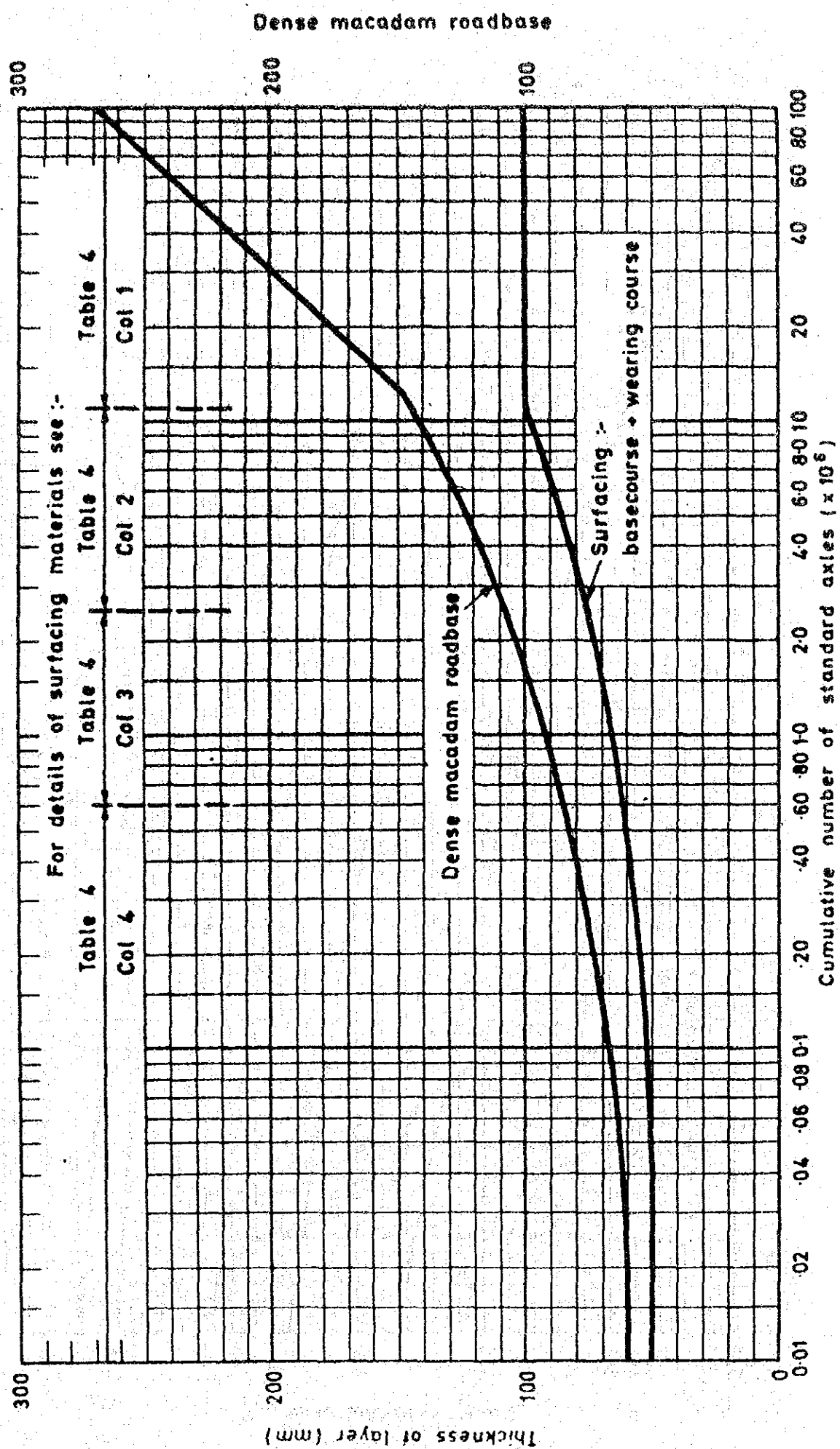
Appendix Fig. A-7-3 MINIMUM THICKNESS OF SURFACING AND ROADBASE



Appendix Table A-8-1 LIST OF STANDARD RATE FOR CULTIVATION IN ALL FIVE DIVISIONS

(a) Valuation per tree (Bearing fruit or tappable rubber)
(b) Valuation per tree (Not yet bearing fruit or untappable rubber)

Description of Cultivation	Standard (a) $	Rate (b) $
Asam Bachang (Lamachang)	7.00	4.00
Asam Depeh	10.00	6.00
Asam Embang (Mawang)	10.00	5.00
Asam Emplam	10.00	6.00
Asam Jawa	5.00	3.00
Asam Kamatan	10.75	6.00
Asam Kendong	5.00	3.00
Asam Kuini	12.00	8.00
Asam Kumbang	10.00	5.00
Asam Mangga	15.00	8.00
Asam Paoh	7.00	3.50
Asam Putaran	8.00	4.00
Asam Raba	8.00	5.00
Antawak or Pandan	7.00	3.50
Belimbing Segi	10.00	5.00
Belimbing Tunjok	5.00	3.00
Benjai or Pudun	7.00	3.50
Betih (Papaya)	5.00	2.50
Blunuh	14.14	8.04
Buloh	1.00	-.50
Betiti	5.00	2.50
Belimbiu Assam	10.00	5.00
Bulang or Balimbin	5.00	2.50
Bagan	3.00	1.50
Bandong Ubi	.50	.25
Champedak Brunei	10.00	5.00
Champedak Sarawak	10.00	5.00
Cherry	5.00	2.50
Chermai	5.00	2.50
Chiku	10.00	6.00
Champaka (Bunga)	6.40	4.00
Coffee Jawa	5.00	2.50
Coffee Sarawak	5.00	3.00
Dabai (Kamayeu)	15.00	7.50
Delima	10.00	5.00
Durian	20.00	10.00
Durian Belanda	6.00	3.00
Durian Isa	8.00	4.00
Dunjong (Rambutan)	5.00	2.50
Dadak (Jintan)	5.00	2.50
Durian Pakon	10.00	5.00
Engkahang (Illipenut)	10.00	5.00
Eagkala	8.00	5.00
Entawak (Trap type)	5.00	2.50
Enbawang	10.00	5.00

Description of Cultivation	Standard (a)	Rate (b)
Getah (Rubber) (Ordinary)	5.00	2.00
Getah (Rubber) (Clonal)		2.00
1 year old tree		2.00
2 years old tree		3.00
3 years old tree		4.00
4 years old tree		6.00
5 years old tree		8.00
6 years old tree		10.00
Getah Durian	7.00	4.00
Gelom	1.00	.50
Ipou (Manggis)	10.00	5.00
Isang	4.00	2.00
Itan (Dadak)	1.00	.50
Isau	5.00	2.50
Isu	5.00	2.50
Jambu Ayer Mawar	8.00	5.00
Jambu Merabas (Baibas)	7.00	3.50
Jumbu Merah	8.00	5.00
Jambu Nipah or Ball	10.00	5.00
Jumbu Retch	5.00	3.00
Jerin	6.00	4.00
Jerutong	5.00	2.50
Kakunan	10.00	5.11
Kalapa (Coconut)	10.00	5.00
Kapayang	5.00	3.00
Karamoh	10.07	6.00
Kedondong	10.00	5.00
Kenanga (Bunga)	4.00	3.00
Kerasaji Burong	8.00	5.00
Keranji Madu	10.00	6.00
Jambu Puteh	10.00	5.00
Jeruit or Serait	2.00	1.00
Kubal	5.00	2.50
Kapok (Cotton)	5.00	2.50
Kakus (Lingging)	5.00	2.50
Kamayan (Rambutan)	5.00	2.50
Kabuan (Binjai)	10.00	5.00
Kabuan	10.00	5.00
Kandis	5.00	2.50
Kambawi	3.00	1.50
Kemanti or rambutan	10.00	5.00
Kelait	.20	-
Lada (Pepper)	20.00	7.00
	15.00	5.00
Lansat Pred	8.00	5.00
Lansat Susu	10.00	6.00
Limo Besar (Pamelo) (Orange)	10.00	6.00
Limo Chantong	10.00	5.00
Limo Kasturi	7.00	3.00
Limo Manis	10.00	6.00
Limo Nipis	8.00	5.00
Langgir (Chirok)	4.00	2.00
Limat (Mata Kuching)	4.00	2.00
Lumek (Padalai)	10.00	5.00

