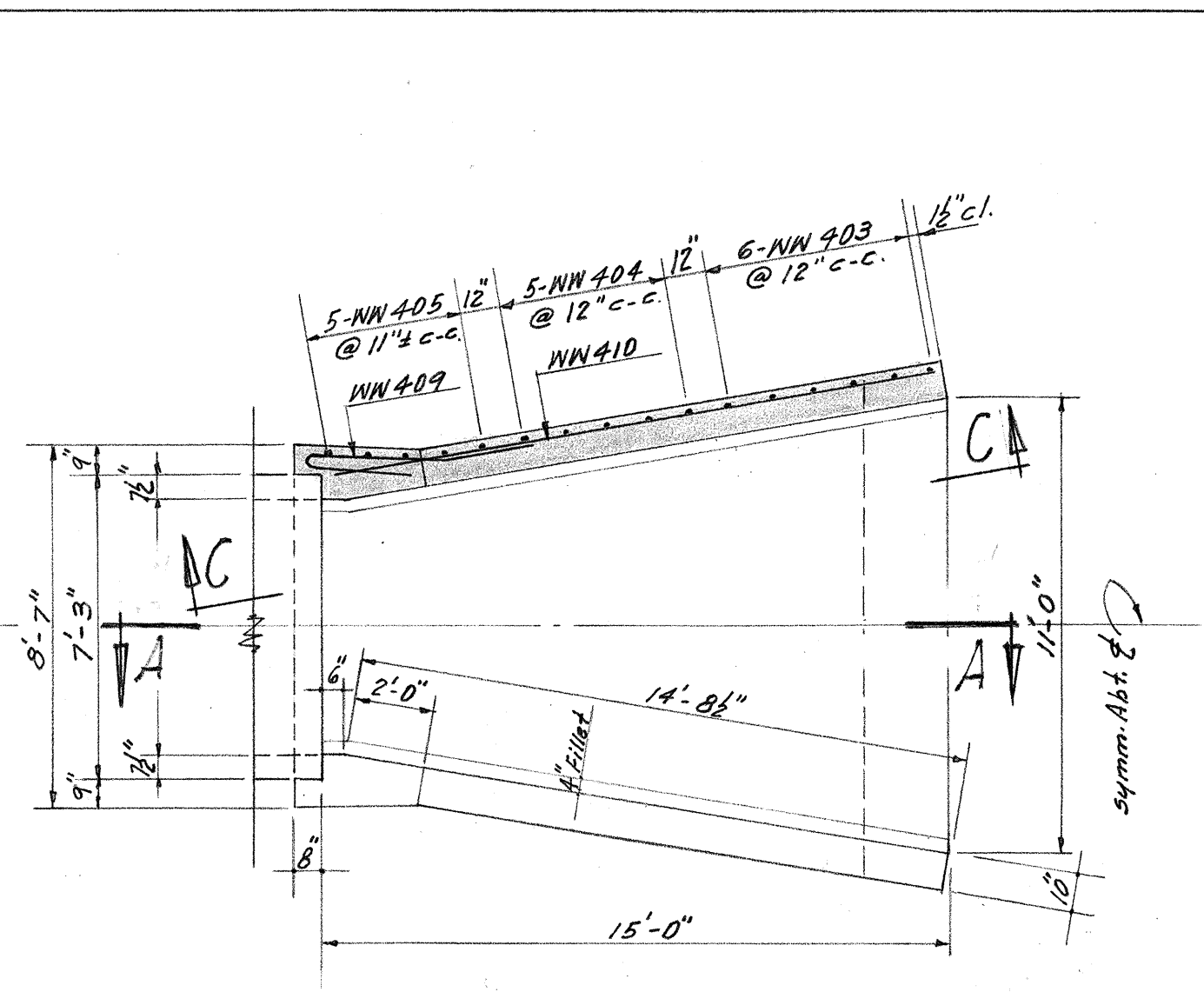
FILE	POCKET	FOLDER	No
7	2	2	36



