

**MINISTRY OF PUBLIC WORKS AND TRANSPORT
THE KINGDOM OF CAMBODIA**

**DATA COLLECTION SURVEY
ON THE TRUNK ROAD NETWORK
PLANNING FOR
STRENGTHENING OF CONNECTIVITY
THROUGH THE SOUTHERN ECONOMIC
CORRIDOR**

FINAL REPORT

MARCH 2013

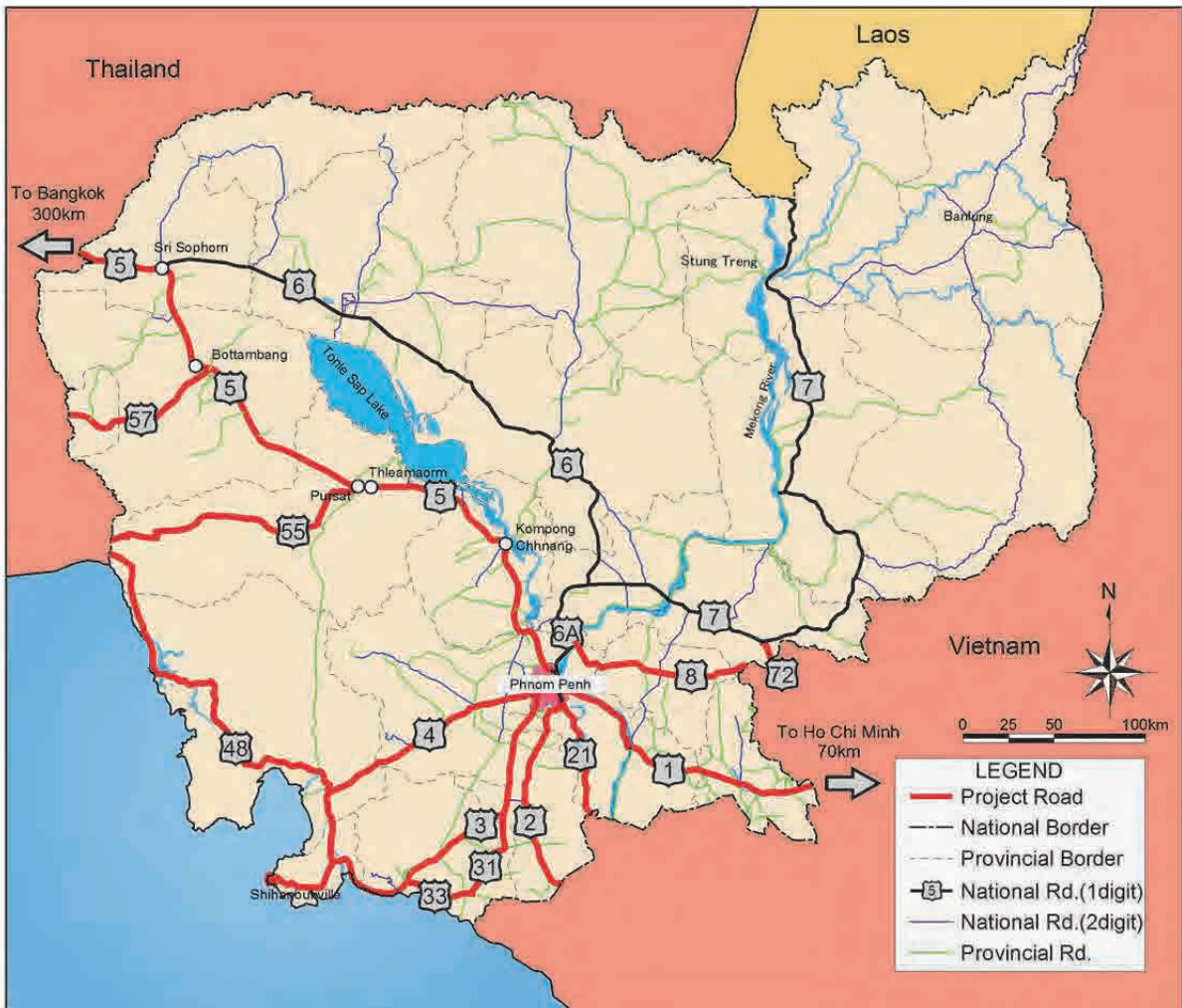
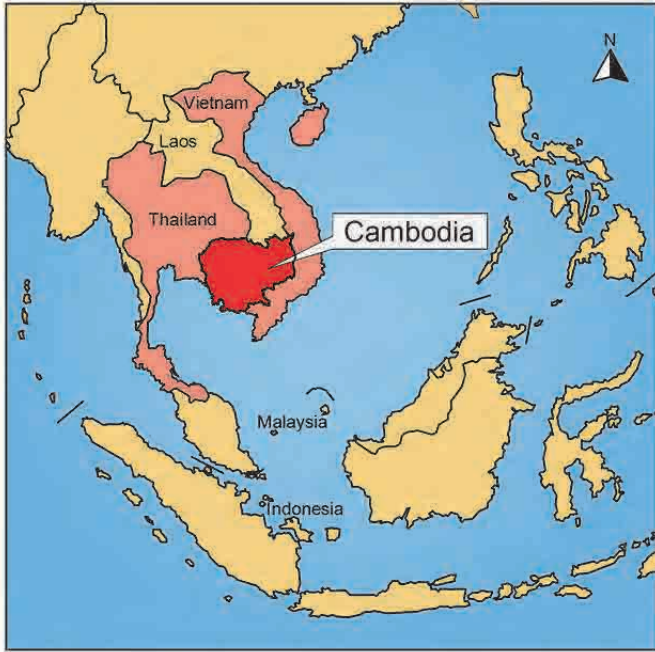
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Location Map

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LIST OF ABBREVIATIONS

AAGR	: Average Annual Growth Rate
AASHTO	: American Association of State Highway and Transportation officials
AC	: Asphalt Concrete
ADB	: Asia Development Bank
AEC	: ASEAN Economic Community
ASEAN	: Association of South East Asian Nations
AH	: Asian Highway
ASYCUDA	: Automatic System of Custom Data
BMA	: Bangkok Metropolitan Authority, Thailand
BOI	: Board of Investment, Thailand
BOT	: Build-Operate-Transfer
CBTA	: Cross Border Transport Agreement
CDC	: Council for the Development of Cambodia
CIF	: Cost, Insurance and Freight
DBST	: Double Bituminous Surface Treatment
DDI	: Domestic Direct Investment
DOH	: Department of Highway
DPWT	: Department Public Works and Transport
DRVN	: Directorate for Roads of Vietnam
EDC	: Electricité du Cambodge
FDI	: Foreign Direct Investment
FOB	: Free on Board
GDP	: Gross Domestic Product
GMS	: Greater Mekong Subregion
HV	: Heavy Vehicle
IEAT	: Industrial Estate Authority of Thailand
IRITWG	: Infrastructure and Regional Integration Technical working Committee
JBIC	: Japan Bank for International Corporation
JICA	: Japan International Cooperation Agency
LV	: Light Vehicle
MC	: Motor Cycle
MEF	: Ministry of Economic and Finance
MLIT	: Ministry of Land, Infrastructure, Transport and tourism of Japan
MOT	: Ministry of Transport, Vietnam
MOU	: Minutes of Understanding
MPWT	: Ministry of Public Works and Transport
NIS	: National Institute of Statistics

NL	: Northern Line
NR	: National Road
NSDP	: National Strategic Development Plan
NTFCs	: National Transport Facilitation Committees
OD	: Origin Destination
ODA	: Official Development Assistance
PAS	: Port Autonomous of Sihanoukville
PCDG	: Prestressed Concrete Deck Girder
PCH	: Prestressed Concrete Hollow Slab
PCU	: Passenger Car Unit
PP	: Phnom Penh
PPAP	: Phnom Penh Autonomous Port
PPP	: Public-Private-Partnership
PR	: Provincial Road
RAMP	: Road Assets Management Project
RCS	: Reinforced Concrete Slab
RID	: Road Infrastructure Department
RCDG	: Reinforced Concrete Deck Girder
RCR	: Royal Cambodian Railways
RGC	: Royal Government of Cambodia
SCQCP	: Strengthening Construction Quality Control Project
SEC	: Southern Economic Corridor
SEZ	: Special Economic Zone
SL	: Southern Line
STRADA	: System for Traffic Demand Analysis
TEU	: Twenty-foot equivalent unit
VOC	: Vehicle Operation Cost

CHAPTER 1 OUTLINE OF SURVEY

1.1 Background of Survey

In the Kingdom of Cambodia (Cambodia), the road transport accounts for around 65% of the passenger transport and 70% of the freight transport, and hence, the road plays the most important role in the domestic transport. In addition, Cambodia is located between Thailand and Vietnam and at the center of the Southern Economic Corridor within the Greater Mekong Subregion (GMS). Cambodia is, therefore, expected to take major parts in terms of freight transport network in GMS.

After the civil war in the year 1991, transport infrastructures in Cambodia were commenced to be rehabilitated with the assistance of Japan, the United States, Australia, the Asian Development Bank (ADB) and the World Bank (WB). As a result, trunk roads including bridges have been restored and in recent years, strengthening and developments of road networks in whole country are required in order to synchronize with increment of domestic and international transport demands, following economic development in Cambodia. In accordance with the National Strategic Development Plan (update 2009 – 2013) of the Royal Government of Cambodia (RGC), “Further Rehabilitation and Construction of Physical Infrastructure” is one of four priorities in the Rectangular Strategy Phase 2 (RS-II). Following this priority strategy, expansion of transport infrastructures and formulation of multimodal transport networks have been placed as an important field. With this basis, road network is being developed, following the study on the road network development and the follow-up study on the road network development master plan in Cambodia compiled by assistance of Japan International Cooperation Agency (JICA) in 2006 and 2009 respectively.

Currently, National Road 1 between Phnom Penh and Neak Loeung, which is in part of the Southern Economic Corridor and also Asian Highway 1 (AH 1) has been and would be developed and Neak Loeung Bridge is under construction with the grant of Japanese Government. Further, preparatory surveys for National Road 5 rehabilitation project (also in part of the Southern Economic Corridor and AH 1) are complete and being carried out in the north section (Battambang – Sri Sophorn) and the south section (Prek Kdam – Thleamaorm), and would be commenced in the middle section (Thleamaorm - Battambang) shortly for loan project of Japanese Official Development Assistance (ODA) upon request from RGC. Also, other road rehabilitation and development connecting to neighboring countries and around Phnom Penh are being implemented with assistance of China and Korea, toward an integration of the Association of South East Asian Nations (ASEAN) targeted in the year 2015. As aforesaid, developments of various roads are shaped up and special economic zones (SEZs) near Phnom Penh and the country boundaries are being developed. Foreign companies including Japanese are investing in Cambodia, so that industrial location map is changing. Further, infrastructures (road, port etc.) and industrial accumulation are progressing in the neighboring countries, such as Thailand and Vietnam.

Under the above mentioned circumstances (rapid progress and changes), trunk road network in Cambodia has to be reviewed with view point of strengthening of regional connectivity through the Southern Economic Corridor. Thus, this data collection survey has been planned and is implemented.

1.2 Objectives of Survey

Objectives of the survey are as follows.

- (1) To collect data on current conditions of infrastructures for transport, plans of road development and industrial locations in Cambodia as well as those in the neighboring countries (Thailand and Vietnam), which are connected with road network from Cambodia and analyze those data
- (2) To confirm and compile functions and features of trunk roads in Cambodia with the above data and analysis

- (3) To make priority of road network development and directions of road improvement (road number and section, year of development and road grade) for future preparatory survey for Japanese loan projects

1.3 Survey Area

The survey area covers the followings.

- (1) Southern Economic Corridor in Cambodia (AH 1 or National Road 1 and 5) and branch roads (one or two digit national roads) from the corridor toward Thailand and Vietnam
- (2) Southern Coastal Corridor (AH 123 or National Road 3, 4 and 48 etc.) and part of Central Corridor (AH 11 or National Road 4) in Cambodia and branch roads from the corridor toward Thailand and Vietnam
- (3) Connected roads from the above 1) and 2) in Thailand and Vietnam

1.4 Framework of Survey

- (1) Methodology

The survey team collects relevant data and reports in connection with road development, logistic survey, connectivity of GMS including cross border transport and industrial park development in Cambodia and neighboring countries and analyzes them.

The survey team surveys current conditions (field survey and interviews to relevant organizations) on the roads along the Southern Economic Corridor including some branch roads, expressway, key areas of logistics (ports, customs etc.) including situation of cross border transport agreement (CBTA) and industrial parks (special economic zones etc.) in Cambodia and neighboring countries and updates the conditions stipulated in the data and reports mentioned above.

Based on the data and reports in the past and field survey and interviews, the survey team analyzes latest conditions and data on the roads, industrial locations and so on and comes out direction of road network development in Cambodia after compiling functions and features on trunk roads and transport infrastructure and industrial location map.

Then medium term road development plan is prepared and priority sections from the plan are selected. Long term development plan, including (expressway) is also compiled for further study.

- (2) Organization of Survey

The organization of the survey and survey team are shown below.

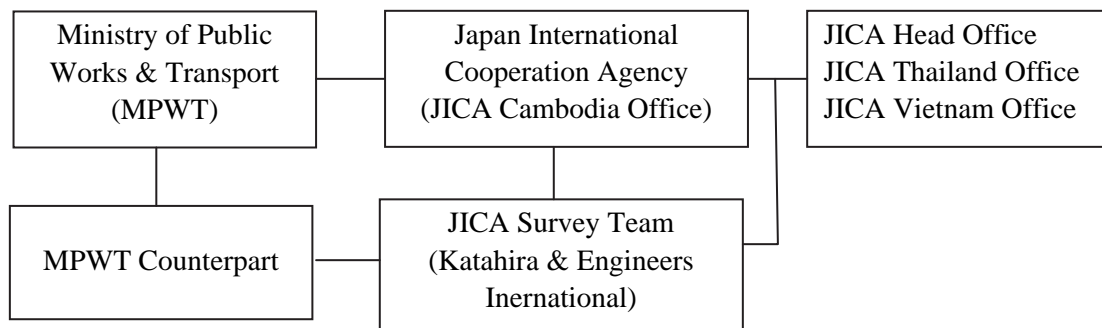


Figure 1.4-1 Organization of Survey

Table 1.4-1 Survey Team Member

Survey team	Name	Remarks
Team leader / Transport Plan	YAMAUCHI Masafumi	Expert
Logistic Plan	KIMURA Toshio	Expert
Road Plan	YUMITA Kazuo	Expert
Traffic Analysis	YASHIRO Shuichi	Expert
Survey Assistant	OEUR Raksa	Local Engineer
Survey Assistant	SNGUON Leakhena	Local Engineer

(3) Work Schedule

Table 1.4-2 Work Schedule

Items	year / month	2013			
		December	January	February	March
1 Preparatory Works					
1) Preparation of Inception Report		---			
2) Presentation of Inception Report to MPWT and Discussion with MPWT		■			
2 Current Situation of Traffic Infrastructure and Industrial Location along Southern Economic Corridor					
(1)-1 Site Survey and Data Collection in Cambodia					
1) Road Survey			■		
2) Industrial Location Survey			■		
(1)-2 Interview to Related Ministries and Authorities in Cambodia					
1) Data Collection of Policy, Rules and Procedures in Cross Border Transport Agreement (CBTA)			■		
2) Data Collection for Review of PPP Scheme			■		
(2)-1 Interview to Related Ministries and Authorities in Thailand and Vietnam					
1) Traffic Infrastructure Survey (ports, airports and railway)			■		
2) Road Survey			■		
3) Industrial Location Survey			■		
(2)-2 Interview to Related Ministries and Authorities in Thailand and Vietnam					
1) Data Collection for International Road Network and Maintenance Procedures, Data Collection of Toll Charge etc.			■		
2) Data Collection of Policy, Rules and Procedures in Cross Border Transport Agreement (CBTA)			■		
(3) Analysis of Functions and Features on Trunk Roads in Cambodia			■		
(4) Formulation of Map for Transport Infrastructure and Industrial Locations			■		
3 Direction of Road Network Development in Cambodia					
(1) Review of Priority Projects based on Analysis of Traffic Demand etc.			■		
(2) Formulation of Medium-term Road Development Plan			■		
4 High Priority Road Project and Long-term Road Development Plan in Cambodia					
(1) Preparation of Standard for Priority Projects and Formulation of Brief TOR for Feasibility Study			■		
(2) Formulation of Long Term Development Plan			■		
5 Reports					
(1) Compilation of Draft Final Report (DFR) and Presentation Files				■	
Presentation of DFR to JICA and MPWT					△△
(2) Compilation and Submission of Final Report					△△

abbreviation --- --- Preparatory works ■ Site Si □ works in Japan △△ Presentation of reports

(4) Flow Chart

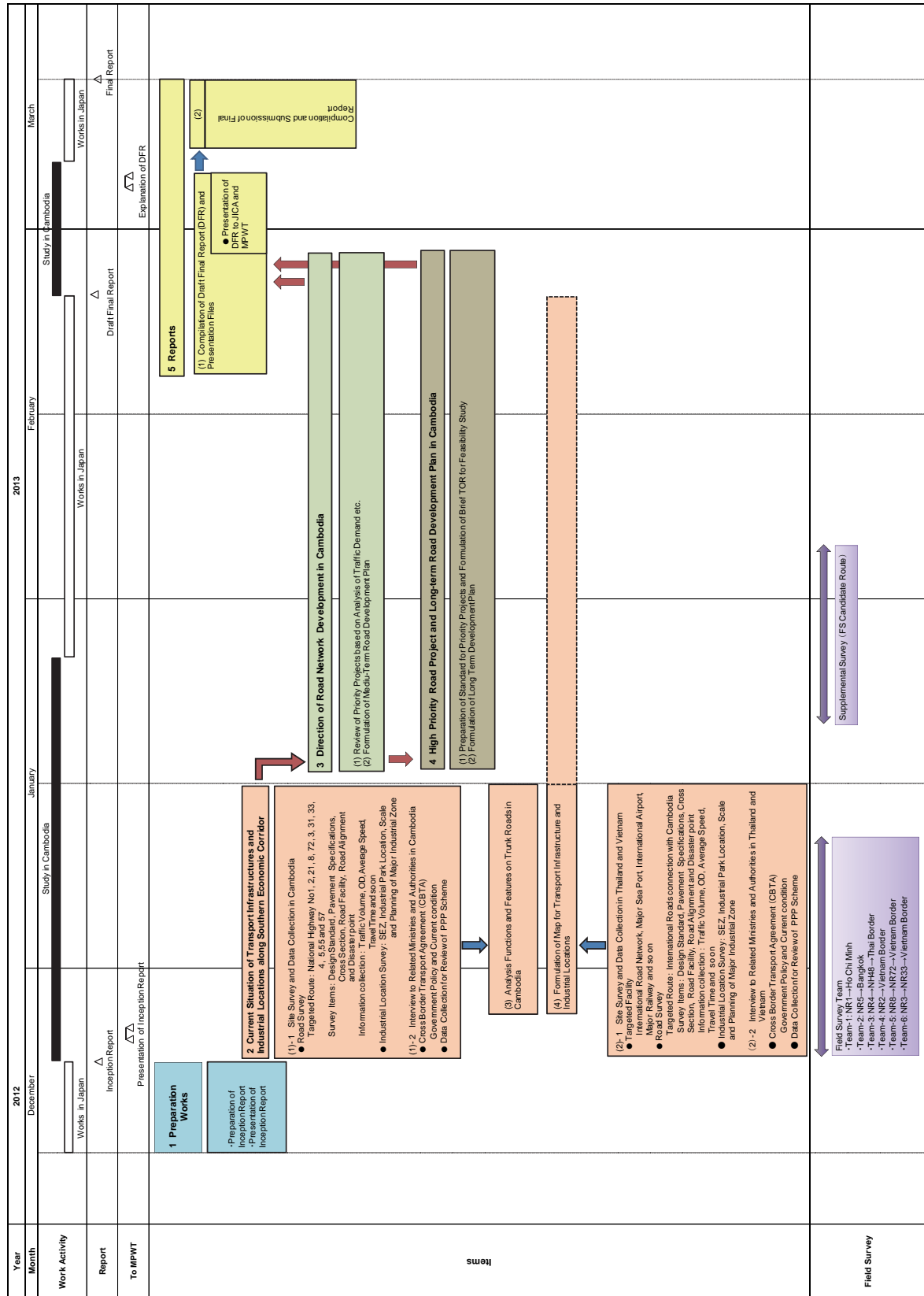


Figure 1.4-2 Work Flow Chart

CHAPTER 2 CONDITION OF TRANSPORT INFRASTRUCTURE, ROAD IMPROVEMENT AND INDUSTRIAL DEVELOPMENT

2.1 Socio-Economic Condition

2.1.1 Socio-Economic Condition in Great Mekong Subregion (GMS) Countries

Table 2.1-1 shows the socio-economic condition of countries in GMS. Among these GMS countries, Thailand is the biggest economic scale and Gross Domestic Product (GDP) per capita is over USD 5,000.

Table 2.1-1 Socio-Economic Condition of Countries in GMS Countries

	Cambodia	Vietnam	Thailand	Lao PDR
Land Area (km ²)	181,035	331,210	513,120	236,800
Population (million)	14.5	87.8	67.6	6.4
Urbanization Rate (%)	21.0	31.7	36.1	33.2
GDP (billion USD)	12.9	122.7	345.7	8.3
Agriculture	34.6%	28.4%	10.9%	28.4%
Industry	21.5%	18.4%	37.0%	18.4%
Mining	0.6%	7.6%	3.2%	7.6%
Service	43.3%	45.7%	49.0%	45.7%
GDP per Capita (USD)	853	1,374	5,395	1,320
Labor Force (million)	7.2	50.4	38.5	2.7
Agriculture	71.3%	48.4%	38.7%	76.3%
Industry	8.8%	20.7%	13.8%	-
Mining	0.7%	0.6%	0.1%	-
Service	19.2%	30.3%	47.4%	-

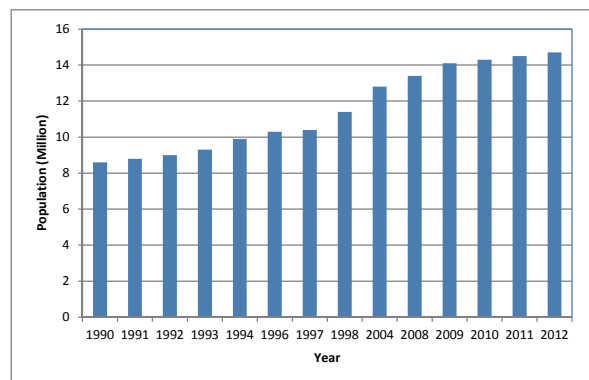
Source: IMF World Economic Outlook Database, October 2012

2.1.2 Current Social Condition in Cambodia

(1) Population

(a) Population Trend

The population in Cambodia increased by 2 million within ten years from 11.4 million in 1998 to 14.5 million in 2008. The annual growth rate during the decade from 1998 and 2008 is 1.8 percent at national level. The population growth rate of Cambodia is higher than in Southeast Asia (1.2 % per annum).



Source: Key Indicators for Asia and the Pacific 2012, ADB

Figure 2.1-1 Population Trend in Cambodia

(b) Urban Rural distribution

The population in the urban and rural area of Cambodia according to the 1998 and 2008 census shows that the urban population was around 2.1 million in 1998 and increased to 2.6 million in 2008. Correspondingly the rural population of the country has risen from 9.6 million in 1998 to 10.9 million in 2008. The share of urban population in relation to the total population has increases at 3.8 % from 15.7 % in 1998 to 19.5 % in 2008. Compared with neighboring countries, urbanization of Cambodia is still much lower than that of other countries.

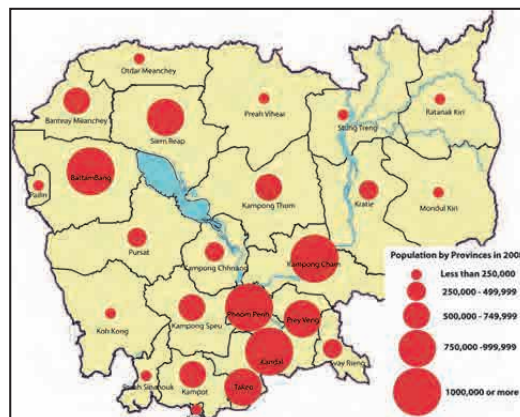
Table 2.1-2 Urban and Rural Distribution of Population in 1998 and 2008

	1998	2004	2008
All Population	11,437	12,824	13,395
Urban	1,795	1,921	2,614
Rural	9,642	10,903	10,781
Urbanization Rate	15.7%	15.0%	19.5%

Source: Statistical Yearbook of Cambodia in 2011, NIS

(c) Population Distribution in Cambodia

Figure 2.1-2 shows population distribution by province in 2008. According to this figure, the following observations can be made:



Source: Statistical Yearbook of Cambodia in 2011, NIS

Figure 2.1-2 Population Distribution

(i) Region in Cambodia is divided into four (4) regions. Among these regions, the most populated region is the Plain Region that includes Phnom Penh, Kandal, Kampong Cham. The population in this region is about 6.5 million and its share to total regions is about 48 %.

(ii) The second largest region is the Tonle Sap Lake Region that includes Battambang, Siemreap, Kampong Thom, etc. The population is about 4.4 million and its share is 33 %.

(iii) Southern economic corridor is covered for Plain Region and Tonle Sap Lake Region. Total population in two (2) regions is totally 10.9 million and its share is 81 %.

(2) Employment

(a) Employment Trend

Major feature of the employment structure in Cambodia is characterized predominantly as primary industrial country. Most of people is living in the rural area and is working agricultural, forestry, and fisheries industry. The share of agriculture sector to total employment is 71 % while that of industry is only 9 %.

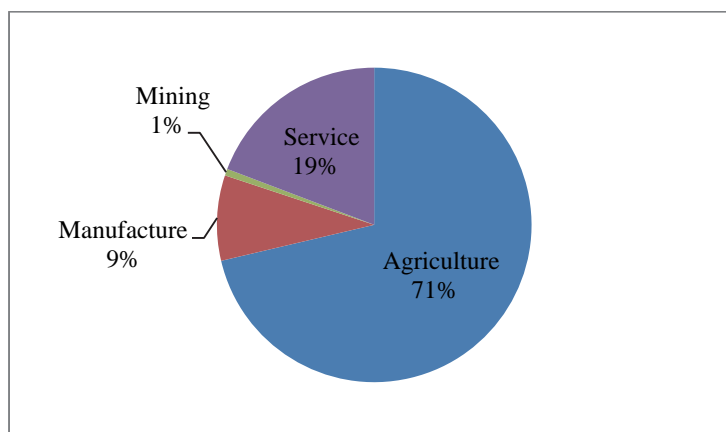
Table 2.1-3 Trend of Population and Employment in Cambodia

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Population (million)	12.8	13.0	13.1	13.3	13.5	13.7	13.9	14.1	14.3	14.5
Labor Force										
Employment ('000)	6,399.7	6,947.6	7,495.6	7,649.4	6,758.4	6,816.7	6,934.8	7,004.1	7,086.3	7,246.5
Agriculture	4,479.8	4,499.8	4,519.8	4,612.6	4,885.6	4,927.8	5,013.1	5,063.3	5,122.7	5,168.9
Manufacture	556.4	634.2	712.1	726.7	571.8	576.7	586.7	592.5	599.5	635.2
Mining	10.8	12.9	15.0	15.3	47.3	47.7	48.5	49.0	49.6	50.7
Service	1,352.8	1,800.7	2,248.7	2,294.8	1,253.7	1,264.5	1,286.4	1,299.3	1,314.5	1,391.7
Composition (%)										
Agriculture	70.0%	64.8%	60.3%	60.3%	72.3%	72.3%	72.3%	72.3%	72.3%	71.3%
Manufacture	8.7%	9.1%	9.5%	9.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.8%
Mining	0.2%	0.2%	0.2%	0.2%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Service	21.1%	25.9%	30.0%	30.0%	18.5%	18.6%	18.6%	18.6%	18.6%	19.2%

Source: Key Indicators for Asia and the Pacific 2012, ADB

(b) Employment Structure

Figure 2.1-3 shows employment structure of Cambodia in 2011. According to this figure, share of employment in agriculture to the total employment is 71 %. Compared with the neighboring countries such as Vietnam and Thailand, share of agricultural employment of Cambodia is predominantly higher than that in Vietnam and Thailand. It can be said that Cambodia is characterized as agricultural country.



Source: Key Indicators for Asia and the Pacific 2012, ADB

Figure 2.1-3 Employment Structure of Cambodia in 2011

2.1.3 Macro-Economy

(1) Cambodia

Table 2.1-4 shows GDP growth rate between 2002 and 2011 and **Figure 2.1-4** shows GDP per capita in the same period. Since 2002, macro economy in Cambodia has been rapidly increasing and the growth of GDP recorded over 10 % during 2004 and 2008. Due to the worldwide recession in 2009, the growth rate in 2009 was dropped down to 0.9 %. However, the growth rate of GDP was again returned to high growth pattern. GDP per capita in 2011 can be achieved to be USD 853.

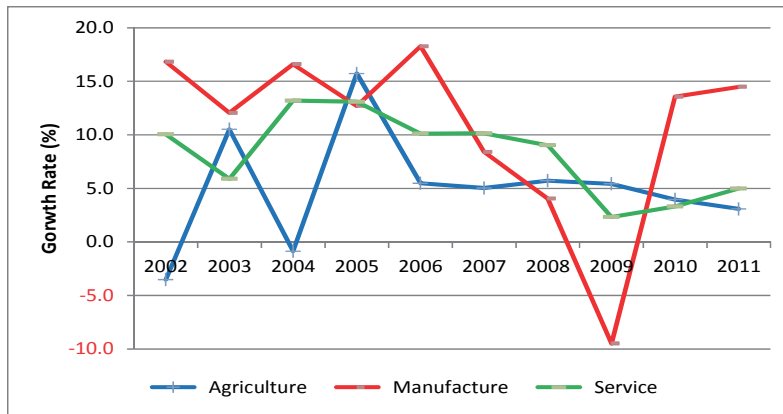
Table 2.1-4 shows the GDP growth rate by Industry between 2002 and 2011. According to the Table, the following findings can be made:

- (a) Agriculture sector is steadily increasing although there were some yearly variations.
- (b) Industrial sector is an engine for Cambodia's economy except 2008.
- (c) Service sector shows strong growth.