Description of Cultivation	Standard (a)	Rate (b)
Lamakat (Ma)	10.00	5.00
Langgang	10.00	5.00
Lamakat	10.00	5.00
Lembu	2.00	1.00
Lamaja	4.00	2.00
Manggis (Mangosteen)	10.00	5.00
Maritam	13.69	7.15
Mahu (Esu)	10.00	6.00
Mulong (Sago)	10.00	6.00
Mundu	6.25	3.25
Majau	3.00	1.50
Malanjan	5.00	2.50
Malekat	4.00	2.00
Mandai	2.00	1.00
Namnam	5.00	3.00
Nanas	1.00	.50
Nangka Biulang (Jack Fruits)	10.00	6.00
Nanga Bubor	8.00	5.00
Nyatoh Durian	8.00	5.00
Nuantau	2.50	1.25
Ochong (Uchong)	6.50	3.35
Osong	1.00	.50
Palak	10.00	5.00
Pinang (Areca nut)	3.00	1.50
Pisang (Banana)	2.00	1.00
Pisang Tandok	3.00	1.50
Puak (Tampoi Puteh)	10.00	5.00
Pulor	7.69	4.27
Podalai	10.00	5.00
Pingan	5.00	2.50
Pantu (Mulong Type)	3.00	1.50
Pance	1.00	.50
Pelajau	5.00	1.50
Papeya (Rougan)	10.00	5.00
Petai	5.00	2.50
Pakon or Nyikak	10.00	5.00
Pala Musoh	10.00	5.00
Pudun (Bingei)	7.00	3.50
Pudu (Dabai sour)	4.00	2.50
Rambai Jawa	10.00	6.00
Rambai Sarawak	8.00	4.00
Rambutan	15.00	6.00
	12.00	5.00
Rotan	1.00	.50
Ruku	10.00	5.00
Ramaja	5.00	2.50
Rian	1.00	.50
Serch	5.00	2.50
Siban	10.00	5.00
Sikup (Menggis)	10.00	5.00
Srikaya	7.00	4.00
Sukun (Breadfruits)	12.00	7.00
Sintel (Suntol)	3.00	1.50
Sabun	4.00	2.00
Salanking (wild fruit)	4.00	2.00

Description of Cultivation	Standard (a)	Rate (b)
Sangelong	2.00	1.00
Sibau Dara	2.00	1.00
Tampei	10.00	5.00
Tauh	10.00	5.00
Tebu (Sugar Cane)	.50	.25
Temap Brunei	10.00	5.00
Terap Sarawak	10.00	5.00
Tuba	1.50	.75
Temadak	10.00	5.00
Takalang	5.00	2.50
Tegelam	10.00	5.00
Tamang	1.00	.50
Ungua	3.00	1.50
Usang	3.00	1.50

SARAWAK TRUNK ROAD

Appendix Table A-8-2 Construction Cost Estimate (Total)

ALTERNATIVE - 01

COMBINATION OF SECTION: A B F — 1 2 3 4 5 6 7 8: * * * * * * * *

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST FOREIGN IN MD	UNIT COST LOCAL IN MD	UNIT COST TAX IN MD	ECONOMIC COST FOREIGN IN MD	ECONOMIC COST LOCAL IN MD	ECONOMIC COST TOTAL IN MD	CONSTRUCTION COST FOREIGN IN MD	CONSTRUCTION COST LOCAL IN MD	CONSTRUCTION COST TOTAL IN MD	ITEM NO.
0101	MAINTENANCE & PROTECTION OF TRAFFIC	L.S					319	233	552	319	289	608	0101
0102	MOBILIZATION	L.S					5778	4001	9779	5778	4881	10659	0102
0201	CLEARING & GRUBBING (FOREST AREA)	SQ.M	2900721	1.52	0.47	0.21	4409	1363	5772	4409	1972	6381	0201
0202	CLEARING & GRUBBING (CULTIVATED)	SQ.M	34111	0.50	0.12	0.05	17	4	21	17	6	23	0202
0203	CLEARING & GRUBBING (RUBBER PLANT)	SQ.M	2341	1.83	0.57	0.25	4	1	5	4	2	6	0203
0204	COMMON EXCAVATION & EMBANKMENT (SOIL)	CU.M	3376999	4.85	1.19	0.53	16378	4019	20397	16378	5809	22187	0204
0205	COMMON EXCAVATION & EMBANKMENT (ROCK)	CU.M	142138	11.24	2.81	1.23	1598	399	1997	1598	574	2172	0205
0206	BORROW EXCAVATION & EMBANKMENT	CU.M	139336	11.36	3.30	1.56	2151	625	2776	2151	920	3071	0206
0207	EXCAVATION DISPOSAL	CU.M	610843	3.71	1.22	0.77	2266	745	3011	2266	1215	3481	0207
0301	R.C.PIPE CULVERT D=900	L.M	3870	125.55	382.14	32.16	486	1479	1965	486	1603	2089	0301
0302	R.C.PIPE CULVERT D=1500	L.M	2010	237.00	922.67	71.08	476	1855	2331	476	1998	2474	0302
0303	R.C.BOX CULVERT 2.0X2.0	L.M	179	751.71	1222.80	143.61	135	219	354	135	245	380	0303
0304	R.C.BOX CULVERT 3.0X2.0	L.M	149	1034.21	1692.36	198.57	154	252	406	154	282	436	0304
0305	R.C.BOX CULVERT 3.0X3.0	L.M	336	801.86	2110.27	182.55	269	709	978	269	770	1039	0305
0306	MULTI BOX CULVERT 2-3.0X2.0	L.M	173	1603.72	4220.55	365.11	277	730	1007	277	793	1070	0306
0401	SUBGRADE PREPARATION	SQ.M	1807411	0.33	0.17	0.04	596	307	903	596	379	975	0401
0402	SUBBASE COURSE	CU.M	569939	22.53	14.62	4.10	12841	8333	21174	12841	10670	23511	0402
0403	BASE COURSE	CU.M	263996	23.75	15.24	4.24	6270	4023	10293	6270	5142	11412	0403
0404	BITUMINUS PRIME COAT	SQ.M	73200	0.76	0.20	0.23	56	15	71	56	32	88	0404
0405	BITUMINUS SURFACE COURSE (HOTMIX)	CU.M	2928	99.17	66.11	36.40	290	194	484	290	301	591	0405
0406	BITUMINUS SURFACE DRESS. (DOUBLE)	SQ.M	0	2.01	1.00	0.55	0	0	0	0	0	0	0406
0501	SHORT SPAN BRIDGE	SQ.M	5753	314.89	844.55	83.17	1813	4863	6676	1913	5342	7155	0501
0502	MODERATE SPAN BRIDGE (20-40)	SQ.M	6989	446.02	782.96	94.03	3117	5472	8589	3117	6129	9246	0502
0503	MODERATE SPAN BRIDGE (40-60)	SQ.M	2424	1254.45	377.72	93.70	3041	916	3957	3041	1143	4184	0503
0504	LONG SPAN BRIDGE	SQ.M	1398	2445.65	394.41	160.36	3419	551	3970	3419	775	4194	0504
0505	FERRY BOAT & FERRY FACILITY	L.S					0	0	0	0	0	0	0505
0601	STONE MASONRY	CU.M	22164	16.26	88.57	5.33	360	1963	2323	360	2081	2441	0601
0602	GROUTED RIPRAP	SQ.M	66499	7.80	41.53	2.52	519	2762	3281	519	2930	3449	0602
0603	GUARD RAIL	L.M	11012	1.24	49.87	2.79	14	549	563	14	580	594	0603
0604	TRAFFIC SIGN	EACH	25	4.01	86.29	2.00	0	2	2	0	2	2	0604
0605	KILOMETER POST	EACH	25	6.83	39.21	2.95	0	1	1	0	1	1	0605
0700	LAND COMPENSATION	L.S					0	76	76	0	76	76	0700

RAWAK TRUNK ROAD

ALTERNATIVE - 01
1 2 3 4 5 6 7 8
COMBINATION OF SECTION A * * * * * * * *
R
F

Appendix Table A-8-3 Summary of Project

T-3.1 CONSTRUCTION COST

ITEM NO.	DESCRIPTION	ECONOMIC COST F.C	L.C	TOTAL	CONSTRUCTION COST F.C	L.C	TOTAL	RATE PER 0001	RATE PER 0000
0100	GENERAL	6097	4234	10331	6097	5170	11267	9.1	
0200	EARTHWORKS	26823	7156	33979	26823	10498	37321	30.1	
0300	DRAINAGE STRUCTURE	1797	5244	7041	1797	5691	7488	6.0	
0400	PAVEMENT	20053	12872	32925	20053	16524	36577	29.5	
0500	BRIDGE STRUCTURE	11390	11802	23192	11390	13389	24779	20.0	
0600	MISCELLANEOUS	893	5277	6170	893	5594	6487	5.2	
0001	TOTAL	67053	46585	113638	67053	56866	123919	100.0	80.0
0002	LAND COMPENSATION (0700)	0	76	76	0	76	76		0.0
0003	CONTINGENCIES						18599		12.0
0004	FINAL ENGINEERING SUPERVISION AND OTHERS						12392		8.0
0000	TOTAL PROJECT AMOUNT						154986		100.0

T-3.2 MAJOR QUANTITY OF PROJECT

1100	TOTAL CUT VOLUME	3519137	CU.M
1200	TOTAL BORROW VOLUME	189336	CU.M
1300	TOTAL AREA OF BRIDGES	16569	SQ.M
1400	TOTAL LENGTH OF BRIDGES	1778	L.M
1500	BOX CULVERTS	837	L.M
1600	PIPE CULVERTS	5880	L.M