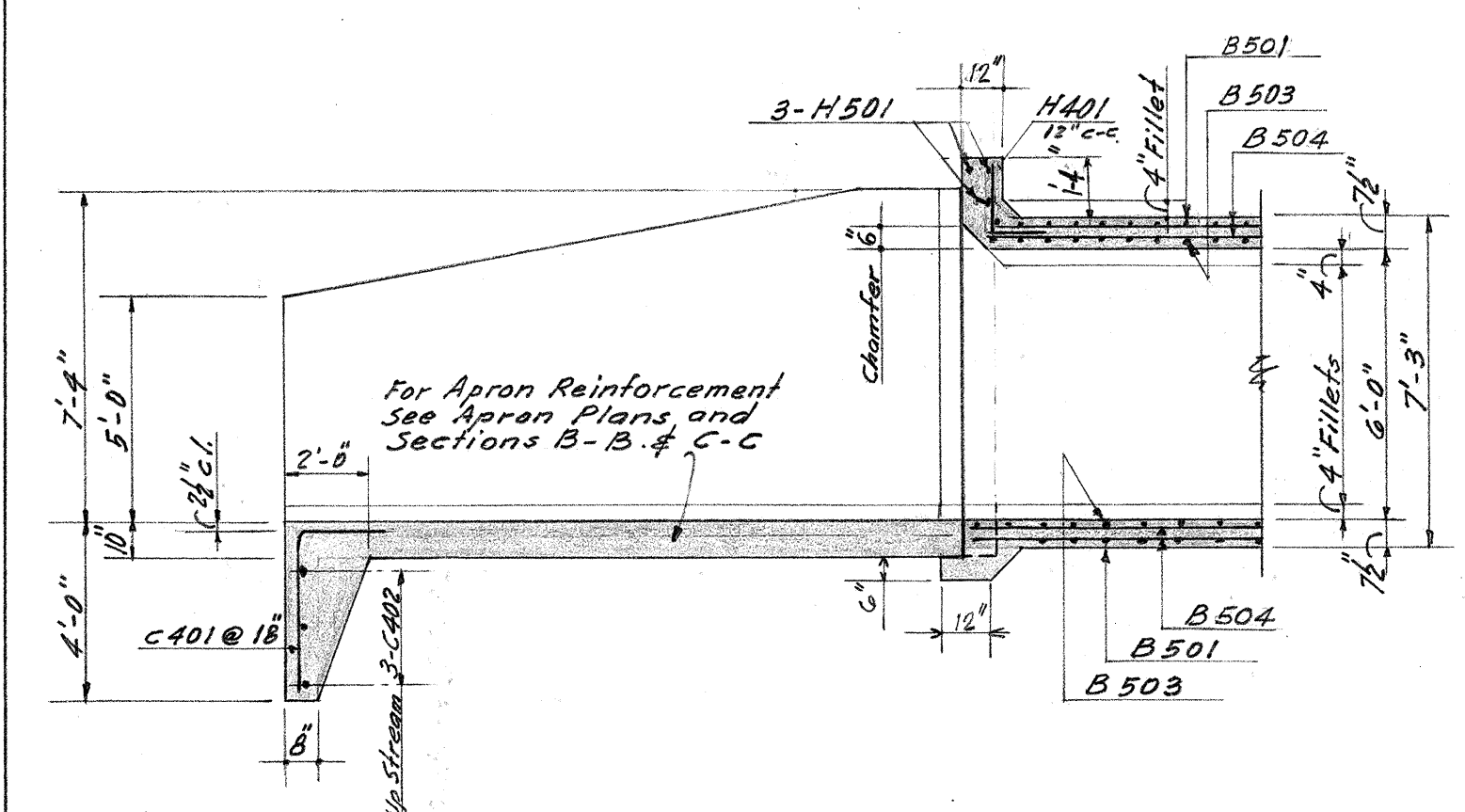
TYPICAL CROSS SECTION OF BARREL
Scale: 1/2" = 1'-0"



