REC'D. 10/7/98

FINAL QUANTITY CALCULATIONS

Bullard Wash Channel Improvements - Final Design

MARICOPA COUNTY
1871
ARIZONA

Flood Control District of Maricopa County
Contract FCD 98-15

Sverdrup Project No. 013884

Bradford D. Olbert

Registered Professional Engineer (Sanitary)
CERTIFICATE NO.
13955
BRADFORD D.
OLBERT
Date Signed 10/7/98
ARIZONA, U.S.A.

October 1998

Sverdrup

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Registered Professional Engineer (Sanitary)
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BRADFORD D. OLBERT
Date Signed 10/7/98
ARIZONA, U.S.A.

October 1998

Sverdrup

By: DES
Chk: BDO

Contract No.: FCD 95-39 — DATE: 29-Sep-98

Project: Bullard Wash Channel Improvements

100% Cost Estimate

ITEM	ITEM DESCRIPTION	UNIT	BULLARD WASH CHANNEL PLAN & PROFILE SHEET NUMBERS 14	15	16	17	18	19	BULLARD WASH CHANNEL PLAN & PROFILE SHEET NUMBERS 20	21	22	23	24	25	EAST TRIBUTARY CHL P & P SHEET # 26	27	28	LWR BUCKEYE P & P SHEET # 29	30	S. BID P&P SHT 31	BID OVERCHT 74	QUANTITY	UNIT PRICE	AMOUNT
105-1	Partnering	L.S.																				1	5,000	$5,000.00
105-2	UPRR Flagman Allowance	L.S.																				1	20,000	$10,000.00
105-3	Roadway Construction Survey and Staking	L.S.																				1	60,000	$95,000.00
107-1	NPDES/SWPPP Permits	L.S.																				1	10,000	$10,000.00
107-2	Public Information and Notification Allowance	L.S.																				1	15,000	$25,000.00
107-3	Project Signs Allowance	L.S.																				1	6,000	$5,000.00
111-1	Mobilization	L.S.																				1	159,000	$159,000.00
201-1	Clear and Grub	Acre	2	2										3			1					8	1,000	$8,000.00
211-1	Irrigation Ditch Fill Construction	Cu. Yd.			82	77	93	380	2,708	2,015	12,165	2,965	1,027		307		533					22,352	2	$44,704.00
211-2	Channel Embankment Fill Construction	Cu. Yd.		5,183	13,232	10,658	5,921															34,994	5	$174,970.00
211-3	Landscaping Berm Fill Construction	Cu. Yd.							1,636	1,162												2,798	2	$5,596.00
211-4	Lower Buckeye Road Berm Construction	Cu. Yd.																4,449	2,110			6,559	3	$19,677.00
215-1	Earthwork for Drainage Channels	Cu. Yd.	4,783	17,345	16,264	19,143	23,890	28,611	45,115	38,190	44,582	29,684	33,016	3,224	13,652	14,987	2,130					334,616	2.50	$836,540.00
216-1	Temporary Bypass Ditch	L.S.																				1	35,000	$35,000.00
216-2	Graded V-Ditch	L.F.		600	935	560						991	475					850	393			4,804	2	$9,608.00
216-3	Dirt Irrigation Ditch (4' Bottom)	L.F.						85	55				90	7			83					320	4	$1,280.00
220-1	Grouted Riprap	Cu. Yd.		496					2,351													2,847	100	$284,700.00
220-2	Dumped Riprap	Cu. Yd.						45									4					49	100	$4,900.00
220-3	Tree Wells	Ea.							10													10	1,000	$10,000.00
221-1	Gabion Baskets	Cu. Yd.		671	334	334	314	288	107	334	334	334	890				4					3,944	85	$335,240.00
221-2	Gabion Mattress	Cu. Yd.		517	1,667	1,667	1,810	1,460	550	1,794	1,781	1,781	2,320									15,347	85	$1,304,495.00
301-1	Farm and BID Canal Roads	L.F.		1,070	2,100	2,100	1,652	1,330		330	1,000	1,000	414					1,800	800	480		14,076	2	$28,152.00
310-1	Aggregate Base Course	Ton		920	700	700	1,297	1,288	1,206	460	350	347	554		1,115	1,162	417	333	148			10,997	10	$109,970.00
310-2	Filter Blanket (Type I)	Ton		94					601													695	10	$6,950.00
310-3	Filter Blanket (Type II)	Ton		142					911													1,053	15	$15,795.00
350-1	Remove Concrete Lined Ditch	L.S.																				1	4,200	$4,200.00
350-2	Remove Irrigation Culverts	L.S.																				1	1,631	$1,631.00
350-3	Remove Chain Link Fence	L.S.																				1	4,300	$4,300.00
350-4	Rubble and Debris Removal	Ton							1,500				20	10	1,360		10					2,900	50	$145,000.00
350-5	Miscellaneous Removals	L.S.																				1	5,000	$5,000.00
401-1	Traffic Control	L.S.																				1	15,000	$15,000.00
405-1	Survey Monument	Ea.											1									1	200	$200.00
415-1	Barricades	L.F.		110									60		80							250	25	$6,250.00
420-1	Chain Link Fence and Gates	L.F.							524	1,000	1,000	1,000	545		964	900	422					6,355	12	$76,260.00
421-1	Wire Fence	L.F.		520					808	300	1,000	1,000	1,365		954	900	50					6,897	8	$55,176.00
432-1	Gravel Mulch	S.Y.					635		1,210	480	700		192		2,426	2,850	233	1,040	490			10,256	7	$71,792.00
502-1	Drilled Shafts	L.F.																			350	350	160	$56,000.00
505-1	Structural Concrete (Class A)	Cu. Yd.		264			34	18	61				10								84	471	225	$105,975.00
505-2	Structural Concrete (Class AA)	Cu. Yd.																			320	320	275	$88,000.00
505-3	Steel Reinforcement	Lb.		27,953			2,550	1,350	4,575				750								44,244	81,422	0.50	$40,711.00
505-4	Concrete Channel Lining	S.Y.		3,165				2,052	4,084						5,467	4,432	1,915					21,115	33	$696,795.00
505-5	Broadway Road Ford Crossing	S.Y.					934															934	75	$70,050.00
505-6	Concrete Inlet Channel	S.Y.											615									615	45	$27,675.00
505-7	Spillways	S.Y.		715											196							911	35	$31,885.00
505-8	O&M Path	L.F.		104					425													529	110	$58,190.00
505-9	Low Flow Channel	L.F.							300	1,000	1,000	1,000	543									3,843	35	$134,505.00
505-10	Inlet and Outlet Structures, MAG Det. 501-4	Ea.		1				2	2													5	1,500	$7,500.00
505-11	Inlet and Outlet Structures, MAG Det. 502-1	Ea.									1	1	2									4	2,000	$8,000.00
505-12	Inlet and Outlet Structures, MAG Det. 501-1	Ea.			2	1																3	1,500	$4,500.00
505-13	Inlet and Outlet Structures, Special Detail 25	Ea.							1		1	1										3	1,000	$3,000.00
505-14	Outlet Structure, Special Section 10c	Ea.		1																		1	1,000	$1,000.00
505-15	Inlet and Outlet Structures, MAG Det. 501-5	Ea.		1		1			1								1					4	2,000	$8,000.00
505-16	Outlet Structure, Special Detail 22	Ea.															1					1	2,000	$2,000.00
505-17	Inlet Structure Detail 13	L.S.															1					1	6,000	$6,000.00

By: DES
Chk: BDO

Contract No.: FCD 95-39 — DATE: 29-Sep-98

Project: Bullard Wash Channel Improvements

100% Cost Estimate

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505-18	Catch Basin, MAG Det. 535, Type F	Ea.							2													2	1,500	$3,000.00
505-19	Concrete Staining	S.F.		43,700				33,064	39,750						14,230							130,744	0.25	$32,686.00
506-1	Precast Slabs	Ea.																			16	16	5,440	$87,040.00
515-1	Access Gates	Ea.		4			3	3	1				2									13	500	$6,500.00
515-2	Safety Posts	Ea.					26										7					33	150	$4,950.00
515-3	Removable Safety Posts	Ea.					2										2					4	150	$600.00
515-4	Delineators	Ea.		9																47		56	35	$1,960.00
520-1	Handrail (42")	L.F.		963	2,000	2,000	2,422	1,935	617	606	300	300	476									11,619	30	$348,570.00
520-2	Handrail (10")	L.F.		104																		104	15	$1,560.00
525-1	Shotcrete Lining Spillway	S.Y.		65																		65	100	$6,500.00
602-1	Jack and Bore Pipe	L.F.							75													75	200	$15,000.00
615-1	Sanitary Sewer Line Installation	L.F.					440															440	60	$26,400.00
618-1	24" DIP	L.F.		112																		112	85	$9,520.00
618-2	30" DIP	L.F.			271	272	284	174														1,001	125	$125,125.00
618-3	12" RGRCP	L.F.									105	73	90									268	40	$10,720.00
618-4	24" RGRCP	L.F.		135	65	67			266				62									595	75	$44,625.00
618-5	30" RGRCP	L.F.							209								122					331	80	$26,480.00
618-6	36" RGRCP	L.F.		24				266														290	100	$29,000.00
618-7	60" RGRCP	L.F.															232					232	160	$37,120.00
625-1	Adjust Sanitary Sewer Manhole	Ea.					2															2	225	$450.00
625-2	Irrigation Siphon Manhole (Detail 12)	Ea.			2	2	2	2														8	2,000	$16,000.00
632-1	PVC Pipe Sleeve	L.F.							695													695	7	$4,865.00
632-2	Steel Pipe Sleeve	L.F.			220	220																440	65	$28,600.00
635-1	Concrete Lined Ditch	L.F.			62	66	232			300	290											950	15	$14,250.00
635-2	Shallow Concrete Lined Ditch	L.F.									71	71										142	16	$2,272.00
	CONSTRUCTION COST																							**$6,162,965.00**

By: DES
Ckd:BDO

BULLARD WASH CHANNEL
100% COMPLETE - EARTHWORK QUANTITIES

ALIGNMENT:	BULL 01_7
EXISTING SURFACE	BULLEX01
DESIGN SURFACE	BULL01_7S Subgrade

SHEET NUMBER	STATION	CUT FACT	CUT AREA	RAW CUT VOLUME	ADJ CUT VOLUME	FILL FACT	FILL AREA	RAW FILL VOLUME	ADJ FILL VOLUME	NET CUMULATIVE CUT VOLUME
	1800	1	0	0	0	1.15	0	0	0	0
	1900	1	334.31	619	619	1.15	0	0	0	619
	2000	1	260.46	1101	1101	1.15	0	0	0	1720
	2100	1	165.94	790	790	1.15	0	0	0	2510
	2200	1	280.48	827	827	1.15	0	0	0	3337
	2300	1	223.03	932	932	1.15	0	0	0	4269
	2400	1	54.75	514	514	1.15	36.24	67	77	4706
			Total Cut For Sheet		**4783**		**Total Fill For Sheet**		**77**	
	2500	1	2.63	106	106	1.15	31.94	126	145	4667
	2600	1	866.81	1610	1610	1.15	0	59	68	6209
	2700	1	797.46	3082	3082	1.15	0	0	0	9291
	2800	1	786.84	2934	2934	1.15	0	0	0	12225
	2900	1	512.72	2407	2407	1.15	28.42	53	61	14571
	3000	1	263.83	1438	1438	1.15	0	0	0	16009
	3100	1	403.31	1235	1235	1.15	226.73	793	912	16332
	3200	1	407.16	1501	1501	1.15	436.01	1214	1396	16437
	3300	1	398.18	1491	1491	1.15	407.55	1562	1796	16132
	3400	1	434.19	1541	1541	1.15	313.41	1335	1535	16138
			Total Cut For Sheet		**17345**		**Total Fill For Sheet**		**5913 (5183)**	
							* partial sum shown for embankment construction fill			
	3500	1	420.62	1583	1583	1.15	322.66	1178	1355	16366
	3600	1	413.94	1545	1545	1.15	326.41	1202	1382	16529
	3700	1	517.56	1725	1725	1.15	259.68	1085	1248	17006
	3800	1	427.78	1751	1751	1.15	325.08	1083	1245	17512
	3900	1	426.5	1582	1582	1.15	322.73	1200	1380	17714
	4000	1	426.58	1580	1580	1.15	324.81	1199	1379	17915
	4100	1	428.78	1584	1584	1.15	314.02	1183	1360	18139
	4200	1	440.62	1610	1610	1.15	307.23	1150	1323	18426
	4300	1	441.34	1633	1633	1.15	302.18	1129	1298	18761
	4400	1	460.93	1671	1671	1.15	290.57	1098	1262	19170
			Total Cut For Sheet		**16264**		**Total Fill For Sheet**		**13232**	
	4500	1	471.62	1727	1727	1.15	282.92	1062	1221	19676
	4600	1	477.99	1759	1759	1.15	277.8	1038	1194	20241
	4700	1	491.48	1795	1795	1.15	270.14	1015	1167	20869
	4800	1	508.95	1853	1853	1.15	260.27	982	1130	21592
	4900	1	517.69	1901	1901	1.15	246.56	939	1079	22414
	5000	1	556.58	1989	1989	1.15	213.05	851	979	23424
	5100	1	525.54	2004	2004	1.15	242.29	843	970	24458
	5200	1	548.12	1988	1988	1.15	232.88	880	1012	25434
	5300	1	557.77	2048	2048	1.15	224.72	847	975	26507
	5400	1	564.91	2079	2079	1.15	212.46	810	931	27655
			Total Cut For Sheet		**19143**		**Total Fill For Sheet**		**10658**	

By: DES
Ckd:BDO

BULLARD WASH CHANNEL
100% COMPLETE - EARTHWORK QUANTITIES

ALIGNMENT:	BULL 01_7	
EXISTING SURFACE	BULLEX01	
DESIGN SURFACE	BULL01_7S	Subgrade

STATION	CUT FACT	CUT AREA	RAW CUT VOLUME	ADJ CUT VOLUME	FILL FACT	FILL AREA	RAW FILL VOLUME	ADJ FILL VOLUME	NET CUMULATIVE CUT VOLUME
5500	1	570.73	2103	2103	1.15	203.61	771	886	28872
5600	1	591.65	2153	2153	1.15	201.48	750	863	30162
5700	1	596.75	2201	2201	1.15	188.72	723	831	31532
5800	1	614.08	2242	2242	1.15	183.72	690	793	32981
5900	1	629.54	2303	2303	1.15	116.57	556	640	34644
6000	1	648.73	2367	2367	1.15	107.71	415	478	36533
6100	1	644.26	2394	2394	1.15	144.61	467	537	38390
6200	1	655.98	2408	2408	1.15	135.34	518	596	40202
6300	1	791.97	2681	2681	1.15	4.01	258	297	42586
6400	1	848.59	3038	3038	1.15	24.85	53	61	45563
		Total Cut For Sheet		23890		Total Fill For Sheet		5982	
6500	1	809.59	3071	3071	1.15	52.11	143	164	48470
6600	1	913.64	3191	3191	1.15	8.56	112	129	51532
6700	1	792.33	3159	3159	1.15	45.47	100	115	54576
6800	1	769.96	2893	2893	1.15	50.77	178	205	57264
6900	1	764.99	2843	2843	1.15	54.94	196	225	59882
7000	1	745.51	2797	2797	1.15	60.46	214	246	62433
7100	1	660.42	2604	2604	1.15	0.52	113	130	64907
7200	1	764.97	2640	2640	1.15	57.85	108	124	67423
7300	1	633.78	2590	2590	1.15	96.48	286	329	69684
7400	1	890.49	2823	2823	1.15	7.67	193	222	72285
		Total Cut For Sheet		28611		Total Fill For Sheet		1889	
7500	1	775.16	3085	3085	1.15	136.77	267	308	75062
7600	1	673.75	2683	2683	1.15	100.33	439	505	77240
7700	1	1434.83	3905	3905	1.15	0	186	214	80931
7800	1	2718.67	7692	7692	1.15	0	0	0	88623
7900	1	2042.83	8818	8818	1.15	0	0	0	97441
8000	1	1412.27	6398	6398	1.15	55.7	103	119	103720
8100	1	793.41	4085	4085	1.15	97.99	285	327	107478
8200	1	670.66	2711	2711	1.15	115.23	395	454	109735
8300	1	794.41	2713	2713	1.15	77.34	357	410	112038
8400	1	838.9	3025	3025	1.15	64.91	263	303	114760
		Total Cut For Sheet		45115		Total Fill For Sheet		2640	
8500	1	809.64	3053	3053	1.15	77.3	263	303	117510
8600	1	844.57	3063	3063	1.15	97.94	325	373	120200
8700	1	821.39	3085	3085	1.15	100.33	367	422	122863
8800	1	872.02	3136	3136	1.15	110.5	390	449	125550
8900	1	951.18	3376	3376	1.15	0	205	235	128691
9000	1	1044.55	3696	3696	1.15	0	0	0	132387
9100	1	1112.31	3994	3994	1.15	40.58	75	86	136295
9200	1	1424.2	4697	4697	1.15	0	75	86	140906
9300	1	1340.91	5121	5121	1.15	0	0	0	146027
9400	1	1342.21	4969	4969	1.15	0	0	0	150996
		Total Cut For Sheet		38190		Total Fill For Sheet		1954	

By: DES
Ckd:BDO

BULLARD WASH CHANNEL
100% COMPLETE - EARTHWORK QUANTITIES

ALIGNMENT:	BULL 01_7	
EXISTING SURFACE	BULLEX01	
DESIGN SURFACE	BULL01_7S	Subgrade

STATION	CUT FACT	CUT AREA	RAW CUT VOLUME	ADJ CUT VOLUME	FILL FACT	FILL AREA	RAW FILL VOLUME	ADJ FILL VOLUME	NET CUMULATIVE CUT VOLUME
9500	1	1320.49	4931	4931	1.15	0	0	0	155927
9600	1	1349.73	4945	4945	1.15	0	0	0	160872
9700	1	1485.89	5251	5251	1.15	0	0	0	166123
9800	1	1356.88	5264	5264	1.15	0	0	0	171387
9900	1	1265.14	4856	4856	1.15	0	0	0	176243
10000	1	1182.37	4532	4532	1.15	0	0	0	180775
10100	1	1040.74	4117	4117	1.15	0	0	0	184892
10200	1	984.04	3750	3750	1.15	1.92	4	4	188638
10300	1	948.8	3579	3579	1.15	11.83	25	29	192188
10400	1	864.16	3357	3357	1.15	22.68	64	73	195472
		Total Cut For Sheet		**44582**		**Total Fill For Sheet**		**106**	
10500	1	892.36	3253	3253	1.15	38.35	113	130	198595
10600	1	870.24	3264	3264	1.15	39.79	145	166	201693
10700	1	845.58	3177	3177	1.15	45.85	159	182	204688
10800	1	826.26	3096	3096	1.15	50.66	179	206	207578
10900	1	819.21	3047	3047	1.15	53.64	193	222	210403
11000	1	808.72	3015	3015	1.15	59.39	209	241	213177
11100	1	735.2	2859	2859	1.15	86.7	271	311	215725
11200	1	700.75	2659	2659	1.15	102.29	350	402	217982
11300	1	729.74	2649	2649	1.15	91.85	360	413	220218
11400	1	709.42	2665	2665	1.15	99.41	354	407	222476
		Total Cut For Sheet		**29684**		**Total Fill For Sheet**		**2680**	
11500	1	680.04	2573	2573	1.15	113.83	395	454	224595
11600	1	641.4	2447	2447	1.15	109.52	414	476	226566
11700	1	764.75	2604	2604	1.15	90.26	370	425	228745
11800	1	952.75	3181	3181	1.15	80.07	315	363	231563
11900	1	1112.84	3825	3825	1.15	84.9	305	351	235037
12000	1	1472.74	4788	4788	1.15	13.06	181	209	239616
12100	1	1494.91	5496	5496	1.15	0	24	28	245084
12200	1	769.15	4193	4193	1.15	0	0	0	249277
12300	1	577.65	2494	2494	1.15	6.44	12	14	251757
12400	1	186.25	1415	1415	1.15	9.64	30	34	253138
		Total Cut For Sheet		**33016**		**Total Fill For Sheet**		**2354**	
12421	1	19.13	80	80	1.15	4.97	6	7	**253211**

See Left Dike and Right Dike Removal Quantities; Sta 124+00 to Sta 133+00

SVERDRUP

JOB Bullard Wash channel

COMPUTATIONS FOR Quantities

SHEET NO. 1 OF

DATE 6-29-98

BY GTF CHKD RWM

BDO 9/7/98

Sht. 14

215-1 Earthwork For Drainage Channels

Drainage Excavation

Start 18+00 Cut 4783 CY

End 24+00

201-1 CLEAR & GRUB

Sta 18+00 to 24+00: 150' x 600' = 90,000 SF (2 acres)

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 15

SHEET NO. 2 OF

DATE 8-28-98

BY DES CHKD BDO 9/7/98

201-1 CLEAR & GRUB Sta 24+00 to Sta 29+00 $\boxed{A = 1.72\ Ac}$

L = 500' W = 150' A = 500 * 150 / 43560 = 1.72ac

211-2 CHANNEL EMBANKMENT FILL CONSTRUCTION
Sta 30+50 to Sta 34+00

30+50 to 31+00 =	912/2 =	456 CY
31+00 to 32+00 =		1396
32+00 to 33+00 =		1796
33+00 to 34+00 =		1535

$\boxed{5,183\ CY}$

215-1 EARTHWORK FOR DRAINAGE CHANNEL
see INROADS PRINTOUTS
Sta 25+00 to 34+00

$\boxed{17,338\ CY}$

216-2 GRADED V-DITCH

STA 25+05 Off 57.0' Rt	
STA 28+34 Off 57.0' Rt	329 LF
STA 31+52.6, Off 147.4' Rt to	
STA 31+76.5, Off 129.5' Rt to	35 LF
STA 34+00 Off 129.5' Rt	237 LF

distance measured along actual flowpath 601 LF use $\boxed{600\ LF}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 15

SHEET NO. 3 OF

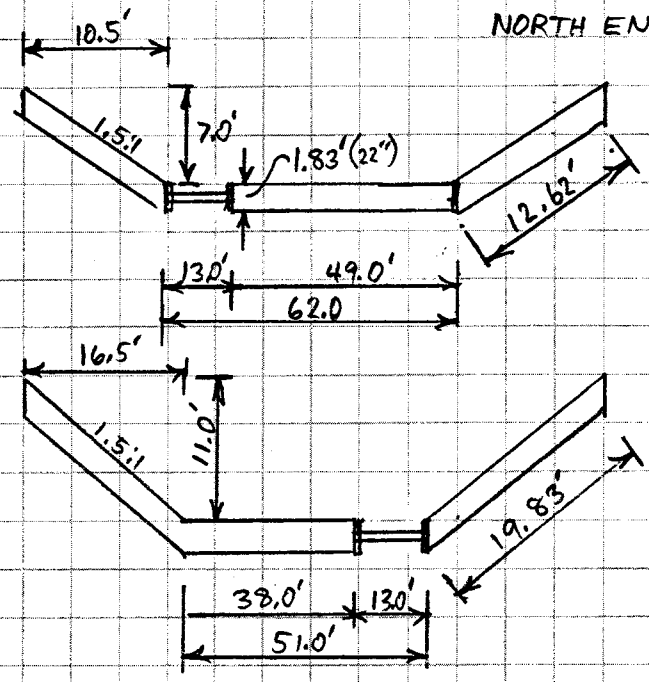
DATE 8-28-98

BY DES CHKD BDD 9/7/98

220-1 GROUTED RIPRAP (TYP SEC D2)

STA 29+01.49 to 29+95.26

NORTH END



$L = 93.77'$

$A_{NORTH} = (2 * 12.6' + 49.0') * 1.83'$
$= 135.8$ S.F.

$A_{SOUTH} = (2 * 19.8' + 38.0) * 1.83$
$= 142.0$ S.F.

$A_{AVG} = (135.8 + 142.0)/2$

$A_{AVG} = 138.9$ SF

$\forall = L * A_{AVG}/27 = 93.77' * 138.9 \text{ SF}/27$

$= 482.4$ CY

Assume that the wedge addition on approach apron offsets the wedge loss (volume) at RCBC.

