

FED. PROJ. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.		
6	TEXAS	A 3148-1-1	1		
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
18	ROCKWALL	3148	1	1	FM 3097

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TEXAS HIGHWAY DEPARTMENT

ROCKWALL COUNTY

F.M. HIGHWAY NO. 3097

FROM: F.M. 740, 0.4 MILE SOUTH OF I.H. 30, SOUTHEAST TO F.M. 549

PROJECT NO. A3148-1-1 PD 2010

PLANS OF PROPOSED

GRADING, STRUCTURES, LIME TREAT. SUBGR., BASE & SURFACING

NET LENGTH 13,543.23 FT. - 2.565 MILES

701415

DESIGN SPEED 50MPH

Date Work Began June 5, 1969
Date Work Completed June 15, 1970

NO EQUATIONS
NO EXCEPTIONS

RETURN TO
RECORDS MANAGEMENT
DEPARTMENT OF
TRANSPORTATION

CORRECT: Feb. 18, 1969

Albert S. Herian
SR RESIDENT ENGINEER

CORRECT: Feb. 18, 1969

John V. Blain Jr.
SR RESIDENT ENGINEER

RECOMMENDED FOR APPROVAL: 2-25-69

John D. Keller
DISTRICT ENGINEER

APPROVED: 3-6-69

H. Armer
ENGINEER, SECONDARY ROADS

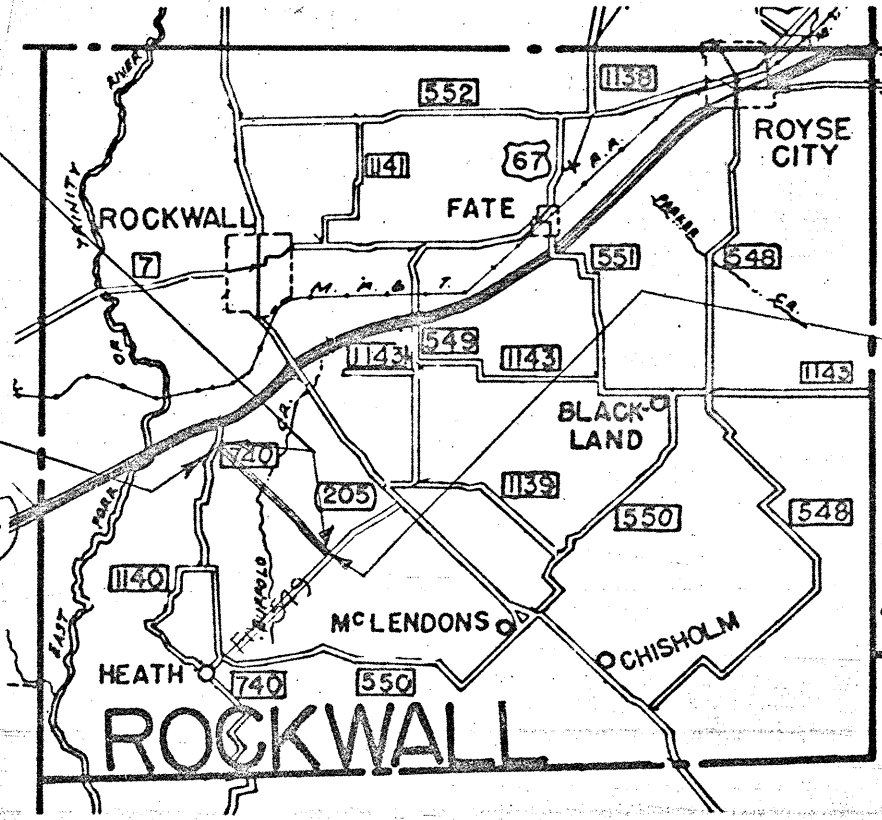
15	7014	FINAL	UNBOUND	AP CARDS	4	TOTAL SHEETS	40	RUN	11x18	4	RUN	8 1/2 x 11	ORDERED BY	Bonnie Waggoner	COUNTY	Rockwall	CONTROL	3148-1-1	TICKET NUMBER	103671	DATE FILMED	11-16-70
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Class 'D' Barricades
Signs, D-34A, D-35, W-155,
D-57, D-59, W-63, D-66.

Begin Project A-3148-1-1
F.M. Highway 3097
Control: 3148-1-1
Sta. 0+12 = F.M. 740
154+61.

- CONVENTIONAL SIGNS
- STATE OR NATIONAL LINE
 - CITY OR VILLAGE LINE
 - COUNTY LINE
 - BASE OR SURVEY LINE
 - RIGHT OF WAY LINE
 - RIGHT OF WAY MARKERS
 - FENCE LINE
 - RAILROAD
 - TRAVELLED WAY
 - CULVERT OR BRIDGE
 - POWER LINE
 - TELEGRAPH OR TELEPHONE

Specifications adopted by the State Highway Department of Texas, January 2, 1962, and specifications items listed and dated as follows, shall govern on this project:

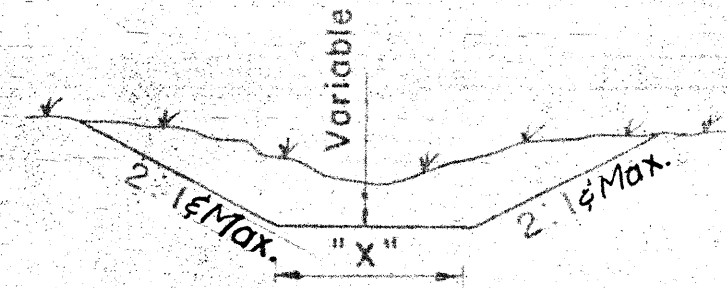


End Project A-3148-1-1
F.M. Highway 3097
Control: 3148-1-1
Sta. 135+55.23 = F.M. 549
Sta. 131+74.5, Cont. 1091-4
Barricades "E" to be placed at all road intersections as directed by the Engineer.

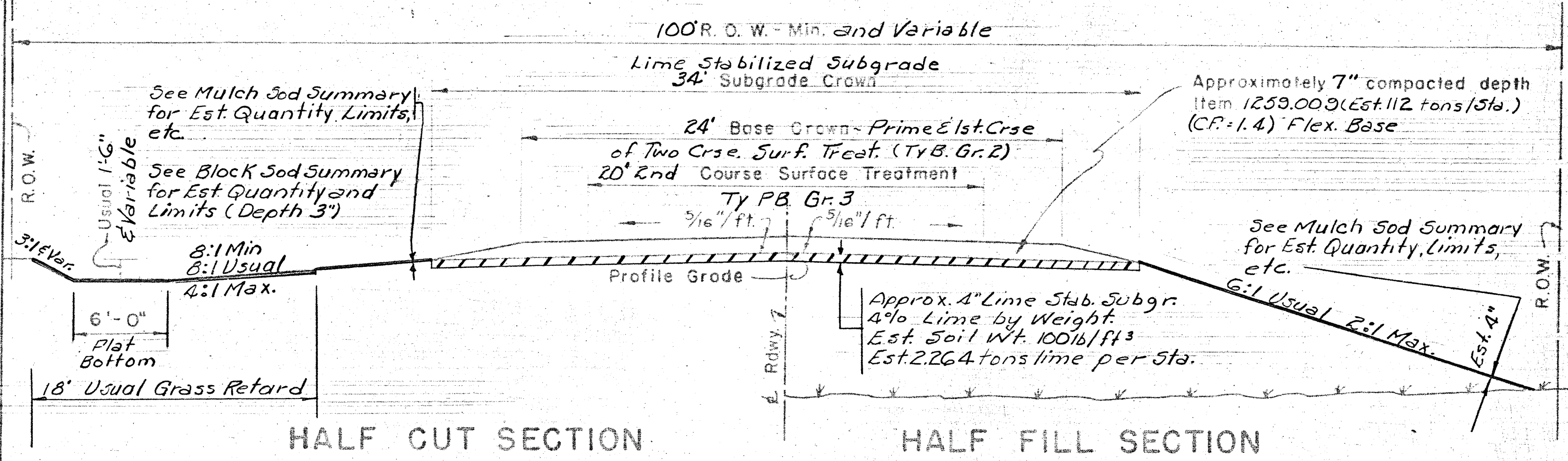
CHANNEL DETAILS

STATION	"X"	CHAN. EXCAV. C. Y.	STATION	"X"	CHAN. EXCAV. C. Y.
41+60	10' Var.	1564			
60+00	20' Var.	814			
104+60	15' Var.	225	- use as directed by Engr. to backfill old channel.		

CURVE NOTES:
 All curves 4° and greater are to be superelevated 0.05 ft. per ft. beginning 100 feet outside of the curve and reaching full superlevation 50 ft. inside the curve. Curves less than 4° to be superelevated in accordance with Table CST-67 with full superlevation attained in 150 ft. as above.



CHANNEL SECTION



HALF CUT SECTION

HALF FILL SECTION

TYPICAL SECTION
 FROM STA. 4+00 to STA 132+93.23

See Transition for Stations:
 Sta. 0+12 to Sta 4+00
 Sta. 132+93.23 to Sta. 135+55.23

TYPICAL SECTIONS

18 FM-4R2



SPECIFICATION DATA

Test to be in accordance with Texas Highway Department Standard Test Methods

ITEM	DESCRIPTION	GRADING REQUIREMENTS PERCENT RETAINED SIEVES								SOIL CONSTANTS			WET BALL MILL	SEE NOTE
		2 1/2"	2"	1 3/4"	1"	1/2"	"4"	"10"	"40"	L.L.	P.I.			
		Max.	Max.	Min.	Max.	Max.	Max.	Max.	Max.	Max.	Min.	Max.		
1259	FLEX BASE(ORD COMP)(TY A GR 4)	-	-	0-5	-	-	55-80	-	70-90	45	12	2	47	

BASIS OF ESTIMATE

ITEM	DESCRIPTION	RATE	QUANTITY	UNIT
166	FERT (BLOCK SOD)	1/16 LB PER SY	0.061	TON
166	FERT (MULCH SOD)	1/16 LB PER SY	1.086	TON
204	SPRINKLING EMB	15 GAL PER CY	1,195.	MG
204	SPRINKLING (FLEX BASE)	60 GAL PER TON	1,011.	MG
204	SPRINKLING SOD (BLOCK)	10 GAL PER SY	20.	MG
204	SPRINKLING SOD (MULCH)	120 GAL PER CY	463.	MG
204	SPRINKLING SUBGR	1525 GAL PER STA	207.	MG
204	SPRINKLING (LIME TREAT SUBGR)(4")	13 GAL PER SY	677.	MG
210	ROLL (FLAT WHEEL) FLEX BASE	1 HR PER 200 TON	84.	HR
212	ROLL (HEAVY TAMP) EMB	1 HR PER 100 CY	797.	HR
212	ROLL (HEAVY TAMP) SUBGR	1 HR PER STA	136.	HR
213	ROLL (MED PNEUM TIRE) BASE	1 HR PER 300 TON	56.	HR
213	ROLL (MED PNEUM TIRE) SUBGR	30 MIN PER STA	68.	HR
213	ROLL (LIGHT PNEUM TIRE) SURF	12 HRS PER MILE	31.	HR
260	LIME (TY A OR B) 4" SUBGR	4% BY WT	312.	TON
310	ASPHALTIC MATERIAL (MC-1)	0.20 GAL PER SY	7,555.	GAL

SURFACE TREATMENT DATA

ITEM	APPLICATION			FIRST COURSE	SECOND COURSE
	First	Second	Quantity		
Asphalt, Type	AC-10	or RC-5	20703	ROADWAY	36,148 SY
Asphalt, Rate (gal/sy)	0.32	0.28		ROADWAY	30,464 SY
Aggregate, Type	B	PB	378	INTERSECTIONS	1,629 SY
Aggregate, Grade	2	3	308	INTERSECTIONS	306 SY
Aggregate, Rate (cy/sy)	1:100	1:100		TOTALS	37,777 SY
Rolling 210(hrs/mi)				TOTALS	30,770 SY
Rolling 213(hrs/mi)					

SPECIFICATION DATA

Sheet A

GENERAL NOTES AND SPECIFICATION DATA:

3

Detours, Barricades, and Warning Signs, etc.

All public or private utilities, either underground or overhead located within the limits of the right of way that conflict with the work on this project will be adjusted by the owners.

Attention is directed to Item 7.1 of the general specifications concerning compliance by the Contractor to all local and State laws.

Detours that are required for the construction of structures, roadway, and pavement shall be constructed, maintained and removed by the Contractor. No direct payment will be made for same, but they shall be subsidiary to the various bid items. Local traffic must be carried through the project and across the project. Temporary driveway approaches will be provided by the Contractor when appropriate and payment shall be subsidiary to the various bid items. Barricades and warning signs shown on these plans have been designed to accomplish the above intent. In the event additional signs and barricades are required the Contractor will be required to furnish the necessary barricades and warning signs.

Prior to placement of asphaltic materials in roadway areas open to traffic "Fresh Oil" sign as specified for sign W-27 in the Texas Manual on Uniform Traffic Control Devices, shall be erected by the Contractor at his expense at locations directed by the Engineer.

When the Contractor desires to move any equipment not licensed for operation on public highways on or across any pavement opened to traffic, he shall protect the pavement from all damage by means of two ply timber mats of 2 inch stock or runways of heavier material, laid on a layer of earth, all as approved by the Engineer.

Item 110

In those instances where fixed features require, the governing slopes indicated herein may be varied from between the limits and to the extent directed by the Engineer.

Item 110.2

The quantity of Unclassified Roadway Excavation shown on plans includes quantities which may be required to provide for the removal and replacement of unstable materials in holes, depressions, water courses, stockponds, fence rows, and all areas where abrupt changes in moisture density relationship occurs within the limits of the proposed roadbed in both cut and fill sections. Payment for the removal and replacement of the unstable material shall be made at the unit price bid for Uncl. Rd. Excav. (Ord Comp), Overhaul, Sprinkling and Rolling (Heavy Tamp).

Item 204

Sprinkling as ordered by the Engineer to allay dust on this project will be paid for.

Item 322

Two course surface treatment of the standard specifications shall be supplemented by the following: No asphaltic materials or mixtures except as prime coats, dust palliative or base preservative shall be placed between November 1 and April 1 unless specifically authorized or directed by the Engineer in writing. When specifically authorized or directed by the Engineer the Contractor will be required to furnish Asphalt RC-5 in lieu of Asphalt AC-10.

SPECIFICATION DATA

Sheet B

GENERAL NOTES AND SPECIFICATION DATA: 4Item 420

Concrete structures shall receive a Type 4 finish.

Item 496

The existing drainage structure at Sta. 59+55 (1-72" x 57' CGM Pipe) will be removed and retained by County of Rockwall forces. The Contractor shall be required to advise the Engineer of the date his sequence of work will require the removal of this structure a minimum of seven (7) days prior to said date.

Item 1259.6 (2) & (5)

Construction Methods - The materials shall be delivered to the project in such a manner that the approved vehicles travel over all subgrade prepared at the time the base course is placed.

Item 260.3, 262.3, and 1259.7

The standard platform truck scales will be required for this project and shall be located at a point approved by the Engineer. Certified public scales, when approved by the Engineer, may be used.

SPECIFICATION DATA

Sheet AC



SUMMARY OF CULVERTS

PLAN PROFILE SHEET NO.	STATION	DESCRIPTION	UNCLASS CHAN EXCAV C.Y.	UNCLASS STRUCT EXCAV. C.Y.	CLASS "C" CONCRETE (CULV) C.Y.	BLOCK SOD HDWLS SY	REINF STEEL LB	FILL OVER STR. FT.	DELIN AND MIDPOST EA.	CLASS "B" CONCRETE RIPRAP C.Y.	RC PIPE CL III					FLOWLINE DIST OFF & TO				
											18" DIA LF	24" DIA LF	30" DIA LF	36" DIA LF	42" DIA LF	ELEVATIONS		HEAD WALL		
																US Elev.	DS Elev.	US (FT)	DS (FT)	
	53' Lt 0+00	1-3x2x14 SBC SCNA E FWN	0	5.5	4.48	6	573	10	1											
	33' Lt 2+00	1-18" RCPipe CI III x 20'									20									
	38' Rt 2+00	1-18" RCPipe CI III x 20'									20									
	31' Lt 15+67	1-18" RCPipe CI III x 20'									20									
	E 28+20	1-30" RCPipe CI III x 47' ECH 11B Hdwls + Flume	0	33.9	2.34	12	245	1.5	2	4.30			47			521.58	521.00	25	24	
	34' Lt 37+81	1-24" RCPipe CI III x 36' ECH 11B Hdwls 15° ~	0	3.4	1.59	8	173					36				409.2	409.0	16	16	
	E 41+75	1-10'x6'x50" SCNA E FWN	1564	188.9	52.77	22	8032	20	2							500.15	500.00	25	25	
	40' Rt 45+33	1-18" RCPipe CI III x 20'									20									
	33' Rt 50+13	1-18" RCPipe CI III x 20'									20									
	31' Rt 55+65	1-18" RCPipe CI III x 20'									20									
	E 60+00	2-9'x9'x47" MBC MC9-2 E MCW-F-2	814	342.6	100.11	28	12002	2.7	2							479.64	479.50	25.5	25.5	
	47' Lt 60+95	1-24" RCPipe CI III x 36' ECH 11B Hdwls	0	3.4	1.62	8	176					36						16	16	
	E 63+96	1-42" RCPipe CI III x 48.08' ECH 11B-45° *	0	35.5	6.23	14	522	20	2	4.30				64		456.44	456.10	24.04	24.04	
	38' Lt 69+13	1-18" RCPipe CI III x 22'									22									
	32' Rt 71+98	1-18" RCPipe CI III x 20'									20									
	32' Lt 72+29	1-18" RCPipe CI III x 20'									20									
	E 74+65	1-36" RCPipe CI III x 82.2' (2-30' Bend Jts, ECH 11B Hdwls)	0	24.3	3.23	14	308	7.5	2							512.4	509.0	40.2	42.0	
	44' Rt 75+53	1-24" RCPipe CI III x 22'									22									
	34' Lt 77+55	1-18" RCPipe CI III x 22'									22									
	34' Lt 78+22	1-18" RCPipe CI III x 22'									22									
	34' Lt 80+53	1-18" RCPipe CI III x 32'									32									
	34' Lt 86+95	1-18" RCPipe CI III x 20'									20									
	31' Rt 89+85	1-18" RCPipe CI III x 28'									28									
	37' Lt 92+34	1-18" RCPipe CI III x 20'									20									
	E 95+05	1-36" RCPipe CI III x 71.29' (30° LFS) with 2-15' Bend Jts. ECH 11B-30° Hdwls *	0	64.6	3.59	14	330	60	2							505.18	499.50	31.45	39.84	
	43' Lt 102+58	2-24" RCPipe CI III x 20'										40								
	E 104+60	2-7'x6'x46.5" MBC (15° RFS) MC7-2-15° E MCW F-100	225	98.1	59.61	24	7737	2.5	2							455.55	452.75	22.5	24.0	
	E 114+75	1-8'x7'x52" SBC (15° RFS) SC15 AEFW 15° ~	0	79.9	52.46	22	6940	4.4	2							491.08	485.00	23.00	29.00	
	34' Lt 122+78	1-24" RCPipe CI III x 36' CH 11B-15° Hdwls	0	3.4	1.59	8	173					36								
	34' Rt 123+21	1-18" RCPipe CI III x 20'									20									
	E 131+40	1-36" RCPipe CI III x 83.14' (45° LFS) with 90° Bend Riprap US ECH 11B-25° Hdwls. E Flume	0	155.1	2.38	14	203	9.2	2	2.0A						526.00	525.17	40.31	43.13	
		TOTAL	2603	1038.6	292.0	194	37,414		19	10.64	346	170	47	287	64					

*Modified Toewall Upstream



ESTIMATE SUMMARY

GRADING, STRUCTURES, LIME TREAT SUBGR, BASE AND SURFACING				ALT.	ITEM-CODE			ITEM DESCRIPTION	UNIT	TOTAL	
ROADWAY		BRIDGES			ITEM NO.	DESC CODE	SP NO.			ESTIMATE	FINAL
ESTIMATE	FINAL	ESTIMATE	FINAL								
4,172	4,172				102	001		CLEAR AND GRUB	AC	4,172	4,172
77,312	68,711				110	001		UNCL RD EXCAV (ORD COMP)	CY	77,312	68,711
2,603	2,049				120	001		UNCL CHAN EXCAV (ORD COMP)	CY	2,603	2,049
17,870	14,236				140	001		OVRHL	YQ	17,870	14,236
1,950	1,750.78				162	002		BLOCK SOD	SY	1,950	1,750.78
3,860	4,086				162	005		MULCH SOD	CY	3,860	4,086
1,147	1.15				166	002		FERT (16-8-8)	TON	1,147	1.15
3,573	1,855.22				204	001		SPRINK	MG	3,573	1,855.22
84	55.50				210	001		ROLL (FLAT WHEEL)	HR	84	55.50
933	424.50				212	001	001	ROLL (HEAVY TAMP)	HR	933	424.50
31	28				213	001	001	ROLL (LIGHT PNEUM TIRE)	HR	31	28
124	150.50				213	002	001	ROLL (MEDM PNEUM TIRE) (TY A)	HR	124	150.50
312	310.27				260	003		LIME (TY A OR B)	TON	312	310.27
52,043	52,044				260	019		LIME TREAT SUBGR (ORD COMP) (4 IN)	SY	52,043	52,044
7,555	7,900				310	012		ASPH MATL (MC-1)	GAL	7,555	7,900
378	402				322	008		AGGR (TY B GR 2)	CY	378	402
19	18				322	068		AGGR (STKPL) (TY B GR 2)	CY	19	18
308	318				322	039		AGGR (TY PB GR 3)	CY	308	318
16	42				322	099		AGGR (STKPL) (TY PB GR 3)	CY	16	42
20,705	20,880				322	215		ASPH (AC-10 OR RC-5)	GAL	20,705	20,880
1038.6	973.25				400	001		UNCL STR EXCAV (CULV)	CY	1038.6	973.25
292	292.09				421	078	030	CLC CONC (CULV)	CY	292	292.09
17	17.21				432	003		RIPRAP (CONC) (CL B)	CY	17	17.21
37,414	37,414				440	001	005	REINF STL	LB	37,414	37,414
346	264			1	464	003	015	RC PIPE (CL III) (18 IN)	LF	346	264
170	170			1	464	005	015	RC PIPE (CL III) (24 IN)	LF	170	170
47	47			1	464	007	015	RC PIPE (CL III) (30 IN)	LF	47	47
287	287			1	464	009	015	RC PIPE (CL III) (36 IN)	LF	287	287
64	68			1	464	010	015	RC PIPE (CL III) (42 IN)	LF	64	68
18	18				496	002		REMOV OLD STR (SMALL)	EA	18	18
180	188				522	001		CONC C AND G	LF	180	188
62	62				550	001		ROW MARK (TY 1)	EA	62	62

original



ESTIMATE SUMMARY

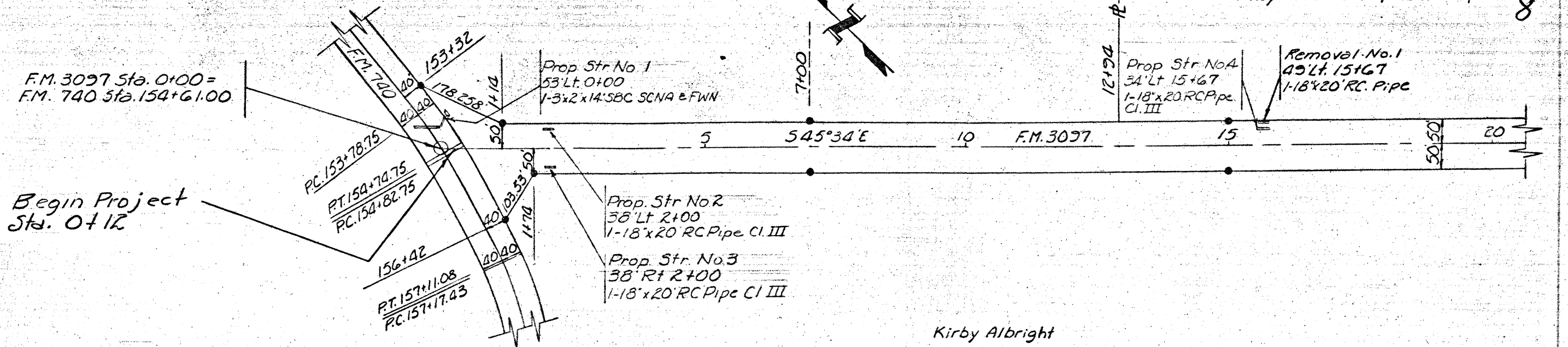
GRADING, STRUCTURES, LIME TREAT, SUBGR., BASE AND SURFACING				ALT.	ITEM-CODE			ITEM DESCRIPTION	UNIT	TOTAL	
ROADWAY		BRIDGES			ITEM NO.	DESC CODE	SP. NO.			ESTIMATE	FINAL
ESTIMATE	FINAL	ESTIMATE	FINAL								
1	1				580	008	021	FIELD LAB (TY B)	EA	1	1
155	155				590	001		CONC MED	LF	155	155
19	19				7303	002		DELIN TY III (IND HOUSED)	EA	19	19
19	19			2	7324	004		DELIN & MI POST MARK POST (8 FT.)	EA	19	19
16,845	16,450.91				1259	009		FLEX BASE (ORD COMP) (TY A GR 4)	TON	16,845	16,450.91
ALTERNATE 1 A											
346					460	005	010	CGM PIPE (18 IN)	LF	346	
170					460	007	010	CGM PIPE (24 IN)	LF	170	
47					460	008	010	CGM PIPE (30 IN)	LF	47	
287					460	009	010	CGM PIPE (36 IN)	LF	287	
64					460	010	010	CGM PIPE (42 IN)	LF	64	
ALTERNATE 1 B											
346					460	022	010	CGM PIPE (Bit Coat) (18 IN)	LF	346	
170					460	024	010	CGM PIPE (Bit Coat) (24 IN)	LF	170	
47					460	025	010	CGM PIPE (Bit Coat) (30 IN)	LF	47	
287					460	026	010	CGM PIPE (Bit Coat) (36 IN)	LF	287	
64					460	027	010	CGM PIPE (Bit Coat) (42 IN)	LF	64	
ALTERNATE 2											
19					7430	004		TIM DELIN POST (8 FT)	EA	19	

