

Appendix Table A-3-1
SAMPLES OF RIVER CARGO TRAFFIC CHARACTERISTICS

Origin	Destination	Type of Vessel ^{1/}	Loading Capacity (ton)	Commodities and Weight	Travel Time (hr.)
Kuching	Marudi	Motor Launch (W)	100	General cargo - 80 ton	6 (days)
Sibu	Marudi	Oil Tanker (S)	150	Fuel (Diesel) - 150 ton	2 (days)
Long Lama	Miri	Barge (S)	450	Stone - 300 ton	13
Marudi	Long Lama	Motor Launch (W)	60	Sugar, Salt, Kerosine	8
Long Lama	K. Baram	Motor Launch (W)	60	Pigs, Rubber, Rice	20
Long Lama	K. Baram	Motor Launch (W)	30	Rice, Wood, Rubber - 6 ton	10
Long Lama	K. Baram	Tug Boat (S)	-	Pulling logs - 10,000 ton	30
Marudi	Long Lama	Motor Launch (W)	30	Sugar, Fertilizer	11
K. Baram	Marudi	Motor Launch (W)	30	Diesel - 30 ton	8
Long Lama	Marudi	Motor Launch (W)	30	Rottan - 20 ton	10
K. Baram	Marudi	Motor Launch (W)	60	Bricks, Wire	7
K. Baram	Marudi	Motor Launch (S)	20	Sugar, Rice, Cement - 20 ton	7
K. Baram	Tinjar	Motor Launch (W)	30	Diesel	14
Marudi	Tutoh	Motor Launch (W)	2	Biscuits, Drink	8
Marudi	Long Teru	Motor Launch (W)	15	Salt, Rubber, etc.	5
Long Ikang	Marudi	Motor Launch (W)	30	Banana, Pigs	5
K. Baram	Marudi	Motor Launch (W)	30	Car, Rice	7
Marudi	Tinjar	Motor Launch (W)	30	Vegetable, Drinks, etc.	11
K. Baram	Marudi	Motor Launch (W)	50	Oil, Plywood	9
Marudi	K. Baram	Motor Launch (W)	50	Rubber, Pepper, Rice	9
Marudi	Asampaya	Motor Launch (W)	5	Rubber, Drink	7
Marudi	Long Tutoh	Motor Launch (W)	10	Oil, Drink, Cement	10
Tinjar	Marudi	Motor Launch (W)	12	Rubber, Pepper, Paddy - 1 ton	7
Marudi	Bemang	Motor Launch (W)	3	Paddy, Fertilizer - 1 ton	5
Long Teru	Marudi	Motor Launch (W)	15	Rottan, Belian wood - 5 ton	7
Long Teru	Marudi	Motor Launch (W)	30	Pepper - 1 ton	6
Long Ikang	Marudi	Motor Launch (W)	8	Rubber, Banana	5
Long Teru	Marudi	Motor Launch (W)	30	Rubber, Pepper - 0.5 ton	7
Long Lama	Marudi	Motor Launch (W)	2	Food, Paddy, Rubber - 2 ton	8
Batu Gading	K. Baram	Tug Boat (W)	-	Pulling logs - 10,000 ton	12
Batu Gading	Marudi	Barge (S)	30	Stone - 12 ton	7
Marudi	Bakong	Motor Launch (W)	3	Biscuits, Drinks	6
Long Ikang	Marudi	Motor Launch (W)	10	Pepper, Banana, Rubber - 1.5 ton	7
K. Baram	Marudi	Motor Launch (S)	40	Diesel - 15 ton	6
Marudi	K. Apoh	Motor Launch (S)	25	Wire - 1 ton	8
Marudi	Long Lama	Motor Launch (W)	20	Rice, Drink	8
K. Baram	Marudi	Motor Launch (W)	30	Pigs, Fertilizer - 5 ton	7

Source : Interview survey conducted by consultant.

^{1/} W : Made of wood
S : Made of steel

Appendix Table A-3-2 AIR TRAFFIC, MIRI

		Passenger (person), Cargo (ton) (per month)																
Incoming (FROM)	K. L.	Singapore	Tawau	Sandakan	K/K	Labuan	Bander Serigawan	Bintulu	Sibu	Kuching	Long Semado	Lawas	Limbang	Bario	Long Seridan	Marudi	Mukah	Total
1973																		
Pass.	-	-	18	54	333	96	320	300	1,413	1,235	0	88	169	22	0	240	63	4,351
Cargo	-	-	-	-	184	25	109	489	375	5,777	24	219	347	9	5	186	19	7,768
1974																		
Pass.	-	-	79	53	479	162	346	308	1,430	1,624	-	99	217	14	1	201	114	5,147
Cargo	-	-	-	5	236	62	323	144	715	9,745	-	156	432	-	-	225	11	12,054
1975																		
Pass.	-	-	23	23	504	226	318	435	1,688	1,638	-	90	241	12	1	226	115	5,540
Cargo	-	-	12	11	770	82	286	161	1,322	10,616	-	205	501	35	2	271	4	14,278
1976																		
Pass.	-	-	-	-	645	290	-	454	2,330	2,031	-	117	382	12	2	223	95	6,581
Cargo	-	-	-	24	289	56	-	229	738	8,716	0	188	496	-	-	258	15	11,009
1977																		
Pass.	131	214	43	36	562	304	-	514	2,314	2,067	-	70	404	10	1	236	81	6,987
Cargo	3,985	140	2	33	12,608	255	-	797	710	16,980	-	325	1,523	29	1	528	45	37,963
1978																		
Pass.	112	-	-	-	710	326	-	667	2,272	2,246	-	124	484	9	-	330	100	7,392
Cargo	2,605	-	-	-	16,981	76	-	174	438	22,748	-	177	526	-	-	289	16	44,030
1973																		
Pass.	-	-	32	71	383	48	366	227	1,383	1,202	0	63	186	26	1	238	59	4,285
Cargo	-	-	-	1	182	25	63	224	298	1,502	-	349	820	-	-	581	-	4,045
1974																		
Pass.	-	-	40	82	420	160	365	304	1,602	1,530	1	63	204	22	0	181	99	5,073
Cargo	-	-	16	6	219	152	85	389	420	1,438	-	503	1,092	3	-	749	20	5,090
1975																		
Pass.	-	-	30	47	409	211	362	383	1,591	1,502	1	68	220	33	1	182	87	5,127
Cargo	-	-	0	14	237	81	65	485	751	1,951	5	531	1,087	23	0	713	72	6,015
1976																		
Pass.	30	237	60	44	514	286	-	484	2,345	1,800	5	96	344	24	2	218	79	6,568
Cargo	264	230	2	31	193	86	-	477	448	2,037	-	335	1,207	1	0	677	30	6,018
1977																		
Pass.	85	-	-	-	675	332	-	532	2,308	2,139	0	107	444	10	-	289	100	7,021
Cargo	830	-	-	-	1,416	71	-	153	554	10,468	-	182	689	19	-	295	19	14,698
1978																		
Pass.	62	237	42	27	671	319	-	609	2,464	1,771	-	64	420	20	1	267	78	7,052
Cargo	1,685	109	-	-	1,538	265	-	902	535	1,413	-	398	1,653	-	-	670	25	14,193

Source: Dept. of Civil Aviation

Appendix Table A-3-3 AIR TRAFFIC, MARUDI

(per month)

Incoming (FROM)		Miri	Bario	Long Seridan	Total
1974	Pass.	189	51	16	256
	Cargo	1.14	1.79	1.30	4.23
1975	Pass.	211	48	15	274
	Cargo	1.93	2.12	0.96	5.01
1976	Pass.	227	52	19	298
	Cargo	3.12	3.16	1.50	7.78
1977	Pass.	263	40	15	318
	Cargo	2.98	2.69	0.96	6.63

Outgoing (FOR)		Miri	Bario	Long Seridan	Total
1974	Pass.	197	55	18	270
	Cargo	0.39	2.91	0.93	4.23
1975	Pass.	229	53	16	298
	Cargo	0.98	2.30	1.01	4.29
1976	Pass.	241	51	21	313
	Cargo	1.89	3.68	0.98	6.55
1977	Pass.	293	49	17	359
	Cargo	2.38	2.53	1.27	6.18

Source: Dept. of civil aviation

Appendix Table A-3-4 AIR TRAFFIC, LIMBANG

(per month)

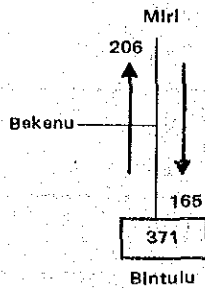
		Incoming Total	Outgoing Total
1974	Pass.	369	404
	Cargo	2,955	1,549
1975	Pass.	418	437
	Cargo	3,169	1,898
1976	Pass.	537	552
	Cargo	4,660	2,093
1977	Pass.	566	582
	Cargo	5,368	2,103
1978	Pass.	594	674
	Cargo	4,313	1,674

Source: Dept. of civil aviation

Appendix Table A-3-5 (1) RESULT OF ROAD TRAFFIC COUNT

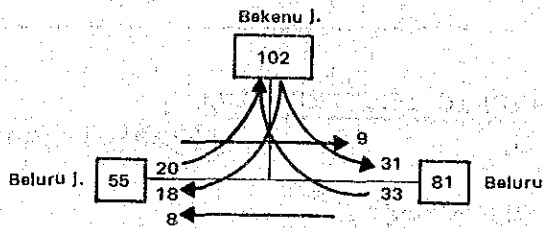
(Average of Two Days)

Miri-Bintulu road; Bekenu junction



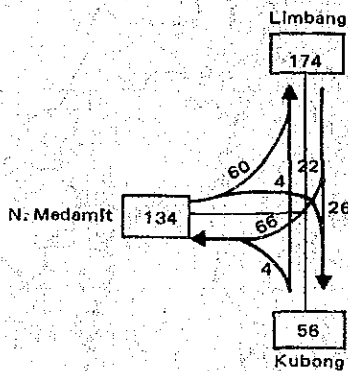
	Car Taxi	Van Pick-up	Truck	Bus	Total
No. of vehicle	179	60	122	10	371
Type of vehicle composition (%)	48.3	16.2	32.8	2.7	100

Beluru road; Peninjau junction



	Car Taxi	Van Pick-up	Truck	Bus	Total
No. of vehicle	38	22	57	2	119
Type of vehicle composition (%)	31.9	18.5	47.9	1.7	100

