CHAPTER 8

EVALUATION AND RECOMMENDATION

CHAPTER 8

EVALUATION AND RECOMMENDATION

8-1 ECONOMIC EVALUATION

Economic viability of the proposed roads was evaluated under the conventional cost/benefit analysis.

Economic benefits counted in the evaluation include:

a) Savings of vehicle operating cost, as described in Chapter 5.

b) Increment of net value added of agricultural porduction attributable to the project, as described in Chapter 4.

c) Savings of road maintenance costs in the road networks concerned, as described in Chapter 7.

d) Residual value of the subject road in the end year of the evaluation period, at the end of 15th year after opening (residual value was counted at 50% of direct construction costs and physical contingency and 100% of land acquisition cost).

Economic costs considered are:

a) Economic construction costs including direct construction cost, engineering and administration and land acquisition, as calculated in Chapter 7.

b) Cost of overlay at the beginning of 8th year after opening, as mentioned in Chapter 7.

Based on the above costs and benefits, internal rate of return was calculated for each project road. Major conditions of calculation are as follows:

a) Year of opening to traffic was set at 1987 which is the base year of the evaluation.

b) Benefits were counted for 15 years after opening.

c) Construction costs were assumed to be disbursed in 2 years or 3 years corresponding to the type of construction schedule as mentioned in Chapter 7. It is assumed that all projects would be completed by the end of 1986.

d) All costs and benefits were estimated at constant price of mid 1981.

e) Costs and benefits were estimated on the condition of F4 class of standard, except for cases of F5 for Route 20 and F6 for Route 27.

f) For the sake of conservative analysis, it was assumed that costs would appear at the beginning of year and benefits would occur at year end. Setting 1987 as the base year of evaluation, benefits and costs were discounted or compounded to the point of the beginning of 1987.

The calculated IRR are shown in Table 8-1. If cut-off rate is set at 12%, 12 route of 393.8 km in total are economically feasible. Among the remaining 2 routes, Route 27 in F6 standard seems to be marginal. For Route 23, partial evaluation was attempted. The IRR for the southern half portion of 33.2 km, Rt. 12 to Rt. 1048, was calculated at 14.2%. This indicates that the rate is higher than the case combined with the northern half.

8-2 RECOMMENDATION

According to the economic evaluation of the proposed roads, the following routes are considered to be justifiable and recommended to be implemented by the end of the current five-year plan period, i.e. by 1986:

> Route 6 (Alternative 6-4), Route 8, Route 12, Route 14, Route 15, Route 19, Route 20 (F5), Route 23 (Alternative 23-2), Route 25, Route 29, Route 30 and Route 31.

Among the above, it is possible for Route 23 to further consider the stage-wise implementation, taking up the southern portion as the 1st stage.

As Route 27 in F6 standard is considered to be marginal in its economic viability, the investment decision depends on the availability of surplus budget.

As a conclusion, it is recommended to arrange promptly for financing the projects recommended and to commence the detailed designs for them.

Total financing requirement for the selected 12 routes is shown below.

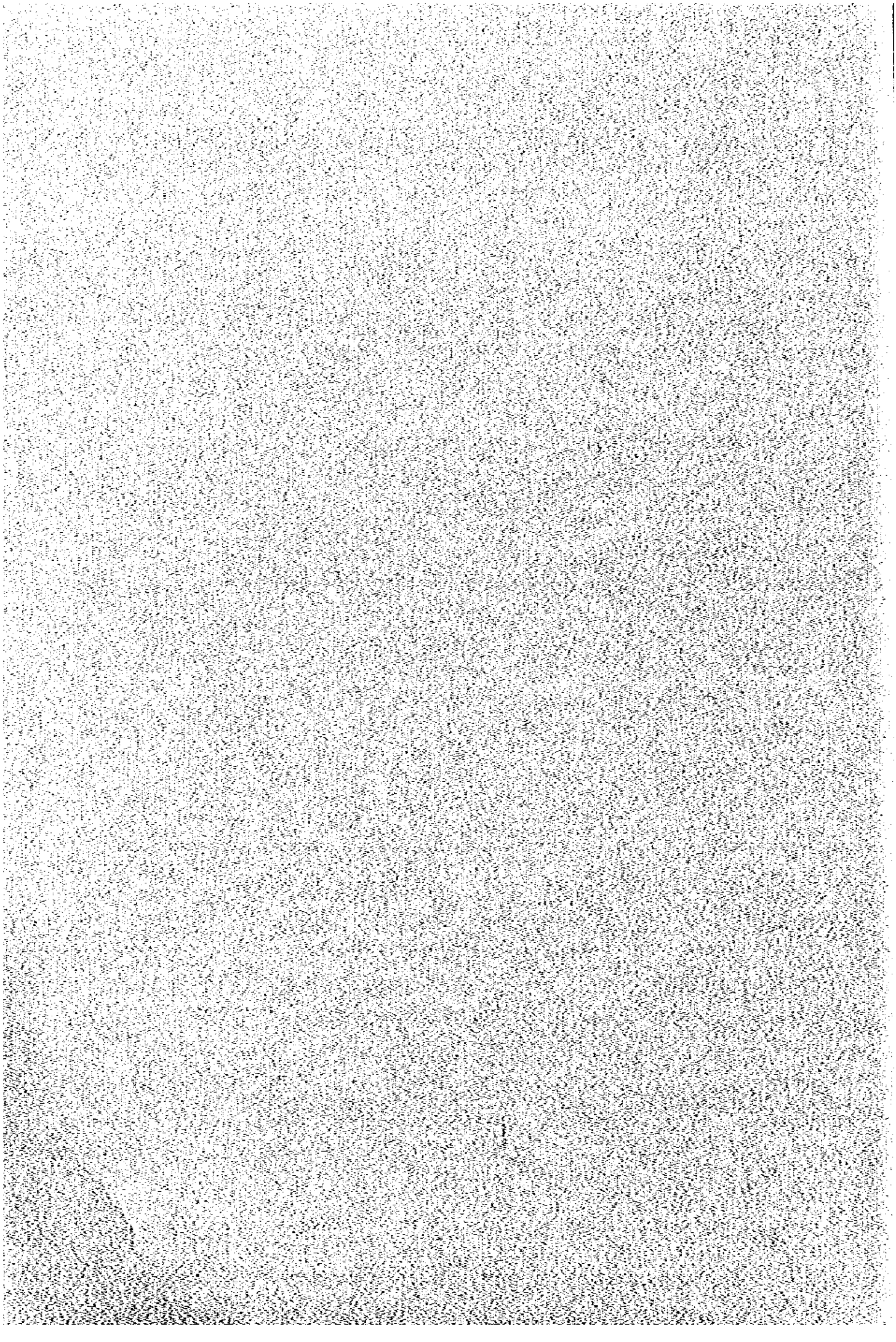
	1984	1985	1986	Total
Foreign Component (Million US$)	3.8	11.3	9.7	24.8
Domestic Component (Million ฿)	106.5	332.5	295.6	734.6
Total (Million ฿)	192.3	592.1	519.1	1,303.5
or (Million US$)	8.4	25.8	22.6	56.8

Table 8-1 INTERNAL RATE OF RETURN

Study Route No.	Changwat	Origin	Destination	Length (km)	IRR (%)
6 (6-4)*	Kamphaeng Phet/ Nakhon Sawan	Khanu Woralaksa Buri	Rt.117 (B.Don Doo)	46.0	28.5
8	Kamphaeng Phet	Rt.115 (B. Thung Naha Chai)	B. Nong Takhian	53.5	20.2
11	Phichit	Rt.1068	Pho Pra Thap Chang	6.8	7.1
12	Phichit	B. Wang Chik	Rt.117 (B. Pa Daeng)	13.0	22.5
14	Phichit/ Phetchabun	B. Nong Khanak	B. Wang Pong	21.0	15.7
15	Phichit/ Phitsanulok	B. Wang Tham	B. Tha Makham	8.3	20.6
19	Phitsanulok	Phrom Phiram	Rt.11 (B. Nong Makhang)	14.4	13.5
20 (F5)	Phitsanulok	Wat Bot	B. Nakham	15.7	20.2
23 (23-2)*	Sukhothai	Rt.12 (Muang Kao Sukhothai)	Si Satchanalai	51.9	14.0
25	Phrae/ Lampang	A. Wang Chin	Thoen	54.0	16.2
27 (F6)	Lamphun	Rt.106 (B. Mae Thoei)	A. Thung Hua Chang	16.6	11.8
29	Chiang Rai	Rt.110 (B. Rong (Sua Ten)	B. Huai Khon	13.2	15.6
30	Chiang Rai	Rt.1020 (B. Tung Ngiu)	Rt.1020 (B. Chumphu)	47.8	17.4
31	Chiang Rai	Rt.1016 (B. Kiu Phrao)	Rt.1174 (B. Kaen Tai)	55.0	20.3

* Selected among alternatives

APPENDIXES



Appendix 2-1 PER CAPITA GPP OF RELATED CHANGWAT
(Million Baht at 1972 Constant Price)

Changwat	1973[1/]	1977[1/]	1975[2/]	1979[2/]	Average Growth[3/] (73-79)	Index[4/]
Chiang Rai	2,228	3,713	2,659	3,998	4.99%	110
Lamphun	2,339	3,251	4,482	4,977		
Lampang	3,016	3,616	3,679	4,629		
Phrae	2,921	3,408	4,096	4,183		
S-total	8,276	10,275	12,257	13,789	5.72%	127
Suthothai	2,832	3,388	4,061	4,590		
Phitsanulok	2,667	3,047	2,731	3,769		
S-total	5,499	6,435	6,792	8,359	4.64%	102
Kamphaeng Phet	2,682	3,075	3,348	4,116		
Phichit	2,542	3,114	2,972	4,347		
Nakhon Sawan	3,096	3,127	3,896	4,570		
S-total	8,320	9,316	10,216	13,033	5.06%	111
Northern	2,898	3,456	3,663	4,350	4.54%	100

Note: 1/ based on "Gross Regional and Provincial Product, 2520, NESDB"
2/ based on "Gross Regional and Provincial Product, 2522, NESDB"
3/ based on the adjusted figures for 1973 referring to the two data sources.
4/ indicate the relative positions of each group of Changwat against the regional average in term of growth rate of per capita GPP.

