

APPENDIX I-4

SOCIOECONOMIC INDICES

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Table (1) Population Forecasts

REGION Prov/Comuna	1990	1991	1992	1993	1994	1995	2000	2005	2010
TOTAL PAIS	13.099.513	13.319.726	13.544.964	13.771.187	13.994.355	14.210.439	15.211.303	16.136.137	17.199.500
I Tarapacá	331.058	338.014	345.173	352.340	359.412	366.257	398.947	439.203	464.390
II Antofagasta	402.499	409.237	416.235	423.203	430.087	436.744	468.411	497.895	531.460
III Atacama	224.122	229.280	234.564	239.865	245.097	250.163	273.576	295.321	319.910
IV Coquimbo	492.825	501.425	510.226	519.061	527.778	536.216	577.831	617.571	662.180
V Valparaíso	1.364.556	1.385.289	1.406.496	1.427.793	1.448.806	1.469.148	1.561.406	1.646.086	1.742.310
VI Libertador Gral. Bernardo O' Higgins	682.376	693.213	704.299	715.430	726.414	737.047	788.814	837.800	892.650
VII Maule	824.528	833.942	843.566	853.238	862.775	872.011	915.246	952.107	994.130
VIII Bio-Bio	1.711.678	1.735.264	1.759.382	1.783.613	1.807.513	1.830.651	1.936.271	2.033.931	2.143.060
IX Araucanía	773.002	783.567	794.377	805.229	815.941	826.308	874.245	917.927	968.330
Malleco	202.737	204.461	206.215	207.991	209.738	211.421	218.078	223.184	229.510
Angol	46.060	46.823	47.605	48.389	49.163	49.912	54.003	57.619	61.870
Rensico	9.108	9.188	9.269	9.356	9.442	9.518	9.799	9.988	10.200
Collipulli	22.578	22.978	23.381	23.792	24.190	24.583	26.552	28.418	30.520
Lonquimay	9.301	9.245	9.191	9.135	9.082	9.027	8.662	8.258	7.860
Curacautín	18.384	18.322	18.256	18.190	18.127	18.066	17.466	16.691	16.010
Ercilla	8.846	8.826	8.810	8.792	8.773	8.755	8.546	8.466	8.290
Victoria	32.711	32.993	33.283	33.568	33.856	34.130	34.876	35.203	35.740
Traiguén	20.591	20.389	20.786	20.893	20.992	21.085	21.191	21.300	21.230
Lumaco	12.189	12.271	12.347	12.431	12.502	12.586	12.736	12.805	12.890
Purén	13.817	14.014	14.214	14.413	14.612	14.805	15.587	16.289	17.040
Los Sauces	9.152	9.112	9.073	9.032	8.992	8.954	8.623	8.242	7.890
Cautín	570.265	579.106	588.162	597.238	606.203	614.887	656.167	694.743	738.820
Temuco	237.194	243.504	250.004	256.454	262.850	269.063	302.816	336.741	376.380
Lautaro	28.504	28.645	28.788	28.938	29.084	29.219	29.367	29.650	29.760
Perquenco	5.966	5.943	5.918	5.893	5.869	5.845	5.645	5.553	5.250
Vilcun	20.769	20.881	20.995	21.109	21.224	21.335	21.616	21.683	21.760
Cunco	18.246	18.337	18.425	18.521	18.612	18.696	18.930	19.056	19.150
Melipuelco	5.421	5.395	5.364	5.343	5.310	5.286	5.106	4.901	4.560
Corarréhue	6.060	6.035	6.009	5.985	5.957	5.934	5.752	5.526	5.170
Pucón	14.153	14.294	14.441	14.888	15.138	15.374	16.411	17.325	18.300
Villarica	35.704	36.093	36.488	36.888	37.282	37.664	39.103	40.133	41.320
Freije	22.964	23.155	23.353	23.552	23.749	23.939	24.607	25.055	25.540
Petrufquén	20.007	20.096	20.191	20.283	20.380	20.465	20.567	20.440	20.300
Gorbea	14.555	14.651	14.746	14.849	14.944	15.040	15.191	15.209	15.200
Loncoche	23.495	23.646	23.793	23.948	24.098	24.242	24.513	24.600	24.670
Toitén	11.970	12.146	12.321	12.502	12.675	12.848	13.475	13.968	14.470
Teodoro Schmidt	14.925	15.021	15.126	15.233	15.326	15.422	15.598	15.672	15.200
Saavedra	14.332	14.426	14.515	14.614	14.708	14.796	14.989	15.068	15.100
Carahue	25.327	25.512	25.694	25.883	26.068	26.247	26.747	27.007	27.290
Nueva Imperial	36.244	37.184	37.628	38.084	38.529	38.957	40.596	41.941	43.430
Galvarino	13.926	14.042	14.163	14.281	14.400	14.515	14.915	15.206	15.470
X Los Lagos	939.457	952.421	965.711	979.042	992.195	1.004.929	1.061.496	1.115.447	1.176.450
XI Aisen del Gral. Carlos Ibañez del Campo	78.766	80.554	82.384	84.221	86.037	87.789	95.035	101.664	110.080
XII Magallanes y de la Antartida Chilena	142.540	144.287	146.074	147.872	148.640	151.355	157.769	163.283	170.280
Región Metropolitana	5.132.106	5.233.153	5.336.478	5.440.280	5.542.660	5.641.811	6.102.211	6.527.903	7.024.270

Table (2) Projected GDP by Region

Millions of pesos of 1986

REGION	1990	1991	1992	1993	1994	1995	1996	2000	2005	2010
I	124.828	131.198	141.620	148.679	150.830	159.768	167.225	180.190	186.210	191.300
II	271.778	289.155	303.012	322.390	331.033	354.527	347.822	428.010	474.870	523.700
III	61.161	70.939	79.994	87.774	92.572	101.498	109.560	134.240	162.890	196.500
IV	102.791	108.367	115.996	125.031	129.868	140.515	149.926	178.340	208.410	242.000
V	380.935	397.111	423.096	449.054	460.084	491.764	518.986	585.500	640.020	696.200
VI	204.748	207.054	228.128	239.931	243.806	258.646	271.098	295.620	309.750	322.600
VII	161.150	185.353	211.066	231.403	243.886	267.243	288.323	362.840	454.680	566.300
VIII	409.815	429.243	457.223	480.555	488.015	517.426	542.053	595.600	630.100	662.700
IX	94.790	99.083	103.825	110.070	112.659	120.304	126.859	144.250	168.570	195.800
X	161.988	164.561	171.461	182.743	187.934	201.551	213.358	247.140	279.410	314.000
XI	19.171	20.974	21.792	23.656	24.721	26.890	28.828	32.490	35.550	38.600
XII	117.493	116.391	114.999	117.041	115.302	118.787	121.098	121.690	122.560	123.000
R.M.	1.736.198	1.853.863	2.080.761	2.284.278	2.410.197	2.643.546	2.854.437	3.587.240	4.471.080	5.540.800
Total GDP	3.846.846	4.073.292	4.452.973	4.802.605	4.990.907	5.402.465	5.766.568	6.893.150	8.144.100	9.613.500
* others	589.196	631.781	735.738	813.809	864.104	952.860	1.033.630	1.411.850	1.960.200	2.680.000
National GDP	4.436.042	4.705.073	5.188.711	5.616.414	5.855.011	6.355.325	6.800.198	8.305.000	10.104.300	12.293.500

* Products in Public Sector

Table (3) Vehicle Ownership by Region (1/2)

Ordinary Cars (Automobil)

REGION	1990	1991	1992	1993	1994	1995	2000	2005	2010
I	26337	30181	39550	43428	43355	56584	88311	108005	129301
II	26355	28415	33798	35374	33052	36643	47434	54133	61376
III	12216	14854	16148	15240	14412	16193	20365	22954	25754
IV	24633	27757	26475	26578	28045	33390	42575	48277	54443
V	90104	93745	99530	104366	107033	116809	144821	162208	181010
VI	37233	42336	45306	45874	48502	55901	75482	87637	100781
VII	43340	52173	51051	60173	62115	58992	75410	85601	96621
VIII	77058	71358	75441	80717	81728	86964	97355	103804	110779
IX	21637	27301	29742	30447	32497	34727	48457	56980	66197
X	38143	39309	42665	46707	47913	48871	60124	67109	74662
XI	3073	3526	3914	3772	4443	4763	6536	7636	8826
XII	15957	17299	17650	18996	19611	29851	25984	29171	32617
R.M.	380304	410166	440955	483345	485404	555266	738788	852707	975891
TODAS	796390	858420	922225	995017	1008110	1125954	1471642	1686222	1618258

$$y = 4.0 \times 10^6 (\text{GDP/Population})^{1.2633}$$

$$R^2 = 0.9897$$

Freight Vehicles (Camioneta)

