

PROJECT ML - 1

Changwat : Chon Buri

Chon Buri Bypass

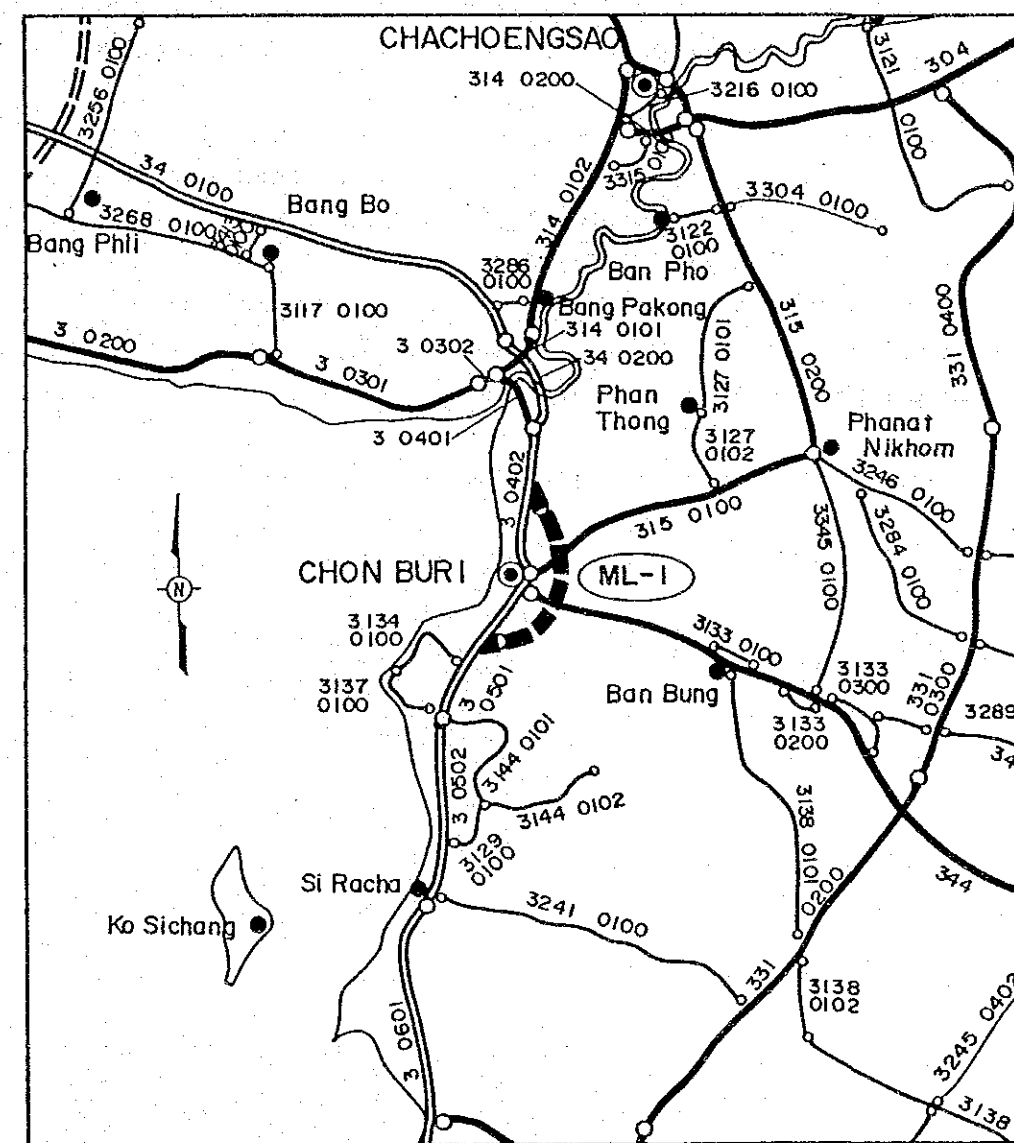
Length : 13.80 km

SUMMARY

PROJECT ML-1

Item	Description
Changwat	Chon Buri
Origin	Chon Buri Bypass
Destination	
Length	
Total	13.8 km
Improvement Section	13.8 km
DOH Road	No.3 13.8 km
Others	-
New Construction Section	-
Surface Type and Condition	AC Surfacing / Fair
Terrain	Flat
Traffic (ADT)	
Existing	6,964
2000	28,090
2008	42,970
Existing Standard	P1
Proposed Standard	PD
Construction Cost	
Financial	100,801 Thousand Baht
Economic	83,849 Thousand Baht
IRR	32.7%
B/C	3.16

LOCATION OF PROJECT ROUTE



LEGEND :

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

1. GENERAL

The proposed route is the Chon Buri Bypass with a total length of 13.8 km.

The existing Chon Buri Bypass starts at a signalized intersection on Route 3 on the approach to the Chon Buri built-up area, runs in a semi-circular alignment on the eastern fringe of the city and ends at a partially grade-separated intersection with Route 3. In between the two ends, it intersects with five roads, of which two are major national highways (Routes 315 and 344).

The terrain is generally flat. Land use along the road is still mostly agricultural, with coconut plantations, paddy and cassava fields being dominant. The present cross section follows the P1 standards with 7.0 m carriageway width and 2.5 m wide shoulders. Because all heavy vehicle traffic is prohibited from passing through Chon Buri on Route 3, the existing two-lane road is at times saturated with heavy vehicle traffic, causing all vehicles to move at the pace of the slowest moving heavy vehicle. At present, therefore, light vehicles normally do not take the Bypass, resulting in congestion in the city of Chon Buri.

The condition of the existing asphaltic surface is generally fair.

Upon completion, the widened multilane Chon Buri Bypass will be a properly functioning bypass.

2. TRAFFIC (Network Assignment Method)

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-1	3-0403-N	1993	3731	8806	3284	1386	5793	2053	3289	24203
		2000	5224	13219	5383	1973	8181	3011	4891	36147
		2008	7592	20768	9079	2884	11855	4377	7041	55092
	3-0403-E	1993	3860	8951	3306	1438	6000	2336	3796	25237
		2000	5433	13402	5403	2047	8542	3502	5734	37821
		2008	7887	20921	9079	2981	12423	5123	8331	57452
	3-0403-S	1993	3418	6738	2742	1138	5330	2271	4382	21704
		2000	4857	10602	4539	1719	7523	3356	6595	33218
		2008	7096	17082	7800	2594	10827	4905	9629	51122
	3-0403-s	1993	1079	486	186	101	418	339	1461	2991
		2000	1352	903	321	169	659	604	2516	5173
		2008	1732	1555	554	276	1013	934	3886	8216
	Average	1993	3022	6245	2379	1016	4385	1750	3232	18534
		2000	4217	9531	3911	1477	6226	2618	4934	28090
		2008	6077	15082	6628	2184	9030	3835	7222	42970

3. BENEFITS

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	321.	6817.	2806.	2159.	1882.	3965.	6655.	24605.
2008	192.	2866.	1469.	1037.	858.	2004.	3202.	11628.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	669.	8898.	8693.	11964.	3537.	1488.	2803.	38051.
2008	286.	4179.	4372.	5251.	1523.	647.	1218.	17476.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	990.	15715.	11499.	14124.	5419.	5453.	9458.	62656.
2008	478.	7045.	5841.	6288.	2381.	2651.	4420.	29104.

