LEFT SIDE

X-SECT NO.	DISTANC (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)
WF ϕ -9		0.00		
WF ϕ -8	13.700	0.00		
WF ϕ -7	49.910	0.00		
WF ϕ -6	47.970	0.00		
WF ϕ -5	54.050	0.00		
WF ϕ -4	47.960	0.00		
WF ϕ -3	50.020	0.00		
WF ϕ -2	49.990	0.00		
WF ϕ -1	50.010	0.00		
WF - 0	49.990	0.00		
WF - 1	46.989	0.00		
WF - 2	46.044	0.00		
WF - 3	51.877	0.00		
WF - 4	52.949	0.00		
WF - 5	60.543	0.00		
WF - 6	50.937	0.00		
WF - 7	40.717	0.00		
WF - 8	51.884	0.00		
WF - 9	46.387	0.00		
WF - 10	50.444	0.00		
WF - 11	47.408	0.00		
WF - 12	49.909	0.00		
WF - 13	51.527	0.00		
WF - 14	44.317	0.00		
WF - 14+33.5	33.469	0.00		
WF - 14+33.5	0.000	0.00		
GE / WF - 15	21.000	0.00		
WF - 15		0.60		
WF - 16	55.962	0.60	33.58	33.58
WF - 17	46.156	0.60	27.69	61.27
WF - 18	50.231	0.60	30.14	91.41
WF - 19	61.180	0.60	36.71	128.12
WF - 20	46.620	0.60	27.97	156.09
WF - 21	52.051	0.60	31.23	187.32
WF - 22	51.364	0.60	30.82	218.14
WF - 23	50.972	0.60	30.58	248.72
WF - 24	46.049	0.60	27.63	276.35
WF - 25	44.175	0.60	26.51	302.86

X-SECT NO.	DISTANC (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)
WF - 26	49.761	0.60	29.86	332.71
WF - 27	53.816	0.60	32.29	365.00
WF - 28	53.395	0.60	32.04	397.04
WF - 29	52.381	0.60	31.43	428.47
WF - 30	52.311	0.60	31.39	459.85
WF - 31	54.872	0.60	32.92	492.78
WF - 32	51.803	0.60	31.08	523.86
WF - 33	52.889	0.60	31.73	555.59
WF - 34	53.628	0.60	32.18	587.77
WF - 35	44.904	0.60	26.94	614.71
WF - 36	45.069	0.60	27.04	641.75
WF - 37	49.307	0.60	29.58	671.34
WF - 38	49.114	0.60	29.47	700.81
WF - 39	54.155	0.60	32.49	733.30
WF - 40	46.052	0.60	27.63	760.93
WF - 41	52.485	0.60	31.49	792.42
WF - 42	50.975	0.60	30.59	823.01
WF - 43	48.218	0.60	28.93	851.94
WF - 44	50.336	0.60	30.20	882.14
WF - 45	52.028	0.60	31.22	913.36
WF - 46	51.048	0.60	30.63	943.98
WF - 47	47.583	0.60	28.55	972.53
WF - 48	51.302	0.60	30.78	1003.32
WF - 49	51.470	0.60	30.88	1034.20
WF - 50	48.795	0.60	29.28	1063.47
WF - 51	48.459	0.60	29.08	1092.55
WF - 52	49.365	0.60	29.62	1122.17
WF - 53	51.789	0.60	31.07	1153.24
WF - 54	52.231	0.60	31.34	1184.58
WF - 55	48.406	0.60	29.04	1213.62
WF - 56	50.267	0.60	30.16	1243.78
WF - 57	50.228	0.60	30.14	1273.92
WF - 58	51.865	0.60	31.12	1305.04
WF - 59	47.230	0.60	28.34	1333.38
WF - 60	50.268	0.60	30.16	1363.54
WF - 61	53.049	0.60	31.83	1395.37
WF - 62	48.939	0.60	29.36	1424.73
WF - 63	47.656	0.60	28.59	1453.33
WF - 64	51.814	0.60	31.09	1484.41

X-SECT NO.	DISTANC (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)
Br / WF - 65	49.558		14.87	1499.28
WF - 65	0.000		0.00	1499.28
WF - 66	26.587		0.00	1499.28
WF - 67	45.754		0.00	1499.28
WF - 68	44.146		0.00	1499.28
WF - 69	53.201		0.00	1499.28
WF - 70	53.074		0.00	1499.28
WF - 71	54.141	0.60	16.24	1515.52
WF - 72	55.980	0.60	33.59	1549.11
l Br / WF- 72+22	29.366	0.60	17.62	1566.73
l Br / WF- 72+29	11.000	0.60	6.60	1573.33
l Br / WF- 73	2.000	0.60	1.20	1574.53
l Br / WF- 73+9	11.137	0.60	6.68	1581.21
WF- 74	45.513	0.60	27.31	1608.52
WF- 75	49.107	0.60	29.46	1637.99
WF- 76	49.940	0.60	29.96	1667.95
WF- 77	52.279	0.60	31.37	1699.32
WF- 78	46.050	0.60	27.63	1726.95
WF- 79	47.348	0.60	28.41	1755.36
WF- 80	55.983	0.60	33.59	1788.95
WF- 81	50.123	0.60	30.07	1819.02
WF- 82	48.606	0.60	29.16	1848.18
WF- 83	50.561	0.60	30.34	1878.52
WF- 84	48.645	0.60	29.19	1907.71
WF- 85	54.033	0.60	32.42	1940.13
WF- 86	50.097	0.60	30.06	1970.18
WF- 87	47.756	0.60	28.65	1998.84
WF- 88	50.018	0.60	30.01	2028.85
WF- 89	49.744	0.60	29.85	2058.70
WF- 90	50.295	0.60	30.18	2088.87
WF- 91	53.526	0.60	32.12	2120.99
WF- 92	50.493	0.60	30.30	2151.28
WF- 93	48.367	0.60	29.02	2180.30
WF- 94	47.764	0.60	28.66	2208.96
n. Br/WF- 94+23	26.866	0.60	16.12	2225.08
WF- 95	25.918	0.60	15.55	2240.63
WF- 96	46.173	0.60	27.70	2268.34

X-SECT NO.	DISTANCE (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)	X-SECT NO.	DISTANCE (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)	X-SECT NO.	DISTANCE (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)
Simongan Weir / WF- 101+20	0.000				WF- 141	51.611	0.60	30.97	831.29	WF- 180	53.450			
WF- 102	34.870				WF- 142	66.195		19.86	851.14	WF- 181	49.870			
WF- 103	50.539				WF- 143	70.715		0.00	851.14					
WF- 104	58.390	0.60	17.52	17.52	WF- 144	55.466		0.00	851.14					
WF- 105	50.623	0.60	30.37	47.89	WF- 145	47.049		0.00	851.14					
WF- 106	46.910	0.60	28.15	76.04	WF- 146	37.717		0.00	851.14					
WF- 107	52.383	0.60	31.43	107.47	WF- 146+22	22.000		0.00	851.14					
WF- 108	53.394	0.60	32.04	139.50	WF- 147	22.950	0.60	6.89	858.03					
WF- 109	42.440	0.60	25.46	164.97	WF- 148	49.490	0.60	29.69	887.72					
WF- 110	48.417		14.53	179.49	WF- 149	56.037	0.60	33.62	921.35					
WF- 111	48.237		0.00	179.49	WF- 150	43.296	0.60	25.98	947.32					
WF- 112	33.216	0.60	9.96	189.46	WF- 151	35.164	0.60	21.10	968.42					
WF- 113	44.094	0.60	26.46	215.91	WF- 152	29.570	0.60	17.74	986.16					
WF- 114	48.018	0.60	28.81	244.72	WF- 153	42.207	0.60	25.32	1011.49					
WF- 115	46.871	0.60	28.12	272.85	WF- 154	46.273	0.60	27.76	1039.25					
WF- 116	48.763	0.60	29.26	302.10	WF- 155	51.643	0.60	30.99	1070.24					
WF- 117	48.629	0.60	29.18	331.28	WF- 156	50.046	0.60	30.03	1100.27					
WF- 118	46.524	0.60	27.91	359.20	WF- 157	55.546	0.60	33.33	1133.59					
WF- 119	46.856	0.60	28.11	387.31	WF- 158	50.472	0.60	30.28	1163.88					
WF- 120	48.226	0.60	28.94	416.25	WF- 159	48.327	0.60	29.00	1192.87					
WF- 121	43.077	0.60	25.85	442.09	WF- 160	57.635	0.60	34.58	1227.45					
WF- 122	39.273	0.60	23.56	465.66	WF- 161	33.976	0.60	20.39	1247.84					
WF- 123	31.760	0.60	19.06	484.71	WF- 162	56.038	0.60	33.62	1281.46					
WF- 124	29.761	0.60	17.86	502.57	WF- 163	51.395	0.60	30.84	1312.30					
WF- 125	32.527	0.60	19.52	522.08	WF- 164	39.314	0.60	23.59	1335.89					
WF- 126	49.643	0.60	29.79	551.87	WF- 165	43.008	0.60	25.80	1361.69					
WF- 126+39.0	39.000		11.70	563.57	WF- 166	26.587	0.60	15.95	1377.64					
WF- 127	9.972		0.00	563.57	WF- 167	45.754	0.60	27.45	1405.10					
WF- 128	42.213		0.00	563.57	WF- 168	44.146	0.60	26.49	1431.58					
WF- 129	42.766		0.00	563.57	WF- 169	53.201	0.60	31.92	1463.50					
WF- 130	38.570		0.00	563.57	WF- 170	53.074	0.60	31.84	1495.35					
WF- 131	47.384		0.00	563.57	WF- 171	54.141	0.60	32.48	1527.83					
WF- 132	37.073		0.00	563.57	WF- 172	50.305	0.60	30.18	1558.02					
WF- 133	37.266		0.00	563.57	WF- 173	57.294	0.60	34.38	1592.39					
WF- 134	42.892	0.60	12.87	576.44	idge / WF- 174	53.883	0.60	32.33	1624.72					
WF- 135	68.840	0.60	41.30	617.74	WF- 174+25	25.000								
WF- 136	58.395	0.60	35.04	652.78	WF- 175	25.650								
WF- 137	64.869	0.60	38.92	691.70	WF- 176	45.912								
WF- 138	56.933	0.60	34.16	725.86	WF- 177	49.330								
WF- 139	63.828	0.60	38.30	764.16	WF- 178	55.000								
WF- 140	60.271	0.60	36.16	800.32	WF- 179	49.260								