REGION	1990	1991	1992	1993	1994	1995	2000	2005	2010
I	9793	11238	14037	14856	13036	14857	20913	25816	31970
II	11420	12563	14791	16465	17897	19419	28985	36777	46452
III	7107	8866	10144	11513	9777	10744	15094	18636	23036
IV	13299	15872	15466	16328	17464	19795	27564	33892	41749
V	28146	31480	35625	38584	39511	44430	63904	79767	99463
VI	20300	23368	25093	26788	27665	30921	43623	53969	66816
VII	25274	28818	31260	36624	42729	40470	58643	73446	91826
VIII	39287	40335	44545	50450	52601	56704	77533	34500	115566
IX	16223	18581	21118	23468	24648	26133	37985	47638	59625
X	20579	23908	26301	29689	30954	33057	47980	60135	75227
XI	2053	2531	3068	3070	3651	4063	6467	8425	10856
XII	6600	7766	7897	8078	8298	8509	10792	12652	14961
R.M.	89628	97907	112359	125360	130161	149585	221289	279694	352215
TODAS	289709	323233	361704	401273	418392	458687	660772	825377	1029763

$$y = 0.0005 (\text{GDP})^{1.3338}$$

$$R^2 = 0.9939$$

Table (3) Vehicle Ownership by Region (2/2)

Buses

REGION	1990	1991	1992	1993	1994	1995	2000	2005	2010
I	578	459	669	1327	901	1124	1664	2516	3869
II	870	668	842	962	903	758	647	472	195
III	283	483	552	518	545	486	687	1004	1507
IV	609	700	766	770	887	1037	1460	2128	3189
V	3056	2993	3360	3805	4424	4754	6433	9083	13291
VI	1285	1316	1409	1433	1653	1900	2508	3468	4992
VII	1041	1070	1284	1634	1827	1870	2690	3984	6038
VIII	2044	2143	2497	2641	2693	3476	4892	7127	10676
IX	865	896	883	993	1156	1253	1637	2242	3204
X	1036	1038	1154	1455	1441	1761	2478	3610	5406
XI	65	80	116	122	174	210	353	580	939
XII	223	340	461	539	561	616	1005	1618	2592
R.M.	10695	11822	12153	13348	15455	18347	25917	37858	56818
TODAS	22650	24008	26146	29547	32620	37592	52371	75690	112716

$$y = 8.0 \times 10^{-41} (\text{Poulation})^{6.2399}$$

$$R^2 = 0.9803$$

Other Veicles (Otros)

REGION	1990	1991	1992	1993	1994	1995	2000	2005	2010
I	1319	2240	3175	3092	2796	3268	5217	7166	9115
II	934	1053	1216	1405	1722	1970	3006	4042	5078
III	567	1224	826	724	771	1180	1793	2406	3019
IV	1106	1272	1354	1311	1178	1471	1836	2201	2566
V	4478	4985	5538	5053	5264	6140	7802	9464	11126
VI	2639	3528	3179	3487	3251	3166	3693	4220	4747
VII	3237	3763	4031	5455	3972	3524	3811	4098	4385
VIII	3044	3182	3314	3589	3766	3975	4906	5837	6768
IX	1492	2094	2320	2267	2673	2692	3892	5092	6292
X	1804	2254	2266	2455	2576	2276	2748	3220	3692
XI	63	130	147	149	213	187	311	435	559
XII	505	494	590	652	720	805	1105	1405	1705
R.M.	13694	18535	18472	20672	20933	25788	37882	49976	62070
TODAS	34882	44754	46428	50311	49835	56442	78002	99562	121122

Table (4) Vehicle Ownership by Commune in IX Region (1/4)

Automobil

	1996	2000	2005	2010
Region : IX Araucania		48457	56980	66197
Province : Malleco		9788	11510	13372
Comuna : Angol		3866	4548	5283
Reralco		323	380	441
Collipulli		675	794	923
Lonquimay		78	92	107
Curacautin		724	852	990
Encilla		176	207	241
Victoria		2251	2647	3076
Traiguën		910	1070	1244
Lumaco		137	161	187
Purèn		355	414	480
Los Sauces		293	345	400
Province : Cautin		38669	45470	52825
Comuna : Temuco		26071	30657	35615
Lautano		1199	1410	1638
Perquenco		271	318	370
Vilcún		657	773	898
Cunco		464	546	634
Meligseuco		193	227	264
Curarrehue		232	273	317
Pucón		1005	1182	1373
Villarica		2629	3092	3592
Fueire		773	909	1057
Petrufquén		967	1137	1321
Gorbea		503	591	687
Loncoche		812	955	1109
Tolten		155	182	211
Teodapo Schmidt		116	136	158
Soavedra		31	36	42
Carahue		503	591	687
Nueva Imperial		1895	2228	2588
Galvarino		193	227	264

Table (4) Vehicle Ownership by Commune in IX Region (2/4)

Camioneta

	1996	2000	2005	2010
Region : IX Araucanía		37985	47638	59625
Province : Malleco		10484	13148	16456
Comuna : Angol		3145	3945	4937
Reralco		440	552	691
Collipulli		860	1078	1349
Lonquimay		189	237	296
Curacautin		933	1170	1465
Encilla		199	250	313
Victoria		2265	2840	3554
Traiguén		1059	1328	1662
Lumaco		660	828	1037
Purén		315	394	494
Los Sauces		419	526	658
Province : Cautin		27501	34490	43169
Comuna : Temuco		14756	18528	23172
Lautano		1155	1448	1813
Perquenco		413	517	648
Vilcún		605	752	950
Cunco		440	552	691
Meligseuco		248	310	389
Curarrehue		228	281	353
Pucón		688	862	1079
Villarica		1623	2035	2547
Fuere		825	1035	1295
Petrufquén		1183	1483	1856
Gorbea		605	759	950
Loncoche		935	1173	1468
Tolten		220	276	345
Teodapo Schmidt		413	513	648
Soavedra		83	103	130
Carahue		880	1104	1381
Nueva Imperial		1898	2380	2979
Galvarino		303	379	475

Table (4) Vehicle Ownership by Commune in IX Region (3/4)

Buses

	1996	2000	2005	2010
Region : IX Araucania		1637	2242	3204
Province : Malleco		290	397	567
Comuna : Angol		187	256	362
Reralco		2	3	5
Collipulli		31	42	60
Lonquimay		2	3	5
Curacautin		0	0	0
Encilla		14	19	28
Victoria		25	34	49
Traiguén		14	19	28
Lumaco		0	0	0
Purén		15	21	30
Los Sauces		0	0	0
Province : Cautin		1347	1845	2637
Comuna : Temuco		826	1142	1632
Lautano		38	52	74
Perquenco		28	39	55
Vilcún		39	54	76
Cunco		31	42	61
Meligseuco		3	4	5
Curarrehue		0	0	0
Pucón		14	20	29
Villarica		81	111	158
Fueire		34	46	66
Petrufoquén		27	37	53
Gorbea		5	7	11
Loncoche		22	30	42
Tolten		5	7	11
Teodapo Schmidt		8	11	16
Soavedra		15	20	29
Carahue		34	46	66
Nueva Imperial		112	157	224
Galvarino		15	20	29

Table (4) Vehicle Ownership by Commune in IX Region (4/4)

Otros

	1996	2000	2005	2010
Region : IX Araucanía		3892	5002	6292
Province : Malleco		1335	1716	2158
Comuna : Angol		803	1034	1299
Reralco		7	9	12
Collipulli		95	122	153
Lonquimay		4	5	6
Curacautin		29	38	47
Encilla		13	17	22
Victoria		198	254	319
Traiguén		69	89	112
Lumaco		31	39	50
Purén		55	70	88
Los Sauces		31	39	50
Province : Cautín		2557	3286	4134
Comuna : Temuco		1675	2150	2705
Lautano		61	79	99
Perquenco		18	23	29
Vilcún		46	59	74
Cunco		15	20	25
Meligseuco		1	2	2
Curarrehue		3	3	4
Pucón		107	138	174
Villarica		164	210	265
Fuere		66	85	107
Petrufquén		72	92	116
Gorbea		23	30	37
Loncoche		46	59	74
Tolten		10	13	17
Teodapo Schmidt		28	36	45
Soavedra		0	0	0
Carahue		28	37	46
Nueva Imperial		184	237	298
Galvarino		10	13	17