Appendix 4-1 FUTURE PLANTED AREA BY PROPOSED ROUTE
- WITHOUT PROJECT -

(1000 RAI)

STUDY ROUTE	1987 PADDY	1987 UPLAND	1993 PADDY	1993 UPLAND	2001 PADDY	2001 UPLAND
6-1	75.8	29.3	75.8	29.3	75.8	29.3
6-2	101.5	46.5	101.5	46.5	101.5	46.5
6-3	75.4	33.2	75.4	33.2	75.4	33.2
6-4	76.0	37.2	76.0	37.2	76.0	37.2
8	70.0	45.6	70.0	47.0	70.0	48.4
11	5.8	4.2	5.8	4.2	5.8	4.2
12	56.4	14.6	56.4	14.6	56.4	14.6
14	23.3	25.6	23.3	25.6	23.3	25.6
15	18.8	2.4	18.8	2.4	18.8	2.4
19	38.1	2.6	39.1	2.6	39.1	2.6
20	7.5	24.3	7.5	25.2	7.5	25.2
23-1	134.8	33.7	134.8	35.9	134.8	37.1
23-2	167.4	34.1	167.4	36.3	167.4	37.5
25	31.2	44.9	31.2	44.9	31.2	44.9
27	0.8	4.4	0.8	4.8	0.8	5.2
29	8.7	13.5	8.7	13.5	8.7	13.5
30	98.6	20.5	98.6	20.5	98.6	20.5
31	19.7	38.1	19.7	38.1	19.7	38.1

Appendix 4-1 FUTURE PLANTED AREA BY PROPOSED ROUTE (Cont'd)
- WITH PROJECT -

(1000 RAI)

STUDY	1987		1993		2001	
ROUTE	PADDY	UPLAND	PADDY	UPLAND	PADDY	UPLAND
6-1	75.8	29.3	75.8	29.3	75.8	29.3
6-2	101.5	46.5	101.5	46.5	101.5	46.5
6-3	75.4	33.2	75.4	33.2	75.4	33.2
6-4	76.0	37.2	76.0	37.2	76.0	37.2
8	70.0	45.9	70.0	49.4	70.0	52.9
11	5.8	4.2	5.8	4.2	5.8	4.2
12	56.4	14.6	56.4	14.6	56.4	14.6
14	23.3	25.6	23.3	25.6	23.3	25.6
15	18.8	2.4	18.8	2.4	18.8	2.4
19	39.1	2.6	39.1	2.6	39.1	2.6
20	7.5	24.3	7.5	25.2	7.5	25.2
23-1	134.8	34.0	134.8	38.0	134.8	40.8
23-2	167.4	34.4	167.4	38.4	167.4	41.2
25	31.2	44.9	31.2	44.9	31.2	44.9
27	0.8	4.4	0.8	5.3	0.8	5.3
29	8.7	13.5	8.7	13.5	8.7	13.5
30	98.6	20.5	98.6	20.5	98.6	20.5
31	19.7	38.1	19.7	38.1	19.7	38.1

Appendix 4-2 CROP YIELDS BY AMPHOE
- WITHOUT PROJECT -
(1987)

(TON/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	0.328	-	0.450	0.140	0.117	0.233	2.813
BANPHOT PHISAI	0.400	0.200	0.320	0.110	0.130	0.300	3.500
KAO LIEO	0.308	-	0.393	0.137	0.150	0.180	-
PHICHIT	0.340	0.260	0.280	0.140	0.170	0.190	-
SAM NGAM	0.314	-	0.250	0.129	0.317	0.400	-
TAPHAN HIN	0.350	-	0.370	0.140	0.150	0.200	-
PHO PRATHAP CHANG	0.320	-	0.270	0.100	0.100	0.170	-
WANG SAI PHUN	0.308	-	-	-	-	-	-
PHROM PHIRAM	0.330	-	0.310	0.130	0.220	0.200	-
WAT BOT	0.370	0.325	0.240	0.110	0.140	0.160	3.300
BANG KRATHUM	0.330	-	0.240	0.130	-	-	-
WANG CHIN	0.550	0.290	0.310	0.150	0.160	0.210	-
THOEN	0.390	0.240	0.240	0.140	0.120	0.270	1.283
CHAING RAI	0.620	0.380	0.320	0.150	0.230	0.250	2.013
CHAING KHONG	0.610	0.370	0.400	0.230	0.270	0.200	1.674
MAE CHAN	0.600	0.320	0.320	0.120	0.160	0.200	1.374
THOENG	0.450	0.410	0.390	0.170	0.120	0.210	-
WIANG CHAI	0.560	0.250	0.270	0.120	0.150	0.180	-
LI	0.360	0.250	0.300	0.150	0.210	0.310	-
THUNG HUA CHANG	0.430	0.260	0.330	0.150	0.150	0.260	-
SUKHOTHAI	0.281	0.242	0.250	0.140	0.150	0.150	-
SI SATCHANALAI	0.390	0.330	0.200	0.160	0.170	0.170	1.527
THUNG SALIAM	0.460	0.370	0.220	0.140	0.150	0.140	-
SAWANKHALOK	0.470	0.320	0.245	0.140	0.150	0.210	-
SI SAMRONG	0.201	0.250	0.250	0.140	0.140	0.210	-
BAN DAN LAN HOI	0.264	0.250	0.200	0.150	0.149	0.221	-
KHLONG KHLUNG	0.370	0.400	0.330	0.100	0.170	0.250	2.791
KHANU WORALAKSABURI	0.370	0.270	0.330	0.100	0.180	0.250	2.623
SAI NGAM	0.370	-	0.330	0.100	0.200	0.250	-
CHON DAEN	0.323	-	0.220	0.110	0.230	0.180	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-2 CROP YIELDS BY AMPHOE (Cont'd)
- WITHOUT PROJECT -
(1987)

(Cont'd) (TON/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	7.350	0.200	-	0.487	0.958	0.833
BANPHOT PHISAI	7.800	0.150	-	0.220	1.041	1.300
KAO LIEO	8.300	-	-	0.350	2.275	0.870
PHICHIT	4.833	0.120	-	0.140	1.300	1.500
SAM NGAM	2.433	0.225	-	-	1.633	-
TAPHAN HIN	2.433	-	-	-	0.927	1.200
PHO PRATHAP CHANG	2.533	-	-	-	0.770	-
WANG SAI PHUN	-	-	-	-	-	-
PHROM PHIRAM	-	-	-	-	1.240	1.000
WAT BOT	3.327	-	-	-	0.330	1.200
BANG KRATHUM	-	-	-	-	-	0.409
WANG CHIN	-	0.500	-	-	1.000	1.100
THOEN	3.645	0.231	0.980	0.640	0.790	2.000
CHAING RAI	3.233	0.200	0.470	0.250	0.906	0.805
CHAING KHONG	-	0.365	-	-	0.720	2.230
MAE CHAN	-	0.372	0.380	-	1.130	0.557
THOENG	-	0.495	-	-	1.420	0.448
WIANG CHAI	-	0.400	-	-	0.650	1.004
LI	-	0.242	1.120	0.715	0.900	0.913
THUNG HUA CHANG	-	0.209	-	-	1.330	1.684
SUKHOTHAI	2.633	0.350	-	-	0.840	1.180
SI SATCHANALAI	4.543	0.326	-	0.210	1.180	0.650
THUNG SALIAM	5.454	-	-	-	0.730	0.550
SAWANKHALOK	7.320	-	-	-	0.650	0.500
SI SAMRONG	4.043	0.190	-	-	0.630	3.814
BAN DAN LAN HOI	3.966	-	-	0.231	0.926	-
KHLONG KHLUNG	6.504	-	-	0.410	0.940	0.849
KHANU WORALAKSABURI	6.504	-	-	0.290	-	0.929
SAI NGAM	6.504	-	-	0.300	-	1.200
CHON DAEN	3.033	-	-	-	1.100	1.170

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-2 CROP YIELDS BY AMPHOE (Cont'd)

- WITH PROJECT -

(1987)

(TON/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	0.329	-	0.451	0.141	0.118	0.234	2.833
BANPHOT PHISAI	0.401	0.201	0.321	0.111	0.131	0.301	3.500
KAO LIEO	0.309	-	0.393	0.138	0.151	0.181	-
PHICHIT	0.342	0.261	0.281	0.141	0.171	0.191	-
SAM NGAM	0.316	-	0.251	0.130	0.318	0.400	-
TAPHAN HIN	0.352	-	0.371	0.141	0.151	0.201	-
PHO PRATHAP CHANG	0.322	-	0.271	0.101	0.101	0.171	-
WANG SAI PHUN	0.309	-	-	-	-	-	-
PHROM PHIRAM	0.332	-	0.311	0.131	0.221	0.201	-
WAT BOT	0.372	0.326	0.241	0.111	0.141	0.161	3.300
BANG KRATHUM	0.332	-	0.241	0.131	-	-	-
WANG CHIN	0.551	0.291	0.311	0.151	0.158	0.215	-
THOEN	0.392	0.241	0.241	0.141	0.123	0.267	1.303
CHAING RAI	0.621	0.381	0.321	0.151	0.231	0.251	2.033
CHAING KHONG	0.611	0.371	0.401	0.231	0.271	0.201	1.694
MAE CHAN	0.601	0.321	0.321	0.121	0.161	0.201	1.394
THOENG	0.451	0.411	0.391	0.171	0.123	0.211	-
WIANG CHAI	0.561	0.251	0.271	0.121	0.149	0.181	-
LI	0.362	0.251	0.301	0.151	0.211	0.311	-
THUNG HUA CHANG	0.431	0.261	0.331	0.151	0.151	0.261	-
SUKHOTHAI	0.283	0.243	0.251	0.141	0.151	0.151	-
SI SATCHANALAI	0.392	0.331	0.201	0.161	0.171	0.171	1.553
THUNG SALIAM	0.461	0.371	0.221	0.141	0.151	0.141	-
SAWANKHALOK	0.471	0.321	0.246	0.141	0.151	0.211	-
SI SAMRONG	0.202	0.251	0.250	0.141	0.141	0.211	-
BAN DAN LAN HOI	0.265	0.251	0.201	0.151	0.150	0.222	-
KHLONG KHLUNG	0.372	0.401	0.331	0.101	0.171	0.251	2.811
KHANU WORALAKSABURI	0.372	0.271	0.331	0.101	0.181	0.251	2.643
SAI NGAM	0.372	-	0.331	0.101	0.201	0.251	-
CHON DAEN	0.325	-	0.221	0.111	0.231	0.181	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-2 CROP YIELDS BY AMPHOE (Cont'd)

- WITH PROJECT -

(1987)

(Cont'd) (TON/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	7.383	0.200	-	0.487	0.958	0.833
BANPHOT PHISAI	7.813	0.150	-	0.220	1.041	1.300
KAO LIEO	8.300	-	-	0.350	2.275	0.870
PHICHIT	4.900	0.120	-	0.140	1.300	1.500
SAM NGAM	2.500	0.225	-	-	1.633	-
TAPHAN HIN	2.533	-	-	-	0.927	1.200
PHO PRATHAP CHANG	2.633	-	-	-	0.770	-
WANG SAI PHUN	-	-	-	-	-	-
PHROM PHIRAM	-	-	-	-	1.240	1.000
WAT BOT	3.427	-	-	-	0.330	1.200
BANG KRATHUM	-	-	-	-	-	0.409
WANG CHIN	-	0.500	-	-	1.000	1.100
THOEN	3.745	0.231	0.980	0.640	0.790	2.000
CHAING RAI	3.333	0.200	0.470	0.250	0.906	0.805
CHAING KHONG	-	0.365	-	-	0.720	2.230
MAE CHAN	-	0.372	0.380	-	1.130	0.557
THOENG	-	0.495	-	-	1.420	0.448
WIANG CHAI	-	0.400	-	-	0.650	1.004
LI	-	0.242	1.120	0.715	0.900	0.913
THUNG HUA CHANG	-	0.209	-	-	1.330	1.684
SUKHOTHAI	2.740	0.350	-	-	0.840	1.180
SI SATCHANALAI	4.609	0.326	-	0.210	1.180	0.650
THUNG SALIAM	5.477	-	-	-	0.730	0.550
SAWANKHALOK	7.352	-	-	-	0.650	0.500
SI SAMRONG	4.109	0.190	-	-	0.630	3.814
BAN DAN LAN HOI	4.033	-	-	0.231	0.926	-
KHLONG KHLUNG	6.557	-	-	0.410	0.940	0.849
KHANU WORALAKSABURI	6.557	-	-	0.290	-	0.929
SAI NGAM	6.557	-	-	0.300	-	1.200
CHON DAEN	3.133	-	-	-	1.100	1.170

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-2 CROP YIELDS BY AMPHOE (Cont'd)
- WITHOUT PROJECT -
(2001)