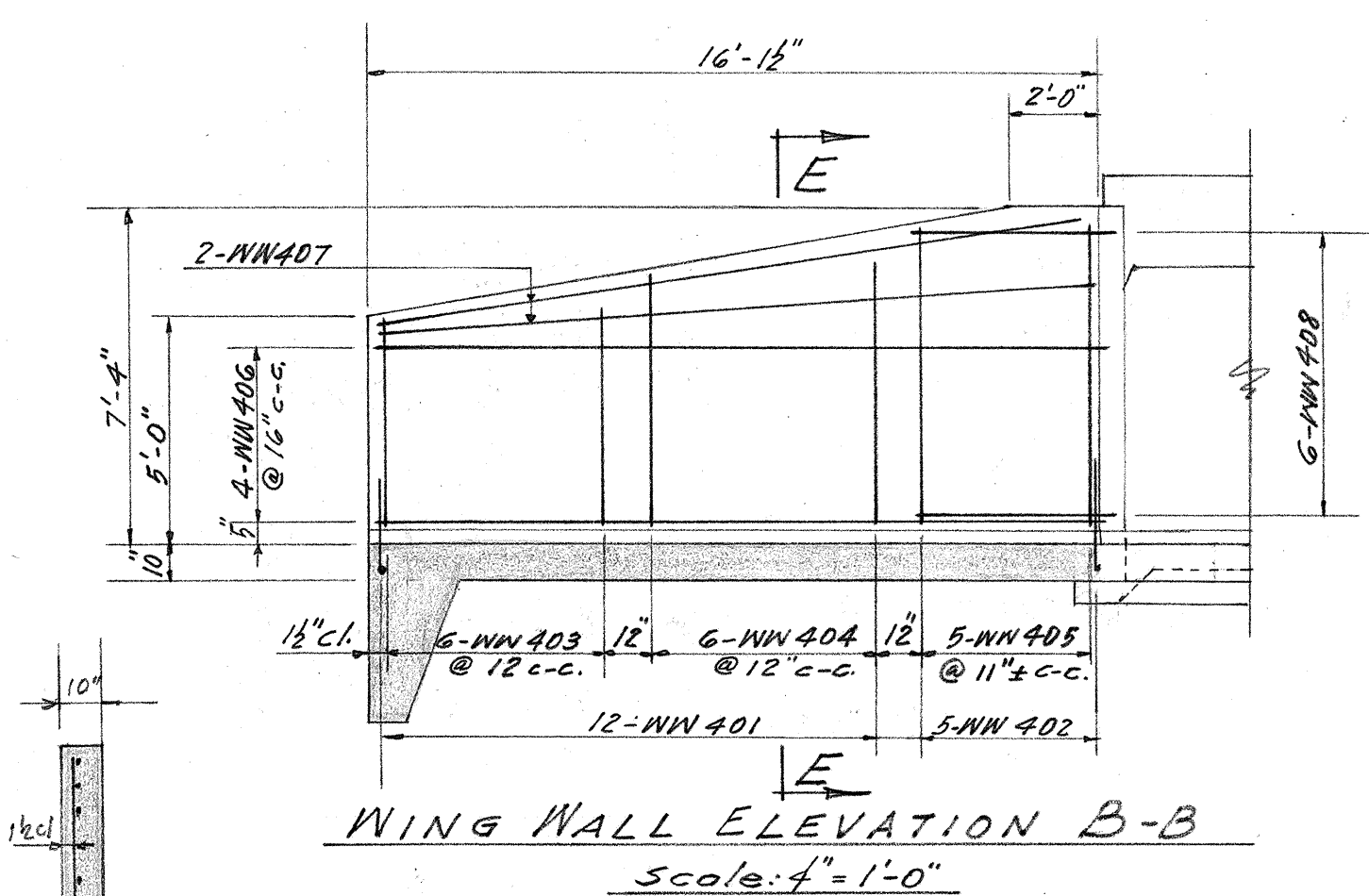
PLAN OF UP STREAM WING WALLS & APRON
Scale: 4" = 1'-0"