APPENDIX I-5

BREAKDOWN OF REHABILITATION UNIT COST

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UNIT COST FOR RECONSTRUCTION

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A-1 Bridge Construction Unit Cost

No.	Bridge name	Structure		Construction Item	unit	Quantity	U.Price (\$)	Price (\$)	Remarks
		Item	Item						
AI - 1	POCULON	Planned Reconstruction Bridge							Span Length = 40m, width=9m
AI - 1.1		Superstructure							
		P.C. Beam manufacturing							
			Concrete	m3	36.9	\$ 59,400	\$ 2,191,461		
			Reinforcing bar	kg	4,698.5	\$ 500	\$ 2,349,235		
			Prestressing steel	kg	1,410.0	\$ 3,000	\$ 4,230,000		
			Formwork	m2	330.1	\$ 5,800	\$ 1,914,348		
			Transportation	L.s.	1.0	\$ 641,103	\$ 641,103		
			Main Girder erection						
			Bearing shoes	each	24.0	\$ 761,700	\$ 18,280,800		
			Erection	L.s.	1.0	\$ 2,671,261	\$ 2,671,261		
			Deck slab construction						
			Concrete	m3	58.9	\$ 58,500	\$ 3,446,820		
			Reinforcing bar	kg	8,172.3	\$ 500	\$ 4,086,150		
				kg	570.6	\$ 430	\$ 245,358		
			Formwork	m2	280.0	\$ 5,800	\$ 1,624,000		
			Approach slab						
			Formwork	m2	8.5	\$ 5,800	\$ 49,300		
			Concrete	m3	16.0	\$ 58,500	\$ 936,000		
			Reinforcing bar	kg	824.2	\$ 500	\$ 412,100		
			Pavement and accessories						
			Hand rail	m	80.0	\$ 34,900	\$ 2,792,000		
			Expansion joint	m	18.0	\$ 91,200	\$ 1,641,600		
			Drainage	L.s.	1.0	\$ -	\$ -		
			Pavement	m3	280.0	\$ 51,600	\$ 14,448,000		
			Approach road construction						
			Earth work	m3	11,388.7	\$ 4,600	\$ 52,388,020		
			Pavement	m2	574.0	\$ 51,600	\$ 29,618,400		
			base course	m3	114.8	\$ 6,800	\$ 780,640		
			Sub total				\$ 144,746,595		

A-1 Bridge Construction Unit Cost

No.	Bridge name	Structure		Construction Item	unit	Quantity	U.Price (\$)	Price (\$)	Remarks
		Structure	Item						
AI - 1	POCULON								
AI - 1.2		Substructure							
			Pier and Abutment construction						
			Foundation	m3			\$ -		
			excavation		1,077.0	\$ 1,700	\$ 1,830,900		
			Base concrete	m3	16.4	\$ 41,400	\$ 678,960		
			Pier concrete	m3	134.5	\$ 58,500	\$ 7,869,420		
			Abutment concrete	m3	301.2	\$ 58,500	\$ 17,619,030		
			Reinforcing bar	kg	28,334.3	\$ 500	\$ 14,167,170		
			Formwork	m2	246.5	\$ 5,800	\$ 1,429,700		
			Scaffolding	m3	507.9	\$ 2,000	\$ 1,015,760		
			Revetment work						
			Bank protection	m2	200.0	\$ 23,200	\$ 4,640,000		
			Scoring protection	m2	200.0	\$ 22,600	\$ 4,520,000		
		Sub total					\$ 53,770,940		
		Total					\$ 198,517,535		
		Miscellaneous		L.s.			64,716,716.33		
		Total amount					\$ 263,234,251		
								\$ 731,200	
Total/m2(Area of superstructure 9m x 40m=360m2)								\$	731,200

A-1 Bridge Construction Unit Cost
Planned Construction Bridge

No.	Description	Unit	Quantity	Unit Cost	Amount	Remarks
AI - 2	Los Aromos Bridge					Span Length L=25m Width=9m
	Substructure					
	Structure Filling	m3	255.0	5,238	1,335,690	
	Machine Excavation	m3	270.0	1,826	493,020	
	Dry Man Excavation	m3	130.0	4,939	642,070	
	Excavation in water	m3	120.0	14,830	1,779,600	
	Formwork	m2	315.0	5,118	1,612,170	
	Reinforcing bar	kg	8024.0	480	3,851,520	
	Concrete H-5	m3	3.8	50,090	190,342	
	Concrete H-25	m3	175.0	62,698	10,972,150	
	Sub Total				20,876,562	
	Superstructure					
	Formwork	m2	246.0	5,118	1,259,028	
	Reinforcing bar	kg	7002.0	480	3,360,960	
	Concrete H-30	m3	58.0	64,387	3,734,446	
	Concrete Pavement	m3	8.8	92,591	814,801	
	Approach Slab	m3	10.5	114,822	1,205,631	
	Post Tensioned Beam L=25m	each	3.0	7,340,576	22,021,728	
	Expansion Joint Supply and Setting	ml	14.0	93,760	1,312,640	
	Hand Rail Supply and Setting	ml	62.0	34,897	2,163,614	
	Bearings, Anchorage and Drain Pip	L-s	1.0	674,544	674,544	
	Sub Total				36,547,392	
	Total				57,423,954	

A-1 Bridge Construction Unit Cost
Planned Construction Bridge

No.	Description	Unit	Quantity	Unit Cost	Amount	Remarks
A1 - 3	Quilacoya Bridge					Span Length L=25m x 2, Width=9m
	Substructure					
	Structure Filling	m3	380.0	5,238	1,990,440	
	Machine Excavation	m3	659.0	1,826	1,203,334	
	Concrete pile cast in place	m2	141.3	414,045	58,504,559	
	Formwork	m2	660.0	5,118	3,377,880	
	Reinforcing bar	kg	10,063.0	480	4,830,240	
	Concrete H-S	m3	10.4	50,090	520,936	
	Concrete H-25	m3	276.0	62,698	17,304,648	
	Sub Total				87,732,037	
	Superstructure					
	Formwork	m2	552.0	5,118	2,825,136	
	Reinforcing bar	kg	16,850.0	480	8,088,000	
	Concrete H-30	m3	117.0	64,387	7,533,279	
	Concrete Pavement	m3	17.5	92,591	1,620,343	
	Approach Slab	m3	10.5	114,822	1,205,631	
	Post Tensioned Beam L=25m	each	6.0	7,340,576	44,043,456	
	Expansion Joint Supply and Setting	ml	21.0	93,760	1,968,960	
	Hand Rail Supply and Setting	ml	128.4	34,897	4,480,775	
	Bearings, Anchorage and Drain Pipe	L.S	2.0	674,544	1,349,088	
	Sub Total				73,114,667	
	Total				160,846,704	

A-1 Bridge Construction Unit Cost
Planned Construction Bridge

No.	Description	Unit	Quantity	Unit Cost	Amount	Remarks
A1 - 4	Gomero Bridge					Span Length L=25m Width=9m
	Substructure					
	Structure Filling	m3	630.0	5,238	3,299,940	
	Dry Man Excavation	m3	198.0	4,939	977,922	
	Excavation in water	m3	410.0	14,830	6,080,300	
	Formwork	m2	635.0	5,118	3,249,930	
	Reinforcing bar	kg	9,479.0	480	4,549,920	
	Concrete H-5	m3	5.2	50,090	260,468	
	Concrete H-25	m3	465.0	62,698	29,154,570	
	Sub Total				47,573,050	
	Superstructure					
	Formwork	m2	310.0	5,118.0	1,586,580	
	Reinforcing bar	kg	8,387.0	480.0	4,025,760	
	Concrete H-30	m3	58.0	64,387.0	3,734,446	
	Concrete Pavement	m3	9.0	92,591.0	833,319	
	Approach Slab	m3	10.5	114,822.0	1,205,631	
	Post Tensioned Beam L=25m	each	3.0	7,340,576	22,021,728	
	Expansion Joint Supply and Setting	ml	14.0	93,760	1,312,640	
	Hand Rail Supply and Setting	ml	72.0	34,897	2,512,584	
	Bearings, Anchorage and Drain Pipe	L.s	1.0	674,544	674,544	
	Sub Total				37,907,232	
	Total				85,480,282	