4. ENGINEERING

SUMMARY OF ROAD INVENTORY

(PROJECT ML-1)

Item	Description
Changwat	Chon Buri
Origin	Chon Buri Bypass
Destination	
Length	
Total	13.8 km
Improvement Section	13.8 km
DOH Road	No.3 13.8 km
Others	-
New Construction Section	-
Terrain	Flat
Alignment (Hori./Vert.)	Good/Good
Formation Width	P1 Standard
Embankment Section	
Length	13.8 km
Height	0.5 m ~ 1.5 m
Cut Section	-
Length	-
Depth	-
Surface Type and Condition	AC surfacing /Fair
SBST or DBST	-
Soil Aggregate	-
Earth	-
Box Culvert	4 units 60.0 m
Bridge	-
Permanent Bridge	-
Narrow Concrete Bridge	-
Wooden Bridge	-
Overflow Section	-
Right of way	Left 20 m Right 40 m

CONSTRUCTION QUANTITIES AND COSTS
(Project ML-1 Length=13.8 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	16	152				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	184,500	7,380				
Embankment (Borrow Pit)	m3	100	-	0				
Sub Total				7,532		6,252		5,627
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	22,100	3,978				
Subbase (Soil Aggregate)	m3	220	29,500	6,490				
Base (Soil Aggregate)	m3	350	19,700	6,895				
Shoulder (Soil Aggregate)	m3	250	12,300	3,075				
Asphaltic Prime/Tack Coat	m2	12	196,800	2,362				
DBST	m2	40	-	0				
AC Surfacing	m2	190	129,200	24,548				
Sub Total				47,348		39,299		19,650
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	592	1,066				
RC Box Culvert (2 x 2.4 x 2.4 Equivalent)	m	20,000	64	1,280				
RC Bridge (W=7.0 L=10.0 Equivalent)	m	80,000	-	0				
Sub Total				2,346		1,947		974
INTERCHANGE/INTERSECTION	nos.	30,000,000	1	30,000	83	24,900	50	12,450
Total (a)					87,226	72,398		38,701
Miscellaneous Work ((a) x 7%)	1s			6,106	83	5,068	0	0
CONTRACT AMOUNT (b)					93,332	77,466		38,701
PHYSICAL CONTINGENCIES ((b) x 10%) (c)	1s			9,333		7,747		3,870
ENGINEERING AND SUPERVISION (((b) + (c)) x 10%) (d)					85	8,727	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))					112,932	93,940		42,571
AVERAGE COST PER KM					8,183			

5. ECONOMIC EVALUATION

COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED(12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	18,788			0	26,396	0
1992	46,970			0	58,919	0
1993	28,182			0	31,564	0
1994		17,713	34,552	52,265	0	46,665
1995		18,862	35,135	53,997	0	43,046
1996		20,010	35,719	55,729	0	39,667
1997		21,159	36,302	57,461	0	36,518
1998		22,308	36,885	59,193	0	33,588
1999		23,456	37,468	60,924	0	30,866
2000		24,605	38,051	62,656	0	28,342
2001	14,558	22,983	35,479	58,462	6,585	23,612
2002		21,361	32,907	54,268	0	19,570
2003		19,739	30,335	50,074	0	16,122
2004		18,117	27,763	45,880	0	13,189
2005		16,495	25,191	41,686	0	10,700
2006		14,872	22,620	37,492	0	8,592
2007		13,250	20,048	33,298	0	6,813
2008	(42,571)	11,628	17,476	29,104	(8,711)	5,317
TOTAL	65,927	286,558	465,932	752,489	114,753	362,607

NET PRESENT VALUE : 247,854
 BENEFIT COST RATIO : 3.16
 INTERNAL RATE OF RETURN : 32.7%

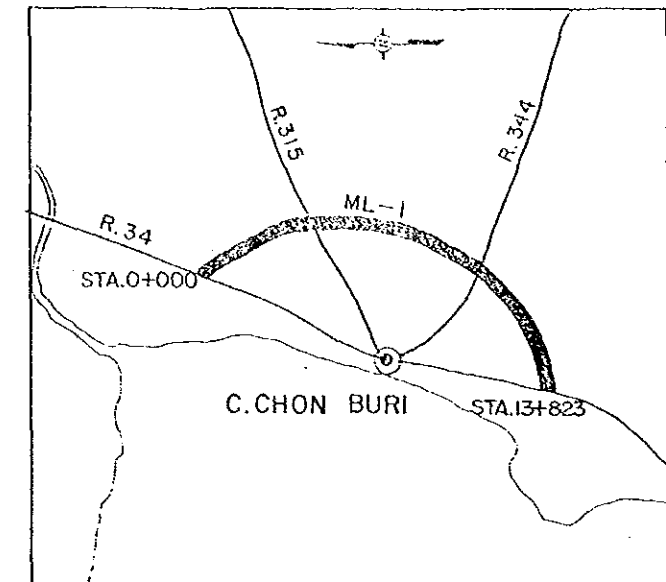
6. DEVELOPMENT AND SOCIAL IMPACTS

At present Chonburi Bypass is only half functioning as explained in Section 1. When a fully functioning Bypass is in place, traffic associated development such as gas station and rest places would be constructed along the road. The City of Chonburi would benefit from less traffic in its center and traffic associated problems.

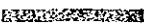
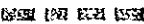
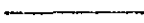


PROJECT NO. ML - 1

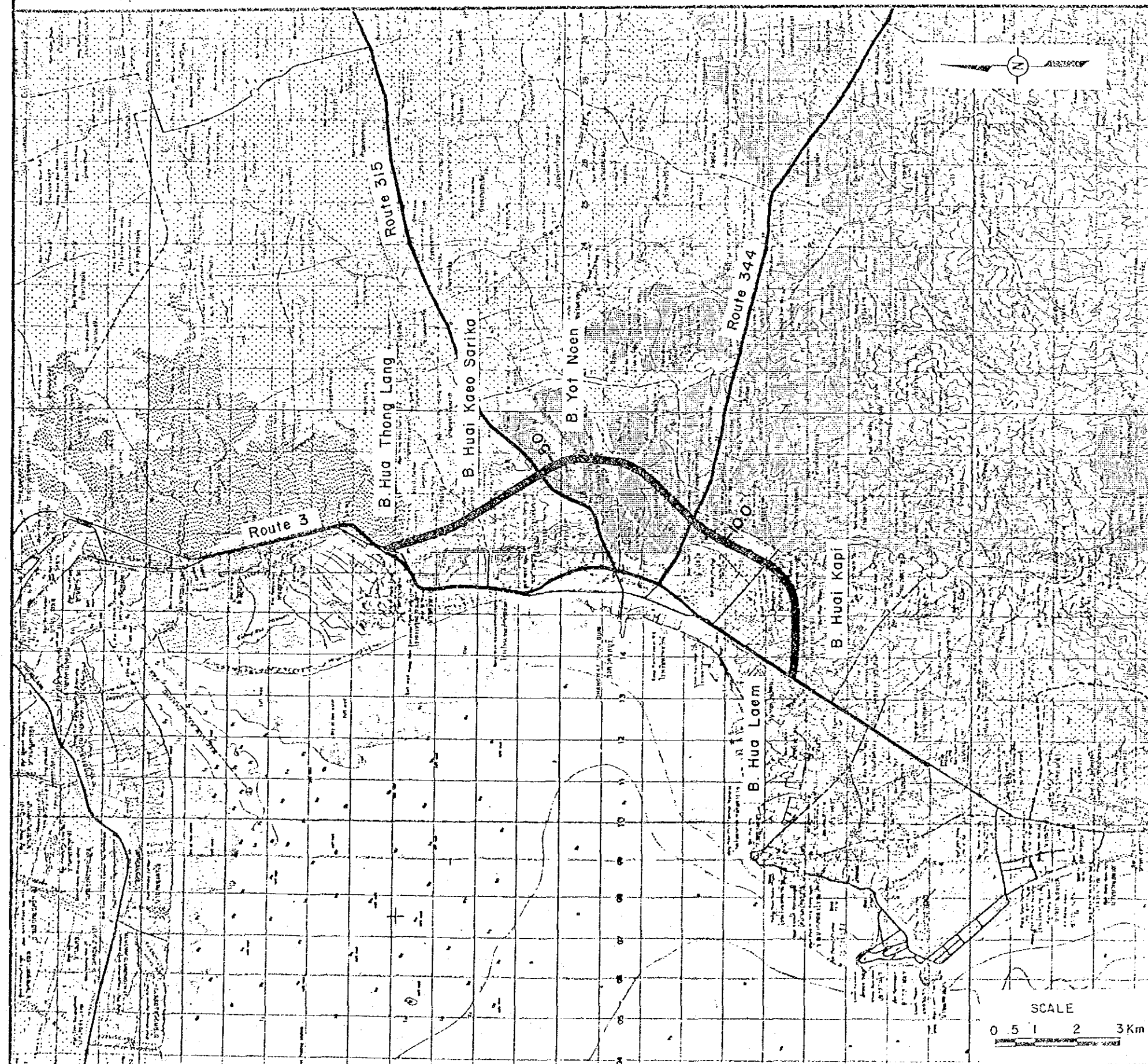
CHON BURI BYPASS
C. CHON BURI

LOCATION MAP



LEGEND

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



The diagram illustrates the cross-section of a road with a total width of 60.00 meters. The existing lane is 20.00 meters wide, and the proposed construction area is 20.00 meters wide. The road bed is 12.00 meters wide, consisting of a 7.00-meter wide carriageway and 2.50-meter wide shoulders (SHLDR.). The proposed construction layers include a 2.00-meter wide variable shoulder, a 2.00-meter wide shoulder, and a 2.00-meter wide shoulder. The construction layers are labeled as follows:

- SOIL AGGREGATE SHOULDER
- SELECTED MATERIAL SUBBASE (T = 15 cm)
- SUBGRADE
- ASPHALTIC CONCRETE SURFACING (T = 10 cm)
- CRUSH STONE BASE (T = 20 cm)
- SOIL AGGREGATE SUBBASE (T = 20 cm)

The diagram also shows the existing lane and the proposed construction area. The existing lane is 20.00 meters wide, and the proposed construction area is 20.00 meters wide. The road bed is 12.00 meters wide, consisting of a 7.00-meter wide carriageway and 2.50-meter wide shoulders (SHLDR.). The proposed construction layers include a 2.00-meter wide variable shoulder, a 2.00-meter wide shoulder, and a 2.00-meter wide shoulder. The construction layers are labeled as follows:


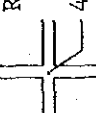


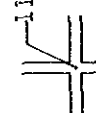
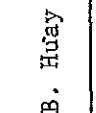
- SOIL AGGREGATE SHOULDER
- SELECTED MATERIAL SUBBASE (T = 15 cm)
- SUBGRADE
- ASPHALTIC CONCRETE SURFACING (T = 10 cm)
- CRUSH STONE BASE (T = 20 cm)
- SOIL AGGREGATE SUBBASE (T = 20 cm)

24-7

PROJECT NO. ML-1

ROAD INVENTORY
ROUTE NO. CHON BURI BYPASS
C. CHON BURI

L = 13.8 km

STATION (Km)		0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
VILLAGE Name of Village		B.Nong Mai Daeng	 2+300	 Rt315 4+200	 6+800	 Rt.344	 8+800	 11+900	B. Huay Kapi								
TERRAIN		Flat															
CROSS SECTION	Formation Width (m)	Carriageway 7.00 m Shoulder 2.50 m															
	Embankment Height (m)	1.50	0.50		0.30	1.0	1.50	1.20	0.50								
	Cutting Depth (m)																
SURFACE	Type/Length (km)	Asphaltic Concrete															
	Condition	Fair															
FLOODING	Overflow Length (km)/Height (m)	No															
LAND USE	Left	Coconut Plantation				paddy			cassava								
	Right	Coconut Plantation				paddy			cassava								
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)		Left 20.0 m Right 40.0 m															
ALIGNMENT	Horizontal	Good															
	Vertical	Good															
ROUTE NO., AGENCIES																	

PROJECT ML - 2

Changwat : Chon Buri

Pattaya - A. Sattahip

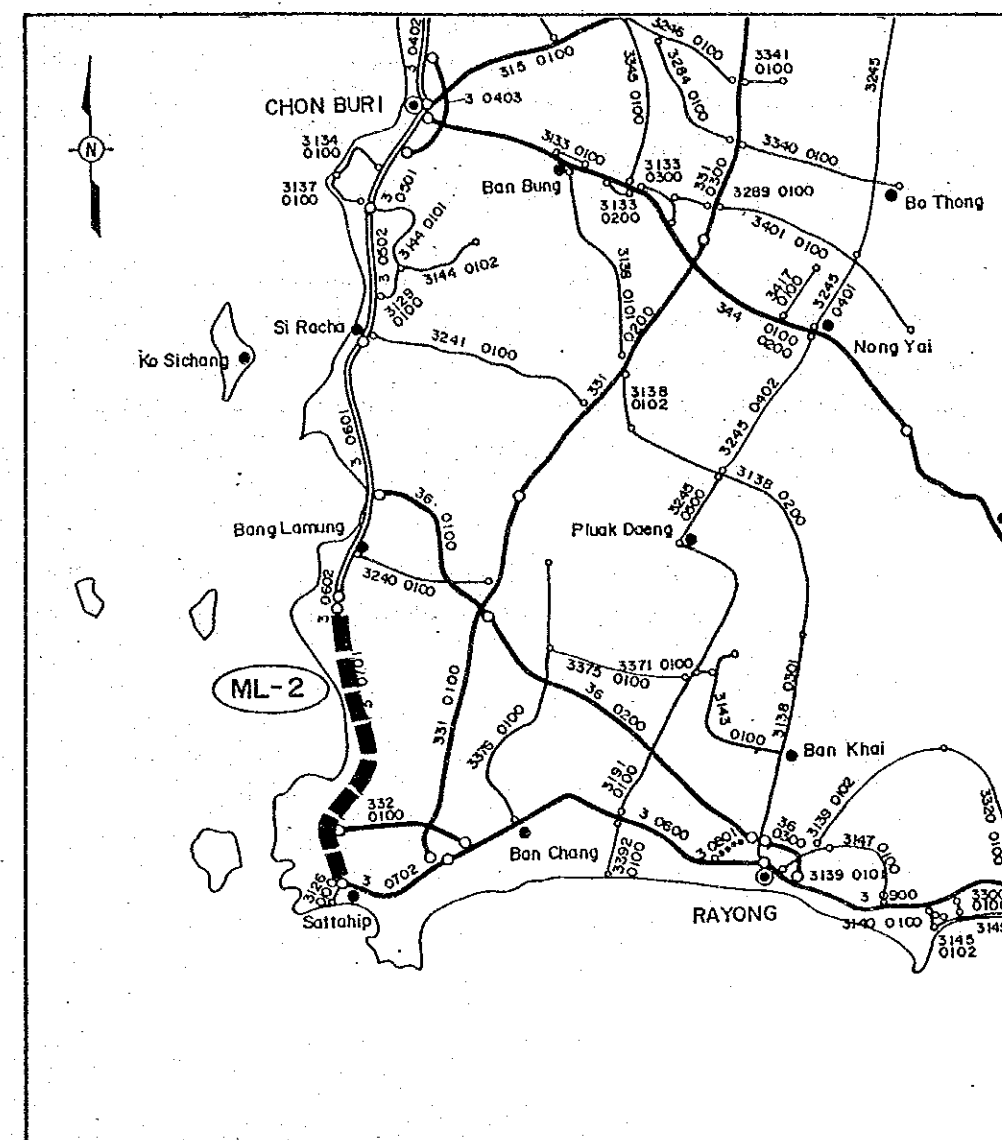
Length : 27.30 km

SUMMARY

PROJECT ML-2

Item	Description
Changwat	Chon Buri
Origin	A. Pattaya
Destination	A. Sattahip
Length	
Total	27.3 km
Improvement Section	27.3 km
DOH Road	No. 3 27.3 km
Others	-
New Construction Section	-
Surface Type and Condition	AC Surfacing / Fair
Terrain	Flat
Traffic (ADT)	
Existing	4,958
2000	11,214
2008	16,629
Existing Standard	P1
Proposed Standard	PD
Construction Cost	
Financial	140,342 Thousand Baht
Economic	116,738 Thousand Baht
IRR	23.9%
B/C	2.45

LOCATION OF PROJECT ROUTE



SCALE
0 10km.

LEGEND :

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

1. GENERAL

The route proposed for widening is a part of Route 3 from Amphoe Pattaya to Amphoe Sattahip, with a total length of 27.3 km.

The terrain is flat to slightly rolling, and land along the road is used mostly for cassava fields but residential and other structures are not infrequent. This two-lane section has asphalt concrete surfacing and its condition is generally fair. There are six permanent bridges in this section. Because of extensive resort development up to Ban Saray in recent years, traffic has been increasing with particularly heavy traffic on weekends.

There are a number of factors which assure a traffic increase in future. The industrial complex under construction in Map Ta Phut will generate a large volume of heavy vehicle traffic as well as passenger traffic to and from the complex. The U Tapao airport is planned to become a commercial airport. Expansion of Sattahip Port activities is also planned. It is therefore imperative to improve this section, at least in time for the full operation of the Map Ta Phut complex.

The condition and other information of the existing road are summarized in the Road Inventory Summary and details are shown in the Road Inventory Record Sheet.

2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-2	3-0701	1986	2467	1748	1740	308	870	201	91	4958

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
ML-2	- 1993	6.44	6.70	6.88	6.29	5.01	6.19	6.99	6.44
	1994 - 2000	5.57	5.61	6.52	5.40	3.49	4.70	5.11	5.57
	2001 - 2008	5.04	5.60	5.03	5.04	3.82	4.58	4.26	5.04

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-2	3-0701	1993	3819	2752	2772	472	1225	306	146	7673
		2000	3819	4033	4313	682	1557	422	207	11214
		2008	8271	6236	6387	1011	2102	604	289	16629

3. BENEFITS

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	-219.	6891.	5136.	1143.	702.	497.	287.	14436.
2008	65.	12829.	9521.	2635.	1257.	1292.	668.	28268.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	2435.	10359.	26373.	15201.	2434.	660.	324.	57785.
2008	3668.	16278.	39690.	22900.	3339.	960.	459.	87295.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	2217.	17250.	31509.	16343.	3136.	1157.	610.	72222.
2008	3733.	29107.	49212.	25535.	4596.	2252.	1127.	115562.