RIGHT SIDE

X-SECT NO.	DISTANCE (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)	X-SECT NO.	DISTANCE (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)	X-SECT NO.	DISTANCE (M)	Gravel Pavement AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)
					WF - 26	49.761	0.60	29.86	332.71	WF - 65	49.558		14.87	1499.28
WF ϕ -9		0.60			WF - 27	53.816	0.60	32.29	365.00	WF - 65	0.000		0.00	1499.28
WF ϕ -8	13.700	0.60	8.22	8.22	WF - 28	53.395	0.60	32.04	397.04	WF - 66	50.581		0.00	1499.28
WF ϕ -7	49.910	0.60	29.95	38.17	WF - 29	52.381	0.60	31.43	428.47	WF - 67	52.397		0.00	1499.28
WF ϕ -6	47.970	0.60	28.78	66.95	WF - 30	52.311	0.60	31.39	459.85	WF - 68	46.986		0.00	1499.28
WF ϕ -5	54.050	0.60	32.43	99.38	WF - 31	54.872	0.60	32.92	492.78	WF - 69	49.202		0.00	1499.28
WF ϕ -4	47.960	0.60	28.78	128.15	WF - 32	51.803	0.60	31.08	523.86	WF - 70	50.566		0.00	1499.28
WF ϕ -3	50.020	0.60	30.01	158.17	WF - 33	52.889	0.60	31.73	555.59	WF - 71	50.978		0.00	1499.28
WF ϕ -2	49.990	0.60	29.99	188.16	WF - 34	53.628	0.60	32.18	587.77	WF - 72	55.980		0.00	1499.28
WF ϕ -1	50.010	0.60	30.01	218.17	WF - 35	44.904	0.60	26.94	614.71	al Br WF - 72+22	29.366		0.00	1499.28
WF - 0	49.990	0.60	29.99	248.16	WF - 36	45.069	0.60	27.04	641.75	al Br WF - 72+22	0.000		0.00	1499.28
WF - 1	46.989	0.60	28.01	276.17	WF - 37	49.307	0.60	29.58	671.34	al Br WF - 72+29	11.000		0.00	1499.28
WF - 2	46.044	0.60	27.63	303.80	WF - 38	49.114	0.60	29.47	700.81	al Br WF - 73	2.000		0.00	1499.28
WF - 3	51.877	0.60	31.13	334.93	WF - 39	54.155	0.60	32.49	733.30	al Br WF - 73+9	11.137		0.00	1499.28
WF - 4	52.949	0.60	31.77	366.70	WF - 40	46.052	0.60	27.63	760.93	WF- 74	43.513		0.00	1499.28
WF - 5	60.543	0.60	36.27	402.97	WF - 41	52.485	0.60	31.49	792.42	WF- 74+7	7.000		0.00	1499.28
WF - 6	50.937	0.60	30.56	433.53	WF - 42	50.975	0.60	30.59	823.01	WF- 75	42.107		0.00	1499.28
WF - 7	40.717	0.60	24.43	457.96	WF - 43	48.218	0.60	28.93	851.94	WF- 76	49.940		0.00	1499.28
WF - 8	51.884	0.60	31.13	489.09	WF - 44	50.336	0.60	30.20	882.14	WF- 77	52.279		0.00	1499.28
WF - 9	46.387	0.60	27.83	516.92	WF - 45	52.028	0.60	31.22	913.36	WF- 78	46.050		0.00	1499.28
WF - 10	50.444	0.60	30.27	547.19	WF - 46	51.048	0.60	30.63	943.98	WF- 79	47.348	0.60	14.20	1513.49
WF - 11	47.408	0.60	28.44	575.63	WF - 47	47.583	0.60	28.55	972.53	WF- 80	55.983	0.60	33.59	1547.08
WF - 12	49.909	0.60	29.95	605.58	WF - 48	51.302	0.60	30.78	1003.32	WF- 81	50.123	0.60	30.07	1577.15
WF - 13	51.527	0.60	30.92	636.50	WF - 49	51.470	0.60	30.88	1034.20	WF- 82	48.606	0.60	29.16	1606.31
WF - 14	44.317	0.60	26.59	663.09	WF - 50	48.795	0.60	29.28	1063.47	WF- 83	50.561	0.60	30.34	1636.65
WF - 14+33.5	33.469	0.00			WF - 51	48.459	0.60	29.08	1092.55	WF- 84	48.645	0.60	29.19	1665.84
WF - 14+33.5	0.000	0.00			WF - 52	49.365	0.60	29.62	1122.17	WF- 85	54.033	0.60	32.42	1698.26
GE / WF - 15	21.000	0.00			WF - 53	51.789	0.60	31.07	1153.24	WF- 86	50.097	0.60	30.06	1728.31
WF - 15		0.60			WF - 54	52.231	0.60	31.34	1184.58	WF- 87	47.756	0.60	28.65	1756.97
WF - 16	55.962	0.60	33.58	33.58	WF - 55	48.406	0.60	29.04	1213.62	WF- 88	50.018	0.60	30.01	1786.98
WF - 17	46.156	0.60	27.69	61.27	WF - 56	50.267	0.60	30.16	1243.78	WF- 89	49.744	0.60	29.85	1816.83
WF - 18	50.231	0.60	30.14	91.41	WF - 57	50.228	0.60	30.14	1273.92	WF- 90	50.295	0.60	30.18	1847.00
WF - 19	61.180	0.60	36.71	128.12	WF - 58	51.865	0.60	31.12	1305.04	WF- 91	53.526	0.60	32.12	1879.12
WF - 20	46.620	0.60	27.97	156.09	WF - 59	47.230	0.60	28.34	1333.38	WF- 92	50.493	0.60	30.30	1909.41
WF - 21	52.051	0.60	31.23	187.32	WF - 60	50.268	0.60	30.16	1363.54	WF- 93	48.367			
WF - 22	51.364	0.60	30.82	218.14	WF - 61	53.049	0.60	31.83	1395.37	WF- 94	47.764			
WF - 23	50.972	0.60	30.58	248.72	WF - 62	48.939	0.60	29.36	1424.73	n. Br/WF- 94+23	26.866			
WF - 24	46.049	0.60	27.63	276.35	WF - 63	47.656	0.60	28.59	1453.33	WF- 95	25.918			
WF - 25	44.175	0.60	26.51	302.86	WF - 64	51.814	0.60	31.09	1484.41	WF- 96	46.173			

X-SECT NO.	DISTANC	Gravel Pavement			X-SECT NO.	DISTANC	Gravel Pavement			X-SECT NO.	DISTANC	Gravel Pavement		
	(M)	AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)		(M)	AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)		(M)	AREA (M^2)	VOLUME (M^3)	AC.VOL (M^3)
Simongan Weir / WF- 101+20	0.000				WF- 141	51.611	0.60	30.97	802.70	WF- 179	58.020	0.6	34.812	1918.008
WF- 102	34.870				WF- 142	66.195	0.60	39.72	842.42	WF- 180	53.450	0.6	56.064	1974.072
WF- 103	50.539				WF- 143	70.715	0.60	42.43	884.85	WF- 181	49.870			
WF- 104	58.390	0.600	17.517	17.517	WF- 144	55.466	0.60	33.28	918.13					
WF- 105	50.623	0.600	30.374	47.891	WF- 145	47.049	0.60	28.23	946.36					
WF- 106	46.910	0.600	28.146	76.037	WF- 146	37.717	0.60	22.63	968.99					
WF- 107	52.383		15.715	91.752	WF- 147	22.950	0.60	26.97	995.96					
WF- 108	53.394		0.000	91.752	WF- 148	49.490	0.60	29.69	1025.65					
WF- 109	42.440		0.000	91.752	WF- 149	56.037	0.60	33.62	1059.27					
WF- 110	48.417		0.000	91.752	WF- 150	43.296	0.60	25.98	1085.25					
WF- 111	48.237	0.600	14.471	106.223	WF- 151	35.164	0.60	21.10	1106.35					
WF- 112	33.216	0.600	19.930	126.152	WF- 152	29.570	0.60	17.74	1124.09					
WF- 113	44.094	0.600	26.456	152.609	WF- 153	42.207	0.60	25.32	1149.42					
WF- 114	48.018	0.600	28.811	181.420	WF- 154	46.273	0.60	27.76	1177.18					
WF- 115	46.871		14.061	195.481	WF- 155	51.643	0.60	30.99	1208.17					
WF- 116	48.763		0.000	195.481	WF- 156	50.046	0.60	30.03	1238.19					
WF- 117	48.629		0.000	195.481	WF- 157	55.546	0.60	33.33	1271.52					
WF- 118	46.524		0.000	195.481	WF- 158	50.472	0.60	30.28	1301.80					
WF- 119	46.856		0.000	195.481	WF- 159	48.327	0.60	29.00	1330.80					
WF- 120	48.226	0.600	14.468	209.949	WF- 160	57.635	0.60	34.58	1365.38					
WF- 121	43.077	0.600	25.846	235.795	WF- 161	33.976	0.60	20.39	1385.77					
WF- 122	39.273	0.600	23.564	259.359	WF- 162	56.038	0.60	33.62	1419.39					
WF- 123	31.760	0.600	19.056	278.415	WF- 163	51.395	0.60	30.84	1450.23					
WF- 124	29.761	0.600	17.857	296.271	WF- 164	39.314	0.60	23.59	1473.82					
WF- 125	32.527	0.600	19.516	315.788	WF- 165	43.008	0.60	25.80	1499.62					
WF- 126	49.643	0.600	29.786	345.573	WF- 166	26.587	0.60	15.95	1515.57					
WF- 127	9.972	0.600	29.383	374.957	WF- 167	45.754	0.60	27.45	1543.03					
WF- 128	42.213	0.600	25.328	400.284	WF- 168	44.146	0.60	26.49	1569.51					
WF- 129	42.766	0.600	25.660	425.944	WF- 169	53.201	0.60	31.92	1601.43					
WF- 130	38.570	0.600	23.142	449.086	WF- 170	53.074	0.60	31.84	1633.28					
WF- 131	47.384	0.600	28.430	477.516	WF- 171	54.141	0.60	32.48	1665.76					
WF- 132	37.073	0.600	22.244	499.760	WF- 172	50.305	0.60	30.18	1695.95					
WF- 133	37.266	0.600	22.360	522.120	d sill WF- 173	57.294	0.60	34.38	1730.32					
WF- 134	42.892	0.600	25.735	547.855	WF- 174	53.883	0.60	32.33	1762.65					
WF- 135	68.840	0.600	41.304	589.159	idge / WF- 174+180	18.000	0.60	10.80	1773.45					
WF- 136	58.395	0.600	35.037	624.196	WF- 174+180	0.000	0.60	0.00	1773.45					
WF- 137	64.869	0.600	38.921	663.117	WF- 175	32.665	0.60	19.60	1793.05					
WF- 138	56.933	0.600	34.160	697.277	WF- 176	45.912	0.60	27.55	1820.60					
WF- 139	63.828	0.600	38.297	735.574	WF- 177	49.330	0.60	29.60	1850.20					
WF- 140	60.271	0.600	36.163	771.737	WF- 178	55.000	0.60	33.00	1883.20					

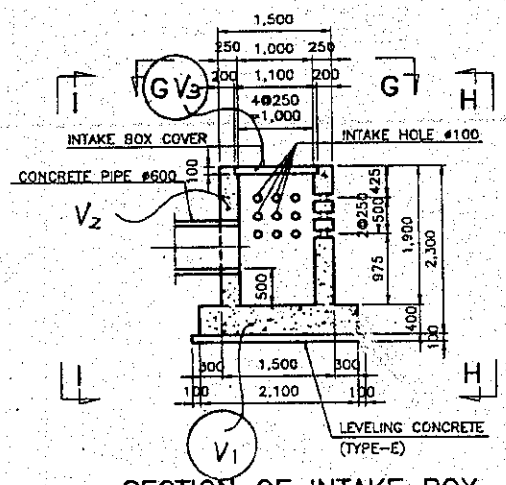
6.4 Water Level Gauging Station

TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION :

CALCULATION			RESULT
STRUCTURAL EXCAVATION			
A_1 = 79.75 m^2			
V_1 = (24.60 + 16.0) x ½ x 79.75	=	1618.93	
A_2 = 21.77 m^2			
V_2 = (16.0 + 5.70) x ½ x 21.77	=	236.20	
TOTAL ($V_1 + V_2$)	=	1855.13	1855.13 m^3
BACKFILL WITH SELECTED SOIL			
Quantity of Structural Excavation : V = 1855.13 m^3			
Volume of Main body			
V_1 = 3.00 x 3.00 x 0.80 + 1.70 x 1.70 x 5.26	=	22.401	
Volume of Concrete Pipe			
V_2 = π /4 x 0.74^2 x 9.60 + π /4 x 0.40^2 x 5.26	=	4.933	
Volume of Intake Box			
V_3 = 2.10 x 2.10 x 0.40 + 150 x 1.50 x 1.90	=	6.039	
Volume of Gabion Mattress			
V_4 = 40.50			
V = 1855.13 – (22.401 + 4.933 + 6.039 + 40.50)	=	1781.26	1781.26 m^3