A-2 Approach Road Construction Unit Cost

2 Lanes Approach Road

Item No.	Construction Item	Description	Unit	Quantity	Price	Total (Peso)	Remarks
	2 Lanes Approach Road						2 lanes = 9.00m
		Earth Work	m3	4125	\$ 4,600	\$ 18,975,000	Approach Length = 100m
		Base Course	m3	210	\$ 6,800	\$ 1,428,000	
		Asphalt Pavement	m3	49	\$ 51,600	\$ 2,528,400	
	Sub Total					\$ 22,931,400	
	One Side of Bridge					\$ 22,900,000	
	Both Side of Bridge					\$ 45,900,000	

1 Lane Approach Road

Item No.	Construction Item	Description	Unit	Quantity	Price	Total (Peso)	Remarks
	1 Lane Approach Road						1 lane = 7.00m
		Earth Work	m3	3625	\$ 4,600	\$ 16,675,000	Approach Length = 100m
		Base Course	m3	150	\$ 6,800	\$ 1,020,000	
		Asphalt Pavement	m3	35	\$ 51,600	\$ 1,806,000	
	Sub Total					\$ 19,501,000	
	One Side of Bridge					\$ 19,500,000	
	Both Side of Bridge					\$ 39,000,000	

A-3 Unit Cost for River Protection

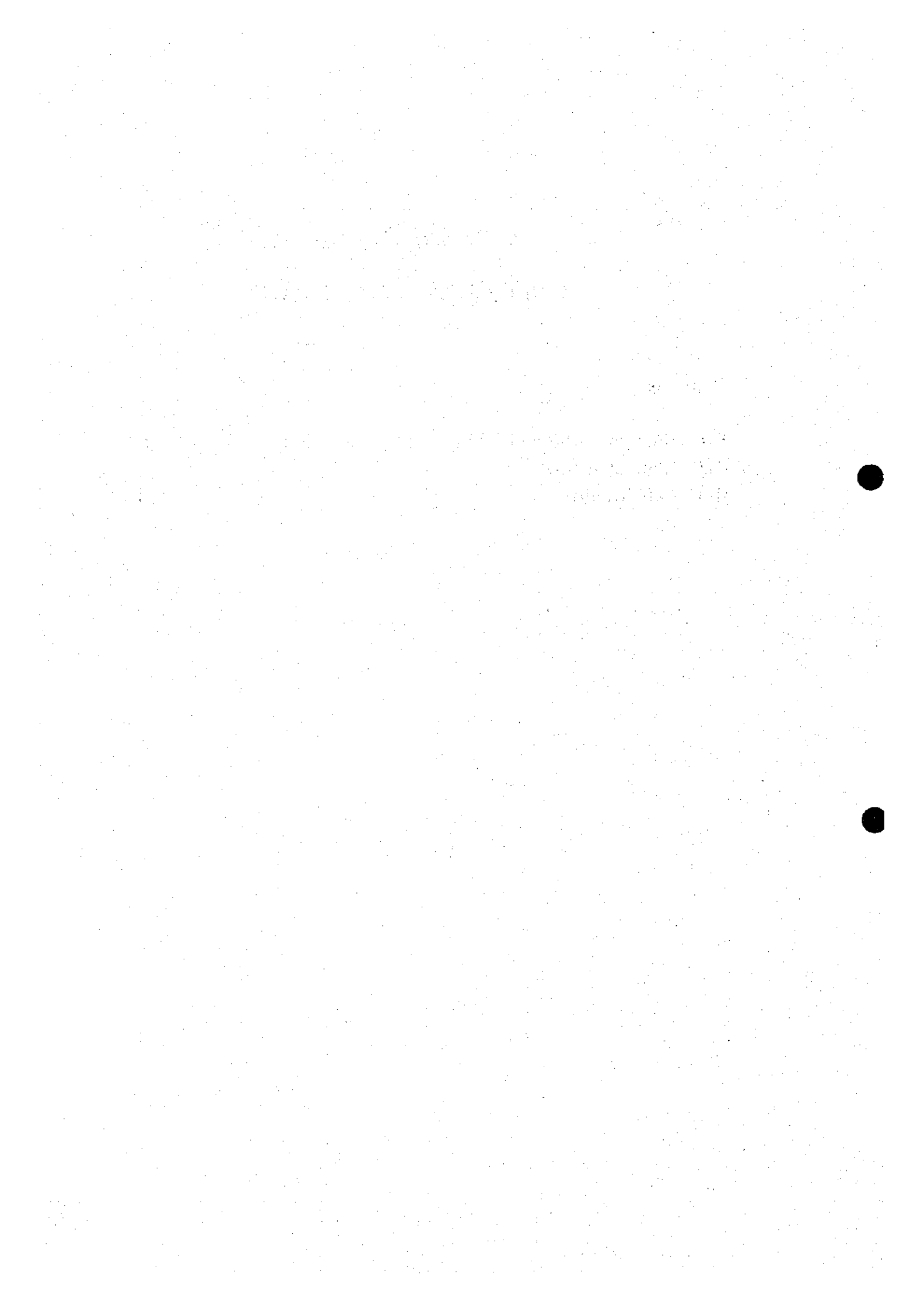
Item No.	Name of Rehabilitation	Description	Unit	Quantity	Price	Total (Peso)	Remarks
	Gabion method						
	Material						
		Cobble stone	m3	10	\$ 1,500	\$ 15,000	10m2x1m = 10m3
		Gabions nets	kg	10	\$ 230	\$ 2,300	
	Labor						
		Engineer	person	0.2	\$ 20,000	\$ 4,000	
		Forman	person	1	\$ 11,000	\$ 11,000	
		Skilled Labor	person	2	\$ 8,500	\$ 17,000	
		Common Labor	person	4	\$ 5,500	\$ 22,000	
	Equipment						
		Hydraulic crane	each	0.5	\$ 80,000	\$ 40,000	
		Truck	each	1	\$ 20,000	\$ 20,000	
		Tools	L.s	1	\$ 15,000	\$ 15,000	
	Transportation						
			L.s	1	\$ 15,000	\$ 15,000	
	Sub total					\$ 161,300	
	Miscellaneous						
			L.s	1	\$ 64,520	\$ 64,520	
	Total					\$ 225,820	
	Total/m2					\$ 22,600	

APPENDIX I-5-B

UNIT COST FOR REPAIR

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B-2 Superstructure	10
B-3 Substructure	21