4. ENGINEERING

SUMMARY OF ROAD INVENTORY

(PROJECT ML-2)

Item	Description
Changwat	Chon Buri
Origin	A. Pattaya
Destination	A. Sattahip
Length	
Total	27.3 km
Improvement Section	27.3 km
DOH Road	No. 3 27.3 km
Others	-
New Construction Section	-
Terrain	Flat
Alignment (Hori./Vert.)	Good / Good
Formation Width	P1 Standard
Embankment Section	
Length	27.3 km
Height	0.5 m ~ 1.5 m
Cut Section	
Length	-
Depth	-
Surface Type and Condition	AC Surfacing /Fair
SBST or DBST	-
Soil Aggregate	-
Earth	-
Box Culvert	1 unit 10.00 m
Bridge	
Permanent Bridge	6 sites 74.00 m
Narrow Concrete Bridge	-
Wooden Bridge	-
Overflow Section	-
Right of way	Left 15.0 m Right 15.0 m

CONSTRUCTION QUANTITIES AND COSTS
(Project ML-2 Length = 27.3 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	35	333				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	408,400	16,336				
Embankment (Borrow Pit)	m3	100	-	0				
Sub Total				16,669		13,835		12,452
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	49,000	8,820				
Subbase (Soil Aggregate)	m3	220	65,300	14,366				
Base (Soil Aggregate)	m3	350	43,600	15,260				
Shoulder (Soil Aggregate)	m3	250	27,200	6,800				
Asphaltic Prime/Tack Coat	m2	12	435,600	5,227				
DBST	m2	40	-	0				
AC Surfacing	m2	190	285,900	54,321				
Sub Total				104,794		86,979		43,490
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	608	1,094				
RC Box Culvert (2 x 2.4 x 2.4 Equivalent)	m	20,000	32	640				
RC Bridge (W=7.0 L=10.0 Equivalent)	m	80,000	74	5,920				
Sub Total				7,654		6,353		3,177
INTERCHANGE/INTERSECTION	nos.	5,000,000	-	0	83	0	50	0
Total (a)					129,117	107,167		59,119
Miscellaneous Work ((a) x 7%)	1s			9,038	83	7,502	0	0
CONTRACT AMOUNT (b)					138,155	114,669		59,119
PHYSICAL CONTINGENCIES ((b) x 10%) (c)	1s			13,816		11,467		5,912
ENGINEERING AND SUPERVISION (((b) + (c)) x 10%) (d)					15,197	12,917	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))					167,168	139,053		65,031
AVERAGE COST PER KM					6,123			

5. ECONOMIC EVALUATION

COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED (12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	27,811			0	39,072	0
1992	69,527			0	87,215	0
1993	41,716			0	46,722	0
1994		1,910	27,140	29,050	0	25,938
1995		3,997	32,247	36,244	0	28,893
1996		6,085	37,355	43,440	0	30,920
1997		8,173	42,463	50,636	0	32,180
1998		10,261	47,570	57,831	0	32,815
1999		12,348	52,678	65,026	0	32,944
2000		14,436	57,786	72,222	0	32,670
2001	32,227	16,165	61,474	77,639	14,578	31,357
2002		17,894	65,163	83,057	0	29,951
2003		19,623	68,851	88,474	0	28,486
2004		21,352	72,540	93,892	0	26,992
2005		23,081	76,229	99,310	0	25,490
2006		24,810	79,917	104,727	0	24,001
2007		26,539	83,606	110,145	0	22,538
2008	(65,031)	28,268	87,295	115,563	(13,307)	21,113
TOTAL	106,250	234,940	892,312	1,127,256	174,280	426,288

NET PRESENT VALUE : 252,008
 BENEFIT COST RATIO : 2.45
 INTERNAL RATE OF RETURN : 23.9%

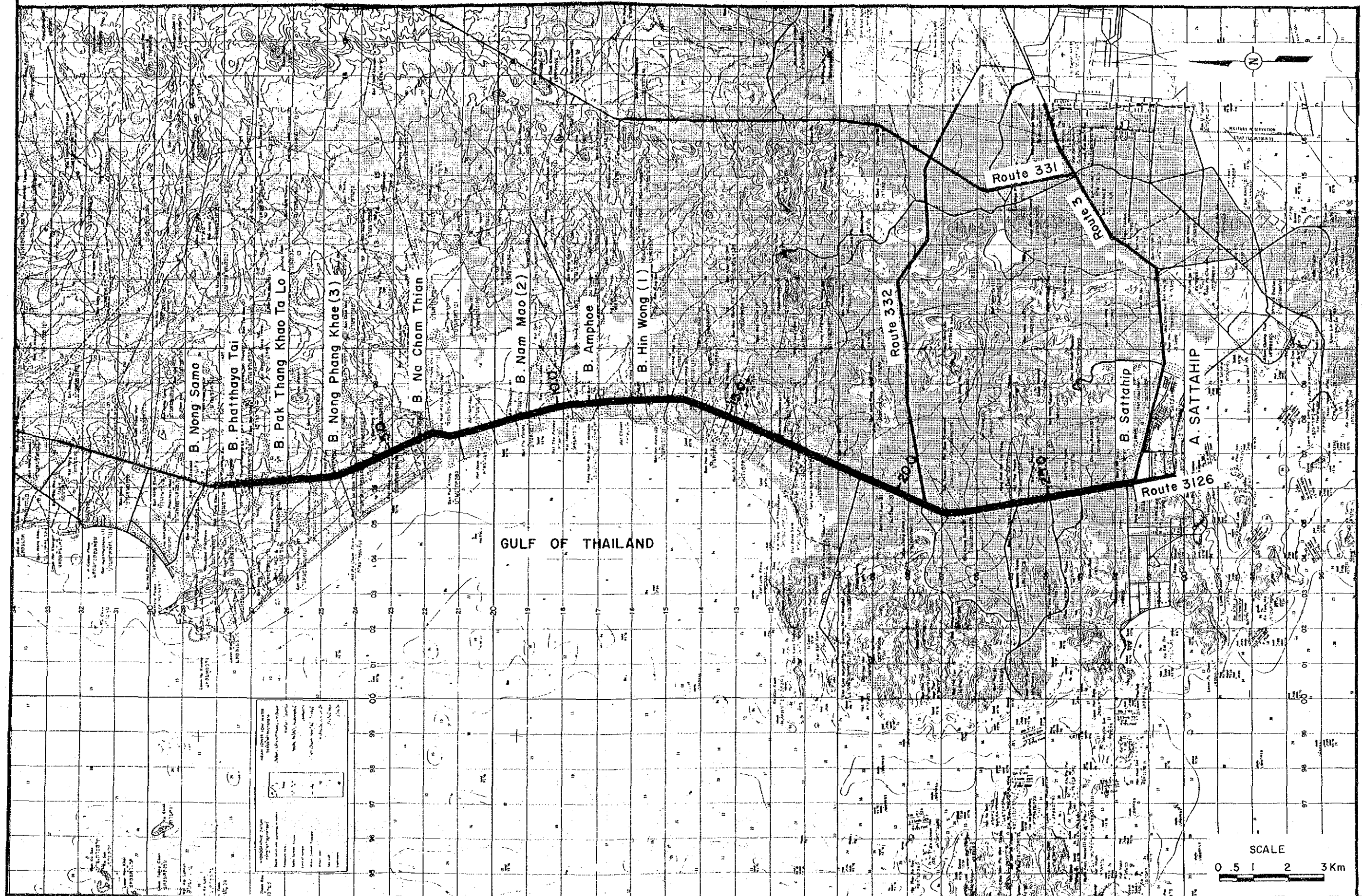
6. DEVELOPMENT AND SOCIAL IMPACTS

Aside from the traffic related development along the improved road such as those already occurring along Route 3 up to Patthaya, resort development south of Patthaya will be accelerated. Such development will not only generate employment for people in the area but bring about significant social impacts on local residents.

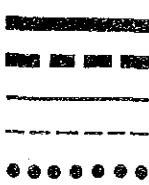
PROJECT NO. ML - 2

PATTAYA - A. SATTACHIP
C. CHON BURI

L = 27.30 KM.