(TON/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	0.335	-	0.450	0.140	0.117	0.233	3.000
BANPHOT PHISAI	0.405	0.205	0.320	0.110	0.130	0.300	3.500
KAO LIEO	0.315	-	0.393	0.137	0.150	0.180	-
PHICHIT	0.345	0.265	0.280	0.140	0.170	0.190	-
SAM NGAM	0.320	-	0.250	0.129	0.317	0.400	-
TAPHAN HIN	0.355	-	0.370	0.140	0.150	0.200	-
PHO PRATHAP CHANG	0.325	-	0.270	0.100	0.100	0.170	-
WANG SAI PHUN	0.315	-	-	-	-	-	-
PHROM PHIRAM	0.337	-	0.310	0.130	0.220	0.200	-
WAT BOT	0.377	0.325	0.240	0.110	0.140	0.160	3.300
BANG KRATHUM	0.337	-	0.240	0.130	-	-	-
WANG CHIN	0.550	0.295	0.310	0.150	0.160	0.210	-
THOEN	0.397	0.245	0.240	0.140	0.120	0.270	1.750
CHAING RAI	0.620	0.380	0.320	0.150	0.230	0.250	2.200
CHAING KHONG	0.610	0.370	0.400	0.230	0.270	0.200	2.150
MAE CHAN	0.600	0.320	0.320	0.120	0.160	0.200	1.850
THOENG	0.455	0.410	0.390	0.170	0.120	0.210	-
WIANG CHAI	0.560	0.255	0.270	0.120	0.150	0.180	-
LI	0.367	0.255	0.300	0.150	0.210	0.310	-
THUNG HUA CHANG	0.435	0.265	0.330	0.150	0.150	0.260	-
SUKHOTHAI	0.290	0.245	0.250	0.140	0.150	0.150	-
SI SATCHANALAI	0.397	0.330	0.200	0.160	0.170	0.170	1.900
THUNG SALIAM	0.465	0.370	0.220	0.140	0.150	0.140	-
SAWANKHALOK	0.475	0.320	0.245	0.140	0.150	0.210	-
SI SAMRONG	0.210	0.255	0.250	0.140	0.140	0.210	-
BAN DAN LAN HOI	0.273	0.255	0.200	0.150	0.149	0.221	-
KHLONG KHLUNG	0.375	0.400	0.330	0.100	0.170	0.250	2.800
KHANU WORALAKSABURI	0.375	0.275	0.330	0.100	0.180	0.250	2.800
SAI NGAM	0.375	-	0.330	0.100	0.200	0.250	-
CHON DAEN	0.330	-	0.220	0.110	0.230	0.180	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-2 CROP YIELDS BY AMPHOE (Cont'd)

- WITHOUT PROJECT -

(2001)

(Cont'd) (TON/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	7.350	0.200	-	0.487	0.958	0.833
BANPHOT PHISAI	7.800	0.150	-	0.220	1.041	1.300
KAO LIEO	8.300	-	-	0.350	2.275	0.870
PHICHIT	5.300	0.120	-	0.140	1.300	1.500
SAM NGAM	2.900	0.225	-	-	1.633	-
TAPHAN HIN	2.900	-	-	-	0.927	1.200
PHO PRATHAP CHANG	3.000	-	-	-	0.770	-
WANG SAI PHUN	-	-	-	-	-	-
PHROM PHIRAM	-	-	-	-	1.240	1.000
WAT BOT	3.700	-	-	-	0.330	1.200
BANG KRATHUM	-	-	-	-	-	0.409
WANG CHIN	-	0.500	-	-	1.000	1.100
THOEN	4.000	0.231	0.980	0.640	0.790	2.000
CHAING RAI	3.700	0.200	0.470	0.250	0.906	0.805
CHAING KHONG	-	0.365	-	-	0.720	2.230
MAE CHAN	-	0.372	0.380	-	1.130	0.557
THOENG	-	0.495	-	-	1.420	0.448
WIANG CHAI	-	0.400	-	-	0.650	1.004
LI	-	0.242	1.120	0.715	0.900	0.913
THUNG HUA CHANG	-	0.209	-	-	1.330	1.684
SUKHOTHAI	3.100	0.350	-	-	0.840	1.180
SI SATCHANALAI	5.000	0.326	-	0.210	1.180	0.650
THUNG SALIAM	5.650	-	-	-	0.730	0.550
SAWANKHALOK	7.320	-	-	-	0.650	0.500
SI SAMRONG	4.500	0.190	-	-	0.630	3.814
BAN DAN LAN HOI	4.400	-	-	0.231	0.926	-
KHLONG KHLUNG	6.700	-	-	0.410	0.940	0.849
KHANU WORALAKSABURI	6.700	-	-	0.290	-	0.929
SAI NGAM	6.700	-	-	0.300	-	1.200
CHON DAEN	3.500	-	-	-	1.100	1.170

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-2 CROP YIELDS BY AMPHOE (Cont'd)

- WITH PORJECT -

(2001)

(TON/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	0.350	-	0.460	0.150	0.130	0.245	3.300
BANPHOT PHISAI	0.415	0.220	0.330	0.120	0.140	0.310	3.500
KAO LIEO	0.335	-	0.400	0.145	0.160	0.190	-
PHICHIT	0.365	0.280	0.290	0.150	0.180	0.200	-
SAM NGAM	0.340	-	0.260	0.140	0.325	0.405	-
TAPHAN HIN	0.375	-	0.380	0.150	0.160	0.210	-
PHO PRATHAP CHANG	0.345	-	0.280	0.110	0.110	0.180	-
WANG SAI PHUN	0.335	-	-	-	-	-	-
PHROM PHIRAM	0.355	-	0.320	0.140	0.230	0.210	-
WAT BOT	0.395	0.340	0.250	0.120	0.150	0.170	3.300
BANG KRATHUM	0.355	-	0.250	0.140	-	-	-
WANG CHIN	0.560	0.310	0.320	0.160	0.130	0.280	-
THOEN	0.415	0.260	0.250	0.150	0.170	0.220	2.050
CHAING RAI	0.630	0.395	0.330	0.160	0.240	0.260	2.500
CHAING KHONG	0.620	0.385	0.410	0.240	0.280	0.210	2.450
MAE CHAN	0.620	0.335	0.330	0.130	0.170	0.210	2.150
THOENG	0.465	0.420	0.400	0.180	0.160	0.220	-
WIANG CHAI	0.570	0.270	0.280	0.130	0.130	0.190	-
LI	0.385	0.270	0.310	0.160	0.220	0.320	-
THUNG HUA CHANG	0.445	0.280	0.340	0.160	0.160	0.270	-
SUKHOTHAI	0.320	0.260	0.260	0.150	0.160	0.160	-
SI SATCHANALAI	0.415	0.345	0.210	0.170	0.180	0.180	2.300
THUNG SALIAM	0.475	0.385	0.230	0.150	0.160	0.155	-
SAWANKHALOK	0.485	0.335	0.255	0.150	0.160	0.220	-
SI SAMRONG	0.240	0.270	0.250	0.150	0.150	0.220	-
BAN DAN LAN HOI	0.300	0.270	0.210	0.160	0.160	0.230	-
KHLONG KHLUNG	0.395	0.410	0.340	0.110	0.180	0.260	3.100
KHANU WORALAKSABURI	0.395	0.290	0.340	0.110	0.190	0.260	3.100
SAI NGAM	0.395	-	0.340	0.110	0.210	0.260	-
CHON DAEN	0.350	-	0.230	0.120	0.240	0.190	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-2 CROP YIELDS BY AMPHOE (Cont'd)

- WITH PROJECT -

(2001)

(Cont'd) (TON/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	7.850	0.200	-	0.487	0.958	0.833
BANPHOT PHISAI	8.000	0.150	-	0.220	1.041	1.300
KAO LIEO	8.300	-	-	0.350	2.275	0.870
PHICHIT	6.300	0.120	-	0.140	1.300	1.500
SAM NGAM	3.900	0.225	-	-	1.633	-
TAPHAN HIN	4.400	-	-	-	0.927	1.200
PHO PRATHAP CHANG	4.500	-	-	-	0.770	-
WANG SAI PHUN	-	-	-	-	-	-
PHROM PHIRAM	-	-	-	-	1.240	1.000
WAT BOT	5.200	-	-	-	0.330	1.200
BANG KRATHUM	-	-	-	-	-	0.409
WANG CHIN	-	0.500	-	-	1.000	1.100
THOEN	5.500	0.231	0.980	0.640	0.790	2.000
CHAING RAI	5.200	0.200	0.470	0.250	0.906	0.805
CHAING KHONG	-	0.365	-	-	0.720	2.230
MAE CHAN	-	0.372	0.380	-	1.130	0.557
THOENG	-	0.495	-	-	1.420	0.448
WIANG CHAI	-	0.400	-	-	0.650	1.004
LI	-	0.242	1.120	0.715	0.900	0.913
THUNG HUA CHANG	-	0.209	-	-	1.330	1.684
SUKHOTHAI	4.700	0.350	-	-	0.840	1.180
SI SATCHANALAI	6.000	0.326	-	0.210	1.180	0.650
THUNG SALIAM	6.000	-	-	-	0.730	0.550
SAWANKHALOK	7.800	-	-	-	0.650	0.500
SI SAMRONG	5.500	0.190	-	-	0.630	3.814
BAN DAN LAN HOI	5.400	-	-	0.231	0.926	-
KHLONG KHLUNG	7.500	-	-	0.410	0.940	0.849
KHANU WORALAKSABURI	7.500	-	-	0.290	-	0.929
SAI NGAM	7.500	-	-	0.300	-	1.200
CHON DAEN	5.000	-	-	-	1.100	1.170

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-3 CROP FARMGATE PRICE BY AMPHOE
- WITHOUT PROJECT -

(BAHT/KG)

AMPHOE	PD	MZ	MB	SB	GN	CS
NAKHON SAWAN	4.28	2.86	9.23	7.55	13.60	1.25
BANPHOT PHISAI	4.28	2.86	9.23	7.55	13.60	1.25
KAO LIEO	4.28	2.86	9.23	7.55	13.60	-
PHICHIT	4.33	3.20	9.55	8.65	15.72	-
SAM NGAM	4.33	3.20	9.55	8.65	15.72	-
TAPHAN HIN	4.33	3.20	9.55	8.65	15.72	-
PHO PRATHAP CHANG	4.33	3.20	9.55	8.65	15.72	-
WANG SAI PHUN	4.33	-	-	-	-	-
PHROM PHIRAM	4.45	3.32	9.20	8.11	12.32	-
WAT BOT	4.45	3.32	9.20	8.11	12.32	0.84
BANG KRATHUM	4.45	3.32	9.20	8.11	12.32	-
WANG CHIN	4.41	2.86	7.13	8.06	8.26	-
THOEN	4.30	2.78	8.42	7.28	9.28	0.68
CHAING RAI	3.45	3.10	7.84	8.43	11.43	0.90
CHAING KHONG	3.45	3.10	7.84	8.43	11.43	0.90
MAE CHAN	3.45	3.10	7.84	8.43	11.43	0.90
THOENG	3.45	3.10	7.84	8.43	11.43	-
WIANG CHAI	3.45	3.10	7.84	8.43	11.43	-
LI	4.13	2.60	9.06	8.43	9.06	-
THUNG HUA CHANG	4.13	2.60	9.06	8.43	9.06	-
SUKHOTHAI	3.66	3.09	7.63	9.38	8.26	-
SI SATCHANALAI	3.66	3.09	7.63	9.38	8.26	0.68
THUNG SALIAM	3.66	3.09	7.63	9.38	8.26	-
SAWANKHALOK	3.66	3.09	7.63	9.38	8.26	-
SI SAMRONG	3.66	3.09	7.63	9.38	8.26	-
BAN DAN LAN HOI	3.66	3.09	7.63	9.38	8.26	-
KHLONG KHLUNG	4.33	2.73	8.75	8.65	12.96	0.97
KHANU WORALAKSABURI	4.33	2.73	8.75	8.65	12.96	0.97
SAI NGAM	4.33	2.73	8.75	8.65	12.96	-
CHON DAEN	4.19	3.37	7.95	6.95	8.43	-

PD = PADDY MZ = MAIZE MB = MUNG BEAN
SB = SOY BEAN GN = GROUND NUTS CS = CASSAVA

Appendix 4-3 CROP FRAMGATE PRICE BY AMPHOE (Cont'd)
- WITHOUT PROJECT -

(Cont'd)

