Station	Distance (m)	Earthwork													Slope Protection					Station
		Cut Volume							Embankment Volume				Balance A - B	Accumulated Volume	Lateral Volume	Left Side		Right Side		
		Common (C=0.90)			Weathered Rock (C=1.10)			Total	Embankment Section			Total Embankment								Total Area	
		Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Corrected Cut Volume A (m3)	Sectional Area (m2)	Volume (m3)	Vary Volume (m3)	Volume B (m3)	(m3)	(m3)	(m3)	Slope Length (m)	Area (m2)	Slope Length (m)	Area (m2)	(m2)	
2 + 950.000		0.0			0.0				310.8					24,740		0.0		19.4			2 + 950.000
2 + 970.000	20.000	0.0	0	0	0.0	0	0	0	206.8	5,176		5,176	-5,176	19,564	0	16.0	160	24.4	438	598	2 + 970.000
2 + 994.080	24.080	0.0	0	0	0.0	0	0	0	20.2	2,733		2,733	-2,733	16,831	0	0.0	193	4.0	342	535	2 + 994.080
3 + 44.790	50.710	15.8	401	361	74.0	1,876	2,064	2,424	2.0	563		563	1,862	18,693	563	4.6	117	1.4	137	254	3 + 44.790
3 + 60.000	15.210	8.2	183	164	0.0	563	619	783	1.1	24		24	760	19,453	24	4.8	71	0.8	17	88	3 + 60.000
3 + 95.310	35.310	17.2	448	404	5.4	95	105	508	0.0	19		19	489	19,942	19	3.8	152	1.4	39	191	3 + 95.310
3 + 140.000	44.690	16.0	742	668	43.4	1,090	1,199	1,867	0.0	0		0	1,867	21,809	0	5.5	208	1.0	54	261	3 + 140.000
3 + 177.450	37.450	28.4	831	748	100.4	2,693	2,962	3,710	0.0	0		0	3,710	25,519	0	4.0	178	2.4	64	242	3 + 177.450
3 + 190.000	12.550	13.6	264	237	80.0	1,132	1,245	1,482	0.0	0		0	1,482	27,001	0	0.0	25	2.8	33	58	3 + 190.000
3 + 210.000	20.000	16.0	296	266	29.2	1,092	1,201	1,468	0.0	0		0	1,468	28,469	0	0.0	0	2.0	48	48	3 + 210.000
3 + 231.220	21.220	44.4	641	577	108.8	1,464	1,611	2,187	0.0	0		0	2,187	30,656	0	5.0	53	1.8	40	93	3 + 231.220
3 + 250.000	18.780	26.0	661	595	58.6	1,572	1,729	2,324	0.0	0		0	2,324	32,980	0	3.6	81	1.8	34	115	3 + 250.000
3 + 270.000	20.000	21.8	478	430	7.6	662	728	1,158	0.0	0		0	1,158	34,139	0	4.0	76	2.2	40	116	3 + 270.000
3 + 284.820	14.820	29.2	378	340	47.4	408	448	788	0.0	0		0	788	34,927	0	4.6	64	1.6	28	92	3 + 284.820
3 + 320.000	35.180	10.8	704	633	1.0	851	936	1,570	0.0	0		0	1,570	36,497	0	4.0	151	0.9	44	195	3 + 320.000
3 + 352.280	32.280	16.0	433	389	5.2	100	110	499	0.0	0		0	499	36,996	0	6.4	168	0.0	15	182	3 + 352.280
3 + 370.000	17.720	12.8	255	230	1.2	57	62	292	0.0	0		0	292	37,288	0	3.0	83	0.0	0	83	3 + 370.000
3 + 390.000	20.000	24.0	368	331	14.2	154	169	501	0.0	0		0	501	37,789	0	13.0	160	1.4	14	174	3 + 390.000
3 + 405.590	15.590	22.2	360	324	2.6	131	144	468	0.0	0		0	468	38,257	0	8.2	165	0.0	11	176	3 + 405.590
3 + 440.000	34.410	30.8	912	821	36.0	664	731	1,551	0.0	0		0	1,551	39,808	0	4.8	224	2.2	38	262	3 + 440.000
3 + 478.600	38.600	32.8	1,227	1,105	114.8	2,910	3,201	4,306	0.0	0		0	4,306	44,115	0	3.2	154	1.6	73	228	3 + 478.600
3 + 490.000	11.400	31.2	365	328	107.2	1,265	1,392	1,720	0.0	0		0	1,720	45,835	0	3.0	35	1.6	18	54	3 + 490.000
3 + 510.000	20.000	22.4	536	482	26.8	1,340	1,474	1,956	0.0	0		0	1,956	47,791	0	3.2	62	1.5	31	93	3 + 510.000
3 + 530.000	20.000	18.8	412	371	15.2	420	462	833	0.0	0		0	833	48,624	0	7.0	102	1.5	30	132	3 + 530.000
3 + 544.570	14.570	25.2	321	288	16.4	230	253	542	0.0	0		0	542	49,166	0	3.8	79	1.5	22	101	3 + 544.570
3 + 573.300	28.730	22.6	687	618	27.2	626	689	1,307	0.0	0		0	1,307	50,473	0	2.8	95	2.6	30	154	3 + 573.300
3 + 600.000	26.700	23.6	617	555	73.2	1,314	1,445	2,000	0.0	0		0	2,000	52,473	0	2.8	75	1.0	48	123	3 + 600.000
3 + 620.000	20.000	25.6	492	443	29.6	1,008	1,109	1,552	0.0	0		0	1,552	54,024	0	4.7	75	1.6	26	101	3 + 620.000
3 + 640.000	20.000	17.2	428	385	33.2	428	471	856	0.0	0		0	856	54,880	0	2.7	74	1.3	29	103	3 + 640.000
3 + 660.000	20.000	40.6	578	520	93.6	1,068	1,175	1,695	0.0	0		0	1,695	56,575	0	3.6	63	2.6	39	102	3 + 660.000
3 + 690.000	30.000	19.2	897	807	12.2	1,587	1,746	2,553	0.0	0		0	2,553	59,128	0	5.3	134	2.0	69	203	3 + 690.000
3 + 719.140	29.140	1.7	305	274	16.6	420	462	736	0.0	0		0	736	59,864	0	0.0	77	0.0	29	106	3 + 719.140
3 + 740.060	20.920	30.8	340	306	75.2	960	1,056	1,362	0.0	0		0	1,362	61,226	0	3.2	33	0.0	0	33	3 + 740.060
3 + 760.000	19.940	1.2	319	287	0.0	750	825	1,112	0.6	6		6	1,106	62,332	6	0.0	32	1.2	12	44	3 + 760.000
3 + 780.000	20.000	0.0	12	11	0.0	0	0	11	27.2	278		278	-267	62,065	11	0.0	0	9.6	108	108	3 + 780.000
3 + 803.430	23.430	4.4	52	46	0.1	1	1	48	6.6	396		396	-348	61,717	48	5.0	59	4.0	159	218	3 + 803.430
3 + 820.000	16.570	10.4	123	110	3.1	27	29	140	0.8	61		61	78	61,795	61	4.8	81	0.5	37	118	3 + 820.000
3 + 840.000	20.000	0.0	104	94	0.0	31	34	128	40.4	412		412	-284	61,511	128	0.0	48	7.2	77	125	3 + 840.000
3 + 859.720	19.720	0.0	0	0	0.0	0	0	0	58.6	976		976	-976	60,534	0	0.0	0	16.7	236	236	3 + 859.720
3 + 880.000	20.280	0.0	0	0	0.0	0	0	0	175.7	2,376		2,376	-2,376	58,159	0	0.0	0	23.4	407	407	3 + 880.000
3 + 900.000	20.000	0.0	0	0	0.0	0	0	0	140.4	3,161		3,161	-3,161	54,998	0	0.0	0	17.7	411	411	3 + 900.000
3 + 913.190	13.190	0.0	0	0	0.0	0	0	0	10.9	998		998	-998	54,000	0	0.0	0	3.4	139	139	3 + 913.190
3 + 950.000	36.810	5.6	103	93	12.0	221	243	336	0.0	201		201	135	54,135	201	8.6	158	0.0	63	221	3 + 950.000
3 + 986.660	36.660	17.1	416	374	58.6	1,294	1,424	1,798	0.0	0		0	1,798	55,933	0	3.4	220	1.0	18	238	3 + 986.660
4 + 20.000	33.340	24.4	692	623	10.2	1,147	1,262	1,884	0.0	0		0	1,884	57,817	0	4.8	137	2.4	57	193	4 + 20.000
4 + 37.420	17.420	13.6	331	298	8.8	165	182	480	0.0	0		0	480	58,297	0	6.4	98	0.7	27	125	4 + 37.420
4 + 84.730	47.310	0.0	322	290	0.0	208	229	519	9.1	215		215	303	58,600	215	0.0	151	1.5	52	203	4 + 84.730
4 + 110.000	25.270	0.0	0	0	0.0	0	0	0	28.0	469		469	-469	58,131	0	12.9	163	1.5	38	201	4 + 110.000
4 + 130.000	20.000	0.0	0	0	0.0	0	0	0	360.6	3,886		3,886	-3,886	54,245	0	20.4	333	21.7	232	565	4 + 130.000
4 + 150.000	20.000	0.0	0	0	0.0	0	0	0	399.4	7,600		7,600	-7,600	46,645	0	0.0	204	34.4	561	765	4 + 150.000
4 + 167.420	17.420	0.0	0	0	0.0	0	0	0	65.7	4,051		4,051	-4,051	42,594	0	0.0	0	18.2	458	458	4 + 167.420
4 + 180.000	12.580	0.0	0	0	0.0	0	0	0	124.2	1,194		1,194	-1,194	41,400	0	0.0	0	26.8	283	283	4 + 180.000
4 + 200.000	20.000	0.0	0	0	0.0	0	0	0	133.0	2,572		2,572	-2,572	38,828	0	0.0	0	30.2	570	570	4 + 200.000
4 + 230.000	30.000	0.0	0	0	0.0	0	0	0	218.4	5,271		5,271	-5,271	33,557	0	0.0	0	30.0	903	903	4 + 230.000
4 + 250.000	20.000	0.0	0	0	0.0	0	0	0	154.0	3,724		3,724	-3,724	29,833	0	0.0	0	24.6	546	546	4 + 250.000
4 + 265.180	15.180	0.0	0	0	0.0	0	0	0	59.6	1,621		1,621	-1,621	28,212	0	0.0	0	23.8	367	367	4 + 265.180
4 + 300.000	34.820	1.4	24	22	0.0	0	0	22	30.2	1,563		1,563	-1,541	26,670	22	0.6	10	23.7	827	837	4 + 300.000
4 + 320.000	20.000	3.7	51	46	0.0	0	0	46	53.2	834		834	-788	25,882	46	0.7	13	35.0	587	600	4 + 320.000
4 + 341.170	21.170	0.3	42	38	0.0	0	0	38	85.2	1,465		1,465	-1,427	24,455	38	0.8	16	39.2	785	801	4 + 341.170
4 + 360.000	18.830	3.2	33	30	0.0	0	0	30	1.3	814		814	-785	23,671	30	3.2	38	3.8	405	443	4 + 360.000
Sub Total	1,410.000		18,181	16,363		32,025	35,228	51,590		52,660		52,660	-1,070		1,411		5,147		10,273	15,420	Sub Total
Total	4,360.000		52,587	47,328		78,878	86,766	134,094		110,423		110,423	23,671		12,785		16,434		22,142	38,576	Total

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Station	Distance (m)	Earthwork													Slope Protection					Station
		Cut Volume							Embankment Volume						Left Side		Right Side		Total Area	
		Common (C=0.90)			Weathered Rock (C=1.10)			Total Corrected Cut Volume A	Embankment Section			Total Embankment Volume B	Balance A - B	Accumulated Volume	Lateral Volume	Slope Length	Area	Slope Length	Area	
		Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)		Sectional Area (m2)	Volume (m3)	Vary Volume (m3)		(m3)	(m3)	(m3)	(m)	(m2)	(m)	(m2)	(m2)	
4 + 360.000		3.2			0.0				1.3					23,671		3.2		3.8			4 + 360.000
4 + 380.000	20.000	7.6	108	97	0.0	0	0	97	0.0	13		13	84	23,755	13	1.8	50	0.0	38	88	4 + 380.000
4 + 399.300	19.300	9.6	166	149	0.0	0	0	149	0.0	0		0	149	23,904	0	2.2	39	0.0	0	39	4 + 399.300
4 + 440.000	40.700	8.0	358	322	0.0	0	0	322	0.0	0		0	322	24,226	0	3.2	110	0.0	0	110	4 + 440.000
4 + 463.070	23.070	1.2	106	96	0.0	0	0	96	0.2	2		2	93	24,320	2	0.4	42	0.2	2	44	4 + 463.070
4 + 480.000	16.930	2.8	34	30	0.0	0	0	30	0.0	2		2	29	24,348	2	1.0	12	0.0	2	14	4 + 480.000
4 + 500.000	20.000	4.2	70	63	0.0	0	0	63	0.0	0		0	63	24,411	0	1.0	20	1.0	10	30	4 + 500.000
4 + 514.500	14.500	8.4	91	82	0.0	0	0	82	0.0	0		0	82	24,494	0	2.5	25	0.6	12	37	4 + 514.500
4 + 546.640	32.140	0.2	138	124	0.0	0	0	124	0.8	13		13	112	24,605	13	0.0	40	0.0	10	50	4 + 546.640
4 + 605.800	59.160	6.0	183	165	0.0	0	0	165	0.0	24		24	141	24,747	24	1.8	53	0.0	0	53	4 + 605.800
4 + 639.270	33.470	4.8	181	163	0.0	0	0	163	0.0	0		0	163	24,909	0	0.7	42	0.6	10	52	4 + 639.270
4 + 660.000	20.730	0.0	50	45	0.0	0	0	45	24.4	253		253	-208	24,701	45	4.0	49	4.0	48	96	4 + 660.000
4 + 690.000	30.000	0.0	0	0	0.0	0	0	0	3.8	423		423	-423	24,278	0	0.0	60	0.8	72	132	4 + 690.000
4 + 710.000	20.000	19.4	194	175	0.0	0	0	175	0.0	38		38	137	24,415	38	2.6	26	0.0	8	34	4 + 710.000
4 + 730.000	20.000	10.2	296	266	0.0	0	0	266	0.0	0		0	266	24,681	0	4.0	66	0.0	0	66	4 + 730.000
4 + 744.070	14.070	7.4	124	111	0.0	0	0	111	0.0	0		0	111	24,793	0	5.0	63	0.0	0	63	4 + 744.070
4 + 794.960	50.890	5.2	321	289	0.0	0	0	289	0.0	0		0	289	25,081	0	2.8	198	0.0	0	198	4 + 794.960
4 + 810.000	15.040	9.2	108	97	0.0	0	0	97	0.0	0		0	97	25,179	0	3.8	50	0.0	0	50	4 + 810.000
4 + 830.000	20.000	6.4	156	140	0.0	0	0	140	0.0	0		0	140	25,319	0	3.8	76	0.0	0	76	4 + 830.000
4 + 846.490	16.490	1.6	66	59	0.0	0	0	59	1.1	9		9	50	25,369	9	2.1	49	2.6	21	70	4 + 846.490
4 + 900.000	53.510	19.8	573	515	1.8	48	53	568	0.0	29		29	539	25,908	29	5.0	190	0.7	88	278	4 + 900.000
4 + 952.070	52.070	4.6	635	572	0.0	47	52	623	0.0	0		0	623	26,531	0	0.8	151	0.0	18	169	4 + 952.070
4 + 970.000	17.930	0.0	41	37	0.0	0	0	37	24.1	216		216	-179	26,352	37	0.0	7	13.2	118	126	4 + 970.000
4 + 990.000	20.000	0.0	0	0	0.0	0	0	0	19.6	437		437	-437	25,915	0	0.0	0	2.0	152	152	4 + 990.000
5 + 21.280	31.280	8.8	138	124	0.0	0	0	124	0.0	307		307	-183	25,733	124	2.0	31	1.6	47	78	5 + 21.280
5 + 50.000	28.720	2.8	167	150	0.0	0	0	150	0.0	0		0	150	25,883	0	0.0	42	0.0	14	56	5 + 50.000
5 + 100.000	50.000	0.0	70	63	0.0	0	0	63	12.4	310		310	-247	25,636	63	0.0	23	2.8	70	93	5 + 100.000
5 + 150.000	50.000	0.0	0	0	0.0	0	0	0	9.2	540		540	-540	25,096	0	0.0	0	1.9	118	118	5 + 150.000
5 + 200.000	50.000	3.0	75	68	0.0	0	0	68	0.0	230		230	-163	24,933	68	0.0	0	0.8	66	66	5 + 200.000
5 + 250.000	50.000	0.0	75	68	0.0	0	0	68	15.6	390		390	-323	24,611	68	0.0	0	2.5	83	83	5 + 250.000
5 + 286.410	36.410	0.0	0	0	0.0	0	0	0	34.8	918		918	-918	23,693	0	0.0	0	4.0	118	118	5 + 286.410
5 + 320.000	33.590	21.1	354	319	1.2	20	22	341	0.0	584		584	-243	23,450	341	4.0	67	0.0	67	134	5 + 320.000
5 + 340.000	20.000	2.0	231	208	0.0	12	13	221	0.3	3		3	218	23,668	3	1.7	57	0.4	4	61	5 + 340.000
5 + 360.000	20.000	0.0	20	18	0.0	0	0	18	3.2	35		35	-17	23,651	18	0.0	17	0.7	11	28	5 + 360.000
5 + 379.110	19.110	8.6	82	74	0.0	0	0	74	0.6	36		36	38	23,689	36	5.5	53	1.5	21	74	5 + 379.110
5 + 421.280	42.170	2.4	232	209	0.0	0	0	209	3.1	78		78	131	23,819	78	3.5	190	6.0	158	348	5 + 421.280
5 + 440.000	18.720	6.8	86	78	0.0	0	0	78	0.0	29		29	48	23,868	29	3.5	66	0.0	56	122	5 + 440.000
5 + 460.000	20.000	17.2	240	216	0.0	0	0	216	0.0	0		0	216	24,084	0	3.8	73	0.0	0	73	5 + 460.000
5 + 480.000	20.000	10.0	272	245	0.0	0	0	245	0.0	0		0	245	24,329	0	3.0	68	0.0	0	68	5 + 480.000
5 + 526.920	46.920	0.6	249	224	0.0	0	0	224	0.4	9		9	214	24,543	9	0.0	70	0.6	14	84	5 + 526.920
5 + 540.000	13.080	4.0	30	27	0.0	0	0	27	0.0	3		3	24	24,567	3	0.6	4	0.0	4	8	5 + 540.000
5 + 560.000	20.000	18.0	220	198	0.0	0	0	198	0.0	0		0	198	24,765	0	2.9	35	1.5	15	50	5 + 560.000
5 + 580.000	20.000	0.0	180	162	0.0	0	0	162	25.2	252		252	-90	24,675	162	0.0	29	6.0	75	104	5 + 580.000
5 + 600.000	20.000	2.4	24	22	0.0	0	0	22	2.7	279		279	-257	24,418	22	0.0	0	0.2	62	62	5 + 600.000
5 + 620.000	20.000	8.2	106	95	0.0	0	0	95	0.0	27		27	68	24,486	27	2.8	28	0.0	2	30	5 + 620.000
5 + 649.560	29.560	8.8	251	226	0.0	0	0	226	0.0	0		0	226	24,713	0	3.8	98	0.0	0	98	5 + 649.560
5 + 696.210	46.650	0.2	210	189	0.0	0	0	189	0.4	9		9	180	24,892	9	0.2	93	0.3	7	100	5 + 696.210
5 + 720.000	23.790	0.0	2	2	0.0	0	0	2	7.6	95		95	-93	24,799	2	0.0	2	2.0	27	30	5 + 720.000
5 + 740.000	20.000	0.0	0	0	0.0	0	0	0	23.8	314		314	-314	24,485	0	0.0	0	4.7	67	67	5 + 740.000
5 + 764.660	24.660	0.0	0	0	0.0	0	0	0	18.2	518		518	-518	23,967	0	0.0	0	3.4	100	100	5 + 764.660
5 + 800.000	35.340	5.0	88	80	0.0	0	0	80	0.0	322		322	-242	23,725	80	1.9	34	1.5	87	120	5 + 800.000
5 + 850.000	50.000	1.2	155	140	0.0	0	0	140	0.5	13		13	127	23,852	13	0.0	48	1.0	63	110	5 + 850.000
5 + 900.000	50.000	4.4	140	126	0.0	0	0	126	0.0	13		13	114	23,966	13	1.0	25	0.0	25	50	5 + 900.000
5 + 950.000	50.000	6.0	260	234	0.0	0	0	234	0.0	0		0	234	24,200	0	0.2	30	0.0	0	30	5 + 950.000
6 + 0.000	50.000	5.2	280	252	0.0	0	0	252	0.0	0		0	252	24,452	0	4.0	105	0.0	0	105	6 + 0.000
6 + 50.000	50.000	5.0	255	230	0.0	0	0	230	0.0	0		0	230	24,681	0	2.3	158	0.0	0	158	6 + 50.000
6 + 100.000	50.000	20.4	635	572	0.0	0	0	572	0.0	0		0	572	25,253	0	3.7	150	2.5	63	213	6 + 100.000
6 + 150.000	50.000	0.0	510	459	0.0	0	0	459	110.8	2,770		2,770	-2,311	22,942	459	0.0	93	24.1	665	758	6 + 150.000
6 + 200.000	50.000	1.6	40	36	0.0	0	0	36	3.8	2,865		2,865	-2,829	20,113	36	1.3	33	1.3	635	668	6 + 200.000
6 + 250.000	50.000	20.4	550	495	2.0	50	55	550	0.0	95		95	455	20,568	95	5.7	175	2.0	83	258	6 + 250.000
Sub Total	1,890.000		10,227	9,204		177	195	9,399		12,502		12,502	-3,103		1,968		3,311		3,436	6,747	Sub Total
Total	6,250.000		62,814	56,532		79,055	86,961	143,493		122,925		122,925	20,568		14,753		19,745		25,578	45,323	Total

Station	Distance (m)	Earthwork													Slope Protection					Station
		Cut Volume							Embankment Volume						Left Side		Right Side		Total Area	
		Common (C=0.90)			Weathered Rock (C=1.10)			Total Corrected Cut Volume A (m3)	Embankment Section			Total Embankment Volume B (m3)	Balance A - B (m3)	Accumulated Volume (m3)	Lateral Volume (m3)	Slope Length (m)	Area (m2)	Slope Length (m)	Area (m2)		
		Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)		Sectional Area (m2)	Volume (m3)	Vary Volume (m3)									
6 + 250.000		20.4			2.0				0.0					20,568		5.7		2.0		6 + 250.000
6 + 278.300	28.300	15.0	501	451	19.0	297	327	778	0.0	0		0	778	21,345	0	6.3	170	1.7	52	222	6 + 278.300
6 + 300.000	21.700	0.2	165	148	0.0	206	227	375	2.6	28		28	347	21,692	28	0.0	68	6.5	89	157	6 + 300.000
6 + 332.340	32.340	0.0	3	3	0.0	0	0	3	34.2	595		595	-592	21,100	3	0.0	0	3.0	154	154	6 + 332.340
6 + 360.000	27.660	8.8	122	110	0.0	0	0	110	0.9	485		485	-376	20,724	110	2.0	28	0.0	41	69	6 + 360.000
6 + 400.000	40.000	2.4	224	202	0.0	0	0	202	0.0	18		18	184	20,908	18	0.3	46	0.0	0	46	6 + 400.000
6 + 450.000	50.000	0.0	60	54	0.0	0	0	54	12.2	305		305	-251	20,657	54	0.0	8	1.4	35	43	6 + 450.000
6 + 510.150	60.150	0.0	0	0	0.0	0	0	0	38.4	1,522		1,522	-1,522	19,135	0	0.0	0	5.5	208	208	6 + 510.150
6 + 520.000	9.850	0.0	0	0	0.0	0	0	0	65.2	510		510	-510	18,625	0	0.0	0	4.0	47	47	6 + 520.000
6 + 540.000	20.000	25.6	256	230	18.0	180	198	428	0.0	652		652	-224	18,401	428	1.7	17	2.8	68	85	6 + 540.000
6 + 560.000	20.000	8.0	336	302	5.2	232	255	558	0.0	0		0	558	18,959	0	3.5	52	0.0	28	80	6 + 560.000
6 + 571.680	11.680	16.4	142	128	5.6	63	69	198	0.0	0		0	198	19,157	0	5.5	53	0.0	0	53	6 + 571.680
6 + 610.100	38.420	16.8	638	574	2.8	161	178	751	0.0	0		0	751	19,908	0	8.5	269	0.0	0	269	6 + 610.100
6 + 630.000	19.900	3.8	215	193	1.2	40	44	237	0.8	8		8	229	20,137	8	10.0	85	4.0	40	124	6 + 630.000
6 + 650.000	20.000	0.0	48	43	0.0	12	13	56	1.8	26		26	30	20,168	26	0.0	0	3.5	75	75	6 + 650.000
6 + 670.000	20.000	3.6	36	33	1.6	16	18	50	1.9	37		37	13	20,181	37	2.6	26	3.0	45	71	6 + 670.000
6 + 687.300	17.300	1.0	40	36	1.2	24	27	62	0.0	16		16	46	20,227	16	2.5	44	0.0	0	53	6 + 687.300
6 + 720.000	32.700	1.5	41	37	0.0	20	22	58	0.0	0		0	58	20,285	0	1.5	65	0.0	0	65	6 + 720.000
6 + 748.600	28.600	22.4	342	308	0.8	11	13	320	0.0	0		0	320	20,605	0	5.0	93	2.2	31	124	6 + 748.600
6 + 760.000	11.400	24.4	267	240	0.8	9	10	250	0.0	0		0	250	20,855	0	5.5	60	2.3	26	86	6 + 760.000
6 + 780.000	20.000	16.6	410	369	15.6	164	180	549	0.0	0		0	549	21,405	0	6.0	115	1.7	40	155	6 + 780.000
6 + 801.020	21.020	8.0	259	233	0.0	164	180	413	0.8	8		8	405	21,809	8	2.0	84	1.5	34	118	6 + 801.020
6 + 843.870	42.850	0.0	171	154	0.0	0	0	154	2.2	64		64	90	21,899	64	0.0	43	0.6	32	75	6 + 843.870
6 + 860.000	16.130	0.0	0	0	0.0	0	0	0	12.0	115		115	-115	21,785	0	12.1	98	15.4	124	222	6 + 860.000
6 + 880.000	20.000	0.0	0	0	0.0	0	0	0	62.4	744		744	-744	21,041	0	0.0	121	19.0	344	465	6 + 880.000
6 + 895.080	15.080	3.0	23	20	1.0	8	8	28	22.4	639		639	-611	20,430	29	0.0	0	18.6	284	284	6 + 895.080
6 + 910.000	14.920	21.2	191	162	0.0	7	8	171	0.0	167		167	4	20,434	167	2.7	20	3.0	161	181	6 + 910.000
6 + 930.000	20.000	16.8	388	342	9.2	92	101	443	0.8	8		8	435	20,869	8	8.0	107	0.9	39	146	6 + 930.000
6 + 952.000	22.000	0.0	185	166	0.0	101	111	278	7.6	92		92	185	21,054	92	0.0	88	0.0	10	98	6 + 952.000
7 + 0.000	48.000	0.8	19	17	0.0	0	0	17	0.0	182		182	-165	20,889	17	0.0	0	0.0	0	0	7 + 0.000
7 + 50.000	50.000	24.4	630	567	6.4	160	176	743	0.0	0		0	743	21,632	0	5.5	138	1.9	48	185	7 + 50.000
7 + 75.000	25.000	2.0	330	297	4.4	135	149	446	0.0	0		0	446	22,078	0	0.0	69	0.0	24	93	7 + 75.000
7 + 111.980	36.980	6.0	148	133	0.0	81	89	223	0.0	0		0	223	22,300	0	0.0	0	0.7	13	13	7 + 111.980
7 + 130.000	18.020	28.8	314	282	10.8	97	107	389	0.0	0		0	389	22,689	0	4.4	40	2.4	28	68	7 + 130.000
7 + 150.000	20.000	15.6	444	400	1.2	120	132	532	0.0	0		0	532	23,221	0	7.3	117	0.0	24	141	7 + 150.000
7 + 165.370	15.370	0.0	120	108	0.0	9	10	118	47.2	363		363	-245	22,976	118	0.0	56	17.5	134	191	7 + 165.370
7 + 200.000	34.630	14.4	249	224	0.8	14	15	240	0.6	828		828	-588	22,388	240	5.1	88	0.6	313	402	7 + 200.000
7 + 218.410	18.410	0.0	133	119	0.0	7	8	127	32.4	304		304	-176	22,212	127	0.0	47	2.0	24	71	7 + 218.410
7 + 240.000	21.590	8.0	86	78	0.0	0	0	78	0.0	350		350	-272	21,940	78	1.2	13	1.0	32	45	7 + 240.000
7 + 260.000	20.000	7.9	159	143	0.0	0	0	143	0.0	0		0	143	22,083	0	2.2	34	0.4	14	48	7 + 260.000
7 + 274.010	14.010	2.2	71	64	0.0	0	0	64	0.0	0		0	64	22,147	0	0.8	21	0.0	3	24	7 + 274.010
7 + 290.000	15.990	8.8	88	79	0.0	0	0	79	0.0	0		0	79	22,226	0	3.0	30	0.9	7	38	7 + 290.000
7 + 330.000	40.000	0.0	176	158	0.0	0	0	158	0.8	16		16	142	22,368	16	0.0	60	0.0	18	78	7 + 330.000
7 + 340.000	10.000	2.4	12	11	0.0	0	0	11	0.0	4		4	7	22,375	4	0.6	3	0.0	0	3	7 + 340.000
7 + 359.760	19.760	22.8	249	224	3.4	34	37	261	0.0	0		0	261	22,636	0	4.0	45	2.1	21	66	7 + 359.760
7 + 387.640	27.880	6.4	407	366	0.0	47	52	418	0.4	6		6	413	23,049	6	9.0	181	0.0	29	210	7 + 387.640
7 + 410.000	22.360	2.8	103	93	0.0	0	0	93	0.0	4		4	88	23,137	4	1.1	113	0.0	0	113	7 + 410.000
7 + 430.000	20.000	3.0	58	52	0.0	0	0	52	0.2	2		2	50	23,187	2	7.2	83	0.4	4	87	7 + 430.000
7 + 439.390	9.390	24.0	127	114	22.6	106	117	231	0.0	1		1	230	23,417	1	3.1	48	1.4	8	57	7 + 439.390
7 + 460.000	20.610	0.0	247	223	0.0	233	256	479	271.2	2,795		2,795	-2,316	21,101	479	0.0	32	30.4	328	360	7 + 460.000
7 + 500.300	40.300	0.0	0	0	0.0	0	0	0	53.6	6,545		6,545	-6,545	14,556	0	0.0	0	17.9	973	973	7 + 500.300
7 + 520.000	19.700	7.2	71	64	0.0	0	0	64	0.8	536		536	-472	14,084	64	4.5	44	3.0	206	250	7 + 520.000
7 + 540.000	20.000	0.6	78	70	0.0	0	0	70	0.1	9		9	61	14,146	9	0.3	48	0.0	30	78	7 + 540.000
7 + 551.860	11.860	11.0	69	62	0.0	0	0	62	0.0	1		1	61	14,207	1	1.9	13	0.0	0	13	7 + 551.860
7 + 600.000	48.140	0.4	274	247	0.0	0	0	247	0.8	19		19	228	14,435	19	0.0	46	0.8	19	65	7 + 600.000
7 + 650.000	50.000	2.0	60	54	0.0	0	0	54	0.0	20		20	34	14,469	20	0.0	0	0.0	20	20	7 + 650.000
7 + 700.000	50.000	21.2	580	522	0.0	0	0	522	0.1	3		3	520	14,988	3	3.0	75	3.6	90	165	7 + 700.000
7 + 725.100	25.100	10.8	402	361	0.5	6	7	368	0.0	1		1	367	15,355	1	4.5	94	0.0	45	139	7 + 725.100
7 + 740.000	14.900	0.0	80	72	0.0	4	4	77	19.3	144		144	-67	15,288	77	0.0	34	8.5	63	97	7 + 740.000
7 + 760.000	20.000	0.0	0	0	0.0	0	0	0	3.0	223		223	-223	15,065	0	0.0	0	5.0	135	135	7 + 760.000
Sub Total	1,510.000		10,827	9,744		2,862	3,148	12,892		18,395		18,395	-5,503		2,382		3,331		4,669	8,000	Sub Total
Total	7,760.000		73,640	66,276		81,917	90,109	156,385		141,320		141,320	15,065		17,135		23,075		30,247	53,323	Total