Limbang-N. Medamit road; Kubong junction



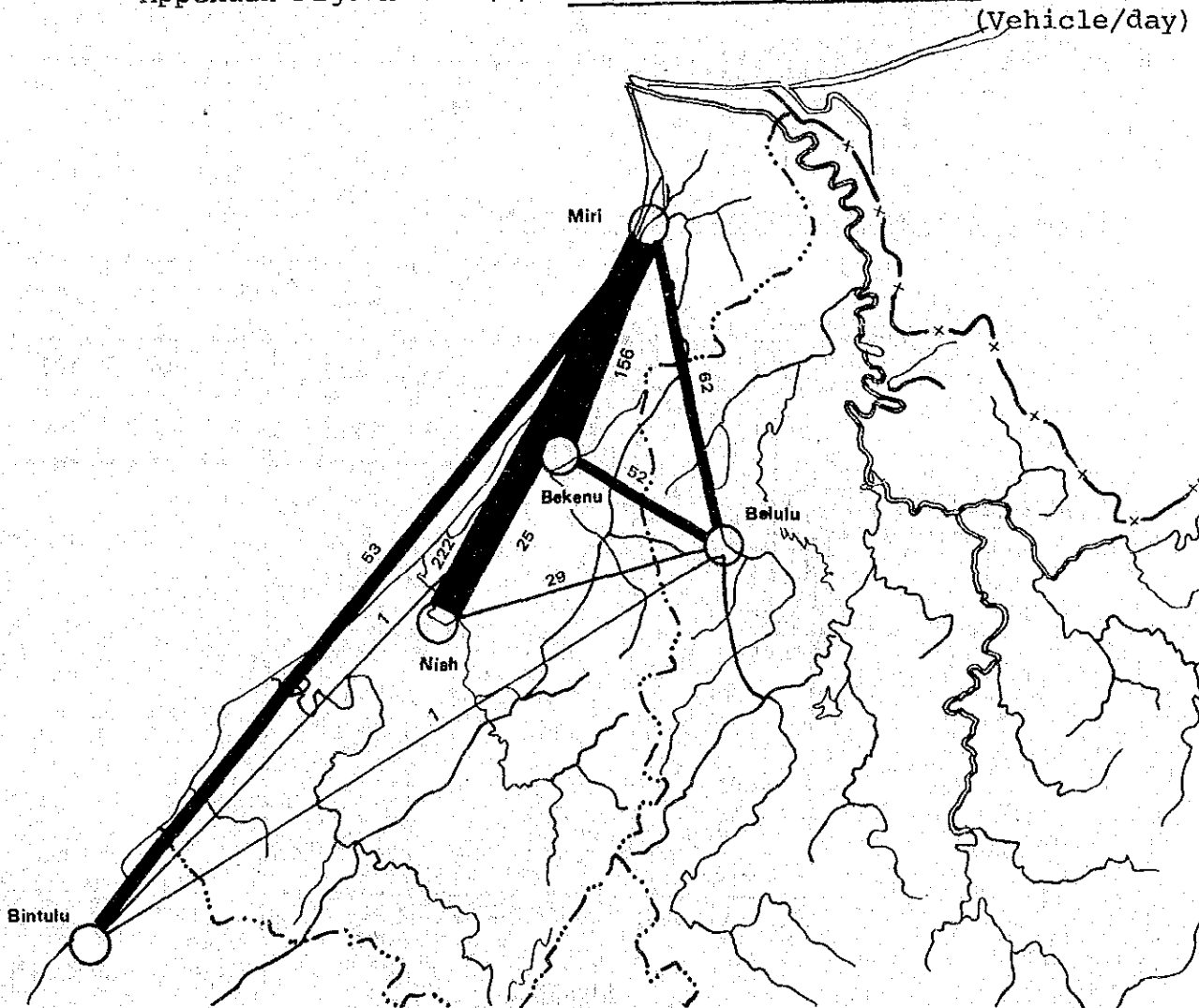
	Car Taxi	Van Pick-up	Truck	Bus	Total
No. of vehicle	80	42	36	24	182
Type of vehicle composition (%)	43.9	23.1	19.8	13.2	100

Appendix Table A-3-5 (2)

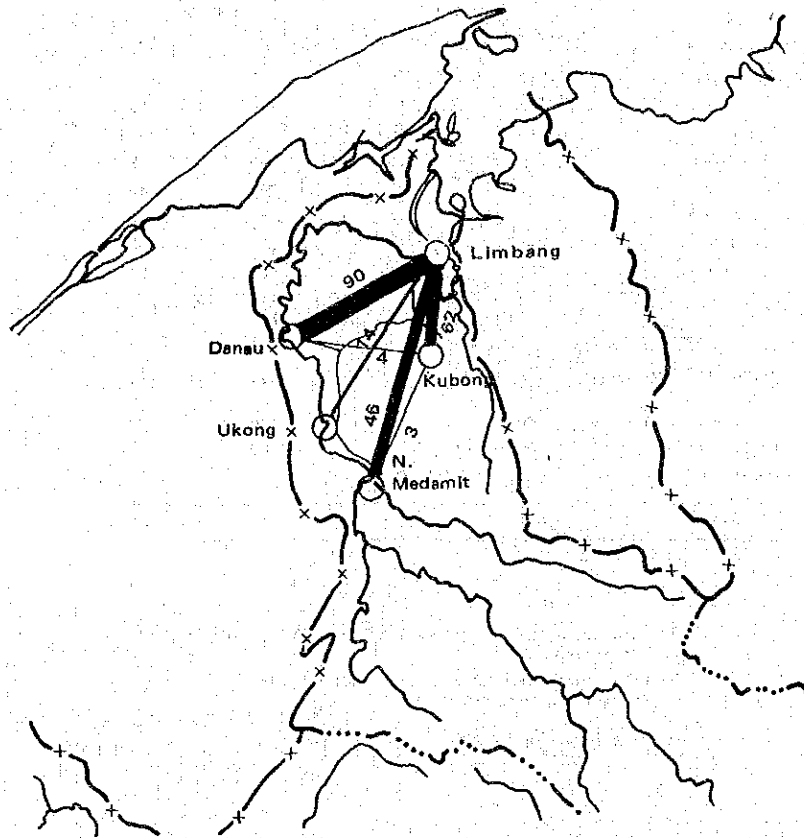
SAMPLE RATE OF ROAD SIDE INTERVIEW SURVEY

Survey post	Date	No. of vehicle	No. of Sample	Sample Rate (%)
1 Miri-Bintulu road (Bekenu junction)	27 July	374	185	49.5
	28 July	368	219	59.5
2 Beluru road (Peninjau junction)	27 July	121	104	86.0
	28 July	115	112	97.4
Miri Total	-	978	620	63.4
3 Limbang-N. Medamit road (Kubong junction)	01 Aug.	182	163	89.6
	02 Aug.	180	165	91.7
Limbang Total	-	362	328	90.6

Appendix Fig. A-3-7 (1) CAR TRAFFIC DESIRED LINE



Appendix Fig. A-3-7 (2) CAR TRAFFIC DESIRED LINE
(vehicle/day)



Appendix Table A-3-5 (3) TRIP PURPOSE COMPOSITION

	Home Work Place	Work	To Home	Social intercourse recreation	Others	Total
Miri	3 (1.0)	185 (59.9)	49 (15.9)	52 (16.8)	20 (6.4)	309 (100)
Limbang	14 (7.2)	143 (73.7)	24 (12.4)	11 (5.7)	2 (1.0)	194 (100)
Total	17 (3.4)	328 (65.2)	73 (14.5)	63 (12.5)	22 (4.4)	503 (100)

Appendix Table A-3-5 (4) AVERAGE NO. OF PASSENGERS

	Car	Taxi	Van Pick-up	Truck	Truck Trailer	Bus ^{1/}
Miri	3.6	3.5	3.1	3.9	2.0	22.6
Limbang	3.9	3.1	3.4	3.2	1.4	13.9

^{1/} Excluding driver and conductor

Appendix Table A-4-1 MAIN IMPORT OF COMMODITY ITEMS/GROUP AT THE PORTS OF MARUDI AND LIMBANG, 1977

Commodity Group/Item	TONS			
	MARUDI		LIMBANG	
	EXTERNAL A)	INTERNAL 1/B)	EXTERNAL A)	INTERNAL B)
Food	262	1,600	345	620
Milled Wheat	132	110	108	60
Sugar	340	400	49	350
Beverages	89	150	69	80
Animal Feed	-	n.a.	267	n.a.
Fertilizer	-	n.a.	15	n.a.
Cement	844	1,100	1,529	200
Iron & Steel	301	400	67	350
Tobacco	3		17	
Crude Materials				
Inedible except fuels	17		1,257	
Animal and Vegetable Oils	4	6,200	64	2,000
Chemicals and Products	30		58	
Other General Cargo	1,600		1,500	
Fuels	-	10,000	-	4,200
TOTAL	3,622	19,960	5,345	7,860

Source: A; Computer Output of external trade by port, Dept. of Statistics

b; Consultants' estimates based on the results of interview survey etc.

1/ Includes Long Lama and Marudi

Appendix Table A-4-2 PER CAPITA CONSUMPTION OF GROUPED IMPORT ITEMS

Commodity Group	Whole State (Sarawak)				Study Area ^{1/} (1977)			
	Average 1971-73	1974	1975	1976	Average 1974-76	Miri	Marudi	Limbang
Food	65.87	72.29	72.77	47.47	64.18	64.23	5.44	14.00
042 Rice	63.49	78.87	33.53	57.12	56.51	0	0	0
08/081 Animal Feed	56.33	59.39	58.81	69.09	62.43	115.82	0	11.03
041 Wheat Flour	13.31	11.02	12.22	14.48	12.57	16.59	2.74	4.46
06 Sugar	22.75	24.35	23.97	25.36	24.56	45.03	7.05	2.02
11 Beverages	7.35	10.51	9.68	9.76	9.98	12.08	1.85	2.85
Cement	86.24	88.76	100.88	112.22	100.62	206.18	17.51	63.18
56/561 Fertilizer	31.69	37.12	31.10	29.15	32.46	126.59	0	0
67 Iron & Steel	37.06	44.11	44.23	53.25	47.20	120.78	6.24	2.77
Mis. Gen. Cargo	157.37	289.55	167.30	n.a.	228.43	591.98	24.90	61.98
Total	541.46	715.97	554.49	n.a.	638.94	1,299.28	65.73	162.29

1/ Imports from outside Sarawak only

Appendix Table A-4-3

TIME DISTANCE OF EACH ZONE PAIR VIA ROAD

												hr.
		2	3	4	5	6	7	8	9	10	11	12
		Bekenu	Niah	Bintulu	Bakong	Tinjar	Lower Baram	Baram Middle	Upper Middle	Tutoh/Apoh	N. Medamit	Limbang
1	Miri	0.95	1.70	3.38	1.14	1.88	-	2.37	-	3.44	4.55	5.19
		2	1.25	2.93	0.69	1.43	-	1.92	-	2.99	4.10	4.74
			3	2.00	1.10	1.84	-	2.33	-	3.40	4.51	5.15
				4	2.78	3.52	-	4.01	-	5.08	6.19	6.83
					5	0.74	-	1.23	-	2.30	3.41	4.05
						6	-	0.49	-	1.56	2.67	3.31
							7	-	-	-	-	-
								8	-	1.07	2.18	2.82
									9	-	-	-
										10	1.11	1.75
											11	0.64