7

Original

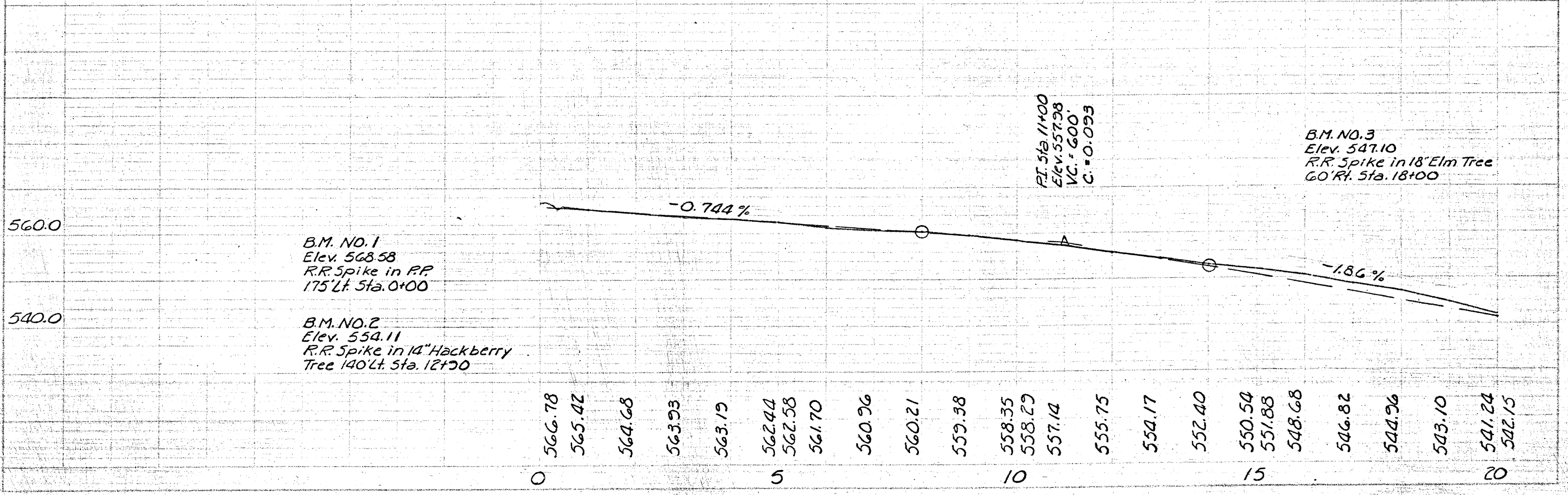


O.L. Steger



Kirby Albright

321	378	357	333	367	343	348	398	376	406	417	411	446	587	733	791	824	874	835	607 (Rd. Exc.)
28	30	30	27	20	18	20	23	15	12	18	15	18	12	0	0	0	0	0	3 (Chen Exc.)
																			3 (Fill+Shr)



CLEARING & GRUBBING		
LOC.	STATION-STATION	AMT.(ACRE)
Rt.	17+90-18+00	0.001
Lt.	17+90-18+00	0.001
Lt.	19+00-21+00	0.023
Lt.	30+00-39+00	0.310
Rt.	36+25-36+40	0.005
Rt.	37+50-38+00	0.023
Lt.	41+00-44+50	0.321
Rt.	44+50-45+00	0.046
Rt.	49+75-50+25	0.034
Lt.	50+75-53+50	0.063
Lt.	55+00-58+00	0.069
Rt.	57+00-58+00	0.023
Lt.	59+50-60+50	0.023
Rt.	59+50-67+50	0.367
Lt.	67+00-68+80	0.062
Lt.	74+80-83+80	0.207
Rt.	74+80-75+30	0.023
Lt.	84+50-84+75	0.006
Lt.	86+00-86+30	0.014
Lt.	87+20-89+20	0.046
Lt.	92+00-92+30	0.007
Rt.	93+25-95+50	0.155
Lt.	95+00-95+50	0.057
Lt.	97+50-106+50	0.620
Rt.	100+75-101+50	0.017
Rt.	101+50-106+75	0.362
Lt.	106+50-107+25	0.026
Rt.	106+75-108+25	0.069
Lt.	108+00-108+30	0.010
Rt.	108+75-114+20	0.188
Lt.	110+00-111+00	0.023
Lt.	113+75-114+00	0.006
Lt.	114+60-116+00	0.096
Rt.	115+00-117+00	0.069
Lt.	116+00-117+00	0.023
Lt.	118+00-118+20	0.005
Rt.	118+00-122+50	0.103
Lt.	119+50-122+60	0.071
Lt.	128+75-129+25	0.017
Rt.	129+20-130+00	0.073
Lt.	130+00-130+40	0.014
Rt.	130+60-131+60	0.092
Lt.	131+40-132+80	0.096
Rt.	131+60-132+80	0.041
Lt.	134+10-134+30	0.007
Rt.	60+00(Chan. Esmt)	0.258
TOTAL =		4.172 Acres

REMOVING OLD STRS. (SMALL)		
NO.	LOC. & STA.	DESCRIPTION
1	49 Lt. 15+67	1-18" x 20' RC Pipe
2	23 Lt. 29+36	1-24" x 24' CGM Pipe
3	8 Rt. 55+65	1-18" x 18' RC Pipe
4*	59+55	1-72" x 57' CGM Pipe
5	19 Lt. 60+74	1-18" x 50' CGM Pipe
6	63+96	1-30" x 28' CGM Pipe
7	12 Lt. 69+13	1-12" x 21' RC Pipe
8	74+85	1-30" x 28' CGM Pipe
9	18 Rt. 75+53	1-12" x 22' RC Pipe
10	13 Lt. 77+55	1-18" x 21' RC Pipe
11	14 Lt. 78+22	1-18" x 21' RC Pipe
12	12 Lt. 80+53	1-12" x 31' RC Pipe
13	15 Lt. 86+95	1-18" x 18' RC Pipe
14	11 Rt. 89+85	1-18" x 28' CGM Pipe
15	17 Lt. 92+34	1-12" x 22' RC Pipe
16	95+22	1-36" x 19' CGM Pipe
17	104+55	1-48" x 32' CGM Arch Pipe
18	114+75	1-60" x 29' CGM Arch Pipe
19	18 Lt. 131+43	1-24" x 24' CGM Arch Pipe
TOTAL = 18 (EA) Removals (Small)		

ITEM 260 LIME (TYA OR B)				
STA~STA.	LOCATION	TON/STA	AMT.	
0+12-4+00	Inter & Trans	Var	12.15	
4+00-132+93.23	Rdwy	2.264	291.96	
132+93.23-133+93.23	Rdwy & Trans	2.54	2.54	
133+93.23-134+93.23	Rdwy & Trans	2.94	2.94	
134+93.23-135+55.23	Rdwy & Trans	2.41	2.41	
TOTAL				312.00 Ton

ITEM 260 LIME STAB SUBGR (4 IN)				
STA~STA	LOCATION	WIDTH	SY/STA	TOTAL
0+12-4+00	Inter & Trans	Var	Var	2.025
4+00-132+93.23	Rdwy	34'	377.77	48.707
132+93.23-133+93.23	Rdwy & Trans	38' Avg.	4.22	4.22
133+93.23-134+93.23	Rdwy & Trans	44' Avg.	4.89	4.89
134+93.23-135+55.23	Inter	Var	4.00	4.00
TOTAL				52.0435Y

*18 Small Structures are to be removed by the Contractor. 1-72" CGM Pipe x 57' is fore removed by the County Forces of Rockwall County and become the property thereof. See General Notes.

ROW MARKERS (TYI)		
LOCATION	STATION	AMOUNT (EA)
40 Lt. F.M. 740	153+32	1
40 Lt. F.M. 740	156+42	1
50 Lt.	1+14	1
50 Rt.	1+74	1
50 Lt. & Rt.	7+00	2
50 Lt. & Rt.	15+00	2
50 Lt. & Rt.	24+00	2
50 Lt.	33+00	1
75 Rt.	33+00	1
75 Rt.	43+00	1
50 Lt. & Rt.	45+00	2
50 Lt. & Rt.	48+90.90	2
50 Lt. & Rt.	51+07.57	2
50 Lt. & 55 Rt.	59+42.90	2
50 Lt. & 55 Rt.	61+76.23	2
50 Lt. & Rt.	70+00	2
60 Lt. & Rt.	72+00	2
50 Lt. & Rt.	74+00	2
50 Lt. & Rt.	81+00	2
50 Lt. & Rt.	88+00	2
50 Lt. & Rt.	95+00	2
50 Lt. & Rt.	102+00	2
50 Lt.	107+00	1
50 Rt.	109+00	1
80 Lt.	110+00	1
60 Rt.	110+00	1
80 Lt.	111+00	1
60 Rt.	111+00	1
50 Rt.	112+00	1
50 Lt. & Rt.	113+09.98	2
50 Lt. & Rt.	116+89.98	2
50 Lt. & Rt.	120+64.39	2
50 Lt. & Rt.	124+44.39	2
50 Lt. & Rt.	129+00	2
50 Lt. & Rt.	134+17.23	2
150 Lt.	135+19.21	1
150 Rt.	135+15.22	1
50 Rt.	59+30.72	1
55 Rt.	59+28.53	1
50 Rt.	64+25	1
55 Rt.	64+25	1
TOTAL 62 Ea.		

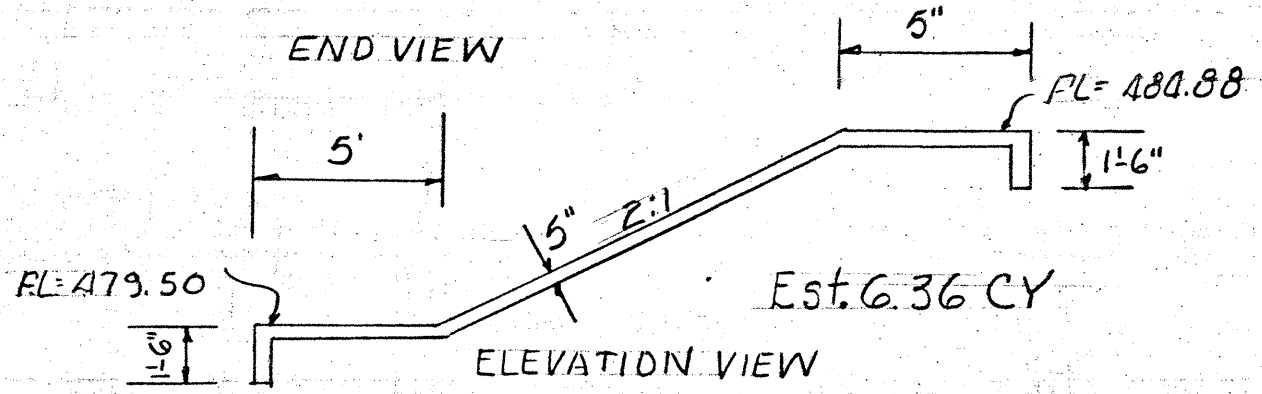
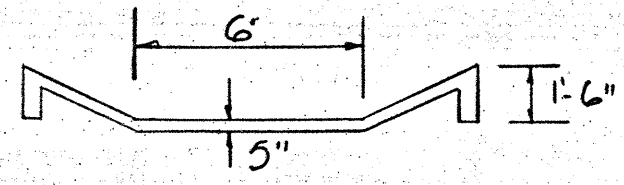
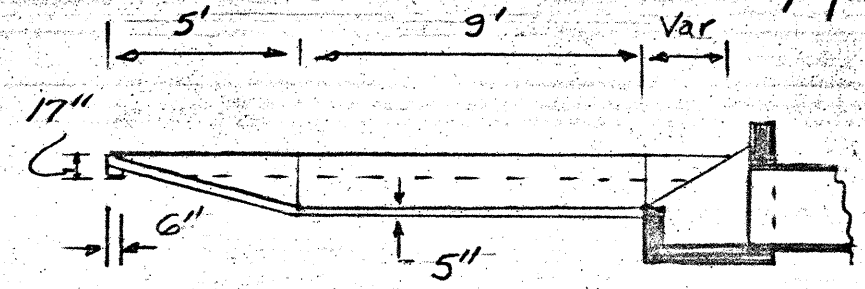
ITEM 259 SUMMARY OF FLEXIBLE BASE				
STA~STA	LOCATION	DEPTH	TON/STA	TOTAL
0+12-1+74	Rdwy & Trans	10"	Var	791
1+74-4+00	Rdwy & Trans	10"	Var	446
4+00-132+93.23	Roadway	7'	112	14,440
132+93.23-133+93.23	Rdwy & Trans	10"	181	181
133+93.23-134+93.23	Rdwy & Trans	10"	214	214
134+93.23-135+55.23	Rdwy & Trans	10"	205	205
3-County Roads @ 36 Tons each		6"	Var	108
25 Private Drives @ 16 Tons each		6"	Var	400
Traffic Island Rt. 0+50		6"	Var	60
TOTAL				16,845 TONS

Item 522.001 Conc C & G		
STATION	LOCATION	AMOUNT
Approx. 40 Rt		
Sta. 60+00	Traffic Island	180
TOTAL		180 LF

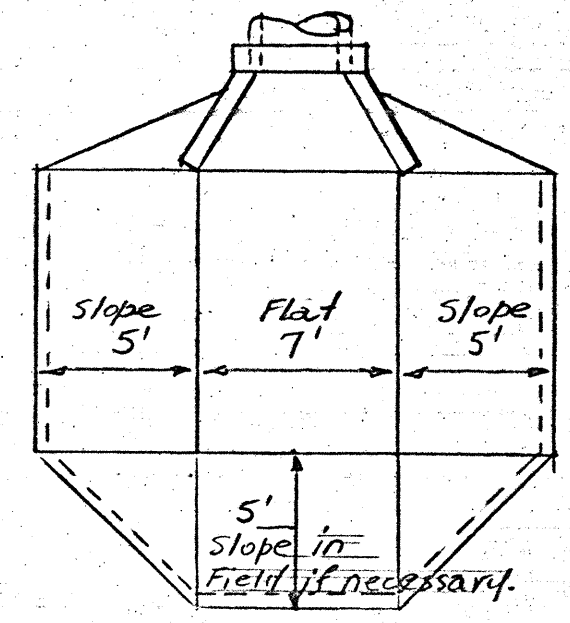
SUMMARY OF CLB" CONC RIPRAP		
ITEM- 43Z		
STATION	LOCATION	AMT. CY.
6+28+20	Flume	4.30
6+3+96	Flume	4.30
6+131+40	Flume	2.04
Rt 60+etc	Ditch Flume	6.36
TOTAL		17.00 CY

SUMMARY OF MULCH SOD		
STA-STA	LOCATION	AMOUNT
25-46	Rt Front Slope	413 C.Y.
37-41	Rt Ditch Back Slope	65
39-45	Lt Front Slope	185
45-56	Lt Ditch Back Slope	181
46-57	Rt Ditch Back Slope	181
56-61	Lt Front Slope	134
58-61	Rt Front Slope	56
63-71	Lt Front Slope	171
62-70	Rt Front Slope	205
70-74	Lt Ditch Back Slope	86
69-74	Rt Ditch Back Slope	90
74-78	Lt Front Slope	106
73-77	Rt Front Slope	114
79-90	Lt Ditch Back Slope	186
77-92	Rt Ditch Back Slope	247
90-97	Lt Front Slope	178
92-96	Rt Front Slope	81
95-100	Rt Ditch Back Slope	84
103-107	Lt Front Slope	87
103-107	Rt Front Slope	89
107-113	Lt Ditch Back Slope	218
107-113	Rt Ditch Back Slope	100
113-117	Lt Front Slope	116
112-117	Rt Front Slope	139
117-129	Lt Ditch Back Slope	186
130-133	Lt Front Slope	76
129-132	Rt Front Slope	86
Total		3360 C.Y.

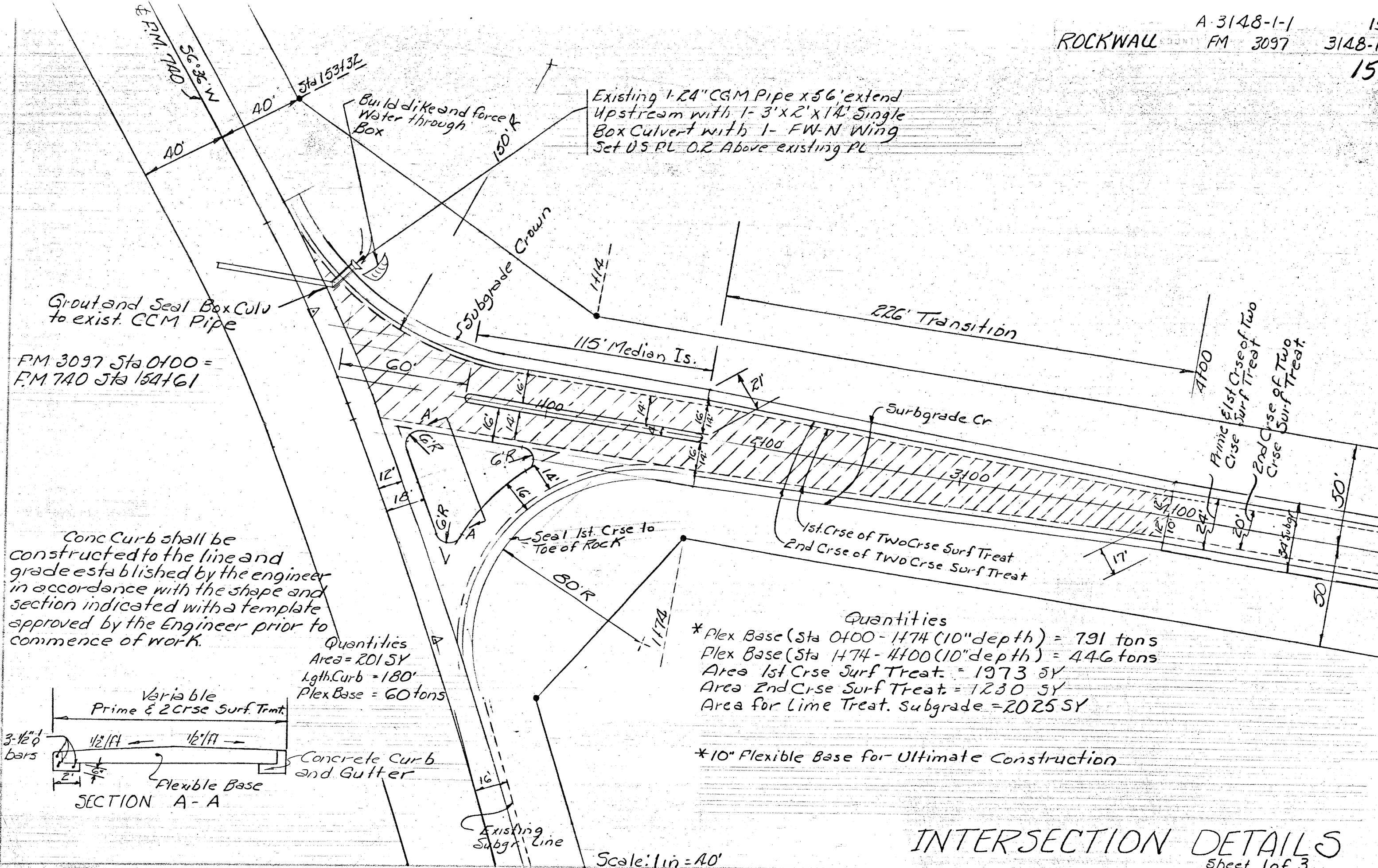
SUMMARY OF BLOCK SOD			
STA-STA	LOCATION	RETARDS	AMOUNT
0-10	Lt & Rt Ditch	2 per Sta	80 SY
10-30	Lt & Rt Ditch	4	320
30-42	Lt & Rt Ditch	3	144
49-56	Lt & Rt Ditch	4	112
56-60	Lt & Rt Ditch	6	96
64-73	Lt & Rt Ditch	6	216
78-88	Lt & Rt Ditch	2	80
88-93	Lt & Rt Ditch	8	160
93-111	Lt & Rt Ditch	2	144
115-123	Lt & Rt Ditch	8	256
123-129	Lt & Rt Ditch	2	48
130-135	Lt & Rt Ditch	5	100
Roadway Total			1756 SY
STR HOWLS (See Str Summary)			194
PROJECT TOTAL			1950 SY



CL 8" CONC RIPRAP
 RT Sta. 60+00 etc.



TYP. CL 8" Conc Rip-Rap Flume
 to be used U.S. Sta 28+20;
 Sta 63+96



Existing 1-24" CGM Pipe x 56' extend
 Upstream with 1- 3'x2'x14' Single
 Box Culvert with 1- FW-N Wing
 Set US PL O.R. Above existing PL

Grout and Seal Box Culv
 to exist. CGM Pipe

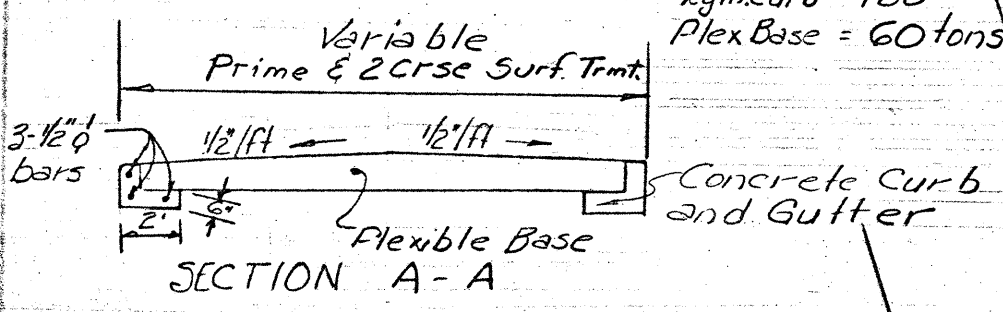
FM 3097 Sta 0100 =
 F.M 740 Sta 154161

Conc Curb shall be
 constructed to the line and
 grade established by the engineer
 in accordance with the shape and
 section indicated with a template
 approved by the Engineer prior to
 commence of work.