Station	Distance (m)	Earthwork													Slope Protection					Station
		Cut Volume							Embankment Volume						Left Side		Right Side			
		Common (C=0.90)			Weathered Rock (C=1.10)			Total	Embankment Section			Total	Balance	Accumulated	Lateral					
		Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Corrected Cut Volume A (m3)	Sectional Area (m2)	Volume (m3)	Vary Volume (m3)	Embankment Volume B (m3)	A - B (m3)	Volume (m3)	Volume (m3)	Slope Length (m)	Area (m2)	Slope Length (m)	Area (m2)	Total Area (m2)	
7 + 760.000		0.0			0.0				3.0					15,065		0.0		5.0			7 + 760.000
7 + 780.000	20.000	13.6	136	122	2.0	20	22	144	0.0	30		30	114	15,179	30	8.5	85	0.0	50	135	7 + 780.000
7 + 800.000	20.000	16.8	304	274	3.6	56	62	335	0.0	0		0	335	15,515	0	5.0	135	0.0	0	135	7 + 800.000
7 + 850.000	50.000	7.6	610	549	4.4	200	220	769	2.4	60		60	709	16,224	60	3.0	200	2.1	53	253	7 + 850.000
7 + 900.000	50.000	0.0	190	171	0.0	110	121	292	190.2	4,815		4,815	-4,523	11,701	292	14.6	440	22.7	620	1,060	7 + 900.000
7 + 937.450	37.450	0.0	0	0	0.0	0	0	0	29.1	4,106		4,106	-4,106	7,594	0	0.0	273	13.9	685	959	7 + 937.450
7 + 960.000	22.550	0.0	0	0	0.0	0	0	0	10.8	450		450	-450	7,144	0	0.0	9	3.5	196	196	7 + 960.000
7 + 980.000	20.000	4.8	48	43	0.0	0	0	43	0.5	111		111	-68	7,076	43	4.9	49	0.5	40	89	7 + 980.000
7 + 996.870	16.870	6.8	98	88	0.0	0	0	88	0.0	3		3	86	7,162	3	1.0	50	0.0	4	54	7 + 996.870
8 + 20.000	23.130	30.4	430	387	26.4	305	336	723	0.0	0		0	723	7,885	0	4.0	58	3.0	35	93	8 + 20.000
8 + 40.000	20.000	38.4	688	619	49.8	762	838	1,457	0.0	0		0	1,457	9,342	0	3.2	72	4.3	73	145	8 + 40.000
8 + 60.000	20.000	30.8	692	623	43.6	934	1,027	1,650	0.0	0		0	1,650	10,993	0	3.7	69	2.8	71	140	8 + 60.000
8 + 83.540	23.540	30.8	725	653	31.4	883	971	1,624	0.0	0		0	1,624	12,616	0	3.8	89	3.4	73	161	8 + 83.540
8 + 100.000	16.460	17.6	398	358	0.0	258	284	643	0.0	0		0	643	13,259	0	2.5	52	2.3	47	99	8 + 100.000
8 + 120.000	20.000	0.0	176	158	0.0	0	0	158	12.0	120		120	38	13,297	120	0.0	25	2.3	46	71	8 + 120.000
8 + 137.090	17.090	0.0	0	0	0.0	0	0	0	8.4	174		174	-174	13,123	0	0.0	0	1.7	34	34	8 + 137.090
8 + 180.000	42.910	0.1	2	2	0.0	0	0	2	1.8	219		219	-217	12,906	2	0.0	0	0.5	47	47	8 + 180.000
8 + 220.000	40.000	17.0	342	308	0.6	12	13	321	0.0	36		36	285	13,191	36	4.3	86	1.1	32	118	8 + 220.000
8 + 240.000	20.000	17.2	342	308	0.0	6	7	314	0.0	0		0	314	13,506	0	2.7	70	2.3	34	104	8 + 240.000
8 + 260.000	20.000	8.2	254	229	0.0	0	0	229	0.0	0		0	229	13,734	0	1.5	42	1.0	33	75	8 + 260.000
8 + 280.000	20.000	0.0	82	74	0.0	0	0	74	6.8	68		68	6	13,740	68	0.0	15	0.6	16	31	8 + 280.000
8 + 296.920	16.920	0.6	5	5	0.0	0	0	5	0.2	59		59	-55	13,685	5	0.6	5	0.0	5	10	8 + 296.920
8 + 340.000	43.080	13.2	297	268	0.0	0	0	268	0.0	4		4	263	13,949	4	3.2	82	1.0	22	103	8 + 340.000
8 + 390.000	50.000	6.4	490	441	0.1	3	3	444	1.2	30		30	414	14,363	30	1.5	118	4.5	138	255	8 + 390.000
8 + 431.400	41.400	0.2	137	123	0.0	2	2	125	3.6	99		99	26	14,388	99	0.8	48	0.0	93	141	8 + 431.400
8 + 450.000	18.600	0.1	3	3	0.0	0	0	3	2.2	54		54	-51	14,337	3	0.5	12	0.0	0	12	8 + 450.000
8 + 470.000	20.000	18.4	185	167	0.0	0	0	167	0.0	22		22	145	14,481	22	2.5	30	3.2	32	62	8 + 470.000
8 + 484.520	14.520	18.0	264	238	0.0	0	0	238	0.0	0		0	238	14,719	0	2.4	36	3.3	47	83	8 + 484.520
8 + 519.420	34.900	1.8	346	311	0.0	0	0	311	18.6	325		325	-14	14,705	311	1.9	75	0.0	58	133	8 + 519.420
8 + 540.000	20.580	0.0	19	17	0.0	0	0	17	79.2	1,006		1,006	-990	13,716	17	8.3	105	13.4	138	243	8 + 540.000
8 + 560.000	20.000	0.0	0	0	0.0	0	0	0	28.2	1,074		1,074	-1,074	12,642	0	2.6	109	1.0	144	253	8 + 560.000
8 + 580.000	20.000	2.0	20	18	0.0	0	0	18	0.9	291		291	-273	12,369	18	2.0	46	0.0	10	56	8 + 580.000
8 + 600.000	20.000	9.0	110	99	0.0	0	0	99	0.0	9		9	90	12,459	9	2.3	43	1.5	15	58	8 + 600.000
8 + 620.000	20.000	21.6	306	275	0.1	1	1	277	0.0	0		0	277	12,735	0	4.2	65	2.5	40	105	8 + 620.000
8 + 640.000	20.000	20.8	424	382	1.7	18	20	401	0.0	0		0	401	13,137	0	0.0	42	3.5	60	102	8 + 640.000
8 + 660.000	20.000	0.0	208	187	0.0	17	19	206	46.8	468		468	-262	12,875	206	0.0	0	7.0	105	105	8 + 660.000
8 + 680.000	20.000	24.0	240	216	2.4	24	26	242	0.0	468		468	-226	12,649	242	5.8	58	2.4	94	152	8 + 680.000
8 + 706.350	26.350	16.8	538	484	10.4	169	186	669	0.0	0		0	669	13,318	0	4.8	140	2.3	62	202	8 + 706.350
8 + 730.000	23.650	8.4	298	268	0.0	123	135	403	0.0	0		0	403	13,722	0	4.0	104	0.0	27	131	8 + 730.000
8 + 780.000	50.000	12.4	520	468	0.0	0	0	468	0.0	0		0	468	14,190	0	2.3	158	0.0	0	158	8 + 780.000
8 + 800.000	20.000	0.4	128	115	0.0	0	0	115	0.8	8		8	107	14,297	8	1.4	37	2.0	20	57	8 + 800.000
8 + 820.000	20.000	14.6	150	135	0.4	4	4	139	0.0	8		8	131	14,428	8	4.1	55	0.0	20	75	8 + 820.000
8 + 835.320	15.320	11.0	196	176	0.0	3	3	180	0.0	0		0	180	14,608	0	3.2	56	0.0	0	56	8 + 835.320
8 + 866.830	31.510	0.0	173	156	0.0	0	0	156	4.6	72		72	84	14,692	72	0.0	50	1.0	16	66	8 + 866.830
8 + 880.000	13.170	0.4	3	2	0.0	0	0	2	6.4	72		72	-70	14,622	2	0.5	3	2.6	24	27	8 + 880.000
8 + 900.000	20.000	26.4	268	241	6.0	60	66	307	0.0	64		64	243	14,865	64	3.9	44	2.5	51	95	8 + 900.000
8 + 920.000	20.000	14.2	406	365	1.4	74	81	447	0.0	0		0	447	15,312	0	3.8	77	2.7	52	129	8 + 920.000
8 + 940.950	20.950	0.0	149	134	0.0	15	16	150	0.9	9		9	141	15,452	9	0.0	40	0.0	28	68	8 + 940.950
8 + 960.000	19.050	14.8	141	127	4.0	38	42	169	0.0	9		9	160	15,612	0	4.2	40	0.0	0	40	8 + 960.000
9 + 0.000	40.000	0.0	296	266	0.0	80	88	354	55.6	1,112		1,112	-758	14,855	354	0.0	84	5.2	104	188	9 + 0.000
9 + 30.000	30.000	8.2	123	111	0.0	0	0	111	0.0	834		834	-723	14,131	111	1.1	17	1.1	95	111	9 + 30.000
9 + 80.000	50.000	1.8	250	225	0.0	0	0	225	0.0	0		0	225	14,356	0	1.2	58	0.0	28	85	9 + 80.000
9 + 120.000	40.000	4.4	124	112	0.0	0	0	112	0.0	0		0	112	14,468	0	0.4	32	0.5	10	42	9 + 120.000
9 + 140.000	20.000	20.8	252	227	0.0	0	0	227	0.0	0		0	227	14,695	0	2.9	33	2.7	32	65	9 + 140.000
9 + 160.000	20.000	26.2	470	423	20.0	200	220	643	0.0	0		0	643	15,338	0	3.5	64	3.6	63	127	9 + 160.000
9 + 180.000	20.000	23.6	498	448	18.2	382	420	868	0.0	0		0	868	16,206	0	3.5	70	3.3	69	139	9 + 180.000
9 + 200.000	20.000	27.2	508	457	2.8	210	231	688	0.0	0		0	688	16,894	0	3.9	74	3.3	66	140	9 + 200.000
9 + 250.000	50.000	0.0	680	612	0.0	70	77	689	6.8	170		170	519	17,413	170	0.0	98	2.1	135	233	9 + 250.000
9 + 300.000	50.000	14.0	350	315	0.8	20	22	337	0.0	170		170	167	17,580	170	6.1	153	0.0	53	205	9 + 300.000
9 + 320.000	20.000	23.6	376	338	7.6	84	92	431	0.0	0		0	431	18,011	0	4.8	109	0.0	0	109	9 + 320.000
Sub Total	1,560.000		15,467	13,920		5,143	5,657	19,577		16,631		16,631	2,946		2,597		4,275		4,142	8,418	Sub Total
Total	9,320.000		89,107	80,196		87,060	95,766	175,962		157,951		157,951	18,011		19,732		27,351		34,390	61,741	Total

Station	Distance (m)	Earthwork													Slope Protection					Station
		Cut Volume							Embankment Volume				Balance A - B	Accumulated Volume	Lateral Volume	Left Side		Right Side		
		Common (C=0.90)			Weathered Rock (C=1.10)			Total	Embankment Section			Total								
		Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Corrected Cut Volume A (m3)	Sectional Area (m2)	Volume (m3)	Vary Volume (m3)	Embankment Volume B (m3)	(m3)	(m3)	(m3)	Slope Length (m)	Area (m2)	Slope Length (m)	Area (m2)	Total Area (m2)	
9 + 320.000		23.6			7.6				0.0					18,011		4.8		0.0			9 + 320.000
9 + 350.000	30.000	23.2	702	632	4.0	174	191	823	0.0	0		0	823	18,834	0	7.8	189	0.0	0	189	9 + 350.000
9 + 364.800	14.800	0.8	178	160	0.0	30	33	192	16.2	120		120	73	18,907	120	1.4	68	8.4	62	130	9 + 364.800
9 + 400.000	24.430	5.2	73	66	0.0	0	0	66	32.0	589		589	-523	18,384	66	4.4	71	29.0	457	528	9 + 400.000
9 + 438.210	38.210	10.8	306	275	0.0	0	0	275	0.6	623		623	-348	18,036	275	4.4	168	2.0	592	760	9 + 438.210
9 + 460.000	21.790	11.2	240	216	0.0	0	0	216	0.3	10		10	206	18,242	10	4.3	95	0.3	25	120	9 + 460.000
9 + 482.120	22.120	5.2	181	163	0.0	0	0	163	0.6	10		10	153	18,396	10	1.8	67	1.8	23	91	9 + 482.120
9 + 500.000	17.880	24.8	268	241	3.2	29	31	273	0.0	5		5	267	18,663	5	6.7	76	0.0	16	92	9 + 500.000
9 + 526.030	26.030	22.4	614	553	3.6	89	97	650	0.0	0		0	650	19,313	0	5.1	154	0.0	0	154	9 + 526.030
9 + 548.910	22.880	16.8	448	404	0.0	41	45	449	0.0	0		0	449	19,762	0	5.5	121	0.0	0	121	9 + 548.910
9 + 570.000	21.090	0.0	177	159	0.0	0	0	159	85.6	903		903	-743	19,019	159	0.0	58	15.6	165	222	9 + 570.000
9 + 590.000	20.000	0.0	0	0	0.0	0	0	0	222.2	3,078		3,078	-3,078	15,941	0	0.0	0	17.9	335	335	9 + 590.000
9 + 606.200	18.200	0.0	0	0	0.0	0	0	0	11.9	2,130		2,130	-2,130	13,811	0	0.0	0	1.1	173	173	9 + 606.200
9 + 650.000	41.800	0.3	6	6	0.0	0	0	6	5.4	362		362	-356	13,455	6	0.2	4	3.0	86	90	9 + 650.000
9 + 696.760	46.760	4.4	110	99	0.0	0	0	99	0.0	126		126	-27	13,428	99	0.8	23	0.0	70	94	9 + 696.760
9 + 720.000	23.240	2.0	74	67	0.0	0	0	67	1.2	14		14	53	13,480	14	0.9	20	1.3	15	35	9 + 720.000
9 + 740.000	20.000	0.0	20	18	0.0	0	0	18	5.6	68		68	-50	13,430	18	0.0	9	2.0	33	42	9 + 740.000
9 + 749.110	9.110	21.0	96	86	0.8	4	4	90	0.0	26		26	65	13,495	26	3.8	17	0.0	9	26	9 + 749.110
9 + 792.880	43.770	0.0	460	414	0.0	18	19	433	11.2	245		245	188	13,683	245	0.0	83	2.8	61	144	9 + 792.880
9 + 810.000	17.120	0.0	0	0	0.0	0	0	0	18.2	252		252	-252	13,431	0	0.0	0	4.7	64	64	9 + 810.000
9 + 830.000	20.000	0.0	0	0	0.0	0	0	0	6.1	243		243	-243	13,188	0	0.0	0	2.5	72	72	9 + 830.000
9 + 847.040	17.040	0.8	7	6	0.0	0	0	6	2.0	69		69	-63	13,125	6	0.2	2	1.1	31	32	9 + 847.040
9 + 900.000	52.960	11.6	328	296	0.0	0	0	296	0.0	53		53	243	13,368	53	1.9	36	1.3	64	119	9 + 900.000
9 + 924.290	24.290	0.0	141	127	0.0	0	0	127	24.6	299		299	-172	13,196	127	0.0	23	1.7	36	60	9 + 924.290
9 + 940.000	15.710	0.0	0	0	0.0	0	0	0	43.1	532		532	-532	12,664	0	0.0	0	4.5	49	49	9 + 940.000
9 + 960.000	20.000	0.8	8	7	0.0	0	0	7	0.0	431		431	-424	12,240	7	0.0	0	0.0	45	45	9 + 960.000
9 + 980.000	20.000	2.8	36	32	0.0	0	0	32	0.0	0		0	32	12,273	0	0.2	2	0.4	4	6	9 + 980.000
10 + 2.450	22.450	5.9	98	88	0.0	0	0	88	0.0	0		0	88	12,361	0	1.7	21	1.4	20	42	10 + 2.450
10 + 50.000	47.550	14.6	487	439	0.0	0	0	439	0.0	0		0	439	12,799	0	2.0	88	2.5	93	181	10 + 50.000
10 + 100.000	50.000	2.8	435	392	0.0	0	0	392	0.0	0		0	392	13,191	0	0.3	58	0.2	68	125	10 + 100.000
10 + 150.000	50.000	1.4	105	95	0.0	0	0	95	0.0	0		0	95	13,285	0	0.9	30	0.0	5	35	10 + 150.000
10 + 200.000	50.000	1.6	75	68	0.0	0	0	68	0.0	0		0	68	13,353	0	1.0	48	0.0	0	48	10 + 200.000
10 + 250.000	50.000	13.2	370	333	0.0	0	0	333	0.0	0		0	333	13,686	0	2.7	93	1.3	33	125	10 + 250.000
10 + 300.000	50.000	2.3	388	349	0.0	0	0	349	0.0	0		0	349	14,035	0	1.7	110	0.0	33	143	10 + 300.000
10 + 350.000	50.000	6.8	228	205	0.0	0	0	205	0.0	0		0	205	14,239	0	3.0	118	0.6	15	133	10 + 350.000
10 + 400.000	50.000	0.0	170	153	0.0	0	0	153	5.0	125		125	28	14,267	125	0.0	75	1.2	45	120	10 + 400.000
10 + 450.000	50.000	0.0	0	0	0.0	0	0	0	4.0	225		225	-225	14,042	0	0.0	0	1.0	35	35	10 + 450.000
10 + 500.000	50.000	1.9	48	43	0.0	0	0	43	0.0	100		100	-57	13,985	43	0.1	3	0.0	25	28	10 + 500.000
10 + 531.040	31.040	2.4	67	60	0.0	0	0	60	0.0	0		0	60	14,045	0	0.5	9	0.0	0	9	10 + 531.040
10 + 590.020	58.980	3.6	177	159	0.0	0	0	159	0.0	0		0	159	14,204	0	0.5	29	0.0	0	29	10 + 590.020
10 + 610.000	19.980	0.2	38	34	0.0	0	0	34	0.2	2		2	32	14,236	2	0.0	5	0.4	4	9	10 + 610.000
10 + 630.000	20.000	5.2	54	49	0.0	0	0	49	0.0	2		2	47	14,283	2	1.4	14	0.0	4	18	10 + 630.000
10 + 645.800	15.800	12.4	139	125	0.0	0	0	125	0.0	0		0	125	14,408	0	4.0	43	0.0	0	43	10 + 645.800
10 + 670.000	24.200	6.8	232	209	0.0	0	0	209	2.0	24		24	185	14,593	24	5.0	109	2.2	27	136	10 + 670.000
10 + 690.000	20.000	0.0	68	61	0.0	0	0	61	16.4	184		184	-123	14,470	61	0.0	50	2.2	44	94	10 + 690.000
10 + 704.560	14.560	0.0	0	0	0.0	0	0	0	24.0	294		294	-294	14,176	0	0.0	0	2.7	36	36	10 + 704.560
10 + 750.000	45.440	0.2	5	4	0.0	0	0	4	0.1	548		548	-543	13,633	4	0.0	0	0.0	61	61	10 + 750.000
10 + 780.000	30.000	2.4	39	35	0.0	0	0	35	0.0	2		2	34	13,666	2	0.8	12	0.0	0	12	10 + 780.000
10 + 800.000	20.000	0.0	24	22	0.0	0	0	22	15.6	156		156	-134	13,532	22	0.0	8	1.0	10	18	10 + 800.000
10 + 820.480	20.480	0.0	0	0	0.0	0	0	0	17.6	340		340	-340	13,192	0	0.0	0	2.5	36	36	10 + 820.480
10 + 850.000	29.520	11.5	167	150	0.0	0	0	150	0.0	260		260	-110	13,082	150	1.0	15	0.0	37	52	10 + 850.000
10 + 900.000	50.000	0.0	283	254	0.0	0	0	254	13.6	340		340	-86	12,997	254	0.0	25	2.1	53	78	10 + 900.000
10 + 930.000	30.000	0.0	0	0	0.0	0	0	0	11.2	372		372	-372	12,625	0	0.0	0	1.7	57	57	10 + 930.000
10 + 950.000	20.000	0.1	1	1	0.0	0	0	1	8.0	192		192	-191	12,433	1	0.0	0	2.1	38	38	10 + 950.000
10 + 963.580	13.580	4.8	33	30	0.0	0	0	30	0.3	56		56	-26	12,407	30	0.0	0	0.0	14	14	10 + 963.580
11 + 0.000	36.420	0.0	87	79	0.0	0	0	79	15.4	286		286	-207	12,200	79	0.0	0	4.3	78	78	11 + 0.000
11 + 50.000	50.000	0.0	0	0	0.0	0	0	0	4.4	495		495	-495	11,705	0	0.0	0	2.1	160	160	11 + 50.000
11 + 100.000	50.000	3.4	85	77	0.0	0	0	77	0.0	110		110	-34	11,671	77	1.2	30	0.0	53	83	11 + 100.000
11 + 120.000	20.000	31.6	350	315	11.2	112	123	438	0.0	0		0	438	12,110	0	4.9	61	3.0	30	91	11 + 120.000
11 + 140.000	20.000	29.8	614	553	9.8	210	231	784	0.0	0		0	784	12,893	0	3.8	87	3.8	68	155	11 + 140.000
Sub Total	1,809.230		9,339	8,405		705	776	9,180		14,298		14,298	-5,118		2,120		2,445		3,686	6,131	Sub Total
Total	11,129.230		98,446	88,601		87,765	96,541	185,143		172,250		172,250	12,893		21,853		29,796		38,076	67,872	Total