Appendix Table A-4-4

DISTANCE OF EACH ZONE PAIR VIA ROAD

													km.
		2	3	3	5	6	7	8	9	10	11	12	13
		Bekenu	Niah	Bintulu	Bakong	Tinjar	Lower Baram	Baram Middle	Upper Middle	Tutoh/Apoh	N. Medamit	Limbang	Brunei
1	Miri	58	102	202	69	107	-	132	-	187	244	285	153
		2	76	176	43	81	-	106	-	161	218	259	211
			3	120	67	105	-	130	-	185	242	283	255
				4	167	205	-	230	-	285	342	283	355
					5	38	-	63	-	118	175	216	222
						6	-	25	-	80	137	178	-
							7	-	-	-	-	-	-
								8	-	55	112	153	-
									9	-	-	-	-
										10	57	98	-
											11	41	-
												12	-

Appendix Table A-4-5 ESTIMATE OF VEHICLE OPERATING COSTS

- Appendix Table A-4-5 (1) OPERATING CHARACTERISTICS OF VEHICLES
- Appendix Table A-4-5 (2) VEHICLE OPERATING COST (WITH TAXES)
- Appendix Table A-4-5 (3) VEHICLE OPERATING COST (WITHOUT TAXES)
- Appendix Table A-4-5 (4) PRICE OF REPRESENTATIVE VEHICLE, 1978
- Appendix Table A-4-5 (5) PRICE OF BODY, 1978
- Appendix Table A-4-5 (6) FUEL CONSUMPTION
- Appendix Table A-4-5 (7) PRICE OF FUEL, 1978
- Appendix Table A-4-5 (8) OIL CONSUMPTION
- Appendix Table A-4-5 (9) PRICE OF OIL, 1978
- Appendix Table A-4-5 (10) TYRE WEAR (LIFE KILOMETRAGE)
- Appendix Table A-4-5 (11) PRICE OF A SET OF TYRES, 1978
- Appendix Table A-4-5 (12) MAINTENANCE: PARTS
- Appendix Table A-4-5 (13) MAINTENANCE: LABOUR
- Appendix Table A-4-5 (14) AVERAGE MONTHLY WAGES OF DRIVERS AND ASSISTANTS
- Appendix Table A-4-5 (15) INSURANCE
- Appendix Table A-4-5 (16) ROAD TAXES/FEES
- Appendix Table A-4-5 (17) VEHICLE OPERATING COST

Appendix Table A-4-5 (1)
OPERATING CHARACTERISTICS OF VEHICLES

	Car			Van/Pick-up			Bus		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Life Years	3	4	5	4	5	6	5	6.5	8
Life Kilometrage (000)	28.8	64	96	57.6	96	144	240	416	640
Km/Year (000)	9.6	12.8	16	14.4	19.2	24	48	64	80
Operating Days/Year	-	-	-	-	-	-	300	320	340
Average Km/Day	-	-	-	-	-	-	160	200	260
Average Running Speed Km/Hour	40	56	80	40	55	70	30	37	48

	Medium Truck (6 Ton)			Heavy Truck I (10 Ton Truck)			Heavy Truck II (20 Ton Truck Trailer)		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Life Years	5	6	7	5	6	7	5	6.5	8
Life Kilometrage (000)	240	384	560	200	320	490	280	520	896
Km/Year (000)	48	64	80	40	53.3	70	56	80	112
Operating Days/Year	260	280	300	260	280	300	280	300	320
Average Km/Day	185	230	270	155	190	235	200	270	350
Average Running Speed Km/Hour	35	43	55	25	32	45	32	40	52

Appendix Table A-4-5 (2) VEHICLE OPERATING COST (WITH TAXES)

Cost Item	CAR			VAN/PICK-UP			BUS		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.5047	0.2271	0.1514	0.4405	0.2643	0.1762	0.3304	0.1906	0.1239
Fuel Consumption	0.0752	0.0627	0.0502	0.1568	0.1254	0.0941	0.1018	0.0853	0.0688
Oil Consumption	0.0038	0.0031	0.0026	0.0045	0.0038	0.0033	0.0055	0.0046	0.0041
Tyre Wear	0.0262	0.0157	0.0079	0.0568	0.0316	0.0149	0.0644	0.0337	0.0177
Maintenance; Parts ; Labour	0.0262 0.0045	0.0189 0.0033	0.0160 0.0026	0.0660 0.0063	0.0431 0.0040	0.0304 0.0030	0.4758 0.0226	0.2775 0.0130	0.1586 0.0080
Wages	-	-	-	-	-	-	0.2500	0.1875	0.1500
Insurance	0.0371	0.0278	0.0222	0.0571	0.0428	0.0343	0.0229	0.0172	0.0138
License/Fees	0.0155	0.0116	0.0093	0.0235	0.0177	0.0141	0.0094	0.0070	0.0056
Overhead	0.0693	0.0370	0.0262	0.0812	0.0533	0.0370	0.1283	0.0816	0.0551
Total	0.7625	0.4072	0.2884	0.8927	0.5860	0.4073	1.4111	0.8980	0.6056

Cost Item	Medium Truck (6 Ton)			Heavy Truck I (10 Ton)			Heavy Truck II (20 Ton T. Trailer)		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.2253	0.1408	0.0966	0.3818	0.2386	0.1558	0.6130	0.3301	0.1916
Fuel Consumption	0.1018	0.0853	0.0688	0.1458	0.1100	0.0825	0.2200	0.1650	0.1238
Oil Consumption	0.0055	0.0046	0.0041	0.0117	0.0097	0.0085	0.0166	0.0138	0.0120
Tyre Wear	0.1745	0.0914	0.0480	0.3875	0.2022	0.1033	0.6975	0.3639	0.1860
Maintenance; Parts ; Labour	0.1893 0.0226	0.1352 0.0130	0.1082 0.0080	0.3436 0.0250	0.2367 0.0150	0.1909 0.0100	0.5149 0.0361	0.3261 0.0208	0.2574 0.0128
Wages	0.2000	0.1500	0.1200	0.3300	0.2477	0.1886	0.3429	0.2400	0.1714
Insurance	0.0258	0.0193	0.0155	0.0446	0.0334	0.0255	0.0707	0.0495	0.0354
License/Fees	0.0098	0.0073	0.0059	0.0155	0.0116	0.0089	0.0188	0.0131	0.0094
Overhead	0.0955	0.0647	0.0475	0.1686	0.1105	0.0774	0.2531	0.1522	0.1000
Total	1.0501	0.7116	0.5226	1.8541	1.2154	0.8514	2.7836	1.6745	1.0998

Appendix Table A-4-5 (3) VEHICLE OPERATING COST (WITHOUT TAXES)

Cost Item	CAR			VAN/PICK-UP			BUS		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.4167	0.1875	0.1250	0.3734	0.2241	0.1494	0.2703	0.1560	0.1014
Fuel Consumption	0.0407	0.0339	0.0271	0.0848	0.0678	0.0509	0.1018	0.0853	0.0688
Oil Consumption	0.0034	0.0028	0.0024	0.0041	0.0034	0.0030	0.0050	0.0042	0.0037
Tyre Wear	0.0231	0.0139	0.0069	0.0500	0.0278	0.0132	0.0566	0.0297	0.0156
Maintenance; Parts ; Labour	0.0216 0.0041	0.0156 0.0030	0.0132 0.0023	0.0559 0.0057	0.0366 0.0036	0.0258 0.0027	0.3893 0.0203	0.2271 0.0117	0.1298 0.0072
Wages	-	-	-	-	-	-	0.2250	0.1688	0.1350
Insurance	0.0297	0.0222	0.0178	0.0457	0.0343	0.0274	0.0183	0.0138	0.0110
Overhead	0.0539	0.0279	0.0195	0.0620	0.0398	0.0272	0.1087	0.0697	0.0473
Total	0.5932	0.3068	0.2142	0.6816	0.4374	0.2996	1.1953	0.7663	0.5198

Cost Item	MEDIUM TRUCK (6 Ton)			HEAVY TRUCK I (10 Ton)			HEAVY TRUCK II (20 Ton T. Trailer)		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.1735	0.1084	0.0744	0.2855	0.1785	0.1165	0.4880	0.2628	0.1525
Fuel Consumption	0.1018	0.0853	0.0688	0.1458	0.1100	0.0825	0.2200	0.1650	0.1238
Oil Consumption	0.0050	0.0042	0.0037	0.0106	0.0088	0.0077	0.0151	0.0125	0.0109
Tyre Wear	0.1536	0.0805	0.0423	0.3410	0.1779	0.0909	0.6138	0.3203	0.1637
Maintenance; Parts ; Labour	0.1457 0.0203	0.1041 0.0117	0.0833 0.0072	0.2570 0.0225	0.1770 0.0135	0.1428 0.0090	0.4099 0.0325	0.2596 0.0187	0.2050 0.0115
Wages	0.1800	0.1350	0.1080	0.2970	0.2229	0.1697	0.3086	0.2160	0.1543
Insurance	0.0206	0.0155	0.0124	0.0356	0.0267	0.0204	0.0566	0.0396	0.0283
Overhead	0.0801	0.0545	0.0400	0.1395	0.0915	0.0640	0.2145	0.1295	0.0850
Total	0.8806	0.5992	0.4401	1.5345	1.0068	0.7035	2.3590	1.4240	0.9350

Appendix Table A-4-5 (4)
PRICE OF REPRESENTATIVE VEHICLE, ^{1/}

Vehicle Type	Average Market Price	Duty, Surtax Sales Tax	Price Without Taxes
1. Car (Toyota Corolla)	14,770	2,560	12,210
2. Van/Pick-up (Toyota Land Cruiser)	25,940	3,930	22,010
3. Medium Truck ^{2/} (Toyota 6 Ton)	45,000	11,020	33,980
4. Heavy Truck I (Isuzu 10 Ton)	81,000	19,800	61,200
5. Heavy Truck II (Nissan 20 Ton)	180,000	36,000	144,000
6. Bus ^{2/} (Bedford)	50,000	10,000	40,000

^{1/} Including tyres

^{2/} Excluding body

Appendix Table A-4-5 (5) PRICE OF BODY, 1978

Vehicle Type	Market Price	Tax	Price Without Tax
Medium Truck	11,000	1,650	9,350
Bus	30,000	4,500	25,500

Source: Interviews with dealers

Appendix Table A-4-5 (6) FUEL CONSUMPTION

Vehicle Type	Liter/1,000km		
	Earth	Road Type Gravel	Paved
Car	120	100	80
Van/Pick-up	250	200	150
Medium Truck	370	310	250
Heavy Truck I	530	400	300
Heavy Truck II	800	600	450
Bus	370	310	250