T-3.3 REQUIRED AMOUNT OF LABOR

2100	FOREIGN LABOR	2882175	MD
2200	LOCAL LABOR	4606646	MD

T-3.4 REQUIRED AMOUNT OF MATERIALS

3100	FUEL	8047549	LIT.
3200	REINFORCING BAR	3694	M.T
3300	PRESTRESSING BAR	150	M.T
3400	STRUCTURAL STEEL	1302	M.T
3500	FINE AGGREGATE FOR CONCRETE	30726	CU.M
3600	COURSE AGGREGATE FOR CONCRETE	45193	CU.M
3700	CRUSHED STONE (1)	569939	CU.M
3800	CRUSHED STONE (2)	266778	CU.M
3900	CEMENT	14282	M.T
4000	ASPHALT	1064	M.T

Appendix Table A-10-1 Increase of Vehicle Operating Cost due to Changes of Gradients

Vehicle Type	Level Tangent	1-3	3-5	5-7	7-9
Car	100	100	107	115	130
Van/Pick-up	100	100	112	127	145
Med.Truck (6ton)	100	100	115	130	150
Hev.Truck I (10ton)	100	110	135	150	170
Hev.Truck II (20ton)	100	112	145	165	190
Bus	100	100	115	130	150

Appendix Table A-10-2 Vehicle Operating Costs by Project Road Section by Vehicle Type and by Road Type

M$/veh. km. in Economic Prices

Road Section 1/	Car		Van/Pick-up		Bus		Medium Truck (6ton)		Heavy Truck I (10ton)		Heavy Truck II (20ton T.Trailer)	
	Gravel	Paved	Gravel	Paved	Gravel	Paved	Gravel	Paved	Gravel	Paved	Gravel	Paved
1.	0.3233	0.2257	0.4752	0.3255	0.8430	0.5718	0.6591	0.4841	1.2165	0.8500	1.8021	1.1833
2.	0.3156	0.2203	0.4581	0.3138	0.8091	0.5489	0.6327	0.4647	1.1536	0.8061	1.6868	1.1075
3.	0.3141	0.2193	0.4562	0.3125	0.8032	0.5448	0.6281	0.4613	1.1317	0.7908	1.6477	1.0819
4.	0.3113	0.2174	0.4488	0.3074	0.7897	0.5357	0.6175	0.4535	1.1105	0.7760	1.6081	1.0558
5.	0.3122	0.2180	0.4510	0.3089	0.7942	0.5388	0.6210	0.4561	1.1213	0.7835	1.6278	1.0688
6.-9.	0.3164	0.2209	0.4608	0.3156	0.8130	0.5515	0.6357	0.4669	1.1533	0.8059	1.6869	1.1076

1/ 1. Miri/Bintulu Rd. - Beluru
2. Beluru - Sg. Tinjar
3. Sg. Tinjar - Long Lama
4. Long Lama - Sg. Tutoh/Apoh
5. Sg. Tutoh/Apoh - N. Medamit
6. N. Medamit - Limbang

Appendix Table A-10-3-(1) Cash Flow of Construction/Maintenace Costs of Project Road by Alternative Construction Plan

Alternative Case: A-1

:M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road.	Bridge				
1980	1,364	-	-	200	-	1,564	
81	2,071	-	-	301	-	2,372	
82	61	-	-	-	-	61	
83	34,660	-	-	5,093	-	39,753	
84	69,318	-	-	10,186	-	79,504	
85	34,660	-	-	5,093	-	39,753	
86	-	618	63	-	66	747	
87	-	618	63	-	66	747	
88	-	618	63	-	66	747	
89	-	618	63	-	66	747	
90	-	618	63	-	66	747	
91	-	600+484*	63	-	66	1,213	*(8) 10.0 km Overlay
92	-	635	63	-	66	764	
93	-	635	63	-	66	764	
94	-	635	63	-	66	764	
95	-	635	63	-	66	764	
96	-	635	63	-	66	764	
97	1,242	587	63	-	66	1,958	(01) 18.4 km Bit. Surfacing
98	2,120	569	63	-	66	2,818	(08) 31.4 km Bit. Surfacing
99	4,220	514	63	-	66	4,863	(02, 03) 62.5 km Bit. Surfacing
2000	-	734	63	-	66	863	
1	-	734	63	-	66	863	
2	7,764	430	63	-	66	8,323	(04-07) 115.0 km Bit. Surfacing
3	-	835	63	-	66	964	
4	-	835	63	-	66	964	
Total	157,480	12,587	1,197	20,873	1,254	193,391	

Appendix Table A-10-3-(2) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: A-2

:M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	1,451	-	-	200	-	1,651	
81	2,202	-	-	301		2,503	
82	61	-	-			61	
83	36,876	-	-	5,093		41,969	
84	73,752	-	-	10,186		83,938	
85	36,876	-	-	5,093		41,969	
86	-	593	63	-	66	722	
87	-	593	63	-	66	722	
88	-	593	63	-	66	722	
89	-	593	63	-	66	722	
90	-	593	63	-	66	722	
91	-	575+484*	63	-	66	1,188	*(08) 10.0 km Overlay
92	-	610	63	-	66	739	
93	-	610	63	-	66	739	
94	-	610	63	-	66	739	
95	-	610	63	-	66	739	
96	-	610	63	-	66	739	
97	1,242	564	63	-	66	1,935	(01) 18.4 km Bit. Surfacing
98	2,120	549	63	-	66	2,798	(08) 31.4 km Bit. Surfacing
99	4,220	501	63	-	66	4,850	(02, 03) 62.5 km Bit. Surfacing
2,000	-	721	63	-	66	850	
1	-	721	63	-	66	850	
2	7,764	430	63	-	66	8,323	(04-07) 115.0 km Bit. Surfacing
3	-	835	63	-	66	964	
4	-	835	63	-	66	964	
Total	166,564	12,230	1,197	20,873	1,254	202,118	

Appendix Table A-10-3-(3) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: A-3 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	1,566	-		200		1,766	
81	2,376	-	-	301	-	2,677	
82	61	-	-	-	-	61	
83	39,809	-	-	5,093	-	44,902	
84	79,616	-	-	10,186	-	89,802	
85	39,809	-	-	5,093	-	44,902	
86	-	418	63	-	66	547	
87	-	418	63	-	66	547	
88	-	418	63	-	66	547	
89	-	418	63	-	66	547	
90	-	418	63	-	66	547	
91	-	400+484*	63	-	66	1,013	*(08) 10.0 km Overlay
92	-	435	63	-	66	564	
93	-	435	63	-	66	564	
94	-	435	63	-	66	564	
95	-	435	63	-	66	564	
96	-	435	63		66	564	
97	-	435	63	-	66	564	
98	-	468	63		66	597	
99	-	523	63	-	66	652	
2000	-	633	63	-	66	762	
1	-	633	63	-	66	762	
2	-	633	63	-	66	762	
3	-	835	63	-	66	964	
4	-	835	63	-	66	964	
Total	163,237	10,144	1,197	20,873	1,254	196,705	

Appendix Table A-10-3-(4) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: B-1 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	524	-	-	24	-	548	
81	800	-	-	36	-	836	
82	22	-	-	-	-	22	
83	13,310	-	-	612	-	13,922	
84	26,618	-	-	1,225	-	27,843	
85	14,150	-	-	788	-	14,938	
86	1,280	314	36	265	8	1,903	
87	30	314	36	-	8	388	
88	21,350	314	36	4,481	8	26,189	
89	42,700	314	36	8,961	8	52,019	
90	21,350	314	36	4,481	8	26,189	
91	-	600+484*	63	-	66	1,213	*(8) 10.0 km Overlay
92	-	635	63	-	66	764	
93	-	635	63	-	66	764	
94	-	635	63	-	66	764	
95	-	635	63	-	66	764	
96	-	635	63	-	66	764	
97	1,242	587	63	-	66	1,958	(01) 18.4 km Bit. Surfacing
98	2,120	569	63	-	66	2,818	(08) 31.4 km Bit. Surfacing
99	4,220	514	63	-	66	4,863	(02, 03) 62.5 km Bit. Surfacing
2000	-	734	63	-	66	863	
1	-	734	63	-	66	863	
2	-	734	63	-	66	863	
3	-	734	63	-	66	863	
4	-	734	63	-	66	863	
Total	149,716	11,169	1,062	20,873	964	183,784	

Appendix Table A-10-3-(5) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: B-2 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	567	-	-	24	-	591	
81	865	-	-	36	-	901	
82	22	-	-	-	-	22	
83	14,404	-	-	612	-	15,016	
84	28,809	-	-	1,225	-	30,034	
85	15,288	-	-	788	-	16,076	
86	1,346	302	36	265	8	1,957	
87	30	302	36	-	8	376	
88	22,472	302	36	4,481	8	27,299	
89	44,943	302	36	8,961	8	54,250	
90	22,472	302	36	4,481	8	27,299	
91	-	575+484*	63	-	66	1,188	*(08) 10.0 km Overlay
92	-	610	63	-	66	739	
93	-	610	63	-	66	739	
94	-	610	63	-	66	739	
95	-	610	63	-	66	739	
96	-	610	63	-	66	739	
97	1,242	564	63	-	66	1,935	(01) 18.4 km Bit. Surfacing
98	2,120	549	63	-	66	2,798	(08) 31.4 km Bit. Surfacing
99	4,220	501	63	-	66	4,850	(02, 03) 62.5km Bit. Surfacing
2000	-	721	63	-	66	850	
1	-	721	63	-	66	850	
2	-	721	63	-	66	850	
3	-	721	63	-	66	850	
4	-	721	63	-	66	850	
Total	158,800	10,838	1,062	20,873	964	192,537	