Station	Distance (m)	Earthwork													Slope Protection					Station
		Cut Volume							Embankment Volume				Balance A - B	Accumulated Volume	Lateral Volume	Left Side		Right Side		Total Area	
		Common (C=0.90)			Weathered Rock (C=1.10)			Total Corrected Cut Volume A	Embankment Section			Total Embankment Volume B				Slope Length	Area	Slope Length	Area		
		Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	Sectional Area (m2)	Ground Volume (m3)	Corrected Volume (m3)	(m3)	Sectional Area (m2)	Volume (m3)	Vary Volume (m3)	(m3)	(m3)	(m3)	(m3)	(m)	(m2)	(m)	(m2)	(m2)	
11 + 140.000		29.8			9.8				0.0					12,893		3.8		3.8			11 + 140.000
11 + 160.000	20.000	27.8	576	518	16.8	266	293	811	0.0	0		0	811	13,704	0	3.9	77	3.2	70	147	11 + 160.000
11 + 180.000	20.000	25.2	530	477	3.6	204	224	701	0.0	0		0	701	14,406	0	4.8	87	2.3	55	142	11 + 180.000
11 + 230.000	50.000	0.0	630	567	0.0	90	99	666	177.0	4,425		4,425	-3,759	10,647	666	14.5	483	18.8	528	1,010	11 + 230.000
11 + 280.000	50.000	18.0	450	405	0.0	0	0	405	0.0	4,425		4,425	-4,020	6,627	405	3.7	455	2.0	520	975	11 + 280.000
11 + 330.000	50.000	33.2	1,280	1,152	40.8	1,020	1,122	2,274	0.0	0		0	2,274	8,901	0	4.5	205	3.0	125	330	11 + 330.000
11 + 360.000	30.000	38.0	1,068	961	16.2	855	941	1,902	0.0	0		0	1,902	10,802	0	5.0	143	4.1	107	249	11 + 360.000
11 + 380.000	20.000	16.4	544	490	0.0	162	178	668	0.0	0		0	668	11,470	0	4.6	96	0.0	41	137	11 + 380.000
11 + 400.000	20.000	1.2	176	158	0.0	0	0	158	1.8	18		18	140	11,610	18	0.5	51	0.6	6	57	11 + 400.000
11 + 420.000	20.000	9.2	104	94	0.0	0	0	94	0.0	18		18	76	11,686	18	3.7	42	0.0	6	48	11 + 420.000
11 + 440.000	20.000	17.2	264	238	1.2	12	13	251	0.0	0		0	251	11,937	0	4.2	79	0.0	0	79	11 + 440.000
11 + 462.990	22.990	1.0	209	188	0.0	14	15	203	9.4	108		108	95	12,032	108	0.8	57	4.6	53	110	11 + 462.990
11 + 500.000	37.010	0.0	19	17	0.0	0	0	17	0.2	178		178	-161	11,871	17	0.0	15	0.0	85	100	11 + 500.000
11 + 550.000	50.000	0.0	0	0	0.0	0	0	0	14.8	375		375	-375	11,496	0	1.5	38	2.8	70	108	11 + 550.000
11 + 600.000	50.000	0.0	0	0	0.0	0	0	0	29.9	1,118		1,118	-1,118	10,379	0	2.6	103	7.5	258	360	11 + 600.000
11 + 640.000	40.000	20.6	412	371	24.3	486	535	905	0.0	598		598	307	10,686	598	3.7	126	0.9	168	294	11 + 640.000
11 + 660.000	20.000	26.0	466	419	0.4	247	272	691	0.0	0		0	691	11,377	0	3.3	70	4.5	54	124	11 + 660.000
11 + 680.000	20.000	9.6	356	320	0.0	4	4	325	0.0	0		0	325	11,702	0	0.9	42	2.0	65	107	11 + 680.000
11 + 720.000	40.000	0.0	192	173	0.0	0	0	173	0.3	6		6	167	11,869	6	0.0	18	0.0	40	58	11 + 720.000
11 + 771.860	51.860	0.0	0	0	0.0	0	0	0	9.6	257		257	-257	11,612	0	0.0	0	2.4	62	62	11 + 771.860
11 + 790.000	18.140	0.0	0	0	0.0	0	0	0	18.0	250		250	-250	11,362	0	0.0	0	2.0	40	40	11 + 790.000
11 + 810.000	20.000	4.4	44	40	0.0	0	0	40	0.0	180		180	-140	11,221	40	1.5	15	0.0	20	35	11 + 810.000
11 + 825.770	15.770	15.8	159	143	0.2	2	2	145	0.0	0		0	145	11,366	0	3.9	43	1.5	12	54	11 + 825.770
11 + 872.650	46.880	21.0	863	776	1.0	28	31	807	0.0	0		0	807	12,174	0	3.2	166	3.4	115	281	11 + 872.650
11 + 890.000	17.350	14.0	304	273	0.0	9	10	283	0.0	0		0	283	12,457	0	3.5	58	1.3	41	99	11 + 890.000
11 + 910.000	20.000	6.4	204	184	0.0	0	0	184	0.0	0		0	184	12,640	0	1.6	51	0.2	15	66	11 + 910.000
11 + 934.170	24.170	10.2	201	181	0.0	0	0	181	0.0	0		0	181	12,821	0	3.4	60	0.3	12	73	11 + 934.170
11 + 960.000	25.830	2.0	158	142	0.0	0	0	142	0.8	10		10	131	12,952	10	1.2	59	0.3	14	74	11 + 960.000
12 + 14.970	54.350	0.0	54	49	0.0	0	0	49	16.3	465		465	-416	12,536	49	0.0	33	3.0	90	122	12 + 14.970
12 + 40.000	25.030	0.0	0	0	0.0	0	0	0	4.2	257		257	-257	12,280	0	0.0	0	1.4	55	55	12 + 40.000
12 + 60.000	20.000	2.4	24	22	0.0	0	0	22	0.0	42		42	-20	12,259	22	0.2	2	0.1	15	17	12 + 60.000
12 + 80.000	20.000	26.6	290	261	2.8	28	31	292	0.0	0		0	292	12,551	0	3.5	37	3.3	34	71	12 + 80.000
12 + 100.000	20.000	30.6	572	515	7.6	104	114	629	0.0	0		0	629	13,180	0	4.5	80	3.0	63	143	12 + 100.000
12 + 120.000	20.000	17.2	478	430	0.0	76	84	514	0.0	0		0	514	13,694	0	4.3	88	1.5	45	133	12 + 120.000
12 + 140.000	20.000	19.2	364	328	0.0	0	0	328	0.0	0		0	328	14,022	0	2.7	70	2.3	38	108	12 + 140.000
12 + 160.000	20.000	22.8	420	378	0.0	0	0	378	0.0	0		0	378	14,400	0	2.7	54	2.9	52	106	12 + 160.000
12 + 172.150	12.150	11.8	210	189	0.0	0	0	189	0.0	0		0	189	14,589	0	0.0	16	2.1	30	47	12 + 172.150
12 + 200.000	27.850	0.0	164	148	0.0	0	0	148	11.6	162		162	-14	14,575	148	3.0	42	0.0	29	71	12 + 200.000
12 + 260.690	60.690	0.0	0	0	0.0	0	0	0	86.0	2,962		2,962	-2,962	11,614	0	25.0	850	0.0	0	850	12 + 260.690
12 + 280.000	19.310	0.0	0	0	0.0	0	0	0	77.6	1,580		1,580	-1,580	10,034	0	24.0	473	6.5	63	536	12 + 280.000
12 + 300.000	20.000	0.0	0	0	0.0	0	0	0	94.4	1,720		1,720	-1,720	8,314	0	23.0	470	14.0	205	675	12 + 300.000
12 + 324.210	24.210	0.0	0	0	0.0	0	0	0	39.2	1,617		1,617	-1,617	6,697	0	7.0	363	14.0	339	702	12 + 324.210
12 + 350.000	25.790	0.0	0	0	0.0	0	0	0	10.0	634		634	-634	6,062	0	3.0	129	6.0	258	387	12 + 350.000
12 + 400.000	50.000	0.0	0	0	0.0	0	0	0	3.8	345		345	-345	5,717	0	1.0	100	3.5	238	338	12 + 400.000
12 + 440.800	40.800	0.0	0	0	0.0	0	0	0	7.0	220		220	-220	5,497	0	0.0	20	9.0	255	275	12 + 440.800
12 + 458.000	17.200	0.0	0	0	0.0	0	0	0	22.8	256		256	-256	5,241	0	5.0	43	13.0	189	232	12 + 458.000
12 + 466.000	8.000	0.0	0	0	0.0	0	0	0	123.6	586		586	-586	4,655	0	12.0	68	18.0	124	192	12 + 466.000
12 + 474.000	8.000	6.0	24	22	0.0	0	0	22	1.6	501		501	-479	4,176	22	1.3	53	4.0	88	141	12 + 474.000
12 + 500.000	26.000	23.0	377	339	0.6	8	9	348	0.0	21		21	327	4,503	21	3.5	62	2.0	78	140	12 + 500.000
12 + 518.460	18.460	21.6	412	370	0.0	6	6	377	0.0	0		0	377	4,880	0	4.0	69	1.0	28	97	12 + 518.460
12 + 550.000	31.540	24.0	719	647	0.0	0	0	647	0.0	0		0	647	5,527	0	3.8	123	2.4	54	177	12 + 550.000
12 + 600.000	50.000	29.2	1,330	1,197	10.8	270	297	1,494	0.0	0		0	1,494	7,021	0	4.0	195	3.5	148	343	12 + 600.000
12 + 619.960	19.960	32.4	615	553	25.6	363	400	953	0.0	0		0	953	7,974	0	3.5	75	3.4	69	144	12 + 619.960
12 + 640.000	20.040	33.6	661	595	25.2	509	560	1,155	0.0	0		0	1,155	9,129	0	3.7	72	3.5	69	141	12 + 640.000
12 + 660.000	20.000	30.4	640	576	14.0	392	431	1,007	0.0	0		0	1,007	10,136	0	3.6	73	3.6	71	144	12 + 660.000
12 + 680.000	20.000	13.6	440	396	0.0	140	154	550	0.0	0		0	550	10,686	0	0.7	43	3.3	69	112	12 + 680.000
12 + 701.660	21.660	18.4	347	312	0.0	0	0	312	0.0	0		0	312	10,998	0	0.9	17	5.5	95	113	12 + 701.660
12 + 723.320	21.660	36.0	589	530	43.6	472	519	1,050	0.0	0		0	1,050	12,048	0	3.0	42	3.5	97	140	12 + 723.320
12 + 758.470	35.150	32.0	1,195	1,076	26.0	1,223	1,346	2,421	0.0	0		0	2,421	14,469	0	3.0	105	4.0	132	237	12 + 758.470
12 + 799.870	41.400	38.4	1,457	1,312	41.2	1,391	1,530	2,842	0.0	0		0	2,842	17,311	0	3.0	124	4.0	166	290	12 + 799.870
12 + 820.000	20.130	42.8	817	736	63.2	1,051	1,156	1,891	0.0	0		0	1,891	19,202	0	3.1	61	4.0	81	142	12 + 820.000
12 + 840.000	20.000	40.8	836	752	48.8	1,120	1,232	1,984	0.0	0		0	1,984	21,186	0	3.3	64	3.8	78	142	12 + 840.000
12 + 860.000	20.000	0.0	408	367	0.0	488	537	904	26.2	262		262	642	21,828	262	8.5	118	0.0	38	156	12 + 860.000
12 + 868.000	8.000	0.0	0	0	0.0	0	0	0	96.0	489		489	-489	21,340	0	0.0	34	19.5	78	112	12 + 868.000
12 + 872.390	4.390	0.0	0	0	0.0	0	0	0	188.0	623		623	-623	20,716	0	0.0	0	26.5	101	101	12 + 872.390
12 + 880.000	7.610	0.0	0	0	0.0	0	0	0	0.0	715		715	-715	20,001	0	0.0	0	0.0	101	101	12 + 880.000

12 + 889.000	9.000	0.0	0	0	0.0	0	0	0	0.0	0		0	0	20,001	0	0.0	0	0.0	0	0	12 + 889.000
12 + 899.000	10.000	0.0	0	0	0.0	0	0	0	178.8	894		894	-894	19,107	0	17.5	88	0.0	0	88	12 + 899.000
12 + 915.000	16.000	0.0	0	0	0.0	0	0	0	126.0	2,438		2,438	-2,438	16,668	0	22.0	324	0.0	0	324	12 + 915.000
12 + 932.560	17.560	0.0	0	0	0.0	0	0	0	50.4	1,549		1,549	-1,549	15,120	0	12.0	307	0.0	0	307	12 + 932.560
12 + 950.000	17.440	0.0	0	0	0.0	0	0	0	15.6	576		576	-576	14,544	0	4.0	140	0.0	0	140	12 + 950.000
13 + 16.420	66.420	25.6	850	765	15.2	505	555	1,320	0.0	518		518	802	15,346	518	2.5	216	4.5	149	365	13 + 16.420
13 + 40.000	23.580	27.0	620	558	18.0	391	431	989	0.0	0		0	989	16,335	0	1.5	47	3.0	88	136	13 + 40.000
13 + 68.930	28.930	26.8	778	700	28.4	671	738	1,439	0.0	0		0	1,439	17,774	0	1.4	42	6.0	130	172	13 + 68.930
13 + 100.000	31.070	0.0	416	375	0.0	441	485	860	24.4	379		379	481	18,255	379	16.5	278	0.0	93	371	13 + 100.000
13 + 142.300	42.300	0.0	0	0	0.0	0	0	0	83.6	2,284		2,284	-2,284	15,971	0	18.5	740	0.0	0	740	13 + 142.300
13 + 172.650	30.350	0.0	0	0	0.0	0	0	0	10.8	1,433		1,433	-1,433	14,538	0	4.3	346	0.0	0	346	13 + 172.650
13 + 180.000	7.350	0.0	0	0	0.0	0	0	0	48.0	216		216	-216	14,322	0	0.0	16	8.0	29	45	13 + 180.000
13 + 200.000	20.000	0.0	0	0	0.0	0	0	0	16.4	644		644	-644	13,678	0	0.0	0	5.0	130	130	13 + 200.000
13 + 220.000	20.000	0.0	0	0	0.0	0	0	0	9.2	256		256	-256	13,422	0	0.0	0	3.3	83	83	13 + 220.000
13 + 240.000	20.000	9.0	90	81	0.0	0	0	81	0.0	92		92	-11	13,411	81	0.6	6	1.6	49	55	13 + 240.000
13 + 260.000	20.000	4.8	138	124	0.0	0	0	124	0.0	0		0	124	13,535	0	0.5	11	0.0	16	27	13 + 260.000
13 + 281.080	21.080	28.4	350	315	6.8	72	79	394	0.0	0		0	394	13,929	0	3.0	37	4.5	47	84	13 + 281.080
13 + 294.070	12.990	33.8	404	364	34.4	268	294	658	0.0	0		0	658	14,587	0	3.5	42	3.0	49	91	13 + 294.070
13 + 354.070	60.000	19.8	1,606	1,447	0.0	1,032	1,135	2,582	0.0	0		0	2,582	17,169	0	4.0	225	1.6	138	363	13 + 354.070
13 + 435.900	81.830	4.6	998	898	0.0	0	0	898	0.0	0		0	898	18,068	0	0.8	196	0.0	65	262	13 + 435.900
13 + 460.000	24.100	14.0	224	202	0.0	0	0	202	0.0	0		0	202	18,270	0	1.8	31	1.0	12	43	13 + 460.000
13 + 480.000	20.000	1.2	152	137	0.0	0	0	137	2.0	20		20	117	18,386	20	0.0	18	2.3	33	51	13 + 480.000
13 + 501.350	21.350	2.4	38	35	0.0	0	0	35	1.0	32		32	3	18,389	32	0.6	6	2.0	46	52	13 + 501.350
13 + 539.130	37.780	22.6	472	425	4.0	76	83	508	0.0	19		19	489	18,878	19	3.4	76	1.2	60	136	13 + 539.130
13 + 560.000	20.870	26.0	507	456	7.2	117	129	585	0.0	0		0	585	19,463	0	3.6	73	1.4	27	100	13 + 560.000
13 + 580.000	20.000	0.0	260	234	0.9	72	79	313	80.6	806		806	-493	18,970	313	12.0	156	8.2	96	252	13 + 580.000
13 + 596.250	16.250	0.0	0	0	0.0	0	0	0	206.8	2,335		2,335	-2,335	16,635	0	12.5	199	18.0	213	412	13 + 596.250
13 + 613.650	17.400	0.0	0	0	0.0	0	0	0	31.0	2,069		2,069	-2,069	14,566	0	0.0	100	12.0	261	370	13 + 613.650
13 + 647.680	34.030	0.0	0	0	0.0	0	0	0	17.2	820		820	-820	13,746	0	0.0	0	5.6	299	299	13 + 647.680
13 + 663.790	16.110	8.8	71	64	0.0	0	0	64	0.0	139		139	-75	13,671	64	1.2	10	0.0	45	55	13 + 663.790
13 + 680.000	16.210	30.0	314	283	9.0	73	80	363	0.0	0		0	363	14,035	0	4.3	43	3.2	26	69	13 + 680.000
13 + 700.000	20.000	19.6	486	437	0.0	90	99	536	0.0	0		0	536	14,571	0	3.6	77	2.2	54	131	13 + 700.000
13 + 725.290	25.290	27.8	587	528	1.8	23	25	553	0.0	0		0	553	15,124	0	4.4	101	2.5	59	161	13 + 725.290
13 + 745.090	19.800	20.8	481	433	0.6	24	26	459	0.0	0		0	459	15,583	0	5.1	94	1.2	37	131	13 + 745.090
13 + 760.000	14.910	9.0	222	200	0.0	4	5	205	0.0	0		0	205	15,788	0	3.2	62	0.0	9	71	13 + 760.000
13 + 780.000	20.000	2.8	118	106	0.0	0	0	106	0.0	0		0	106	15,894	0	0.5	37	0.0	0	37	13 + 780.000
13 + 800.000	20.000	0.0	28	25	0.0	0	0	25	20.8	208		208	-183	15,712	25	0.0	5	6.0	60	65	13 + 800.000
13 + 809.130	9.130	0.0	0	0	0.0	0	0	0	30.8	236		236	-236	15,476	0	0.0	0	7.7	63	63	13 + 809.130
13 + 853.240	44.110	9.2	203	183	0.0	0	0	183	0.0	679		679	-497	14,979	183	2.7	60	0.6	183	243	13 + 853.240
13 + 883.720	30.480	3.8	198	178	0.0	0	0	178	0.0	0		0	178	15,158	0	2.0	72	2.5	47	119	13 + 883.720
13 + 900.000	16.280	8.0	96	86	0.0	0	0	86	0.0	0		0	86	15,244	0	0.9	24	1.2	30	54	13 + 900.000
13 + 920.000	20.000	7.0	150	135	0.0	0	0	135	0.0	0		0	135	15,379	0	1.2	21	0.9	21	42	13 + 920.000
13 + 940.000	20.000	0.0	70	63	0.0	0	0	63	6.8	68		68	-5	15,374	63	0.0	12	0.0	9	21	13 + 940.000
13 + 960.000	20.000	25.0	250	225	11.6	116	128	353	0.0	68		68	285	15,659	68	4.1	41	2.8	28	69	13 + 960.000
13 + 980.000	20.000	31.8	568	511	32.4	490	539	1,050	0.0	0		0	1,050	16,709	0	3.8	79	3.0	58	137	13 + 980.000
13 + 994.140	14.140	34.4	468	421	53.4	642	706	1,127	0.0	0		0	1,127	17,836	0	3.5	52	3.2	44	95	13 + 994.140
14 + 58.000	63.860	10.2	1,424	1,282	0.0	1,705	1,876	3,157	0.0	0		0	3,157	20,994	0	8.0	367	1.8	160	527	14 + 58.000
14 + 113.890	55.890	40.4	1,414	1,273	103.0	2,878	3,166	4,439	0.0	0		0	4,439	25,432	0	3.5	321	1.5	92	414	14 + 113.890
14 + 187.480	73.590	11.2	1,899	1,709	0.0	3,790	4,169	5,878	0.0	0		0	5,878	31,310	0	2.4	217	0.6	77	294	14 + 187.480
14 + 200.000	12.520	4.6	99	89	0.0	0	0	89	0.0	0		0	89	31,399	0	1.0	21	0.0	4	25	14 + 200.000
14 + 220.000	20.000	0.0	46	41	0.0	0	0	41	58.8	588		588	-547	30,852	41	0.0	10	30.0	300	310	14 + 220.000
14 + 240.000	20.000	0.4	4	4	0.0	0	0	4	8.8	676		676	-672	30,180	4	0.8	8	7.0	370	378	14 + 240.000
14 + 256.950	16.950	25.0	215	194	16.8	142	157	350	0.0	75		75	276	30,456	75	4.8	47	1.6	73	120	14 + 256.950
14 + 267.700	10.750	32.2	307	277	30.8	256	281	558	0.0	0		0	558	31,014	0	4.3	49	2.7	23	72	14 + 267.700
14 + 301.000	33.300	0.0	536	483	0.0	513	564	1,047	178.0	2,964		2,964	-1,917	29,097	1,047	9.3	226	30.3	549	776	14 + 301.000
14 + 317.230	16.230	30.4	247	222	50.5	410	451	673	0.0	1,444		1,444	-772	28,325	673	6.0	124	3.1	271	395	14 + 317.230
14 + 326.000	8.770	46.0	335	302	60.8	488	537	838	0.0	0		0	838	29,164	0	5.1	49	3.0	27	75	14 + 326.000
14 + 340.000	14.000	18.0	448	403	0.0	426	468	871	0.0	0		0	871	30,035	0	3.5	60	3.0	42	102	14 + 340.000
14 + 360.000	20.000	0.0	180	162	0.0	0	0	162	222.0	2,220		2,220	-2,058	27,977	162	20.0	235	12.5	155	390	14 + 360.000
14 + 367.410	7.410	0.0	0	0	0.0	0	0	0	293.2	1,909		1,909	-1,909	26,068	0	17.5	139	22.0	128	267	14 + 367.410
14 + 378.000	10.590	0.0	0	0	0.0	0	0	0	314.4	3,217		3,217	-3,217	22,851	0	15.0	172	22.0	233	405	14 + 378.000
14 + 400.000	22.000	0.0	0	0	0.0	0	0	0	11.0	3,579		3,579	-3,579	19,271	0	1.3	179	5.0	297	476	14 + 400.000
14 + 419.540	19.540	22.4	219	197	3.2	31	34	231	0.0	107		107	124	19,395	107	5.5	66	1.5	64	130	14 + 419.540
14 + 453.000	33.460	0.8	388	349	0.0	54	59	408	2.0	33		33	375	19,770	33	1.7	120	1.4	49	169	14 + 453.000
14 + 479.560	26.560	15.4	215	194	3.8	50	56	249	0.0	27		27	223	19,993	27	5.0	89	0.0	19	108	14 + 479.560
14 + 528.180	48.620	32.0	1,152	1,037	35.0	943	1,038	2,075	0.0	0		0	2,075	22,067	0	7.0	292	1.5	36	328	14 + 528.180
14 + 540.000	11.820	32.8	383	345	32.4	398	438	783	0.0	0		0	783	22,850	0	7.5	86	1.2	16	102	14 + 540.000
14 + 560.000	20.000	10.4	432	389	0.0	324	356	745	7.6	76		76	669	23,519	76	6.0	135	14.0	152	287	14 + 560.000
14 + 584.410	24.410	0.0	127	114	0.0	0	0	114	58.8	810		810	-696	22,823	114	0.0	73	8.0	269	342	14 + 584.410
14 + 587.410	3.000	0.0	0	0	0.0	0	0	0	68.8	191		191	-191	22,632	0	0.0	0	7.3	23	23	14 + 587.410
14 + 619.040	31.630	0.0	0	0	0.0	0	0	0	39.2	1,708		1,708	-1,708	20,924	0	0.0	0	13.5	329	329	14 + 619.040
14 + 640.000	20.960	0.0	0	0	0.0	0	0	0	14.0	558		558	-558	20,366	0	0.0	0	5.5	199	199	14 + 640.000
14 + 660.000	20.000	14.2	142	128	0.0	0	0	128	0.0	140		140	-12	20,354	128	3.7	37	1.2	67	104	14 + 660.000
14 + 683.450	23.450	12.8	317	285	0.4	5	5	290	2.2	26		26	264	20,618	26	5.0	102	9.5	125	227	14 + 683.450
Sub Total	3,542.830		45,398	40,858		28,559	31,414	72,273		64,547		64,547	7,725		6,686		14,653		13,378	28,031	Sub Total

Total	14,672,060		143,844	129,460		116,323	127,956	257,415		236,797		236,797	20,618		28,538		44,448		51,454	95,903	Total

Working Division: 15 Los Cuyuyes Access Road

Description	Calculation Details	Unit	Quantity	Remarks
15.5	Pavement			
101	Improved subgrade material			
	Cut section L = 8,751.73 + 874.32 Embankment section L = 4,792.71 + 253.3			
	V = 6.0 × 0.075 × 8751.73 + 6.0 × (0.35 + 0.2)/2 × 4792.71 + 4.0 × 0.075 × 874.32 + 4.0 × (0.35 + 0.2)/2 × 253.3 = 12387.2 m³			
		m³	12387	
102	Graded crushed stone subbase			
	V = 6.0 × 0.15 × (8751.73 + 4792.71) + 4.0 × 0.15 × (874.32 + 253.3) = 12866.6 m³			
		m³	12867	
103	Transportation of Improved subgrade material			
	V = 12387.2 × 0.01 × 10 = 1.238.7			
		m³.km	1,239	

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Working Division: 15 Los Cuyuyes Access Road

Description	Calculation Details	Unit	Quantity	Remarks
15.6				
101	Guardrail (Bridge site)			
	L = 10.0 m x 4 = 40 m			
		m	40	
102	Warning signs			
	N = 14672 / 250 = 58			
		nos	58	

Working Division: 16 Poza Honda Inlet Access Road

Description	Calculation Details	Unit	Quantity	Remarks
16.1	Earthwork			
101	Clearing			
106	Compaction of original ground			
	A = 6.0 × 451.2 × 0.1 = 270.7	m²	271	

Quantity Calculation 16.1/01 Clearing

Access Road Name : Poza Honda Inlet Access Road

Station	Distance (m)	Earthwork: Cut Volume: Common (C=0.90): Sectional Area (m2)	Common: Ground Volume (m3)	Common: Corrected Volume (m3)	Weathered Rock (C=1.10): Sectional Area (m2)	Weathered Rock: Ground Volume (m3)	Weathered Rock: Corrected Volume (m3)	Total Corrected Cut Volume A (m3)	Embankment Volume: Embankment Section: Sectional Area (m2)	Embankment Section: Volume (m3)	Embankment Section: Vary Volume (m3)	Total Embankment Volume B (m3)	Balance A - B (m3)	Accumulated Volume (m3)	Lateral Volume (m3)	Length (m)	Area (m2)	Poza Honda Inlet Access Road: Clearing: Length (m)	Clearing: Area (m2)	Total Area (m2)	Station
0 + 0.000		30.2			13.8				0.0					0				14.5			0 + 0.000
0 + 23.000	23.000	0.0	347	313	0.0	159	175	487	28.2	324		324	163	163	324		0	10.5	288	288	0 + 23.000
0 + 49.500	26.500	0.0	0	0	0.0	0	0	0	294.4	4,274		4,274	-4,274	-4,112	0		0	34.0	590	590	0 + 49.500
0 + 69.880	20.380	36.2	369	332	43.4	442	486	818	0.0	3,000		3,000	-2,181	-6,293	818		0	18.0	530	530	0 + 69.880
0 + 80.000	10.120	59.8	486	437	114.8	800	881	1,318	0.0	0		0	1,318	-4,975	0		0	25.5	220	220	0 + 80.000
0 + 100.000	20.000	34.0	938	844	37.2	1,520	1,672	2,516	0.0	0		0	2,516	-2,459	0		0	16.7	422	422	0 + 100.000
0 + 120.000	20.000	34.4	684	616	30.4	676	744	1,359	0.0	0		0	1,359	-1,100	0		0	16.5	332	332	0 + 120.000
0 + 136.400	16.400	0.0	282	254	0.0	249	274	528	39.2	321		321	207	-893	321		0	34.0	414	414	0 + 136.400
0 + 160.000	23.600	26.6	314	282	72.8	859	945	1,227	0.0	463		463	765	-128	463		0	20.0	637	637	0 + 160.000
0 + 180.000	20.000	40.4	670	603	75.4	1,482	1,630	2,233	0.0	0		0	2,233	2,105	0		0	22.2	422	422	0 + 180.000
0 + 192.100	12.100	38.0	474	427	50.8	764	840	1,267	0.0	0		0	1,267	3,372	0		0	21.8	266	266	0 + 192.100
0 + 207.530	15.430	25.8	492	443	20.0	546	601	1,044	0.0	0		0	1,044	4,415	0		0	16.7	297	297	0 + 207.530
0 + 220.000	12.470	21.8	297	267	6.8	167	184	451	0.0	0		0	451	4,866	0		0	14.5	195	195	0 + 220.000
0 + 240.000	20.000	30.4	522	470	13.2	200	220	690	0.0	0		0	690	5,556	0		0	15.3	298	298	0 + 240.000
0 + 260.000	20.000	31.6	620	558	11.6	248	273	831	0.0	0		0	831	6,387	0		0	15.0	303	303	0 + 260.000
0 + 277.770	17.770	0.0	281	253	0.0	103	113	366	24.4	217		217	149	6,536	217		0	15.0	267	267	0 + 277.770
0 + 322.820	45.050	0.0	0	0	0.0	0	0	0	42.2	1,500		1,500	-1,500	5,036	0		0	15.3	683	683	0 + 322.820
0 + 382.140	59.320	37.2	1,103	993	101.8	3,019	3,321	4,314	0.0	1,252		1,252	3,063	8,099	1,252		0	26.3	1,234	1,234	0 + 382.140
0 + 402.000	19.860	0.0	369	332	0.0	1,011	1,112	1,444	187.4	1,861		1,861	-416	7,682	1,444		0	28.5	544	544	0 + 402.000
0 + 421.380	19.380	24.0	233	209	0.3	3	3	213	0.0	1,816		1,816	-1,603	6,079	213		0	19.5	465	465	0 + 421.380
0 + 421.610	0.230	20.4	5	5	0.2	0	0	5	0.0	0		0	5	6,083	0		0	14.5	4	4	0 + 421.610
0 + 440.000	18.390	13.4	311	280	0.0	2	2	282	0.0	0		0	282	6,365	0		0	12.0	244	244	0 + 440.000
0 + 460.000	20.000	31.2	446	401	29.2	292	321	723	0.0	0		0	723	7,088	0		0	17.2	292	292	0 + 460.000
0 + 480.000	20.000	0.0	312	281	0.0	292	321	602	76.6	766		766	-164	6,924	602		0	22.3	395	395	0 + 480.000
0 + 491.180	11.180	0.0	0	0	0.0	0	0	0	393.4	2,627		2,627	-2,627	4,296	0		0	39.5	345	345	0 + 491.180
0 + 493.910	2.730	0.0	0	0	0.0	0	0	0	326.6	983		983	-983	3,314	0		0	39.3	108	108	0 + 493.910
0 + 500.000	6.090	0.0	0	0	0.0	0	0	0	266.0	1,804		1,804	-1,804	1,509	0		0	34.0	223	223	0 + 500.000
0 + 520.000	20.000	20.6	206	185	4.0	40	44	229	0.0	2,660		2,660	-2,431	-921	229		0	15.0	490	490	0 + 520.000
0 + 540.000	20.000	44.0	646	581	53.2	572	629	1,211	0.0	0		0	1,211	289	0		0	22.3	373	373	0 + 540.000
0 + 560.000	20.000	56.8	1,008	907	45.4	986	1,085	1,992	0.0	0		0	1,992	2,281	0		0	22.5	448	448	0 + 560.000
0 + 580.000	20.000	34.2	910	819	27.8	732	805	1,624	0.0	0		0	1,624	3,905	0		0	20.0	425	425	0 + 580.000
0 + 592.000	12.000	22.6	341	307	9.8	226	248	555	0.0	0		0	555	4,460	0		0	14.7	208	208	0 + 592.000
0 + 623.000	31.000	14.8	580	522	6.8	257	283	805	0.0	0		0	805	5,265	0		0	13.0	429	429	0 + 623.000
0 + 650.000	27.000	0.0	200	180	0.0	92	101	281	43.8	591		591	-311	4,954	281		0	20.0	446	446	0 + 650.000
0 + 666.810	16.810	10.2	86	77	1.2	10	11	88	0.1	369		369	-281	4,674	88		0	12.5	273	273	0 + 666.810
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Total	666.810		13,531	12,178		15,750	17,324	29,503		24,829		24,829	4,674		6,253		0		13,108	13,108	

