

**PROJECT IM - 4**

**Changwat : Uthai Thani**

**B. Thong Lang - A. Lan Sak**

**Length : 34.00 km**

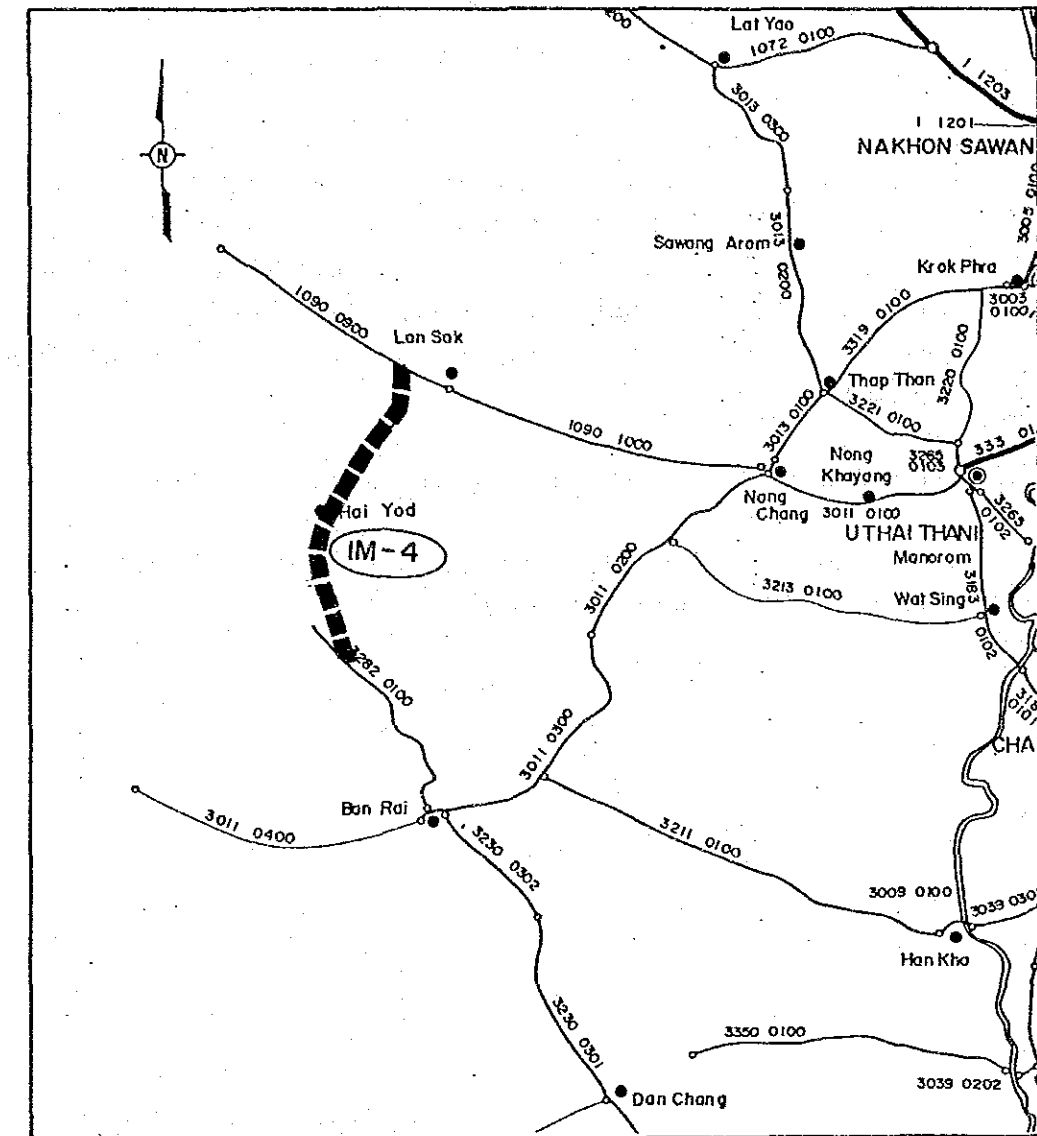
# SUMMARY

## PROJECT IM-4

Item	Description
Changwat	Uthai Thani
Origin	Thong Lang (J.R.3282)
Destination	Lan Sak (J.R.3438)
Length	
Total	34.0 km
Improvement Section	34.0 km
DOH Road	No. 3282 34.0 km
Others	-
New Construction Section	-
Surface Type and Condition	SBST S/A Fair 34.0 km
Terrain	Flat, Rolling, Mountaing
Traffic (ADT)	
Existing	112
2000	268
2008	391
Existing Standard	Laterite, Substandard
Proposed Standard	F4*
Construction Cost	
Financial	80,852 Thousand Baht
Economic	67,255 Thousand Baht
IRR	12.3 %
B/C	1.02

\* : Exceptional application was applied.

## LOCATION OF PROJECT ROUTE



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

## 1. GENERAL

The proposed route lies entirely in Changwat Uthai Thani.

It originates at the junction with Route 3282 in Thong Lang, runs northward and ends at the junction with Route 3438 in Lan Sak. Its total length is 34 km.

After the first 4 km of flat section, the terrain becomes rolling for 10 km and then becomes mountainous for a distance of 4 km. The last 16-km section is flat. Sugarcane is grown at the base of the mountain in the last flat section, which is followed by sections of cassava fields and then paddy fields. About 60% of land along the road is left unused. The existing road is of laterite for its entire length. The mountainous section requires engineering design in alignment for improvement. There is one permanent concrete bridge and seven wooden bridges at present.

The surface condition of the existing laterite road is generally fair.

When complete, the improved road will facilitate a much higher level of mobility to the people living in the influence area of this road.

## 2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-4		1988	344	0	0	0	87	10	15	112

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
IM-4	- 1993	5.53	6.62	5.69	0.00	5.42	4.44	4.65	5.53
	1994 - 2000	5.68	5.64	5.13	21.90	6.25	4.13	3.51	5.68
	2001 - 2008	4.98	5.88	5.08	7.25	4.92	4.25	4.56	4.98

Induced Traffic Ratio

Route	PC	LB	HB	LT	MT	HT
IM-4	1.31	1.33	1.19	1.32	1.00	1.00

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-4		1993	563	0	0	0	149	12	19	180
		2000	563	0	0	0	228	16	24	268
		2008	1232	0	0	0	335	22	34	391

### 3. BENEFITS

#### ROAD CONDITIONS

	LENGTH (KM)	ROAD CLASS	GRADIENTS CLASS GRADIENTS	CURVE	NO. OF NARROW BRIDGE	NO. OF WOODEN BRIDGE
WITHOUT PROJECT	34.00	LATERITE FAIR	FAIR	FAIR	0	7
WITH PROJECT	34.00	PAVED F4	FAIR	FAIR	0	0

#### VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	4915.	0.	0.	0.	4617.	663.	2335.	12530.
2008	7262.	0.	0.	0.	6781.	912.	3309.	18264.

#### TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	419.	0.	0.	0.	402.	32.	48.	901.
2008	619.	0.	0.	0.	591.	44.	68.	1322.

#### TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	5334.	0.	0.	0.	5019.	695.	2384.	13432.
2008	7881.	0.	0.	0.	7373.	956.	3377.	19586.

### 4. ENGINEERING

#### SUMMARY OF ROAD INVENTORY

(PROJECT IM-4)

Item	Description
Changwat	Uthai Thani
Origin	Thong Lang (J.R.3282)
Destination	Lan Sak (J.R.3438)
Length	
Total	34.0 km
Improvement Section	34.0 km
DOH Road	No. 3282 34.0 km
Others	-
New Construction Section	-
Terrain	Flat, Rolling, Mountaing
Alignment (Hori./Vert.)	Fair (Poor 3 km)
Formation Width	4.0 m ~ 8.0 m
Embankment Section	
Length	23 km
Height	0.4 m ~ 1.0 m
Cut Section	
Length	11 km
Depth	0.4 m ~ 1.0 m
Surface Type and Condition	
SBST or DBST	-
Soil Aggregate	Fair 34.0 km
Earth	-
Box Culvert	-
Bridge	
Permanent Bridge	1 site 18.00 m
Narrow Concrete Bridge	
Wooden Bridge	7 sites 38.00 m
Overflow Section	-
Right of way	30 m ~ 40 m

**CONSTRUCTION QUANTITIES AND COSTS**  
(Project IM-4 Length = 34.0 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	18	171				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	282,000	11,280				
Embankment (Borrow Pit)	m3	100	-	0				
Sub Total				11,451		9,504		8,554
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	45,900	8,262				
Subbase (Soil Aggregate)	m3	220	61,200	13,464				
Base (Soil Aggregate)	m3	350	33,300	11,655				
Shoulder (Soil Aggregate)	m3	250	12,900	3,225				
Asphaltic Prime/Tack Coat	m2	12	220,800	2,650				
DBST	m2	40	186,900	7,476				
AC Surfacing	m2	190	-	0				
Sub Total				46,732		38,788		19,394
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	1,170	2,106				
RC Box Culvert (2 x 2.4 x 2.4 Equivalent)	m	20,000	78	1,560				
RC Bridge (W=7.0 L=10.0 Equivalent)	m	60,000	10	600				
Sub Total				4,266		3,541		1,771
INTERCHANGE/INTERSECTION	nos.	5,000,000	-	0	83	0	50	0
Total (a)					62,449	51,833		29,719
Miscellaneous Work ( (a) x 7% )	1s			4,371	83	3,628	0	0
CONTRACT AMOUNT (b)					66,820	55,461		29,719
PHYSICAL CONTINGENCIES ( (b) x 10% ) (c)	1s			6,682		5,546		2,972
ENGINEERING AND SUPERVISION ( ((b) + (c)) x 10% ) (d)	1s			7,350	85	6,248	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) )					80,852	67,255		32,691
AVERAGE COST PER KM					2,378			

## 5. ECONOMIC EVALUATION

### COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED(12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	13,451			0	18,898	0
1992	33,628			0	42,183	0
1993	20,177			0	22,598	0
1994		9,241	651	9,892	0	8,832
1995		9,789	693	10,482	0	8,356
1996		10,338	734	11,072	0	7,881
1997		10,886	776	11,662	0	7,411
1998		11,434	818	12,252	0	6,952
1999		11,982	860	12,842	0	6,506
2000		12,530	901	13,431	0	6,076
2001	16,936	13,247	954	14,201	7,661	5,736
2002		13,964	1,007	14,971	0	5,399
2003		14,680	1,059	15,739	0	5,068
2004		15,397	1,112	16,509	0	4,746
2005		16,114	1,164	17,278	0	4,435
2006		16,831	1,217	18,048	0	4,136
2007		17,547	1,270	18,817	0	3,850
2008	(21,691)	18,264	1,322	19,586	(4,438)	3,578
TOTAL	62,501	202,244	14,537	216,782	86,902	88,962

