

PROJECT ML - 6

Changwat : Ratchaburi

C. Ratchaburi - J. R. 35

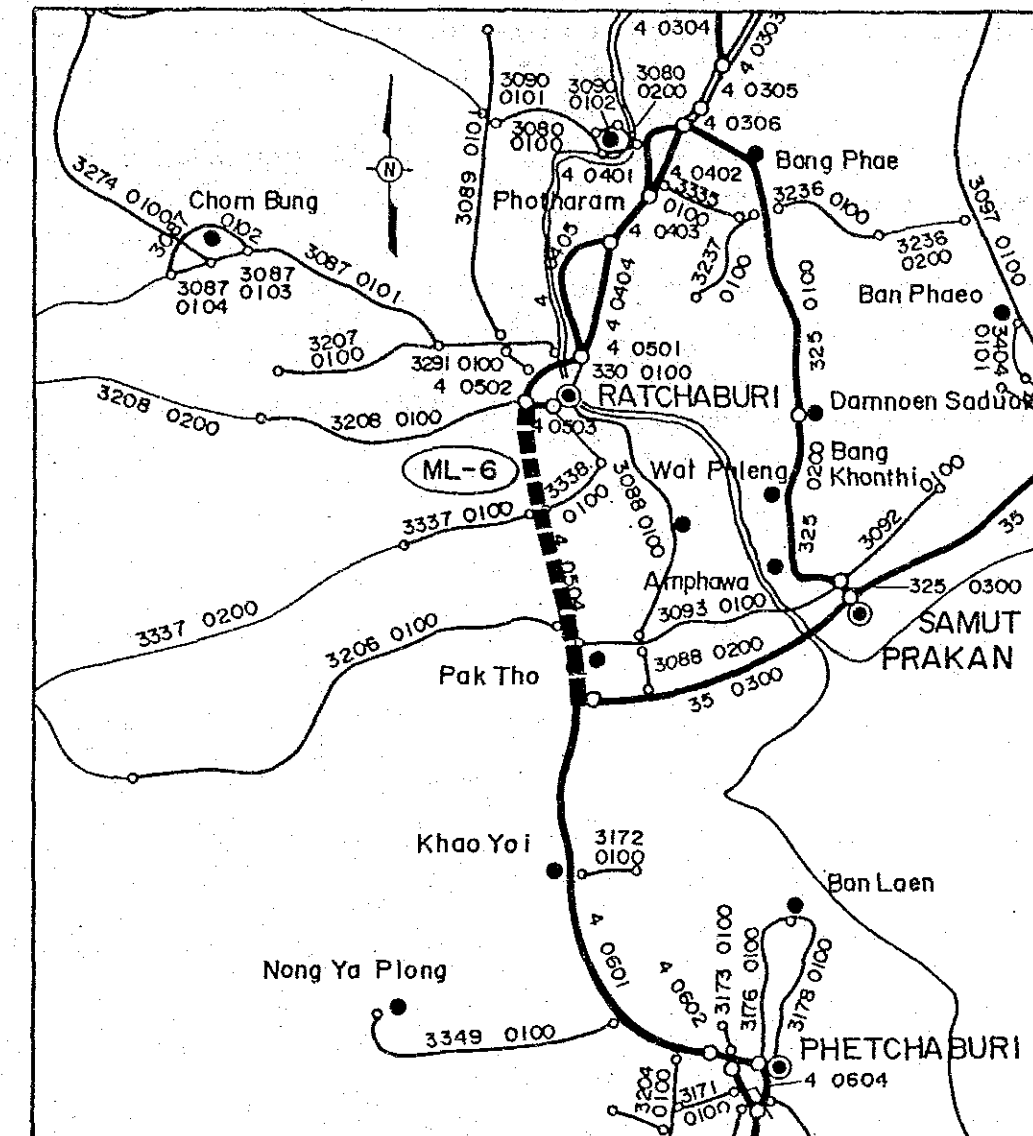
Length : 22.20 km

SUMMARY

PROJECT ML-6

Item	Description
Changwat	Ratchaburi
Origin	C. Ratchaburi (J.R.3208)
Destination	J.R. 35
Length	
Total	22.8 km
Improvement Section	22.8 km
DOH Road	No.4 22.8 km
Others	-
New Construction Section	-
Surface Type and Condition	AC Surfacing/Fair
Terrain	Flat
Traffic (ADT)	
Existing	8,004
2000	21,925
2008	32,583
Existing Standard	P1
Proposed Standard	PD
Construction Cost	
Financial	155,216 Baht
Economic	129,111 Baht
IRR	29.6%
B/C	2.95

LOCATION OF PROJECT ROUTE



SCALE
5 0 10 Km.

LEGEND :

■■■■■	PROJECT ROUTE	—	PROVINCIAL HIGHWAYS
====	DIVIDED HIGHWAYS	—	PROVINCIAL HIGHWAYS (Unpaved)
—	NATIONAL HIGHWAYS	●, ●	CHANGWAT, AMPHOE

1. GENERAL

The project section is a part of Route 4 and lies in Changwat Ratchaburi from the junction with Route 3208 to the junction with Route 35, the Thonburi-Pak Tho Highway, with a total length of 22.8 km. The existing road has a two-lane asphaltic concrete carriageway of 7.00 m width and 2.50-m shoulders. The terrain is flat. Land use in the surrounding area is paddy field with little unused land. Sugarcane is grown in the area along the last 3 km of this section. Horizontal alignment is good throughout the length, but there are some bridge approaches where vertical alignment is less than desirable.

Traffic is heavy as the road shares traffic between Bangkok and the Southern Region with the Thonburi-Pak Tho Highway.

This project is therefore planned to accommodate traffic which is expected to increase.

2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-6	4-0502	1986	3820	2346	337	347	2928	931	1115	8004

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
ML-6	- 1993	9.53	10.15	8.32	7.61	9.72	8.68	9.85	9.53
	1994 - 2000	5.34	5.81	5.50	4.90	5.36	4.59	5.07	5.34
	2001 - 2008	5.12	5.76	4.80	3.90	4.94	4.61	4.58	5.12

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-6	4-0502	1993	7224	4616	590	580	5605	1667	2152	15210
		2000	7224	6854	858	811	8078	2282	3042	21925
		2008	15504	10728	1248	1101	11880	3273	4353	32583

3. BENEFITS

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	604.	9503.	985.	1749.	3804.	4556.	5933.	27134.
2008	2345.	9734.	1321.	2498.	5390.	8167.	9216.	38671.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	3169.	12296.	3664.	12625.	8820.	2492.	3321.	46388.
2008	3106.	12650.	3503.	11266.	8526.	2349.	3124.	44525.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	3774.	21799.	4649.	14374.	12623.	7048.	9254.	73521.
2008	5451.	22385.	4825.	13763.	13916.	10516.	12340.	83196.

4. ENGINEERING

SUMMARY OF ROAD INVENTORY

(PROJECT NO. ML-6)

Item	Description
Changwat	Ratchaburi
Origin	C. Ratchaburi (J.R.3208)
Destination	J.R. 35
Length	
Total	22.8 km
Improvement Section	22.8 km
DOH Road	No.4 22.8 km
Others	-
New Construction Section	-
Terrain	Flat
Alignment (Hori./Vert.)	Good // Good/Fair
Formation Width	P1 Standard
Embankment Section	
Length	22.8 km
Height	1.00 m ~ 2.00 m
Cut Section	-
Length	-
Depth	-
Surface Type and Condition	AC Surfacing // Fair
SBST or DBST	-
Soil Aggregate	-
Earth	-
Box Culvert	-
Bridge	
Permanent Bridge	11 sites 200.0 m
Narrow Concrete Bridge	-
Wooden Bridge	-
Overflow Section	-
Right of way	30.0 m ~ 55.0 m

CONSTRUCTION QUANTITIES AND COSTS
(Project ML-6 Length = 22.8 km)