Quantities
 Area = 2015Y
 Lgth. Curb = 180'
 Plex Base = 60 tons

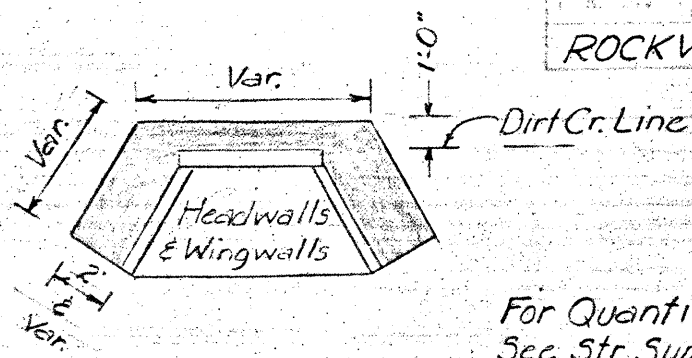
Quantities
 * Plex Base (Sta 0100 - 1474 (10" depth) = 791 tons
 Plex Base (Sta 1474 - 4400 (10" depth) = 446 tons
 Area 1st Crse Surf Treat = 1973 SY
 Area 2nd Crse Surf Treat = 1230 SY
 Area for Lime Treat. Subgrade = 2025 SY

* 10" Flexible Base for Ultimate Construction

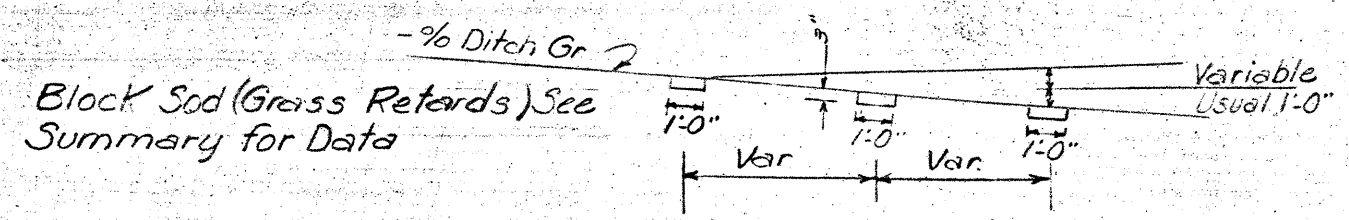


Scale: 1 in = 40'

INTERSECTION DETAILS
 Sheet 1 of 3

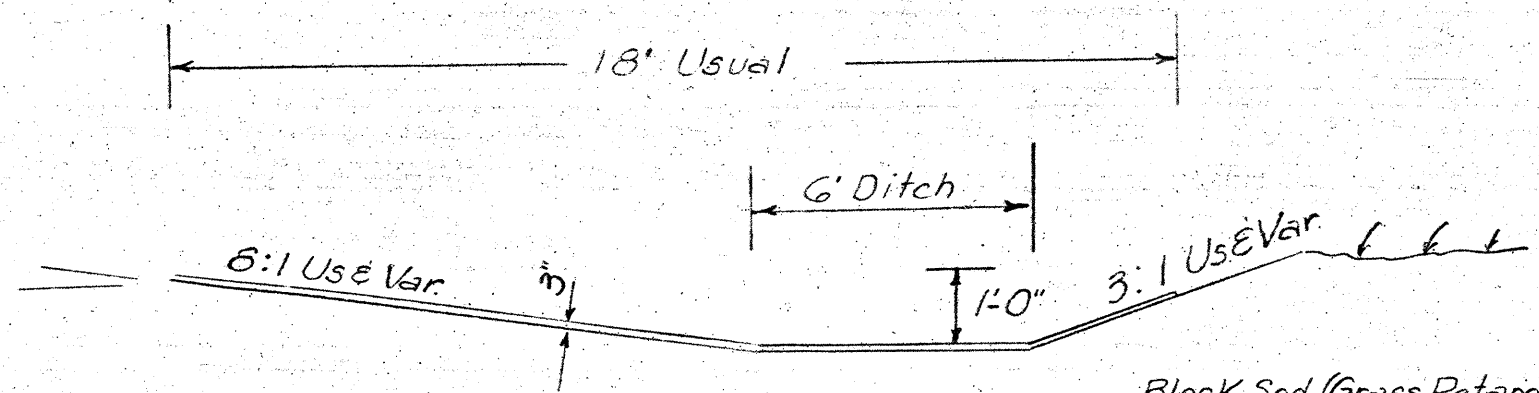


For Quantities and Station
 See Str. Summary Sheet.



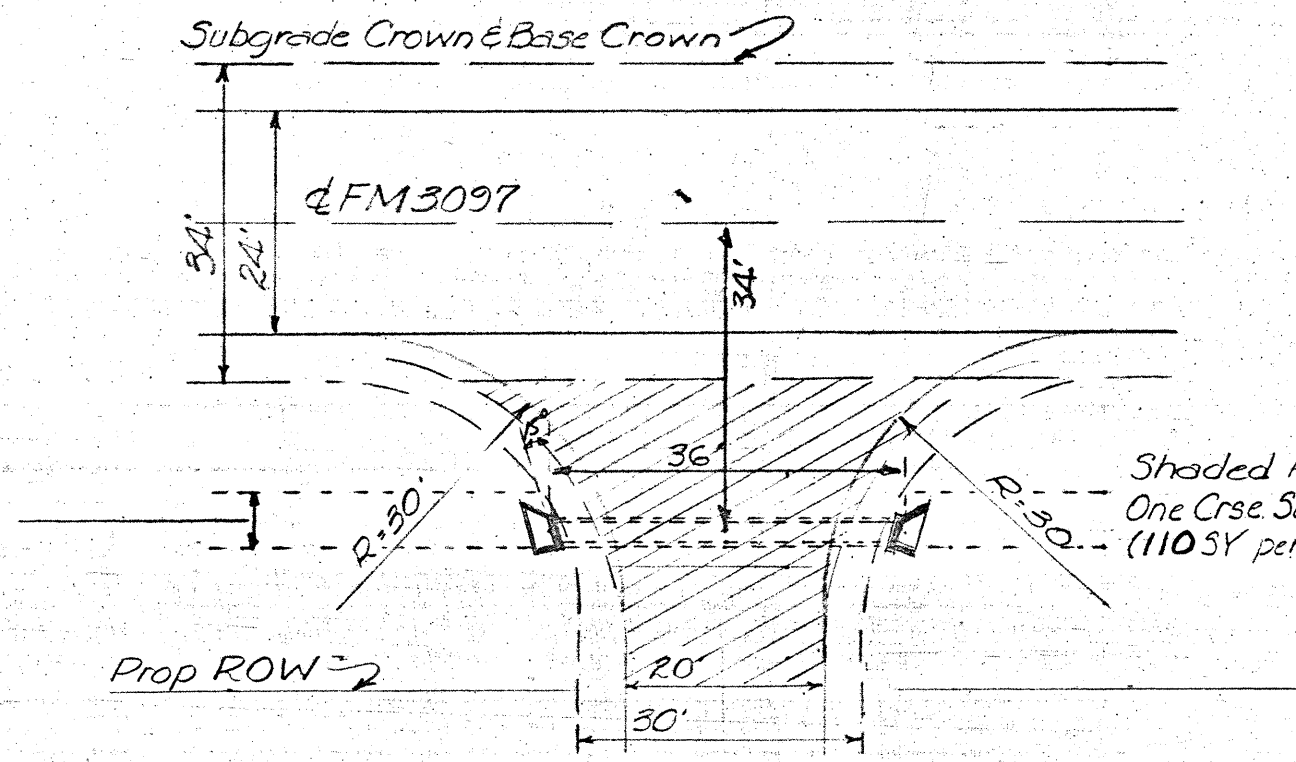
Block Sod (Grass Retards) See
 Summary for Data

Note: Retards were calculated and are to be
 located at the rate of one per 0.5% longitudinal
 grade. Change as or directed by the Engineer.



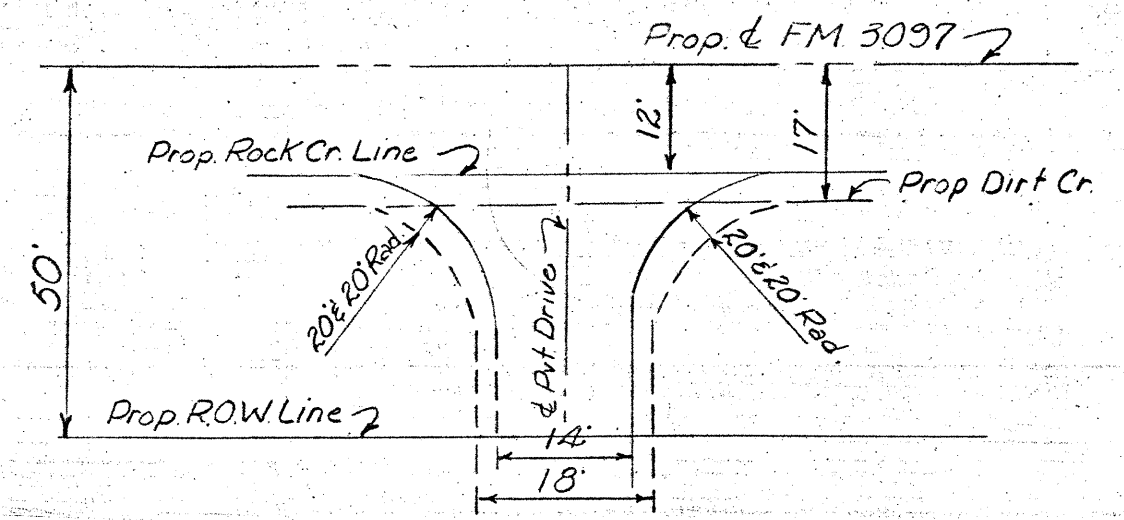
TYPICAL ROADWAY
 CUT SECTION

Block Sod (Grass Retards) For
 Quantities and Station See
 Block Sod Summary.



TYPICAL COUNTY ROAD INTER.

Flexible Base	36 Tons
Asphaltic Mat (MC-1)	22 Gal
Asph (AC-10 or RC-5)	35 Gal
Aggr (Ty B Gr 2)	1.1 CY
To be used at 3 locations or as directed.	



TYPICAL PRIVATE DRIVE

Est. Quantity 16 Ton Flex. Base per Dr.
 to be used at 25 locations.

* Variable - Dependent upon Right of Way at intersection.
 When Right-Of-Way corner clip is provided, increase
 "Y" Dimension.

SUMMARY TABLE

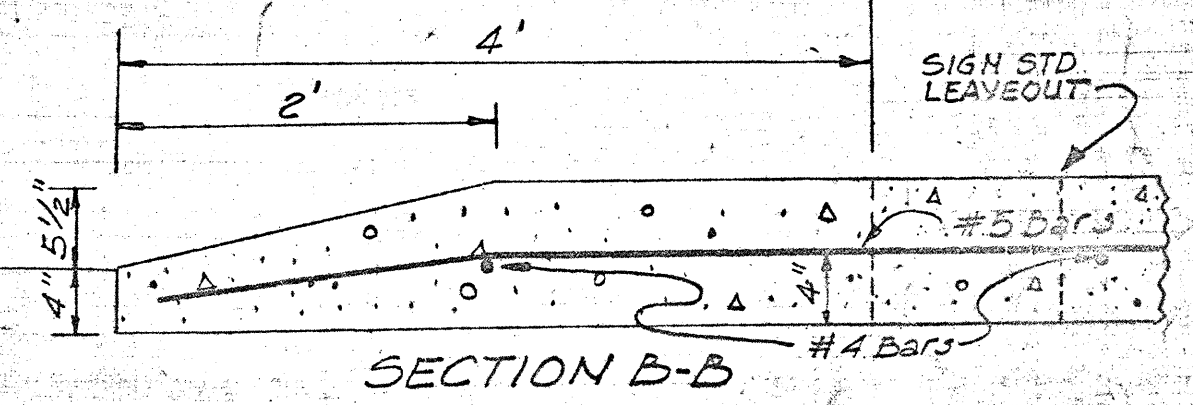
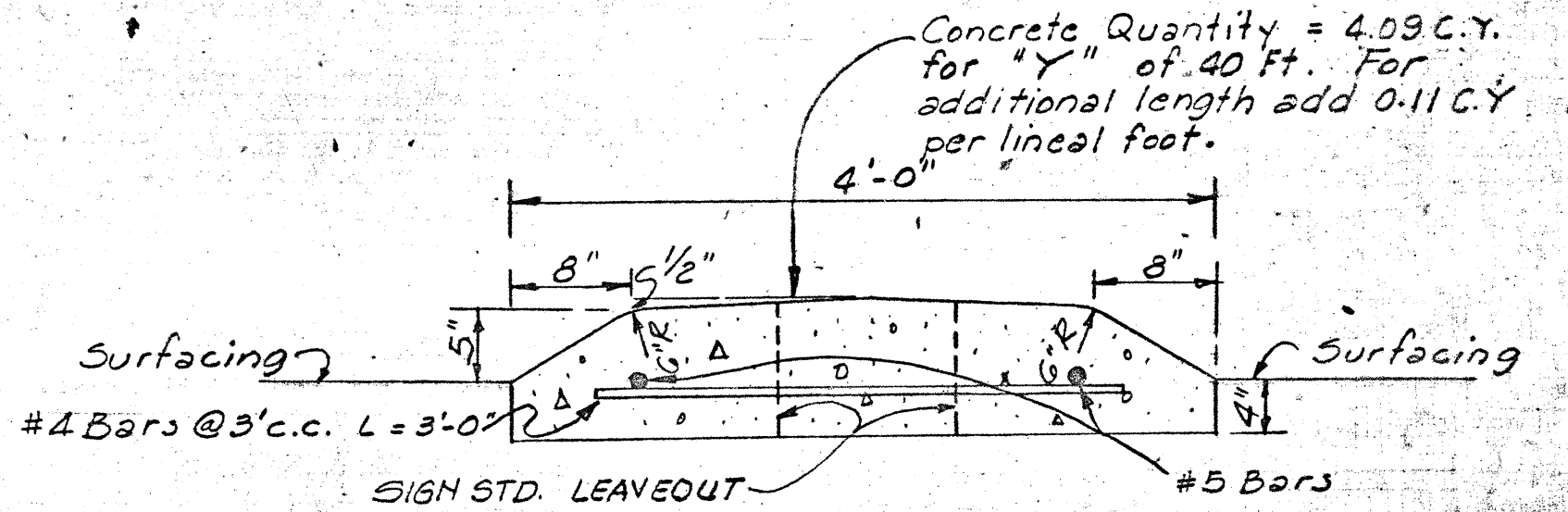
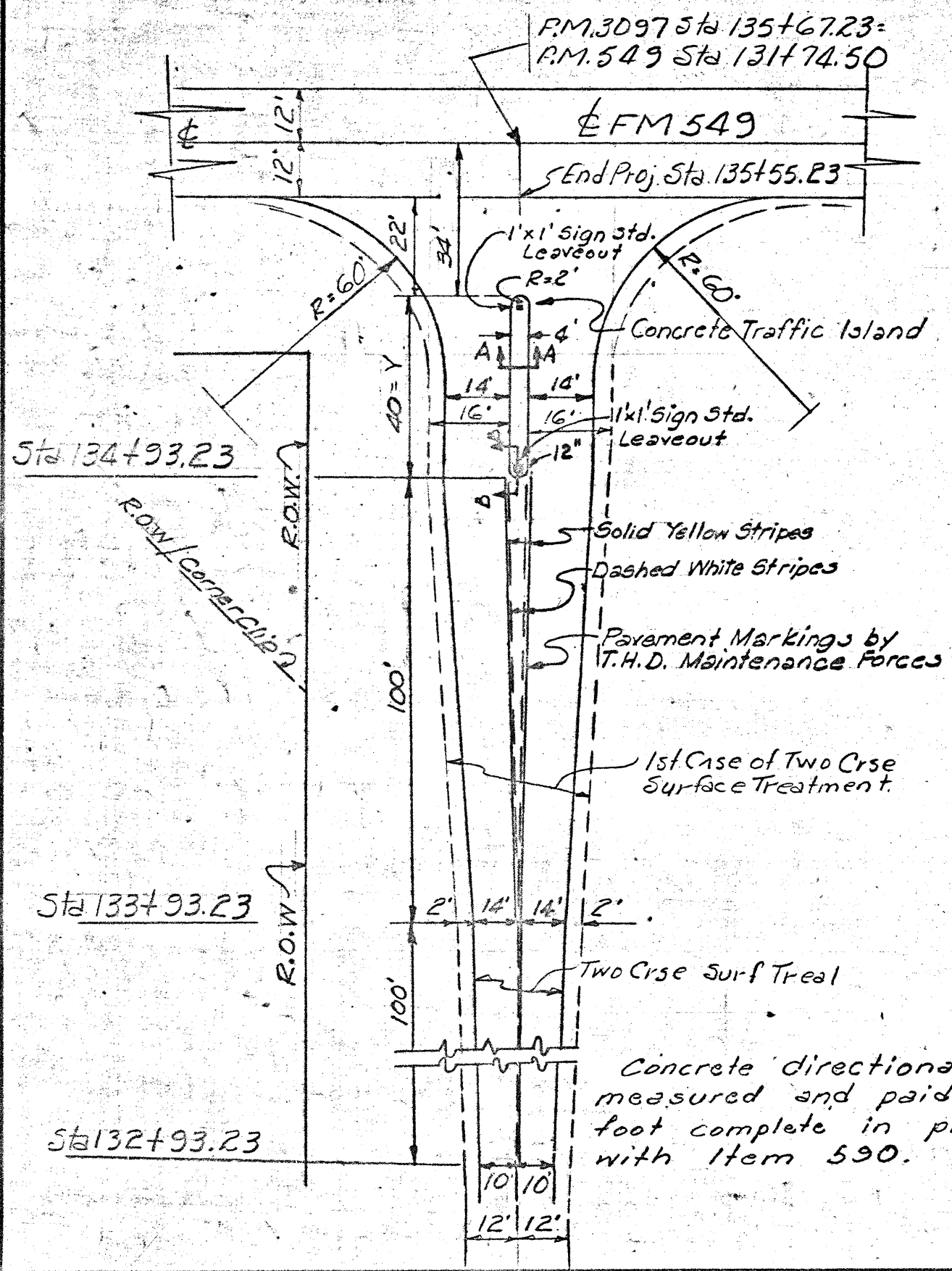
LOCATION	"Y"*	CLASS 'A' CONC.
Intersection FM 740 & FM 3039	115	12.34
Intersection FM 740 & FM 549	40	4.09
TOTAL	155 LF	
TOTAL	155 LF	16.43 CY

QUANTITIES

* FLEXIBLE BASE

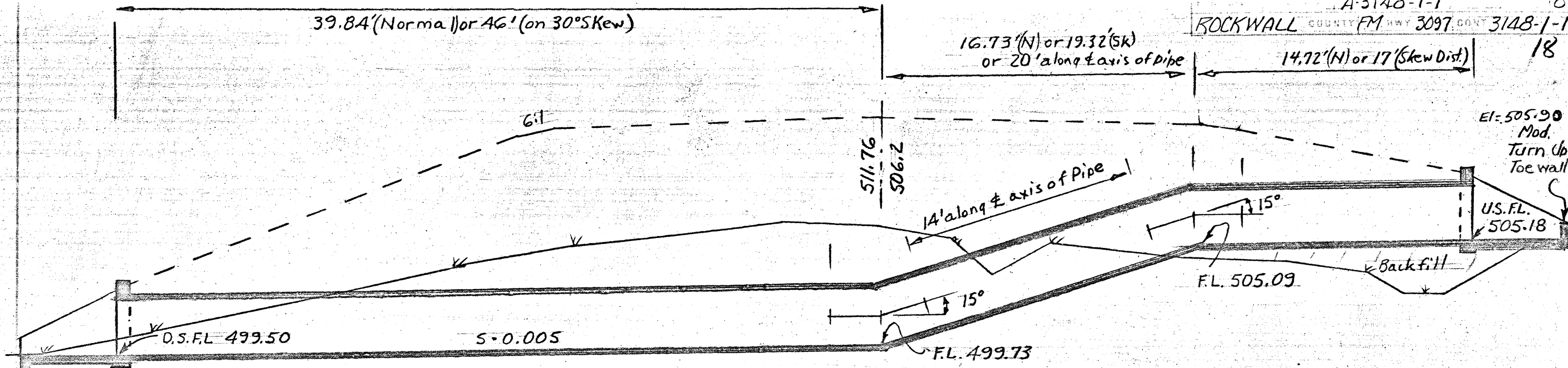
Sta. 132+93.23-133+93.23	181 Tons
Sta. 133+93.23-134+93.23	214 Tons
Sta. 134+93.23-135+55.23	205 Tons
TOTAL	600 Tons
Area 1st Crse Surf. Treat.	1092 SY
Area 2nd Crse Surf. Treat.	888 SY
Area for Lime Treat Subgr.	= 1311 SY

* 10" Flexible Base for Ultimate Const.

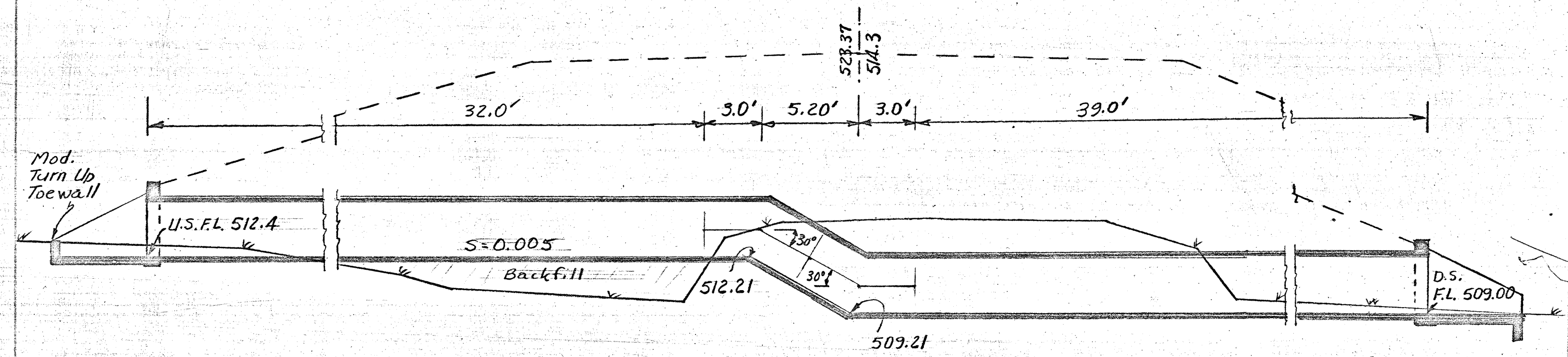


Concrete directional islands will be measured and paid for by the linear foot complete in place in accordance with Item 590.

INTERSECTION DETAIL
 FARM TO MARKET HIGHWAYS
 Sheet 30 of 3

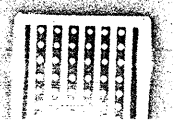


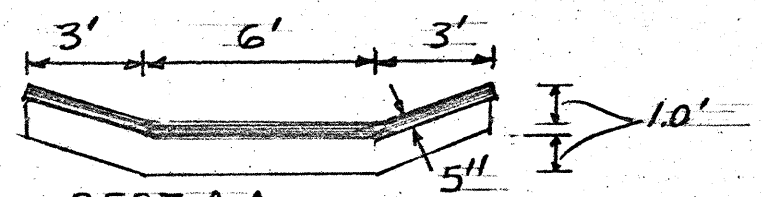
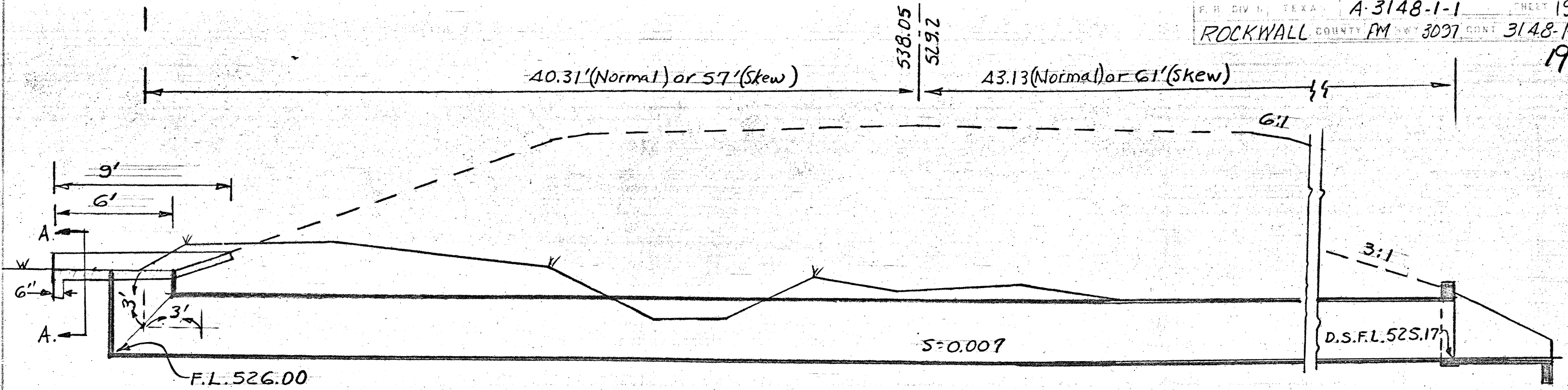
Prop. & Sta. 95+05 1-36" R.C. Pipe (CI) x 71.29' (30° LFS)
 with 2-(15° Bend Joints) & CH-11B-15° Hd'wls
 (Mod. T.W. U.S.)