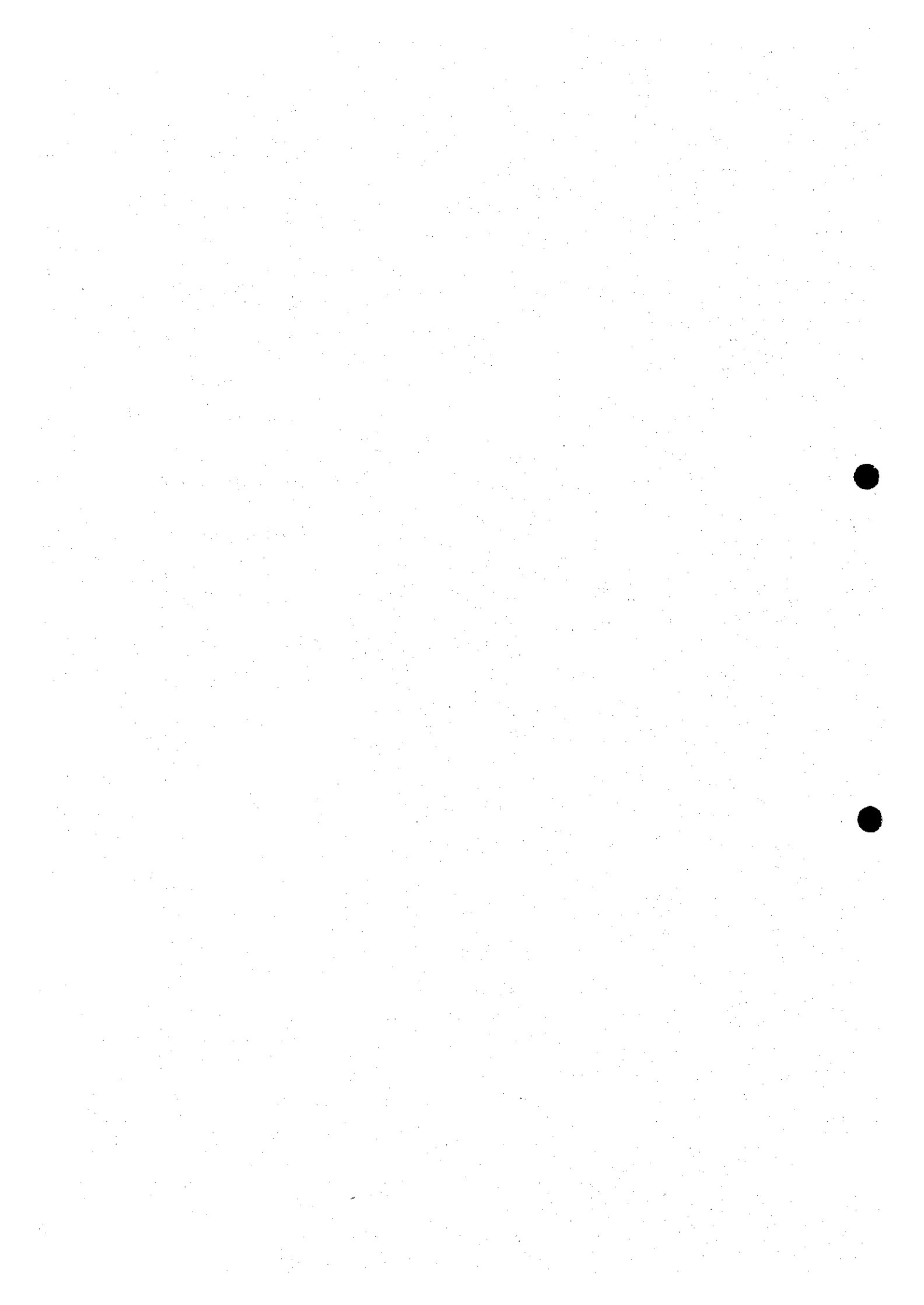
B-1 Summary of Repair Unit Cost by Damages

No. Code	Damage Name	For Damages of Superstructure/m2			For damages of Substructure/m2			Remarks
		Concrete	Steel	Timber	Concrete	Steel	Timber	
1	BR Breakage/Fallout	\$12,400	\$31,600	\$25,800	\$8,800	\$26,500	\$18,000	
2	CO Corrosion/Decay/Deterioration	\$9,900	\$13,600	\$25,800	\$9,300	\$12,400	\$18,000	
3	CR Crack	\$47,000	\$29,400	\$25,800	\$25,300	\$24,500	\$18,000	
4	DH Deformation of member	-	\$552,600	-	-	\$473,800	-	
5	ER Erosion of bank around Abutment and pier	-	-	-	-	\$40,000	-	
6	FI Fire	-	-	\$25,800	-	-	\$18,000	
7	IN Inclination of Substructure	-	-	-	Depend on the site condition	-	-	
8	NF Not Functioning (Bearing and Expansion joint)	Depend on the site condition	-	-	-	-	-	
9	SC Scaling	\$12,400	-	-	\$8,800	-	-	
10	SE Settlement	-	-	-	Depend on the site condition	-	-	
11	SL Sliding	-	-	-	Depend on the site condition	-	-	
12	SP Spalling/Scaling	\$9,300	-	-	\$6,500	-	-	
13	WE Surface Wearing	\$13,200	-	-	\$13,000	-	-	



B-2 Superstructure

Concrete



I-5-B. Unit Cost for Repair
Breakage/Fallout

No.	Code of Damage Superstructure	Repair Method	Unit	Cost	Remarks
BR - c1	Shatcrete mortar method		m2	\$6,000	
BR - c2	Over Lay method by asphalt		m2	\$5,200	
BR - c3	Over Lay method by Concrete		m2	\$6,800	
BR - c4	Dry-pack method		m2	\$20,500	
BR - c5	Pre-pack method		m2	\$20,200	
BR - c6	Patching by cement concrete		m2	\$15,500	
	Total			\$74,200	
	Average			\$12,400	Unit cost of Corrosion/Deterioration repair

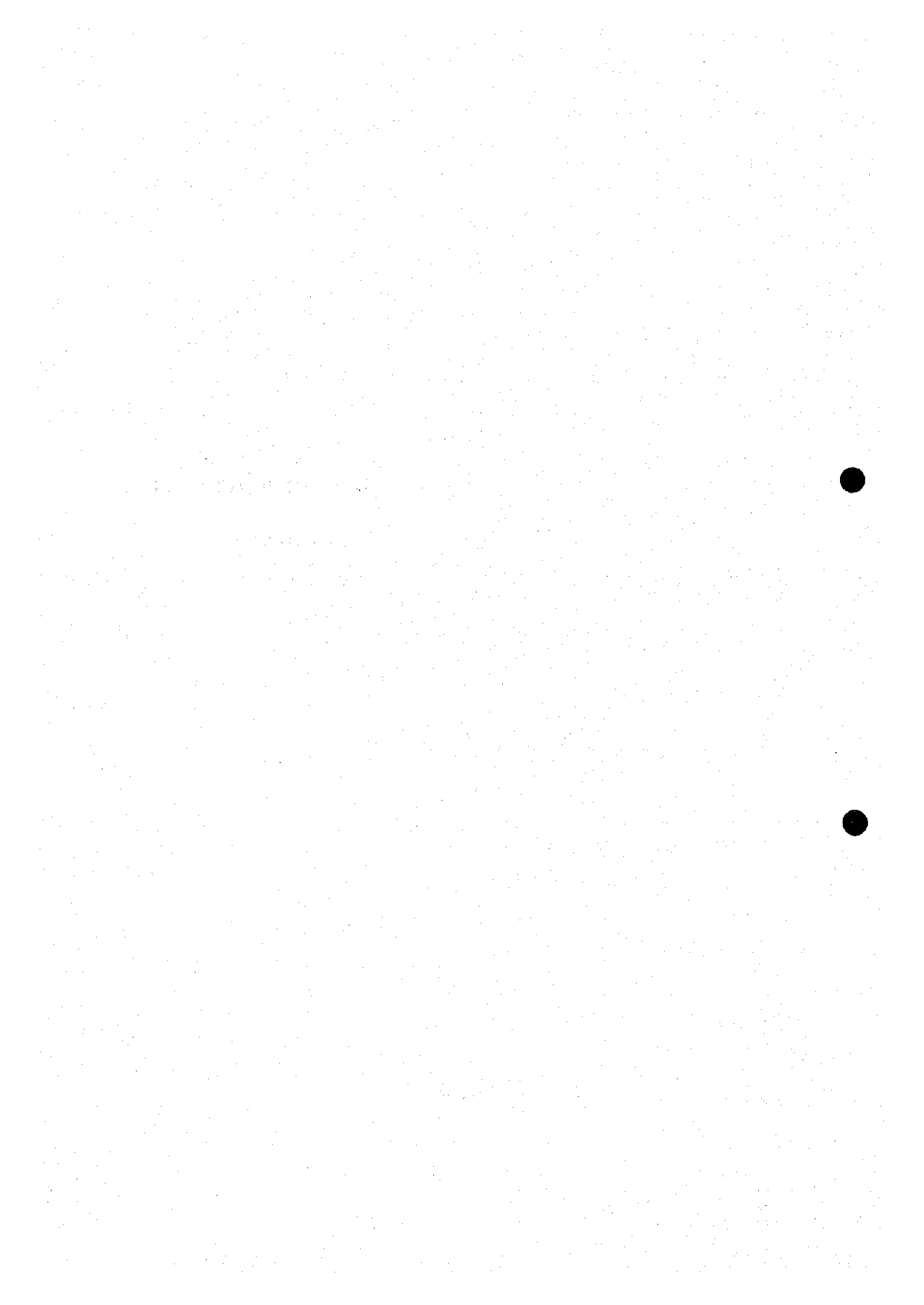
**I-5-B. Unit Cost for Repair
Spalling/Scaling**