NET PRESENT VALUE : 2,060  
 BENEFIT COST RATIO : 1.02  
 INTERNAL RATE OF RETURN : 12.3%

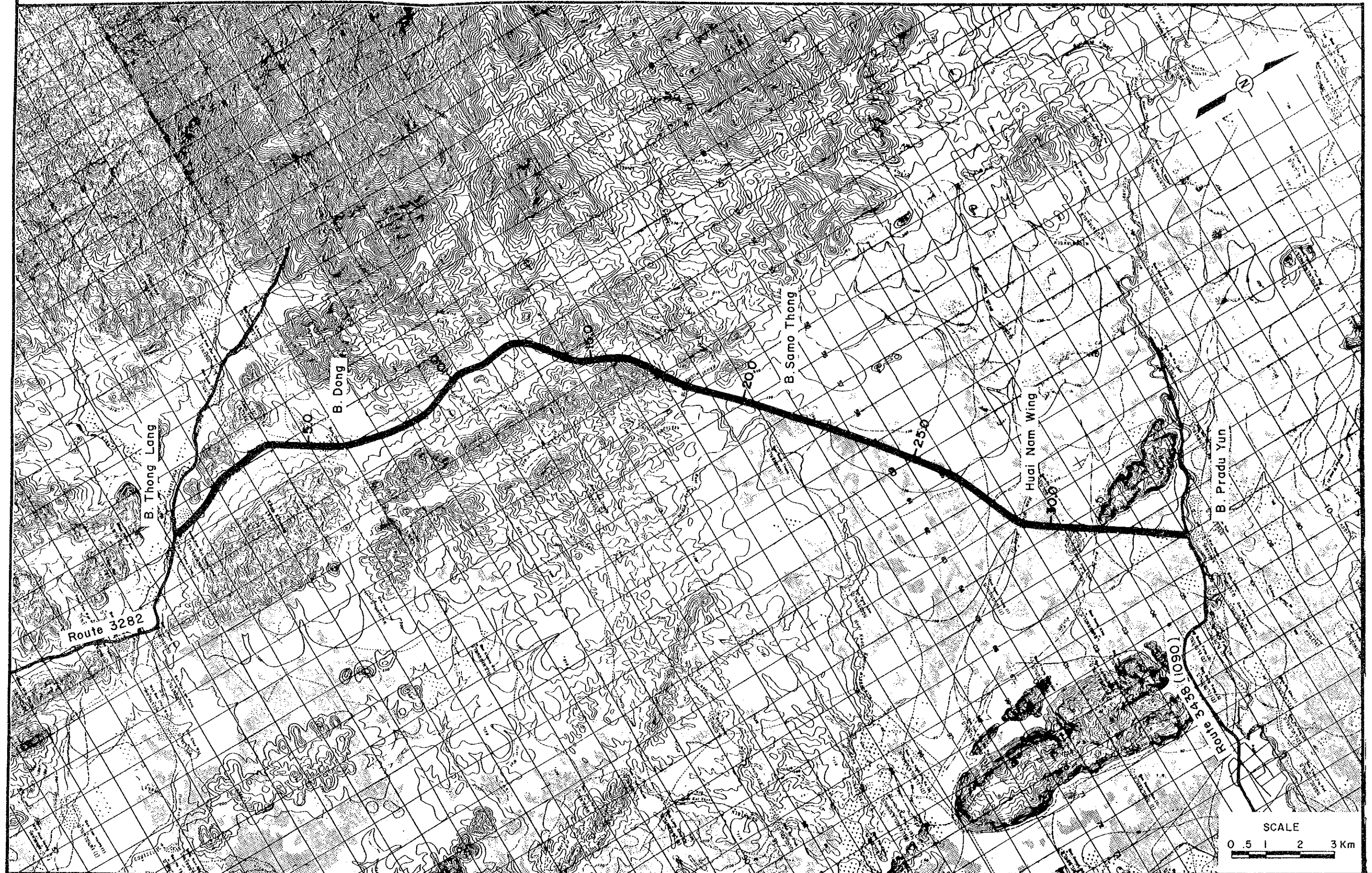
## 6. DEVELOPMENT AND SOCIAL IMPACTS

The improved road would accelerate the development of its influence area as a high proportion of land is unused at present. It may attract new migrants from outside the area.

PROJECT NO. IM - 4

B. THONG LANG - A. LAN SAK  
C. UTHAI THANI

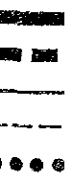
L = 34.00 KM.



B. THO

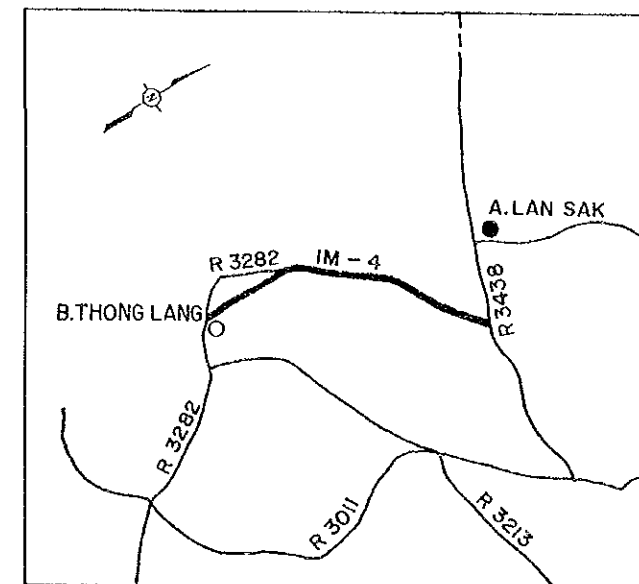
No	Sta
1	4
2	5
3	7
4	8
5	16
6	21
7	22
8	25

LEGE





LOCATION MAP

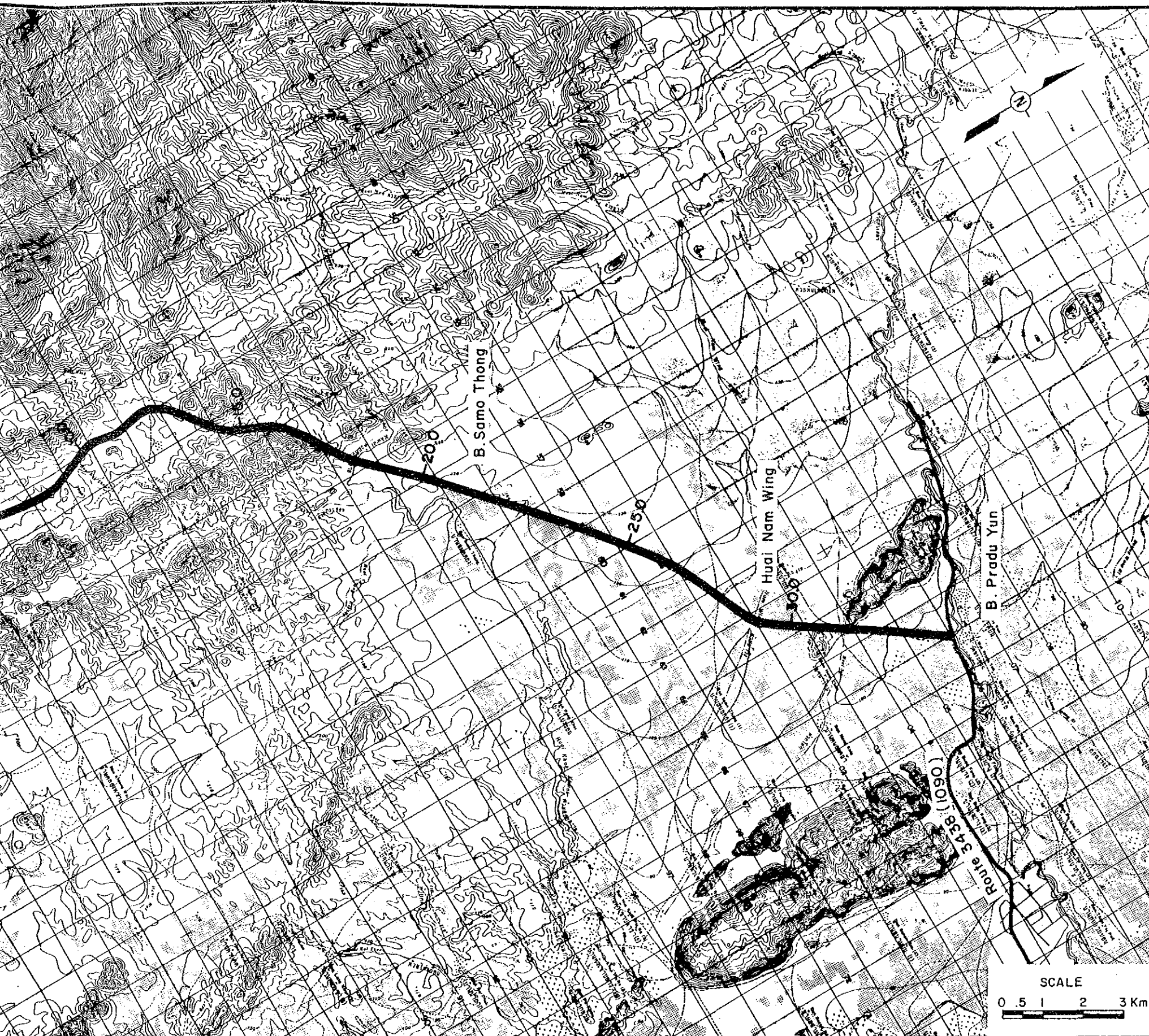


BRIDGE LIST

No.	Station Km.	Proposed Bridge	Existing Bridge
1	4.9	—	C- 7.00x18.00
2	5.8	( BOX CULVERT )	W- 3.50x4.00
3	7.2	( BOX CULVERT )	W- 3.50x5.00
4	8.1	( BOX CULVERT )	W- 3.50x4.00
5	18.0	( BOX CULVERT )	W- 3.50x6.00
6	21.2	( BOX CULVERT )	W- 3.50x6.00
7	22.9	C- 7.00x10.00	W- 3.50 x 8.00
8	25.1	( BOX CULVERT )	W- 3.50x5.00

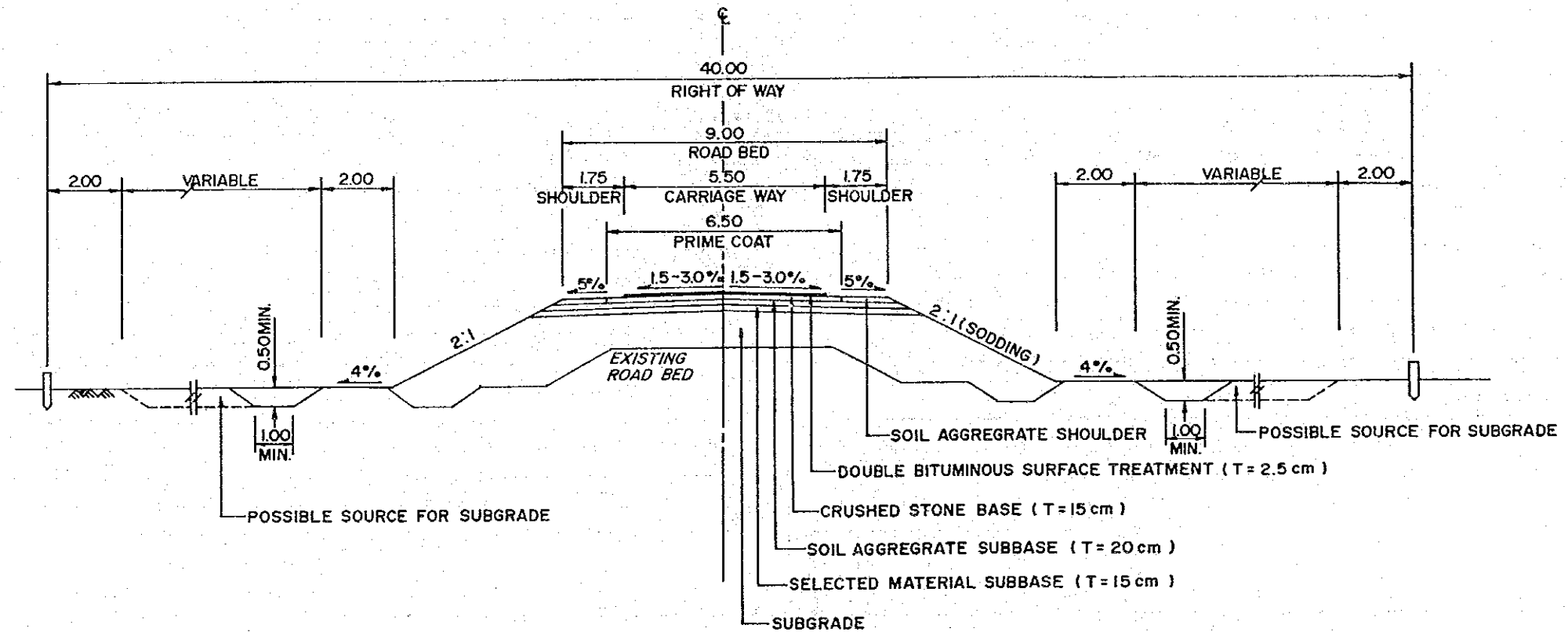
LEGEND

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





## TYPICAL CROSS SECTION



PROVINCIAL HIGHWAY ( CLASS F4 )