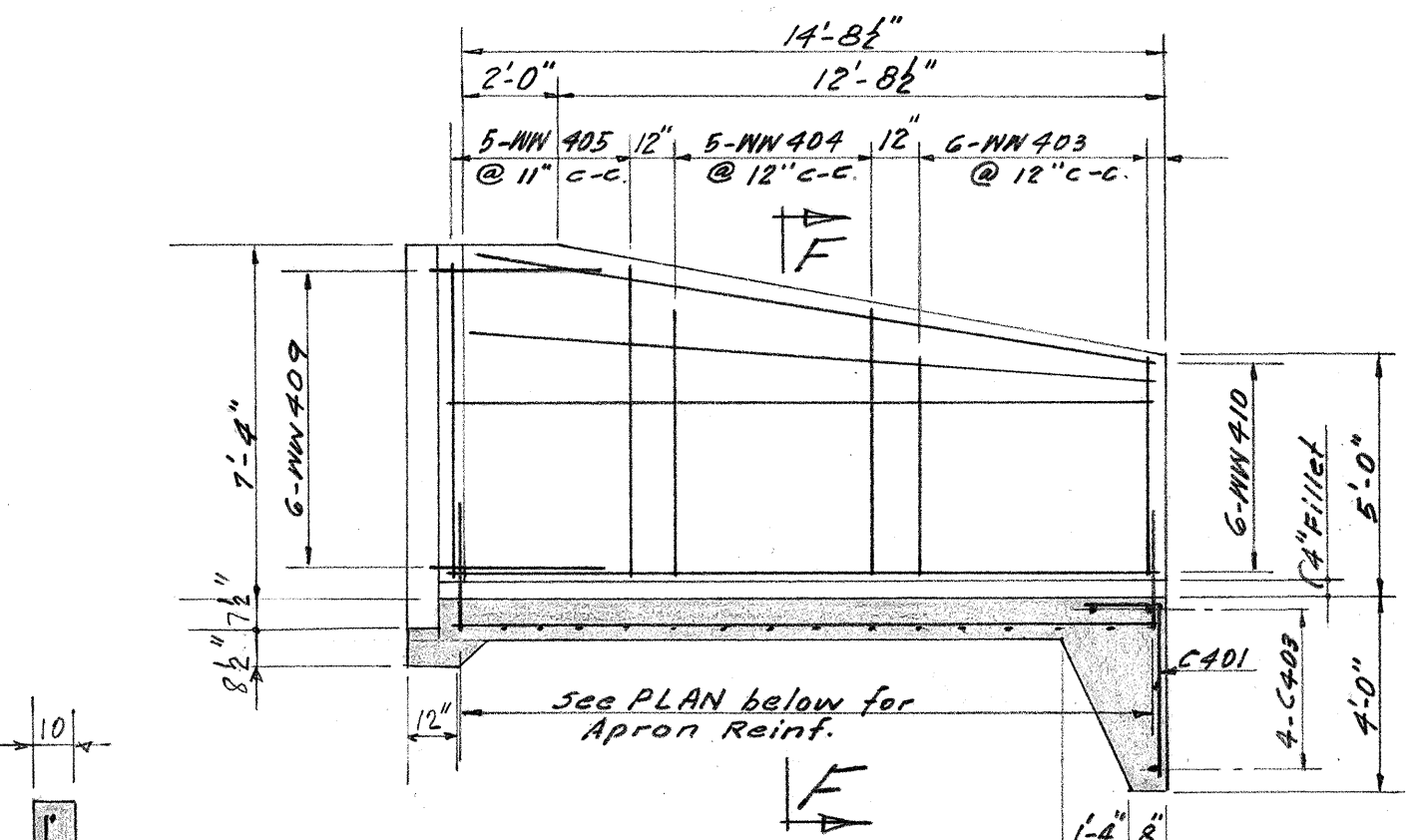
PLAN OF DOWN STREAM WING WALLS & APRON
Scale: 4" = 1'-0"