Table 2.1-4 Trend of GDP and GDP per Capita in Cambodia

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
GDP (US \$ million)	4,283	4,657	5,332	6,293	7,295	8,639	10,352	10,414	11,255	12,890
GDP Growth (%)	7.5	8.7	14.5	18.0	15.9	18.4	19.8	0.6	8.1	14.5
GDP per Capita (US \$)	327	349	393	455	514	603	711	703	753	853
GDP per Capita Growth (%)	5.8	6.9	12.6	15.7	12.9	17.4	17.9	-1.1	7.0	13.4
Consumer Price	3.3	1.1	3.9	5.8	4.7	5.9	19.7	-0.7	4.0	6.3
Growth of Output (%)										
Agriculture	-3.5	10.5	-0.9	15.7	5.5	5.0	5.7	5.4	4.0	3.1
Manufacture	16.8	12.0	16.6	12.7	18.3	8.4	4.0	-9.5	13.6	14.5
Service	10.0	5.9	13.2	13.1	10.1	10.1	9.0	2.3	3.3	5.0

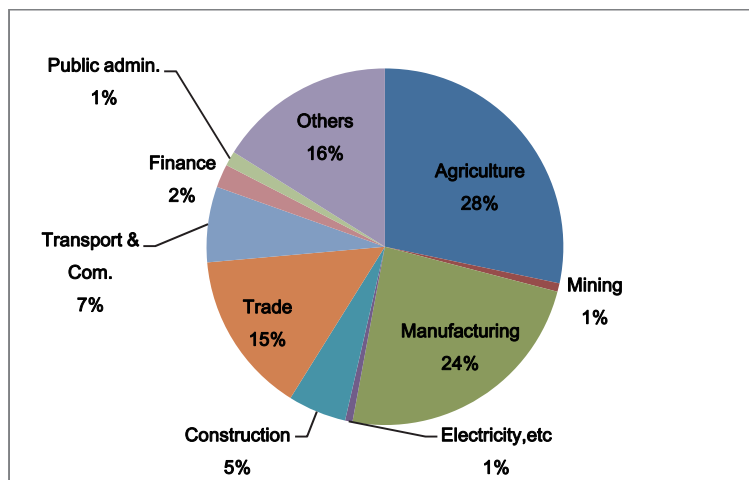
Source: IMF World Economic Outlook Database, October 2012



Source: IMF World Economic Outlook Database, October 2012

Figure 2.1-4 Growth Rate of GDP per Industry in 2002 – 2011

Although the high growth rate of GDP, the share of agricultural sector to the total industry is the highest and is 28 %. The second largest share is the industrial sector and its share is about 24 %. Considering the recent high growth of industrial sector, the share of industrial sector will take over that of agricultural sector.



Source: Statistical Yearbook of Cambodia in 2011, NIS

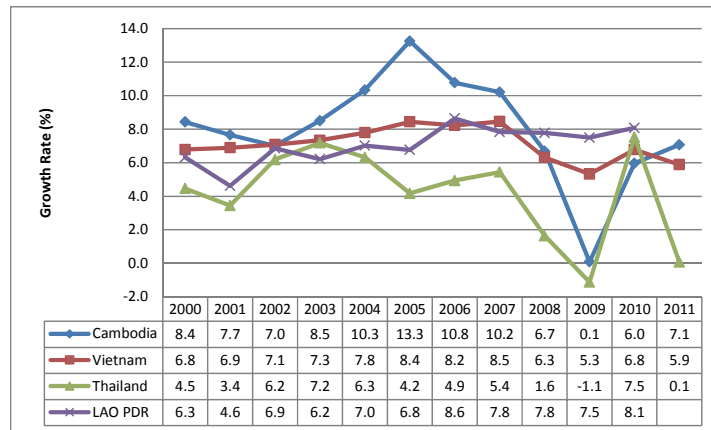
Figure 2.1-5 Composition of GDP by Sector

(2) Economic Condition in the Neighboring Counties

Figure 2.1-6 shows past trend of GDP growth rate in the neighboring counties.

According to this table and figure, the following observation can be made:

- (a) GDP growth rates on the neighboring countries of Cambodia in the GMS have also been rapidly growing since 2000.
- (b) As the results, GDP per capita in those countries has been rapidly increasing. This means that more trade between those countries is expected and the same time, more freight traffic is expected.



Source: IMF World Economic Outlook Database, October 2012

Figure 2.1-6 Past Trend of GDP Growth Rate between 2000 and 2011

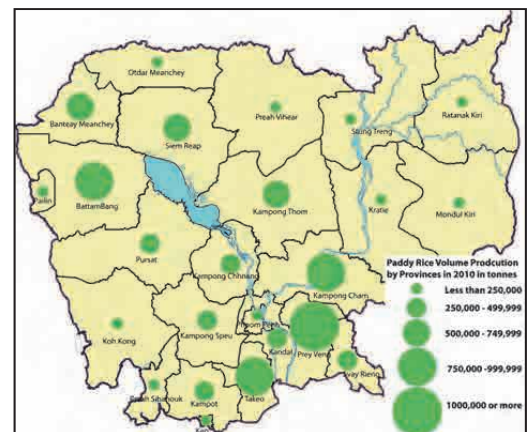
2.1.4 Economy by Sectors

(1) Agriculture

Cambodia has been made great efforts to produce agricultural products since 2000. The growth rate of paddy rice products during 2000 and 2011 is about 4.9 % per year.

As the results, the agricultural products by provinces are shown in **Figure 2.1-7**. The cultivated area of the paddy rice in 2010 was

2.80 million hectares, compared to 2.16 million hectares in 2000. On the other hand, the production of the paddy rice in 2010 was 8.25 million tons compared to 4.04 million tons in 2000.



Source: Statistical Yearbook of Cambodia in 2011, NIS

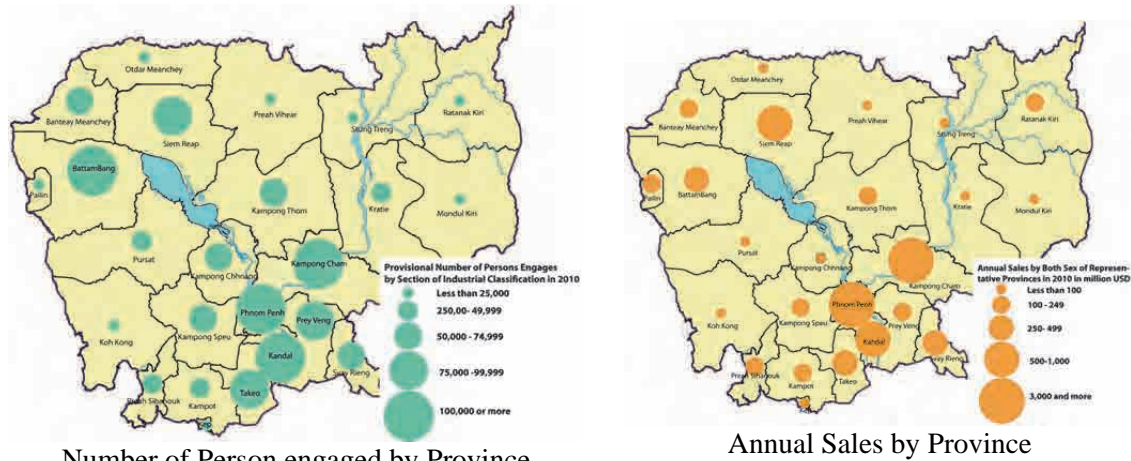
Figure 2.1-7 Paddy Rice Products by Provinces in 2010

(2) Industry

The industrial data is furnished from pilot survey of 2011 Economic Census of Cambodia conducted in March 2010. According to the survey the following findings are made:

- (a) There are 533.5 thousand establishments in Cambodia. Most of the establishments have only one or two employees.
- (b) The number of persons engaged as 1.82 million, compared of 0.76 million men (42 %) and 1.06 million women (58 %).
- (c) Regarding to type of industry, whole sale and retail trade and repair of motor vehicle and motor cycles accounts for more that t6 %.
- (d) Information and communication has the highest share of new establishments among others.
- (e) Regarding to regional distribution of persons engaged, Phnom Penh accounts for 0.47 million (27 %) and Kandal and Kampong Cham account 0.18million (10 %) and 0.17 (9 %), respectively.
- (f) Regarding to regional distribution of annual sales, Phnom Penh accounts for 9.0 billion (52 %) and Kampong Cham account 3.3 billion (20%).

Figures 2.1-8 shows regional distribution of persons engaged and annual sales respectively.



Number of Person engaged by Province

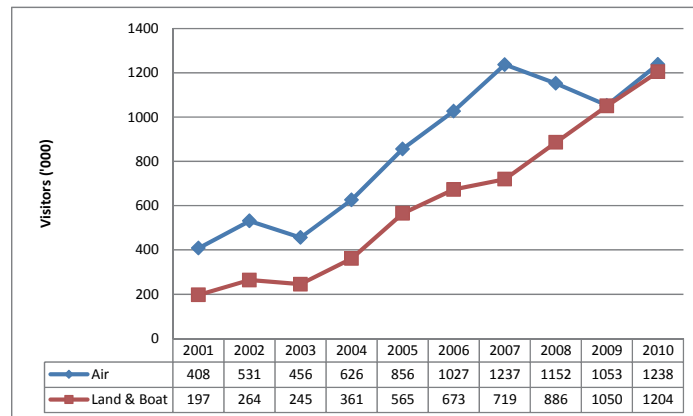
Annual Sales by Province

Source: Economic Census in Cambodia in 2010, NIS

Figure 2.1-8 Regional Distribution of Employment and Amount of Sales in 2010

(3) Tourism Industry

According to the statistics compiled by the Ministry of Tourism (MOT), the total number of visitors increased from 0.60 million in 2001 to 2.5 million in 2010, an average annual growth rate by 17 %.



Source: Statistic data of Ministry of Tourism

Figure 2.1-9 Number of Visitors in Cambodia

2.1.5 Trade, Import and Export Situation

(1) Trade of Cambodia

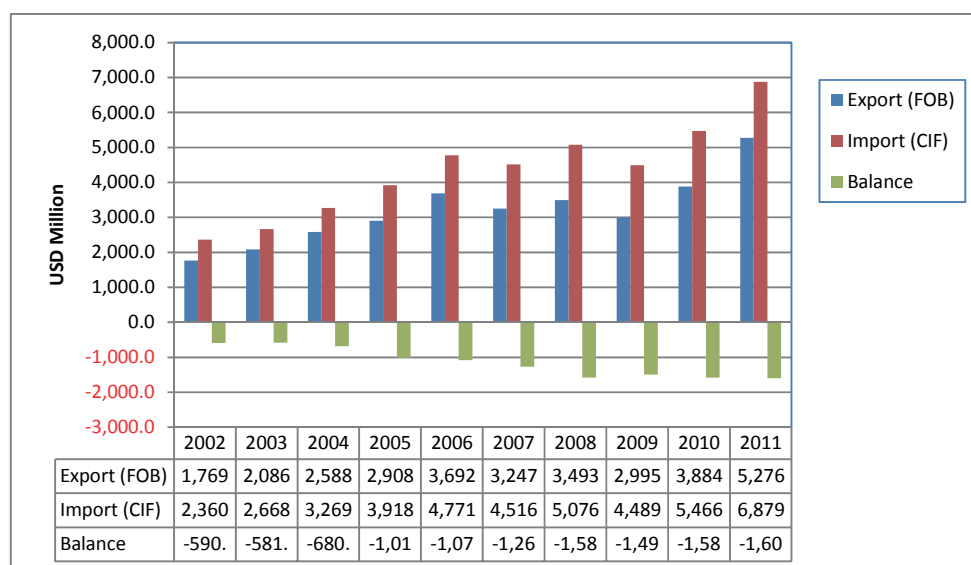
Table 2.1-5 shows the historical trend of import and export of Cambodia. Supporting by the active economy in Cambodia, both value and volume of import and export have been increasing since 2002. An average annual growth rate (AAGR) of import and export during 2002 and 2011 is 12.9 % and 12.6 % respectively. The balance on export - import in 2010 was expanded to deficit of USD 1.6 billion compared with that in 2002 being deficit of USD 0.6 billion.

Table 2.1-5 Trend of Export and Import of Cambodia

Unit: USD million

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	AAGR(%)
Export (FOB)	1,769.8	2,086.8	2,588.9	2,908.0	3,692.4	3,247.8	3,493.1	2,995.7	3,884.3	5,276.5	12.9
Import (CIF)	2,360.5	2,668.1	3,269.5	3,918.3	4,771.2	4,516.7	5,076.7	4,489.9	5,466.0	6,879.0	12.6
Balance	-590.7	-581.3	-680.6	-1,010.3	-1,078.9	-1,268.9	-1,583.6	-1,494.2	-1,581.6	-1,602.6	-

Source: Key Indicators for Asia and the Pacific 2012, ADB



Source: General Department of Customs and Excise in Cambodia

Figure 2.1-10 Trend of Export and Import of Cambodia

The table below shows export and import amount with Thailand and Vietnam. Total trade amount with Thailand in 2011 is 5 times of that in 2002 and same with Vietnam in 2011 is 12 times of that in 2002. It is also to note huge imbalance of export and import with Thailand and Vietnam, which shall be taken care in logistic view point.

Table 2.1-6 Trend of Export and Import with Thailand and Vietnam

Unit: USD million

item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Export to Thailand	11	12	27	31	35	49	90	78	215	176
Export to Vietnam	65	95	131	160	170	206	214	197	277	430
Import from Thailand	516	685	725	920	1,236	1,355	2,040	1,580	2,342	2,693
Import from Vietnam	178	267	384	556	781	1,041	1,531	1,167	1,564	2,406
Export+Import from Thailand	527	697	752	951	1,271	1,404	2,130	1,658	2,557	2,869
Export+Import from Vietnam	243	362	515	716	951	1,247	1,745	1,364	1,841	2,836

Source: Bank of Thailand and General Statistic Office of Vietnam

(2) Trade in Neighboring Countries

Table 2.1-7 shows historical trend of import and export in neighboring countries. According to this table, the import and export in Thailand are tremendously big amount compared with Cambodia.

Table 2.1-7 Trend of Export and Import in GMS Countries

Unit: USD million

Export/Import	Countries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	AAGR(%)
Export (FOB)	Cambodia	1,770	2,087	2,589	2,908	3,692	3,248	3,493	2,996	3,884	5,276	12.9
	Vietnam	16,706	20,149	26,485	32,447	39,826	48,561	62,685	57,096	72,237	96,906	21.6
	Thailand	67,760	84,000	99,170	108,182	136,976	157,247	167,672	155,902	204,844	217,617	13.8
	Lao PDR	301	336	363	553	882	923	1,092	1,053	1,746	1,853	22.4
Import (CIF)	Cambodia	2,361	2,668	3,269	3,918	4,771	4,517	5,077	4,490	5,466	6,879	12.6
	Vietnam	19,746	25,256	31,969	36,761	44,891	62,765	80,714	69,949	84,839	106,750	20.6
	Thailand	64,304	79,281	97,311	115,867	137,130	144,437	170,856	138,116	194,240	220,050	14.6
	Lao PDR	447	462	713	882	1,060	1,065	1,403	1,461	2,060	2,423	20.7
Balance	Cambodia	-591	-581	-681	-1,010	-1,079	-1,269	-1,584	-1,494	-1,582	-1,603	-
	Vietnam	-3,040	-5,107	-5,484	-4,314	-5,065	-14,204	-18,029	-12,853	-12,602	-9,844	-
	Thailand	3,455	4,720	1,859	-7,685	-154	12,810	-3,184	17,786	10,604	-2,433	-
	Lao PDR	-146	-127	-349	-329	-178	-142	-311	-408	-314	-570	-

Source: Key Indicators for Asia and the Pacific 2012, ADB

(3) Composition of Export and Import Volume by Categories

Table 2.1-8 & 2.1-9 shows weight of export and import commodities by categories.

Table 2.1-8 Export Volume by Categories in 2010

Unit: 1000 tons

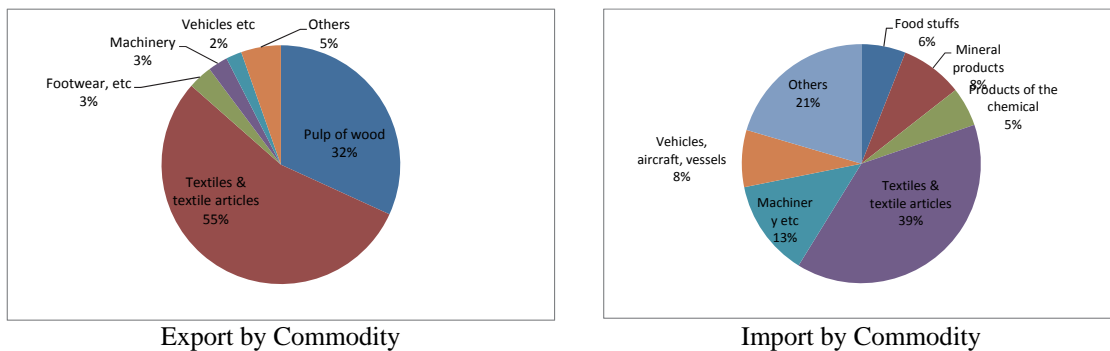
Category	Description	Weight	%
Sec.1	Live animals; animal products	2	0.3%
Sec.2	Vegetable products	130	16.5%
Sec.3	Aminul or vegetable fats & oils	15	1.9%
Sec.4	Prepared food stuffs	42	5.3%
Sec.5	Mineral products	0	0.0%
Sec.6	Products of the chemical or allied industries	4	0.5%
Sec.7	Plastics & articles thereof	33	4.2%
Sec.8	Raw hides & skins; leather, firkins & articles of wood	2	0.3%
Sec.9	Wood & articles of wood	108	13.7%
Sec.10	Pulp of wood	7	0.9%
Sec.11	Textiles & textile articles	278	35.3%
Sec.12	Footwear, headgear, umbrellas	25	3.2%
Sec.13	Articles of stone, plaster, cement, glass	3	0.4%
Sec.14	Precious stones	0	0.0%
Sec.15	Base metals & articles thereof	6	0.8%
Sec.16	Machinery & mechanical appliances, electrical equipment	10	1.3%
Sec.17	Vehicles, aircraft, vessels	117	14.9%
Sec.18	Optical, medical & musical instruments	0	0.0%
Sec.19	Arms & ammunition	0	0.0%
Sec.20	Miscellaneous manufactured	3	0.4%
Sec.21	Sec.21 Works of art	0	0.0%
	Others	2	0.3%
	Total	787	100.0%

Source: General Department of Customs and Excise in Cambodia

Table 2.1-9 Import Volume by Categories in 2010

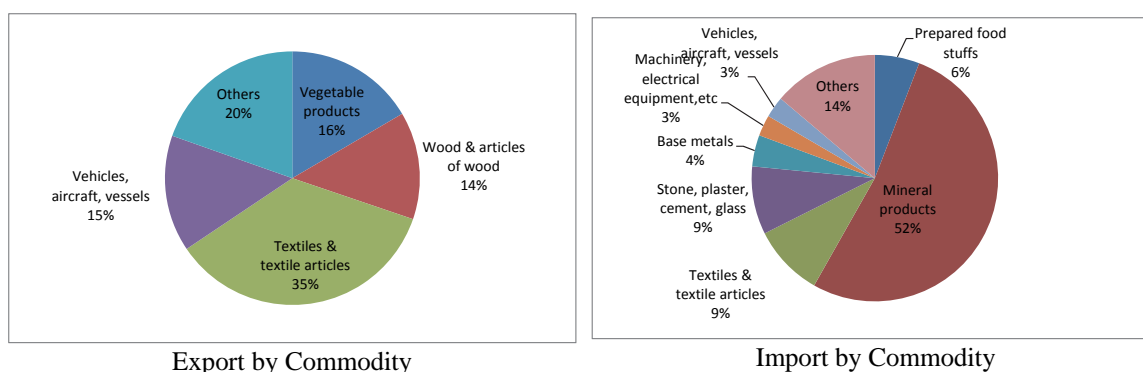
		Unit: 1000 tons	
Category	Description	Weight	%
Sec.1	Live animals; animal products	12	0.3%
Sec.2	Vegetable products	87	1.9%
Sec.3	Aminul or vegetable fats & oils	9	0.2%
Sec.4	Prepared food stuffs	266	5.9%
Sec.5	Mineral products	2,380	52.3%
Sec.6	Products of the chemical or allied industries	323	7.1%
Sec.7	Plastics & articles thereof	59	1.3%
Sec.8	Raw hides & skins; leather, firkins & articles of wood	6	0.1%
Sec.9	Wood & articles of wood	7	0.2%
Sec.10	Pulp of wood	88	1.9%
Sec.11	Textiles & textile articles	428	9.4%
Sec.12	Footwear, headgear, umbrellas	13	0.3%
Sec.13	Articles of stone, plaster, cement, glass	406	8.9%
Sec.14	Precious stones	0	0.0%
Sec.15	Base metals & articles thereof	187	4.1%
Sec.16	Machinery & mechanical appliances, electrical equipment	125	2.7%
Sec.17	Vehicles, aircraft, vessels	126	2.8%
Sec.18	Optical, medical & musical instruments	3	0.1%
Sec.19	Arms & ammunition	0	0.0%
Sec.20	Miscellaneous manufactured	22	0.5%
Sec.21	Sec.21 Works of art	0	0.0%
Others		1	0.0%
Total		4,547	100.0%

Source: General Department of Customs and Excise in Cambodia



Source: General Department of Customs and Excise in Cambodia

Figure 2.1-11 Export and Import Value by Commodity Type in 2010



Source: General Department of Customs and Excise in Cambodia

Figure 2.1-12 Export and Import Volume by Commodity Type in 2010

(4) Origin/Destination of Export and Import Commodities

Table 2.1-10 shows the export and import commodities by destination and origin countries.

Table 2.1-10 Export and Import Volume by Countries in 2010

Unit: 1000 tons

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Exports										
1. United States	960	1,126	1,312	1,595	1,899	2,363	1,971	1,553	1,903	2,552
2. Hong Kong, China	6	5	5	541	543	17	840	1,646	1,384	39
3. Canada	-	-	94	107	115	189	292	196	274	528
4. Singapore	27	29	10	70	139	77	113	482	429	173
5. United Kingdom	133	143	175	124	153	212	156	180	235	486
6. Germany	118	154	238	225	233	298	138	109	112	502
7. Viet Nam	32	39	42	46	75	187	169	116	96	108
8. Netherlands	-	-	33	21	28	32	151	145	235	70
9. Japan	19	22	25	63	34	126	32	80	90	280
10. Spain	-	-	31	34	85	115	124	106	101	161
Imports										
1. China, People's Rep. of	198	223	342	424	524	969	935	881	1,185	2,550
2. Thailand	238	216	231	291	415	1,491	697	465	689	3,161
3. Viet Nam	98	119	169	182	270	1,145	471	494	486	545
4. Hong Kong, China	372	409	413	450	539	673	590	484	552	770
5. Singapore	122	120	145	136	157	482	304	209	155	1,000
6. Korea, Rep. of	95	81	100	151	146	310	229	209	248	496
7. Indonesia	78	82	79	83	85	134	96	146	175	285
8. Malaysia	58	78	78	92	89	148	122	132	165	236
9. United States	16	16	23	36	26	153	219	91	130	204
10. Japan	64	75	84	100	130	123	115	119	156	225

Source: Key Indicators for Asia and the Pacific 2012, ADB

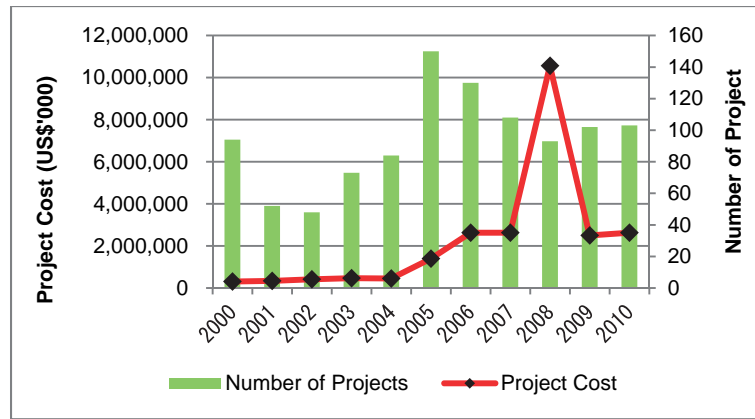
2.1.6 Foreign Investment in Cambodia

(1) Companies/ Projects

Considering on a period of the time from 1994 to 2010, Council for the Development of Cambodia (CDC) had approved 1,759 companies and projects totally. In 2010, 103 companies had been approved to make business in Cambodia.

(2) Trend of Investment Companies/Projects

Figure 2.1-13 shows number of investment projects and project cost. As for the project costs, before 2004, the total investment was less than USD 450 million. However, the total investment after 2005 was over 1 billion and that in 2008 recorded over USD 10 billion. After 2008, the total investment was constantly USD 2 billion.



Source: Statistical Yearbook of Cambodia in 2011, NIS

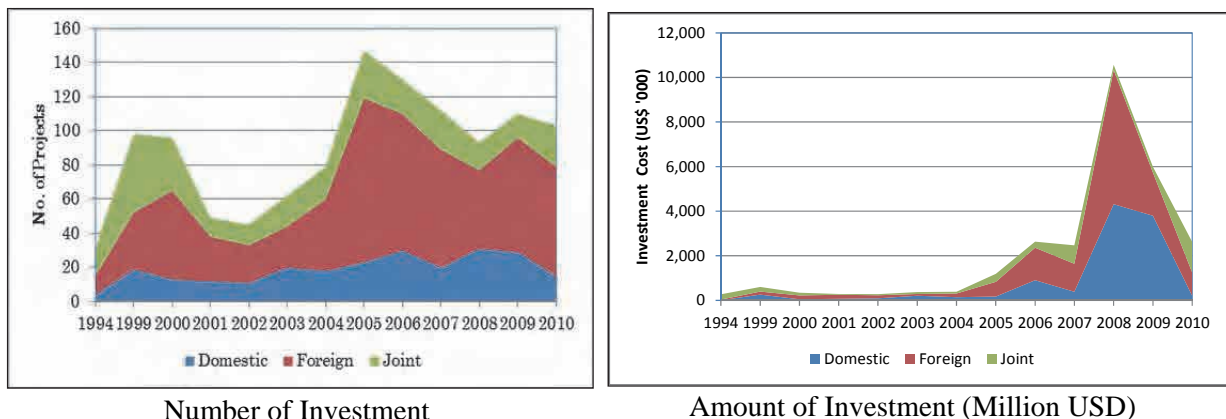
Figure 2.1-13 Trend of Investment Project Approvals in 1999 – 2010

(3) Investment by Type of Investors

Investors are classified into three categories; Domestic Direct Investment (DDI), Foreign Direct Investment (FDI), and Joint Direct Investment (JDI). DDI refers to Cambodian investors who have hundred percent of investment capitals registered and operational business in Cambodia. FDI defines as foreign investors from one country who have hundred percent of invested capital in Cambodia. JDI is categorized joint investment or sharing invested capitals,

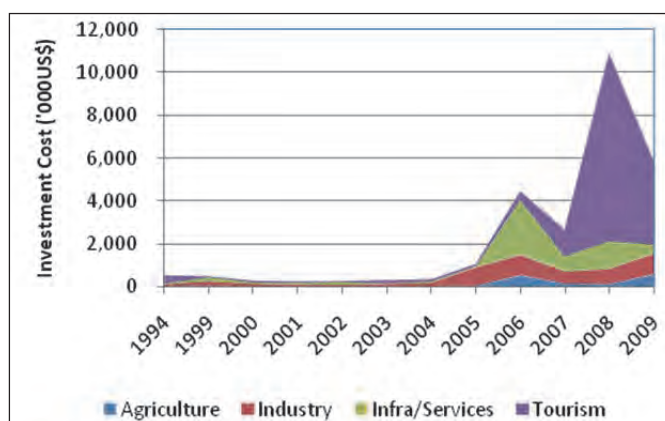
(4) Investment by Industry Sector

Figure 2.1-14 and **2.1-15** show number and amount of the investment and projects approval (fixed assets) by sector from 1994 to 2010 or 2009. After 2005, the investment projects were drastically increasing by the infrastructure / service or tourism sectors.



Source: Statistical Yearbook of Cambodia in 2011, NIS

Figure 2.1-14 Number and Amount of Investment by Type of Investors



Source: Statistical Yearbook of Cambodia in 2011, NIS

Figure 2.1-15 Investment Projects Approved by Sector

(5) Labor Force by Sector

Table 2.1-11 shows labor force created by the investment. The employment has been created at 172 thousand in 2008, 144 thousand in 2009 and 142 thousand in 2010.

Table 2.1-11 Labor Force Created by the Investment

	2008	2009	2010
Agriculture	11,307	26,519	28,362
Industries	91,870	70,143	95,852
Services	5,622	2,199	14,400
Tourism	62,911	45,137	3,129
Total	171,710	143,998	141,743

Source: Statistical Yearbook of Cambodia in 2011, NIS

2.1.7 Government Finance

(1) Government Finance Position

Table 2.1-12 shows the Cambodia Government financial position. There are two types of revenues: one is taxes revenue and the other is non-taxes. In addition to the revenue, the grants are government revenues. As for the expenditure, there are also two types: one is current expenditure and the other is capital.

In the current year, the financial situation is budgetary deficit. Current expenditure to central government was delivered to about 88 %.

Table 2.1-12 Cambodia Government Finance

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<i>Government Finance</i>										
Total revenue and grants	2,426	2,320	2,623	3,208	4,156	4,976	6,651	6,135	8,545	8,201
Total revenue	1,786	1,821	2,220	2,719	3,394	4,223	5,567	5,121	6,221	6,607
Grants	640	499	403	488	761	754	1,084	1,014	2,325	1,594
Total expenditure	2,963	2,946	2,970	3,389	4,203	5,151	6,681	8,828	10,020	10,555
Current expenditure	1,575	1,758	1,746	2,032	2,451	2,979	3,953	4,912	5,154	5,845
Capital expenditure	1,388	1,188	1,225	1,357	1,752	2,172	2,728	3,915	4,866	4,710
Overall budgetary surplus/deficit	-537	-626	-347	-181	-48	-175	-30	-2,693	-1,475	-2,354

Unit: Billion KHR

Source: ADB Key indicators for Asia and the Pacific 2012

Table 2.1-13 shows GDP and government expenditure with its ratio.