PROJECT NO. IM-4

**ROAD INVENTORY (1/2)**  
**ROUTE NO. 3287    A. LAN SAK (J.R. 3035) - B. THONG LANG (J.R. 3282)**  
**ARD Rural C. UTHAI THANI**

L = 34.0 km

STATION (Km)		0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30					
VILLAGE Name of Village		B. Phraduyen		B. Nong Pakbung				B. Nong Pakhang				B. Khlong Hang										
TERRAIN		Flat										Mountainous		Rolling								
CROSS SECTION	Formation Width (m)	8.00		6.00-7.00										4.00		6.00-7.00						
	Embankment Height (m)	0.80	0.50-0.60				1.00	1.00	0.40-0.60													
	Cutting Depth (m)																					
SURFACE	Type/Length (km)	Laterite																				
	Condition	Fair																				
FLOODING	Overflow Length (km)/Height (m)																					
LAND USE	Left	Paddy		No Use		Cassava		No Use						Pinepy								
	Right	Paddy		Cassava				No Use	Sugar Cane	No Use	Sugar Cane	No Use										
BOX CULVERT & BRIDGE	Station (km)																					
	Dimension (m)																					
	Bridge																					
	- Conc.or Wooden																					
	- Width																					
	- (Sidewalk)																					
- Length																						
RIGHT OF WAY (m) (Left/Right)																						
ALIGNMENT	Horizontal																					
	Vertical																					
ROUTE NO., AGENCIES		DOH																				

PROJECT NO. IM-4

ROAD INVENTORY (2/2)  
 ROUTE NO. 3287 B. NAM PHU - LAN SAK  
 ARD Rural C. UTHAI THANI

L = 34.0 km

STATION (Km)		30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
VILLAGE Name of Village		Sta. 34+000 B. Thong Lang															
TERRAIN		Flat															
CROSS SECTION	Formation Width (m)	7.00															
	Embankment Height (m)	0.30															
	Cutting Depth (m)																
SURFACE	Type/Length (km)	Laterite Rd.															
	Condition	F															
FLOODING	Overflow Length (km)/Height.(m)																
LAND USE	Left	Pinery															
	Right	Pinery															
BOX CULVERT & BRIDGE	Station (km)																
	Dimension (m)																
	Bridge																
	- Conc. or Wooden																
	- Width																
	- (Sidewalk)																
	- Length																
RIGHT OF WAY (m) (Left/Right)																	
ALIGNMENT	Horizontal																
	Vertical																
ROUTE NO., AGENCIES		DOH															

**PROJECT IM – 5**

**Changwat : Uthai Thani, Nakhon Sawan**

**A. Lan Sak – B. Kao Chonkhon**

**Length : 69.10 km**

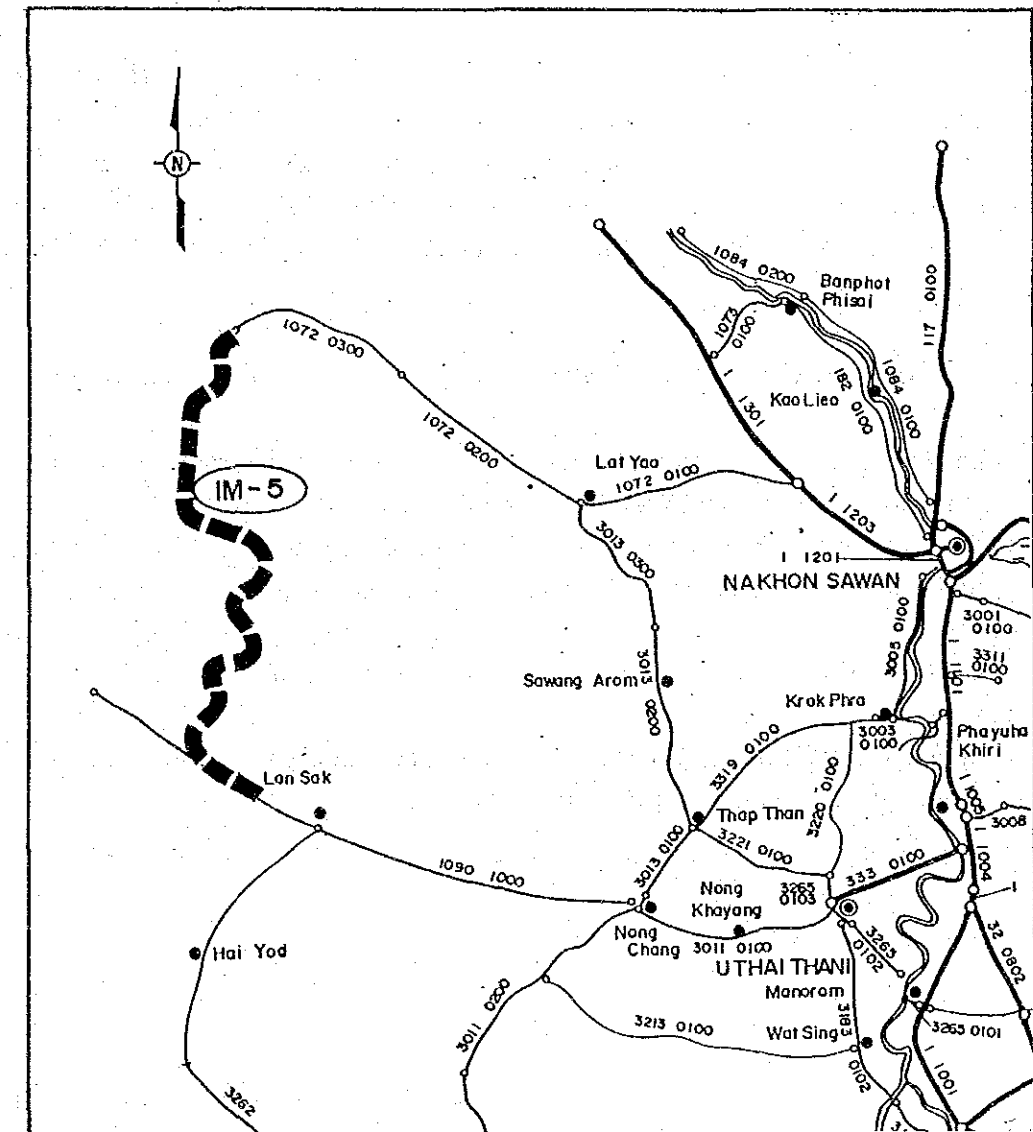
# SUMMARY

## PROJECT IM-5

Item	Description
Changwat	Uthai Thani / Nakhon Sawan
Origin	Lan Sak (J.R.3438)
Destination	Kao Chonkhon (J.R.1072)
Length	
Total	69.1 km
Improvement Section	69.1 km
DOH Road	No. 3438 12.0
Others	ARD 38.4 km, PWD 18.7 km
New Construction Section	-
Surface Type and Condition	SBST S/A Fair 30.7 km
Terrain	Rolling/Flat
Traffic (ADT)	
Existing	87
2000	202
2008	294
Existing Standard	Laterite, Substandard
Proposed Standard	F5 *
Construction Cost	
Financial	104,873 Thousand Baht
Economic	87,235 Thousand Baht
IRR	11.5 %
B/C	0.95

\* : Exceptional application was applied.

## LOCATION OF PROJECT ROUTE



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## 1. GENERAL

The proposed route originates at the junction with Route 3438 in Lan Sak, runs northward and ends at the junction with Route 1072 in Kao Chonkhon. Its total length is 69.1 km.

The terrain is generally rolling, except for 2-km stretches at both ends. The first 12 km comes under DOH and the next 19 km under PWD at present. Both sections have a cross section width of 7 to 8 meters and an embankment height of 0.8 to 1.50 m, and the horizontal alignment is generally acceptable. However, the remaining section of 38 km is an ARD road, and is essentially a natural path with minimum widening. A major design effort will be required for the last section.

The existing road is entirely of laterite and its surface condition is fair to poor.

Land along the road is still mostly natural forest with scattered cassava fields and some sugarcane fields. Forestry is practiced in the middle section. A large amount of land is left unused. The area is relatively new for human habitation, and a high proportion of land remains to be cultivated. The population in the area along the road is sparse.

There is one permanent bridge and 11 wooden bridges along the road.

Upon completion of improvement, this road will not only serve people in the area but will accelerate the development of the surrounding area.

## 2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-5	PWD/ARD	1988	87	0	22	0	29	25	11	87

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
IM-5	- 1993	5.53	6.62	5.69	0.00	5.42	4.44	4.65	5.53
	1994 - 2000	5.68	5.64	5.13	21.90	6.25	4.13	3.51	5.68
	2001 - 2008	4.98	5.88	5.08	7.25	4.92	4.25	4.56	4.98

Induced Traffic Ratio

Route	PC	LB	HB	LT	MT	HT
IM-5	1.42	1.45	1.26	1.44	1.00	1.00

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-5	PWD/ARD	1993	145	0	42	0	55	31	14	142
		2000	145	0	60	0	83	41	18	202
		2008	318	0	89	0	122	57	26	294

### 3. BENEFITS

#### ROAD CONDITIONS

	LENGTH (KM)	ROAD CLASS	GRADIENTS	CURVE	NO. OF NARROW BRIDGE	NO. OF WOODEN BRIDGE
WITHOUT PROJECT	69.10	LATERITE POOR	FAIR	FAIR	0	11
WITH PROJECT	69.10	S.A. F5	FAIR	FAIR	0	0

#### VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	1698.	0.	1582.	0.	1770.	2484.	2169.	9704.
2008	2509.	0.	2350.	0.	2599.	3453.	3134.	14045.

#### TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	636.	0.	2350.	0.	839.	488.	214.	4526.
2008	940.	0.	3490.	0.	1231.	678.	309.	6648.

#### TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
2000	2334.	0.	3932.	0.	2609.	2972.	2384.	14230.
2008	3449.	0.	5840.	0.	3830.	4131.	3443.	20693.