Item	Unit	Financial	Quantity	Financial	Economic Cost		Residual Value	
		Unit Rate Baht		Total Cost 1000 Baht	%	1000 Baht	%	1000 Baht
EARTHWORK					83		90	
Clearing & Grubbing	ha	9,500	29	276				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	339,000	13,560				
Embankment (Borrow Pit)	m3	100	-	0				
Sub Total				13,836		11,484		10,336
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	40,700	7,326				
Subbase (Soil Aggregate)	m3	220	54,200	11,924				
Base (Soil Aggregate)	m3	350	36,200	12,670				
Shoulder (Soil Aggregate)	m3	250	22,600	5,650				
Asphaltic Prime/Tack Coat	m2	12	361,600	4,339				
DBST	m2	40	-	0				
AC Surfacing	m2	190	237,300	45,087				
Sub Total				86,996		72,207		36,104
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	1,696	3,053				
RC Box Culvert (2 x 2.4 x 2.4 Equivalent)	m	20,000	-	0				
RC Bridge (W=7.0 L=10.0 Equivalent)	m	80,000	200	16,000				
Sub Total				19,053		15,814		7,907
INTERCHANGE/INTERSECTION	nos.	5,000,000	-	0	83	0	50	0
Total (a)					119,885	99,505		54,347
Miscellaneous Work ((a) x 7%)	1s			8,392	83	6,965	0	0
CONTRACT AMOUNT (b)					128,277	106,470		54,347
PHYSICAL CONTINGENCIES ((b) x 10%) (c)	1s			12,828		10,647		5,435
ENGINEERING AND SUPERVISION (((b) + (c)) x 10%) (d)					14,111	11,994	0	0
LAND ACQUISITION					100		100	
Highly Developed Land	ha	-	-	0				
Less Developed Land	ha	-	-	0				
Sub Total (e)	1s			0		0		0
PROJECT COST ((b) + (c) + (d) + (e))					155,216	129,111		59,782
AVERAGE COST PER KM					6,808			

5. ECONOMIC EVALUATION

COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED(12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	25,822			0	36,278	0
1992	64,556			0	80,979	0
1993	38,733			0	43,381	0
1994		19,698	39,391	59,089	0	52,758
1995		20,938	40,557	61,495	0	49,023
1996		22,177	41,723	63,900	0	45,483
1997		23,416	42,890	66,306	0	42,139
1998		24,655	44,056	68,711	0	38,988
1999		25,894	45,222	71,116	0	36,030
2000		27,134	46,388	73,522	0	33,258
2001	26,749	28,576	46,155	74,731	12,100	30,183
2002		30,018	45,922	75,940	0	27,385
2003		31,460	45,689	77,149	0	24,840
2004		32,902	45,456	78,358	0	22,526
2005		34,345	45,223	79,568	0	20,423
2006		35,787	44,990	80,777	0	18,512
2007		37,229	44,758	81,987	0	16,776
2008	(59,782)	38,671	44,525	83,196	(12,233)	15,200
TOTAL	96,078	432,899	662,945	1,095,845	160,505	473,524

NET PRESENT VALUE : 313,019
 BENEFIT COST RATIO : 2.95
 INTERNAL RATE OF RETURN : 29.6%

6. DEVELOPMENT AND SOCIAL IMPACTS

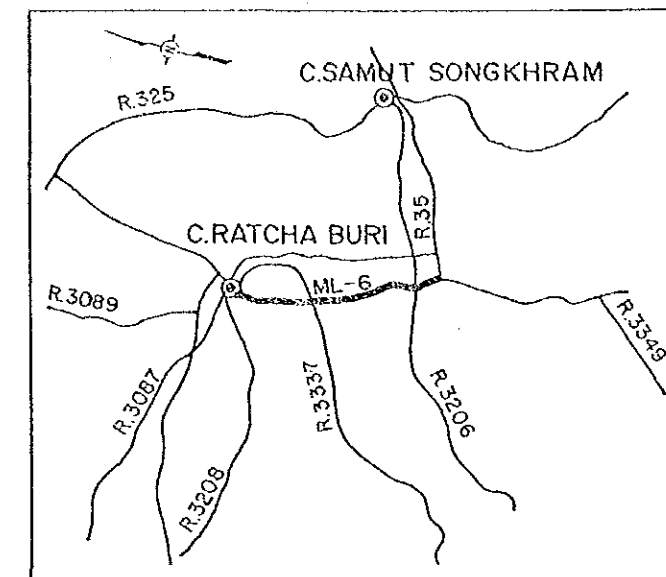
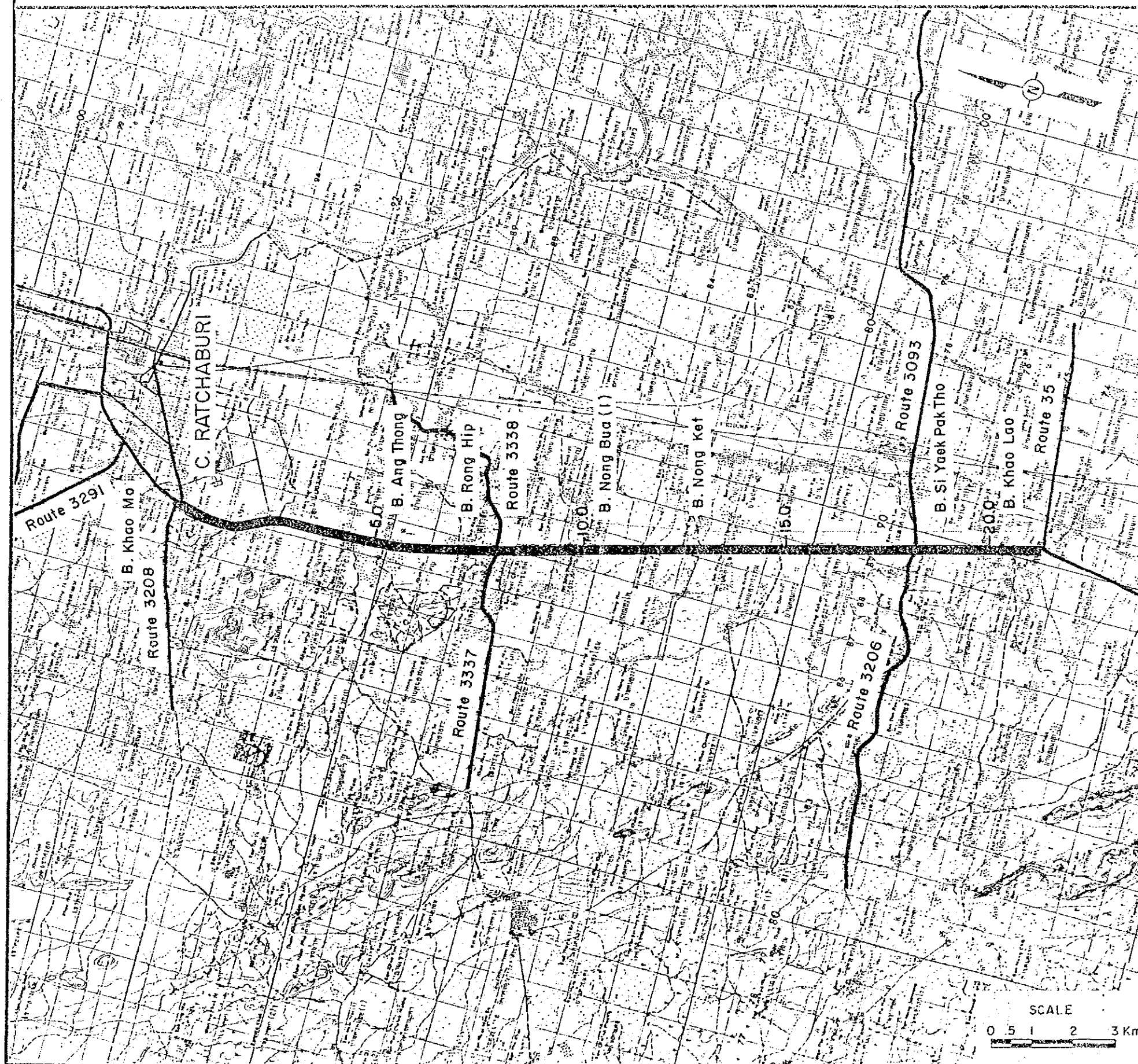
Combined with the already planned improvement of other sections of Route 4, the completion of this project would further help the integration of economies of the Southern and Central Regions. Aside from the development directly related with traffic such as gas stations, impact on the productive activities in the surrounding area would be small.

PROJECT NO. ML - 6

C. RATCHABURI - J.R.35
C. RATCHABURI

L = 22.20 KM.

