

## **CHAPTER 16**

# **TRANSPORTATION**

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## TRANSPORTATION

### 16.1 International and Inter-Urban Transport System of Thailand

#### 16.1.1 National Highway System in Thailand

The DOH<sup>1</sup> network of national highways has a total route length of approximately 55,000 km, of which there are about 20,000 km of 1-, 2- and 3-digit roads and 30,000 km of 4-digit roads. All provinces (changwats) are connected to this network and most long-distance (inter-province) traffic uses these roads.

**Table 16.1 Highway Classification by Numbering System**

1-digit route	Highway Route No.1: Bangkok - Chiangrai (Phaholyothin Road) Highway Route No.2: Saraburi - Nongkai (Friendship Road) Highway Route No.3: Bangkok - Trad (Sukhumvit Road) Highway Route No.4: Bangkok - Amphoe Sadao, Songkla (Petchkasem Road)
2- digit route	Primary highway in the regions
3-digit route	Secondary highway in the regions
4-digit route	Highway linking Changwat and Amphoe or important places in that province.

Source: Department of Highways, Ministry of Transport and Communications

<sup>1</sup> Department of Highway, Ministry of Transport and Communication, Thailand

**Table 16.2 Highway Classification by Jurisdiction**

(1) Special Highway and National Highway	Highways registered at the Department of Highways (DOH) by the order of the Director-General with the approval of the Minister.
(2) Concession Highways	Highways registered at the Department of Highways (DOH) by the order of the Director-General with the approval of the Minister.
(3) Rural Roads	Roads registered at Provincial City Hall by the order of the Governor with the consent of the Director-General of the Public Works, Department of the Secretary-General of the Office of the Accelerated Rural Development.
(4) Municipal Roads	Roads registered at Municipality by the order of Lord Major with the approval of the Governor.
(5) Sanitary Roads	Roads registered at Sanitary Office by the order of the Chairman of the Sanitary Board with the approval of the Director-General of Public Works Department..

Source: Department of Highways, Ministry of Transport and Communications

**Table 16.3 Highway Development by DOH**

Year	Under Maintenance (km)				Under construction (km)
	Concrete	Asphalt	Unpaved	Total	
1985	635	30,621	4,979	36,235	9,102
1990	1,326	38,606	5,513	45,445	6,900
1994	3,313	42,656	4,186	50,155	8,043
1999	4,497	49,481	1,240	55,218	

Source: Department of Highways, Ministry of Transport and Communications

There are three concession highways under DOH as follows:

- Neon Lang Tao – Ban Thoong Highway (Distance: 14.7 km, Highway Route No.3246),
- Bu Kae Samee – Du Song Yoa (Distance: 15 km, Highway Route No. 4055), and
- Vidpawadi – Rangsit Elevated Tollway.

Concession contracts of the first two projects were expired. Currently the Vidpawadi – Rangsit Elevated Tollway has been operated under a concession agreement between DOH and the operator.

### **Asian Highway Network in Thailand**

The Asian Highway (AH) project was initiated in 1959 by the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), aiming at promoting the development of international road transport in the region. In 1992, UN ESCAP

endorsed the “Integrated Asian Land Transport Infrastructure Development (ALTID)” project, comprising the Asian Highway, the Trans-Asian Railway and the facilitation of land transport projects. In 1995, the “Study on Road Network in Central Asia” was implemented. As a result of the study, a new Asian Highway network of approximately 90,000 km in 28 member countries was revised / formulated; road classification and design standards were also revised; and international border crossing facilitation measures were introduced.

As part of the Asian Highway System, DOH has improved about 3,439 kilometers of the national highway system as shown in the table below. It can be said that the condition of the Asian Highway system in Thailand is rather good in comparison with those of neighboring countries.

**Table 16.4 Asian Highway in Thailand**

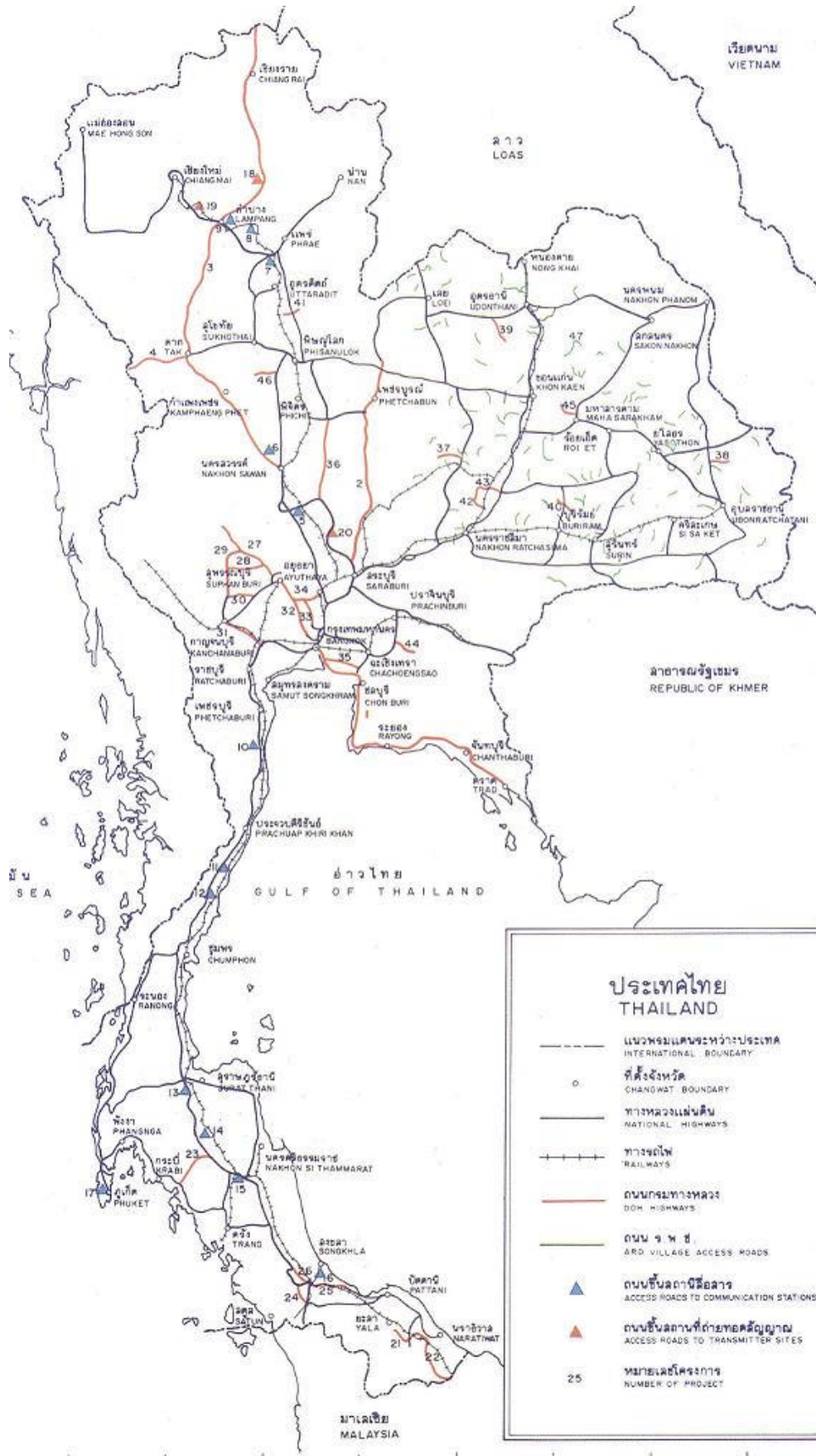
Route Name	Distance	Route
Asian Highway Route A-1	698 km (paved)	Mae Sod (Myanmar) – (Highway No. 105) – Changwat Tak – (Highway No.1) – Amphoe Payuhakiri – (Highway No.32) – Amphoe Bang Pa In – (Highway No. 1) – Hin Kong – Nakhon Nayok, Prachinburi, Aranyaprathet (Cambodia)
Route A-2	1,945 km (paved)	Mae Sai – (Highway No. 110) – Chiengrai – (Highway No.1) – Payuhakiri – (Highway No.32) – Bang Pa In – (Highway No.1) – Bangkok – (Highway No.4) – Nakhon Pathom, Petchaburi, Prachaubkirikhan, Chumphon - (Highway No.41) – Phattalung – (Highway No.4) – Hat Yai – Amphoe Sadao (Malaysian border)
Route A-3	115 km	Chiengrai – (Highway No. 1020 and 1152) – Amphoe Chiengkong
Route A-12	524 km (paved)	Hin Kong – (Highway No.1 and No.2) – Nakhon Ratchasima Khon Kaen, Udon Thani – Nong Khai
Route A-15	241 km (paved)	Udon Thani – (Highway No.22) – Sakon Nakhon – Nakhon Phanom
Route A-16	275 km (paved)	Hat Yai – (Highway No.43) – Pattani, Narathiwat – (Highway No.4056) – Amphoe Sungai Kolok (Malaysian border)

Source: Department of Highways, MOTC, Thailand

### **The East-West Transport Corridor Project by Asian Development Bank**

As part of the East-West Transport Corridor Project funded by Asian Development Bank, a road transport corridor linking northeast Thailand through Lao PDR to Da Nang Port in Viet Nam has been improved.

Currently about 78 km of Road No. 9 in Lao PDR between Maung Phin and the border with Vietnam has been improved. The scope of this project includes reconstructing the existing largely-failed road pavement to a two-lane bituminous surface treatment standard construction of new bridges and other drainage structures, and repair of existing structures, and ancillary works



Source: Department of Highway

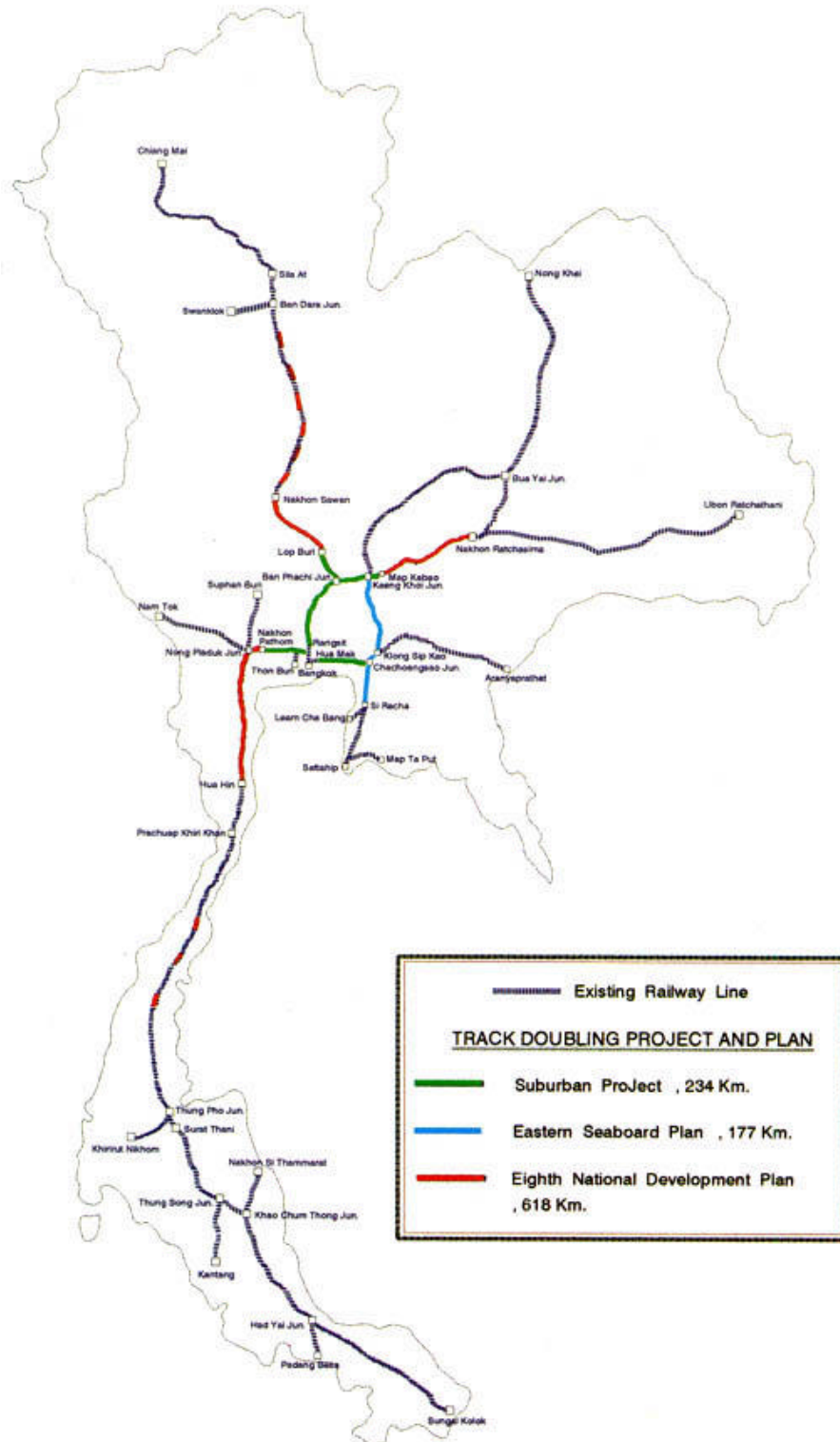
**Figure 16.1 National Highway System**

## 16.1.2 National Railway System in Thailand

SRT currently operates a network of about 4,404.5 km, all of which is single track with the exception of the 90-km double-track section between Bangkok and Ban Phachi. Ridership in 1997 was over 65 million passengers; however, the railway's transport share has been declining, reflecting the rapid growth of highway length and road traffic.