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Quantity Calculation 16.1 Earthwork

Access Road Name : Poza Honda Inlet Access Road

Station	Distance (m)	Earthwork: Cut Volume: Common (C=0.90) Sectional Area (m2)	Common (C=0.90) Ground Volume (m3)	Common (C=0.90) Corrected Volume (m3)	Weathered Rock (C=1.10) Sectional Area (m2)	Weathered Rock (C=1.10) Ground Volume (m3)	Weathered Rock (C=1.10) Corrected Volume (m3)	Total Corrected Cut Volume A (m3)	Embankment Volume: Embankment Section Sectional Area (m2)	Embankment Section Volume (m3)	Embankment Section Vary Volume (m3)	Total Embankment Volume B (m3)	Balance A - B (m3)	Accumulated Volume (m3)	Lateral Volume (m3)	Slope Protection: Left Side Slope Length (m)	Left Side Area (m2)	Right Side Slope Length (m)	Right Side Area (m2)	Total Area (m2)	Station
0 + 0.000		30.2			13.8				0.0					0		4.0		3.3			0 + 0.000
0 + 23.000	23.000	0.0	347	313	0.0	159	175	487	28.2	324		324	163	163	324	0.0	46	1.8	59	105	0 + 23.000
0 + 49.500	26.500	0.0	0	0	0.0	0	0	0	294.4	4,274		4,274	-4,274	-4,112	0	0.0	0	18.9	274	274	0 + 49.500
0 + 69.880	20.380	36.2	369	332	43.4	442	486	818	0.0	3,000		3,000	-2,181	-6,293	818	4.0	41	4.0	233	274	0 + 69.880
0 + 80.000	10.120	59.8	486	437	114.8	800	881	1,318	0.0	0		0	1,318	-4,975	0	4.1	41	3.9	40	81	0 + 80.000
0 + 100.000	20.000	34.0	938	844	37.2	1,520	1,672	2,516	0.0	0		0	2,516	-2,459	0	3.7	78	3.6	75	153	0 + 100.000
0 + 120.000	20.000	34.4	684	616	30.4	676	744	1,359	0.0	0		0	1,359	-1,100	0	4.5	82	3.0	66	148	0 + 120.000
0 + 136.400	16.400	0.0	282	254	0.0	249	274	528	39.2	321		321	207	-893	321	19.2	194	0.0	25	219	0 + 136.400
0 + 160.000	23.600	26.6	314	282	72.8	859	945	1,227	0.0	463		463	765	-128	463	1.0	238	1.8	21	260	0 + 160.000
0 + 180.000	20.000	40.4	670	603	75.4	1,482	1,630	2,233	0.0	0		0	2,233	2,105	0	2.2	32	4.6	64	96	0 + 180.000
0 + 192.100	12.100	38.0	474	427	50.8	764	840	1,267	0.0	0		0	1,267	3,372	0	2.2	27	7.7	74	101	0 + 192.100
0 + 207.530	15.430	25.8	492	443	20.0	546	601	1,044	0.0	0		0	1,044	4,415	0	2.0	32	4.8	96	129	0 + 207.530
0 + 220.000	12.470	21.8	297	267	6.8	167	184	451	0.0	0		0	451	4,866	0	1.0	19	4.3	57	75	0 + 220.000
0 + 240.000	20.000	30.4	522	470	13.2	200	220	690	0.0	0		0	690	5,556	0	3.1	41	3.9	82	123	0 + 240.000
0 + 260.000	20.000	31.6	620	558	11.6	248	273	831	0.0	0		0	831	6,387	0	3.3	64	3.6	75	139	0 + 260.000
0 + 277.770	17.770	0.0	281	253	0.0	103	113	366	24.4	217		217	149	6,536	217	6.6	88	0.0	32	120	0 + 277.770
0 + 322.820	45.050	0.0	0	0	0.0	0	0	0	42.2	1,500		1,500	-1,500	5,036	0	6.8	302	0.0	0	302	0 + 322.820
0 + 382.140	59.320	37.2	1,103	993	101.8	3,019	3,321	4,314	0.0	1,252		1,252	3,063	8,099	1,252	1.3	246	5.5	163	409	0 + 382.140
0 + 402.000	19.860	0.0	369	332	0.0	1,011	1,112	1,444	187.4	1,861		1,861	-416	7,682	1,444	15.2	166	0.0	55	220	0 + 402.000
0 + 421.380	19.380	24.0	233	209	0.3	3	3	213	0.0	1,816		1,816	-1,603	6,079	213	0.0	147	4.5	44	191	0 + 421.380
0 + 421.610	0.230	20.4	5	5	0.2	0	0	5	0.0	0		0	5	6,083	0	0.0	0	4.3	1	1	0 + 421.610
0 + 440.000	18.390	13.4	311	280	0.0	2	2	282	0.0	0		0	282	6,365	0	0.0	0	4.5	81	81	0 + 440.000
0 + 460.000	20.000	31.2	446	401	29.2	292	321	723	0.0	0		0	723	7,088	0	1.9	19	4.8	93	112	0 + 460.000
0 + 480.000	20.000	0.0	312	281	0.0	292	321	602	76.6	766		766	-164	6,924	602	15.4	173	0.0	48	221	0 + 480.000
0 + 491.180	11.180	0.0	0	0	0.0	0	0	0	393.4	2,627		2,627	-2,627	4,296	0	19.4	195	0.0	0	195	0 + 491.180
0 + 493.910	2.730	0.0	0	0	0.0	0	0	0	326.6	983		983	-983	3,314	0	18.0	51	25.0	34	85	0 + 493.910
0 + 500.000	6.090	0.0	0	0	0.0	0	0	0	266.0	1,804		1,804	-1,804	1,509	0	0.0	55	22.2	144	199	0 + 500.000
0 + 520.000	20.000	20.6	206	185	4.0	40	44	229	0.0	2,660		2,660	-2,431	-921	229	5.0	50	0.0	222	272	0 + 520.000
0 + 540.000	20.000	44.0	646	581	53.2	572	629	1,211	0.0	0		0	1,211	289	0	8.1	131	3.1	31	162	0 + 540.000
0 + 560.000	20.000	56.8	1,008	907	45.4	986	1,085	1,992	0.0	0		0	1,992	2,281	0	9.1	172	3.0	61	233	0 + 560.000
0 + 580.000	20.000	34.2	910	819	27.8	732	805	1,624	0.0	0		0	1,624	3,905	0	7.4	165	3.1	61	226	0 + 580.000
0 + 592.000	12.000	22.6	341	307	9.8	226	248	555	0.0	0		0	555	4,460	0	4.8	73	0.5	22	95	0 + 592.000
0 + 623.000	31.000	14.8	580	522	6.8	257	283	805	0.0	0		0	805	5,265	0	4.0	136	0.0	8	144	0 + 623.000
0 + 650.000	27.000	0.0	200	180	0.0	92	101	281	43.8	591		591	-311	4,954	281	0.0	54	8.4	113	167	0 + 650.000
0 + 666.810	16.810	10.2	86	77	1.2	10	11	88	0.1	369		369	-281	4,674	88	5.3	45	0.2	72	117	0 + 666.810
Total	666.810		13,581	12,178		15,750	17,324	29,503		24,829		24,829	4,674		6,253		3,203		2,526	5,729	

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Working Division: 16 Poza Honda Inlet Access Road

Description	Calculation Details	Unit	Quantity	Remarks
16.4	Pavement			
101	Improved subgrade material			
	Cut section			
	L = 451.23 m			
	Embankment section			
	L = 215.58 m			
	V = 6.0 × 0.075 × 451.23			
	+ 6.0 × (0.35 + 0.2)/2 × 215.58			
	= 558.8 m³			
		m³	559	
102	Graded crushed stone subbase			
	V = 6.0 × 0.15 × 666.81 = 600.1 m³			
		m³	600	
103	Transportation of improved subgraded material			
	V = 558.8 × 0.01 × 10 km = 55.9			
		m³·km	56	

6-49

Working Division: 16 Poza Honda Inlet Access Road

Description	Calculation Details	Unit	Quantity	Remarks
16.6				
101	Guardrail			
	L = 0	m	0	
102	Warning signs			
	N = 666.81/250 = 4	nos	4	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
	Estero Cañales			
Earth Work				
	01) Open cut Excavation			
	Left			
	· (11.0 + 7.5) x 10.5 x 1/2 x 7.0 = 312.38			
	· 7.5 x 5.0 x 1/2 x 7.0 = 131.25			
	· 63.38 x 5 x 1/3 = 105.63			
	549.26 m^3			
	Right			
	· 11.0 x 9 x 1/2 x 7.0 = 346.50			
	· 6.5 x 9 x 1/2 x 7.0 = 204.75			
	· 78.75 x 6.5 x 1/3 = 170.63			
	721.88 m^3			
	Total volume 1271.14 m^3			
	03) Free Draining Backfill			
	11.0 x 7.0 x 0.4 x 2nos = 61.6 m^3			
	04) Gravel Bedding			
	9.8 x 7.0 x 0.2 x 2nos = 27.44 m^3			

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Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
Earth Work				
	01) Open Cut Excavation			
	. (12.5+ 6.0) x 130x1/2x7.0 = 841.75			
	. 12.5x 0.5x 1/2x7.0 = 21.88			
	. 13.0 x 6.5x1/2 x 6.0x 2nos = 507			
	. 130x 6.0x 7.0 = 546.00			
	. 12.5x 6.0x1/2x7.0 = 262.50			
	. 13.0 x 6.5x 1/2x6.0x 2nos = 507			
	. 13.0x 6.5x 1/2x5.5x1/3x 2nos = 159.92			
	. 13.0x 6.5x1/2x 6.0x1/3x2nos = 169.00			
	. (8.5+2.0)x3.5x1/2x7.0 = 128.63			
	. (5.0+2.0)x3.5x1/2x7.0= 85.75			
	Total 3224.43			
	03) Free Draining Backfill			
	11.0x7.0x0.4x2nos = 61.6 m³			
	04) Gravel Bedding			
	9.8x7.0x0.2x2nos = 27.44 m³			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
	02) Backfill with Selected Material.			
	3224.43 - 61.6 - 452.06 = 2710.77			
	∴ 2710.77 m^3.			
	Gabion			
	12.0 x (7.0 + 6.0x2) = 228.00			
	7.0 x (7.0 + 6.0x2) = 133.00			
	Total 361.0 m^3			

Working Division: 3.2. CAÑA DULCE

Description	Calculation Details	Unit	Quantity	Remarks
11.2	Box culverts			
105	Open-cut excavation	m^3	432.29	
106	Backfill with selected material	m^3	111.78	
107	Free draining backfill	m^3	178.848	
108	Gravel bedding	m^3	12.3	

Working Division: 13. CAÑA DULCE INLET ACCESS ROAD

Description	Calculation Details	Unit	Quantity	Remarks
13.3	CULVERT AND DRAINAGE WORKS			
101	Open-cut excavation, all classes	m^3	571.116	
	1. Pipe culvert 75.67			
	2. Box culvert			
	3. Drain pipe 288.134			
	4. Catch basin 207.312			
	Total 571.116			
102	Backfill with selected material	m^3	219.81	
	1. Pipe culvert 36.13			
	2. Box culvert			
	3. Catch basin 183.68			
	Total 219.81			
103	Crushed stone bedding	m^3	12.32	→ 12.3
	1. Pipe culvert			

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Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3	CULVERT AND DRAINAGE WORKS			
104	Reinforced concrete pipe, D.600 mm Culvert : 10.4 m, For ditch 53.5 m	m	63.9	→ 64
105	Reinforced concrete pipe, D.800 mm	m	15.3	→ 16
106	Reinforced concrete pipe D.1,000 mm	m	0.0	→ 0
107	P.V.C. perforated drain pipe D.200 mm	m	1200.560	→ 1201
108	Free drainage material for subdrain	m^3	250.437	→ 251
109	Concrete, class E. for pipe culvert and wing walls	m^3	82.261	
	1. Pipe culvert 17.01			
	~~2. Box culvert~~			
	3. Wing wall for pipe culvert 8.607			
	4. Wing wall for box culvert 56.624			
	Total 82.261			
110	Concrete, class F. for side ditch and catch basin	m^3	345.953	→ 346
	1. Side ditch 332.919			
	2. catch basin 13.034			
	Total 345.953			

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Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3	CULVERT AND DRAINAGE WORKS			
111	Concrete, class H, for levelling concrete	m^3	9.544	
	1. Culvert			
	2. Wing wall 8.312			
	3. Catch basin 1.232			
	Total 9.544			
112	Formwork, F1 finish, for concrete of Items 109 and 110	m^2	255.573	
	1. culvert			
	2. Wing wall 182.808			
	3. Catch basin 72.765			
	Total 255.573			
113	Formwork, F3 finish, for concrete of Items 109 and 110	m^2	2930.382	
	1. Culvert			
	2. Wing wall 118.255			
	3. Catch basin 44.211			
	4. Drain ditch 2767.908			
	Total 2930.382			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3.	CULVERT AND DRAINAGE WORKS			
14	Reinforcing bars for concrete works	ton	6	
	1. Culvert			
	2 Wing wall 5030.16			
	3 Catch basin 1042.72			
	Total 6072.88			
15	Gabion mattress, t=500 mm	m^3	180.48	→ 181
16	Joint filler, t=10 mm	m^2		
17	Bituminous coating for contraction joint	m^2		

Working Division: A

Description	Calculation Details	Unit	Quantity	Remarks
A	CONCRETE WORKS			
103	Concrete class E for box culvert	m^3	259 958	
104	Concrete class H for levelling concrete	m^3	24 60	
106	Formwork F1 finish for concrete item 103, 104	m^2	482 26	
108	Formwork F3 finish for concrete item 103	m^2	534 21	
109	Reinforcing bars for concrete works	Ton	22	
110	Joint filler for culvert	m^2	15 770	
112	Bituminous coating for contraction joint	m^2	16 760	

69

変更なし

8 CAN~A DULCE

Sr. No	St No.	Q m3/s	I	Entrance El m	Exit El m	Road El m	Culvert Length m	Type	Soil Thickness m
D-1	0+060.00	5.01	6.0%	144.900	143.664	150.825	20.600	1200mm x 1200mm	5.343
D-2	1+059.77	1.11	3.0%	118.950	118.491	123.485	15.300	D=800mm 180	3.965
D-3	1+850.00	24.45	3.0%	86.110	84.520	98.830	53.000	2000mm x 2000mm Ⅲ	11.515
D-4	2+268.00	21.00	5.0%	98.200	97.000	105.687	24.000	2000mm x 2000mm Ⅱ	6.087
D-5	2+500.00	0.78	8.0%	117.950	117.118	121.000	10.400	D=600mm 90°	2.866

123.300

		(m)	(Nos)
φ600	90°	10.4	1
φ800	180°	15.3	1
1.2×1.2		20.6	1
2.0×2.0	Ⅱ	24.0	1
2.0×2.0	Ⅲ	53.0	1

8. Cana Dulce

		Length	Pipe Length	Open Cut Excavation (12.3/01)		Backfill (12.3/02)		Crushed Stone Bedding (12.3 /03)		Pipe D=600 (12.3/04)	Pipe D=800 (12.3/05)	Pipe D=1000 (12.3/06)	Concrete Class E (12.3/09)		Form Work F1 (12.3/12)		Reinforced Bar (12.3/14)	
		Unit (m)	Unit (m)	Unit (m3)	Total	Unit (m3)	Total	Unit (m3)	Total	Unit (m)	Unit (m)	Unit (m)	Unit (m3)	Total	Unit (m2)	Total	Unit (kg)	Total
D=600mm	90	63.9	63.9	0.83	52.96	0.43	27.52	0.14	9.11				0.16	9.99	0.52	33.23	0.00	0.00
	180	0.0		0.93	0.00	0.42	0.00	0.17	0.00				0.26	0.00	1.00	0.00	0.00	0.00
	Fix	0.0		1.09	0.00	0.45	0.00	0.24	0.00				0.62	0.00	2.00	0.00	42.98	0.00
D=800mm	90	0.0	15.3	1.28	0.00	0.58	0.00	0.17	0.00				0.26	0.00	0.68	0.00	0.00	0.00
	180	15.3		1.48	22.71	0.56	8.62	0.21	3.21				0.46	7.03	1.34	20.50	0.00	0.00
	Fix	0.0		1.72	0.00	0.60	0.00	0.31	0.00				1.11	0.00	2.68	0.00	73.53	0.00
D=1000mm	90	0.0	0.0	1.90	0.00	0.73	0.00	0.28	0.00				0.35	0.00	0.76	0.00	0.00	0.00
	180	0.0		2.12	0.00	0.72	0.00	0.33	0.00				0.60	0.00	1.58	0.00	0.00	0.00
	Fix	0.0		2.22	0.00	0.71	0.00	0.36	0.00				1.43	0.00	3.16	0.00	84.55	0.00
Total		79.2			75.67		36.13		12.32	63.90	15.30	0.00		17.01		53.73		0.00

19-9

		Length	Open Cut Excavation (12.2/07)		Backfill (12.2/06)		Concrete Class E (Item12.4/03)		Concrete Class H (Item12.4/04)		Form Work F1 (Item12.4/06)		Form Work F3 (Item12.4/08)		Reinforced Bar (12.4/09)	
		Unit (m)	Unit (m3)	Total	Unit (m3)	Total	Unit (m3)	Total	Unit (m3)	Total	Unit (m2)	Total	Unit (m2)	Total	Unit (kg)	Total
1200mm x 1200mm	~9.25	20.6	2.42	49.88	0.77	15.87	1.63	~~33.57~~ ~~49.88~~	0.19	3.81	3.60	74.16	3.70	76.19	162.91	3,355.90
1500mm x 1500mm	~9.5	0.0	3.36	0.00	0.96	0.00	2.31	0.00	0.22	0.00	4.30	0.00	4.45	0.00	193.31	0.00
2000mm x 2000mm	~5.75	77.0	4.97	382.40	1.25	95.91	2.94	~~382.40~~ 26.38	0.27	20.79	5.30	408.10	5.95	458.03	232.36	17,892.03
2000mm x 2000mm	~7.75	0.0	5.18	0.00	1.31	0.00	3.20	0.00	0.27	0.00	5.50	0.00	5.95	0.00	236.02	0.00
2000mm x 2000mm	7.751~	0.0	5.54	0.00	1.37	0.00	3.74	0.00	0.28	0.00	5.70	0.00	5.95	0.00	270.47	0.00
2500mm x 2000mm	3.75~5.75	0.0	5.93	0.00	1.31	0.00	3.61	0.00	0.32	0.00	5.50	0.00	6.43	0.00	317.29	0.00
2500mm x 2000mm	5.751~	0.0	6.32	0.00	1.37	0.00	4.20	0.00	0.32	0.00	5.70	0.00	6.43	0.00	331.62	0.00
Total		97.6		432.29		111.78		~~432.29~~		24.60		482.26		534.21		21,247.93

259.958

LONGITUD DE CUNETAS

CAMINO DE ACCESO: CAÑA DULCE KM: 0+000 a 2+694.91

	ABSCISAS	IZQUIERDA	DERECHA	LONGITUD
	0+14.46 - 0+20	5.54	5.54	11.08
✓	0+020 - 0+040	20.00	0.00	20
✓	0+100 - 0+126.39	26.39	0.00	26.39
	0+126.39 - 0+146.38	19.99	19.99	39.98
9.0	0+199.78 - 0+400	200.22	0.00	200.22
	0+400 - 0+492.19	92.19	0.00	92.19
	0+492.19 - 0+650	57.81	57.81	115.62
	0+550 - 0+620	0.00	70.00	70
	0+650 - 0+700	50.00	0.00	50
	0+700 - 0+750	50.00	50.00	100
	0+750 - 0+760	10.00	0.00	10
5.5	0+760 - 0+800	✓ 40.00	40.00	80
	0+800 - 0+820	0.00	20.00	20
6.0	0+820 - 0+940	✓ 120.00	120.00	240
	0+940 - 0+978.60	38.60	0.00	38.6
7.0	0+978.60 - 1+032.51	✓ 53.91	53.91	107.82
	1+127.34 - 1+205	77.66	0.00	77.66
8.0	1+205 - 1+240	✓ 35.00	35.00	70
	1+240 - 1+360	120.00	0.00	120
10.0	1+360 - 1+380	✓✓ 20.00	20.00	40
	1+380 - 1+400	20.00	0.00	20
	1+400 - 1+550	150.00	150.00	300
	1+550 - 1+634	84.00	0.00	84
8.0	1+634 - 1+698.63	64.63	64.63	129.26
	1+698.63 - 1+720	21.37	0.00	21.37
	1+720 - 1+760	✓✓ 40.00	40.00	80
	2+131.44 - 2+208.42	✓ 0.00	76.98	76.98
	2+340 - 2+420	✓ 0.00	80.00	80
	2+420 - 2+500	✓✓ 80.00	80.00	160
	2+550 - 2+560	10.00	10.00	20
	2+560 - 2+573.93	13.93	0.00	13.93
	2+626 - 2+679.52	✓ 53.52	0.00	53.52
	2+679.52 - 2+694.91	15.39	15.39	30.78
			LONG. TOTAL:	2801.40

Total length 2601.40

Additions 15 x 10 = 150 2751.4

Catch basin 7 nos

Ø 600 53.5 m.

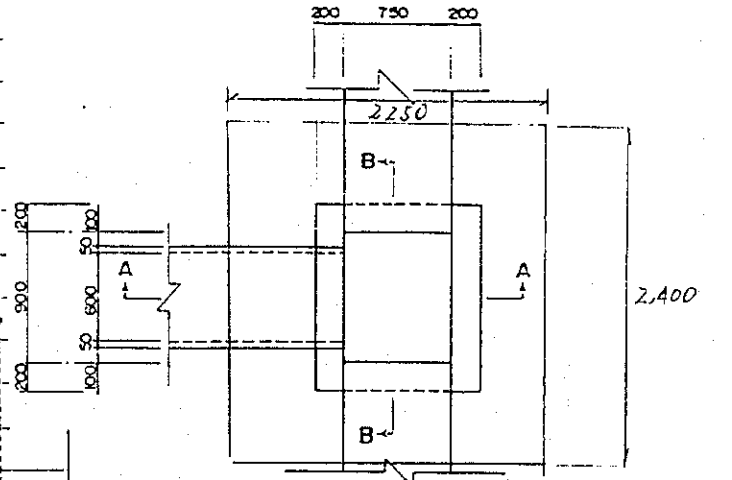
Drain Pipe Quantities

Access Road Name	Length (m)	Excavation (m3)		P.V.C Pipe D=200mm (m)		Drainage Material (m3)	
		Per meter	Total		Total	Per meter	Total
Conguillo	5,823.120	0.240	1,397.549		5,823.120	0.209	1,214.703
Severno Tramo1	1,535.870	0.240	368.609		1,535.870	0.209	320.382
Severno Tramo2	2,472.920	0.240	593.501		2,472.920	0.209	515.851
Los Cuyuyes	7,324.030	0.240	1,757.767		7,324.030	0.209	1,527.793
Poza Honda	266.710	0.240	64.010		266.710	0.209	55.636
La Seca	2,035.376	0.240	488.490		2,035.376	0.209	424.579
El Guasmo	786.460	0.240	188.750		786.460	0.209	164.056
Cana Dulce	1,200.560	0.240	288.134		1,200.560	0.209	250.437
Membrillo Outlet	30.000	0.240	7.200		30.000	0.209	6.258
Grand Total			5,154.011		21,475.046		4,479.695

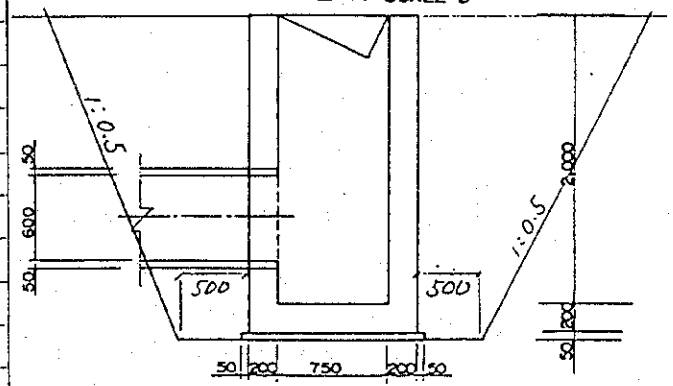
Excavation	V=(0.8+0.4)*0.4/2	=0.24
Free Drainage Material	V=0.24-3.14*0.1^2	=0.21

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 101	Open-cut excavation, all classes (Catch basin)			
	2.25 × 2.4 m = 5.4 m².			
	4.5 × 4.65 m = 20.925 m².			
	(5.4 + 20.925) × ½ × 2.25 = 29.616 m³.			
	29.616 × 7 = 207.312	m³	207.312	



TIPO-A ESCALA B
TYPE-A SCALE B



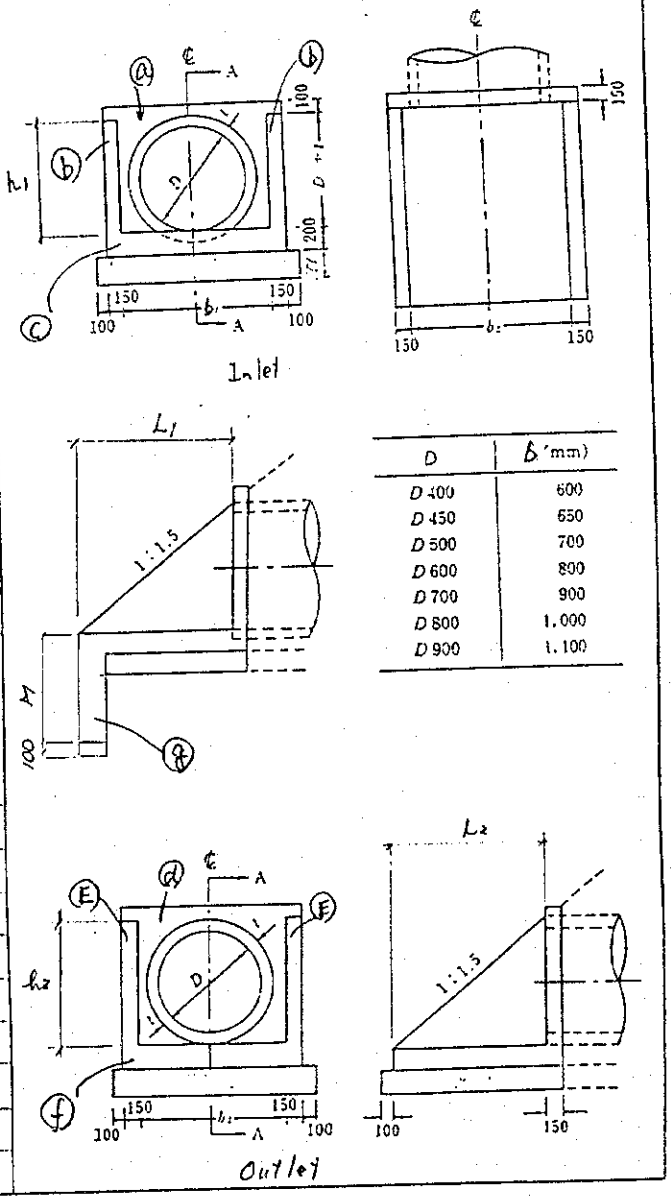
SECCION A-A
SECTION A-A

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 102	Backfill with selected material			
	<catch basin>			
	29.616 - 1.15 × 1.3 × 2.2 - 1.25 × 1.4 × 0.05 = 26.240			
	26.240 × 7 m = 183.68	m^3	183.680	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 109	Concrete class E for			
	(wing wall)			
	(pipe type)			
	L Ø600 (h_1 = 650 mm, b = 800 mm)			
	(L_1 = 975 mm, h_2 = 700 mm) L_2 = 105 M=400mm			
	ⓐ 1.1 × 0.95 × 0.15 m = 0.157 m^3			
	ⓑ 0.975 × 0.65 × 0.15 × 1/2 × 2 = 0.095 m^3			
	ⓒ 1.7 × 0.975 × 0.2 = 0.215 m^3			
	ⓓ 1.1 × 1.0 × 0.15 m = 0.165 m^3			
	ⓔ 1.05 × 0.7 × 1/2 × 0.15 × 2 = 0.110 m^3			
	ⓕ 1.1 × 1.05 × 0.2 m = 0.231 m^3			
	ⓖ 0.3 × 0.4 × 1.1 m × 2 = 0.264 m^3			
	1.337 m^3			
	1.337 × 1 = 1.337	m^3	6.67	
	0.77 × 7 = 5.390			



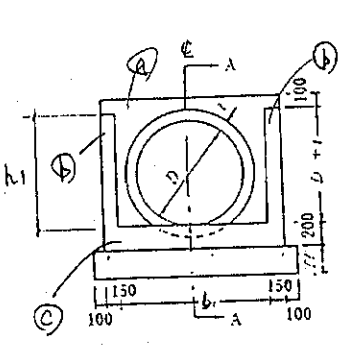
D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