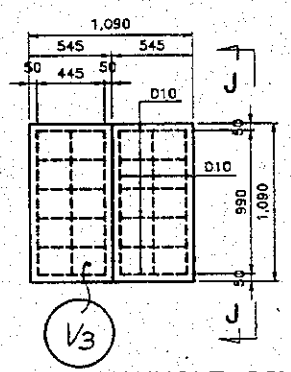
WATERLEVEL GAUGING STATION

TYPE OF WORK :	CONCRETE (TYPE-C1)
LOCATION :	INTAKE BOX



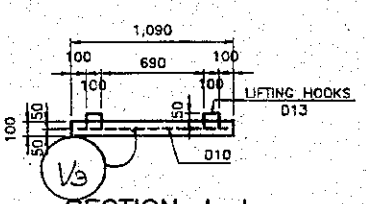
SECTION OF INTAKE BOX

SCALE A



PLAN OF MANHOLE COVER

SCALE B



SECTION J-J

SCALE B

CALCULATION	RESULT
(TYPE-C1)	
$V_1 = 2.10 \times 2.10 \times 0.40 = 1.764$	
$V_2 = \{(1.25 \times 1.90 \times 0.25) - (1.00 \times 0.10 \times 0.05)\} \times 4$	
$= 2.355$	
$V_3 = (0.545 \times 1.09 \times 0.10) \times 2 = 0.119$	
(Deduction for Openings)	
$V_4 = -\pi/4 \times 0.74^2 \times 0.25 = -0.108$	
$V_5 = -\pi/4 \times 0.10^2 \times 0.25 \times 9 \times 3 = -0.053$	
TOTAL = 4.077	4.077 m^3

TYPE OF WORK : WATERLEVEL GAUGING STATION
: FORM (H<4.0m)
LOCATION : INTAKE BOX

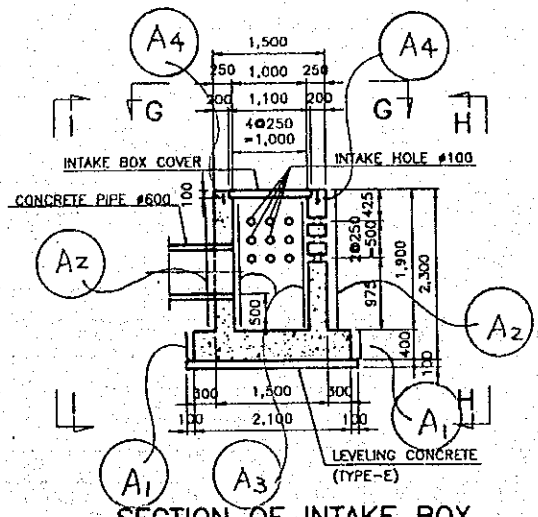
CALCULATION	RESULT
(H<4.0m)	
$A_1 = 0.40 \times 2.10 \times 4 = 3.360$	
$A_2 = 1.50 \times 1.90 \times 4 = 11.400$	
$A_3 = 1.80 \times 1.00 \times 4 = 7.200$	
$A_4 = 0.10 \times 1.10 \times 4 = 0.440$	
$A_5 = 0.10 \times 1.09 \times 2 \times 2 = 0.436$	
$A_6 = 0.10 \times 0.545 \times 2 \times 2 = 0.218$	
(Deduction for Openings)	
$A_7 = -\pi/4 \times 0.74^2 \times 2 = -0.860$	
$A_8 = -\pi/4 \times 0.10^2 \times 9 \times 3 \times 2 = -0.424$	
$A_9 = \pi \times 0.10 \times 0.25 \times 9 \times 3 = 2.121$	
TOTAL = 23.891	23.891 m^2

WATERLEVEL GAUGING STATION

TYPE OF WORK : FORM (H<4.0m)

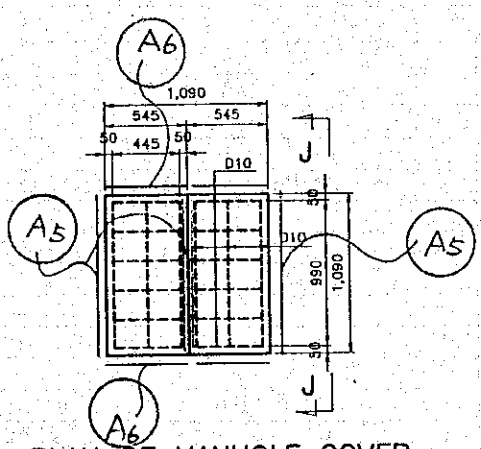
LOCATION : INTAKE BOX

EXPLANATORY DRAWING



SECTION OF INTAKE BOX

SCALE A



PLAN OF MANHOLE COVER

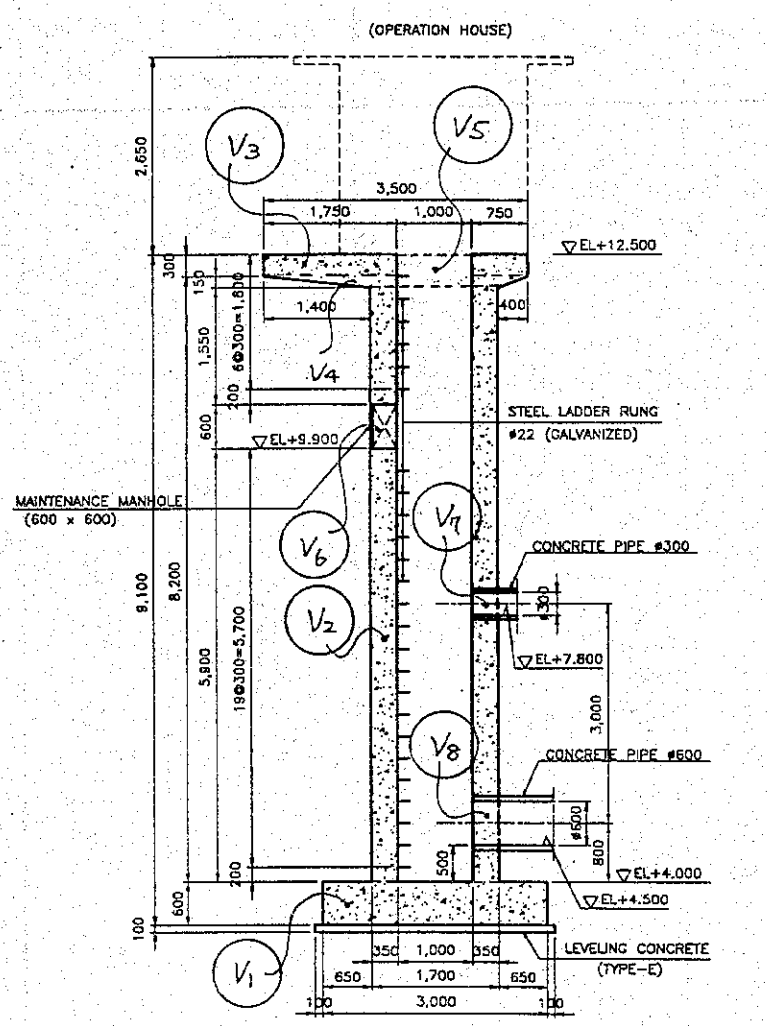
SCALE B

TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION : INTAKE BOX

CALCULATION				RESULT
LEVELLING CONCRETE				
(TYPE – E)				
$V = (2.10 + 0.10 \times 2)^2 \times 0.10$		=	0.529	0.259 m^3
FORM FOR LEVELLING CONCRETE				
(H < 4.0 m)				
$A_1 = 0.10 \times (2.10 + 0.10 \times 2) \times 2$		=	0.460	
$A_2 = 0.10 \times (2.10 + 0.10 \times 2) \times 2$		=	0.460	
	TOTAL	=	0.920	0.920 m^2
REINFORCING BAR				
• D 13 (W = 1.04 kgf / m)				
n_1 = 10 Bars x 2	= 20 Bars			
L_1 = 2.00 m / Bar				
W_1 = 20. X 2.00 x 1.04		=	41.600	
n_2 = 6 Bars x 4	= 24 Bars			
L_2 = 2.05 m / Bar				
W_2 = 24 x 2.05 x 1.04		=	51.168	
n_3 = 8 Bars				
L_3 = 1.25 x 4	= 5.00 m / Bar			
W_3 = 5.00 x 8 x 1.04		=	41.600	
• D 10 (W = 0.617 kgf / m)				
n_4 = 6 Bars x 2	= 12 Bars			
L_4 = 0.445 m / Bar				
W_4 = 12 x 0.445 x 0.617		=	3.295	
n_5 = 3 Bars x 2	= 6 Bars			
L_2 = 0.99 m / Bar				
W_1 = 6 x 0.99 x 0.617		=	141.328 kg	0.325 t

WATERLEVEL GAUGING STATION)

TYPE OF WORK :	CONCRETE (TYPE - C1)
LOCATION :	MAIN BODY



SECTIONAL ELEVATION OF GAUGING WALL

SCALE A

CALCULATION	RESULT
(TYPE - C1)	
$V_1 = 3.00 \times 3.00 \times 0.60 = 5.400$	
$V_2 = \{(1.70 \times 1.70) - (1.00 \times 1.00) + \frac{1}{2} \times 0.15^2 \times 4\} \times 8.05$	
$= 15.577$	
$V_3 = (2.50 \times 3.50 \times 0.30) = 2.625$	
$V_4 = \frac{1}{6} \times 0.15 \times \{2.50 \times 3.50 + (2.50 + 1.70) \times (3.50 + 1.70) + 1.70 \times 1.70\}$	
$= 0.837$	
$V_5 = -\{(1.70 \times 1.70) - (1.00 \times 1.00) + \frac{1}{2} \times 0.15^2 \times 4\} \times 0.45 = -0.871$	
$V_6 = -0.60 \times 0.60 \times 0.35 = -0.126$	
$V_7 = -\pi/4 \times 0.40^2 \times 0.35 = -0.044$	
$V_8 = -\pi/4 \times 0.74^2 \times 0.35 = -0.151$	
TOTAL = 23.247	23.247 m^3

WATERLEVEL GAUGING STATION

TYPE OF WORK : FORM ($H \geq 4.0m$)

LOCATION : MAIN BODY

CALCULATION	RESULT
($H \geq 4.0m$)	
$A_1 = 1.70 \times 8.05 \times 4 = 54.740$	
$A_2 = 0.70 \times 8.50 \times 4 = 23.800$	
$A_3 = \sqrt{2} \times 0.15 \times 8.50 \times 4 = 7.212$	
$A_4 = (1.70 + 2.50) \times 1/2 \times \sqrt{1.40^2 + 0.15^2} = 2.957$	
$A_5 = (1.70 + 2.50) \times 1/2 \times \sqrt{0.40^2 + 0.15^2} = 0.897$	
$A_6 = (3.50 + 1.70) \times 1/2 \times \sqrt{0.40^2 + 0.15^2} \times 2 = 2.221$	
$A_7 = 2.50 \times 0.30 \times 2 = 1.500$	
$A_8 = 3.50 \times 0.30 \times 2 = 2.100$	
$A_9 = 0.35 \times 0.60 \times 2 = 0.420$	
$A_{10} = 0.35 \times 0.60 \times 2 = 0.420$	
(Deduction For Openings)	
$A_{11} = -\pi/4 \times 0.40^2 \times 2 = -0.251$	
$A_{12} = -\pi/4 \times 0.74^2 \times 2 = -0.860$	
$A_{13} = -(0.60 \times 0.60) \times 2 = -0.720$	
TOTAL = 94.436	94.436 m^2