### 4. ENGINEERING

#### SUMMARY OF ROAD INVENTORY

(PROJECT IM-5)

Item	Description
Changwat	Uthai Thani / Nakhon Sawan
Origin	Lan Sak (J.R.3438)
Destination	Kao Chonkhon (J.R.1072)
Length	
Total	69.1 km
Improvement Section	69.1 km
DOH Road	No. 3438 12.0
Others	ARD 38.4 km, PWD 18.7 km
New Construction Section	-
Terrain	Rolling/Flat
Alignment (Hori./Vert.)	Fair
Formation Width	4.0 m ~ 8.0 m
Embankment Section	
Length	64 km
Height	0.3 ~ 1.5 m
Cut Section	
Length	-
Depth	-
Surface Type and Condition	
SBST or DBST	-
Soil Aggregate	Fair 30.7 km
Earth	Fair/Poor 38.4 km
Box Culvert	-
Bridge	
Permanent Bridge	1 site 24.00 m
Narrow Concrete Bridge	
Wooden Bridge	1 site 107.00 m
Overflow Section	-
Right of way	30.0 m ~ 40.0 m

**CONSTRUCTION QUANTITIES AND COSTS**  
(Project IM-5 Length = 69.1 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	19	181				
Earth Excavation	m3	16	-	0				
Embankment (Side Borrow)	m3	40	517,200	20,688				
Embankment (Borrow Pit)	m3	100	-	0				
Sub Total				20,869		17,321		15,589
PAVEMENT					83		50	
Subbase (Selected Material)	m3	180	124,100	22,338				
Subbase (Soil Aggregate)	m3	220	124,100	27,302				
Base (Soil Aggregate)	m3	350	-	0				
Shoulder (Soil Aggregate)	m3	250	-	0				
Asphaltic Prime/Tack Coat	m2	12	-	0				
DBST	m2	40	-	0				
AC Surfacing	m2	190	-	0				
Sub Total				49,640		41,201		20,601
STRUCTURES					83		50	
RC Pipe Culvert (D 1.00 Equivalent)	m	1,800	1,807	3,253				
RC Box Culvert (2 x 2.4 x 2.4 Equivalent)	m	20,000	26	520				
RC Bridge (W=7.0 L=10.0 Equivalent)	m	60,000	112	6,720				
Sub Total				10,493		8,709		4,355
INTERCHANGE/INTERSECTION	nos.	5,000,000	-	0	83	0	50	0
Total (a)				81,002		67,231		40,545
Miscellaneous Work ( (a) x 7% )	1s			5,670	83	4,706	0	0
CONTRACT AMOUNT (b)				86,672		71,937		40,545
PHYSICAL CONTINGENCIES ( (b) x 10% ) (c)	1s			8,667		7,194		4,055
ENGINEERING AND SUPERVISION ( ((b) + (c)) x 10% ) (d)	1s			9,534	85	8,104	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) )				104,873		87,235		44,600
AVERAGE COST PER KM				1,518				

## 5. ECONOMIC EVALUATION

### COST AND BENEFIT STATEMENT

(1000 BAHT)

YEAR	COST		BENEFITS		DISCOUNTED(12%)	
	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1991	17,447			0	24,512	0
1992	43,618			0	54,714	0
1993	26,171			0	29,312	0
1994		7,381	3,364	10,745	0	9,594
1995		7,768	3,558	11,326	0	9,029
1996		8,155	3,752	11,907	0	8,475
1997		8,542	3,945	12,487	0	7,936
1998		8,929	4,139	13,068	0	7,415
1999		9,317	4,333	13,650	0	6,916
2000		9,704	4,526	14,230	0	6,437
2001		10,246	4,792	15,038	0	6,074
2002		10,789	5,057	15,846	0	5,714
2003		11,332	5,322	16,654	0	5,362
2004		11,874	5,587	17,461	0	5,020
2005		12,417	5,853	18,270	0	4,689
2006		12,960	6,118	19,078	0	4,372
2007		13,502	6,383	19,885	0	4,069
2008	(44,600)	14,045	6,649	20,694	(9,126)	3,781
TOTAL	42,636	156,959	73,378	230,339	99,412	94,883

NET PRESENT VALUE : (4,529)  
 BENEFIT COST RATIO : 0.95  
 INTERNAL RATE OF RETURN : 11.5%

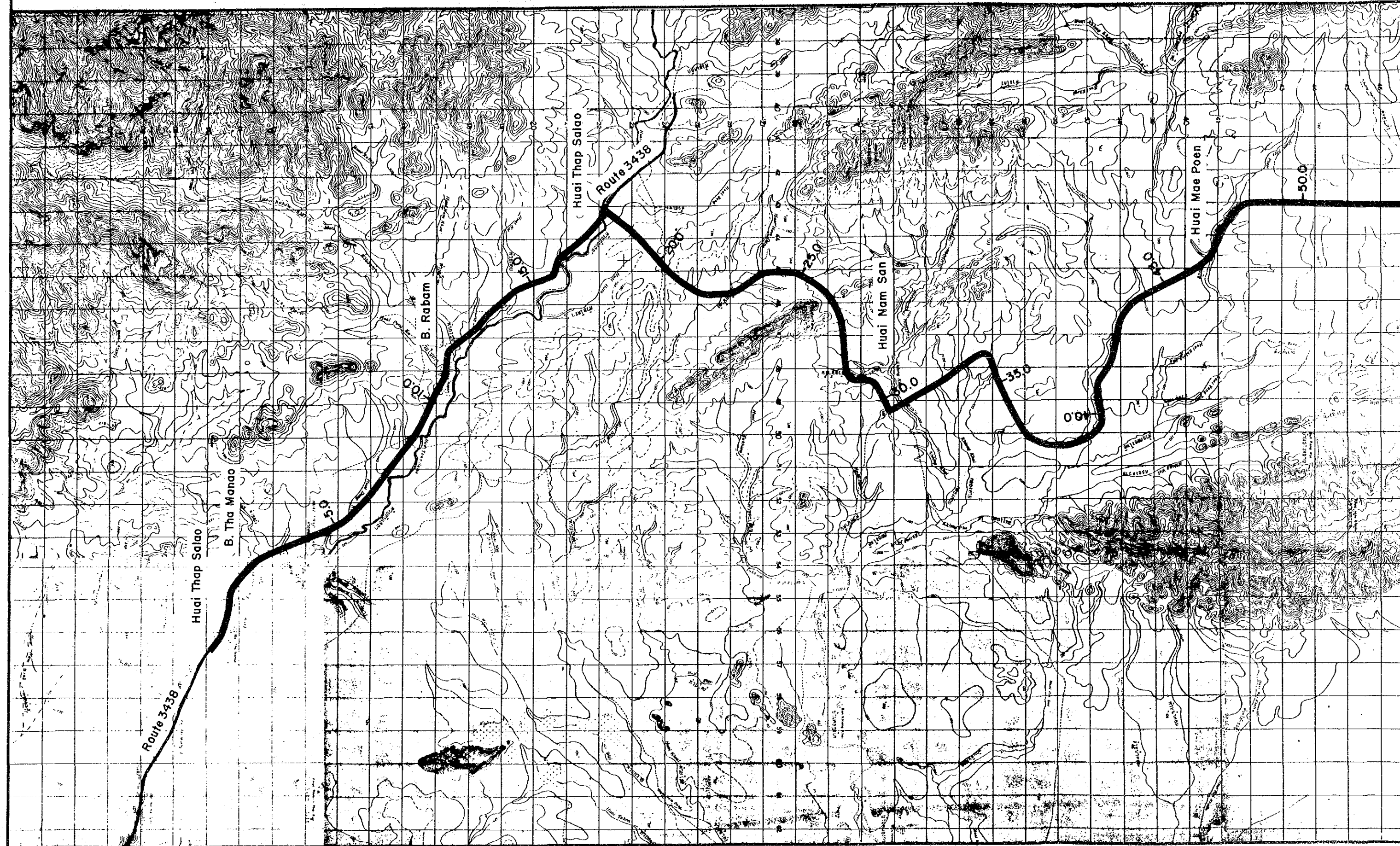
## 6. DEVELOPMENT AND SOCIAL IMPACTS

Because of its long length and yet-to-be-exploited level of development the improved road, when completed, will have a considerable impact on the development of the area. New migrants may be attracted to this area.

PROJECT NO. IM - 5

A. LAN SAK - B. KAO CHONKHAN  
C. UTHAI THANI, C. NAKHON SAWAN

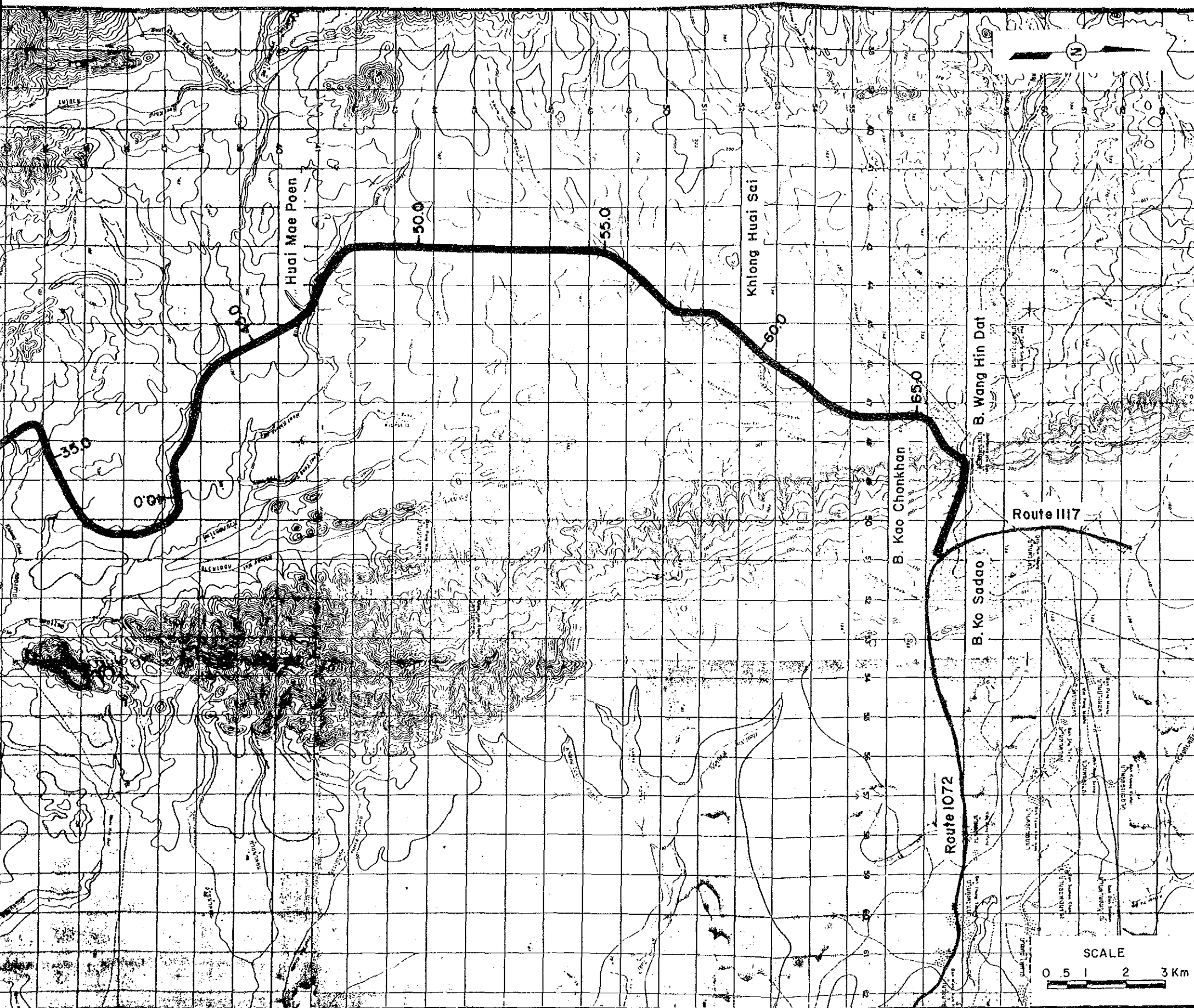
L = 69.10 KM.