LEGEND

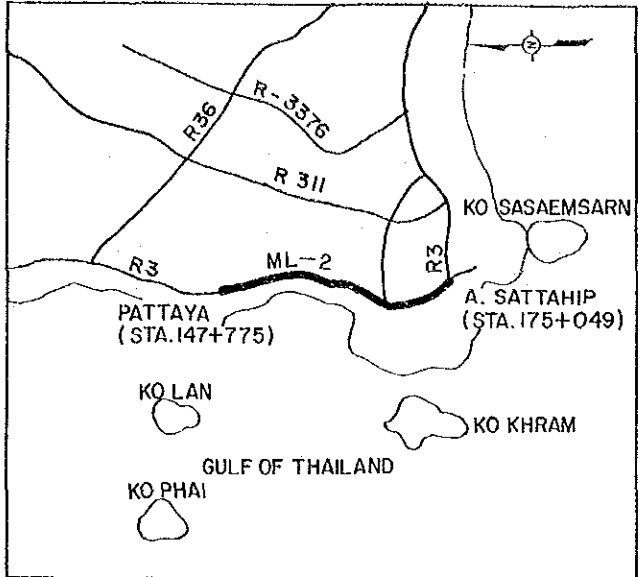
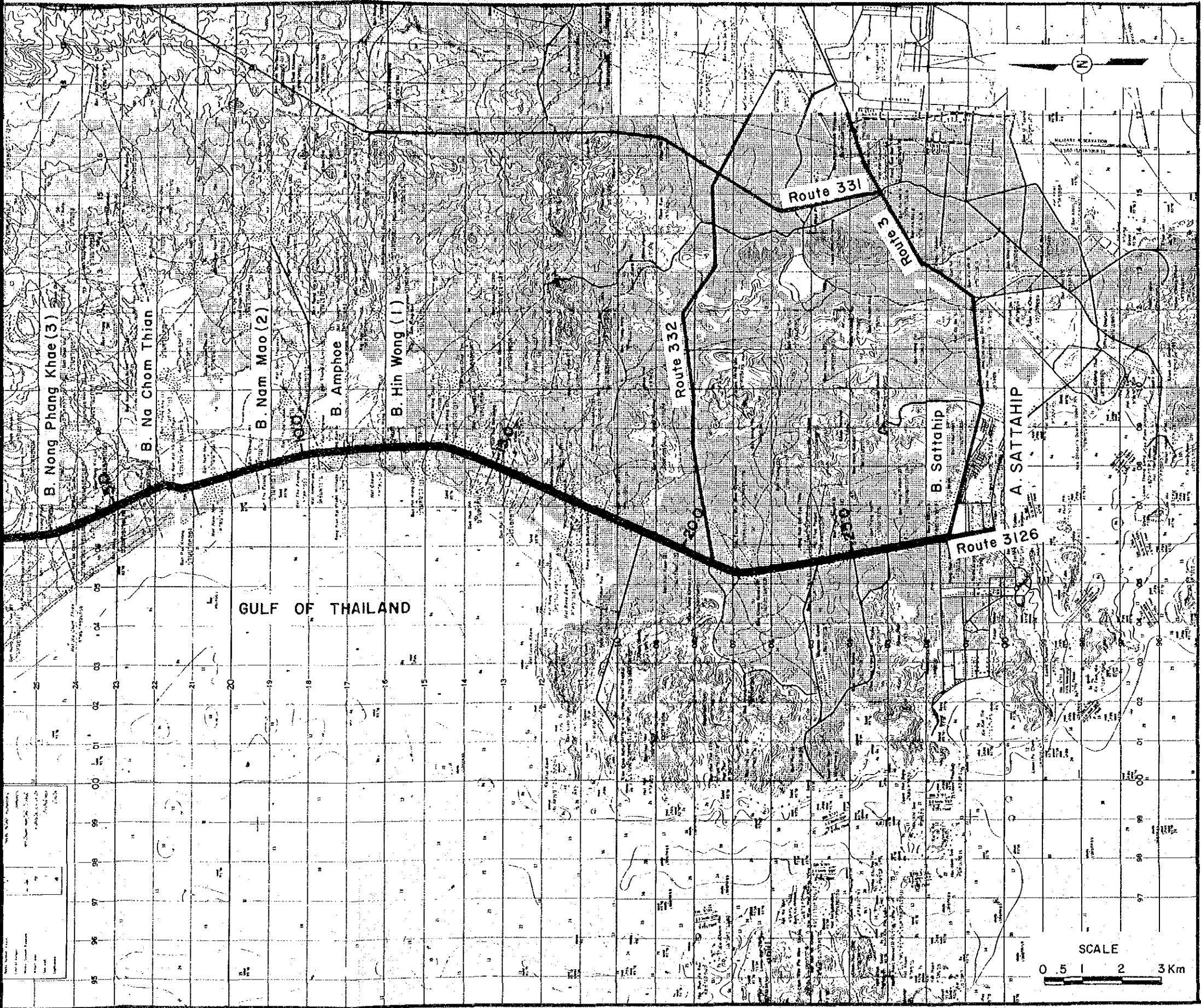


PROJECT NO. ML - 2

PATTAYA - A. SATTAHIP
C. CHON BURI

L = 27.30 KM.

LOCATION MAP



LEGEND

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

The diagram illustrates a cross-section of a road widening project. The top section shows the 'RIGHT OF WAY' with a total width of 60.00. The existing lane (left) has a width of 20.00, with a 12.00 wide 'ROAD BED' consisting of a 7.00 wide 'CARRIAGEWAY' and two 2.50 wide 'SHLDR.' (shoulders). The proposed widening (right) also has a 20.00 wide 'RIGHT OF WAY', with a 12.00 wide 'ROAD BED' consisting of a 7.00 wide 'CARRIAGEWAY' and two 2.50 wide 'SHLDR.'. The widening section includes a 'PRIME COAT' of 8.00 width, with slopes of 4% on the outer edges and 1.5~2.5% on the inner edges. The widening is 2.00 wide, with a 'VARIABLE' section of 2.00. The subgrade details include a 'SOIL AGGREGATE SHOULDER', 'SELECTED METERIAL SUBBASE (T=15 cm)', 'SUBGRADE', 'ASPHALTIC CONCRETE SURFACING (T=10 cm)', 'CRUSH STONE BASE (T=20 cm)', and 'SOIL AGGREGATE SUBBASE (T=20 cm)'. A 'POSSIBLE SOURCE FOR SUBGRADE' is indicated on the right. The diagram also shows a '0.50 MIN.' vertical clearance and a '1.00 MIN.' vertical clearance.

25-7

PROJECT NO. ML-2

ROAD INVENTORY
ROUTE NO. PATTAYA - SATTAHIP
C. CHON BURI

L = 27.3 km

STATION (Km)		0	2	4	6	8	10	12	14	16	18	20	22	24	26	27+300	28	30
VILLAGE Name of Village		B.Noen Patthaya	B.Nong Pang Kae		B.Na Jonthien		B. Amphoe		B. Hin Wong		B.Bang Sa-rae	B.Huay Luak		B. Tao Tan	B. Sattahip			
TERRAIN																		
CROSS SECTION	Formation Width (m)																	
	Embankment Height (m)		1.0	1.2	1.0	1.5	0.5	1.5	1.0	1.5	1.0	0.5	1.0	1.5	1.0	1.5	1.0	
	Cutting Depth (m)																	
SURFACE	Type/Length (km)																	
	Condition																	
FLOODING	Overflow Length (km)/Height (m)																	
LAND USE	Left																	
	Right																	
BOX CULVERT & BRIDGE	Station (km)		3+000		6+400	8+600	10+500 10+800					20+200 21+200						
	Dimension (m) Bridge - Conc. or wooden - Width - (Side walk) - Length Box - width - Height - Length		C-Box 2(3.0x1.0)x10.00		C-Br. 7.00x20.00	C-Br. 7.00x12.00	C-Br. 7.00x18.00 C-Br. 7.00x12.00					C-Br. 7.00x6.00 C-Br. 7.0x6.00						
	RIGHT OF WAY (m) (Left/Right)																	
ALIGNMENT	Horizontal																	
	Vertical																	
ROUTE NO., AGENCIES																		