Appendix Table A-10-3-(6) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: B-3 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	624	-	-	24	-	648	
81	951	-	-	36	-	987	
82	22	-	-	-	-	22	
83	15,853	-	-	612	-	16,465	
84	31,707	-	-	1,225	-	32,932	
85	16,795	-	-	788	-	17,583	
86	1,434	215	36	265	8	1,958	
87	30	215	36	-	8	289	
88	23,955	215	36	4,481	8	28,695	
89	47,911	215	36	8,961	8	57,131	
90	23,955	215	36	4,481	8	28,695	
91	-	400+484*	63	-	66	1,013	*(08) 10.0 km Overlay
92	-	435	63	-	66	564	
93	-	435	63	-	66	564	
94	-	435	63	-	66	564	
95	-	435	63	-	66	564	
96	-	435	63	-	66	564	
97	-	435	63	-	66	564	
98	-	468	63	-	66	597	
99	-	523	63	-	66	652	
2000	-	633	63	-	66	762	
1	-	633	63	-	66	762	
2	-	633	63	-	66	762	
3	-	633	63	-	66	762	
4	-	633	63	-	66	762	
Total	163,237	8,725	1,062	20,873	964	194,861	

Appendix Table A-10-3-(7) Cash Flow of Construction/Maintenance Costs of Project Raod by Alternative Construction Plan

Alternative Case: B-4 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	662	-	-	200	-	862	
81	1,009	-	-	301	-	1,310	
82	37	-	-	-	-	37	
83	16,829	-	-	5,093	-	21,922	
84	33,658	-	-	10,186	-	43,844	
85	17,531	-	-	5,093	-	22,624	
86	1,062	237	49	-	66	1,414	
87	24	237	49	-	66	376	
88	17,831	237	49	-	66	18,183	
89	35,660	237	49	-	66	36,012	
90	17,831	237	49	-	66	18,183	
91	-	600+484*	63	-	66	1,213	*(8) 10.0 km Overlay
92	-	635	63	-	66	764	
93	-	635	63	-	66	764	
94	-	635	63	-	66	764	
95	-	635	63	-	66	764	
96	-	635	63	-	66	764	
97	-	635	63	-	66	764	
98	-	635	63	-	66	764	
99	1,769	566	63	-	66	2,464	(03) 26.2 km Bit. Surfacing
2000	-	658	63	-	66	787	
1	-	658	63	-	66	787	
2	4,990		63	-	66	5,582	(01)(04)(05) 73.9 km Bit. Surfacing
3	2,120	641	63	-	66	2,890	(08) 31.4 km Bit. Surfacing
4	2,447	655	63	-	66	3,231	(02) 36.25 km Bit. Surfacing
Total	153,460	10,355	1,127	20,873	1,254	187,069	

Appendix Table A-10-3-(8) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: B-5 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	694	-	-	200	-	894	
81	1,056	-	-	301	-	1,357	
82	37	-	-	-	-	37	
83	17,625	-	-	5,093	-	22,718	
84	35,250	-	-	10,186	-	45,436	
85	18,382	-	-	5,093	-	23,475	
86	1,146	228	49	-	66	1,489	
87	24	228	49	-	66	367	
88	19,251	228	49	-	66	19,594	
89	38,502	228	49	-	66	38,845	
90	19,251	228	49	-	66	19,594	
91	-	575+484*	63	-	66	1,188	*(8) 10.0 km Overlay
92	-	610	63	-	66	739	
93	-	610	63	-	66	739	
94	-	610	63	-	66	739	
95	-	610	63	-	66	739	
96	-	610	63	-	66	739	
97	-	610	63	-	66	739	
98	-	610	63	-	66	739	
99	1,769	544	63	-	66	2,442	(03) 26.2 km Bit. Surfacing
2000	-	636	63	-	66	765	
1	-	636	63	-	66	765	
2	4,990	449	63	-	66	5,568	(01)(04)(05) 73.9 km Bit. Surfacing
3	2,120	630	63	-	66	2,879	(08) 31.4 km Bit. Surfacing
4	2,447	649	63	-	66	3,225	(02) 36.25 km Bit. Surfacing
Total	162,544	10,013	1,127	20,873	1,254	195,811	

Appendix Table A-10-3-(9) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: B-6 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	736	-	-	200	-	936	
81	1,120	-	-	301	-	1,421	
82	37	-	-	-	-	37	
83	18,708	-	-	5,093	-	23,801	
84	37,414	-	-	10,186	-	47,600	
85	19,538	-	-	5,093	-	24,631	
86	1,256	164	49	-	66	1,535	
87	24	164	49	-	66	303	
88	21,101	164	49	-	66	21,380	
89	42,202	164	49	-	66	42,481	
90	21,101	164	49	-	66	21,380	
91	-	400+484*	63	-	66	1,013	*(08) 10.0 km Overlay
92	-	435	63	-	66	564	
93	-	435	63	-	66	564	
94	-	435	63	-	66	564	
95	-	435	63	-	66	564	
96	-	435	63	-	66	564	
97	-	435	63	-	66	564	
98	-	435	63	-	66	564	
99	-	389	63	-	66	518	
2000	-	481	63	-	66	610	
1	-	481	63	-	66	610	
2	-	351	63	-	66	480	
3	-	557	63	-	66	686	
4	-	603	63	-	66	732	
Total	163,237	7,611	1,127	20,873	1,254	194,102	

Appendix Table A-10-3-(10) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: C-1 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	524	-	-	24	-	548	
81	800	-	-	36	-	836	
82	22	-	-	-	-	22	
83	13,310	-	-	612	-	13,922	
84	26,618	-	-	1,225	-	27,843	
85	13,740	-	-	788	-	14,528	
86	659	314	36	265	8	1,282	
87	34	314	36	-	8	392	
88	10,928	314	36	4,481	8	15,767	
89	21,854	314	36	8,961	8	31,173	
90	11,338	314	36	4,481	8	16,177	
91	616	446+484*	50	-	66	1,662	*(8) 10.0 km Overlay
92	1	481	50	-	66	598	
93	10,423	481	50	-	66	11,020	
94	20,844	481	50	-	66	21,441	
95	10,423	481	50	-	66	11,020	
96	-	635	63	-	66	764	
97	1,242	587	63	-	66	1,958	(01) 18.4 km Bit. Surfacing
98	2,120	569	63	-	66	2,818	(08) 31.4 km Bit. Surfacing
99	4,220	514	63	-	66	4,863	(02, 03) 62,5 km Bit. Surfacing
2000	-	734	63	-	66	863	
1	-	734	63	-	66	863	
2	-	734	63	-	66	863	
3	-	734	63	-	66	863	
4	-	734	63	-	66	863	
Total	149,716	10,399	997	20,873	964	182,949	

Appendix Table A-10-3-(11) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: C-2 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	567	-	-	24	-	591	
81	865	-	-	36	-	901	
82	22	-	-	-	-	22	
83	14,404	-	-	612	-	15,016	
84	28,809	-	-	1,225	-	30,034	
85	14,855	-	-	788	-	15,643	
86	691	302	36	265	8	1,302	
87	34	302	36	-	8	380	
88	11,468	302	36	4,481	8	16,290	
89	22,936	302	36	8,961	8	32,243	
90	11,901	302	36	4,481	8	16,728	
91	650	428+484*	50	-	66	1,678	*(8) 10.0 km Overlay
92	1	463	50	-	66	580	
93	11,004	463	50	-	66	11,583	
94	22,007	463	50	-	66	22,586	
95	11,004	463	50	-	66	11,583	
96	-	610	63	-	66	739	
97	1,242	564	63	-	66	1,935	(01) 18.4 km Bit. Surfacing
98	2,120	549	63	-	66	2,798	(08) 31.4 km Bit. Surfacing
99	4,220	501	63	-	66	4,850	(02, 03) 62.5 km Bit. Surfacing
2000	-	721	63	-	66	850	
1	-	721	63	-	66	850	
2	-	721	63	-	66	850	
3	-	721	63	-	66	850	
4	-	721	63	-	66	850	
Total	158,800	10,103	997	20,873	964	191,737	

Appendix Table A-10-3-(12) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: C-3 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	624	-	-	24	-	648	
81	951	-	-	36	-	987	
82	22	-	-	-	-	22	
83	15,853	-	-	612	-	16,465	
84	31,707	-	-	1,225	-	32,932	
85	16,333	-	-	788	-	17,121	
86	735	215	36	265	8	1,259	
87	34	215	36	-	8	293	
88	12,212	215	36	4,481	8	16,952	
89	24,424	215	36	8,961	8	33,644	
90	12,674	215	36	4,481	8	17,414	
91	694	*297+484	50	-	66	1,591	*(8) 10.0 km Overlay
92	1	333	50	-	66	450	
93	11,743	333	50	-	66	12,192	
94	23,487	333	50	-	66	23,936	
95	11,743	333	50	-	66	12,192	
96	-	435	63	-	66	564	
97	-	435	63	-	66	564	
98	-	468	63	-	66	597	
99	-	523	63	-	66	652	
2000	-	633	63	-	66	762	
1	-	633	63	-	66	762	
2	-	633	63	-	66	762	
3	-	633	63	-	66	762	
4	-	633	63	-	66	762	
Total	163,237	8,214	997	20,873	964	194,285	