Key-In For Grouted Riprap (Sec D2)
Sta 29+01.49 to Sta 29+95.26

$L = 93.8$ LF $W = 1.0'$ $H = 2.0'$

$\forall = (93.8' * 1.0' * 2.0') * 2/27 = \underline{13.9 \text{ CY}}$

Total $482.4 + 13.9 = 496.3$ $\boxed{\text{Use } 496 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 15

SHEET NO. 4 OF

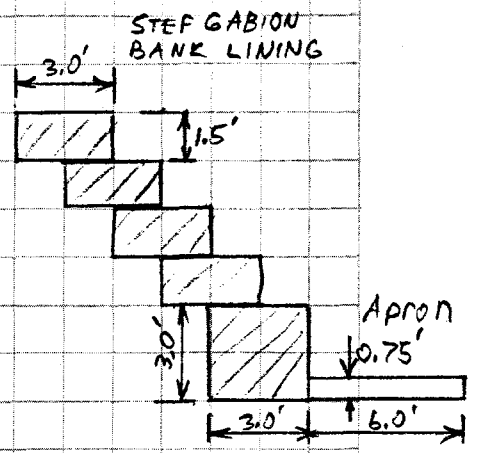
DATE 8-28-98

BY DES CHKD BDO 9/7/98

221-1 GABION BASKETS (TYP SEC A1)

STA 25+00.00 to 26+55.80 @ Lt – 156 LF

STA 25+00.00 to 28+60.56 @ Rt – 360 LF



$A = (4 * 1.5' * 3.0') + (3.0' * 3.0')$

$A = 27.0$ S.F.

LEFT BANK

$L = 156$ LF

$\forall = 156 * 27.0 / 27 = \underline{156 \text{ C.Y.}}$

NOTE Aprons tallied separately as Bid Item 221-2

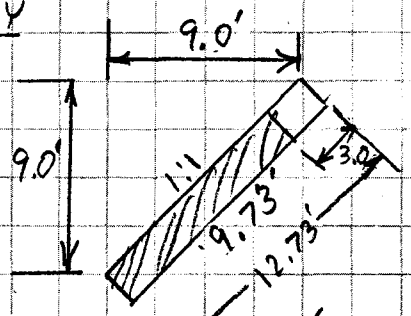
RIGHT BANK

$L = 360$ LF

$\forall = 360 * 27.0 / 27 = \underline{360 \text{ CY}}$

GABION COUNTERFORTS (Detail 5c, Sh. 53)

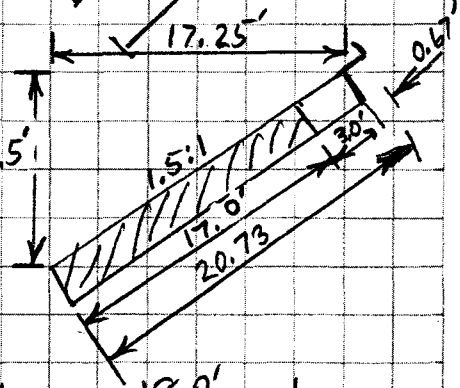
<u>@ STA 28+60 (Rt)</u>



$L = 9.7'$ $W = 3.0'$ $H = 1.5'$

$\forall = (9.7' * 3.0' * 1.5) / 27 = \underline{1.6 \text{ CY}}$

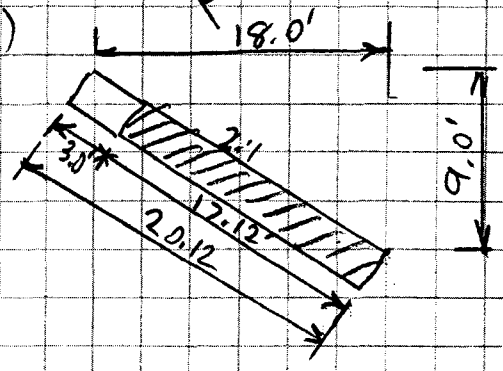
<u>@ STA 33+30± (Detail 1c, Sh 49)</u>



$L = 17.7'$ $W = 3.0'$ $H = 1.5'$ (Lt and Rt)

$\forall = (17.0' * 3.0' * 1.5') * 2 / 27 = \underline{5.7 \text{ C.Y.}}$

<u>@ Sta 26+55 & 28+60 (Lt) (Detail 5a, Sh 53)</u>



$L = 17.1'$ $W = 3.0'$ $H = 1.5'$

$\forall = 17.1 * 3.0' * 1.5' = \underline{2.9 \text{ CY}}$ (each)

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH.15

SHEET NO. 5 OF

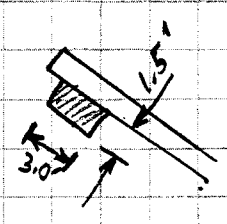
DATE 8-28-98

BY DES CHKD BDD 9/7/98

221-1 GABION BASKETS (Cntd)

Gabion Key-in

Sta 26+55 to 28+60.00 (Typ Sec R1)



L= 205' W=3.0' H=1.5'

$\forall = (205' * 3.0' * 1.5)/27 = \underline{34.2 \text{ C.Y.}}$

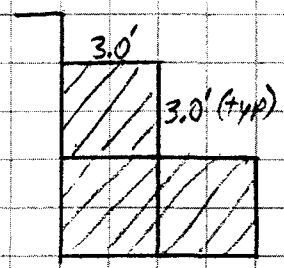
sta 33+30± to 34+00 (Lt & Rt) (Sec A2)

L= 70' W= 3.0' H= 1.5

$\forall = 70' * 3.0' * 1.5'/27 = \underline{11.7 \text{ C.Y.}}$

Gabion Erosion Apron (Sec 1a, Sh 49) Sta 33+30±

Apron Length/
Channel Width = 80' W=3.0' H=3.0', 3 each

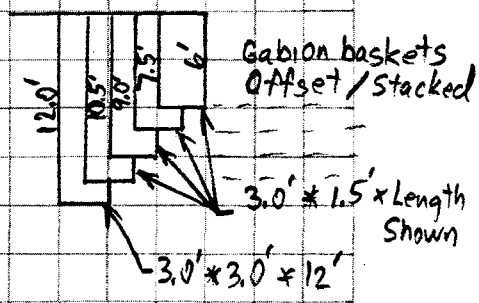


$\forall = 3 * (80' * 3.0' * 3.0')/27 = \underline{80 \text{ C.Y.}}$

Gabion Terminus (Detail 10e, Sh 58)
Sta 25+00 (Lt and Rt)

$\forall = [(3.0' * 1.5') * (6.0' + 7.5' + 9.0' + 10.5') + (3.0' * 3.0' * 12.0')] * 2/27$

$\underline{\forall = 19 \text{ CY}}$



PLAN VIEW - Detail 10e

TOTAL = 34.2 + 11.7 + 80 + 19 + 5.7 + 2.9 + 1.6 + 360 + 156 =
= 671.1

$\boxed{\forall = 671 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES Sh. 15

SHEET NO. 6 OF

DATE 8-28-98

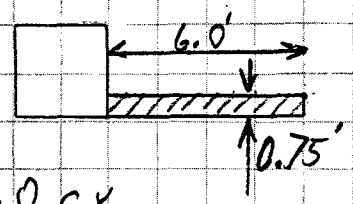
BY DES CHKD BDO 9/7/98

221-2 GABION MATTRESS

Apron for Sec A1

Sta 25+00 to 26+55 Lt

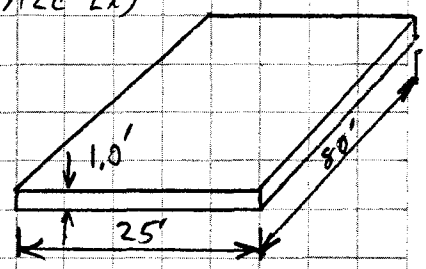
Sta 25+00 to 28+60.56 Rt



$L = (155 + 361) * 6.0' * 0.75' / 27 = \underline{86.0 \text{ c.y.}}$

Gabion Mattress Channel Bottom (Sec A1b-Rt A2c-Lt)

Sta 28+35.56 to 28+60.56



$L = 25' \quad W = 80' \quad H = 1.0'$

$\forall = (25' * 80' * 1') / 27 = \underline{74.1 \text{ c.y.}}$

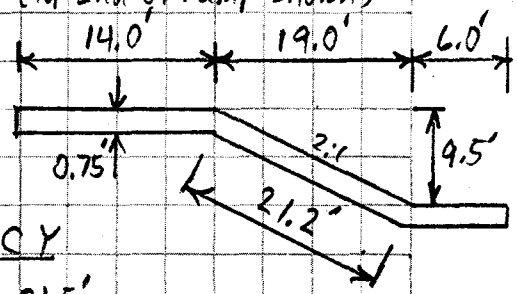
Ramp RA1 Lining (Typ Sec R1)

(Top End of Ramp Shown)

Sta 26+55 to 28+60.56

$L = 205.56'$

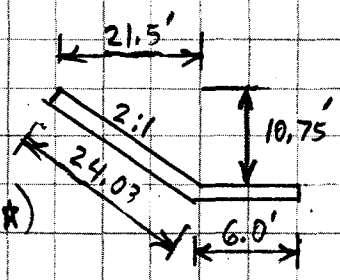
$W = 14.0' + 21.2' + 6.0' = 41.2'$ (use 42')



$\forall = 205.56 * 42' * 0.75' / 27 = \underline{239.8 \text{ CY}}$

Channel Bank Lining (Sec A2)

Sta 33+30± to 34+00 (Lt and Rt)



Note: (2:1 SS used for quantities only)

$L = 70' \quad W = 24.03' + 6.0 = 30.03$ (use 30')

$\forall = (70' * 30' * 0.75') * 2 / 27 = \underline{116.7 \text{ CY}}$

TOTAL = 86.0 + 74.1 + 239.8 + 116.7 = 516.6

$\boxed{\forall = 517 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 15

SHEET NO. 7 OF

DATE 8/28/98

BY DES CHKD BDD 9/7/98

301-1 FARM ROADS

Sta 31+29 to 34+00 @ Lt — 224

Sta 31+76 to 34+00 @ Rt — 155

185' parallel to N. BID Maint Rd. — 185

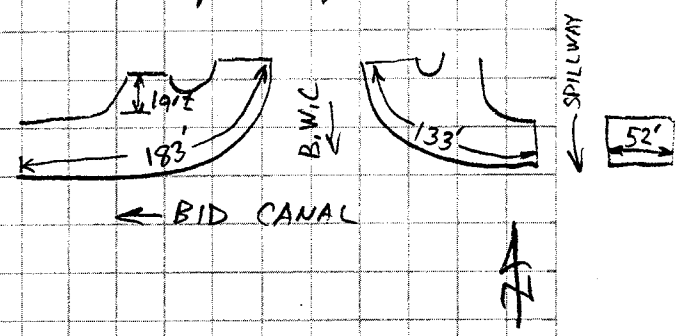
L = 271' + 224' + 185' = 680 LF

(NOTE S. BID Maintenance Road earthworks accounted for on sheet 31 qtys.)

North BID Maintenance Road (measure along S. edge)

L = 183 + 133 + 52 + 19

L = 387 LF use 390 LF



TOTAL = 680 + 390 = 1070 LF

1070 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 15

SHEET NO. 8 OF

DATE 8/31/98

BY DES CHKD BDO 9/7/98

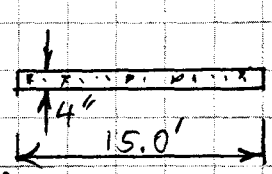
310-1 AGGREGATE BASE COURSE

O&M Roads

Sta 30+89 to 33+30± (sec B1, Lt & Rt)

Sta 33+30± to 34+00 (Sec A2, Lt & Rt)

L = (241 + 70) * 2 = 622 LF



W = 15.0' T = 0.33' density = 140 lb/cu.ft. (compacted in-place)

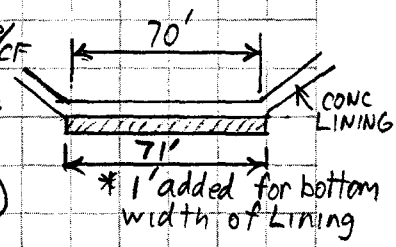
AB = 622 * 15.0' * 0.33' * 140 lb/cf. / 2000 lb/ton = 215.5 tons

AB for Channel Section B1

Sta 30+88.92 to 32+66.30 (Regular Sec B1)

L = 177.38' W = 71' T = 0.5' density = 140 lb/cf

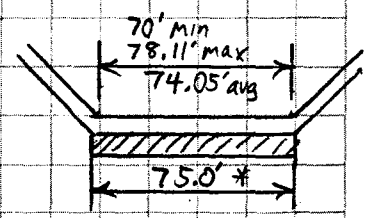
AB = 177.38 * 71' * 0.5 * 140 / 2000 = 440.8 tons



Sta 32+66.30 to 33+18± (Transition Sec B1)

L = 51.7' W = 75.0' T = 0.5'

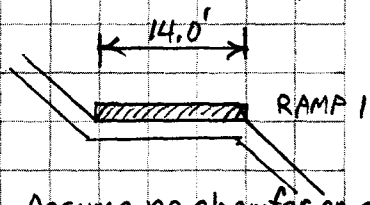
AB = 51.7' * 75.0 * 0.5' * 140 / 2000 = 135.7 tons



AB Overlay on Maintenance Ramp 1

Sta 0+00 to 1+45.27 (Ramp 1 ℄)

L = 145.27 W = 14' T = 0.33'



V = 145.27' * 14' * 0.33' = 671.1 cu.ft.

Assume no chamfer on edges for quantities only.

density = 140 lb/cu.ft * 1.10 = 154 lb/cu.ft (to account for infiltration into gabion mattresses)

AB = 671.1 * 154 / 2000 = 51.7 tons

310-1 continued
see next sheet 8a

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 15

SHEET NO. 8a OF

DATE 9-8-98

BY DES CHKD

310-1 AGGREGATE BASE COURSE (cntd)

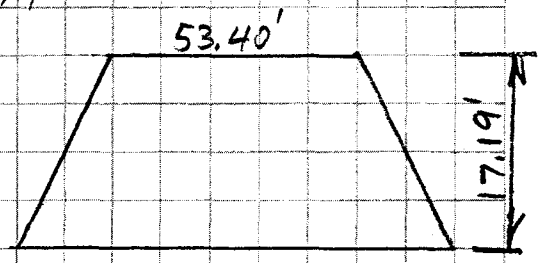
for Box Culvert
Sta 28+77.74 to 29+00.74

$L = 23.00'$ $W = (4) * 12.00' + (5) * 1.08' + (2) * 0.33' = 54.06'$

$T = 0.50'$ $\rho = 140$ lb/cF

$AB_{BC1} = 23.00' * 54.06' * 0.50' * 140/2000 = \underline{43.5 \text{ Tons}}$

under Concrete Apron, BC1
Sta 28+60.55 to 28+77.74



$L = 17.19'$

$W_1 = (2) * 6.25' + 9.94' + (3) * 10.92'$

$W_1 = 55.20'$

B = 9.94'
C = 6.25'
+(3) x 10.92'

$W_2 = (4) * 12.00' + (5) * 1.08' = 53.40'$

$W_{AVG} = (55.20' + 53.40')/2 = 54.30'$

$T = 0.50'$ $\rho = 140$ lb/cF

$AB = 17.19' * 54.30' * 0.50' * 140/2000 = \underline{32.7 \text{ Tons}}$

TOTAL AB = 215.5 + 440.8 + 135.7 + 51.7 + 43.5 + 32.7
= 919.9 Tons

$\boxed{AB = 920 \text{ Tons}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES Sh 15

SHEET NO. 9 OF

DATE 8-31-98

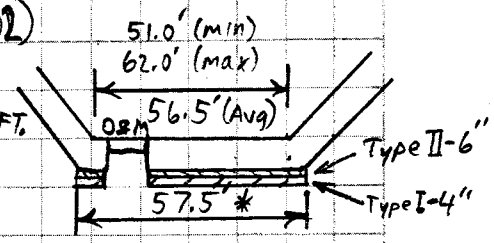
BY DES CHKD BDO 9/7/98

310-2 FILTER BLANKET (TYPE I) (Typ Sec D2)

Sta 29+01.49 to 29+95.26

NOTE O&M Path Area to Exclude = 13' * 104' = 1352 S.FT.

L = 93.8' W_{AVG} = 57.5' T = 4" = 0.33'



density = 140 lb/CF Exclude S.FT.

*1' added to account for grouting bottom width

Wt(TYPE I) = (93.8' * 57.5' - 1352 S.FT) * 0.33' * 140 lb/CF / 2000 = 93.4

= **94 tons**

310-3 FILTER BLANKET (TYPE II) (Typ Sec D2)

L = 93.8' W_{AVG} = 57.5' T = 6" = 0.5' density = 140 lb/CU.FT.

Wt(TYPE II) = (93.8 * 57.5' - 1352) * 0.50' * 140 lb/CF / 2000 = 141.5

Wt(TYPE II) = **142 tons**

~~TOTAL~~ =

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 15

SHEET NO. 10 OF

DATE 8-31-98

BY DES CHKD BDO 9/7/98

415-1 BARRICADES

Along S. BID Maint Road

L = 110 LF

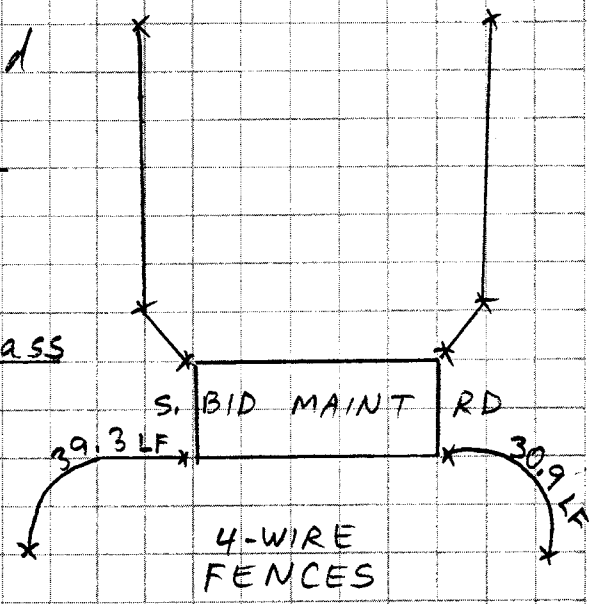
(2)*25 LF = 50 LF

Along N. BID Maint. Road

(2)*30 LF = 60 LF

421-1 WIRE FENCING

Along S. BID Maint. Rd Bypass



L = 39.3 + 30.9 LF

L = 70.2

Along Grouted Riprap

Sta 28+99.62 to 29+95.23

L = 100.4 LF (Lt) + 98.6 LF (Rt) = 199 LF

Along N. BID Maint Rd

Sta 30+80.23, Off 196.50' Lt to 44.67' Lt

Sta 30+80.23, Off 44.66' Rt to 140.00' Rt

L = 151.8 LF + 95.3 LF = 247.1 LF

TOTAL L = 70.2 + 199.0 + 247.1 = 516.3 LF ROUND TO 520 LF

502-1 DRILLED SHAFTS

BID Overchute (see p. 74)

350 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 15

SHEET NO. 11 OF

DATE 8-31-98

BY DES CHKD BDO 9/7/98

505-1 STRUCTURAL CONCRETE (CLASS A)

Concrete Box Culvert (BC1) (see B-08.20 for inlet)

		CBC 1 STRUCTURAL CONCRETE QUANTITIES					
		23	LF	UNIT CONC		UNIT STEEL	
BARREL	Lt		11.5	6.52	75.0	846	9730
INLET WINGS (Type A)			1	21.86	21.9	1680	1680
For each addtl Ft x 4				3.29	3.3	256	256
For 12' spans x 3				4.88	4.9	465	465
Extra Footing Depth				1.78	1.8	133	133
					106.8		**12264**
BARREL	Rt		11.5	6.524	75.0	846	9730
OUTLET WINGS			1	37.52	37.5	2668	2668
OUTLET APRON			1	18.48	18.5	1380	1380
					131.0		**13778**
			TOTALS		**237.853**		**26042.6**

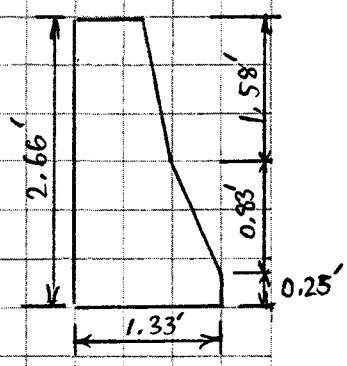
CBC Barriers Along S. BID Maint. Rd.

$L = 2 * 53\,LF = 106\,LF$

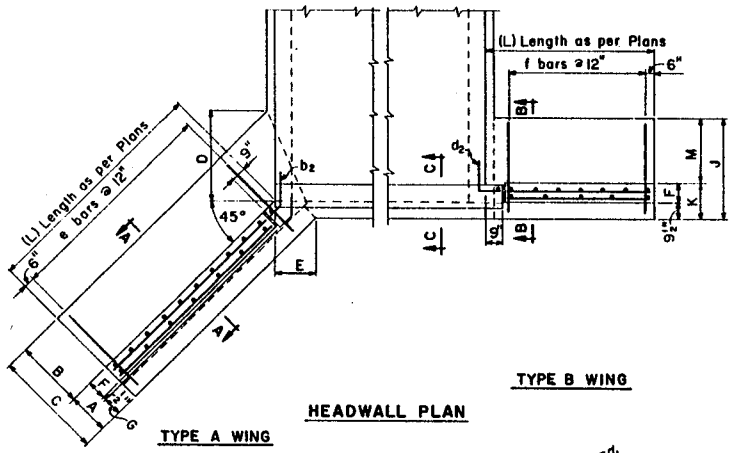
$A_{X\text{-}SEC} = 1.58 * (0.66' + 0.83')/2 + 0.83' * (0.83' + 1.33')/2 + 1.33' * 0.25'$

$= 2.40/27 = 0.089\ CY/LF$

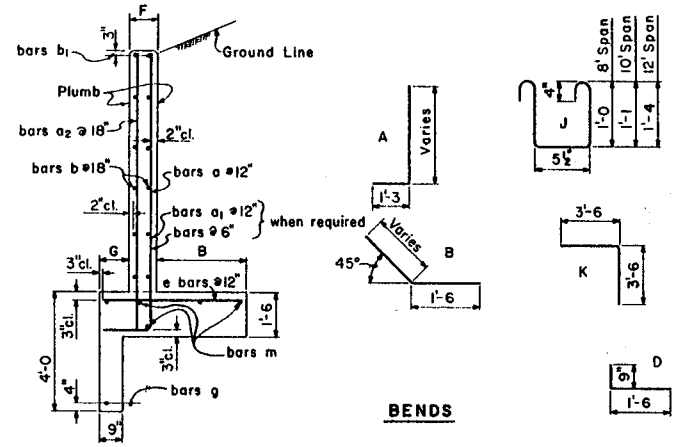
$\forall = 106\,LF * 0.089\ CY/LF = \underline{9.4\ CY}$



DESIGN	WT, DHY	8-72	NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
DRAWN	KDM, APJ	9-72	1	Wing thickness & curb height	JTW	7-76
CHECKED	NAB, APJ	5-73	2			
			3			

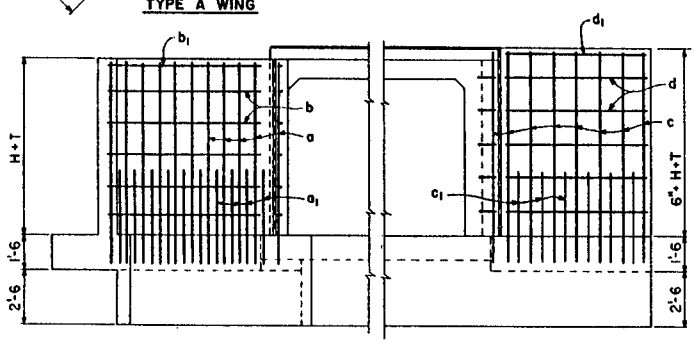


HEADWALL PLAN



SECTION A-A

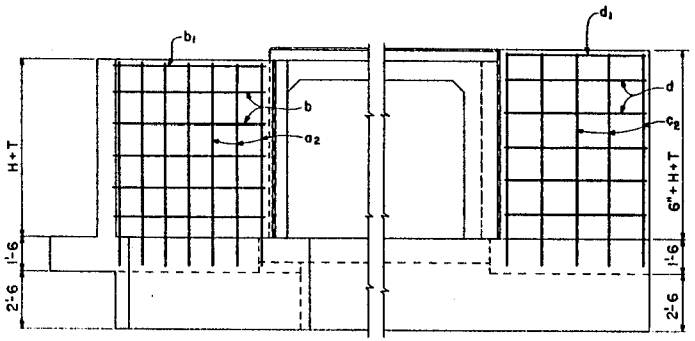
BENDS



TYPE A WING
(Back Face Reinf.)