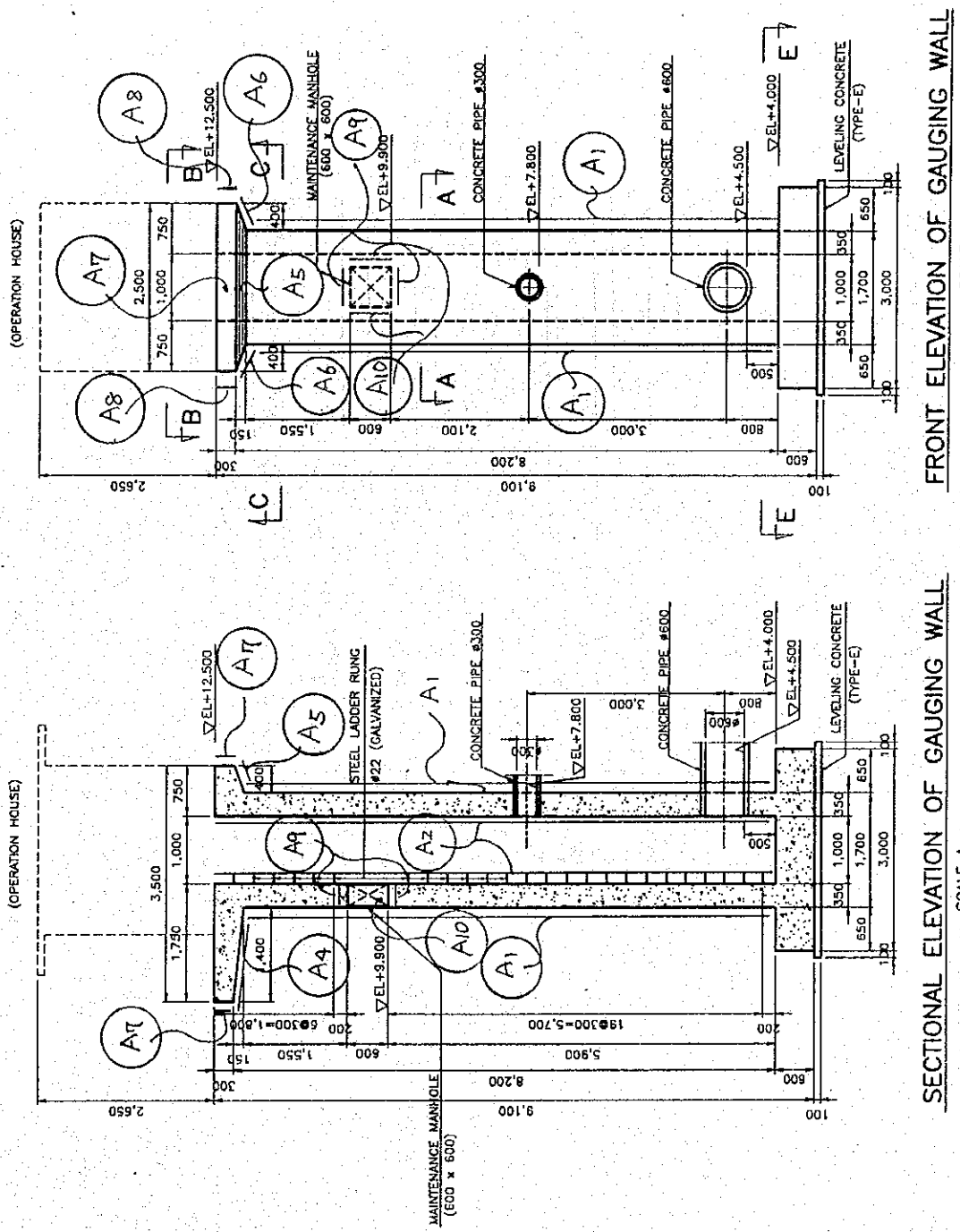
WATERLEVEL GAUGING STATION

TYPE OF WORK : FORM (H≅4.0m)

LOCATION : MAIN BODY

(1/2)

EXPLANATORY DRAWING



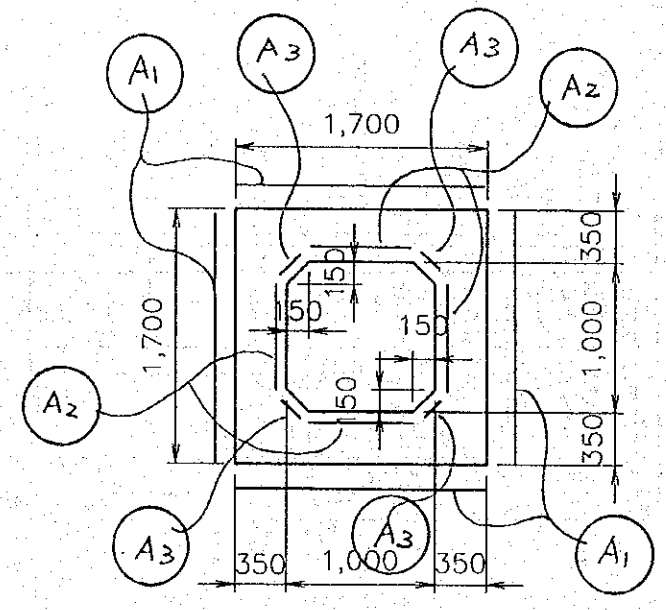
WATERLEVEL GAUGING STATION

TYPE OF WORK : FORM ($H \geqq 4.0m$)

LOCATION : MAIN BODY

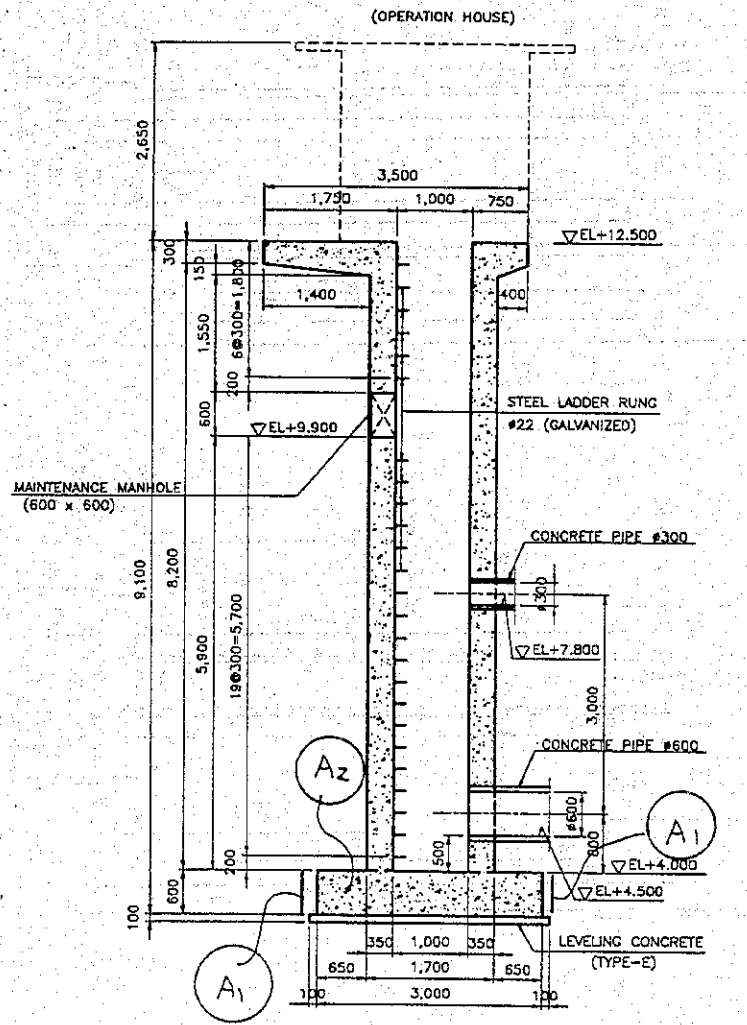
(2/2)

EXPLANATORY DRAWING



WATERLEVEL GAUGING STATION

TYPE OF WORK :	FORM (H<4.0m)
LOCATION :	MAIN BODY



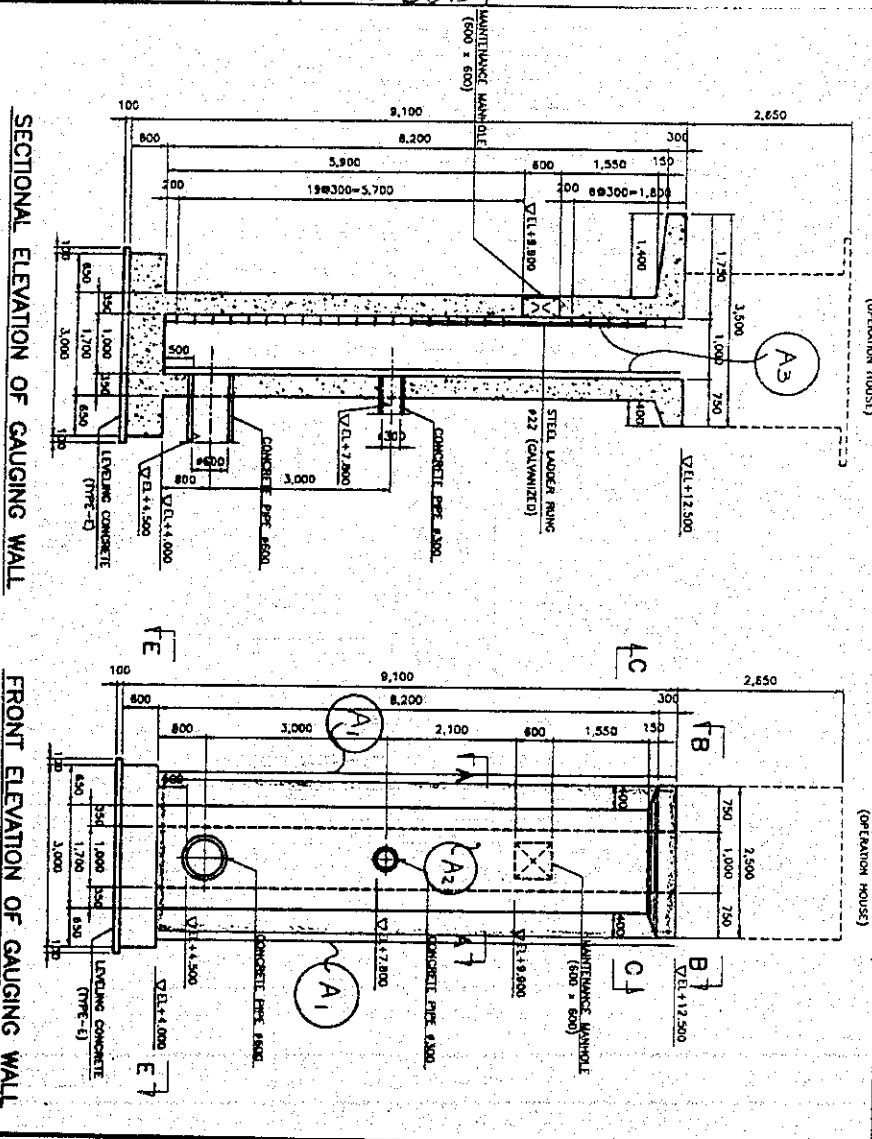
SECTIONAL ELEVATION OF GAUGING WALL

SCALE A

CALCULATION	RESULT
(H<4.0m)	
$A_1 = 3.00 \times 0.60 \times 2 = 3.600$	
$A_2 = 3.00 \times 0.60 \times 2 = 3.600$	
TOTAL = 7.200	7.200 m²