PROJECT ML - 3

Changwat : Chon Buri, Rayong

A. Sattahip - C. Rayong

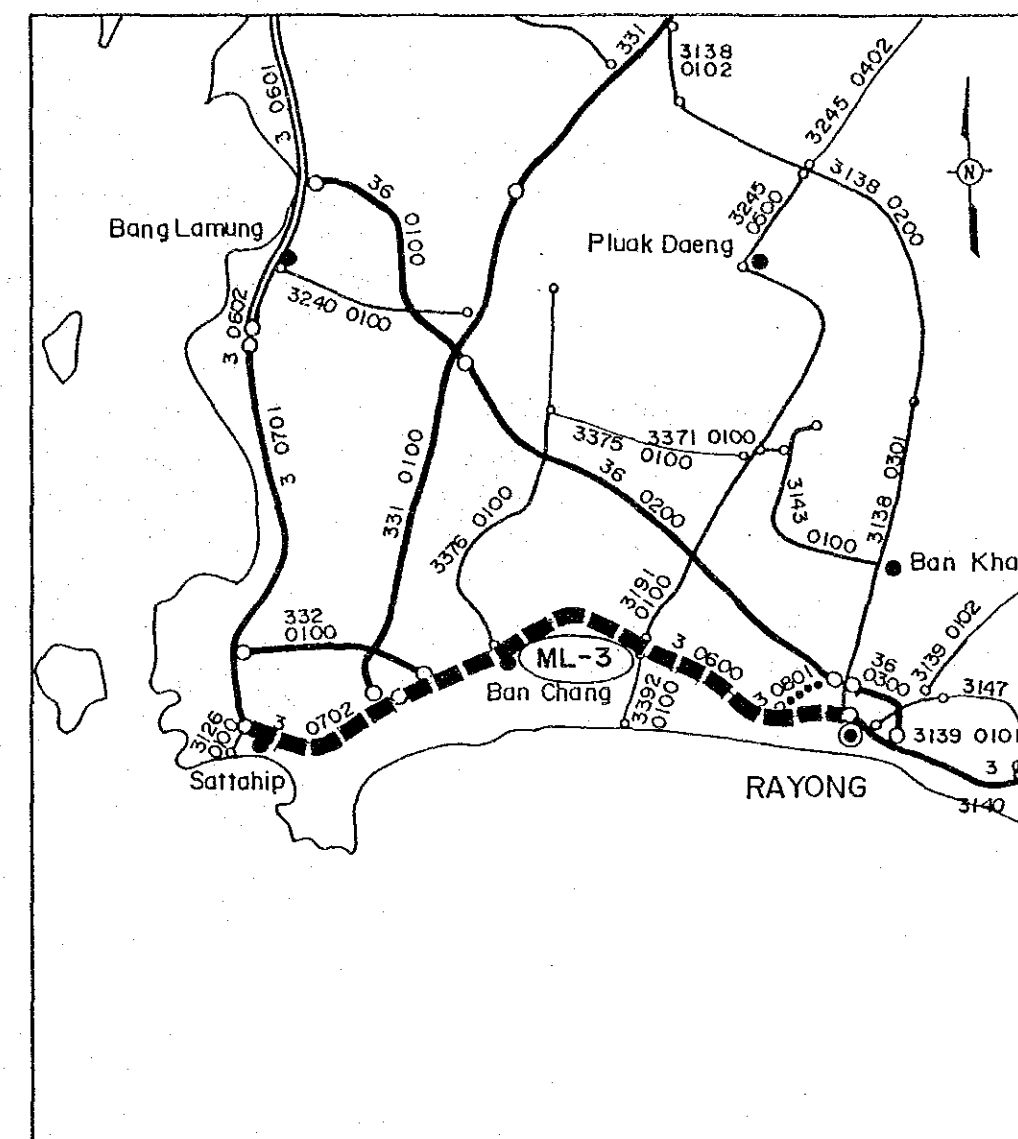
Length : 48.80 km

SUMMARY

PROJECT ML-3

Item	Description
Changwat	Chon Buri
Origin	A. Sattahip
Destination	C. Rayong
Length	
Total	48.8 km
Improvement Section	48.8 km
DOH Road	No.3 48.8 km
Others	-
New Construction Section	-
Surface Type and Condition	AC Surfacing / Fair (Poor)
Terrain	Rolling/Flat
Traffic (ADT)	
Existing	8,830
2000	21,749
2008	32,800
Existing Standard	P1
Proposed Standard	PD
Construction Cost	
Financial	284,713 Thousand Baht
Economic	236,830 Thousand Baht
IRR	32.8%
B/C	3.38

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 route proposed to be widened is a part of Route 3 from Amphoe Sattahip to Muang Rayong with a total length of 48.8 km. The route lies in Changwat Rayong for its entire length.

The terrain is mildly rolling, except for short sections at both ends. Present land use along the road is mostly dry land crops such as coconut, cassava, fruits, sugarcane and rubber. Roadside development is heavy at several places. At Km 34 the Map Ta Phut Industrial Complex is under construction, with a large-scale gas separation plant already in operation.

The existing two-lane asphalt road is already carrying relatively heavy traffic. Its surface condition is often poor.

The city of Rayong and its environs have been growing rapidly in recent years due to industrial development and growth in the fishery and tourism industries, as well as the successful development of cash crops. Together with the development of the Map Ta Phut complex, Changwat Rayong will generate a high demand for road traffic.

There are seven permanent bridges with a total length of 152 m. There are a number of places where horizontal or vertical alignment is poor.

where horizontal or vertical alignment is poor.

2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-3	3-0800	1986	4707	1556	1550	312	4474	467	471	8830

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
ML-3	- 1993	7.42	7.16	8.52	5.72	7.73	4.73	4.95	7.42
	1994 - 2000	5.89	6.42	5.89	5.08	5.94	4.55	4.96	5.89
	2001 - 2008	5.27	6.08	5.18	5.10	5.17	4.27	4.38	5.27

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
ML-3	3-0800	1993	7769	2525	2747	461	7534	645	661	14573
		2000	7769	3903	4101	652	11284	881	928	21749
		2008	17490	6258	6143	971	16889	1231	1308	32800

3. BENEFITS

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	1399.	11642.	10081.	3004.	11368.	3744.	3864.	45101.
2008	5579.	11978.	13718.	4646.	16163.	6480.	5842.	64406.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	7601.	15057.	37664.	21827.	26494.	2069.	2179.	112890.
2008	7408.	15602.	36460.	21006.	25626.	1868.	1985.	109954.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	9000.	26700.	47745.	24830.	37861.	5813.	6042.	157992.
2008	12988.	27580.	50178.	25653.	41789.	8347.	7826.	174361.

4. ENGINEERING

SUMMARY OF ROAD INVENTORY

(PROJECT ML-3)

Item	Description
Changwat	Chon Buri
Origin	A. Sattahip
Destination	C. Rayong
Length	
Total	48.8 km
Improvement Section	48.8 km
DOH Road	No.3 48.8 km
Others	-
New Construction Section	-
Terrain	Rolling/Flat
Alignment (Hori./Vert.)	Good (Poor)/Fair (Poor)
Formation Width	P1 Standard
Embankment Section	
Length	48.8 km
Height	0.10 m ~ 1.50 m
Cut Section	-
Length	-
Depth	-
Surface Type and Condition	AC surfacing / Fair (Poor)
SBST or DBST	-
Soil Aggregate	-
Earth	-
Box Culvert	-
Bridge	
Permanent Bridge	7 sites 152.0 m
Narrow Concrete Bridge	-
Wooden Bridge	-
Overflow Section	-
Right of way	40.0 m

CONSTRUCTION QUANTITIES AND COSTS
(Project ML-3 Length=48.8 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	63	599				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	414,500	16,580				
Embankment (Borrow Pit)	m3	100	-	0				
Sub Total				17,179		14,259		12,833
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	87,600	15,768				
Subbase (Soil Aggregate)	m3	220	116,755	25,686				
Base (Soil Aggregate)	m3	350	77,800	27,230				
Shoulder (Soil Aggregate)	m3	250	48,600	12,150				
Asphaltic Prime/Tack Coat	m2	12	778,400	9,341				
DBST	m2	40	-	0				
AC Surfacing	m2	190	510,800	97,052				
Sub Total				187,227		155,398		77,699
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	1,856	3,341				
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	152	12,160				
Sub Total				15,501		12,866		6,433
INTERCHANGE/INTERSECTION	nos.	5,000,000	-	0	83	0	50	0
Total (a)					219,907	182,523		96,965
Miscellaneous Work ((a) x 7%)	1s			15,393	83	12,776	0	0
CONTRACT AMOUNT (b)					235,300	195,299		96,965
PHYSICAL CONTINGENCIES ((b) x 10%) (c)	1s			23,530		19,530		9,697
ENGINEERING AND SUPERVISION (((b) + (c)) x 10%) (d)					25,883	22,001	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))					284,713	236,830		106,662
AVERAGE COST PER KM					5,834			