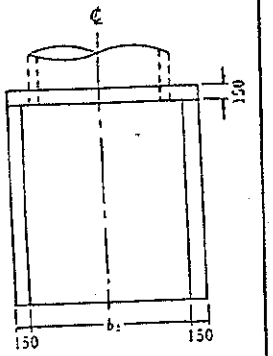
99-7

Working Division:

Description	Calculation Details	Unit	Quantity
3 109.	2. ϕ800. $h_1 = 0.866$m $L_1 = 1.299$ m $b = 1.0$m, $h_2 = 0.932$, $L_2 = 1.398$ m $M = 0.6$m.		
	ⓐ: $1.3 \times 1.166 \times 0.15 = 0.227$ m³. ⓑ: $0.866 \times 1.299 \times \frac{1}{2} \times 0.15 \times 2 = 0.169$ m³ ⓒ: $1.3 \times 1.299 \times 0.2 = 0.338$ m³.		
	ⓓ: $1.3 \times 1.232 \times 0.15 = 0.240$ m³. ⓔ: $0.932 \times 1.398 \times \frac{1}{2} \times 0.15 \times 2 = 0.195$ m³ ⓕ: $1.3 \times 1.398 \times 0.2 = 0.363$ m³.		
	ⓖ: $0.3 \times 0.6 \times 1.3 \times 2 = 0.468$ m³		
	2.0 m³		
	$2.0 \times 1 = 2.0$	m³	2.0

Remarks





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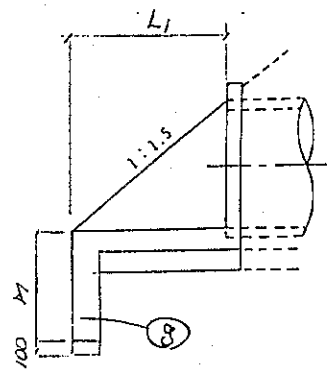
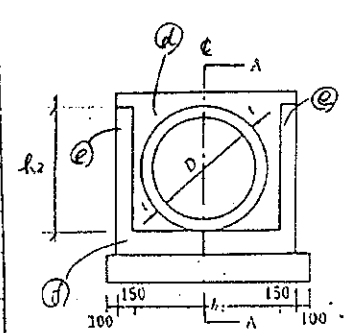
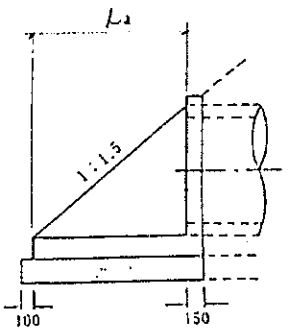


D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1.000
D 900	1.100



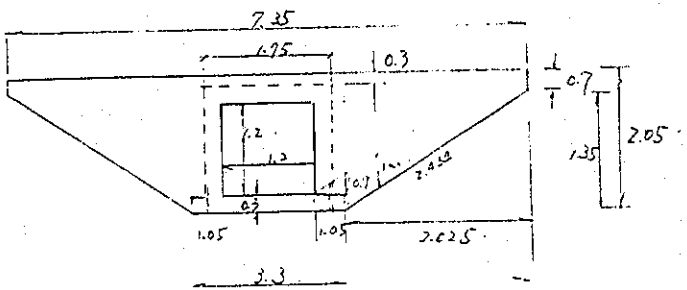


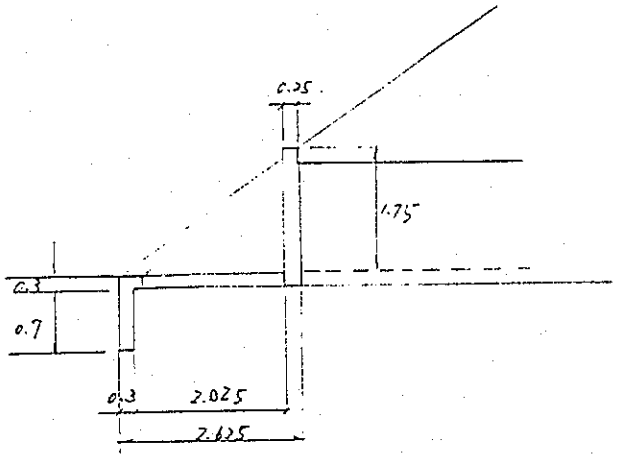
Outlet

L9-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 109	Concrete, class E for pipe culvert and wing wall.	m^3		
	(wing wall)			
	1. 1.2 × 1.2 m			
	(wing)			
	$[(3.3+7.35) \times 1.35 \times \frac{1}{2} + 0.7 \times 7.35 - 1.2 \times 1.2] \times 0.25 = 2.723\ m^3$			
	(slab)			
	$1.75 \times 2.325 \times 0.3 = 1.221$			
	$1.75 \times 0.7 \times 0.3 = 0.388$			
	$4.312\ m^3$			
	$4.312 \times 2 \times 1 = 8.614$	m^3	8.614	

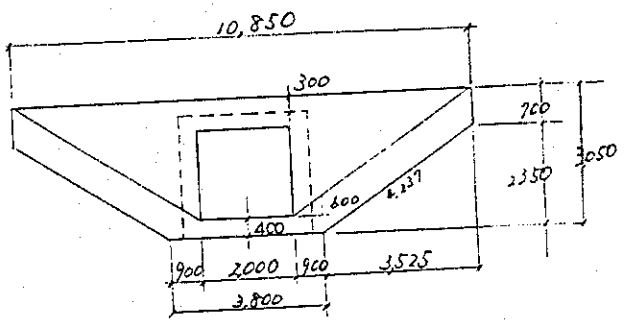


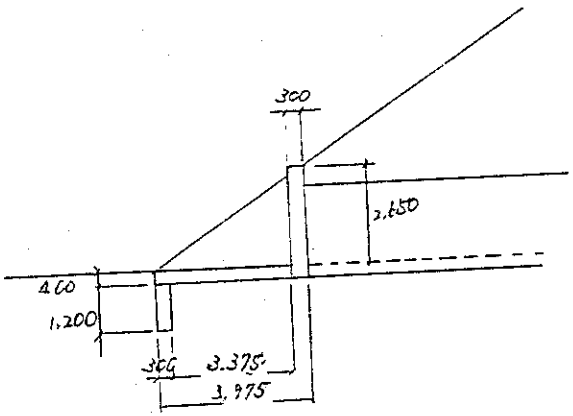


B9-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
a 109	Concrete class E			
	(Wing wall)			
	4. 2.0 × 2.0 (II)			
	(wing)			
	$\{(10.85+3.8)\times 2.35\times \frac{1}{2}+0.7\times 10.85 - 2.0^2\}\times 0.3 = 6.243$			
	<slab>			
	$2.6\times 3.675\times 0.4 = 3.822$			
	$0.3\times 1.20\times 2.6 = 0.936$			
	11.001 m³			
	$11.001\times 2\times 1 = 22.002$	m³	22.002	

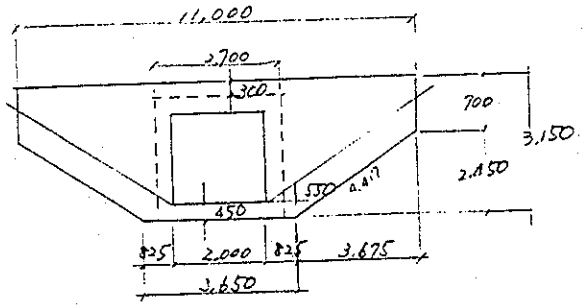


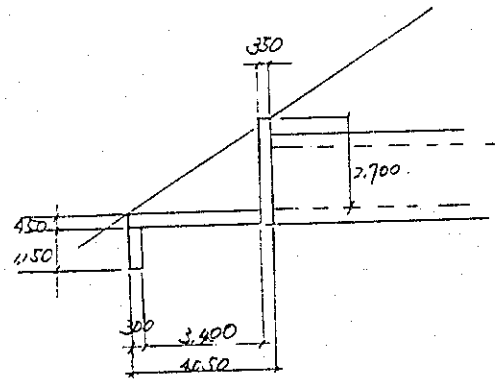


69-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 109	Concrete class E			
	(Wing wall)			
	5. 2.0×2.0 (III)			
	<Wing>			
	{(11.0+3.65)×2.45×1/2+0.7×11.0			
	−2.0²}×0.35			
	=7.576 m³			
	<slab>			
	2.7×3.70×0.45 = 4.496			
	0.3×1.15×2.70 = 0.932			
	13.004 m³			
	13.004×2×1=26.008	m³	26.008	

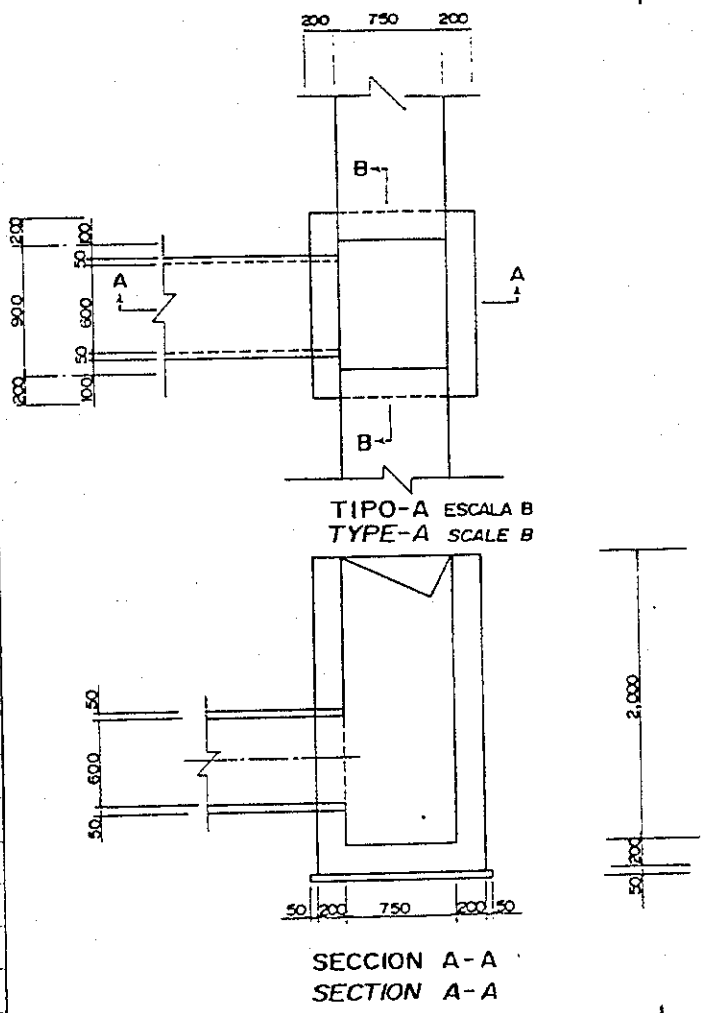




04-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 1/0	Concrete, class F for side ditch and catch basin			
	(catch basin) per 1 no.			
	1.15 × 1.30 × 2.2			
	− 0.75 × 0.9 × 2.0 = 1.939 m³.			
	1.939 − 0.35π × 0.2² = 1.862 m³			
	1.862 × 7 = 13.034	m³	13.034	



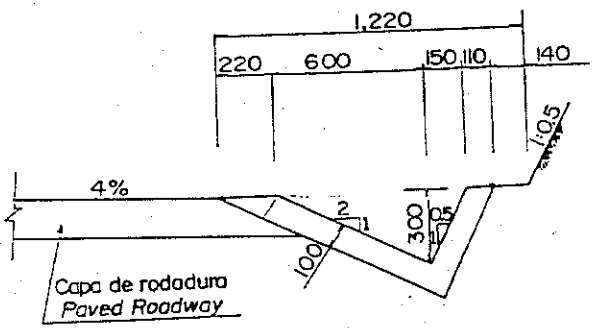
TIPO-A ESCALA B
TYPE-A SCALE B

SECCION A-A
SECTION A-A

14-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 110	Concrete class F. for side ditch and catch basin			
	(Side ditch) per 1 m			
	1.08 × 0.432 × 1/2			
	− 0.75 × 0.3 × 1/2 = 0.121 m^3			
	0.121 × 2751.4 = 332.919	m^3	332.919	

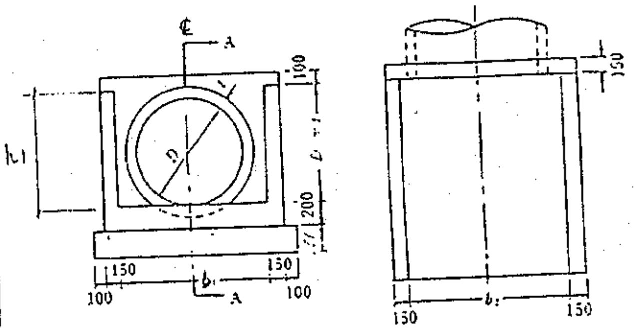


6-72

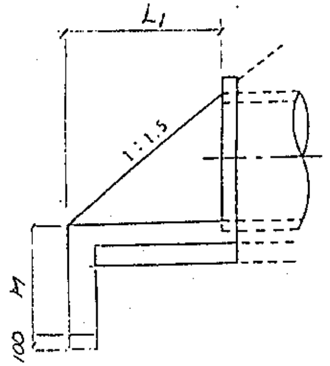
Working Division:

Description	Calculation Details	Unit	Quantity
3 ///	Concrete, class H for levelling concrete		
	1. Ø600 pipe (wing wall)		
	1.1m × 1.125 × 0.1 = 0.124 m^3		
	1.1 × 1.20 × 0.1 = 0.132 m^3		
	0.256 m^3		
	0.256 × 1 = 0.256 0.132 × 7 = 0.924	m^3	1.18
	2. Ø800 pipe		
	1.3 × 1.449 × 0.1 = 0.189 m^3		
	1.3 × 1.548 × 0.1 = 0.201 m^3		
	0.390 m^3		
	0.390 × 1 = 0.390	m^3	0.390
	3. Ø1,000 pipe		
	1.5 × 1.773 × 0.1 = 0.266 m^3		
	1.5 × 1.896 × 0.1 = 0.284 m^3		
	0.550 m^3		

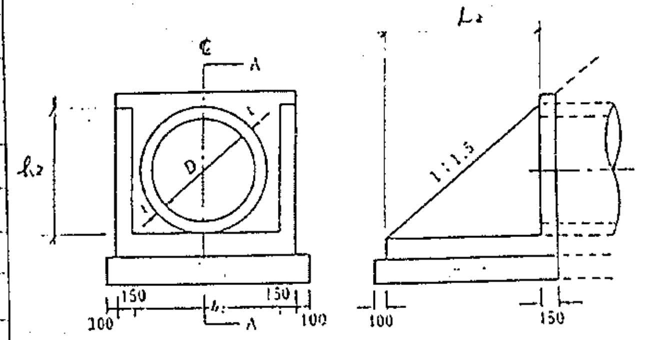
Remarks



Inlet



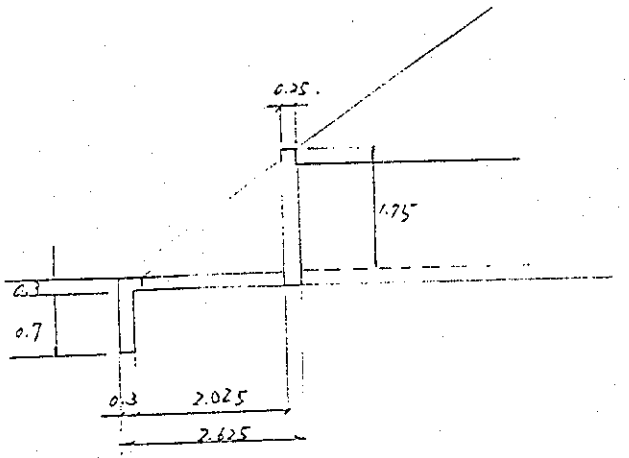
D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

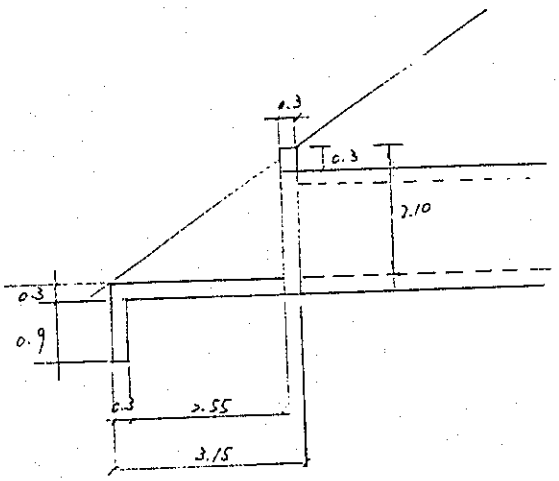


Outlet

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /11	Concrete class H for levelling concrete (wing wall)			
	1. 1.2 × 1.2 m			
	(wing) 0.25 × (2.434 × 2 + 3.3) × 0.1 = 0.204			
	(slab) 1.75 × 2.325 × 0.1 = 0.407			
	0.611 m^3			
	0.611 × 2 × 1 = 1.222	m^3	1.222	
	2. 1.5 × 1.5 m			
	(wing) 0.3 × (3.154 × 2 + 3.45) × 0.1 = 0.293			
	(slab) 2.1 × 2.85 × 0.1 = 0.599			
	0.892 m^3			

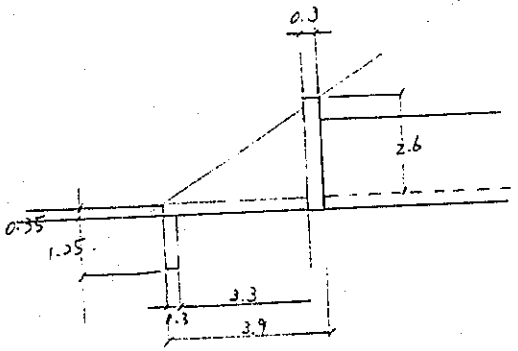


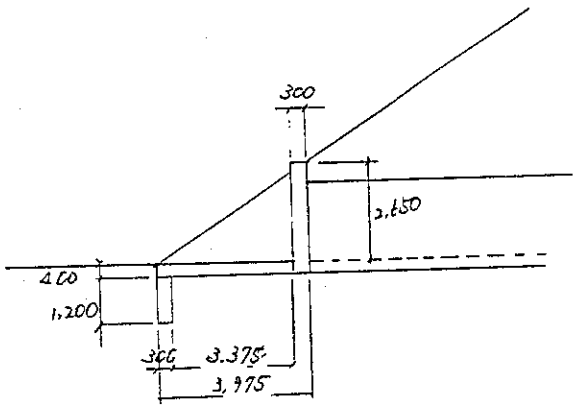


SL-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /11	Concrete class H for levelling concrete			
	(wing wall)			
	3 2.0 × 2.0 (I)			
	(wing) 0.3 × (4.056 × 2 + 3.95) × 0.1 = 0.362 m³			
	(slab) 2.6 × 3.33 × 0.1 = 0.866			
	1.228 m³			
	4. 2.0 × 2.0 (II)			
	(wing) 0.3 × (4.237 × 2 + 3.80) × 0.1 = 0.368			
	(slab) 2.6 × 3.675 × 0.1 = 0.956			
	1.324 m³			
	1.324 × 2 × 1 = 2.648	m³	2.648	

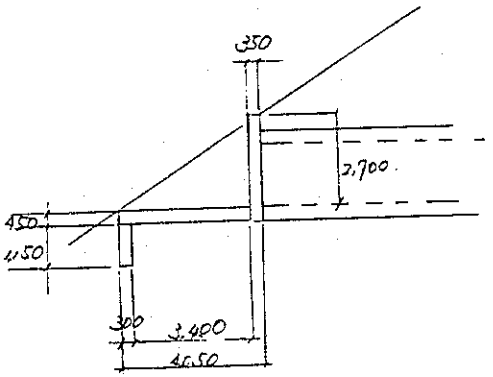


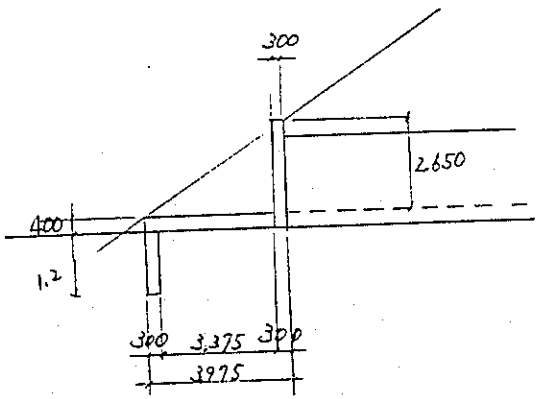


6-79

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /11	Concrete class H for levelling concrete			
	(Wing Wall)			
	5 2.0x2.0m (III)			
	(wing) 0.35 x (4.417x2+3.65) x0.1 = 0.437			
	(slab) 2.7 x 3.7 x 0.1 = 0.999			
	1.436 m³			
	1.436 x 2 x 1 = 2.872	m³	2.872	
	6.25 x 2.0 m (I)			
	(wing) 0.30 x (4.237x2+4.5) x0.1 = 0.383			
	(slab) 3.1 x 3.675 x 0.1 = 1.139			
	1.522 m³			

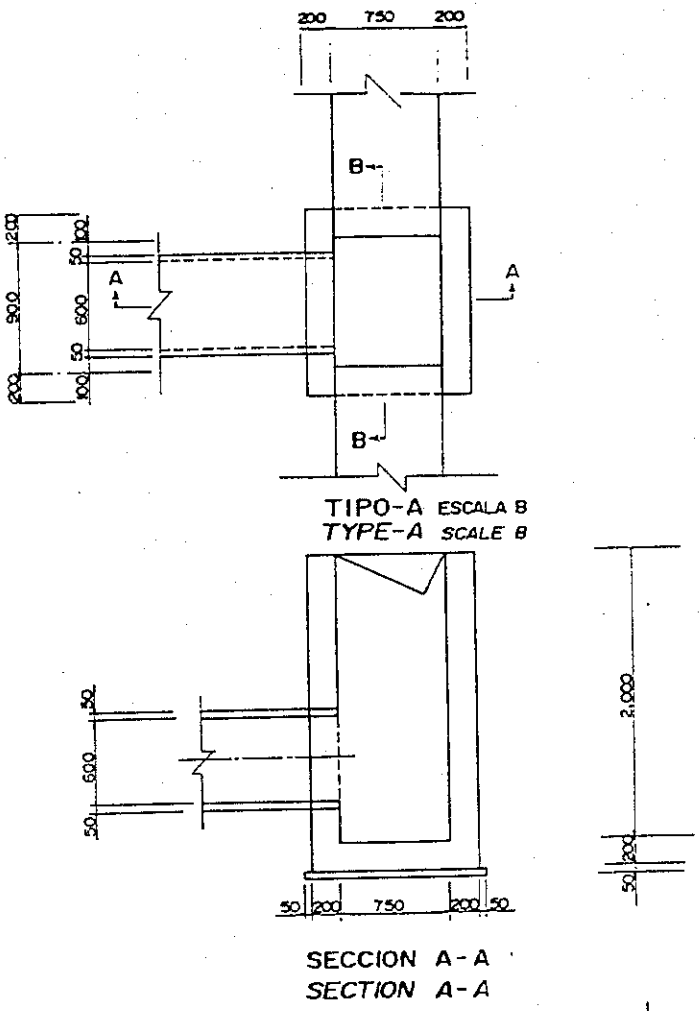




94-9

Working Division:

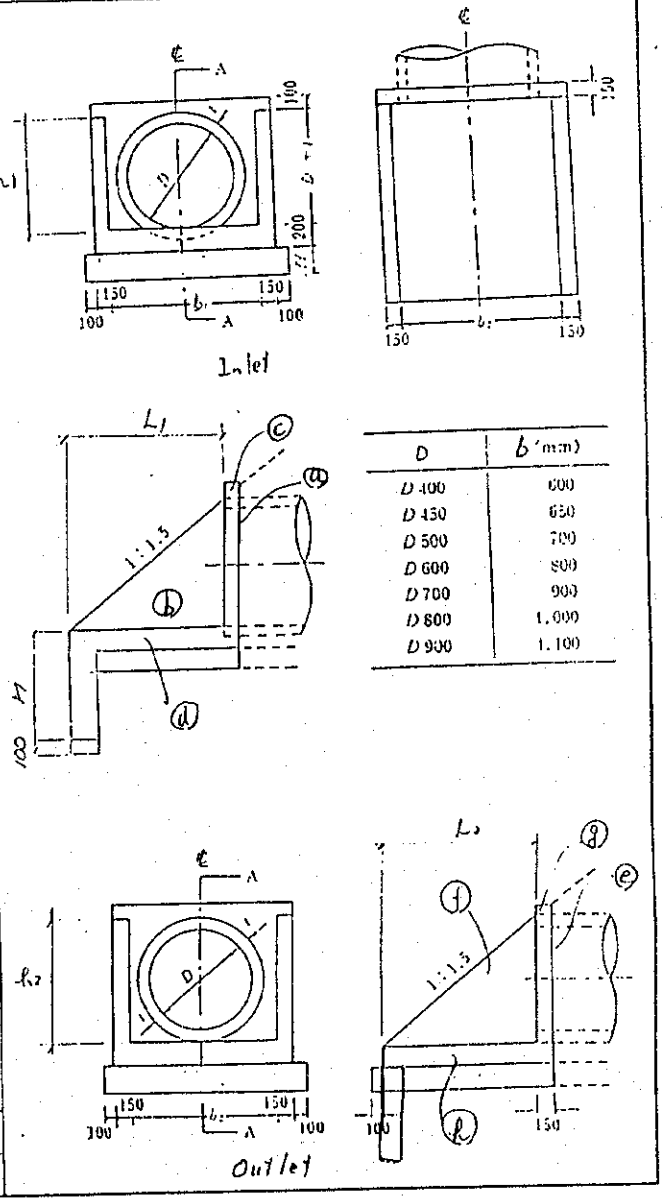
Description	Calculation Details	Unit	Quantity	Remarks
3 /11	Concrete class H for levelling concrete			
	(catch basin) per 1 no.			
	1.25 × 1.4 × ~~0.05~~ = ~~0.088~~ m^3			
	0.1 = 0.176.			
	0.176 × 7 = 1.232	m^3	1.232	



44-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
13 /12	Formwork, FI finish for concrete of item 109, 110 and 111			
	(wing wall).			
	1. ϕ 600.			
	ⓐ 1.1m × 0.95m = 1.045 m²			
	1.045 − (0.3+0.05)²π = 0.660 m²			
	ⓑ (0.15+1.125) × 0.65/2 × 2 = 0.859 m²			
	ⓒ 0.15 × 0.1 × 2 = 0.03 m²			
	ⓓ 0.2 × (1.1 + 1.125 × 2) + 1.1 × (0.4 + 0.2) = 1.33			
	ⓔ 1.1m × 1.0m = 1.100 m²			
	1.100 − (0.3+0.05)²π = 0.715			
	ⓕ (0.15+1.20) × 0.7 × ½ × 2 = 0.945			
	ⓖ 0.15 × 0.1 × 2 = 0.03 m²			
	ⓗ 0.2 × (1.1 + 1.20 × 2) + 1.1 × (0.4 + 0.2) = 1.36			
	5.899 m²			
	5.899 × 1 = 5.899	m²	27.249	
	3.05 × 7 = 21.350			