**Table 16.5 Current Railway System in Thailand**

Line	Section	Year of Opening
Southern	Bangkok - Hat Yai - Padang Besar	1918
	Bangkok - Hat Yai - Sungai Kolok	1921
Eastern	Bangkok - Aranyaprathet	1926
Northern	Bangkok - Chiang Mai	1926
Northeastern	Bangkok Ubon Ratchathani	1939
	Bangkok Nong Khai	1958
Eastern Sea board	Chachoengsao - Sattahip	1985
	Si Racha - Leam Chabang	1993
	Kao Cheechan - Map Ta Phut	1995
	Khong Sip Kao - Kaeng Khoi	1995



Source: State Railway of Thailand

Figure 16.2 Railway Network in Thailand

### 16.1.3 Air Aviation in Thailand

The air route network centers on Bangkok and a dominant portion of all domestic air trips have one trip end in Bangkok (Don Muang International Airport). Four airports, namely, Bangkok, Phuket, Hat Yai and Chiang Mai, provide scheduled international services in Thailand.

Passenger activity at all airports has shown significant growth over the last decade. Total passengers increased from 8.3 million in 1985 to 32.3 million in 1997. Over the same period, international passengers increased by an annual average growth of 9.6%.

Cargo has also achieved significant growth since 1985, reaching 900,000 tons a year. Most of the cargo is international, and more than 90% of international cargo flows through Bangkok International Airport. Meanwhile, domestic cargo movement has been very limited, and all of it is carried by passenger flights (there is no domestic freighter service). Therefore, it is unlikely that freighter services are required in the foreseeable future.



## 16.2 Regional Transport System of North-East Thailand

Figure 16.1 shows the national highway system (DOH roads) in the Northeastern Region of Thailand. And the major highway system in the Study area is shown in Figure 16.3.

The region has the largest route mileage of DOH roads. The network comprises a central spine (The Friendship Highway – Route 2) from Bangkok to Nakhon Ratchasima, and continues northwards to Khon Kaen, Udon Thani and Nong Khai, plus additional east-west highways (Routes 12, 22, 23 and 24) linking major population centers.

Nakhon Ratchasima is the major city of and gateway to the region. Highway 2 provides the main connection to Bangkok and the Central Region, while Route 304 provides a secondary link southwards through Khao Yai National Park to the Eastern Seaboard.

Most of the northern and eastern borders of the region are formed by the Mekong River, which is also the border with Lao PDR. The Friendship Bridge has been completed at Nong Khai to provide the first fixed crossing to Vientiane, and another crossing (The Second Mekong Bridge) will be constructed at Mukdahan.

Traffic volumes are relatively low throughout the region and traffic growth in recent years has been below the national average. With the exception of Route 2 and immediate environs of the main towns, traffic volumes on almost all routes are less than 4,000 vehicles per day.

The second major corridor in the region runs eastwards from Korat to Ubon Ratchathani. This corridor was developed originally along the rail line and contains four *chanwats*—Buriram, Surin, Si Saket and Ubon— with a combined population in excess of 1 million. There are two parallel roads in the corridor—Route 226 which links the towns and closely follows the railway and Route 24, approximately 40 km to the south, which follows a new alignment away from the urban settlements.

Khon Kaen, together with the nearby *changwats* of Kalasin, Mahasarakham and Roi Et, comprises a significant concentration of population in the center of the region. Routes 12 and 23 provide east-west connections from this area to Ubon Ratchathani and the Northern Region (Phitsanulok).

An extensive network of 2- and 3-digit roads link the main towns throughout the region and minor improvements have been made to selected 4-digit roads to supplement this network. Most economic activity is focused inwards onto the center of the region and

Route 212, which generally follows the right bank of the Mekong River, carries relatively low traffic volumes.

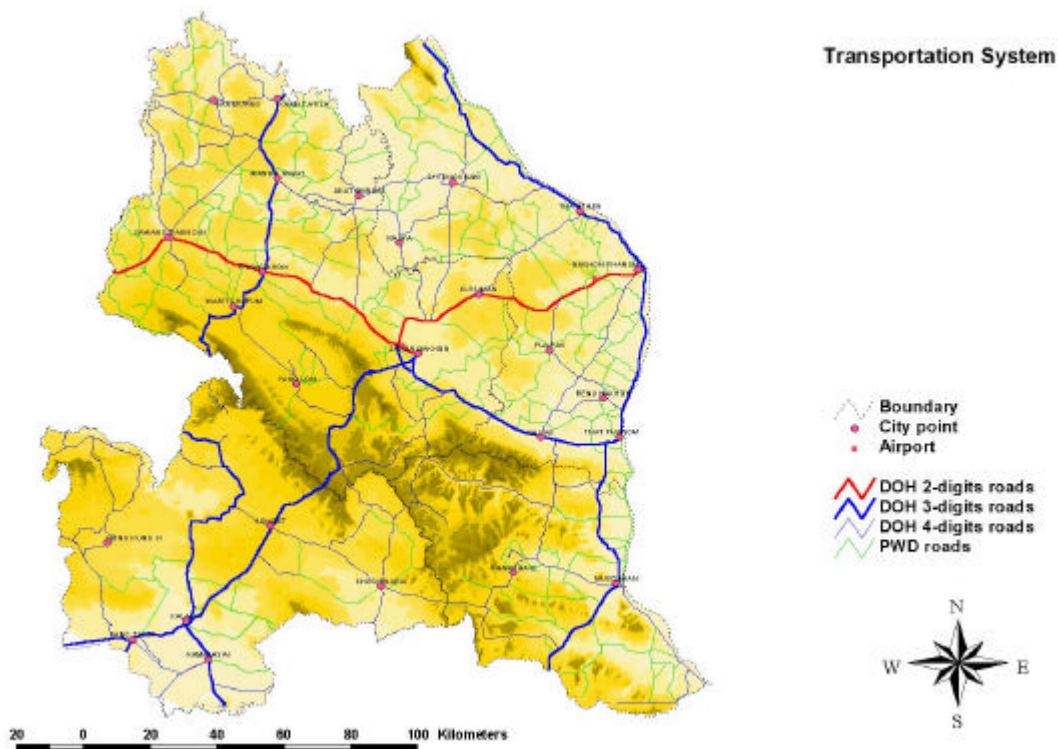
Current traffic levels do not warrant major capacity improvements and with the exception of Highway 2 and localized sections near major towns, two-lane roads are likely to provide adequate capacity for the foreseeable future.

As shown in Table 16.6, the numbers of registered motor vehicles are still very small.

**Table 16.6 Registered Motor Vehicles in 1999**

Type	Kalasin	Mukdahan	Nakhon Phanom	Sakon Nakhon
Passenger Car	3,898	1,405	3,780	5,426
Pick-up	22,145	8,662	14,914	34,246
Motorcycle	120,220	40,098	80,574	187,537
Population	984,046	333,035	714,779	1,094,615

Source: Pocket Thailand in Figures 2000



**Figure 16.3 Land Transport Network in the Study Area**

Table 16.7 Highway Traffic Volume in the NBR

Route	Control	Link_ID	Name	Type	KM.	Car	Light Bus	Heavy Bus	Light Truck	Medium Truck	Heavy Truck	Total	HV.	Bicycle	Motorcycle
22	202	220202	KM.43+073 - BY PASS KHO TAI	C	54+328	1686	37	282	3483	633	508	6629	21.47%	45	2393
22	204	220204	BYPASS KHO TAI	C	57+100	46	34	5	67	4	10	166	11.45%	105	893
22	205	220205	BYPASS KHO TAI -BYPASS BAN NGON	C	60+350	1414	327	276	2996	454	435	5902	19.74%	3	1486
22	207	220207	BYPASS BAN NGON	C	74+500	70	15	24	347	35	47	538	19.70%	247	3466
22	301	220301	JCT.TALAT SAWANGDAENDIN -BYPASS MUANG KHAI	C	80+000	651	70	198	2807	270	247	4243	16.85%	27	3660
22	303	220303	BYPASS MUANG KHAI	C	100+200	55	10	0	207	21	7	300	9.33%	198	1765
22	304	220304	BYPASS MUANG KHAI -KM.106+895 (PHANG KHON)	P	103+800	750	2	212	3133	330	327	4754	18.28%	16	2067
22	401	220401	JCT.PHANG KHON -BYPASS PHANNANIKHOM	C	114+400	1798	62	214	3284	431	257	6046	14.92%	24	2860
22	403	220403	BYPASS PHANNANIKHOM	C	121+440	456	24	122	1412	123	30	2167	12.69%	202	3667
22	404	220404	BYPASS PHANNANIKHOM -JCT.THAT NAWAENG	C	135+000	1919	239	223	2407	422	194	5404	15.53%	190	3020
22	405	220405	JCT.THAT NAWAENG -JCT.SAKONNAKHON 1 DIST.	C	156+900	4441	991	680	7719	568	187	14586	9.84%	41	7339
22	406	220406	JCT.R.NO.223 -THANON RATPHATTHANA	C	161+140	5994	652	578	318	375	134	8051	13.50%	51	1808
22	407	220407	THANON RATPHATTHANA- THANON MAKHALAI	C	161+378	5370	1319	1043	5987	647	179	14545	12.85%	113	5331
22	501	220501	JCT.THAT NAWENG - KM.171+000(NAKHONPHANOM DIST.)	C	156+700	2844	781	767	3474	1084	742	9692	26.75%	498	6619
22	502	220502	KM.171+000 (SAKONNAKHON DIST)- KM.189+190	C	189+500	748	116	185	3310	753	1190	6302	33.77%	266	5704
22	600	220600	JCT.TO THA UTHEN -HUAI HU MENT BRIDGE (WEST)	C	195+500	846	127	178	1728	321	211	3411	20.82%	10	1834
22	700	220700	HUAI HU MENT BRIDGE (WEST) -NAKHON PHANOM	C	234+100	1594	653	438	3061	632	628	7006	24.24%	201	6302
209	202	2090202	KM.38+552 - JCT.YANG TALAT	C	45+500	2368	367	261	2897	589	467	6949	18.95%	275	1570
212	901	2120901	HUAI DAN CHUM BRIDGE -THA U-THEN	C	269+850	978	65	43	481	177	38	1782	14.48%	73	1380
212	1001	2121001	BYPASS THA UTHEN (D) -NAKHON PHANOM	P	18+000	1016	176	109	1391	161	130	2983	13.41%	21	1253
212	1100	2121100	MUNI. OF NAKHON PHANOM -JCT.TO RENU KAKHON	C	261+300	941	424	237	2164	263	138	4167	15.31%	32	4138
212	1201	2121201	JCT.TO RENU KAKHON - BAN TONG(MUKDAHAN DIST.)	C	213+900	936	230	128	3008	390	181	4873	14.34%	126	6781
212	1302	2121302	NAKHON PHANOM - DON SAWAN	C	201+600	1377	183	323	1175	490	228	3776	27.57%	184	1478
212	1400	2121400	MUKDAHAN - JCT.LOENG NOK THA(NEW)	C	163+350	5717	222	158	742	500	413	7752	13.82%	34	7687
213	101	2130101	JCT.R.NO.208 - KALASIN DIST.	C	1+700	4552	309	299	1771	263	141	7335	9.58%	26	8301
213	102	2130102	KM.14+020 - KALASIN	P	33+500	3820	491	437	6736	968	1249	13701	19.37%	23	2715
213	103	2130103	BYPASS KALASIN	C	2+300	1773	198	37	4423	595	508	7534	15.13%	56	6058
213	200	2130200	KALASIN - JCT.TALAT SOMDET	C	47+618	3342	92	294	2762	448	185	7123	13.01%	100	7485
213	302	2130302	KM.84+620 (KALASIN DIST.) -KM.109+470	C	86+000	1323	259	148	251	244	229	2454	25.31%	13	344
213	303	2130303	KM.109+470 - JCT.NAM PHUNG DAM	C	127+100	1874	121	199	264	243	207	2908	22.32%	9	908
213	400	2130400	JCT.NAM PHUNG DAM - MUNI. OF SAKON NAKHON	C	28+950	748	341	315	3034	418	269	5125	19.55%	31	3796
214	100	2140100	JCT. TO TALAT KALASIN -KM.28+000	C	8+764	3746	306	211	1306	565	278	6412	16.44%	84	4171
222	100	2220100	JCT.PHANG KHON - KM.31+153)BRIDGE (WANONIWAT)	C	16+225	291	93	110	1577	141	69	2281	14.03%	68	1451
222	201	2220201	KM.31+153 BRIDGE (WANONIWAT)- KM.57+500	C	42+700	399	85	122	1659	261	235	2761	22.38%	325	1861
223	102	2230102	MUNI. OF SAKON NAKHON -JCT. TO NONG BO	C	23+950	743	465	123	2060	354	169	3914	16.50%	178	3997