5. ECONOMIC EVALUATION

COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED(12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	47,366			0	66,546	0
1992	118,415			0	148,540	0
1993	71,049			0	79,575	0
1994		31,836	94,085	125,921	0	112,429
1995		34,047	97,220	131,267	0	104,645
1996		36,258	100,354	136,612	0	97,238
1997		38,469	103,488	141,957	0	90,216
1998		40,680	106,622	147,302	0	83,583
1999		42,891	109,756	152,647	0	77,336
2000		45,101	112,890	157,991	0	71,467
2001	57,573	47,515	112,523	160,038	26,043	64,637
2002		49,928	112,156	162,084	0	58,449
2003		52,341	111,789	164,130	0	52,845
2004		54,754	111,422	166,176	0	47,772
2005		57,167	111,055	168,222	0	43,178
2006		59,580	110,688	170,268	0	39,021
2007		61,993	110,321	172,314	0	35,259
2008	(106,662)	64,406	109,954	174,360	(21,825)	31,855
TOTAL	187,741	716,966	1,614,324	2,331,289	298,879	1,009,930

NET PRESENT VALUE : 711,051
 BENEFIT COST RATIO : 3.38
 INTERNAL RATE OF RETURN : 32.8%

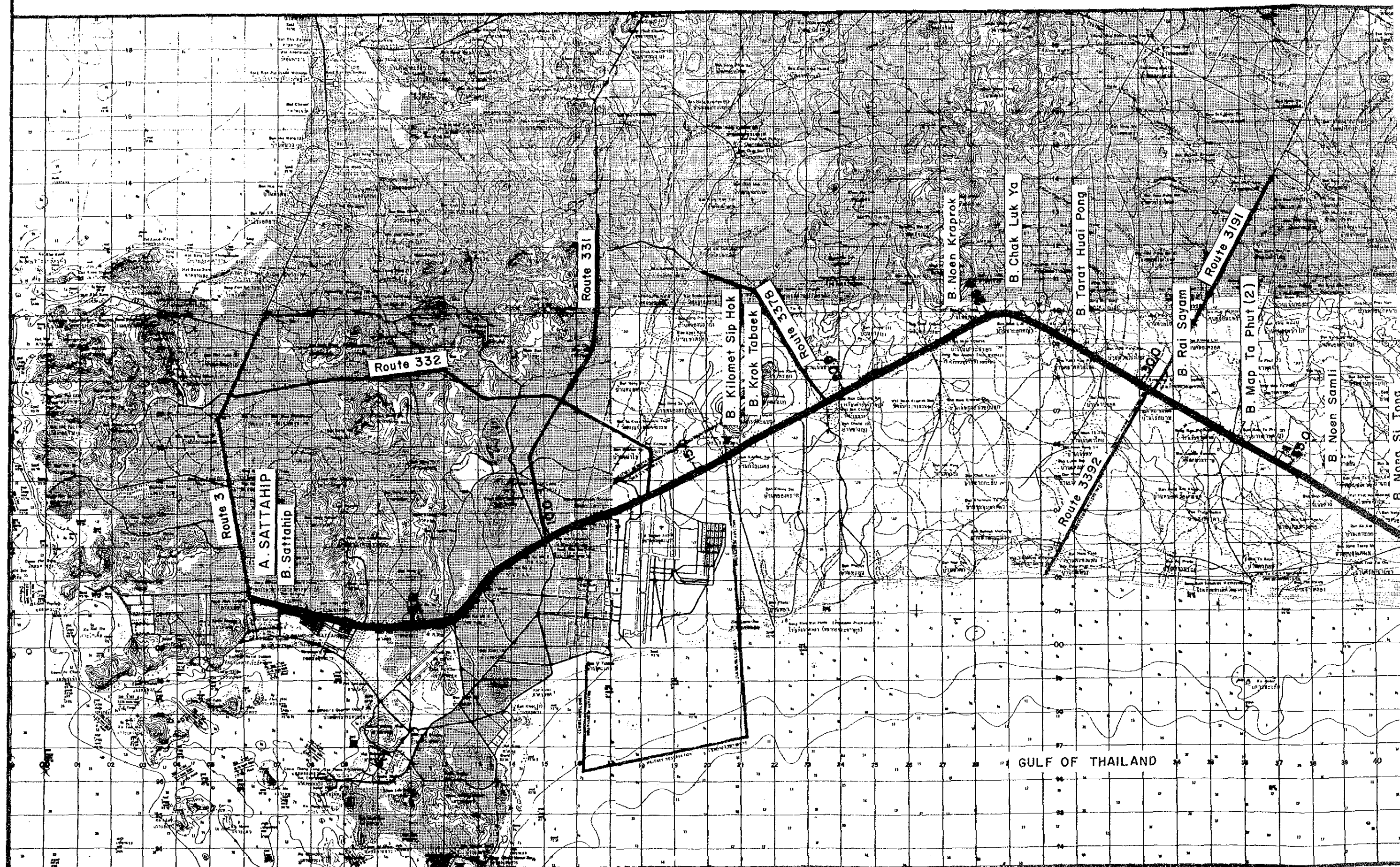
6. DEVELOPMENT AND SOCIAL IMPACTS

The development of the Map Ta Phud complex requires the improvement of this route. Increased accessibility may induce further development of fruit production and other cash crops such as cashew nuts. High speed traffic lanes would expand the commuting range for industrial workers in the area.

PROJECT NO. ML - 3

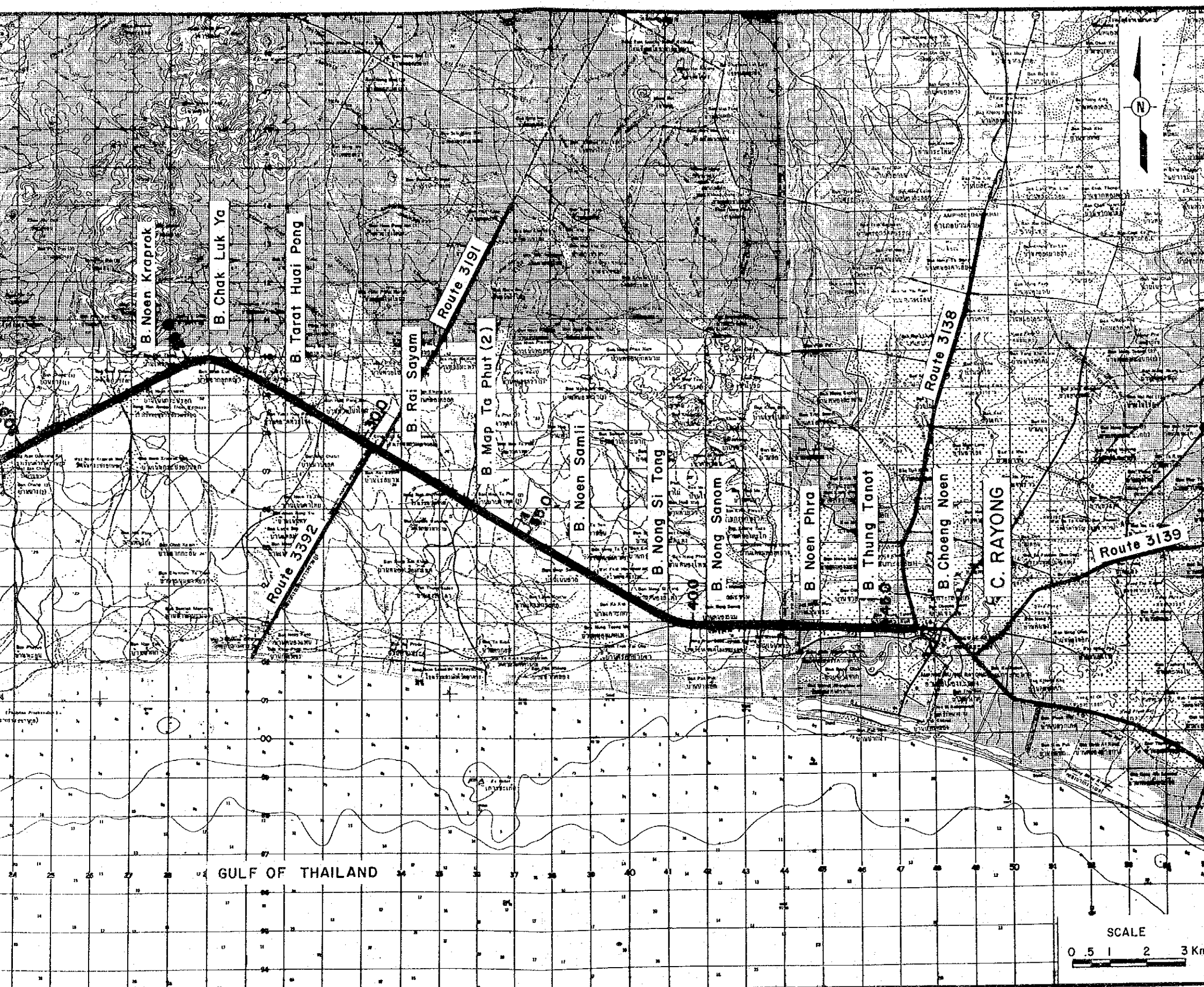
A. SATTAPHIP - C. RAYONG
C. CHON BURI, C. RAYONG

L = 48.80 KM.