TYPE B WING
(Back Face Reinf.)

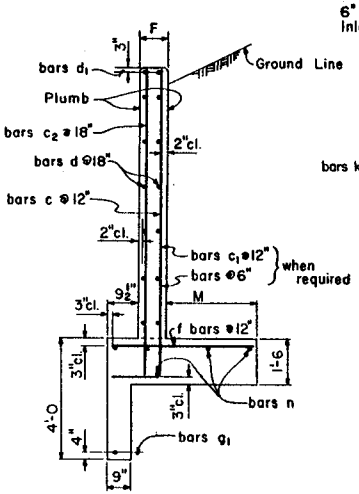
ELEVATION



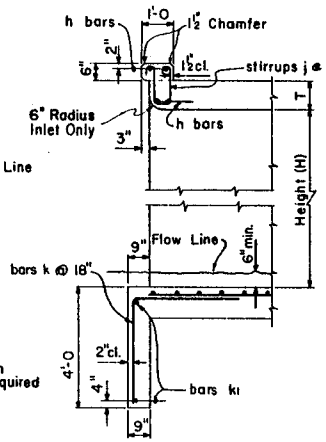
TYPE A WING
(Front Face Reinf.)

ELEVATION

TYPE B WING
(Front Face Reinf.)



SECTION B-B



SECTION C-C

WINGS STEEL LIST (L=H+2')

Mark	Bend	8' Height			9' Height			10' Height			11' Height			12' Height		
		No.	Size	Lgth.	No.	Size	Lgth.	No.	Size	Lgth.	No.	Size	Lgth.	No.	Size	Lgth.
TYPE A WING																
a	A	20	#7	11'-0	22	#8	12'-3	24	#6	13'-3	26	#7	14'-3	28	#7	15'-3
a_1	A							24	#6	6'-6	26	#7	6'-9	28	#7	7'-0
a_2	str.	14	#4	9'-9	14	#4	11'-0	16	#4	12'-0	18	#4	13'-0	18	#4	14'-0
b	⌐	20	#4	9'-0	24	#4	10'-0	28	#4	11'-0	28	#4	12'-0	32	#4	13'-0
b_1	⌐	4	#6	9'-0	4	#6	10'-0	4	#6	11'-0	4	#6	12'-0	4	#6	13'-0
b_2	B	12	#4	2'-3	14	#4	2'-3	16	#4	2'-3	16	#4	2'-3	18	#4	2'-3
e	str.	20	#5	5'-0	22	#6	5'-6	24	#7	6'-0	26	#7	6'-6	28	#8	6'-9
g	B	2	#4	12'-3	2	#4	13'-9	2	#4	14'-9	2	#4	16'-0	2	#4	17'-0
m	str.	10	#4	9'-6	10	#4	10'-6	10	#4	11'-6	10	#4	12'-6	10	#4	13'-6
TYPE B WING																
c	A	20	#7	11'-6	22	#8	12'-9	24	#6	13'-9	26	#7	14'-9	28	#7	15'-9
c_1	⌐							24	#6	6'-6	26	#7	6'-9	28	#7	7'-0
c_2	str.	14	#4	10'-3	14	#4	11'-6	16	#4	12'-6	18	#4	13'-6	18	#4	14'-6
d	⌐	24	#4	9'-0	28	#4	10'-0	28	#4	11'-0	32	#4	12'-0	36	#4	13'-0
d_1	⌐	4	#6	9'-0	4	#6	10'-0	4	#6	11'-0	4	#6	12'-0	4	#6	13'-0
d_2	D	14	#4	2'-3	16	#4	2'-3	16	#4	2'-3	18	#4	2'-3	20	#4	2'-3
f	str.	20	#5	5'-0	22	#6	5'-6	24	#7	6'-0	26	#7	6'-6	28	#9	7'-6
g_1	⌐	2	#4	11'-3	2	#4	12'-3	2	#4	13'-3	2	#4	14'-3	2	#4	15'-3
n	⌐	10	#4	9'-6	10	#4	10'-6	10	#4	11'-6	10	#4	12'-6	10	#4	13'-6

CURB & CUT-OFF WALL STEEL LIST

Mark	Bend	Size	8' Spans				10' Spans				12' Spans			
			1 Barrel		○	◇	1 Barrel		○	◇	1 Barrel		○	◇
			No.	Lgth.	No.	Lgth.	No.	Lgth.	No.	Lgth.	No.	Lgth.	No.	Lgth.
TYPE A WING														
h	str.	#6	4	9'-0		8'-9	4	11'-3		10'-10	4	13'-6		13'-0
j	J	#4	7	3'-6	5		8	3'-9	7		9	4'-3	8	
k	K	⌐	4	7'-0	6		6	7'-0	7		7	7'-0	8	
k_1	str.	⌐	2	5'-9		8'-9	2	7'-6		10'-10	2	8'-3		13'-0
TYPE B WING														
h	str.	#6	4	10'-6		8'-9	4	12'-9		10'-10	4	15'-0		13'-0
j	J	#4	7	3'-6	6		9	3'-9	7		10	4'-3	8	
k	K	⌐	7	7'-0	6		9	7'-0	7		10	7'-0	8	
k_1	str.	⌐	2	9'-6		8'-9	2	11'-6		10'-10	2	13'-6		13'-0

○ Additional number of bars per. ea. extra barrel.
◇ Additional length of bars per. ea. extra barrel.

CURB & CUT-OFF WALL QUANTITIES PER EACH ADDITIONAL BARREL

8' Spans		10' Spans		12' Spans	
Conc.	Steel	Conc.	Steel	Conc.	Steel
1.114	103	1.370	130	1.625	155

APPROXIMATE HEADWALL QUANTITIES *

Span	Height	Hdwl. Type A Wings				Hdwl. Type B Wings			
		For L=H+2'		Per each Add. Ft.		For L=H+2'		Per each Add. Ft.	
		Conc.	Steel	Conc.	Steel	Conc.	Steel	Conc.	Steel
8'	8'	15.07	1017	.682	46	15.05	1095	.703	49
10'	8'	15.44	1045	.690	46	15.41	1128	.707	49
	9'	18.30	1462	.753	61	18.18	1556	.771	63
	10'	21.49	1655	.817	64	21.20	1708	.835	65
12'	8'	15.78	1071	.696	46	15.80	1155	.714	49
	9'	18.67	1488	.759	61	18.59	1582	.777	63
	10'	21.86	1680	.822	64	21.61	1734	.840	65
	11'	25.95	2197	.663	78	25.61	2295	.922	81
	12'	30.03	2596	1.015	87	30.86	2908	1.035	98

* Includes curb and cut-off wall quantities for a single barrel.

NOTE:
See B-01.10 for general notes and miscellaneous details

DIMENSIONS

Height of Opening	A	B	C	D	E	F	G	J	K	M
8'	1'-9	3'-9	5'-6	5'-0	1'-8¾	11½	0'-9	5'-6	1'-9	3'-9
9'	2'-0	4'-0	6'-0	5'-4	2'-1	11½	1'-0	6'-0	1'-9	4'-3
10'	2'-0	4'-6	6'-6	6'-0	2'-1	11½	1'-0	6'-6	1'-9	4'-9
11'	2'-4	4'-8	7'-0	6'-3	2'-6⅜	1'-0½	1'-3	7'-0	1'-10	5'-2
12'	2'-6	4'-9	7'-3	6'-5	2'-9⅛	1'-1½	1'-4	8'-0	1'-11	6'-1

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD DRAWINGS	REVISION
APPROVED FOR DISTRIBUTION	INLET OR OUTLET LEVEL WINGS, HEIGHT 8' TO 12'	STANDARD NO. B-08.20

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES Sh 15

SHEET NO. 12 OF

DATE 8-31-98

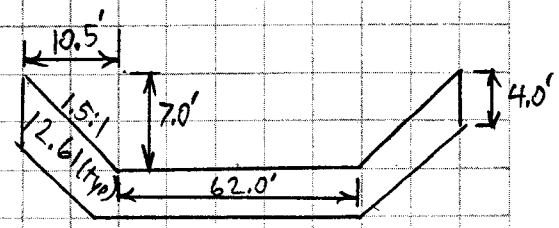
BY DES CHKD BDO 9/7/98

505-1 STRUCTURAL CONCRETE (CLASS A, cntd)

Concrete Cutoff Walls

Note: Cutoff walls for BC1 are included in ADOT Std Det quantities.

At South Approach Slab / Grouted Riprap Junction
Sta 30+02 (Detail 3a)

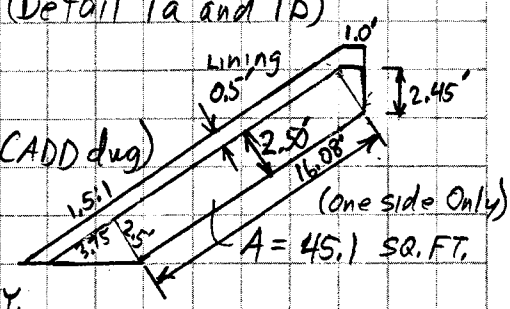


$L = (2 * 12.6') + 62.0 = 87.2$ LF
use 88 LF

$W = 1.0'$ $H = 4.0'$

$\forall_{CO\ WALL_1} = 88\ LF * 1.0' * 4.0' / 27 = \underline{13.0\ C.Y.}$

At 96" APS Encasement (Banks Only) (Detail 1a and 1b)
Sta 33+30 ±



Area = 45.1 SQ.FT. (measured in scaled CADD dwg)
THICKNESS = 1.0'

$\forall_{CO\ WALL_2} = 2 * 45.1 * 1.0' / 27 = \underline{3.4\ C.Y.}$

Bridge Overchute (Sheet 74)
Total, all but superstructure
298 CY

TOTAL STRUCTURAL CONCRETE CLASS A

$\forall = 237.9 + 9.4 + 13.0 + 3.4 = 263.7$

$\boxed{\text{USE } 264.\ C.Y.}$

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 13 OF

DATE 8-31-98

COMPUTATIONS FOR QUANTITIES
Sheet 15

BY DES CHKD BDO 9/7/98

505-2 STRUCTURAL CONCRETE (CLASS AA)
(BID Overchute; See Sheet 74)

	$\forall_{conc-AA}$
Superstructure	122 CY

$\forall_{AA}$ = 122 CY

505-3 REINFORCING STEEL

Box Culvert (see Calcs from Std Qtys) 26043

CBC Barriers 75 lb/cy * 9.07 = 680 use → 680

Cutoff Walls 75 lb/cy * (13.0 + 3.4) = 1230 → 1230

27,953

SEE SH. 74 QTYS FOR BID OVERCHUTE CONC & STEEL QTYS

TOTAL STEEL 27,953

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES
SHEET 15

SHEET NO. 14 OF

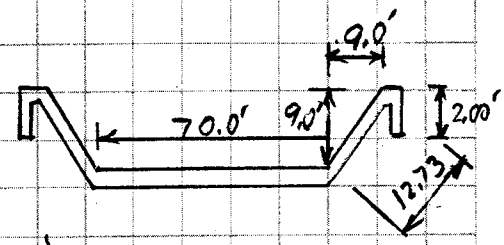
DATE 8-31-98

BY DES CHKD BDD 9/7/98

505-4 CONCRETE CHANNEL LINING
sta 30+88.94 to 32+66.00 (Typ Sec B1)

L = 177.1' W = 12.73' * 2 + 70' + (2)x2.0' = 99.5'

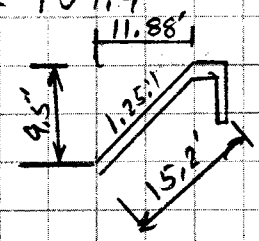
A = (177.1' * 99.5')/9 = 1,958 S.Y.



Transition Section (Sec B1 to A2)
sta 32+66.30 to 33+30± (see Exclusion)

L = 63.7' W = 15.2' *(2) + 75.0' (Avg Width) +(2)*2.0' = 109.4'

A = 63.7' * 109.4'/9 = 774 S.Y.



Maintenance Ramps 2 & 3

L = 152' (Avg) W = 16.0'

A_{RAMPS} = 2 *(152' * 16')/9 = 540 S.Y.

Area to Exclude - Over APS Pipe Encasement (BANKS REMAIN)
Sta 33+18± to 33+30± EXCLUDE CHANNEL BOTTOM

L = 12.0' W = 80.0'

A = 12' * 80'/9 = -107 S.Y

TOTAL CONCRETE CHANNEL LINING = 1958 + 774 + 540 - 107 = 3,165 SY

SVERDRUP

JOB BULLARD WASH CHANNEL

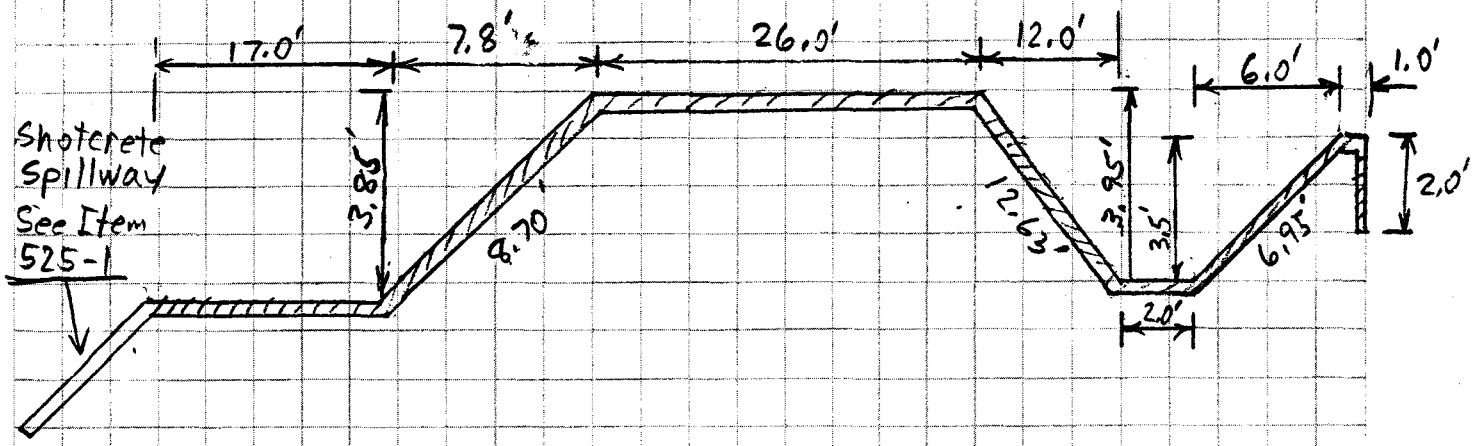
COMPUTATIONS FOR QUANTITIES SHEET 15

SHEET NO. 15 OF

DATE 8-31-98

BY DES CHKD BDO 9/7/98

505-7 SPILLWAYS (Spec. Det 104)



L = 80' (Along N. BID Maint Rd)

W = 17.0' + 8.70' + 26.0' + 12.63' + 2.0' + 6.95' + 1.0' + 2.0'

W = 76.3'

A_{SPILL} = 80' * 76.3'/9 = 678.2 S.Y.

TO ACCOUNT FOR ADDITIONAL AREA DUE TO 1.0' DIP SECTION USE A 5% AREA INCREASE

A_{SPILL} = 678.2 * 1.05 = 712.1 → USE 715 SY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES
SHEET 15

SHEET NO. 16 OF

DATE 8-31-98

BY DES CHKD BDO 9/7/98

505-8 O & M PATH (Detail 3) 12' WIDE W/VERT. CURB
Sta 29+01.49, Off 19.5' Rt to Sta 29+95.26, Off 25' ± Lt
Sta 0+00 to 1+04.10 (O&M Path ℄)

(NOTE USE SAME UNIT COST DEVELOPED FOR THE 14' WIDE O&M Path, Detail 4) L = 104 LF

505-9 INLET & OUTLET STRUCTURES (MAG Det 501-4)
Pipe 1 Inlet 1 ea

505-13 OUTLET STRUCTURE (Special Detail 10c)

Pipe 1 Outlet 1 ea

505-14 INLET & OUTLET STRUCTURES (MAG Det 501-5)
Pipe 2 Inlet 1 ea

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 15

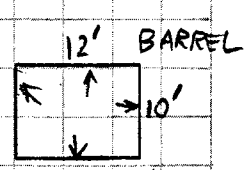
SHEET NO. 17 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

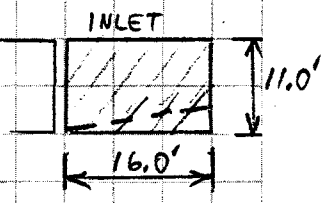
505-18 CONCRETE STAINING
Concrete Box Culvert (BC1)

(inside) Barrels $A = 23.0' * (12' + 10') * 2 * 4 = \underline{4048 \text{ S.FT}}$



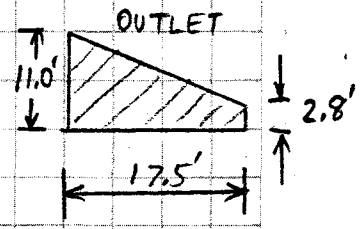
(Iside) Inlet Wingwall $A = 2 * 16.0' * 11.0' = \underline{352 \text{ S.FT}}$

(Iside) Outlet Wingwall $A = 2 * 17.5' * (11.0' + 2.8')/2 = \underline{242 \text{ S.FT.}}$



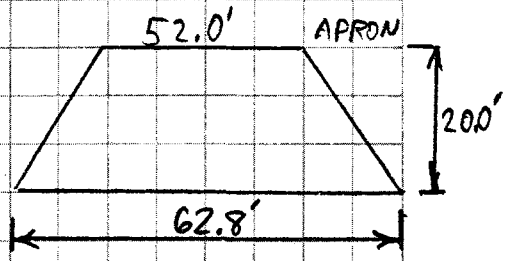
Apron $A = 20.0' * (52.0' + 62.8')/2 = \underline{1148 \text{ S.FT.}}$

Conc Barriers $A = 2 * (2 * 2.7 + 0.6) * 53.0' = \underline{636 \text{ S.FT}}$



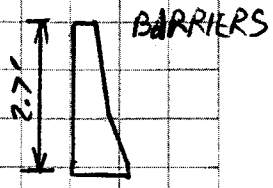
Rectangular Overchute
Sta 30+02.33 to 30+49.67
Wetted channel surface,
$L = 47.34'$ $W_{INSIDE} = 62.0' + (2) * 7.0'$

$A = \underline{3598 \text{ S.FT.}}$

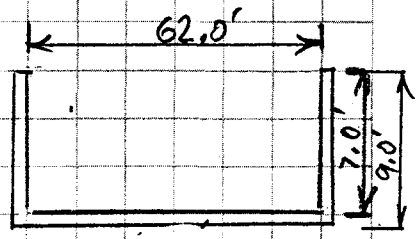


Outside
$L = 47.34'$ $H = 9.0'$ (Lt and Rt)

$A = 47.34 * 9.0' * 2 = \underline{852 \text{ S.FT.}}$

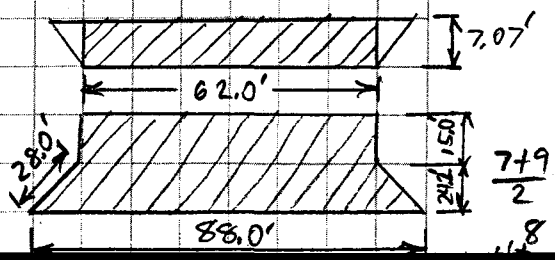


Approach Slabs
Outlet $A = 62.0' * 7.07' = \underline{438 \text{ S.FT.}}$
Inlet $A = 62.0' * 15.0' + (62' + 88')/2 * 24.2'$
$A = \underline{2745 \text{ SFT.}}$



Wingwalls and Inside Walls, Inlet App. Slab
$L = 28.0' + 15.0'$ (Lt & Rt) $H = 8.0'$

$A = (2) * 43.0' * 8.0' = \underline{688 \text{ S.FT}}$



SVERDRUP

JOB BULLARD WASH CHANNEL

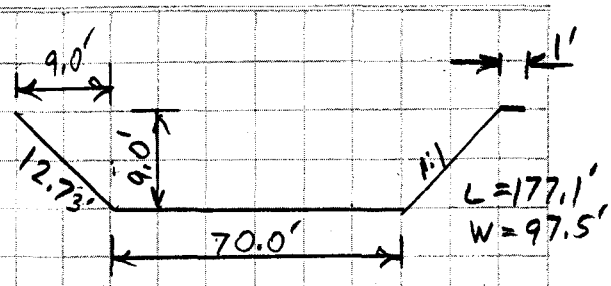
COMPUTATIONS FOR QUANTITIES SHEET 15

SHEET NO. 18 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

505-18 CONCRETE STAINING (cntd)
for Conc. Chl Lining (See Prev. Calcs)



$A_{\text{Regular Section B1}}$ = 177.1' x 97.5'

= 17,267 S.FT.

$A_{\text{TRANS Section}}$ = 63.7' * 107.4 (INCLUDES CONC. ENCASEMENT, APS PIPE)

= 6841 S.FT.

Maint Ramps 2 & 3

A = 152' * 16' * 2' = 4864 S.FT.

TOTAL = 4048 + 352 + 242 + 1148 + 636 + 3598 + 852 + 438 + 2745 + 688 + 17267 + 6841 + 4864 = 43719

43,700 SF

506-1 PRECAST CONCRETE SLABS
(BID Overchute)
See Bridge Quantities - Sheet 74 # Slabs = **16 ea**

515-1 ACCESS GATES **4 each**
Sta 31+38.75 @ Lt # Gates 2 ea
Sta 31+56.49 @ Rt # Gates 2 ea

515-4 DELINEATORS **9 each**
On N. MAINT RD. West Side - 3 ea
East Side - 6 ea

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SHEET 15

SHEET NO. 19 OF

DATE 9-1-98

BY DES CHKD ABDO 9/7/98

520-1 HANDRAILS (42")

Left Side

L = 178.9' + 85.6' + 121.3' + 67.5' + 49.1' + 14.0' = 516 LF

Right Side

L = 193.7' + 118.7' + 62.4' + 58.2' + 14.0' = 447 LF

TOTAL 963 LF

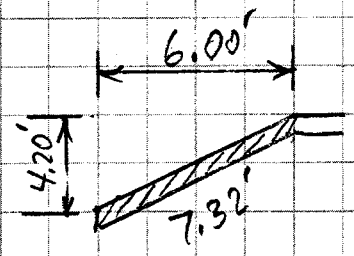
520-2 HANDRAILS (10")

Along S. BID Maintenance Road (Lt & RA)

L = 52.0' + 52.0' (see sh 57) = 104 LF

525-1 SHOTCRETE LINING SPILLWAY

Spillway for Pipe 12



L = 80.0' W = 7.32' (on slope)

A = 80.0 * 7.32/9 = 65.1 S.Y use 65 S.Y

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 20 OF

DATE 9-1-98

COMPUTATIONS FOR QUANTITIES SHEET 15

BY DES CHKD BDO 9/7/98

618-1 24" DIP
Pipe 2, L = 112 LF.

618-4 24" RGRCP
Pipe 12 L = 135 LF
L = 45' * (3) = 135 LF

618-6 36" RGRCP
Pipe 1 L = 24 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SHEET 16

SHEET NO. 21 OF

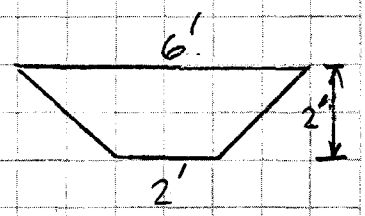
DATE 9-1-98

BY DES CHKD BDO 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION

USE AVERAGE DITCH CONFIGURATION SHOWN

$A_{AVG} = (6+2)/2 * 2' = 8$ SQ. FT.