Source: Quantification of Road User Savings, IBRD

Appendix Table A-4-5 (7) PRICE OF FUEL, 1978 ^{1/}

Fuel Type	Price, M\$/Gallon (M\$/Liter)	
	With Tax	Without Tax
Gasoline ; Super	3.45 (0.759)	2.08 (0.458)
; Regular	2.85 (0.627)	1.54 (0.339)
Diesel	1.25 (0.275)	1.25 (0.275)

Source: Interviews with dealers

^{1/} Average in Miri and Limbang areas

Appendix Table A-4-5 (8) OIL CONSUMPTION

Vehicle Type	Road Type		
	Earth	Gravel	Paved
Car	1.6	1.3	1.1
Van/Pick-up	1.9	1.6	1.4
Medium Truck	3.1	2.6	2.3
Heavy Truck I	6.6	5.5	4.8
Heavy Truck II	9.4	7.8	6.8
Bus	3.1	2.6	2.3

Appendix Table A-4-5 (9) PRICE OF OIL, 1978

Oil Type	Price, M\$/Gallon (M\$/Liter)	
	With Tax	Without Tax
For Gasoline Engine	10.75 (2.365)	9.75 (2.145)
For Diesel Engine	8.05 (1.771)	7.30 (1.606)

Appendix Table A-4-5 (10) TYRE WEAR (LIFE KILOMETRAGE)

Vehicle Type	Road Type		
	Earth	Gravel	Paved
Car	9	15	30
Van/Pick-up	10	18	38
Medium Truck	11	21	40
Heavy Truck I	12	23	45
Heavy Truck II	12	23	45
Bus	11	21	40

Appendix Table A-4-5 (11) PRICE OF A SET OF TYRES, 1978

Vehicle Type	Tyre Type	No. of Tyres	Price (M\$)	
			With Tax	Without Tax
Car	615 x 13	4	236	208
Van/Pick-up	750 x 16	4	568	500
Medium Truck	825 x 20	6	1,920	1,690
Heavy Truck I	1,000 x 20	10	4,650	4,092
Heavy Truck II	1,000 x 20	18	8,370	7,366
Bus	670 x 13	6	708	623

Appendix Table A-4-5 (12) MAINTENANCE: PARTS

Vehicle Type	% of Depreciable Value per 1,000km		
	Earth	Gravel	Paved
Car	0.18	0.13	0.11
Van/Pick-up	0.26	0.17	0.12
Medium Truck	0.35	0.25	0.20
Heavy Truck I	0.45	0.31	0.25
Heavy Truck II	0.30	0.19	0.15
Bus	0.60	0.35	0.20

Appendix Table A-4-5 (13) MAINTENANCE: LABOUR ^{1/}

Vehicle Type	Hours per 1,000km		
	Earth	Gravel	Paved
Car	1.13	0.83	0.66
Van/Pick-up	1.58	1.00	0.76
Medium Truck	5.64	3.24	2.00
Heavy Truck I	6.25	3.75	2.50
Heavy Truck II	9.03	5.19	3.20
Bus	5.64	3.24	2.00

^{1/} Hourly Cost of Labour:

$$\frac{\$600/\text{Month}}{150\text{hrs}/\text{Month}} = \$4.0/\text{hr.}$$

Appendix Table A-4-5 (14)

AVERAGE MONTHLY WAGES OF DRIVERS AND ASSISTANTS ^{1/}

<u>Vehicle Type</u>	<u>M\$/Month</u>	
	<u>Driver</u>	<u>Assistant</u>
Medium Truck	500	300
Heavy Truck I	800	300
Heavy Truck II	1,000	300 x 2
Bus	700	300

^{1/} Including trip allowances and other fringe benefits.

Appendix Table A-4-5 (15) INSURANCE

<u>Vehicle Type</u>	<u>M\$/Year</u>	
	<u>With Tax</u>	<u>Without Tax</u>
Car	355.9	284.7
Van/Pick-up	822.6	658.1
Medium Truck	1,236.0	988.8
Heavy Truck I	1,782.0	1,425.6
Heavy Truck II	3,960.0	3,168.0
Bus	1,100.0	880.0

Appendix Table A-4-5 (16) ROAD TAXES/FEEES

<u>Vehicle Type</u>	<u>Amount (M\$/Year)</u>
Car	149.0
Van/Pick-up	339.0
Medium Truck	470.0
Heavy Truck I	620.0
Heavy Truck II	1,050.0
Bus	450.0

Appendix Table A-4-5 (17) VEHICLE OPERATING COST
(M\$/veh.km.)

Vehicle Type	(Taxes)	Level tangent				Gradient (1/2) 0 ~ 3% (1/2) 0 ~ 5%		
		Earth	Gravel	(1/2)Gravel (1/2)Paved	Paved	Gravel	(1/2)Paved	Paved
Car	(WITH)	0.7625	0.4072	0.3478	0.2884	0.4276	0.3652	0.3028
	(WITHOUT)	0.5932	0.3068	0.2605	0.2142	0.3221	0.2735	0.2249
Truck 6ton	(WITH)	1.0501	0.7116	0.6171	0.5226	0.9002	0.7806	0.6611
	(WITHOUT)	0.8806	0.5992	0.5197	0.4401	0.7580	0.6574	0.5567
10ton	(WITH)	1.8541	1.2154	1.0334	0.8514	1.5375	1.3073	1.0770
	(WITHOUT)	1.5345	1.0068	0.8552	0.7035	1.2736	1.0818	0.8899
20ton	(WITH)	2.7836	1.6745	1.3872	1.0998	2.1182	1.7548	1.3912
	(WITHOUT)	2.3590	1.4240	1.1795	0.9350	1.8014	1.4921	1.1828
BUS	(WITH)	1.4111	0.8980	0.7518	0.6056	1.1360	0.9510	0.7661
	(WITHOUT)	1.1953	0.7663	0.6431	0.5198	0.9694	0.8135	0.6575

Appendix Table A-4-6 ESTIMATE OF VESSEL OPERATING COSTS

- Appendix Table A-4-6 (1) OPERATING CHARACTERISTICS OF LIGHT VESSELS
- Appendix Table A-4-6 (2) OPERATING COST OF TUG BOAT
- Appendix Table A-4-6 (3) OPERATING COST OF TUG (120 HP) and MOTOR VESSEL (40 TON)
- Appendix Table A-4-6 (4) OPERATING COST OF MOTOR VESSELS
- Appendix Table A-4-6 (5) OPERATING COST OF BARGE
- Appendix Table A-4-6 (6) OPERATING CHARACTERISTICS OF PASSENGER EXPRESS LAUNCH
- Appendix Table A-4-6 (7) OPERATING COST OF PASSENGER EXPRESS LAUNCH
- Appendix Table A-4-6 (8) OPERATING CHARACTERISTICS OF LONG BOATS
- Appendix Table A-4-6 (9) PRICE OF HULL
- Appendix Table A-4-6 (10) PRICE OF OUTBOARD ENGINE
- Appendix Table A-4-6 (11) OPERATING COST OF LONG BOAT WITH OUTBOARD ENGINE
- Appendix Table A-4-6 (12) COST OF LOG RAFTING

Appendix Table A-4-6 (1) OPERATING CHARACTERISTICS OF LIGHT VESSELS

	Tug Boat		Barge (Tons)		Motor Vessel (Tons)					
	120HP	150HP	500HP	800HP	150	300	500	40	150	200
Loading Capacity	-	-	-	-	150	300	500	40	150	200
Ave. Operat. Speed (KPH)	8.0	8.0	9.0	9.0	8.0	8.0	8.0	11	12.5	13.5
Operating Hours/Day	10	10	10	10	14	14	14	10	24	24
Ave. Line Haul/Day (Km)	80	80	90	90	112	112	112	110	300	324
Operat. Days/Year	240	240	240	240	230	210	180	200	200	180
Operat. Km./Year	19,200	19,200	21,600	21,600	25,760	23,520	20,160	22,000	60,000	58,320
Life Years	15	15	20	20	20	22	25	15	22	25

Source: Interviews with Shipping Companies

Appendix Table A-4-6 (2) OPERATING COST OF TUG BOAT

(M\$/day)

	150HP		500HP		800HP	
	with	without	with	without	with	without
1. Depreciation						
	625,000	500,000	1,062,500	850,000	1,375,000	1,100,000
15 years 240 day/year						
Cost	173.61	138.89	221.35	177.08	286.46	229.17
2. Fuel 4 gallon/hr.= 0.8 gallon/mile(80km/day) 1.2 gallon/mile(90km/day) 1.5 gallon/mile(90km/day) \$1.61 gallon, \$1.57/gallon						
Cost	64.40	62.80	108.68	105.98	135.84	132.47
3. Lubrication						
0.02 gallon/mile(80km/day) 0.02 gallon/mile(90km/day) 0.025 gallon/mile(90km/day) \$11.30/gallon \$11.0/gallon						
Cost	5.65	5.50	12.71	12.37	15.89	15.47
4. Maintenance						
Engine 15,000/year Hull 12,750			\$30,000	\$25,500	\$40,000	\$34,000
Cost	62.50	53.12	125.00	106.25	166.67	141.67
5. Crew						
Captain 1 7,000 Engineer - Hands 2 3,500 } 14,000			1 7,000 1 6,000 2 3,500 } 20,000		1 7,000 1 6,000 2 3,500 } 20,000	
Cost	58.33	55.42	83.33	79.17	83.33	79.17
6. Stores 1,500/year			2,200/year		2,400/year	
Cost	6.25	5.94	9.17	8.71	10.00	9.50
7. Insurance 1% on value/days						
Cost	24.04	19.23	44.27	35.41	57.29	45.83
Sub-Total	394.78	340.90	604.51	524.97	755.48	653.28
8. Overhead	39.48	34.09	60.45	52.50	75.55	65.33
Total/Day	434.26	374.99	664.96	577.47	831.03	718.61

Appendix Table A-4-6 (3)
OPERATING COST OF TUG (120HP) AND MOTOR VESSEL (40 TON)

		120HP TUG		40 TON Motor Vessel	
		(with)	(without)	(with)	(without)
(M\$/day)					
1. Depreciation					
	Engine	55,000	38,000	60,000	45,000
	Hull	20,000	17,000	25,000	21,250
	Engine	22.92	15.83	30.00	22.50
	Hull	5.56	4.72	8.33	7.08
	Total	28.48	20.55	38.33	29.58
2. Fuel					
		4 gallon/1hr = 0.8 gallon/mile \$1.61/gallon \$1.57/gallon		0.7 gallon/mile = 48 gallon/day	
	Cost	64.40	62.80	77.28	75.36
3. Lubrication					
		every 250 mile, 10 gallons 0.04 gallons/mile 2 gallons/day \$11.30/gallon \$11.00/gallon			
	Cost	11.30	11.00	13.56	13.20
4. Maintenance					
	Hull	1,000/year		Hull	4,000/year
	Engine	2,000/year		Engine	7,000/year
		3,000	2,550	11,000	9,350
	Cost	12.50	10.63	55.00	46.75
5. Crew					
	Captain	1 x 5,000/year			
	Crew	3 x 3,500/year			
	Total	15,500/year		15,500/year	
	Cost	64.58	61.35	77.50	73.63
6. Insurance					
		1% on value/days			
		3.13	2.29	4.25	3.31
Sub-total		184.39	168.62	265.92	241.83
7. Overhead					
		10% of sub-total			
		18.44	16.86	26.59	24.18
Total/Day		202.83	185.48	292.51	266.01