Table 2.1-13 Government Financial Position

Unit: Billion KHR

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
GDP	16,781	18,535	21,438	25,754	29,849	35,042	41,968	43,066	47,048	52,069
Government Expenditure	1,575	1,758	1,746	2,032	2,451	2,979	3,953	4,912	5,154	5,875
Expenditure / GDP	9.4%	9.5%	8.1%	10.2%	7.9%	8.5%	9.4%	11.4%	11.0%	11.3%

Source: ADB Key indicators for Asia and the Pacific 2012

Note: Government expenditure is central government expenditure

(2) Transport Development Expenditure to Total Expenditures

Among various expenditures, the transport expenditure is categorized in the economic services (this report refers as economic development) defined by ADB¹. The economic development consists of agriculture, industry, transport and communication (in short transport) and other economic services. **Table 2.1-14** shows trend of government expenditure, economic development and transport development with their ratios.

Table 2.1-14 Government Expenditure, Economic Development and Transport Development

Unit: Billion KHR

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Government Expenditure	1565.0	1758.1	1745.7	2638.2	2354.6	2973.7	4435.7	4752.4	5052.5	5375.4
Economic Development	159.5	170.5	151.3	178.1	218.3	239.8	288.6	348.5	406.3	389.9
Transport Development	49.1	48.7	37.4	43.8	49.1	50.2	59.7	66.8	69.6	60.3
Economic Development / Expenditure	10.2	9.7	8.7	6.8	9.3	8.1	6.5	7.3	8.0	7.3
Transport Development / Expenditure	3.1	2.8	2.1	1.7	2.1	1.7	1.3	1.4	1.4	1.1

Source: ADB Key indicators for Asia and the Pacific 2012

Notes: 1) Government expenditure is central government expenditure

2) Economic development expenditure is categorized as economic services in ADB indicators

(3) Comparison with Neighboring Country

The financial situation of the following two countries is compared hereinafter.

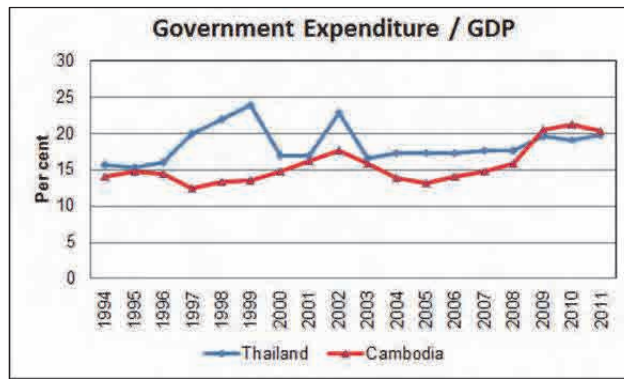
- Cambodia
- Thailand

Items of comparison are as follows:

- Expenditure to GDP
- Economic development rate to government expenditure
- Transport development rate to government expenditure

Figure 2.1-16 shows the government expenditure to GDP. According to this figure, both countries are not much different in share of government expenditure to GDP.

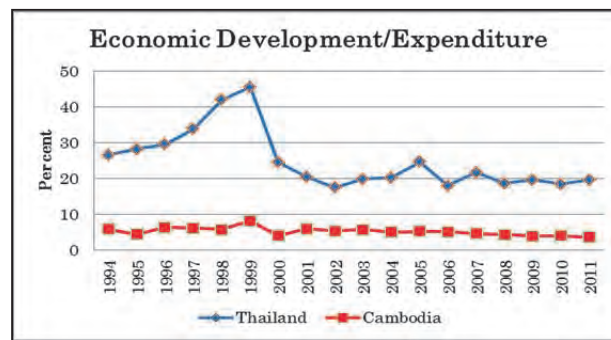
¹ Defined in ADB Key indicators for Asia and the Pacific 2012



Source: JICA survey team based on figures in Key Indicators for Asia and the Pacific 2012, ADB

Figure 2.1-16 Share of Government Expenditure to GDP

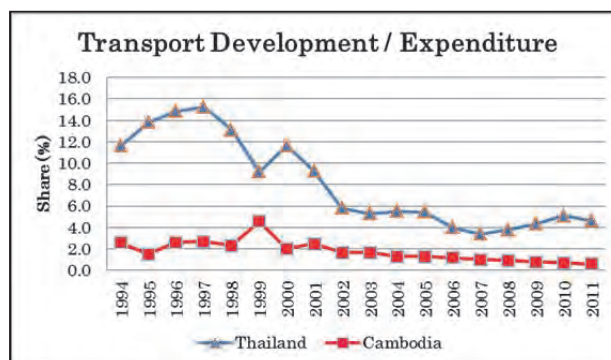
The next comparison is how much the government disperses to economic development in the government expenditure. **Figure 2.1-17** shows the result of comparison. According to this figure, Thailand Government disperses to economic development with 30 % to 45 %, while Cambodia Government disperses only 4 % to 10 %. It is clear that the economic development dispersed in Cambodia is too small and is necessary to disperse more funds for economic development sector.



Source: JICA survey team based on figures in Key Indicators for Asia and the Pacific 2012, ADB

Figure 2.1-17 Share of Economic Development to Government Expenditure

The last comparison is how much the government disperses to transport development in the government expenditure. **Figure 2.1-18** shows the result of comparison. According to this figure, Thailand Government disperses to transport development with 4 % to 15 %, while Cambodia Government disperses only 0.4 % to 4.5 %. It can be said that more funds to transport development sector shall be required to allocate.



Source: JICA survey team based on figures in Key Indicators for Asia and the Pacific 2012, ADB

Figure 2.1-18 Share of Transport Development to Government Expenditure

2.2 Geographical Location and International Transport Network

(1) Geographical Location of Cambodia

Economic growth in the Southern Economic Corridor (SEC) of Cambodia, Thailand and Vietnam have been expanding rapidly mainly in manufacturing exports, thus the faster-growing economies in the world.

In order to accelerate the economic growth in the Greater Mekong Sub-region (GMS), nine (9) economic corridors in the sub-region was identified by Asian Development Bank (ADB) as shown in **Figure 2.2-1**. Among the nine (9) economic corridors, the following three (3) economic corridors are related to Cambodia and they are important corridors:

- (a) Southern Economic Corridor
- (b) Central Economic Corridors
- (c) Southern Coastal Corridor



Source: *Transport and Trade Facilities in General Mekong Subregion*, ADB

Figure 2.2-1 Major Economic Development Corridors in GMS Region

More details of those corridors in Cambodia are shown in the table below.

Table 2.2-1 Economic Corridor in Cambodia

No.	Economic Corridor	Length(km)	Detailed Route
1	Southern Corridor I	1,032	Bangkok- Aranyaprathet/Poipet - Phnom Penh- Bavet/Moc Bai- Ho Chi Minh - Vung Tau
2	Southern Corridor II	1,168	Bangkok- Aranyaprathet/Poipet - Siem Reap - Stung Treng - Ratanakiri/O Yadov - Pleiku - Quy NhonVung Tau
3	Central Corridor	893	Sihanoukville - Phnom Penh - Kratie =Stung Treng - Dong Kralor - Veun Kham - Pakse -Savannakhet
4	Southern Coastal Corridor	763	Bangkok - Hat Lei/Cham Yeam - Kampot - Ha Tienn - Ca Mau - Nam Can

Source: Transport Infrastructure Survey in Cambodia in 2010, JICA

(2) International Highway /Road Network in Cambodia

Regarding the international highway / road network, there are two major transport networks: one is Asian / ASEAN Highway Network Plan. Since the highway network has been established, great efforts for improving the highway network have been put by various agencies and countries.



Source: Transport Infrastructure Survey in Cambodia in 2010, JICA

Figure 2.2-2 Asian / ASEAN Highway Plan (GMS Region)

(3) International Rail Route

Regarding the rail route, Trans-Asian Railway has been established by United Nations Economic and Social Commission for Asia (UN ESCAP) and is shown in **Figure 2.2-3**.



Source: *Transport Infrastructure Survey in Cambodia in 2010, JICA*

Figure 2.2-3 Trans-Asia Railway Plan (GMS Region)

(4) International Maritime Transport Network

In Cambodia, there are two (2) major international ports: one is Sihanoukville International Port and the other is Phnom Penh International Port. From these ports, maritime transport to the world is made directly and indirectly through major ports in the neighboring countries.



Source: *Transport Infrastructure Survey in Cambodia in 2010, JICA*

Figure 2.2-4 Maritime Transport Network in ASEAN Countries

2.3 Road Network Condition

2.3.1 Existing Road Condition Cambodia

The road network development has contributed greatly to the transport sector in Cambodia and has provided the country lifeline to the outside world as well as the internal distribution system. Efforts to rehabilitate and upgrade the road network started in the 1990s with various international donors contributing to the development and at present, almost around 46,325 km of national (1-Digit and 2-Digit), provincial and rural or tertiary roads have been and are being developed.

In Cambodia, administrative road classification according to the government agency responsible for the construction and maintenance is categorized into National Road (1-Digit Road & 2-Digit Road), Provincial Road (3 and 4-Digit Road) and Rural/Tertiary Road (under Ministry of Rural Development).

At present, the Cambodian Road Network covers about 46,325 km of paved and unpaved roads, consisting of 5,604 km of national / international roads (both 1-Digit and 2-Digits), 7,741 km of provincial roads and approximately 35,000km of rural or tertiary roads. **Table 2.3-1** shows the road length by their classification in 2012, comparing to the follow up study by JICA in year 2009.

Table 2.3-1 Road Length by Road Classification

Road Classification	Year 2008	Year 2012
1-Digit National Road	2,100 (5 %)	2,244 (5 %)
2-Digit National Road	3,145 (8 %)	3,360 (8 %)
Provincial Road (3 & 4-Digits)	6,441 (16 %)	7,741 (17 %)
Rural/Tertiary Road	28,000 (71 %)	35,000 (71 %)
Total Length	39,686 (100 %)	46,325 (100%)

Source MPWT 2012 and JICA study team 2009

Table 2.3-2 indicates pavement condition for 1-Digit and 2-Digit national road and provincial road progressing since 2008.

As compared with the road pavement condition in 2008, present paved ratio is increased to 100 % for 1-Digit national road, and increase from 30 % to 70 % for 2-Digit national road, respectively. In addition, present paved ratio of the provincial road is increased from 2 % up to 15%.

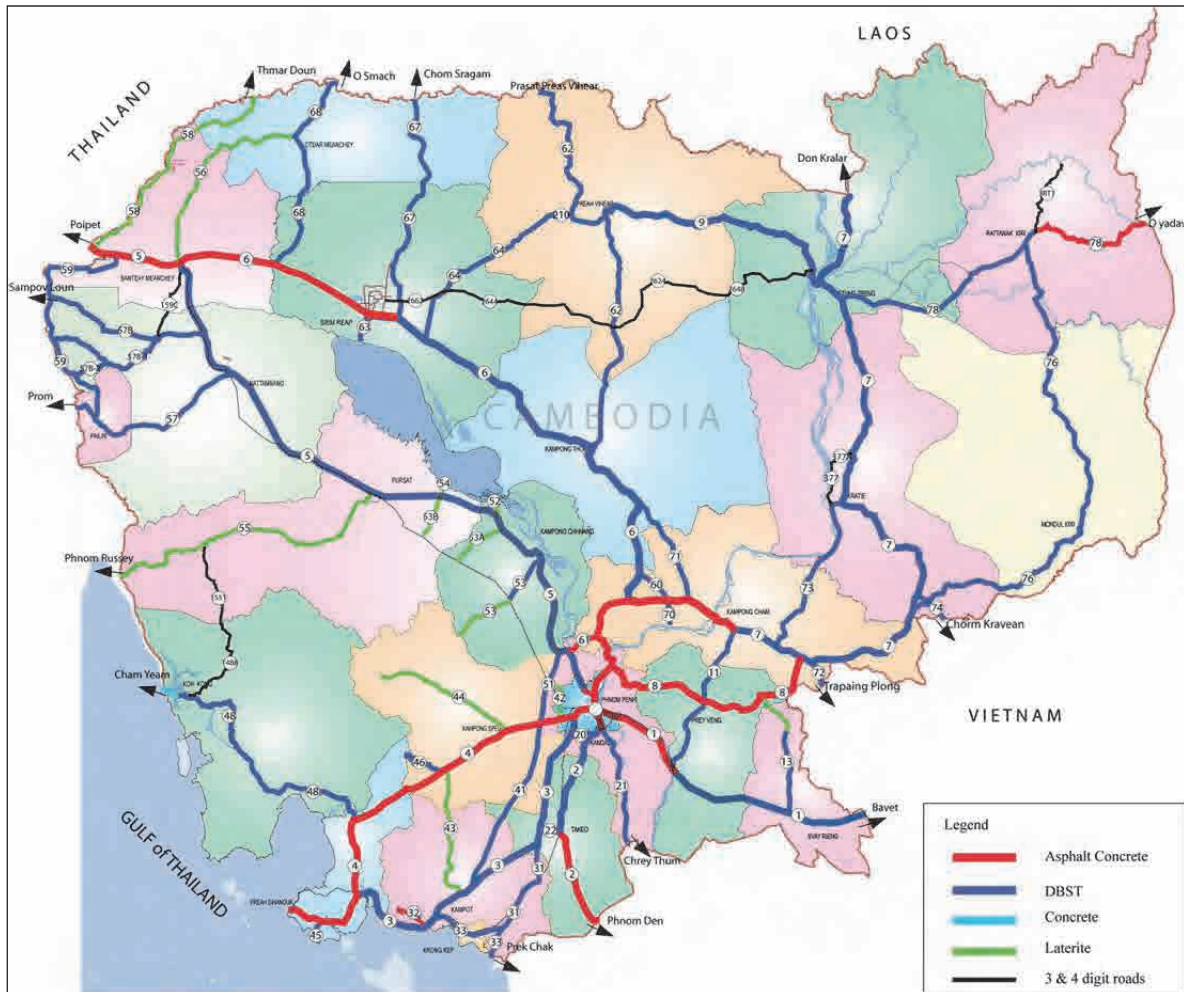
Table 2.3-2 Progress of Paved Road for Each Road Classification

Road Classification	Road Condition in 2008			Road Condition in 2012		
	Paved	Unpaved	Total	Paved	Unpaved	Total
1-Digit National	2,080 (99 %)	20 (1 %)	2,100 (100%)	2,244 (100 %)	0 (0 %)	2,244 (100 %)
2-Digit National	949 (30 %)	2,197 (79 %)	3,146 (100%)	2,358 (70 %)	1,002 (30 %)	3,360 (100 %)
Provincial (3&4 -Digit)	109 (2 %)	6,332 (98 %)	6,441 (100%)	1,196 (15 %)	6,545 (85 %)	7,741 (100 %)
Total (km)	3,138 (27 %)	8,549 (73 %)	11,687 (100 %)	5,798 (43 %)	7,547 (57 %)	13,345 (100 %)

Source MPWT 2012 and JICA study team 2009

Note: Paved road condition includes under construction to be improved to paved road

Figure 2.3-1 shows the existing pavement condition for mainly 1 and 2 Digit national roads in Cambodia in 2012.



Source: JICA survey team

Figure 2.3-1 Existing Pavement Condition of 1 and 2 Digit National Road in Cambodia

(1) 1-Digit National Road

Road condition for 1-Digit road are indicated in **Table 2.3-3** in 2012 compared to that in 2008, which is assumed the on-going improvement works are completed. The asphalt pavement road has been increased from 699 km to 786 km while the DBST is increased from 1,381 km to 1,457 km respectively from year 2008 to year 2012. It can be seen that once on-going projects are completed, 35 % of pavement type is asphalt concrete, and 65% will be DBST while non-treated pavement is not found for 1-Digit road. However the new NR 9 developed by China which links from Tbeng Mean Chey to Stung Treng via Therabarivat (total length: 143.41km) was formed in the 1-Digit road recently and the construction would be completed by year 2015. Hence, **Table 2.3-6** is formed for identifying the 1-Digit National Road conditions.

Table 2.3-3 Road Length by Road Width of 1-Digit National Road

Pavement type	Year 2008				Year 2012			
	w<6.5m	6.5m<w<9.0m	w≥9.0m	Total Length (km)	w<6.5m	6.5m<w<9.0m	w≥9.0m	Total Length (km)
Asphalt	-	-	699	699 (33 %)	-	-	786	786 (35 %)
DBST	-	68	1,313	1,381 (66 %)	-	68	1,389	1,457 (65 %)
Laterite	-	-	-	-	-	-	-	-
Earth	20	-	-	20 (1 %)	-	-	-	-
Total (km)	20 (1 %)	68 (3 %)	2,012 (96 %)	2,100 (100 %)	-	68 (3 %)	2,176 (97%)	2,244 (100 %)

Source: MPWT 2012 & JICA study team 2009

(2) 2-Digit National Road

For 2-Digit national road, the road width and pavement types have been also revised from the JICA Study, 2009. The pavement conditions of some road sections have been upgraded and new roads have been promoted from provincial status to 2-digit national road, and some road names were recently changed into the different name as well which are indicated as the following:

- 9.62 km of NR20 (Krang Svay – Kampong Tuol)
- 12.33 km of NR23 (Prek Ho –Phoum Ta Prum)
- 22.30 km of NR53B (KraKor - Komrieng)
- 69.75 km of NR57B-1 (Bovel –Phnom Prek)
- 16.40 km of NR57B-2 (Phnum Sam Sep –Kamrieng)
- 250 km of NR58 (Banteaychey –Thmar Daun)
- 5.63 Km of NR88 (Krar bao –Moeun Chey) which is likely to confirm later
- 112.16 km of NR64(Dam Dek-Thnol Chek) upgraded from PR2661
- 133.87 km of NR67 (Ror Lours –Chhoarm) modified from NR64

As shown in **Table 2.3-4** in year 2012, 4 % of asphalt concrete (AC) roads, 66 % of DBST roads and 1 % of Concrete roads sections are identified while 29 % of road sections are still laterites or earth roads, which were identified 70 % in year 2008. AC & DBST roads have been increased from 30 % to 70 % within 4 years, and it means MPWT is now trying to upgrade the laterite and earth roads. **Table 2.3-7** also indicates the existing condition of 2- Digit National Roads.

Table 2.3-4 Road Length of 2-Digit National Road

Pavement Type	Year 2008	Year 2012
	Total Length (km)	Total Length (km)
Asphalt	-	125 (4 %)
DBST	949 (30 %)	2,214 (66 %)
Concrete	-	19 (1 %)
Laterite	1,923 (61 %)	951 (28 %)
Earth	273 (9 %)	-
Total (km)	3,146 (100 %)	3,360 (100 %)

Source: MPWT 2012 & JICA study team 2009

(3) 3- & 4-Digit Roads

As presented in the **Table 2.3-5**, 3- and 4-Digits roads are slowly upgraded with their pavement condition. The increase of pavement condition is from 3 km to 23 km for AC, 2 % to 15% for DBST from year 2008 to 2012 respectively. Due to insufficient information for 3- & 4- Digits roads, **Table2.3-8** presents only major 3- &4-Digit roads identified by the survey team.

Table 2.3-5 Road Length of 3 & 4-Digit National Road

Pavement Type	Total Length (km) in 2008	Total Length (km) in 2012
Asphalt	3.4 (0 %)	23 (0 %)
DBST	101 (2 %)	1,167 (15 %)
Concrete	5 (0 %)	5 (0 %)
Laterite	3,895 (60%)	5,022 (65 %)
Earth	2,437 (38 %)	1,524 (20 %)
Total (km)	6,441 (100 %)	7,741 (100 %)

Source: MPWT 2012 & JICA study team 2009

Table 2.3-6 Existing Condition for 1-Digit Road

Existing Road Condition						Remark
Road Section	Location	Length (km)	Current road condition	Road Width (m)	Road Pavement	
NR1	Phnom Penh – Vietnam Border	167				
1-1	Wat Phnom – Monivong Bridge	5	(2 lanes +bike) x2	20-24	AC	Within Phnom Penh
1-2	Monivong Bridge – PK9	4	1 lane x2	-	AC	Waiting for Approval (by Japan)
1-3	PK9 – Neak Loeung	51	(1 lane +bike) x2	17-18	AC	Completed (by Japan, 2011)
1-4	Neak Loeung Bridge	-	-	-	-	On-going (by Japan)
1-5	Neak Loeung – Bavet	107	1 lane x2	10-11	DBST	Repairing (by ADB, 2012)
NR2	Monivong Bridge – Phnom Den	120				
2-1	Monivong Bridge – Takhmau Roundabout	6	(2 lanes +bike)x 2	20-24	AC	Within Phnom Penh
2-2	Takhmau Roundabout – Takeo	64	1 lane x2	8.0-10.0	DBST	Developed by ADB, 2001; F/S to upgrade into AC by Korea
2-3	Takeo – Phnom Den	50	1 lane x2	10.0-11.0	AC	Completed (by Japan, 2007)
NR3	Phnom Penh – Veal Rinh	201				
3-1	Wat Phnom – Chaom Chao	12	(2lanes+bike)x2	20-24	AC	Within Phnom Penh
3-2	Chaom Chao – Kampot	137	1 lane x2	12-13	DBST	Completed (by Korea, 2011)
3-3	Kampot – Trapang Ropaou	33	1 lane x2	12-13	DBST	Completed (by Korea, 2007)
3-4	Trapang Ropaou – Veal Rinh	19	1 lane x2	12-13	DBST	Completed (by WB, 2006)
NR4	Phnom Penh – Sihanoukville	214				
4-1	Chaom Chao – Kampon Speu (KP45)	33	(2 lane x2); (2 lane x1, 1lane x1)	17-20	AC/DBST	Completed (by USA, 1996) Maintained by AZI
4-2	Kampong Speu – Sihanoukville	181	1 lane x 2	10-13	AC	Completed (by USA, 1996) Maintained by AZI
NR5	Phnom Penh – Poipet	407				
5-1	Wat Phnom – Prek Kdam	30	1 lane x2	11.0-12.0	AC/DBST	Being widened by China with AC, from 2012
5-2	PrekKdam – ThleaM’am	139	1 lane x2	10-10.5	DBST	F/S by JICA by 2013
5-3	ThleaM’am – Battambang	123	1 lane x2	10-10.5	DBST	F/S by JICA by 2013
5-4	Battambang – Sri Sophornn	68	1 lane x2	10.0-11.0	DBST	F/S by JICA in 2012
5-5	Sri Sophorn – Poipet	47	1 lane x2	10.0-11.0	AC	Completed (by ADB, 2008)
NR6	Phnom Penh – Sri Sophorn	415				
6-1	Wat Phnom – Skun (PK75)	75	1 lane x2	9.0-10.0	AC	On-going (upgraded to 4 lanes, China, from 2012)
6-2	Skun – Siem Reap	240	1 lane x2	10.0-11.0	DBST	Bakong temple to Siem Reap (15km) by Japan 2001, Committed (upgraded to AC 2lanes, China, 2012)
6-3	Siem Reap – Sri Sophorn	100	1 lane x2	10.0-11.0	AC	Completed (by ADB, 2008)
NR7	Skun – Trapaing Kreil	446				
7-1	Skun – NR11	61	1 lane x2	9.0-10.0	AC	55 km by Japan in 1999/2003
7-2	NR11 – Kratie	187	1 lane x2	11.0-12.0	DBST	-
7-3	Kratie – Stoeung Treng	142	1 lane x2	11.0	TBST	Completed (by China, 2007)
7-4	Stoeung Treng – Trapaing Kreil	56	1 lane x2	11.0	TBST	Completed (by China, 2007)
NR8	PreakTameak – Krek	128				
8-1	Preak Tameak – NR11	64	1 lane x2	10	AC	Completed (by China, 2012)
8-2	NR11 – Vietnam Border	44	1 lane x2	10	AC	Completed (by China, 2012)
8-3	Vietnam Border – Krek	20	1 lane x2	12	AC	Completed (by China, 2012)
NR9	TbaengMeanchey– Stung Treng	143				
9-1	TbengMeanchey – Therabarivat	141	1 lane x2	10-11	DBST	On-going (by China)
9-2	Mekong Bridge (Stung Treng)	2	1 lane x2	10-11	DBST	On-going (by China)
Total Length (Km)		2,241				

Source: MPWT 2012, JICA survey team

Table 2.3-7 Existing Condition for 2-Digit Roads

Road Section	Location	Existing Condition				Remark
		Length (km)	Current road condition	Road Width (m)	Road Pavement	
NR11	NeakLeoung – ThnalToteoung	90	1 lane x 2	9.0	DBST	Completed (by ADB, 2004)
NR13	SvayRieng – AndongTrabek	60	1 lane x 2	6.5-9.0	DBST (39.2km) / Laterite (20.3km)	Completed (by ADB)
NR20	KrangSvay – Kampong Tuol	10	1 lane x 2	6.5-9.0	DBST	-
NR21-1	Takhmau Roundabout – PK4	4	1 lanex 2	11.0 – 15.0	AC	On-going (by China)
NR21-2	PK4 – ChreyThum	62	1 lane x 2	10.0 -11.0	DBST	Developed by ADB, Requested to upgrade into AC (Korea)
NR22	Ochambak – AngTa Saom	10	1 lane x 2	4.5-6.5	DBST	-
NR23	Prek Ho – Phoum Ta Prum	12	1 lane x 2	4.5-6.5	AC	Requested (Korea)
NR31	ThnalBekKous – Kampong Trach	54	1 lane x 2	10.0	DBST	Being rehabilitated by Korea
NR32	KepThmei – Phnom Bokor	33	1 lane x 2	6.5-9.0	AC	Completed
NR33-1	Kampot – Kampong Trach	37	1 lane x 2	10.0	DBST	On-going (by Korea)
NR33-2	Kampot – Lork(Vietnam Border)	15	1 lane x 2	10.0	DBST	On-going (by ADB)
NR41	ThnalToteung (NR4) – Chum Kiri(NR3)	96	1 lane x 2	6.5-9.0	DBST	On-going (by China)
NR42	Bek Chan – Bat Doeng	24	1 lane x 2	6.5-9.0	Laterite	-
NR43	TrengTrayeung (NR4) – TvearThmey	79	1 lane x 2	6.5-9.0	DBST (4.0km) / Laterite (74.9km)	Under Negotiation (China)
NR44	Chbar Morn – RolakKorng Cheung	85	1 lane x 2	4.5-9.0	DBST (11.0km) / Laterite (73.8km)	F/S (by China)
NR45	Kang Keng – Ream (Military Camp)	9	1 lane x 2	4.5-6.5	DBST	-
NR46	TrengTrayueng – Kirirom Mountain top	27	1 lane x 2	6.5-9.0	DBST	Completed
NR48-1	SreAmbel – Koh Kong Bridge	153	1 lane x 2	10.0-11.0	DBST	Completed (by Thailand, 2007)
NR48-2	Koh Kong Bridge – Cham Yeam	8	1 lane x 2	15.0 – 20.0	Concrete	Completed (by Thailand)
NR51	VeangChass – ThnalToteoung Market	38	1 lane x 2	10.0-11.0	DBST	Completed (by WB, 2006)
NR52	Ponley – ChhnokTru	8	1 lane x 2	4.5-6.5	DBST (2.0km) /Laterite (6.0km)	-
NR53	KampogChhnang – Prey Chruv	62	1 lane x 2	4.5-9.0	DBST (37.0km) / Laterite (25.0km)	-
NR53A	Phsar – Kdul	29	1 lane x 2	4.5-6.5	Laterite	-
NR53B	Krokor – Komrieng	22	1 lane x 2	4.5-6.5	Laterite	-
NR54	Krakor – Kampong Luong	5	1 lane x 2	4.5-6.5	DBST (2.0km) / Laterite (2.9km)	-
NR55	Pursat – Thma Da	185	1 lane x 2	6.5-9.0	DBST (2.0km) / Laterite (123.2km)/ Gravel (60km)	Requested (China)
NR56	Banteay Mean Chey – OddarMeanchey	114	1 lane x 2	6.5-9.0	DBST (3.0km) / Laterite (110.6km)	-
NR57	Battambang – Thai Border	103	1 lane x 2	6.5-9.0	DBST	Completed (by China, 2012)
NR57B	Thmorkoul – Sampaouloun	90	1 lane x 2	6.5-9.0	DBST	On-going (by China)
NR57B-1	Bovel – Phnom Prek	70	1 lane x 2	6.5-9.0	DBST	On-going (by China)
NR57B-2	Phnum Sam Sep – Kamrieng	16	1 lane x 2	6.5-9.0	DBST	On-going (by China)
NR58	Banteaychey – ThmarDaun	250	1 lane x 2	4.5-6.5	Laterite	Requested (China)
NR59	KounDamrey – Pailin	140	1 lane x 2	6.5-9.0	DBST	On-going (by China)
NR60	SamborChey – Prey Toteng	20	1 lane x 2	4.5-6.5	DBST	-
NR61	PrekKdam – ThnalKeng	16	1 lane x 2	9.0-10.0	AC	On-going (by China)
NR62	ThnalBek on NR6 - Tbeng Mean Chey- PreahVihear Temple	243	1 lane x 2	6.5-9.0	DBST (235.97km) / Concrete (6.69km)	Completed (by China, 2012)
NR63	Siem Reap – Chong Khneas (Phnom Krom)	14	1 lane x 2	6.5-9.0	DBST	-
NR64	Dam Dek – ThnolChek	112	1 lane x 2	6.5-9.0	DBST	-
NR67	RorLours – Chhoarm	134	1 lane x 2	6.5-9.0	DBST	Completed (by Thailand, 2009)
NR68	Kralanh(NR6) – O Smach (Border with Thailand)	117	1 lane x 2	6.5-9.0	DBST	Completed (by Cambodia, 2011)
NR70	Prey Tor Teung – PeamChikong	14	1 lane x 2	4.5-6.5	DBST	Maintained (by RAMP)
NR71	Troeung(NR7) – KompongThmar	58	1 lane x 2	6.5-9.0	DBST	Maintained (by RAMP)
NR72	Krek(NR7) – Smach	13	1 lane x 2	5.0-10.0	DBST	Maintained (by RAMP)
NR73	Pratheat(NR7) – Kratietown	92	1 lane x 2	6.5-9.0	DBST	Maintained (by RAMP)
NR74	Snuol(NR7) – KhumThnou	21	1 lane x 2	6.5-9.0	DBST	Maintained (by RAMP)
NR76	Snuol(NR7) – Senmonorom– O Chheng	306	1 lane x 2	6.5-9.0	DBST	Completed (by China, 2011)
NR78-1	Ou Pong Moan – Bang Lung	122	1 lane x 2	6.5-9.0	DBST	Completed (by China, 2013)
NR78-2	Bang Lung – O YaDav	70	1 lane x 2	6.5-9.0	AC	Completed (by Vietnam, 2008)
NR88	KrarBao – MoeunChey	6	1 lane x 2	4.5-6.5	AC	Not confirmed
Total Length (Km)		3,360				