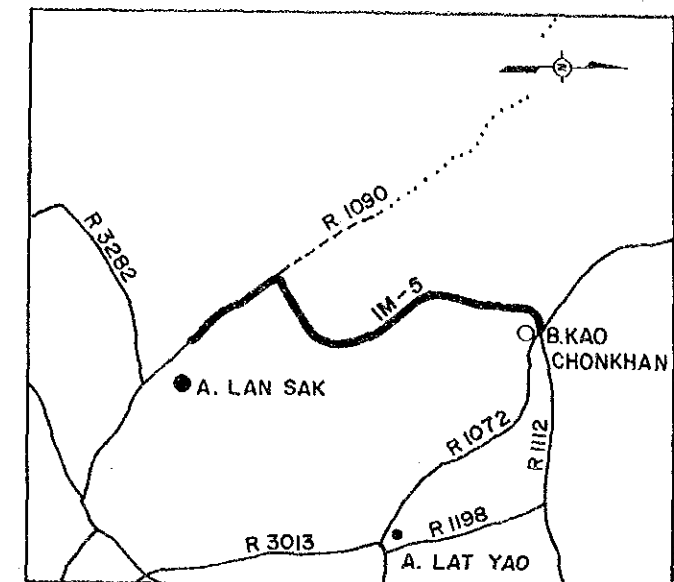


SAK - B. KAO CHONKHAN  
THANI, C. NAKHON SAWAN

L = 69.10 KM.



LOCATION MAP



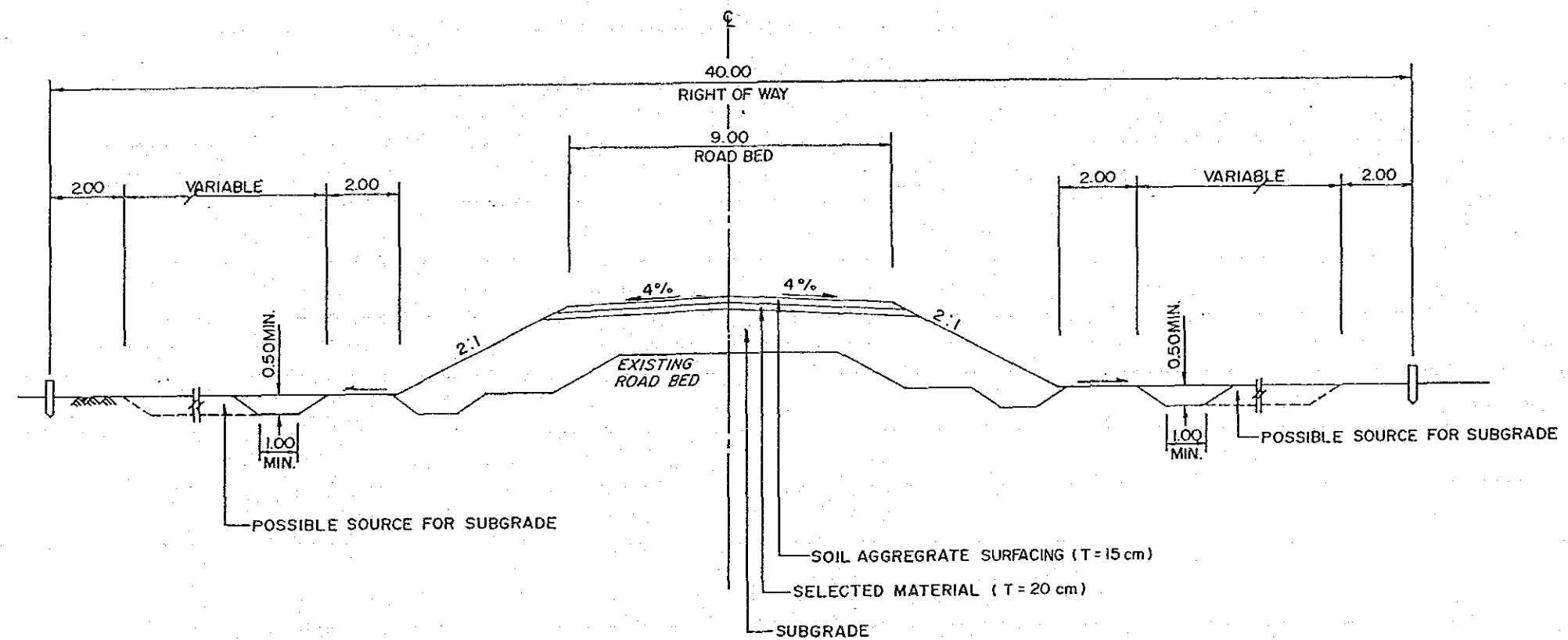
BRIDGE LIST

No	Station Km.	Proposed Bridge	Existing Bridge
1	29.0	—	C - 7.00x24.00
2	42.1	C - 7.00x12.00	W - 3.00x10.00
3	51.1	C - 7.00x 8.00	W - 2.00x 6.00
4	53.2	C - 7.00x14.00	W - 4.50x12.00
5	54.6	C - 7.00x10.00	W - 3.00x 7.00
6	57.2	C - 7.00x12.00	W - 3.00x10.00
7	60.3	C - 7.00x12.00	W - 4.50x10.00
8	62.5	C - 7.00x12.00	W - 3.50x10.00
9	63.9	C - 7.00x12.00	W - 3.00x10.00
10	65.8	(BOX CULVERT)	W - 2.70x 6.50
11	65.9	(BOX CULVERT)	W - 2.70x 6.50
12	66.1	C - 7.00x20.00	W - 3.80x19.00

LEGEND

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

# TYPICAL CROSS SECTION



PROVINCIAL HIGHWAY ( CLASS F5 )

## ARD Rural C. UTHAI THANI

**L = 69.1 km**

5-8

PROJECT NO. IM-5

**ROAD INVENTORY (2/3)**  
**ROUTE NO. 1139    A. LAN SAK (J.R. 3438) - B. KAO CHONKHUN (J.R. 1072)**  
**ARD Rural C. UTHAI THANI**

L = 69.1 km

STATION (Km)		30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60		
		Sta. 30+700				Sta. 42+100				Sta. 48+100				Sta. 52+100		Sta. 57+100		Sta. 59+100	
VILLAGE Name of Village		B. Lan				B. Nong Mai				B. Chet Royrai				B. Phai Kodeaw		B. Pong Kanoon		B. Pong Sut	
TERRAIN																			
CROSS SECTION	Formation Width (m)	5.00-6.00				4.00-5.00								6.00-7.00					
	Embankment Height (m)											0.30-0.40							
	Cutting Depth (m)					Laterite													
SURFACE	Type/Length (km)	Poor																	
	Condition																		
FLOODING	Overflow Length (km)/Height (m)													Corn Field					
LAND USE	Left																		
	Right									No Use				Cassava		No Use			
BOX CULVERT & BRIDGE	Station (km)																		
	Dimension (m)																		
	Length (m)					Sta. 42+100		Sta. 51+100		Sta. 53+200		Sta. 54+600		Sta. 57+200					
	Width (m)					10.00		6.00		12.00		7.00		10.00					
						3.00		2.00		4.50		3.00		3.00					
						Type													
						Wood Temporary													
RIGHT OF WAY (m) (Left/Right)		15.00/each																	
ALIGNMENT	Horizontal																		
	Vertical																		
ROUTE NO., AGENCIES		PWD	ARD																

PROJECT NO. IM-5

**ROAD INVENTORY (3/3)**  
**ROUTE NO. 1139 A. LAN SAK (J.R. 3438) - B. KAO CHONKHUN (J.R. 1072)**  
**ARD Rural C. UTHAI THANI**

L = 69.1km

STATION (Km)		60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90															
		Sta. 61+100		Sta. 66+100													
VILLAGE Name of Village		B. Rong Muang		Sta. 68+100 Khlong Maewong Sta. 69+100 B. Hin Dad B. Kao Chonkhun													
TERRAIN																	
CROSS SECTION	Formation Width (m)	6.00-7.00		4.00-5.00				6.50									
	Embankment Height (m)	0.30 - 0.40		0.50													
	Cutting Depth (m)	5.00(Sta.66+200)															
SURFACE	Type/Length (km)	Laterite															
	Condition	Poor															
FLOODING	Overflow Length (km)/Height.(m)																
LAND USE	Left	No Use	Garden	No Use													
	Right	No Use															
BOX CULVERT & BRIDGE	Station (km)																
	Dimension (m)																
	Length (m.)	Sta. 60+300		Sta. 62+500		Sta. 63+900		Sta. 65+800		Sta. 65+900		Sta. 66+100					
	Width (m.)	10.00		10.00		10.00		6.50		6.50		19.00					
		4.50		3.50		3.00		2.70		2.70		3.80					
		Type		Wood Temporary													
RIGHT OF WAY (m) (Left/Right)		15.00/each															
ALIGNMENT	Horizontal																
	Vertical																
ROUTE NO., AGENCIES		ARD															



**PROJECT IM - 6**

**Changwat : Nakhon Sawan**

**B. Thap Krit Klang - B. Phanom Rok**

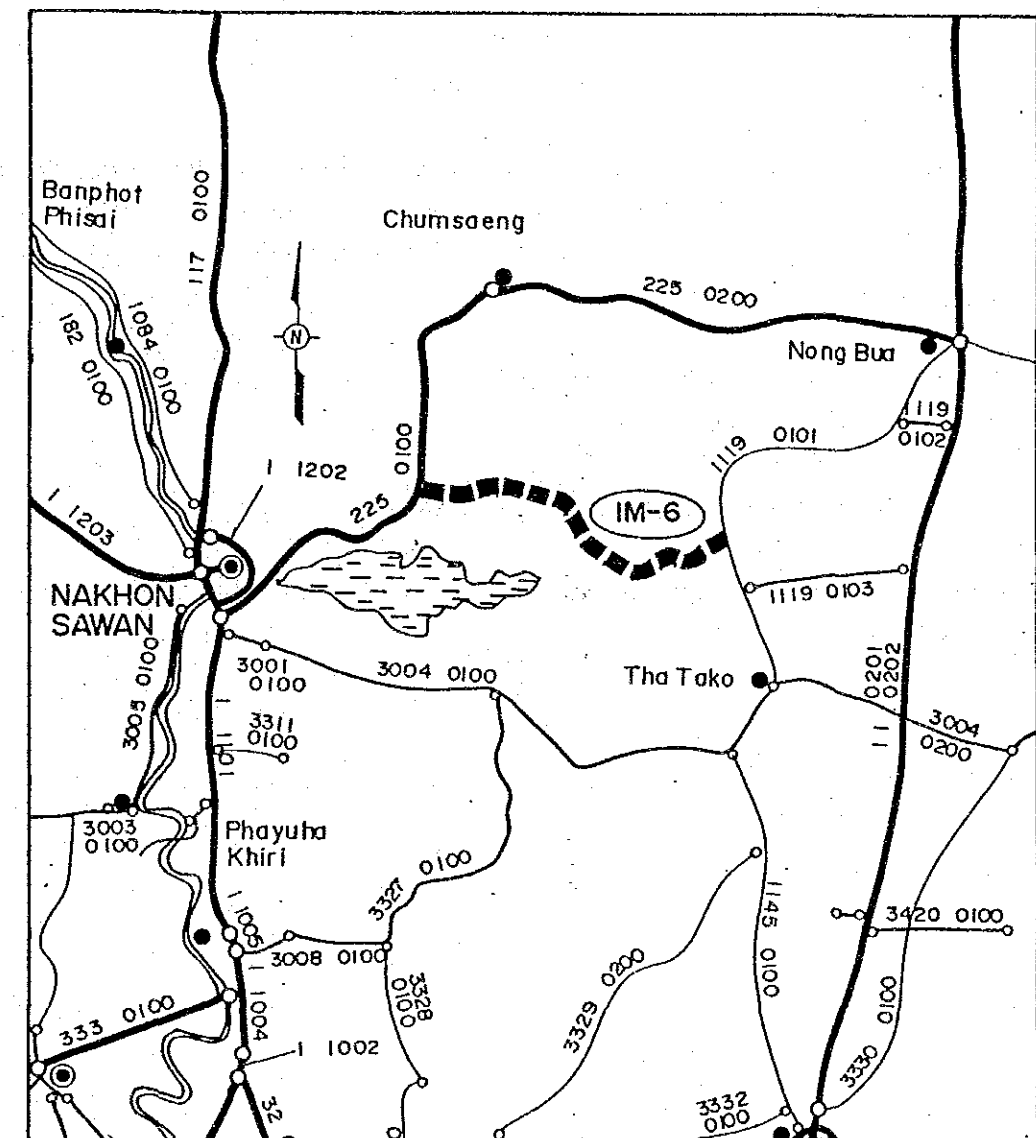
**Length : 25.00 km**

# SUMMARY

## PROJECT IM-6

Item	Description
Changwat	Nakhon Sawan
Origin	B. Thap Kait Klang (J.R.225)
Destination	B. Phanom Rok (J.R.1119)
Length	
Total	25.0 km
Improvement Section	25.0 km
DOH Road	-
Others	PWD 25.0 km
New Construction Section	-
Surface Type and Condition	S/A Fair/Poor 25.0 km
Terrain	Flat
Traffic (ADT)	
Existing	68
2000	162
2008	209
Existing Standard	Laterite, Substandard
Proposed Standard	F6
Construction Cost	
Financial	-
Economic	-
IRR	-
B/C	-

## LOCATION OF PROJECT ROUTE



## 1. GENERAL

The proposed route lies entirely in Changwat Nakhon Sawan.