LOCATION MAP



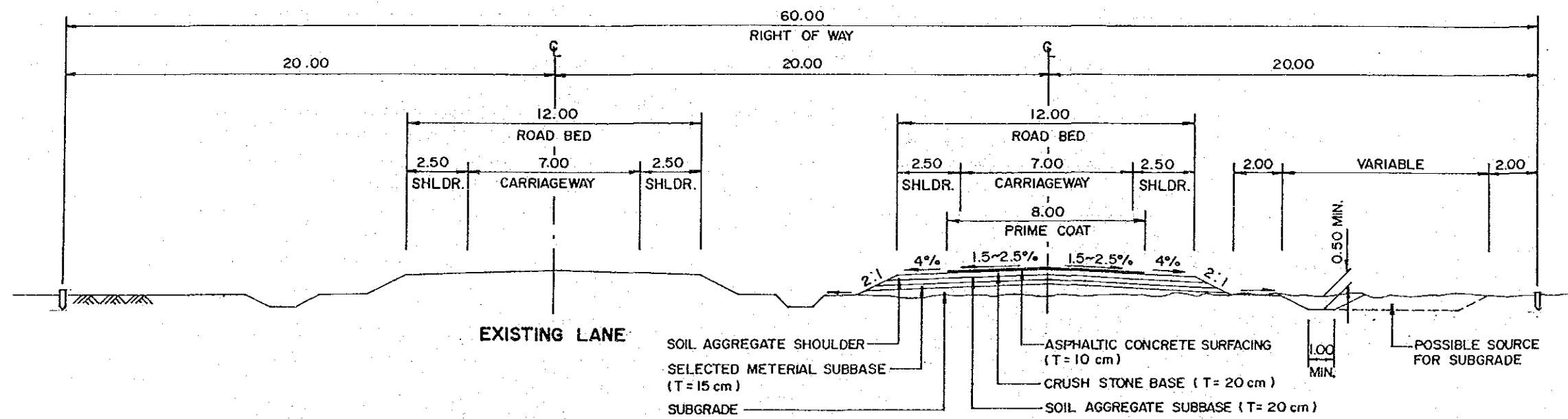
BRIDGE LIST

No	Station Km.	Proposed Bridge	Existing Bridge
1	3.3	C-8.00x15.00	C-8.00x15.00
2	4.8	C-8.00x15.00	C-8.00x15.00
3	5.5	C-8.00x20.00	C-8.00x20.00
4	5.6	C-8.00x15.00	C-8.00x15.00
5	6.4	C-8.00x21.00	C-8.00x21.00
6	7.5	C-8.00x8.00	C-8.50x8.00
7	8.8	C-8.00x14.50	C-12.50x14.50
8	12.9	C-8.00x15.50	C-8.00x15.50
9	17.2	C-8.00x40.00	C-8.00x40.00
10	19.7	C-8.00x25.50	C-8.00x25.50
11	21.8	C-8.00x10.50	C-13.00x10.50

LEGEND

- PROPOSED ROUTE (IMPROVEMENT)
- PROPOSED ROUTE (NEW CONSTRUCTION)
- PAVED ROUTE
- UNPAVED ROUTE
- INVENTORY SURVEY ROUTE

TYPICAL CROSS SECTION



PRIMARY HIGHWAY (CLASS PD)

STATION (Km)		0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
VILLAGE - Name		T. Wang Manao	T. Don Sai	A. Pak Tho B. Tha Yang B. Don Sai		T. Nong Kratum	T. Pak Kai	T. Bo Kradan T. Ang Thong	B. Huai Chinsee B. Thung Luang		B. Yai Ang Thong		T. Don Tako B. Khao Mo A. Muang				
TERRAIN		Flat															
CROSS SECTION	Formation Width (m)	10.20											7.60				
	Embankment Height (m)	1.50		1.00		2.00		1.00		1.50		2.00	1.50	1.00	0.10		
	Cutting Depth (m)																
SURFACE	Type/Length (km)	Asphaltic Concrete Pavement															
	Condition	Fair															
FLOODING	Overflow Length(km)/Height(m)																
LAND USE	Left	Paddy											Sugar Cane				
	Right	Paddy											Sugar Cane				
PIPE CULVERT	Total Number																
BOX CULVERT & BRIDGE	Station (km)	1+000	3+100	5+600		9+900		14+050	15+275	16+400	17+200	17+350	18+000	19+500			
	Dimension (m) Bridge - Conc. or wooden - Width - (Side walk) - Length Box - Width - Height - Length	C-Br. 13.10x10.40	C-Br. 8.00(1.20)x25.45	C-Br. 8.00(1.20)x40.20		C-Br. 8.00(1.20)x15.45		C-Br. 12.50x14.45 C-Br. 8.40(1.20)x8.10 C-Br. 8.00(1.20)x21.20 C-Br. 8.10(1.20)x15.10 C-Br. 8.10(1.20)x20.05 C-Br. 8.00(1.20)x15.00	C-Br. 8.00(1.20)x15.10								
RIGHT OF WAY (m)		30.00						55.00									
ALIGNMENT	Horizontal	Good															
	Vertical	Good								Fair		Good		Fair			
ROUTE NO., AGENCIES		DOH															

PROJECT ML - 7

Changwat : Bangkok, Chachoengsao

A. Min Buri - C. Chachoengsao

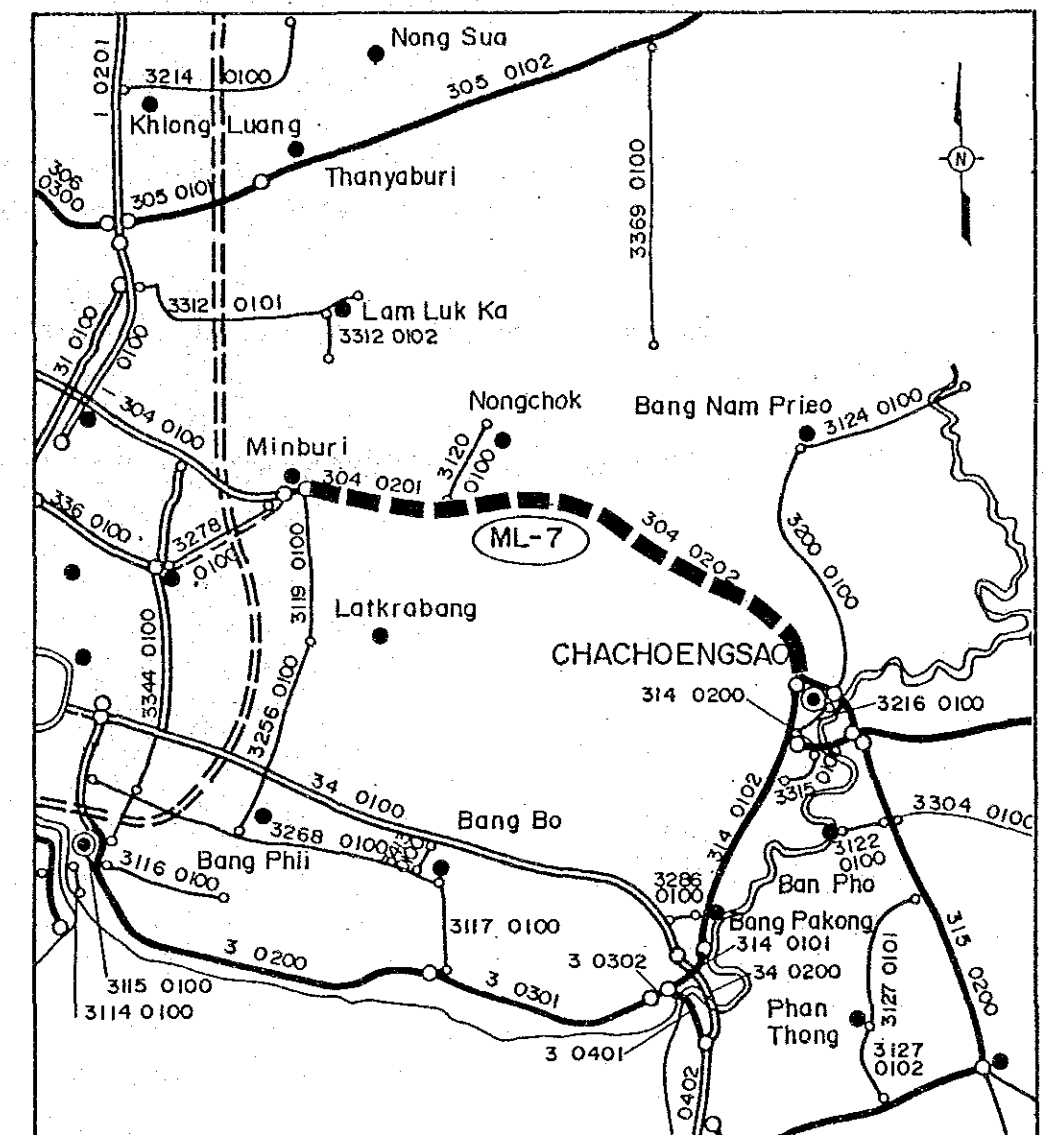
Length : 41.00 km

SUMMARY

PROJECT ML-7

Item	Description
Changwat	Bangkok/Chachoengsao
Origin	A. Min Buri (J.R. 3101)
Destination	C. Chachoengsao (J.R.314)
Length	
Total	41.0 km
Improvement Section	41.0 km
DOH Road	No.304 41.0 km
Others	-
New Construction Section	-
Surface Type and Condition	AC Surfacing // Fair/Poor
Terrain	Flat
Traffic (ADT)	
Existing	10,847
2000	22,577
2008	34,061
Existing Standard	S3
Proposed Standard	SD
Construction Cost	
Financial	421,562 Thousand Baht
Economic	350,662 Thousand Baht
IRR	29.1%
B/C	2.87

LOCATION OF PROJECT ROUTE



SCALE
5 0 10 Km.