Appendix Table A-4-6 (4) OPERATING COST OF MOTOR VESSELS

	(M\$/day)			
	200 Ton		150 Ton	
	with	without	with	without
	2,500,000	2,000,000	1,900,000	1,520,000
1. Depreciation	24hrs/day 8 mile/hr. = 12km/hr 180 day/year 25 year life	288km/day	200 day/year 22 years	
Cost	555.56	444.44	431.82	345.45
2. Fuel	18 gallon/hr 1.61/gallon	1.5 gallon/km \$1.57/gallon	15 gallon/hr	
Cost	695.52	678.24	579.60	565.20
3. Lubrication	1/5 gallons/hr \$11.30	\$11.0	1/6 \$11.30	
Cost	54.24	52.80	45.20	44.00
4. Maintenance	70,000		50,000	
Cost	388.89	311.11	250.00	200.00
5. Crew	Captain 8,000 Mate 7,000 Engineer 6,000 Hands 4 x 3,000	33,000	8,000 7,000 6,000 9,000	30,000
Cost	183.33	164.70	150.00	135.00
6. Stores	\$4,000/year		\$3,000/year	
Cost	22.22	21.11	15.00	14.25
7. Insurance	1% on value/days			
Cost	138.89	111.11	95.00	76.00
Sub-Total	2,038.65	1,783.51	1,566.62	1,379.90
8. Overhead	203.87	178.35	156.66	137.99
Total/Day	2,242.52	1,951.86	1,723.28	1,517.89

Appendix Table A-4-6 (5) OPERATING COST OF BARGE

		(M\$/day)					
		150 TON		300 TON		500 TON	
		with	without	with	without	with	without
1. Depreciation	Price New						
		253,000	190,000	416,000	312,000	613,000	460,000
	Cost	55.0	41.30	90.04	67.53	136.22	102.22
2. Maintenance	7,000\$/year			12,000\$/year		17,000\$/year	
	Cost	30.43	24.35	57.14	45.71	94.44	75.56
3. Stores (Docking)		12.00	11.40	18.00	17.10	28.00	26.60
4. Crew Wages							
	Captain 8,000/y x 1	} 22,000	}	15,000	} 29,000	15,000	43,000
	Mates 7,000/y x 1						
	Hands 3,500/y x 2						
	Cost	95.65	86.09	138.10	124.29	238.89	215.00
5. Insurance	1% on value/days						
	Cost	11.00	8.80	19.81	15.85	32.26	25.81
Sub-Total		204.08	171.94	323.09	270.48	529.81	445.19
Overhead 10%		20.41	17.19	32.31	27.05	52.98	44.52
Total/Day		224.49	189.13	355.40	297.53	582.79	489.71

Appendix Table A-4-6 (6)

OPERATING CHARACTERISTICS OF PASSENGER EXPRESS LAUNCH

	Distance; 65 miles K. Baram/Marudi	68 miles Marudi/L. Lama
Size of Hull	73' x 13.5'	n.a.
Loading Capacity (No. of Pass.)	120	70
Max. Cruising Speed (KPH)	38	30
Ave. Cruising Speed (KPH)	30	22
Operating Hours/Day	3.5	5.0
Operating Days/Year	350	240
Annual Kilometrage	36,750	26,400
Life Years	20	16
Life Kilometrage	735,000	422,400
Life Years of Engine	10	6

Appendix Table A-4-6 (7)

OPERATING COST OF PASSENGER EXPRESS LAUNCH

	Kuala Baram - Marudi		Marudi - Long Lama	
	300,000	219,000	180,000	137,250
Engine	80,000 x 2	50,000 x 2 (37.5%)	Engine	70,000 x 1 43.750
Body	140,000	119,000 (15.0%)	Body	110,000 93.500
Dipreciation ¹⁾				
Engine	45.7	28.6	Engine	48.6 30.4
Hull	20.0	17.0	Hull	28.6 24.3
Total	65.7	45.6	Total	77.2 54.7
1) Price/Life years/Days per year				
Fuel				
Consumption	180 gallon/trip(51.4/hr)		120 gallon/trip(24.0/hr)	
Price of fuel	\$1.61/gallon, \$1.57/gallon			
Cost	289.8	261.0	193.2	174.0
Lubrication				
Consumption	1.5 gallon/trip		1.0 gallon/trip	
Price of L/O	\$11.30/gallon, \$11.0			
Cost	17.0	16.5	11.3	11.0
Maintenance				
Engine	\$10,000/year		\$6,000/year	
Hull	\$2,000/year		\$1,300/year	
Overhaul	\$5,000/year		\$3,000/year	
	\$25,000/year		\$20,000/year	
Cost	73.5	62.5	83.3	70.8
Crew				
Captain	\$7,200/year		\$7,200	
Crew(3)	\$4,200/year x 3 = 12,600/year		x 2 = \$8,400	
Total	\$19,800		\$15,600	
Cost	$19,800 \times \frac{350}{23 \text{ days/month} \times 12} \times \frac{1}{350} =$		$15,600 \times \frac{1}{240}$	
	71.7	68.1	65.0	61.8
Insurance 1% on value/days				
Cost	8.6	6.3	7.5	5.2
Sub-Total	526.3	460.0	437.5	378.0
Overhead 10% of Sub-total				
Cost	52.6	46.0	43.8	37.8
Total/Day	578.9	506.0	481.3	415.8

Appendix Table A-4-6 (8)

OPERATING CHARACTERISTICS OF LONG BOATS

	Long Boat		
	67' x 4'	45' x 2.5'	20' x 2'/16' x 1.75'/ 14' x 1.5'
Loading Capacity (No. of Passengers)	15-18	6-8	2-3
Life Years	5	4	4
Ave. Operating Speed	11.6	11.6	-
Ave. Life Kilometrage	30,000	24,000	-
Engine Type	40HP x 1	25HP x 1	-
Life Years of Engine	30 (18,000)	2.5 (15,000)	-

Appendix Table A-4-6 (9)

PRICE OF HULL

Boat Type	Price (M\$)	
	With Tax	Without Tax
67' x 4'	3,000	2,760
45' x 2.5'	1,800	1,656
16' x 1.75'	400	400

Appendix A-4-6 (10)

PRICE OF OUTBOARD ENGINE

Engine Type	Price (M\$)	
	With Tax	Without Tax
40 HP	2,500 (25%)	1,875
25 HP	1,450 (25%)	1,088

Appendix Table A-4-6 (11)

OPERATING COST OF LONG BOAT WITH OUTBOARD ENGINE

	67' x 4'		45' x 2.5'	
	Financial	Economic	Financial	Economic
Depreciation	Price New x 1/Life kilometrage			
Hull	0.1000	0.0920	0.0750	0.0690
Engine	0.1389	0.1042	0.0967	0.0725
Total	0.2389	0.1962	0.1717	0.1415
Fuel	4.5 gallons/hr./11.6		2.5 gallons/hr./11.6	
Mixed benzine	\$4.1 gallons(L/Lama) \$6.0 gallons(L/Akah) \$4.1 gallon		10% tax \$3.69	
Cost	1.5905	1.4315	0.8836	0.7953
Lubrication	5% of fuel consumption			
Cost	0.0923	0.0830	0.0574	0.0517
Maintenance	3% of depreciable value/1000km			
Hull	0.0900	0.0828	0.0540	0.0497
Engine	0.0750	0.0497	0.0435	0.0326
Total	0.1650	0.1325	0.0975	0.0823
Total/Km.	2.0867	1.8432	1.2102	1.0708

Appendix Table A-4-6 (12) COST OF LOG RAFTING

- 1 Racket 100 logs
- 2 Rackets 200 logs
- (1) Labour 6.5men x 8hrs/2rackets
M\$4.0/hr
6.5 x 8.0 x 4.0 = \$208/200 logs --- \$1.04/log
- (2) Ropes; 8ft/10g x M\$0.35/ft = M\$2.8/log
\$250(1 roll) = 720ft --- \$0.35/ft
M\$2.8 x 1/2 times use = M\$1.4/log
- (3) Cable; 400ft/2rackets
400ft x M\$5.50/ft = M\$2,200/8 time life = M\$275/200 logs

Tons	(350)	(700)	(1,400)	(2,800)	(3,500)
No.logs(Rackets)	100 (1)	200 (2)	400 (4)	800 (8)	1,000 (10)
Labour	104	208	416	832	1,040
Ropes	140	280	560	1,120	1,400
Cable	138	275	413	689	827
Total	382	763	1,389	2,641	3,267
Inc. Overhead (20%)	458	916	1,667	3,169	3,920
Per log	4.58	4.58	4.17	3.96	3.92