(BAHT/KG)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	0.39	14.50	-	26.91	5.35	4.79
BANPHOT PHISAI	0.39	14.50	-	26.91	5.35	4.79
KAO LIEO	0.39	-	-	26.91	5.35	4.79
PHICHIT	0.58	14.50	-	23.69	6.98	5.25
SAM NGAM	0.58	14.50	-	-	2.35	-
TAPHAN HIN	0.58	-	-	-	6.98	5.25
PHO PRATHAP CHANG	0.58	-	-	23.69	6.98	-
WANG SAI PHUN	-	-	-	-	-	-
PHROM PHIRAM	-	-	-	-	3.53	3.05
WAT BOT	0.55	-	-	-	3.53	3.05
BANG KRATHUM	-	-	-	-	3.53	3.05
WANG CHIN	-	15.92	-	-	3.03	4.84
THOEN	0.38	15.92	10.31	32.35	3.43	3.35
CHAING RAI	0.37	15.66	14.18	39.96	4.12	4.80
CHAING KHONG	-	15.66	-	-	-	4.80
MAE CHAN	-	15.66	14.18	-	4.12	4.80
THOENG	-	15.66	-	-	4.12	4.80
WIANG CHAI	-	15.66	-	-	4.12	4.80
LI	-	15.66	14.18	33.51	4.68	4.49
THUNG HUA CHANG	-	15.66	-	-	4.68	4.49
SUKHOTHAI	0.53	18.05	-	-	5.25	5.00
SI SATCHANALAI	0.53	18.05	-	32.23	5.25	5.00
THUNG SALIAM	0.53	-	-	-	5.25	5.00
SAWANKHALOK	0.53	-	-	-	5.25	5.00
SI SAMRONG	0.53	18.05	-	-	5.25	5.00
BAN DAN LAN HOI	0.53	-	-	32.23	5.25	-
KHLONG KHLUNG	0.53	-	-	25.78	6.08	4.79
KHANU WORALAKSABURI	0.53	-	-	25.78	6.08	4.79
SAI NGAM	0.53	-	-	25.78	-	4.79
CHON DAEN	0.39	-	-	-	4.66	5.09

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-3 CROP FARMGATE PRICE BY AMPHOE (Cont'd)
- WITH PROJECT -

(BAHT/KG)

AMPHOE	PD	MZ	MB	SB	GN	CS
NAKHON SAWAN	4.39	3.00	9.46	7.74	13.94	1.31
BANPHOT PHISAI	4.39	3.00	9.46	7.74	13.94	1.31
KAO LIEO	4.39	3.00	9.46	7.74	13.94	-
PHICHIT	4.44	3.36	9.79	8.87	16.11	-
SAM NGAM	4.44	3.36	9.79	8.87	16.11	-
TAPHAN HIN	4.44	3.36	9.79	8.87	16.11	-
PHO PRATHAP CHANG	4.44	3.36	9.79	8.87	16.11	-
WANG SAI PHUN	4.44	-	-	-	-	-
PHROM PHIRAM	4.56	3.49	9.43	8.31	12.63	-
WAT BOT	4.56	3.49	9.43	8.31	12.63	0.88
BANG KRATHUM	4.56	3.49	9.43	8.31	12.63	-
WANG CHIN	4.52	3.00	7.31	8.26	8.47	-
THOEN	4.41	2.92	8.63	7.46	9.51	0.71
CHAING RAI	3.54	3.26	8.04	8.64	11.72	0.95
CHAING KHONG	3.54	3.26	8.04	8.64	11.72	0.95
MAE CHAN	3.54	3.26	8.04	8.64	11.72	0.95
THOENG	3.54	3.26	8.04	8.64	11.72	-
WIANG CHAI	3.54	3.26	8.04	8.64	11.72	-
LI	4.23	2.73	9.29	8.64	9.29	-
THUNG HUA CHANG	4.23	2.73	9.29	8.64	9.29	-
SUKHOTHAI	3.75	3.24	7.82	9.61	8.47	-
SI SATCHANALAI	3.75	3.24	7.82	9.61	8.47	0.71
THUNG SALIAM	3.75	3.24	7.82	9.61	8.47	-
SAWANKHALOK	3.75	3.24	7.82	9.61	8.47	-
SI SAMRONG	3.75	3.24	7.82	9.61	8.47	-
BAN DAN LAN HOI	3.75	3.24	7.82	9.61	8.47	-
KHLONG KHLUNG	4.44	2.87	8.97	8.87	13.28	1.02
KHANU WORALAKSABURI	4.44	2.87	8.97	8.87	13.28	1.02
SAI NGAM	4.44	2.87	8.97	8.87	13.28	-
CHON DAEN	4.29	3.54	8.15	7.12	8.64	-

PD = PADDY MZ = MAIZE MB = MUNG BEAN
SB = SOY BEAN GN = GROUND NUTS CS = CASSAVA

Appendix 4-3 CROP FARMGATE PRICE BY AMPHOE (Cont'd)
- WITH PROJECT -

(Cont'd) (BAHT/KG)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	0.41	14.86	-	27.58	5.62	5.03
BANPHOT PHISAI	0.41	14.86	-	27.58	5.62	5.03
KAO LIEO	0.41	-	-	27.58	5.62	5.03
PHICHIT	0.61	14.86	-	24.28	7.33	5.51
SAM NGAM	0.61	14.86	-	-	2.47	-
TAPHAN HIN	0.61	-	-	-	7.33	5.51
PHO PRATHAP CHANG	0.61	-	-	24.28	7.33	-
WANG SAI PHUN	-	-	-	-	-	-
PHROM PHIRAM	-	-	-	-	3.71	3.20
WAT BOT	0.58	-	-	-	3.71	3.20
BANG KRATHUM	-	-	-	-	3.71	3.20
WANG CHIN	-	16.32	-	-	3.18	5.08
THOEN	0.40	16.32	10.57	33.16	3.60	3.53
CHAING RAI	0.39	16.05	14.53	40.96	4.33	5.04
CHAING KHONG	-	16.05	-	-	-	5.04
MAE CHAN	-	16.05	14.53	-	4.33	5.04
THOENG	-	16.05	-	-	4.33	5.04
WIANG CHAI	-	16.05	-	-	4.33	5.04
LI	-	16.05	14.53	34.35	4.91	4.71
THUNG HUA CHANG	-	16.05	-	-	4.91	4.71
SUKHOTHAI	0.56	18.50	-	-	5.51	5.25
SI SATCHANALAI	0.56	18.50	-	33.04	5.51	5.25
THUNG SALIAM	0.56	-	-	-	5.51	5.25
SAWANKHALOK	0.56	-	-	-	5.51	5.25
SI SAMRONG	0.56	18.50	-	-	5.51	5.25
BAN DAN LAN HOI	0.56	-	-	33.04	5.51	-
KHLONG KHLUNG	0.56	-	-	26.42	6.38	5.03
KHANU WORALAKSABURI	0.56	-	-	26.42	6.38	5.03
SAI NGAM	0.56	-	-	26.42	-	5.03
CHON DAEN	0.41	-	-	-	4.89	5.34

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-4 CROP PRODUCTION COST BY AMPHOE
- WITHOUT PROJECT -
(1987)

(BAHT/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	634	-	455	392	592	908	591
BANPHOT PHISAI	634	361	455	392	592	908	591
KAO LIEO	634	-	455	392	592	908	-
PHICHIT	521	391	395	419	536	978	-
SAM NGAM	521	-	407	419	536	978	-
TAPHAN HIN	521	-	407	419	536	978	-
PHO PRATHAP CHANG	521	-	395	419	536	978	-
WANG SAI PHUN	521	-	395	419	536	978	-
PHROM PHIRAM	604	-	407	429	536	978	-
WAT BOT	604	398	395	429	536	978	590
BANG KRATHUM	604	-	395	429	-	-	-
WANG CHIN	618	397	410	436	548	970	-
THOEN	610	423	400	436	548	970	620
CHAING RAI	590	460	428	420	677	1031	671
CHAING KHONG	590	460	440	430	677	1031	671
MAE CHAN	590	460	428	420	677	1031	671
THOENG	591	460	440	420	677	1031	-
WIANG CHAI	590	431	428	420	677	1031	-
LI	691	431	428	420	677	970	-
THUNG HUA CHANG	691	431	428	420	677	970	-
SUKHOTHAI	580	361	400	436	548	970	-
SI SATCHANALAI	580	360	400	436	548	970	621
THUNG SALIAM	580	360	400	436	548	970	-
SAWANKHALOK	580	360	400	436	548	970	-
SI SAMRONG	580	361	400	436	548	970	-
BAN DAN LAN HOI	580	361	400	436	548	970	-
KHLONG KHLUNG	686	380	407	419	536	978	621
KHANU WORALAKSABURI	686	381	407	419	536	978	621
SAI NGAM	686	-	407	419	536	978	-
CHON DAEN	581	-	405	382	592	908	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-4 CROP PRODUCTION COST BY AMPHOE (Cont'd)
- WITHOUT PROJECT -
(1987)

(Cont'd)

(BAHT/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	1240	1680	-	1490	1190	1215
BANPHOT PHISAI	1240	1640	-	1490	1190	1215
KAO LIEO	1259	-	-	1490	1190	1215
PHICHIT	1535	1600	-	1490	1190	1215
SAM NGAM	1243	1680	-	-	980	-
TAPHAN HIN	1243	-	-	-	1190	1115
PHO PRATHAP CHANG	1243	-	-	1490	1190	-
WANG SAI PHUN	-	-	-	1490	980	-
PHROM PHIRAM	-	-	-	-	1190	1115
WAT BOT	1243	-	-	-	980	1115
BANG KRATHUM	-	-	-	-	-	1115
WANG CHIN	-	1840	-	-	1280	1215
THOEN	1226	1840	1280	1490	1280	1115
CHAING RAI	1228	1840	1280	1490	1280	1215
CHAING KHONG	-	1840	-	-	-	1215
MAE CHAN	-	1840	1280	-	1280	1215
THOENG	-	1840	-	-	1280	1215
WIANG CHAI	-	1840	-	-	1280	1215
LI	-	1840	1280	1490	1280	1215
THUNG HUA CHANG	-	1840	-	-	1280	1215
SUKHOTHAI	1007	1840	-	-	1280	1215
SI SATCHANALAI	1503	1840	-	1490	1190	1215
THUNG SALIAM	1501	-	-	-	1190	1215
SAWANKHALOK	1500	-	-	-	1190	1215
SI SAMRONG	1503	1800	-	-	1190	1215
BAN DAN LAN HOI	1503	-	-	1490	1190	-
KHLONG KHLUNG	1531	-	-	1490	1190	1115
KHANU WORALAKSABURI	1531	-	-	1490	1190	1115
SAI NGAM	1531	-	-	1490	-	1115
CHON DAEN	1002	-	-	-	1190	1215

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-4 CROP PRODUCTION COST BY AMPHOE (Cont'd)
- WITH PROJECT -
(1987)

(BAHT/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	636	-	455	393	593	909	593
BANPHOT PHISAI	636	362	455	393	593	909	593
KAO LIEO	636	-	455	393	593	909	-
PHICHIT	523	392	396	420	537	979	-
SAM NGAM	523	-	408	420	537	979	-
TAPHAN HIN	523	-	408	420	537	979	-
PHO PRATHAP CHANG	523	-	396	420	537	979	-
WANG SAI PHUN	523	-	396	420	537	979	-
PHROM PHIRAM	606	-	408	430	537	979	-
WAT BOT	606	400	396	430	537	979	593
BANG KRATHUM	606	-	396	430	-	-	-
WANG CHIN	619	398	410	437	549	971	-
THOEN	612	424	401	437	549	971	620
CHAING RAI	591	462	428	421	677	1032	673
CHAING KHONG	591	462	440	431	677	1032	673
MAE CHAN	591	462	428	421	677	1032	673
THOENG	592	462	440	421	677	1032	-
WIANG CHAI	591	432	428	421	677	1032	-
LI	693	432	428	421	677	971	-
THUNG HUA CHANG	692	432	428	421	677	971	-
SUKHOTHAI	582	398	401	437	549	971	-
SI SATCHANALAI	582	362	401	437	549	971	623
THUNG SALIAM	581	362	401	437	549	971	-
SAWANKHALOK	581	362	401	437	549	971	-
SI SAMRONG	582	362	401	437	549	971	-
BAN DAN LAN HOI	582	362	401	437	549	971	-
KHLONG KHLUNG	688	381	408	420	537	979	623
KHANU WORALAKSABURI	688	382	408	420	537	979	623
SAI NGAM	688	-	408	420	537	979	-
CHON DAEN	583	-	405	383	593	909	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-4 PRODUCTION COST BY AMPHOE (Cont'd)
- WITH PROJECT -