Prop. & Sta. 74+85 1-36" R.C. Pipe (CI) x 82.2'
 with 2-(30° Bend Joints) & CH-11B Hd'wls.
 (Mod. T.W. U.S.)

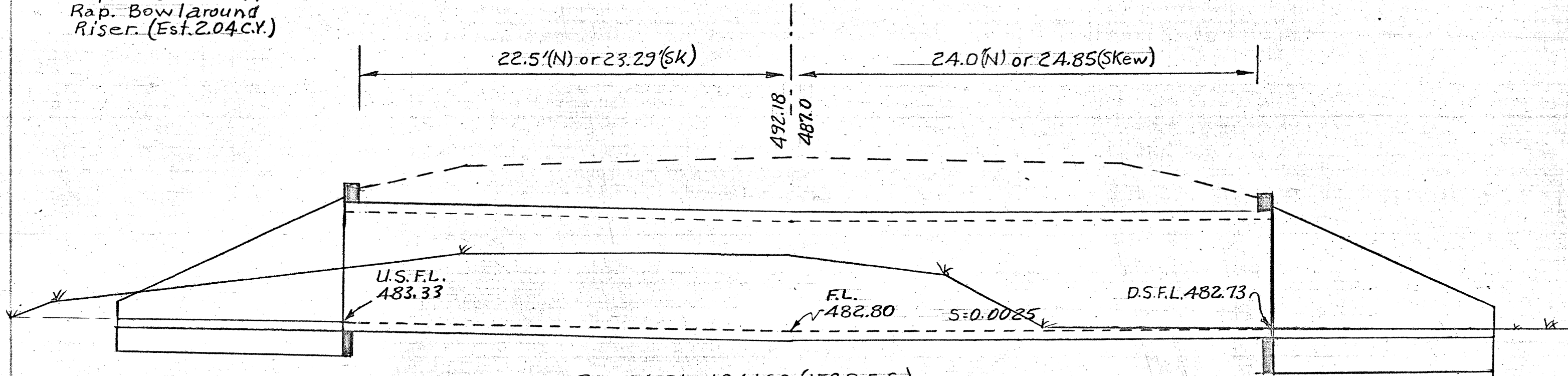
CULVERT-CROSS-SECTION.





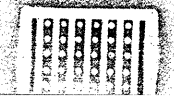
SECT A-A
 Prop. 41" B" Conc. Rip-
 Rap. Bowl around
 Riser. (Est. 2.04 C.Y.)

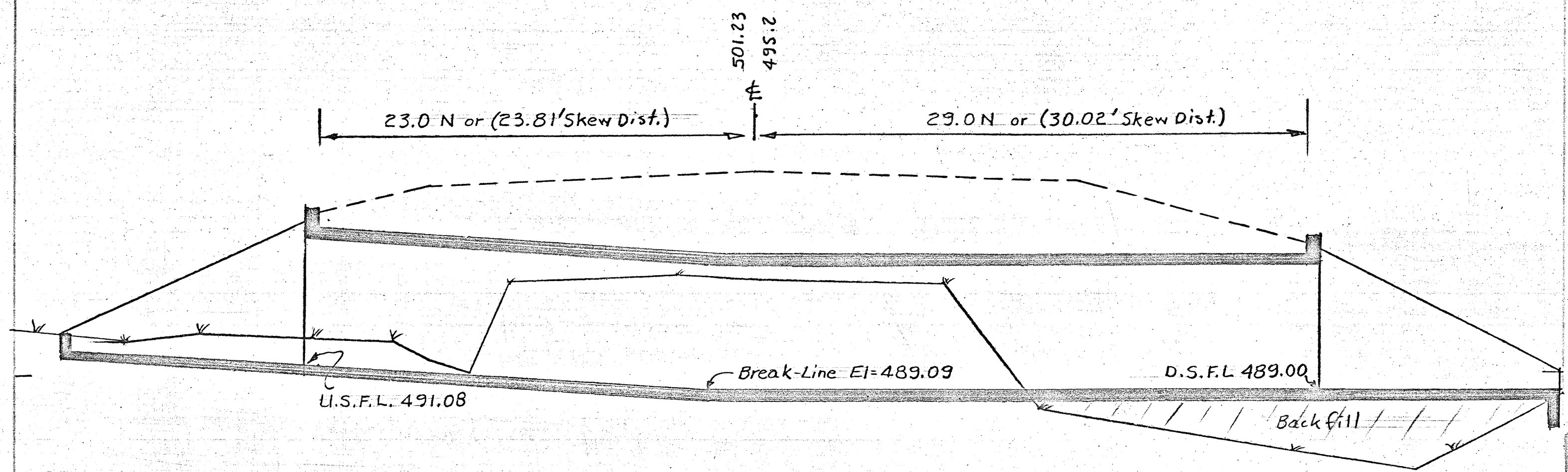
Prop. & Sta. 131+40 (45° L.F.S.)
 1-36" R.C. Pipe (CI III) x 83.44' with
 90° Bend Jt. U.S. & CH-11B-45° Hd'wt. D.S.



Prop. & Sta. 104+60 (15° R.F.S.)
 2-7' x 6' x 46.5' MBC MC7-2-15° & MCW-FI-15°
 (Broken-back at & of F.M.)

CULVERT-CROSS-SECTION





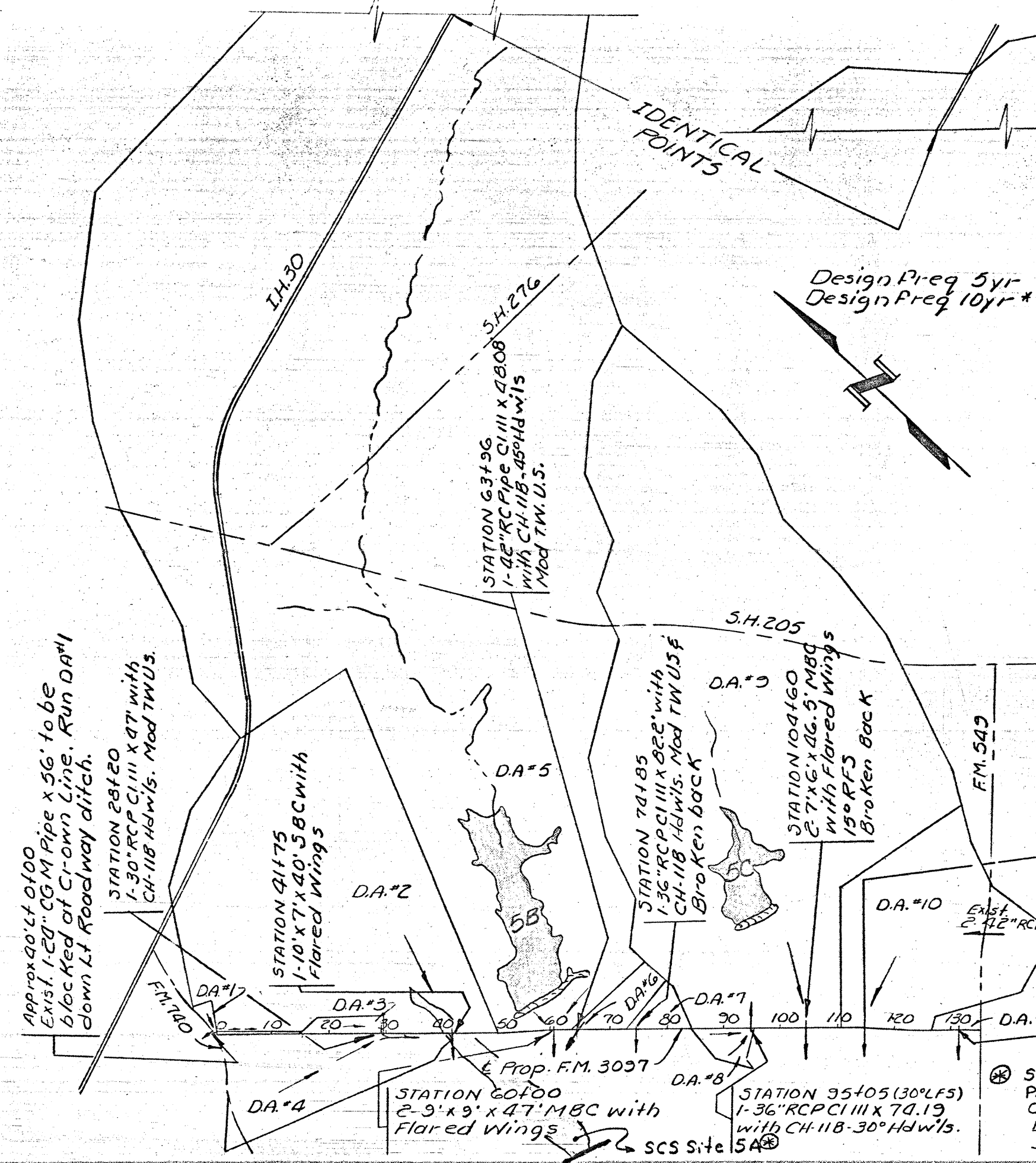
Prop. & Sta. 114+75
1-8'x7'x52' SBC (15°RFS) SC-15°A & FW-15° (Mod.)
(Turn toe wall up U.S.)

CULVERT-CROSS-SECTION



STATION	Q	ALLOW HW	OUTLET CHANNEL					CULVERT														REMARKS	
			W	SS	n	S	TW	SIZE, LENGTH & DESCRIPTION	d _c	S _c	S	$\frac{v^2}{2g}$	C _e	h _e	h _f	H	P	SL	HW	V _{out}	TYPE OPER.		
Approx 40' Lt 0+100	12.1	2.4	Natural	0.035	0.01	—	Exist. 1-24" CGM Pipe x 56' ext. U.S. with 1-3' x 2' x 14' SBC & FWN	1.24	0.0145	0.01	—	—	—	—	—	—	—	—	1.90	5.2	3	Not enough Cover for Pipe *	
28+20	21	3.0	Natural	0.035	0.0186	—	1-30" RCP Pipe C1111 x 47' with CH-11B Hd w/ls (Mod TW U.S.)	1.55	0.0046	0.008	—	—	—	—	—	—	—	—	2.30	7.9	3	Sheet flow Assume TW < D < d _c	
** 41+75	421	8.0	Natural & variable	0.035	0.01	5.7	1-10' x 6' x 50' SBC with * Flared Wings	3.7	0.0032	0.003	0.85	0.15	0.089	0.015	—	—	—	—	0.150	6.534	7.4	2	1-10' x 7' x 40' SBC proved more economical
60+00	1121	12.0	20' & Var.	0.035	0.004	8.5	2-9' x 9' x 47' MBC with Flared Wings	4.8	0.0036	0.004	0.834	0.15	0.088	0.039	—	—	—	—	0.188	9.280	7.33	2	* See Hydra Notes
63+96	40.2	4.5	Natural	0.035	0.012	—	1-42" RCP Pipe C1111 x 48.08' with CH-11B-45° (Mod TW U.S.)	1.96	0.0038	0.005	—	—	—	—	—	—	—	—	2.97	8.0	3	Assume TW < d _c & D	
74+85	29.2	4.0	Natural	0.035	0.023	—	1-36" RCP Pipe C1111 x 82.2' with CH-11B Hd w/ls (Mod TW U.S.)	1.77	0.004	0.005	—	—	—	—	—	—	—	—	2.64	7.5	3	Assume TW < d _c & D Broken BK See Layout	
95+05	29.2	4.0	Natural	0.035	0.0241	—	1-36" RCP C1111 x 74.19' with CH-11B-30° Hd w/ls. (30° LFS)	1.77	0.004	0.005	—	—	—	—	—	—	—	—	2.64	7.5	3	Assume TW < d _c & D See Layout	
** 104+60	56.8	7.0	Natural	0.035	0.0035	4.80	2-7' x 6' x 46.5' MBC with Flared Wings (15° RFS)	3.6	0.0038	0.0025	1.070	0.15	0.112	0.082	—	—	—	—	0.116	5.948	7.5	2	2-7' x 5' Req'd., 2-7' x 6' Proved more economical
** 114+75	316	7.0	Natural	0.035	0.008	4.90	1-8' x 7' x 52' SBC with Flared Wings (15° RFS) Mod TW U.S.	3.5	0.0036	0.003	0.994	0.15	0.104	0.078	—	—	—	—	0.156	5.92	8.0	2	1-8' x 6' Req'd., 1-8' x 7' x 52' Proved more economical
131+40	23.7	4.0	Natural	0.035	0.007	—	1-36" RCP Pipe C1111 x 83.44' with CH-11B-45° Hd w/ls (90° Bend U.S.)	1.575	0.004	0.007	—	—	—	—	—	—	—	—	2.34	8.0	3	Assume TW < d _c & D 90° Bend U.S.	
							* 24" CGM Pipe adequate to leave in place and extend.																
							** Note "Remarks" The extra 1 ft Height proved to be more economical with a decrease in length.																
							Note: Natural Channel denotes the existing outlet channel where no work is to be performed. Where the outlet is a flood plain type and not well defined, the tailwater depth is assumed to be less than critical depth																





DRAINAGE AREA NO.	AREA (Acres)	LENGTH (Feet)	TIME (Min's)	"I" (Inches/hr)	"C"	"Q" (CFS)
1	4	600	6.67	6.7	0.45	12.1
2	390	6,900	76.70	2.4	0.45	421.*
3	9	1,400	15.55	5.2	0.45	21
4	109	4,000	44.40	3.0	0.45	147
**5	3,073	22,500	250.00	1.2	0.45	1660*
6	19	1,800	20.00	4.7	0.45	10.2
7	11	1,000	11.10	5.9	0.45	29.2
8	11	1,000	11.10	5.9	0.45	29.2
**9	1,141	13,200	146.5	1.5	0.45	771*
10	251	4,400	48.8	2.8	0.45	316
11	8	600	6.67	6.6	0.45	23.7

** 10yr Flood design without any Lake Considerations
 Consider DA No's 5 & 9 with 2yr flood

5	3,073	22,500	250	I _e = 0.70	0.45	968
9	1,141	13,200	146.5	I _e = 1.0	0.45	513

See Hydraulic Notes for design procedures and explanation of Str. Design Sta. 60+00 & 100+60

DRAINAGE AREA MAP

SCALE: 1" = 2000'

* SCS Site 5A -
 Permanent Water Elevation - 499.0
 Outlet Pipes - 22" Reinf. Conc. & 24" CGMP
 Emergency Spillway Crest - 508.5
 SCS gives 5.10 in. Storage (Low Sag - FM - Elev 510.10)

I. DRAINAGE AREA NO 5 (Includes SCS Lake site 5B)

STRUCTURE STATION 60+00 (2-9'x9'x47' Mul Box Culv with Flared Wings)

Approximately 400 ft upstream of the proposed Structure at Sta 60+00, Buffalo Creek has been impounded by a Soil Conservation dam which intercepts DA No 5 (Dam site 5B). A 22" RC Pipe and a 36" CGM Pipe are installed in the lake dam and function as drawdown pipes. The SCS estimates that the discharge from these two pipes is 153 cfs at emergency spillway crest. Our traffic count (370 vpd) requires a 10 yr flood design frequency under usual circumstances. Q_{10} (W/O lake consideration) = 1660 cfs, $dTW_{10} = 9.5$, would require 3-10'x10' MBC and would function as a type 2 installation and with an outlet velocity of 5.82 ft per sec.

We propose to take advantage of the upstream dam interception by reducing the design frequency to a 2 yr flood occurring after storage in the lake has accumulated as a result of the SCS estimate of a 25 year storage capacity at emergency spillway elevation, giving us $Q_2 = 968 \text{ cfs} + 153 \text{ cfs (drawdown Pipes)} = \text{Total } Q_2 = 1121 \text{ cfs}$, $dTW_2 = 8.5$. 2-9'x9' MBC will pass 1121 cfs, operating as type 2 installation, $HW = 9.320 \text{ ft}$ and an Outlet Velocity of 7.33 ft per sec.

In the event the dam fails, our proposed 2-9'x9' MBC will function as a type 4 installation with a submerged entrance and a submerged outlet, and will pass $Q_{10} = 1660 \text{ cfs}$ at an outlet velocity of 10.25 ft per sec. and with a $HW = 11.77'$.

We propose to protect the downstream outlet eventuality by placing 18" Conc. Riprap between the headwalls.

INFORMATION FURNISHED BY SCS (SITE 5B) - Site 5B has a drainage area above the site of 3081 acres or 4.81 square miles. This site was constructed with a 22" RC Pipe and 14" baffle plate. The baffle plate has been removed several years. This structure was modified in 1966 by installing a 36" CMP 176 ft. long. These two pipes will give a total discharge of 153 cfs at emergency spillway crest. This site has 5.35 inches of detention storage.

II. DRAINAGE AREA NO 9 (Includes SCS Lake site 5C)

* STRUCTURE STATION 104+60 (2-7'x6'x46.5' Mul Box Culv. with Flared Wings) 15° Rt Fwd Skew.

Approximately 2000 feet upstream of the structure proposed at station 104+60, No Name Creek, has been impounded by a soil Conservation dam which intercepts DA No 9 (Dam site 5C). A 22" RC Pipe is installed in the lake dam and functions as a drawdown pipe. The SCS estimates that the maximum discharge from this pipe to be 55 cfs at emergency spillway crest. Our traffic count (370 VPD) requires a 10 year design flood frequency under usual circumstances. Q_{10} (W/O Lake Considerations) = 771 cfs, $dTW = 5.8$, would require 2-9'x6' MBC and would function as a type 2 installation and an outlet velocity of 7.4 ft per sec.

We propose to take advantage of the upstream dam interception by reducing the design frequency to a 2 year flood occurring after storage in the lake has accumulated as a result of the SCS estimates of a 25 year storage capacity at emergency spillway elevation, giving us $Q_2 = 513 \text{ cfs} + 55 \text{ cfs (drawdown pipe)} = \text{TOTAL } Q_2 = 568 \text{ cfs}$, $dTW_2 = 4.8$. 2-7'x5' MBC will pass 568 cfs, operating as a type 2 installation, $HW = 5.948$ and an outlet velocity of 7.5 ft per sec.

In the event the upstream dam fails, our proposed 2-7'x5' MBC will function as a type 4 installation with a submerged entrance and a submerged outlet, and will pass $Q_{10} = 771 \text{ cfs}$ at an outlet velocity of 11.03 ft per sec.

We propose to protect the downstream outlet eventuality by placing 18" Conc Riprap between the headwalls.

INFORMATION FURNISHED BY SCS (SITE 5C) - Site 5C has a drainage area of 1002 acres or 1.57 square miles. This structure is a 22" RC Pipe with a 9" baffle plate. The baffle plate can be removed. With the baffle plate in the maximum discharge is 8 cfs. When removed the maximum discharge at emergency spillway level is 55 cfs. The detention storage for this site is 5.46 inches.

* 2-7'x6' MBC proved to be more economical than 2-7'x5' due to a lesser length required.