WATER LEVEL GAUGING STATION

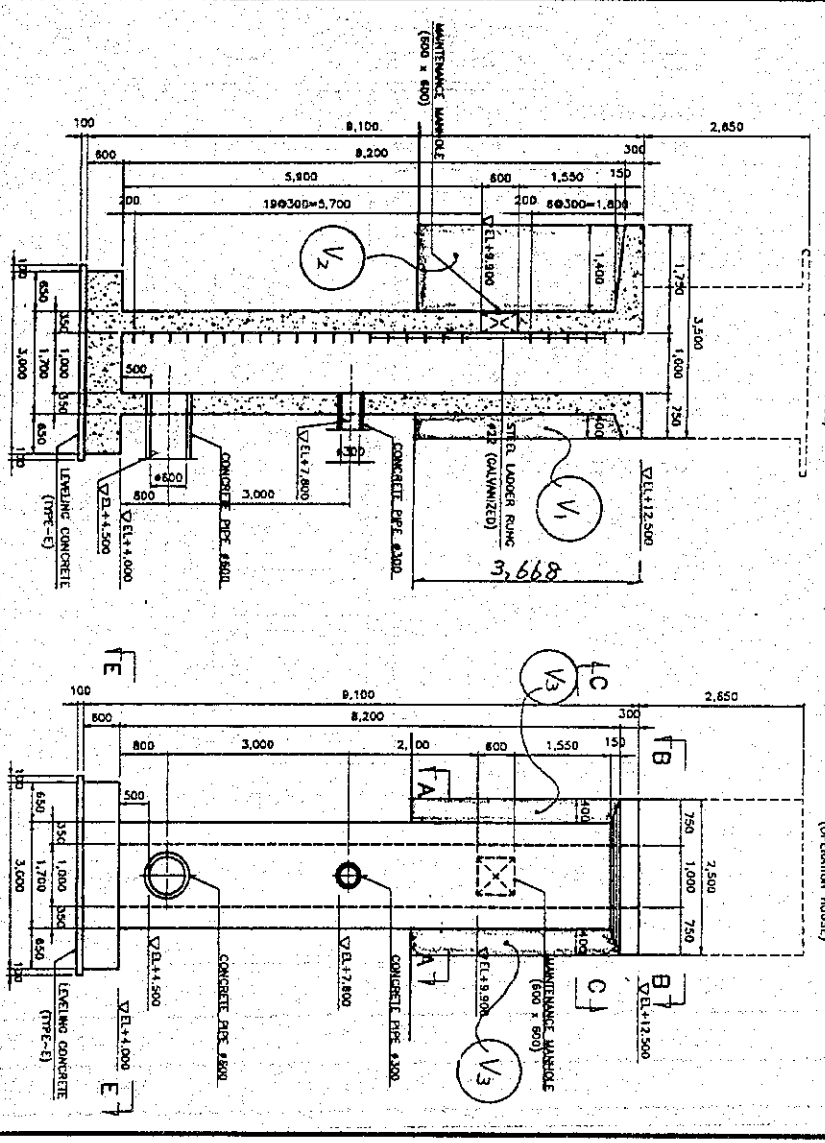
TYPE OF WORK :	SCAFFOLDING
LOCATION :	MAIN BODY



CALCULATION	RESULT
$A_1 = 3.50 \times 8.50 \times 2 = 59.500$	
$A_2 = 2.50 \times 8.50 \times 2 = 42.500$	
$A_3 = 1.00 \times 8.50 \times 4 = 34.000$	
TOTAL = 136.000	136.000 m²

WATERLEVEL GAUGING STATION

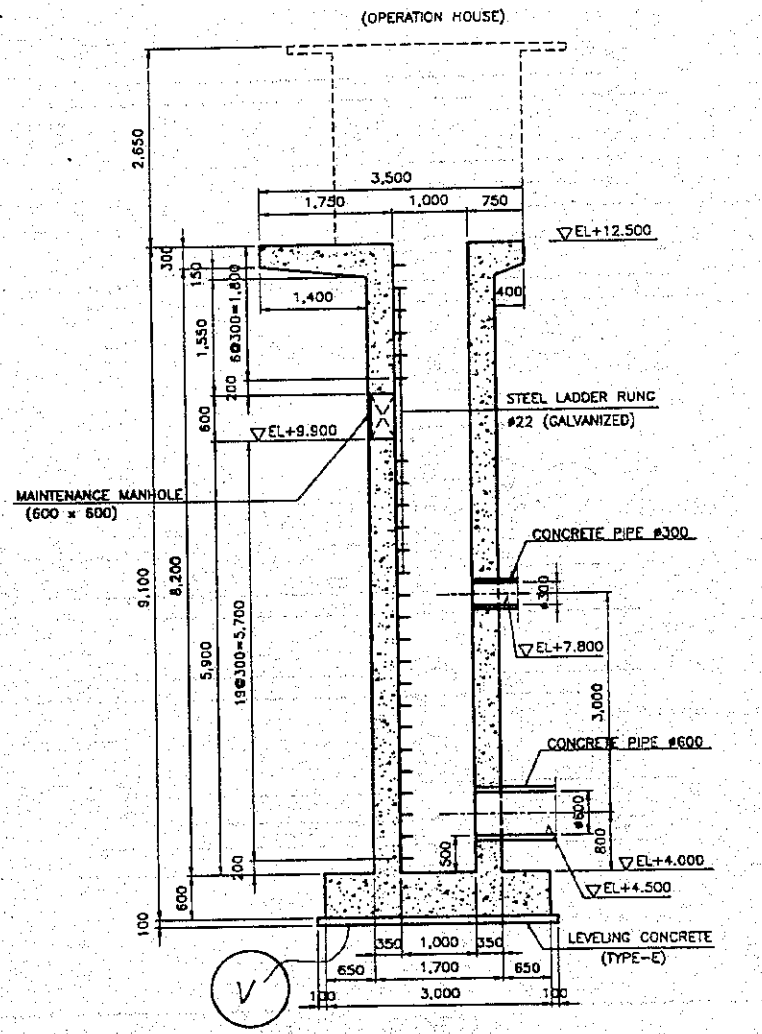
TYPE OF WORK :	SUPPORTING
LOCATION :	MAIN BODY



CALCULATION	RESULT
$V_1 = (3.368 + 3.218) \times 1/2 \times 0.40 \times 1.70 = 2.239$	
$V_2 = (3.368 + 3.218) \times 1/2 \times 1.40 \times 1.70 = 7.837$	
$V_3 = (3.368 + 3.218) \times 1/2 \times 0.40 \times 3.50 \times 2$	
$= 9.220$	
TOTAL = 19.296	19.296 m^3

WATERLEVEL GAUGING STATION)

TYPE OF WORK :	LEVELING CONCRETE
LOCATION :	MAIN BODY



SECTIONAL ELEVATION OF GAUGING WALL

SCALE A

CALCULATION	RESULT
(TYPE-E)	
$V = (3.00 + 0.10 \times 2) \times (3.00 + 0.10 \times 2) \times 0.10$	
$= 1.024$	$1.024\ m^3$

TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION : MAIN BODY

CALCULATION			RESULT
FROM FOR LEVELLING CONCRETE			
(H < 4.0 m)			
A_1 = 0.10 x (3.00 + 0.10 x 2) x 2	=	0.640	
A_2 = 0.10 x (3.00 + 0.10 x 2) x 2	=	0.640	
TOTAL	=	1.280	1.280 m^2
STEEL LADDER			
(GALVANIZED , Ø 22)			
n = 25 Bars			
W = 25 Bars x 1.10 x 2.98 kgf / m	=	81.950 kgf	0.082 tf
STEEL HAND RAIL			
(GALVANIZED)			
STEEL PIPE Ø 75 (W = 5.77 kgf / m)			
L = 1.35 m /pipe			
n = 6 pipes			
W_1 = 6 pipes x 1.35 x 5.77	=	46.737	
STELL PIPE			
L_1 = 0.75 m /pipe , L_2 = 0.40 m /pipe			
n_1 = 4 pipes , n_2 = 4 pipes			
W_2 = 4 pipes x (0.75 + 0.40) x 2.63	=	12.098	
ROUND BAR			
L = 1.10 m /Bar			
n = 8 Bars			
W = 8 Bars x 1.10 x 1.58	=	13.904	
TOTAL ($W_1 + W_2 + W_3$)	=	72.739 kgf	0.073 tf

TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION : MAIN BODY

CALCULATION	RESULT
CONCRETE PIPE (∅ 600)	
L = 2.50 m /pipe	
Necessary Length : L = 10.20 m	
n = 10.20 : 2.50 = 4.08 ≅ 5 pipes	
L = 5 pipes x 2.50 = 12.500	12.500 m
CONCRETE PIPE (∅ 300)	
L = 1.25 m /pipe	
Necessary Length : L = 6.60 m	
n = 6.60 : 1.25 = 5.28 ≅ 6 pipes	
L = 6 pipes x 1.25 = 7.500	7.500 m
GABION MATTRESS	
t = 500	
V = {(6.00 x 3.00) + (3.00 x 1.50) x 2 + (3.00 x 1.50)	
RUBBLE STONE FILLING	
V = ½ x 0.75 x 1.50 x 0.50 x 1/3 x 2 = 0.188	0.188 m^3

TYPE OF WORK : WATER LEVEL GAUGING STATION
: REINFORCING BAR
LOCATION : MAIN BODY

CALCULATION	RESULT
· D16 (w = 1.58 kg/m)	
n_1 = 13 Bars × 4 = 52 Bars	
L_1 = 2.90 + 0.45 = 3.35 m/Bar	
W_1 = 52 × 3.35 × 1.58 = 275.236	
n_{2-1} = 36 Bars	
L_{2-1} = 1.00 m/Bar	
W_{2-1} = 36 × 1.00 × 1.58 = 56.88 kg/m	
n_{2-2} = 4 Bars	
L_{2-2} = 1.60 × 4 = 6.40 m/Bar	
W_{2-2} = 4 × 6.40 × 1.04 = 26.624 kg/m	
n_{2-3} = 4 Bars	
L_{2-3} = 1.60 × 4 = 6.40 m/Bar	
W_{2-3} = 4 × 6.40 × 1.04 = 26.624 kg/m	
For Box culvert W_2' = 110.128 kgf/m	
W_2 = 110.128 × 8.05 = 886.530	
n_3 = 12 Bars × 2 = 24 Bars	
L_3 = 3.40 + 0.20 = 3.60 m/Bar	
W_3 = 24 × 3.60 × 1.58 = 136.512	
n_4 = 15 Bars × 2 = 30 Bars	
L_4 = 2.40 + 0.20 = 2.60 m/Bar	
W_4 = 30 × 2.60 × 1.58 = 123.240	
TOTAL ($W_1 + W_2 + W_3 + W_4$) = 1421.518 kg	1.422 t

TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION : MAIN BODY

CALCULATION			RESULT
GAUGING HOUSE			
• CONCRETE (TYPE – C1)			
V_1 = {(0.40 x 0.40) – (0.25 x 0.25)} x 2.40 x 2	=	0.468	
V_2 = {(0.40 x 0.80) – (0.25 x 0.65)} x 2.40 x 2	=	0.912	
V_3 = 2.50 x 0.25 x 3.70	=	2.313	
V_4 = 0.35 x 0.60 x 0.15 x 4	=	0.126	
TOTAL	=	3.819	3.819 m^3
• FORM			
A_1 = (0.40 x 2 + 0.25 x 2 + 20.15 x 2) x 2.40 x 2	=	7.680	
A_2 = (0.40 + 0.80 + 0.25 + 0.65 + 0.15 x 2) x 240 x 2	=	11.520	
A_3 = (2.50 + 3.70) x 0.25 x 2	=	3.100	
A_4 = 0.35 x 0.60 x 2 x 4	=	1.600	
TOTAL	=	23.560	23.560 m^3
• HOLLOW CONCRETE BLOCK			
A_1 = 1.70 x 2.40 x 2	=	8.160	
A_2 = 1.70 x 2.00	=	3.400	
TOTAL	=	11.560	11.560 m^2
• REINFORCING BAR			
D13 (W = 1.04 kgf /m)			
n_1 = 26 Bars			
L_1 = 0.25 + 2.40 + 0.25 x 2	=	3.15 m /Bar	
W_1 = 3.15 x 26 x 1.04 x 2	=	170.352	

TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION : MAIN BODY

CALCULATION			RESULT
n_2 = 9 Bars			
L_2 = 0.25 + 2.40	=	2.65 m /Bar	
W_2 = 2.65 x 9 x 1.04 x 2	=	49.608	
D16 (W = 1.58 kgf/m)			
n_3 = 10 Bars			
L_3 = 3.60 + 0.25	=	3.85 m /Bar	
W_3 = 3.85 x 10 x 1.58 x 2	=	121.660	
TOTAL ($W_1 + W_2 + W_3$)	=	341.620 kg	0.444 t
• PLASTERING			
A_1 = 1.70 x 2.40 x 2	=	8.160	
A_2 = 1.70 x 2.00	=	3.400	
TOTAL	=	11.560	11.560 m^3
• SCAFFOLDING			
A = 3.70 x 2.65 x 2.50 x 2.65	=	16.430	16.430 m^2
• SUPPORTING			
V = 2.50 x 2.40 x 0.60 x 2	=	7.200	7.200 m^3

TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION : MAINTENANCE STEPS

CALCULATION			RESULT
CONCRETE (TYPE – D)			
(TYPE – D)			
V = 0.40 x 0.30 x 1.30	=	0.156	0.156 m^3
FORM (H < 4.0 m)			
(H < 4.0 m)			
A_1 = 0.40 x 1.30 x 2	=	1.040	
A_2 = 0.30 x 0.40 x 2	=	0.240	
TOTAL	=	1.280	1.280 m^2
GRAVEL BEDDING			
V = (0.30 + 0.10 x 2) x (1.30 + 0.10 x 2) x 0.10	=	0.075	0.075 m^3

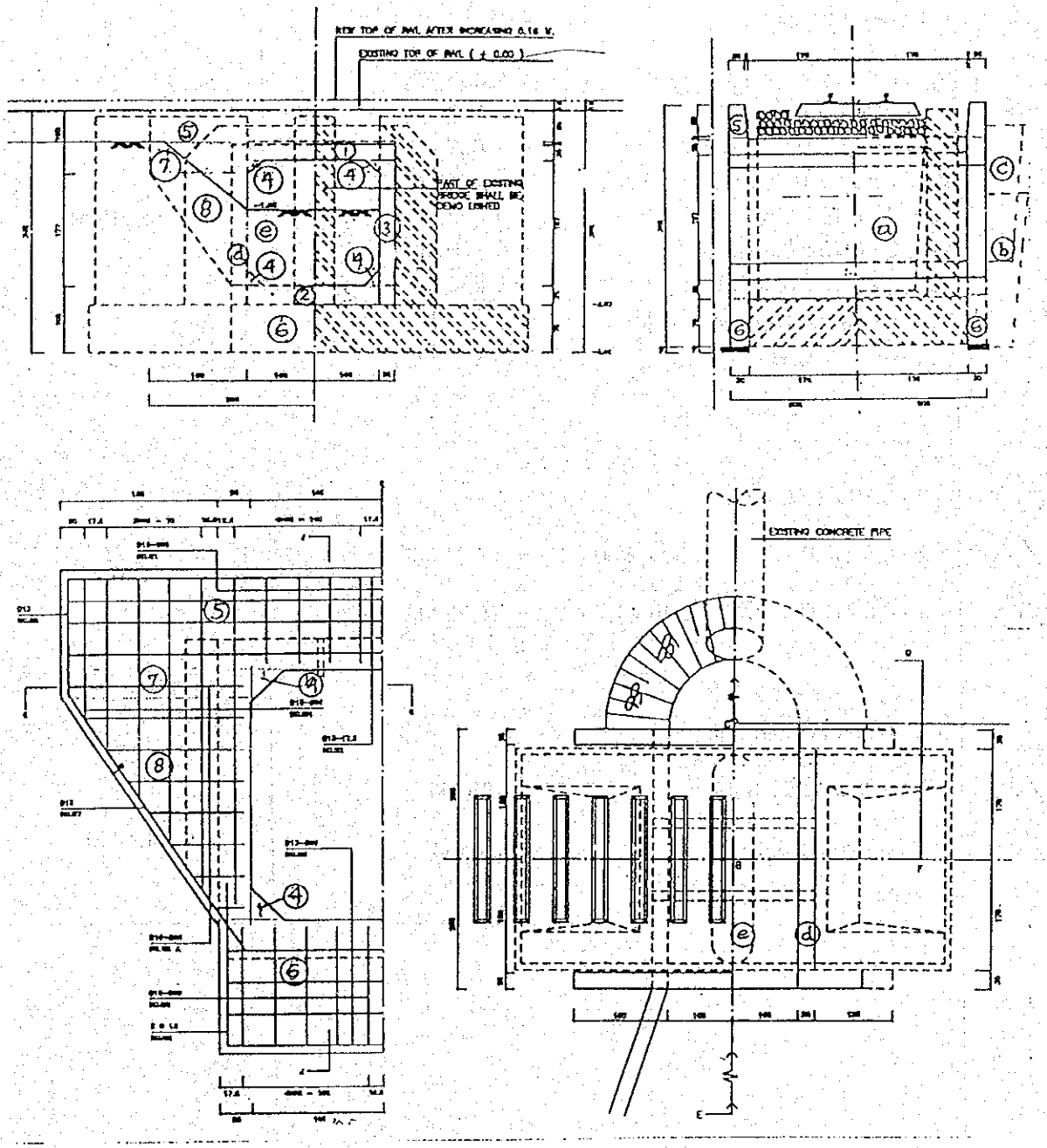
TYPE OF WORK : WATER LEVEL GAUGING STATION
LOCATION : MAINTENANCE STEPS

CALCULATION	RESULT
STEEL MAINTENANCE STEPS	
(GALVANIZED)	
• STEEL PIPE Ø 75 (W = 5.77 kgf /m)	
L_1 = 2.00 m /pipe L_2 = 1.35 m /pipe L_3 = 2.46 m /pipe	
n_1 = 2 pipes n_2 = 2 pipes n_3 = 2 pipes	
W_1 = 2 pipes x (2.00 + 1.35 + 2.46) x 5.77 = 67.047	
• STEEL PIPE Ø 50 (W = 2.63 kgf /m)	
L_1 = 1.92 m /pipe , L_2 = 1.55 m /pipe , L_3 = 0.855 m /pipe , L_4 = 1.00 m /pipe	
n_1 = 4 pipes , n_2 = 2 pipes , n_3 = 4 pipes , n_4 = 7 pipes	
W_2 = {(1.92 x 4 pipes) + (1.55 x 2 pipes) + (0.855 x 4 pipes) + (1.00 x 7 pipes)} x 2.63 = 55.756	
• ROUND BAR Ø 16 (W = 1.58 kgf /m)	
L_1 = 1.10 m /Bar , L_2 = 1.55 m /Bar	
n_1 = 14 Bars n_2 = 3 Bars	
W_2 = {(1.92 x 4 pipes) + (1.55 x 2 pipes) + (0.855 x 4 pipes) = 31.679	
• STEEL PLATE (W = 37.01 kgf /m)	
A = (0.20 + 0.30) x 1.00 x 6 = 3.000 m^2	
W_4 = 3.00 x 37.01 = 111.030	
TOTAL ($W_1 + W_2 + W_3 + W_4$) = 265.512 kgf	0.266 tf

CHAPTER 7 RAISING OF RAILWAY BRIDGE

7.1 Box Culvert (Location : Km + 816 m)

Project	: Design of Railway Bridge Across West Flood
Line	: Semarang - Cirebon
BH No.	: 5 (Km. 00 + 816)
Span	: 2.10 x 1.97 M (Box Culvert)

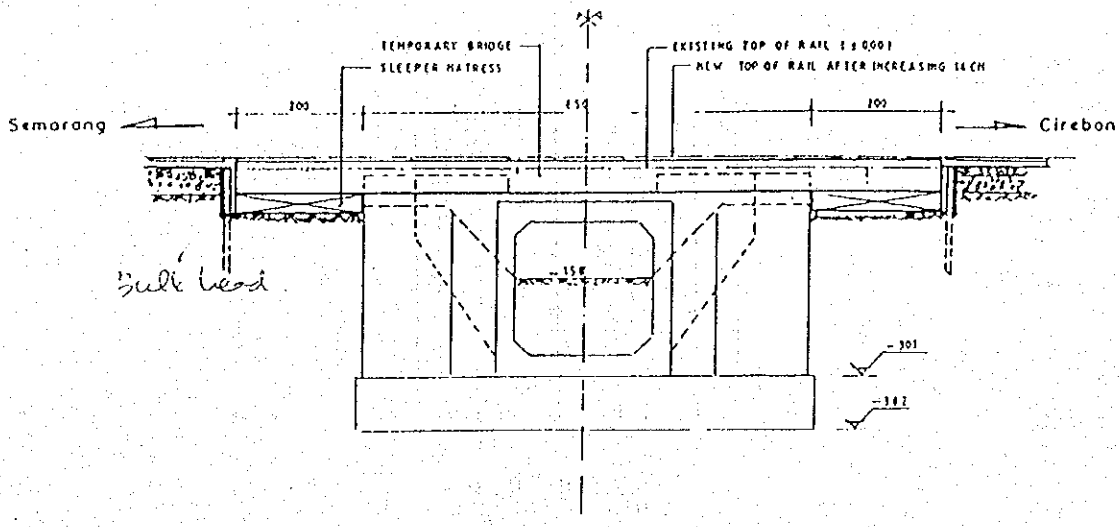


Project : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 5 (Km. 00 + 816)
Span : 2.10 x 1.97 M (Box Culvert)