Appendix Table A-10-4-(1) Summary of Cash Flow of Construction/ Maintenance Costs of Project Road by Alternative Construction Plan of D-1 through D-6

YEAR	Case D-1	D-2	D-3	D-4	D-5	D-6
1980	384.	416.	457.	384.	416.	457.
1981	586.	632.	694.	586.	632.	694.
1982	20.	0.	0.	20.	20.	20.
1983	9776.	10565.	11608.	9776.	10565.	11608.
1984	19551.	21129.	23218.	19551.	21129.	23218.
1985	9776.	10565.	11608.	10382.	11192.	12264.
1986	257.	248.	185.	1181.	1204.	1185.
1987	257.	248.	185.	291.	282.	219.
1988	257.	248.	185.	15666.	16197.	16878.
1989	257.	248.	185.	31072.	32145.	33570.
1990	257.	248.	185.	15666.	16197.	16878.
1991	257.	248.	185.	478.	463.	357.
1992	257.	248.	185.	478.	463.	357.
1993	257.	248.	185.	478.	463.	357.
1994	257.	248.	185.	478.	463.	357.
1995	257.	248.	185.	478.	463.	357.
1996	257.	248.	185.	478.	463.	357.
1997	1450.	1443.	185.	1672.	1659.	357.
1998	273.	266.	219.	494.	481.	390.
1999	4329.	4328.	218.	4549.	4543.	390.
2000	328.	328.	329.	549.	543.	500.
2001	328.	328.	329.	549.	543.	500.
2002	328.	328.	328.	549.	543.	500.
2003	328.	328.	328.	549.	543.	500.
2004	-1608.	-1608.	328.	-16796.	-17342.	-16193.
TOTAL	48675.	51776.	51881.	99558.	104270.	106077.

Appendix Table A-10-4-(2) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: D-1 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks 1/
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	360	-	-	24	-	384	
81	550	-	-	36	-	586	
82	20	-	-	-	-	20	
83	9,164	-	-	612	-	9,776	
84	18,326	-	-	1,225	-	19,551	
85	9,164	-	-	612	-	9,776	
86	-	214	35	-	8	257	
87	-	214	35	-	8	257	
88	-	214	35	-	8	257	
89	-	214	35	-	8	257	
90	-	214	35	-	8	257	
91	-	214	35	-	8	257	
92	-	214	35	-	8	257	
93	-	214	35	-	8	257	
94	-	214	35	-	8	257	
95	-	214	35	-	8	257	
96	-	214	35	-	8	257	
97	1,242	165	35	-	8	1,450	(01) 18.4 km Bit. Surfacing
98	-	230	35	-	8	273	
99	4,220	65	35	-	8	4,328	
2000	-	285	35	-	8	328	
1	-	285	35	-	8	328	
2	-	285	35	-	8	328	
3	-	285	35	-	8	328	
4	-	285	35	-	8	328	
Total	43,046	4,239	665	2,509	152	50,611	

Appendix Table A-10-4-(3) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: D-2 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks 1/
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	392	-	-	24	-	416	
81	596	-	-	36	-	632	
82	20	-	-	-	-	20	
83	9,953	-	-	612	-	10,565	
84	19,904	-	-	1,225	-	21,129	
85	9,953	-	-	612	-	10,565	
86	-	205	35	-	8	248	
87	-	205	35	-	8	248	
88	-	205	35	-	8	248	
89	-	205	35	-	8	248	
90	-	205	35	-	8	248	
91	-	205	35	-	8	248	
92	-	205	35	-	8	248	
93	-	205	35	-	8	248	
94	-	205	35	-	8	248	
95	-	205	35	-	8	248	
96	-	205	35	-	8	248	
97	1,242	158	35	-	8	1,443	(01) 18.4 km Bit. Surfacing
98	-	223	35	-	8	266	
99	4,220	65	35	-	8	4,328	(02, 03) 62.5 km Bit. Surfacing
2000	-	285	35	-	8	328	
1	-	285	35	-	8	328	
2	-	285	35	-	8	328	
3	-	285	35	-	8	328	
4	-	285	35	-	8	328	
Total	46,280	4,126	665	2,509	152	53,732	

1/ Figure in parenthesis corresponds to the number of Project Road Sections.

Appendix Table A-10-4-(4) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: D-3 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	433	-	-	24	-	457	
81	658	-	-	36	-	694	
82	20	-	-	-	-	20	
83		-	-	612	-	11,608	
84	21,993	-	-	1,225	-	23,218	
85	10,996	-	-	612	-	11,608	
86	-	142	35	-	8	185	
87	-	142	35	-	8	185	
88	-	142	35	-	8	185	
89	-	142	35	-	8	185	
90	-	142	35	-	8	185	
91	-	142	35	-	8	185	
92	-	142	35	-	8	185	
93	-	142	35	-	8	185	
94	-	142	35	-	8	185	
95	-	142	35	-	8	185	
96	-	142	35	-	8	185	
97	-	142	35	-	8	185	
98	-	175	35	-	8	218	
99	-	175	35	-	8	218	
2000	-	285	35	-	8	328	
1	-	285	35	-	8	328	
2	-	285	35	-	8	328	
3	-	285	35	-	8	328	
4	-	285	35	-	8	328	
Total	45,096	3,479	665	2,509	152	51,901	

Appendix Table A-10-4-(5) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: D-4 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	360	-	-	24	-	384	
81	550	-	-	36	-	586	
82	20	-	-	-	-	20	
83	9,164	-	-	612	-	9,776	
84	18,326	-	-	1,225	-	19,551	
85	9,594	-	-	788	-	10,382	
86	659	214	35	265	8	1,181	
87	34	214	35	-	8	291	
88	10,928	214	35	4,481	8	15,666	
89	21,854	214	35	8,961	8	31,072	
90	10,928	214	35	4,481	8	15,666	
91	-	363	49	-	66	478	
92	-	363	49	-	66	478	
93	-	363	49	-	66	478	
94	-	363	49	-	66	478	
95	-	363	49	-	66	478	
96	-	363	49	-	66	478	
97	1,242	315	49	-	66	1,672	(01) 18.4 km Bit. Surfacing
98	-	379	49	-	66	494	
99	4,220	214	49	-	66	4,549	(02, 03) 62.5 km Bit. Surfacing
2000	-	434	49	-	66	549	
1	-	434	49	-	66	549	
2	-	434	49	-	66	549	
3	-	434	49	-	66	549	
4	-	434	49	-	66	549	
Total	87,879	6,329	861	20,873	964	116,906	

Appendix Table A-10-4-(6) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: D-5 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks 1/
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	392	-	-	24	-	416	
81	596	-	-	36	-	632	
82	20	-	-	-	-	20	
83	9,953	-	-	612	-	10,565	
84	19,904	-	-	1,225	-	21,129	
85	10,404	-	-	788	-	11,192	
86	691	205	35	265	8	1,204	
87	34	205	35	-	8	282	
88	11,468	205	35	4,481	8	16,197	
89	22,936	205	35	8,961	8	32,145	
90	11,468	205	35	4,481	8	16,197	
91	-	348	49	-	66	463	
92	-	348	49	-	66	463	
93	-	348	49	-	66	463	
94	-	348	49	-	66	463	
95	-	348	49	-	66	463	
96	-	348	49	-	66	463	
97	1,242	302	49	-	66	1,659	(01) 18.4 km Bit. Surfacing
98	4,220	366	49	-	66	4,701	(02, 03) 62.5 km Bit. Surfacing
99	-	208	49	-	66	323	
2000	-	428	49	-	66	543	
1	-	428	49	-	66	543	
2	-	428	49	-	66	543	
3	-	428	49	-	66	543	
4	-	428	49	-	66	543	
Total	93,328	6,129	861	20,873	964	122,155	

Appendix Table A-10-4-(7) Cash Flow of Construction/Maintenance Costs of Project Road by Alternative Construction Plan

Alternative Case: D-6 :M$ 000 in economic price

Year	Project Road			Feeder Roads		Total	Remarks 1/
	Const.	Maintenance		Const.	Maint.		
		Road	Bridge				
1980	433	-	-	24	-	457	
81	658	-	-	36	-	694	
82	20	-	-	-	-	20	
83	10,996	-	-	612	-	11,608	
84	21,993	-	-	1,225	-	23,218	
85	11,476	-	-	788		12,264	
86	735	142	35	265	8	1,185	
87	34	142	35	-	8	219	
88	12,212	142	35	4,481	8	16,878	
89	24,424	142	35	8,961	8	33,570	
90	12,212	142	35	4,481	8	16,878	
91	-	242	49	-	66	357	
92	-	242	49	-	66	357	
93	-	242	49	-	66	357	
94	-	242	49	-	66	357	
95	-	242	49	-	66	357	
96	-	242	49	-	66	357	
97	-	242	49	-	66	357	
98	-	275	49	-	66	390	
99	-	275	49	-	66	390	
2000	-	385	49	-	66	500	
1	-	385	49	-	66	500	
2	-	385	49	-	66	500	
3	-	385	49	-	66	500	
4	-	385	49	-	66	500	
Total	95,193	4,879	861	20,873	964	122,770	

1/ Figure in parenthesis cooresponds to the number of project Road Sections.