No.	Code of Damage Superstructure	Repair Method	Unit	Cost	Remarks
SP - c1		Shotcrete mortar method	m2	\$6,000	
SP - c2		Coating by Cement concrete		\$8,500	
SP - c3		Bituminous coating, Tar coating		\$6,500	
SP - c4		Coating by linseed oil		\$5,900	
SP - c5		Over laying method by Asphalt		\$5,200	
SP - c6		Over laying method by Concrete		\$6,800	
SP - c7		Pre-pack method		\$20,200	
SP - c8		Patching by cement concrete		\$15,500	
SP - c9		Patching by asphalt concrete		\$9,200	
		Total		\$83,800	
		Average		\$9,300	Unit cost of Spalling and scaling

Damage Unit Cost SP-CEM-4-b

B-2 Superstructure

Steel



I-5-B. Unit Cost for Repair

Corrosion/Decay/Deterioration

No.	Code of Damage Superstructure	Repair Method	Unit	Cost	Remarks
CO - m1	CO	Replace Method	m2	\$35,400	
CO - m2		Repainting	m2	\$6,200	
CO - m3		Repainting	m2	\$6,300	
CO - m4		Repainting	m2	\$6,500	
		Total		\$54,400	
		Average		\$13,600	

I-5-B. Unit Cost for Repair
Deformation of member

Item No.	Name of Repair	Description	Unit	Quantity	Cost	Amount	Remarks
	Superstructure						
DH - ml	Reform method						
	Material						
	Paint		kg	1	\$ 5,800	\$ 5,800	per 1 m2
	Labor						
	Technical Engineer		person	1	\$ 20,000	\$ 20,000	
	Forman		person	1	\$ 11,000	\$ 11,000	
	Skilled Labor		person	3	\$ 8,500	\$ 25,500	
	Common Labor		person	1	\$ 5,500	\$ 5,500	
	Equipment						
	Jack		each	2	\$ 50,000	\$ 100,000	
	Hydraulic Crane		each	1	\$ 80,000	\$ 80,000	
	H Beam 300 x 300 x 6000		each	2	\$ 300	\$ 600	
	H Beam 200 x 200 x 1500		each	2	\$ 200	\$ 400	
	Wooden beam 150x150		each	4	\$ 100	\$ 400	
	Hammer		each	2	\$ 1,500	\$ 3,000	
	Acetylene Welder		each	1	\$ 35,000	\$ 35,000	
	Tools		L.s	1	\$ 15,000	\$ 15,000	
	Scaffolding		m3	250	\$ 250	\$ 62,500	5m x 10m x 5m = 250m3
	Transportation		L.s	2	\$ 15,000	\$ 30,000	
	Sub Total					\$ 394,700	
	Miscellaneous		L.s	1	\$ 157,880	\$ 157,880	
	Total					\$ 552,580	
	Total/ m2					\$ 552,600	

B-2 Superstructure

Timber



**I-5-B. Unit Cost for Repair
Breakage/Fallout**

Item No.	Name of Rehabilitation Breakage/Fallout	Description	Unit	Quantity	Unit Cost	Cost	Remarks
BR - w1	Superstructure Replacement Cost (Timber Bridge)						
		Materials					
		Timber material	m3	1	\$ 355,000	\$ 355,000	an Oak 40m2x 0.0254m, 1m3
		Nail	kg	4	\$ 230	\$ 920	
		Bond	kg	4	\$ 4,000	\$ 16,000	
		Paint	kg	8	\$ 4,500	\$ 36,000	
		Labor					
		Engineer	Person	0.5	\$ 20,000	\$ 10,000	
		Forman	Person	1	\$ 11,000	\$ 11,000	
		Skilled Labor	Person	0	\$ 8,500	\$ -	
		Common Labor	Person	2	\$ 5,500	\$ 11,000	
		Carpenter	Person	2	\$ 9,000	\$ 18,000	
		Equipment					
		Tools	L.s.	1	\$ 15,000	\$ 15,000	
		Scaffolding					
		Scaffolding	m3	1,000	\$ 250	\$ 250,000	(10m x 20m x 5m) = 1000m3
		Transportation					
		Transportation	L.s.	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
		Sub total				\$ 737,920	
		Miscellaneous					
		Miscellaneous	L.s.	1	\$ 295,168	\$ 295,168	
		Total Cost per 1m3 Total/m2				\$ 1,033,088	(peso/ m3) 25,800 (peso/m2)

I-5-B. Unit Cost for Repair
Corrosion/Decay/Deterioration

Item No.	Name of Rehabilitation	Description	Unit	Quantity	Unit Cost	Cost	Remarks
Superstructure							
CO - w1	Replacement Cost (Timber Bridge)						
	Materials						
	Timber material		m ³	1	\$ 355,000	\$ 355,000	an Oak 40m2x 0.025-4m, 1m ³
	Nail		kg	4	\$ 230	\$ 920	
	Bond		kg	4	\$ 4,000	\$ 16,000	
	Paint		kg	8	\$ 4,500	\$ 36,000	
	Labor						
	Engineer		Person	0.5	\$ 20,000	\$ 10,000	
	Forman		Person	1	\$ 11,000	\$ 11,000	
	Skilled Labor		Person	0	\$ 8,500	\$ -	
	Common Labor		Person	2	\$ 5,500	\$ 11,000	
	Carpenter		Person	2	\$ 9,000	\$ 18,000	
	Equipment						
	Tools		L.s.	1	\$ 15,000	\$ 15,000	
	Scaffolding		m ³	1,000	\$ 250	\$ 250,000	(10m x 20m x 5m) = 1000m ³
	Transportation		L.s.	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
	Sub total					\$ 737,920	
	Miscellaneous		L.s.	1	\$ 295,168	\$ 295,168	
	Total Cost per 1m ³					\$ 1,033,088	(peso/ m ³)
	Total/m ²					\$ 25,800	(peso/m ²)

I-5-B. Unit Cost for Repair

Crack

Item No.	Name of Rehabilitation	Description	Unit	Quantity	Unit Cost	Cost	Remarks
Superstructure							
CR - w1	Replacement Cost (Timber Bridge)						
	Materials						
	Timber material		m3	1	\$ 355,000	\$ 355,000	an Oak 40m2x 0.0254m. 1m3
	Nail		kg	4	\$ 230	\$ 920	
	Bond		kg	4	\$ 4,000	\$ 16,000	
	Paint		kg	8	\$ 4,500	\$ 36,000	
	Labor						
	Engineer		Person	0.5	\$ 20,000	\$ 10,000	
	Forman		Person	1	\$ 11,000	\$ 11,000	
	Skilled Labor		Person	0	\$ 8,500	\$ -	
	Common Labor		Person	2	\$ 5,500	\$ 11,000	
	Carpenter		Person	2	\$ 9,000	\$ 18,000	
	Equipment						
	Tools		L.s.	1	\$ 15,000	\$ 15,000	
	Scaffolding		m3	1,000	\$ 250	\$ 250,000	(10m x 20m x 5m) = 1000m3
	Transportation		L.s	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
	Sub total					\$ 737,920	
	Miscellaneous		L.s	1	\$ 295,168	\$ 295,168	
	Total Cost per 1m3					\$ 1,033,088	(peso/ m3)
	Total/m2					\$ 25,800	(peso/m2)