Source: MPWT 2012, JICA survey team

Table 2.3-8 Existing Condition for Major 3-Digit Road

Major Provincial Road			Existing Condition			Remark
3& 4-Digit Road Section	Location	Length (km)	Number of Traffic lane	Road Width (m)	Type of Pavement	
118A	Nek Leoung – KaamSamnar	43	1-2	4.5-6.5	DBST	-
120	Siem Reap – Kampong Kantort	7	1-2	4.5-6.5	DBST	-
120B	Link NR2 to NR3 in Kandal	10	1-2	4.5-6.5	Earth	-
126	ThnalBekSanloung – Tani	16	1-2	4.5-6.5	DBST	-
1332	Phnom Leav – Lork	13	1-2	4.5-6.5	DBST	-
147	Kampong Speu – TramKnar	35	1-2	4.5-6.5	DBST (3km) / Laterite (31.61km)	-
1577	Pcheav – Sanlot	33	1-2	4.5-6.5	DBST(10km) / Laterite (22.50km)	Requested (China)
258D	KoukNimit – OuBeiChoan	18	1-2	6.5-9.0	DBST	On-going (by China)
264E	Stoung – Peam Athit (PreasVihea)	57	1-2	4.5-6.5	Laterite	-
310	Prey Phnov –PrekSandek	45	1-2	4.5-6.5	Earth	-
312	Lvea – PraosSva	29	1-2	4.5-6.5	DBST	-
312A	Lvea – KorKouk	21	1-2	4.5-6.5	Earth	-
312B	KorAndeuk – Roung	22	1-2	4.5-6.5	Earth	-
312C	KraolKo – KreangLvea	21	1-2	4.5-6.5	Earth	-
314D	SvayTeap – KoasTrach	26	1-2	4.5-6.5	Laterite	-
316A	Chi Pou – Chantrea	14	1-2	4.5-6.5	DBST (5.7Km)/ Laterite (8.63km)	-
316B	Bati – Kandal	17	1-2	4.5-6.5	Laterite	-
372	Memot –Dounroth Ti Muoy	10	1-2	4.5-6.5	Laterite	-
372A	KchheaySatom – Satom	29	1-2	4.5-6.5	Laterite	-
3134	Sangke(NR13) – Bos Morn	10	1-2	4.5-6.5	DBST	-
371	Tonle Bet – Chhloung	90	1-2	4.5-6.5	DBST (27.9Km)/ Laterite (61.61km)	-
378	Dong Kralor – Pak Ke	79	1-2	4.5-6.5	Laterite (50Km) / Earth(29.01)	-
129C+ to NR21	Link NR21 to PR126	41	1-2	4.5-6.5	Laterite	-
PR1551 + 1488	Pramouy – Veal Veang – Koh Kong	96	1-2	4.5-6.5	Laterite (41.17Km)/ Earth (55.23Km)	Requested (China)
2561	SvayChek(NR56) – Chamkarkor	20	1-2	4.5-6.5	Earth	-
2626	ChomKsan Intersection – ChomKsan	35	1-2	4.5-6.5	DBST(27km)/ Conc.(2.1km)/ Laterite(6.18km)	-
2620+264C	KonThnot –TaingKrasaing	95	1-2	4.5-6.5	Laterite	-
2625	Sraem – PhumTomnupdach	31	1-2	4.5-6.5	Earth	-
2668	AnloungVeng – PreasVihear border	48	1-2	4.5-6.5	Laterite	-
2686	Kirivan – AnloungVeng	53	1-2	4.5-6.5	DBST (21.65Km) / Laterite (31.45km)	-
2641A	SvayLeu – Banteaysyei	36	2	4.5-6.5	Laterite	-
2647	ChhaebMuoy – Kampong SralauMuoy	66	1-2	4.5-6.5	Laterite	-
2714	ChamkarLeu(NR71) – StuongTrang	33	1-2	4.5-6.5	DBST	-
3762	MondulKiri – Dak Dam	27	1-2	6.5-9.0	DBST	Completed (by China, 2012)
3764	MondulKiri – PhoumPoulu	28	1-2	4.5-6.5	DBST	-
3764A	BouChry – Oda	12	1-2	4.5-6.5	Laterite	-
3785	Tharangsvay – Pak Ke	61	1-2	4.5-6.5	DBST/Laterite (35.35km)/ Earth (17.76km)	-
3787	Panal – Karmen	12	1-2	4.5-6.5	Laterite	Requested (China)
3RK1	O Chum – Ta Veng	37	1-2	4.5-6.5	Laterite	-
3RK2	TharangSvay – SamaKi	20	1-2	4.5-6.5	Laterite	-
Total Length (Km)		1,382				

Source: MPWT 2012 & JICA survey team

2.3.2 Road Network in Southern Economic Corridor of Cambodia

The survey team has checked the current road conditions of National Road 1, 2, 3, 4, 5, 8, 21, 31, 33, 48, 55,57 and 72 and also reviewed the inventory data as well as the development plans for these roads. Then, the survey results are compiled hereinafter.

(1) National Road 1

National Road 1 (NR 1) is 167 km long in total, in which 60 km in Phnom Penh side is asphalt concrete (AC) pavement and the remaining is double bituminous surface treatment (DBST). Terrain around NR 1 is flat in whole stretch. Longitudinal profile is gentle and elevation is between 3 m to 8 m. Generally road conditions are good and travel speed may be 60 km/hr except the sections with minor pot holes observed in a few stretches between Neak Loeung and Bavet.

As per current road conditions and road development carried out so far or to be carried out shortly, NR 1 is classified as follows.

Table 2.3-9 Section of NR 1

Section		Length	Road width	Remarks
1	Phnom Penh– Monivong Bridge	5 km	(2 lanes + bike) x 2	within Phnom Penh
2	Monivong Bridge – PK 9	4 km	1 lane x 2	to be developed shortly
3	PK 9 – Neak Loeung	51 km	(1 lane + bike) x 2	widened by Japanese grant
4	Neak Loeung	-	Ferry transport	bridge being constructed by Japanese grant
5	Neak Loeung - Bavet	107 km	1 lane x 2	rehabilitated by ADB

Source: JICA survey team

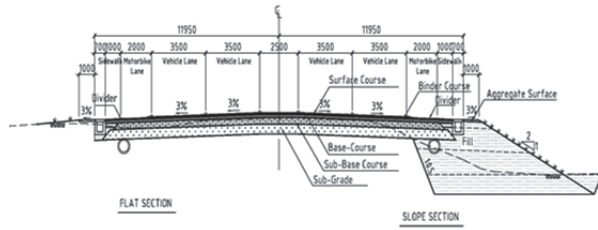
According to the present plan of road development (Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (4th Edition) and other MPWT data), section 2 will be widened to (2 lanes + bike) x 2 directions starting from this year and Neak Loeung Bridge (section 4) will be open to public in year 2015.

It is to note that section 2 and 4 were included in the Follow up Study on the Road Network Development Plan 2009 (herein after as the Follow up Study 2009), as short term plan, and section 5 was to improve to AC, as medium or long term plan.

Photo and cross section in each section is shown below.



Section 2 photo

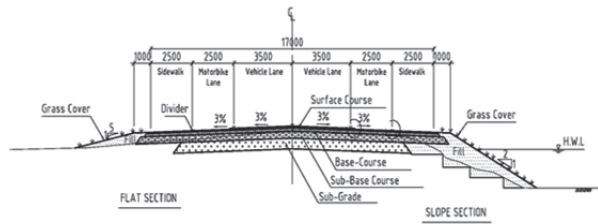


AC 9 cm
BC 15cm
SB 33cm

New Section for Development



Section 3 photo



AC 9 cm
BC 15cm
SB 27-33cm

Developed Section



Section 4 photo

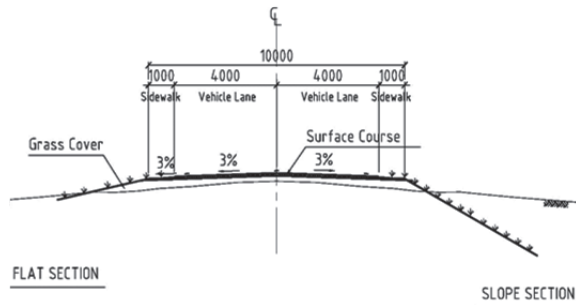


AC 10 cm
BC 13cm
SB 30cm

Bridge at completion



Section 5 photo



Current Section

Source: JICA survey team

Figure 2.3-2 Photo and Section in NR 1

Further details of current conditions of NR 1 are shown in the Straight Line Diagram in Appendix.

Major bridges (length more than 20 m) along NR 1 are shown in the table below.

Table 2.3-10 Bridge List in NR 1

	Location	Length (m)	Span (no)	Type of superstructure
1	PK 5.5	284	11	Balance cantilever
2	PK 48.3	99	3	PCDG
3	PK 53.5	66	2	PCDG
4	PK 65.4	149	6	PCDG
5	PK 88.1	123	6	RCDG / PCDG
6	PK 89.1	47	3	RCS / RCDG
7	PK 90.5	31	2	RCDG
8	PK 125.2	125	6	PCDG
9	PK 135.4	61	4	Steel

Source: JICA survey team

Box culverts and pipe culverts along NR 1 are recorded as 48 nos. and 13 nos. respectively in MPWT inventory.

Street lamp are provided only in Phnom Penh, Svay Rieng and Bavet and other facilities such as road side ditch and center divider are generally non in stretch except Phnom Penh and Bavet.

In addition, the following matters shall be taken into account, when preparing development plan along NR 1.

- Bypass is required at town of Svay Rieng, as houses are closed along NR 1 and current alignment in Svay Rieng town includes sharp curves.
- All bridges shall be widened either at both sides or one side.
- Where flooding occurred in the past in certain stretches, road design in those sections shall be reviewed in order to prevent future flooding by raising road formation and/or providing structures against flooding.

(2) National Road 2

National Road 2 (NR 2) is 120 km long in total which starts from Kbal Thnal intersection (PK 5) to Phnom Den (Cambodia-Vietnam Border or PK 126). NR 2 is classified to three sections, as shown in the table below, based on surface treatment and road width measurement through inventory survey by JICA survey team. Section 1 starts from Kbal Thnal to Takhmau roundabout of 6 km long with AC pavement. Section 2 starts from PK 11 (Takhmau) to first T intersection of NR 2 & NR 22 (Takeo around PK 74) of about 63 km long with DBST pavement, while section 3 starts from Takeo downtown to Phnom Den (Cambodia-Vietnam border) of 50 km long with AC pavement. The geographic condition of the terrain around the NR 2 is generally flat in whole stretch. Longitudinal profile along the road is gentle while elevation is in between 8 m and 11 m, and the lower elevation is found around 4 m from PK 90 to Phnom Den. In addition, road is generally in good condition and travel speed was noticed around 60 km/hr, but some pot holes between PK 10 to PK 20 and deteriorated AC pavement from Takeo to Phnom Den were observed, which shall be taken into account for the future improvement.

Table 2.3-11 Section of NR 2

Section	length	Road width	Remarks
1	Kbal Thnal intersection – Takhmau Roundabout	6 km	(2 lanes + bike) x 2 within Phnom Penh and Takhmau City
2	Takhmau Roundabout – PK74	64 km	1 lane x 2 rehabilitated by ADB FS to upgrade into AC by Korea
3	PK 74 – Phnom Den (Cambodia-Vietnam Border)	50 km	1 lane x 2 rehabilitated by Japanese Counter Part Fund

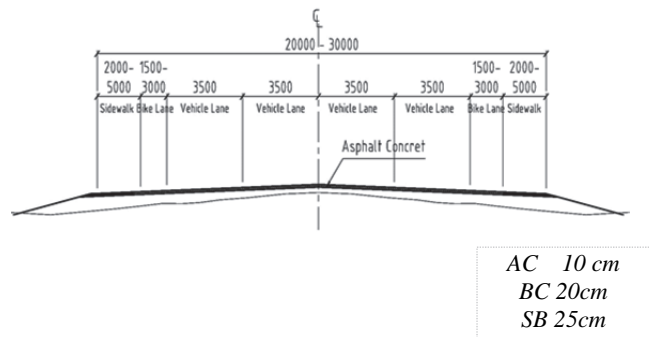
Source: JICA survey team

According to the present plan of road development (Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (4th Edition) and other MPWT data), section 2 is under feasibility study for improvement (to be AC pavement). This was also included in the Follow up Study 2009, as long term plan.

Photo and cross section at specific PK which represents each section width are shown below.



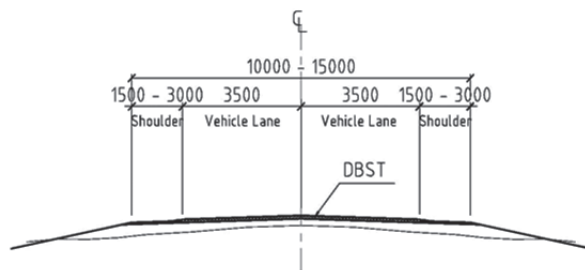
Section 1 photo (PK 10)



Current Section



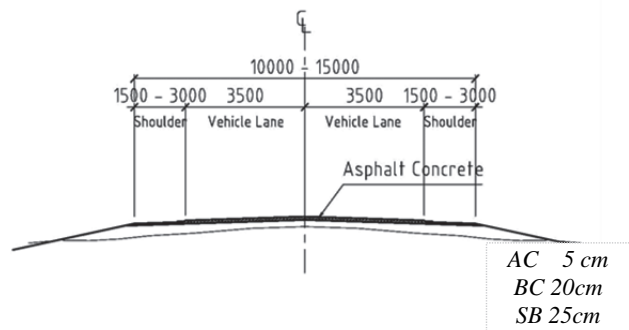
Section 2 photo(PK 15)



Current Section



Section 3 photo(PK 80)



Current Section

Source: JICA survey team

Figure 2.3-3 Photo and Section in NR 2

Further details of current conditions of NR 2 are shown in the Straight line Diagram in Appendix. Along the NR 2, there are 15 bridges which were RC girders or RC slab and bailey bridges. Table below shows only bridges with length of 20 m or longer along the NR 2.

Table 2.3-12 Bridge List in NR 2

	Location	Length (m)	Span (no)	Type of superstructure
1	PK 11.1	74	4	RCDG
2	PK 11.2	83	4	H Steel Girder with Concrete Slab
3	PK 14.5	108	4	PCDG
4	PK 18.0	60	3	PCH
5	PK 63.5	31	1	Bailey (Steel)
6	PK 64.9	46	3	Steel
7	PK 85.7	24	1	RCDG
8	PK 95.4	24	1	RCDG

Source: JICA survey team

Taking into account other drainage systems as box and pipe culverts along NR 2, they were recorded as 45 nos. and 67 nos. respectively in MPWT inventory.

Street lamps are provided only in Phnom Penh, Takhamu and Takeo. Other facilities such as road side ditches etc. are generally non in stretch, but center dividers are installed in Phnom Penh and Takeo.

In order to take into account for road development plan in the future, the following matters have been identified by the survey team:

- Electric poles are observed inside the residential area of certain sections from Takhmau to Takeo.
- Bailey and short span bridges were in bad condition from Takhmau to Takeo and shall be reviewed.
- Where flooding occurred in the past at sections in Kandal Province, road design in those sections shall be reviewed in order to prevent future flooding by raising road formation and/or providing structures against flooding.
- AC surface pavements shall be treated immediately from Takeo to Phnom Den, because of destruction from heavy vehicles.
- Pot holes were observed in DBST surface, which is to be repaired in due course.

(3) National Road 3

National Road 3 (NR 3) is 201 km long in total, in which 12 km in Phnom Penh side is AC pavement and the remaining is DBST. Terrain around NR 3 is flat in whole stretch. Longitudinal profile is rolling and elevation is between 8 m to 36 m. Generally road conditions are good and travel speed may be 60 km/hr except the sections with minor pot holes observed in a few stretches between Phnom Penh and Kampot. But from Kampot to Trapeang Ropao, road conditions are only fair and travel speed may be 40 km/hr, because road is under repair and many pot holes are observed in a few stretches. The remaining, from Trapeang Ropao to Veal Renh, are generally good conditions except the sections under repair and many pot holes at approach to bridges.

As per current road conditions and road development carried out so far or to be carried out shortly, NR 3 is classified as follows.

Table 2.3-13 Section of NR 3

Section	length	Road width	Remarks
1	Phnom Penh – Chom Chao	12 km	(2 lanes + bike) x 2
2	Chom Chao – Kampot	137 km	1 lane x 2
3	Kampot – Trapeang Ropao	33 km	1 lane x 2
4	Trapeang Ropao – Veal Renh	19 km	1 lane x 2

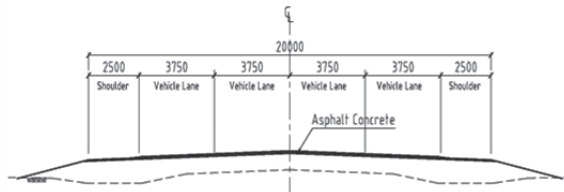
Source: JICA survey team

According to the plan of road development in MPWT, section 3 and 4 will be complete in 2013.

Photo and cross section in each section is shown below.



Section 1 photo

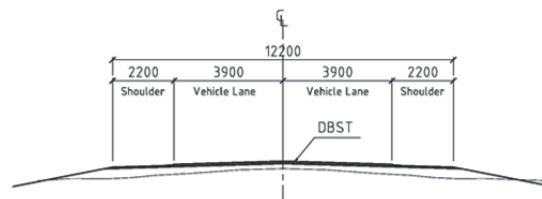


AC 10cm

Current Section



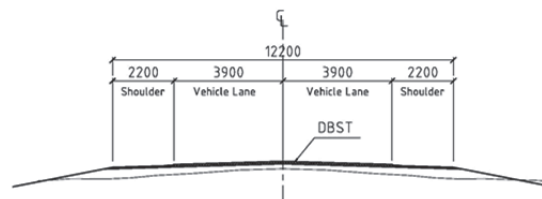
Section 2 photo



Current Section



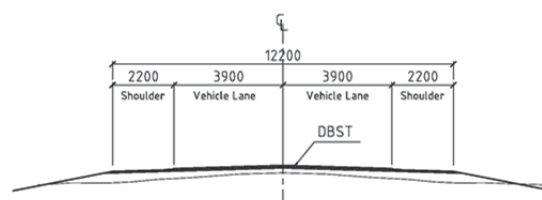
Section 3 photo



Current Section



Section 4 photo



Current Section

Source: JICA survey team

Figure 2.3-4 Photo and Section in NR 3

Further details of current conditions of NR 3 are shown in the Straight Line Diagram in Appendix.

Major bridges (length more than 20 m) along NR 3 are shown in the table below.

Table 2.3-14 Bridge List in NR 3

	Location	Length (m)	Span (no)	Type of superstructure
1	PK 22.7	53	3	PCH
2	PK 23.5	80	6	PCH
3	PK 23.8	81	4	Steel
4	PK 25.8	47	3	PCH
5	PK 65.4	110	4	PCDG
6	PK 66.7	62	3	PCH
7	PK 105.9	58	2	PCH
8	PK 107.1	32	1	PCH
9	PK 116.0	47	3	RCS
10	PK 145.8	34	1	RCS
11	PK 148.8	290	6	Steel
12	PK 150.1	25	1	RCS
13	PK 161.3	25	2	RCS
14	PK 162.1	57	2	PCH
15	PK 165.7	25	1	RCS
16	PK 170.1	57	2	PCH
17	PK 174.0	50	2	PCH
18	PK 176.7	50	2	PCH
19	PK 180.9	47	2	PCH
20	PK 184.0	32	1	PCH
21	PK 186.5	40	2	PCH
22	PK 187.7	36	2	PCH
23	PK 188.5	40	2	PCH
24	PK 196.5	180	6	PCDG

Source: JICA survey team

Box culverts and pipe culverts along NR 3 are recorded as 213 nos. and 669 nos. respectively in MPWT inventory.

Street lamps are provided only in Phnom Penh and Veal Renh and other facilities such as road side ditch and center divider are generally non in stretch except certain sections.

In addition, the following matters shall be taken into account, when preparing development plan along NR 3.

- Bypass is required at town of Kampot, as houses are closed along NR 3 and current alignment in the town includes sharp curves.
- All bridges shall be widened either at both sides or one side.
- When flooding occurred in the past in certain stretches, road design in those sections shall be reviewed in order to prevent future flooding by raising road formation and/or providing structures against flooding.

(4) National Road 4

National Road 4 (NR 4) is 214 km long in total which starts from Chaom Chao(PK 12) to Sihanoukville City (PK 226). NR 4 is classified in three sections as shown in the table below, based on road width measurement through inventory survey by JICA survey team. Section 1 starts from PK 12 (Chaom Chao roundabout) to PK 25 (Thnal Tor-Toeung) of about 13 km long with 4 lane road. Section 2 starts from PK 25 to PK 45 of about 20 km long in which major portion of road section is 3 lanes road (this means 2 lanes + 1 lane), while section 3 starts from PK 45 to PK 226 (Sihanoukville city) of 181 km with 2 lanes road. As per the inventory carried out, first or original lane of road section is AC pavement and second lane is DBST.

It is to note that NR 4 is being maintained and repaired by the company signed in the Concession Contract with the Royal Government of Cambodia (RGC) since year 2001 for 35 years. The company also built gates to charge toll rates to users. Toll charge is shown in **Table 5.4-1** in **Section 5.4** together with other cases in Cambodia. Toll gates are shown in the figure below. In accordance with the contract, the company ought to pave road shoulders with AC for 25 km from Choam Chaou and seems to widen road further, if congested. It is unclear in the contract, but the second lane stated above may be paved with AC instead of DBST so far done. In other words, DBST is only temporary measures and would be replaced with AC in future.



Source: JICA survey team

Figure 2.3-5 Toll Gates in NR 4

Taking into account the geographic condition of the terrains around NR 4, it is generally flat from starting point to PK 90, but the mountainous and rolling terrain are from PK 90 up to Sihanoukville city, while terrain in certain sections is observed flat as well. The longitudinal profile of the road is fluctuated in whole stretch with the lowest elevation is 2 m (nearby Chaom Chao roundabout) and highest one is around 63 m at Pich Nil mountainous area. It was observed during the survey that heavy trucks drive slowly (20-30 km/hr) in mountainous area where vertical profile is steep, and truck lanes have been and are being provided in two locations for smooth traffic flow. Other than those, road conditions are good paved and travel speed outside of downtown is around 80 km/hr for cars and 40-50 km/hr for heavy trucks.

Table 2.3-15 Section of NR 4

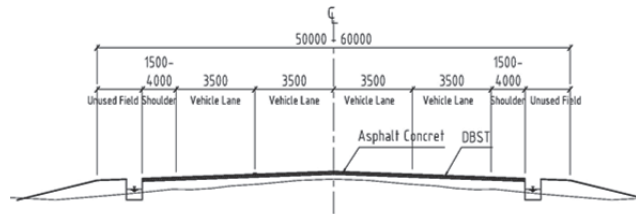
Section	length	Road width	Remarks
1 Chaom Chao Roundabout – PK25 (Thnal TorTeung)	13 km	2 lanes x 2	developed by USA; maintained by the private company
2 PK 25 (Thnal TorTeung) – PK45	20 km	2 lanes + 1 lane	developed by USA; maintained by the private company
3 PK 45 – PK 226	181 km	1 lanes x 2	developed by USA; maintained by the private company

Source: JICA survey team

Photo and cross section in each section is shown below.



Section 1 photo (PK 12)

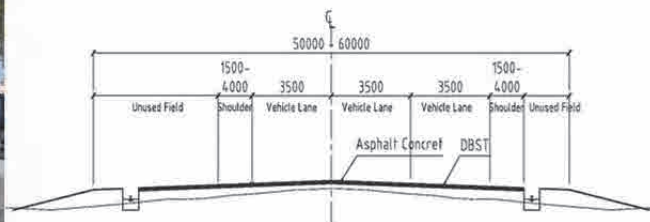


AC 10 cm,
AC 7 cm for overlay

Current Section



Section 2 photo(PK 30)

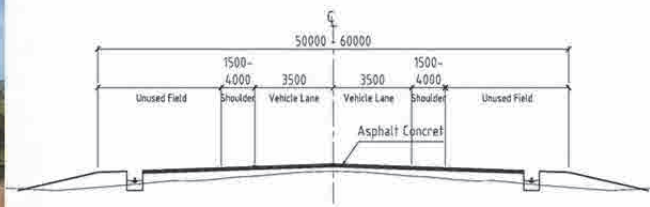


AC 10 cm,
AC 7 cm for overlay

Current Section



Section 3 photo(PK60)



AC 10 cm,
AC 7cm for overlay

Current Section

Source: JICA survey team

Figure 2.3-6 Photo and Section in NR 4

Further details of current conditions of NR 4 are also shown in the Straight Line Diagram in Appendix.

According to the Follow up Study 2009, NR 4 would be widened to (2 lanes + bike) x 2 directions with AC pavement for whole stretch as medium and long term plan.

There are 30 bridges in total along the NR 4 and some are found cracks or damaged by heavy vehicles. The bridges at PK 110.1, PK 131.1, PK 152.9, PK 167.6 and PK 205.0 shall be reviewed in due course. It was also observed that repairing to RCS and RCDG bridges are being conducted in PK 110.1 and PK 131.1. The table below shows bridges with length more than 20 m.

Table 2.3-16 Bridge List in NR 4

	Location	Length (m)	Span (no)	Type of superstructure
1	PK 38.1	57	4	RCDG
2	PK 47.5	45	3	RCDG
3	PK 50.0	110	5	RCDG
4	PK 57.7	23	1	RCS
5	PK 76.5	67	3	PCDG
6	PK 89.2	22	1	RCS
7	PK 106.9	22	1	RCDG
8	PK 110.1	32	2	RCS
9	PK 116.0	33	1	RCDG
10	PK 116.3	44	3	RCDG
11	PK 131.1	60	5	RCDG
12	PK 138.4	48	2	PCDG
13	PK 152.9	44	3	RCDG
14	PK 156.4	32	2	RCDG
15	PK 163.7	22	1	RCS
16	PK 167.6	48	2	PCDG
17	PK 170.2	22	1	RCS
18	PK 184.1	28	2	RCS
19	PK 185.6	20	1	RCS
20	PK 187.8	22	1	RCS
21	PK 190.0	28	3	RCS
22	PK 194.7	20	1	RCS
23	PK 195.0	20	1	RCS
24	PK 197.4	20	1	RCS
25	PK 202.8	22	1	RCS
26	PK 205.0	132	10	RCDG

Source: JICA survey team

Box culverts and pipe culverts along NR 4 are recorded as 44 nos. and 168 nos. respectively in MPWT inventory.

Street lamps are provided only in Phnom Penh and Sihanoukville and other facilities such as road side ditch and center divider are generally non in stretch except certain sections.

In addition, the following issues and problems for NR 4 have been identified by the survey team:

- Cracks and damaged piers are found at some bridges. It is recommended that bridges along NR 4 shall be checked for ensuring their quality. Damaged bridges are shown below as example.
- There are some sections with three lanes (2 lanes + 1 lane) without center divider, which make driver confuse and therefore countermeasure shall be taken in due course.
- There is no separated lane for heavy truck which hampers light and faster traffic. Two lanes for both ways are necessary for future plan.
- The traffic safety shall be concern for NR 4 traffic, especially at night. It is recommended that traffic safety facilities and street lamps shall be installed for certain sections and vehicle drivers shall strictly follow traffic rules.



Bridge at PK 110.1



Bridge at PK 152.9

Source: JICA survey team

Figure 2.3-7 Cracks and Damages of Bridges in NR 4

(5) National Road 5

National Road 5 (NR 5) is 407 km long in total, in which 13 km in Phnom Penh side and 47 km between Sri Sophorn and Poipet is AC pavement and the remaining is DBST. Terrain around NR 5 is flat in whole stretch. Longitudinal profile is gentle and elevation is around 10 m. Generally road conditions in DBST are not very good as there are pot holes and depresses observed in certain sections, whereas conditions in AC pavement are good and travel speed may be 60 km/hr.

As per current road conditions and road development carried out so far or to be carried out shortly, NR 5 is classified as follows.

Table 2.3-17 Section of NR 5

Section		Length	Road width	Remarks
1	Phnom Penh – Prek Kdam	30 km	1 lane x 2	being widened to (2 lanes + bike) x 2 directions by China
2	Prek Kdam – Thlea Maorm	139 km	1 lane x 2	FS being carried out by Japan
3	Thlea Maorm – Battambang	123 km	1 lane x 2	FS to be carried out shortly
4	Battambang – Sri Sophorn	68 km	1 lane x 2	LA to sign shortly
5	Sri Sophorn – Poipet	47 km	(1 lane + bike) x 2	developed by ADB

Source: JICA survey team

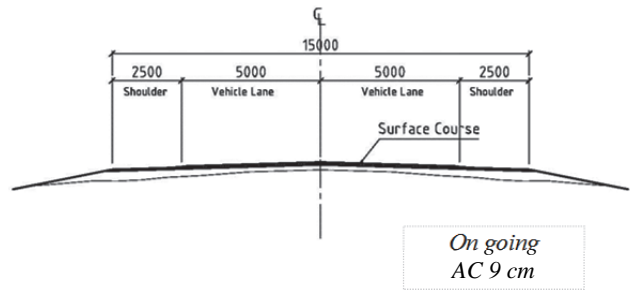
According to the present plan of road development (Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (4th Edition) and other MPWT data), section 1 is being widened to (2 lanes + bike) x 2 directions, starting from last year and completing in year 2014. Feasibility study is being carried out by JICA in section 2 and would be commenced in section 3 shortly. Feasibility study in section 4 has been complete and loan agreement between RGC and Japanese Government would be signed at the beginning of 2013. As road width with 2 lanes x 2 directions has been confirmed in section 4, similar road width in section 2 and 3 may be recommended and likely to confirm.