1 H/T = 1.803m³

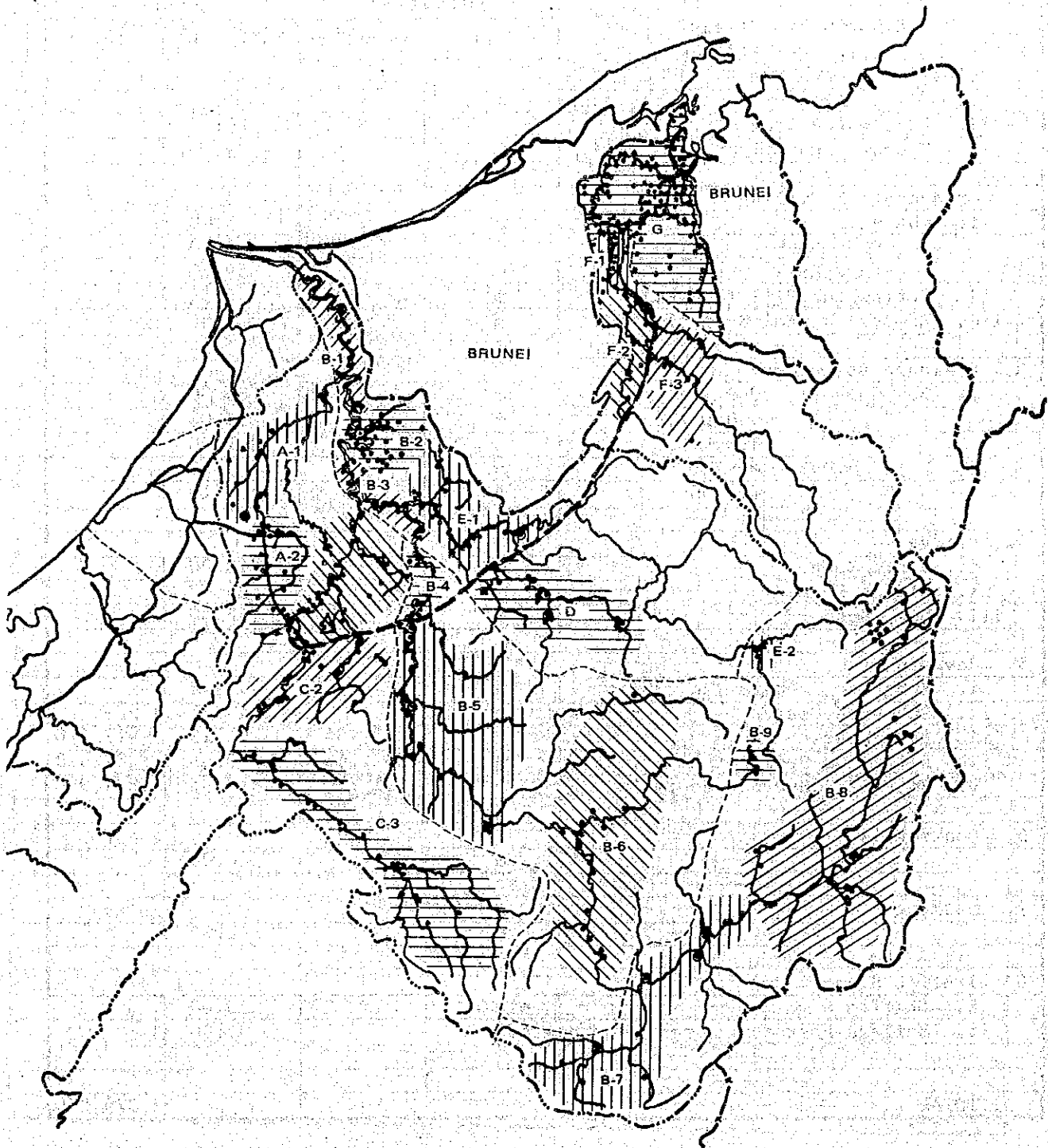
Appendix Table A-4-7 POPULATION BY MAJOR RIVER BASIN

Area Code	Traffic Zone No.	1977	River Basin
A-1	5	2,900	
A-2	5	2,500	Sg. Bakong
Beluru	5	380	
C-1	6	4,100	
C-2	6	4,200	Sg. Tinjar
C-3	6	1,920	
B-1	7	1,000	
B-2	7	3,200	
B-3	7	1,700	
Marudi	7	5,000	
B-4	8	1,800	Bg. Baram
B-5	8	3,200	
B-6	9	2,600	
B-7	9	3,300	
B-8	9	2,400	
B-9	9	300	
Long Lama	8	1,500	
D	10	3,600	Sg. Apoh
E-1	10	2,500	
E-2	10	100	Sg. Tutoh
F-1	11	3,100	
F-2	11	2,300	Sg. Limbang
F-3	11	800	
G	12	18,000	Sg. Limbang

Appendix Table A-4-8
ESTIMATED FUTURE POPULATION BY TRAFFIC ZONE

Traffic Zone Code	Name	1977	1982	1987	1992	2002
1	Miri	50,700	63,300	78,600	95,300	137,500
2	Bekenu	12,900	14,600	16,400	18,100	21,600
5	Sg. Bakong	5,780	6,750	7,800	8,800	11,100
	Beluru	380	480	580	710	1,000
	Others	5,400	6,270	7,210	8,090	10,100
6	Sg. Tinjar	10,220	11,750	13,500	15,300	19,200
7	Lower Bg. Baram	10,900	12,200	13,600	15,000	17,600
	Marudi	5,000	5,500	5,900	6,400	7,100
	Others	5,900	6,700	7,700	8,600	10,500
8	Bg. Baram Middle	6,500	7,400	8,400	9,300	11,400
	Long Lama	1,500	1,800	2,100	2,500	3,100
	Others	5,000	5,600	6,300	6,800	8,300
9	Upper Bg. Baram	8,600	9,000	9,400	9,800	10,400
10	Sg. Tutoh/Apoh	6,200	7,100	8,000	8,900	11,000
11	N. Medamit	6,200	6,700	7,200	7,600	8,300
12	Limbang	18,000	20,400	23,000	25,500	30,800
	TOTAL	136,000	159,200	185,900	213,600	278,900
3	B. Niah	14,200	16,100	18,100	20,000	23,900
4	Bintulu	18,200	24,200	32,300	43,000	76,300

Appendix Fig. A-4-1 POPULATION DISTRIBUTION BY
MAJAR RIVER BASIN



Appendix Table A-8-1 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section 1. (Miri-Bintulu Rd ~ Beluru)			
Design Length	18.0 km			
Unit: M\$				
Construction Items	Quantities		Cost	
	Unit	Quantity	Unit Cost	Total
1. Clearing & Grubbing				
i. Forest Area	m ²	-	4.84	-
ii. Cultivated Area	m ²	-	0.75	-
iii. Rubber Plantation	m ²	-	3.30	-
2. Excavation & Filling				
i. Cut Soil	m ³	-	5.00	-
Soft Rock	m ³	-	7.50	-
Hard Rock	m ³	-	59.50	-
ii. Borrow for Fill (1.0 km)	m ³	-	7.59	-
iii. Removal of Top Soil (1.0 km)	m ³	-	2.86	-
3. Drainage Structure				
i. Box Culvert 2.0 x 2.0	m	-	185.00	-
" 3.0 x 2.0	m	-	235.00	-
" 3.0 x 3.0	m	-	317.00	-
ii. Pipe Culvert ϕ 900	m	-	109.90	-
" ϕ 1,500	m	-	200.15	-
4. Bridge				
i. Short Span	m ²	-	1,940.00	-
ii. Middle Span	m ²	-	2,195.00	-
iii. Long Span	m ²	-	2,262.00	-
5. Pavement				
i. Subgrade Preparation	m ²	-	0.41	-
ii. Sub-base Course	m ²	-	44.31	-
iii. Base Course	m ³	19,764	46.43	917,650
iv. Bituminus Primcoat	m ²	131,760	0.66	87,000
v. Bituminus Surface Course	m ²	131,760	13.85	1,824,900
6. Guard Rail				
	m	-	66.00	-
7. Marking				
	m	-	1.20	-
8. Traffic Sign				
i. Traffic Sign	piece	-	560.00	-
ii. Mailage Post	piece	-	91.00	-
TOTAL				2,829,550

Appendix Table A-8-2 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section 2 (Beluru ~ Sg. Tinjar)			
Design Length	35.5 km			
Unit: M\$				
Construction Items	Quantities		Cost	
	Unit	Quantity	Unit Cost	Total
1. Clearing & Grubbing				
i. Forest Area	m ²	-	4.84	-
ii. Cultivated Area	m ²	-	0.75	-
iii. Rubber Plantation	m ²	-	3.30	-
2. Excavation & Filling				
i. Cut Soil	m ³	-	5.00	-
Soft Rock	m ³	-	7.50	-
Hard Rock	m ³	-	59.50	-
ii. Borrow for Fill (1.0 km)	m ³	-	7.59	-
iii. Removal of Top Soil (1.0 km)	m ³	-	2.86	-
3. Drainage Structure				
i. Box Culvert 2.0 x 2.0	m	-	185.00	-
" 3.0 x 2.0	m	-	235.00	-
" 3.0 x 3.0	m	-	317.00	-
ii. Pipe Culvert ϕ 900	m	-	109.90	-
" ϕ 1,500	m	-	200.15	-
4. Bridge				
i. Short Span	m ²	-	1,940.00	-
ii. Middle Span	m ²	-	2,195.00	-
iii. Long Span	m ²	-	2,262.00	-
5. Pavement				
i. Subgrade Preparation	m ²	-	0.41	-
ii. Sub-base Course	m ²	-	44.31	-
iii. Base Course	m ³	38,979	46.43	1,809,800
iv. Bituminus Primcoat	m ²	259,860	0.66	171,500
v. Bituminus Surface Course	m ²	259,860	13.85	3,599,100
6. Guard Rail				
	m	-	66.00	-
7. Marking				
	m	-	1.20	-
8. Traffic Sign				
i. Traffic Sign	piece	-	560.00	-
ii. Mailage Post	piece	-	91.00	-
TOTAL				5,580,400

Appendix Table A-8-3 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section 3 (Sg. Tinjar ~ Sg. Baram/Long Lama)				
Design Length	25.0 km				
Unit: M\$					
Construction Items	Quantities		Cost		
	Unit	Quantity	Unit Cost	Total	
1. Clearing & Grubbing					
i. Forest Area	m ²	399,620	4.84	1,934,200	
ii. Cultivated Area	m ²	130,380	0.75	97,800	
iii. Rubber Plantation	m ²	-	3.30	-	
2. Excavation & Filling					
i. Cut Soil	m ³	720,500	5.00	3,602,500	
Soft Rock	m ³	-	7.50	-	
Hard Rock	m ³	-	59.50	-	
ii. Borrow for Fill (1.0 km)	m ³	156,400	7.59	1,187,100	
iii. Removal of Top Soil (1.0 km)	m ³	41,040	2.86	40,200	
3. Drainage Structure					
i. Box Culvert 2.0 x 2.0	m	54	185.00	10,000	
" 3.0 x 2.0	m	54	235.00	12,700	
" 3.0 x 3.0	m	54	317.00	17,150	
ii. Pipe Culvert ϕ 900	m	840	109.90	92,350	
" ϕ 1,500	m	588	200.15	117,700	
4. Bridge					
i. Short Span	m ²	2,529.6	1,940.00	4,907,450	
ii. Middle Span	m ²	1,488.0	2,195.00	3,266,200	
iii. Long Span	m ²	1,488.0	2,262.00	3,365,900	
5. Pavement					
i. Subgrade Preparation	m ²	183,000	0.41	75,050	
ii. Sub-base Course	m ²	54,900	44.31	2,432,650	
iii. Base Course	m ³	27,450	46.43	1,274,500	
iv. Bituminus Primcoat	m ²	183,000	0.66	120,800	
v. Bituminus Surface Course	m ²	183,000	13.85	2,534,550	
6. Guard Rail					
	m	13,600	66.00	897,600	
7. Marking					
	m	50,000	1.20	60,000	
8. Traffic Sign					
i. Traffic Sign	piece	3	560.00	1,700	
ii. Mailage Post	piece	3	91.00	300	
TOTAL				26,048,400	