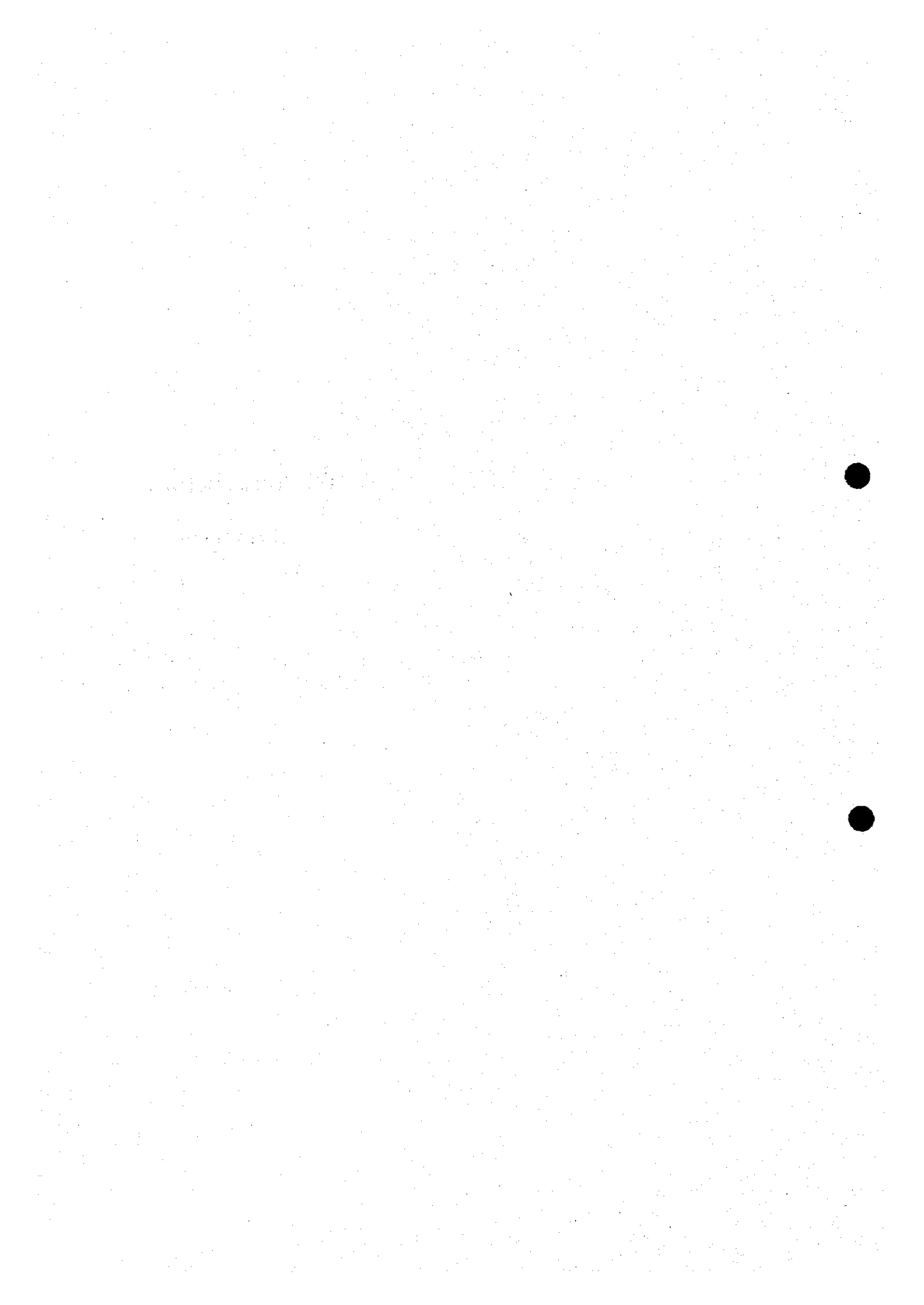
I-5-B. Unit Cost for Repair

Fire

Item No.	Name of Rehabilitation	Description	Unit	Quantity	Unit Cost	Cost	Remarks
Superstructure							
FI - w1 Replacement Cost (Timber Bridge)							
Materials							
		Timber material	m3	1	\$ 355,000	\$ 355,000	an Oak #0m2x 0.0254m, 1m3
		Nail	kg	4	\$ 230	\$ 920	
		Bond	kg	4	\$ 4,000	\$ 16,000	
		Paint	kg	8	\$ 4,500	\$ 36,000	
Labor							
		Engineer	Person	0.5	\$ 20,000	\$ 10,000	
		Forman	Person	1	\$ 11,000	\$ 11,000	
		Skilled Labor	Person	0	\$ 8,500	\$ -	
		Common Labor	Person	2	\$ 5,500	\$ 11,000	
		Carpenter	Person	2	\$ 9,000	\$ 18,000	
Equipment							
		Tools	L.s.	1	\$ 15,000	\$ 15,000	
		Scaffolding	m3	1,000	\$ 250	\$ 250,000	(10m x 20m x 5m) = 1000m3
		Transportation	L.s.	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
Sub total							
					\$	\$ 737,920	
Miscellaneous							
			L.s.	1	\$ 295,168	\$ 295,168	
Total Cost per 1m3							
					\$	\$ 1,033,088	(peso/ m3)
Total/m2							
					\$	\$ 25,800	(peso/m2)

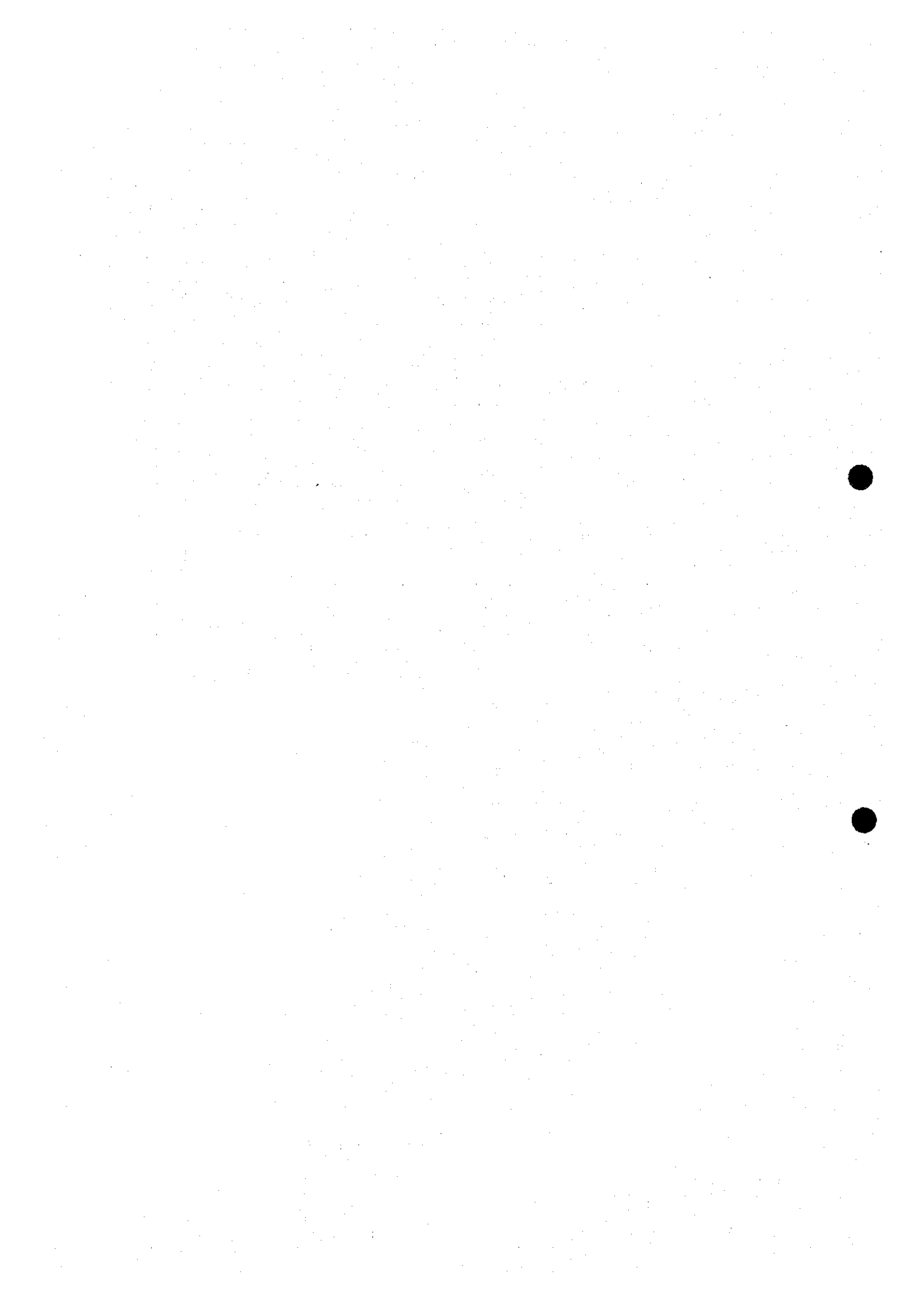
B-3 Substructure

Concrete



B-3 Substructure

Steel



I-5-B. Unit Cost for Repair
Corrosion/Decay/Deterioration

No.	Code of Damage Substructure	Repair Method	Unit	Cost	Remarks
CO - m1	CO	Replace Method	m2	\$32,300	
CO - m2		Repainting	m2	\$5,600	
CO - m3		Repainting	m2	\$5,700	
CO - m4		Repainting	m2	\$6,000	
		Total		\$49,600	
		Average		\$12,400	