Source: Department of Highways, Ministry of Transport and Communication

## 16.3 Commodity Transportation

### 16.3.1 Major Commodity Movement at Transport Centers in the Northeastern Thailand

Nakhon Ratchasima and Khon Kaen are the two major transport centers in the Northeastern region. Statistics of commodity movement at such major centers are available at the Department of Land Transport, MOTC. Tables 16.8 and 16.9 show total commodity volume transported to/from major transport centers: Nakhon Ratchasima, Khon Kaen, and Bangkok by road transport.

Nakhon Ratchasima is a gateway city to the Northeastern region from the Central and other southern areas including Bangkok, the Eastern region and the Southern region. The Central region is the dominant region that generates commodity movement to Nakhon Ratchasima, followed by the Northeastern region. The total volume of commodity attracted to Khon Kaen is slightly larger than that of Nakhon Ratchasima. Similar to the case of Nakhon Ratchasima, the Central region is the dominant commodity-producing region to Khon Kaen.

Bangkok is the biggest commodity generation and attraction center for the Northeastern region, of which situation is common to other regions. While within the region, it can be said that Khon Kaen is a more important transport center than Nakhon Ratchasima.

**Table 16.8 Total Commodity Volume Attracted to Transport Centers**

Unit: ton per year

From	To		
	Nakhon Ratchasima	Khon Kaen	Bangkok
Central Region	2,089,894	2,387,988	14,829,381
Eastern Region	230,494	238,241	24,715,757
Northeastern Region	408,066	1,516,151	3,418,830
Northern Region	8,212	53,917	2,480,295
Western Region	51,918	32,474	18,672,826
Southern Region	12,865	12,863	1,295,725
Bangkok	855,560	854,187	
Total	3,657,009	5,095,821	65,412,814

From	To		
	Nakhon Ratchasima	Khon Kaen	Bangkok
Central Region	57.1%	46.9%	22.7%
Eastern Region	6.3%	4.7%	37.8%
Northeastern Region	11.2%	29.8%	5.2%
Northern Region	0.2%	1.1%	3.8%
Western Region	1.4%	0.6%	28.5%
Southern Region	0.4%	0.3%	2.0%
Bangkok	23.4%	16.8%	0.0%
Total	100.0%	100.0%	100.0%

Note: Data of Nakhon Ratchasima and Khon Kaen are of 1997, while those of Bangkok are of 1996  
Source: Department of Land Transport, MOTC

**Table 16.9 Total Commodity Volume Generated from Transport Centers**

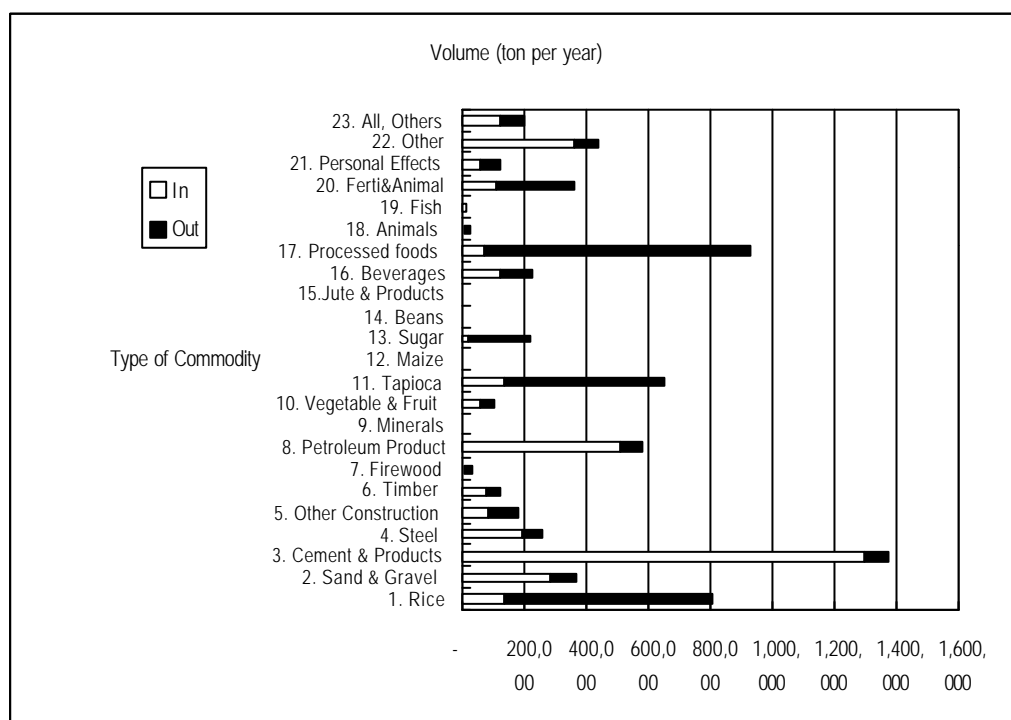
Unit: ton per year

To	From		
	Nakhon Ratchasima	Khon Kaen	Bangkok
Central Region	785,659	377,117	2,549,406
Eastern Region	669,316	168,990	4,806,016
Northeastern Region	786,021	1,550,638	2,412,619
Northern Region	9,670	27,822	3,376,120
Western Region	178,939	112,323	4,307,880
Southern Region	23,358	7,938	2,816,851
Bangkok	865,050	675,883	
<b>Total</b>	<b>3,318,013</b>	<b>2,920,711</b>	<b>20,268,892</b>

To	From		
	Nakhon Ratchasima	Khon Kaen	Bangkok
Central Region	23.7%	12.9%	12.6%
Eastern Region	20.2%	5.8%	23.7%
Northeastern Region	23.7%	53.1%	11.9%
Northern Region	0.3%	1.0%	16.7%
Western Region	5.4%	3.8%	21.3%
Southern Region	0.7%	0.3%	13.9%
Bangkok	26.1%	23.1%	0.0%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

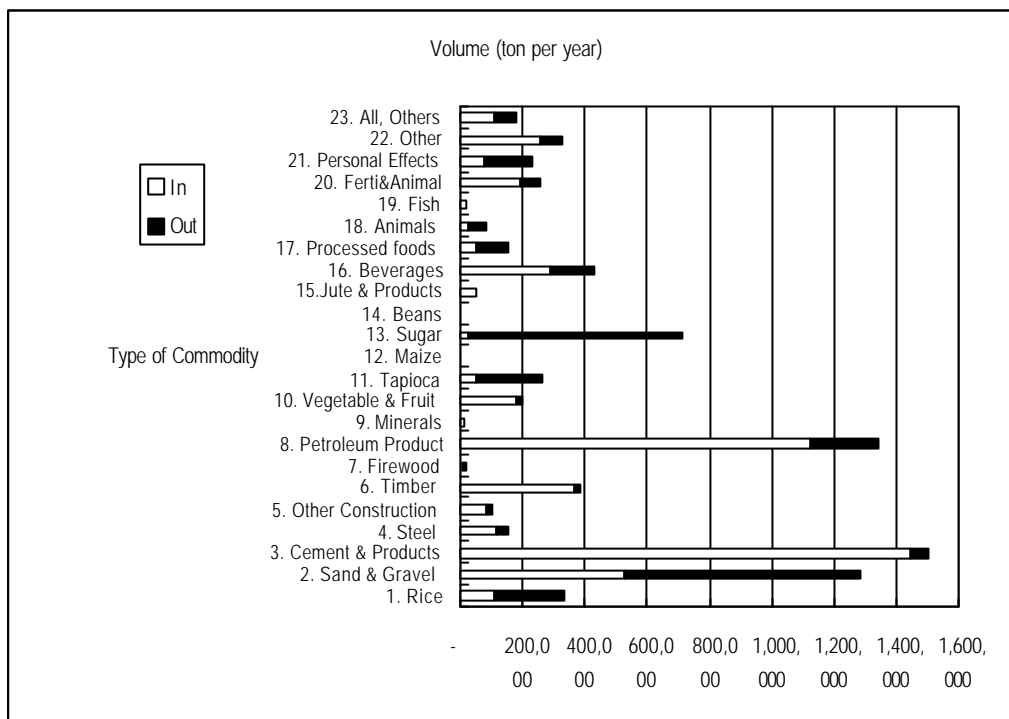
Note: Data of Nakhon Ratchasima and Khon Kaen are of 1997, while those of Bangkok are of 1996  
 Source: Department of Land Transport, MOTC

Figures 16.4 and 16.5 show volumes of commodities by type at the two transport centers. Rice, tapioca, and processed foods are the major commodities generated from Nakhon Ratchasima, while cement/cement products and petroleum products are the major commodities that come from other provinces to Nakhon Ratchasima.



**Figure 16.4 Volumes of Commodity Generation and Attraction at Nakhon Ratchasima**

Sugar and sand & gravel are the major commodities generated from Khon Kaen, while Cement/cement products and petroleum products are the major commodities that come from other provinces to Khon Kaen.



Source: Department of Land Transport, MOTC

Figure 16.5 Volumes of Commodity Generation and Attraction at Khon Kaen

### 16.3.2 Major Commodity Movement at Provincial Level of the Northeastern Thailand

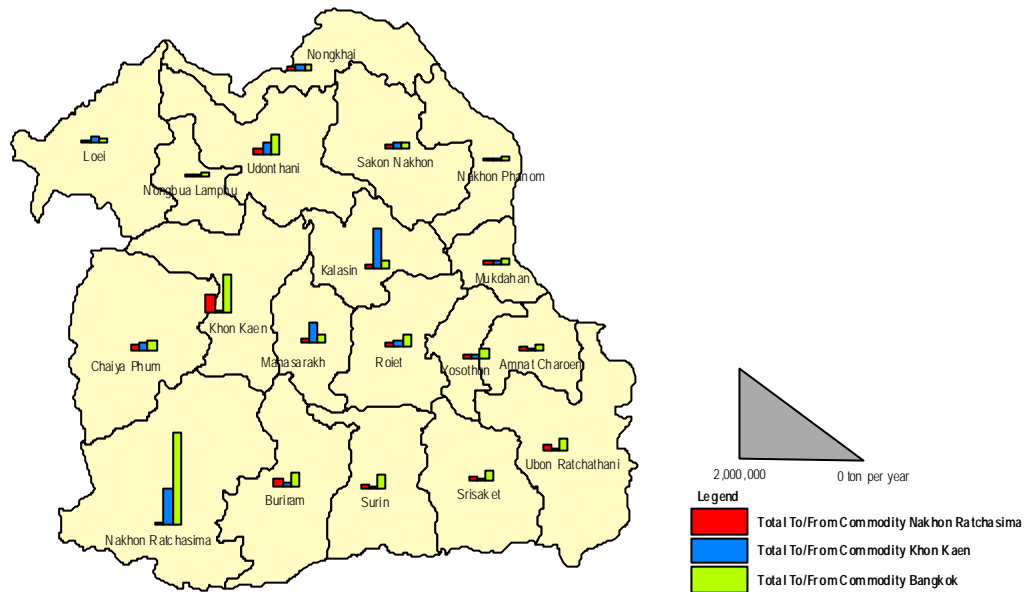
Figure 16.6 shows total amount of annual commodity flow generated from and attracted to Nakhon Ratchasima, Khon Kaen, and Bangkok.