It is to note that section 1 and 2 in **Table 2.3-17** was included for development to 2 lanes x 2 directions with AC in the Follow up Study in 2009, as short to long term plan, whereas section 3 and 4 was for development with AC only.

Photo and cross section in each section is shown below.



Section 1 photo

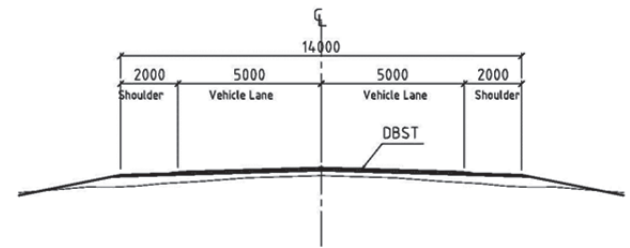


Current Section

On going
AC 9 cm



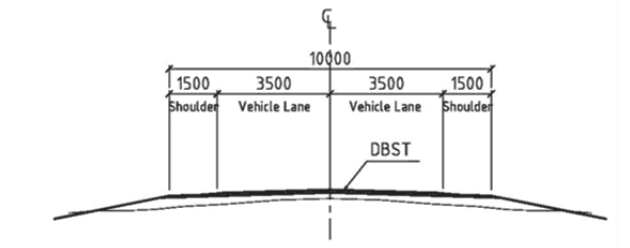
Section 2 photo



Current Section



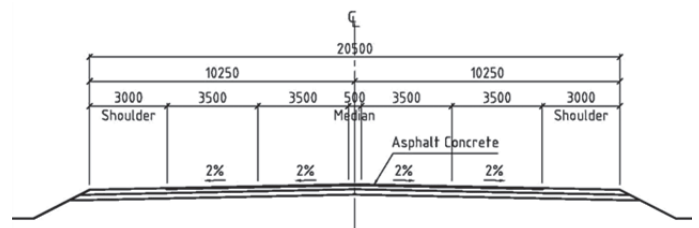
Section 3 photo



Current Section



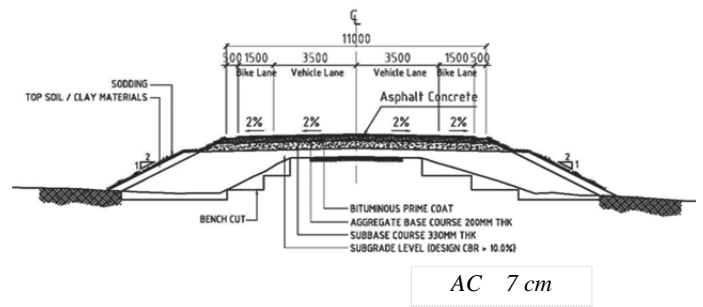
Section 4 photo



New Section for Development



Section 5 Photo



AC 7 cm

Current Section

Source: JICA survey team

Figure 2.3-8 Photo and Section in NR 5

Further details of current conditions of NR 5 are shown in the Straight Line Diagram in Appendix.

Major bridges (more than 30 m long) along NR 5 are shown in the table below.

Table 2.3-18 Bridge List in NR 5

	Location	Length (m)	Span (no)	Type of superstructure
1	PK 12.5	38	1	Steel
2	PK 21.5	36	3	Steel
3	PK 24.5	85	3	Steel
4	PK 83.5	43	2	Steel
5	PK 106.3	91	4	Steel
6	PK 116.6	71	3	Steel
7	PK 171.6	41	3	Steel
8	PK 182.9	42	2	PCH
9	PK 183.3	51	3	RCDG
10	PK 184.0	42	2	PCH
11	PK 185.6	121	6	PCDG
12	PK 187.6	39	2	RCDG
13	PK 187.8	31	2	PCH
14	PK 188.1	61	3	PCH
15	PK 188.3	52	3	PCH
16	PK 189.2	37	2	PCH
17	PK 191.1	31	2	PCH
18	PK 208.4	34	2	PCH
19	PK 215.7	46	3	Steel
20	PK 219.5	99	3	Steel
21	PK 220.6	31	2	PCH
22	PK 242.8	37	2	PCH
23	PK 244.5	31	2	PCH
24	PK 255.6	30	2	PCH
25	PK 273.3	30	2	PCH
26	PK 303.3	30	1	Steel
27	PK 333.8	34	2	PCH
28	PK 351.5	43	3	PCH
29	PK 358.2	77	3	PCDG
30	PK 365.5	102	4	PCDG

Source: JICA survey team

Box culverts and pipe culverts along NR 5 are recorded as 124 nos. and 309 nos. respectively in MPWT inventory.

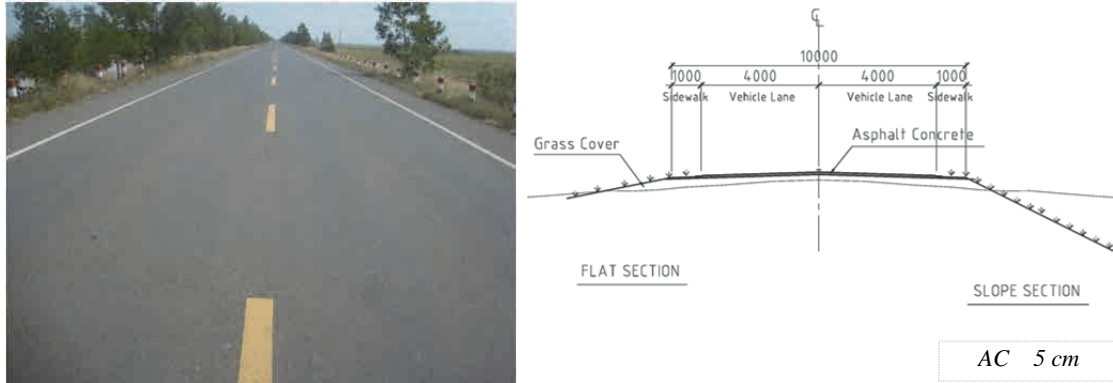
Street lamps are provided only in Phnom Penh, Pursat and Battambang and other facilities such as road side ditch and center divider are generally non in stretch except certain sections.

In addition, the following matters shall be taken into account, when preparing development plan in section 2 to 5 in **Table 2.3-17** between Prek Kdam and Poipet along NR 5.

- Bypass is required at town of Kampong Chhnang, Battambang and Sri Sophorn.
- Bridges shall be widened either at both sides or one side.
- Flooding has been experienced in year 2011 between PK 40 and PK 90 and where flooding occurred in the past, design in those sections shall be reviewed in order to prevent future flooding by raising road formation and/or providing structures against flooding.

(6) National Road 8

National Road 8 (NR 8) is an AC road of 128 km long and 4 m width in each direction, which runs from Prek Ta Meak Bridge to National Road 7 at Ponhea Kraek. It is a one lane road which lies over flat terrains. Basically, the road condition for the whole road length is very good, including its pavement and shoulder condition as shown in the photo below.



Section photo

Current Section

Source: JICA survey team

Figure 2.3-9 Photo and Section in NR 8

Further details of current conditions of NR 8 are given in the Straight Line Diagram in Appendix.

More than 20 major bridges have been constructed along NR 8 as listed in the table below.

Table 2.3-19 Bridge List in NR 8

	Location	Length (m)	Span (no)	Type of superstructure
1	PK 29.9	85	4	PCH
2	PK 30.5	103	5	PCH
3	PK 31.3	184	9	PCH
4	PK 32.1	85	4	PCH
5	PK 33.5	85	4	PCH
6	PK 34.0	85	4	PCH
7	PK 34.5	85	3	PCH
8	PK 44.6	104	5	PCH
9	PK 45.7	65	3	PCH
10	PK 46.9	144	7	PCH
11	PK 48.2	104	5	PCH
12	PK 51.7	164	8	PCH
13	PK 56.3	186	9	PCH
14	PK 60.5	64	3	PCH
15	PK 61.3	144	7	PCH
16	PK 62.6	85	4	PCH
17	PK 64.6	124	6	PCH
18	PK 65.5	85	4	PCH
19	PK 67.1	163	7	PCH
20	PK 68.2	64	3	PCH
21	PK 75.6	144	7	PCH
22	PK 110.5	104	5	PCH
23	PK 116.4	65	3	PCH
24	PK 125.9	65	3	PCH
25	PK 131.3	65	3	PCH

Source: JICA survey team

According to MPWT inventory data, there are 14 Box culverts and 115 pipe culverts along this national road.

Generally, there is not much traffic passing through this road currently and the electricity pole has only been installed at one side of the road.

It is to note that section from Prek Ta Meak to NR 11 (approximately 64 km) was included for development to 2 lanes x 2 directions in the Follow up Study in 2009, as medium to long term plan.

(7) National Road 21

National Road 21 (NR 21) is 66 km long in total starting from Takhmau roundabout (at the junction of NR 2) to Chrey Thom (Cambodia-Vietnam border) along the Mekong River, in which 4 km in Takmau side is AC pavement and the remaining is DBST. Terrain around NR 21 is generally flat and it is observed that residents are living along the road up to the border. With geographic profile, longitudinal profile is gentle and elevation is between 3 m to 6 m. Generally, road conditions are good and travel speed may be around 60 km/hr but there are some pot holes found from PK 20 up to the border.

As per road surface conditions checked by the survey team, NR 21 is classified as follows.

Table 2.3-20 Section of NR 21

Section		Length	Road width	Remarks
1	Takhmau Roundabout- PK 4	4 km	1 lane x 2	within Takhmau town, Kandal Province
2	PK 4 - Chrey Thum	62 km	1 lane x 2	rehabilitated by ADB requested to AC by Korea

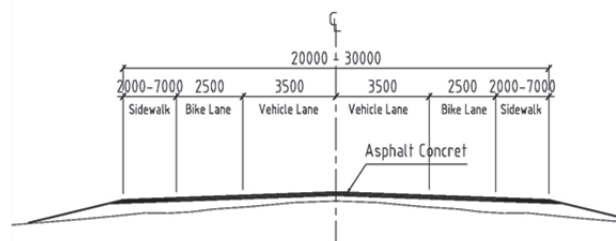
Source: JICA survey team

According to the present plan of road development (Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (4th Edition) and other MPWT data), consultant for detail design (improving to AC pavement) for section 2 is being selected. In the Follow up Study in 2009, section 2 would be developed to AC pavement as long term plan, too.

Photo and cross section in each location is shown below.



Section 1 photo(PK1.5)



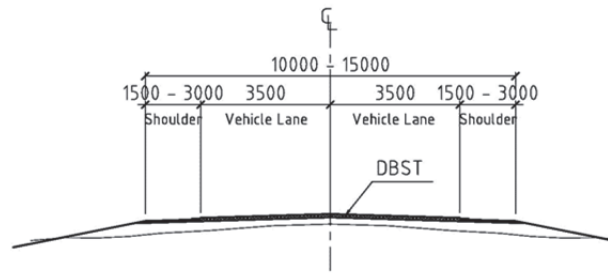
AC 5 cm

Current Section



Section 2 photo(PK5)

Source: JICA survey team



Current Section

Figure 2.3-10 Photo and Section in NR 21

The details of current conditions of NR 21 are also shown in the Straight Line Diagram in Appendix.

There are around 55 bridges along NR 21. Major bridges with 30 m and longer are shown in the table below.

Table 2.3-21 Bride List in NR 21

	Location	Length (m)	Span (no)	Type of superstructure
1	PK 11.8	36	3	H Steel Beam with Concrete Slab
2	PK 24.5	48	3	H Steel Beam with Concrete Slab
3	PK 26.6	50	4	RCDG
4	PK 30.9	88	5	Steel
5	PK 42.7	77	4	RCDG
6	PK 45.8	30	2	Steel
7	PK 47.2	30	2	RCDG
8	PK 49.2	48	2	Steel
9	PK 49.7	36	3	Steel
10	PK 56.4	110	5	Steel
11	PK 58.7	36	2	Steel
12	PK 59.7	36	2	Steel
13	PK 62.1	49	2	Steel
14	PK 62.8	48	2	Steel
15	PK 63.8	36	2	Steel

Source: JICA survey team

Box culverts and pipe culverts along NR 21 are recorded as 20 nos. and 5 nos. respectively in MPWT inventory.

Street lamps are provided only in Takhmau town and other facilities such as road side ditch and center divider are generally non in stretch except certain sections.

In addition, the following issues and problems for NR 21 have been identifies by the survey team:

- There are electric poles inside the residential area in certain section.
- Some portion of road and bridge are damaged by heavy vehicles.
- The road is along the Mekong River and flooding has been experienced in year 2011 at PK 40 and where flooding occurred in the past, road design in those sections shall be reviewed in

order to prevent future flooding by raising road formation and/or providing structures against flooding.

- There is no bridge across the river at the border to ease transportation between Cambodia and Vietnam

(8) National Road 31

National Road 31 (NR 31) is 55 km long in total, in which all is DBST. Terrain around NR 31 is flat in whole stretch. Longitudinal profile is gentle and elevation is between 9 m to 25 m. Generally, road conditions are only fair and travel speed may be 40 km/hr except roads and bridges under rehabilitation observed in a few stretches between Voat Kus and Kampong Trach.

As per current road conditions and road development carried out so far, NR 31 is shown below.

Table 2.3-22 Section of NR 31

Section	Length	Road width	Remarks
1 Voat kus (PK 0) – Kampong Trach (PK 54)	54 km	1 lane x 2	being rehabilitated by Korea

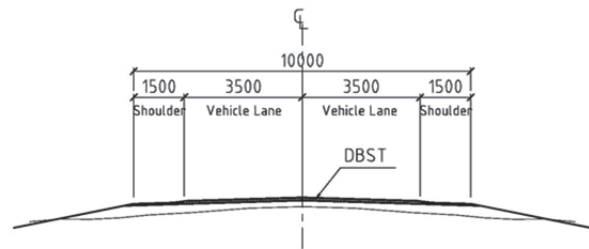
Source: JICA survey team

According to the present rehabilitation plan, section 1 will be complete in year 2013.

Photos and cross sections are shown below.



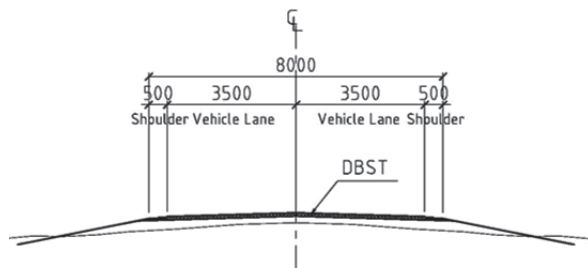
Section 1 photo PK 10



Current Section



Section 1 photo PK 45



Current Section

Source: JICA survey team

Figure 2.3-11 Photo and Section in NR 31

Further details of current conditions of NR 31 are shown in the Straight Line Diagram in Appendix.

Bridge along NR 31 is shown in the table below.

Table 2.3-23 Bridge List in NR 31

Location	Length (m)	Span (no)	Type of superstructure
1 PK 37+450	54	3	Steel (arch)

Source: JICA survey team

Street lamps are provided only in Voat Kus and other facilities such as road side ditch and center divider are generally non in stretch except certain sections.

In addition, the following matters shall be taken into account, when preparing development plan along NR 31.

- Bridges shall be widened either at both sides or one side.
- When flooding occurred in the past, road design in those sections shall be reviewed in order to prevent future flooding by raising road formation and/or providing structures against flooding.

(9) National Road 33

National Road 33 (NR 33) is 52 km long in total, in which all is DBST. Terrain around NR 33 is flat in whole stretch. Longitudinal profile is gentle and elevation is between 8 m to 11 m. Generally road conditions are only fair and travel speed may be 40 km/hr except roads and bridges under rehabilitation observed in a few stretches between Kampot to Kampong Trach.

As per current road conditions and road development carried out so far, NR 33 is classified as follows.

Table 2.3-24 Section of NR 33

	Section	Length	Road width	Remarks
1	Kampot – Kampong Trach	37 km	1 lane x 2	being rehabilitated by Korea
2	Kampong Trach – Ha Tien	15 km	1 lane x 2	being rehabilitated by ADB

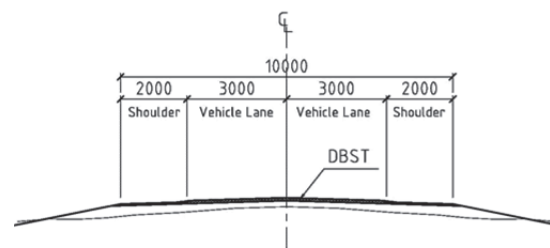
Source: JICA survey team

According to the present rehabilitation plan, section 1 and 2 will be complete in year 2013.

Photos and cross sections in each section are shown below.



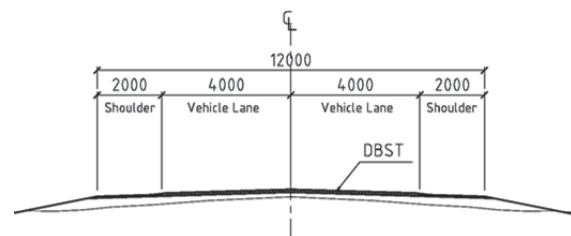
Section 1 photo PK 5



Current Section



Section 2 photo PK 41



Current Section

Source: JICA survey team

Figure 2.3-12 Photo and Section in NR 33

Further details of current conditions of NR 33 are shown in the Straight Line Diagram in Appendix.

Major bridge along NR 33 is shown in the table below.

Table 2.3-25 Bridge List in NR 33

Location		Length (m)	Span (no)	Type of superstructure
1	PK 4.8	91	5	RCDG

Source: JICA survey team

Street lamp is not provided and other facilities such as road side ditch and center divider are generally non in stretch

In addition, the following matters shall be taken into account, when preparing development plan along NR 33.

- Bridges shall be widened either at both sides or one side.
- Where flooding occurred in the past, road design in those sections shall be reviewed in order to prevent future flooding by raising road formation and/or providing structures against flooding.

(10) National Road 48

National Road 48 (NR 48) is approximately 161 km long in total and starts from Sre Ambel Intersection (PK 0) at NR 4 and NR48 to Cham Yeam (Cambodia-Thaland border), in which 152 km from PK 0 to the end of Koh Kong bridge is DBST and the remaining is concrete pavement. Terrain around NR 48 is generally mountainous and it is observed that residents do not live along the road except some towns. It was observed during the survey that heavy trucks drive slowly (20-30 km/hr) in mountainous area where vertical profile is steep, and it is recommended that truck lanes would be provided in those parts for smooth traffic flow when upgrading, by referring the Road Structure Ordinance of Japan and/or American Association of State Highway and Transportation Officials (AASHTO) of USA etc. Other than that, road conditions are good and travel speed may be around 60 km/hr except certain sections with pot holes observed along the road.

As per road inventory carried out by the survey team on current conditions, NR 48 is classified as follows.

Table 2.3-26 Section of NR 48

Section		length	Road width	Remarks
1	PK 0(Sre Ambel Intersection)– End of Koh Kong Bridge	153 km	1 lanes x 2	rehabilitated by Thailand
2	End of Koh Kong Bridge- Cham Yeum Border	8 km	1 lane x 2 (wide lane)	-

Source: JICA survey team

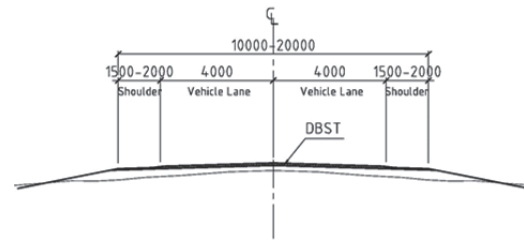
It was found that there is toll gate to charge toll at Koh Kong Bridge, as the bridge was constructed under Build-Operate-Transfer (BOT) scheme. Toll charge is shown in **Table 5.4-2** in **Section 5.4** together with other cases in Cambodia.

According to the information from MPWT staff, NR 48 would be improved with assistance of Thailand and/or Korea.

Photos and cross sections in each section are shown below.



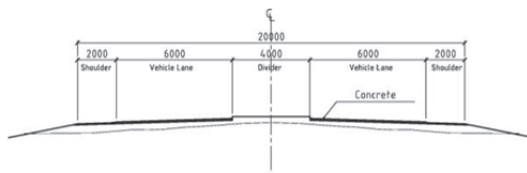
Section 1 photo(PK 70)



Current Section



Section 2 photo(PK 155)



Current Section

Source: JICA survey team

Figure 2.3-13 Photo and Section in NR 48

Further details of current conditions of NR 48 are shown in the Straight Line Diagram in Appendix.

Major bridges along NR 48 with 30m or longer are shown in the table below.

Table 2.3-27 Bridge List in NR 48

Location	Length (m)	Span (no)	Type of Superstructure	
1	PK12.2	433	14	PCDG
2	PK19.3	30	3	RCS
3	PK21.0	50	5	RCS
4	PK24.3	30	3	RCS
5	PK33.4	60	6	RCS
6	PK44.1	40	4	RCS
7	PK49.9	285	9	PCDG
8	PK74.2	30	3	RCS
9	PK84.3	30	3	RCS
10	PK90.1	467	15	PCDG
11	PK130.1	403	13	PCDG
12	PK142.1	40	4	RCS
13	PK151.6	1720	94	PCDG (Kong Kong Bridge)

Source: JICA survey team

Box culverts and pipe culverts along NR 48 are recorded as 30 nos. and 152 nos. respectively in MPWT inventory.

Street lamps are provided only in Koh Kong and other facilities such as road side ditch and center divider are generally non in stretch except certain sections.

In addition, when preparing development plan along NR 48, RCS bridges shall be ensured their quality in case of future freight traffic along the road, and road pavement condition shall be strengthened for the effectiveness as well. Meanwhile there is only Koh Kong Bridge across the sea and its width is not enough for future freight traffic, so alternative bridge or other transport infrastructure shall be considered.

(11) National Road 55

National Road 55 (NR 55) runs between Pursat of NR 5 and Thmar Da of Thai border and length is 185 km in total. NR 55 is located in flat, hill and mountainous area of the western part of Cambodia. The elevation of Pursat town side is between 15 m to 30 m up to 30 km and the highest elevation in mountainous area reaches 900 m. Road surface of NR 55 has been treated to either laterite or gravel.

There is National Road 155 (NR 155), running parallel to NR 55 and linking to NR 5. NR 155 is DBST pavement and about 30 km long in total from NR 5.

As per road inventory survey, NR 55 is classified as follows.

Table 2.3-28 Section of NR 55

	Section	length	Road width	Remarks
1	Junction NR 5 – Junction NR 155	30 km	1 lane x 2	DBST & laterite
2	Junction NR 55 and NR 155 – PK 90	60 km	1 lane x 2	laterite
3	PK 90 – PK 150	60 km	1 lane x 2	gravel
4	PK 150 – PK 180	35 km	1 lane x 2	laterite

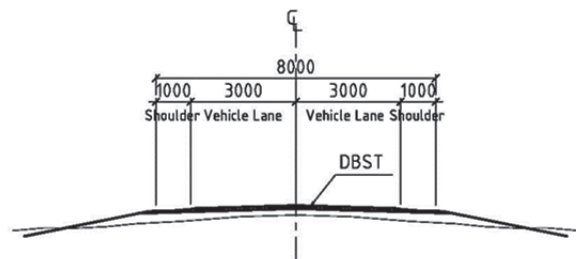
Source: JICA survey team

According to the present plan of road development (Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (4th Edition) and other MPWT data), improvement work on NR 55 would start in year 2013 by China loan. It is recommended that truck lane would be provided in parts of steep profile for smooth traffic flow, by referring the Road Structure Ordinance of Japan and/or AASHTO of USA etc., when carrying out improvement.

Photo and cross section in each location is shown below.



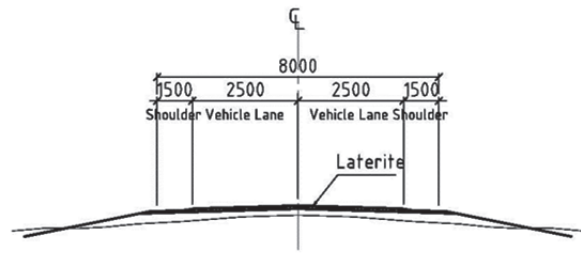
Section 1 photo (PK 1 km)



Current Section



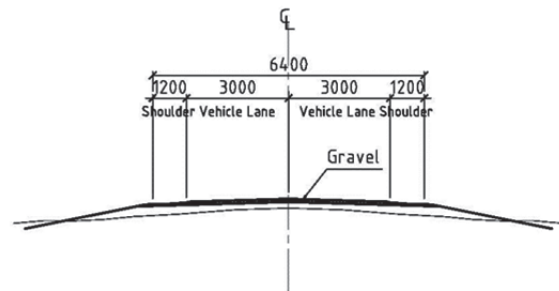
Section 2 photo (PK 60 km)



Current Section



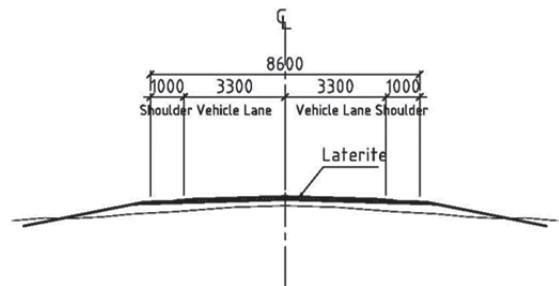
Section 3 photo (PK 125 km)



Current Section



Section 4 photo (PK 170 km)



Current Section

Source: JICA survey team

Figure 2.3-14 Photo and Section in NR 55

Further details of current conditions of NR 55 are shown in the Straight Line Diagram in Appendix.

Major bridges along NR 55 are shown in the table below.

Table 2.3-29 Bridge List in NR 55

	Location	Length (m)	Type of superstructure
1	PK 35.4	24	Baily
2	PK 53.5	24	Baily
3	PK 160.0	68	Baily

Source: JICA survey team

There are more than one hundred twenty baily bridges, nine timber bridges and one low water bridge. The survey team observed the baily bridge collapsed at PK 118 during the road inventory

survey.

Photos of bridge condition in each location are shown below.



PK 35.4



PK 53.5



PK 118.0



PK 160.0

Source: JICA survey team

Figure 2.3-15 Photo of Bridge in NR 55

It is to note that whole NR 55 was included for development in the Follow up Study in 2009, as medium or long term plan.

(12) National Road 57

National Road 57 (NR 57) is 103 km long in total which is located in flat, rolling terrain hill and mountainous area of the northwest part of Cambodia. The route connects to Pailin town in Battambang province and Thai border. The road of whole section is DBST and good condition.

As per road inventory survey, NR 57 is shown below.

Table 2.3-30 Section of NR 57

Section	length	Road width	Remarks
Junction(Jct.) NR 5 – PK 103	103 km	1 lane x 2	DBST

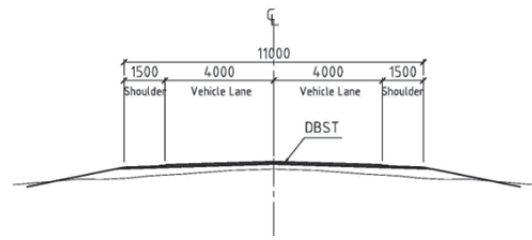
Source: JICA survey team

According to the present plan of road development (Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (4th Edition) and other MPWT data), the construction work has been complete in year 2012 by China.

Photos and cross section in each location are shown below.



photo (PK 25 km)



Current Section



Source: JICA survey team

Figure 2.3-16 Photo and Section in NR 57

Street lamps and divider are provided in the 400 m section located just before Pailin town. Further details of current conditions of NR 57 are shown in the Straight Line Diagram in Appendix.

Major bridges along NR 57 are shown in the table below.

Table 2.3-31 Bridge List in NR 57

	Location	Length (m)	Type of superstructure
1	PK 2.4	90	PCDG
2	PK 41.4	33	RCDG
3	PK 42.5	25	RCDG
4	PK 52.4	20	RCDG
5	PK 56.6	28	RCDG
6	PK 59.3	34	RCDG
7	PK 63.9	42	RCDG
8	PK 66.0	34	RCDG
9	PK 68.9	56	RCDG
10	PK 73.7	39	RCDG
11	PK 73.9	39	RCDG
12	PK 73.9	31	RCDG
13	PK 75.1	31	RCDG
14	PK 76.2	34	RCDG
15	PK 82.8	34	RCDG
16	PK 83.6	31	RCDG
17	PK 86.6	28	RCDG
18	PK 89.7	67	RCDG

Source: JICA survey team

Photos of bridge conditions in each location are shown below.



PK 2.9



PK 68.9



PK 73.4



PK 89.7

Source: JICA survey team

Figure 2.3-17 Photo of Bridges in NR 57

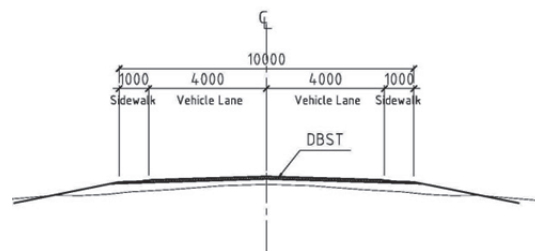
(13) National Road 72

National Road 72 (NR 72) is a one lane road of DBST with 13 km long that connects from National Road 7 to Vietnam Border. Generally, the road condition is fairly good which means the travel speed can be between 40 – 60 km/hr except between PK1 to PK 3 where surface course has already been damaged.



Photo PK 1.5

Source: JICA survey team



Current Section

Figure 2.3-18 Photo and Section in NR 72

According to the survey, there is only one bridge found at the downtown area. There are 18 pipe culverts (MPWT Inventory data). Same as in other road, the Straight Line Diagram is provided in Appendix.

Table 2.3-32 Bridge List in NR 72

Location	Length (m)	Span (no)	Type of superstructure
1 PK 12.3	22	2	RCDG

Source: JICA survey team

Even though road condition is not entirely damaged, road widening and maintenance will be taken into account for further development plan as this road is considered to be very useful for freight transport at cross border between Cambodia and Vietnam.