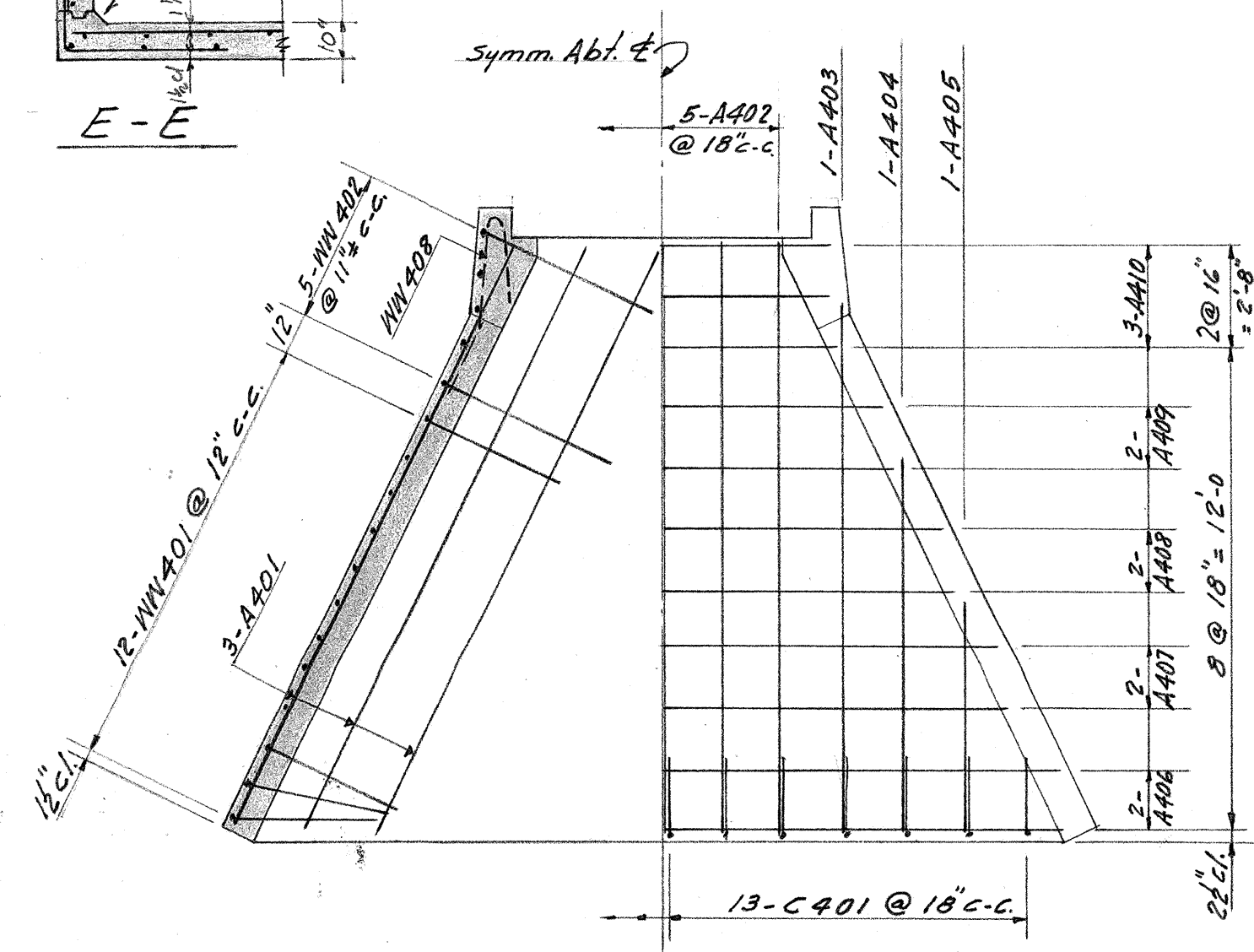
TYPICAL LONGITUDINAL SECTION A-A
Scale: 4" = 1'-0"



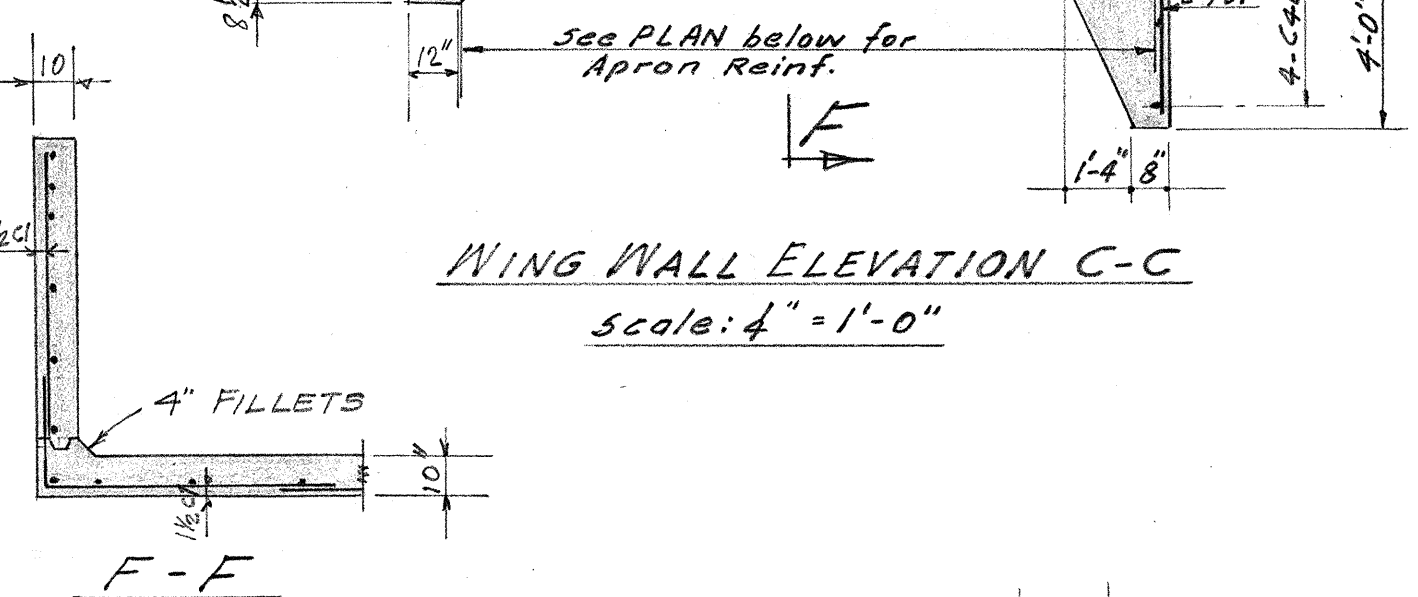
WING WALL ELEVATION B-B
Scale: 4" = 1'-0"