LEGEND :

■■■■■	PROJECT ROUTE	—	PROVINCIAL HIGHWAYS
====	DIVIDED HIGHWAYS	—	PROVINCIAL HIGHWAYS (Unpaved)
————	NATIONAL HIGHWAYS	●, ●	CHANGWAT, AMPHOE

1. GENERAL

The proposed project is to expand Route 304 from Amphoe Min Buri to Muang Chachoengsao from the existing two to four lanes. The total length of the project is 41.0 km.

The terrain is flat, and both sides of the road are fully cultivated with paddy.

The existing road has an asphalt concrete carriageway of 6.00 m width and 2.00-m wide shoulders. The surface condition is fair to poor. There are 32 bridges, but horizontal and vertical alignments are good.

As the road is the main road connecting Chachoengsao with Bangkok, traffic is heavy and is expected to grow further.

Therefore, this project is proposed to accommodate the increase in future traffic.

2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-7	304-47KM	1986	2415	8193	1539	1428	1328	1429	1193	15110
	304-73KM	1986	883	2542	1185	528	1275	1026	27	6583
Average		-	1649	5368	1362	978	1302	1228	610	10847

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
ML-7	- 1993	5.07	5.94	5.83	3.94	3.36	4.60	3.78	5.07
	1994 - 2000	5.36	5.88	5.11	5.07	5.14	4.68	3.98	5.36
	2001 - 2008	5.18	5.86	4.98	4.29	4.57	4.53	4.01	5.18

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-7	304-47KM	1993	3414	12271	2288	1872	1674	1958	1547	21610
		2000	3414	18305	3243	2646	2378	2697	2033	31302
		2008	7369	28869	4784	3703	3400	3844	2784	47384
	304-73KM	1993	1287	3881	1890	702	1648	1439	35	9595
		2000	1287	5813	2665	987	2344	1995	48	13852
		2008	2782	9202	3919	1356	3359	2835	67	20738
	Average	1993	2351	8076	2089	1287	1661	1699	791	15603
		2000	3390	12059	2954	1817	2361	2346	1041	22577
		2008	5076	19036	4352	2530	3380	3340	1426	34061

3. BENEFITS

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	417.	31221.	6449.	7517.	2120.	9104.	3903.	60732.
2008	1324.	29781.	7943.	9895.	2644.	14370.	5206.	71163.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	1933.	40473.	23602.	52917.	4823.	4792.	2126.	130666.
2008	1781.	39312.	21396.	45337.	4248.	4198.	1792.	118064.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	2350.	71694.	30052.	60434.	6943.	13896.	6030.	191398.
2008	3104.	69093.	29339.	55233.	6892.	18568.	6998.	189227.

4. ENGINEERING

SUMMARY OF ROAD INVENTORY

(PROJECT NO. ML-7)

Item	Description
Changwat	Bangkok/Chachoengsao
Origin	A. Min Buri (J.R. 3101)
Destination	C. Chachoengsao (J.R.314)
Length	
Total	41.0 km
Improvement Section	41.0 km
DOH Road	No.304 41.0 km
Others	-
New Construction Section	-
Terrain	Flat
Alignment (Hori./Vert.)	Good/Good
Formation Width	S3
Embankment Section	
Length	41.0
Height	2.0 m
Cut Section	-
Length	-
Depth	-
Surface Type and Condition	AC Surfacing // Fair/Poor
SBST or DBST	-
Soil Aggregate	-
Earth	-
Box Culvert	1 unit 16.0 m
Bridge	
Permanent Bridge	32 sites 1,241.0 m
Narrow Concrete Bridge	-
Wooden Bridge	-
Overflow Section	-
Right of way	60.0 m

CONSTRUCTION QUANTITIES AND COSTS
(Project ML-7 Length=41.0 km)

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost		Residual Value	
					%	1000 Baht	%	1000 Baht
EARTHWORK					83		90	
Clearing & Grubbing	ha	9,500	52	494				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	-	0				
Embankment (Borrow Pit)	m3	100	734,700	73,470				
Sub Total				73,964		61,390		55,251
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	71,600	12,888				
Subbase (Soil Aggregate)	m3	220	95,400	20,988				
Base (Soil Aggregate)	m3	350	63,600	22,260				
Shoulder (Soil Aggregate)	m3	250	39,800	9,950				
Asphaltic Prime/Tack Coat	m2	12	636,200	7,634				
DBST	m2	40	-	0				
AC Surfacing	m2	190	371,100	70,509				
Sub Total				144,229		119,710		59,855
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	1,496	2,693				
RC Box Culvert (2 x 2.4 x 2.4 Equivalent)	m	20,000	22	440				
RC Bridge (W=7.0 L=10.0 Equivalent)	m	80,000	1,241	99,280				
Sub Total				102,413		85,003		42,502
INTERCHANGE/INTERSECTION	nos.	5,000,000	1	5,000	83	4,150	50	2,075
Total (a)				325,606		270,253		159,683
Miscellaneous Work ((a) x 7%)	1s			22,792	83	18,917	0	0
CONTRACT AMOUNT (b)				348,398		289,170		159,683
PHYSICAL CONTINGENCIES ((b) x 10%) (c)	1s			34,840		28,917		15,968
ENGINEERING AND SUPERVISION (((b) + (c)) x 10%) (d)	1s			38,324	85	32,575	0	0
LAND ACQUISITION					100		100	
Highly Developed Land	ha	-	-	0				
Less Developed Land	ha	-	-	0				
Sub Total (e)	1s			0		0		0
PROJECT COST ((b) + (c) + (d) + (e))				421,562		350,662		175,651
AVERAGE COST PER KM				10,282				

5. ECONOMIC EVALUATION

COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED(12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	70,132			0	98,530	0
1992	175,331			0	219,935	0
1993	105,199			0	117,823	0
1994		46,666	111,996	158,662	0	141,663
1995		49,010	115,107	164,117	0	130,833
1996		51,355	118,219	169,574	0	120,699
1997		53,699	121,331	175,030	0	111,235
1998		56,043	124,443	180,486	0	102,413
1999		58,388	127,554	185,942	0	94,204
2000		60,732	130,666	191,398	0	86,579
2001	50,224	62,036	129,091	191,127	22,719	77,193
2002		63,340	127,516	190,856	0	68,825
2003		64,643	125,940	190,583	0	61,363
2004		65,947	124,365	190,312	0	54,710
2005		67,251	122,790	190,041	0	48,779
2006		68,555	121,215	189,770	0	43,490
2007		69,859	119,639	189,498	0	38,775
2008	(175,651)	71,163	118,064	189,227	(35,942)	34,571
TOTAL	225,235	908,686	1,837,935	2,746,623	423,065	1,215,332