As can be seen, three provinces along the National Highway 2, namely, Udon Thani, Khon Kaen and Nakhon Ratchasima have relatively strong relationship with Bangkok.

Khon Kaen is the major commodity attraction and distribution center for Kalasin; 15% of the inflow commodity at Khon Kaen comes from Kalasin, while 48% of the outflow commodity goes to Kalasin.

Other three provinces in the Study area have relatively small shares in terms of commodity volume between the transport centers, ranging around 1% to 2 % of the total.

In general, provinces along the Mekong River have relatively weak relationship with the two transport centers on the National Highway 2. While there are relatively larger commodity movements between these provinces and Bangkok in comparison to the two transport centers. Kalasin is the only exception.



Source: Department of Land Transport, MOTC

**Figure 16.6 Volume of Commodity To/From Nakhon Ratchasima, Khon Kaen, and Bangkok**

**Table 16.10 Commodity Movement in the Northeastern Region at Major Centers**

Region/ Province	Nakhon Ratchasima in 1997			Khon Kaen in 1997			Bangkok in 1996		
	Total	In	Out	Total	In	Out	Total	In	Out
Chaiyaphum	69,349	24,637	44,712	103,923	61,132	42,791	149,647	110,410	39,237
Yasothon	42,157	16,060	26,097	25,638	23,084	2,554	159,320	94,169	65,151
Ubon Ratchathani	78,018	58,856	19,162	19,432	11,952	7,480	242,262	139,882	102,380
Sri Saket	40,423	25,915	14,508	7,845	3,557	4,288	182,040	131,398	50,642
Buriram	143,262	43,070	100,192	56,934	35,584	21,350	290,171	192,537	97,634
Nakhon Ratchasima	-	-	-	799,244	599,504	199,740	2,141,627	1,131,951	1,009,676
Surin	65,791	13,596	52,195	17,153	11,953	5,200	284,516	200,749	83,767
Amnat Charoen	26,280	13,140	13,140	4,013	1,915	2,098	72,086	58,399	13,687
Nong Bualumpoo	2,920	-	2,920	4,742	2,007	2,735	32,849	5,931	26,918
Nong Khai	27,831	9,855	17,976	119,802	74,639	45,163	127,383	69,988	57,395
Loei	8,759	2,007	6,752	84,304	19,887	64,417	38,870	28,743	10,127
Udon Thani	90,246	25,641	64,605	243,079	66,790	176,289	453,600	213,523	240,077
Nakhon Phanom	12,136	3,011	9,125	19,982	7,665	12,317	56,209	45,624	10,585
Sakhon Nakhon	14,143	2,737	11,406	59,669	14,232	45,437	87,963	60,589	27,374
Khon Kaen	395,477	133,681	261,796	-	-	-	892,508	517,475	375,033
Kalasin	47,631	9,398	38,233	961,945	220,271	741,674	178,117	113,604	64,513
Maha Sarakham	50,917	8,760	42,157	440,267	299,932	140,335	140,066	90,154	49,912
Roi Et	67,342	15,695	51,647	71,352	54,200	17,152	234,326	156,765	77,561
Mukdahan	11,405	2,007	9,398	27,465	7,847	19,618	67,889	56,939	10,950
Total	1,194,087	408,066	786,021	3,066,789	1,516,151	1,550,638	5,831,449	3,418,830	2,412,619

Region/ Province	Nakhon Ratchasima in 1997			Khon Kaen in 1997			Bangkok in 1996		
	Total	In	Out	Total	In	Out	Total	In	Out
Chaiyaphum	5.8%	6.0%	5.7%	3.4%	4.0%	2.8%	2.6%	3.2%	1.6%
Yasothon	3.5%	3.9%	3.3%	0.8%	1.5%	0.2%	2.7%	2.8%	2.7%
Ubon Ratchathani	6.5%	14.4%	2.4%	0.6%	0.8%	0.5%	4.2%	4.1%	4.2%
Sri Saket	3.4%	6.4%	1.8%	0.3%	0.2%	0.3%	3.1%	3.8%	2.1%
Buriram	12.0%	10.6%	12.7%	1.9%	2.3%	1.4%	5.0%	5.6%	4.0%
Nakhon Ratchasima	0.0%	0.0%	0.0%	26.1%	39.5%	12.9%	36.7%	33.1%	41.8%
Surin	5.5%	3.3%	6.6%	0.6%	0.8%	0.3%	4.9%	5.9%	3.5%
Amnat Charoen	2.2%	3.2%	1.7%	0.1%	0.1%	0.1%	1.2%	1.7%	0.6%
Nong Bualumpoo	0.2%	0.0%	0.4%	0.2%	0.1%	0.2%	0.6%	0.2%	1.1%
Nong Khai	2.3%	2.4%	2.3%	3.9%	4.9%	2.9%	2.2%	2.0%	2.4%
Loei	0.7%	0.5%	0.9%	2.7%	1.3%	4.2%	0.7%	0.8%	0.4%
Udon Thani	7.6%	6.3%	8.2%	7.9%	4.4%	11.4%	7.8%	6.2%	10.0%
Nakhon Phanom	1.0%	0.7%	1.2%	0.7%	0.5%	0.8%	1.0%	1.3%	0.4%
Sakhon Nakhon	1.2%	0.7%	1.5%	1.9%	0.9%	2.9%	1.5%	1.8%	1.1%
Khon Kaen	33.1%	32.8%	33.3%	0.0%	0.0%	0.0%	15.3%	15.1%	15.5%
Kalasin	4.0%	2.3%	4.9%	31.4%	14.5%	47.8%	3.1%	3.3%	2.7%
Maha Sarakham	4.3%	2.1%	5.4%	14.4%	19.8%	9.1%	2.4%	2.6%	2.1%
Roi Et	5.6%	3.8%	6.6%	2.3%	3.6%	1.1%	4.0%	4.6%	3.2%
Mukdahan	1.0%	0.5%	1.2%	0.9%	0.5%	1.3%	1.2%	1.7%	0.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Department of Land Transport, MOTC

### 16.3.3 Freight Forwarding Services

The Express Transportation Organization (ETO) of MOTC used to monopolize the freight forwarding services by truck in Thailand. At present, there emerged a number of private forwarding companies.



ETO provides three types of services as follows:

1. Express domestic cargo (EDC)
2. Express International cargo (EIC)
3. Transit cargo

A number of private companies are now providing express-type domestic forwarding services at prices lower than ETO's. Since changes of prices for services by ETO need approval by the Government, therefore, ETO has been losing its competitiveness in this business

Figure 16.7 shows ETO's prices for freight forwarding by distance. An incremental increase of the price by 6-wheel trucks is 7 baht per kilometer, and 9 baht per kilometer by 10-wheel trucks.

The NBR is located in the northeastern border of the northeastern region of Thailand. It is one of the farthest and most remote areas in Thailand from Bangkok. Distances from Bangkok are about 560 km to Kalasin and 790 km to Nakhon Phanom. Transportation costs from major activity centers to NBR are accordingly very high as shown in Figure 16.7 in comparison with other industrial areas such as the Eastern Seaboard (ESB).

Figure 16.8 shows ETO's transport prices for freight forwarding services from Bangkok to Amphoes in the Study area. As clearly seen from the figure, prices along the major highway system are relatively low than those of mountainous areas and of other areas with no DOH highways.

**Table 16.11 Distance from Major Urban Centers**

	From Bangkok	Truck transport cost from Bangkok (10 wheel er , Baht)	From Khon Kaen	Truck transport cost from Bangkok (10 wheeler , Baht)
Nakhon Phanom	790 Km	8,490	315 Km	4,305
Mukdahan	675 Km	7,475	260 Km	3,820
Sakon Nakhon	690 Km	7,610	215 Km	3,425
Kalasin	560 Km	6,460	85 Km	2,360

Source: JICA Study Team

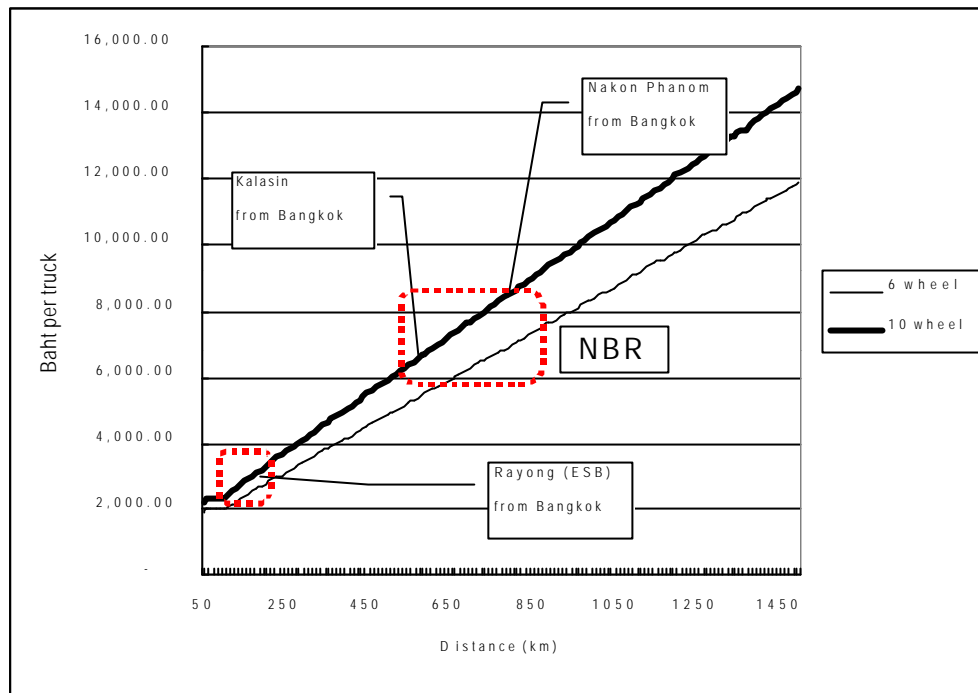


Figure 16.7 Domestic Transport Cost Applied by ETO

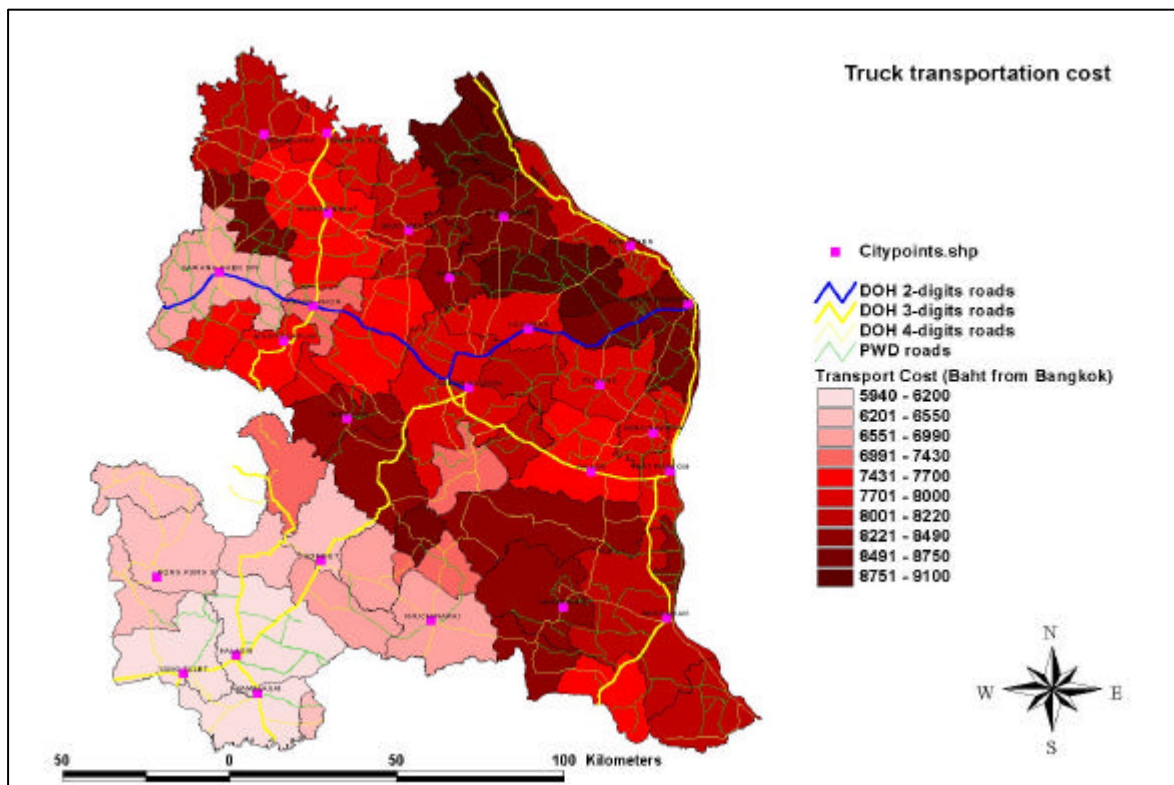


Figure 16.8 Domestic Transport Cost by a 10-wheel Truck

International transit cargoes have been handled by three private companies and by ETO. These three private companies are:

1. TL Enterprise (in Lao)
2. Ubon Sahatham Co.,
3. RCL Co.,

In this market, ETO still has about 30% share according to an official of ETO.