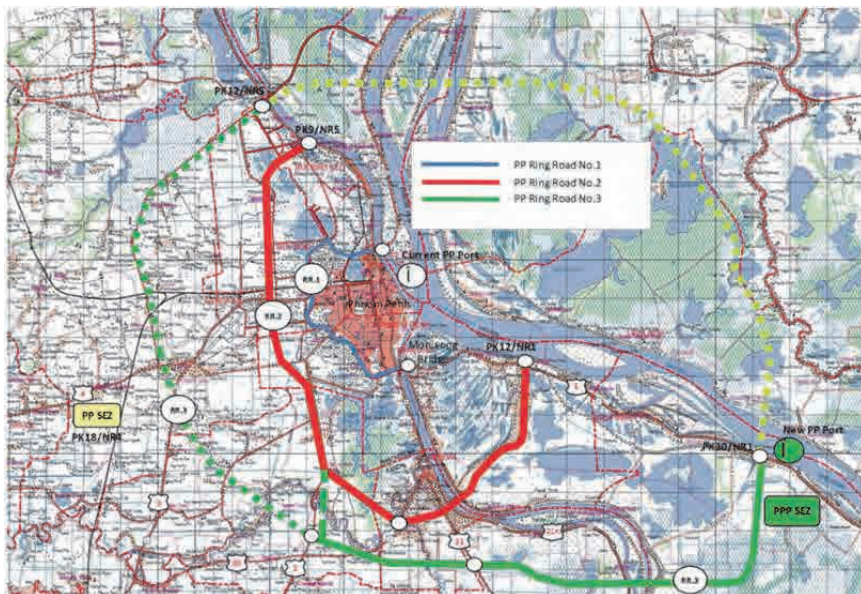
(14) Ring Road

(a) Plan of Ring Road

MPWT has planned three routes of ring road around Phnom Penh city, based on “the Study on the Transport Master Plan of the Phnom Penh Metropolitan Area in the Kingdom of Cambodia in 2001”, “the Study on the Road Network Development in the Kingdom of Cambodia in 2006” and “the Follow-up Study on the Road Network Development Master Plan in the Kingdom of Cambodia in 2009”. MPWT has constructed some of ring roads so far.

The objectives of development of ring road are as follows.

- To improve mobility
- To alleviate traffic congestion
- To raise the standard of living in Phnom Penh city
- To connect each road in the radial network
- To make logistic smooth
- To provide bypass for city planning



Source: JICA survey team based on MPWT information

Figure 2.3-19 Phnom Penh Ring Road

[Route of Ring Road]

Ring Road 1: Inner Ring Road, Street 271 along Phnom Penh downtown boundary

Ring Road 2: Connect from NR 1 at PK 7 to NR 21 through cross of Bassak River

Remaining part up to NR 5 will start construction in 2014.

Ring Road 3: Connect from NR 1 at PK 30 to NR 5 through NR 21, 2, 3 and 4

(b) Current Progress of Ring Road

➤ **Ring Road No. 1**

Street 271, common name of which is Inner Ring Road, is two lanes road of AC pavement and was constructed in 2002 as ring road No. 1 of Phnom Penh city.

With this construction, traffic congestion of the city was resolved, as especially heavy vehicles were able to pass smoothly to go in & out and arrangement of the city area was progressed along the city planning. As a result, the range of Phnom Penh city has been expanded.



St. 271(near Preh Kosamak Hospital)



St. 271 (near LC Mart)

Source: JICA survey team

Figure 2.3-20 Current Condition of Ring Road No. 1

➤ **Ring Road No. 2**

Part of the ring road No. 2 ((1lane+bike) x 2 directions) is being constructed by China loan from NR 1 at PK 9 through Takhmau Bridge crossing Bassak River to NR 21. Net clearance of navigation in Bassak River is designed 45 m wide and 8 m high. The completion is expected in 2015. For a time being, existing roads will be used as the connecting road from No. 21 to NR 4 and NR 5. The remaining part of the ring road No. 2 (up to NR 5) is planned to commence in 2015 again by China loan. By the completion of ring road No. 2, vehicles can go from NR 1 to NR 2, 3, 4 and 5 without passing the city area of Phnom Penh. It will function as the southern economic corridor and contribute great deal to smooth development and logistics.

The progress of the present construction is shown in the figures below. As of current condition, some parts of pavement are removed and some parts of surface are damaged heavily probably due to the effect of the passing of the vehicles of construction work.



Photo of Ring Road No.2 (Jct. NR 1)



Photo of Bridge Construction

Source: JICA survey team

Figure 2.3-21 Construction of Ring Road No. 2

➤ **Ring Road No. 3**

There are a few plans for ring road No. 3, so called as Outer Ring Road.

The plan of ring road No. 3 was prepared and presented to MPWT by Korean Express Corporation in January 2013. The plan of the ring road No. 3 is connection of NR 1 to NR 5 (clockwise) and needs to have major bridges. The capital for construction was suggested as PPP (Public Private Partnership) scheme with several funds including Korean Government and Korean enterprises. In the presentation, MPWT commented that “sufficient discussions are necessary to the suggested PPP scheme” and requested “to show justification toward construction under the precondition of collecting tolls”.

The ring road No. 3, which is essential as an access to new Phnom Penh Port and new SEZ nearby being studied by JICA, is often appeared in the plan of the development of road network around Phnom Penh city. The construction is very important for the southern economic corridor and will be a big merit in logistics for the forwarders who long expect to send goods to destinations on time.

There are some other ideas for the ring road No. 3 with slight modification of the route from the above. In any case, ring road No.3 shall be firmly planned and start construction as soon as possible.

In addition, ring road No. 3 of NR 1 to NR 5 (counter clockwise or east bank of Mekong River) shown with light green dot line in **Figure 2.3-19** shall be planned as well in due course for development of these areas (east bank) and connection to NR 6 and 7, too.

(15) Road Maintenance and Operation

(a) Organization in Charge of Road Maintenance

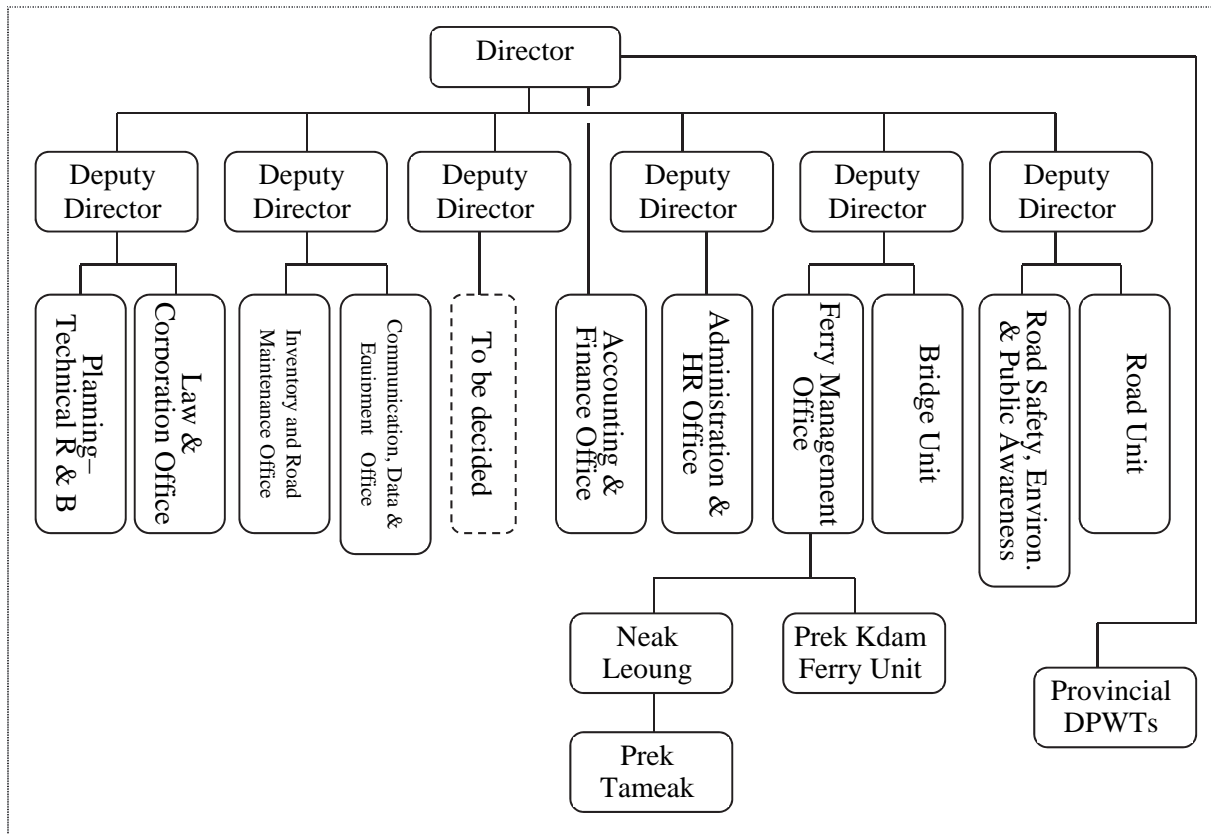
The functions of Ministry of Public Works and Transport (MPWT) are stipulated in the Sub-decree on the Organization and Function of MPWT and those of Department of Public Works and Transport (DPWT) in provinces and cities are stipulated in the Declaration on the Management and Process of DPWT. The important articles in the Sub-Decree and Declaration in respect of road maintenance are extracted and shown in **Table 2.3-33** below.

Table 2.3-33 Functions and Duties of MPWT and DPWT with Respect to Maintenance

<p>[Sub-Decree]</p> <p>Article 3: MPWT has functions and duties as below; (2nd Clause)</p> <ul style="list-style-type: none"> - Completion, maintenance and management of road, bridge, port, railway, maritime and state building infrastructure. <p>Article 11: General Department of Public Works and Transport is responsible for direction, introduction, following up and control of construction and maintenance of road and bridge infrastructure, public building construction and construction management, maintenance of national vestiges assigned by the Royal Government of Cambodia. General department is ...</p> <p>Article 12: Road Infrastructure Department (RID) is responsible for:</p> <ul style="list-style-type: none"> - Completion, maintenance, management and make regulation for business on road infrastructure, such as road, local road, ferry dock, ferry and urban street. - For this responsibility, department has two functions. <ol style="list-style-type: none"> a) Organize maintenance program and manage roads and bridges <ul style="list-style-type: none"> - Selecting data and utilizing data to understand road network. - Manage technical documents on roads and road network related documents. - Organize budget, divide follow-up means and control the maintenance. - Manage public properties, road transport, water transport and rail transport. b) Manage road and bridge working site. <ul style="list-style-type: none"> - Study, manage and organize road and bridge maintenance program. - Organize budget, divide follow-up means and control road and bridge working site. - Assess complete working site. - Manage ferry docks and ferry. <p>Article 23: In the whole Cambodia, there are Provincial Departments of Public Works and Transport that is responsible for implementation and coordination with Ministry activities. Arrangement and operation of local organization is defined by other document.</p>
<p>[Declaration]</p> <p>Article 1: This proclamation indicates the management and process of the base units under supervision of MPWT- so called Department of Public Works and Transport, Provinces and Cities has the following duties; (4th Clause)</p> <ul style="list-style-type: none"> - Control and maintain all completed works of infrastructures, such as roads, bridges, ports, airports, drainage system, drainage & exhaust pipe stations, harbors, buildings, land plots.

Source: Sub-decree and Declaration in Cambodia

Referring to the above, it is noted that Road Infrastructure Department (RID) under General Department of Public Works and Transport in MPWT and DPWT are responsible for maintaining all national roads and bridges in Cambodia. **Figure 2.3-22** shows the organizational chart of RID.



Source: JICA survey team with MPWT information

Figure 2.3-22 Organizational Chart of Road Infrastructure Department of MPWT

(b) Practice of Road Maintenance and Operation

MPWT prepared and compiled four guidelines for road maintenance together with JICA experts in 2008 and the maintenance works are being carried out in accordance with those guidelines. Four guidelines are as listed below:

- Guideline for Regular Inspection
- Guideline for Supervision of Routine Maintenance
- Guideline for Supervision of Periodic Maintenance
- Guideline for Repairing Defects of Roads

According to the guidelines, road maintenance works are classified into three types: namely, routine, periodic and emergency.

Table 2.3-34 summarizes typical activities of each type of maintenance work.

Table 2.3-34 Typical Maintenance Activities

Type	Activity
Routine Maintenance	Clearing of pavement
	Mowing and maintenance of plants
	Clearing of ditches and culverts
	Repair of traffic signs and road markings
	Shoulder grading
	Pothole patching and crack sealing
	Repair of sealants and expansion joints of bridges
	Repair of cut and fill slopes

Type	Activity
Periodic Maintenance	Re-graveling
	Resealing/surface dressing
	Overlay
	Maintenance of traffic signs and road markings
Emergency maintenance	Removal of debris or obstacles from natural causes
	Repair of damage caused by traffic accidents

Source: MPWT Guideline

Routine maintenance is planned based on regular (daily) inspection of the condition of road on the items as listed below:

- Pavement: potholes, cracks, ruts/settlements, deformations, local aggregate loss, edge break, scratches, bleeding etc.
- Cut and fill slopes
- Drainage
- Bridges: bottom, expansion joint etc.
- Other structures and facilities: markings, guardrails/handrails, signboards etc.

The results of regular inspection are categorized into three ranks as listed below.

Table 2.3-35 Rank of Defects

Rank A	Severe defects that may be harmful to traffic or structure and it requires urgent countermeasures.
Rank B	Defects that may be harmful to traffic or structure and it requires countermeasures but not urgent.
Rank C	Small defects that do not require countermeasures but it requires continuous observation.

Source: MPWT Guideline

The results of regular inspection are promptly reported to the operation office for follow-up maintenance works to be undertaken either continually throughout a year or at certain intervals every year.

Periodic maintenance is substantial repairs carried out at an appropriate time interval (every 3-year, 5-year, 8-year, 10-year etc.) based on the age, investment and initial design of the road. It could also be required when vehicle weight and traffic volume increased. It includes reconstruction, improvement, or rehabilitation works on any road section.

Emergency maintenance basically comprises works to restore road and road related facilities to their normal operating conditions after they are damaged by road accidents or natural causes. It is impossible to foresee the frequency, but such maintenance requires immediate action.

In addition to the above three types of maintenance, there is still another type of maintenance called 'preventive maintenance'. The term "preventive maintenance" refers to repair that addresses causes of deterioration leading to the need for costly rehabilitation work in future.

(c) **Necessity of Capacity Enhancement for Road Maintenance**

In the past, actual works of road maintenance have been executed mainly by DPWT and the Army under contracts with MPWT. In this case, type of pavement has been mainly DBST or Macadam. DPWTs and the Army have capacity for such types of pavement but they are not supposed to have sufficient capacity for maintenance of AC pavement. Thus, a new system needs to be introduced for maintenance of roads with AC pavement, including to increase staff

in the road maintenance office of MPWT and DPWT, and capacity enhancement for maintenance of AC pavement is necessary.

In this connection, it is the fact that technical cooperation projects have been or are being implemented in the MPWT, such as Strengthening Construction Quality Control Project (SCQCP) under JICA and Road Asset Management Project (RAMP) under ADB and WB. As roads are currently being improved in Cambodia and AC pavement roads are increasing, it is highly needed to have capacity development project for road maintenance in Cambodia and JICA survey team recommends to plan and commence such projects near future.

(d) Budget for Road Maintenance and Operation Works

In the budget situation for road maintenance and operation works under MPWT, it is found that budget has been increased in recent years and the following table shows budget in each category of works under MPWT. It is to note that huge amount allocated to flood restoration works in 2012 is due to country wide flooding damages experienced in year 2011.

Table 2.3-36 Budget for Road Maintenance under MPWT

Unit: USD million

Items	2007	2008	2009	2010	2011	2012
Routine maintenance	5.7	8.8	17.1	17.9	16.1	15.4
Periodic maintenance	12.2	14.3	13.3	15.0	26.6	31.7
Emergency maintenance	1.6	1.9	2.4	2.9	3.7	3.9
Flood restoration works	2.4	2.4	0	0	0	23.2
Total	21.9	27.4	32.8	35.8	46.3	74.2

Source: Road Infrastructure Department, MPWT

As per discussion with staff in the road maintenance of RID under MPWT, maintenance works from the year 2013 shall be implemented with standard guideline and regulation compiled in SCQCP over all provinces and contract out to private companies will be commenced for maintenance works as well.

(16) PPP BOT Scheme

There has been no legal frame works in respect of Build-Operate-Transfer (BOT) and Public-Private-Partnership (PPP) scheme in Cambodia. Hence, when BOT (like Koh Kong Bridge and Prek Pnov Bridge, toll charge for these is shown in **Table 5.4-2** in **Section 5.4** together with other cases in Cambodia) or PPP proposal is submitted, discussion shall be usually commenced from scratch and contract be prepared case by case. It is considered that the concession contract like NR 4 case is part of PPP scheme in the field of maintenance and operation with certain improvement of the current road conditions.

It is hereby recommended that legal frame for BOT and PPP scheme shall be prepared as soon as possible. Further recommendation in this regard is discussed in **Section 5.4**.

2.3.3 Road Network Condition in Neighbouring Countries

(1) Thailand

(a) Outline of Road Network in Thailand

Thailand has relatively advanced basic infrastructure such as roads, public transports, ports, and electricity, compared to neighboring countries. This infrastructure development attracts foreign investments, and thus it has supported the economy of Thailand.

Regarding the road network sector, road maintenance has been considered important. Therefore, a large amount of budget has been allocated for road maintenance and safety management every year. In addition, the total length of national highways reached approximately 52,000 km and the pavement rate is nearly 100 %. Although improved, road network is still responsible for logistic measure in Thailand.

However, traffic flow to Bangkok has been over-concentrated, so that existing national highways have chronically been congested at the junction of highway to Bangkok. To solve this problem, alternative routes have been planned, extending north, south, east and west from Bangkok with five motorways construction to the Laem Chabang port without passing through Bangkok.

Additionally, according to the Thai National Economic and Social Development Board, GDP percentage of logistics costs in 2009 was 16.8 % and it has been improved, compared to 18.6 % in 2007. However, it is still a major issue in Thailand.

(b) Long-term Road Development Plan in Thailand

Thailand long-term road development plan started from year of 1960s. That created roads subject to the first National Economic and Social Development Plan of 1962-1966 years. In the latest information of 9th road improvement plan, year 2006 to year 2009, objectives are as follows:

- (i) To develop road improvement to east coast
- (ii) To develop four-lane road network on the west coast and the southern province
- (iii) To develop outer ring in Bangkok (south section)
- (iv) To improve road network between major cities in the north of country
- (v) To improve road network between major cities in the north-east of country
- (vi) The number of registered motor vehicles in Thailand in 2006 is 9 million units, and compared with the 1990s, it has grown about twice in 10 years. This growth can be said to promote motorization.

(c) Type of Roads

Roads of Thailand are classified into several types (category), depending on the administrative management division and role of roads.

(i) National Highways

National Highways are managed by the Department of Highway (DOH), in the Ministry of Transport. It is high standards in road construction connecting the cities across the country. It is divided into three categories as below;

- Primary highway: Connecting the community
- Secondary highway: Highway within each region
- Tertiary highway: The road linking between the prefecture

Number for the first figure of Secondary highway and Tertiary highway represents the area such as 1: northern part, 2: north-eastern part, 3: central and eastern part, 4: southern part.

National Highway signs have been installed to the next stage.

Road in Thailand has been developed in length from 5,451km to 51,535km from 1965 until now, and pavement ratio is nearly 100% from 51%.

(ii) Rural Road

Rural road are managed by the Department of Rural Roads (DOR) in the Ministry of Transport. Total network distance of Rural road is 41,509km, and pavement ratio is now 82%, which means 34,296 km of roads have been paved.

(iii) Municipal road

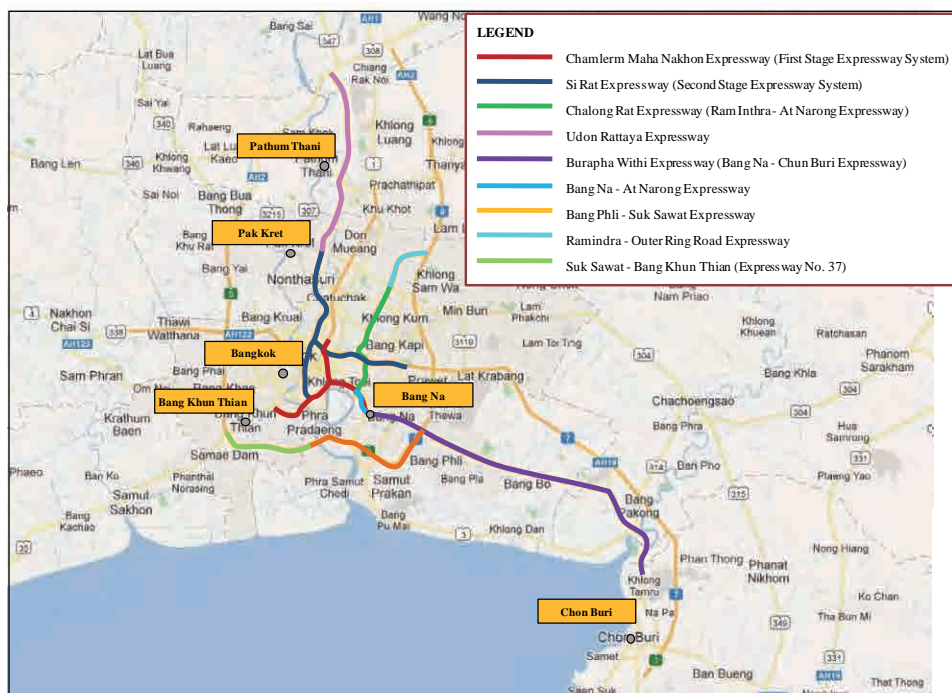
Municipal roads are managed by local governments, such as Bangkok Metropolitan Authority (BMA) and so on. Municipalities of major cities conduct on their own construction and management, however, DOR is conducting the construction of roads and road administration in other small cities.

(iv) Motorways

A motorway is managed by DOH and operated under the oversight of the Expressway Authority of Thailand (EXAT). Interstate urban development plan was approved in 1997 as a parliament of 20-year plan, and the total project cost is expected to be 573.9 billion baht. The short-term plan of year 2006 to 2011 would have been developed to 778km road and the mid to long-term plan expected to be a high standard road network will be developed to 4,150km by year in 2016. Long-term investment plan of DOH was verified by the World Bank (WB) in 2000, and then it was recommended by WB as the preferred route is 1,130km development of the central region. Asian Development Bank (ADB) is also planning to conduct technical cooperation in order to promote the development of alternative routes to take advantage of PPP scheme.

In addition, EXAT is announcing the future plan, route to Mukdahan of Lao border, to Aranyaprathet of Cambodia border and to Mae Sai of Myanmar border for ASEAN Integration.

Current motorway network is shown below.



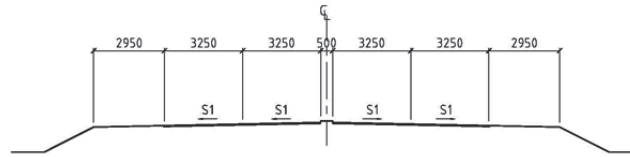
Source website of Expressway Authority of Thailand

Figure 2.3-23 Motorway Network in Thailand

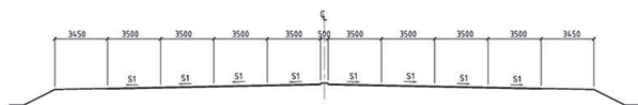
Current roads and road facilities in Thailand are shown below.



4-lane Road



8-lane Road



AC 10 cm



Lighting Post & Concrete Barrier



Median

Source JICA survey team

Figure 2.3-24 Photos and Section of Road in Thailand

In regard to pavement structure, it is found in the report “the Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road (East Portion) in the Kingdom of Thailand in 2012 under JICA” that pavement consists of AC 10 cm, asphalt compound 10 cm, base course 25 cm and sub-base course 20 cm and is designed with AASHTO standard.

- (d) Cross-border Network between Thailand and Cambodia
 - (i) Aranyaprathet- Laem Chabang Port route

The cross-border road network through Aranyaprathet is the most important trunk route supporting cross-border trade between Cambodia and Thailand. The Aranyaprathet–Laem Chabang Port route consists of five roads, namely National Highway (NH) 33, Provincial Road (PR) 304, PR 314, NH 7 and the approach road to the port as shown in **Table 2.3-37** below. Road infrastructure, including the traffic control system, is well-maintained and paved with AC on the road surface, and there are no continuous steep slopes along all sections. Accordingly, it is possible to keep considerably high-speed driving (average of 73 km/h) during the road condition survey.

Basically, street lamp and center median are provided in motorway and highway and those are not always in rural road and municipal road.

Table 2.3-37 Existing Condition of Roads between Laem Chabang Port and Aranyaprathet

Section	Road	Section	Number of Traffic Lanes	Width of Side Lane	Distance	Time* ¹	Average Speed* ¹
				(m)			
1	NH 33	Border of Cambodia (Aranyaprathet) – Connection point with PR 304	2 x 2	2.5	104	78	80
2	PR 304	Connection point with NR 33 – Connection point with PR 314	2 x 2	1.5 – 2.5	89	66	81
3	PR 314	Connection point with PR 304 - Connection point with NR 51	2 x 2	1.5 - 2.5	19	18	63
4	NH 7	Connection point with PR 314 – Intersection of Laem Chabang Port	4 x 2	2.5	53	55	96
5	Approach Road	Intersection of Laem Chabang Port – Gate	2 x 2	2.5	11	11	61
				Total	276	228	

Note: National Highway (NH), Provincial Road (PR)

*1: Time and average speed mentioned in the above table are measured by a sedan car.

Source: *The Project for the Study on Strengthening Competition and Development of Sihanouville Port, 2012*



Source: *The Project for the Study on Strengthening Competition and Development of Sihanouville Port, 2012*

Figure 2.3-25 Map of Existing Road between Laem Chabang Port and Aranyaprathet

(ii) Hat Lek–Laem Chabang Port route

The cross-border road network through Hat Lek is the second trunk route connecting Cambodia and Thailand. The Hat Lek–Laem Chabang Port route consists of five roads, namely, PR 318, NH 3, NH 36, NH 7 and the approach road to the port as shown in **Table 2.3-38** below. This route is moderately maintained and paved with AC on the road surface, and arranged with adequate side lanes along all its sections. There are steep upward/downward slopes between Klong Yai and Hat Lek in PR 318, and it was observed that heavy vehicles could drive around 20 km/h at most on the steep upward slope. Road improvement (widening the road and arranging side work) has been implemented at the center of Klong Yai.

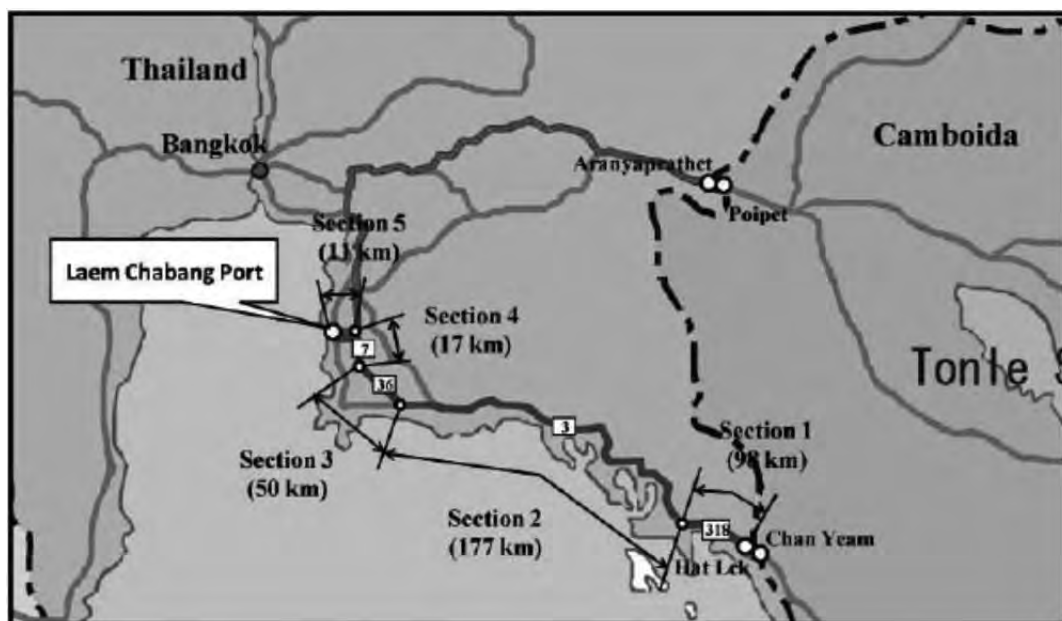
Table 2.3-38 Existing Condition of Roads between Laem Chabang Port and Hat Lek

Section	Road	Section	Number of Traffic Lanes	Width of Side Lane	Distance (km)	Time* ¹	Average Speed* ¹
				(m)		(min)	(km/h)
1	PR 318	Border of Cambodia (Hat Lek) – Connection point with NR 3	2 x 2	2.5	98	83	71
2	NR 3	Connection point with PR 318– Connection point with NR 36	2 x 2	2.0 - 2.5	177	144	70
3	NR 36	Connection point with NR 3 – Connection point with NR 7	2 x 2	1.5 - 2.5	50	40	75
4	NR 7	Connection point with NR 36 – Intersection of Laem Chabang Port	3 x 2	2.0-2.5	17	9	110
5	Approach Road	Intersection of Laem Chabang Port – Gate	2 x 2	2.5	11	11	61
Total					353	287	

Note: National Highway (NH), Provincial Road (PR)

*1: Time and average speed mentioned in the above table are measured by a sedan car.

Source: *The Project for the Study on Strengthening Competition and Development of Sihanouville Port, 2012*



Source: *The Project for the Study on Strengthening Competition and Development of Sihanouville Port, 2012*

Figure 2.3-26 Map of Existing Road between Laem Chabang Port and Hat Lek

(2) Vietnam

(a) National Roads Connecting from Cambodia

In accordance with the terms of reference of the Data Collection Survey, there are the following connection roads between Cambodia and Vietnam.