NET PRESENT VALUE : 792,267
 BENEFIT COST RATIO : 2.87
 INTERNAL RATE OF RETURN : 29.1%

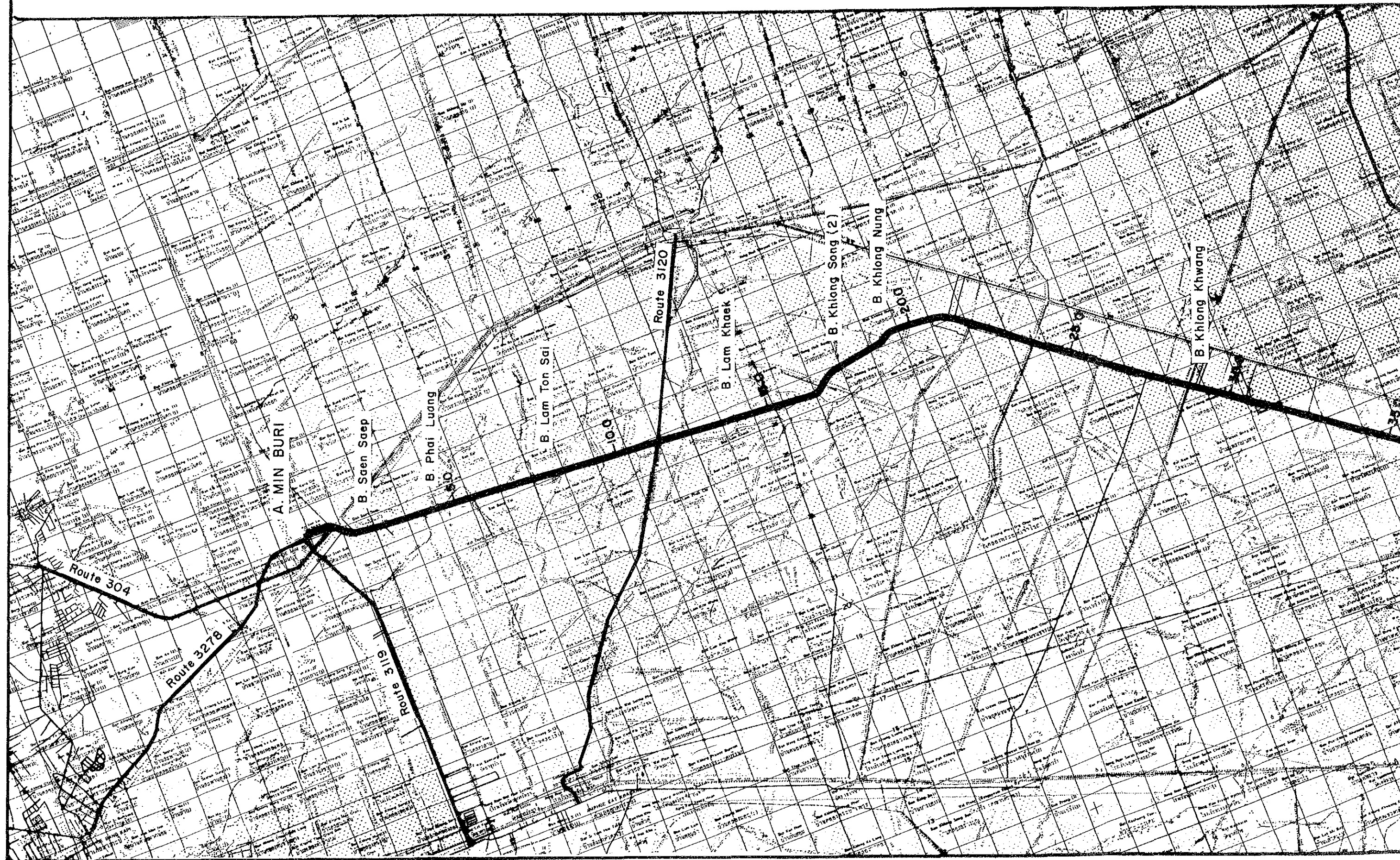
6. DEVELOPMENT AND SOCIAL IMPACTS

It is not likely that expanded Route 304 would induce changes in agricultural production patterns in the surrounding area as it is already served by a paved road. Due to its proximity to Bangkok and relatively good and inexpensive land readily available along the road, industrial development may take place such as along Route 34, although the level of development would be less than those along Route 34.

PROJECT NO. ML - 7

A. MIN BURI - C. CHACHOENGSAO
C. BANGKOK, C. CHACHOENGSAO

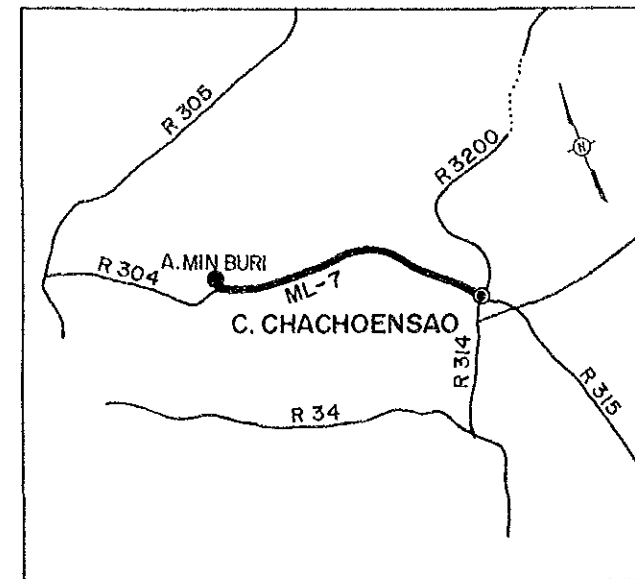
L = 41.00 KM.



L = 41.00 KM.



LOCATION MAP



BRIDGE LIST

No.	Station Km.	Proposed Bridge	Existing Bridge
1	1.0	C-8.00 x 100.00	C-8.00 x 100.00
2	2.7	C-8.00 x 16.00	C-8.00 x 16.00
3	3.9	C-8.00 x 25.00	C-8.00 x 25.00
4	4.4	C-8.00 x 15.00	C-8.00 x 15.00
5	5.3	C-8.00 x 40.00	C-8.00 x 40.00
6	6.4	C-8.00 x 25.00	C-8.00 x 25.00
7	7.3	C-8.00 x 15.00	C-8.00 x 15.00
8	8.2	C-8.00 x 35.00	C-8.00 x 35.00
9	9.5	C-8.00 x 22.00	C-8.00 x 22.00
10	10.3	C-8.00 x 24.00	C-8.00 x 24.00
11	12.0	C-8.00 x 45.00	C-8.00 x 45.00
12	12.7	C-8.00 x 21.00	C-8.00 x 21.00
13	13.3	C-8.00 x 10.00	C-8.00 x 10.00
14	14.3	C-8.00 x 24.00	C-8.00 x 24.00
15	15.7	C-8.00 x 21.00	C-8.00 x 21.00
16	16.7	C-8.00 x 28.00	C-8.00 x 28.00
17	17.5	C-8.00 x 24.00	C-8.00 x 24.00
18	18.6	C-8.00 x 37.00	C-8.00 x 37.00
19	19.0	C-8.00 x 25.00	C-8.00 x 25.00
20	21.0	C-8.00 x 30.00	C-8.00 x 30.00
21	21.8	C-8.00 x 115.00	C-8.00 x 115.00
22	22.5	C-8.00 x 32.00	C-8.00 x 32.00
23	23.7	C-8.00 x 138.00	C-8.00 x 138.00
24	25.9	C-8.00 x 90.00	C-8.00 x 90.00
25	28.7	C-8.00 x 132.00	C-8.00 x 132.00
26	31.1	C-8.00 x 15.00	C-8.00 x 15.00
27	31.9	C-8.00 x 15.00	C-8.00 x 15.00
28	32.6	C-8.00 x 19.00	C-8.00 x 19.00
29	34.7	C-8.00 x 18.00	C-8.00 x 18.00
30	35.7	C-8.00 x 38.00	C-8.00 x 38.00
31	39.5	C-8.00 x 16.00	C-8.00 x 16.00
32	40.1	C-8.00 x 15.00	C-8.00 x 15.00
33	40.6	C-8.00 x 16.00	C-8.00 x 16.00

LEGEND

- PROPOSED ROUTE (IMPROVEMENT)
- PROPOSED ROUTE (NEW CONSTRUCTION)
- PAVED ROUTE
- UNPAVED ROUTE
- INVENTORY SURVEY ROUTE

[illegible]

30-7

PROJECT NO. ML-7

ROAD INVENTORY (1/2)