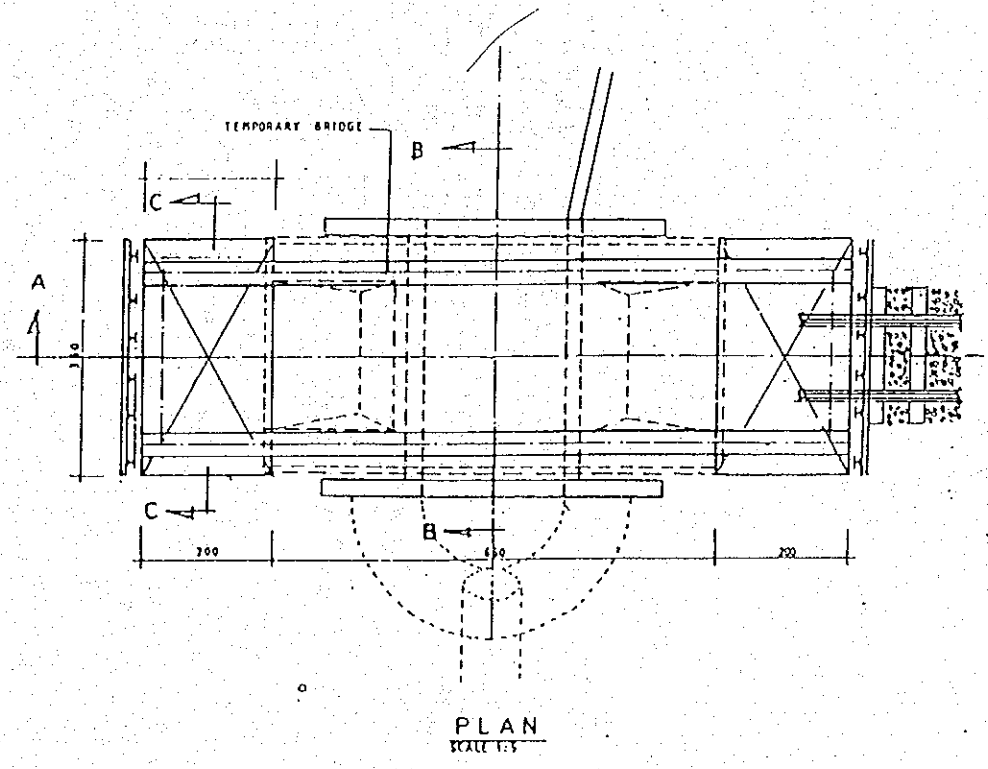
No.	Calculation		Total
	Box culvert concrete:		
	V_1 = 0,25 x 2,6 x 4,10	= 2,665 M^3	
	V_2 = 0,30 x 2,6 x 4,10	= 3,198 M^3	
	V_3 = 0,25 x 1,97 x 4,10 x 2	= 4,039 M^3	
	V_4 = 4 x 0,5 x 0,25 x 0,25 x 4,10	= 0,513 M^3	
	V_5 = 2 x 5,10 x 0,55 x 0,5	= 1,543 M^3	15,019 M^3
	V_6 = 2 x 0,75 x 0,30 x 2,6	= 1,170 M^3	
	V_7 = 4 x 0,25 x 0,45 x 1,25	= 0,563 M^3	
	V_8 = 4 x 1,25 x 1,77 x 0,30 x 0,5	= 1,328 M^3	
		= 15,019 M^3	
	Excavation:		
A	= 2 x 0,70 x 1,50 x 3,50	= 7,35 M3	
B	= 2 x 0,5 x (1,0 + 2,0) x 2,30 x 2,60	= 17,94 M3	51,61 M^3
C	= 4 x 0,5 x (1,0 + 2,20) x 2,35 x 1,75	= 26,32 M3	
		= 51,61 M^3	
	Demolition of abutment:		
d	= 2 x 0,25 x 2,85 x 3,40	= 4,85 M3	
e	= 0,70 x 2,85 x 3,40	= 6,78 M3	11,63 M^3
		= 11,63 M^3	

Project : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 5 (Km. 00 + 816)
Span : 2.10 x 1.97 M (Box Culvert)

TEMPORARY WORK



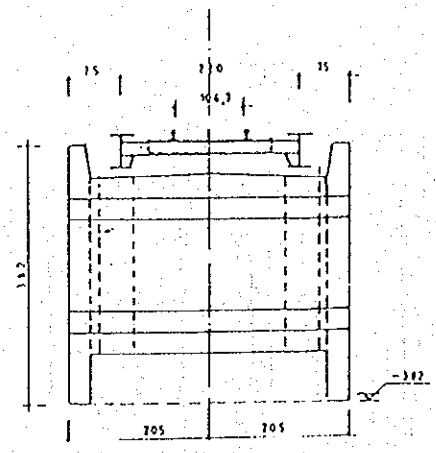
SECTION A - A
SCALE 1:5



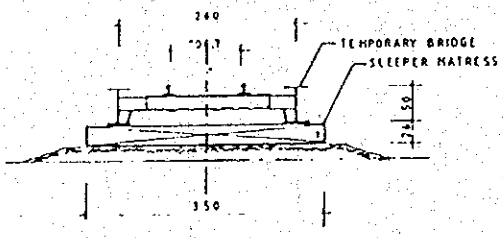
PLAN
SCALE 1:5

3

Project	: Design of Railway Bridge Across West Flood
Line	: Semarang - Cirebon
BH No.	: 5 (Km. 00 + 816)
Span	: 2.10 x 1.97 M (Box Culvert)



SECTION B - B
SCALE 1:5



SECTION C - C
SCALE 1:5

4

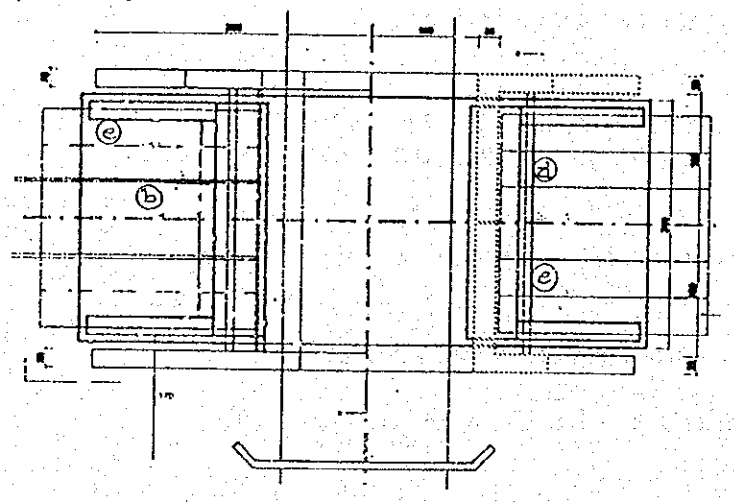
Proyek : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 5 (Km. 00 + 816)
Span : 2.10 x 1.97 M (Box Culvert)

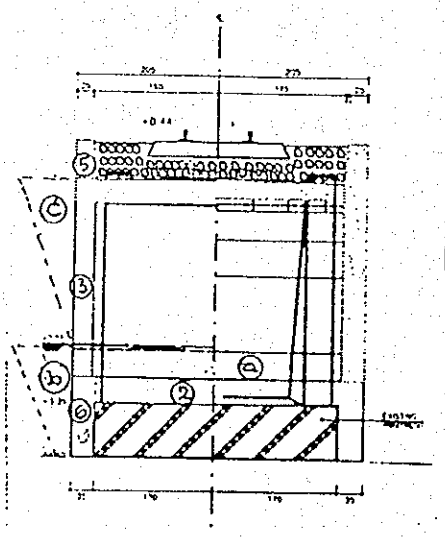
No.	Calculation	Total
	Ballast clearing for temporary bridge	
5	Cn Side + Sm Side = 2 x 3,5 x 1 = 7 x 2 = 14 Under temporary bridge = 3 x 2,5 x 0,3 = 3,75	17,75 m^3
	Temporary abutment / sleeper mattress	
6	Each of Cn and Sm side are consist 1 piece Sleeper = 2 x (16 + 6 + 5 + 6) = 66 bars	2 Pieces 66 Bars
	Construct bulkhead behind the temporary abutment	
7	Ballast wall Wooden plate 6 cm thickness = 2 x 0,06 x 0,6 = 0,216 m^3 is needed behind the temporary bridge	0,216 M^3
8	Setting / demolish temporary bridge	13,044 Ton
	Material supply / temporary bridge construction	
9	Balanced with temporary bridge BH.13 Volume = $\frac{10,5}{12}$ x 14,907 = 13,044 ton	13,044 Ton

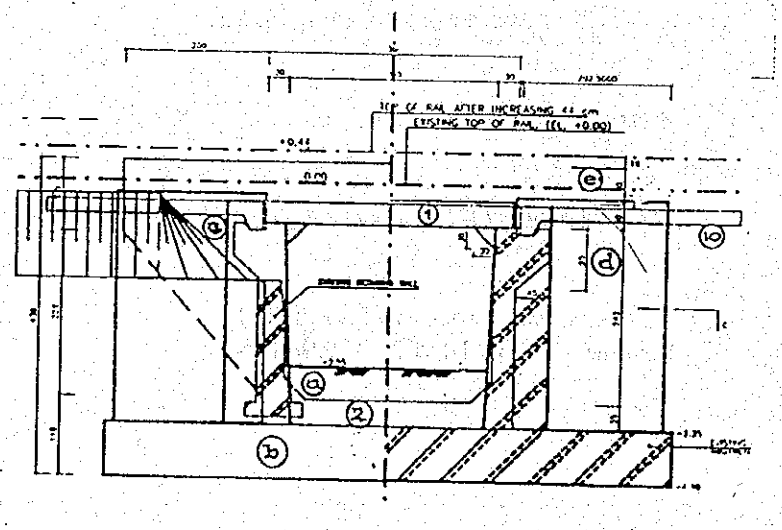
5

7.2 Box Culvert (Location 1k+177m)

Project	: Design of Railway Bridge Across West Flood
Line	: Semarang - Cirebon
BH No.	: 6 (Km. 01 +177)
Span	: 3.00 x 2.43 M

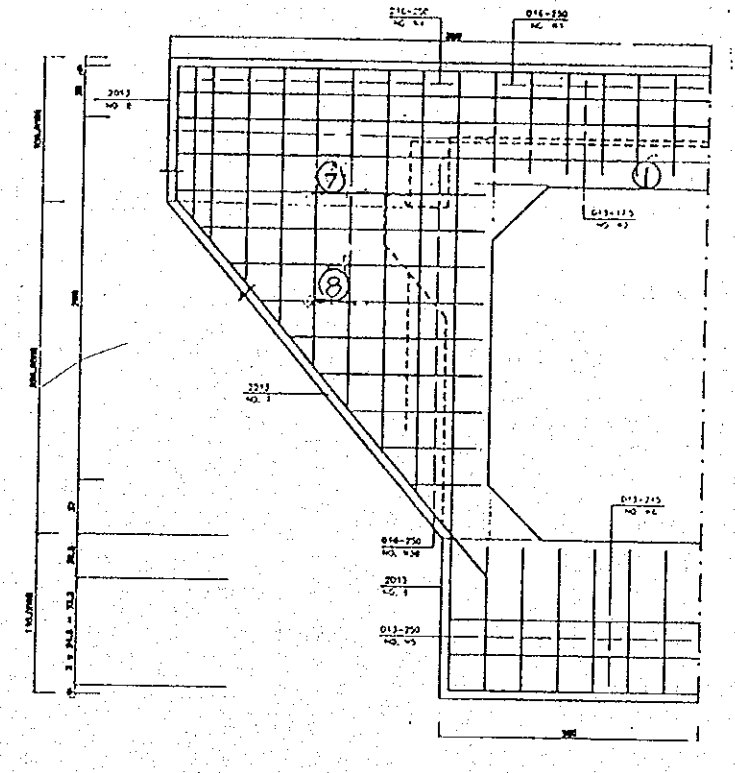


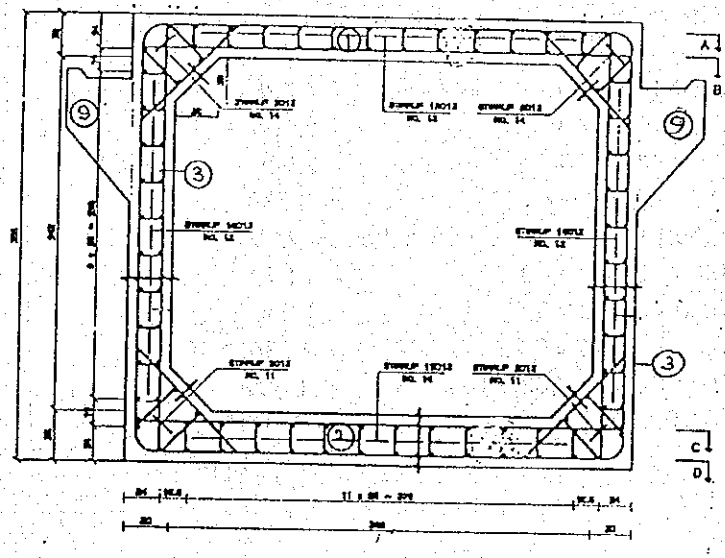




6

Project	: Design of Railway Bridge Across West Flood
Line	: Semarang - Cirebon
BH No.	: 6 (Km. 01 +177)
Span	: 3.00 x 2.43 M