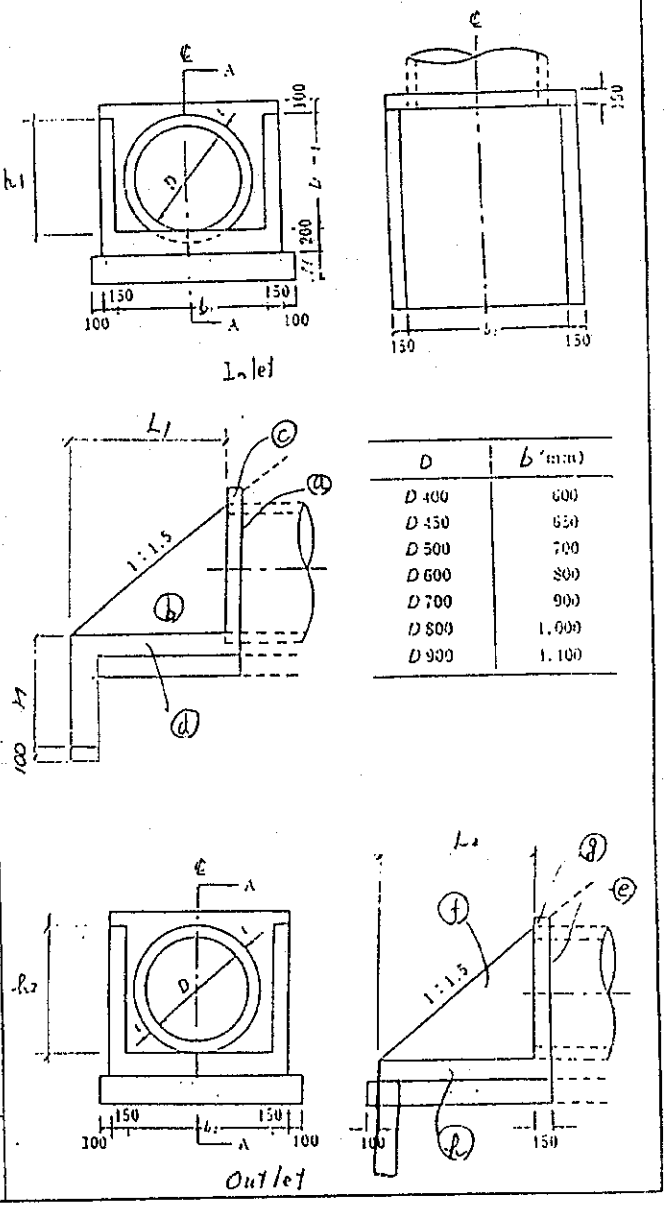


D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

84-2

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 / 12	Formwork Fl finish			
	(wing wall)			
	2. ϕ800			
	ⓐ 1.3 m × 1.166 m = 1.516			
	1.516 − (0.466)²π = 0.834 m²			
	ⓑ (0.15+1.449) × 0.866 × ½ × 2 = 1.385 m²			
	ⓒ 0.15 × 0.1 × 2 = 0.03			
	ⓓ 0.2 × (1.3+1.449×2) + 1.3(0.6+0.4)			
	= 2.140			
	ⓔ 1.3 × 1.232 = 1.602			
	1.602 − 0.466²π = 0.920 m²			
	ⓕ (0.15+1.548) × 0.932 × ½ × 2 = 1.583 m²			
	ⓖ 0.15 × 0.1 × 2 = 0.03			
	ⓗ 0.2 × (1.3+1.548×2) + 1.3 × (0.6+0.4)			
	= 2.179			
	9.101 m²			
	9.101 × 1 = 9.101	m²	9.101	

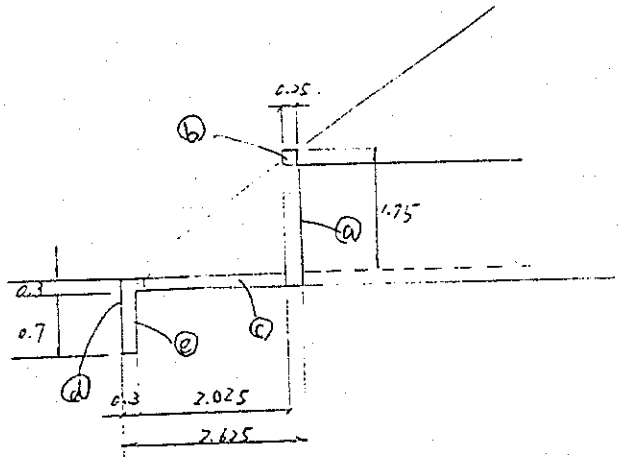


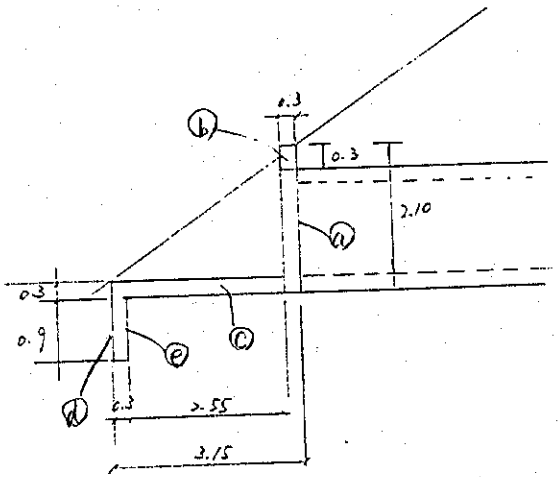
D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

64-9

Working Division:

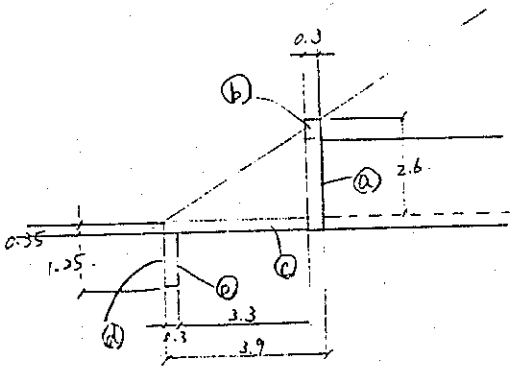
Description	Calculation Details	Unit	Quantity	Remarks
.3 1/12	Formwork FI finish (curing wall)			
	1. 1.2×1.2 m			
	ⓐ (7.35+3.3)×1.35×½ + 0.7×7.35 − 1.80×1.75 = 9.184 m²			
	ⓑ 0.7×0.25×2 = 0.35 m²			
	ⓒ (2.325×1.0 − 2.025×0.7)×2 = 1.815 m²			
	ⓓ 1.0×1.75 = 1.75 m²			
	ⓔ 0.7×1.75 = 1.225 m²			
	14.324 m²			
	14.324 ×7×1 = 28.648	m²	28.648	
	2. 1.5×1.5 m			
	ⓐ (8.7+3.45)×1.75×½ + 0.7×8.7 − 2.1×2.15 = 12.206 m²			
	ⓑ 0.7×0.3×2 = 0.42 m²			
	ⓒ (2.85×1.2 − 2.55×0.9)×2 = 2.250 m²			
	ⓓ 1.2×2.1 = 2.52 m²			
	ⓔ 0.9×2.1 = 1.89 m²			
	19.286 m²			

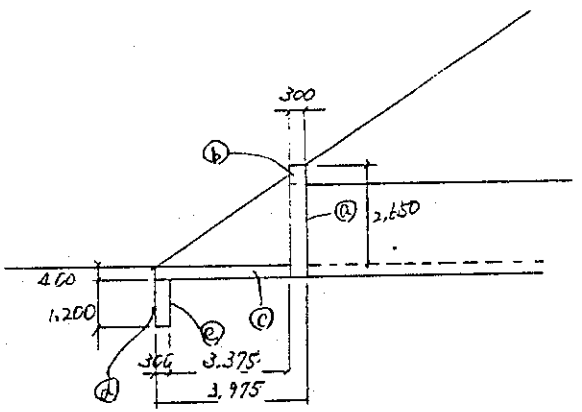




Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 /12	Formwork FI finish			
	3. 2.0×2.0 m (I)			
	ⓐ (10.7+3.95)×2.35×½ + 0.7×10.7			
	−2.6×2.65 = 17.081 m²			
	ⓑ 0.7×0.3×2 = 0.42 m²			
	ⓒ (3.6×1.60 − 3.3×1.25)×2 = 3.270 m²			
	ⓓ 1.60×2.6 = 4.16 m²			
	ⓔ 1.25×2.6 = 3.25 m²			
	28.181 m²			
	4. 2.0×2.0 m (II)			
	ⓐ (10.85+3.8)×2.35×½ + 0.7×10.85			
	−2.6×2.75 = 17.659 m²			
	ⓑ (0.7×0.3×2 = 0.42 m²			
	ⓒ (3.675×1.6 − 3.375×1.2)×2 = 3.660 m²			
	ⓓ 1.6×2.6 = 4.16 m²			
	ⓔ 1.2×2.6 = 3.12 m²			
	29.019 m²			
	29.019×2×1 = 58.038 m²	m²	58.038	

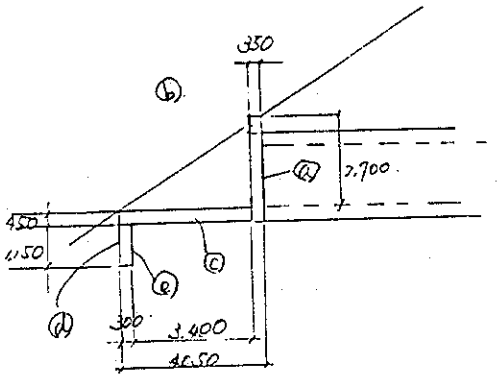


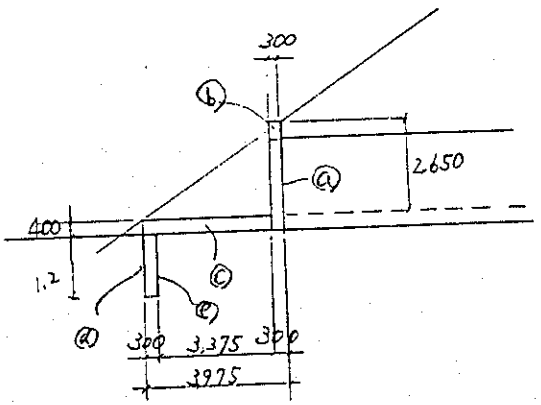


18-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 / 12	Formwork Fl finish			
	5. 2.0 × 2.0 (Ⅲ)			
	ⓐ (11.0 + 3.65) × 2.45 × ½ + 0.7 × 11.0 − 2.7 × 2.85 = 17.951 m²			
	ⓑ 0.7 × 0.35 × 2 = 0.49			
	ⓒ (3.70 × 1.6 − 3.4 × 1.15) × 2 = 4.02			
	ⓓ 1.6 × 2.7 = 4.32			
	ⓔ 1.15 × 2.7 = 3.105			
	29.886 m²			
	29.886 × 2 × 1 = 59.772	m²	59.772	
	6. 2.5 × 2.0 (I)			
	ⓐ (11.35 + 4.3) × 2.35 × ½ + 0.7 × 11.35 − 3.1 × 2.75 = 17.809			
	ⓑ 0.7 × 0.3 × 2 = 0.42			
	ⓒ (3.675 × 1.6 − 3.375 × 1.2) × 2 = 3.660			
	ⓓ 1.6 × 3.1 = 4.96			
	ⓔ 1.2 × 3.1 = 3.72			
	30.569 m²			

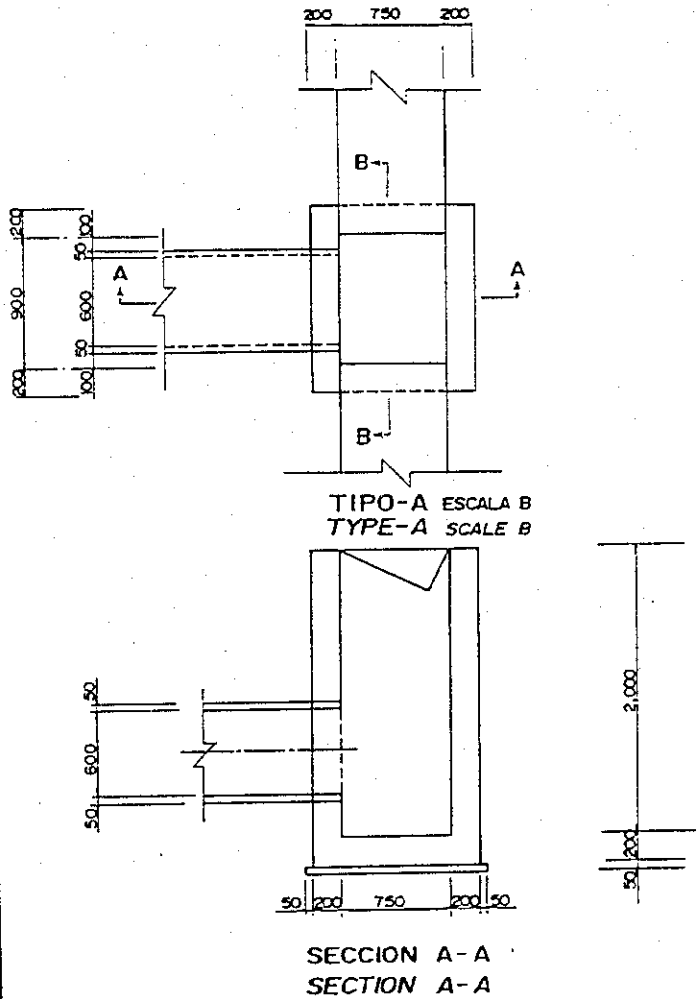




6-82

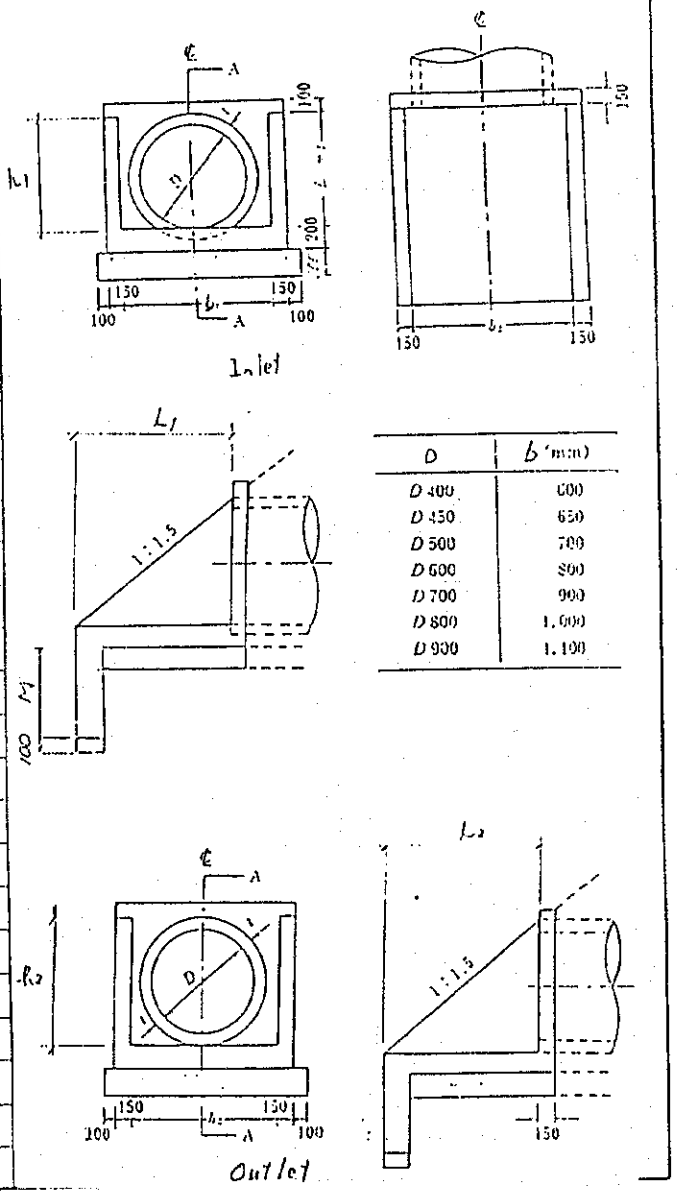
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 12	Formwork FI finish			
	(Catch basin)			
	1.15 × 2.2 × 2 = 5.06			
	1.30 × 2.2 × 2 − 0.35²π = 5.335			
	10.395 m²			
	10.395 × 7 = 72.765	m²	72.765	



Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 /13	Formwork F3 finish			
	(Wing wall)			
	1. ø600.			
	ⓐ 0.1×1.1 + 0.8×0.65 − 0.3²π = 0.347 m²			
	ⓑ 0.975×0.65×½×2 = 0.634 m²			
	ⓒ 0.1×1.1 + 0.8×0.70 − 0.3²π = 0.387 m²			
	ⓓ 1.05×0.70×½×2 = 0.735 m²			
	2.103 m²			
	2.103 × 1 = 2.103	m²	9.957	
	1.122 × 7 = 7.854			



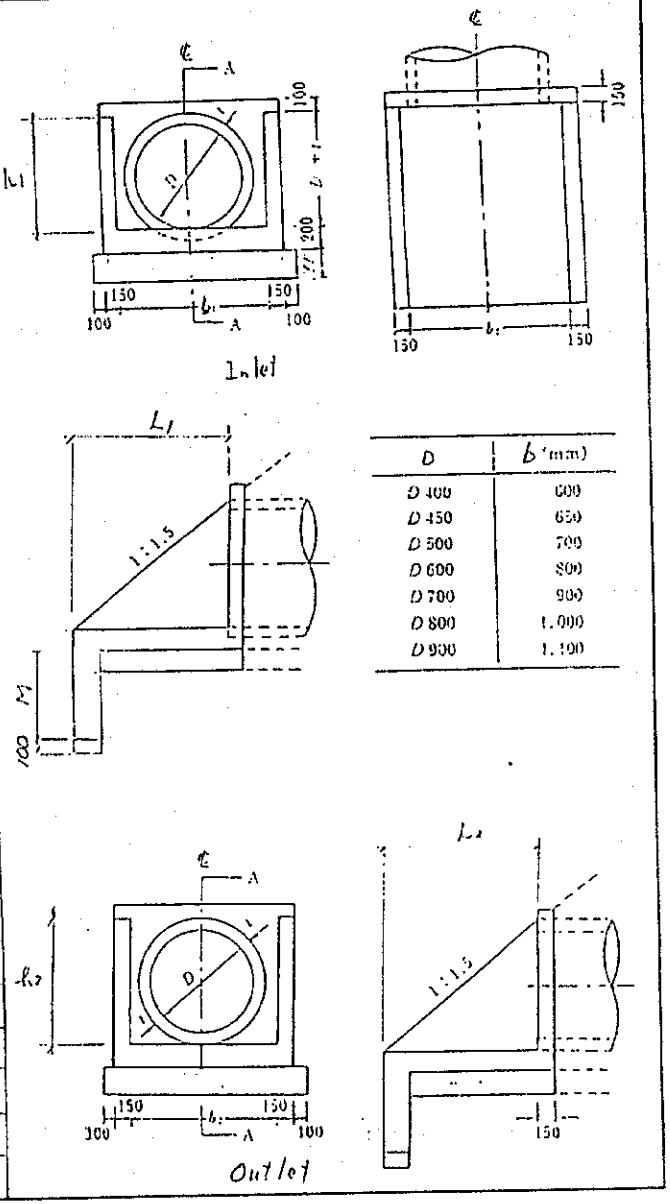
D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

X8-9

Working Division:

Description	Calculation Details	Unit	Quantity
3 /13	Formwork, F3 finish (curing wall)		
	2 Ø800		
	ⓐ 0.1×1.3 + 1.0×0.866 − 0.4²π = 0.493 m²		
	ⓑ 1.299×0.866×½×2 = 1.125 m²		
	ⓒ 0.1×1.3 + 1.0×0.932 − 0.4²π = 0.559 m²		
	ⓓ 1.398×0.932×½×2 = 1.303 m²		
	3.480 m²		
	3.480×1 = 3.480	m²	3.480

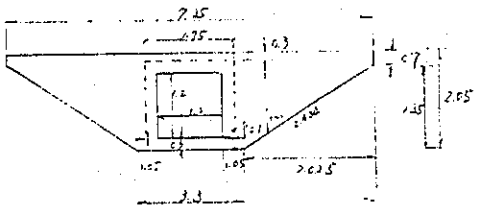
Remarks



D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /13	Formwork, F3 finish			
	(Wing wall)			
	1. 1.2 × 1.2 m			
	(3.3 + 7.35) × 1.35/2 + 0.7 × 7.35			
	− 1.2 × 1.2 = 10.894 m²			
	10.894 × 2 × 1 = 21.788	m²	21.788	
	2. 1.5 × 1.5 m			
	(3.45 + 8.7) × 1.75/2 + 0.7 × 8.7			
	− 1.5² = 14.471 m²			
	3. 2.0 × 2.0 m (I)			
	(10.7 + 3.95) × 2.35/2 + 0.7 × 10.7			
	− 2.0² = 19.971 m²			
	4. 2.0 m × 2.0 m (II)			
	(10.85 + 3.80) × 2.35/2 + 0.7 × 10.85	m²	39.738	
	− 2.0² = 19.869 m²			
	19.869 × 2 × 1 = 39.738			



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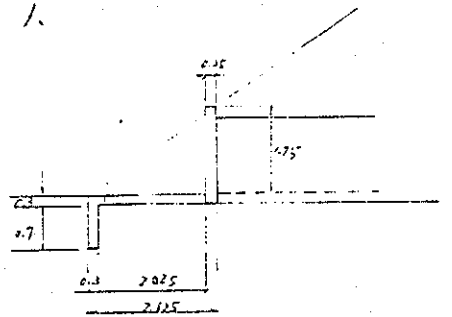

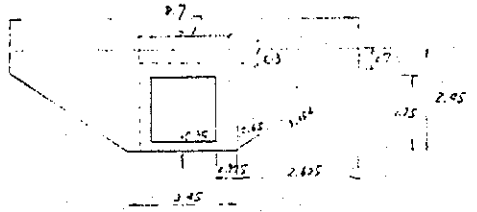

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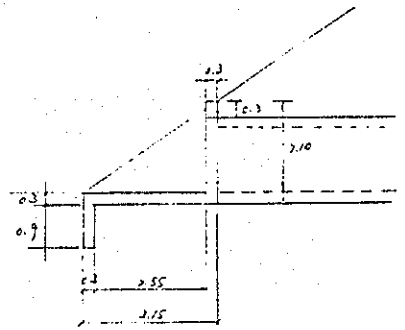
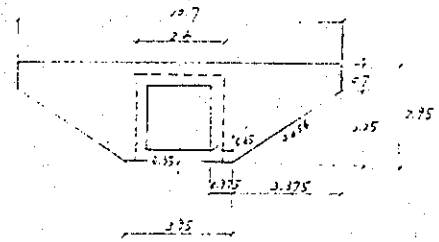


98-3



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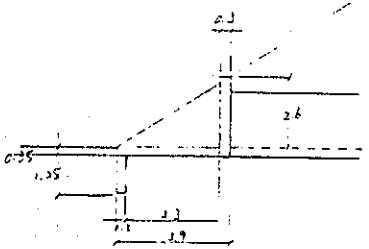

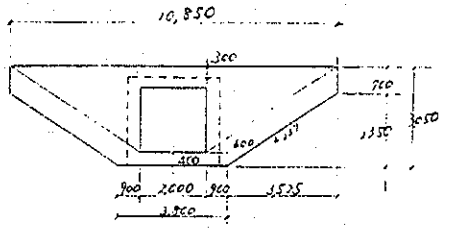

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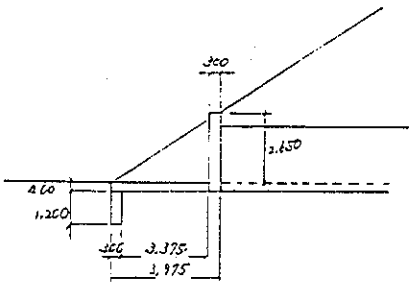
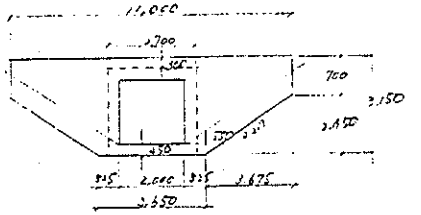
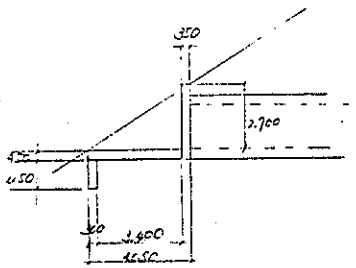
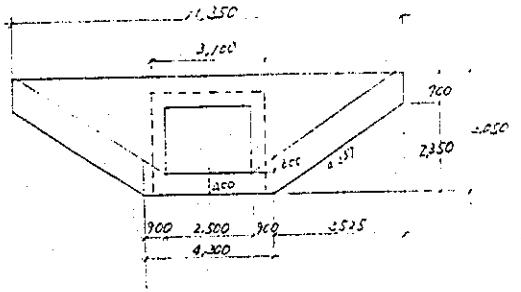
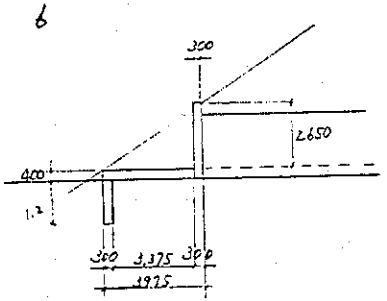


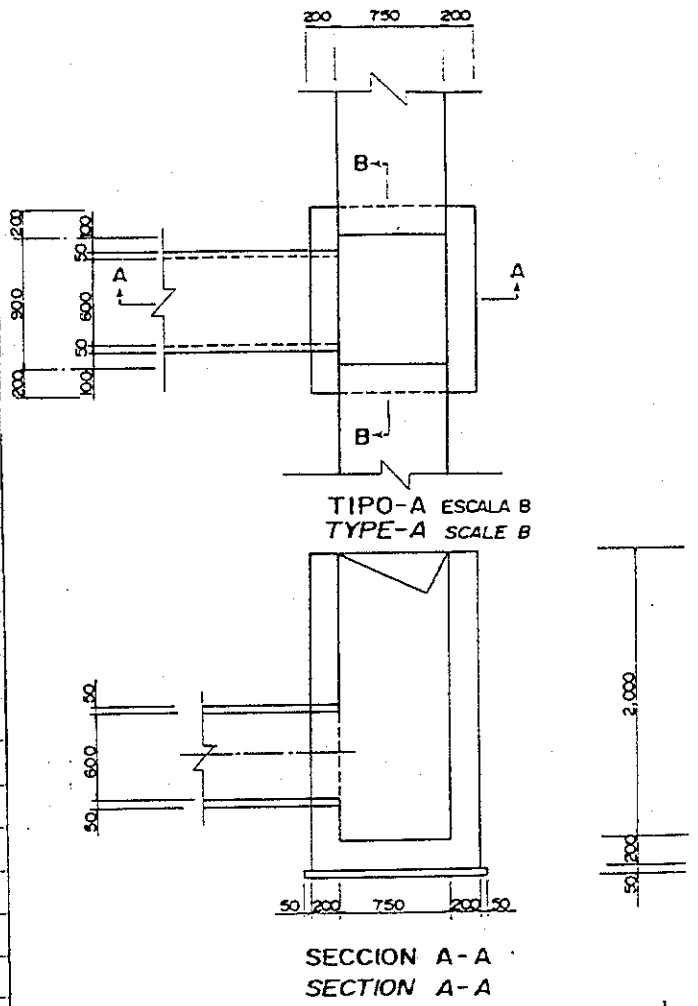
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 /13	Formwork F3 finish (Curing wall) 5. 2.0 x 2.0 m (III) (11 + 3.65) x 2.45 x 1/2 + 0.7 x 11 - 2.0² = 21.646 m² 21.646 x 2 x 1 = 43.292	m²	43.292	 5   6 
	6. 2.5 x 2.0 (I) (11.35 + 4.3) x 2.35 x 1/2 + 0.7 x 11.35 - 2.5 x 2.0 = 21.334 m²			
	7. 2.5 x 2.0 (II) (11.5 + 4.15) x 2.4 x 1/2 + 0.7 x 11.5 - 2.5 x 2.0 = 21.830 m²			

28-7

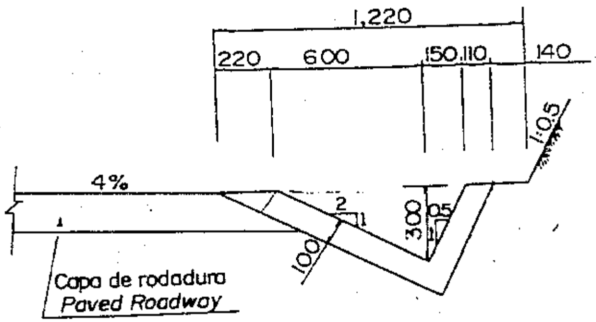
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /3	Formwork F3 finish			
	(Catch basin)			
	0.75 × 2.0 × 2 = 3.0			
	0.90 × 2.0 × 2 − 0.35 = 3.317			
	6.317 m²			
	6.317 × 7 = 44.219	m²	44.219	



189

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 113	Formwork, F3 finish for concrete item 109 and 110.			
	(Side ditch). per 1m.			
	$0.671 + 0.335 = 1.006\ m^2$			
	$1.006 \times 2751.4\ m = 2767.908$	m^2	2767.908	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
1 3 14	Reinforcing bars for concrete works			
	(wing wall).			
	80 kg / 1 m^3 of concrete volume			
	1. ø600			
	1.237 m^3 × 80 = 98.96 kg			
	98.96 × 1 = 98.96			
	.77 × 80 × 7 = 431.2			
	2. ø800			
	2.000 m^3 × 80 = 160 kg			
	160 × 1 = 160			
	3. ø1,000			
	2.939 m^3 × 80 = 235.12 kg			

16-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /14	Reinforcing bars for concrete works (wing wall)			
	80 kg / m^3 of concrete volume			
	1 1.2×1.2 m			
	4.312 × 80 = 329.6 kg			
	329.6 × 2 = 659.2			
	2 1.5×1.5 m			
	6.704 × 80 = 536.32 kg			
	3 2.0×2.0 m (I)			
	10.242 × 80 = 819.36 kg			
	4 2.0×2.0 m (II)			
	11.001 × 80 = 880.08 kg			
	880.08 × 2 = 1760.16			
	5 2.0×2.0 m (III)			
	13.004 × 80 = 1040.32 kg			
	1040.32 × 2 = 2080.64			

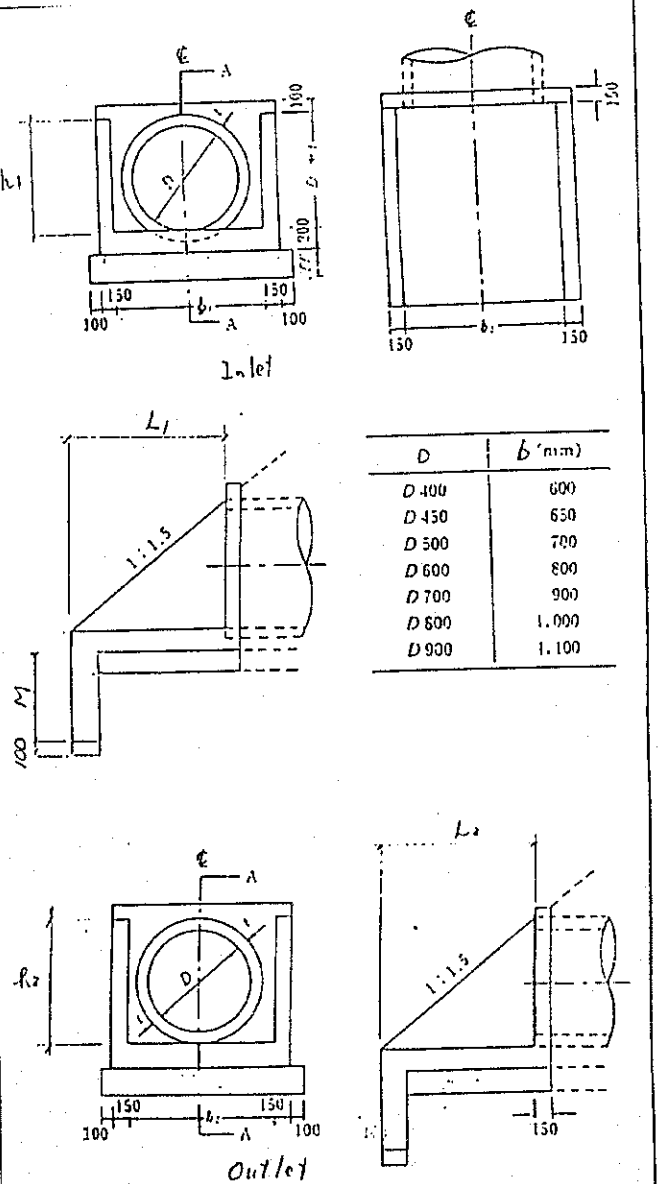
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 114	Reinforcing bars for concrete works			
	(Catch basin)			
	80 kg/ 1 m^3 of concrete volume	Ton	1.0	
	1.862 m^3 x 80 kg/m^3 = 148.96 m^3.			
	148.96 x 7 = 1042.72.			