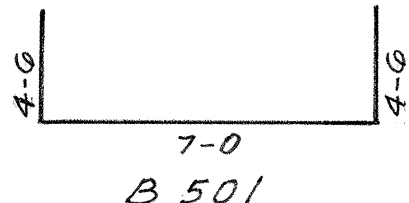
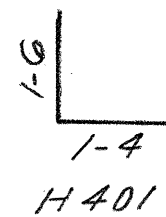
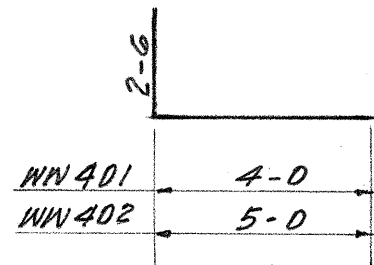
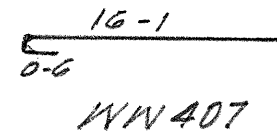
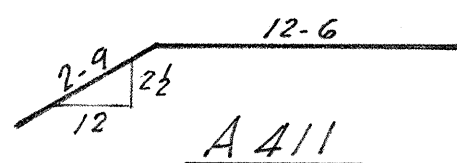
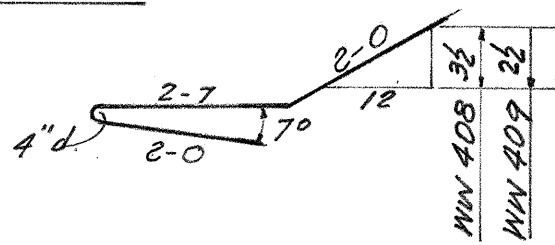
WING WALL ELEVATION C-C
Scale: 4" = 1'-0"



HALF APRON PLAN - BOT. F. REINF. HALF APRON PLAN - TOP F. REINF.
UP STREAM APRON REINFORCEMENT
Scale: 4" = 1'-0"



DOWN STREAM APRON REINFORCEMENT
Scale: 4" = 1'-0"

REINFORCING STEEL SCHEDULE											
BENT BARS					STRAIGHT BARS					BENDING DIAGRAMS	
Mark	No.	Size	Lgth.	Wt.	Mark	No.	Size	Lgth.	Wt.		
B 501	386	3/8"	16-0	644.7	B 503	386	3/8"	7-0	238.2		
					B 504	130	3/8"	23-9	3220.3		
H 401	16	1/2"	8-10	90.3	H 501	6	5/8"	7-0	43.8		
NW 401	24	1/2"	6-6	104.2	NW 403	24	1/2"	4-8	74.8		
NW 402	10	"	7-6	50.1	NW 404	22	"	5-6	80.2		
NW 407	4	"	16-7	44.3	NW 405	20	"	6-4	84.6		
NW 408	12	"	6-7	52.7	NW 406	8	"	16-1	86.0		
NW 409	12	"	6-7	52.7	NW 410	12	"	15-0	120.2		
A 411	2	1/2"	15-3	20.3	A 401	6	1/2"	16-2	64.1		
A 412	8	"	7-4	39.2	A 402	8	"	14-9	78.8		
A 413	6	"	7-9	31.2	A 403	2	"	13-0	17.4		
A 414	6	"	8-5	33.7	A 404	2	"	9-3	12.4		
A 415	6	"	9-0	36.0	A 405	2	"	5-10	7.8		
A 416	6	"	9-6	38.0	A 406	2	"	19-8	26.3		
					A 407	2	"	16-6	22.0		
					A 408	2	"	13-8	18.3		
					A 409	4	"	11-0	24.4		
					A 410	3	"	8-4	16.7		
C 401	22	1/2"	5-4	78.4	C 402	3	1/2"	20-0	40.0		
					C 403	4	"	11-0	24.4		

TOTAL STEEL REQD. = 13,944#
TOTAL CONC. REQD. = 101 c.y.
TOTAL STRUCT. EXC. REQD. = 765 c.y.
TOTAL UNCL. EXC. REQD. = 826 c.y.
TOTAL G. R. PAVING REQD. = 150 s.y.