TABLE OF DIMENSIONS													TABLE OF REINFORCING STEEL FOR 2 WINGS																																
CULVERT SIZE		MAX. FILL						TOTAL QUANTITIES		TABLE OF REINFORCING STEEL FOR 2 WINGS																																			
S	H	L	M	V	W	C	D	Ta	Conc. Cu Yds	Steel Lbs	Bars H-#4	Bars J-#6	Bars O	Bars O1-Ox	Bars P	Bars P1-Px	Bars Q1-Qx	Bars R	Bars S	Bars U	Bars V1-Vx	8 Bars W	CULVERT SIZE																						
											No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	S	H																			
3 x 2	3'-6"	3'-8"	6"	6'-5 1/2"	1'-0"	2'-8"	6"	-	1.73	241	12	20	8	48	3	5'-11"	12	4	3'-6"	9	3	6'-5"	13	4	4'-0"	11	6	5'-0"	20	6'-6"	17	3'-5"	18	8	3'-1"	16	16	#4	12"	3'-6"	37	#4	3'-9"	20	3 x 2
3 x 3	5'-6"	5'-11 1/2"	6"	8'-5 1/2"	1'-0"	3'-8"	6"	-	3.03	371	16	27	8	48	3	7'-11"	16	6	4'-6"	18	3	8'-5"	17	6	5'-0"	20	10	6'-0"	40	8'-6"	23	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33	3 x 3
4 x 2	3'-6"	3'-8"	6"	7'-5 1/2"	1'-0"	2'-8"	6"	-	1.93	256	12	20	8	48	4	5'-11"	16	4	3'-6"	9	4	6'-5"	17	4	4'-0"	11	6	6'-0"	24	7'-6"	20	3'-5"	18	8	3'-1"	16	16	#4	12"	3'-6"	37	#4	3'-9"	20	4 x 2
4 x 3	5'-6"	5'-11 1/2"	6"	9'-5 1/2"	1'-0"	3'-8"	6"	-	3.29	390	16	27	8	48	4	7'-11"	21	6	4'-6"	18	4	8'-5"	22	6	5'-0"	20	10	7'-0"	47	9'-6"	25	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33	4 x 3
4 x 4	7'-6"	8'-2 1/2"	6"	11'-5 1/2"	1'-0"	4'-8"	6"	-	4.98	558	20	33	8	48	4	9'-11"	26	8	5'-6"	29	4	10'-5"	28	8	6'-0"	32	14	8'-0"	75	11'-6"	31	7'-10"	42	16	5'-7"	60	36	#4	12"	4'-6"	108	#4	8'-7"	46	4 x 4
5 x 2	3'-6"	3'-8"	6"	8'-5 1/2"	1'-0"	2'-8"	6"	-	2.12	271	12	20	8	48	5	5'-11"	20	4	3'-6"	9	5	6'-5"	21	4	4'-0"	11	6	7'-0"	28	8'-6"	23	3'-5"	18	8	3'-1"	16	16	#4	12"	3'-6"	37	#4	3'-9"	20	5 x 2
5 x 3	5'-6"	5'-11 1/2"	6"	10'-5 1/2"	1'-0"	3'-8"	6"	-	3.56	410	16	27	8	48	5	7'-11"	26	6	4'-6"	18	5	8'-5"	28	6	5'-0"	20	10	8'-0"	53	10'-6"	28	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33	5 x 3
5 x 4	7'-6"	8'-2 1/2"	6"	12'-5 1/2"	1'-0"	4'-8"	6"	-	5.32	583	20	33	8	48	5	9'-11"	33	8	5'-6"	29	5	10'-5"	35	8	6'-0"	32	14	9'-0"	84	12'-6"	33	7'-10"	42	16	5'-7"	60	36	#4	12"	4'-6"	108	#4	8'-7"	46	5 x 4
5 x 5	8'-7 1/2"	9'-3 1/2"	7"	13'-5 1/2"	1'-6"	5'-8"	6"	-	7.17	728	24	40	8	48	5	10'-11"	36	8	6'-6"	35	5	11'-5"	38	8	7'-0"	37	16	9'-0"	102	13'-6"	36	9'-0"	48	20	6'-6"	87	40	#4	12"	4'-5"	108	#4	9'-8"	46	5 x 5
6 x 3	5'-6"	5'-11 1/2"	6"	11'-5 1/2"	1'-0"	3'-8"	6"	-	3.83	432	16	27	8	48	6	7'-11"	32	6	4'-6"	18	6	8'-5"	34	6	5'-0"	20	10	9'-0"	60	11'-6"	31	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33	6 x 3
6 x 4	7'-6"	8'-2 1/2"	6"	13'-5 1/2"	1'-0"	4'-8"	6"	-	5.66	610	20	33	8	48	6	9'-11"	40	8	5'-6"	29	6	10'-5"	42	8	6'-0"	32	14	10'-0"	94	13'-6"	36	7'-10"	42	16	5'-7"	60	36	#4	12"	4'-6"	108	#4	8'-7"	46	6 x 4
6 x 5	8'-7 1/2"	9'-3 1/2"	7"	14'-5 1/2"	1'-6"	5'-8"	6"	-	7.55	757	24	40	8	48	6	10'-11"	44	8	6'-6"	35	6	11'-5"	46	8	7'-0"	37	16	10'-6"	112	14'-6"	39	9'-0"	48	20	6'-6"	87	40	#4	12"	4'-5"	108	#4	9'-8"	46	6 x 5
6 x 6	10'-7 1/2"	11'-6 1/2"	7"	16'-5 1/2"	1'-6"	6'-8"	6"	-	10.13	972	28	47	8	48	6	12'-11"	52	10	7'-6"	50	6	13'-5"	54	10	8'-0"	53	20	11'-6"	154	16'-6"	44	11'-3"	60	24	7'-8"	123	48	#4	12"	4'-6"	108	#4	10'-9"	46	6 x 6
7 x 3	5'-7 1/2"	6'-0 1/2"	6"	12'-6 1/2"	1'-0"	3'-8 1/2"	6 1/2"	10'	4.36	465	16	27	8	48	7	8'-0"	37	6	4'-7"	18	7	8'-6"	40	6	5'-1"	20	10	10'-0"	67	12'-7"	34	5'-8"	30	12	4'-4"	35	28	#4	12"	4'-1"	76	#4	6'-3"	33	7 x 3
7 x 4	7'-7 1/2"	8'-3 1/2"	6"	14'-6 1/2"	1'-0"	4'-8 1/2"	6 1/2"	10'	6.37	642	20	33	8	48	7	10'-0"	47	8	5'-7"	30	7	10'-6"	49	8	6'-1"	33	14	11'-0"	103	14'-7"	39	8'-0"	43	16	5'-7"	60	36	#4	12"	4'-7"	110	#4	8'-9"	47	7 x 4
7 x 5	8'-8 1/2"	9'-4 1/2"	7"	15'-6 1/2"	1'-6"	5'-8 1/2"	6 1/2"	10'	8.37	792	24	40	8	48	7	11'-0"	51	8	6'-7"	35	7	11'-6"	54	8	7'-1"	38	16	11'-6"	123	15'-7"	42	9'-1"	49	20	6'-6"	87	40	#4	12"	4'-7"	110	#4	9'-8"	46	7 x 5
7 x 6	10'-8 1/2"	11'-7 1/2"	7"	17'-6 1/2"	1'-6"	6'-8 1/2"	6 1/2"	10'	11.15	1014	28	47	8	48	7	13'-0"	61	10	7'-7"	51	7	13'-6"	63	10	8'-1"	54	20	12'-6"	167	17'-7"	47	11'-4"	61	24	7'-9"	124	48	#4	12"	5'-10"	187	#5	12'-5"	104	7 x 6
7 x 7	12'-8 1/2"	13'-10 1/2"	7"	19'-6 1/2"	1'-6"	7'-8 1/2"	6 1/2"	10'	14.28	1372	32	58	8	48	7	15'-0"	70	12	8'-7"	69	7	15'-6"	72	12	9'-1"	73	24	13'-6"	216	19'-7"	52	13'-7"	73	28	8'-11"	167	84	#4	8"	6'-4"	355	#5	14'-11"	124	7 x 7
8 x 4	7'-8 1/2"	8'-4 1/2"	6"	15'-7 1/2"	1'-0"	4'-9"	7"	9 1/2"	7.14	671	20	33	8	48	8	10'-1"	54	8	5'-8"	36	8	10'-7"	57	8	6'-2"	33	14	12'-0"	112	15'-8"	42	8'-1"	43	16	5'-7"	60	36	#4	12"	4'-8"	112	#4	8'-10"	47	8 x 4
8 x 5	8'-9 1/2"	9'-6"	7"	16'-7 1/2"	1'-6"	5'-9"	7"	9 1/2"	9.26	828	24	40	8	48	8	11'-1"	59	8	6'-8"	38	8	11'-7"	62	8	7'-2"	38	16	12'-6"	134	16'-8"	45	9'-2"	49	20	6'-7"	88	40	#4	12"	5'-5"	145	#5	10'-1"	84	8 x 5
8 x 6	10'-9 1/2"	11'-8 1/2"	7"	18'-7 1/2"	1'-6"	6'-9"	7"	9 1/2"	12.25	1053	28	47	8	48	8	13'-1"	70	10	7'-8"	51	8	13'-7"	73	10	8'-2"	55	20	13'-6"	180	18'-8"	50	11'-5"	61	24	7'-9"	124	48	#4	12"	5'-11"	190	#5	12'-6"	104	8 x 6
8 x 7	12'-9 1/2"	13'-11 1/2"	7"	20'-7 1/2"	1'-6"	7'-9"	7"	9 1/2"	15.60	1385	32	53	8	48	8	15'-1"	81	12	8'-8"	69	8	15'-7"	83	12	9'-2"	73	24	14'-6"	232	20'-8"	55	13'-8"	73	28	8'-11"	167	76	#4	9"	6'-5"	326	#5	15'-0"	125	8 x 7
8 x 8	13'-9 1/2"	15'-1 1/2"	8"	21'-7 1/2"	2'-0"	8'-9"	7"	9 1/2"	19.25	1818	36	60	8	48	8	16'-2"	86	12	9'-9"	78	8	16'-8"	89	12	10'-3"	82	26	15'-0"	261	21'-8"	58	14'-9"	79	32	9'-9"	208	120	#4	6"	7'-2"	575	#6	16'-2"	194	8 x 8
9 x 5	8'-10 1/2"	9'-7 1/2"	7"	17'-8 1/2"	1'-6"	5'-9 1/2"	7"	9 1/2"	9.82	858	24	40	8	48	9	11'-2"	67	8	6'-9"	36	9	11'-8"	70	8	7'-3"	39	16	13'-6"	144	17'-9"	47	9'-3"	49	20	6'-7"	88	40	#4	12"	5'-5"	145	#5	10'-2"	85	9 x 5
9 x 6	10'-10 1/2"	11'-10"	7"	19'-8 1/2"	1'-6"	6'-9 1/2"	7"	9 1/2"	12.91	1106	28	47	8	48	9	13'-2"	79	10	7'-9"	52	9	13'-8"	82	10	8'-3"	55	20	14'-6"	194	19'-9"	53	11'-6"	61	24	7'-9"	124	52	#4	12"	5'-11"	206	#5	12'-7"	105	9 x 6
9 x 7	12'-10 1/2"	14'-0 1/2"	7"	21'-8 1/2"	1'-6"	7'-9 1/2"	7"	9 1/2"	16.36	1428	32	53	8	48	9	15'-2"	91	12	8'-9"	70	9	15'-8"	94	12	9'-3"	74	24	15'-6"	248	21'-9"	58	13'-9"	73	28	8'-11"	167	76	#4	9"	6'-5"	326	#5	15'-1"	126	9 x 7
9 x 8	13'-10 1/2"	15'-2 1/2"	8"	22'-8 1/2"	2'-0"	8'-9 1/2"	7"	9 1/2"	20.09	1894	36	60	8	48	9	16'-3"	98	14	8'-10"	83	9	16'-9"	101	14	9'-4"	87	26	16'-0"	278	22'-9"	61	14'-10"	79	32	9'-10"	210	124	#4	6"	7'-2"	594	#6	16'-3"	195	9 x 8
9 x 9	15'-10 1/2"	17'-5 1/2"	8"	24'-8 1/2"	2'-0"	9'-9 1/2"	7"	9 1/2"	24.47	2563	40	67	8	48	9	18'-3"	110	16	9'-10"	105	9	18'-9"	113	16	10'-4"	110	30	17'-0"	341	24'-9"	66	17'-1"	91	36	11'-0"	265	120	#5	7"	8'-2"	1022	#6	18'-9"	225	9 x 9
10 x 5	8'-11 1/2"	9'-8 1/2"	7"	18'-9 1/2"	1'-6"	5'-10"	7 1/2"	9'	10.82	894	24	40	8	48	10	11'-3"	75	8	6'-10"	37	10	11'-9"	78	8	7'-4"	39	16	14'-6"	155	18'-10"	50	9'-4"	50	20	6'-8"	89	40	#4	12"	5'-6"	147	#5	10'-3"	86	10 x 5
10 x 6	10'-11 1/2"	11'-11 1/2"	7"	20'-9 1/2"	1'-6"	6'-10"	7 1/2"	9'	14.14	1149	28	47	8	48	10	13'-3"	89	10	7'-10"	52	10	13'-9"	92	10	8'-4"	56	20	15'-6"	207	20'-10"	56	11'-7"	62	24	7'-10"	126	52	#4	12"	6'-0"	208	#5	12'-8"	106	10 x 6
10 x 7	12'-11 1/2"	14'-1 1/2"	7"	22'-9 1/2"	1'-6"	7'-10"	7 1/2"	9'	17.84	1479	32	53	8	48	10	15'-3"	102	12	8'-10"	71	10	15'-9"	105	12	9'-4"	75	24	16'-6"	265	22'-10"	61	13'-10"	74	28	9'-0"	168	76	#4	9"	6'-6"	330	#5	15'-2"	127	10 x 7
10 x 8	13'-11 1/2"	15'-3 1/2"	8"	23'-9 1/2"	2'-0"	8'-10"	7 1/2"	9'	21.72	1849	36	60	8	48	10	16'-4"	109	14	8'-11"	83	10	16'-10"	112	14	9'-5"	88	26	17'-0"	295	23'-10"	64	14'-11"	80	32	9'-10"	210	104	#4	7"	7'-3"	504	#6	16'-4"	196	10 x 8
10 x 9	15'-11 1/2"	17'-6 1/2"	8"	25'-9 1/2"	2'-0"	9'-10"	7 1/2"	9'	26.36	2626	40	67	8	48	10	18'-4"	122	16	9'-11"	106	1																								

TABLE OF DIMENSIONS & REINFORCING STEEL MODIFICATIONS
ENTER WITH NORMAL CULVERT SPAN & WIDTH

SPAN	MC--1															MC--2			MC--3						
	DIMENSIONS				NO. LENGTH		NO. BARS		LENGTH OF VARIABLE BARS (FIRST & LAST)					SPACES			LENGTH		NO		LENGTH		NO		
	WIDTH	b	a	d	K	H	A/B/B1	B2	A	A	B, B1, B2	B/B1	B2	X	Y	Z	Y	LAST B	B	Y	LAST B	B	Y	LAST B	B
5	2	11'-6"	11.91	3.08	43.85	24	11'-7"	44	86	-	7'-11"	4'-2"	9'-9"	2'-3"	-	2	3	-	3	2'-3"	86	-	-	-	-
5	3	17'-0"	17.60	4.56	42.38	36	17'-3"	43	84	-	13'-5"	2'-2"	15'-3"	4'-1"	-	4	4	-	4	4'-1"	84	-	-	-	-
5	4	22'-6"	23.29	6.03	40.90	46	22'-11"	41	80	-	18'-11"	3'-11"	20'-9"	2'-1"	-	5	6	-	6	2'-1"	80	-	-	-	-
5	5	28'-0"	28.99	7.50	39.43	58	28'-8"	40	78	-	24'-5"	2'-0"	26'-3"	3'-10"	-	7	7	-	7	3'-10"	78	-	-	-	-
5	6	33'-6"	34.68	8.98	37.96	70	34'-4"	38	74	-	29'-11"	3'-9"	31'-9"	1'-10"	-	8	9	-	9	1'-10"	74	-	-	-	-
5	2	11'-9"	12.16	3.15	43.78	24	11'-10"	44	86	-	8'-2"	4'-5"	10'-0"	2'-6"	-	2	3	-	3	2'-6"	86	-	-	-	-
5	3	17'-4"	17.95	4.64	42.29	36	17'-7"	43	84	-	13'-9"	2'-7"	15'-7"	4'-5"	-	4	4	-	4	4'-5"	84	-	-	-	-
5	4	22'-11"	23.73	6.14	40.79	48	23'-5"	41	80	-	19'-4"	4'-5"	21'-2"	2'-6"	-	5	6	-	6	2'-6"	80	-	-	-	-
5	5	28'-6"	29.51	7.64	39.30	60	29'-2"	40	78	-	24'-11"	2'-6"	26'-9"	4'-4"	-	7	7	-	7	4'-4"	78	-	-	-	-
5	6	34'-1"	35.29	9.13	37.80	70	34'-11"	38	74	-	30'-6"	4'-4"	32'-4"	2'-6"	-	8	9	-	9	2'-6"	74	-	-	-	-
6	2	13'-6"	13.98	3.62	43.32	28	13'-8"	53	104	-	10'-2"	3'-11"	11'-9"	2'-5"	-	3	4	-	5	1'-10"	130	-	-	-	-
6	3	20'-0"	20.71	5.36	41.57	42	20'-4"	50	98	-	16'-8"	4'-3"	18'-3"	2'-8"	-	5	6	-	7	3'-4"	124	-	-	-	-
6	4	26'-6"	27.44	7.10	39.83	56	27'-1"	48	94	-	23'-2"	4'-6"	24'-9"	3'-0"	-	7	8	-	10	2'-4"	118	-	-	-	-
6	5	33'-0"	34.16	8.84	38.09	68	33'-10"	46	90	-	29'-8"	1'-8"	31'-3"	3'-3"	-	10	10	-	12	3'-11"	114	-	-	-	-
6	6	39'-6"	40.89	10.58	36.35	82	40'-6"	44	86	-	36'-2"	1'-11"	37'-9"	3'-6"	-	12	12	-	15	2'-11"	108	-	-	-	-
6	2	13'-9"	14.24	3.68	43.25	28	13'-10"	53	104	-	10'-5"	4'-2"	12'-0"	2'-8"	-	3	4	-	5	2'-1"	130	-	-	-	-
6	3	20'-4"	21.05	5.45	41.49	42	20'-9"	50	98	-	17'-0"	4'-7"	18'-7"	3'-0"	-	5	6	-	7	3'-8"	124	-	-	-	-
6	4	26'-11"	27.87	7.21	39.72	56	27'-6"	48	94	-	23'-7"	1'-10"	25'-2"	3'-5"	-	8	8	-	10	2'-9"	118	-	-	-	-
6	5	33'-6"	34.68	8.98	37.96	70	34'-4"	46	90	-	30'-2"	2'-2"	31'-9"	3'-9"	-	10	10	-	13	1'-11"	114	-	-	-	-
6	6	40'-1"	41.50	10.74	36.19	84	41'-2"	44	86	-	36'-9"	2'-6"	38'-4"	4'-1"	-	12	12	-	15	3'-6"	108	-	-	-	-
7	2	15'-6"	16.05	4.15	42.78	32	15'-9"	52	102	-	12'-2"	2'-10"	13'-9"	4'-5"	-	4	4	-	6	2'-1"	136	4	4'-5"	102	
7	3	23'-0"	23.81	6.16	40.77	48	23'-5"	50	98	-	19'-8"	4'-1"	21'-3"	2'-7"	-	6	7	-	9	2'-7"	130	7	2'-7"	98	
7	4	30'-6"	31.58	8.17	38.76	64	31'-3"	47	92	-	27'-2"	2'-3"	28'-9"	2'-10"	-	9	9	-	12	3'-1"	124	9	3'-10"	92	
7	5	38'-0"	39.34	10.18	36.75	80	39'-0"	45	88	-	34'-8"	3'-7"	36'-3"	2'-1"	-	11	12	-	15	3'-7"	118	12	2'-1"	88	
7	6	45'-6"	47.11	12.19	34.74	94	46'-9"	42	82	-	42'-2"	1'-9"	43'-9"	3'-4"	-	14	14	-	19	1'-9"	110	14	3'-4"	82	
7	2	15'-9"	16.31	4.22	42.71	32	16'-0"	52	102	-	12'-5"	3'-1"	14'-0"	1'-7"	-	4	5	-	6	2'-4"	136	5	1'-7"	102	
7	3	23'-4"	24.16	6.25	40.68	48	23'-10"	49	96	-	20'-0"	4'-5"	21'-7"	2'-11"	-	6	7	-	9	2'-11"	130	7	2'-11"	96	
7	4	30'-11"	32.01	8.28	38.65	64	31'-8"	47	92	-	27'-7"	2'-8"	29'-2"	4'-4"	-	9	9	-	12	3'-6"	124	9	4'-4"	92	
7	5	38'-6"	39.86	10.32	36.62	80	39'-6"	45	88	-	35'-2"	4'-1"	36'-9"	2'-6"	-	11	12	-	16	1'-9"	116	12	2'-6"	88	
7	6	46'-1"	47.71	12.35	34.59	96	47'-4"	42	82	-	42'-4"	2'-4"	44'-4"	3'-11"	-	14	14	-	19	2'-4"	110	14	3'-11"	82	
8	2	17'-6"	18.12	4.69	42.24	36	17'-9"	60	118	-	14'-5"	3'-10"	15'-9"	2'-6"	-	5	6	-	7	2'-8"	144	8	2'-8"	168	
8	3	26'-0"	26.92	6.97	39.97	54	26'-7"	57	112	-	22'-11"	1'-9"	24'-3"	3'-1"	-	9	9	-	11	2'-6"	136	13	1'-10"	160	
8	4	34'-6"	35.72	9.24	37.69	72	35'-4"	54	106	-	31'-5"	2'-4"	32'-9"	3'-8"	-	12	12	-	15	2'-3"	128	17	2'-11"	150	
8	5	43'-0"	44.52	11.52	35.41	90	44'-2"	51	100	-	39'-11"	2'-11"	41'-3"	1'-7"	-	15	16	-	19	2'-0"	122	22	2'-1"	142	
8	6	51'-6"	53.32	13.80	33.13	108	53'-0"	47	92	-	48'-5"	3'-6"	49'-9"	2'-2"	-	18	19	-	23	1'-10"	114	26	3'-1"	132	
8	2	17'-9"	18.38	4.76	42.18	38	18'-0"	60	118	-	14'-8"	4'-1"	16'-0"	2'-9"	-	5	6	-	7	2'-11"	144	8	2'-11"	168	
8	3	26'-4"	27.26	7.06	39.88	54	26'-11"	57	112	-	23'-3"	2'-1"	24'-7"	3'-5"	-	9	9	-	11	2'-10"	136	13	2'-2"	160	
8	4	34'-11"	36.15	9.36	37.58	72	35'-10"	54	106	-	31'-10"	2'-9"	33'-2"	4'-1"	-	12	12	-	15	2'-8"	128	17	3'-4"	150	
8	5	43'-6"	45.04	11.66	35.28	90	44'-9"	51	100	-	40'-5"	3'-5"	41'-9"	2'-1"	-	15	16	-	19	2'-7"	120	22	2'-7"	142	
8	6	52'-1"	53.92	13.96	32.98	108	53'-7"	47	92	-	49'-0"	4'-1"	50'-4"	2'-9"	-	18	19	-	23	2'-5"	112	27	1'-10"	132	
8	2	18'-0"	18.64	4.82	42.11	38	18'-3"	60	118	-	14'-11"	1'-8"	16'-3"	3'-0"	-	6	6	-	7	3'-2"	144	8	3'-2"	168	
8	3	26'-8"	27.61	7.15	39.79	56	27'-3"	57	112	-	23'-7"	2'-5"	24'-11"	3'-9"	-	9	9	-	11	3'-2"	136	13	2'-6"	160	
8	4	35'-4"	36.58	9.47	37.47	74	36'-3"	54	106	-	32'-3"	3'-2"	33'-7"	1'-10"	-	12	13	-	15	3'-1"	128	18	1'-10"	150	
8	5	44'-0"	45.55	11.79	35.14	92	45'-2"	50	98	-	40'-11"	3'-11"	42'-3"	2'-7"	-	15	16	-	19	3'-1"	120	22	3'-1"	140	
8	6	52'-8"	54.53	14.11	32.82	110	54'-2"	47	92	-	49'-7"	2'-0"	50'-11"	3'-4"	-	19	19	-	23	3'-0"	112	27	2'-5"	132	
9	2	19'-9"	20.45	5.29	41.64	42	20'-1"	56	55	66	16'-7"	2'-7"	18'-0"	4'-0"	1'-8"	6	6	8	9	3'-1"	166	7	3'-1"	124	
9	3	29'-4"	30.37	7.86	39.07	62	30'-0"	53	52	62	26'-2"	3'-9"	27'-7"	3'-5"	1'-11"	9	10	12	14	3'-4"	156	11	2'-8"	116	
9	4	38'-11"	40.29	10.43	36.51	80	40'-0"	49	48	58	35'-9"	2'-2"	37'-2"	3'-7"	2'-2"	13	13	16	20	1'-9"	146	15	2'-4"	110	
9	5	48'-6"	50.21	13.00	33.94	100	49'-10"	46	45	54	45'-4"	3'-4"	46'-9"	2'-0"	2'-5"	16	17	20	25	2'-0"	136	19	2'-0"	102	
9	6	58'-1"	60.13	15.56	31.37	120	59'-9"	42	41	50	54'-11"	1'-9"	56'-4"	3'-2"	2'-8"	20	20	24	30	2'-3"	126	23	1'-7"	94	
9	2	20'-0"	20.71	5.36	41.57	42	20'-4"	56	55	71	16'-10"	2'-10"	18'-3"	4'-3"	3'-0"	6	6	8	9	3'-4"	166	7	3'-4"	124	
9	3	29'-8"	30.71	7.95	38.98	62	30'-4"	53	52	67	26'-6"	4'-1"	27'-11"	2'-9"	1'-10"	9	10	13	15	1'-10"	156	11	3'-0"	116	
9	4	39'-4"	40.72	10.54	36.39	82	40'-4"	49	48	62	36'-2"	2'-7"	37'-7"	4'-0"	2'-9"	13	13	17	20	2'-2"	146	15	2'-9"	108	
9	5	49'-0"	50.73	13.13	33.80	102	50'-4"	46	45	58	45'-10"	3'-10"	47'-3"	2'-6"	1'-6"	16	17	22	25	2'-6"	136	19	2'-6"	100	
9	6	58'-8"	60.74	15.72	31.21	122	60'-4"	42	41	53	55'-6"	2'-4"	56'-11"	3'-9"	2'-6"	20	20	26	30	2'-10"	124	23	2'-2"	94	
10	2	21'-9"	22.52	5.83	41.11	46	22'-2"	36	35	47	17'-10"	4'-9"	20'-0"	2'-7"	3'-8"	4	5	6	8	2'-7"	122	8	3'-8"	132	
10	3	32'-4"	33.47	8.66	38.27	68	33'-1"	33	32	43	28'-5"	2'-3"	30'-7"	4'-5"	4'-5"	7	7	9	12	3'-3"	114	13	2'-7"	122	
10	4	42'-11"	44.43	11.50	35.43	90	44'-1"	31	30	40	39'-0"	4'-2"	41'-2"	2'-0"	2'-0"	9	10	13	16	3'-10"	106	18	1'-6"	112	
10	5	53'-6"	55.39	14.34	32.60	112	55'-0"	28	27	37	49'-7"	1'-8"	51'-9"	3'-10"	2'-9"	12	12	16	21	2'-0"	98	22	2'-9"	104	
10	6	64'-1"	66.35	17.17	29.76	134	66'-0"	26	25	34	60'-2"	3'-7"	62'-4"	5'-9"	3'-7"	14	14	19	25	2'-7"	88	27	1'-8"	94	
10	2	22'-0"	22.78	5.89	41.04	46	22'-5"	36	35	46															

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

S	H	2 Span		3 Span		4 Span		5 Span		6 Span		
		ft	ft	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	
MC5-1	5	2	25.79	3777	37.37	5570	48.95	7357	60.53	9150	72.11	10937
	5	3	28.40	3924	40.85	5782	53.30	7631	65.75	9488	78.20	11339
	5	4	31.01	4197	44.33	6181	57.64	8156	70.96	10140	84.28	12117
	5	5	36.23	5040	51.29	7241	66.36	9435	81.42	11637	96.48	13841
MC5-2	5	2	25.79	3417	37.37	5160	48.95	6899	60.53	8644	72.11	10381
	5	3	28.40	3557	40.85	5364	53.30	7165	65.75	8974	78.20	10774
	5	4	31.01	3821	44.33	5755	57.64	7682	70.96	9617	84.28	11545
	5	5	36.23	4649	51.29	6797	66.36	8941	81.42	11070	96.48	13242
MC6-1	6	3	31.98	4734	46.22	7013	60.46	9284	74.69	11561	88.93	13834
	6	4	34.59	5016	49.69	7421	64.80	9817	79.91	12221	95.02	14621
	6	5	39.81	5874	56.66	8497	73.51	11114	90.36	13740	107.21	16364
	6	6	42.85	6074	60.72	8760	78.58	11442	96.45	13697	114.31	16818
MC6-2	6	3	31.98	5007	46.22	7613	60.46	10210	74.69	12811	88.93	15410
	6	4	34.59	5303	49.69	8035	64.80	10758	79.91	13485	95.02	16212
	6	5	39.81	6170	56.66	9118	73.51	12061	90.36	15009	107.21	17958
	6	6	42.85	6384	60.72	9394	78.58	12403	96.45	15413	114.31	18425
MC7-1	7	3	37.80	5061	54.92	7478	72.04	9883	89.15	12299	106.27	14705
	7	4	40.41	5342	58.40	7885	76.38	10417	94.37	12958	112.35	15491
	7	5	45.68	6198	65.41	8961	85.15	11715	104.89	14477	124.63	17233
	7	6	48.72	6398	69.47	9225	90.22	11942	110.97	14868	131.73	17686
MC7-2	7	3	37.80	5206	54.92	7920	72.04	10628	89.15	13342	106.27	16050
	7	4	40.41	5487	58.40	8327	76.38	11160	94.37	14002	112.35	16837
	7	5	45.68	6341	65.41	9399	85.15	12454	104.89	15514	124.63	18570
	7	6	48.72	6575	69.47	9732	90.22	12885	110.97	16044	131.73	19198
MC7-3	7	7	51.76	6963	73.53	10247	95.29	13524	117.06	16810	138.82	20089
	7	3	37.80	5900	54.92	9101	72.04	12298	89.15	15502	106.27	18697
	7	4	40.41	6188	58.40	9516	76.38	12837	94.37	16169	112.35	19491
	7	5	45.68	7053	65.41	10601	85.15	14146	104.89	17697	124.63	21241
MC8-1	8	4	44.28	6385	64.20	9417	84.12	12437	104.04	15472	123.96	18496
	8	5	49.54	7264	71.22	10513	92.89	13761	114.56	17015	136.24	20267
	8	6	52.59	7515	75.27	10868	97.96	14218	120.65	17576	143.33	20929
	8	7	55.63	7917	79.33	11396	103.03	14871	126.73	18357	150.43	21834
MC8-2	8	4	46.82	6362	67.97	9640	89.12	12908	110.27	16184	131.42	19457
	8	5	52.12	7235	75.03	10727	97.95	14221	120.87	17716	143.79	21216
	8	6	55.16	7448	79.09	11005	103.02	14562	126.95	18121	150.88	21684
	8	7	58.20	7852	83.15	11534	108.09	15217	133.04	18901	157.98	22591
8	8	65.24	8363	92.53	12123	119.83	15887	147.12	19644	174.41	23401	