According to the ETO's statistics (refer to Tables 16.12 and 16.13), Tha Na Lang (opposite to Nongkhai in Thailand) is the dominant crossing point in terms of total transit commodity movement, followed by Sawannakhet. Traffic crossing Sawannakhet has been increasing recently due to improvement of road condition in Lao PDR.

**Table 16.12 Transit Cargoes transported by ETO from Lao through Thai to 3rd Countries**

From - To	1999		2000	
	10 wheels truck (unit)	Volume of commodity (ton)	10-wheel truck (unit)	Volume of commodity (ton)
Tha Na Lang- Thai- 3rd countries	252	2,520.00	240	2,620.00
<b>Sawannakhet</b> - Thai- 3rd countries	57	567.93	135	1,350.00
Chong Mek- Thai- 3rd countries	83	2,263.90	356	5,520.63
Chieng Khong- Thai- 3rd countries	0	-	1	20.00
Total	392	5,351.83	732	9,510.63

Source: ETO

Note: The information does not include petroleum products.

Table 16.14 shows volume of commodities exported from Thai to Lao that were transported by ETO. A significant increase is observed at the Sawannakhet crossing.

According to an official of ETO, the number of empty trucks passing the checkpoint is close to 50%, which is not economical in comparison to the so-called developed countries. One of the facts to explain this situation is that a lot of small and individual transport companies provide freight forwarding services, therefore there is neither effective cooperation nor coordination between them. It is suggested that there be a kind of integration of this business by providing facilities such as a truck terminal and communication system between individual truck companies (owners).

**Table 16.13 Transit Cargoes transported by ETO from a 3rd Country through Thai to Lao**

From - To	1999		2000	
	10-wheel truck (unit)	Volume of commodity (ton)	10-wheel truck (unit)	Volume of commodity (ton)
3rd countries- Thai- Tha Na Lang	233	3,995.24	343	6,014.72
3rd countries - Thai- <b>Sawannakhet</b>	340	5,047.65	463	6,179.26
3rd countries- Thai-Chong Mek	39	437.71	31	382.00
3rd countries - Thai-Chieng Khong	2	74.10	13	240.58
3rd countries - Thai- Tha Khek	13	175.82	21	567.75
3rd countries - Thai- Tha Lee	0	-	2	26.00
3rd countries - Thai- Pak Sun	4	50.70	0	-
Total	631	9,781.21	873	13,410.31

Source: ETO

Note: The information does not include petroleum products

**Table 16.14 Exported Commodity Volume by ETO from Thai to Lao**

From - To	1999		2000	
	10-wheel truck (unit)	Volume of commodity (ton)	10-wheel truck (unit)	Volume of commodity (ton)
<i>Export between Lao and Thai</i>				
Thai- Tha Na Lang	359	4,850.00	286	3,771.00
Thai- Sawannakhet	166	2,157.00	255	3,224.00
Thai- Tha Khek	18	234.00	8	104.00
Thai-Chong Mek	63	819.00	88	1,138.00
Thai-Pak Sun	2	26.00		
Thai-Chieng Khong	3	39.00		
<i>Export between Lao and each province in the Northeastern region</i>				
Nongkhai- Tha Na Lang	1,956	24,802.20	1,875	25,433.22
Ubon Ratchathani (Chong Mek)	-	-	10	100.00
Northeastern- Sawannakhet	-	-	57	230.00
Northeastern- Tha Khek	86	1,008.00	74	876.00

## **16.4 Review of Future Transport Development Plans**

### **16.4.1 Highway Development Plan**

Table 16.15 summarizes the second phase, four-lane highway widening projects that were approved for budget allocation within the four provinces. On the other hand, Table 16.16 summarizes the four-lane highway projects proposed as loan projects in fiscal year 2000. The widening of Routes 209 and 210 from Khon Kaen to Yang Talad was proposed under the East-West Corridor development concept.

Table 16.17 summarizes the implementation plan of the major four-lane widening projects in the Study area.

In addition to the mentioned widening projects under the EWC concept, a new alignment has been studied between Kalasin and Kochinarai to provide faster and direct access between Mukdahan and Khon Kaen.

**Table 16.15 The Second Phase 4-Lane Highway Widening Project**  
**Approved for Construction Budget**

ITEM	ROUTE NO.	ALIGNMENT & CONTROL SECTION NAME	DISTANCE (KM)	CONSTRUCTION COST (MILL. BAHT)	OPERATION YEAR	CURRENT CONDITION	REMARK
1	101	DEN CHAI-PHRAE	19.90	557,060	1996-1999	UNDER CONSTRUCTION	NETWORK-NAKHON SAWAN-PHITSANULOK-PHRAE-NGAO
2	101	RONG KWANG-PHRAE	17.000	510,000	1999-2001	BIDDING	NETWORK-NAKHON SAWAN-PHITSANULOK-PHRAE-NGAO
3	117	NAKHON SAWAN-PHITSANULOK PART NARASUAN U. - PHITSANULOK (INCLUDE JUNCTION TO WAT JURUMANG)	22.291	820,550	1996-1999	UNDER CONSTRUCTION	NETWORK-NAKHON SAWAN-PHITSANULOK-PHRAE-NGAO
		JCT. KAMPHAENGPHET - NARASUAN UNIVERSITY	25.30	777,492	1996-2000	UNDER CONSTRUCTION	NETWORK-NAKHON SAWAN-PHITSANULOK-PHRAE-NGAO
		PART NAKHON SAWAN - PHO THALE	48.80	557,480	1999-2001	BIDDING	NETWORK-NAKHON SAWAN-PHITSANULOK-PHRAE-NGAO
4	12	JCT. RONG PHO-WANG THONG (MAHA SARAKHAM HWY. DIST.)	12.664	250,000	1996-1999	UNDER CONSTRUCTION	NETWORK-MAE SOT-MUNDAHAN
5	12	TAK-SUKHOTHAJ PART SUKHOTHAJ BYPASS	26.990	745,295	1996-2001	UNDER CONSTRUCTION	NETWORK-MAE SOT-MUNDAHAN
6	12	KHON KAEN-CHUM PHAE	5.830	185,910	-	CONSTRUCTION COMPLETED	NETWORK-MAE SOT-MUNDAHAN
7	12	PHITSANULOK-WANG THONG PART CROSS-RAIL BRIDGE - JCT. RONG PHO	6.000	807,000	1999-2001	FOR APPROVAL	NETWORK-MAE SOT-MUNDAHAN
8	209	KHON KAEN-CHANG YUW	6.875	233,460	1996-1998	CONSTRUCTION COMPLETED	NETWORK-MAE SOT-MUNDAHAN
9	21	SI THEP-BUNG SAM PHAN	36.275	552,455	1997-1999	UNDER CONSTRUCTION	NETWORK-SARABURI-PHETCHABUN-LOMSOK-LOB
10	21	BUNG SAM PHAN-KONG PHAL-NA CHALEANG	40.800	770,238	1996-1998	UNDER CONSTRUCTION	NETWORK-SARABURI-PHETCHABUN-LOMSOK-LOB
11	21	PHUTKA-PHATHANANA NIKHOM-CHAI BADAJ NO. 1	26.20	322,495	1999-2001	FOR CONTRACT SIGNING	NETWORK-SARABURI-PHETCHABUN-LOMSOK-LOB
		NO. 2	32.074	710,000	1996-2001	UNDER CONSTRUCTION	NETWORK-SARABURI-PHETCHABUN-LOMSOK-LOB
12	33	HINWONG-BANNA	25.880	500,730	1996-1999	CONSTRUCTION COMPLETED	NETWORK-BAN HINWONG - CAMBODIA BOUNDARY
13	33	BAN NA-NAKHON WAYOK	14.000	239,000	1999-2001	FOR APPROVAL	NETWORK- BAN HINWONG
14	321	NAKHON PATHOM-SUPHAN BURI NAKHON PATHOM-KAMPANGSANG	30.280	1,659,411	1997-2000	UNDER CONSTRUCTION	CAMBODIA BOUNDARY NETWORK-NAKHON PATHOM-SUPHAN BURI-SARABURI
		KAMPANGSANG-U-YA NO. 1-2	64.377	2,779,201	1996-1999	UNDER CONSTRUCTION	NETWORK-NAKHON PATHOM-SUPHAN BURI-SARABURI
		JUNCTION 3542 - BAN SA YAI 50M	4.993	223,893	1996-1998	CONSTRUCTION COMPLETED	NETWORK-NAKHON PATHOM-SUPHAN BURI-SARABURI
		IMPROVE ROUTE AT U-THONG	5.250	122,318	1996-1998	CONSTRUCTION COMPLETED	NETWORK-NAKHON PATHOM-SUPHAN BURI-SARABURI
15	23	KHLANG NAI - TO UBON RATCHATHANI MUNICIPAL TOWN	5.441	173,375	1996-1997	CONSTRUCTION COMPLETED	NETWORK-NAKHON SAWAN-UBON RATCHATHANI-CHONG MEK
16	217	IMPROVE ROUTE AT CHONG MEK	2.099	45,189	-	CONSTRUCTION COMPLETED	NETWORK-NAKHON SAWAN-UBON RATCHATHANI-CHONG MEK
17	212	UBON RATCHATHANI-MUKDAHAN (PART UBON RATCHATHANI BYPASS) - KM20+000	20.000	363,000	-	UNDER CONSTRUCTION	NETWORK-SATTAPHI-MUNDAHAN
18	403	THUNG SONG -JCT. KRABI HUAN YOD	20.625	471,967	1996-2000	UNDER CONSTRUCTION	NETWORK-PHUKIET-KRABI-TRANG-PHATHALUNG
19	22	BAN TRAO MA WANG - SAKON NAKHON	7.812	306,967	1996-1998	UNDER CONSTRUCTION	NETWORK-LOEI - UDONTHAN-SAKON NAKHON - NAKHON PHANOM
20	22	SAKON NAKHON - NAKHON PHANOM PART BYPASS KM. 240	15.0	252,538	1996-2000	UNDER CONSTRUCTION	NETWORK-LOEI - UDONTHAN-SAKON NAKHON - NAKHON PHANOM
21	22	UDON THANI - SAKON NAKHON NO.1	8.000	89,000	1999-2001	FOR APPROVAL	NETWORK-LOEI - UDONTHAN-SAKON NAKHON - NAKHON PHANOM
22	210	UDON THANI - MONG BUA LAM PHU UDON THANI - JUNCTION NO. 2012	15.132	316,066	1996-2001	UNDER CONSTRUCTION	NETWORK-LOEI - UDONTHAN-SAKON NAKHON - NAKHON PHANOM
23	4	KOKLAI-PHANGNGA	35.490	1,139,40	1997-2000	UNDER CONSTRUCTION	NETWORK- OTHER
24	401	SURAT THANI - KANDHNAOT	16.626	510,681	1996-1998	CONSTRUCTION COMPLETED	OTHER NETWORK
25	201	MONG BUA KOK - CHAYAHUM	23.705	467,000	1997-2000	UNDER CONSTRUCTION	OTHER NETWORK