(1987)

(Cont'd)

(BAHT/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	1243	1680	-	1490	1190	1215
BANPHOT PHISAI	1241	1645	-	1490	1190	1215
KAO LIEO	1260	-	-	1490	1190	1215
PHICHIT	1538	1605	-	1490	1190	1215
SAM NGAM	1247	1680	-	-	980	-
TAPHAN HIN	1248	-	-	-	1190	1115
PHO PRATHAP CHANG	1248	-	-	1490	1190	-
WANG SAI PHUN	-	-	-	1490	980	-
PHROM PHIRAM	-	-	-	-	1190	1115
WAT BOT	1248	-	-	-	980	1115
BANG KRATHUM	-	-	-	-	-	1115
WANG CHIN	-	1840	-	-	1280	1215
THOEN	1233	1840	1280	1490	1280	1115
CHAING RAI	1233	1840	1280	1490	1280	1215
CHAENG KHONG	-	1840	-	-	-	1215
MAE CHAN	-	1840	1280	-	1280	1215
THOENG	-	1840	-	-	1280	1215
WIANG CHAI	-	1840	-	-	1280	1215
LI	-	1840	1280	1490	1280	1215
THUNG HUA CHANG	-	1840	-	-	1280	1215
SUKHOTHAI	1015	1840	-	-	1280	1215
SI SATCHANALAI	1507	1840	-	1490	1190	1215
THUNG SALIAM	1503	-	-	-	1190	1215
SAWANKHALOK	1503	-	-	-	1190	1215
SI SAMRONG	1507	1803	-	-	1190	1215
BAN DAN LAN HOI	1507	-	-	1490	1190	-
KHLONG KHLUNG	1535	-	-	1490	1190	1115
KHANU WORALAKSABURI	1535	-	-	1490	1190	1115
SAI NGAM	1535	-	-	1490	-	1115
CHON DAEN	1010	-	-	-	1190	1215

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-4 CROP PRODUCTION COST BY AMPHOE (Cont'd)
- WITHOUT PROJECT -
(2001)

(BAHT/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	644	-	455	392	592	908	610
BANPHOT PHISAI	644	368	455	392	592	908	610
KAO LIEO	644	-	455	392	592	908	-
PHICHIT	531	398	395	419	536	978	-
SAM NGAM	531	-	407	419	536	978	-
TAPHAN HIN	531	-	407	419	536	978	-
PHO PRATHAP CHANG	531	-	395	419	536	978	-
WANG SAI PHUN	531	-	395	419	536	978	-
PHROM PHIRAM	614	-	407	429	536	978	-
WAT BOT	614	398	395	429	536	978	590
BANG KRATHUM	614	-	395	429	-	-	-
WANG CHIN	618	404	410	436	548	970	-
THOEN	620	430	400	436	548	970	620
CHAING RAI	590	460	428	420	677	1031	690
CHAING KHONG	590	460	440	430	677	1031	690
MAE CHAN	590	460	428	420	677	1031	690
THOENG	598	460	440	420	677	1031	-
WIANG CHAI	590	438	428	420	677	1031	-
LI	701	438	428	420	677	970	-
THUNG HUA CHANG	698	438	428	420	677	970	-
SUKHOTHAI	595	368	400	436	548	970	-
SI SATCHANALAI	590	360	400	436	548	970	640
THUNG SALIAM	587	360	400	436	548	970	-
SAWANKHALOK	587	360	400	436	548	970	-
SI SAMRONG	595	368	400	436	548	970	-
BAN DAN LAN HOI	595	368	400	436	548	970	-
KHLONG KHLUNG	696	380	407	419	536	978	640
KHANU WORALAKSABURI	696	388	407	419	536	978	640
SAI NGAM	696	-	407	419	536	978	-
CHON DAEN	591	-	405	382	592	908	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-4 CROP PRODUCTION COST BY AMPHOE (Cont'd)

- WITH PROJECT -

(2001)

(Cont'd)

(BAHT/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	1240	1680	-	1490	1190	1215
BANPHOT PHISAI	1240	1640	-	1490	1190	1215
KAO LIEO	1240	-	-	1490	1190	1215
PHICHIT	1610	1600	-	1490	1190	1215
SAM NGAM	1285	1680	-	-	980	-
TAPHAN HIN	1285	-	-	-	1190	1115
PHO PRATHAP CHANG	1285	-	-	1490	1190	-
WANG SAI PHUN	-	-	-	1490	980	-
PHROM PHIRAM	-	-	-	-	1190	1115
WAT BOT	1285	-	-	-	980	1115
BANG KRATHUM	-	-	-	-	-	1115
WANG CHIN	-	1840	-	-	1280	1215
THOEN	1245	1840	1280	1490	1280	1115
CHAING RAI	1270	1840	1280	1490	1280	1215
CHAING KHONG	-	1840	-	-	-	1215
MAE CHAN	-	1840	1280	-	1280	1215
THOENG	-	1840	-	-	1280	1215
WIANG CHAI	-	1840	-	-	1280	1215
LI	-	1840	1280	1490	1280	1215
THUNG HUA CHANG	-	1840	-	-	1280	1215
SUKHOTHAI	1240	1840	-	-	1280	1215
SI SATCHANALAI	1545	1840	-	1490	1190	1215
THUNG SALIAM	1520	-	-	-	1190	1215
SAWANKHALOK	1500	-	-	-	1190	1215
SI SAMRONG	1545	1800	-	-	1190	1215
BAN DAN LAN HOI	1545	-	-	1490	1190	-
KHLONG KHLUNG	1550	-	-	1490	1190	1115
KHANU WORALAKSABURI	1550	-	-	1490	1190	1115
SAI NGAM	1550	-	-	1490	-	1115
CHON DAEN	1240	-	-	-	1190	1215

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 4-4 CROP PRODUCTION COST BY AMPHOE (Cont'd)

- WITH PROJECT -

(2001)

(BAHT/RAI)

AMPHOE	PD	UPD	MZ	MB	SB	GN	CS
NAKHON SAWAN	673	-	460	402	602	928	630
BANPHOT PHISAI	673	385	460	402	602	928	630
KAO LIEO	673	-	460	402	602	928	-
PHICHIT	560	425	405	429	546	993	-
SAM NGAM	560	-	415	429	546	993	-
TAPHAN HIN	560	-	415	429	546	993	-
PHO PRATHAP CHANG	560	-	405	429	546	993	-
WANG SAI PHUN	560	-	405	429	546	993	-
PHROM PHIRAM	643	-	415	439	546	993	-
WAT BOT	643	425	405	439	546	993	630
BANG KRATHUM	643	-	405	439	-	-	-
WANG CHIN	633	430	417	446	558	985	-
THOEN	649	457	410	446	558	985	620
CHAING RAI	605	485	435	430	678	1041	710
CHAING KHONG	605	485	445	440	678	1041	710
MAE CHAN	605	485	435	430	678	1041	710
THOENG	615	485	445	430	678	1041	-
WIANG CHAI	605	465	435	430	678	1041	-
LI	730	465	435	430	678	980	-
THUNG HUA CHANG	715	465	435	430	678	980	-
SUKHOTHAI	629	935	410	446	558	985	-
SI SATCHANALAI	619	385	410	446	558	985	660
THUNG SALIAM	604	385	410	446	558	985	-
SAWANKHALOK	604	385	410	446	558	985	-
SI SAMRONG	629	395	410	446	558	985	-
BAN DAN LAN HOI	629	395	410	446	558	985	-
KHLONG KHLUNG	725	395	415	429	546	993	660
KHANU WORALAKSABURI	725	410	415	429	546	993	660
SAI NGAM	725	-	415	429	546	993	-
CHON DAEN	620	-	413	392	602	928	-

PD = PADDY UPD = UPLAND PADDY MZ = MAIZE
MB = MUNG BEAN SB = SOY BEAN GN = GROUND NUTS
CS = CASSAVA

Appendix 4-4 CROP PRODUCTION COST BY AMPHOE (Cont'd)
- WITH PROJECT -
(2001)

(Cont'd)

(BAHT/RAI)

AMPHOE	SC	TB	GL	CL	VG	FR
NAKHON SAWAN	1280	1680	-	1490	1190	1215
BANPHOT PHISAI	1260	1720	-	1490	1190	1215
KAO LIEO	1260	-	-	1490	1190	1215
PHICHIT	1655	1680	-	1490	1190	1215
SAM NGAM	1340	1680	-	-	980	-
TAPHAN HIN	1365	-	-	-	1190	1115
PHO PRATHAP CHANG	1365	-	-	1490	1190	-
WANG SAI PHUN	-	-	-	1490	980	-
PHROM PHIRAM	-	-	-	-	1190	1115
WAT BOT	1365	-	-	-	980	1115
BANG KRATHUM	-	-	-	-	-	1115
WANG CHIN	-	1840	-	-	1280	1215
THOEN	1350	1840	1280	1490	1280	1115
CHAING RAI	1350	1840	1280	1490	1280	1215
CHAING KHONG	-	1840	-	-	-	1215
MAE CHAN	-	1840	1280	-	1280	1215
THOENG	-	1840	-	-	1280	1215
WIANG CHAI	-	1840	-	-	1280	1215
LI	-	1840	1280	1490	1280	1215
THUNG HUA CHANG	-	1840	-	-	1280	1215
SUKHOTHAI	1365	1840	-	-	1280	1215
SI SATCHANALAI	1600	1840	-	1490	1190	1215
THUNG SALIAM	1540	-	-	-	1190	1215
SAWANKHALOK	1540	-	-	-	1190	1215
SI SAMRONG	1600	1840	-	-	1190	1215
BAN DAN LAN HOI	1600	-	-	1490	1190	-
KHLONG KHLUNG	1605	-	-	1490	1190	1115
KHANU WORALAKSABURI	1605	-	-	1490	1190	1115
SAI NGAM	1605	-	-	1490	-	1115
CHAN DAEN	1365	-	-	-	1190	1215

SC = SUGAR CANE TB = TOBACCO GL = GARLIC
CL = CHILLI VG = VEGETABLES FR = FRUITS

Appendix 5-1 VEHICLE OPERATING COSTS ON LEVEL TANGENT ROAD

(Paved Road)

Vehicle Type	Speed (km/hr)	Fuel	Oil	Tyre & Tube	Repair & Maintenance	Depreciation & Interest	Overhead	Crew	Total
M/C	64	0.259	0.044	0.011	0.077	0.406	-	-	0.797
P/C	80	0.629	0.033	0.093	0.197	0.847	-	-	1.799
L/B	72	0.750	0.036	0.107	0.317	0.443	-	0.465	2.118
M/B	72	0.747	0.043	0.135	0.482	0.816	0.089	1.116	3.428
H/B	72	1.338	0.074	0.404	1.069	1.057	0.381	1.010	5.333
P/T	72	0.750	0.036	0.107	0.205	0.545	-	-	1.643
4/T	72	0.747	0.043	0.160	0.465	0.794	-	0.532	2.741
6/T	64	0.989	0.074	0.190	0.870	1.080	0.151	0.893	4.247
10/T	64	1.631	0.074	0.590	0.726	1.502	0.330	1.473	6.326

Appendix 5-1 VEHICLE OPERATING COSTS ON LEVEL TANGENT ROAD (Cont'd)

(Laterite Road)