Fill From West TCE @ 180' Lt to 40' Lt
L = 140'

And From 40' Rt to 175' Rt
L = 135'

$\forall = (140' + 135') * 8$ S.F. $/27 = 81.5$ C.Y. USE $\boxed{82 \text{ CY}}$

211-2 CHANNEL EMBANKMENT FILL CONSTRUCTION

$\boxed{\text{FILL} = 13232 \text{ CY}}$

215-1 EARTHWORK FOR DRAINAGE CHANNEL

$\boxed{\text{CUT} = 16{,}264 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 16

SHEET NO. 22 OF

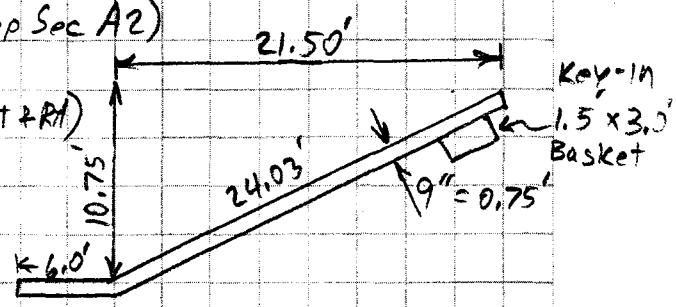
DATE 9-1-98

BY DES CHKD BDO 9/7/98

216-2 GRADED V-DITCH
Sta 34+00 to 36+36
Sta 37+01 to 44+00

L = 236 + 699 = 935 LF use L = **935 LF**

221-1 GABION BASKETS (Typ Sec A2)
Key-In Top of Bank
Sta 34+00 to 44+00 (LT & RT)



UNIT QUANTITY (for each Bank)

UNIT QTY $v = A = 1.5' * 3.0'/27 = 0.167$ CY/LF

$V = (2) * 1000' * 0.167 =$ **334 CY**

221-2 GABION MATTRESS (Typ Sec A2) see drawing above

W = 6.0' + 24.03' = 30.03' use 30' (Rounded to nearest even increment of 3')

UNIT QTY $v = A = 30.0' * 0.75'/27 = 0.833$ CY/LF

$V = (2) * 1000' * 0.833 =$ **1,667.0 CY**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 16

SHEET NO. 23 OF

DATE 9-1-98

BY DES CHKD BDJ 9/7/98

301-1 FARM ROADS & BID CANAL ROADS
Sta 34+00 to 44+00 (Lt and Rt)

L = (2) * 1000' + 50' * (2) L = 2100 LF

310-1 AGGREGATE BASE COURSE
Sta 34+00 to 44+00 (Typ Sec A2)
O&M Roads

UNIT TONS

Unit Tons per LF W = 15.0' T = 0.33' Density = 140 lb/CF

$\mathcal{W}$ = 15.0' * 0.33' * 140/2000 = 0.3497 TON/LF use 0.350 TON/LF

Sta 34+00 to 44+00 (Lt & Rt)
L = (2) * 1000' = 2000 LF

$\forall$ = 2000 * 0.350 = 700 TONS

350-1 REMOVE CONCRETE LINED DITCH
Siphon 3, Sta 36+50
Off 180' Lt to 169.70' Rt

L = 180.0' + 169.70 = 349.7 use L = 350 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 16

SHEET NO. 24 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

505-11 INLET & OUTLET STRUCTURES (MAG Det 501-1) No. Inlets 2 ea

Pipe 3, Sta 36+36 to 36+94

520-1 HANDRAIL (42")
sta 34+00 to 44+00

L = 2 * 1000' L = 2000 LF

618-2 30" DIP
Siphon 1, Sta 36+50 L = 271 LF

618-4 24" RGRCP L = 65 LF
Pipe 3, Sta 36+36.51 to 36+94.21

625-2 IRRIGATION SIPHON MANHOLE
Siphon 1, Sta 36+50 #MH = 2 ea

632-2 STEEL PIPE SLEEVE
sta 37+00 ±, 110' Lt to 110' Rt L = 220 LF

635-1 CONCRETE LINED DITCH
for Siphon 1, 36 LF Lt & 26 LF Rt

L = 36' + 26' = 62 LF L = 62 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 17

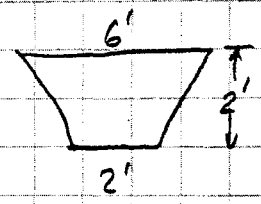
SHEET NO. 25 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION for Siphon 2

USE A_{AVG} = 8 SQ.FT



For Ditch From 170'Lt to 40'Lt L= 130 LF
and Ditch From 40'Rt to 170'Rt L= 130 LF

$\forall = (130+130) * 8.0 / 27 = 77.0$ C.Y.

use $\forall =$ 77 CY

211-2 CHANNEL EMBANKMENT FILL CONSTRUCTION for Typ Sec A2, Sta 44+00 to 54+00 (Lt & Rt)

FILL = 10,658 CY

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 19,143 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 26 OF

DATE 9-1-98

COMPUTATIONS FOR QUANTITIES SH 17

BY DES CHKD BDO 9/7/98

216-2 GRADED V-DITCH
Sta 44+00 to 49+60 (RA) L = 560 LF

221-1 GABION BASKETS
Key-in for Typ Sec A2
Sta 44+00 to 54+00 (Lt & Rt)

L = (2) * 1000' = 2000 LF

UNIT VOLUME $\mathcal{V}$ = 0.167 CY/LF (FROM SH. 16 QTYS)

$\forall$ = 2000 LF * 0.167 = 334 CY $\forall$ = 334 CY

221-2 GABION MATTRESS (Typ Sec A2)
Sta 44+00 to 54+00 (Lt & Rt)

L = (2) * 1000' = 2000 LF

UNIT VOLUME $\mathcal{V}$ = 0.833 CY/LF

$\forall$ = 2000 * 0.833 = 1667 CY $\forall$ = 1,667 CY

301-1 FARM ROADS & BID CANAL RDS
Sta 44+00 to 54+00 (Lt & Rt)

L = (2) * 1000' + (2)(50)' = 2100' L = 2,100 LF

310-1 AGGREGATE BASE COURSE
Sta 44+00 to 54+00 (Lt & Rt)
L = (2) * 1000 LF = 2000 LF
UNIT TONS w = 0.350 TON/LF (FROM SH. 16 QTYS)
$\forall$ = 2000 * 0.350 = 700 TONS AB = 700 TONS

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 17

SHEET NO. 27 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

350-1 REMOVE CONCRETE LINED DITCH
for Siphon 2, Sta 49+76 ±
Off 170' Lt to 170.0' Rt
L = 170 + 170 = 340 LF

L = 340 LF

505-11 INLET & OUTLET STRUCTURES (MAG Det 501-1)
Pipe 4 Outlet, Sta 49+60.49

#OUTLETS 1 ea

505-14 INLET & OUTLET STRUCTURES (MAG Det 501-5)
Pipe 4 Inlet, Sta 50+26.94

INLETS 1 ea

520-1 HANDRAIL (42") sta 44+00 to 54+00
(2) * 1000'

L = 2,000 LF

618-2 30" DIP (Siphon 2)

L = 272 LF

618-4 24" RGRCP (Pipe 4)

L = 67 LF

625-2 IRRIGATION SIPHON MANHOLE
for Siphon 2

MH = 2 ea

632-2 STEEL PIPE SLEEVE
Sta 50+25 ±, Off 110' Lt to 110' Rt

L = 220 LF

635-1 CONCRETE LINED DITCH
for Siphon 2, Sta 49+76 ±

L = 39 LF (@ Lt) + 27 LF (@ Rt) = 66 LF

L = 66 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

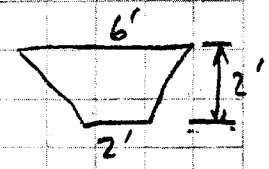
COMPUTATIONS FOR QUANTITIES SH. 18

SHEET NO. 28 OF

DATE 9-1-98

BY DES CHKD SDO 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION for Siphon 3



USE A_{AVG} = 8 SQ. FT.

For Ditch From 249' Lt to 92' Lt L = 157'

and From 92' Rt to 250' Rt L = 158'

use ∀ = 93 CY

∀ = (157 + 158) * 8 / 27 = 93.3 CY

211-2 CHANNEL EMBANKMENT FILL CONSTRUCTION Sta 54+00 to Sta 63+00

FILL = 5,936 CY

∀ = 5992 − 56 = 5936

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 23,895 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 18

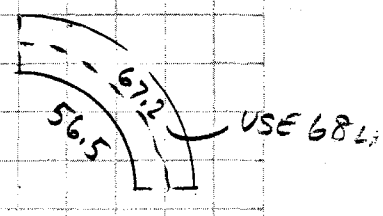
SHEET NO. 29 OF

DATE 9-1-98

BY DES CHKD SDO 9/2/98

221-1 GABION BASKETS
for Key-In of Gabion Bank Lining
Typ Sec A2 & A3
Sta 54+00 to 60+26 (Lt)
Sta 54+00 to 62+26± (Rt)
Sta 60+26 to 62+26± (Typ Sec R3, Lt)
4 Bank Curved Sections @ Broadway

$L = 626' + 826' + 200' + (4) * 56.5'$



$L = 1878$ LF

UNIT VOLUME $v = 0.167$ CY/LF

$V = 1878 * 0.167 = 313.6$ CY use $V = \boxed{314 \text{ CY}}$

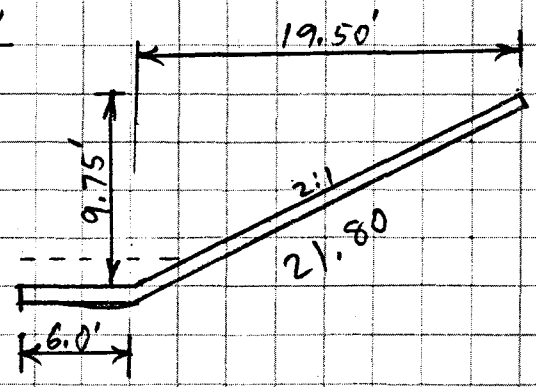
221-2 GABION MATTRESS
for Typ Sec A2
Sta 54+00 to 59+00 (Includes Transition)

$L = 500' * 2 = 1000$ LF

UNIT VOLUME $v = 0.833$ CY/LF

$V = 1000 * 0.833 = \underline{833 \text{ CY}}$

For Typ Sec A3



$W = 6.0' + 21.8' = 27.8'$ (USE THIS)

$T = 0.75'$

UNIT VOLUME $v = 27.8' * 0.75' / 27 = \underline{0.772}$ CY/LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 18

SHEET NO. 30 OF

DATE 9-1-98

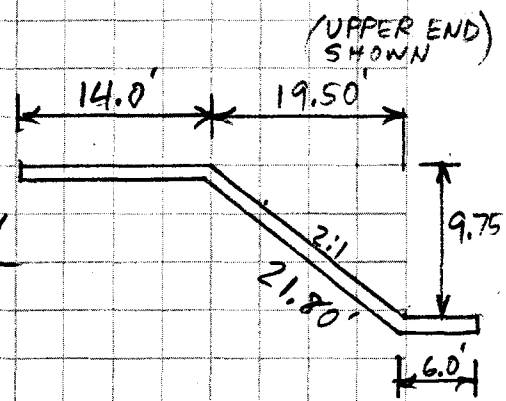
BY DES CHKD BDO 9/7/98

221-2 GABION MATTRESS
Typ Sec A3 (cntd)
Sta 59+00 to 60+26 (LT)
Sta 59+00 to 62+26 (RT)
4 Curved Sections @ 68 LF each

L = 126 + 326 + (4) * 68 = 724 LF

∀ = 724 * 0.772 (UNIT VOL) = 558.9 CY

For Maintenance Ramp 4 & 5
Sta 60+26 to 62+26
Sta 64+02 to 66+10 (see sheet 19)



W = 14.0' + 21.8' + 6.0' = 41.8' use 42.0'

T = 9" = 0.75'

RAMP 4 & 5 UNIT VOL

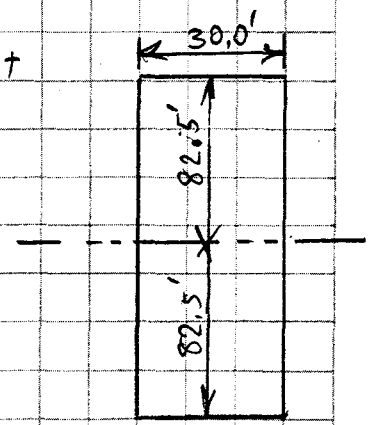
v = 42.0' * 0.75'/27 = 1.167 CY/LF

Ramp 4

L = 200 LF (Includes Transition Wedge @ 60+26)

∀ = 200 * 1.167 CY/LF = 233.4 CY

Gabion Mattress Channel Bottom
Sta 62+71 to 63+01; Off 82.5' Lt to 82.5' Rt



L = 30.0' W = 165' T = 1.0'
∀ = 30' * 165'/27
∀ = 183.3 CY

GABION MATTRESS TOTAL =
833 + 558.9 + 233.4 + 183.3 = 1808.6

USE 1810 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES
SH. 18

SHEET NO. 31 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

301-1 FARM ROADS & BID CANAL RDS
Sta 54+00 to 62+26 (Lt & Rt)

L = (2) * 826' = 1652 LF

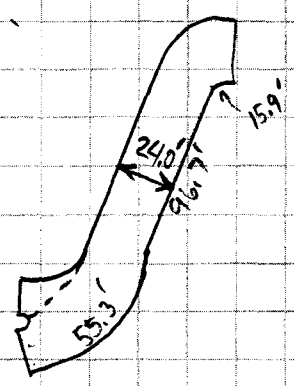
L = 1652 LF

310-1 AGGREGATE BASE COURSE
O&M Rd Sta 54+00 To 62+26 (Lt & Rt)
density = 140 lb/cu.ft.

L = (2) * 826 = 1652 LF W = 15.0' T = 0.33'

$AB_{O\&M}$ = 1652' * 15.0' * 0.33' * 140/2000

$AB_{O\&M}$ = 572.4 TONS



O&M Access Roads

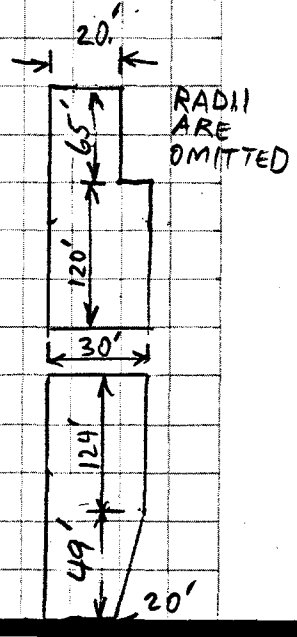
see dwg above

L_{AVG} = 55.3' + 96.7' + 15.9' = 167.9 use 170 LF each

W = 24.0' T = 0.33' density = 140 lb/cu.ft.

$AB_{O\&M\ ACCESS}$ = (4) * 170' * 24.0' * 0.33' * 140/2000 = 377.0 TONS

Broadway Road, AB Paved Section



A = (65' * 20') + (120' * 30') + (124' * 30') + (49' * (20+30)/2)
A = 9,845 S.FT

T = 0.50' density = 140 lb/cf

AB_{Brdwy} = 9845 S.F * 0.50' * 140/2000 = 345 TONS

SVERDRUP

JOB BULLARD WASH CHANNEL

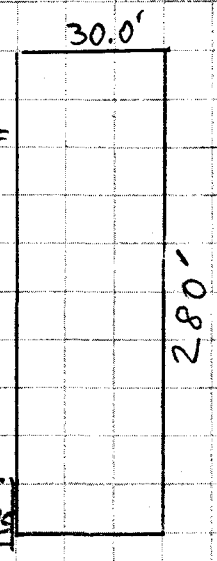
COMPUTATIONS FOR QUANTITIES SH. 18

SHEET NO. 32 OF

DATE 9-1-98

BY DES CHKD BDD 9/7/98

310-1 AGGREGATE BASE COURSE (cntd)
Broadway Rd, AB under Dip Crossing



L = 280.0' W = 30.0' T = 0.5' density = 140 #/CF

AB = 280.0 * 30.0' * 0.5' * 140 / 2000

AB = 294.0 TONS (Use to develop unit cost for B.I. 505-5)

N.P.I. see 505-5

TOTAL AB = 572.4 + 377.0 + 345.0 = 1297 TONS

350-1 REMOVE CONCRETE LINED DITCH
for Siphon 3 Sta 62+45±, Off 248.5' Lt to 249.5' Rt

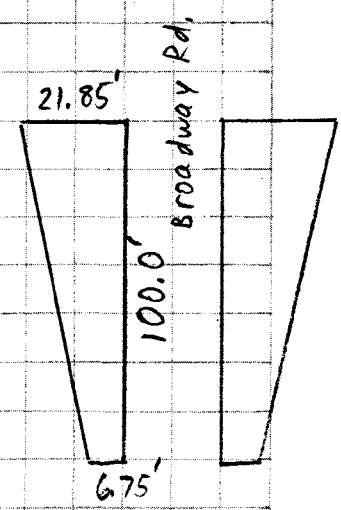
L = 248.5 + 249.5' = 498 LF

for CLD @ Sta 63+33±, Off 245'± Lt

L = 20 LF

TOTAL = 498 + 20 = 518 LF

432-1 GRAVEL MULCH
for Broadway Road Sideslopes (4 each)



L_{AVG} = 100.0' W_{AVG} = (6.75' + 21.85')/2

W_{AVG} = 14.3'

A = (4) 100.0' * 14.3'/9 = 635 S.Y.

SVERDRUP

JOB Bullard Wash Channel

COMPUTATIONS FOR Quantities SH. 18

SHEET NO. 33 OF

DATE 6-30-98

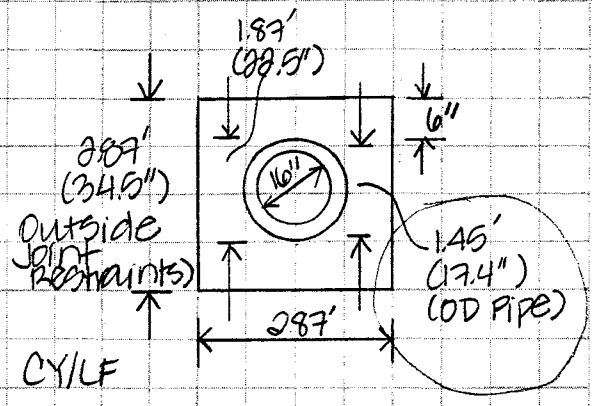
BY GTF CHKD RWM 3DO 9/7/98

SHT 18

505-1 Structural Concrete (Class A)

Sanitary Sewer Encasement Sta 41+75 to 43+15

L = 140 LF



$A_{conc} = 2.87' \times 2.87' = 8.24$ SF

$A_{pipe\ OD} = \pi \times (\frac{1.45}{2})^2 = 1.65$ SF (Subtract)

$V_{conc\ Encasement} = (8.24 - 1.65)/27 = 0.244$ CY/LF

$V_{conc\ Encasement} = 140 \times 0.244 = \boxed{34.2\ CY}$

(Concrete Ford Crossing
30' * 280' * 0.67 / 27 = 208.4 CY use for unit cost of 505-5)

Cutoff walls @ 63+02± & 63+32±

L = 280' x 2 = 560' D = 4.00' T = 1.00'

$V_{cutoff\ conc} = 560 \times 4.0' \times 1.00'/27 = 83.0$ CY (use for unit cost of 505-5)

TOTAL STRUCTURAL CONCRETE (CLASS A) $\boxed{34\ CY}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 18

SHEET NO. 34 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

505-3 STEEL REINFORCEMENT for Structural Concrete

$Wt_{STEEL} = \forall_{conc} * 75$ lb/cy

$= 34$ cy $* 75$ lb/cy $=$ **2,550 lb**

(☆ for use in 505-5 → (208.4 + 83) * 75 = 21,855 lb (use for 505-5 unit cost))

505-5 BROADWAY ROAD DIP CROSSING (Typ Sec E1 & E2)
Sta 63+02.08 to 63+32.08, Off=140' Lt to 140' Rt

L = 280' W = 30.0'

A = 280' * 30.0'/9 = **934 S.Y.**

21,855 lb Steel Reinf
291.4 cy Str. Conc (Class A)
294 Tons AB

515-1 ACCESS GATES
Sta 62+26± (2 ea @ Lt) & (1 ea @ Rt) #GATES **3 ea**

515-2 SAFETY POSTS
Sta 62+52 - 13 ea
Sta 63+90 - 13 ea #POSTS **26 each**

515-3 REMOVEABLE SAFETY POSTS
Sta 62+52 - 1 ea
Sta 63+90 - 1 ea #POSTS **2 each**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 18

SHEET NO. 35 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

520-1 HANDRAIL (42")

sta 54+00 to 62+28.57 (Rt) L = 823.6'

Sta 54+00 to 60+24.31 (Lt) L = 624.3'

Sta 60+24.3 to 62+24.3 (Bends, Lt) L = 200.0'

Sta 60+76.2 to 62+29.6 (Lt) L = 154.5'

Along Broadway & Curves

SW Cor → L = 55.7' + 96.7' = 152.4'

NW Cor L = 98.1' + 55.6' = 153.7' (Ends at 64+02.3)

NE Cor L = 62.2' + 94.6' = 156.8' (Ends at 64+09.0)

SE Cor L = 62.9' + 93.6' = 156.5'

TOTAL 2421.8 LF use **2422 LF**

615-1 SANITARY SEWER LINE INSTALLATION

sta 40+20 to 44+60 (Broadway Rd ℄)

$L_{NEW\ PIPE}$ = **440 LF**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 18

SHEET NO. 36 OF

DATE 9-1-98

BY DES CHKD BDO 9/7/98

618-2 30" DIP
Siphon 3, Sta 62+45±
Off = 144.83' Lt to 138.72' Rt

L = 144.83' + 138.72' = 283.5 L = 284 LF

625-1 ADJUST SANITARY SEWER MANHOLE

#MH 2 each

625-2 IRRIGATION SIPHON MANHOLE
Siphon 3, Sta 62+45±

MH 2 each

635-1 CONCRETE LINED DITCH (Detail S3, Typ Sec F5)
for Siphon 3

L = 112.4' (@Lt) + 119.7' (@Rt) = 232.1 L = 232 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 19

SHEET NO. 37 OF

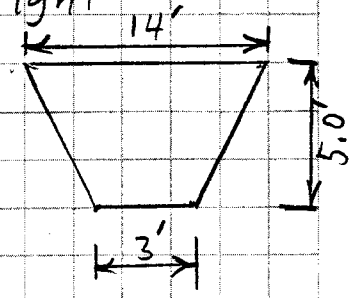
DATE 9-1-98

BY DES CHKD BDD 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION

Ditch: @ Sta 71+80, Off=190'± Rt
to Sta 73+30, Off=220' Rt

Use typical ditch dimensions shown at right

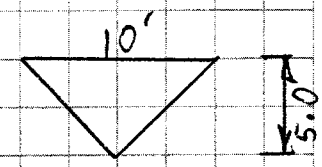


$A_{AVG} = [(14' + 3')/2 * 5.0] = 42.5$

L = 170 LF

$\forall = 170' * 42.5/27 = 267.6$ C.Y. use 270 CY

For the Ditch @ Sta 71+65, Off 155' Rt
to Sta 72+60, Off 210' Rt



A = 10' * 5'/2 = 25 S.FT.

L = 120 LF

$\forall = 120' * 25$ S.FT/27 = 110 C.Y.

TOTAL = 270 + 110 = 380 CY

211-2 CHANNEL EMBANKMENT FILL CONSTRUCTION

FILL = 1868 CY

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 28,704 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 19

SHEET NO. 38 OF

DATE 9-2-98

BY DES CHKD BDO 9/7/98

216-2 DIRT IRRIGATION DITCH (Typ Sec F4)
Sta 70+72, Off=99.0' Lt to Sta 71+57, Off=99.0' Lt

L=(71+57)-(70+72) = 85 LF L = 85 LF

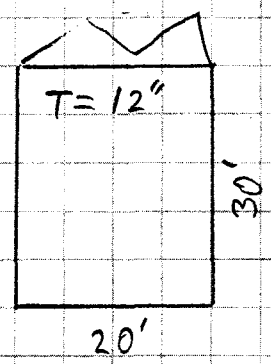
220-2 DUMPED RIPRAP
Along MC 85 Fill slopes @ ~73+00 (Lt & Rt)

L = 60 LF (@ Lt) + 40 LF (@ Rt) = 100' W = 5.0' T = 1.0'

∀ = 100 * 5 * 1/27 = 18.5 CY

For Siphon 4 Sta 70+55± @ Outlet

A = 20' * 30' + (5' * 20') = 700 S.FT.