NOTES:
Concrete to have an ultimate compressive strength of 2500 psi @ 28 days.
Reinforcing steel to be new billet intermediate grade deformed bars.

PROPERTY OF DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHU TUNNEL
KANEKOE APPROACH ROAD SECTION B
JOB No. 31-52
6'x6' REINF. CONC. BOX CULVERT
B. L. STA. 55+00

ENGINEER S.O.H. & C.Y.P. DATE September 28, 1958
DRAFTSMAN C.Y.P. CHECKED BY W. L. LUM
SCALE As Shown TRACER C.Y.P.
APPROVED: [Signature] APPROVED: [Signature]
CHIEF ENGINEER BUREAU ENGINEER

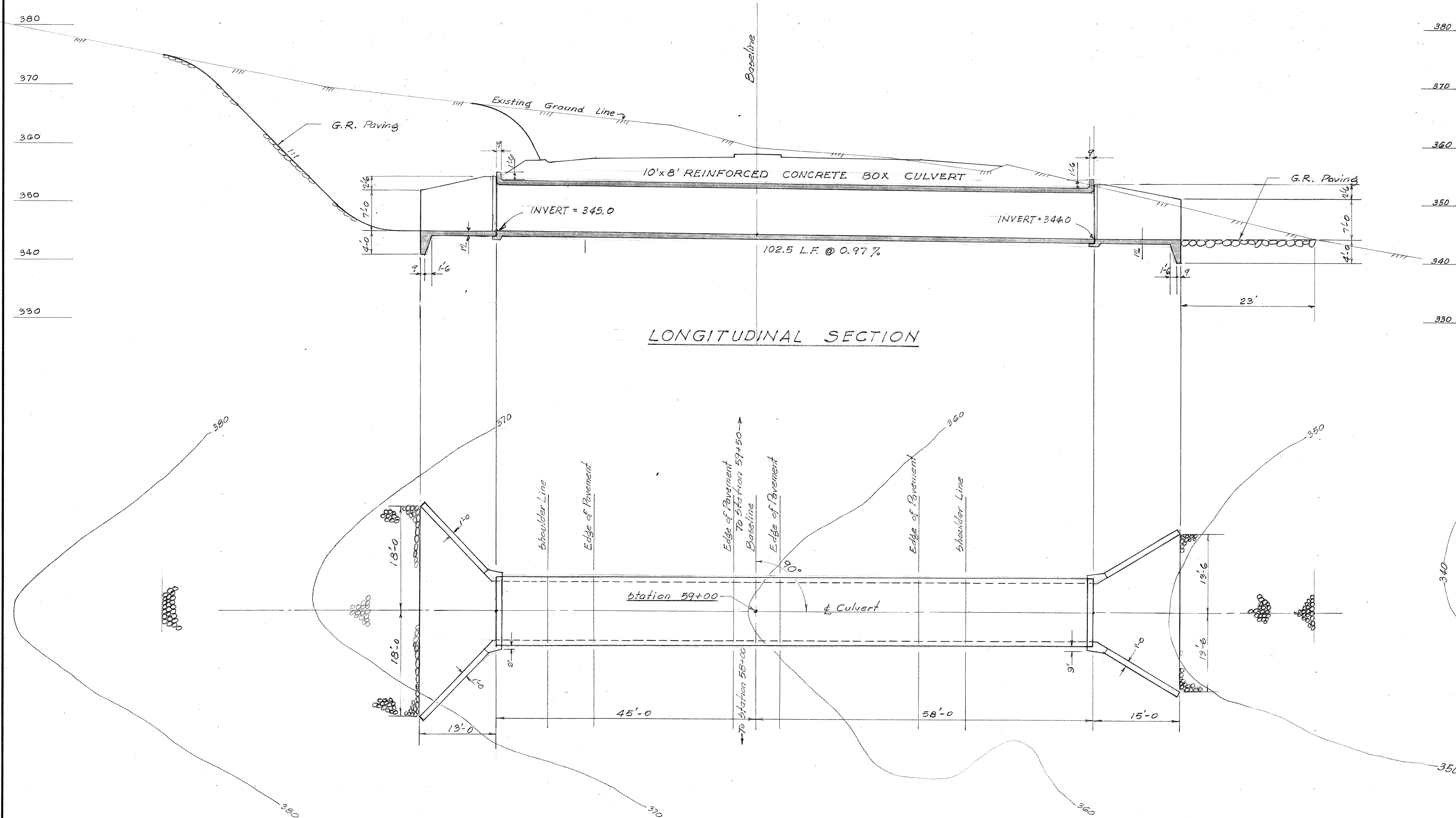
W. S.	PROFILE	C. B.
CR. SEC.	F. B.	S. B.
W. M. BY	F. W. BY	S. BY