Appendix Table A-10-5 Cash Flow of Project Benefits by Alternative
Construction Plan of D-1 through D-6

YEAR	BENEFIT					CASE:D-2					CASE:D-3				
	NORMAL	DIVERTED	DEVELOPMENT	INDUCED	TOTAL	NORMAL	DIVERTED	DEVELOPMENT	INDUCED	TOTAL	NORMAL	DIVERTED	DEVELOPMENT	INDUCED	TOTAL
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	2608.	0.	626.	3234.	274.	2705.	0.	661.	3640.	547.	2796.	0.	696.	4039.
1986	0.	2779.	0.	1340.	4119.	291.	2881.	0.	1415.	4587.	583.	2978.	0.	1489.	5050.
1987	0.	2960.	105.	2151.	5216.	310.	3069.	111.	2271.	5761.	621.	3172.	117.	2389.	6299.
1988	0.	3153.	133.	3068.	6354.	331.	3269.	140.	3240.	6980.	662.	3379.	148.	3409.	7598.
1989	0.	3358.	167.	3283.	6808.	352.	3482.	177.	3467.	7478.	705.	3599.	186.	3647.	8137.
1990	0.	3578.	211.	3512.	7301.	376.	3709.	222.	3709.	8016.	751.	3833.	234.	3902.	8720.
1991	0.	3811.	211.	3758.	7780.	400.	3950.	222.	3968.	8540.	800.	4083.	234.	4175.	9292.
1992	0.	4059.	211.	4021.	8291.	426.	4208.	222.	4246.	9102.	853.	4349.	234.	4467.	9903.
1993	0.	4324.	211.	4302.	8837.	454.	4482.	222.	4543.	9701.	908.	4633.	234.	4779.	10554.
1994	0.	4606.	211.	4603.	9420.	484.	4774.	222.	4860.	10340.	968.	4935.	234.	5113.	11250.
1995	0.	4907.	211.	4924.	10042.	516.	5085.	222.	5200.	11023.	1031.	5256.	234.	5471.	11992.
1996	0.	5188.	211.	5220.	10619.	551.	5376.	222.	5512.	11661.	1102.	5557.	234.	5799.	12692.
1997	0.	5484.	211.	5533.	11228.	589.	5683.	222.	5843.	12337.	1177.	5875.	234.	6147.	13433.
1998	0.	5798.	211.	5865.	11874.	629.	6009.	222.	6193.	13053.	1258.	6211.	234.	6516.	14219.
1999	0.	6130.	211.	6217.	12558.	672.	6352.	222.	6565.	13811.	1344.	6566.	234.	6907.	15051.
2000	0.	6481.	211.	6590.	13282.	718.	6716.	222.	6959.	14615.	1436.	6942.	234.	7321.	15933.
2001	0.	6852.	211.	6985.	14048.	767.	7100.	222.	7376.	15465.	1534.	7339.	234.	7760.	16867.
2002	0.	7244.	211.	7404.	14859.	819.	7506.	222.	7819.	16366.	1639.	7759.	234.	8226.	17858.
2003	0.	7659.	211.	7848.	15718.	876.	7936.	222.	8288.	17322.	1751.	8203.	234.	8720.	18908.
2004	0.	8098.	211.	8319.	16628.	935.	8390.	222.	8785.	18332.	1871.	8673.	234.	9243.	20021.
TOTAL	0.	99077.	3570.	95569.	198215.	10770.	102682.	3758.	100920.	218130.	21541.	106138.	3961.	106176.	237816.

YEAR	CASE:D-4					CASE:D-5					CASE:D-6				
	NORMAL	DIVERTED	DEVELOPMENT	INDUCED	TOTAL	NORMAL	DIVERTED	DEVELOPMENT	INDUCED	TOTAL	NORMAL	DIVERTED	DEVELOPMENT	INDUCED	TOTAL
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	2642.	0.	626.	3268.	274.	2726.	0.	661.	3661.	547.	2796.	0.	696.	4039.
1986	0.	3107.	0.	1340.	4447.	291.	3205.	0.	1415.	4911.	583.	3288.	0.	1489.	5360.
1987	0.	3653.	111.	2151.	5915.	310.	3769.	114.	2271.	6464.	621.	3866.	117.	2389.	6993.
1988	0.	4296.	139.	3068.	7503.	331.	4432.	144.	3240.	8147.	662.	4546.	148.	3409.	8765.
1989	0.	5051.	176.	3283.	8510.	352.	5211.	181.	3467.	9211.	705.	5345.	186.	3647.	9883.
1990	0.	5939.	221.	3636.	9796.	376.	6128.	228.	3840.	10572.	751.	6285.	234.	4040.	11310.
1991	0.	6326.	221.	4027.	10574.	400.	6527.	228.	4253.	11408.	800.	6695.	234.	4474.	12203.
1992	0.	6739.	221.	4461.	11421.	426.	6953.	228.	4711.	12318.	853.	7131.	234.	4956.	13174.
1993	0.	7178.	1989.	4941.	14108.	454.	7406.	2052.	5218.	15130.	908.	7596.	2104.	5489.	16097.
1994	0.	7646.	2284.	5246.	15176.	484.	7888.	2357.	5540.	16269.	968.	8091.	2417.	5828.	17304.
1995	0.	8144.	2624.	5570.	16338.	516.	8403.	2707.	5882.	17508.	1031.	8618.	2776.	6188.	18613.
1996	0.	8610.	3015.	5914.	17539.	551.	8883.	3110.	6245.	18789.	1102.	9111.	3190.	6570.	19973.
1997	0.	9103.	3464.	6279.	18846.	589.	9392.	3574.	6631.	20186.	1177.	9633.	3665.	6976.	21451.
1998	0.	9624.	3977.	6667.	20268.	629.	9929.	4103.	7040.	21701.	1258.	10184.	4209.	7407.	23058.
1999	0.	10174.	3977.	7079.	21230.	672.	10497.	4103.	7475.	22747.	1344.	10766.	4209.	7864.	24183.
2000	0.	10756.	3977.	7516.	22249.	718.	11098.	4103.	7937.	23856.	1436.	11383.	4209.	8350.	25378.
2001	0.	11372.	3977.	7980.	23329.	767.	11733.	4103.	8427.	25030.	1534.	12034.	4209.	8866.	26643.
2002	0.	12023.	3977.	8473.	24473.	819.	12404.	4103.	8947.	26273.	1639.	12722.	4209.	9413.	27983.
2003	0.	12711.	3977.	8996.	25684.	876.	13114.	4103.	9500.	27593.	1751.	13450.	4209.	9995.	29405.
2004	0.	13438.	3977.	9552.	26967.	935.	13864.	4103.	10087.	28989.	1871.	14220.	4209.	10612.	30912.
TOTAL	0.	158532.	42304.	106805.	307641.	10770.	163562.	43644.	112787.	330763.	21541.	167760.	44768.	118658.	352727.

Appendix Table A-10-6 Results of Economic Analysis for Construction Plans of D-1 through D-6

8% Discount Rate

ANALYSIS CASE	PRESENT COST	VALUE (AT 1985 : M$ 000) B E N E F I T					IRR (%)	B/C RATIO	NPV (B-C)
		NORMAL	DIVERTED	DEVELOP MENT	INDUCED	TOTAL			
D-1	47662.	0.	45224.	1646.	41290.	88160.	15.73	1.85	40498.
D-2	51091.	4851.	46875.	1733.	43601.	97061.	16.08	1.90	45970.
D-3	53833.	9704.	48452.	1827.	45872.	105854.	16.26	1.97	52021.
D-4	92192.	0.	69774.	15077.	45393.	130244.	12.58	1.41	38052.
D-5	97129.	4851.	71988.	15555.	47936.	140329.	12.88	1.44	43201.
D-6	101718.	9704.	73836.	15955.	50431.	149926.	13.04	1.47	48208.

10% Discount Rate

ANALYSIS CASE	PRESENT COST	VALUE (AT 1985 : M$ 000) B E N E F I T					IRR (%)	B/C RATIO	NPV (B-C)
		NORMAL	DIVERTED	DEVELOP MENT	INDUCED	TOTAL			
D-1	47975.	0.	38598.	1397.	34655.	74650.	15.73	1.56	26675.
D-2	51494.	4129.	40008.	1471.	36595.	82203.	16.08	1.60	30719.
D-3	54654.	8259.	41354.	1551.	38501.	89664.	16.26	1.64	35010.
D-4	90133.	0.	58908.	11930.	37927.	109765.	12.58	1.21	19632.
D-5	95083.	4129.	60777.	12307.	40052.	117265.	12.88	1.23	22182.
D-6	100040.	8259.	62338.	12624.	42137.	125357.	13.04	1.25	25317.