∀ = 700 * 1.0/27 = 25.9 CY

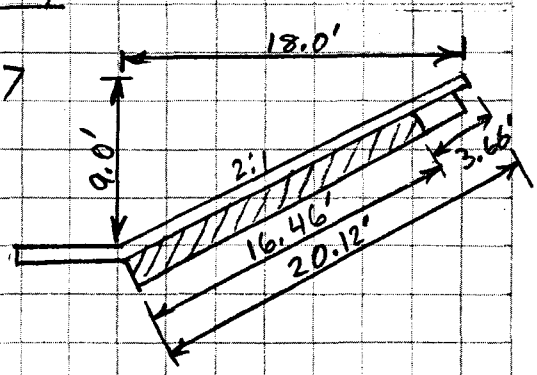
TOTAL ∀ = 18.5 + 25.9 = 44.4 use 45 CY

221-1 GABION BASKETS
for Key-in of Typ Sec A3 & R3
Sta 64+00 to 72+47 (Lt and Rt)

L = (2) * 847' = 1694' W = 3.0' T = 1.5'

∀ = 1694' * 3.0' * 1.5'/27 = 282.3 CY

For Counterforts @ Sta 72+47
(Lt & Rt Banks)



L = (2) * 16.46' W = 3.0' T = 1.5'

= 32.92' use 33 LF

∀ = 33' * 3' * 1.5'/27 = 5.5 CY

TOTAL = 282.3 + 5.5 = 287.8 ∀ = 288 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 19

SHEET NO. 39 OF

DATE 9-2-98

BY DES CHKD BDO 9/7/98

221-2 GABION MATTRESS
for Ramp 5 (Typ Sec R3)
Sta 64+11.83 to 66+08.03 (Lt)

L = 196.2 LF ν = 1.167 CY/LF (see SH. 18 QTYS)

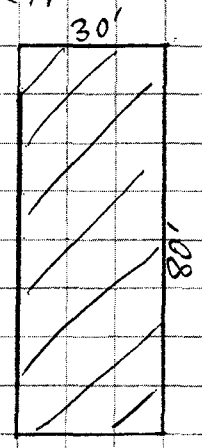
$\forall$ = 196.2 * 1.167 = 229.0 CY

For Typ Sec A3
Sta 66+08.03 to 72+47 (Lt)
Sta 64+07.35 to 72+47 (Rt)

L = 638.97' + 839.6 = 1479 LF ν = 0.772 CY/LF (SEE SH. 18 QTYS)

$\forall$ = 1479' * 0.772 CY/LF = 1141.8 CY

For Gabion Mattress Channel Bottom (Typ Sec A1b)
Sta 72+17 to 72+47



L = 30.0' W = 80.0' T = 1.0'

$\forall$ = 30.0' * 80.0' * 1.0'/27 = 88.9 CY

TOTAL GABION MATTRESS = 229.0 + 1141.8 + 88.9 = 1459.7

$\boxed{\forall = 1460 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 19

SHEET NO. 40 OF

DATE 9-2-98

BY DES CHKD BDO 9/7/98

301-1 FARM ROADS

Sta 64+07.35 to 69+45.23 (Lt)

Sta 64+07.35 to 70+53.05 (Rt)

Curved Section @ Lt & Rt

$L = 537.9' + 645.7' + 88' + 56' = 1327.6'$ $L = \boxed{1330\ LF}$

310-1 AGGREGATE BASE COURSE

O&M RDS; Sta 64+07.35 to 71+32.9 (Lt)

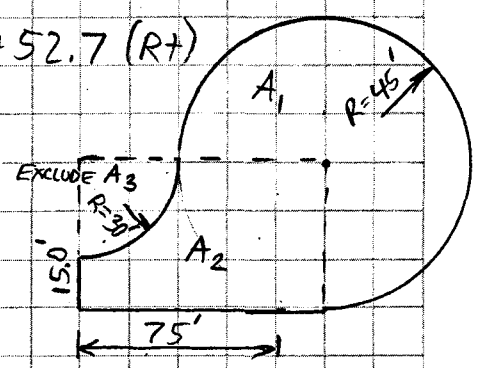
and Sta 64+07.35 to 71+52.7 (Rt)

$L = 725.6' + 745.4' = 1471'$ $W = 15.0'$ $T = 0.33'$ $\rho = 140\#/CF$

$AB = 1471 * 15.0' * 0.33' * 140\ lb/CF / 2000 = 509.7$ use 510 tons

For Cul-de-sacs

Sta 71+32.9 (Lt) and Sta 71+52.7 (Rt)



$A_1 = \pi * 45^2 (3/4) = 4771.3$ S.FT.

$A_2 = 75' * 45' = 3375$ S.FT

$A_3 = \pi * 30^2 * (1/4) = 706.9$ S.FT

$A = A_1 + A_2 - A_3 = 4771.3 + 3375 - 706.9$

$A = 7439.4$ S.FT $T = 0.33'$ $\rho = 140\ lb/CF$

$AB_{CUL\ LT} = 7439.4 * 0.33' * 140/2000 = 171.9$ TONS $\times 2 \rightarrow AB = 343.8$ TON

Under Concrete Channel Lining Sta 72+47 to 74+00

$L = 153'$ $W = 81'$ $T = 0.50'$ $\rightarrow AB = 153 * 81 * 0.50 * 140/2000$

$AB = 433.8$ TONS

AB TOTAL $= 510.0 + 343.8 + 433.8 = 1287.6$ use $\boxed{1288\ TONS}$

SVERDRUP

JOB BULLARD WASH CHANNEL

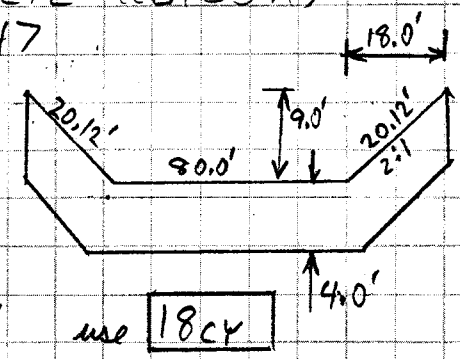
COMPUTATIONS FOR QUANTITIES SH. 19

SHEET NO. 41 OF

DATE 9-2-98

BY DES CHKD BRO 9/7/98

505-1 STRUCTURAL CONCRETE (CLASS A)
Cutoff Wall @ Sta 72+47



$L = (2) * 20.12' + 80.00' = 120.24'$

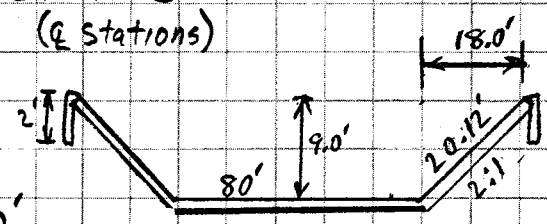
$W = 1.0'$ $H = 4.0'$

$V = 120.24' * 4.0' * 1.0'/27 = 17.8$ C.Y. use $\boxed{18 \text{ CY}}$

505-3 STEEL REINFORCEMENT
for Cutoff Wall, Sta 72+47

lb STEEL = 75 lb/CY * 18 CY = $\boxed{1{,}350 \text{ lb}}$

505-4 CONCRETE CHANNEL LINING
Transition: Sta 72+47 to 72+99.20± (℄ stations)

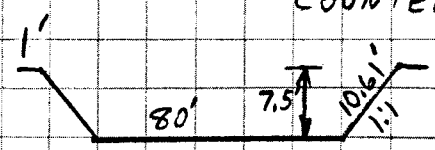


$L = 52.2'$

$W = (2) * 20.12' + (2) * 2.0' + 80.0' = 124.20'$

$A_{TRANS} = 52.2' * 124.20'/9 = \underline{720.4 \text{ S.Y.}}$

for Section J1a Under MC 85 Bridge
Sta 72+99.2± to 74+15.3± (℄ stations) 15' OF SH 20 LINING COUNTED HERE



$L = 116.1'$

$W = (2) * 1' + (2) * 10.61' + 80 = 103.2'$

$A = 116.1' * 103.2/9 = \underline{1331.5 \text{ S.Y}}$

TOTAL CONC LINING 720.4 + 1331.5 SY $\boxed{2052 \text{ SY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 19

SHEET NO. 42 OF

DATE 9-2-98

BY DES CHKD SDO 9/7/98

505-9 INLET & OUTLET STRUCTURE (MAG DET 501-4)

Pipe 5 Outlet @ Sta 71+57.5, Off=99.0' Lt

Pipe 5 Inlet @ Sta 74+23.24, Off=99.0' Lt

(Located on SH 20, called out here) **2 each**

505-18 CONCRETE STAINING

Of Conc Chl Lining

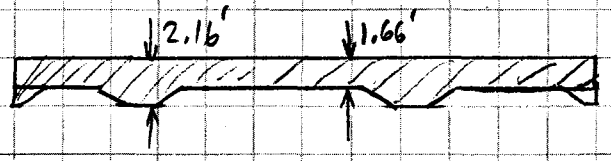
$A_{STAIN} = A_{LINING} = 2052 \text{ S.Y.} * 9 = \underline{18,468 \text{ S.FT.}}$

Bridge at MC 85 (Surfaces Visible to Channel)

Bridge Faces (South & North)

L = 101'

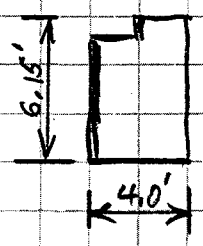
Approx. Depth = 2'



$A = (2) * 101 * 2' = \underline{404 \text{ SQ.FT.}}$

Bridge Abutments (East & West)

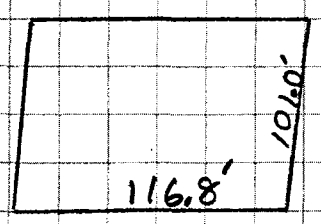
L = 118.1' H = 6.15'



$A = (2) * 118.1 * 6.15 + 6.15 * 4.0 * (4) = \underline{1551 \text{ S.FT}}$

Underside of Bridge Deck

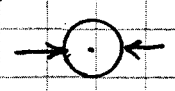
$A = 101' * 116.8' = \underline{11,797 \text{ SQ.FT.}}$



Bridge Piers

#COLUMNS = 10 H = 10.75' D = 2.5'

$A = (10) * 10.75' * \pi * 2.5 = \underline{844.3 \text{ SQ FT}}$



TOTAL STAIN 18,468 + 404 + 1551 + 11,797 + 844 = **33,064 SF**

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 43 OF

DATE 9-2-98

COMPUTATIONS FOR QUANTITIES SH. 19

BY DES CHKD GDO 9/7/98

515-1 ACCESS GATES

@ Sta 64+06 (Lt) - 2 ea

@ Sta 64+09 (Rt) - 1 ea

3 each

520-1 HANDRAIL (42")

Sta 64+02.27 to 65+56.17 (Lt)	156.0 LF	NOTE! measured w/ CADD on angled portions ▲ Sta on straight sections.
Sta 64+13.85 to 72+91.93 (Lt)	880.3 LF	
Sta 64+09.00 to 73+06.31 (Rt)	898.5 LF	
TOTAL HANDRAIL	1935 LF	

618-2 30" DIP (Detail S4)

Siphon 4 L = **174 LF**

618-6 36" RGRCP (Detail P5)

Pipe 5 Under MC 85 (Entire Length) L = **266 LF**

625-2 IRRIGATION SIPHON MANHOLE (Detail 12)

MH **2 each**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 44 OF

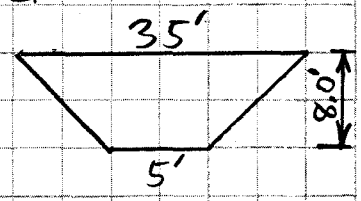
DATE 9-2-98

BY DES CHKD BDO 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION

@ Sta 76+75± (Lt) L = 34 LF

Sta 79+77± to 84+00 L = 423 LF



Use Avg Cross Section

$A_{AVG} = (35' + 5')/2 * 8.0' = 160$ SQ. FT.

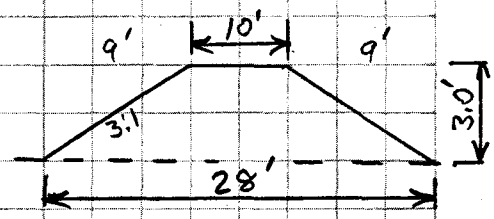
$\forall_{DITCH} = (34 + 423) * 160 / 27 =$ **2,708 C.Y.**

(SHOW ON SH. 5 QUANTITIES)

211-3 LANDSCAPING BERM FILL CONSTRUCTION

Sta 76+25 Off 210.0' Lt to Sta 84+00, 210.0'± Lt

UNIT VOL $v = (28' + 10')/2 * 3.0'/27 = 2.111$ CY/LF



L = 775 LF

$\forall = 775 * 2.111 =$ **1,636 C.Y.**

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = **45,115 CY**

216-3 DIRT IRRIGATION DITCH (4' BOTTOM)

Between Pipe 5 & Pipe 6; Sta 74+23 to 74+78 (Lt)

L = 55 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 45 OF

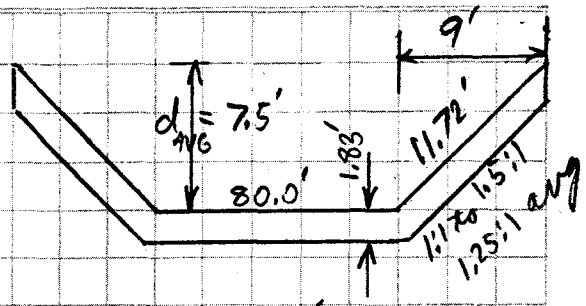
DATE 9-2-98

BY DES CHKD BDO 9/7/98

220-1 GROUTED RIPRAP

Transition Section (B2 to D1)

Sta 77+00 to 77+71.64



L = 71.64'

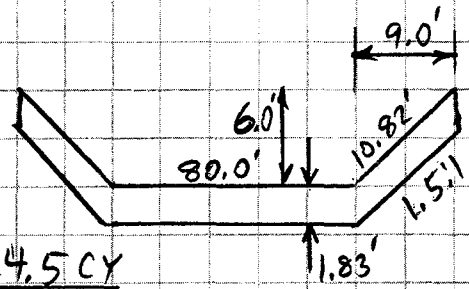
$d_{AVG} = (9.0 + 6.0')/2 = 7.5'$

W = (2) * 11.72' + 80.0' = 103.43' T = 1.83'

$\forall$ = 71.64' * 103.43' * 1.83'/27 = 502.2 CY

Regular Typ Sec D1

Sta 77+71.64 to 80+80



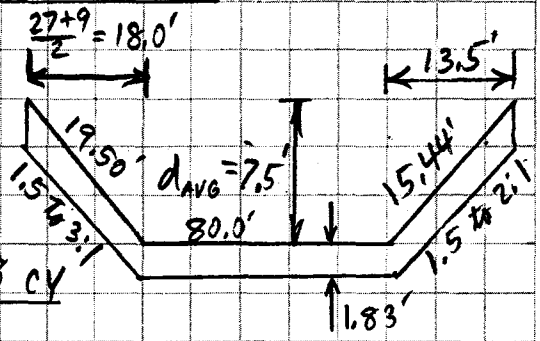
L = 308.4' T = 1.83'

W = (2) * 10.82' + 80.0' = 101.64'

$\forall$ = 308.4' * 101.64' * 1.83'/27 = 2124.5 CY

Transition Section (Typ Sec D1 to C1)

Sta 80+80 to Sta 81+00



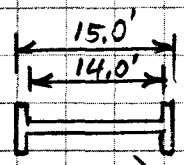
L = 20' T = 1.83'

W = 19.50' + 15.44' + 80.0' = 114.94'

$\forall$ = 20.0' * 1.83' * 114.94'/27 = 155.8 CY

AMOUNT TO EXCLUDE (O & M PATH)

Sta 77+00 to 81+00 (Meandering)



L = 424.7' T = 1.83'

W = 15.0' → $\forall_{EXCL.}$ = 424.7 * 15.0' * 1.83'/27 = (-431.8 CY)

TOTAL GROUTED RIPRAP = 502.2 + 2124.5 + 155.8 - 431.8 CY =

= 2351 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 46 OF

DATE 9-2-98

BY DES CHKD BDO 9/7/98

220-3 TREE WELLS **10 each**

221-1 GABION BASKETS (Key-in for Typ Sec C1)
sta 81+00 to 84+00 (Lt & Rt)

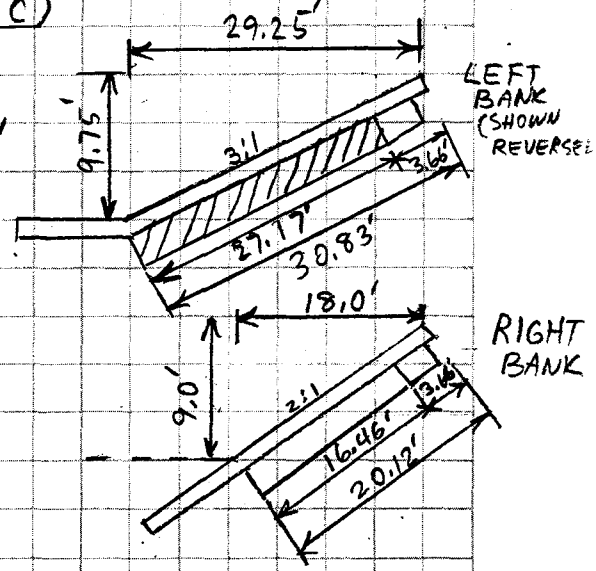
$L = 300' * (2) = 600'$ $W = 3.0'$ $T = 1.5'$

$\forall = 600' * 3.0' * 1.5'/27 = \underline{100.0 \text{ C.Y.}}$

For Counterforts (Detail 5c)
@ Sta 81+00 Left Bank

$L_{Lt} = 27.17'$ $W = 3.0'$ $T = 1.5'$

$\forall = 27.2' * 3.0' * 1.5'/27 = \underline{4.5 \text{ C.Y.}}$



@ Sta 81+00 Rt (Detail 5e)

$L = 16.46'$ $W = 3.0'$ $L = 1.5'$

$\forall = 16.46' * 3.0' * 1.5'/27 = \underline{2.7 \text{ C.Y.}}$

TOTAL = 100.0 + 4.5 + 2.7 = 107.2 CY

$\boxed{\forall = 107 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

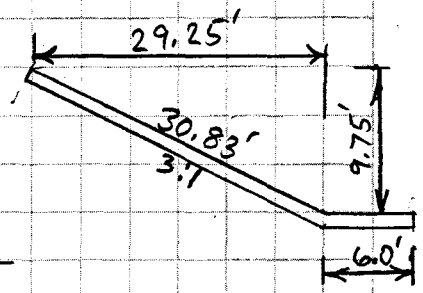
SHEET NO. 47 OF

DATE 9-2-98

BY DES CHKD BDO 9/7/98

221-2 GABION MATTRESS (Typ Sec C1)

Left Bank Sta 81+00 to 84+00



L = 300'

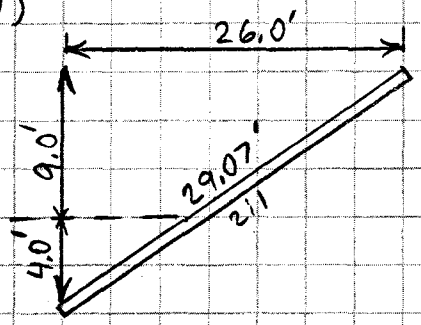
W = 30.83 + 6.0' = 36.83' T = 0.75'

UNIT VOL $v = 36.83' * 0.75'/27 = \underline{1.023 \text{ CY/LF}}$

$\rightarrow \forall = 300' * 1.023^{CY}/_{LF} = \underline{306.9 \text{ CY}}$

For Right Bank (Typ Sec C1)

Sta 81+00 to 84+00



L = 300' T = 0.75'

W = 29.07'

UNIT VOL $v = 29.07' * 0.75'/27 = \underline{0.808 \text{ CY/LF}}$

$\forall = 300' * 0.808^{CY}/_{LF} = \underline{242.4 \text{ CY}}$

TOTAL = 306.9 + 242.4 = 549.3 CY

$\boxed{\forall = 550 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 48 OF

DATE 9-2-98

BY DES CHKD BDO 9/7/98

310-1 AGGREGATE BASE COURSE

for O&M Roads (Typ Secs B2, C1, & D1)

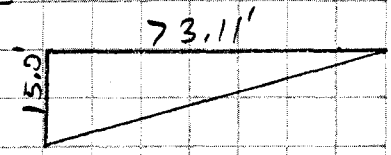
sta 74+00 to 84+00 (less 10' for UPRR X-ING)

L = 990' W = 15.0' T = 0.33' ρ = 140 lb/cf

$AB_{O\&M}$ = 990' * 15.0' * 0.33' * 140 / 2000 = 343.0 TONS

O&M Road Wedge at Ramp G

sta 77+70 to 78+43.11



AB = (73.1' * 15.0') / 2 * 0.33' * 140 / 2000

AB = 12.7 TONS

Under Concrete Channel Lining (Typ Sec B2)

sta 74+00 to 77+00

L = 300' W = 81' T = 0.5' ρ = 140 lb/cf

AB = 300' * 81' * 0.5' * 140 / 2000 = 850.5 TONS

TOTAL = 343.0 + 12.7 + 850.5 = 1206.2

AB = 1,206 TONS

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 49 OF

DATE 9-2-98

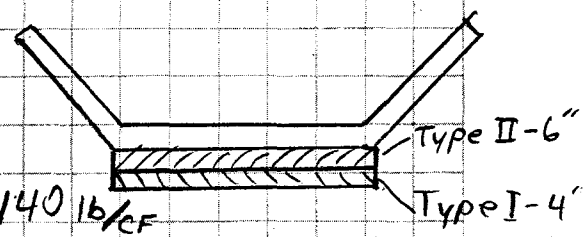
BY DES CHKD ~~BDO~~ 9/7/98

310-2 FILTER BLANKET (TYPE I)

Sta 77+00 to 81+00

Exclude Area Under O&M Path

L = 424.7' W = 15.0' A = 6370 SQ. FT. EXCLUDE



L = 400' W = 81' $T_{TYPE\ I}$ = 0.33' ρ = 140 lb/CF

A = (400' * 81') − 6370 = 26,030 SQ. FT.

$Wt_{(TYPE\ I)}$ = 26,030 * 0.33' * 140 lb/CF / 2000 = **601 TONS**

310-3 FILTER BLANKET (TYPE II)

A = 26,030 SQ. FT T = 0.50' ρ = 140 lb/CF

$Wt_{(TYPE\ II)}$ = 26,030 SF * 0.50' * 140 lb/CF / 2000 = **911 TONS**

350-3 REMOVE CHAIN LINK FENCE

@ Lt L = 145 LF

@ Rt L = 50 LF

L = **195 LF**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 50 OF

DATE 9-2-98

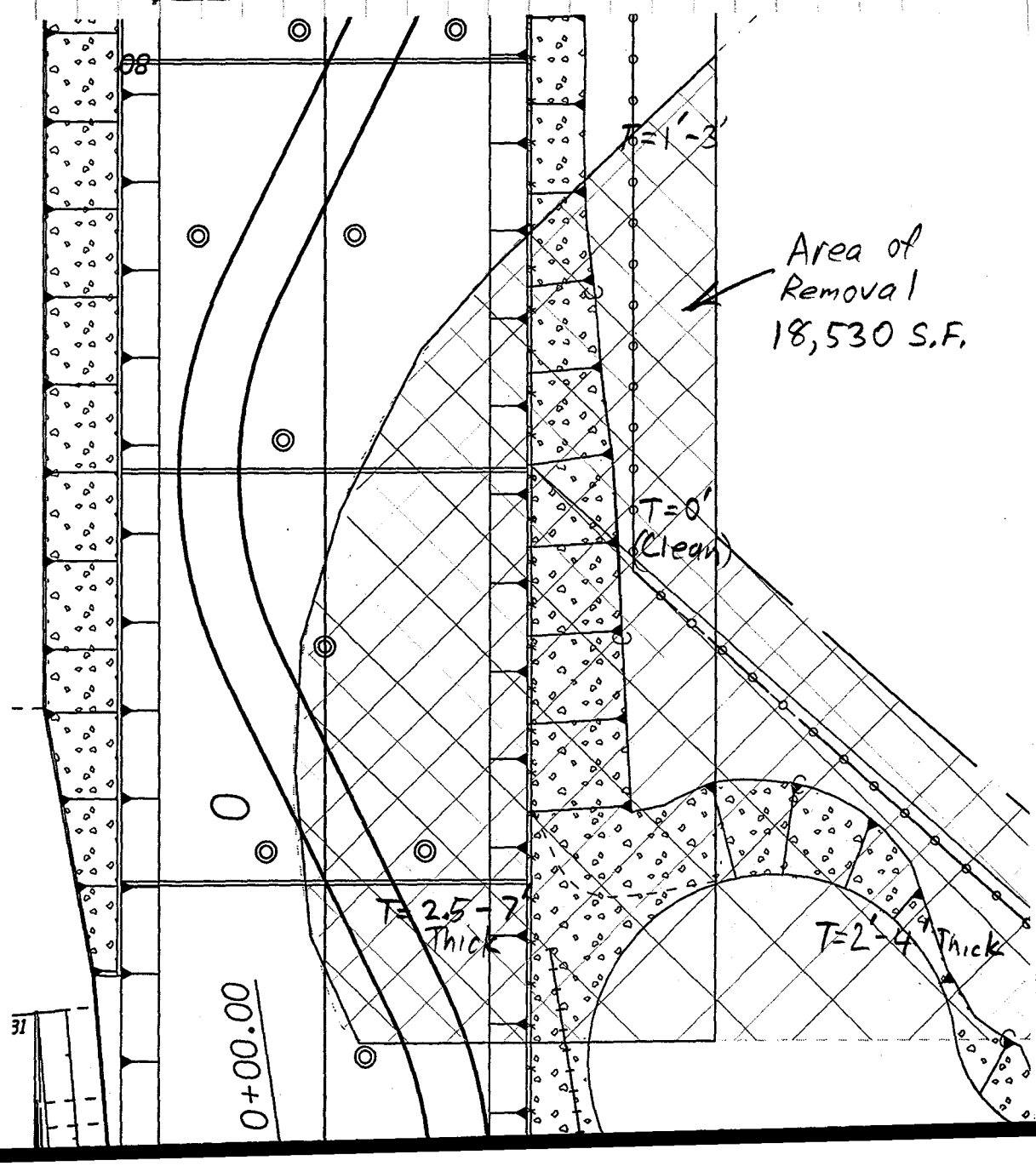
BY DES CHKD BDO 9/7/98

350-4 RUBBLE & DEBRIS REMOVAL

$A = 18{,}530$ S.F.