WORK THIS SHEET WITH SHEET No. 36

FILE	POCKET	FOLDER	No.
7	2	2	37

Sheet No. 37 of 66 Sheets

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS



LONGITUDINAL SECTION

PLAN
1" = 10'-0"

REINFORCING STEEL SCHEDULE														
Bent Bars					Straight Bars					Bending Diagrams				
Mark	No.	Size	Lgh	Wt.	Mark	No.	Size	Lgh	Wt.					
B601	135	3/4"	18'-6"	4307	B602	308	3/4"	11'-2"	5166					
B603	310	"	12'-3"	5703	B501	90	5/8"	35'-6"	3323					
					B401	78	1/2"	11'-2"	582					
					B402	42	"	35'-6"	996					
					B404	156	"	7'-10"	816					
H401	24	1/2"	3'-3"	52	H501	4	5/8"	11'-2"	47					
NW601	24	3/4"	11'-4"	409	NW602	12	3/4"	8'-5"	151					
NW501	24	5/8"	9'-5"	236	NW603	12	3/4"	8'-10"	159					
NW504	14	"	6'-6"	95	NW502	24	5/8"	7'-3"	182					
NW505	14	"	6'-6"	95	NW402	22	1/2"	6'-5"	95					
NW401	22	1/2"	7'-3"	107	NW403	14	"	17'-9"	166					
					NW404	14	"	16'-7"	155					
					A501	4	5/8"	10'-6"	44					
					A401	8	1/2"	17'-10"	95					
					A402	2	"	12'-0"	16					
					A404	11	"	12'-9"	94					
					A405	4	"	9'-9"	26					
					A406	6	"	6'-9"	27					
					A407	4	"	12'-6"	34					
					A408	4	"	18'-0"	48					
					A409	5	"	25'-0"	84					
					A410	2	"	31'-0"	41					
					A411	4	"	4'-0"	15					
					A412	1	"	36'-0"	24					
					A413	2	"	15'-0"	20					
					A414	2	"	21'-6"	28					
					A415	8	"	16'-7"	89					
					A416	2	"	9'-0"	12					
					A417	2	"	11'-9"	16					
					A418	9	"	14'-9"	95					
C401	40	1/2"	5'-4"	143	C402	2	1/2"	36'-0"	48					
					C403	2	"	25'-0"	33					

Total Steel Req'd. = 23,870 #
 Total Conc. Req'd. = 180 c.y.
 Total Struct. Exc. Req'd. = 1269 c.y.
 Total Uncl. Exc. Req'd. = 1080 c.y.
 Total G. R. Paving Req'd. = 300 c.y.

NOTES:
 concrete to have an ultimate compressive strength of 2500 #/sq" @ 28 days.
 Reinf. Steel to be new billet intermediate grade deformed bars.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
BUREAU OF PLANS
KALIHU TUNNEL
KANEHOHE APPROACH ROAD SECTION B
JOB No. 31-53
10'x8' REINF. CONC. BOX CULVERT
B. L. STA. 59+00

ENGINEER J.S.S.Y.
DRAFTSMAN J.S.S.Y.
SCALE 1" = 10'
APPROVED: [Signature]
CITY ENGINEER

DATE September 22, 1952
CHECKED BY W. Lum
TRACER J.S.S.Y.
APPROVED: [Signature]
BUREAU ENGINEER

W. S.

OR. SEC.

F. S.

W. M. BY

PROFILE

F. W. BY

G. B.

S. B.

S. BY

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
QUANTITIES CHECKED BY	
CHECKED BY	

WORK THIS SHEET WITH SHEET No. 39

SHEET NO. 38 OF 66 SHEETS

FILE	POCKET	FOLDER	NO.
7	2	6	38