NOTE: CS. = CONTROL SECTION  
AC. = ASPHALTIC CONCRETE  
RC. = REINFORCEMENT CONCRETE  
SST. = SINGLE SURFACE TREATMENT  
DST. = DOUBLE SURFACE TREATMENT  
JCT. = JUNCTION

Source: Department of Highways, Ministry of Transport and Communication

**Table 16.16 The Second Phase 4-Lane Highway Widening Project Proposed for Loan  
Project in Fiscal Year 2000**

ITEM	ROUTE NO.	ALIGNMENT & CONTROL SECTION NAME	DISTANCE (KM.)	CONSTRUCTION COST (MILL. BAHT)	OPERATION YEAR	REMARK
1	11	PHITSANULOK - UTTARADIT	97	2,600	2000-2002	NETWORK NAKHON SAWAN PHITSANULOK-PHRAE-NGAO
2	117	NAKHON SAWAN-PHITSANULOK JCT. PHO THALE - JCT. KAMPHAENG PHET	42	900	2000-2002	NETWORK NAKHON SAWAN- PHITSANULOK-PHRAE-NGAO
3	209,210	KHON KAEN-YANG TALAD (INCLUDE KHON KAEN BYPASS)	65	1,600	2000-2002	NETWORK MAE SOT - MUKDAHAN
4	12	KHON KAEN - NONG BUA	36	1,050	2000-2002	NETWORK MAE SOT - MUKDAHAN
5	21	CHAI BADAN - SRI THEP	49	750	2000-2002	NETWORK SARABURI - PHETCHABUN- LOM SAK - LOEI
6	324	KANCHANABURI - PHRANOM THUAN	20	300	2000-2002	NETWORK NAKHON PATHOM - SUPHANBURI - SARABURI
7	23	BAN PHAI - BORABU	44	1,220	2000-2002	NETWORK NAKHON SAWAN- UBON - CHONG MEK
8	23	KHUANG NAI - UBON RATCHATHANI	32	700	2000-2002	NETWORK NAKHON SAWAN UBON - CHONG MEK
9	212	MUKDAHAN - NIKOM KAM SOI	35	750	2000-2002	NETWORK SATTAHIP - MUKDAHAN
10	212	AMNAT CHACHAROEN - LOENG NOK THA	10	150	2000-2002	NETWORK SATTAHIP - MUKDAHAN
11	24	IMPROVE ROUTE AT NANG RONG	11	300	2000-2002	NETWORK SATTAHIP - MUKDAHAN
12	304	PHRANOM SARAKAM - KABIN BURI	35	600	2000-2002	NETWORK SATTAHIP - MUKDAHAN
13	401	JCT. DON SAK - SICHON	32	1,050	2000-2002	NETWORK SURATHANI - HAT YAI
14	4	BAN NA YONG - BAN KRA CHONG	12	180	2000-2002	NETWORK PHUKET - KRABI- TRANG - PHATTHALUNG
15	4	PHATTHALUNG - BAN NA WONG	25	400	2000-2002	NETWORK PHUKET - KRABI- TRANG - PHATTHALUNG
16	4	KRABI - GO TO LAM THAP NO.1	12	200	2000-2002	NETWORK PHUKET - KRABI- TRANG - PHATTHALUNG
17	4	TRANG - HUAI YOT	30	600	2000-2002	NETWORK PHUKET - KRABI- TRANG - PHATTHALUNG
18	403	NAKHON SI THAMMARAT - RON PHIBON- ROUTE NO. 41	32	900	2000-2002	NETWORK PHUKET - KRABI- TRANG - PHATTHALUNG
19	4	JCT. LA-UN - RANONG	27	400	2000-2002	OTHER NETWORK
20	201	NONG BUA KHOK - CHAIYAPHOM	32	750	2000-2002	OTHER NETWORK

Source: Department of Highways, Ministry of Transport and Communication

**Table 16.17 The Second Phase 4-Lane Highway Widening Project**  
**Construction Planning in 1999 – 2008**

ROUTE NETWORK(2): MAE SOT - TAK - SOKHOTHAI - PHISANULOK - LOM SAK - CHUM PHAE - KHON KAEN - KALASIN - MUKDAHAN

HIGHWAYS ROUTE NO.	NETWORK / CONTROL SECTION	LENGTH (KM)	CONSTRUCTION COST (MILLION BAHT)	YEARS								REMARK		
				2000	2001	2002	2003	2004	2005	2006	2007		2008	
209, 213 709	<b>KHON KAEN - KALASIN</b> KHON KAEN - CHIENG YUIN - YANG TAI AT	65	1,585		317	634	634							
213, 2042 7047	<b>KALASIN - SOMDET - MUKDAHAN</b> KAMCHA-I - MUKDAHAN	35	813		163	325	325							
213, 2042	<b>KALASIN - SOMDET - MUKDAHAN</b> KALASIN (NEW ALIGNMENT) - KAMCHA-I	102	7,818					564	1,127	1,127				
<b>TOTAL</b>		<b>202</b>	<b>5,216</b>	<b>480</b>	<b>959</b>	<b>959</b>	<b>564</b>	<b>1,127</b>	<b>1,127</b>					

ROUTE NETWORK(7): SATTAPHI - PHANOM SARAKHAM - PAK THONG CHAI - CHOK CHAI - UBON RATCHATHANI - MUKDAHAN

HIGHWAYS ROUTE NO.	NETWORK / CONTROL SECTION	LENGTH (KM)	CONSTRUCTION COST (MILLION BAHT)	YEARS								REMARK		
				2000	2001	2002	2003	2004	2005	2006	2007		2008	
212	<b>UBON RATCHATHANI - MUKDAHAN</b> KM.20 - LU AMNAT	38	912				182	365	365					
	AMNAT CHAROEN - LOENG NOK THA	35	803				161	321	321					
212	<b>UBON RATCHATHANI - MUKDAHAN</b> LU AMNAT - AMNAT CHAROEN	42	1,085							217	434	434		
212	<b>UBON RATCHATHANI - MUKDAHAN</b> NIKHOM KHAM SOI - MUKDAHAN	35	750		150	300	300							
212	<b>UBON RATCHATHANI - MUKDAHAN</b> LOENG NOK THA - NIKHOM KHAM SOI	21	453			91	181	181						
<b>TOTAL</b>		<b>171</b>	<b>4,003</b>	<b>150</b>	<b>391</b>	<b>824</b>	<b>867</b>	<b>686</b>	<b>217</b>	<b>434</b>	<b>434</b>			

ROUTE NETWORK(10): UDON THANI - SAKON NAKHON - NAKHON PHANOM

HIGHWAYS ROUTE NO.	NETWORK / CONTROL SECTION	LENGTH (KM)	CONSTRUCTION COST (MILLION BAHT)	YEARS								REMARK		
				2000	2001	2002	2003	2004	2005	2006	2007		2008	
22	<b>UDON THANI - SAKON NAKHON - NAKHON PHANOM</b> UDON THANI - JCT. R. NO. 2312	31	764				152	306	306					
210	<b>WANG SA PUNG - NONG BUA LAM PHU - UDON THANI</b> NONG BUA LAM PHU - UDON THANI	49	1,654				330	662	662					
22	<b>UDON THANI - SAKON NAKHON - NAKHON PHANOM</b> JCT. R. NO. 2312 - SAWANG DAEN DIN	55	1,622							324	649	649		
	SAWANG DAEN DIN - PHANG KHON	26	788							158	315	315		
	PHANG KHON - SAKON NAKHON	45	1,156							232	462	462		
	SAKON NAKHON - JCT. R. NO. 2132	16	448							90	179	179		
<b>TOTAL</b>		<b>222</b>	<b>6,432</b>	<b>152</b>	<b>636</b>	<b>968</b>	<b>986</b>	<b>1,129</b>	<b>1,605</b>	<b>956</b>				

Source: Department of Highways, Ministry of Transport and Communication



## 16.4.2 Railway Development Plan

Progress of those SRT's projects are summarized as follows:

### (1) Track Rehabilitation Projects

Life of the current tracks has gradually expired, resulting in frequent cracks and breakage that has seriously disturbed train operations. In 1994, SRT started the three-phase track rehabilitation project in order to secure traffic capacity as well as to efficiently maintain the rail tracks by reinforcing the 791 km northern and southern lines with 100 lb/yard rails and concrete pre-cast sleepers with three phases (Table 16.18).

**Table 16.18 Track Rehabilitation Projects**

	Project Area		Length (Km)	Progress
Phase 1	Northern line	Lop Buri – Chumsaeng	148	Completed
	Southern line	Hua Hin – Ban Krut	141	Completed
Phase 2	Northern line	Chumsaeng – Phitsanulok	108	Progressing
	Southern line	Chiya – Thung Song	150	Progressing
Phase 3	Southern line	Ban Krut - Chiya	244	Progressing

As the second phase, approximately 840 km of the track rehabilitation project has been justified in the 8<sup>th</sup> Plan by the NESDB; however, the project has been delay due to the economic crisis.

### (2) Track Doubling Projects

SRT started the track-doubling project in order to improve transportation capability by increasing train frequency as well as train speed. In 1993, 234 km lines of track doubling project around Bangkok was started as the first phase of the track-doubling program approved by the Cabinet in principle.

**Table 16.19 Track Doubling Projects**

Project Area		Length (Km)	Progress
Southern line	Bang Sue – Taling Chan	14	Completed
Northern line	Rangsit – Ban Phachi	61	Completed
Northern line	Bang Phachi – Lop Buri	43	Under construction
Northeastern line	Bang Phachi – Map Kabao	44	Under construction
Southern line	Taling Chan – Nakhon Pathom	42	Under construction
Eastern line	Hua Mak - Chachoengsao	30	Under construction

As the second phase, the following 618 km of the track doubling project has been justified in the 8<sup>th</sup> Plan by the NESDB, and 177 km of track doubling project related to the ESB development is also planned. However, these projects have not yet commenced due to the economic crisis.

**Table 16.20 Track Doubling Projects under 8<sup>th</sup> Plan**

	Project Area	Length (Km)	Note
Northern line	Nakhon Sawan – Sila At	104	Long loops
Southern line	Prachuab Kirikhan – Surat Thani	70	Long loops
Northern line	Lop Buri – Nakhon Sawan	113	Extension of phase 1
Northern line	Map Kabao – Nakhon Ratchasima	130	Extension of phase 1
Southern line	Nakhon Pathom – Hua Hin	165	Extension of phase 1
Eastern line	Chachoengsao – Klong Sip Kao	177	ESB related project

### (3) Expansion of Rail Network (new railway line) Projects

Recently the Thai government has adopted a policy of extending the railway system to densely populated areas, such as Chiang Rai province in the north, Phuket island in the south, Rayong province in the Eastern Seaboard Area, and Nakhon Phanom or Mukdahan in the northeast. In July 1997, the Cabinet approved in principle the extension of the 4 new railway lines.

Following the policy, SRT has planned to construct 4 new railway lines to cover highly populated remote areas.

**Table 16.21 New Railway Project**

	Project Area	Length (Km)	Note
Northern line	Den Chai – Chiang Rai	246	D/D completed
Northeastern line	Bua Yai – Roi Et – Mukdahan – Nakhon Phanom	368	F/S completed
Eastern line	Map Ta Phut – Rayong	24	D/D completed
Southern line	Maluan/ Thung Pho - Phuket	165	D/D completed

An extension railway network to the northeastern region: Bua Yai – Roi Et – Mukdahan – Nakhon Phanom route has been planned since 1969. According to the preliminary study by Engineering Consulting Firms Association (ECFA), Japan in 1989, this line has potential. Following this recommendation, a feasibility study had been made in 1994 by a Canadian consultant. Economic appraisal of this study suggests that all of the three alternative routes, namely, Corridor 1 Udon Thani-Sakon Nakhon-Nakhon Phanom, Corridor 2 Bua Yai-Roi Et-Mukdahan-Nakhon Phanom, and Corridor 3 Chatturat-Chaiyaphum-Ban Phai-Roi Yet-Mukdahan-Nakhon Phanom, have a negative net present value (NPV) at a 10% discount rate. However, the consultant recommended that SRT proceed with a preliminary design and feasibility analysis for the line from Bua Yai to Nakhon Phanom.