ROUTE NO. A. MIN BURI - C. CHACHOENGSAO

A. MIN BURI - C. CHACHOENGSAO

L = 41.00 km

STATION (Km)		0	2	38	39	40	42	44	46	48	50	52	54	56	58	60	62	64	66								
VILLAGE Name of Village		A. Min Buri																									
TERRAIN		Flat																									
CROSS SECTION	Formation Width (m)	Carriageway 6.00 shoulder 2.00																									
	Embankment Height (m)	2.0																									
	Cutting Depth (m)																										
SURFACE	Type/Length (km)	Asphaltic Concrete																									
	Condition	Fair/Poor																									
FLOODING	Overflow Length (km)/Height (m)	No.																									
LAND USE	Left	Paddy																									
	Right	Paddy																									
BOX CULVERT & BRIDGE	Station (km)	1+000	2+700	3+900	4+400	5+300	6+400	7+300	8+200	9+500	10+300	12+000	12+700	13+300	14+300	15+700	16+700	17+500	18+600	19+000	19+000	21+000	21+800	22+500	23+700	25+900	28+700
	Dimension (m)																										
	Bridge - Conc. or wooden - Width - (Side walk) - Length Box - width - Height - Length	C-Br. 8.00()x100.00	C-Br. 8.00(1.50)x16.00	C-Br. 8.00()x25.00	C-Br. 8.00()x15.00	C-Br. 8.00()x40.00	C-Br. 8.00()x25.00	C-Br. 8.00()x15.00	C-Br. 8.00()x35.00	C-Br. 8.00()x22.00	C-Br. 8.00()x24.00	C-Br. 8.00()x45.00	C-Br. 8.00()x21.00	C-Br. 8.00()x10.00	C-Br. 8.00()x24.00	C-Br. 8.00()x21.00	C-Br. 8.00()x28.00	C-Br. 8.00()x24.00	C-Br. 8.00()x37.00	C-Br. 8.00()x25.00	C-Br. 8.00()x30.00	C-Br. 8.00()x115.0	C-Br. 7.00()x32.00	C-Br. 6.00(0.50)x138.00	C-Br. 8.00(1.50)x90.00	C-Br. 6.00(0.50)x132.00	
RIGHT OF WAY (m) (Left/Right)		30.00/30.00																									
ALIGNMENT	Horizontal	Good																									
	Vertical	Good																									
ROUTE NO., AGENCIES		DOH Route No. 304																									

ROAD INVENTORY (2/2)

ROUTE NO. A. MINBURI - C. CHACHOENGSAO
C. BANGKOK/CHACHOENGSAO

PROJECT NO. ML-7

L = 41.00 km

STATION (Km)		66	68	70	72	74	76	14	16	18	20	22	24	26	28	30
VILLAGE Name of Village																
TERRAIN																
CROSS SECTION	Formation Width (m)															
	Embankment Height (m)															
	Cutting Depth (m)															
SURFACE	Type/Length (km)															
	Condition															
FLOODING	Overflow Length (km)/Height (m)															
LAND USE	Left															
	Right															
BOX CULVERT & BRIDGE	Station (km)															
	Dimension (m)															
	Bridge - Conc. or wooden - Width - (Side walk) - Length Box - width - Height - Length															
RIGHT OF WAY (m) (Left/Right)																
ALIGNMENT	Horizontal															
	Vertical															
ROUTE NO., AGENCIES																

PROJECT ML - 8

Changwat : Nonthaburi

B. Bang Muang - A. Lat Lum Khaew

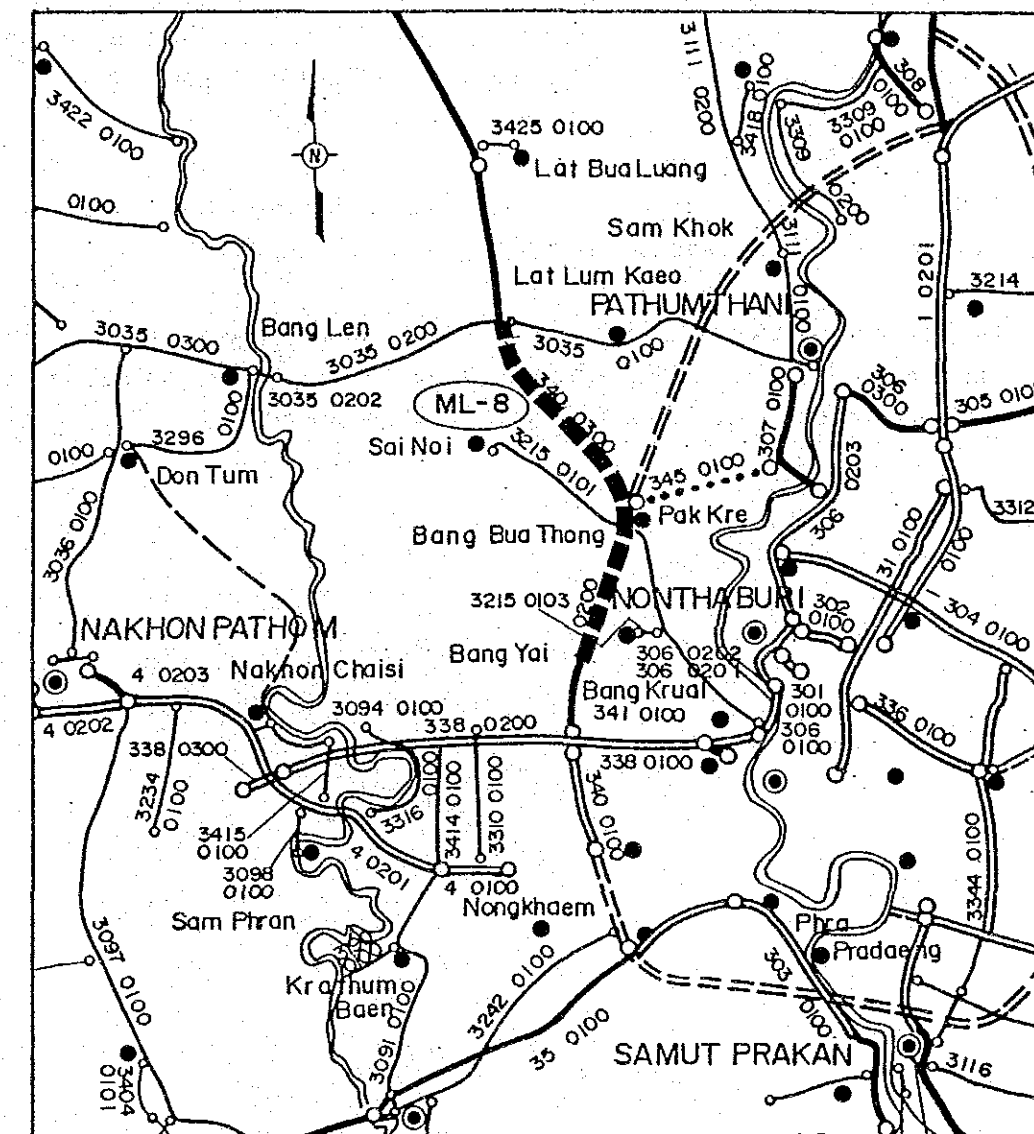
Length : 25.60 km

SUMMARY

PROJECT ML-8

Item	Description
Changwat	Nonthaburi
Origin	B. Bang Muang
Destination	A. Lat Lum Khaew (J.R. 3035)
Length	
Total	25.6 km
Improvement Section	25.6 km
DOH Road	No.340 25.6 km
Others	-
New Construction Section	-
Surface Type and Condition	AC Surfacing // Fair
Terrain	Flat
Traffic (ADT)	
Existing	5,569
2000	14,258
2008	21,311
Existing Standard	P1, S1
Proposed Standard	PD, SD
Construction Cost	
Financial	254,890 Thousand Baht
Economic	212,022 Thousand Baht
IRR	24.7%
B/C	2.46

LOCATION OF PROJECT ROUTE



SCALE
5 0 10 Km.

LEGEND :

■■■■■	PROJECT ROUTE	—	PROVINCIAL HIGHWAYS
====	DIVIDED HIGHWAYS	---	PROVINCIAL HIGHWAYS (Unpaved)
—	NATIONAL HIGHWAYS	●, ●	CHANGWAT, AMPHOE

1. GENERAL

The proposed project is to expand the number of lanes from the existing two to four for the section of Route 340 from a point 5 km north of the junction with Route 338 in Ban Bang Muang to Amphoe Lat Lum Khaew. The section from the start to Amphoe Bang Bua Thong is to form a part of the Outer Ring Road. The section of Route 340 from the junction with Route 338 to the start of the project road has already been constructed as a four-lane divided highway. The project is thus intended to extend the four-lane divided highway northward.