Working Division:

Description	Calculation Details	Unit	Quantity
3 1/5	Gabion mattress $t = 500$ mm		
	(wing wall part)		
	1. ø600		
	$(0.8 + 0.3) \times 5.0 \times 0.5 = 2.75\ m^3$	m^3	9.35
	$2.75 \times 2 = 5.5$		
	$2.75 \times 7 \times 1/5 = 3.85$		
	2. ø800		
	$(1.1 + 0.3) \times 5.0 \times 0.5 = 3.25\ m^3$	m^3	6.5
	$3.25 \times 2 \times 1 = 6.5$		
	3. ø1,000		
	$(1.2 + 0.3) \times 5.0 \times 0.5 = 3.75\ m^3$		
	4. 1.2 × 1.2 m		
	$(2.434 \times 2 + 3.3) \times 5.0 \times 0.5 = 20.42\ m^3$	m^3	40.84
	$20.42 \times 2 \times 1 = 40.84$		
	5. 1.5 × 1.5 m		
	$(3.154 \times 2 + 3.45) \times 5.0 \times 0.5 = 29.395\ m^3$		

Remarks



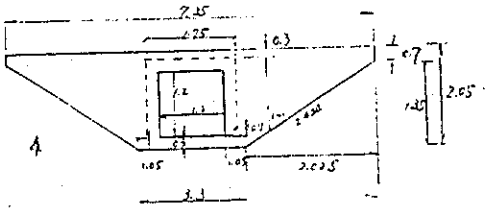
D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

A1-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 /15	Gabion mattress, t = 500mm. (Wing wall)			
	6. 2.0×2.0 (I) (4.056×2+3.95)×5.0×0.5 = 30.155 m³.			
	7. 2.0×2.0 (II) (4.237×2+3.8)×5.0×0.5 = 30.685 m³	m³	61.370	
	30.685×2×1 = 61.370			
	8. 2.0×2.0 (III) (4.417×2+3.65)×5.0×0.5 = 31.21 m³			
	31.21×2×1 = 62.42	m³	62.42	
	9. 2.5×2.0 (I) (4.287×2+4.3)×5.0×0.5 = 31.935 m³			
	10. 2.5×2.0 (II) (4.417×2+4.15)×5.0×0.5 = 32.46 m³			

4



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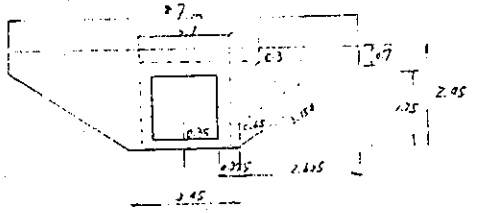

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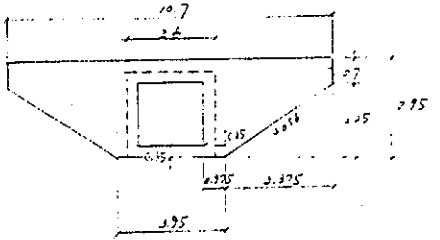

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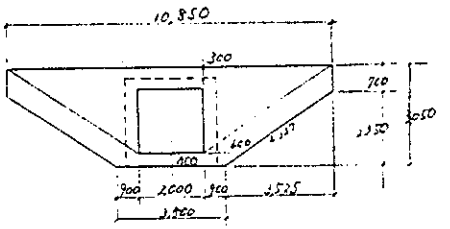

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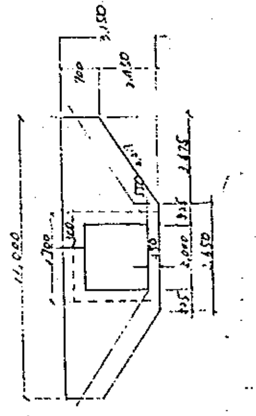

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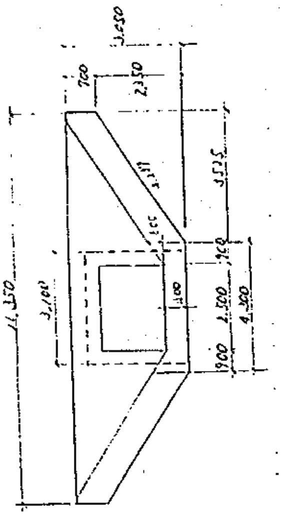

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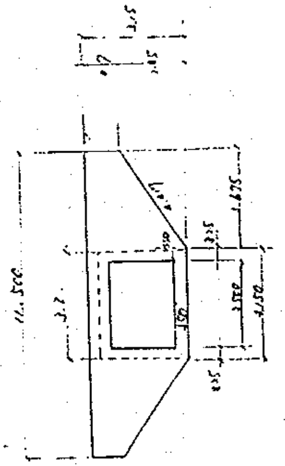

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
~~3~~ ~~1~~	Joint Filler, t=10 mm			
4 10	<Culvert>			
	1. 1.2×1.2 m			
	1.75×1.70 − 1.2×1.2 = 1.535 m²	m²	1.535	
	1.535 × 1 = 1.535			
	2. 1.5×1.5 m			
	~~2.1 × 2.15 − 1.5 × 1.5 = 2.265 m²~~			
	3. 2.0×2.0 m (I)			
	~~2.6 × 2.65 − 2 × 2 = 2.890 m²~~			
	4. 2.0×2.0 m (II)			
	2.6×2.75 − 2×2 = 3.15 m²	m²	3.15	
	3.15 × 1 = 3.15			
	5. 2.0×2.0 m (III)			
	2.7×2.85 − 2×2 = 3.695 m²	m²	11.085	
	3.695 × 3 = 11.085			

Remarks:

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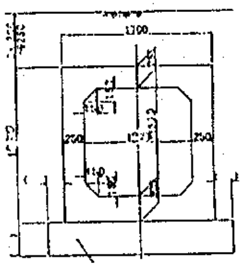

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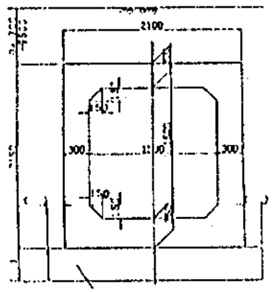

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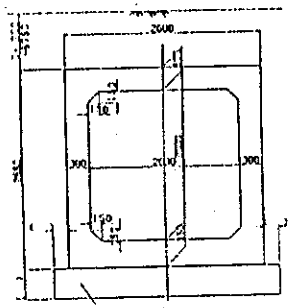

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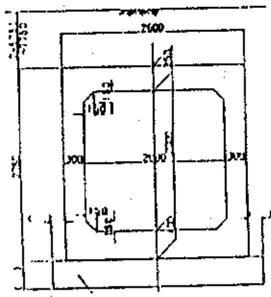

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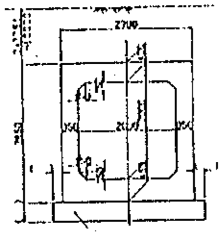
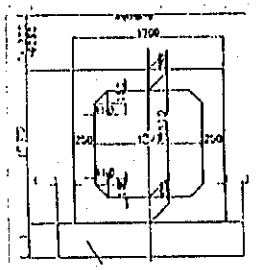
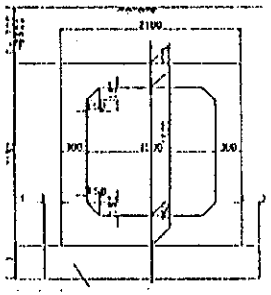
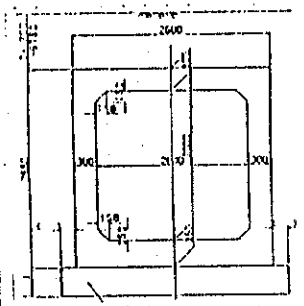
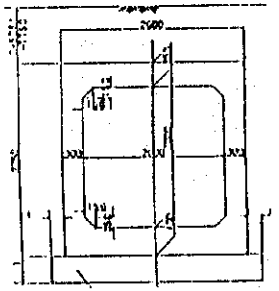
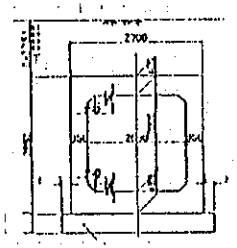


Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3.4 .19 12	Bituminous coating for contraction joint			
	<Culvert>			
	1. 1.2 × 1.2 m			
	1.75 × 1.70 − 1.2 × 1.2 = 1.535 m²	m²	3.07	
	1.535 × 2 = 3.07			
	2. 1.5 × 1.5 m			
	2.1 × 2.15 − 1.5 × 1.5 = 2.265 m²			
	3. 2.0 × 2.0 m (I)			
	2.6 × 2.65 − 2 × 2 = 2.89 m²			
	4. 2.0 × 2.0 m (II)			
	2.6 × 2.75 − 2 × 2 = 3.15 m²	m²	6.30	
	3.15 × 2 = 6.30			
	5. 2.0 × 2.0 m (III)			
	2.7 × 2.85 − 2 × 2 = 3.695 m²	m²	7.390	
	3.695 × 2 = 7.390			

1. 
2. 
3. 
4. 
5. 

08-9

Working Division: 12. SEVERINO

Description	Calculation Details	Unit	Quantity	Remarks
12.2				
105		m^3	244	
106		m^3	117	
107		m^3	187	
108		m^3	13	
12.3				
101		m^3	3214	
102		m^3	1657	
103		m^3	152	
104		m	783	
105		m	49	
106		m	0	
107		m	4009	
108		m^3	837	
109		m^3	388	
110		m^3	1342	
111		m^3	30	
112		m^2	1835	
113		m^2	10912	
114		tm	32	
115		m^3	237	
116		m^2	0	
117		m^2	0	

66-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
12.4				
103		m^3	305	
104		m^3	25	
106		m^2	496	
108		m^2	518	
109		Ton	23	
110		m^2	16	
112		m^2	15	

02-13

Working Division: 122. SEVERINO ACCESS ROAD (I)

Description	Calculation Details	Unit	Quantity	Remarks
11.2	Box culverts			
105	Open-cut excavation	m^3	0	
106	Backfill with selected material	m^3	0	
107	Free draining backfill	m^3	0	
108	Gravel bedding	m^3	0	

Working Division: 12. SEVERINO ACCESS ROAD (1)

Description	Calculation Details	Unit	Quantity	Remarks
12.3	CULVERT AND DRAINAGE WORKS			
101	Open-cut excavation, all classes	m^3	1587.717	
	1. Pipe culvert 389.86			
	2 Box culvert 0			
	3. Drain pipe 368.609			
	4. Catch basin 829.248			
	Total 1587.717			
102	Backfill with selected material	m^3	921.890	
	1. Pipe culvert 187.17			
	2. Box culvert 0			
	3. Catch basin 734.720			
	Total 921.89			
103	Crushed stone bedding	m^3	79.000	
	1. Pipe culvert			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
12.3	CULVERT AND DRAINAGE WORKS			
104	Reinforced concrete pipe, D.600 mm Culvert : 163.4 m, For ditch 265.3 m	m	428.700	
105	Reinforced concrete pipe, D.800 mm	m	0.0	
106	Reinforced concrete pipe, D.1,000 mm	m	0.0	
107	P.V.C. perforated drain pipe D.200 mm	m	1,535.870	
108	Free drainage material for subdrain	m^3	320.382	
109	Concrete, class E. for pipe culvert and wing walls	m^3	157.909	
	1. Pipe culvert 127.69			
	2. Box culvert 0			
	3. Wing wall for pipe culvert 30.219			
	4. Wing wall for box culvert 0			
	Total 157.909			
110	Concrete, class F. for side ditch and catch basin	m^3	662.989	
	1. side ditch 610.853			
	2. catch basin 52.136			
	Total 662.989			

6-103

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
12.3	CULVERT AND DRAINAGE WORKS			
/11	Concrete, class H, for levelling concrete	m^3	13.860	
	1. Culvert 0			
	2. Wing wall 8.960			
	3. Catch basin 4.900			
	Total 13.860			
/12	Form work, F1 finish, for concrete of Items 109 and 110	m^2	838.973	
	1. culvert 421.22			
	2. Wing wall 126.693			
	3. Catch basin 291.060			
	Total 838.973			
/13	Formwork, F3 finish, for concrete of Items 109 and 110	m^2	5301.673	
	1 Culvert 0			
	2. Wing wall 46.137			
	3 Catch basin 176.810			
	4. Drain ditch 5078.660			
	Total 5301.673			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
D.3	CULVERT AND DRAINAGE WORKS			
1.14	Reinforcing bars for concrete works	ton	0.11	
	1. Culvert 5523.44 kg			
	2. Wing wall 2417.52.			
	3. Catch basin 4170.88			
	Total 11111.84			
1.15	Gabion mattress, t=500 mm	m^3	53.90	
1.16	Joint filler, t=10 mm	m^2	0	
1.17	Bituminous coating for contraction joint	m^2	0	

Working Division: 4

Description	Calculation Details	Unit	Quantity	Remarks
4	CONCRETE WORKS			
103	Concrete class E for box culvert:	m^3	0	
104	Concrete class H for levelling concrete	m^3	0	

2 SEVERINO TRAMO 1

Sr. No	St No.	Q m3/s	I	Entrance El m	Exit El m	Road El m	Culvert Length m	Type	Soil Thickness m
D-1	0+100.00	0.78	17.5%	414.650	412.900	416.588	0 10.000	D=600mm 90	2.213
D-2	0+588.00	0.34	1.0%	394.900	394.820	396.537	0 8.000	D=600mm 90	1.077
D-3	0+920.00	1.12	12.8%	371.050	367.600	376.600	1 27.000	D=600mm 360	6.675
D-4	1+699.48	0.68	5.0%	340.450	339.225	346.552	1 24.500	D=600mm 360	6.115
D-5	2+387.48	0.34	35.5%	310.300	304.300	312.302	1 16.900	D=600mm 180	4.402
D-6	2+808.48	2.22	24.5%	276.900	270.600	282.197	1 25.700	D=600mm 360	7.847
D-7	3+460.00	0.79	24.8%	229.650	221.400	234.000	2 33.300	D=600mm 360	7.875

145.400

		(m)	(nos)
φ600	90°	18	2
	180°	16.9	1
	360°	128.5	4

2. Severino Tramo1

		Length	Pipe Length	Open Cut Excavation (12.3/01)		Backfill (12.3/02)		Crushed Stone Bedding (12.3 /03)		Pipe D=600 (12.3/04)	Pipe D=800 (12.3/05)	Pipe D=1000 (12.3/06)	Concrete Class E (12.3/09)		Form Work F1 (12.3/12)		Reinforced Bar (12.3/14)	
		Unit (m)	Unit (m)	Unit (m3)	Total	Unit (m3)	Total	Unit (m3)	Total	Unit (m)	Unit (m)	Unit (m)	Unit (m3)	Total	Unit (m2)	Total	Unit (kg)	Total
D=600mm	90	283.3	428.7	0.83	234.78	0.43	122.00	0.14	40.37				0.16	44.28	0.52	147.32	0.00	0.00
	180	16.9		0.93	15.65	0.42	7.02	0.17	2.79				0.26	4.35	1.00	16.90	0.00	0.00
	Fix	128.5		1.09	139.42	0.45	58.15	0.24	30.84				0.62	79.05	2.00	257.00	42.98	5,523.44
D=800mm	90	0.0	0.0	1.28	0.00	0.58	0.00	0.17	0.00				0.26	0.00	0.68	0.00	0.00	0.00
	180	0.0		1.48	0.00	0.56	0.00	0.21	0.00				0.46	0.00	1.34	0.00	0.00	0.00
	Fix	0.0		1.72	0.00	0.60	0.00	0.31	0.00				1.11	0.00	2.68	0.00	73.53	0.00
D=1000mm	90	0.0	0.0	1.90	0.00	0.73	0.00	0.28	0.00				0.35	0.00	0.76	0.00	0.00	0.00
	180	0.0		2.12	0.00	0.72	0.00	0.33	0.00				0.60	0.00	1.58	0.00	0.00	0.00
	Fix	0.0		2.22	0.00	0.71	0.00	0.36	0.00				1.43	0.00	3.16	0.00	84.55	0.00
Total		428.7			389.86		187.17		74.00	428.70	0.00	0.00		127.69		421.22		5,523.44

		Length	Open Cut Excavation (12.2/07)		Backfill (12.2/06)		Concrete Class E (Item12.4/03)		Concrete Class H (Item12.4/04)		Form Work F1 (Item12.4/06)		Form Work F3 (Item12.4/08)		Reinforced Bar (12.4/09)	
		Unit (m)	Unit (m3)	Total	Unit (m3)	Total	Unit (m3)	Total	Unit (m3)	Total	Unit (m2)	Total	Unit (m2)	Total	Unit (kg)	Total
1200mm x 1200mm	~9.25	0.0	2.42	0.00	0.77	0.00	1.63	0.00	0.19	0.00	3.60	0.00	3.70	0.00	162.91	0.00
1500mm x 1500mm	~9.5	0.0	3.36	0.00	0.96	0.00	2.31	0.00	0.22	0.00	4.30	0.00	4.45	0.00	193.31	0.00
2000mm x 2000mm	~5.75	0.0	4.97	0.00	1.25	0.00	2.94	0.00	0.27	0.00	5.30	0.00	5.95	0.00	232.36	0.00
2000mm x 2000mm	~7.75	0.0	5.18	0.00	1.31	0.00	3.20	0.00	0.27	0.00	5.50	0.00	5.95	0.00	236.02	0.00
2000mm x 2000mm	7.751~	0.0	5.54	0.00	1.37	0.00	3.74	0.00	0.28	0.00	5.70	0.00	5.95	0.00	270.47	0.00
2500mm x 2000mm	3.75~5.75	0.0	5.93	0.00	1.31	0.00	3.61	0.00	0.32	0.00	5.50	0.00	6.43	0.00	317.29	0.00
2500mm x 2000mm	5.751~	0.0	6.32	0.00	1.37	0.00	4.20	0.00	0.32	0.00	5.70	0.00	6.43	0.00	331.62	0.00
Total		0.0		0.00		0.00		0.00		0.00		0.00		0.00		0.00

Drain Pipe Quantities

Access Road Name	Length (m)	Excavation (m3)		P.V.C Pipe D=200mm (m)		Drainage Material (m3)	
		Per meter	Total		Total	Per meter	Total
Conguillo	5,823.120	0.240	1,397.549		5,823.120	0.209	1,214.703
Severno Tramo1	1,535.870	0.240	368.609		1,535.870	0.209	320.382
Severno Tramo2	2,472.920	0.240	593.501		2,472.920	0.209	515.851
Los Cuyuyes	7,324.030	0.240	1,757.767		7,324.030	0.209	1,527.793
Poza Honda	266.710	0.240	64.010		266.710	0.209	55.636
La Seca	2,035.376	0.240	488.490		2,035.376	0.209	424.579
El Guasmo	786.460	0.240	188.750		786.460	0.209	164.056
Cana Dulce	1,200.560	0.240	288.134		1,200.560	0.209	250.437
Membrillo Outlet	30.000	0.240	7.200		30.000	0.209	6.258
Grand Total			5,154.011		21,475.046		4,479.695

Excavation	V=(0.8+0.4)*0.4/2	=0.24
Free Drainage Material	V=0.24-3.14*0.1^2	=0.21

LONGITUD DE CUNETAS

CAMINO DE ACCESO: SEVERINO Tramo 1 0+000 a 4+357.76 Km

	ABSCISAS	IZQUIERDA	DERECHA	LONGITUD
	0+000.00 - 0+012.63	12.63	0.00	12.63
8.9	0+012.63 - 0+190.00	70.00	0.00	70.00
8.3	0+265.00 - 0+350.00	85.00	0.00	85.00
7.9	0+350.00 - 0+400.00	0.00	50.00	50.00
	0+430.00 - 0+490.00	60.00	60.00	120.00
6.0	0+490.00 - 0+563.00	0.00	73.00	73.00
26.0	0+563.00 - 0+800.00	237.00	0.00	237.00
9.5	0+800.00 - 1+000.00	200.00	0.00	200.00
	1+000.00 - 1+020.00 ✓	20.00	0.00	20.00
10.0	1+020.00 - 1+060.00	40.00	40.00	80.00
	1+060.00 - 1+150.00	90.00	0.00	90.00
	1+150.00 - 1+220.00	70.00	70.00	140.00
7.9	1+340.00 - 1+440.00	100.00	0.00	100.00
10.0	1+440.00 - 1+500.00	60.00	60.00	120.00
	1+500.00 - 1+699.48	199.48	0.00	199.48
10.0	1+699.48 - 1+800.00	100.52	0.00	100.52
9.2	1+820.00 - 1+885.00	65.00	0.00	65.00
15.0	1+885.00 - 1+915.00	30.00	30.00	60.00
	1+915.00 - 2+000.00 ✓	0.00	85.00	85.00
7.5	2+080.00 - 2+350.00	270.00	0.00	270.00
15	2+400.00 - 2+560.00	160.00	0.00	160.00
17.0	2+560.00 - 2+611.89	51.89	0.00	51.89
7.5	2+611.89 - 2+682.36	70.47	70.47	140.94
	2+682.36 - 2+700.00	17.64	0.00	17.64
	2+700.00 - 2+790.00	90.00	90.00	180.00
	2+790.00 - 2+820.00	30.00	0.00	30.00
11.5	2+820.00 - 2+890.43	70.43	70.43	140.86
	2+890.43 - 2+920.00	29.57	0.00	29.57
8.0	2+920.00 - 2+975.00	55.00	55.00	110.00
	3+000.00 - 3+060.00	0.00	60.00	60.00
✓ 8.0	3+060.00 - 3+100.00	40.00	40.00	80.00
	3+100.00 - 3+111.53	0.00	11.53	11.53
10.0	3+111.53 - 3+150.00	38.47	38.47	76.94
	3+150.00 - 3+180.00	0.00	30.00	30.00
9.5	3+180.00 - 3+218.00	38.00	38.00	76.00
	3+218.00 - 3+238.01	0.00	20.01	20.01
8.2	3+238.01 - 3+322.62	84.61	84.61	169.22
	3+322.62 - 3+340.00	0.00	17.38	17.38
8.0	3+340.00 - 3+410.00	70.00	70.00	140.00
8.5	3+419.00 - 3+600.00	0.00	181.00	181.00
10.0	3+600.00 - 3+800.00	0.00	200.00	200.00
	3+800.00 - 4+000.00	200.00	200.00	400.00

29	4+000.00 - 4+160.00	160	160.00	321.00
	4+160.00 - 4+200.00	40.00	0.00	41.00
	4+200.00 - 4+357.78	157.78	0.00	157.78
				0.00
			LONG. TOTAL.	5018.37 m

Total length 5018.37 m

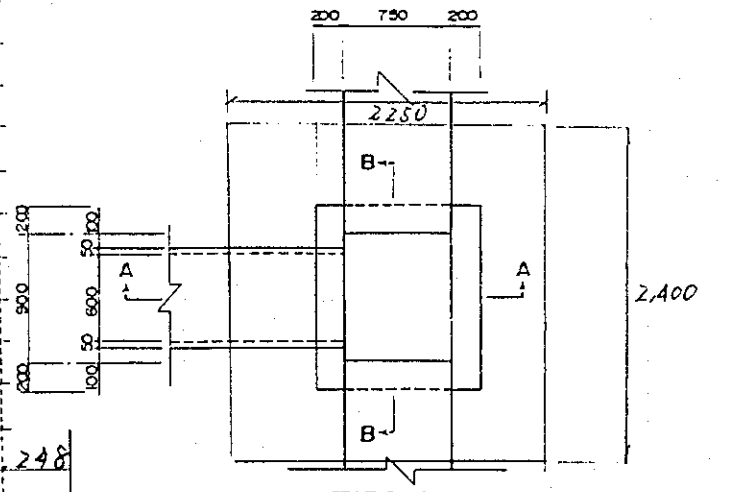
addition 10×3 = 30 m. 5048.37 m

catch basin 28 nos

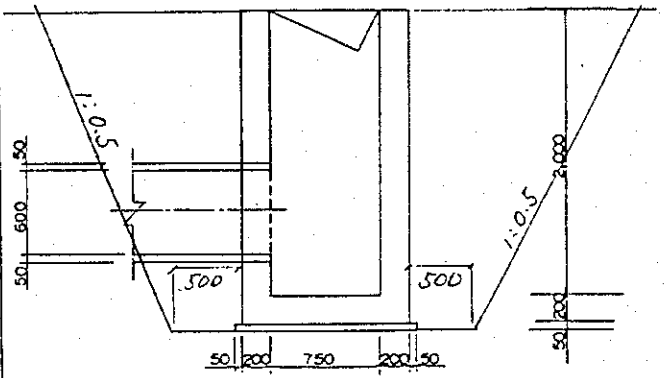
ϕ600 266.3 m

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
.3 101	Open-cut excavation, all classes (Catch basin)			
	2.25 × 2.4 m = 5.4 m².			
	4.5 × 4.65 m = 20.925 m².			
	(5.4 + 20.925) × 1/2 × 2.25 = 29.616 m³			
	29.616 × 28 no = 829.248	no		
		m³	829.248	