Due to severe financial situation, SRT principally seeks private sector participation on a Build-Operate-Transfer (BOT) basis for implementing above new line projects. No progress has been seen on these projects yet.

#### **(4) Signaling and Telecommunication Improvement Projects**

SRT has commenced two projects for signaling and telecommunication improvement projects, namely, upgrading of the level crossing protection for the eastern lines project, and installation of signaling and telecommunication system for a track project.

#### **(5) Service Improvement Projects**

For improving client service, SRT has encouraged computerization through on-line computerized ticketing and reservation system and client server system.

### **16.4.3 Airport Development Plan**

According to the Study on Airport Development Master Plan in the Kingdom of Thailand, Department of Aviation (DOA), Ministry of Transport and Communication (MOTC), which has been recently finalized through the technical assistance of Japan International Cooperation Agency (JICA), a new airport is proposed at Mukdahan. The site is located approximately 16 km through the well-paved Route 212 from the CBD of Mukdahan. The short-term development plan of the new airport includes the following:

- earthworks of approximately 236,650 cu.m. cut and 633,650 cu.m. fill,
- construction of a 1,840 m x 45 m runway with a 300-meter-wide runway strip,
- construction of a new passenger terminal, apron, cargo building, control tower, fire station, fuel farm, car park, etc. on the south site of the runway, and
- installation of air navigation systems including VOR/DME, ILS LLZ, ILS GP, and ALS.

Among the investigated 29 regional airports, the new Mukdahan airport ranked 7<sup>th</sup> in terms of EIRR. However, the estimated EIRR of the new Mukdahan airport was lower than the general standard used by the World Bank, which is 12%. Therefore, the study recommended that the economic viability of the airport needed further investigation due to its marginal feasibility and risk sensitivity.

**Table 16.22 Annual Domestic Air Passenger Demand**

	1997	2002	2007	2012	2017
Nakhon Phanom	43,472	57,792	78,179	168,667	281,081
Sakon Nakhon	47,938	60,899	84,259	179,488	298,051
Mukdahan			112,800	202,535	318,600

Source: The Study on Airport Development Master Plan in the Kingdom of Thailand, Ministry of Transport and Communications

Since the new Mukdahan airport development is still ranked relatively high, it is worthwhile to seek a way to improve its economic and financial viability. One such idea is sharing airport functions with the Savannakhet airport in Lao PRD. If this airport were used jointly by Mukdahan (Thai) and Savannakhet (Lao PDR), the Thai side could save huge investment costs for construction of the new airport and related facilities. For this joint operation, there is an idea for the city of Mukdahan to have a City Airport Terminal (M-CAT) with effective shuttle services between the Savannakhet airport and the M-CAT by fully utilizing the planned Second Mekong Bridge. Institutional arrangement between both countries is required to make this idea operational.

**Table 16.23 Cost Estimates of Mukdahan Airport in 2002**

	Cost (Baht)
Earthworks	51,200,000
Runway	66,380,340
Taxiway	43,455,238
Apron	8,621,925
Drainage System	27,600,000
Passenger Air Terminal	63,270,000
Fire Station	4,750,000
Maintenance Building	3,800,000
Car Park and Road	21,331,250
Firefighting Vehicle	14,800,000
Airfield Lighting	12,704,600
Airport Utilities	30,258,650
Preliminary and General	34,817,200
Miscellaneous	153,195,681
Consultants' Fee	53,618,488
Grand Total	589,803,373

Source: The Study on Airport Development Master Plan in the Kingdom of Thailand, Ministry of Transport and Communications

**Table 16.24 Priority of Airport Development by EIRR**

Rank	Airport	EIRR
1	Mae Hong Son	22.0%
2	Phrae	20.3%
3	Lampang	17.5%
4	Nan	16.5%
5	Betong	16.3%
6	Udon Thani	14.9%
7	<b>Mukdahan</b>	<b>8.4%</b>
8	Pattani	4.7%
9	Loei	4.2%
10	Roi Et	0.9%
	All other airports	Zero or negative

Source: The Study on Airport Development Master Plan in the Kingdom of Thailand

## 16.5 Issues in Developing Land Transportation System

In this section, several issues found from the current situation as well as the future development plans in the Study area. It is not necessary that all of the planning issues are derived from a quantitative analysis.

### 16.5.1 Land Transport

#### (1) Arterial Road System

##### 1) Identification of Heavily-Loaded Road System and Truck Terminal Development

In general, the highway system in the Northeastern Region has been well developed. Besides, many four-lane widening projects and new highway development are scheduled. Most sections of the highways are AC paved; however, due to some vehicles carrying heavy load some road segments of 3-digit roads are easily deteriorated. In order to prevent the further deterioration of lower-class roads, the routes should be designated along 2-, 3 and some 4-digit DOH roads and development truck terminals will be necessary.

##### 2) New 2-digits Class Roads Connecting Major Urban Centers

In the northern area of the Phu Pham, the highway No.2 connects major urban centers such as Udon Thani, Sakon Nakhon and Nakhon Pathom. However, highway system in the southern area is relatively weak. In order to develop another effective east-west

axis in the region, it is recommended to develop a 2-digit class road connecting Mukdahan, Kalasin and Khon Kaen. Actually, DOH has been conducting widening projects under the 8<sup>th</sup> National Plan, and carried out a feasibility study for the new alignment connecting Kalasin and Khochinara.

## **(2) Public Transport**

### **1) Introduction of ordinary shuttle bus services between Mukdahan and Savannakhet using the Second Mekong Bridge**

Based on the Trilateral Agreement signed by Thailand, Lao PDR, and Vietnam on 26 November 1999, shuttle bus services between the cities of Mukdahan and Savannakhet should be discussed in the National Transport Facilitation Committees, as stated in Article 28.

### **2) Establishment of Thai-Lao Joint Bus Operation Company**

For the provision of the above-mentioned shuttle bus services, establishment of a joint operation company (by both countries or cities) is recommended to mutually enjoy the benefit generated from the business. The shuttle bus services will provide comfortable passenger transport services between the city centers of the two cities: Mukdahan and Savannakhet. Immigration function should be included with the bus terminal function to be a "City Air Terminal". Articles 5 and 6 of the agreement are relevant to materialize this idea.

## **(3) International Freight Transport**

### **1) Inland Container Depot (ICD) Development at Mukdahan**

In order to provide one-window inspection and one-stop inspection services, it is worthwhile to consider the development of ICD at Mukdahan. If Savannakhet in Lao PDR has an industrial estate aimed at exporting goods to Thailand, this idea becomes more realistic, since the forwarding system in Thailand is well developed in comparison with those in Lao PDR.

## **(4) Intra-Regional Freight Transport**

### **1) Establishment of Forwarding Cooperation for Agricultural Products**

Following the structural change of agricultural products, from monoculture to mixed farming, traffic demand between urban centers and farmland will increase in order to transport daily consumables such as vegetables, eggs, and flowers. In order to transport these products effectively and economically, it is recommended that the farmers in the region share vehicles to transport their product.

### (5) New Gateway Development: The Third Mekong Bridge at Nakhon Phanom

The Second Mekong Bridge will provide better access to Da Nang in Vietnam as well as to Savannakhet for the Thai side. Likewise, Nakhon Phanom has good potential for development of a third Mekong Bridge. As discussed in the earlier section of this report, traffic demand for crossing this point has been increasing. And it is also mentioned that this crossing will provide another opportunity to the region by connecting the central area of Lao PDR and the northern part of Vietnam.



**Figure 16.9** Trucks of Lao PDR  
at the Nakhon Phanom Pier



**A truck from the ESB to Lao PDR**  
at Nakhon Phanom

### 16.5.2 Aviation

As mentioned earlier, it is worthwhile to consider the opportunity of sharing airport functions with Savannakhet Airport. In order to proceed with this idea, the following actions will be necessary:

- Establishment of Thai-Lao Friendship Committee for joint use of the Savannakhet Airport; and
- Establishment of Bilateral Service Agreement for sharing the Savannakhet Airport.

Consequently, the following projects should be discussed:

- Development of Mukdahan City Airport Terminal;
- Airport Shuttle Bus (or LRT) Services using the Second Mekong Bridge; and
- Express-bus services to/from the Mukdahan City Airport Terminal.

## 16.6 Proposed Transportation System Development

### 16.6.1 Concept of Urban Center Development

Under Strategy 5: Urban Center and Infrastructure Development, it is proposed to develop urban centers by infrastructure-led urban development with the following targets and link urban centers together to form one economic zone.

**Table 16.25 Planned Urban Population**

(thousand person)

	1998	2020
Nakhon Phanom	32	150
Sakon Nakhon	52	200
Mukdahan	28	150
Kalasin	38	150
Other municipalities	344	457
Urban Population of NBR	494	1,107

Three provinces located north of Mt. Phu Phan will have about 500 thousand urban population, forming an “NBR Urban Alliance.” Mukdahan and Savannakhet will form a “Pair City.” Nakhon Phanom and Ta Khek will form another Pair City. Mukdahan and Kalasin are on the East West corridor. By these urban center networks, urban function in the NBR as a whole should be intentionally strengthened adequately to support industry and the agricultural sector in the NBR. Overall urban structure of the NBR is shown in Figure 16.10.



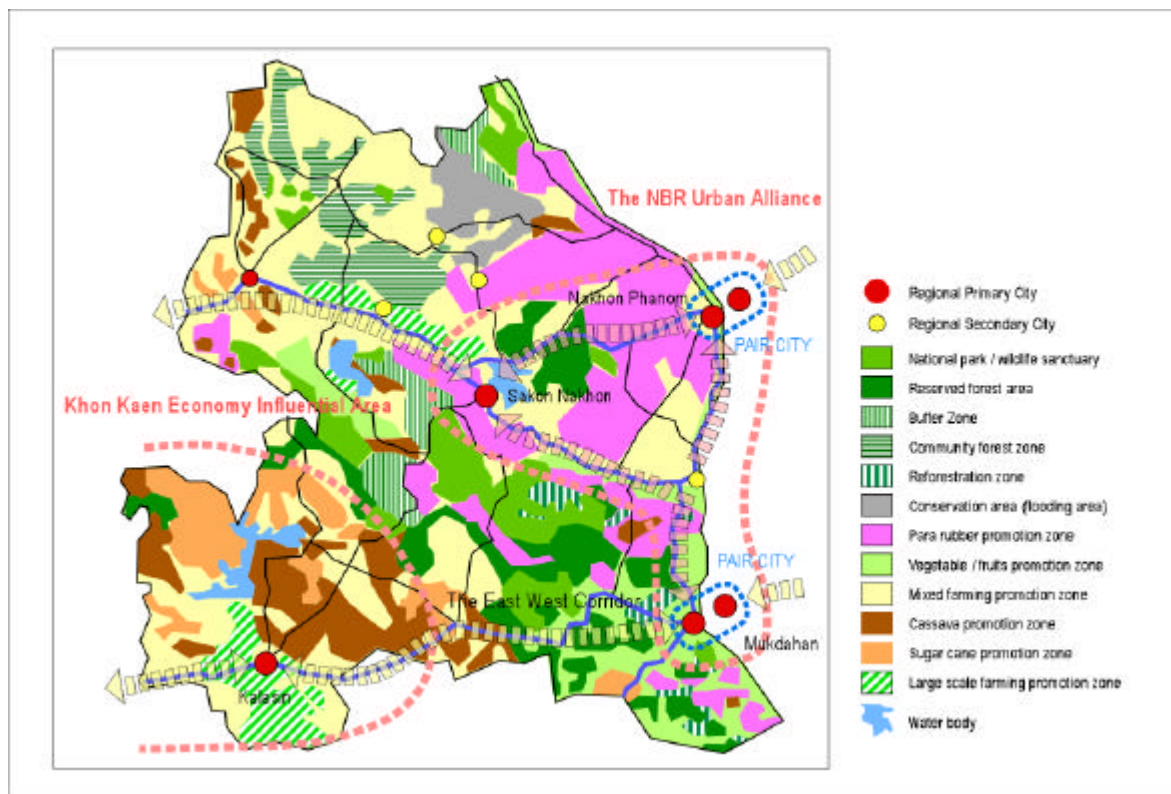


Figure 16.10 Urban Development Concept

### 1) Nakhon Phanom

Nakhon Phanom will be an industrial development center in the NBR by fully utilizing its advantage of agricultural products and proximity to the Indochina market including Vietnam and Lao PDR. Under the Pair City Program, Nakhon Phanom will jointly promote tourism and border trade with Tha Khek, Laos.