$T_{AVG} = (2' + 4.75' + 3')/3 = 3.25'$

$WT_{REM} = 18{,}530 \times 3.25 \times 50^{lb}/_{CF} / 2000 = 1490.9$ TONS → **1500 TONS**



SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 51 OF

DATE 9-3-98

BY DES CHKD 9/7/98 BDD

420-1 CHAIN LINK FENCE & GATES 524 LF

Sta 78+76.00 to 84+00 (RT)

421 WIRE FENCE

Sta 74+07.91 to 75+18.17 (LT) L= 110.5 LF

Sta 75+34.88 to 76+25.00 (LT) L= 90.1' LF

Sta 74+22.69 to 75+32.19 (RT) L= 109.6 LF

Sta 75+49.43 to 76+42.00 (RT) L= 92.7 LF

Sta 76+94.60 to 81+00.00 (RT) L= 405.4 LF

NOTE: ALL FENCE PARALLEL TO E.TRIB.CHL. TALLIED ON SH. 26-28

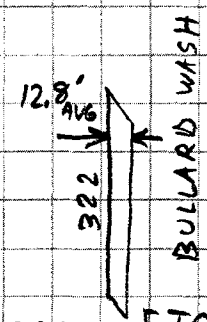
TOTAL L = 808 LF

432-1 GRAVEL MULCH

Sta 77+78 to 81+00 (LT)

L = 322' W_{AVG} = 12.8'

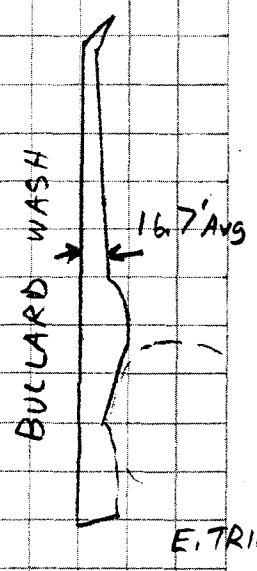
A_{LT} = 322' * 12.8' / 9 = 458 S.Y.



Sta 76+95 to 81+00 (to edge of Cul-de-sac on ETC)

L = 405 LF W_{AVG} = 16.7'

A = 405' * 16.7' / 9 = 752 S.Y.



TOTAL = 458 + 752 = 1210 S.Y.

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

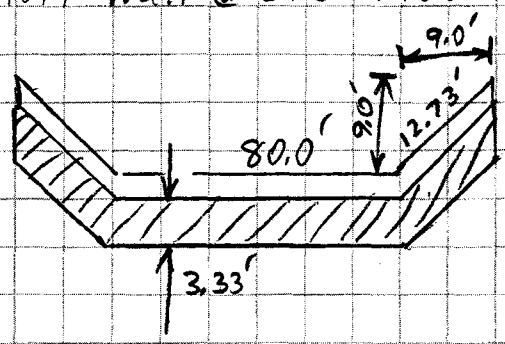
SHEET NO. 52 OF

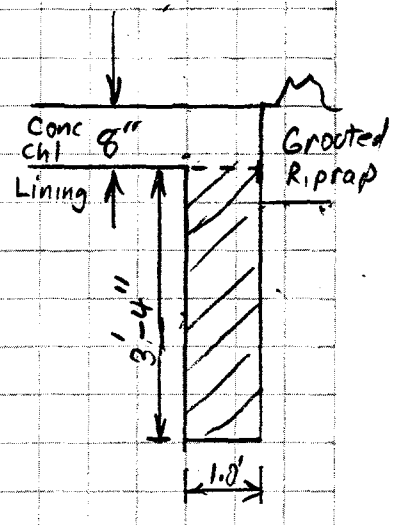
DATE 9-3-98

BY DES CHKD BDO 9/7/98

505-1 STRUCTURAL CONCRETE (CLASS A)

For Cutoff Wall @ Sta 77+00





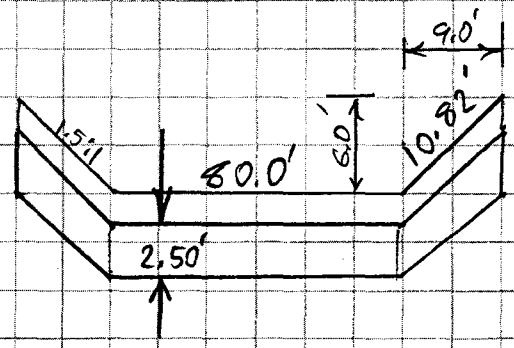
$L = 80.0' + (2)\,12.73'$

$L = 105.5'$

$W = 1.0'$ $H = 3.33'$

$\forall = 105.5' * 1.0' * 3.33'/27 = \underline{13.0\ C.Y}$

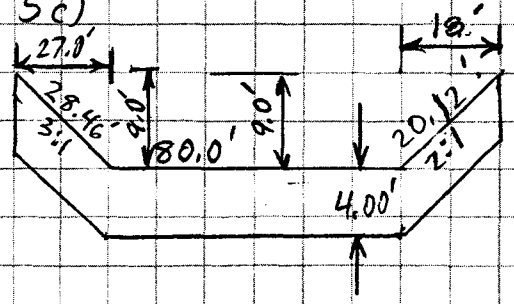
For Cutoff Walls (Det 4a)
@ Sta 78+00, 79+00 & 80+00



$L = (2) * 10.82' + 80.0' = 101.6'$

$\forall = (3) * 101.6' * 1.0' * 2.5'/27 = \underline{28.2\ CY}$

For Cutoff Wall (Detail 5c)
Sta 81+00



$L = 20.12' * 28.46' + 80.0' = 128.6'$

$W = 1.0'$ $H = 4.00'$

$\forall = 128.6' * 1.0' * 4.0'/27 = \underline{19.1\ C.Y.}$

TOTAL $\forall = 13.0 + 28.2 + 19.1 = 60.3 \rightarrow \boxed{61.\ CY}$

505-3 STEEL REINFORCEMENT

$Wt_{STEEL} = 75\ lb/CY * 61\ CY = \boxed{4575\ lb}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 53 OF

DATE 9-3-98

BY DES CHKD BDO 9/7/98

505-4 CONCRETE CHANNEL LINING
sta 74+00 to 77+00

L = 300' W = 113.5' (For 9' Bank Ht; See QTYS, Sh 19)

A = 300' * 113.5' / 9 = 3783.3 S.Y.

Additional for Ramp 6
sta 75+55 (Lt) to 77+48 ± (Lt)

L = 193' W = 14'

A = 193' * 14' / 9 = 300.2 S.Y.

TOTAL = 3783.3 + 300.2 = 4083.5 **4,084 SY**

505-8 O & M PATH (Det 4)
Sta 77+00 to Sta 81+00 (Meandering)

L = 424.7' (per PATH ℄ Stations) **L=425 LF**

505-9 INLET & OUTLET STRUCTURES
(MAG Std Det 501-4)

NOTE: Pipe 5 Inlet called out on Sh 19 QTYS.
Pipe 6 Outlet 1 ea
Pipe 7 Outlet 1 ea

HW = **2 each**

505-14 INLET & OUTLET STRUCTURES
(MAG Std Det 501-5)
Pipe 6 Inlet (Drop Inlet) sta 76+84.23, 124.0' Lt

(NOTE: Pipe collar at angle point is N.P.I.)

HW = **1 each**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 54 OF

DATE 9-3-98

BY DES CHKD BDD 9/7/98

505-17 INLET & OUTLET STRUCTURES
(MAG Std Det 535, Type F)
Pipe 14 Inlet 1 ea
Pipe 16 Inlet 1 ea # INLETS = 2 each

OUT OF ORDER

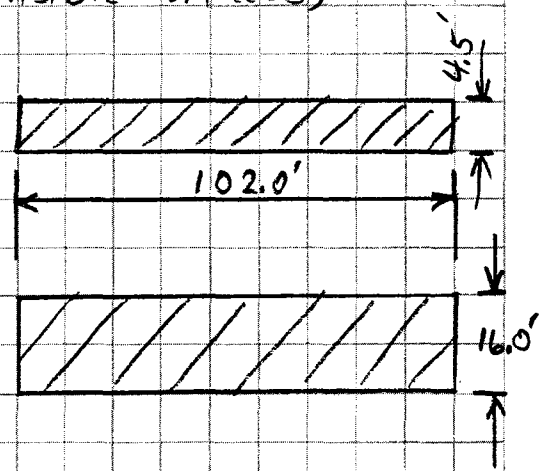
505-12 INLET & OUTLET STRUCTURES
Special Detail 25
Pipe 7 Inlet 1 each

505-18 CONCRETE STAINING
Bullard Wash Channel Lining & Ramp 6

$A_{CONC} = 4084 \times 9 = 36{,}756$ SF

UPRR Railroad Bridge (Visible Surfaces)

A (Faces) = (2) * 102' * 4.5' = 918 SF

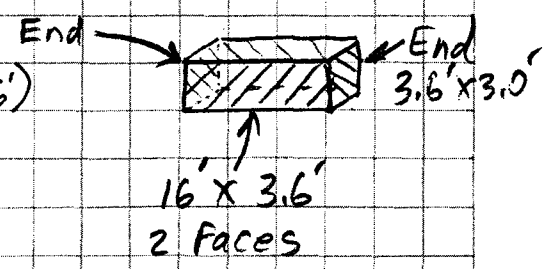


A (Underside) = 16.0' * 102.0' = 1632 SF

A (Pier and Abutment Faces & Ends) =

$A_{ABUT} = 4 * [2 * (16.0 + 3.0') * 3.6'] - 2(16 * 3.6')$
outside of abutments

A = 432 SF



TOTAL = 36,756 + 918 + 1632 + 432 = 39,738 SF. 39,750 SF

Note: All E.Trib stain accounted for on Sh 26 QTys

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 20

SHEET NO. 55 OF

DATE 9-3-98

BY DES CHKD BDD 9/7/98

515-1 ACCESS GATES
@ 74+02 (Lt) **1 each**

520-1 HANDRAIL (42")
Sta 76+26.00 to 77+47.85 (Lt) L = 121.9'

Sta 76+04.89 to 81+00 (Lt) L = 495.1'

TOTAL = L = **617 LF**

635-3 CONCRETE LINING LOW FLOW CHANNEL
For Shallow Dip Crossing (Typ Sec B4)
Sta 81+17.48, Off 38.50' Lt to 82+10.0 Off 20.0' Rt
L = 109.5 LF

For Regular Low Flow Channel (Typ Sec B4)
Sta 82+10.0 to 84+00
L = 190 LF
TOTAL = 109.5 + 190.0 = 299.5 TOTAL L = **300 LF**

602-1 JACK & BORE PIPE
Pipe 6 L = **75 LF**

618-4 24" RGRCP
Pipe 14 L = 28 LF
Pipe 16 L = 37 LF
Pipe 7 L = 201 LF
TOTAL **L = 266 LF**

618-5 30" RGRCP
Pipe 6 **L = 209 LF**

★ Note: Entire Length of Pipe 5 is accounted for on Sh 19

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 56 OF

DATE 7-13-98

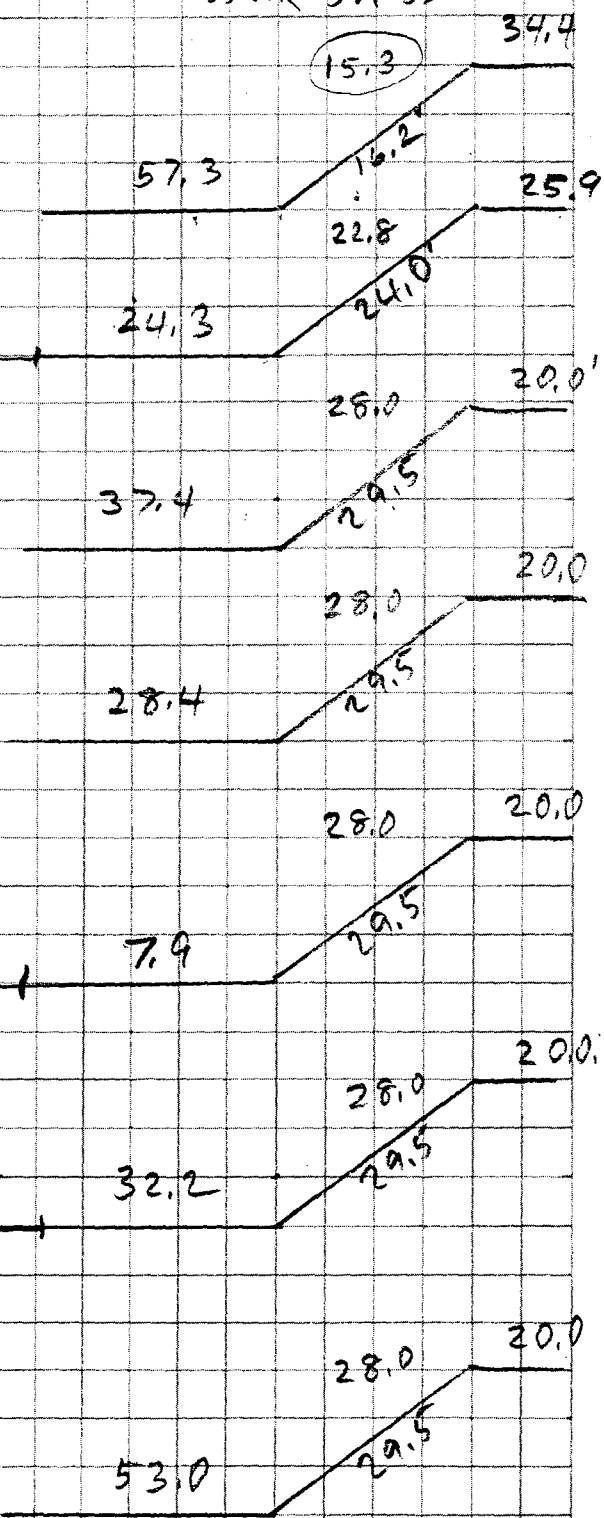
COMPUTATIONS FOR QUANTITIES SH. 20

BY DES CHKD RWM

BDO 9/7/98

632-1 PVC PIPE SLEEVE in Grade Control Str. 2

Assume 3:1 SS



57.3 + 16.2 + 34.4 = 108

35.3 + 24.3 + 24.0 + 25.9 = 110

37.4 + 29.5 + 20.0 = 87

28.4 + 29.5 + 20.0' = 78

34.8 + 7.9 + 29.5 + 20.0' = 92

34.8 + 32.2 + 29.5 + 20.0 = 117

53.0 + 29.5 + 20.0 = 103

108 + 110 + 87 + 78 + 92 + 117 + 103 = 695 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

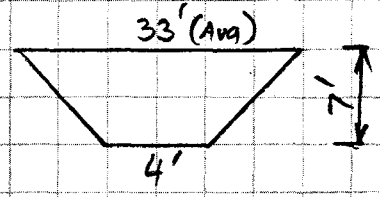
COMPUTATIONS FOR QUANTITIES SH. 21

SHEET NO. 57 OF

DATE 9-3-98

BY DES CHKD BDO 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION
sta 84+00 to Sta 88+00 (LT)



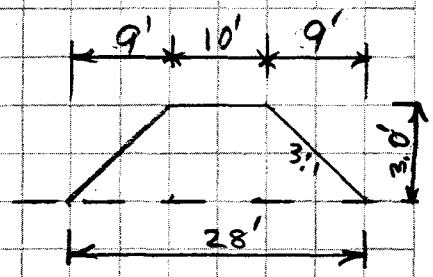
L = 420 LF d = 7'

W = (33' + 4')/2 = 18.5'

V = 420' * 18.5' * 7.0'/27 = 2015 CY

Show on Sheet 5 quantities

211-3 LANDSCAPING BERM FILL CONSTRUCTION
sta 84+00 to 89+50



L = 550' H = 3' (avg)

W = (28' + 10')/2 = 19'

V = 550' * 19' * 3'/27 = 1162 CY

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 38,190 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 21

SHEET NO. 58 OF

DATE 9-3-98

BY DES CHKD BDO 9/7/98

221-1 GABION BASKETS
for Key-in of Bank Lining (Typ Sec C1)
sta 84+00 to 94+00 (Lt & Rt)

$L = (2) * 1000'$ $W = 3.0'$ $H = 1.5'$

$\forall = 2000' * 3.0' * 1.5'/27 = \underline{333.3 \text{ CY}}$ $\forall = \boxed{334 \text{CY}}$

221-2 GABION MATTRESS
sta 84+00 to 89+00 (Typ Sec C1, Lt Bank & apron) 3:1 SS

$L = 500'$ $v = 1.023$ CY/LF (see Sh 20 Qtys)

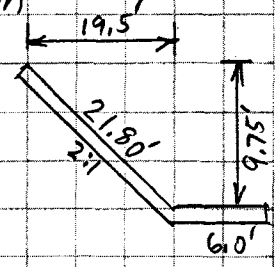
$\forall = 500' * 1.023 \text{ CY/LF} = \underline{511.5 \text{ CY}}$

For Typ Sec C1, Rt Bank & Apron
Sta 84+00 to 94+00

$L = 1000'$ $v = 0.808$ CY/LF (see Sh 20 Qtys)

$\forall = 1000' * 0.808 \text{ CY/LF} = \underline{808 \text{ CY}}$

For Typ Sec C1, 2:1 SS, Lt Bank & Apron
sta 90+00 to 91+93.86



$L = 193.86'$
$W = 27.80'$ $T = 0.75'$

$v = 27.80' * 0.75'/27 = \underline{0.772 \text{ CY/LF}}$

$\forall = 193.86' * 0.772 \text{ CY/LF} = \underline{149.6 \text{ CY}}$

for Transition Section 89+00 to 90+00 (Lt)

$\forall = 100' * \left(\frac{0.772 + 1.023}{2}\right) = 89.75$

SVERDRUP

JOB BULLARD WASH CHANNEL

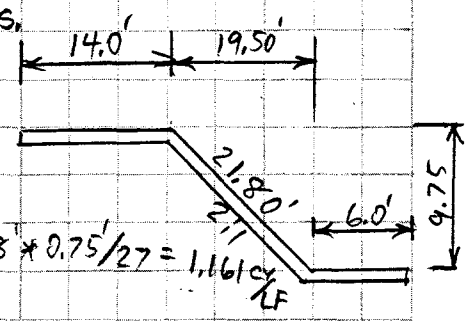
COMPUTATIONS FOR QUANTITIES SH. 21

SHEET NO. 59 OF

DATE 9-3-98

BY DES CHKD BDO 9/7/98

221-2 GABION MATTRESS (cntd)
for Ramp 7 (Typ Sec R3) and Trans.
Sta 91+93.86 to 93+71.17 (Lt)



L = 177.31' T = 0.75'

Unit volume v W = 14.0' + 21.80' + 6.0' = 41.80' v = 41.8' * 0.75'/27 = 1.161 CY/LF

V = 177.31' * 41.80' * 0.75'/27 = 205.9 CY

For Typ Sec C1; 3:1 SS
Sta 93+71.17 to 94+00 (Lt)

L = 28.83' v = 1.023 CY/LF

V = 28.83' * 1.023 = 29.5 CY

use 1794 CY

TOTAL GABION MATTRESS
V = 511.5 + 808 + 149.6 + 89.8 + 205.9 + 29.5 = 1794.3

301-1 FARM ROADS Sta 90+70 to 94+00

L = 330 LF

310-1 AGGREGATE BASE COURSE
on Ramp 7 Sta 93+46.75 to Sta 95+04.2 ±

L = 158 LF W = 14.0' T = 0.33' ρ = 140 lb/CF

AB = 158 * 14.0' * 0.33' * 140 lb/CF / 2000 = 51.1 TONS

O&M Road Sta 84+00 to 94+00 (Lt)

L = 1000' W = 15' T = 0.33' ρ = 140 lb/CF

AB_{O+M} = 1000 * 15 * 0.33 * 140 / 2000 = 346.5 TONS

for Airport Perim. Rd: Sta 88+70 to Sta 90+02 (Rt)

L = 132' W = 20' T = 0.33' ρ = 140 lb/CF

V = 132' * 20' * 0.33' * 140 / 2000 = 61.0 TONS

AB = 460 TONS

TOTAL = 51.1 + 346.5 + 61.0 = 458.6

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 21

SHEET NO. 60 OF

DATE 9-3-98

BY DES CHKD BDO 9/7/98

350-1 REMOVE CONCRETE LINED DITCHES
Sta 90+99, Off 127.1' Lt to Sta 94+00 Off = 104' Rt

L = 380 LF

350-2 REMOVE EXIST IRRIGATION CULVERTS
Sta 88+03 to 88+55 (@ Lt)
Lump Sum

L = ~~60 LF~~

350-3 REMOVE CHAIN LINK FENCE
Sta 90+90, Off = 100' Lt to 94+00, Off = 130' Rt

L = 385 LF

420-1 CHAIN LINK FENCE & GATES
Sta 84+00 to Sta 94+00 (Rt)

L = 1000 LF

421-1 WIRE FENCE
Sta 90+99.17 to Sta 94+00 (Lt)

L = 300 LF

432-1 GRAVEL MULCH
Sta 88+20 to Sta 90+80 (Rt)
Sta 91+80 to Sta 94+00

$L = 260' + 220' = 480'$ $W_{AVG} = 9'$

$A = 480' * 9' / 9 = 480$ S.Y.

A = 480 SY

520-1 HANDRAIL (42")
Sta 89+00 to 93+22.4 (Lt) L = 426.0 LF
Sta 92+02.6 to 93+71.2 L = 179.8 LF

L = 606 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 61 OF

DATE 9-3-98

COMPUTATIONS FOR QUANTITIES SH. 21

BY DES CHKD BDO 9/7/98

635-3 CONCRETE LINED LOW FLOW CHANNEL
sta 84+00 to 94+00 L = 1000 LF

635-1 CONCRETE LINED DITCH
sta 90+98.91, Off 127.14' Lt to
sta 94+00, Off 120.00' Lt

L = 300 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 22

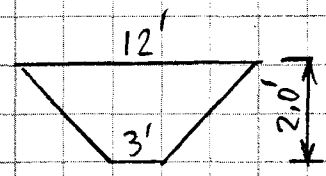
SHEET NO. 62 OF

DATE 9-3-98

BY DES CHKD BDO 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION
Sta 98+30, Off=340' Rt to Sta 99+45, Off=65' Rt

L = 293 LF

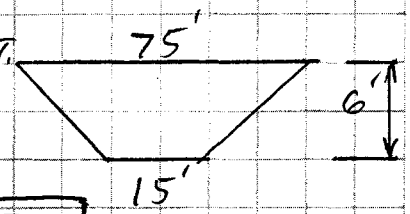


A_{AVG} = (12+3)/2 * 2.0' = 15 SQ FT.