Vehicle Type	Speed (km/hr)	Fuel	Oil	Tyre & Tube	Repair & Maintenance	Depreciation & Interest	Overhead	Crew	Total
M/C	48	0.284	0.055	0.014	0.084	0.459	-	-	0.896
P/C	56	0.622	0.041	0.099	0.202	0.957	-	-	1.921
L/B	48	0.714	0.045	0.115	0.339	0.717	-	0.698	2.628
M/B	48	0.711	0.054	0.146	0.515	1.395	0.134	1.675	4.630
H/B	48	1.566	0.093	0.437	1.136	1.807	0.571	1.515	7.125
P/T	48	0.714	0.045	0.115	0.219	0.883	-	-	1.976
4/T	48	0.711	0.054	0.173	0.497	1.287	-	0.798	3.520
6/T	48	1.258	0.093	0.234	1.030	1.649	0.201	1.186	5.651
10/T	48	2.074	0.093	0.728	0.860	2.293	0.437	1.954	8.439

Appendix 5-1 VEHICLE OPERATING COSTS ON LEVEL TANGENT ROAD
(Cont'd)

(Earth Road)

Vehicle Type	Speed (km/hr)	Fuel	Oil	Tyre & Tube	Repair & Maintenance	Depreciation & Interest	Overhead	Crew	Total
M/C	32	0.357	0.066	0.018	0.123	0.585	-	-	1.149
P/C	32	0.772	0.050	0.111	0.280	1.220	-	-	2.433
L/B	32	0.861	0.063	0.147	0.484	1.235	-	1.046	3.836
M/B	32	0.858	0.075	0.187	0.735	2.488	0.201	2.511	7.055
H/B	32	2.240	0.130	0.558	1.803	3.223	0.856	2.272	11.082
P/T	32	0.861	0.063	0.147	0.313	1.521	-	-	2.905
4/T	32	0.858	0.075	0.221	0.709	2.216	-	1.196	5.275
6/T	32	1.800	0.130	0.299	1.634	2.941	0.302	1.779	8.885
10/T	32	2.968	0.130	0.931	1.365	4.089	0.656	2.930	13.069

Appendix 5-2

VEHICLE OPERATING COSTS BY SPEED

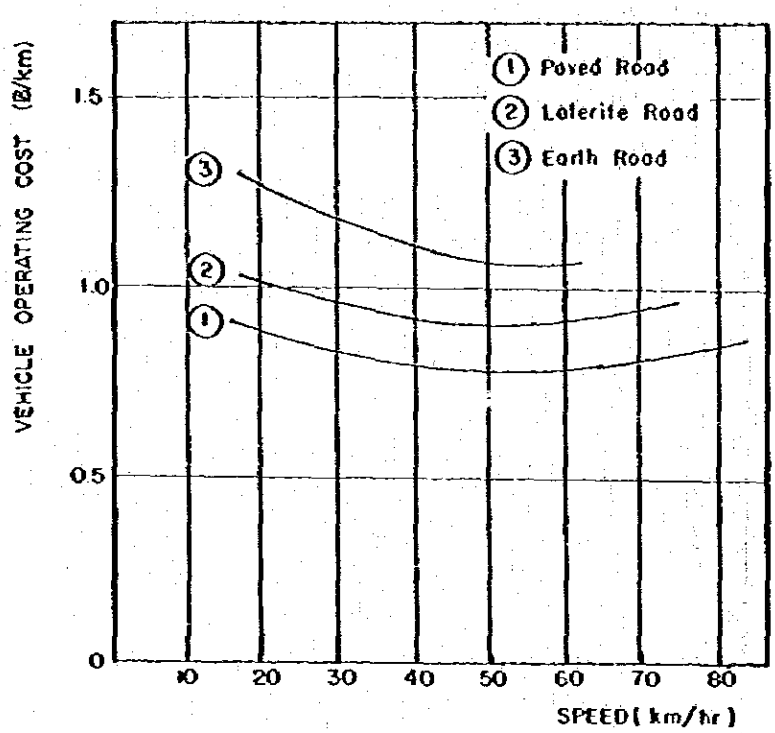
(On Level Tangent Road)

(Baht/km)

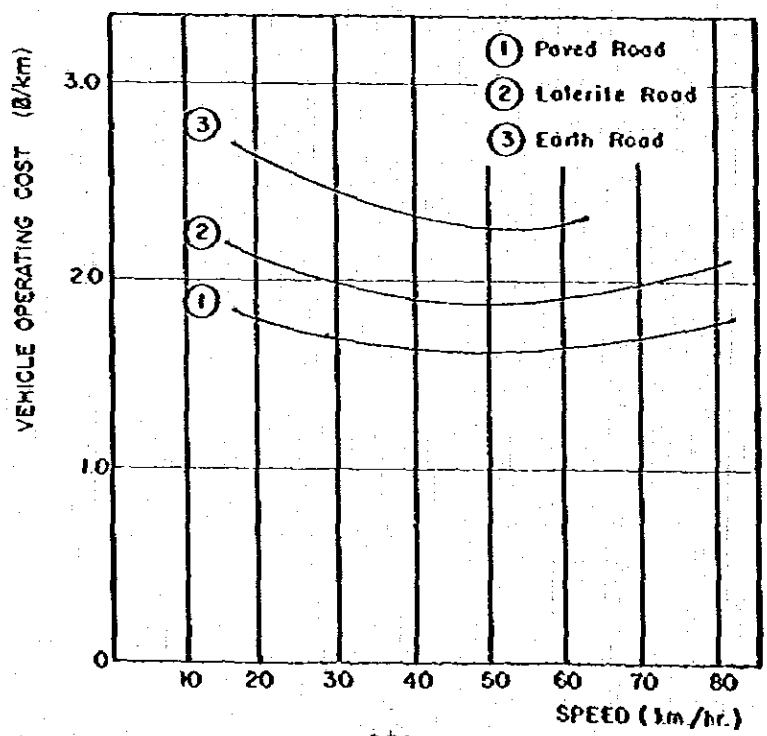
Vehicle Type \ Road Class / Speed (km/hr)	Earth Road			Laterite Road				Paved Road			
	16	24	32	32	40	48	56	64	72	80	88
M/C	1.29	1.22	1.15	0.94	0.91	0.90	0.90	0.80	0.82	0.85	0.88
P/C	2.69	2.54	2.43	1.98	1.90	1.87	1.92	1.68	1.74	1.80	1.86
L/B	5.50	4.60	3.84	3.45	2.85	2.63	2.45	2.05	2.12	2.20	2.35
M/B	11.20	8.75	7.06	6.20	5.25	4.63	4.20	3.50	3.43	3.50	3.75
H/B	17.00	13.70	11.08	9.20	8.10	7.13	5.40	5.20	5.33	5.60	6.20
P/T	4.10	3.45	2.91	2.35	2.05	1.98	1.80	1.50	1.64	1.75	1.95
4/T	7.90	6.50	5.28	4.45	3.80	3.52	3.75	2.70	2.74	2.80	3.05
6/T	14.00	10.55	8.89	7.50	6.10	5.65	5.20	4.20	4.25	4.35	4.60
10/T	20.20	16.20	13.07	11.10	9.40	8.44	6.90	6.30	6.33	6.60	7.20

Appendix 5-3 VEHICLE OPERATING COSTS - (1)

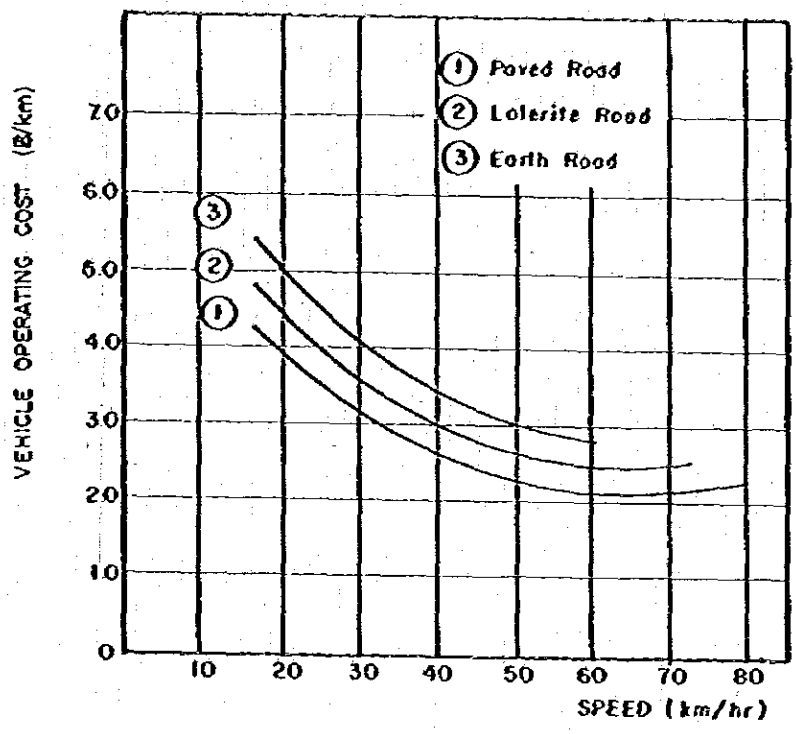
(Motor Cycle)



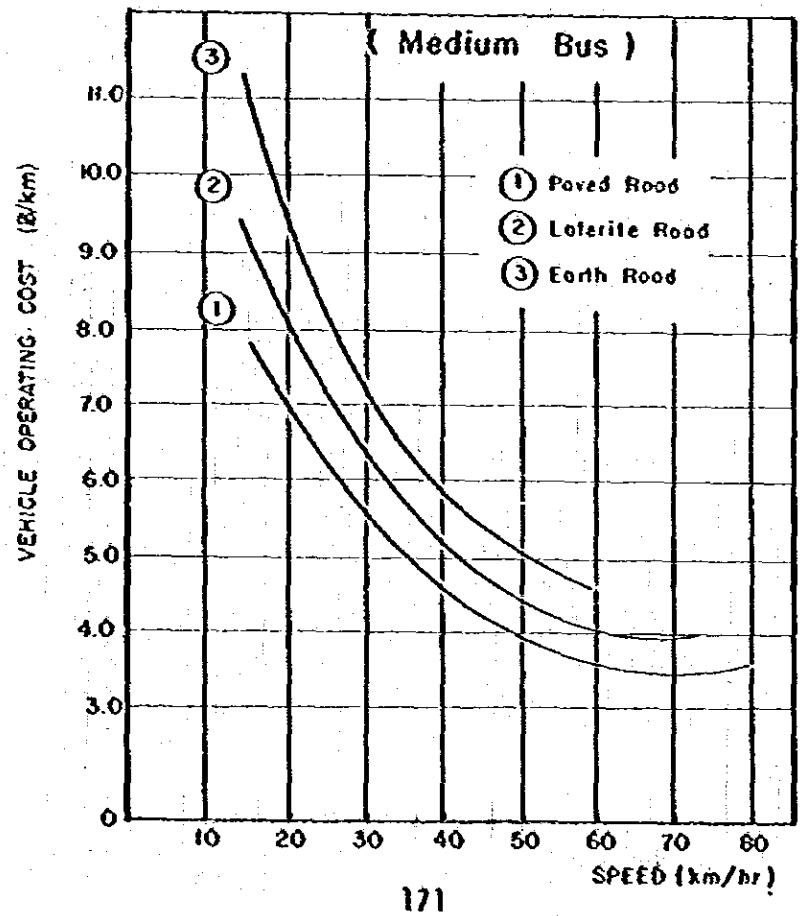
(Passenger Car)



(Light Bus)