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

S	H	2 Span		3 Span		4 Span		5 Span		6 Span		
		ft	ft	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	
MC8-3	8	4	49.35	7273	71.73	11107	94.11	14931	116.49	18764	138.87	22593
	8	5	54.68	8168	78.84	12218	103.00	16268	127.16	20323	151.32	24377
	8	6	57.73	8400	82.90	12513	108.07	16627	133.24	20745	158.42	24864
	8	7	60.77	8977	86.95	13216	113.14	17455	139.33	21690	165.51	25944
MC9-1	9	5	56.27	7893	81.26	11565	106.26	15242	131.25	18919	156.24	22596
	9	6	59.31	8141	85.32	11913	111.33	15687	137.33	19464	163.34	23238
	9	7	62.35	8544	89.37	12441	116.40	16341	143.42	20243	170.44	24144
	9	8	69.39	9179	98.72	13221	128.13	17275	157.50	21327	186.87	25371
MC9-2	9	5	61.87	9599	103.40	13766	133.92	17945	164.45	22122	194.98	26293
	9	6	65.03	8234	93.81	12148	122.60	16059	151.38	19977	180.16	23893
	9	7	68.07	8644	97.87	12684	127.67	16720	157.46	20765	187.26	24807
	9	8	75.19	9171	107.32	13393	139.52	17627	171.69	21860	203.86	26083
MC9-3	9	9	78.66	9590	111.99	13939	145.32	18298	178.64	22658	211.97	27011
	9	5	64.85	8642	94.07	12979	123.17	17315	152.33	21656	181.48	25994
	9	6	67.89	9222	98.07	13767	128.24	18311	158.41	22861	188.58	27408
	9	7	70.94	9643	102.12	14314	133.31	18984	164.49	23658	195.68	28330
MC10-1	10	6	66.62	8959	96.24	13089	125.86	17213	155.48	21336	185.10	25602
	10	7	69.66	9500	100.30	13790	130.93	18075	161.57	22359	192.20	26786
	10	8	76.74	9874	109.73	14229	142.73	18595	175.72	22959	208.72	27460
	10	9	80.22	10510	114.37	15061	148.52	19622	182.67	24182	216.83	28881
MC10-2	10	10	83.69	11355	119.01	16101	154.32	20857	189.63	25613	224.94	30513
	10	6	72.92	9595	105.61	14262	138.29	18918	170.98	23576	203.66	28385
	10	7	75.96	10109	109.66	14901	143.36	19683	177.06	24465	210.76	29400
	10	8	83.11	10593	119.19	15350	155.28	20217	191.36	25077	227.44	30086
MC10-3	10	9	86.59	11280	123.83	16324	161.07	21480	198.31	26427	235.55	31624
	10	10	90.07	12131	128.47	17355	166.87	22589	205.27	27815	243.67	33192
	10	6	79.23	10251	114.98	15269	150.74	20280	186.49	25286	222.24	30456
	10	7	82.27	10946	119.04	16089	155.80	21225	192.57	26357	229.34	31653
MC10-3	10	8	89.49	11250	128.67	16460	167.84	21679	207.02	26893	246.19	32262
	10	9	92.97	12034	133.30	17368	173.64	22713	213.97	28053	254.30	33549
	10	10	96.44	13101	137.94	18652	179.43	24211	220.92	29764	262.42	35466

GENERAL NOTES:

The necessary details for adapting normal MULTI-BOX CULVERT Standards, MC-5-1 through MC-10-3, to 15° Skew Culverts are shown on these sheets. Refer to the appropriate normal Standard for details, dimensions, sections, notes and bar diagrams not shown hereon.

Quantities shown hereon are for 44'-0" Clear width between headwalls measured perpendicular to the center line. Quantities of reinforcing steel are approximate. Quantities P.L.F. Barrel shown on normal MC Standards may be converted to P.L.F. Clear width by multiplying by 1.0353.

The number of variable length bars required: Bars A = 2X, Bars B = 4Y, Bars B₁ = 2Y, and Bars B₂ = 2Z.
Size of Bars H: #4 for Spans = 5'-7', #5 for Spans = 8'-10'.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

MULTIPLE BOX CULVERT
15° SKEW

MC-15°

33

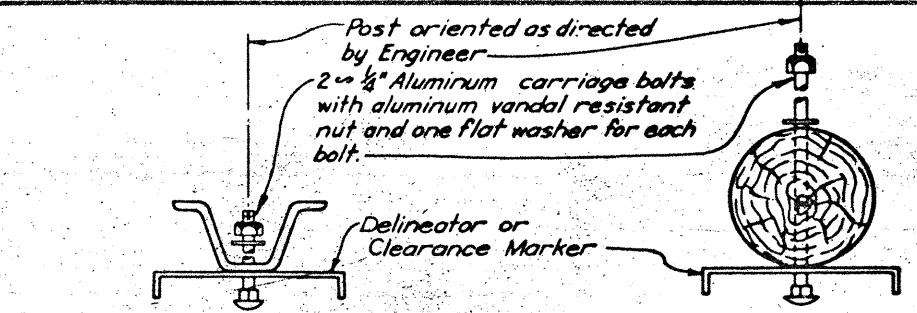
ORIGINAL DRAWING DATE: MAY, 1964	STATE: TEXAS	FEDERAL DISTRICT: 6	FEDERAL AID PROJECT: 4348-1-1	SHEET: 33
DN THD	REVISIONS	COUNTY: Rockwall	CONTROL SECTION JOB	HIGHWAY: 3097
CK				
DW				
CK				



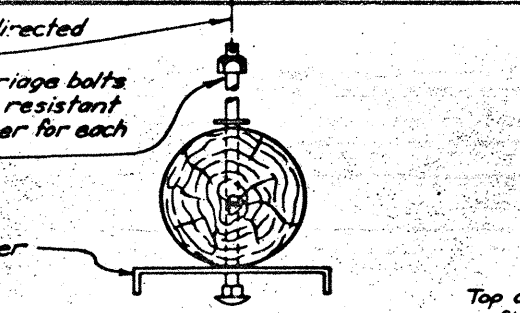
BILLS OF REINFORCING STEEL FOR 44'-0" CLEAR ROADWAY WIDTH

CULVERT SIZE	TYPE SECTION	DIMENSIONS	TOTAL QUANTITIES OF 44' CLEAR WIDTH		QUANT. PL. OF RDWY. BARREL		BARS A IN TOP SLAB				BARS B IN BOTTOM SLAB				BARS C WALLS AND TOP CORNER				BARS D IN BOTTOM CORNERS				62#4 BARS E @ 18" C.T.C.		#4 BARS F LENGTH = 46'-8"				BARS H A-#4		#4 BARS M IN TOP SLAB				#4 BARS N IN BOTTOM SLAB																				
			Conc.		Reinf.		No.		Size		Length		Weight		No.		Size		Length		Weight		Dim X		Length		Weight		No.		Spa		Length		Weight		No.		Spa		Length		Weight												
			S	H	T	U	Conc.	Reinf.	No.	Size	Length	Weight	No.	Size	Length	Weight	No.	Size	Length	Weight	No.	Size	Length	Weight	Dim X	Length	Weight	Fi	Spa	Fz	Spa	F3	Spa	Total	Weight	Length	Weight	No.	Wt	No.	Spa	Length	Weight	X"	Y"	No.	Spa	Length	Weight	X"	Y"				
SC-15° A	3x4	1	6"	6"	10.63	1285	0.230	27.49	78	#4	7"	3'-9"	195	#4	7"	3'-9"	195	#4	7"	3'-9"	195	#4	7"	3'-9"	195	7"	12"	3	20"	4	10"	14	436	3'-9"	10	10	26	61	9"	8'-5"	343	3'-9"	2'-4"	61	9"	6'-9"	275	3'-9"							
					12.42	1771	0.268	38.06	91	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	9"	12"	4	18"	4	14"	17	530	4'-10"	13	12	31	78	7"	11'-6"	599	4'-10"	3'-4"	78	7"	7'-10"	408	4'-10"			
	4x4	1	6"	6"	14.16	1875	0.307	40.35	91	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	9"	12"	4	18"	4	14"	17	530	4'-10"	13	12	31	78	7"	11'-6"	599	4'-10"	3'-4"	78	7"	7'-10"	408	4'-10"							
					15.90	2041	0.345	44.03	91	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	#4	6"	4'-10"	294	9"	12"	4	18"	4	14"	17	530	4'-10"	13	12	31	78	7"	13'-6"	703	4'-10"	4'-4"	78	7"	7'-10"	408	4'-10"			
	5x4	2	6"	6"	17.74	2126	0.307	45.74	68	#5	8"	5'-10"	414	58	#4	9 1/2"	5'-10"	226	136	#4	8"	5'-10"	530	3'-4"	136	#4	8"	4'-1"	371	1'-7"	9"	12"	7	18"	4	10"	20	623	5'-10"	16	14	37													
					15.95	2217	0.345	47.75	68	#5	8"	5'-10"	414	58	#4	9 1/2"	5'-10"	226	136	#4	8"	5'-10"	530	3'-4"	136	#4	8"	4'-1"	371	1'-7"	9"	12"	7	18"	4	10"	20	623	5'-10"	16	14	37													
	6x4	2	6"	6"	19.48	2956	0.422	63.81	78	#5	7"	6'-11"	563	78	#4	7"	6'-11"	360	168	#4	6 1/2"	5'-10"	655	3'-4"	168	#4	6 1/2"	4'-11"	458	1'-7"	10	12"	8	18"	4	14"	22	686	6'-11"	18	16	42													
					22.96	3757	0.498	78.06	78	#5	7"	7'-1"	576	78	#4	7"	7'-1"	369	168	#4	6 1/2"	5'-10"	655	3'-4"	168	#4	6 1/2"	4'-11"	458	1'-7"	10	12"	8	18"	4	14"	22	686	6'-11"	18	16	42													
	7x4	2	6"	6"	20.69	2974	0.447	64.04	78	#5	7"	7'-1"	644	91	#4	6"	7'-1"	481	156	#4	7"	5'-10"	608	3'-4"	156	#4	7"	4'-11"	425	1'-7"	11	12"	9	18"	4	10"	20	623	5'-10"	16	14	37													
					22.43	3140	0.486	67.71	78	#5	7"	7'-1"	644	91	#4	6"	7'-1"	481	156	#4	7"	5'-10"	608	3'-4"	156	#4	7"	4'-11"	425	1'-7"	11	12"	9	18"	4	10"	20	623	5'-10"	16	14	37													
8x4	2	6"	6"	22.96	3757	0.607	81.30	78	#5	7"	8'-1"	658	91	#4	6"	8'-1"	491	136	#4	8"	7'-10"	711	5'-4"	136	#4	8"	4'-11"	371	1'-7"	11	12"	9	18"	4	10"	20	623	5'-10"	16	14	37														
				27.96	4746	0.694	102.84	78	#5	7"	8'-1"	658	91	#4	6"	8'-1"	491	136	#4	8"	7'-10"	711	5'-4"	136	#4	8"	4'-11"	371	1'-7"	11	12"	9	18"	4	10"	20	623	5'-10"	16	14	37														
9x4	3	7"	7"	33.36	6000	0.723	130.13	68	#6	8"	10'-2"	977	84	#5	6 1/2"	10'-2"	891	128	#5	8 1/2"	8'-3"	1101	5'-5"	128	#5	8 1/2"	4'-11"	657	2'-11"	13	12"	10	18"	16	14	39	1216	10'-2"	27	22	58														
				35.31	6506	0.768	121.70	64	#6	8"	10'-2"	977	84	#5	6 1/2"	10'-2"	891	128	#5	8 1/2"	8'-3"	1101	5'-5"	128	#5	8 1/2"	4'-11"	657	2'-11"	13	12"	10	18"	16	14	39	1216	10'-2"	27	22	58														
10x4	3	7"	7"	37.41	6534	0.813	141.83	68	#6	8"	11'-2"	1141	68	#6	8"	11'-2"	1141	156	#5	7"	8'-3"	1342	5'-5"	156	#5	7"	4'-11"	801	2'-11"	14	12"	11	18"	16	14	41	1278	11'-2"	30	24	63														
				42.34	6350	0.922	137.28	61	#6	8"	10'-4"	947	61	#6	9"	10'-4"	947	122	#5	9"	12'-3"	1559	9"-5"	122	#6	9"	5'-4"	977	2'-4"	7-11"	328	13	12"	10	18"	20	15	43	1340	10'-4"	28	22	58												
6x4	3	6"	6"	17.74	2870	0.383	61.97	68	#5	8"	6'-11"	491	68	#5	8"	6'-11"	491	182	#4	6"	5'-10"	709	3'-4"	182	#4	6"	4'-11"	496	1'-7"	8	18"	8	18"	4	14"	20	623	6'-11"	18	16	42														
				19.48	3054	0.422	66.03	68	#5	8"	6'-11"	491	68	#5	8"	6'-11"	491	182	#4	6"	5'-10"	709	3'-4"	182	#4	6"	4'-11"	496	1'-7"	8	18"	8	18"	4	14"	20	623	6'-11"	18	16	42														
7x4	3	6"	6"	22.96	3715	0.498	80.51	68	#5	8"	7'-1"	502	68	#5	8"	7'-1"	502	182	#4	6"	7'-10"	952	5'-4"	182	#4	6"	4'-11"	496	1'-7"	8	18"	8	18"	4	14"	20	623	6'-11"	18	16	42														
				24.99	4016	0.543	87.21	68	#5	8"	7'-1"	502	68	#5	8"	7'-1"	502	182	#4	6"	7'-10"	952	5'-4"	182	#4	6"	4'-11"	496	1'-7"	8	18"	8	18"	4	14"	20	623	6'-11"	18	16	42														
8x4	3	6"	6"	20.69	3187	0.447	68.86	68	#5	8"	7'-1"	561	68	#5	8"	7'-1"	561	168	#4	6 1/2"	6'-10"	766	4'-4"	168	#4	6 1/2"	4'-11"	458	1'-7"	9	18"	9	18"	4	10"	20	623	5'-10"	16	14	37														
				22.43	3162	0.486	68.29	68	#5	8"	7'-1"	561	68	#5	8"	7'-1"	561	168	#4	6 1/2"	6'-10"	766	4'-4"	168	#4	6 1/2"	4'-11"	458	1'-7"	9	18"	9	18"	4	10"	20	623	5'-10"	16	14	37														
9x4	3	7"	7"	25.93	3815	0.563	82.58	68	#5	8"	8'-1"	573	68	#5	8"	8'-1"	573	168	#4	6 1/2"	7'-10"	879	5'-4"	168	#4	6 1/2"	4'-11"	458	1'-7"	9	18"	9	18"	4	10"	20	623	5'-10"	16	14	37														
				27.96	4173	0.607	90.28	73	#5	7 1/2"	8'-1"	615	73	#5	7 1/2"	8'-1"	615	198	#4	5 1/2"	8'-10"	1074	6'-4"	198	#4	5 1/2"	4'-11"	496	1'-7"	9	18"	9	18"	4	10"	20	623	5'-10"	16	14	37														
10x4	3	7"	7"	29.99	4611	0.652	99.98	73	#5	7 1/2"	8'-1"	615	73	#5	7 1/2"	8'-1"	615	198	#4	5 1/2"	9'-10"	1300	7'-4"	198	#4	5 1/2"	4'-11"	540	1'-7"	9	18"	9	18"	4	10"	20	623	5'-10"	16	14	37														
				36.59	5131	0.723	130.13	68	#6	8"	10'-2"	977	84	#5	6 1/2"	10'-2"	891	128	#5	8 1/2"	8'-3"	1101	5'-5"	128	#5	8 1/2"	4'-11"	657	2'-11"	13	12"	10	18"	16	14	39	1216	10'-2"	27	22	58														
6x4	3	6"	6"	20.69	3187	0.447	68.86	68	#5	8"	7'-1"	561	68	#5	8"	7'-1"	561	168	#4	6 1/2"	6'-10"	766	4'-4"	168	#4	6 1/2"	4'-11"	458	1'-7"	9	18"	9	18"	4	10"	20	623	5'-10"																	

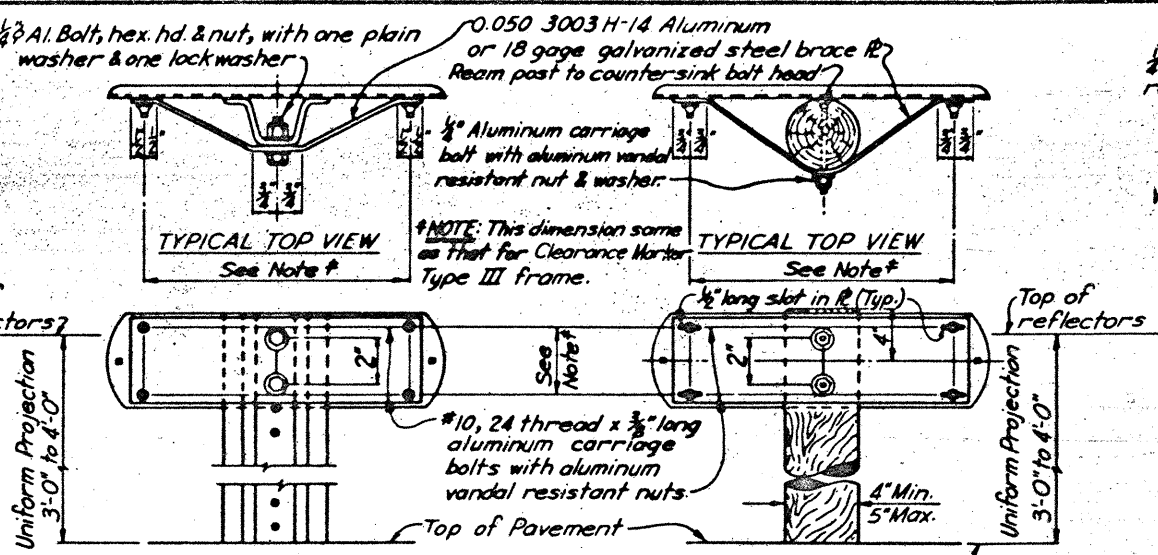
ORIGINAL



WINGED CHANNEL
TYPICAL PLAN VIEW OF
MONODIRECTIONAL MOUNTING
DELINEATORS - TYPES I & II
CLEARANCE MARKER - TYPE III

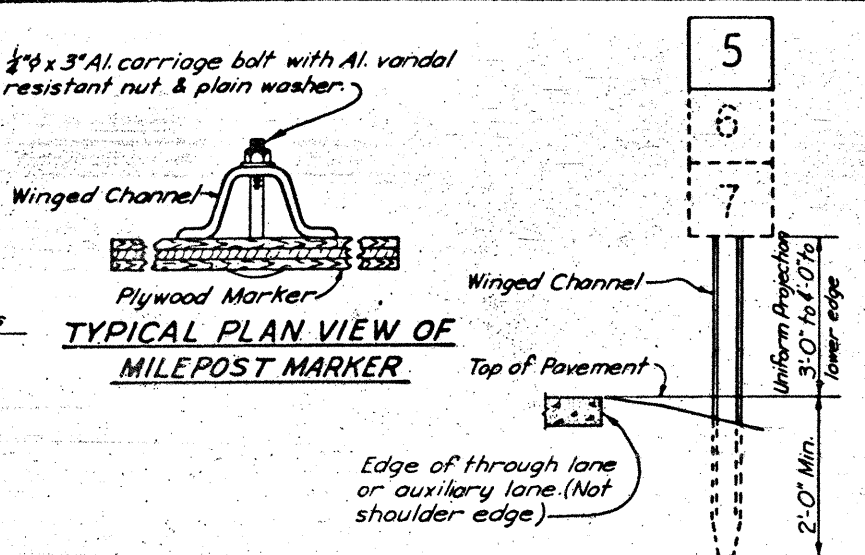


TIMBER POST
TYPICAL PLAN VIEW OF
MONODIRECTIONAL MOUNTING
DELINEATORS - TYPES I & II
CLEARANCE MARKER - TYPE III



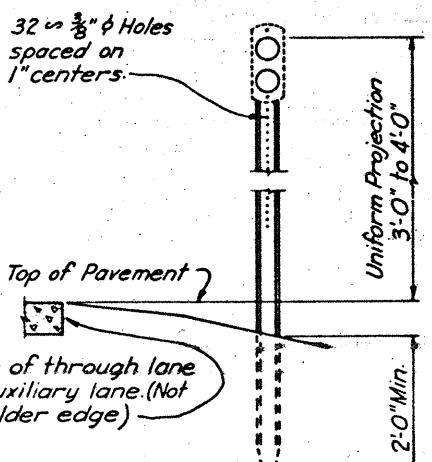
TYPICAL REAR VIEW
WINGED CHANNEL
TYPICAL HAZARD MARKER
TYPE IV
 (Independently Housed Units)

TYPICAL REAR VIEW
TIMBER POST
TYPICAL HAZARD MARKER
TYPE IV
 (Independently Housed Units)

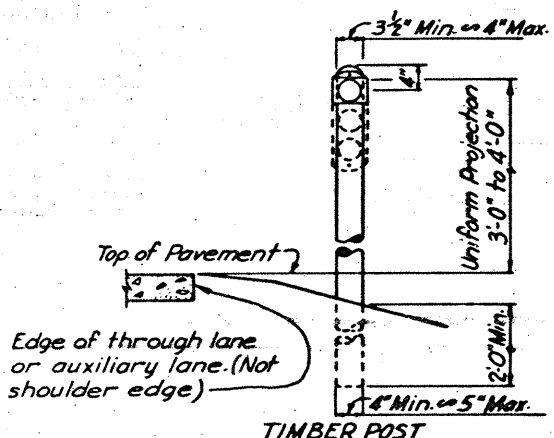


TYPICAL PLAN VIEW OF
MILEPOST MARKER

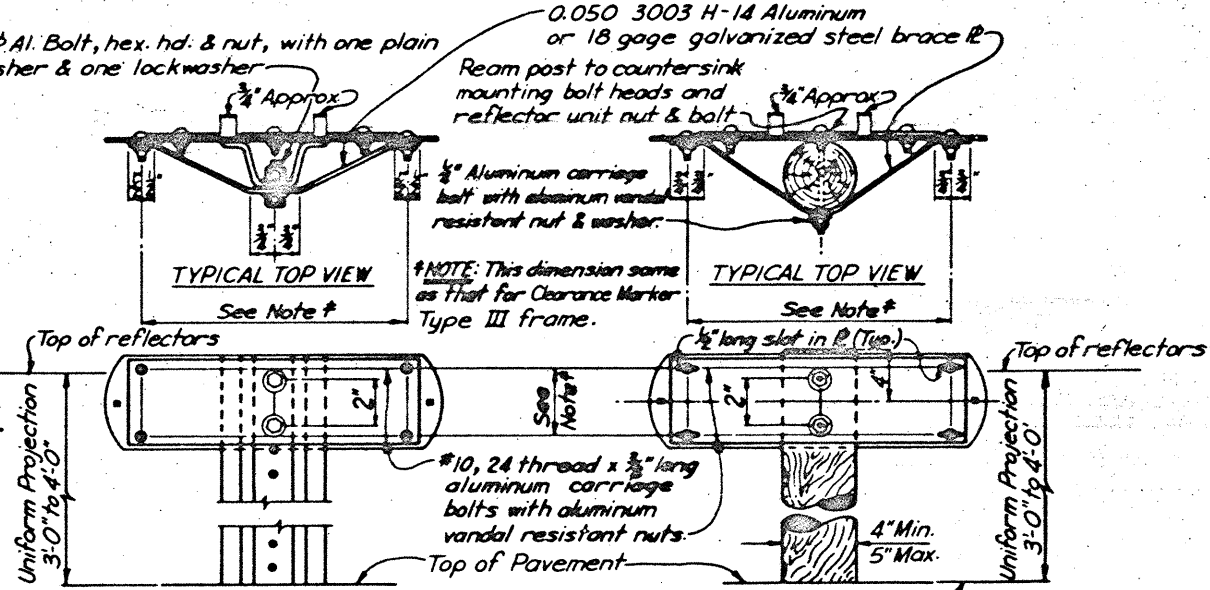
TYPICAL ELEVATION OF
MILEPOST MARKER



TYPICAL ELEVATION OF
MOUNTING
DELINEATORS - TYPES I & II
CLEARANCE MARKER - TYPE III

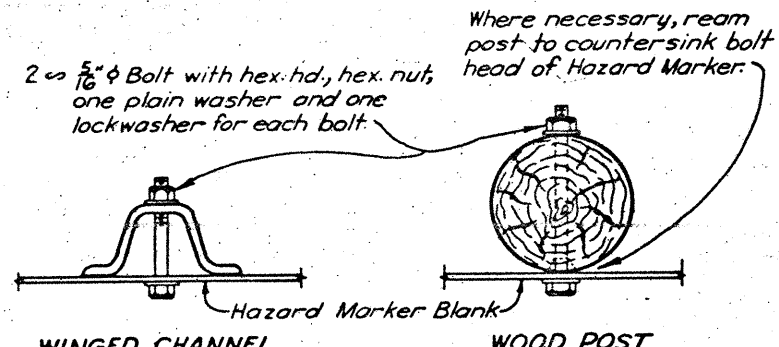


TYPICAL ELEVATION OF
MOUNTING
DELINEATORS - TYPES I & II
CLEARANCE MARKER - TYPE III



TYPICAL REAR VIEW
WINGED CHANNEL
TYPICAL HAZARD MARKER
TYPE IV
 (Center Mount Units)