Table 2.3-39 Connection Roads between Cambodia and Vietnam

no	Road and Town in Cambodia	Road and Town in Vietnam
1	National Road 1 Bavet	National Road 22 Moc Bai
2	National Road 2 Phnom Den	National Road 91 Tinh Bien
3	National Road 33 Prek Chak	National Road 80 Ha Tien
4	National Road 72 Trapeang Phlong	National Road 22B Xa Mat

Source JICA survey team

In addition to the above, the survey team has checked National Road 51 (NR 51) in Vietnam, which runs from Ho Chi Minh to Vung Tau where Cai Mep Thi Vai port is near-by. NR 51 is east end of the Southern Economic Corridor, too.

Those five roads are shown in the map below.



Source JICA survey tem

Figure 2.3-27 Roads in South of Vietnam

The survey team has interviewed to the officers of Regional Road Management Unit 7 (RRMU 7) in Ho Chi Minh, which is under the Directorate for Roads of Vietnam (DRVN) in the Ministry of Transport (MOT) in Vietnam and collected data from RRMU 7 as well as DRVN. Basic data of those five roads, such as road length, pavement structure, road width, lane configuration, bridge and toll information, development plan, maintenance information and traffic count, are summarized in the table below.

The survey team has also check current conditions of those roads on site and photos are hereinafter shown.

Table 2.3-40 Summary of Five National Roads in Vietnam

item	NR 22	NR 22B	NR 51	NR 80	NR 91
1 length (km)	58 km	84 km	73 km	280 km	142 .km
2 start from	An Suong (HCM)	Go Dau (Tay Ninh)	Bien Hoa (Dong Nai)	Vin Long (Vin Long)	Ben Xe (Can Tho)
3 end to	Moc Bai-Ben Cau (Tay Ninh)	Xa Mat (Tay Ninh)	Vung Tau (Ba Ria Vung Tau)	Ha Tien (Kien Giang)	Tinh Bien (An Giang)
4 pavement structure	AC 12 cm + BC 30 cm	AC 7 cm + BC 20 cm	AC 12 cm + BC 40 cm	not available	not available
width: left section	7 m to 11 m	7 m to 11 m	7.5 m to 11 m	4 m to 7 m	4 m to 7 m
width: center medium	0 m to 1.5 m	0 m to 1.5 m	0 m to 2 m	-	-
width: right section	7 m to 11 m	7 m to 11 m	7.5 m to 11 m	4 m to 7 m	4 m to 7 m
6 lane configuration	(2 lanes) to (2 lanes + bike) x 2 directions	(2 lanes) to (2 lanes + bike) x 2 directions	(2 lanes) to (2 lanes + bike) x 2 directions	1 lane to 2 lanes x 2 directions	1 lane to 2 lanes x 2 directions
7 bridges	2 nos. longest 680 m	13 nos. longest 75 m	41 nos longest 248 m	47 nos longest 164 m	62 nos longest 384 m
8 toll gate	one	-	two	-	-
9 development plan			8 lanes to widen	My Thuan - Vam Cong to widen	
10 maintenance	contract out approx. USD 7 thousand / km	contract out approx. USD 5 thousand / km	contract out approx. USD 13 thousand / km	not available	not available
11 traffic count in 2012	near HCM	near Go Dau	near Bien Hoa	near Sa Duc	near Can Tho
(1) Bicycle	897	592	359	8,426	682
(2) Motor Bike	14,705	13,014	31,828	13,405	16,004
(3) Car	2,680	2,351	6,986	1,428	1,609
(4) Light Truck	2,103	1,872	3,588	1,249	2,303
(5) Truck	2,712	2,095	5,879	2,742	941
(6) Bus	4,331	3,002	5,092	2,830	1,689
Total of (3) to (6)	11,826	9,320	21,545	8,249	6,542

Source: JICA survey team



Photo (1) at Moc Bai



Photo (2) 9 km from Moc Bai



Photo (3) 20 km from Moc Bai



Photo (4) 32 km from Moc Bai



Photo (5) 42 km from Moc Bai



Photo (6) 52 km from Moc Bai

Source: JICA survey team

Figure 2.3-28 Photos of NR 22



Photo (1) at Go Dau



Photo (2) 10 km from Go Dau



Photo (3) 10 km from Go Dau

Source: JICA survey team

Figure 2.3-29 Photos of NR 22B



Photo (1) of NR 80 at Border



Photo (2) of NR 91



Photo (3) of NR 91

Source: JICA survey team

Figure 2.3-30 Photos of NR 80 and NR 91



Photo (1) Toll Gate



Photo (2) in HCM

Source: JICA survey team

Figure 2.3-31 Photos of NR 1



Figure 2.3-32 Photos of NR 51

Based on the interviews to RRMU 7 and DRVN, collected data and site survey, important points are compiled as follows.

- Asian Highway in Vietnam is NR 22, NR 1 and NR 51.
- Pavement is asphalt concrete in all roads and there is no DBST kind of pavement.
- There are at least two lanes in one direction in most of NR 22, 22B, 1 and 51 and bike lane is provided in most of them (NR 22, 22B, 1 and 51). Exclusive bike lane with concrete block is provided in certain sections.
- It is advisable to separate motor bike from car traffic.
- There are center dividers (width 0.5 m to 1.5 m) in most of NR 22, 22B and 51.
- Street lamps are installed in NR 22, 1 and 51.
- There are toll gates in NR 22, 1 and 51. Toll gates are two kinds, which are for state budget funds and for Build-Operate-Transfer contracts. Toll rate was defined in Circular No. 90/2004/TT-BTC dated September 7, 2004, which is shown in the table below.

Table 2.3-41 Roads / Highway Toll Rates

Type of Vehicles	Toll Ticket for Roads			Toll Ticket for Highway	
	Single trip (VND/trip)	Month ticket (VND / month)	Quarter ticket (VND / quarter)	Month ticket (VND / month)	Quarter ticket (VND/quarter)
Two or three wheels, mopeds etc.	1,000	10,000	~	20,000	=
Lambretta, rudimentary trucks, tractors	4,000	120,000	300,000	240,000	600,000
Cars under 12 seats, trucks less than 2 tons, buses	10,000	300,000	800,000	600,000	1,600,000
Cars with 12 to 30 seats, trucks 2 to 4 tons	15,000	450,000	1,200,000	900,000	2,400,000
Cars with more than 31 seats, trucks 4 to 10 tons	22,000	660,000	1,800,000	1,320,000	3,600,000
Trucks 10 to 18 tons, 20 ft- container lorries	40,000	1,200,000	3,200,000	2,400,000	6,400,000
Trucks more than 18 tons, 40 ft-container lorries	80,000	2,400,000	6,500,000	4,800,000	13,000,000

Source: Circular in Vietnam

- Toll gates in roads invested with state budget funds start to remove from the beginning of 2013 in accordance with Decree 18 issued in March 2012, as the Government decided to introduce road-use fees in late last year. Road use rates are shown in table below.

Table 2.3-42 Road Use Rates

Type of Vehicles	Toll rate (VND/year)
1 Cars with less than 10 seats by private registration	1,560,000
2 Cars with less than 10 seats (other than above), Trucks / Trailers less than 4 tons	2,160,000
3 Trailers 4 to 13 tons	2,760,000
4 Cars with 10 to 25 seats, Truck / Specific cars 4 to 8.5 tons	3,240,000
5 Trailers 13 to 19 tons	4,200,000
6 Cars with 10 to 25 seats, Trucks / Specific cars 8.5 to 13 tons	4,680,000
7 Trailers 10 to 27 tons, semi-trailers less than 27 tons	5,160,000
8 Cars with more than 40 seats, Trucks / Specific cars 13 to 19 tons	7,080,000
9 Trailers / Semi-trailers more than 27 tons	7,740,000
10 Trucks / Specific cars 19 to 27 tons	8,640,000
11 Trucks / Specific cars more than 27 tons	12,480,000

Source: Decree in Vietnam

- Road maintenance is generally responsible for RRMU and currently those roads (NR 22, 22B and 51) are being maintained by the companies contracted with RRMU 7 with USD 5 to 13 thousand/km.
- Considering result of traffic count, NR 22 and 22B may not be required to have 2 lanes road. It is important to provide sufficient road capacity to avoid negative impact on freight transport.

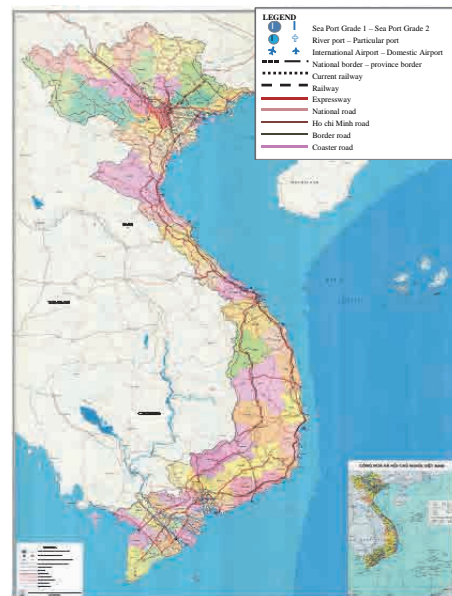
(b) Expressway and International Highway

MOT announced Expressway Development Plan in Vietnam in 2007 and the Plan was finally approved by the Government of Vietnam in 2008. According to the Plan, there are twenty routes of expressway with total 5,873 km long in which 2,639 km would be complete by year 2020 and the remaining be developed after 2020. The Plan is shown in the figure at right.

Vietnam Expressway Corporation (VEC) was granted as management organization for expressway with Prime Minister Decision No. 1202/QD-TTg and No. 1734/QD-TTg dated September 10, 2007 and December 1, 2009. Missions of VEC are as follows.

- Investing and developing expressway system network in Vietnam under different cooperation forms
- Mobilizing various investment funds: ODA, ordinary loan, concession of toll collection, PPP with local and foreign investors, etc.
- Management, operation and maintenance of expressway and service facilities along the expressway, payback and reinvestment development for expanding expressway system

In regard to routes along with NR 22, 51, 80 and 91, only Bien Hoa to Vung Tau section



Source: Leader Transport Development and Strategy Institute, Vietnam

Figure 2.3-33 Expressway Development Plan in Vietnam

(along NR 51) is planned to complete before year 2020 and other sections (HCM to Moc Bai, Ha Tien to Bac Lieu and Soc Trang to Chau Doc, along with NR 22, 80 and 91 respectively) would be after 2020.

Currently 1,500 km of expressway have been invested or studied for feasibility, while 4,373 km are still untouched. As of beginning of 2013, 150 km of expressway in four routes are in use and approximately over 600 km of expressway in five routes are under construction.

According to the Saigon Times Daily (February 20, 2013), recently Vietnamese consultant (the Vietnam Institute of Architecture, Urban and Rural Planning: VIAP) has compiled the report “the Planning for Areas along Ho Chi Minh City (HCMC) - Moc Bai” and submitted it to HCMC and Tay Ninh Province. The plan divides three areas to facilitate development and management, which are HCMC’s outlying district of Cu Chi as the first one, Tay Ninh Province’s Go Dau and Trang Bang districts as the second and Moc Bai as the last. The news also confirmed that in October 2011 MOT approved the task of planning for the areas along HCMC-Moc Bai expressway until 2030. On the other hand, there is information that the HCMC-Moc Bai expressway would be promoted to construct earlier and in use before 2020. Those kinds of information shall be checked further, as road development plan in Cambodia is closely related with the development plan in that part of Vietnam.

Sign boards of Asian Highway (AH 1) have been observed along NR 22 and 51 during the survey and therefore concept of “International Highway” seems common understanding in Vietnam. However, management of International Highway needs to have further discussion together with Cross Border Transport Agreement (CBTA) and it will take some more time to realize international highway.

(c) BOT and PPP Scheme

In Vietnam, there are legal frameworks in respect of Build-Operate-Transfer (BOT) Contract and Public-Private Partnership (PPP) Form, which are as follows.

- Decree No. 108/2009/ND-CP dated November 27, 2009 (revised by No. 24/2011/ND-CP dated April 5, 2011)

Investment in the Form of Build-Operate-Transfer, Build-Transfer-Operate or Build-Transfer Contract

- Decision No. 71/2010/QD-TTg dated November 09, 2010
- Promulgating the Regulation on Pilot Investment in the Public-Private Partner Form

In the former, the interpretation of terms is provided in Article 2 as follows.

- Build-operate-transfer (BOT) contract means a contract signed between a competent state agency and an investor to build and operate an infrastructure facility in a specified duration. Upon the expiration of this duration, the investor shall transfer without compensation such facility to the Vietnamese State.
- Build-transfer-operate (BTO) contract means a contract signed between a competent state agency and an investor to build an infrastructure facility. After completely building this infrastructure facility, the investor shall transfer it to the Vietnamese State. The Government will grant the investor the right to operate that facility for a specified duration to recover investment capital and earn profits.
- Build-transfer (BT) contract means a contract signed between a competent state agency and an investor to build an infrastructure facility. After completely building this infrastructure facility, the investor shall transfer it to the Vietnamese State. The Government will create conditions for the investor to implement other projects for recovering investment capital and earning profits or shall make payments to the investor as agreed in the BT contract.

In addition, investment domains are also provided in Article 4 as follows.

- The Government encourages the implementation of projects of new infrastructure works building, and operation, management or projects of current works improvement, expansion, modernization, and operation, management in the following domains.
 - (i) Roads, road bridges, road tunnels and ferry landings
 - (ii) Railways, railway bridges and railway tunnels
 - (iii) Airports, seaports and river ports
 - (iv) Clean water supply systems, sewage systems, and wastewater and waste collecting and handling systems
 - (v) Power plants and power transmission lines
 - (vi) Infrastructure works of health service, education training, career training, culture, sport and offices of State agencies
 - (vii) Other infrastructure works as decided by the Prime Minister

Further, limitation of state capital for implementation of a project is provided in Article 6 to be 49 % of total investment capital of that project.

In the latter, similar provisions (Interpretation of term (Article 2), Sectors for investment (Article 4) and State participation (Article 9)) are provided as follows.

- Investment in the Public-Private Partner (PPP) form means that the State and investor jointly implement projects on development of infrastructure or provision of public services on the basis of project contracts.
- Sectors for pilot investment in the PPP form are;
 - (i) Roads, road bridges, road tunnels and ferry landings
 - (ii) Railways, railway bridges and railway tunnels
 - (iii) Urban transport
 - (iv) Airports, seaports and river ports
 - (v) Clean water supply systems
 - (vi) Power plants
 - (vii) Healthcare (hospitals)
 - (viii) Environment (waste treatment plants)
 - (ix) Other projects on development of infrastructure and provision of public services under the Prime Minister's decisions
- The total state participation portion must not exceed 30 % of the total investment level of a project, except other cases decided by the Prime Minister.

Currently projects formulated under BOT scheme are four cases for expressway and only one (Hanoi to Hai Phong) is progressed in construction stage. For national roads, there are approximately 20 cases of BOT, most of which are road widening and maintenance with toll collection. There is no case for PPP scheme.

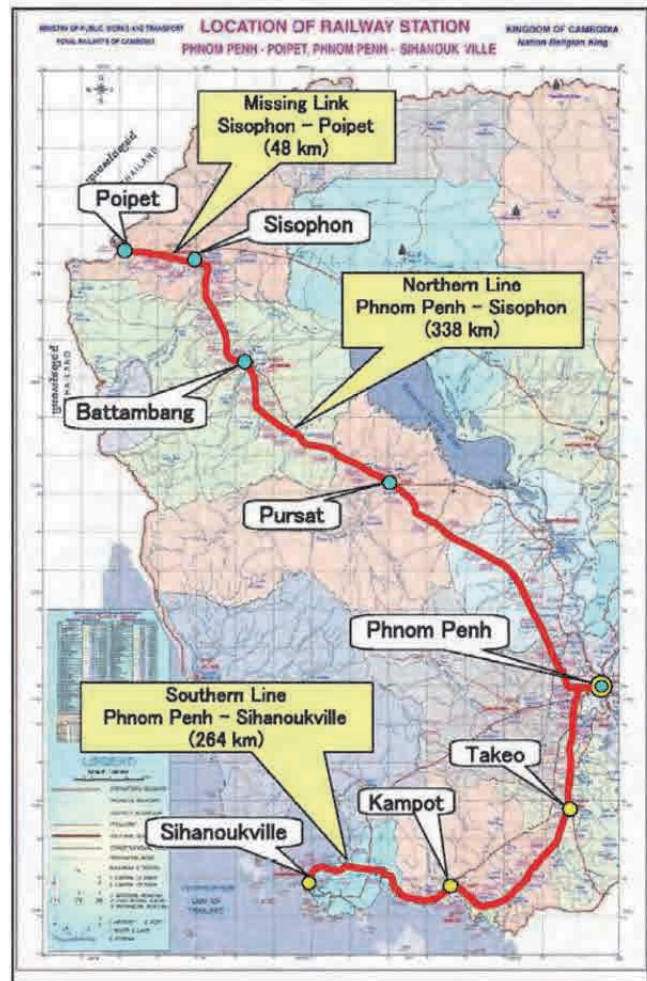
There are several comments for improvement in regard to PPP management mechanism, which are 1) insufficient legal base as well as vague regulations to select projects, investors, risk sharing and contribution from State and public sector, 2) making approval of PPP projects more efficient and less time-consuming, 3) excluding infrastructure at industrial zones, and 4) increasing the 30 percent rate that the Government contributes. The Government will amend the Decision No. 71, taking those comments into consideration.

2.4 Railway Network Condition in Cambodia

2.4.1 Existing Railway Infrastructure

French Colonial Government in Cambodia built the first railway of 1 meter gauge linking Phnom Penh to Poipet (Northern Line or NL) (through Kampong Chhnang, Pursat, Battambang and Sri Sophorn at the Thai border) in 1929-1942. This line runs across Cambodia's greatest rice producing province - Battambang. The Phnom Penh Railway Station inaugurated in 1932 whereas the connection with Thailand Railway was made in 1942, whose service later was interrupted in late 1940s due to political and security reasons. In 1960s in order to reduce the reliance on ports in then Saigon (former South Vietnam) and Thailand (Khlung Toei), Cambodia, with support from France, West Germany and People's Republic of China, began to construct second railway line linking capital Phnom Penh to Sihanoukville port, which later became known as the Southern Line (SL).

There are two (2) existing railway lines in Cambodia. Outline of these railway facilities are shown in **Table 2.4-1** and **Figure 2.4-1**.



Source: Overview on Transport Infrastructure Sectors in Cambodia, 2012

Figure 2.4-1 Existing Railway Network in Cambodia

Table 2.4-1 Outline of Cambodia Railway Facilities

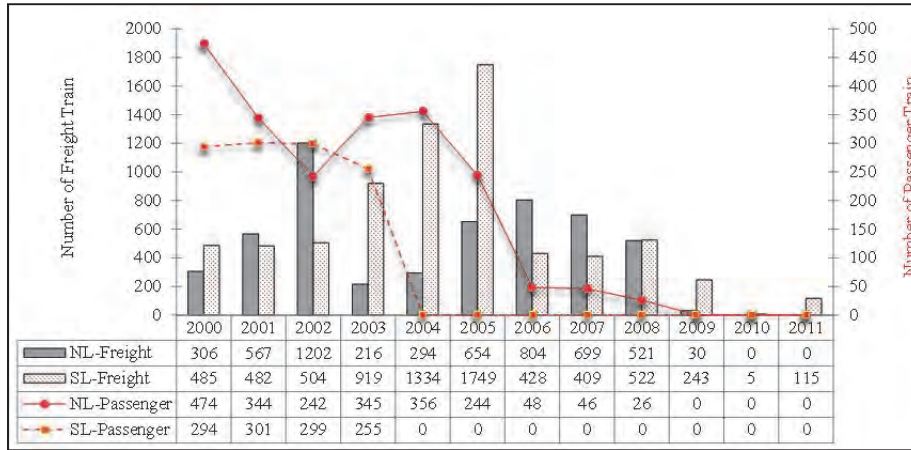
Item	Northern Line	Southern Line
Length (km)	388 km (including 48 km missing link)	264 km
Section	Phnom Penh - Pursat - Battambang - Mongkoi Borey - Poipet	Phnom Penh - Takeo - Kampot - Sihanoukville
Station (number)	49 (Current operation 7)	27 (Current operation 5)
Construction Year	1929-1942	1960-1969
Railway Gauge (mm)	1,000	1,000

Source: MPWT Information

2.4.2 Existing Railway Utilization

(1) Number of Train Service

Passenger train service ceased to operate at SL since 2004 and it also ceased to operate at NL since mid-2008. Freight Service remains function at SL but it ceased to operate at NL since 2009.

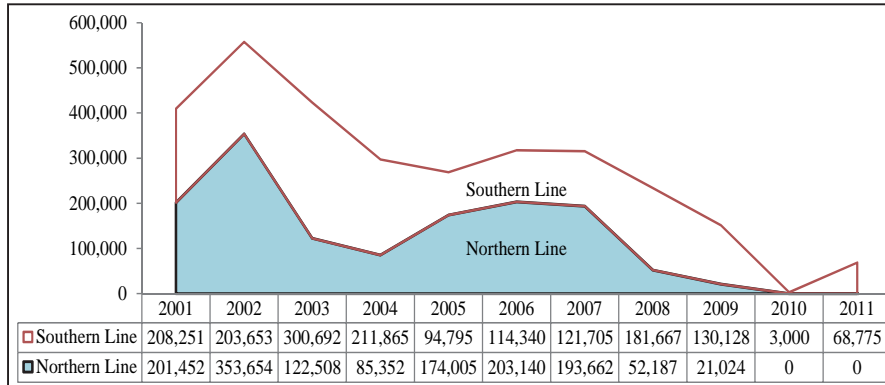


Source: Overview on Transport Infrastructure Sectors in Cambodia, 2012

Figure 2.4-2 Number of Trains Operated in a Year

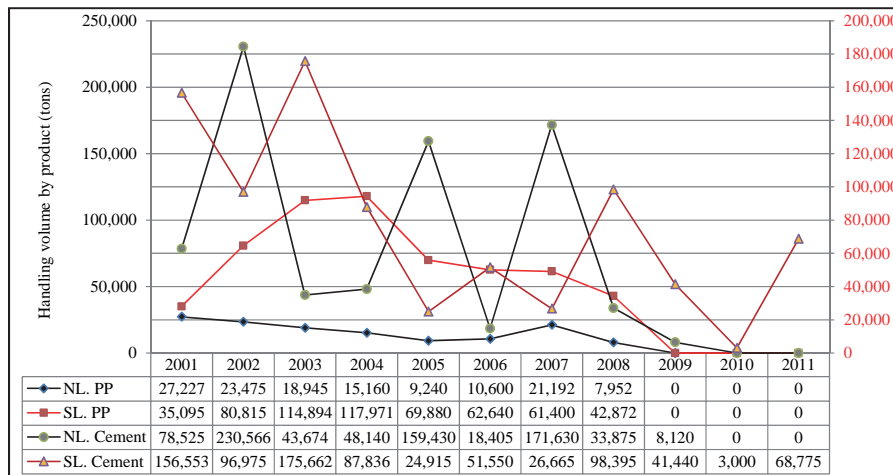
(2) Freight Train Service by Volume and Product

The volume of rail cargo transport began to decrease after reaching 557,000 tons in 2002. Currently only SL remains in service and it carries only cement from Toukmeas to Phnom Penh.



Source: Overview on Transport Infrastructure Sectors in Cambodia, 2012

Figure 2.4-3 Trends in Rail Cargo Transport Volume (ton)



Source: Overview on Transport Infrastructure Sectors in Cambodia, 2012

Figure 2.4-4 Trends in Transport Volume by Product

2.4.3 Current Railway Rehabilitation

Railway in Cambodia was managed by MPWT through independent railway general department. With limited fund and support, railway services run into difficulties. Derailment of train in operation was not infrequent. To improve this sector, the government takes the following action:

- Dissolve this general department and create railway department instead (issued sub-decree No. 163 dated 01st October 2009 to establish Railway Department. This department will be under the supervision and management of MPWT).
- Rehabilitate the railway infrastructure through financial support from ADB (Loan No. CAM-2288[SF]) and AusAid. The implementation is carried out by TSO-A.S-NWR JV (later Thai company withdraw and TSO carry out the rehabilitation alone) supervised by Nippon Koei-JARTS.
- The Privatization of Railway: The 30-year concession to manage and upgrade Royal Cambodian Railways (RCR) has been awarded to the joint venture Toll Holdings, Australia (55 percent share) and the Royal Group (45 percent share). Revenues will be shared between the government and Toll when the railway becomes profitable. Toll is responsible for operation and maintenance of the railway.

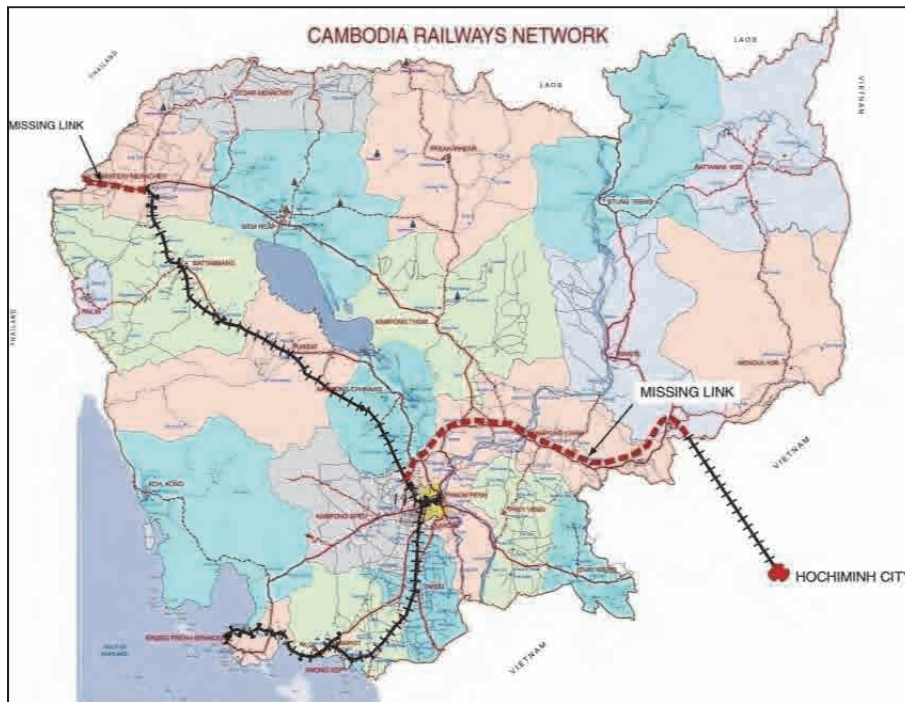
The rehabilitation of railway is carried out by TSO, who sub-contracted to local sub-contractors. Rehabilitation work is behind the schedule at all sections:

- SL from Phnom Penh –Sihanoukville (L1: 266km): As of September 2012, section from Phnom Penh to Kampot has been rehabilitated and from Kampot to Sihanoukville has been just complete in December 2012.
- NL from Phnom Penh – Sri Sophorn (L2-1: 338km): there is only small portion of the entire line seen to be completed:
 - PK: 0 to PK: 9+450: Completion of survey
 - PK: 9+450 to PK: 31 + 000 (Batdeng station): Rehabilitation completed
 - From Batdeng to Sri Sophorn: Not yet started
- Missing link from Sri Sophorn - Poipet (L2-2: 48 km): This section is completed except between PK: 378+450 to PK: 384+900. TSO is still working on survey, clearing and grabbing.

2.4.4 Future Development Plan

The first priority to establish railway line is between Batdeng and Loc Ninh, Vietnam. The study of this section was done by China. The other envisioned railway lines will be prioritized by the master plan study, supported by Korea.

- Plan to establish railway station at Tonlebet, Kampong Cham province, where road and waterway transport networks are met.
- Tbaeng Meanchey (Preah Vihear) to Sihanoukville (L4: through Kampong Thom, Skun, Batdeung and Phnom Penh). The primary purpose of this railway is to export mine particularly iron ore from mineral rich province of Preah Vihear to the world through Sihanoukville port. This section is studied by China Railway (450 km) and Yooshin – Korea (115.5 km).
- Siem Reap to Skun through Kampong Thom (L5-1). The total length of this line is 239 km.
- Sri Sophorn to Siem Reap (L5-2). The total length of this line is 105 km.
- Snuol to Lao P.D.R border through Kratie and Thalaborivat (Stung Treng) provinces (L6). The total length of this line is 273km.



Source: Overview on Transport Infrastructure Sectors in Cambodia, 2012

Figure 2.4-5 Future Railway Network Plan in Cambodia

2.5 Marine Ports and River Ports in Cambodia and Neighboring Countries

2.5.1 General

In Cambodia, there are two (2) types of ports: one is marine ports and the other is river ports. **Table 2.5-1** shows the marine and river ports in Cambodia.