The terrain is flat, and surrounding land use is almost entirely paddy fields. There are 10 permanent bridges along the route. The existing road has a cross-section with an asphalt pavement width of 7 to 8 m and its surface condition is generally fair.

Traffic is heavy, on the order of 5000 to 6000 ADT, and it is expected that the traffic volume will exceed 10,000 ADT by 1993. When completed, this road would greatly enhance the accessibility of the area northwest of Bangkok to the Bangkok area.

2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-8	340-0300	1986	589	3015	455	367	659	988	85	5569

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
ML-8	- 1993	8.89	8.73	9.67	9.84	9.20	8.46	8.66	8.89
	1994 - 2000	5.04	5.25	5.04	5.07	4.57	4.52	6.55	5.04
	2001 - 2008	5.15	5.54	5.26	4.47	4.42	4.67	4.30	5.15

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-8	340-0300	1993	1069	5417	868	708	1220	1744	152	10109
		2000	1069	7750	1225	1001	1668	2377	237	14258
		2008	2254	11930	1846	1420	2358	3425	332	21311

3. BENEFITS

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	0.	19037.	2191.	2981.	1180.	5715.	617.	31721.
2008	180.	25805.	3252.	4660.	1699.	10275.	983.	46854.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	849.	25676.	9662.	28777.	3363.	4793.	478.	73597.
2008	1070.	33329.	12278.	34424.	4009.	5823.	564.	91498.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	849.	44713.	11852.	31758.	4543.	10507.	1095.	105318.
2008	1250.	59134.	15529.	39084.	5708.	16099.	1548.	138352.

4. ENGINEERING

SUMMARY OF ROAD INVENTORY

(PROJECT ML-1-8)

Item	Description
Changwat	Nonthaburi
Origin	B. Bang Muang
Destination	A. Lat Lum Khaew (J.R. 3035)
Length	
Total	25.6 km
Improvement Section	25.6 km
DOH Road	No.340 25.6 km
Others	-
New Construction Section	-
Terrain	Flat
Alignment (Hori./Vert.)	Good // Fair
Formation Width	
Embankment Section	
Length	25.6 km
Height	0.5 m ~ 1.0 m
Cut Section	
Length	-
Depth	-
Surface Type and Condition	AC Surfacing // Fair
SBST or DBST	-
Soil Aggregate	-
Earth	-
Box Culvert	-
Bridge	
Permanent Bridge	10 sites 1047 m
Narrow Concrete Bridge	-
Wooden Bridge	-
Overflow Section	-
Right of way	50.0 m ~ 80.0 m

CONSTRUCTION QUANTITIES AND COSTS
(Project ML-8 Length=25.6 km)

Item	Unit	Financial	Quantity	Financial	Economic Cost		Residual Value	
		Unit Rate Baht		Total Cost 1000 Baht	%	1000 Baht	%	1000 Baht
EARTHWORK					83		90	
Clearing & Grubbing	ha	9,500	32	304				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	368,300	14,732				
Embankment (Borrow Pit)	m3	100	-	0				
Sub Total				15,036		12,480		11,232
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	44,200	7,956				
Subbase (Soil Aggregate)	m3	220	58,900	12,958				
Base (Soil Aggregate)	m3	350	39,300	13,755				
Shoulder (Soil Aggregate)	m3	250	24,600	6,150				
Asphaltic Prime/Tack Coat	m2	12	392,800	4,714				
DBST	m2	40	-	0				
AC Surfacing	m2	190	257,900	49,001				
Sub Total				94,534		78,463		39,232
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	1,968	3,542				
RC Box Culvert (2 x 2.4 x 2.4 Equivalent)	m	20,000	-	0				
RC Bridge (W=7.0 L=10.0 Equivalent)	m	80,000	1,047	83,760				
Sub Total				87,302		72,461		36,231
INTERCHANGE/INTERSECTION	nos.	5,000,000	-	0	83	0	50	0
Total (a)					196,872	163,404		86,695
Miscellaneous Work ((a) x 7%)	1s			13,781	83	11,438	0	0
CONTRACT AMOUNT (b)					210,653	174,842		86,695
PHYSICAL CONTINGENCIES ((b) x 10%) (c)	1s			21,065		17,484		8,670
ENGINEERING AND SUPERVISION (((b) + (c)) x 10%) (d)					23,172	19,696	0	0
LAND ACQUISITION					100		100	
Highly Developed Land	ha	-	-	0				
Less Developed Land	ha	-	-	0				
Sub Total (e)	1s			0		0		0
PROJECT COST ((b) + (c) + (d) + (e))					254,890	212,022		95,365
AVERAGE COST PER KM					9,957			

5. ECONOMIC EVALUATION

COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED (12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	42,404			0	59,575	0
1992	106,011			0	132,980	0
1993	63,607			0	71,240	0
1994		14,038	45,847	59,885	0	53,469
1995		16,985	50,472	67,457	0	53,776
1996		19,932	55,097	75,029	0	53,404
1997		22,880	59,722	82,602	0	52,495
1998		25,827	64,347	90,174	0	51,167
1999		28,774	68,972	97,746	0	49,521
2000		31,721	73,597	105,318	0	47,641
2001	29,065	33,613	75,835	109,448	13,148	44,204
2002		35,504	78,072	113,576	0	40,957
2003		37,396	80,310	117,706	0	37,898
2004		39,287	82,548	121,835	0	35,025
2005		41,179	84,785	125,964	0	32,332
2006		43,071	87,023	130,094	0	29,814
2007		44,962	89,260	134,222	0	27,464
2008	(95,365)	46,854	91,498	138,352	(19,514)	25,276
TOTAL	145,722	482,023	1,087,383	1,569,408	257,429	634,443

NET PRESENT VALUE : 377,014
 BENEFIT COST RATIO : 2.46
 INTERNAL RATE OF RETURN : 24.7%

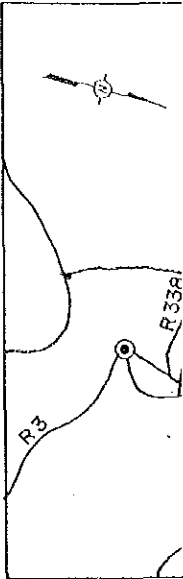
6. DEVELOPMENT AND SOCIAL IMPACTS

Upon completion of the project road as a four-lane divided highway, development can be expected at and near the intersection of Route 340 as the Outer Ring Road and Route 338 (Bangkok Noi-Nakhon Chaisi Highway). Changwat Suphanburi will increase in importance in the area.

PROJECT NO. ML - 8

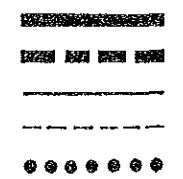
B. BANG MUANG - A.LAT LUM KHAEW
C. NONTHABURI