### 2) Sakon Nakhon

Sakon Nakhon will be a research and human resource development center in the NBR. Based on the research and higher educational functions, Sakon Nakhon will be the center of cultural and human interchange between Thailand and Laos in short/medium term, and among GMS countries in the long term.

### 3) Mukdahan

Mukdahan is the gateway city to Laos and Vietnam along the Indochina East-West Corridor. Based on the development potential provided by the 2<sup>nd</sup> Mekong International Bridge, Mukdahan will be a goods distribution and related business center of the NBR.

#### 4) Kalasin

Kalasin will be a base of supporting industries and agro-processing of the NBR by utilizing its advantage of proximity to Khon Kaen. Kalasin is also to be developed as a tourism destination by utilizing villages and its fossil dinosaur attraction.

#### 5) NBR Urban Alliance and Pair City Development

In summary, each city has specific characteristics and supports each other in the NBR to form an effective intra urban linkage (NBR Urban Alliance Program) as follows:

Nakhon Phanom: Industrial Activity Center

Sakon Nakhon: Research & Human Resources Development Center

Mukdahan: Goods Distribution business Center

Kalasin: Agro-processing Center

Under the ‘NBR Urban Alliance System,’ Sakon Nakhon, Mukdahan and Nakhon Phanom should be closely linked with each other by an effective transportation system.

The Second Mekong International Bridge will provide direct access between Mukdahan and Savannakhet. Nakhon Phanom and Tha Khek have been a historically important pair city in terms of commodity flow. To encourage further cooperation and development, a ‘Pair City Development’ concept is proposed to maximize mutual benefits through joint use of their infrastructure. In the transportation sector, such idea includes:

- Joint Savannakhet Airport Utilization; and
- Secondary (minor) river crossing points development.

### 16.6.2 Supporting Transport Infrastructure Development

NBR has relatively well-developed transportation infrastructure, however, it is still necessary to further develop its transportation system in order to physically support the ‘NBR Urban Alliance’ concept as well as ‘Pair City’ concept. Following are the proposed projects under the PLANET Master Plan.

#### **Transportation Development Code TR01 and TR03:**

To form the Indochina East West Corridor in Thai portion, the currently planned highway network should be developed on schedule, the components of which are already listed in the second phase widening plan of DOH:

- Khon Kaen – Kalasin (2000-2002);
- Ubon Ratchathani – Mukdahan (2000-2007); and

- Udon Thani – Sakon Nakhon – Nakhon Phanom (2000-2004).

#### **TR02: New Widening Project under NBR Urban Alliance Program**

To support urban center development under the “NBR Urban Alliance” concept, the following road-widening projects will be necessary under the widening plan by DOH to form a triangle four-lane highway network:

- Sakon Nakhon – Mukdahan (Route 223 and 212); and
- Nakhon Phanom – Mukdahan (Route 212).

Total length of this new widening project is roughly calculated at 175km.

#### **TR04: Rural Products Home Delivery Service Center Project**

This project aims at establishing a small parcel collection and delivery system in the NBR. Such small parcels will be agricultural products bound for large markets such as Bangkok. E-commerce function will also be included in this facility to collect market information from the central activity centers. Two strategic places have been selected for this project at Sakon Nakhon and Mukdahan.

#### **TR05: Goods Distribution Center and Inland Container**

Under the Local Industrialization Promotion Program, a goods distribution and processing center project is recommended.

The objective of this project is to develop an industrial area with a truck terminal and light industry base. It is planned for environment-friendly industries with zero-emission concept. The cluster development method, which is a stepwise development according to the demand situation, is applied to the industrial area to reduce cost. It is expected to induce standard factories, warehouses, information center, and related common service facilities.

Physically, the project is composed of three major functions as follows:

- Truck terminal for local distribution and collection;
- Inland container depot for international cargo; and
- Goods processing center of local products and materials.

#### **TR06: Mukdahan City Air Terminal**

Under the Pair City Development Program, the Joint Usage Project of Savannakhet Airport has been proposed. To fully materialize this idea, a city air terminal development project is recommended in the city of Mukdahan. The capacity of this terminal should meet the air passenger of about 380,000 in the year of 2017.

**TR07: The Third Mekong Bridge**

The border trading locations between Thailand and Lao PDR are limited to 13 points along the Mekong River. Within the NBR there are four locations, namely, Tha Uten, Nakhon Phanom, That Phanom and Mukdahan. The volume of border trade at Nakhon Phanom is lower than that of Mukdahan; however, its volume is the third largest one among all border-trading locations in Thailand. The volumes of Tha Uten and That Phanom are negligible. Growth of the trading at Nakhon Phanom has been remarkable, achieving a 35% annual increase in the last 5 years in terms of Baht. Within ten years, the amount of trading at Nakhon Phanom will reach at the current trading volume at Mukdahan. Therefore it is recommended that the Third Mekong International Bridge at Nakhon Phanom be developed in Phase 3 of the NBR-PLANET Master Plan.

**TR08: Ferryboat Pier Improvement Project at Nakhon Phanom**

In phase 3 of PLANET, construction of the Third Mekong Bridge has been proposed, however, in order to meet the current demand, a minimum improvement of the ferryboat and pier is recommended.

**TR09: Savannakhet Airport Dedicated Shuttle Bus Service Development**

In order to provide passenger transfer services from the Mukdahan City Air Terminal and the Savannakhet Airport, a quality shuttle bus service is necessary. The demand for such service is estimated at 137,000 in the year 2007 (380 passengers per day) and 382,000 in 2017 (1,050 passengers per day). Assuming two daily flights from Bangkok in 2007, two large bus coaches will be necessary.

**TR10: Minor Boat Pier Improvement**

There are four potential small- and medium-scale towns in the NBR along the Mekong River, namely Ban Phaeng, Tha Uten, That Phanom and Wan Yai. Two of them are included in the border trading locations, but the scale of trading is very small. In order to support local small scale-trading activities, boat pier improvement is recommended.

**TR11 and TR12: Joint Master Plan Development**

Under the Pair City Development Program, Joint Master Plan Development Studies are recommended for both of the two pair cities. Because the gap in the level of urban facilities including transportation system between the cities in Thai and those in Lao PDR which is quite huge at present, a balanced urban development is required to avoid unbalanced urban problems, e.g. traffic congestion in Lao side but no traffic congestion in Thai side.

Table 16.26 Proposed Transport Project under NBR-PLANET Master Plan

	Code No.	Sector Transport	Relevant Strategy	Project/Program	Objectives	Scope (components)
	TR01	Transport	5	The Second Phase Widening Project/NBR Urban Alliance Development Program (PLANET)	To widen highways between Kalasin and Mukdahan (2000-2005) and between Sakon Nakhon and Nakhon Phanom (2002-2008)	As described in the DOH plan
	TR02	Transport	5	New Widening Project/NBR Urban Alliance Program (PLANET)	To widen highways between Sakon Nakhon and Mukdahan (-2010) and between Nakhon Phanom and Mukdahan(-2010)	Widening of Route 212 and 223 (Total length 175km)
	TR03	Transport	5	The Second Phase Widening Project/International and Regional Interface Development Program (PLANET)	To widen highways between Khon Kaen and Kalasin (2000-2002) , Ubon Ratchathani - Mukdahan (2000-2007) and Udon Thani - Sakon Nakhon - Nakhon Phanom (2000-2004)	As described in the DOH plan
	TR04	Transport	5	Rural Products Home Delivery Service Center Project	To create a small parcel transport system to provide direct marketing channel to remote areas	Small parcel transport system (collect rural products and deliver to major consumption centers such as Bangkok) at Sakon Nakhon and Mukdahan.
	TR05	Transport	3 5	Goods Distribution Center and Inland Container Depot	To enhance the international gateway function of Mukdahan To consolidate and distribution of LCL (Less than container load )	Full facility to handle containers Container Freight Station Custom Office, etc
	TR06	Transport	5	Mukdahan City Air Terminal Project	To develop domestic and international city air terminal at Mukdahan for the Savannakhet airport passengers.	Savannakhet Airport Improvement (runway extension and internationalization) is necessary.
	TR07	Transport	5	The Third Mekong Bridge	To provide effective access to the Nakhon Phanom airport for Lao people. To provide better access to Hanoi from NE.	Tha Khek City Air Terminal Project can be recommended to Lao PDR.
	TR08	Transport	5	Ferryboat Pier Improvement Project	To improve the ferry pair at Nakhon Phanom to meet the demand	Until construction of the Third Mekong Bridge, the life of ferryboat pier will be extended by minimum improvement.
	TR09	Transport	5	Savannakhet Airport Dedicated Shuttle Bus Service Development	To provide quality passenger services to/from the Savannakhet Airport.	Establishment of a joint operation company by Thai and Lao concessionaire.
	TR10	Transport	5	Minor Boat Pier Improvement Project	To improve local boat piers in small towns along the Maekong River	Four minor towns along the Mekong River (Ban Phaeng, Tha Uthen, Tha Phanom, and Wan Yai) and small- and medium-scale market development.
	TR11	Transport	5	Mukdahan and Savannakhet Urban Transportation Master Plan Study	To develop urban transportation master plan with a target year of 2021.	Master Plan Study
	TR12	Transport	5	Nakhon Phanom and Tha Khek Urban Transportation Master Plan Study	To develop urban transportation master plan with a target year of 2021.	Master Plan Study

### 16.6.3 Project Costing and Schedule

Based on the proposed projects above and the development scenario of the Master Plan, the following development schedule was developed.

The total implementation cost of the proposed projects (excluding DOH's project: TR01 and TR03) is estimated at 7,116 million Baht for the next twenty years.

**Table 16.27 Project Costing and Schedule**

Code No.	Sector	Project/Program	Place	Implementing Organization	Schedule				Cost (Million Baht)
					2000-2004	2005-2009	2010-2014	2015-2020	
TR01	Transport	The Second Phase Widening Project/NBR Urban Alliance Development Program (DOH projects)	NBR	DOH, MOTC	■	■			4080.0
TR02	Transport	New Widening Project/NBR Urban Alliance Program (PLANET)	Mukdahan Sakon Nakhon Nakhon Phanom	DOH, MOTC		■			4600.0
TR03	Transport	The Second Phase Widening Project/International and Regional Interface Development Program (DOH projects)	NBR	DOH, MOTC	■	■			9154.0
TR04	Transport	Rural Products Home Delivery Service Center Project	Mukdahan Sakon Nakhon	Mukdahan Sakon Nakhon Private sector	■				37.5
TR05	Transport	Inland Container Depot	Mukdahan	Changwat Office, Concession to		■			188.0
TR06	Transport	Mukdahan City Air Terminal Project	Mukdahan	DOA, MOTC		■			62.5
TR07	Transport	The Third Mekong Bridge	Nakhon Phanom	DOH, MOTC			■		2000.0
TR08	Transport	Ferryboat Pier Improvement Project	Nakhon Phanom	DOH, PAT, Municipalities		■			38.0
TR09	Transport	Savannakhet Airport Dedicated Shuttle Bus Service Development	Mukdahan	DOA, MOTC Concessionaire		■			4.5
TR10	Transport	Minor Boat Pier Improvement Project	Nakhon Phanom Mukdahan	DOH, PAT, Municipalities	■	■			45.0
TR11	Transport	Mukdahan and Savannakhet Urban Transportation Master Plan Study	Mukdahan Savannakhet	Mukdahan Savannakhet			■		70.0
TR12	Transport	Nakhon Phanom and Tha Khek Urban Transportation Master Plan Study	Nakhon Phanom Tha Khek	Nakhon Phanom Tha Khek			■		70.0

including planned DOH project 20349.5  
excluding planned DOH project (PLANET New Project) 7115.5