Appendix Table A-8-4 ESTIMATION FOR CONSTRUCTION COST

Design Section		Section 4 (Sg. Baram/Long Lama ~ Sg. Apoh)			
Design Length		24.3 km			
Unit: M\$					
Construction Items		Quantities		Cost	
		Unit	Quantity	Unit Cost	Total
1. Clearing & Grubbing					
i.	Forest Area	m ²	457,700	4.84	2,215,300
ii.	Cultivated Area	m ²	101,200	0.75	75,900
iii.	Rubber Plantation	m ²	-	3.30	-
2. Excavation & Filling					
i.	Cut Soil	m ³	501,000	5.00	2,505,000
	Soft Rock	m ³	100,150	7.50	751,150
	Hard Rock	m ³	25,100	59.50	1,493,450
ii.	Borrow for Fill (1.0 km)	m ³	586,560	7.59	4,452,000
iii.	Removal of Top Soil (1.0 km)	m ³	-	2.86	-
3. Drainage Structure					
i.	Box Culvert 2.0 x 2.0	m	54	185.00	10,000
	" 3.0 x 2.0	m	54	235.00	12,700
	" 3.0 x 3.0	m	54	317.00	17,150
ii.	Pipe Culvert ϕ 900	m	840	109.90	92,350
	" ϕ 1,500	m	588	200.15	117,700
4. Bridge					
i.	Short Span	m ²	1,438.4	1,940.00	2,790,500
ii.	Middle Span	m ²	1,388.8	2,195.00	3,048,450
iii.	Long Span	m ²	-	2,262.00	-
5. Pavement					
i.	Subgrade Preparation	m ²	177,900	0.41	72,950
ii.	Sub-base Course	m ²	53,363	44.31	2,364,550
iii.	Base Course	m ³	26,700	46.43	1,239,700
iv.	Bituminous Primcoat	m ²	177,900	0.66	117,450
v.	Bituminous Surface Course	m ²	177,900	13.85	2,463,950
6. Guard Rail					
		m	15,700	66.00	1,036,200
7. Marking					
		m	48,600	1.20	58,400
8. Traffic Sign					
i.	Traffic Sign	piece	3	560.00	1,700
ii.	Mailage Post	piece	3	91.00	300
TOTAL					24,936,850

Appendix Table A-8-5 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section 5 (Sg. Apoh ~ Sg. Tutoh)				
Design Length	29.7 km				
Unit: M\$					
Construction Items	Quantities		Cost		
	Unit	Quantity	Unit Cost	Total	
1. Clearing & Grubbing					
i. Forest Area	m ²	637,200	4.84	3,084,050	
ii. Cultivated Area	m ²	4,320	0.75	3,300	
iii. Rubber Plantation	m ²	-	3.30	-	
2. Excavation & Filling					
i. Cut Soil	m ³	603,900	5.00	3,019,500	
Soft Rock	m ³	53,700	7.50	402,750	
Hard Rock	m ³	13,400	59.50	797,300	
ii. Borrow for Fill (1.0 km)	m ³	407,000	7.59	3,089,150	
iii. Removal of Top Soil (1.0 km)	m ³	54,120	2.86	154,800	
3. Drainage Structure					
i. Box Culvert 2.0 x 2.0	m	72	185.00	13,350	
" 3.0 x 2.0	m	72	235.00	16,950	
" 3.0 x 3.0	m	72	317.00	22,850	
ii. Pipe Culvert ϕ 900	m	1,008	109.90	110,800	
" ϕ 1,500	m	714	200.15	142,900	
4. Bridge					
i. Short Span	m ²	1,438.4	1,940.00	2,790,500	
ii. Middle Span	m ²	-	2,195.00	-	
iii. Long Span	m ²	1,091.2	2,262.00	2,468,300	
5. Pavement					
i. Subgrade Preparation	m ²	217,404	0.41	89,150	
ii. Sub-base Course	m ²	65,200	44.31	2,889,050	
iii. Base Course	m ³	32,611	46.43	1,514,150	
iv. Bituminous Primcoat	m ²	217,404	0.66	143,500	
v. Bituminous Surface Course	m ²	217,404	13.85	3,011,050	
6. Guard Rail					
	m	18,500	66.00	1,221,000	
7. Marking					
	m	59,400	1.20	71,300	
8. Traffic Sign					
i. Traffic Sign	piece	3	560.00	1,700	
ii. Mailage Post	piece	3	91.00	300	
TOTAL				25,057,700	

Appendix Table A-8-6 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section 6 (Sg. Tutoh ~ Sg. Medalam)			
Design Length	29.5 km			
Unit: M\$				
Construction Items	Quantities		Cost	
	Unit	Quantity	Unit Cost	Total
1. Clearing & Grubbing				
i. Forest Area	m ²	536,900	4.84	2,598,600
ii. Cultivated Area	m ²	-	0.75	-
iii. Rubber Plantation	m ²	-	3.30	-
2. Excavation & Filling				
i. Cut Soil	m ³	183,125	5.00	915,650
Soft Rock	m ³	-	7.50	-
Hard Rock	m ³	-	59.50	-
ii. Borrow for Fill (1.0 km)	m ³	96,690	7.59	733,900
iii. Removal of Top Soil (1.0 km)	m ³	-	2.86	-
3. Drainage Structure				
i. Box Culvert 2.0 x 2.0	m	72	185.00	13,350
" 3.0 x 2.0	m	72	235.00	16,950
" 3.0 x 3.0	m	72	317.00	22,850
ii. Pipe Culvert ϕ 900	m	1,008	109.90	110,800
" ϕ 1,500	m	714	200.15	142,900
4. Bridge				
i. Short Span	m ²	2,728	1,940.00	5,292,350
ii. Middle Span	m ²	-	2,195.00	-
iii. Long Span	m ²	-	2,262.00	-
5. Pavement				
i. Subgrade Preparation	m ²	215,940	0.41	88,550
ii. Sub-base Course	m ²	43,188	44.31	1,913,650
iii. Base Course	m ³	32,391	46.43	1,503,950
iv. Bituminus Primcoat	m ²	215,940	0.66	142,550
v. Bituminus Surface Course	m ²	215,940	13.85	2,990,800
6. Guard Rail				
	m	14,650	66.00	966,900
7. Marking				
	m	59,000	1.20	62,400
8. Traffic Sign				
i. Traffic Sign	piece	3	560.00	1,700
ii. Mailage Post	piece	3	91.00	300
TOTAL				17,419,150

Appendix Table A-8-7 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section 7 (Sg. Medalam ~ Sg. Limbang/Ng. Medamit)				
Design Length	25.7 km				
Unit: M\$					
Construction Items	Quantities		Cost		
	Unit	Quantity	Unit Cost	Total	
1. Clearing & Grubbing					
i. Forest Area	m ²	247,650	4.84	1,198,650	
ii. Cultivated Area	m ²	249,600	0.75	187,200	
iii. Rubber Plantation	m ²	3,900	3.30	12,900	
2. Excavation & Filling					
i. Cut Soil	m ³	399,550	5.00	1,997,750	
Soft Rock	m ³	-	7.50	-	
Hard Rock	m ³	-	59.50	-	
ii. Borrow for Fill (1.0 km)	m ³	242,205	7.59	1,838,350	
iii. Removal of Top Soil (1.0 km)	m ³	-	2.86	-	
3. Drainage Structure					
i. Box Culvert 2.0 x 2.0	m	54	185.00	10,000	
" 3.0 x 2.0	m	54	235.00	12,700	
" 3.0 x 3.0	m	54	317.00	17,200	
ii. Pipe Culvert ϕ 900	m	882	109.90	96,950	
" ϕ 1,500	m	630	200.15	126,100	
4. Bridge					
i. Short Span	m ²	2,083.2	1,940.00	4,041,400	
ii. Middle Span	m ²	1,488	2,195.00	3,266,200	
iii. Long Span	m ²	-	2,262.00	-	
5. Pavement					
i. Subgrade Preparation	m ²	188,124	0.41	77,150	
ii. Sub-base Course	m ²	37,625	44.31	1,667,200	
iii. Base Course	m ³	28,218	46.43	1,310,200	
iv. Bituminus Primcoat	m ²	188,124	0.66	124,200	
v. Bituminus Surface Course	m ²	188,124	13.85	2,605,550	
6. Guard Rail					
	m	10,050	66.00	663,300	
7. Marking					
	m	51,400	1.20	61,700	
8. Traffic Sign					
i. Traffic Sign	piece	3	560.00	1,700	
ii. Mailage Post	piece	3	91.00	300	
TOTAL				19,316,700	