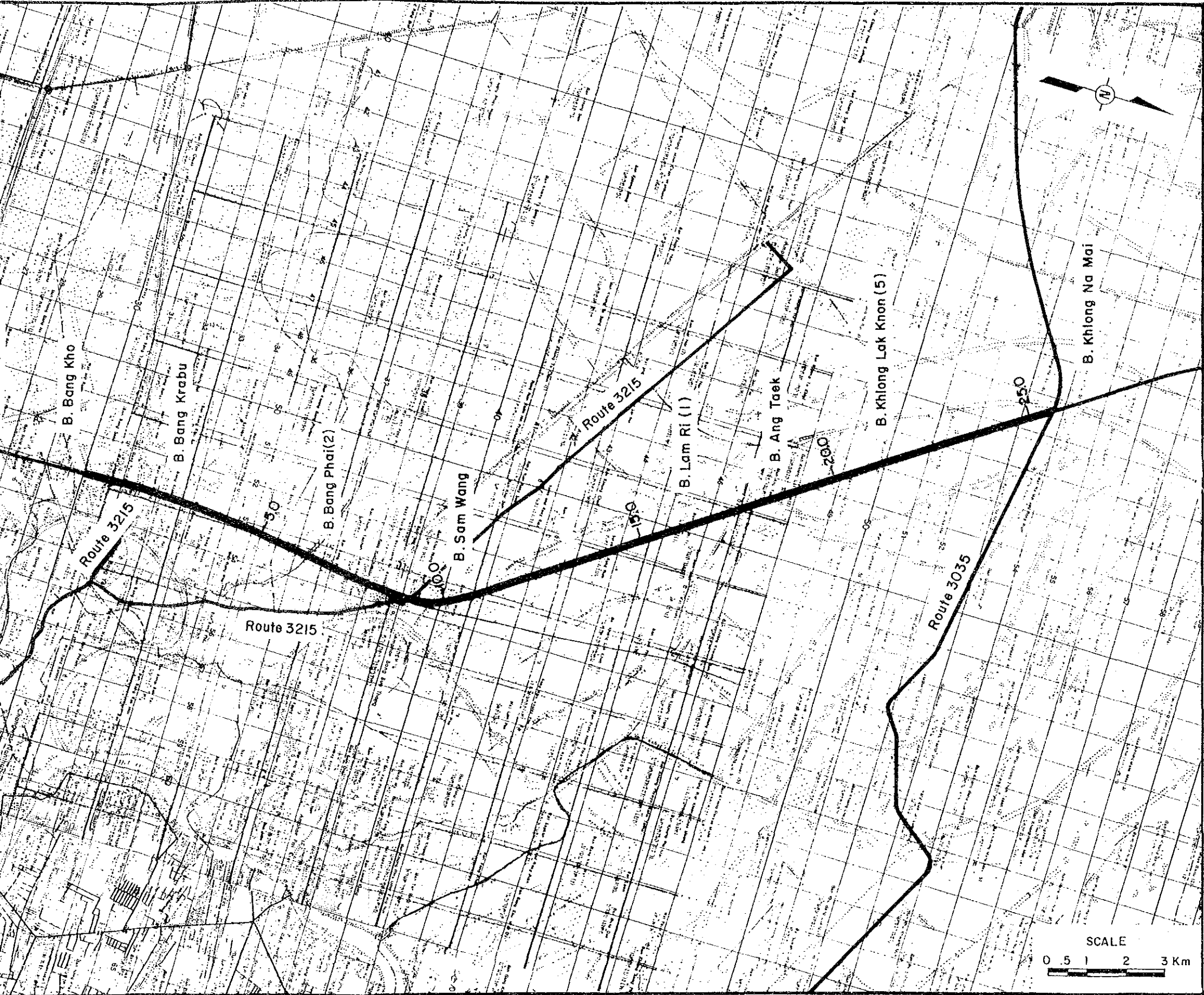
L = 25.60 KM.



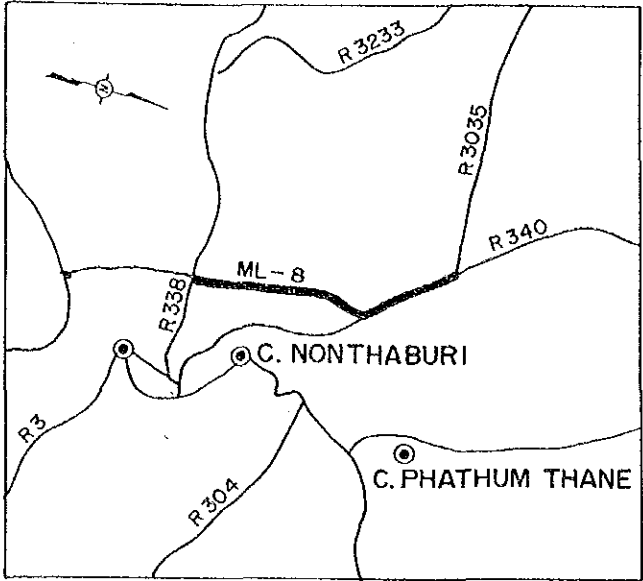
No	Station Km.	F
1	0.7	
2	1.2	
3	4.8	
4	5.6	
5	8.1	
6	8.8	
7	9.5	
8	11.3	
9	11.9	
10	19.5	

LEGEND





LOCATION MAP



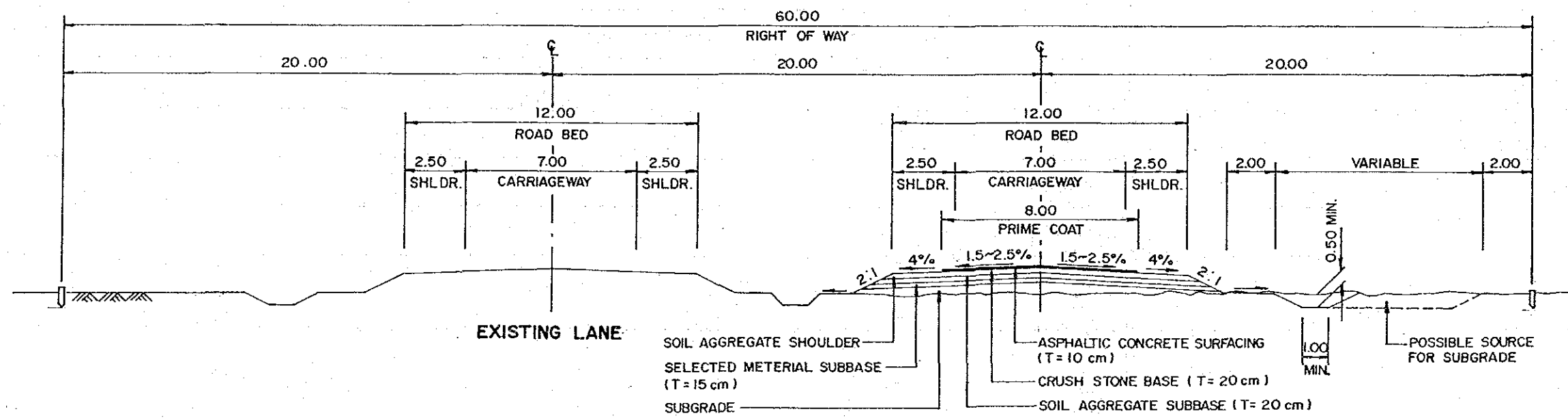
BRIDGE LIST

No	Station Km.	Proposed Bridge	Existing Bridge
1	0.7	C-12.00x191.00	C-12.00x191.00
2	1.2	—	C-12.00 x 50.55
3	4.8	—	C-12.00 x 40.60
4	5.6	—	C-12.00 x 50.80
5	8.1	—	C-12.00 x 70.00
6	8.8	—	C-12.00 x 30.20
7	9.5	—	C-12.00 x 211.40
8	11.3	—	C-8.10 x 12.10
9	11.9	—	C-12.00 x 130.70
10	19.5	—	C-8.00 x 260.00

LEGEND

- PROPOSED ROUTE (IMPROVEMENT)
- PROPOSED ROUTE (NEW CONSTRUCTION)
- PAVED ROUTE
- UNPAVED ROUTE
- INVENTORY SURVEY ROUTE

TYPICAL CROSS SECTION



PRIMARY HIGHWAY (CLASS PD)

PROJECT NO. ML-8

ROAD INVENTORY
ROUTE NO. B. BANG MUANG - A. LAT LUM KHAEW
C. NONTHABURI

L = 25.6 km

STATION (Km)		0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	31.8
VILLAGE Name of Village					B. Bang Muang	B. Bang Yai	B. Bang Kra Bu Intersection to Nonthaburi	B. Bang Prak	B. Khlong Tanon	B. Bang Pai B. Klual	B. Bang Bua Thong	B. Lum Lee	B. Lum Pong		T. La Han	T. Na Mai		A. Lat Lum Khaew
TERRAIN								Flat										
CROSS SECTION	Formation Width (m)					7.00						8.00						
	Embankment Height (m)					1.00				0.50		1.00						
	Cutting Depth (m)																	
SURFACE	Type/Length (km)					Asphaltic Concrete Pavement												
	Condition					Fair												
FLOODING	Overflow Length (km)/Height (m)																	
LAND USE	Left					Fruits						Paddy						
	Right					Frutis						Paddy						
BOX CULVERT & BRIDGE	Station (km)					6+900 7+400		11+000 11+800		14+300 15+000	15+700	17+500 18+100			25+700			
	Dimension (m) Bridge - Conc. or wooden - Width - (Side walk) - Length Box - width - Height - Length					C-Br. 12.00x191.00 C-Br. 12.00x50.50		C-Br. 12.00x40.60 C-Br. 12.00x50.80		C-Br. 12.00x70.00 C-Br. 12.00x30.20	C-Br. 12.00x211.40	C-Br. 8.10(0.8)x12.10 C-Br. 12.00x130.70			C-Br. 8.00(1.00)x260.00			
	RIGHT OF WAY (m) (Left/Right)							50.00					80.00					
ALIGNMENT	Horizontal					Good				Fair		Good		Fair		Good		
	Vertical									Fair								
ROUTE NO., AGENCIES										DOH								

JICA