TIPO-A ESCALA B
TYPE-A SCALE B



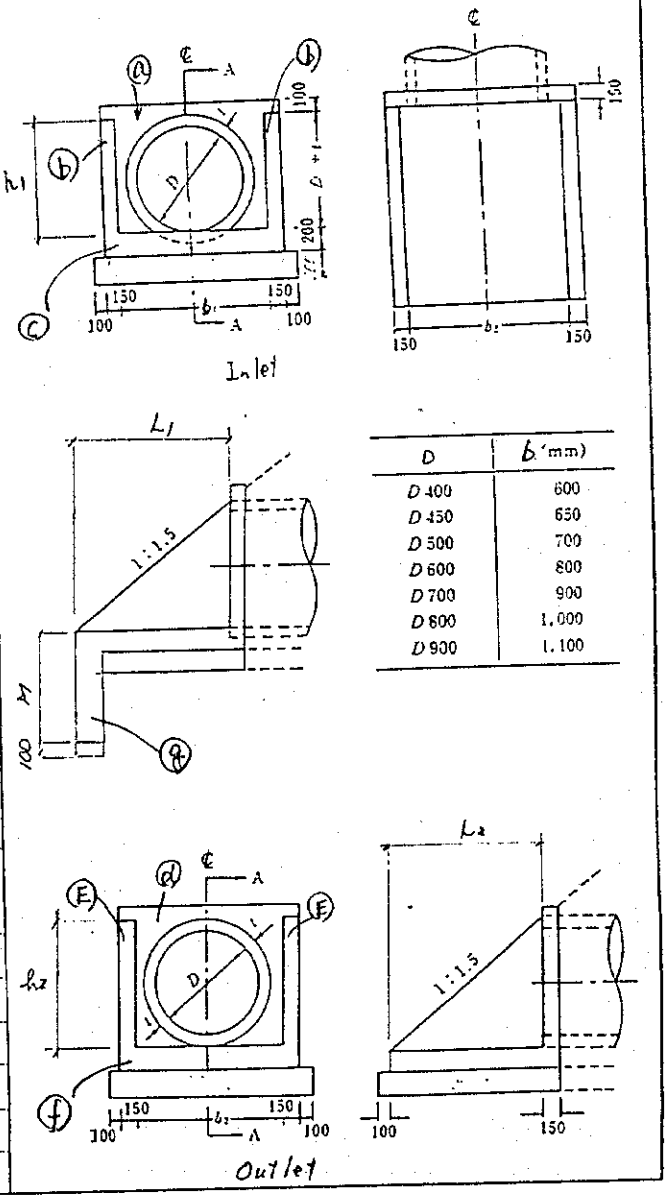
SECCION A-A
SECTION A-A

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /02	Backfill with selected material.			
	< catch basin >			
	29.616 - 1.15 × 1.3 × 2.2 - 1.25 × 1.4 × 0.05			
	= 26.240			
	26.240 × 28 = 734.72	m^3	734.720	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 109	Concrete class E for			
	(wing wall)			
	<pipe type>			
	1. ϕ600 (h_1 = 650 mm, b = 800 mm)			
	(L_1 = 975 mm, b_2 = 700 mm) L_2 = 1.5 m = 400 mm			
	ⓐ 1.1 × 0.95 × 0.15 m = 0.157 m³			
	ⓑ 0.975 × 0.65 × 0.15 × ½ × 2 = 0.095 m³			
	ⓒ 1.7 × 0.975 × 0.2 = 0.215 m³			
	ⓓ 1.1 × 1.0 × 0.15 m = 0.165 m³			
	ⓔ 1.05 × 0.7 × ½ × 0.15 × 2 = 0.110 m³			
	ⓕ 1.1 × 1.05 × 0.2 m = 0.231 m³			
	ⓖ 0.3 × 0.4 × 1.1 m × 2 = 0.264 m³			
	1.237 m³			
	1.237 × 7 mm = 8.659	m³	30.219	
	0.770 × 28 mm = 21.560			

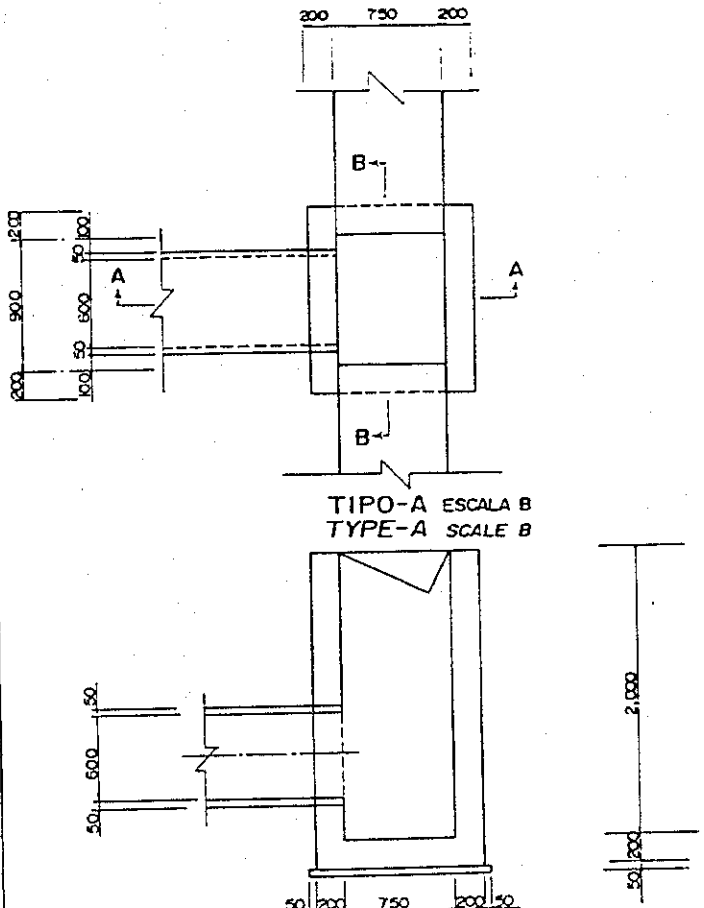


D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

K-119

Working Division:

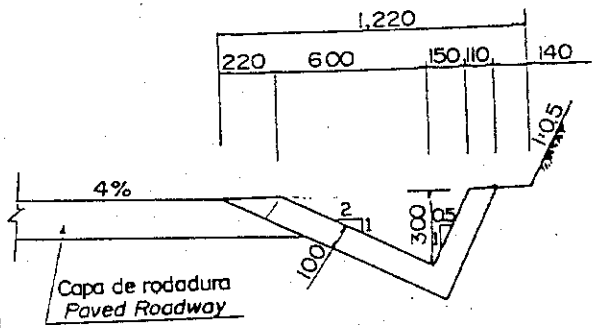
Description	Calculation Details	Unit	Quantity	Remarks
3 1/10	Concrete, class F, for side ditch and catch basin			
	(catch basin). per 1 no.			
	1.15 x 1.30 x 2.2			
	- 0.75 x 0.9 x 2.0 = 1.939 m³.			
	1.939 - 0.35π x 0.2 = 1.862 m³			
	1.862 x 28 nos = 52.136	m³	52.136	



6-14

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 1,0	Concrete class F for side ditch and catch basin			
	(Side ditch) per 1m			
	1.08 × 0.432 × ½			
	− 0.75 × 0.3 × ½ = 0.121 m³			
	0.01 × 5048.37 m = 610.853	m³	610.853	

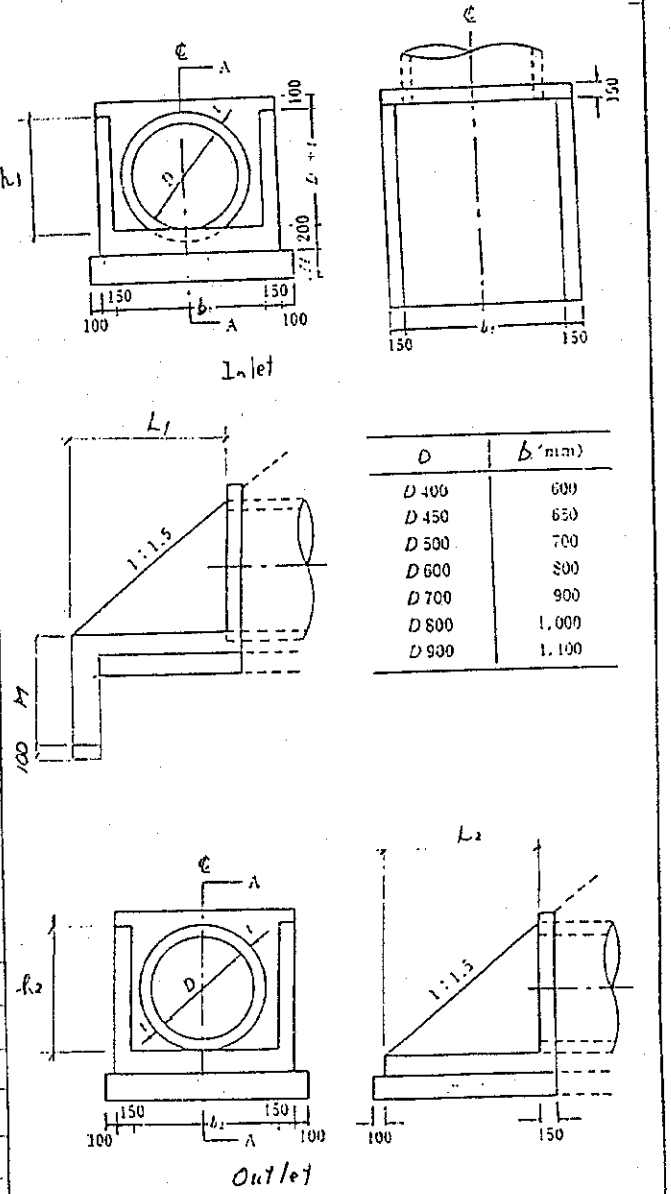


911-9

Working Division:

Description	Calculation Details	Unit	Quantity
3 111	Concrete, class H for levelling concrete		
	1. Ø600 pipe (wing wall)		
	1.1m × 1.125 × 0.1 = 0.124 m³		
	1.1 × 1.20 × 0.1 = 0.132 m³		
	0.256 m³		
	0.256 × 7 = 1.792 0.256 × 28 = 7.168	m³	8.960
	2. Ø800 pipe		
	1.3 × 1.449 × 0.1 = 0.189 m³		
	1.3 × 1.598 × 0.1 = 0.201 m³		
	0.390 m³		
	3. Ø1,000 pipe		
	1.5 × 1.773 × 0.1 = 0.266 m³		
	1.5 × 1.896 × 0.1 = 0.284 m³		
	0.550 m³		

Remarks

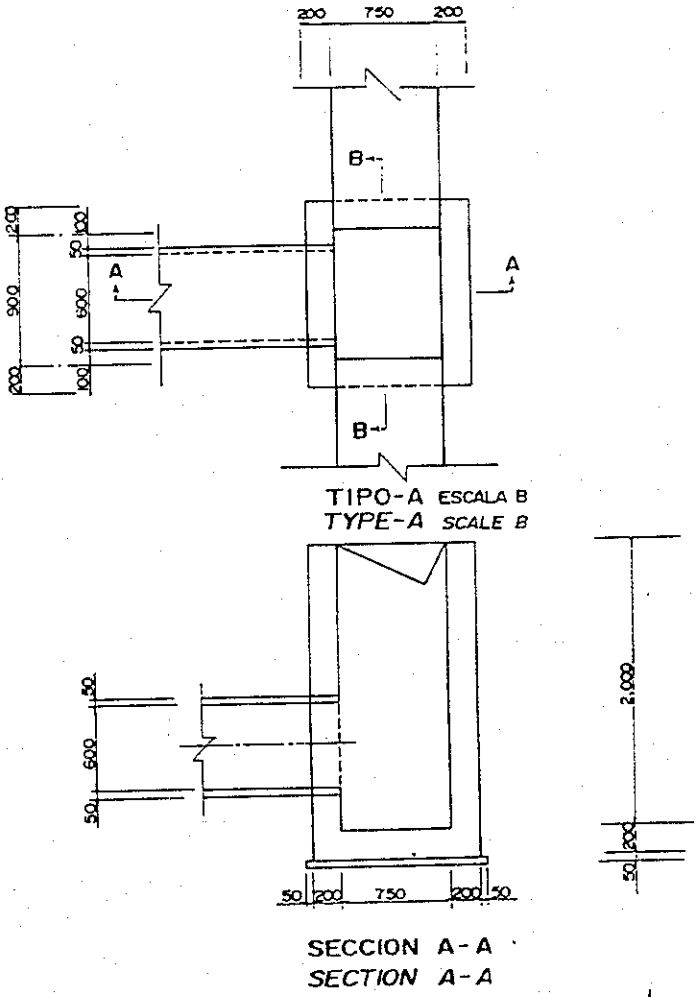


D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

Ⅲ-9

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /11	Concrete class H for levelling concrete			
	(catch basin) per 1 no.			
	$1.25 \times 1.4 \times \cancel{0.05}\ 0.10 = \cancel{0.088}\ 0.175\ m^3$			
	$0.175 \times 28\ nos = 4.90$	m^3	4.900	



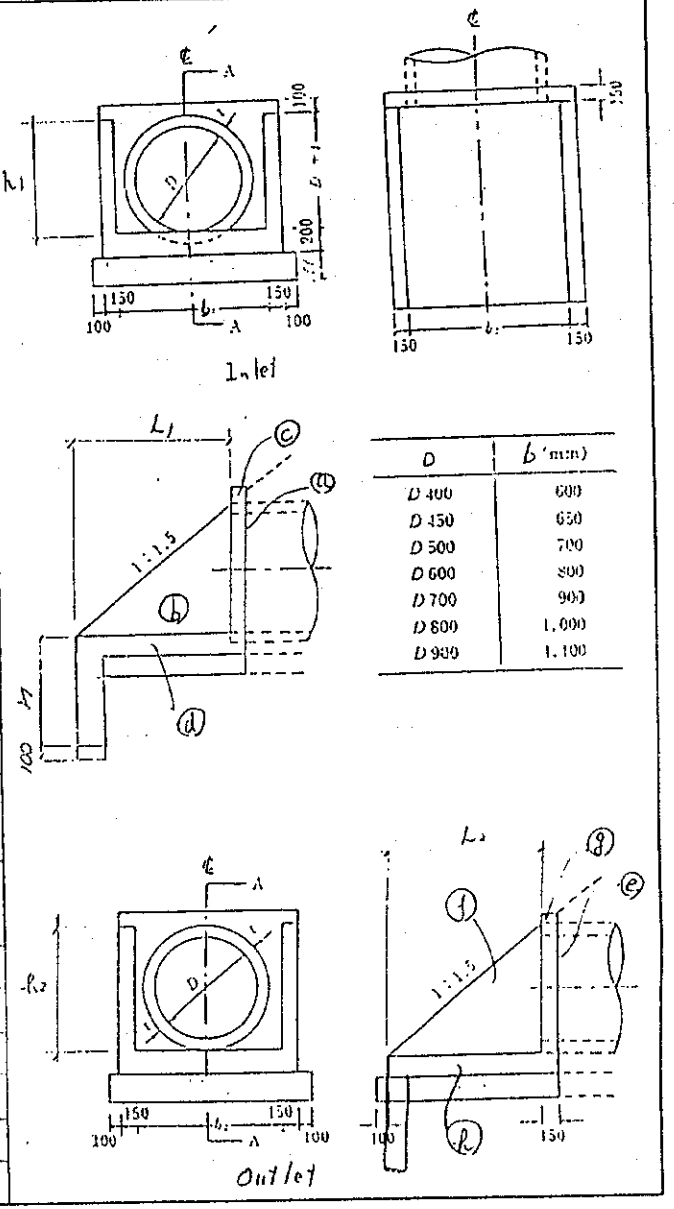
TIPO-A ESCALA B
TYPE-A SCALE B

SECCION A-A
SECTION A-A

8/19

Working Division:

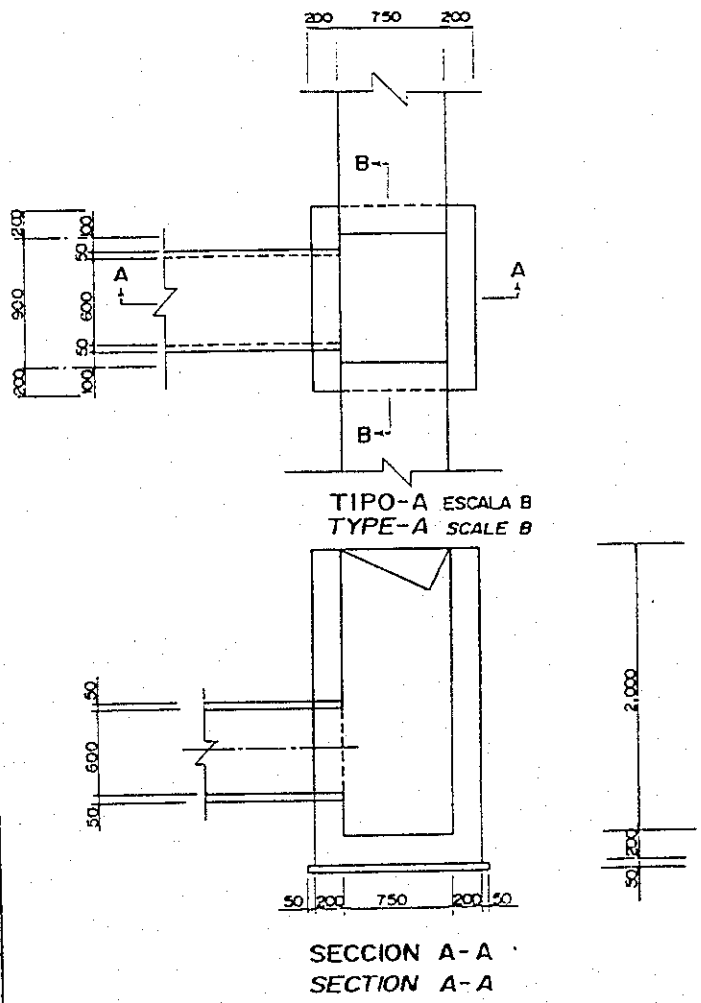
Description	Calculation Details	Unit	Quantity	Remarks
13 /12	Formwork, FI finish for concrete of item 109, 110 and 111			
	(wing wall).			
	1. ϕ 600.			
	ⓐ 1.1m × 0.95m = 1.045 m²			
	1.045 − (0.3+0.05)²π = 0.660 m²			
	ⓑ (0.15+1.125) × 0.65/2 × 2 = 0.839 m²			
	ⓒ 0.15 × 0.1 × 2 = 0.03 m²			
	ⓓ 0.2 × (1.1 + 1.125 × 2) + 1.1 × (0.4+0.2) = 1.33			
	ⓔ 1.1m × 1.0 m = 1.100 m²			
	1.100 − (0.3+0.05)²π = 0.715			
	ⓕ (0.15 + 1.20) × 0.7 × ½ × 2 = 0.945			
	ⓖ 0.15 × 0.1 × 2 = 0.03 m²			
	ⓗ 0.2 × (1.1 + 1.20 × 2) + 1.1 × (0.4+0.2) = 1.36			
	5.899 m²			
	5.899 × 7 = 41.293	m²	136.693	
	3.05 × 28 = 85.40			



D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

Working Division:

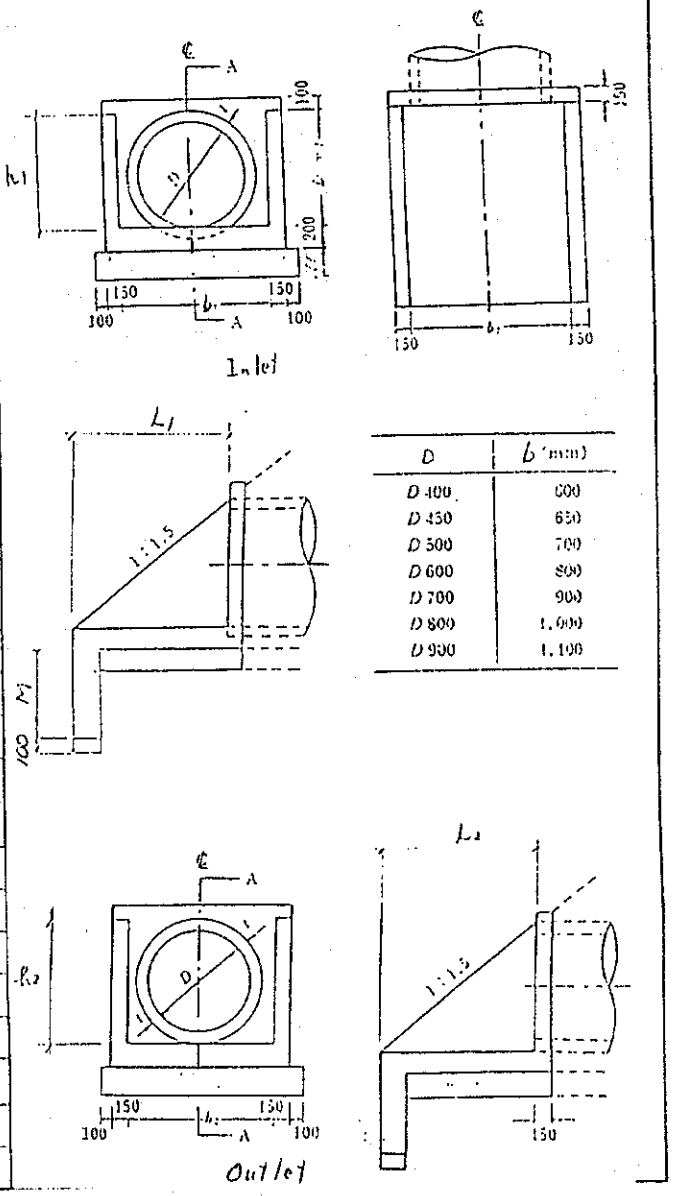
Description	Calculation Details	Unit	Quantity	Remarks
.3 /12	Formwork FI finish			
	(Catch basin)			
	1.15 × 2.2 × 2 = 5.06			
	1.30 × 2.2 × 2 − 0.35²π = 5.335			
	10.395 m²			
	10.395 × 28 nos = 291.06	m^2	291.060	



6-120

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 /13	Formwork F3 finish			
	(Wing wall)			
	1. ϕ600			
	ⓐ 0.1×1.1 + 0.8×0.65 − 0.3²π = 0.347 m²			
	ⓑ 0.975×0.65×½×2 = 0.634 m²			
	ⓒ 0.1×1.1 + 0.8×0.70 − 0.3²π = 0.387 m²			
	ⓓ 1.05×0.70×½×2 = 0.735 m²			
	2.103 m²			
	2.103×7 = 14.721	m²	46.137	
	1.122×28 = 31.416			

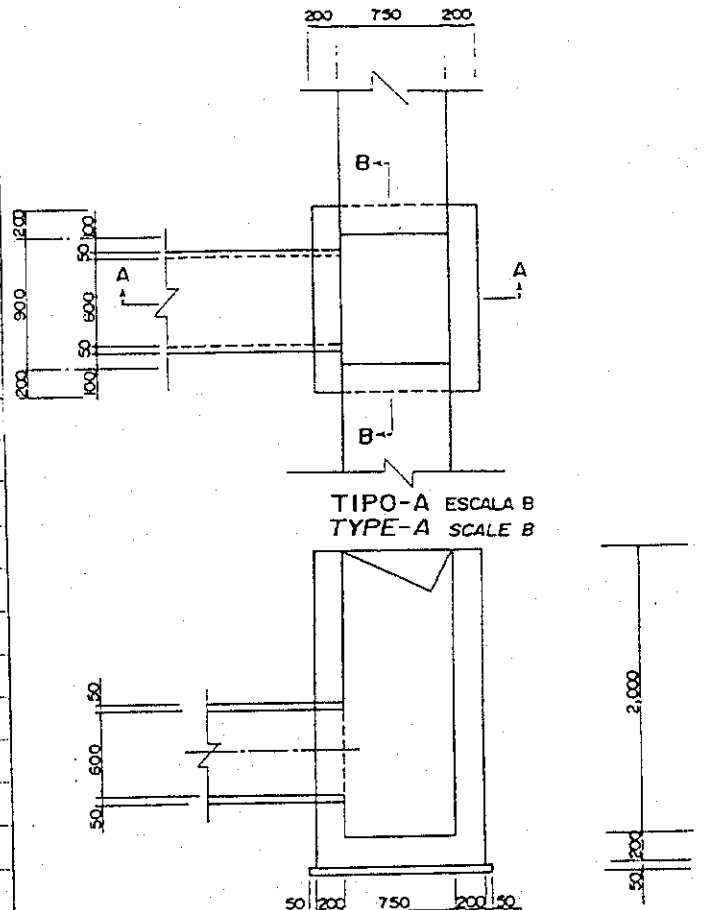


D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100

B-121

Working Division:

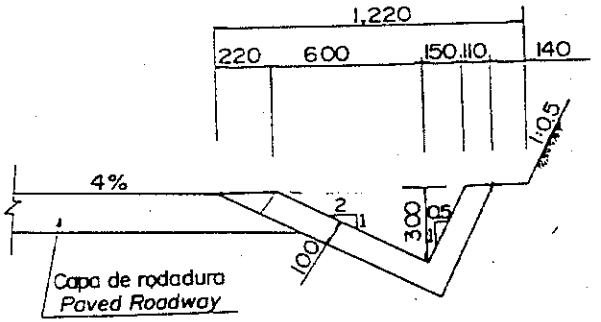
Description	Calculation Details	Unit	Quantity	Remarks
3 1/3	Formwork F3 finish			
	(Catch basin)			
	0.75 × 2.0 × 2 = 3.0			
	0.90 × 2.0 × 2 − 0.35 = 3.317			
	6.317 m²			
	6.317 × 28 nos = 176.876	m²	176.876	



8-122

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
3 113	Formwork, F3 finish for concrete item 109 and 110.			
	(Side ditch). per 1m.			
	0.671 + 0.335 = 1.006 m²			
	1.006 × 5048.37 = 5078.660	m²	5078.660	



6-125

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
1. 3 /14	Reinforcing bars for concrete works			
	(wing wall)			
	80kg / 1m³ of concrete volume			
	1. ø600			
	1.237 m³ x 80 = 98.96 kg			
	98.96 x 7 nos = 692.72	Ton	2.4	
	0.77 x 80 x 28 = 1724.8			
	2. ø800			
	2.000 m³ x 80 = 160 kg			
	3. ø1.000			
	2.939 m³ x 80 = 235.12 kg			

X1-8

Working Division:

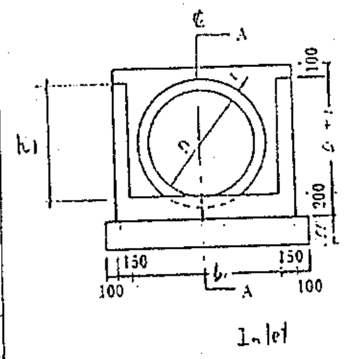
Description	Calculation Details	Unit	Quantity	Remarks
3 114	Reinforcing bars for concrete works			
	(Catch basin)			
	80 kg/ 1 m^3 of concrete volume			
	1.862 m^3 x 80 kg/m^3 = 148.96 m^3.			
	108.96 x 28 = 4170.88	ton	4.2	

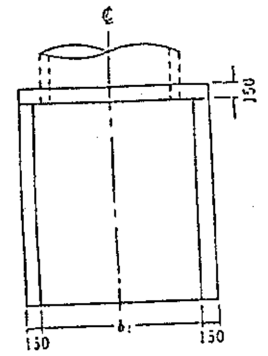
8-82

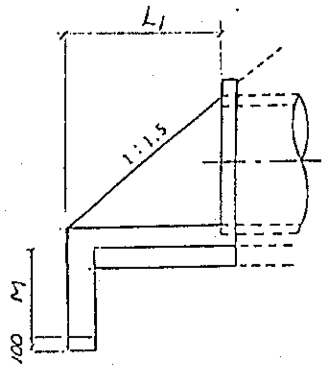
Working Division:

Description	Calculation Details	Unit	Quantity
3 1.15	Gabion mattress, t = 500 mm		
	(Wing wall part)		
	1. Ø600		
	(0.8 + 0.3) × 5.0 × 0.5 = 2.75 m^3		
	2.75 × 7 × 2 = 38.5	m^3	53.90
	2.75 × 28 × 1/5 = 15.4		
	2. Ø800		
	(1.0 + 0.3) × 5.0 × 0.5 = 3.25 m^3		
	3. Ø1,000		
	(1.2 + 0.3) × 5.0 × 0.5 = 3.75 m^3		
	4. 1.2 × 1.2 m		
	(2.434 × 2 + 3.3) × 5.0 × 0.5 = 20.42 m^3		
	5. 1.5 × 1.5 m		
	(3.154 × 2 + 3.45) × 5.0 × 0.5 = 24.395 m^3		

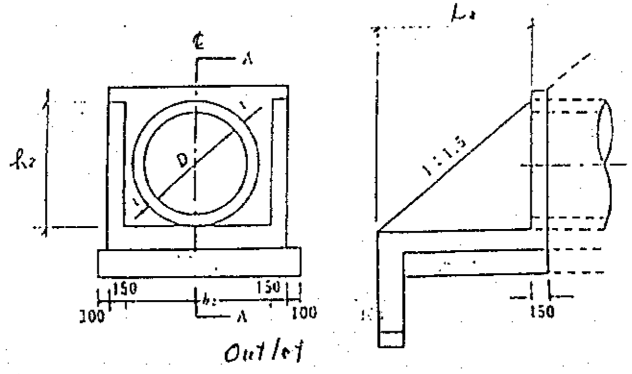
Remarks.







D	b (mm)
D 400	600
D 450	650
D 500	700
D 600	800
D 700	900
D 800	1,000
D 900	1,100



Working Division: 12. SEVERINO ACCESS ROAD (II)

Description	Calculation Details	Unit	Quantity	Remarks
II.2	Box culverts			
105	Open-cut excavation	m^3	243 988	
106	Backfill with selected material	m^3	116 45	
107	Free draining backfill	m^3	186 32	
108	Gravel bedding	m^3	12 285	