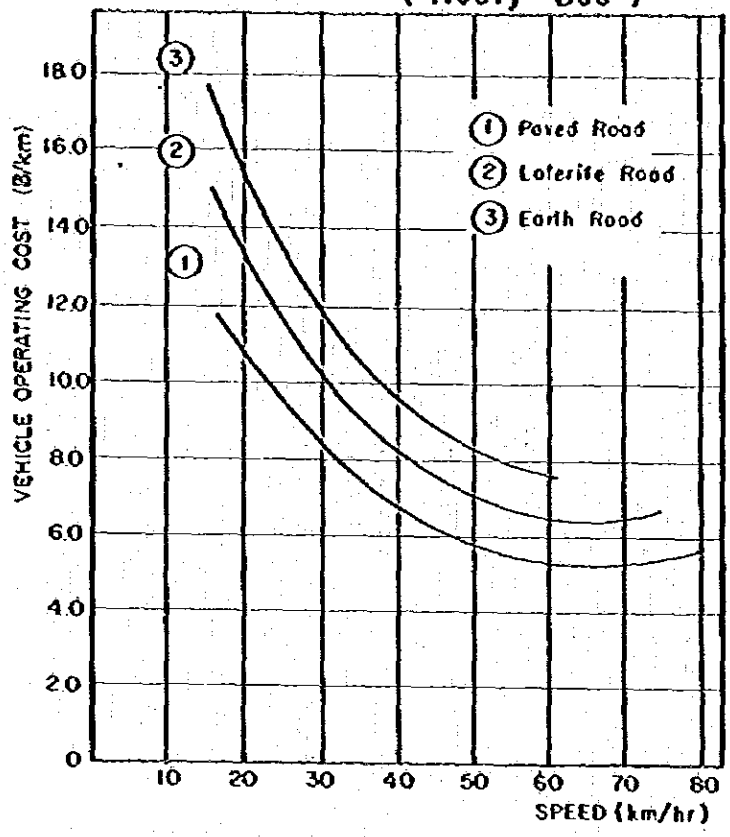


(Medium Bus)

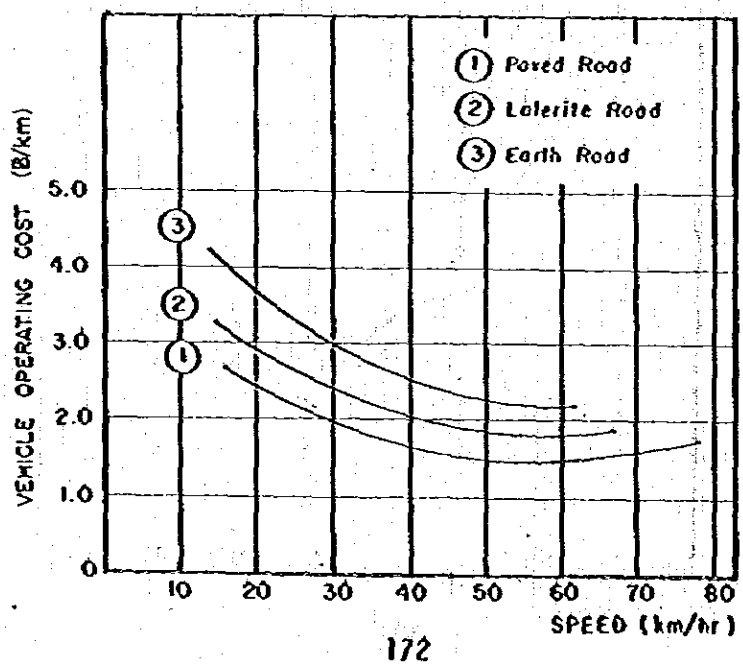


Appendix 5-3 VEHICLE OPERATING COSTS - (3)

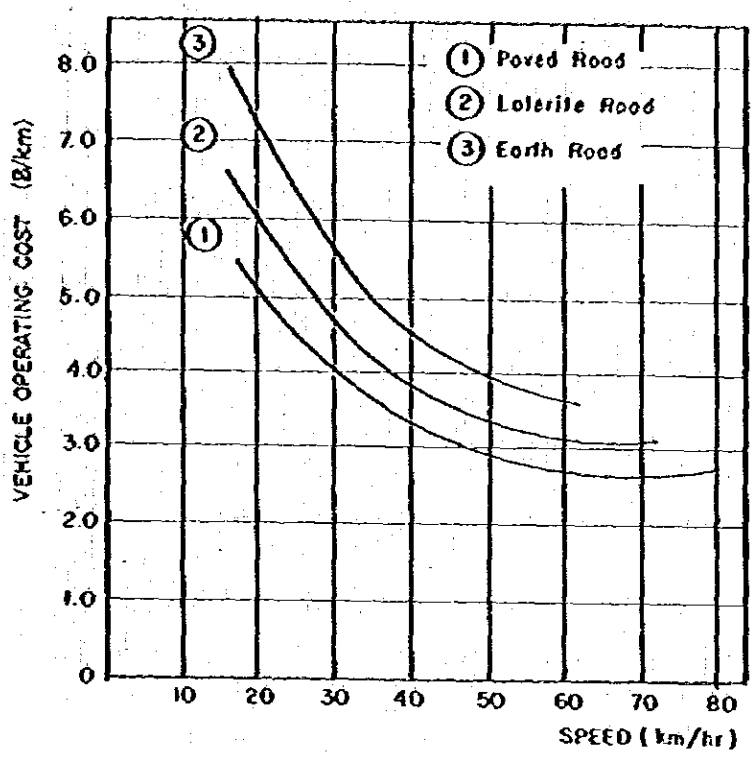
(Heavy Bus)



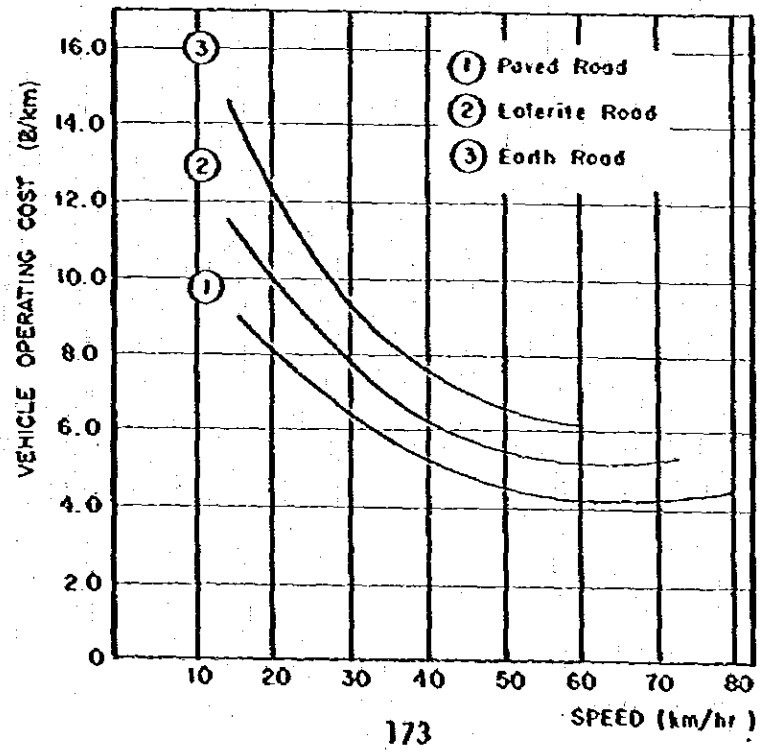
(Pick-up Truck)



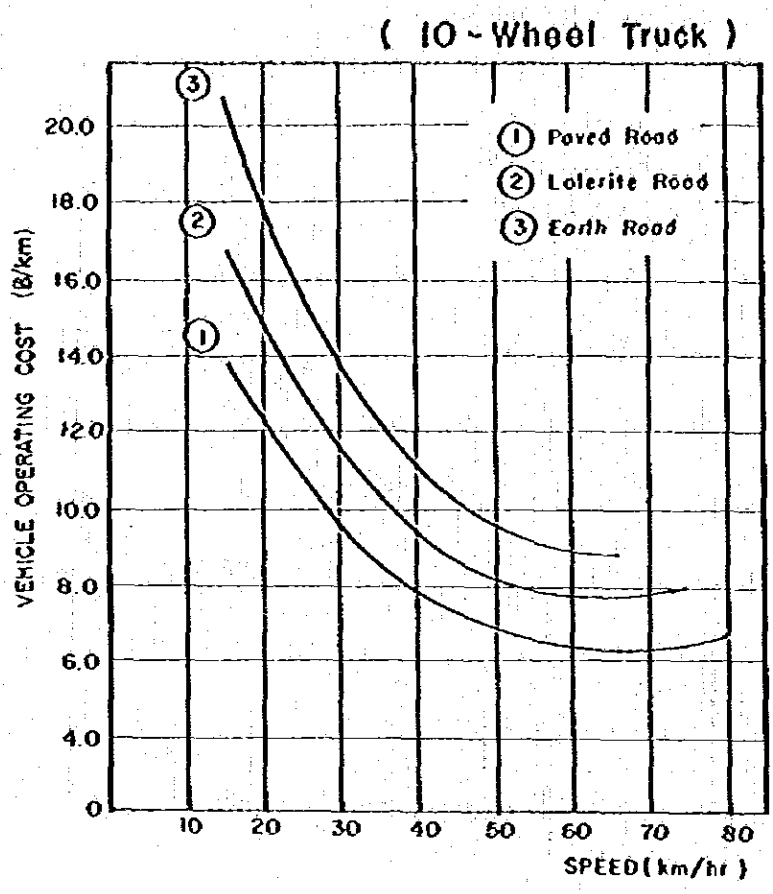
(4-Wheel Truck)



(6-Wheel Truck)



Appendix 5-3 VEHICLE OPERATING COSTS - (5)



Appendix 5-4 (1) ADDITIONAL CURVE COSTS
(% of Level Tangent Costs)

Motor Cycle, Passenger Car, Light Bus & Pick-up Truck

Initial Speed (km/h)	Radius (m)								
	1500	750	500	375	300	250	200	150	100
16	1.58	3.03	4.20	5.14	5.99	6.81	8.26	9.79	12.86
24	2.21	4.25	5.86	7.22	8.73	9.64	12.46	15.30	21.39
32	2.43	4.58	6.63	8.63	10.54	12.40	16.18	20.50	29.58
40	2.58	5.00	7.33	9.68	12.15	14.73	20.32	26.78	42.10
48	2.75	5.41	8.51	11.14	14.44	18.10	26.01	35.61	63.02
56	3.05	6.33	10.47	13.84	19.76	23.82	33.95	49.28	90.48
64	3.97	8.11	13.56	18.47	25.69	32.37	50.53	72.51	124.18
72	5.28	10.89	17.91	24.42	34.18	43.78	71.57	98.79	165.31
80	6.98	14.65	23.51	32.55	45.17	57.49	91.49	125.92	202.85
88	9.23	19.17	30.47	42.48	58.45	74.12	112.44	152.21	-

Medium Bus & 4-Wheel Truck

Initial Speed (km/h)	Radius (m)								
	1500	750	500	375	300	250	200	150	100
16	1.84	3.41	4.47	5.31	6.02	6.69	8.32	10.20	14.16
24	2.45	4.53	6.12	7.36	8.70	10.42	13.59	16.76	22.65
32	2.75	4.93	6.14	9.04	11.45	13.63	18.36	22.47	31.53
40	2.93	5 43	7.43	10.56	13.19	15.74	21.73	28.34	43.00
48	3.26	6.05	9.61	12.92	16.05	19.53	27.64	37.16	60.17
56	3.87	7.69	12.27	17.05	21.71	26.88	38.86	52.89	87.07
64	4.75	9.59	15.16	21.47	28.52	36.33	54.21	75.07	125.78
72	5.99	12.57	20.13	28.69	38.80	50.17	73.65	101.27	172.21
80	7.53	14.76	23.77	34.50	46.91	60.84	93.13	130.69	214.17
88	9.37	19.90	31.31	44.50	59.41	75.96	114.22	166.14	-

Appendix 5-4 (1) ADDITIONAL CURVE COSTS (Cont'd)
(% of Level Tangent Costs)