∀ = 293' * 15 S.F./27 = 162.8 CY

Airport Ditch @ Sta 91+30± Off = 75' Rt to Sta 103+00, Off 600' Rt

L = 1200 LF A = (75'+15)/2 * 6' = 270 S.FT.



∀ = 1200 * 270/27 = 12,000 CY.

TOTAL = 12,165 CY

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 44,582 CY

221-1 GABION BASKETS
for Key-in of Bank Lining (Typ Sec C1)
Sta 94+00 to 104+00 (Lt and Rt)

L = (2) * 1000' = 2000' W = 3.0' T = 1.5'

∀ = 2000' * 3.0' * 1.5'/27 = 333.3 CY

∀ = 334 CY

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 22

SHEET NO. 63 OF

DATE 9-3-98

BY DES CHKD BDO 9/7/98

221-2 GABION MATTRESS

For Sta 94+00 to Sta 101+00, Lt Bank 3:1 SS and Trans 100'

L = 700' ν = 1.023 CY/LF (see sheet 20 Qtys)

$\forall$ = 700' * 1.023 CY/LF = 716.1 CY

For Sta 101+00 to 103+00, Lt Bank 2:1 SS and Trans 100'

L = 200' ν = 0.772 CY/LF (sheet 21 Qtys)

$\forall$ = 200' * 0.772 CY/LF = 154.4 CY

For Sta 103+00 to Sta 104+00, Lt Bank 3:1 SS

L = 100' ν = 1.023 CY/LF

$\forall$ = 100 * 1.023 CY/LF = 102.3 CY

For Sta 94+00 to Sta 104+00, Rt side 2:1

L = 1000' ν = 0.808 CY/LF (see Sh. 20 Qtys)

$\forall$ = 1000' * 0.808 CY/LF = 808 CY

TOTAL GABION MATRESS $\forall$ = 716.1 + 154.4 + 102.3 + 808

$\forall$ = 1780.8 CY use $\boxed{\forall = 1{,}781 \text{ CY}}$

301-1 FARM ROADS

Sta 94+00 to 104+00 (Lt) $\boxed{L = 1000 \text{ LF}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 22

SHEET NO. 64 OF

DATE 9-3-98

BY DES CHKD

310-1 AGGREGATE BASE COURSE
for O & M Road
sta 94+00 to 104+00

L = 1000' W = 15' T = 0.33' ρ = 140 lb/CF

AB = 1000 * 15 * 0.33 * 140 / 2000 = 346.5 TONS **350 TONS**

350-1 REMOVE CONCRETE LINED DITCH
sta 94+00, Off 105' Rt to Sta 96+79.6, Off = 130' Lt

Measured along CLD ℄ L = **483 LF**

350-2 REMOVE IRRIGATION CULVERTS
sta 95+00 ± Rt Lump Sum **~~8 LF~~**

420-1 CHAIN LINK FENCE & GATES
Sta 94+00 to 104+00 (Rt) **L = 1000 LF**

421-1 WIRE FENCE
sta 94+00 to sta 104+00 (Lt) **L = 1000 LF**

432-1 GRAVEL MULCH
Sta 94+00 to Sta 103+00 (Rt)

L = 900' W = 7' A = 900' * 7' / 9 = **700 SY**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 22

SHEET NO. 65 OF

DATE 9-3-98

BY DES CHKD

505-10	INLET & OUTLET STRUCTURES (MAG Det 502-1) Pipe 8 Inlet, Sta 103+51 (Lt)	1 each
505-12	INLET & OUTLET STRUCTURES (Special Detail 25) Pipe 8 Outlet, Sta 103+51 (Lt)	1 each
520-1	HANDRAIL (42") sta 100+00 to 103+00 (Lt)	L = 300 LF
635-3	CONCRETE LINING LOW FLOW CHANNEL Sta 94+00 to 104+00	L = 1000 LF
618-3	12" RGRCP Pipe 8, Sta 103+51	L = 105 LF
635-1	CONCRETE LINED DITCH sta 94+00 to Sta 96+79.58	L = 290 LF
635-2	SHALLOW CONCRETE LINED DITCH for Pipe 8 Outlet, Sta 103+51	L = 71 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 23

SHEET NO. 66 OF

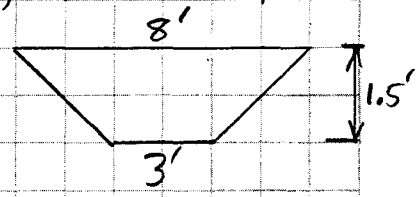
DATE 9-4-98

BY DES CHKD SDO 9/7/98

211-1 IRRIGATION DITCH FILL

Sta 104+66 Off 60.0' Rt to Sta 114+00, Off 200' Rt (Airport)

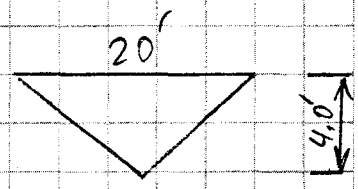
L = 1260 LF A = (8+3)/2 * 1.5' = 8.25 S.FT.



∀ = 1260 * 8.25 / 27 = 385 CY

Sta 109+50, Off 585' Rt to 116+50 Off 75.0' Rt (Airport)

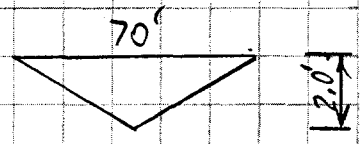
L = 830 LF A = 20' * 4' / 2 = 40 S.FT.



∀ = 830' * 40 S.FT / 27 = 1230 CY

Sta 103+00, Off = 600' Rt to Sta 109+30, Off 600' Rt

L = 520 LF A = 70 * 2 / 2 = 70 S.FT.



∀ = 520' * 70 / 27 = 1350 CY

NOTE: ALL OF THE DITCHES SHOWN HERE ARE ACCOUNTED FOR ON SH. 5 QUANTITIES

TOTAL = 385 + 1230 + 1350 = 2965

∀ = 2965 CY

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 29,684 CY

216-2 GRADED V-DITCH

Sta 104+09 to 114+00 (Lt)

L = 991 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 23

SHEET NO. 67 OF

DATE 9-4-98

BY DES CHKD BDO 9/7/98

221-1 GABION BASKETS
for Key-in of Bank Lining (Typ Sec C1)
Sta 104+00 to 114+00 (Lt and Rt)

L = (2) * 1000' = 2000' W = 3.0' H = 1.5'

V = 2000' * 3.0' * 1.5'/27 = 333.3 CY $\boxed{V = 334 \text{ CY}}$

221-2 GABION MATTRESS
for Typ Sec C1, Lt Bank
Sta 104+00 to 111+00 (3:1 SS & Trans)
Sta 113+00 to 114+00 (3:1 SS)

L = 700' + 100' = 800' ν = 1.023 CY/LF (see sh. 20 Qtys)

V = 800 * 1.023 = 818.4 CY

for Typ Sec C1, Lt Bank, 2:1 SS & Trans
Sta 111+00 to 113+00

L = 200' ν = 0.772 CY/LF (see Sh. 21 Qtys)

V = 200 * 0.772 = 154.4 CY

for Typ Sec C1, Rt Bank, 2:1 SS
Sta 104+00 to 114+00

L = 1000' ν = 0.808 CY/LF (see Sh 20 Qtys)

V = 1000' * 0.808 = 808 CY

TOTAL GABION MATTRESS V = 818.4 + 154.4 + 808 = 1780.8 $\boxed{1781 \text{ CY}}$

SVERDRUP

JOB BULLARD CHANNEL WASH

COMPUTATIONS FOR QUANTITIES SH. 23

SHEET NO. 68 OF

DATE 9-4-98

BY DES CHKD BDO 9/2/98

301-1 FARM ROADS
Sta 104+00 to 114+00 (Lt)

L = 1000LF

310-1 AGGREGATE BASE COURSE
Sta 104+00 to 114+00 (Lt)

L = 1000' W = 15.0' T = 0.33' ρ = 140 lb/CF

AB = 1000 * 15.0' * 0.33' * 140 / 2000 = 346.5 TONS

AB = 347 TONS

420-1 CHAIN LINK FENCE & GATES
Sta 104+00 to Sta 114+00 (Rt)

L = 1000 LF

421-1 WIRE FENCING
Sta 104+00 to sta 114+00 (Lt)

L = 1000LF

505-10 INLET & OUTLET STRUCTURES (MAG Det 502-1)
Pipe 15 Inlet, Sta 107+50

1 each

505-12 INLET & OUTLET STRUCTURES (Special Det 25)

1 each

520-1 HANDRAIL (42")
Sta 110+00 to sta 113+00

L = 300 LF

635-3 CONCRETE LINING LOW FLOW CHANNEL
Sta 104+00 to 114+00

L = 1000 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 69 OF

DATE 9-4-98

COMPUTATIONS FOR QUANTITIES SH. 23

BY DES CHKD BDO 9/7/98

618-3 12" RGRCP
Pipe 15, Sta 107+50 (Lt) $\boxed{L = 73 LF}$

635-2 SHALLOW CONCRETE LINED DITCH
for Pipe 15 Outlet, Sta 107+50 $\boxed{L = 71 LF}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 24

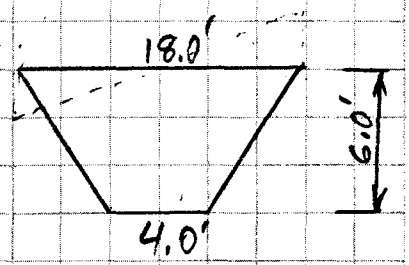
SHEET NO. 70 OF

DATE 9-4-98

BY DES CHKD BDO 9/7/98

211-1 IRRIGATION DITCH FILL CONSTRUCTION
Sta 119+80, Off 70.0' Lt to Sta 124+00, Off=78' Lt

L = 420 LF A = (18' + 4')/2 * 6' = 66 S.FT.



V = 420' * 66 S.FT / 27 = 1027 CY

NOTE: LOWER BUCKEYE RD BERM CONSTRUCTION IS ACCOUNTED FOR ON SH. 29 & 30 QUANTITIES (BID ITEM 211-4)

* ALL DITCH FILL QUANTITIES ACCOUNTED FOR ON SH. 5 QUANTITIES

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 30,673 CY

216-2 GRADED V-DITCH
Sta 114+00 to 118+75 (Lt) L = 475 LF

* See sh 30 for ditch along Lower Buckeye Rd.

216-3 DIRT IRRIGATION DITCH (4' BOTTOM) (Detail 8, Typ Sec F4)
Sta 123+54, Off=13.3' Lt to Sta 124+00, Off=80± Lt

L = 90 LF (along flowpath) L = 90 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 24

SHEET NO. 71 OF

DATE 9-4-98

BY DES CHKD BDO 9/7/98

221-1 GABION BASKETS

For Key-in of Gabion Matt. Bank Lining (Typ Sec C1 & R3)
Sta 114+00 to 119+43 (Lt & Rt)

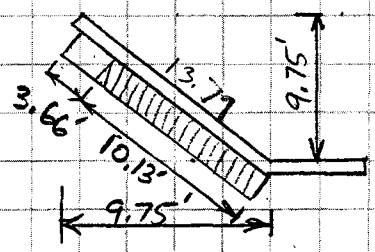
L = 543 LF W = 3.0' H = 1.5'

$\forall$ = 543 * 3.0' * 1.5'/27 * (2) = 181.0 CY

For Counterforts @ Sta 119+43 (Det 5a, Typ Sec C2, Lt side)

L = 10.1' W = 3.0' H = 1.5'

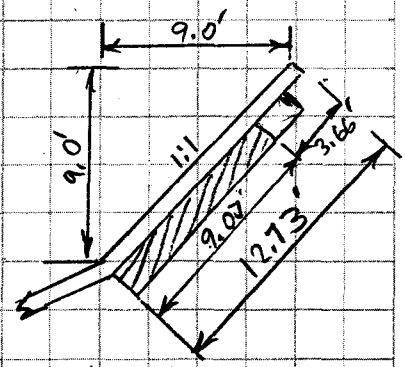
$\forall$ = 10.1' * 3.0' * 1.5'/27 = 1.7 CY



For Right Side (Detail 5e)

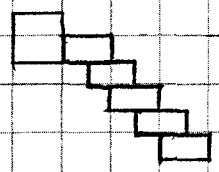
L = 9.1' W = 3.0' H = 1.5'

$\forall$ = 9.1' * 3.0' * 1.5'/27 = 1.5 CY



For Step Gabion Bank Lining Around Channel Inlet

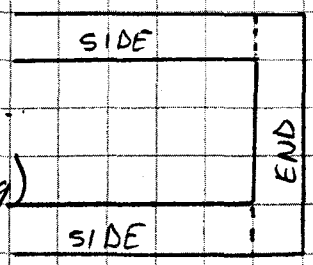
UNIT VOLUME $\forall$ = [3.0' * 3.0' + (5) * 3.0' * 1.5]/27 = 1.167 CY/LF



Sides: Sta 119+43 to Sta 121+95 (Lt & Rt)

L = (2) * 252' = 504'

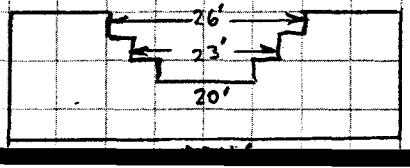
$\forall$ = 504' * 1.167 CY/LF = 588.2 CY



For End (subtract $\forall_{\text{INLET OPENING}}$ Inlet Channel Opening)

$\forall$ = 104.0' * 1.167 CY/LF − (26' + 23' + 20') * 3.0' * 1.5'/27

$\forall$ = 109.9 CY



SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 72 OF

DATE 9-4-98

COMPUTATIONS FOR QUANTITIES SH 24

BY DES CHKD

221-1 GABION BASKETS (cntd)

TOTAL GABION BASKETS

$\forall = 181 + 1.7 + 1.5 + 588.2 + 109.9 = 882.3$ CY $\boxed{\forall = 890 \text{ CY}}$

*ADD 8 CY TO ACCOUNT FOR TRANSITIONS, BENDS & OVERLAP IN THE INLET CHANNEL - GRADE CONTROL STRUCTURE TRANSITION.

221-2 GABION MATTRESS

For Typ Sec C1, Lt Bank, 3:1 SS
Sta 114+00 to 115+50

$L = 150'$ $\upsilon = 1.023$ CY/LF (see Sh 20 Qtys)

$\forall = 150' * 1.023$ CY/LF $=$ 153.5 CY

For Ramp 8, Lt Bank; 2:1 SS & Trans
Sta 115+50 to Sta 117+46

$L = 196'$ $\upsilon = 1.161$ CY/LF (see Sh 21 Qtys, Ramp 7 Unit Vol)

$\forall = 196' * 1.161$ CY/LF $=$ 227.6 CY

For Typ Sec C2, Lt Bank, 2:1 SS
Sta 117+46 to 119+43

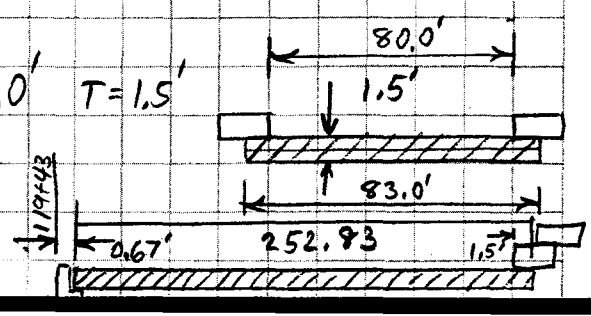
$L = 197'$ $\upsilon = 0.772$ CY/LF (same as Typ Sec C1, see sh 21 Qtys)

$\forall = 197' * 0.772$ CY/LF $=$ 152.1 CY

For Gabion Mattress Channel Bottom (Typ Sec C3)
Sta 119+43 to Sta 121+95

$L = 252 - 0.67' + 1.5' = 252.83'$ $W = 83.0'$ $T = 1.5'$

$\forall = 252.83 * 83.0' * 1.5'/27 =$ 1165.8 CY



SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 24

SHEET NO. 73 OF

DATE 9-7-98

BY DES CHKD BDO 9/7/98

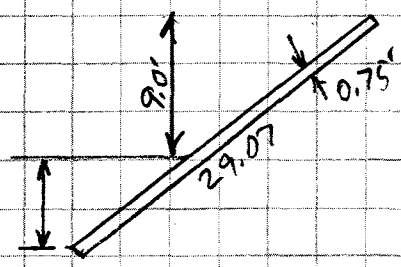
221-2 GABION MATTRESS (cntd

for Right Bank (Typ Sec C1)

Sta 114+00 to 115+50

L = 150' v = 0.808 CY/LF (see Sh 20 Qtys)

$\forall$ = 150 * 0.808 = 121.2 CY



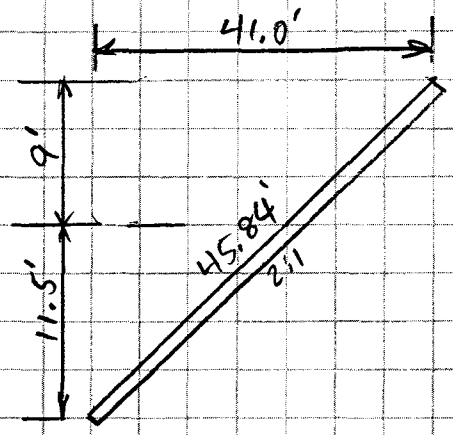
for Right Bank (Typ Sec C2)

Sta 115+50 to 119+43

L = 393' W = 45.84' T = 0.75'

$\forall$ = 393' * 45.84' * 0.75' / 27

$\forall$ = 500.4 CY



TOTAL GABIONS = 153.5 + 227.6 + 152.1 + 1165.8 + 121.2 + 500.4

$\forall$ = 2320.6 CY

$\boxed{\forall = 2320 \text{ CY}}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH24

SHEET NO. 74 OF

DATE 9-4-98

BY DES CHKD BDO 9/7/98

301-1 FARM ROADS
Sta 114+00 to 118+14

L = 414 LF

310-1 AGGREGATE BASE COURSE
For O&M Road, Sta 114+00 to Sta 124+00

L = 1000' W = 15.0' T = 0.33' ρ = 140 lb/cF

AB = 1000 * 15.0' * 0.33' * 140 lb/cF / 2000 = 346.5 CY

Additional AB for Ramp 8 and Lwr. Buckeye Rd Transition
Sta 115+85.4 to 119+43

L = 357.6' W = 14.0' T = 0.33' ρ = 140 lb/cF

AB = 357.6' * 14.0' * 0.33' * 140/2000 = 115.6 TONS

For Airport Perimeter Rd
Sta 116+68 to 119+16.50, 93.0' Rt

L = 248.5' W = 16' T = 0.33' ρ = 140 lb/cF

AB = 248.5' * 16' * 0.33' * 140/2000 = 91.8 TONS

TOTAL AB = 346.5 + 115.6 + 91.8 = 554.0

AB = 554 TONS

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 24

SHEET NO. 75 OF

DATE 9-24-98

BY DES CHKD

350-4 RUBBLE & DEBRIS REMOVAL — 200 TONS

405-1 SURVEY MONUMENT @ Center of Section — 1 each

415-1 BARRICADES
sta 119+02.52 to Sta 119+64.39

L = 60' (along length of barricade) — L = 60 LF

420-1 CHAIN LINK FENCE & GATES
Sta 114+00 to Sta 119+43 — L = 545 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 24

SHEET NO. 76 OF

DATE 9-4-98

BY DES CHKD BDO 9/7/98

421-1 WIRE FENCE

Sta 114+00 to 118+00 (Lt) L = 400 LF

Sta 119+32.52 to 123+45.36 (Lt) L = 412.8 LF

Sta 123+45.36, Off 73.62 Lt to Off 75.15' Rt

L = 148.87 → L = 150 LF

Sta 119+42.97 to 123+45.36 (Rt) L = 402.4 LF

TOTAL = 400 + 412.8 + 150 + 402.4 = 1365. LF

432-1 GRAVEL MULCH

Sta 117+35 to Sta 119+75 (Lt) A = 700 S.FT

Sta 116+78 to Sta 117+91 (Rt) A = 320 S.FT.

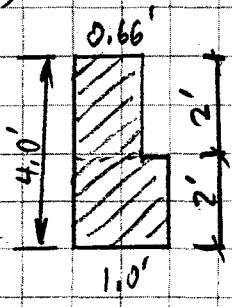
Sta 118+25 to Sta 119+43 (Rt) A = 700 S.FT

Areas measured using CADD

1720/9 = 192 S.Y.

505-1 STRUCTURAL CONCRETE (CLASS A)

Sta 119+42.97, Off 43.0' Lt to Off 43.0' Rt



L = 86 LF A = 0.66' * 2.0' + 1.0' * 2.0' = 3.32 S.FT.

WIER NOTCH

V = 86' * 3.32 S.FT / 27 = 10.1 CY

− [1.79' * 4 + 1.79 (3.58)] / 27

USE 10 CY

505-3 STEEL REINFORCEMENT

Wt_{STEEL} = 75 lb/CY * 10 CY = 750 lb

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 77 OF

DATE 9-4-98

COMPUTATIONS FOR QUANTITIES SH. 24

BY DES CHKD SDO 9/7/98

505-10 INLET AND OUTLET STRUCTURES (MAG Det 502-1)

Pipe 13 Inlet 1 ea

Pipe 9 Inlet 1 ea

2 each

515-1 ACCESS GATES

@ Sta 117+35 (Lt)

2 each

520-1 HANDRAIL (42")

Sta 116+05.03 to Sta 117+45.13 (Lt) L = 192 LF (measured along rail)

Sta 116+10.3 to Sta 119+32.5 L = 283.8 LF " "

L = 476 LF

618-3 12" RGRCP

Pipe 13

L = 90 LF

618-4 24" RGRCP

Pipe 9

L = 62 LF

505-6 CONCRETE INLET CHANNEL

Sta 122+07 to Sta 123+45

W = (2) * 10.06' + 20.0' = 40.12'

A = 138' * 40.12'/9 = 615 SY

A = 615 SY

635-3 CONCRETE LOW FLOW CHANNEL

Sta 114+00 to Sta 119+43

L = 543 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 78 OF

DATE 9-4-98

COMPUTATIONS FOR QUANTITIES SH. 25

BY DES CHKD BDO 9/7/98

215-1 EARTHWORK FOR DRAINAGE CHANNEL

for Left Dike $\forall_{CUT}$ = 1307 CY

for Right Dike $\forall_{CUT}$ = 1,917 CY

CUT = 3224 CY

216-3 DIRT IRRIGATION DITCH

Sta 124+00 to 124+07± (Lt)

L = .7 LF

201-1 CLEAR & GRUB

(TREE REMOVAL)

Sta 124+00 to 133+00 L = 900' W = 130'

3 AC

A = 900' * 130 / 43560 = 2.7 ac

350-4 RUBBLE & DEBRIS REMOVAL

Assume 10 tons

W = 10 Tons

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 79 OF

DATE 9-4-98

COMPUTATIONS FOR QUANTITIES E. TRIB. SH 26

BY DES CHKD BDO 9/7/98

201-1 CLEAR & GRUB (N.P.I.)