It originates at the junction with Route 225, runs eastward through flat terrain and ends at the junction with Route 1119. Its total length is 25 km.

About a dozen villages are in the immediate vicinity of this road. Both sides of the road are well cultivated with paddy. No land is left idle. It appears that at present villages located west of Km 11+000 are within the influence area of Nakhon Sawan and those east of that point are within the influence area of Tha Tako.

The existing road is entirely of laterite with an embankment 0.5 to 2.0 m high. There are eight permanent bridges along the road.

The condition of the existing laterite road surface is fair to poor.

Upon completion, the improved road will increase the accessibility of the large area east of Bung Boraped.

## 2. TRAFFIC (Growth Rate Method)

**Base Traffic Volume**

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-6	PWD	1987	58	0	10	0	48	10	0	68

**Traffic Growth Rate**

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
IM-6	- 1993	6.87	6.42	5.70	5.70	9.21	4.53	4.54	6.87
	1994 - 2000	3.78	4.40	5.10	5.08	2.35	4.08	4.10	3.78
	2001 - 2008	3.60	3.11	5.11	5.11	2.58	4.17	4.14	3.60

**Induced Traffic Ratio**

Route	PC	LB	HB	LT	MT	HT
IM-6	1.26	1.27	1.16	1.27	1.00	1.00

**Future Traffic Volume**

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-6	PWD	1993	106	0	18	0	102	13	0	133
		2000	106	0	25	0	120	17	0	162
		2008	183	0	38	0	147	24	0	209

#### 4. ENGINEERING

##### SUMMARY OF ROAD INVENTORY

(PROJECT IM-6)

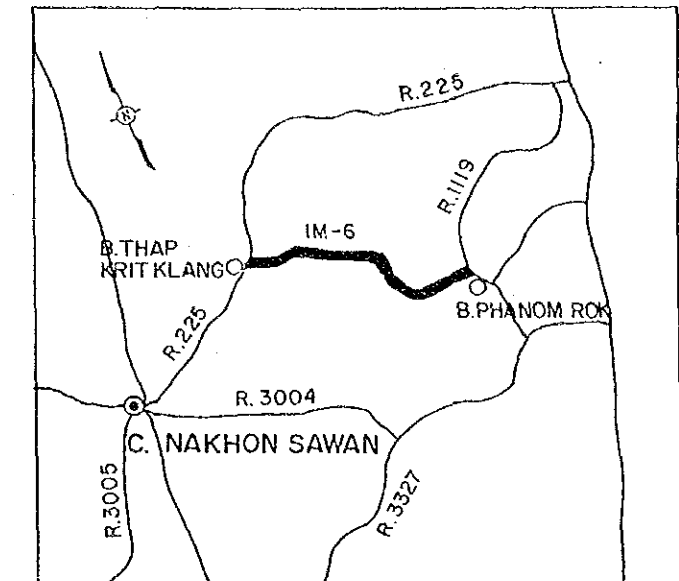
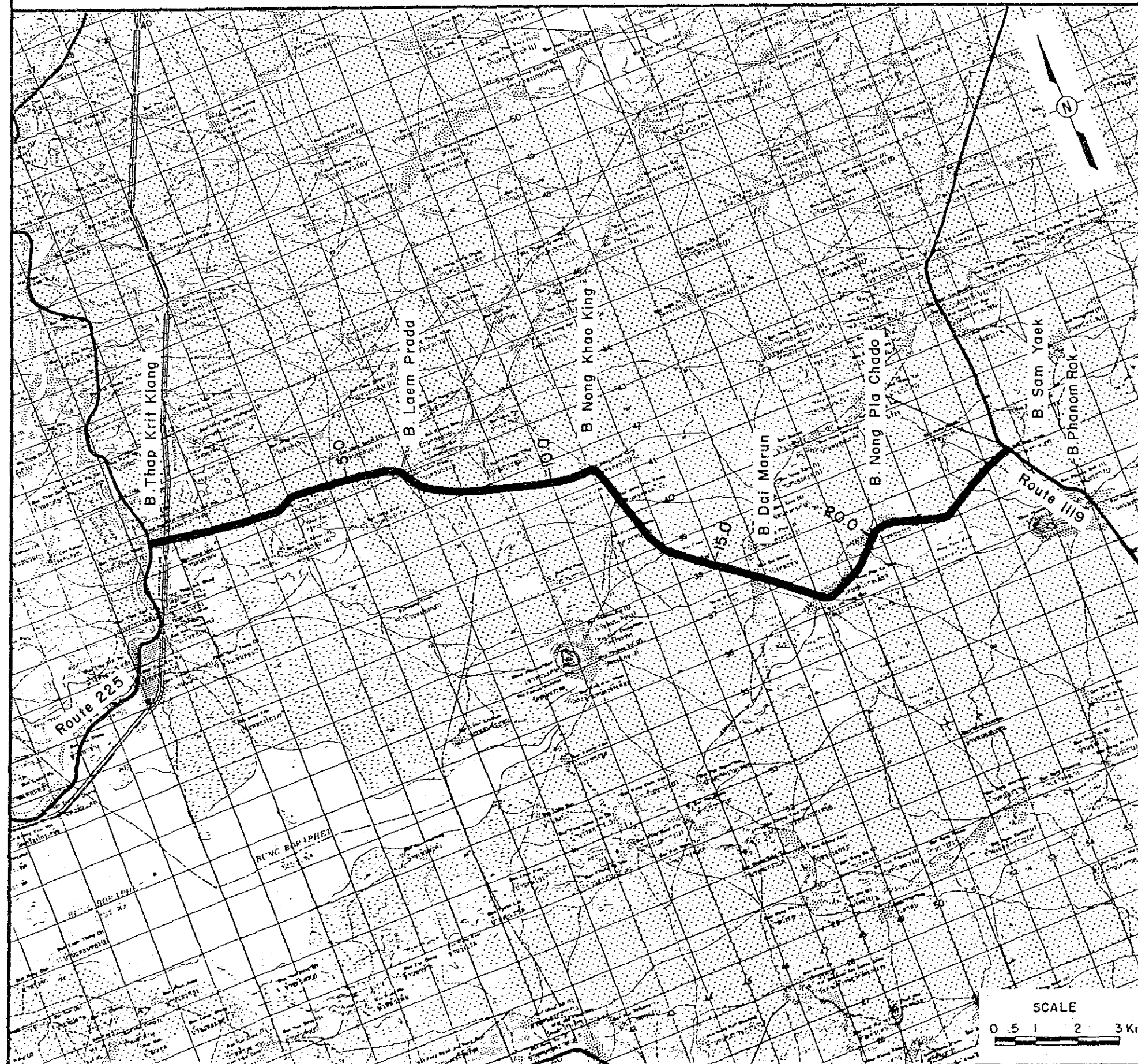
Item	Description
Changwat	Nakhon Sawan
Origin	B. Thap Knit Klang (J.R.225)
Destination	B. Phanom Rok (J.R.1119)
Length	
Total	25.0 km
Improvement Section	25.0 km
DOH Road	-
Others	PWD 25.0 km
New Construction Section	-
Terrain	Flat
Alignment (Hori./Vert.)	Fair/Fair
Formation Width	7.0 m
Embankment Section	
Length	25.0 km
Height	0.5 m ~ 2.0 m
Cut Section	-
Length	-
Depth	-
Surface Type and Condition	
SBST or DBST	-
Soil Aggregate	Fair/Poor 25.0 km
Earth	-
Box Culvert	-
Bridge	
Permanent Bridge	8 sites 125.0 m
Narrow Concrete Bridge	-
Wooden Bridge	-
Overflow Section	-
Right of way	30.0 m

PROJECT NO. IM - 6

B. THAP KRIT KLANG - B. PHANOM ROK  
C. NAKHON SAWAN

L = 25.00 KM.

LOCATION MAP



BRIDGE LIST

No	Station Km.	Proposed Bridge	Existing Bridge
1	0.07	—	C - 7.00x25.00
2	3.6	—	C - 7.00x17.50
3	8.5	—	C - 7.00x17.50
4	17.6	—	C - 7.00x10.00
5	19.8	—	C - 7.00x10.00
6	22.2	—	C - 7.00x25.00
7	22.9	—	C - 7.00x10.00
8	23.6	—	C - 7.00 x10.00

LEGEND

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



PROJECT NO. IM-6

**ROAD INVENTORY**  
**ROUTE NO. B. THAP KRIT KLANG - B. PHANOM ROK**  
**ARD C. NAKHON SAWAN**

L = 25.0 km

STATION (Km)		024681012141618202224262830																		
VILLAGE Name of Village		Sta. 0+300 Railway																		Sta. 25+000 B. Phanom Rok
		B. Thap Krit KlangB. Laem PhradaB. Pha NomsateB. Bang Yai																		
TERRAIN		Flat																		
CROSS SECTION	Formation Width (m)	7.00 m																		
	Embankment Height (m)	1.50	2.00		1.50		0.50		0.70		0.50									
	Cutting Depth (m)																			
SURFACE	Type/Length (km)	Laterite																		
	Condition	Fair/Poor																		
FLOODING	Overflow Length (km)/Height (m)	Sta. 1+800																		
LAND USE	Left	Ditch (Site Borrow) w=8.00 m. Paddy Ditch (Site Borrow) w=3.00 m.																		
	Right	Paddy																		
BOX CULVERT & BRIDGE	Station (km)																			
	Dimension (m)																			
	Bridge																			
	- Conc. or Wooden																			
	- Width																			
	- (Sidewalk)																			
RIGHT OF WAY (m) (Left/Right)		Sta. 8+800																		
ALIGNMENT	Horizontal	B																		
	Vertical																			
ROUTE NO., AGENCIES		PWD																		