I-5-B. Unit Cost for Repair
Crack

No.	Code of Damage Substructure	Repair of Mthod	Unit	Cost	Remarks
CR - m1		Re-welding	m2	\$14,900	
CR - m2		Gusset plate welding method	m2	\$28,300	
CR - m3		Gusset plate high strength bolt method	m2	\$30,300	
		Total		\$73,500	
		Average		\$24,500	

I-5-B. Unit Cost for Repair
Deformation of member

Item No.	Name of Repair Substructure	Description	Unit	Quantity	Cost	Amount	Remarks
DH - m1	Reform method						
		Material					
		Paint	kg	1	\$ 5,800	\$ 5,800	
		Labor					
		Technical Engineer	person	1	\$ 20,000	\$ 20,000	
		Forman	person	1	\$ 11,000	\$ 11,000	
		Skilled Labor	person	3	\$ 8,500	\$ 25,500	
		Common Labor	person	1	\$ 5,500	\$ 5,500	
		Equipment					
		Jack	each	2	\$ 50,000	\$ 100,000	
		Hydraulic Crane	each	1	\$ 80,000	\$ 80,000	
		H Beam 300 x 300 x 6000	each	2	\$ 300	\$ 600	
		H Beam 200 x 200 x 1500	each	2	\$ 200	\$ 400	
		Wooden beam 150x150	each	4	\$ 100	\$ 400	
		Hammer	each	2	\$ 1,500	\$ 3,000	
		Acetylene Welder	each	1	\$ 35,000	\$ 35,000	
		Tools	Ls	1	\$ 15,000	\$ 15,000	
		Scaffolding	m3	25	\$ 250	\$ 6,250	10m x 1m x 2.5m = 25m3
		Transportation	Ls	2	\$ 15,000	\$ 30,000	
		Sub Total				\$ 338,450	
		Miscellaneous	Ls	1	\$ 135,380	\$ 135,380	
		Total				\$ 473,830	
		Total/m2				\$ 473,800	

I-5-B Unit Cost for Repair
Erosion of bank around abutment and pier

No.	Code of Damage Substructure	Repair Method	Unit	Cost	Remarks
ER - cm1		Gabion Method	m2	\$ 22,600	
ER - cm2		Block Method	m2	\$ 45,600	
ER - cm3		Concrete Slab Method	m2	\$ 38,900	
ER - cm4		Framed Gabion Method	m2	\$ 47,900	
ER - cm5		Frame Method	m2	\$ 45,100	
		Total of Cost		\$ 200,100	
		Average		\$ 40,000	



B-3 Substructure

Timber



I-5-B. Unit Cost for Repair

Breakage

Item No.	Name of Rehabilitation Substructure	Description	Unit	Quantity	Unit Cost	Cost	Remarks
BR - w1	Replacement Cost (Timber Bridge)						
	Materials						
	Timber material		m3	1	\$ 355,000	\$ 355,000	an Oak 40m2x 0.0254m, 1m3
	Nail		kg	4	\$ 230	\$ 920	
	Bond		kg	4	\$ 4,000	\$ 16,000	
	Paint		kg	8	\$ 4,500	\$ 36,000	
	Labor						
	Engineer		Person	0.5	\$ 20,000	\$ 10,000	
	Forman		Person	1	\$ 11,000	\$ 11,000	
	Skilled Labor		Person	0	\$ 8,500	\$ -	
	Common Labor		Person	2	\$ 5,500	\$ 11,000	
	Carpenter		Person	2	\$ 9,000	\$ 18,000	
	Equipment						
	Tools		L.s.	1	\$ 15,000	\$ 15,000	
	Scaffolding		m3	100	\$ 250	\$ 25,000	(10m x 1m x 5m)x2 =100m3
	Transportation		L.s	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
	Sub total					\$ 512,920	
	Miscellaneous		L.s	1	\$ 205,168	\$ 205,168	
	Total Cost per 1m3					\$ 718,088	(peso/ m3)
	Total/m2					\$ 18,000	(peso/m2)

I-S-B. Unit Cost for Repair
Corrosion/Decay/Deterioration

Item No.	Name of Rehabilitation Substructure	Description	Unit	Quantity	Unit Cost	Cost	Remarks
CO - w1	Replacement Cost (Timber Bridge)						
	Materials						
	Timber material		m3	1	\$ 355,000	\$ 355,000	an Oak 40m2x 0.0254m, 1m3
	Nail		kg	4	\$ 230	\$ 920	
	Bond		kg	4	\$ 4,000	\$ 16,000	
	Paint		kg	8	\$ 4,500	\$ 36,000	
	Labor						
	Engineer		Person	0.5	\$ 20,000	\$ 10,000	
	Forman		Person	1	\$ 11,000	\$ 11,000	
	Skilled Labor		Person	0	\$ 8,500	\$ -	
	Common Labor		Person	2	\$ 5,500	\$ 11,000	
	Carpenter		Person	2	\$ 9,000	\$ 18,000	
	Equipment						
	Tools		L.s.	1	\$ 15,000	\$ 15,000	
	Scaffolding		m3	100	\$ 250	\$ 25,000	(10m x 1m x 5m)x2 =100m3
	Transportation		L.s.	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
	Sub total					\$ 512,920	
	Miscellaneous		L.s.	1	\$ 205,168	\$ 205,168	
	Total Cost per 1m3					\$ 718,088	(peso/ m3)
	Total/m2					\$ 18,000	(peso/m2)

I-5-B. Unit Cost for Repair

Crack

Item No.	Name of Rehabilitation Substructure	Description	Unit	Quantity	Unit Cost	Cost	Remarks
CR - w1	Replacement Cost (Timber Bridge)						
	Materials						
	Timber material		m3	1	\$ 355,000	\$ 355,000	an Oak 40m2x 0.0254m. 1m3
	Nail		kg	4	\$ 230	\$ 920	
	Bond		kg	4	\$ 4,000	\$ 16,000	
	Paint		kg	8	\$ 4,500	\$ 36,000	
	Labor						
	Engineer		Person	0.5	\$ 20,000	\$ 10,000	
	Forman		Person	1	\$ 11,000	\$ 11,000	
	Skilled Labor		Person	0	\$ 8,500	\$ -	
	Common Labor		Person	2	\$ 5,500	\$ 11,000	
	Carpenter		Person	2	\$ 9,000	\$ 18,000	
	Equipment						
	Tools		L.s.	1	\$ 15,000	\$ 15,000	
	Scaffolding		m3	100	\$ 250	\$ 25,000	(10m x 1m x 5m)x2 = 100m3
	Transportation		L.s.	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
	Sub total					\$ 512,920	
	Miscellaneous					\$ 205,168	
	Total Cost per 1m3					\$ 718,088	(peso/ m3)
	Total/m2					\$ 18,000	(peso/m2)

I-5-B. Unit Cost for Repair

Fire

Item No.	Name of Rehabilitation Substructure	Description	Unit	Quantity	Unit Cost	Cost	Remarks
F1 - w1	Replacement Cost (Timber Bridge)						
	Materials						
	Timber material		m3	1	\$ 355,000	\$ 355,000	an Oak 40m2x 0.0254m. 1m3
	Nail		kg	4	\$ 230	\$ 920	
	Bond		kg	4	\$ 4,000	\$ 16,000	
	Paint		kg	8	\$ 4,500	\$ 36,000	
	Labor						
	Engineer		Person	0.5	\$ 20,000	\$ 10,000	
	Forman		Person	1	\$ 11,000	\$ 11,000	
	Skilled Labor		Person	0	\$ 8,500	\$ -	
	Common Labor		Person	2	\$ 5,500	\$ 11,000	
	Carpenter		Person	2	\$ 9,000	\$ 18,000	
	Equipment						
	Tools		L.s.	1	\$ 15,000	\$ 15,000	
	Scaffolding		m3	100	\$ 250	\$ 25,000	(10m x 1m x 5m)x2 =100m3
	Transportation		L.s.	1	\$ 15,000	\$ 15,000	100km(one way)x2=200km
	Sub total					\$ 512,920	
	Miscellaneous		L.s.	1	\$ 205,168	\$ 205,168	
	Total Cost per 1m3					\$ 718,088	(peso/ m3)
	Total/m2					\$ 18,000	(peso/m2)