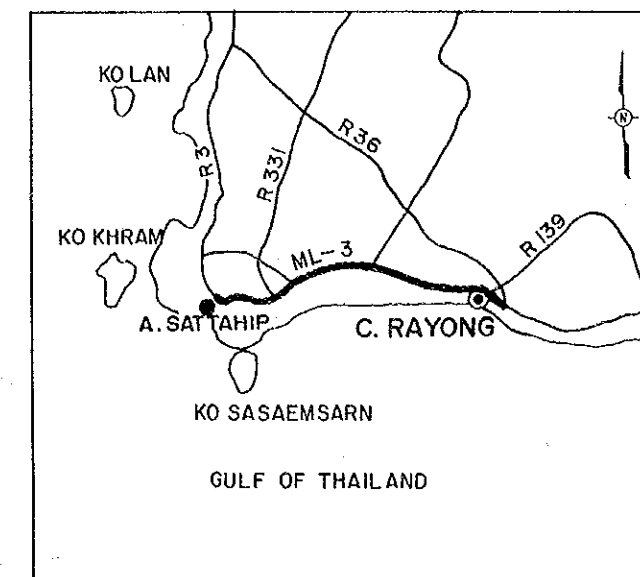


A. SATTAHIP - C. RAYONG
C. CHON BURI, C. RAYONG

L = 48.80 KM.



LOCATION MAP



BRIDGE LIST

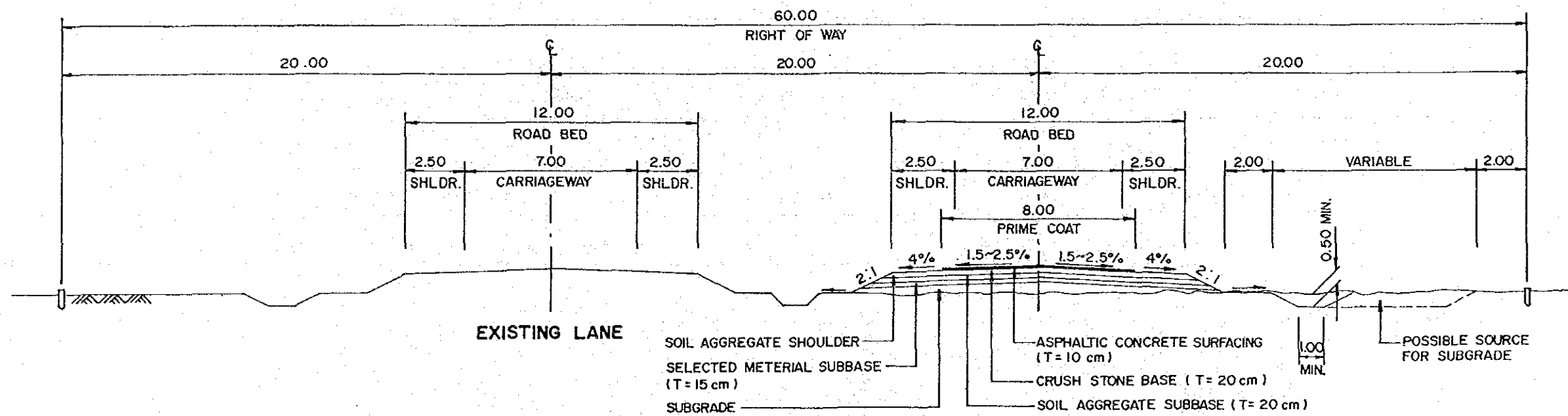
No	Station Km.	Proposed Bridge	Existing Bridge
1	5.0	C-8.00 x 8.00	C-6.80 x 8.00
2	11.7	C-8.00 x 50.00	C-9.00 x 50.00
3	22.3	C-8.00 x 40.00	C-9.00 x 40.00
4	34.8	C-8.00 x 12.00	C-6.80 x 12.00
5	36.6	C-8.00 x 12.00	C-6.80 x 12.00
6	39.0	C-8.00 x 12.00	C-6.70 x 12.00
7	41.8	C-8.00 x 18.00	C-6.70 x 18.00

LEGEND

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

SCALE
0 5 1 2 3 Km

TYPICAL CROSS SECTION



PRIMARY HIGHWAY (CLASS PD)

PROJECT NO. ML-3

ROAD INVENTORY (1/2)
ROUTE NO. 3 SATTAPHIP - RAYONG
C. RAYONG

L = 48.8km

STATION (Km)		0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
VILLAGE Name of Village		Sattaheep	B. Khao Noi		B. Ko Moha T. Plu Ta Luang		B. Ko Mo Sip	T. Sannak Kraton B. Ko Mo Sip Song B. Khlong Bang Pai		A. Ban Chang	B. Krok Kra Tak			B. Noen Kra Prok		B. Pan Din Thai	T. Huai Pong
TERRAIN		FLAT															
CROSS SECTION	Formation Width (m)					6.00						7.00			6.00		
	Embankment Height (m)		0.50	1.00	1.50	0.10	1.00			0.10					0.50		
	Cutting Depth (m)																
SURFACE	Type/Length (m)																
	Condition					POOR				FAIR				POOR			
FLOODING	Overflow Length (km)/Height (m)																
LAND USE	Left	COCONUT	CASSAVA					FRUITS		COCONUT, CASSAVA, ENCALYPTUS AND SUGAR CANE							
	Right	COCONUT	CASSAVA					FRUITS		COCONUT, CASSAVA, ENCALYPTUS AND SUGAR CANE							
BOX CULVERT & BRIDGE	Station (km)		5+000					11+700						22+300			
	Dimension (m)																
	Bridge - Conc. or Wooden - Width - (Sidewalk) - Length Box - Width - Height - Length		C-Br. 6.80x8.00					C-Br. 9.00(1.00)x50.00						C-Br. 9.00(1.00)x40.00			
RIGHT OF WAY (m)			55.00							40.00							
ALIGNMENT	Horizontal			FAIR			POOR		GOOD	FAIR		GOOD			POOR		
	Vertical			FAIR			POOR	FAIR	POOR			FAIR			POOR		
ROUTE NO., AGENCIES								DOH									

PROJECT NO. ML-3

ROAD INVENTORY (2/2)
ROUTE NO. 3 SATTAHIP - RAYONG
C. RAYONG

L = 48.8 km

STATION (Km)		30	32	34	36	38	40	42	44	46	48	
VILLAGE Name of Village				B. Map Tapud			B. Khao Pai		B. Móng Sanom		T. Noen Pra	C. Rayong
TERRAIN			ROLLING				FLAT					
CROSS SECTION	Formation Width (m)		6.00				FLAT					
	Embankment Height (m)	0.10		0.50			1.00		0.50			
	Cutting Depth (m)											
SURFACE	Type/Length (m)	ASPHALTIC PAVING										
	Condition	POOR	GOOD	FAIR								
FLOODING	Overflow Length (km)/Height (m)											
LAND USE	Left	CASSAVA AND COCONUT			PARA WOOD		CASSAVA		PADDY			
	Right	CASSAVA AND COCONUT			COCONUT		CASSAVA		PADDY			
BOX CULVERT & BRIDGE	Station (km)			34+750	36+600		39+000	41+750				
	Dimension (m) Bridge - Conc. or Wooden - Width - (Sidewalk) - Length Box - Width - Height - Length			C-Br. 6.80x12.00	C-Br. 6.80x12.00		C-Br. 6.70x12.00	C.-Br. 6.70x18.00				
RIGHT OF WAY (m)						40.00						
ALIGNMENT	Horizontal		GOOD					POOR	GOOD		FAIR	
	Vertical		POOR			FAIR						
ROUTE NO., AGENCIES						DOH						