211-1 IRRIGATION DITCH FILL CONSTRUCTION

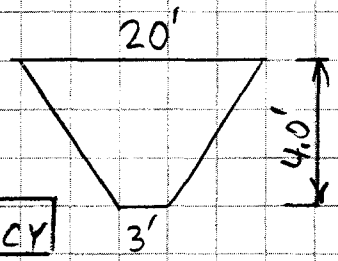
Sta 0+40 to 1+60

L = 120' A = 46.0' (see below)

∀ = 120' * 46 S.FT / 27 = 204.4 CY

Sta 2+00±, Off 15' Rt to 75' Rt

L = 60' A = (20+3)/2 * 4.0' = 46 S.FT



∀ = 60' * 46 S.FT / 27 = 102.2 CY

TOTAL = 204.4 + 102.2 = 306.6 CY ∀ = 307 CY

(Accounted for on Sheet 5 Qtys)

215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT 13652 CY FILL IS N.P.I. CUT 13652 CY

310-1 AGGREGATE BASE COURSE

For O&M Road Sta 1+96.39 to Sta 10+00.00 Less 80' For Conc Spillway

L = 803.6 − 80 = 723.6' W = 14' T = 0.33' ρ = 140 lb/CF

AB = 723.6' * 14' * 0.33' * 140 / 2000 = 234.0 TONS

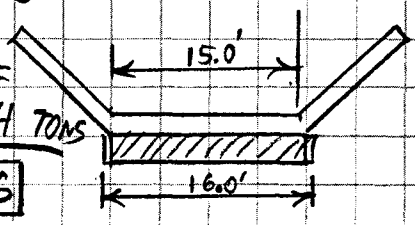
For Cul-de-Sac (Lt) AB = 343.8 TONS (see Sh 19 Qtys)

For Under Concrete Channel Lining (Typ Sec B3)

Sta 0+40.44 to Sta 10+00

L = 959.56' W = 16.0' T = 0.50' ρ = 140 lb/CF

AB = 959.56' * 16.0' * 0.50' * 140 / 2000 = 537.4 TONS



TOTAL = 234.0 + 343.8 + 537.4 = 1115 TONS

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 26

SHEET NO. 80 OF

DATE 9-4-98

BY DES CHKD BDO 9/7/98

350-3 REMOVE CHAIN LINK FENCE $\boxed{L = 955\ LF}$

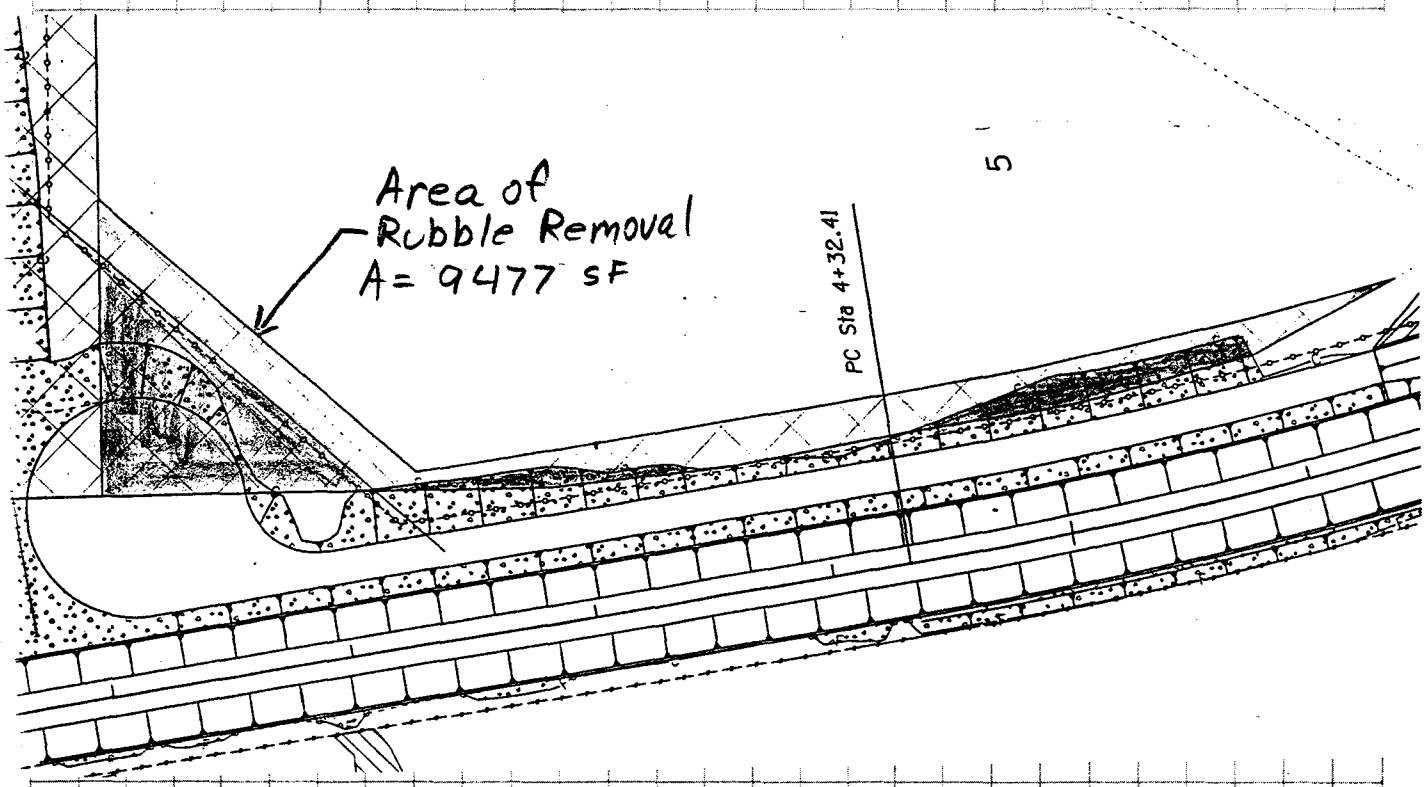
Sta 0+45 to Sta 10+00 (Rt)

350-4 RUBBLE & DEBRIS REMOVAL

$A = 9{,}477\ SF$ $\rho_{RUBBLE} = 50\ lb/CF$

$T_{AVG} = (5.5' + 6.0' + 5.5' + 6.0')/4 = 5.75'$

$Wt_{RUBBLE} = 9{,}477_{SF} * 5.75' * 50\ lb/CF / 2000 = \boxed{1{,}360\ tons}$



SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITY E.TRIB. SH. 26

SHEET NO. 81 OF

DATE 9-4-98

BY DES CHKD BDO 9/7/98

415-1 BARRICADES
Sta 0+72.80 (ETC) off 30.0' Lt to 110.0' Lt

$\boxed{L = 80\ LF}$

420-1 CHAIN LINK FENCE & GATES
Sta 1+05.31, off 197.73 to 2+27.67, 50' Lt to sta 10+00.00 off 50.0' Lt

$\boxed{L = 964\ LF}$

L = 191.8' + 772.3' = 964.1'

421-1 WIRE FENCE
Sta 0+46.08, off 30.00' Rt = 76+42.02, off 50.00' RT (BULLARD WASH CHL)
to Sta 10+00 (ETC), off 30.00' Rt

$\boxed{L = 954\ LF}$

432-1 GRAVEL MULCH
Sta 0+45 to Sta 10+00 (Lt & Rt)

$L_{Lt} = 955' - 80' = 875'$ W = 9' (on slope) A = 875' * 9'/9 = 875 S.Y.

$L_{Rt} = 560'$ W = 6' A = 560' * 6'/9 = 373 S.Y.

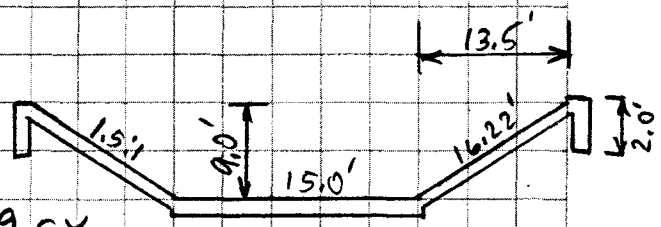
AREA N. of ODM in TCE/RW = (8250 + 2350)/9 = 1177.8 SY

TOTAL Gravel Mulch = $\boxed{2426\ SY}$

505-4 CONCRETE CHANNEL LINING
sta 0+43.5 to Sta 10+00.0

L = 956.5'

W = (2)(2.0' + 16.22') + 15.00' = 51.44'



$A_{\substack{CONC \\ 9' BANK}}$ = 956.5' * 51.44'/9 = 5466.9 S.Y.

A = $\boxed{5467\ SY}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 26

SHEET NO. 82 OF

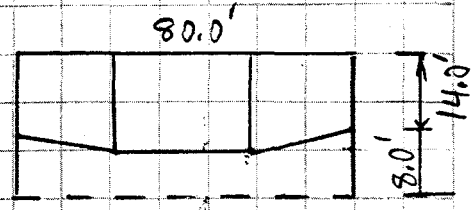
DATE 9-4-98

BY DES CHKD BDO 9/7/98

505-7 SPILLWAYS

Sta 6+40 to 7+20

$A = 80.0' * (8.0' + 14.0')/9 = \boxed{196 \text{ S.Y.}}$

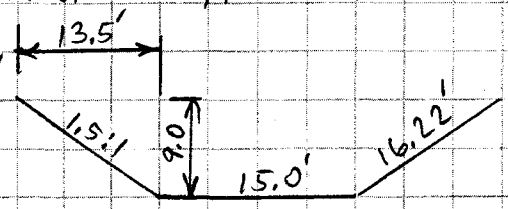


505-18 CONCRETE STAINING

E. TRIB CHL Sta 0+43.5 to Sta 3+43.5 (limit of stain application)

$L = 300'$ $W = (2)\,16.22' + 15.00' = 47.44'$

$A = 300' * 47.44' = \boxed{14{,}230 \text{ S.FT.}}$



SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 27

SHEET NO. 83 OF

DATE 9-5-98

BY DES CHKD BDO 9/7/98

201-1 CLEAR & GRUB (N.P.I.)

211-1 IRRIGATION DITCH FILL CONSTRUCTION
Area South of Inlet Apron & Berm
L = 120' W = 40' T = 3'
$\forall$ = 120' * 40' x 3'/27 = 533

215-1 EARTHWORK FOR DRAINAGE

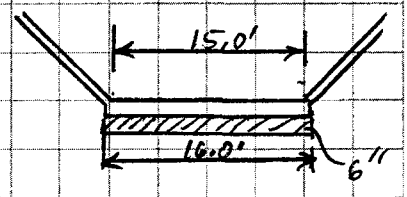
CUT = 14987 CY FILL (N.P.I.) $\forall_{CUT}$ = **14,987 CY**

310-1 AGGREGATE BASE COURSE
ORMRd sta 10+00 to 20+00

L = 1000' W = 14.0' T = 0.33' ρ = 140 lb/CF

AB = 1000' * 14.0' * 0.33' * 140 / 2000 = 323.4 TONS

Under Channel Lining
Sta 10+00 to Sta 20+00



L = 1000' W = 16' T = 0.5' ρ = 140 lb/CF

AB = 1000' * 16' * 0.5' * 140 / 2000 = 560.0 TONS

Airport Perimeter Road
Sta 10+65 to Sta 18+20 (Lt)
L = 755' W = 16' T = 0.33' ρ = 140 lb/CF

AB = 755' * 16.0' * 0.33' * 140 / 2000 = 279.0 TONS

TOTAL AB = 323.4 + 560.0 + 279.0 = **1162 TONS**

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 27

SHEET NO. 84 OF

DATE 9-5-98

BY DES CHKD BDO 9/7/98

350-5 MISCELLANEOUS REMOVALS

Airport Perimeter Road Milled AC Pvmt
Sta 10+65 To Sta 18+20 (Lt)

(N.P.I.)

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 27

SHEET NO. 35 OF

DATE 9-5-98

BY DES CHKD BDO 9/7/98

350-3 REMOVE CHAIN LINK FENCE
Sta 10+00 to Sta 19+00 (Rt) $\boxed{L = 900\,LF}$

420-1 CHAIN LINK FENCE & GATES
Sta 10+00 to Sta 19+00 (Lt) $\boxed{L = 900\,LF}$

421-1 WIRE FENCE
Sta 10+00 to Sta 19+00 (Rt) $\boxed{L = 900\,LF}$

432-1 GRAVEL MULCH
Sta 10+00 to Sta 19+00 (Lt)

L = 900 LF, W = 20' (on slope, 1.5:1, 11' wide)

A = 900 * 20'/9 = 2000 SY.

Sta 10+00 to Sta 19+00 (Rt)

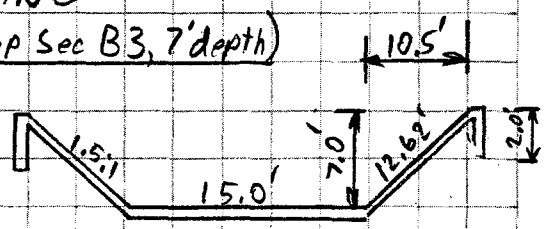
L = 900LF, W = 5' (Avg)

A = 900' * 5'/9 = 500 S.Y. $\boxed{A = 2850\ S.Y}$

Area N. of O&M Rd = 3106 S.FT/9 = 345.1 SY

505-4 CONCRETE CHANNEL LINING
Sta 10+20 to Sta 19+00 (Typ Sec B3, 7' depth)

L = 880' W = (2)(12.62 + 2.00') + 15.00'
W = 44.24'



A = 880' * 44.24'/9 = 4325.7 S.Y.

For Transition @ Sta 10+00 to Sta 10+20 (9' to 7' depth)

L = 20' W = (51.44' + 44.24')/2 = 47.84'
A = 20' * 47.84'/9 = 106.3 SY.

TOTAL CONC A = 4325.7 + 106.3 = $\boxed{4432\ SY}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 28

SHEET NO. 86 OF

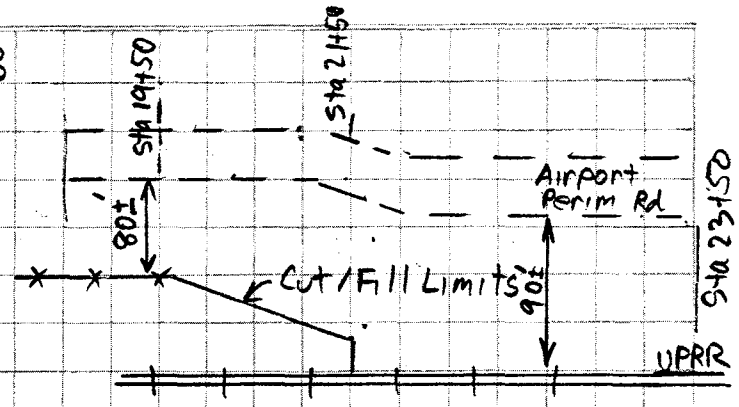
DATE 9-5-98

BY DES CHKD BDO 9/7/98

201-1 CLEAR & GRUB
Sta 19+50 to 23+50

A = 26,370 S.FT.
(measured in CADD)

$\boxed{A = 0.6\ Ac}$



215-1 EARTHWORK FOR DRAINAGE CHANNEL

CUT = 2130 C.Y. FILL (N.P.I.)

$\boxed{\forall_{CUT} = 2130\ CY}$

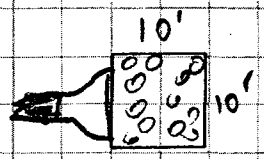
216-3 DIRT IRRIGATION DITCH (4' Bottom)
Sta 22+07.25 to Sta 22+90 (Lt)

$\boxed{L = 83\ LF}$

220-2 DUMPED RIPRAP
@ Pipe 10 Outlet Sta 21+72± (Detail II)

L = 10' W = 10' T = 1.0'

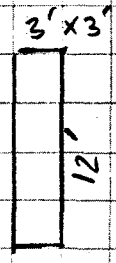
$\forall = 10' * 10' * 1 / 27 = 3.7\ CY$



$\boxed{\forall_{RIPRAP} = 4\ CY}$

221-1 GABION BASKETS
Sta 22+03.9, Off = 57' Lt to Sta 22+06.8, Off = 68.5'

$\forall = 12' * 3' * 3' / 27 = \boxed{4\ CY}$



SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 28

SHEET NO. 87 OF

DATE 9-5-98

BY DES CHKD ~~BDD~~ 9/7/98

310-1 AGGREGATE BASE COURSE

O & M Road Sta 19+00 to 22+70 ± (Lt)

L = 370' W = 14' T = 0.33' ρ = 140 lb/cF

AB = 370' * 14' * 0.33' * 140/2000 = 119.7 TONS

for Concrete Channel Lining (Typ Sec B3) and Trans

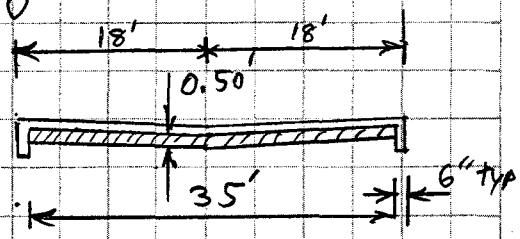
Sta 19+00 to Sta 21+90

L = 290' W = 16' T = 0.50' ρ = 140 lb/cF see sh. 26 Qtys Sketch

AB = 290' * 16' * 0.50' * 140/2000 = 162.4 TONS

for Concrete Channel Inlet Apron

Sta 21+90 to Sta 23+00



L = 110' W = (36' - 1') = 35'

T = 0.50' ρ = 140 lb/cF

AB = 110' * 35' * 0.50' * 140/2000 = 134.8 TONS

TOTAL = 119.7 + 162.4 + 134.8 = 416.9

AB = 417 TONS

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 28

SHEET NO. 88 OF

DATE 9-5-98

BY DES CHKD BDO 9/7/98

350-2 REMOVE IRRIGATION CULVERTS
@ Sta 21+50 to Sta 22+00 (Lt)

$L_{PIPE\ (EACH)} = 27'\pm$ # Pipes = 5

Lump Sum

$L_{REMOVAL} = 135LF$

350-3 REMOVE CHAIN LINK FENCE
sta 19+00 to sta 23+00± (Lt)

L = 400 LF

350-4 RUBBLE & DEBRIS REMOVAL

WT = 10 TONS

420-1 CHAIN LINK FENCE & GATES
Sta 19+00.00 to Sta 23+00.00 (Lt, Several ∡ Points)

L = 87.4' + 30.4' + 175.4' + 128.1' = 421.3'

L = 422 LF

421-1 WIRE FENCE
sta 19+00 to Sta 19+50

L = 50LF

432-1 GRAVEL MULCH
sta 19+00 to 21+00±

L = 200' W = 10.5 A = 200' * 10.5/9 = 233 S.Y.

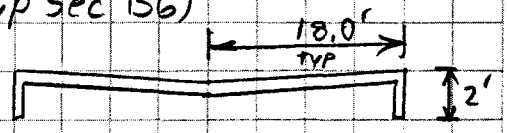
505-4 CONCRETE CHANNEL LINING
Sta 19+00 to sta 21+90 (Typ Sec B3) & Transition

L = 290' W = 44.24' (see SH 27 Qtys)

A = 290' * 44.24'/9 = 1425.5 S.Y.

Sta 21+90 to 23+00 (Typ Sec B6)

L = 110' W = (2)(18.0' + 2.0') = 40.0'



A = 110' * 40'/9 = 488.9 S.Y.

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 28

SHEET NO. 89 OF

DATE 9-5-98

BY DES CHKD BDO 9/7/98

505-14	INLET & OUTLET STRUCTURES (MAG Det 501-5) Pipe 10 Inlet		1 each
505-16	INLET STRUCTURE DETAIL 13		1 each
505-15	OUTLET STRUCTURE DETAIL 22		1 each
515-2	SAFETY POSTS @ sta 21+60 @ Sta 23+02	 2 each 5 each	7 each
515-3	REMOVEABLE SAFETY POSTS @ sta 21+60 @ sta 23+02	 1 each 1 each	2 each
618-5	30" RGRCP Pipe 10		L = 122 LF
618-7	60" RGRCP Pipe 11 4 * 58 = 232 LF		L = 232 LF

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH. 29

SHEET NO. 90 OF

DATE 9-5-98

BY DES CHKD ~~BDO~~ 9/2/98

211-1 NOTE: Irrigation ditch along south edge of Lower Buckeye Road will be filled in by the typical section H1.

211-4 LOWER BUCKEYE ROAD BERM CONSTRUCTION
sta 49+00 to 58+00

FILL = 4,449 CY

216-2 GRADED V-DITCH
sta 49+50 to Sta 58+00

L = 850 LF

301-1 FARM ROADS
sta 49+00 to 58+00 (Lt and Rt)

L = (2) * 900' = 1800 LF

L = 1800 LF

310-1 AGGREGATE BASE COURSE
Sta 49+00 to 58+00

L = 900' W = 16.0' T = 0.33' ρ = 140 lb/CF

AB = 900' * 16' * 0.33' * 140 / 2000 = 332.6 TONS

AB = 333 Tons

432-1 GRAVEL MULCH
Sta 49+50 to 58+00 (Lt only)

L = 850' W = 11' (avg) on slope A = 850' * 11' / 9 = 1038.9 SY

A = 1040 SY

SVERDRUP

JOB BULLARD WASH CHANNEL

SHEET NO. 91 OF

DATE 9-5-98

COMPUTATIONS FOR QUANTITIES SH. 30

BY DES CHKD BDO 9/7/98

211-4 LOWER BUCKEYE ROAD BERM CONSTRUCTION
Sta 58+00 to 62+15±

FILL = 2110 CY

$\boxed{2{,}110\ CY}$

216-2 GRADED V-DITCH
Sta 58+00 to 61+93

$\boxed{L = 393\ LF}$

301-1 FARM & BID CANAL ROADS
Sta 58+00 to Sta 62+00± (Lt & Rt)

$\boxed{L = 800\ LF}$

310-1 AGGREGATE BASE COURSE
Sta 58+00 to Sta 62+00

L = 400' W = 16' T = 0.33' ρ = 140 lb/CF

AB = 400' * 16' * 0.33' * 140 / 2000 = $\boxed{147.8\ Tons}$

350-2 REMOVE IRRIGATION CULVERTS
@ Sta 61+50 ± (Lt)
24" RCP, 32 LF

$\boxed{1\ each}$

Lump Sum

432-1 GRAVEL MULCH

L = 400 LF W = 11' Avg A = 400 * 11/9 = 488.9 SY

$\boxed{490\ SY}$

SVERDRUP

JOB BULLARD WASH CHANNEL

COMPUTATIONS FOR QUANTITIES SH 31

SHEET NO. 92 OF

DATE 9-5-98

BY DES CHKD BDO 9/7/98

301-1 FARM & BID CANAL ROADS
Sta 0+00 to 5+34.13 (S. BID MAINT. RD. BYPASS)

L = 534 - 53 = 481 LF

480 LF

415-1 Barricades called out on Sh 15

421-1 Wire Fence called out on Sh 15

NEED BID ITEM# 515-4 DELINEATORS
Sta 0+00 to Sta 5+34.13 (S. BID)

LEFT SIDE 12 + 12 = 24 ea
RIGHT SIDE 12 + 11 = 23 ea

47 each

GENERAL NOTES:

Construction Specifications - Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 1998 and revisions to date, and the Special Provisions.

Design Specifications - AASHTO Standard Specifications for Highway Bridges, 16th Edition, 1996.

Dead Load - Water with sediment load 65 pcf. Design flow in overchute=Q_{100}=3,200 cfs. Design water depth in overchute=5 ft at wall.

Vehicle Loading Class - HS20-44 Maintenance Vehicle

Seismic Performance Category A (Acc. = 0.03g)

Reinforcing shall conform to ASTM Specification A615 (AASHTO M31). All reinforcing shall be furnished as Grade 60 (fy=60,000 psi).

All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise. All bend or hook dimensions not shown shall be standard bends or hooks.

All reinforcing shall have 2 inches clear cover unless noted otherwise.

Prestressing steel shall conform to ASTM Specification A416 (AASHTO M203) Uncoated Seven-Wire Stress Relieved Steel Strand for Prestressed Concrete, Low-Relaxation, ½" nominal diameter, Grade 270.

Stresses:

Precast-Prestressed Concrete	f'c = 5,000 psi
Abutments and Drilled Shafts (MAG Class A)	f'c = 3,000 psi
All other concrete (MAG Class AA)	f'c = 4,000 psi
Grade 60 reinforcing steel	fs = 24,000 psi
Prestressing Steel	f's = 270,000 psi
Allowable concrete tension stress in the precompressed tensile zone at service load after losses have occurred	f_t = 424 psi.

Slabs shall be prestressed by the pretensioning method only.

Chamfer all exposed corners ¾" unless noted otherwise.

Dimensions shall not be scaled from drawings.

See Drilled Shaft Notes for drilled shaft foundation information.

See Special Provisions for staining of exposed concrete and for rustication formliner.

APPROXIMATE QUANTITIES					
	Class A Concrete f'c=3000 C.Y.	Class AA Concrete f'c=4000 C.Y.	Reinf. Steel lbs.	30" ϕ Drilled Shafts Lin. Ft.	AASHTO Precast Slab Each
Abutment #1	40		3917	175	
Abutment #2	40		3917	175	
Superstructure		122	7834		16
Approach Slab		244	21543		
Channel Walls		49	7081		
Total	80	415	44292	350	16
As-Built Total					

b.dgn 12/6/93 Filename: p:\013884\0000\010\bodg\010\str\010\bodgnotes.dgn Plotted By: ahishirk Date: 08-SEP-1998 11:25