Appendix Note A-10-1

Road Construction Impact Preliminary Study Summary: Areas along the Miri/Bintulu Road

I. Introductory Background

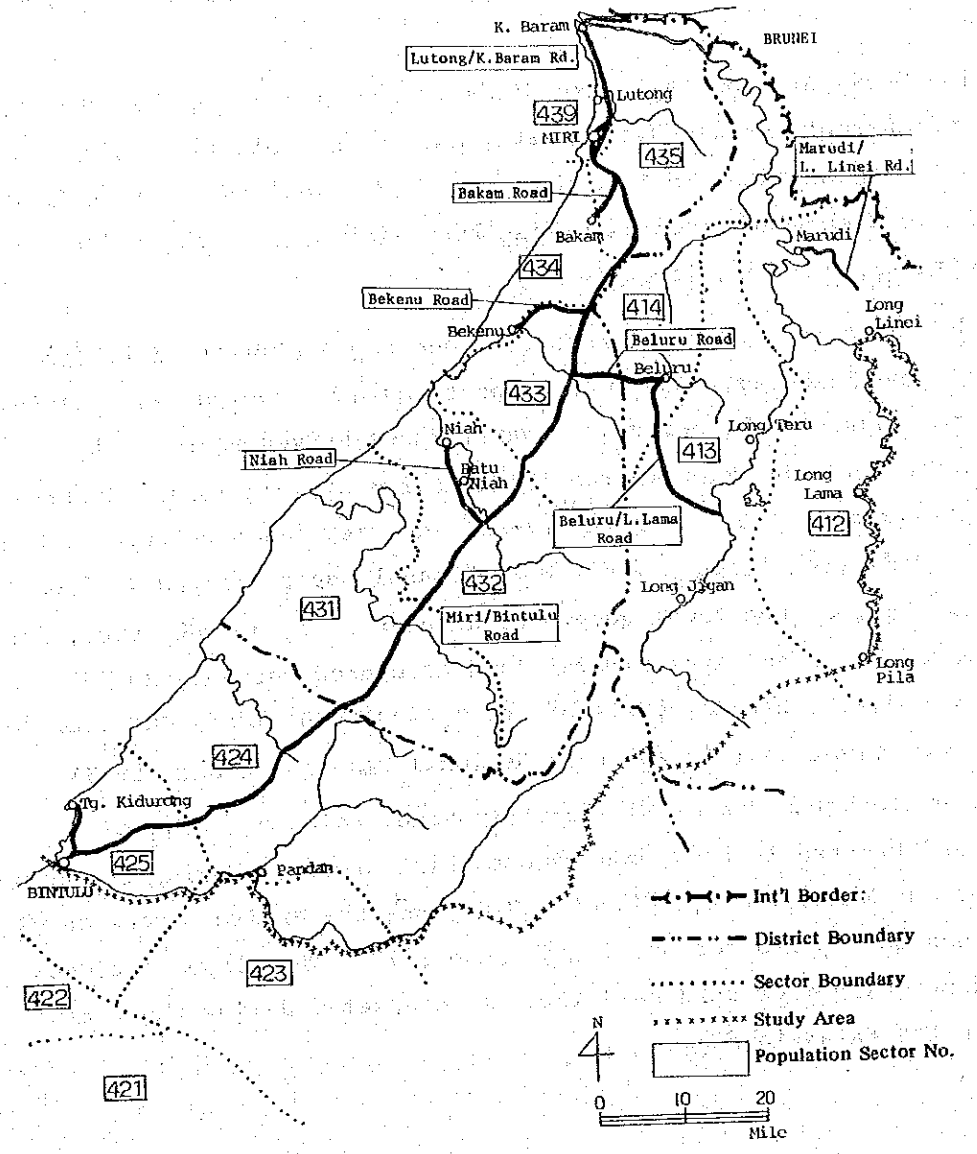
This Case Study has been completed for the purpose of predicting changes in various aspects which the contruction of a Beluru/Long Lama/Limbang Trunk Road will possiblly cause in the areas along the Road.

The Study Area of this Case Study is the area along Miri/Bintulu Road, which runs through Miri, Baram, and Bintulu Districts of the Sarawak's 4th Division in East Malaysia, and Bakam Road, Bekenu Road as well as Niah Road (including Niah/Batu Niah Spur Road), which stem from Miri/Bintulu Road (see Fig. A).

This area is a tropical rain zone and has a climate with high temperature and humidity. The coastal part contains swamps, and the inland hills are separated by numerous rivers, which served as the only transportation mode prior to the construction of said roads. Settlements and farms strung along the rivers and vast lands between rivers had been left unexplored. The 1:250,000 scalemap published in 1968 revealed that, of the total geographical area of 3,550,000 acres, forest represented 78.3% and agricultural land accounted for only 20.2%--and moreover, 13.9% (that is, 69.1% of the agricultural land) was used for shifting cultivation (Miri/Bintulu Regional Planning Study, 1973).

The construction of Miri/Bintulu Road, which was planned in 1959 and started in 1960, made substantial progress during the period of the 1st Malaysia Plan (1966 - 1970), and the entire extension of the Road was opened for service in June 1972. The above mentioned roads stemming from this Road were all completed during the period of the 1st Malaysia Plan.

Fig. A The Project Road Impact Area



2. Population

The population of the Study Area (14 Sectors in the 3 Districts, excluding Miri Town) increased from the 82,950 in 1968 to 138,388 in 1977, for an average annual increase rate of 5.85%, which was quite high in comparision with the 2.51% in Sarawak State as a whole. Of the 14 Sectors, roads run though 8 Sectors, and the population of these 8 Sectors increased from the 44,133 prior to the completion of the road (1968) to 81,432 after the opening of the road (1977), for an even higher average annual increase rate of 7.04% (See Table A). Population increase was particularly remarkable in Sector 425 (which encompasses Bintulu City) and Sector 433.

Table A Sectoral Populations Before and After the Road Completion

Sector	Before (1968)	After (1977)	Average Annual Growth Rate (%)
414	6,937	10,464	4.67
424	5,275	7,682	4.27
425	8,431	19,608	9.83
431	2,864	5,693	7.93
432	5,497	10,324	7.25
433	5,402	13,351	10.58
434	3,900	4,738	2.19
435	5,827	9.572	5.67
Total	44,133	81,432	7.04

Source: Master List of Kampong 1968 & 1977

As for racial distribution, Sea Dayak, Malaya, and Chinese together, represented 88.8% of the 8-Sector population prior to the road's completion and 95.45% after the completion, and separately registered the three highest increase rates of all races (See Table B).

The people living in Kampong (settlements), which increased in number from the 340 (before) to 439 (after the road completion) are shown in Table C.

Table B Racial Distribution of the 8-Sector Population, Before and After the Road Completion

Race	Population		Average Annual Growth Rate (%)
	Before (1968)	After (1977)	
Malay	15,223 (34.5)	27,523 (33.8)	6.80
Chinese	8,158 (18.5)	14,799 (18.2)	6.84
Sea Dayak	15,780 (35.8)	35,333 (43.4)	9.37
Kenyak	408 (0.9)	711 (0.9)	6.37
Kayan	-	125 (0.2)	-
Punyah	356 (0.8)	377 (0.5)	0.64
Others & Unknown	4,208 (9.5)	2,564 (3.1)	-5.66
Total	44,133 (100.0)	81,432 (100.0)	7.04

Source: Master List of "Kampong" 1968 & 1977

Table C. Number of "Kampong" by Sector & by Race

District	Sector	Sea Dayak		Malay		Chinese		Others Unknown		Total	
		1968	1977	1968	1977	1968	1977	1968	1977	1968	1977
Baram	414	27	30	9	12	7	19	5	-	45	61
Bintulu	424	30	40	4	5	4	7.5	17	12.5	55	65
	425	25	34.5	6	7.5	11	19	10	1	42	62
	431	15	29	7	11	1	8	4	5	27	53
	432	25	47.5	5	8.5	5	9	10	2	45	67
Miri	433	12	26.5	26	29.5	2	4	6	1	46	61
	434	-	-	26	25	3	6	6	4	35	38
	435	1	4.5	16.5	17	5	9	9.5	1.5	32	32
Total		135	212	99.5	118.5	38	86.5	67.5	27	340	439

3. Land Utilization

Land utilization maps covering the northern half of Miri/Bintulu Road-side area have been prepared from aerial photographs taken before (1963 - 1964) and after (1977) the completion of this road, in order to obtain facts about the impact of a new road on the adjacent areas (see Fig. B, Fig. C, Fig. D-1 through -6, and Fig. E-1 through -6).

Using these land utilization maps, area sizes of land within the belt of one kilometer width from the Road or a river and land one to two kilometers away from them, as well as the sizes of land in different uses before and after the road completion have been measured in Area C and Area F. (See Fig. B). These planimetric measurements enables a comparison between land immediately adjacent to the road and land at some distance from the road and between with and without the road situations. The results of the measurement are shown in Table D and Table E.