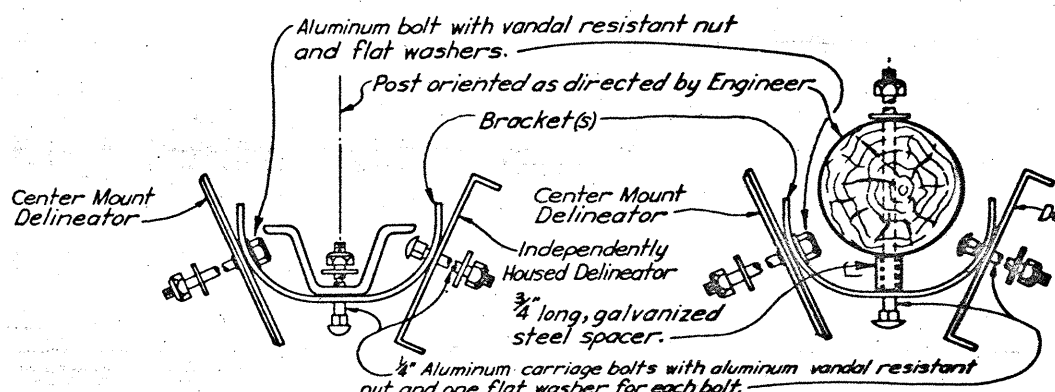
TYPICAL REAR VIEW
TIMBER POST
TYPICAL HAZARD MARKER
TYPE IV
 (Center Mount Units)



TYPICAL PLAN VIEWS
HAZARD MARKERS - TYPE V

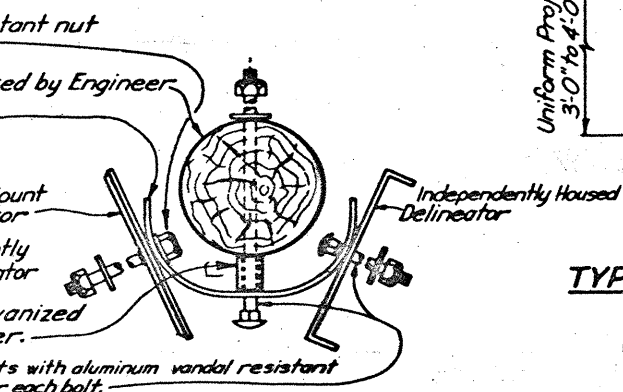
GENERAL NOTES:
LOCATION of Delineators, Types I & II, and Milepost Markers: Facing on-coming traffic, two feet from edge of shoulder or two feet from face of unmountable curb or in line with guard fence where guard fence is used.
LOCATION of Clearance Markers, Type III, and Hazard Markers, Types IV and V, to be at points designated on plan sheets.
HARDWARE shall be galvanized steel, stainless steel or aluminum; except as noted.
POSTS for supporting reflector units shall be in accordance with the applicable specification items for delineator posts.

Sheet 1 of 2

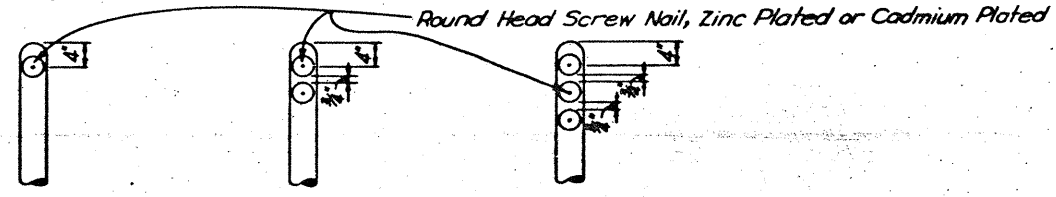


WINGED CHANNEL
TYPICAL PLAN VIEW OF
BIDIRECTIONAL MOUNTING
DELINEATORS - TYPES I & II
ONLY

(Depicting Independently Housed or Center Mount Units)



TIMBER POST
TYPICAL PLAN VIEW OF
BIDIRECTIONAL MOUNTING
DELINEATORS - TYPES I & II
ONLY



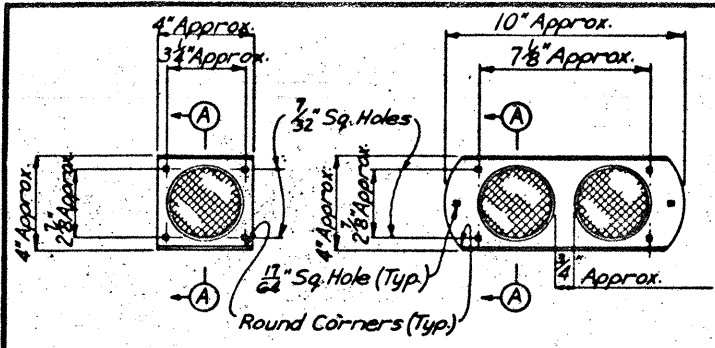
TYPICAL CENTER MOUNT UNIT
TIMBER POST INSTALLATION
DELINEATORS - TYPES I & II
CLEARANCE MARKER - TYPE III

TEXAS HIGHWAY DEPARTMENT
STANDARD ROADSIDE SIGN
MOUNTING DETAILS
FOR
DELINEATORS, CLEARANCE MARKERS,
HAZARD MARKERS, & MILEPOST MARKERS
SMD-6A 42

ORIGINAL DRAWING DATE	Jan, 1967	STATE DISTRICT	FEDERAL REGION	FEDERAL-AND PROJECT	SHEET
DR - CH		18	43142-1-1	42	
CR -					
DW - J.K.					
CK -					

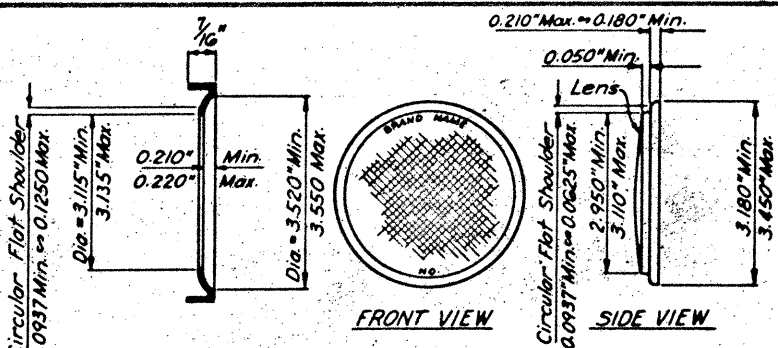


ORIGINAL



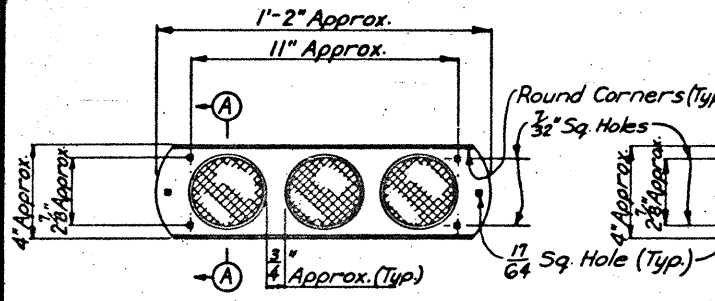
DELINEATOR-TYPE I
Single White Reflector Unit

DELINEATOR-TYPE II
Double Yellow Reflector Units

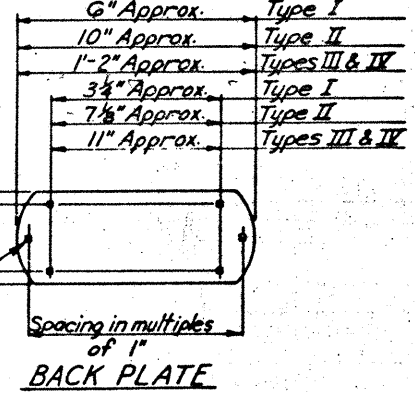


SECTION A-A INDEPENDENTLY HOUSED UNIT

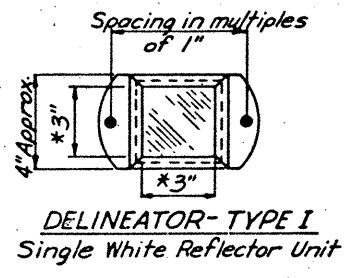
CENTER MOUNT UNIT



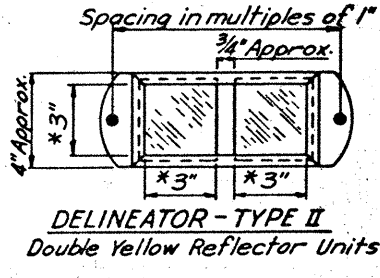
CLEARANCE MARKER-TYPE III & HAZARD MARKER-TYPE IV
Triple Yellow Reflector Units



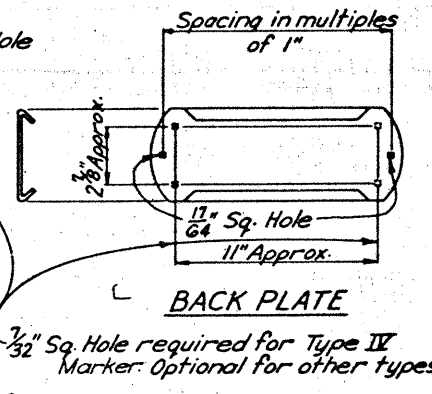
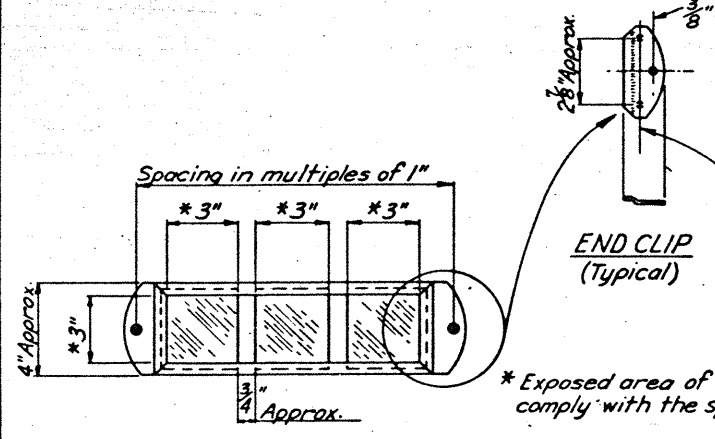
ACRYLIC PLASTIC REFLECTOR UNIT MARKERS
(Independently Housed)



DELINEATOR-TYPE I
Single White Reflector Unit



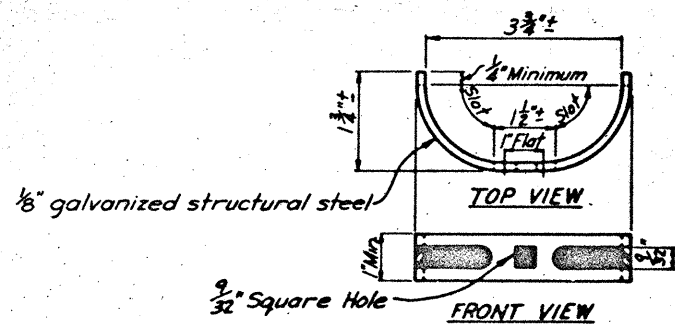
DELINEATOR-TYPE II
Double Yellow Reflector Units



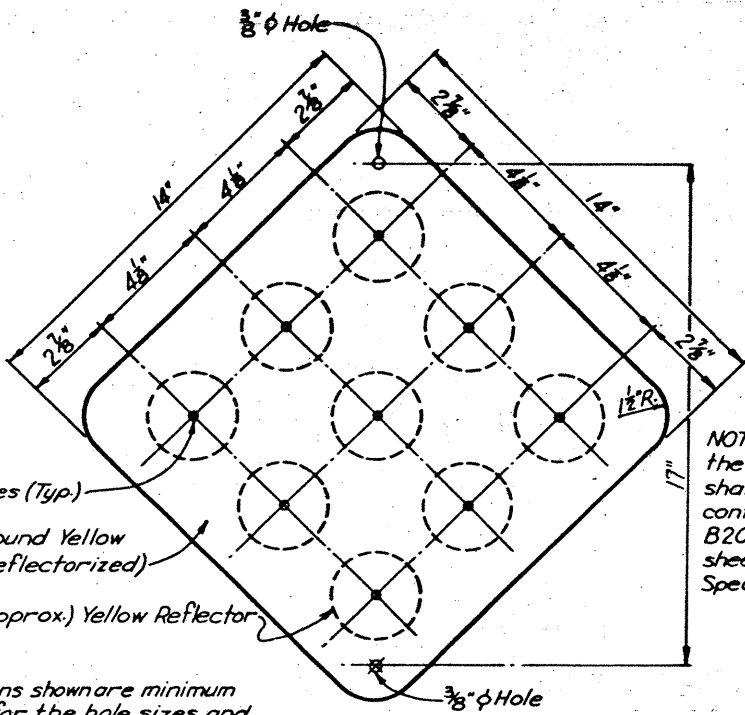
CLEARANCE MARKER-TYPE III & HAZARD MARKER-TYPE IV
Triple Yellow Reflector Units

ENCAPSULATED REFLECTIVE SHEETING MARKERS
(Illustrative only - see specifications for limitations)

* Exposed area of reflector shall comply with the specifications.

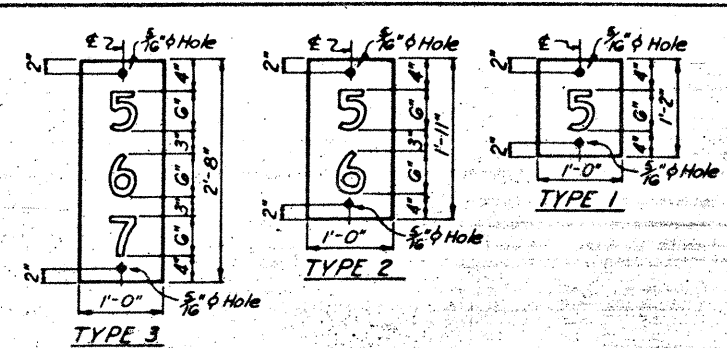


BIDIRECTIONAL BRACKET
FOR DELINEATORS - TYPES I & II ONLY
(Obtainable from the Texas Highway Department)



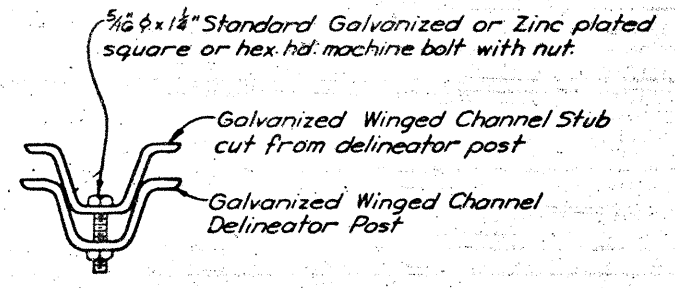
Dimensions shown are minimum except for the hole sizes and the size of the reflectors.

HAZARD MARKER-TYPE V

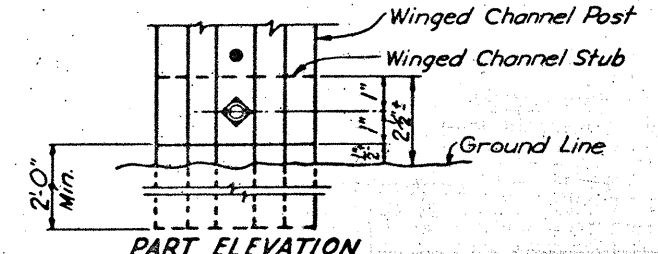


MILEPOST MARKER DETAILS

MILEPOST numerals shall be G Series D white reflective with Interstate Green reflective background, made with green transparent ink on a white flat surface reflective sheeting, using the reverse screen process. Milepost marker blanks shall be 3/8 inch Type A, High Density plywood.



PLAN VIEW



PART ELEVATION

BREAK AWAY CHANNEL POST
(Where specified on plans)

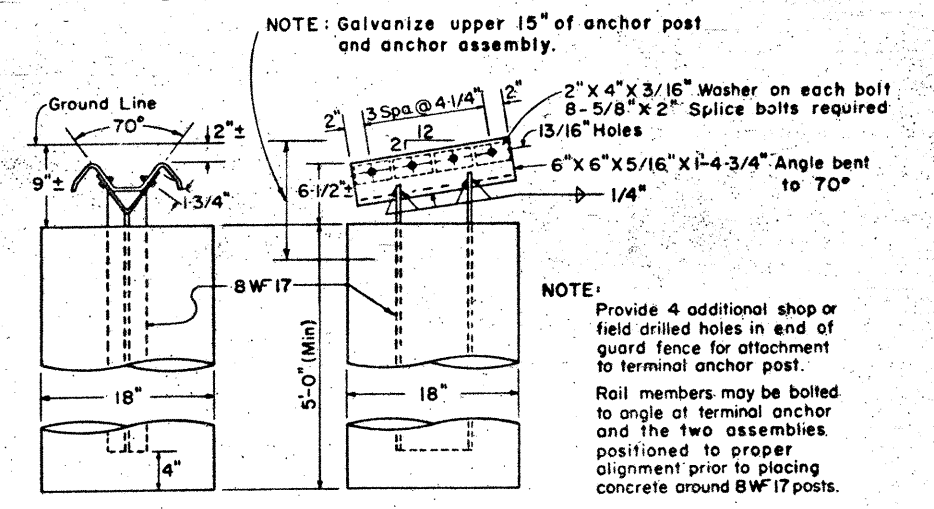
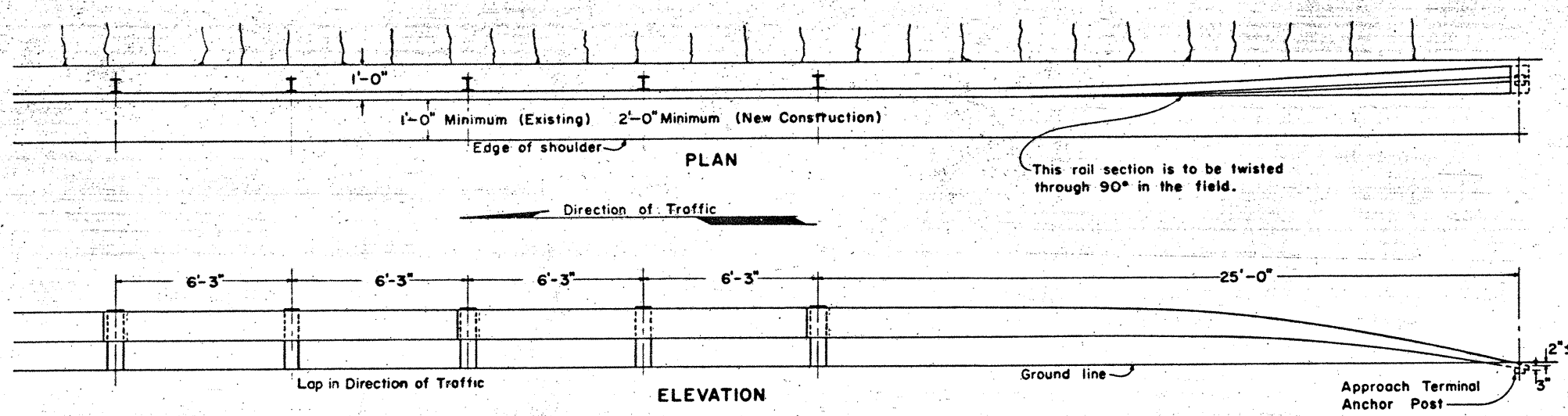
NOTE: With Center Mount Reflector Units, the "Type V" Hazard Marker blank shall be 0.125 inch thick sheet aluminum conforming with A.S.T.M. Specification B209 alloy 6061-T6, or 12 gauge sheet steel conforming with A.S.T.M. Specification A-415.

GENERAL NOTES: See sheet 1 of 2.