Heavy Bus & 6 Wheel Truck

Initial Speed (km/h)	Radius (m)								
	1500	750	500	375	300	250	200	150	100
16	2.52	4.62	6.30	7.57	8.33	9.00	11.71	14.35	19.68
24	3.48	6.32	8.39	9.87	12.08	14.22	18.60	22.92	31.93
32	3.55	6.36	9.42	12.46	15.49	18.29	24.10	29.97	42.41
40	3.71	6.57	10.89	14.41	18.04	21.38	28.47	35.90	53.68
48	3.84	8.06	12.01	15.90	20.01	23.82	32.13	44.11	88.25
56	4.11	8.29	12.40	16.58	21.01	26.43	45.74	69.31	127.16
64	4.18	8.54	14.87	22.61	32.02	42.56	67.98	98.26	171.44
72	6.31	14.00	23.11	33.70	46.01	59.69	91.54	128.90	224.90
80	9.05	19.65	31.62	45.16	60.52	77.30	116.13	161.11	-
88	11.98	25.41	40.49	51.99	75.66	96.02	-	-	-

10-Wheel Truck

Initial Speed (km/h)	Radius (m)								
	1500	750	500	375	300	250	200	150	100
16	4.33	7.98	10.93	13.14	14.53	15.75	20.52	25.07	34.20
24	6.29	11.28	15.06	17.62	21.62	25.44	33.27	41.05	57.15
32	6.49	11.61	17.26	22.73	28.30	33.45	44.07	54.87	77.69
40	6.96	12.32	20.50	27.03	33.82	40.08	53.41	67.36	100.54
48	7.29	15.33	22.88	30.22	38.08	45.40	61.27	84.09	168.17
56	7.98	16.10	24.08	32.15	40.68	51.32	88.82	134.44	264.03
64	8.16	16.78	29.14	44.29	62.76	83.36	133.09	192.07	333.79
72	12.47	27.80	45.80	66.81	91.29	118.15	180.81	254.10	-
80	18.12	39.24	63.26	90.25	120.76	153.96	230.34	318.29	-
88	24.20	51.20	81.38	104.39	151.64	191.70	-	-	-

Appendix 5-4 (2) ADDITIONAL UPHILL GRADE COSTS
(% of Level Tangent Costs)

Motor Cycle, Passenger Car, Light Bus & Pick-up Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	4.36	9.08	14.04	19.14	23.73	30.11	36.46
24	5.06	10.60	16.28	22.07	28.37	34.86	42.18
32	5.47	11.54	17.71	24.00	30.74	37.83	45.97
40	5.87	12.15	18.64	25.23	32.25	39.85	48.55
48	6.04	12.49	19.22	26.01	33.26	41.13	50.27
56	5.98	12.40	19.19	26.09	33.46	41.63	50.95
64	5.85	12.13	18.81	25.86	33.40	41.59	50.93
72	5.61	11.93	18.36	25.28	32.78	41.12	50.58
80	5.47	11.52	17.79	24.64	32.00	40.32	49.82
88	5.33	11.08	17.18	23.84	31.19	39.41	48.87

Medium Bus & 4-Wheel Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	3.76	7.94	12.55	17.72	23.54	30.31	38.27
24	4.39	9.20	14.54	20.45	27.20	34.22	44.05
32	4.93	10.17	15.99	22.54	29.84	38.34	48.32
40	5.21	10.81	17.07	23.95	31.89	40.88	51.39
48	5.42	11.44	18.03	25.31	33.47	42.60	53.97
56	5.73	11.96	18.83	26.42	34.97	44.24	56.20
64	6.00	12.45	19.56	27.34	36.15	46.22	58.15
72	6.26	13.04	20.35	28.38	37.45	47.80	60.37
80	6.52	13.49	21.09	29.42	38.79	49.82	63.57
88	6.75	14.00	21.82	30.46	40.30	-	-

Appendix 5-4 (2) ADDITIONAL UPHILL GRADE COSTS (Cont'd)
(% of Level Tangent Costs)

Heavy Bus & 6-Wheel Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	4.33	8.90	14.00	19.64	25.98	33.15	41.57
24	5.21	10.80	17.29	24.26	32.20	41.35	52.27
32	6.16	12.75	20.53	29.20	39.06	51.09	66.39
40	7.10	14.65	24.08	34.68	48.45	63.93	88.34
48	8.15	16.76	27.74	41.35	60.59	77.87	107.60
56	9.26	19.17	31.85	49.76	73.66	-	-
64	10.48	21.90	36.29	60.97	90.25	-	-
72	11.85	24.79	41.04	68.95		-	-
80	13.43	27.36	45.71	-	-	-	-
88	14.24	29.74	-	-	-	-	-

10-Wheel Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	8.65	17.22	25.67	33.98	42.20	50.30	58.64
24	12.15	24.27	36.51	48.79	61.16	73.45	82.27
32	14.61	29.37	44.77	60.81	77.61	95.49	116.07
40	16.52	33.38	51.65	71.92	95.29	120.57	-
48	17.99	36.68	57.80	83.37	110.46	-	-
56	19.62	40.21	64.52	97.25	-	-	-
64	20.05	42.49	70.22	105.84	-	-	-
72	20.87	45.29	-	-	-	-	-
80	22.12	-	-	-	-	-	-
88	23.10	-	-	-	-	-	-

Appendix 5-4 (3) REDUCTION FOR DOWNHILL GRADE
(% of Level Tangent Costs)

Motor Cycle, Passenger Car, Light Bus & Pick-up Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	3.74	12.26	12.09	11.82	11.24	10.44	8.92
24	4.40	11.55	14.62	14.30	13.69	12.96	11.48
32	4.99	11.16	16.90	16.53	15.99	15.23	13.86
40	5.25	10.47	15.86	18.50	17.93	17.29	15.97
48	5.47	10.51	15.61	19.68	19.97	19.22	18.08
56	5.67	10.56	15.42	19.36	21.96	21.14	19.97
64	5.80	10.62	15.30	19.21	22.81	22.87	21.67
72	5.73	10.70	15.66	19.53	22.99	24.78	23.52
80	5.75	10.81	15.77	19.71	23.13	26.03	25.18
88	5.75	11.01	16.04	20.45	23.84	26.28	26.81

Medium Bus & 4-Wheel Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	3.86	7.21	10.26	11.05	10.55	9.82	8.33
24	4.39	8.11	11.71	13.32	12.80	12.21	10.83
32	4.69	8.46	12.68	15.27	14.86	14.28	13.07
40	4.96	8.76	13.12	16.55	16.85	16.40	15.27
48	5.06	9.26	13.91	17.07	19.05	18.51	17.60
56	5.55	9.67	14.41	17.56	20.79	20.62	19.78
64	5.42	10.14	15.16	18.30	21.59	22.82	21.97
72	5.70	10.67	16.10	19.79	23.09	25.29	24.68
80	5.98	11.13	16.83	21.28	24.74	27.51	27.47
88	6.24	11.96	17.67	23.35	27.35	-	-

Appendix 5-4 (3) REDUCTION FOR DOWNHILL GRADE (Cont'd)
(% of Level Tangent Costs)

Heavy Bus & 6-Wheel Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	5.37	9.54	13.50	16.61	17.35	16.86	16.36
24	6.79	11.88	16.13	19.17	20.80	20.02	19.17
32	7.83	13.60	18.13	20.77	22.78	22.49	21.34
40	8.51	14.99	20.70	21.78	23.59	24.49	23.11
48	8.92	16.02	19.81	22.39	24.33	25.11	24.51
56	9.02	16.28	20.03	22.61	24.47	24.86	24.13
64	8.94	16.06	19.99	22.14	23.30	22.61	-
72	8.85	15.37	20.03	21.90	-	-	-
80	8.73	14.49	19.38	-	-	-	-
88	8.92	13.47	18.28	-	-	-	-

10-Wheel Truck

Initial Speed (km/h)	Grade (%)						
	1	2	3	4	5	6	7
16	8.07	11.67	15.28	14.35	11.56	9.26	7.00
24	10.30	14.85	18.70	17.28	14.53	11.51	8.36
32	11.95	17.91	21.23	19.59	17.16	13.75	9.99
40	13.05	19.75	21.73	20.38	18.53	14.95	-
48	13.59	20.90	21.81	20.83	19.25	-	-
56	12.99	20.63	21.77	21.32	-	-	-
64	12.80	20.41	22.59	21.57	-	-	-
72	12.32	19.47	22.66	-	-	-	-
80	11.96	18.37	-	-	-	-	-
88	12.49	17.58	-	-	-	-	-

Appendix 5-4 (4) ADDITIONAL COST PER SPEED CHANGE CYCLE
(% of Level Tangent Costs per km at Initial Speed)

Motor Cycle, Passenger Car, Light Bus & Pick-up Truck

Initial Speed (km/h)	Reduced Speed (km/h)								
	STOP	16	24	32	40	48	56	64	72
16	6.55	-	-	-	-	-	-	-	-
24	13.13	4.71	-	-	-	-	-	-	-
32	21.35	11.47	6.21	-	-	-	-	-	-
40	31.25	20.75	14.73	8.04	-	-	-	-	-
48	42.90	31.99	25.71	18.42	10.04	-	-	-	-
56	56.34	45.25	38.80	31.48	22.74	12.43	-	-	-
64	71.98	60.79	54.22	46.86	38.14	27.95	15.21	-	-
72	89.77	78.59	72.07	64.66	55.95	46.03	33.19	18.19	-
80	110.16	98.99	92.37	84.97	76.21	66.53	53.92	39.16	21.42
88	133.35	122.03	115.53	107.98	99.11	89.36	77.14	62.71	45.36

Medium Bus & 4-Wheel Truck

Initial Speed (km/h)	Reduced Speed (km/h)								
	STOP	16	24	32	40	48	56	64	72
16	7.02	-	-	-	-	-	-	-	-
24	13.41	5.04	-	-	-	-	-	-	-
32	21.80	12.25	6.61	-	-	-	-	-	-
40	32.04	21.55	15.46	8.37	-	-	-	-	-
48	44.19	32.96	26.49	19.04	10.25	-	-	-	-
56	58.36	46.55	39.79	32.05	23.13	12.50	-	-	-
64	74.52	62.30	55.36	47.40	38.24	27.52	15.02	-	-
72	92.45	79.84	72.84	64.77	55.58	44.93	32.45	17.61	-
80	111.73	99.00	91.84	83.86	74.67	64.17	51.81	37.28	20.22
88	131.66	118.89	111.74	103.93	94.81	84.36	72.45	58.39	41.82

Appendix 5-4 (4) ADDITIONAL COST PER SPEED CHANGE CYCLE (Cont'd)
(% of Level Tangent Costs per km at Initial Speed)

Heavy Bus & 6-Wheel Truck

Initial Speed (km/h)	Reduced Speed (km/h)								
	STOP	16	24	32	40	48	56	64	72
16	9.74	-	-	-	-	-	-	-	-
24	19.07	6.78	-	-	-	-	-	-	-
32	30.52	16.75	8.91	-	-	-	-	-	-
40	43.63	29.12	20.91	11.25	-	-	-	-	-
48	58.39	43.52	35.12	25.31	13.69	-	-	-	-
56	74.64	59.77	51.32	41.61	30.05	16.41	-	-	-
64	92.74	78.01	69.60	59.99	47.07	35.24	19.33	-	-
72	112.45	97.91	89.71	80.31	69.31	56.33	40.91	22.36	-
80	133.58	119.47	111.44	102.24	91.59	79.04	64.20	46.50	25.36
88	155.53	141.85	134.14	125.26	115.00	102.91	88.77	71.92	51.84

10-Wheel Truck

Initial Speed (km/h)	Reduced Speed (km/h)								
	STOP	16	24	32	40	48	56	64	72
16	27.95	-	-	-	-	-	-	-	-
24	53.38	20.33	-	-	-	-	-	-	-
32	87.69	58.90	28.11	-	-	-	-	-	-
40	128.71	90.06	66.04	36.61	-	-	-	-	-
48	175.81	136.52	111.92	82.43	45.77	-	-	-	-
56	228.90	189.56	165.37	136.03	100.04	55.57	-	-	-
64	285.23	247.07	223.18	194.79	160.30	117.74	65.68	-	-
72	347.01	309.64	286.90	259.57	226.54	186.25	136.97	75.98	-
80	411.60	375.79	354.06	327.98	296.60	258.50	212.17	141.17	85.77
88	476.82	442.56	421.87	397.10	367.36	331.49	288.11	248.02	171.15