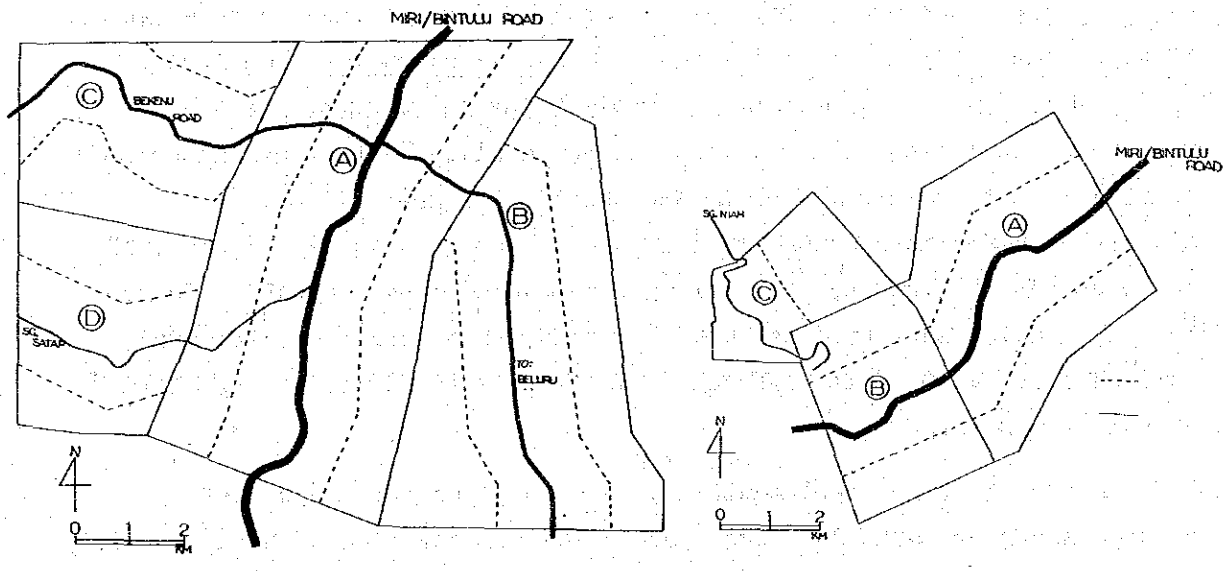
In Area C, before the Road construction, land in permanent crops was only three hectares, while slash-and-burn farming land represented 23.0% of the total areal land space of 8,750 hectares (of the 23.0%, land representing only 6.8% was actually being cultivated, the remainder was fallow). A majority of the total land space was untouched: natural forest represented 63.6% and secondary forest, 12.8%.
After the road construction, land in permanent crops increased to 2,919 hectares (34.1%), and the settlement area expanded by ten-fold. Shifting cultivation increased to 44.6% (of this, that actually cultivated increased to 8.0%), while natural forest shrunk to 12.8%, or one-fifth of the size before.

In Area F, some settlements and land in permanent crops already existed along Sg. Niah Road even before the construction of Miri/Bintulu Road, and slash-and-burn farming had reached 34.9% (2.1% actually cultivated) of the total areal space. After the completion of the Road, both settlement space and land in permanent crops increased as in Area C, and slash-and-burn farming reached as much as 70% of the total land (althouth, that which was actually cultivated shrunk to 1.1%). Natural forestry decreased, not so rapidly as in Area C, but substantially from 61.3% down to 26.9%.

A comparisons made between the land immediately adjacent to the Road or a river compared with land at some distance from them revealed that, in both Area C and Area F, remarkable increases in settlements and permanent crop land occurred immediately adjacent to both sides of the river. Reductions in natural forest were somewhat more noticeable in the land immediately adjacent rather than in the belt one to two kilometers away.

These changes in land utilization indicate that development is faster in land closer to a road or a river. (The remarkable increases in slash-and-burn farming, which have resulted from squatting by the aborigines, have at the same time invited rapid compensatory reductions in natural forest thus contributing to flooding and providing a hindrance to orderly development.)

Fig. B Land Utilization Areas Measured



(Area C) (Area F)

Table D Area and Percentage of Land Use Categories (Area C)

Land Use	1 km Width 1963 ha	(%)	1 km Width 1977 ha	(%)	1-2 km Belt 1963 ha	(%)	1-2 km Belt 1977 ha	(%)	2 km Belt 1963 ha	(%)	2 km Belt 1977 ha	(%)
1. Settlement[1]	4	(0.1)	83	(1.9)	5	(0.1)	9	(0.2)	9	(0.1)	92	(1.1)
2-1 a Wet Padi	-	-	-	-	-	-	-	-	-	-	-	-
b Pepper[2]	-	-	23	(0.5)	2	(0.05)	9	(0.2)	2	(0.02)	32	(0.4)
c Rubber	-	-	29	(0.7)	-	-	12	(0.3)	-	-	41	(0.5)
d Oil Palm	-	-	1,791	(40.7)	-	-	1,054	(25.3)	-	-	2,895	(33.2)
e Others[3]	-	-	1	(0.02)	1	(0.02)	1	-	1	(0.01)	1	(0.01)
Sub-Total	-	(-)	1,844	(41.9)	3	(0.1)	1,075	(25.8)	3	(0.04)	2,919	(34.1)
2-2 f Under Cultivation	286	(6.5)	447	(10.2)	293	(7.0)	242	(5.8)	579	(6.8)	689	(8.0)
g Fallow Land	599	(13.6)	1,316	(29.9)	795	(19.1)	1,819	(43.6)	1,394	(16.3)	3,135	(36.6)
Sub-Total	885	(20.1)	1,763	(40.1)	1,088	(26.1)	2,060	(49.4)	1,973	(23.0)	3,823	(44.6)
3. Secondary Forest	589	(13.4)	376	(8.5)	511	(12.3)	249	(6.0)	1,100	(12.8)	625	(7.3)
4. Forest Land	2,922	(66.4)	318	(7.2)	2,528	(60.6)	777	(18.6)	5,450	(63.6)	1,095	(12.8)
5. Swamp, Unproductive Land & Clearings	-	-	17	(0.4)	35	(0.8)	-	-	35	(0.4)	17	(0.2)
Total	4,400	(100.0)	4,400	(100.0)	4,170	(100.0)	4,170	(100.0)	8,570	(100.0)	8,570	(100.0)

Source: Planimetric Measurement from the Aerial Photographs of 1963 and 1977

1) Assumed 0.90 hectare per Settlement 2) Assumed 0.75 rectare per Field
3) Assumed 0.60 hectare per Field

Table E Area and Percentage of Land Use Categories (Area F)

Land Use	1 km Width 1963 ha	(%)	1 km Width 1977 ha	(%)	1-2 km Belt 1963 ha	(%)	1-2 km Belt 1977 ha	(%)	2 km Belt 1963 ha	(%)	2 km Belt 1977 ha	(%)
1. Settlement	10	(0.5)	35	(1.8)	-	-	2	(0.1)	10	(0.3)	37	(1.0)
2-1 a Wet Padi	-	-	6	(0.3)	-	-	-	-	-	-	6	0.2
b Pepper	2	(0.1)	62	(3.2)	1	(0.1)	6	(0.3)	3	(0.1)	68	(1.8)
c Rubber	-	-	6	(0.3)	-	-	-	-	-	-	6	(0.2)
d Oil Palm	-	-	-	-	-	-	-	-	-	-	-	-
e Others	13	0.7	-	-	1	(0.1)	-	-	14	(0.4)	-	-
Sub-Total	15	(0.8)	74	(3.9)	2	(0.1)	6	(0.3)	17	(0.4)	80	(2.1)
2-2 f Under Cultivation	37	(1.9)	-	-	43	(2.3)	43	(2.3)	80	(2.1)	43	(1.1)
g Fallow Land	629	(32.9)	1,427	(74.7)	619	(32.8)	1,190	(63.0)	1,248	(32.8)	2,617	(68.9)
Sub-Total	665	(34.8)	1,427	(74.7)	662	(35.0)	1,233	(65.2)	1,327	(34.9)	(2,660)	(70.0)
3. Secondary Forest	63	(3.3)	-	-	50	(2.6)	-	-	113	(3.0)	-	-
4. Forest Land	1,151	(60.3)	374	(19.6)	1,176	(62.2)	649	(34.3)	2,327	(61.2)	1,023	(26.9)
5. Swamp, Unproductive Land & Clearings	6	(0.3)	-	-	-	-	-	-	6	(0.2)	-	-
Total	1,910	(100.0)	1,910	(100.0)	1,890	(100.0)	1,890	(100.0)	3,800	(100.0)	3,800	(100.0)

Source: Planimetric Measurement from the Aerial phtographs of 1963 and 1977

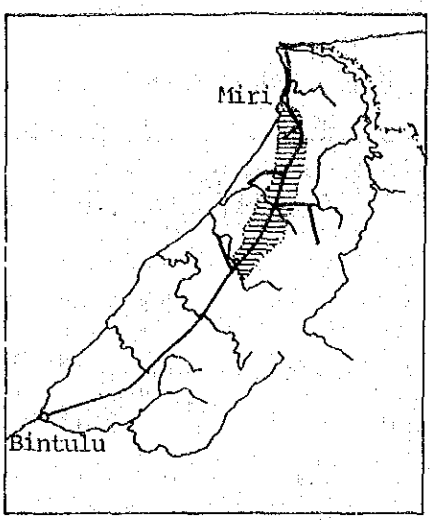


Fig. C Location of Areas for Land Use Comparison