Appendix Table A-8-8 ESTIMATION FOR CONSTRUCTION COST

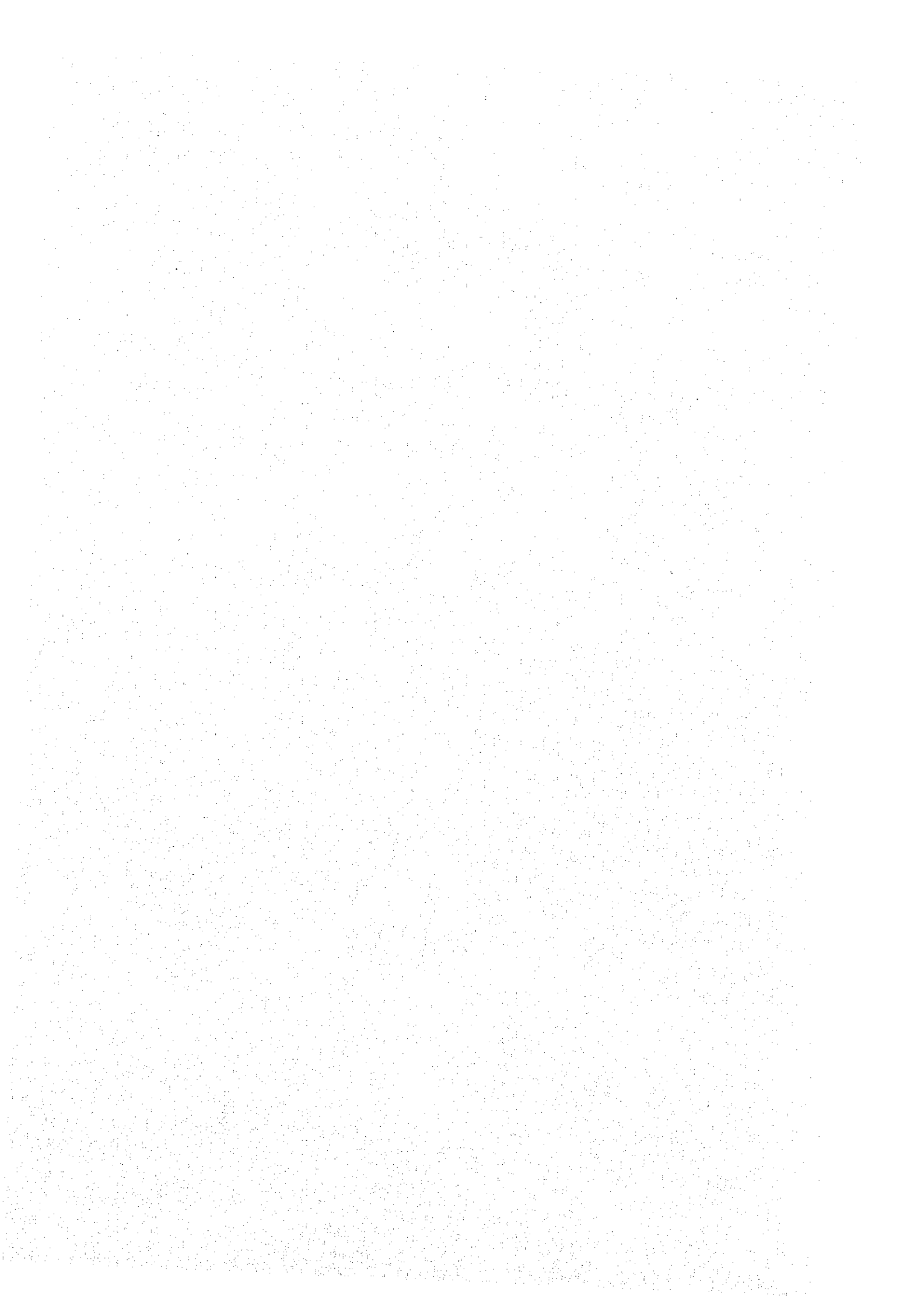
Design Section	Section 8 (Sg. Limbang/Ng. Medamit ~ Limbang)			
Design Length	41.0 km			
Unit: M\$				
Construction Items	Quantities		Cost	
	Unit	Quantity	Unit Cost	Total
1. Clearing & Grubbing				
i. Forest Area	m ²	-	4.84	-
ii. Cultivated Area	m ²	-	0.75	-
iii. Rubber Plantation	m ²	-	3.30	-
2. Excavation & Filling				
i. Cut Soil	m ³	-	5.00	-
Soft Rock	m ³	-	7.50	-
Hard Rock	m ³	-	59.50	-
ii. Borrow for Fill (1.0 km)	m ³	-	7.59	-
iii. Removal of Top Soil (1.0 km)	m ³	-	2.86	-
3. Drainage Structure				
i. Box Culvert 2.0 x 2.0	m	-	185.00	-
" 3.0 x 2.0	m	-	235.00	-
" 3.0 x 3.0	m	-	317.00	-
ii. Pipe Culvert ϕ 900	m	-	109.90	-
" ϕ 1,500	m	-	200.15	-
4. Bridge				
i. Short Span	m ²	1,934.4	1,940.00	3,752,750
ii. Middle Span	m ²	-	2,195.00	-
iii. Long Span	m ²	-	2,262.00	-
5. Pavement				
i. Subgrade Preparation	m ²	-	0.41	-
ii. Sub-base Course	m ²	-	44.31	-
iii. Base Course	m ³	45,018	46.43	2,090,200
iv. Bituminus Primcoat	m ²	300,100	0.66	198,100
v. Bituminus Surface Course	m ²	300,100	13.85	4,156,400
6. Guard Rail				
	m	-	66.00	-
7. Marking				
	m	-	1.20	-
8. Traffic Sign				
i. Traffic Sign	piece	-	560.00	-
ii. Mailage Post	piece	-	91.00	-
TOTAL				10,197,450

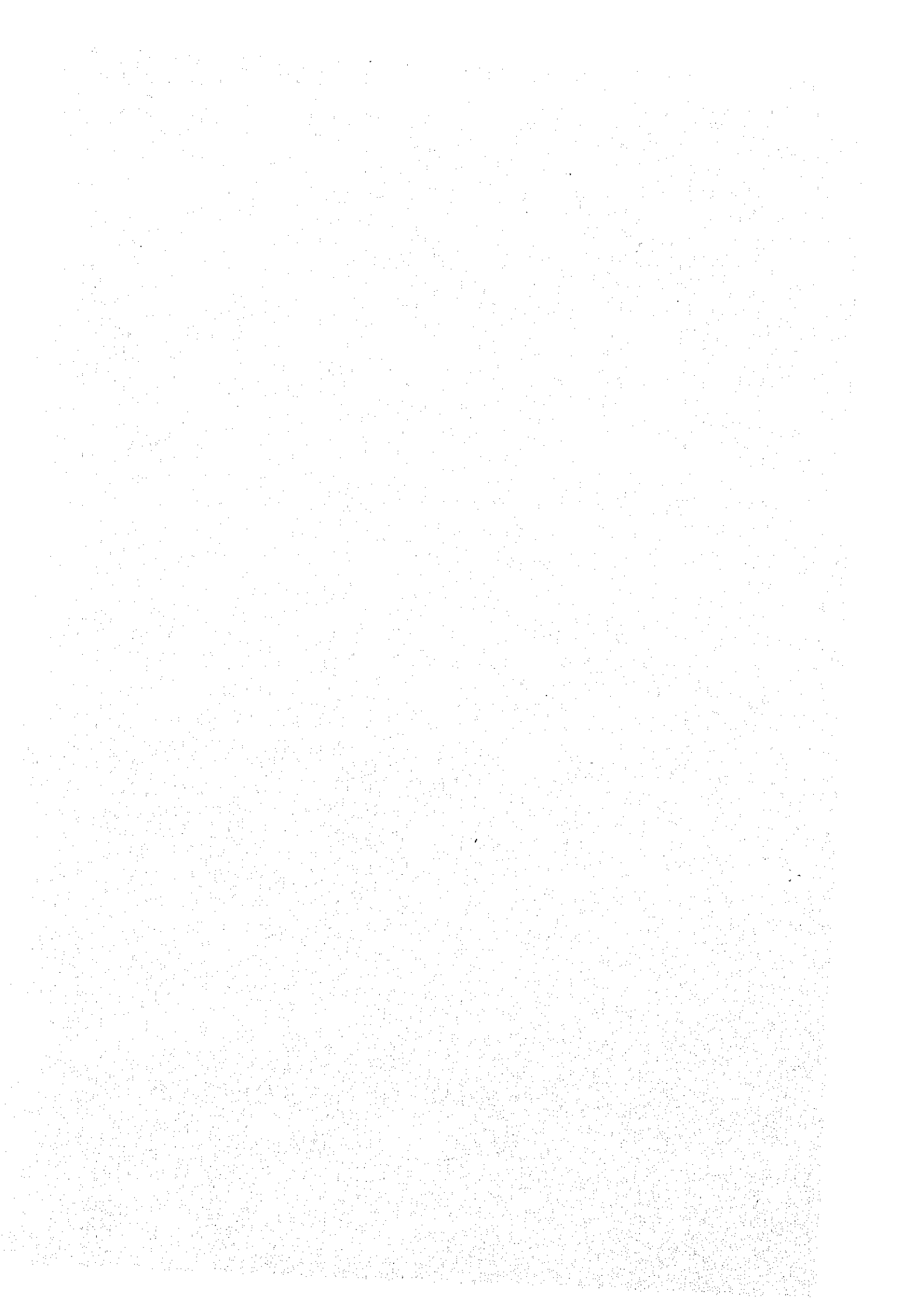
Appendix Table A-8-9 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section B (Alternative)			
Design Length	27.4 km			
Unit: M\$				
Construction Items	Quantities		Cost	
	Unit	Quantity	Unit Cost	Total
1. Clearing & Grubbing				
i. Forest Area	m ²	495,940	4.84	2,400,350
ii. Cultivated Area	m ²	-	0.75	-
iii. Rubber Plantation	m ²	-	3.30	-
2. Excavation & Filling				
i. Cut Soil	m ³	65,000	5.00	325,000
Soft Rock	m ³	-	7.50	-
Hard Rock	m ³	-	59.50	-
ii. Borrow for Fill (1.0 km)	m ³	45,600	7.59	346,100
iii. Removal of Top Soil (1.0 km)	m ³	-	2.86	-
3. Drainage Structure				
i. Box Culvert 2.0 x 2.0	m	72	185.00	13,350
" 3.0 x 2.0	m	72	235.00	16,950
" 3.0 x 3.0	m	72	317.00	22,850
ii. Pipe Culvert ϕ 900	m	924	109.90	101,550
" ϕ 1,500	m	672	200.15	134,500
4. Bridge				
i. Short Span	m ²	1,190.4	1,940.00	2,309,400
ii. Middle Span	m ²	992.0	2,195.00	2,177,450
iii. Long Span	m ²	-	2,262.00	-
5. Pavement				
i. Subgrade Preparation	m ²	200,600	0.41	82,250
ii. Sub-base Course	m ²	40,100	44.31	1,776,850
iii. Base Course	m ³	40,100	46.43	1,861,850
iv. Bituminus Primcoat	m ²	200,600	0.66	132,400
v. Bituminus Surface Course	m ²	200,600	13.85	2,778,350
6. Guard Rail				
	m	14,800	66.00	976,800
7. Marking				
	m	54,800	1.20	65,800
8. Traffic Sign				
i. Traffic Sign	piece	3	560.00	1,700
ii. Mailage Post	piece	3	91.00	300
TOTAL				15,523,800

Appendix Table A-8-10 ESTIMATION FOR CONSTRUCTION COST

Design Section	Section C (Alternative)				
Design Length	28.4 km				
Unit: M\$					
Construction Items	Quantities		Cost		
	Unit	Quantity	Unit Cost	Total	
1. Clearing & Grubbing					
i. Forest Area	m ²	651,360	4.84	3,152,600	
ii. Cultivated Area	m ²	18,880	0.75	14,200	
iii. Rubber Plantation	m ²	-	3.30	-	
2. Excavation & Filling					
i. Cut Soil	m ³	846,675	5.00	4,233,400	
Soft Rock	m ³	225,825	7.50	1,693,700	
Hard Rock	m ³	56,400	59.50	3,355,800	
ii. Borrow for Fill (1.0 km)	m ³	533,030	7.59	4,045,700	
iii. Removal of Top Soil (1.0 km)	m ³	-	2.86	-	
3. Drainage Structure					
i. Box Culvert 2.0 x 2.0	m	72	185.00	13,350	
" 3.0 x 2.0	m	72	235.00	16,950	
" 3.0 x 3.0	m	72	317.00	22,850	
ii. Pipe Culvert ϕ 900	m	966	109.90	106,200	
" ϕ 1,500	m	672	200.15	134,500	
4. Bridge					
i. Short Span	m ²	892.8	1,940.00	1,732,050	
ii. Middle Span	m ²	992	2,195.00	2,177,450	
iii. Long Span	m ²	-	2,262.00	-	
5. Pavement					
i. Subgrade Preparation	m ²	207,900	0.41	85,250	
ii. Sub-base Course	m ²	41,600	44.31	1,843,300	
iii. Base Course	m ³	41,600	46.43	1,931,500	
iv. Bituminus Primcoat	m ²	207,900	0.66	137,250	
v. Bituminus Surface Course	m ²	207,900	13.85	2,879,450	
6. Guard Rail					
	m	17,650	66.00	1,164,900	
7. Marking					
	m	56,800	1.20	68,200	
8. Traffic Sign					
i. Traffic Sign	piece	3	560.00	1,700	
ii. Mailage Post	piece	3	91.00	300	
TOTAL				28,810,600	





JICA