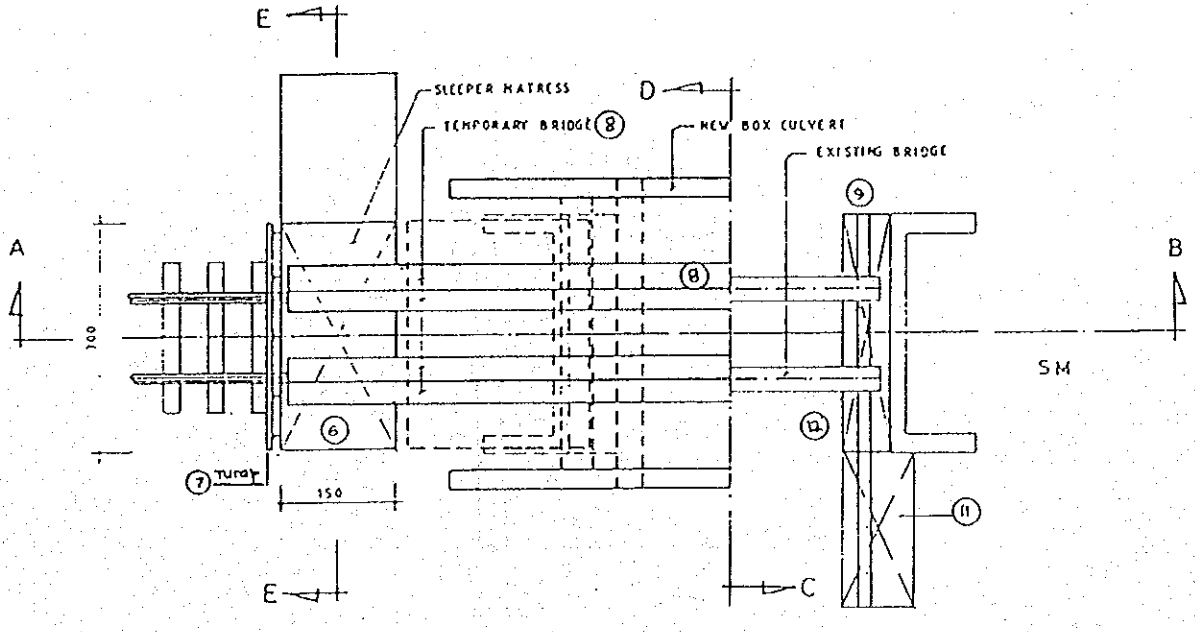
7

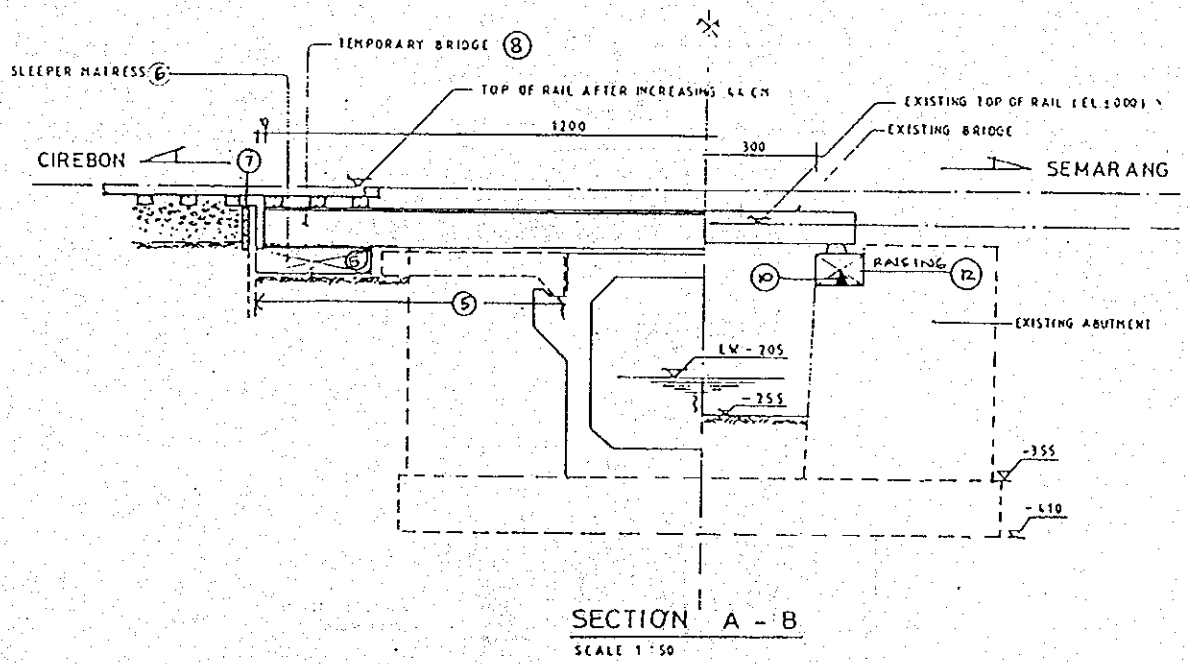
Project : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 6 (Km. 01 + 177)
Span : 3.00 x 2.43 M

No.	Calculation		Total
	Soil Excavation		
A	= 0,80 x 3,00 x 3,6	= 8,64	46,71 M^3
B	= 2 x 0,5 (1,0 + 1,50) x 3,6 x 1,55	=13,95	
C	= 4 x 2,28 x 2,30 x 0,5 (0,8 + 1,50)	= 24,12	
		= 46,71 M^3	
	Demolishing Abutment		
D	= 0,85 x 3,6 x 0,90 x 2	= 5,51	7,11 M^3
E	= 4 x 0,50 x 0,40 x 2	= 1,60	
		= 7,11 M^3	
	Box culvert concrete		
	V_1 = 0,30 x 4,10 x 3,60	= 4,428	26,535 M^3
	V_2 = 0,35 x 4,10 x 3,60	= 5,166	
	V_3 = 0,30 x 2,43 x 4,10	= 2,989	
	V_4 = 4 x 0,3 x 0,3 x 0,5 x 4,10	= 0,738	
	V_5 = 2 x 0,5 x (0,25 + 0,30) x 0,55 x 7,60	= 2,299	
	V_6 = 2 x 0,35 x 0,75 x 3,60	= 1,890	
	V_7 = 4 x 0,30 x 0,45 x 2,00	= 1,080	
	V_8 = 4 x 0,30 x 0,5 x 2 x 2,28	= 2,736	
	V_9 = 2 x 0,5 x (0,88 + 0,33) x 0,38 x 3,5	= 1,609	
	V_{10} = 2 x 6 x 0,5 x 0,3 x 2	= 3,600	
		= 26,535 M^3	

8

Project : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 6 (Km. 01 +177)
Span : 3.00 x 2.43 M

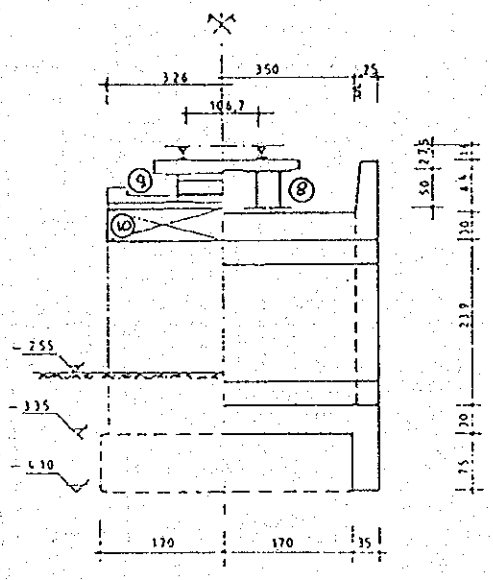




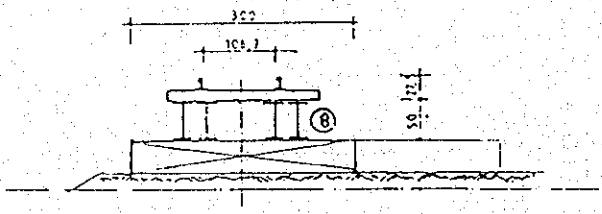
SECTION A - B
SCALE 1 : 50

9

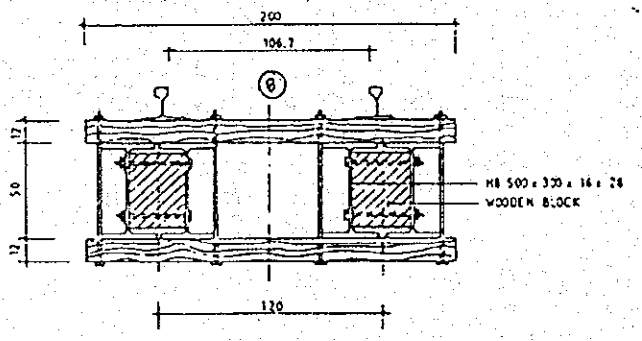
Project : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 6 (Km. 01 +177)
Span : 3.00 x 2.43 M



SECTION C - D
SCALE 1 : 50



SECTION E - E



DETAIL 1
SCALE 1 : 20

ID

Project : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 6 (Km. 01 + 177)
Span : 3.00 x 2.43 M

No.	Calculation	Total
5	Cn Side = 0,6 x 4 x 3 = 7,2 m^3 Sm Side = 0,6 x 4 x 3 = 7,2 m^3	14,4 m^3
	Construct temporary abutment for temporary bridge	
6	Cn Side and Sm = 2 pieces The necessary sleeper is 2 x (14 + 3 x 6) = 64 Bars	2 Pieces 64 Bars
	Construct ballast wall behind temporary abutment	
7	Cn Side and Sm = 2 pieces Using wooden plate with the 8 cm thickness = 2 x 0,08 x 0,6 x 3 = 0,288 m^3	2 Pieces 0,288 m^3
	Construct / setting the temporary bridge	
8	HB 500 x 300 x 16 x 28 = 4 Bars	7,5 Ton
	Demolish / carry out the existing bridge	
9	Used / existing bridge with 2,1 Ton of weight	2,1 Ton
	Remove the steel bearing	
10	Bearing steel is available at the Cn side abutment = 2 Pieces, Sm side = 2 Pieces	4 Pieces
	Construct the receiver staging of existing bridge	
11		

Project : Design of Railway Bridge Across West Flood
Line : Semarang - Cirebon
BH No. : 6 (Km. 01 + 177)
Span : 3.00 x 2.43 M

No.	Calculation	Total
11	One stapling is made for both side of the bridge, quantity = 2 Pcs	2 Pieces
	The sleper 2 x (3 x 2 Layer + 2) is needed	16 Bars
	Bridge raising Implementation	
12	4 Steps Implementation	4 Steps
	It's needed the sleeper 2 x (1/2 x 4 + 2 x 2) = 12 Bars	12 Bars

12