**PROJECT IM - 7**

**Changwat : Lop Buri**

**K. A. Khok Charoen - B. Mai Samakki**

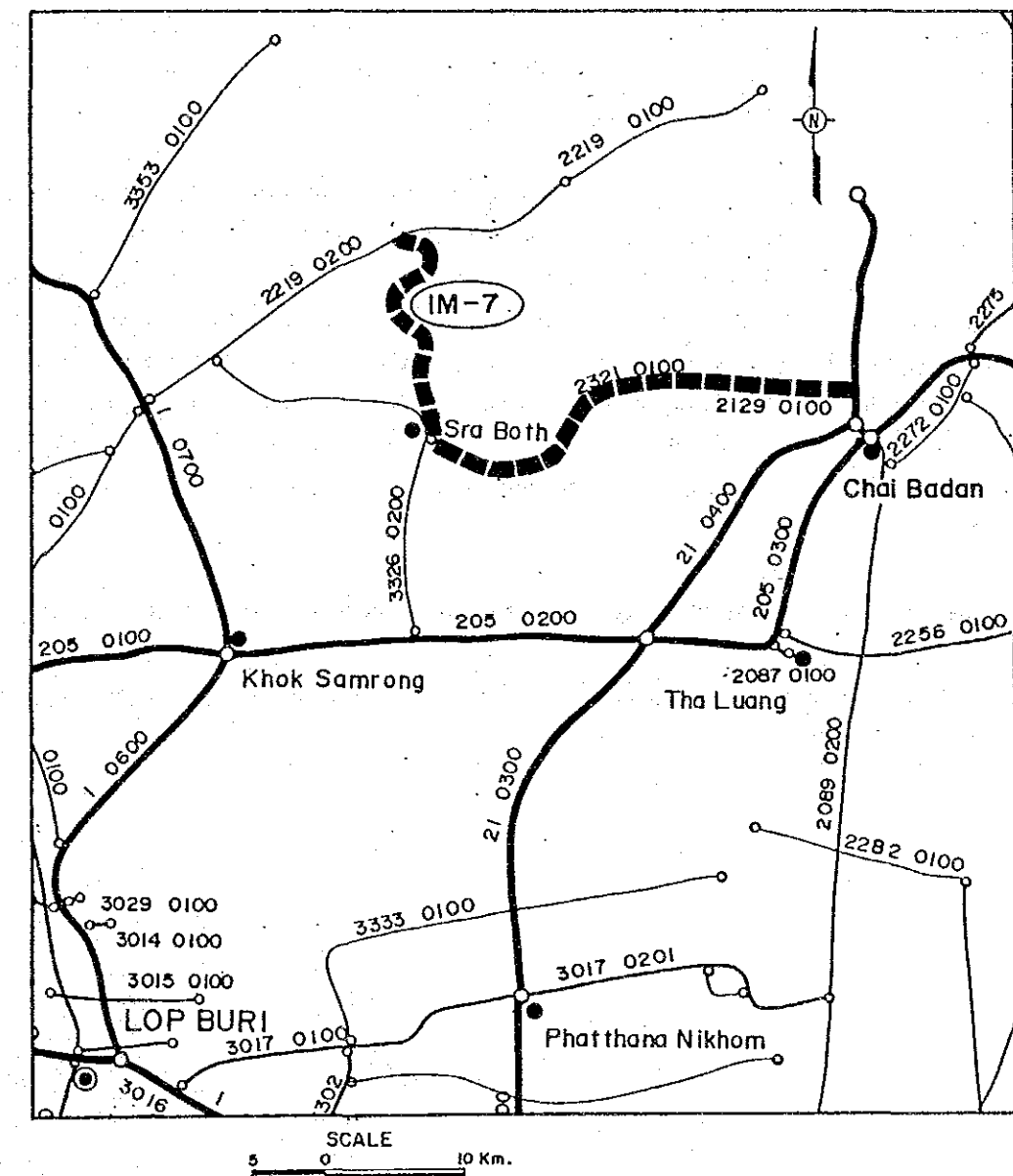
**Length : 66.30 km**

# SUMMARY

## PROJECT IM-7

Item	Description
Changwat	Lop Buri
Origin	K.A. Khok Charoen (J.R.2219)
Destination	B. Mai Samakkhi (J.R.21)
Length	
Total	66.3 km
Improvement Section	66.3 km
DOH Road	No.2321 38.1 km
Others	28.2 km
New Construction Section	-
Surface Type and Condition	SBST Fair & S/A Good/Fair
Terrain	Flat/Rolling
Traffic (ADT)	
Existing	55
2000	102
2008	143
Existing Standard	Laterite, Substandard
Proposed Standard	F6
Construction Cost	
Financial	-
Economic	-
IRR	-
B/C	-

LOCATION OF PROJECT ROUTE



### LEGEND:

	PROJECT ROUTE		PROVINCIAL HIGHWAYS
	DIVIDED HIGHWAYS		PROVINCIAL HIGHWAYS (Unpaved)
	NATIONAL HIGHWAYS		CHANGWAT, AMPHOE

## 1. GENERAL

The proposed route lies entirely in Changwat Lopburi.

It originates at the junction with Route 2219 in King Amphoe Khok Charoen, runs in a generally south direction in a circuitous route through about 10 villages in a row and joins Route 3326 to reach Ban Sa Bot. From Ban Sa Bot it separates from Route 3326 and runs eastward through half a dozen villages to end at the junction with Route 21 in Ban Mai Samakkhi. Its total length is 66.3 km. The total length of sections to be improved currently under DOH is 38.1 km, and under other agencies is 28.2 km.

The first 15-km section runs in a flat terrain at the foot of hills through a winding route. Paddy is grown in a relatively limited area. The next section of about 9 km in length has a good horizontal alignment with both sides cultivated by paddy. The 2-km section of Route 3326, which is an approach to Ban Sa Bot, is currently being widened. The next 15-km westward section lies in a flat terrain but in an increasingly narrow strip. In this section paddy is planted. The last 22-km section goes through rolling terrain, and land is mostly not used for cultivation except for some patches of maize and wheat. Along the last 4-km section tobacco is grown. The entire length is of laterite except for three short stretches of SBST sections where the road passes through villages.

There are nine permanent bridges and one narrow concrete bridge with a length of 32 m.

Upon completion, the improved road will provide better access for villages scattered in this area to each other and to outside areas.

## 2. TRAFFIC (Growth Rate Method)

Base Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-7	2321-1002	1988	58	0	5	0	33	8	0	46
		1988	102	0	4	0	51	8	0	63
Average		-	80	0	5	0	42	8	0	55

Traffic Growth Rate

Route	Period	MC	PC	LB	HB	LT	MT	HT	ADT
IM-7	- 1993	4.09	5.08	7.67	5.71	2.39	4.25	3.80	4.09
	1994 - 2000	4.53	5.49	5.94	4.32	4.17	4.04	4.14	4.53
	2001 - 2008	4.34	5.11	4.91	4.46	4.10	3.97	3.93	4.34

Induced Traffic Ratio

Route	PC	LB	HB	LT	MT	HT
IM-7	1.23	1.25	1.15	1.24	1.00	1.00

Future Traffic Volume

Route	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-7	2321-1002	1993	85	0	9	0	46	10	0	65
		2000	85	0	12	0	61	13	0	86
		2008	163	0	19	0	84	18	0	121
		1993	151	0	7	0	71	10	0	88
		2000	151	0	11	0	94	13	0	118
		2008	288	0	16	0	130	18	0	164
	Average	1993	118	0	8	0	59	10	0	77
		2000	161	0	12	0	78	13	0	102
		2008	226	0	18	0	107	18	0	143

#### 4. ENGINEERING

##### SUMMARY OF ROAD INVENTORY

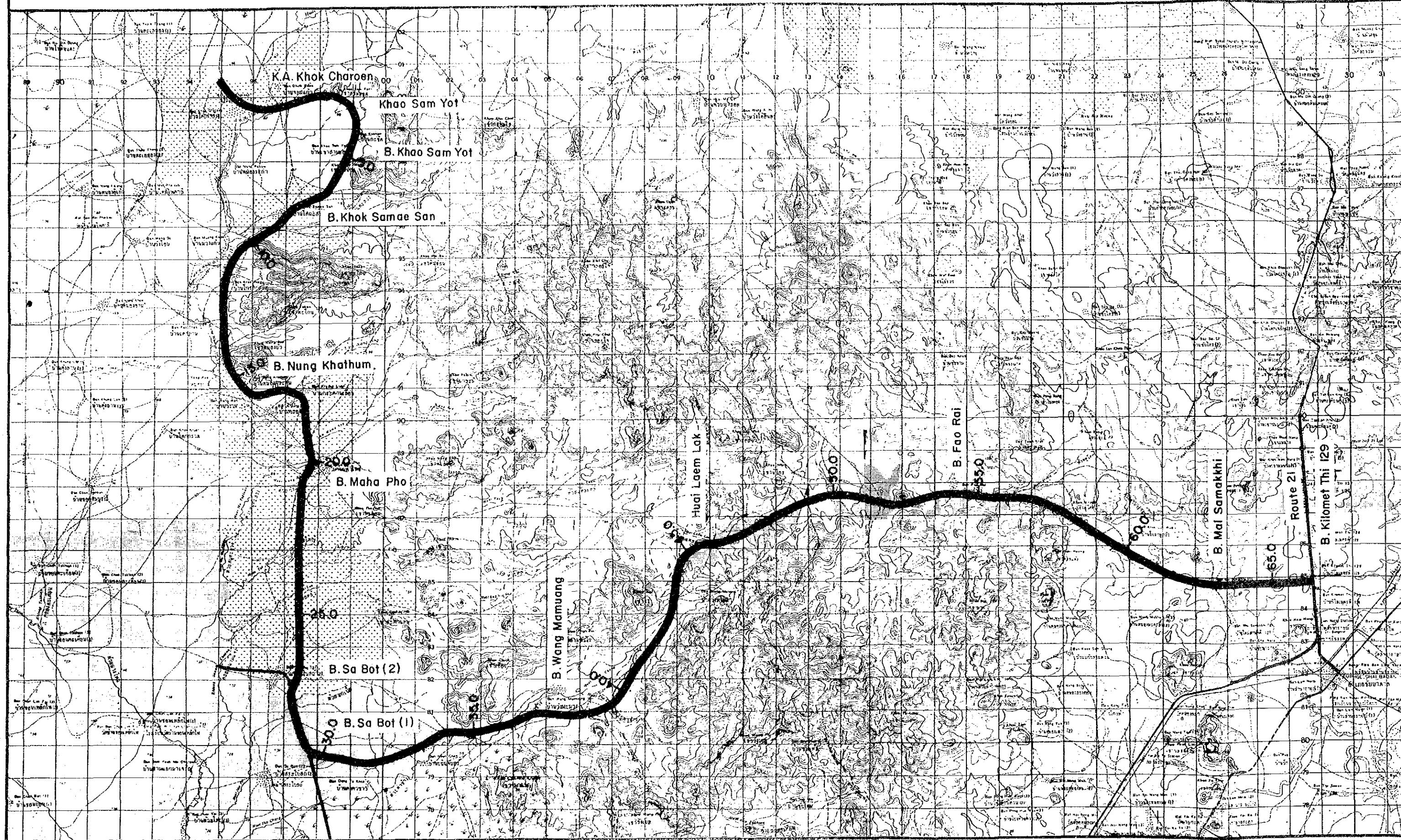
(PROJECT IM-7)

Item	Description
Changwat	Lop Buri
Origin	K.A. Khok Charoen (J.R.2219)
Destination	B. Mai Samakkhi (J.R.21)
Length	
Total	66.3 km
Improvement Section	66.3 km
DOH Road	No.2321 38.1 km
Others	28.2 km
New Construction Section	-
Terrain	Flat/Rolling
Alignment (Hori./Vert.)	Good/Fair (H)/ Good/Fair (V)
Formation Width	5.5 m ~ 6.0 m
Embankment Section	
Length	65.8 km
Height	0 m ~ 1.0 m
Cut Section	
Length	0.5 km
Depth	2.5 m
Surface Type and Condition	
SBST or DBST	Fair
Soil Aggregate	Good/Fair
Earth	
Box Culvert	1 unit 14.0 m
Bridge	
Permanent Bridge	9 sites 172 m
Narrow Concrete Bridge	1 sites 32 m
Wooden Bridge	-
Overflow Section	-
Right of way	20 m ~ 30 m