TEXAS HIGHWAY DEPARTMENT

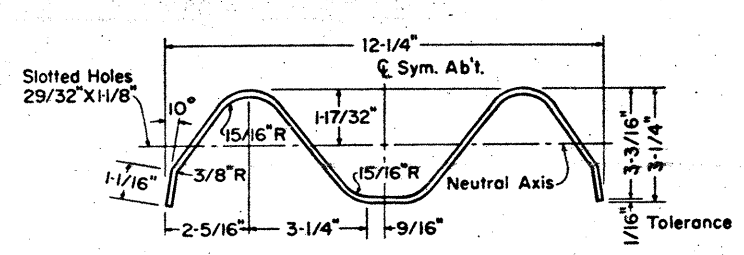
STANDARD ROADSIDE SIGN MOUNTING DETAILS FOR DELINEATORS, CLEARANCE MARKERS, HAZARD MARKERS, & MILEPOST MARKERS SMD-6A 43

ORIGINAL DRAWING DATE	Jan, 1967	STATE DISTRICT	18	FEDERAL REGION	43103-1-1	PROJECT	23
DR	CH	REVISIONS		COUNTY	Rockwall	CONTROL SECTION	2057
DW	JK						118
CR							

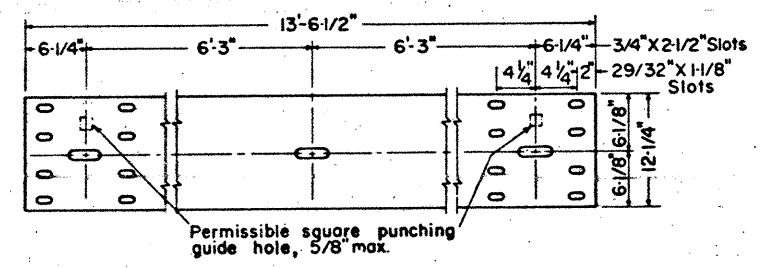


DETAIL OF TERMINAL ANCHOR POST
GENERAL NOTES

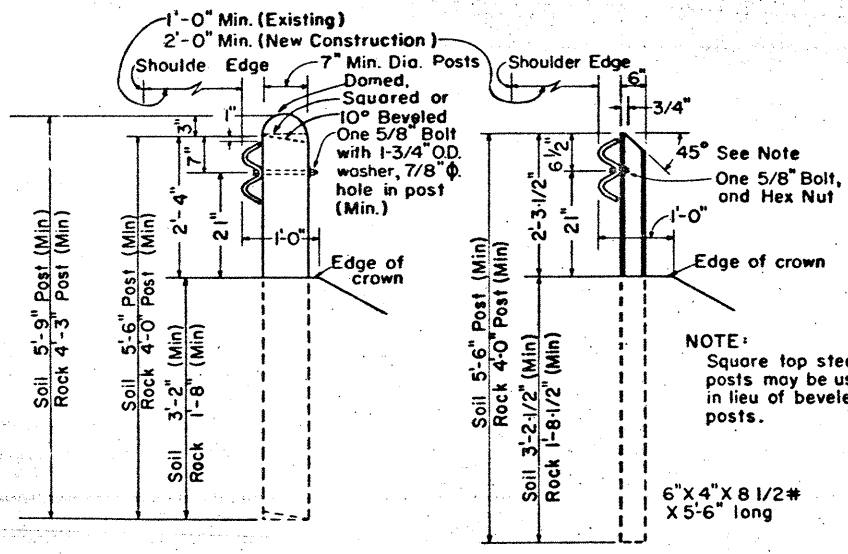
- EXCEPT WHERE USED AT STRUCTURES OR UNDERPASSES THAT ARE NARROWER THAN CROWN WIDTH OR WHERE OTHERWISE INDICATED ON THE PLANS, THE GUARD FENCE SHALL BE LOCATED A MINIMUM OF ONE FOOT AND DESIRABLY TWO FEET OUTSIDE THE SHOULDER EDGE WHERE REQUIRED. RAIL SHALL BE TRANSITIONED TO A SMOOTH CONNECTION WITH OTHER RAIL AS SHOWN ELSEWHERE IN PLANS.
- AT THE OPTION OF THE CONTRACTOR THE RAIL ELEMENTS FOR THE GUARD FENCE MAY BE FURNISHED IN EITHER 12 1/2 OR 25 FOOT NOMINAL LENGTHS. RAIL SHALL BE FURNISHED WITH POST BOLT SLOTS FOR 5/8" DIAMETER BOLT CONNECTION TO POSTS.
- BOLTS USED IN ATTACHING RAIL TO POST SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND NO MORE THAN 3/4" BEYOND IT.
- THE TOP OF THE TERMINAL ANCHOR POST ASSEMBLY AND ALL STEEL FITTINGS THEREON SHALL BE GALVANIZED AS SHOWN.
- WHERE ROCK IS ENCOUNTERED OR WHERE SHOWN ON THE PLANS, THE DIAMETER OF THE HOLES AND THE MATERIAL FOR BACKFILLING SHALL BE AS DIRECTED BY THE ENGINEER.
- THE TERMINAL ANCHOR POST SHALL BE SET IN CLASS "A" CONCRETE IN ACCORDANCE WITH ITEMS "CONCRETE FOR STRUCTURES" OR "CONCRETE PAVEMENT". CLASS "A" CONCRETE SHALL BE SUBSIDIARY TO THE BID ITEM "METAL BEAM GUARD FENCE."
- TIMBER POSTS MAY BE BEVELED AT APPROXIMATELY 10 DEGREES ON THE TOP OR BOTH ENDS WITH HIGH SIDE OF TOP PLACED TOWARD THE ROADWAY.
- AN ANCHOR OTHER THAN TO A TERMINAL ANCHOR POST SHALL CONSIST OF NOT LESS THAN AN EIGHT BOLT CONNECTION SIMILAR TO THE RAIL SPLICE.
- SPECIAL FABRICATION WILL BE REQUIRED IN INSTALLATIONS HAVING A CURVATURE OF LESS THAN 150' RADIUS.



SECTION THRU RAIL ELEMENT

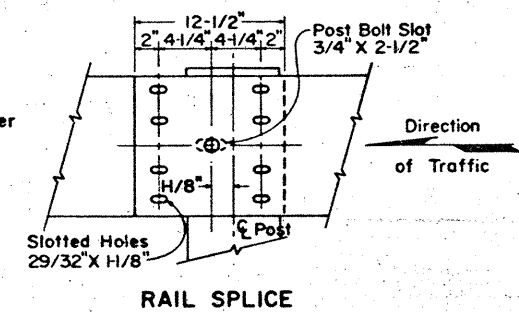


ELEVATION OF GUARD RAIL

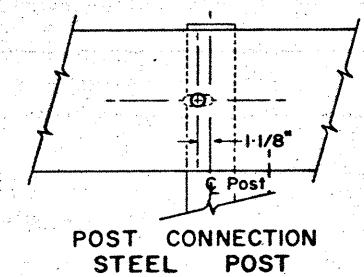


WOOD LINE POST

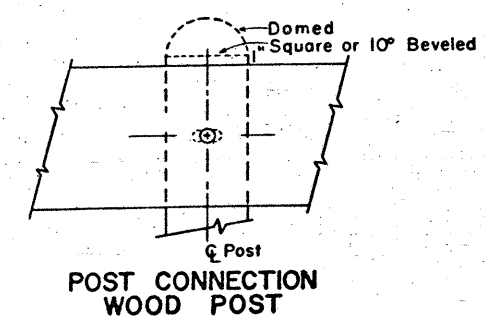
STEEL LINE POST



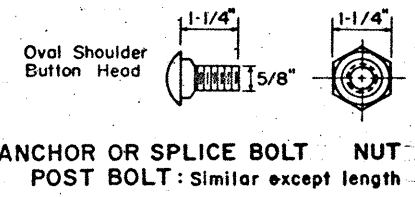
RAIL SPLICE



POST CONNECTION STEEL POST



POST CONNECTION WOOD POST



ANCHOR OR SPLICE BOLT NUT
POST BOLT: Similar except length

TEXAS HIGHWAY DEPARTMENT
METAL BEAM GUARD FENCE

GF(TD)-69

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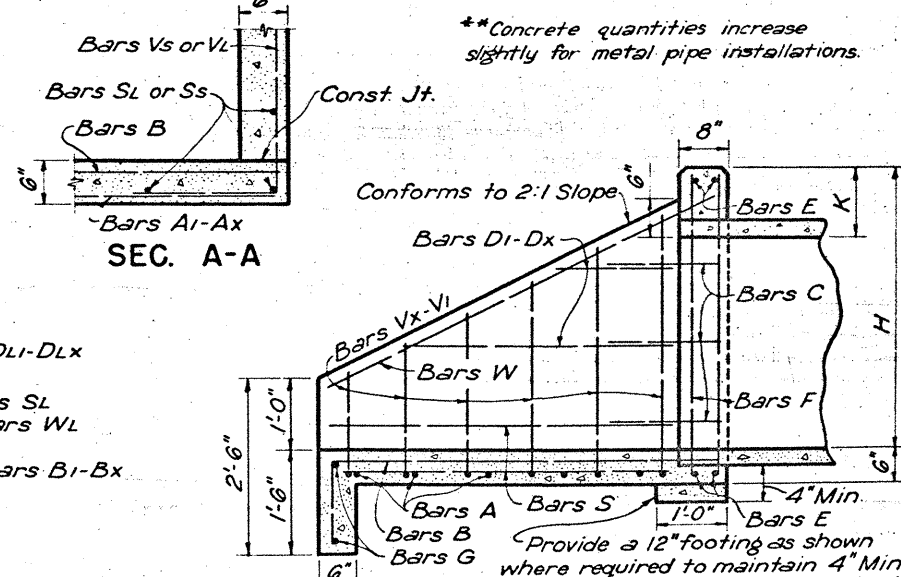
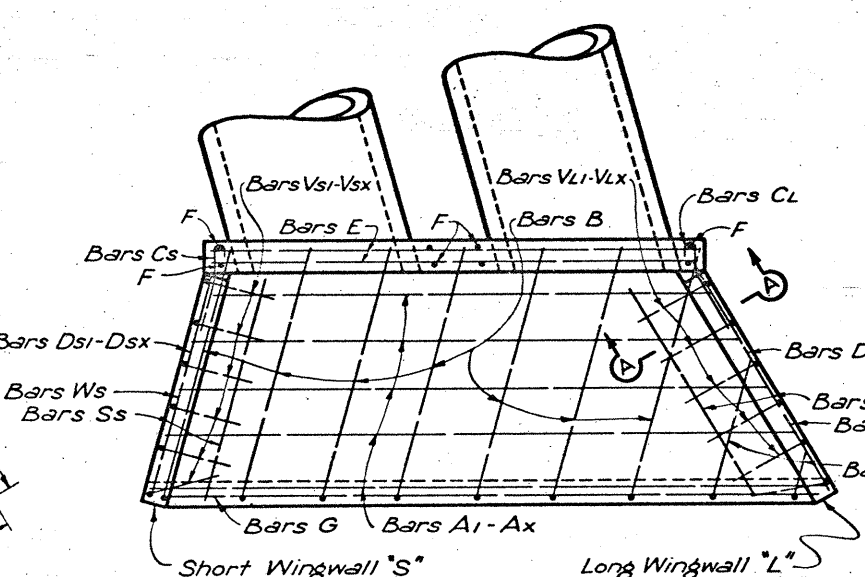
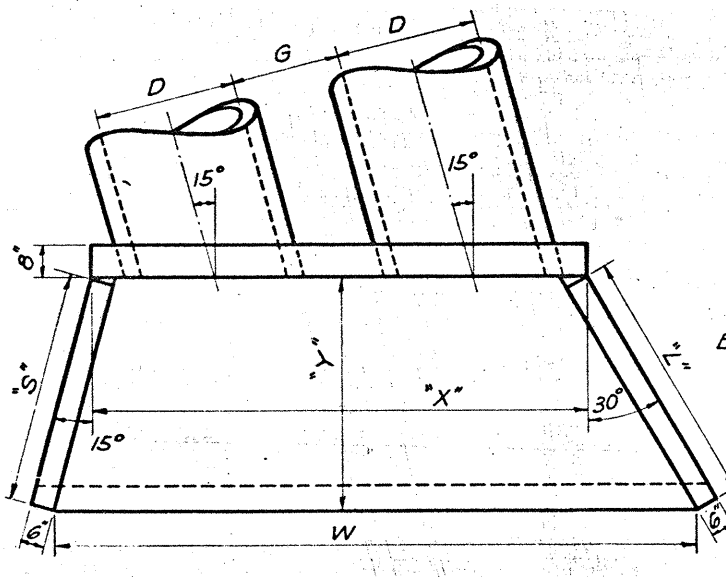
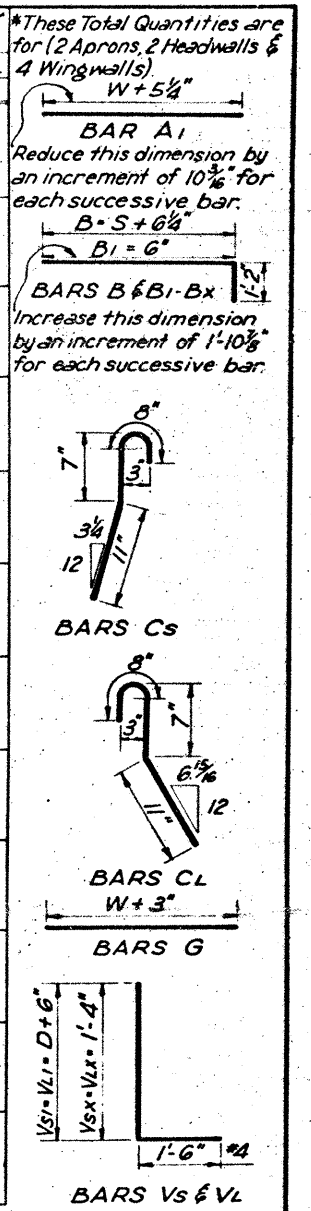
DN.	DRAWING	DATE	FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
CK. DN.	ORIGINAL	AUG 1968	6	TEXAS	A3143-1-1	44
CK. DW.				COUNTY	CONT. SECT. JOB	HIGHWAY NO.
TR.				18 Rockwell		30-57
CK. TR.						

PLAN
NOTE: BODIES
NO. 100-
NO.

PROFILE
NOTE: BODIES
NO. 100-
NO.

BILL OF REINFORCING STEEL FOR TWO COMPLETE HEADWALLS

NO. OF PIPES	PIPE DIAM.	TABLE OF DIMENSIONS								BILL OF REINFORCING STEEL FOR TWO COMPLETE HEADWALLS																* TOTAL QUANTITIES																						
		D	G	K	X	H	Y	W	S	L	BARS A1-Ax #1 @ 12"	BARS B #3 @ 18"	BARS B1-Bx #3 @ 18"	Cs = 2'-0" #4 @ 12"	Cl = 2'-0" #4 @ 12"	BARS Ds1-Dsx #3 @ 12"	BARS D1-DLx #3 @ 12"	BARS E 8-#5	BARS F	BARS G 4-#3	BARS Ss 6-#4	BARS SL 6-#4	BARS Vs-Vsx #4 @ 12"	BARS VL1-VLx #4 @ 12"	BARS Ws 2-#5	BARS WL 2-#5	LBS.	C.Y.																				
1	12"	12"	12"	12"	2'-5 1/2"	2'-0"	1'-0"	2'-2 1/2"	10 1/2"	10 1/2"	2	2'-8"	4	4	2'-7"	4	2	3	2	3	2'-3"	19	8	*4	2'-2"	12	2'-5"	4	0'-8"	3	0'-8"	3	2	2'-11"	4	2	2'-11"	4	1'-7"	3	1'-8"	3	69	.54				
2	15"	15"	15"	15"	2'-10 1/2"	2'-3"	1'-6"	3'-0 3/4"	1'-5 1/2"	1'-5 1/2"	4	3'-1"	8	4	3'-1"	5	2	1'-8"	1	4	5	4	5	2	2'-7"	22	8	*4	2'-5"	13	3'-3"	5	1'-3"	5	1'-3"	5	4	3'-0"	8	4	3'-0"	8	2'-2"	5	2'-3"	5	100	.77
3	18"	18"	18"	18"	3'-2"	2'-6"	2'-0"	3'-9 3/4"	1'-11 1/2"	2'-0 1/4"	4	3'-9"	10	4	3'-7"	5	2	1'-8"	1	4	5	4	5	2	2'-11"	24	8	*4	2'-8"	14	4'-0"	6	1'-9"	7	1'-10"	7	6	3'-2"	13	6	3'-2"	13	2'-8"	6	2'-11"	6	124	1.01
4	24"	24"	24"	24"	3'-9 1/2"	3'-0"	3'-0"	5'-2 1/2"	2'-11 1/2"	3'-2 1/2"	6	4'-10"	19	6	4'-8"	11	2	1'-8"	1	4	5	4	5	2	3'-6"	29	8	*4	3'-2"	17	5'-5"	8	2'-9"	11	3'-0"	12	8	3'-5"	18	8	3'-5"	18	3'-10"	8	4'-2"	9	173	1.59
1	30"	30"	30"	30"	4'-4 1/2"	3'-6"	4'-0"	6'-7 1/2"	4'-0 1/8"	4'-4"	8	5'-10"	31	6	5'-8"	13	4	2'-7"	4	6	8	6	8	4	4'-1"	34	8	*4	3'-8"	20	6'-11"	10	3'-10"	15	4'-2"	17	10	3'-8"	25	10	3'-8"	25	5'-0"	10	5'-5"	11	237	2.29
2	36"	36"	36"	36"	4'-11 1/2"	4'-0"	5'-0"	8'-1 1/2"	5'-0 1/2"	5'-5 1/2"	10	6'-10"	46	8	6'-9"	20	4	2'-7"	4	6	8	6	8	4	4'-9"	40	8	*4	4'-2"	22	8'-4"	13	4'-10"	19	5'-4"	21	12	3'-11"	31	12	3'-11"	31	6'-2"	13	6'-8"	14	296	3.11
3	42"	42"	42"	42"	5'-7 1/2"	4'-6"	6'-0"	9'-6 1/2"	6'-0 1/8"	6'-7 1/8"	12	7'-11"	63	8	7'-9"	23	6	3'-7"	8	8	11	8	11	6	5'-4"	44	8	*4	4'-8"	25	9'-10"	15	5'-11"	24	6'-5"	26	14	4'-2"	39	14	4'-2"	39	7'-3"	15	7'-11"	17	374	4.04
4	48"	48"	48"	48"	6'-2 1/2"	5'-3"	7'-0"	11'-0"	7'-1 1/2"	7'-9 1/2"	14	8'-11"	83	8	8'-10"	27	8	4'-6"	14	8	11	8	11	6	5'-11"	49	8	*5	5'-5"	45	11'-3"	17	6'-11"	28	7'-7"	30	16	4'-5"	47	16	4'-5"	47	8'-5"	18	9'-3"	19	461	5.17
1	54"	54"	54"	54"	6'-9 1/2"	5'-9"	8'-0"	12'-5 1/2"	8'-1 1/2"	8'-11 1/2"	16	9'-11"	106	10	9'-10"	37	8	4'-6"	14	10	13	10	13	8	6'-6"	54	8	*5	5'-11"	49	12'-8"	19	8'-0"	32	8'-9"	35	18	4'-8"	56	20	4'-8"	62	9'-7"	20	10'-5"	22	557	6.35
2	60"	60"	60"	60"	7'-4 1/2"	6'-3"	9'-0"	13'-10 1/2"	8'-1 1/2"	8'-11 1/2"	18	11'-0"	132	10	10'-10"	41	10	5'-5"	20	10	13	10	13	8	7'-2"	60	8	*5	6'-5"	54	14'-2"	21	9'-0"	36	9'-11"	40	20	4'-11"	66	22	4'-11"	72	10'-9"	22	11'-8"	24	639	7.65
3	66"	66"	66"	66"	7'-11 1/2"	6'-9"	10'-0"	15'-4 1/2"	8'-1 1/2"	8'-11 1/2"	20	12'-0"	160	12	11'-11"	54	10	5'-5"	20	12	16	12	16	10	7'-9"	65	8	*5	6'-11"	58	15'-7"	23	10'-0"	40	11'-1"	44	22	5'-2"	76	24	5'-2"	83	11'-11"	25	13'-0"	27	747	9.07
4	72"	72"	72"	72"	8'-7 1/2"	7'-3"	11'-0"	16'-9 1/2"	8'-1 1/2"	8'-11 1/2"	22	13'-0"	191	12	12'-11"	58	12	6'-5"	29	12	16	12	16	10	8'-4"	70	8	*5	7'-5"	62	17'-1"	26	11'-1"	44	12'-3"	49	24	5'-5"	87	26	5'-5"	94	13'-0"	27	14'-3"	30	839	10.61
1	12"	12"	12"	12"	2'-5 1/2"	2'-0"	1'-0"	2'-2 1/2"	10 1/2"	10 1/2"	2	2'-8"	4	4	2'-7"	4	2	3	2	3	2'-3"	19	8	*4	2'-2"	12	2'-5"	4	0'-8"	3	0'-8"	3	2	2'-11"	4	2	2'-11"	4	1'-7"	3	1'-8"	3	69	.54				
2	15"	15"	15"	15"	2'-10 1/2"	2'-3"	1'-6"	3'-0 3/4"	1'-5 1/2"	1'-5 1/2"	4	3'-1"	8	4	3'-1"	5	2	1'-8"	1	4	5	4	5	2	2'-7"	22	8	*4	2'-5"	13	3'-3"	5	1'-3"	5	1'-3"	5	4	3'-0"	8	4	3'-0"	8	2'-2"	5	2'-3"	5	100	.77
3	18"	18"	18"	18"	3'-2"	2'-6"	2'-0"	3'-9 3/4"	1'-11 1/2"	2'-0 1/4"	4	3'-9"	10	4	3'-7"	5	2	1'-8"	1	4	5	4	5	2	2'-11"	24	8	*4	2'-8"	14	4'-0"	6	1'-9"	7	1'-10"	7	6	3'-2"	13	6	3'-2"	13	2'-8"	6	2'-11"	6	124	1.01
4	24"	24"	24"	24"	3'-9 1/2"	3'-0"	3'-0"	5'-2 1/2"	2'-11 1/2"	3'-2 1/2"	6	4'-10"	19	6	4'-8"	11	2	1'-8"	1	4	5	4	5	2	3'-6"	29	8	*4	3'-2"	17	5'-5"	8	2'-9"	11	3'-0"	12	8	3'-5"	18	8	3'-5"	18	3'-10"	8	4'-2"	9	173	1.59
1	30"	30"	30"	30"	4'-4 1/2"	3'-6"	4'-0"	6'-7 1/2"	4'-0 1/8"	4'-4"	8	5'-10"	31	6	5'-8"	13	4	2'-7"	4	6	8	6	8	4	4'-1"	34	8	*4	3'-8"	20	6'-11"	10	3'-10"	15	4'-2"	17	10	3'-8"	25	10	3'-8"	25	5'-0"	10	5'-5"	11	237	2.29
2	36"	36"	36"	36"	4'-11 1/2"	4'-0"	5'-0"	8'-1 1/2"	5'-0 1/2"	5'-5 1/2"	10	6'-10"	46	8	6'-9"	20	4	2'-7"	4	6	8	6	8	4	4'-9"	40	8	*4	4'-2"	22	8'-4"	13	4'-10"	19	5'-4"	21	12	3'-11"	31	12	3'-11"	31	6'-2"	13	6'-8"	14	296	3.11
3	42"	42"	42"	42"	5'-7 1/2"	4'-6"	6'-0"	9'-6 1/2"	6'-0 1/8"	6'-7 1/8"	12	7'-11"	63	8	7'-9"	23	6	3'-7"	8	8	11	8	11	6	5'-4"	44	8	*4	4'-8"	25	9'-10"	15	5'-11"	24	6'-5"	26	14	4'-2"	39	14	4'-2"	39	7'-3"	15	7'-11"	17	374	4.04
4	48"	48"	48"	48"	6'-2 1/2"	5'-3"	7'-0"	11'-0"	7'-1 1/2"	7'-9 1/2"	14	8'-11"	83	8	8'-10"	27	8	4'-6"	14	8	11	8	11	6	5'-11"	49	8	*5	5'-5"	45	11'-3"	17	6'-11"	28	7'-7"	30	16	4'-5"	47	16	4'-5"	47	8'-5"	18	9'-3"	19	461	5.17
1	54"	54"	54"	54"	6'-9 1/2"	5'-9"	8'-0"	12'-5 1/2"	8'-1 1/2"	8'-11 1/2"	16	9'-11"	106	10	9'-10"	37	8	4'-6"	14	10	13	10	13	8	6'-6"	54	8	*5	5'-11"	49	12'-8"	19	8'-0"	32	8'-9"	35	18	4'-8"	56	20	4'-8"	62	9'-7"	20	10'-5"	22	557	6.35
2	60"	60"	60"	60"	7'-4 1/2"	6'-3"	9'-0"	13'-10 1/2"	8'-1 1/2"	8'-11 1/2"	18	11'-0"	132	10	10'-10"	41	10	5'-5"	20	10	13	10	13	8	7'-2"	60	8	*5	6'-5"	54	14'-2"	21	9'-0"	36	9'-11"	40	20	4'-11"	66	22	4'-11"	72	10'-9"	22	11'-8"	24	639	7.65
3	66"	66"	66"	66"	7'-11 1/2"	6'-9"	10'-0"	15'-4 1/2"	8'-1 1/2"	8'-11 1/2"	20	12'-0"	160	12	11'-11"	54	10	5'-5"	20	12	16	12	16	10	7'-9"	65	8	*5	6'-11"	58	15'-7"	23	10'-0"	40	11'-1"	44	22	5'-2"	76	24	5'-2"	83	11'-11"	25	13'-0"	27	747	9.07
4	72"	72"	72"	72"	8'-7 1/2"	7'-3"	11'-0"	16'-9 1/2"	8'-1 1/2"	8'-11 1/2"	22	13'-0"	191	12	12'-11"	58	12	6'-5"	29	12	16	12	16	10	8'-4"	70	8	*5	7'-5"	62	17'-1"	26	11'-1"	44	12'-3"	49	24	5'-5"	87	26	5'-5"	94	13'-0"	27	14'-3"	30	839	10.61



GENERAL NOTES:-
All Concrete shall be Class C.
Dimensions relating to reinforcing steel are to centers of bars.
Steel cover to be 2" from center of outside layer of steel to face of concrete.

Subscripts "s" & "L" for bar markings designate short wingwall (s) and long wingwall (L).
Chamfer all exposed corners 1/4".

TEXAS HIGHWAY DEPARTMENT
CONCRETE HEADWALLS
FOR
PIPE CULVERTS
12 TO 72 INCHES IN DIAMETER
CH-11B-15°

DN	THD	DRAWING	DATE	REV. NO.	STATE	APPROVAL NO.	PROJECT NO.
CK	ON	THD	Original	Feb 1950	6	TEXAS	A3123-1-1
DW	MDA	Rev. Spec. Bars	5-7-51				25
CK	DW	K.M.	Rev. Jan 59				
TR	OCK	Re. No. 24	Quant note				
CK	TR	MDA					3697

7014
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