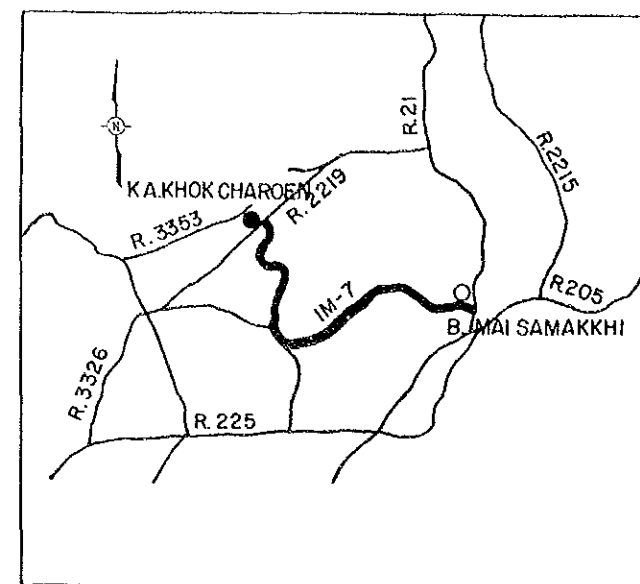
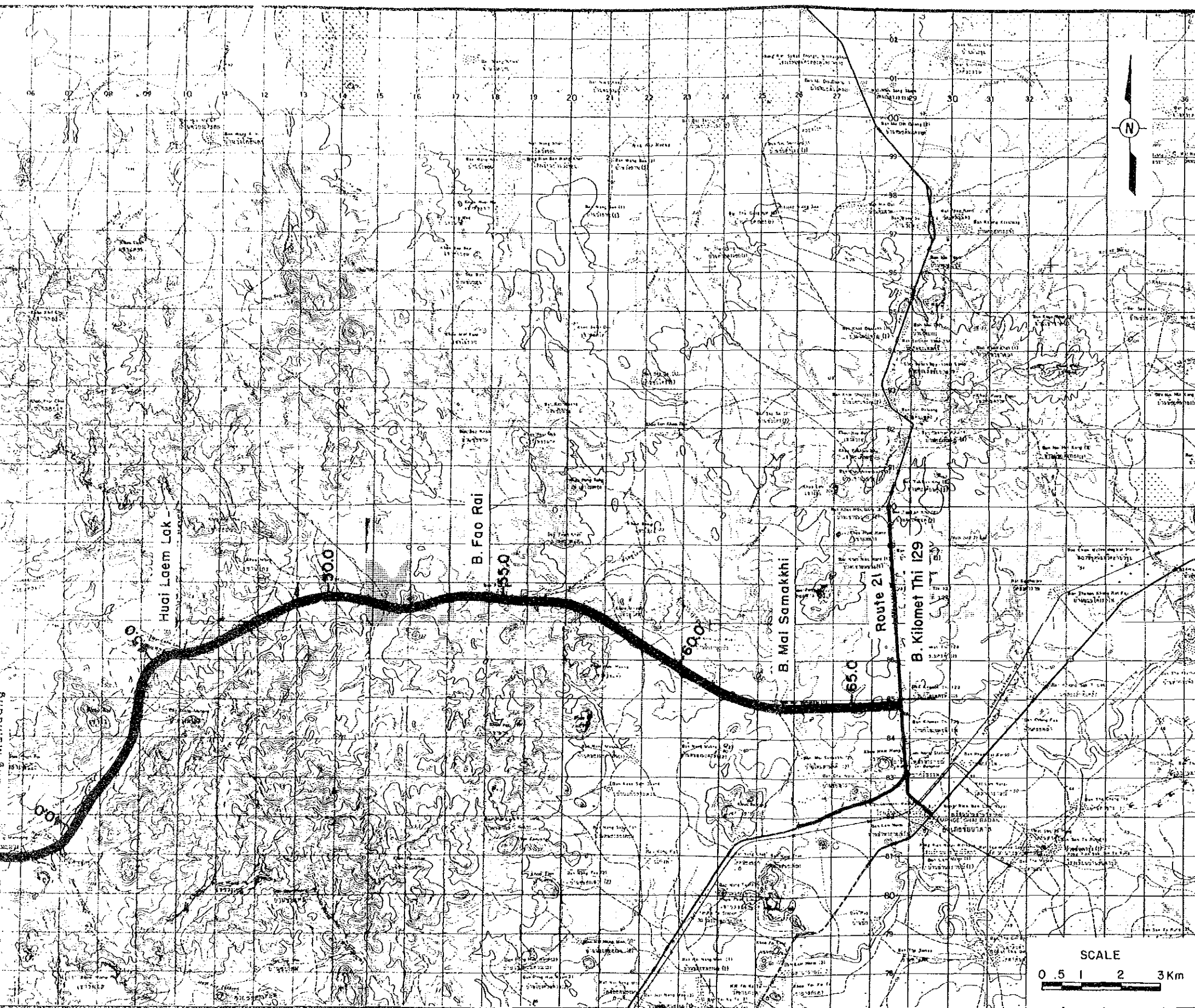
PROJECT NO. IM - 7

K.A. KHOK CHAROEN - B. MAI SAMAKKI  
C. LOP BURI

L = 66.30 KM.







BRIDGE LIST

No	Station Km.	Proposed Bridge	Existing Bridge
1	3.0	—	C - 7.00 x 30.00
2	5.3	—	C - 7.00 x 10.00
3	14.7	—	C - 7.00 x 20.00
4	30.1	—	C - 7.00 x 30.00
5	41.2	—	C - 7.00 x 21.00
6	42.6	—	C - 7.00 x 21.00
7	44.8	—	C - 7.00 x 15.00
8	46.4	—	C - 7.00 x 10.00
9	47.8	—	C - 7.00 x 15.00
10	63.8	C - 7.00 x 32.00	C - 4.00 x 32.00

LEGEND

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



PROJECT NO. IM-7

## ROAD INVENTORY (1/3)

ROUTE NO. 2321 K.A. KHOK CHAKOEN (J.R. 21) - B. MAI SAMAKKI (J.R. 2219) (KI (J.R.2219))

L = 66.3 km

ARD Rural

STATION (Km)		0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
VILLAGE Name of Village		K.A. KHOK CHAROEN (J.R.21)		B. CHOM KAEW			B. KHOK SAMAESAN		B. KHOK PRADU		B. WANG WON	B. KLONG		B. MAHA PHO			28+200
TERRAIN		Flat															
CROSS SECTION	Formation Width (m)	5.0 (1.0)	4.0 (1.0)	5.5 (1.0)	5.0 (1.0)	5.0 (1.0)	5.0 (1.0)	4.5 (1.0)	4.5 (1.0)	5.5 (1.0)	6.0 (1.0)	6.0 (1.0)	6.0 (1.0)	6.5 (1.0)	6.5 (1.0)	Under Cons. (Widening)	
	Embankment Height (m)	0	0	0	0	0	0	0	-	0	0	0	0.6	0.5	1.2		
	Cutting Depth (m)																
SURFACE	Type/Length (km)	Laterite															
	Condition	Poor				Fair							Bad	Good			
FLOODING	Overflow Length (km)/Height.(m)	No															
LAND USE	Left		Paddy	Paddy	Paddy	Paddy	Mount.	-	Paddy	Teak	Idle		Paddy	Paddy	Paddy	Paddy	Paddy
	Right		Paddy	Paddy	Paddy	Paddy	Paddy	Teak	Paddy	Teak	Paddy		Paddy	Paddy	Paddy	Paddy	Paddy
BOX CULVERT & BRIDGE	Station (km)											18+500	19+900	21+500	23+700	25+100	
	Dimension (m)																
	Bridge - Conc. or Wooden - Width - (Sidewalk) - Length		C-Br. 4.00(0.5)x32.0									C-Br. 7.00(0.7)x15.00	C-Br. 7.00(0.7)x10.00	C-Br. 7.00(0)x15.00	C-Br. 7.00(0)x21.00	C-Br. 7.00(0)x21.00	
RIGHT OF WAY (m) (Left/Right)		No	10 10	10 10	10 10	20 20	10 10	10 10	20 10	10 10		No	10 10			15 15	
ALIGNMENT	Horizontal		Fair									Good	Bad	Good			
	Vertical		Good														
ROUTE NO., AGENCIES																	

PROJECT NO. IM-7

ROAD INVENTORY (2/3)  
 ROUTE NO. 2321 K.A. KHOK CHAKOEN (J.R. 21) - B. MAI SAMAKKI (J.R. 2219)  
 ARD Rural

L = 66.3 km

STATION (Km)		30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
VILLAGE Name of Village		K.A. SA BOT 30+400					B. DANCHAN		B. TAOTONE			B. DONG NOI		B. SUBTAKUA	B. SUB HINKHAENG		B. PRONG
TERRAIN			Flat						Rolling			Flat		Rolling			
CROSS SECTION	Formation Width (m)		6.0 (1.0)	6.0 (1.0)	6.0 (1.0)	6.0 (1.0)	6.0 (1.0)	6.5 (1.0)	5.5 (1.0)	5.5 (1.0)	5.5 (1.0)	5.5 (1.0)	6.0 (1.0)	6.0 (1.0)	5.5 (1.0)	5.5 (1.0)	5.5 (1.0)
	Embankment Height (m)		0.6	1.5	2.0	0.5	0.3	0.6	0	0	0	0.5		0	0	0	0
	Cutting Depth (m)												3.0				3.0
SURFACE	Type/Length (km)	SB ST	Laterite											SB ST	Laterite		
	Condition	F	Good											F	Good		
FLOODING	Overflow Length (km)/Height (m)		No														
LAND USE	Left		Paddy	Paddy	Idle	Paddy	Paddy	Idle	Maize	Idle	Idle	Idle	Mount.	Wheat			
	Right		Paddy	Paddy	Idle	Paddy	Paddy	Idle	Idle	Idle	Idle	Idle	Idle	Idle			
BOX CULVERT & BRIDGE	Station (km)				36+200		29+200						51+600				
	Dimension (m) Bridge - Conc. or Wooden - Width - (Sidewalk) - Length Box - Width - Height - Length				C-Br. 7.00(0)x30.00		C-Box 9.50x14.00x2.50						C-Br. 7.00(0)x20.00				
RIGHT OF WAY (m) (Left/Right)												10 10					
ALIGNMENT	Horizontal						Good						Fair	Good	Fair	Good	
	Vertical						Good								Fair		
ROUTE NO., AGENCIES			DOH 2321														

## ROAD INVENTORY (3/3)

PROJECT NO. IM-7

ROUTE NO. 2321 K.A. KHOK CHAKOEN (J.R. 21) - B. MAI SAMAKKI (J.R. 2219)

L = 66.3 km

ARD Rural

STATION (Km)		60	62	64	66	68	70
VILLAGE Name of Village			B. Mai Samakki		B. MAI SAMAKKI (J.R. 2219)		
TERRAIN			Rolling				
CROSS SECTION	Formation Width (m)	5.5 (1.0)	5.5 (1.0)	6.0 (1.0)	6.5		
	Embankment Height (m)		1.0	1.5	2.5		
	Cutting Depth (m)	3.0					
SURFACE	Type/Length (km)	Laterite	SB ST	Laterite			
	Condition	Good	F	Good			
FLOODING	Overflow Length (km)/Height (m)		No				
LAND USE	Left		Tobacco	Tob.	Tob.		
	Right		Wheat	Tob.	Tob.		
BOX CULVERT & BRIDGE	Station (km)	61+000		63+300			
	Dimension (m)						
	Bridge						
	- Conc. or Wooden						
	- Width						
	- (Sidewalk)						
	- Length						
RIGHT OF WAY (m) (Left/Right)			10 10				
ALIGNMENT	Horizontal		Good				
	Vertical		Fair				
ROUTE NO., AGENCIES			DOH 2321				