Table 2.5-1 Marine and River Ports in Cambodia

Port Location Type	Name of Port	Management Body	Remarks
Marine Ports	Shihanoukville Port	Shihanoukville Autonomous Port	
	Kampot Port	Kampot Province	
	Stueng Hav Port	Koh Kong Province	
	Tomnop Rolok Port	Sihanoukville City	SNV Municipal Quay
	Sre Ambel Port	MDH Trading Co., LTD	Opened in 2003
	Oknha Mong Port	Oknha Mong Port Co., LTD	Opened in 2004
	Oil Terminals	Private Company	
	Koh Kong	Private Company	
	Kep	Private Company	
River Ports	Phnom Penh Port	Phnom Penh Autonomous Port	Upper 348km from Mekong Estuary
	Kampong Cham Port	Kompong Cham Province	Upper Mekong 105km from PP
	Kratie Port	Kratie Province	Upper Mekong 220km from PP
	Stung Treng Port	Stung Treng Province	Upper Mekong 370km from PP
	Kampong Chhnang Port	Kampong Chhnang Province	Tonle Sap River 90km from PP
	Chon Kneas Port	Siem Reap Province	Tonle Sap River 260km from PP
	Battambang Port	Battambang Province	Sangke River west of Tonle Sap
	Neak Loeang Terminal	Private Ferry Terminal	Lower Mekong 60km from PP
	Other 43 ports	District	33 ports along the Mekong River 10 ports along the Tonle Sap River

*Source: The Study on the Master Plan for Marine and Port Sectors in Cambodia in March 2007,
JICA*

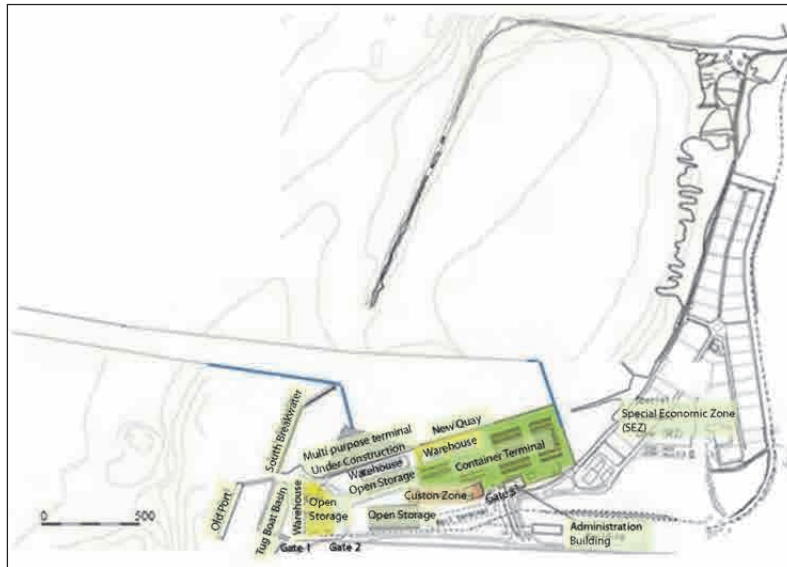
Among the seaports in Cambodia, Sihanoukville Port is the major port that handles international containers. It is under the MPWT and MEF, but is autonomously-managed ports, which is officially called Port Autonomous of Sihanoukville (PAS). The port construction was completed in 1960 with French assistance with a total capacity of 1.2 million encompassing the old French-built wharf and adjacent new facilities. Beside Sihanoukville Port located in newly established Sihanoukville province, Cambodia other seaports locate mainly in Koh Kong and Kampot provinces.

On the other hand, Cambodia's navigable inland waterways measure total length of 1,750km. Most of the major river ports are located along these major rivers. The Mekong mainstream accounts for 30% of the total, the TonleSap River 15%, the Bassac River 5%, and other tributaries 50%. Year-round navigation is possible through 580km long and one third width of the river. As for the River port, Phnom Penh port is the major port that handles international containers.

It will be discussed these ports as below:

2.5.2 Sihanoukville Port

The Port of Sihanoukville, situating in mouth of the Bay of Kampong Som – Sihanoukville province, is the principal and only deep seaport in the Kingdom of Cambodia. Sihanoukville's natural advantages include deep inshore and a degree of natural protection from storms. The present traffic of Sihanoukville Port, in its present condition, is estimated at about 2.4 million tonnes per year, including Petrol-Oil-Lubricant (POL), which has separate facilities. The port can accommodate 10,000 DWT Cargo ships and 20,000 DWT Class Containerships. To promote the economic development, PAS, with financial support from Japan, has been established.



Source: The Study on the Master Plan for Marine and Port Sectors in Cambodia in March 2007, JICA

Figure 2.5-1 Port Layout

(1) Sihanoukville Port’s Major Infrastructure

(a) Sihanoukville Port’s Wharf

- The Old Jetty, completed in 1960, has two berths for 10,000 DWT and 7,000 DWT vessels at a time. The jetty has a total length of 580m with a reported depth alongside of -9.0m and -8.0m drafts. This jetty was repaired under the ADB's Special Rehabilitation Assistance Project (SRAP) in 1996 and its outer berth is also used for passenger ships.
- The “new wharf” (locally known as “New Quay”), which located in the Northeast, completed in 1970 with 350m long by -8.5m draft and can accommodate three vessels for off-loading and loading cargoes. However, the pavement of the apron is worn out and damaged. The “new wharf” area is sheltered by two breakwaters. The northern one was never completed, however, with the result that the entrance is some 200m wider than planned. This may be aggravating some problems of waves in the port.
- The second wharf is a Container Terminal completed in 2007 with a berth’s length 400m and berth depth -10.0m draft. The capacity of the container throughput is 350,000 twenty-foot equivalent units (TEUs) per year and the capacity of the container storage is 114,000 TEUs.
- In addition to the above facilities, Sihanoukville's oil terminal for the Petroleum-Oil-Lubricant (POL) traffic is some 10km north of the main port. This was originally an oil refinery, opened in 1969 and destroyed a year later at the outset of civil war. Now Sokimex and Tela use those facilities for the importation of POL.

Table 2.5-2 Infrastructure at Sihanoukville Port

Channel	Berth					Other Facilities
	Name	Structure	Length (m)	Depth (m)	Year	
South Channel Length: 5.5 km Depth: -8.5 m Width: 80 - 100m	Old Jetty	Outer	Jetty	290	-9.0	Warehouses 5; 36,000m ²
	Jetty	Inner	Jetty	290	-8.0	
	New wharfs	Concrete Bolck	350	-8.5	1970	Container yard: 3 yards, 174,000m ²
	Container Berth	Concrete Bolck	400	-10.0	2007	
North Channel Length: 1km Depth: -10m Width: 150 -200 m	(Private Facilities)					
	Sokimex	Jetty	200	-10.5		
	Tela	Pontoon	110	-6.5		
	-	Stone walf	53	-4.2		

Source: The Study on the Master Plan for Marine and Port Sectors in Cambodia in March 2007, JICA



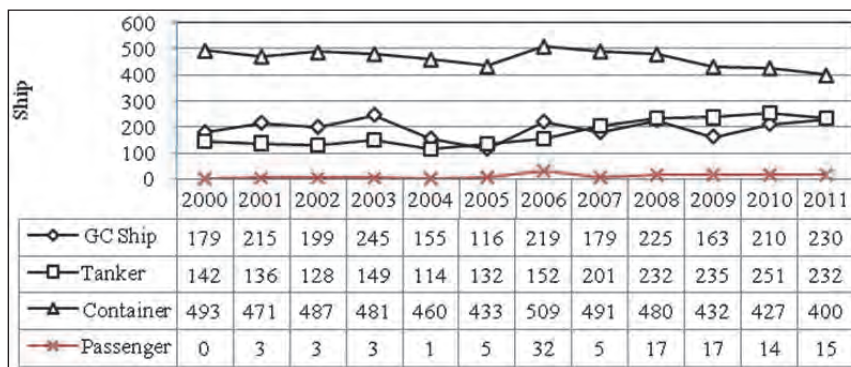
Source: Overview on Transport Infrastructure Sectors in Cambodia 2012

Figure 2.5-2 Long Term Development Plan at Sihanoukville Port

(2) Handling Cargoes, Passenger Traffic and Number of Vessels

(a) Ship Call at Sihanoukville Port

General Cargo (GC) ship, Oil tanker (Tanker) and Containerized Cargo (CC) ship account more than 98% ship call at Sihanoukville Port. Passenger ship account less than 2% of total ship call.

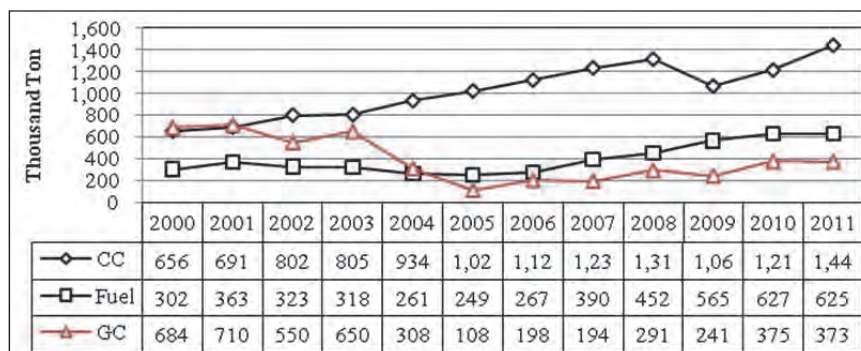


Source: PAS

Figure 2.5-3 Number of Ship Call at Sihanoukville Port

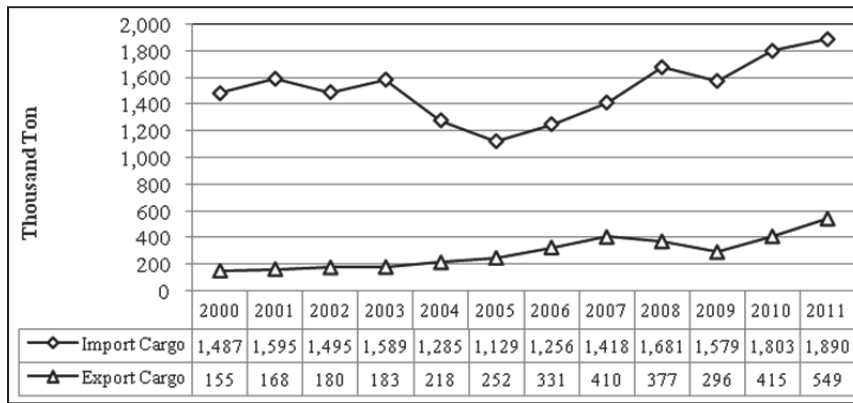
(b) Cargo Throughput at Sihanoukville Port

Cambodia's export increases more than 3 folds over the last 11 years and within the same period of time Cambodia import increases by only less than 1 fold. However import volume always remains higher comparing to export volume.



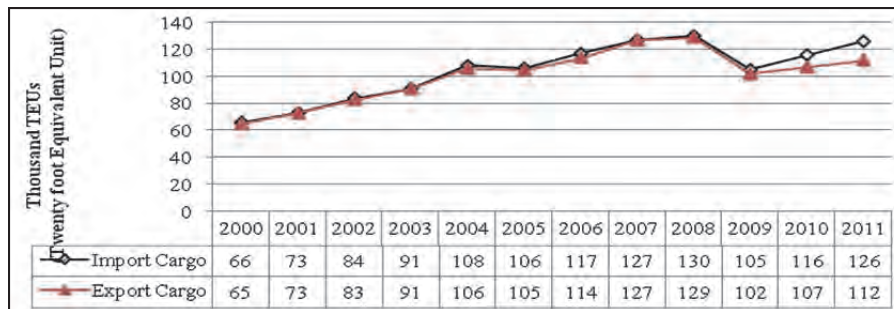
Source: PAS

Figure 2.5-4 Trends of All Cargoes at Sihanoukville Port



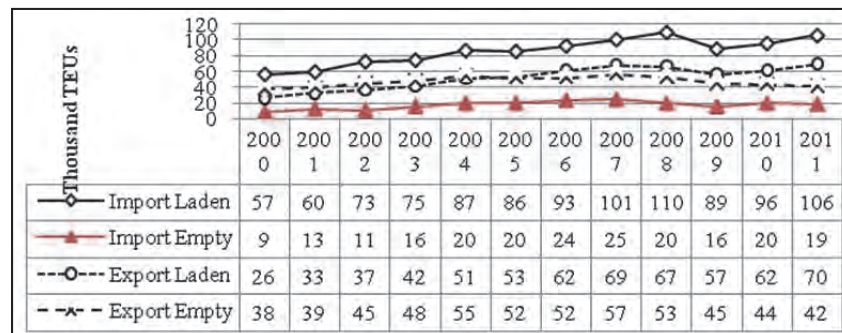
Source: PAS

Figure 2.5-5 Trends of Import & Export of All Cargo at Sihanoukville Port



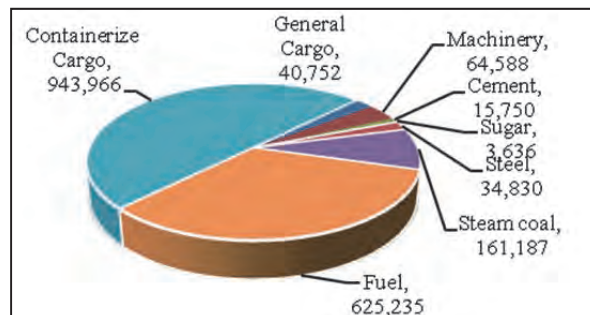
Source : PAS

Figure 2.5-6 Trends of Import and Export Containerized Cargo at Sihanoukville Port



Source: PAS

Figure 2.5-7 Trends of Ratio of Empty and Laden Containers at Sihanoukville Port



Source PAS

unit: ton

Figure 2.5-8 Composition of Cargo Items of Imported Cargoes at Sihanoukville in 2011

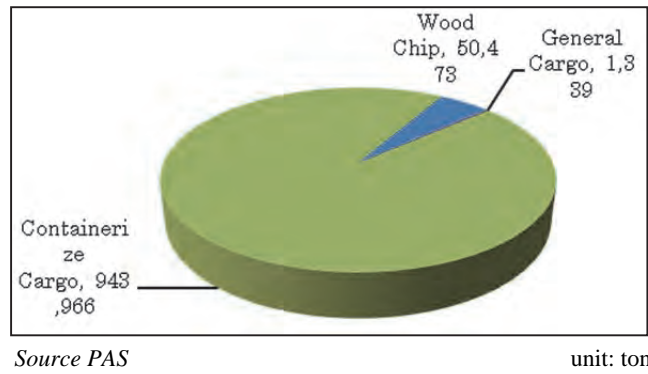


Figure 2.5-9 Composition of Cargo Items of Exported Cargoes at Sihanoukville in 2011

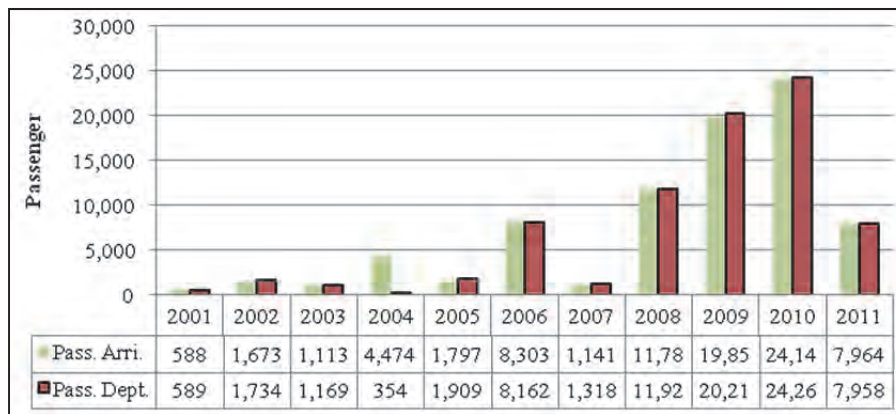
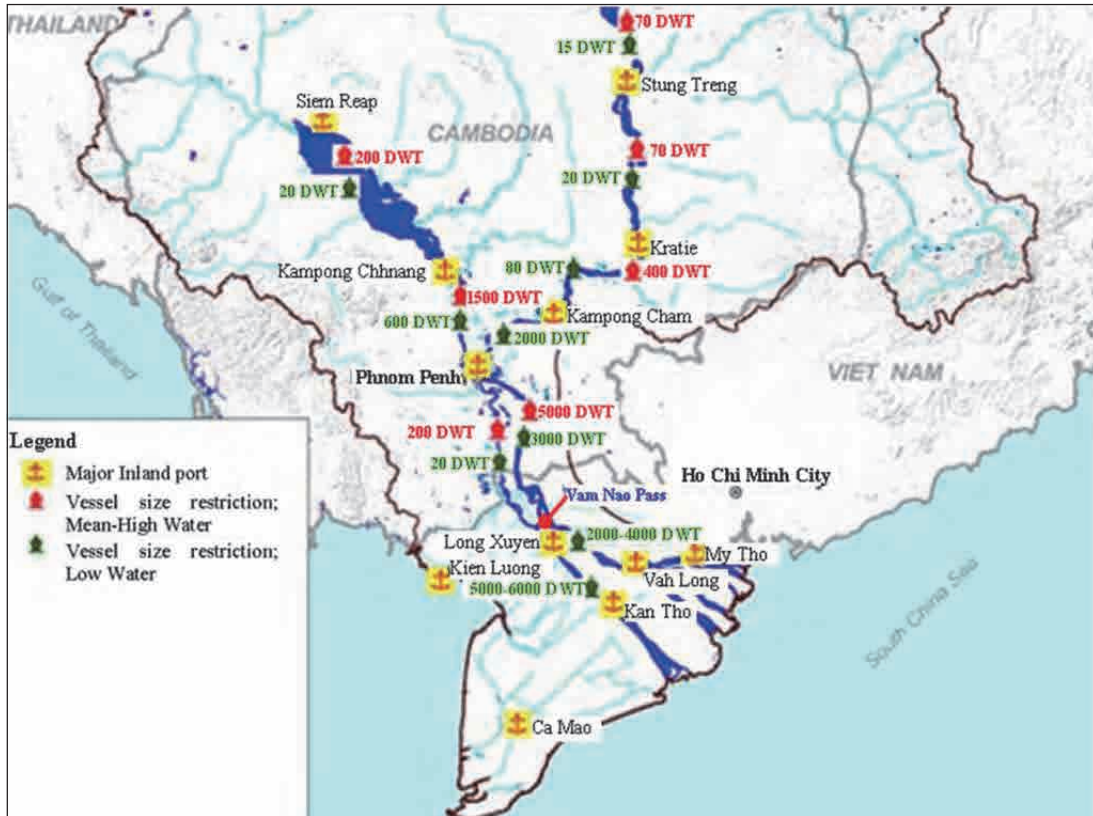


Figure 2.5-10 Number of Passenger at Sihanoukville Port

2.5.3 Phnom Penh Port

(1) Navigation

For the 102 km stretch between Phnom Penh and Cambodian-Vietnam border, the bends of the river prevent the passage of vessels more than 110m long. To travel from Phnom Penh to South China Sea, currently vessel must take Mekong route in Cambodia and also Mekong route in Vietnam. It has to wait for high tide to pass the most difficult path, which locates at the mouth of the Mekong River. Its water level supports only up to 4,000DWT in high tide and 3,000DWT in low tide



Source: Master Plan for Waterborne Transport on the Mekong River System in Cambodia, Final Report in 2006

Figure 2.5-11 Maximum Navigable Vessel Size in the Mekong River Basin

(2) Present State of Phnom Penh Port

Phnom Penh Port is under the management of state enterprise supervised by MPWT and Ministry of Economy and Finance (MEF). This autonomous enterprise was established by Sub-Decree No. 51, dated 17 July 1998. The Phnom Penh port is the country's traditional river port, accessible to vessels from the South China Sea through Vietnam. Phnom Penh port is located in the city, along the Tonle Sap, some 3-4 km from its junction with the Mekong

Table 2.5-3 Major Infrastructure at Phnom Penh Port

Description	Specification	Remarks
Container and General Cargoes	Quay: 20 m x 300m	Water depth is -5.0 m
	Berthing capacity: 3 vessels at one time	
Passenger terminal	2 Pontoons of 15 m X 45 m each	
Warehouse	70 m X 50 m = 3,500 m ²	
	50 m X 30 m = 1,500 m ²	
ICD	Area: 92,000 m ²	

Source: PPAP

Phnom Penh Port is located at 3 areas: a) Port No. 1 or the main port located along Tonle Sap about 4km North of Mekong junction, b) Port No. 2 located about 1km south of Port No. 1 and Port No. 3 located 25km south of Phnom Penh along Mekong river. Port No.3 is still under construction and the operation has started in January 2013.

(3) Shipping Companies

Several shipping companies are called at Phnom Penh Port:

Table 2.5-4 Shipping Companies and Shipping Lines

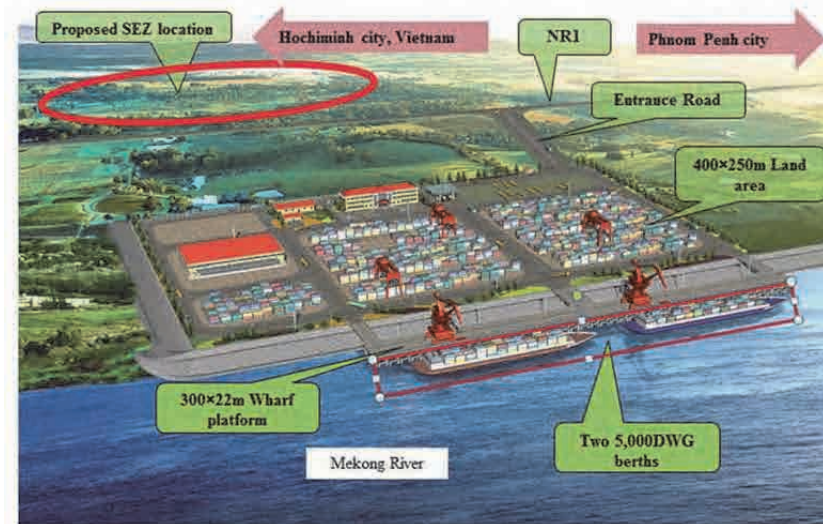
		SOVEREIGN BASE Logistics Company	Gemadep Company	Hai Minh Company	New Port Cypress Company
Feeder Shipping Line	Vessels	3 vessels (80-120 TEUs)	10 vessels (75-120 TEUs)	1 vessel (56 TEUs)	3 vessels (75-120 TEUs)
	Call per week	2-3 calls	5-7 calls	1 call	2-3 calls
	Other	2 floating cranes and some trucks			
Shipping Line		Maersk Line, MOL, Wan Hai, CMA, OOCL, K-Line, NYK, China Shipping, Star Shipping, HAN JIN, APL, Evergreen, POS Shipping, ZIM, Hyundai, Sun Shipping, RCL and others...			

Source: PPAP

(4) New Phnom Penh Port and SEZ Plan

Because of several restriction to run No. 1 and No. 2 ports such as low water level, traffic congestion as well as their capacities are getting full, New Phnom Penh Port or the third port is being constructed 25km downstream from the 2nd ports (between NR1 and Mekong river). This is a 28-million USD project funded by China.

- Contractor: Shanghai Construction (Group) General Company
- Construction Period: 30 months (Construction of infrastructure)
- Request further budget to finance superstructure
- Initial capacity: 120,000 ETUs/Year
- Total Capacity = 300,000 TEUs/year (including future plan)
- Berth = 22m x 300m, Port Area = 12 ha
- SEZ plan : To support New Container Terminal (NCT), PPAP is planning to develop SEZ. This project is under preparatory survey by JICA.
 - Infrastructure : Bonded Warehouse, Agricultural Processing Zone and Industrial Zone
 - Location : NR1, PK 30, opposite side of current New Container Terminal
 - Size : Approximately 200ha

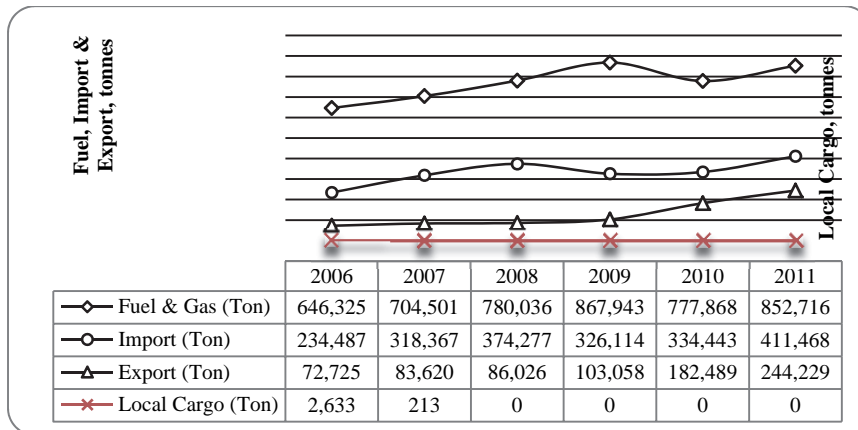


Source: PPAP

Figure 2.5-12 New Phnom Penh Port

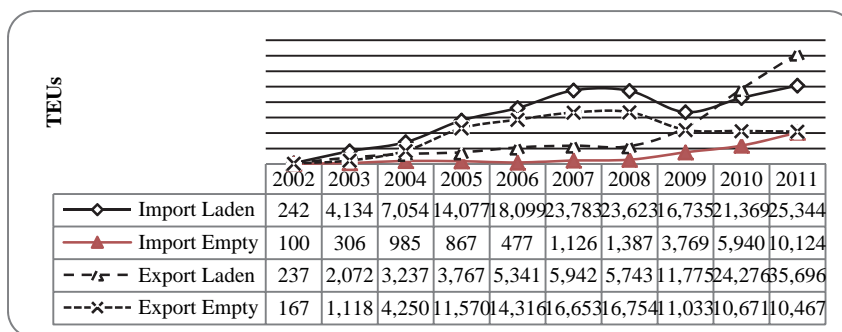
(5) Cargo Throughput at Phnom Penh Port

There is only data of Phnom Penh port usage is available. Most of Phnom Penh port service is used for maritime trade service (import and export). Local cargo ceased to operate since 2008.



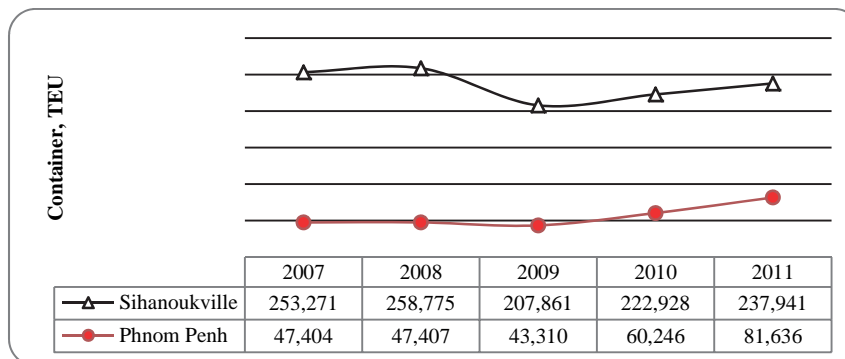
Source: PPAP

Figure 2.5-13 Trend of Import and Export Cargoes Phnom Penh Port



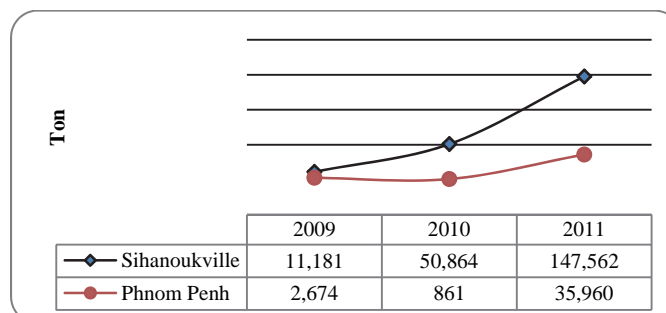
Source: PPAP

Figure 2.5-14 Trend of Empty and Laden Containers at Phnom Penh Port



Source: PAS & PPAP

Figure 2.5-15 Comparison between Containerized Cargoes at Phnom Penh Port and Sihanoukville Port



Source: PAS & PPAP

Figure 2.5-16 Comparison between Rice Export at Phnom Penh Port and Sihanoukville Port

2.5.4 Ports in Neighboring Countries

(1) Major Ports in Southern Vietnam

Major marine ports in the southern part of Vietnam are a) Ho Chi Minh Port, located around 83 km from mouth of Saigon River and Cai-Mep Thi-Vai Port is situated around mouth of Thi-Vai river and is characterized as deep sea port.

(a) Cai-Mep Thi-Vai Port

Recently, in proposition with economic development in Vietnam, especially Ho Chi Minh Area, freight traffic demand has been increasing tremendously. As the results, traffic congestion and environmental pollution around Ho Chi Minh Port is very much severe. And there is no room to construct the additional port to meet increasing freight traffic demand in Ho Chi Minh Area. Based on such background, Vietnam Government has decided to construct deep sea port at river mouth of Thi-Vai River.

Areas around mouth of Thi-Vai River are allocated for bulk terminal and container terminal as shown in **Figure 2.5-4**.



Source: website of ports around Cai Mep Thi Vai

Figure 2.5-17 Terminal Location Plan at Cai-Mep Thi-Vai Port

Table 2.5-5 shows cargo handling volume at Cai Mep Thi Vai port.

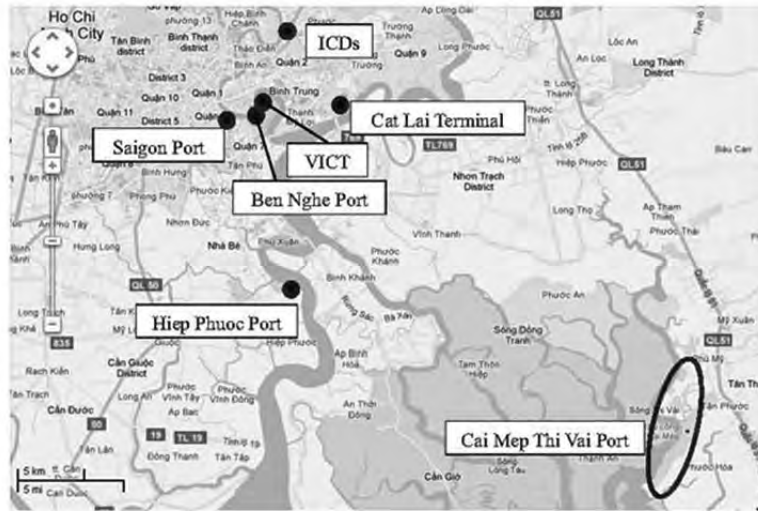
Table 2.5-5 Cargo Handling Volume at Cai -Mep Thi-Vai Port

Item	Unit	2010	2011	2012
Number of vessel calls	Calls	529	788	
Total volume of cargoes	Million tons	9.5	12.7	
Container throughput	1000 TEU	308	794	

Source: website of ports around Cai Mep Thi Vai

(b) Ho Chi Minh Port

As shown in **Figure 2.5-18**, Ho Chi Minh Port consists of several terminals. Cat Lai Terminal managed by Saigon New Port Authority is the biggest one in Vietnam. Vietnam International Container Terminal (VICT) is first private port and Ben Nghe Port adjacent to VICT is mainly handling domestic containers. Hiep Phuoc Port is the newest and the deepest terminal among Ho Chi Minh Port.



Source: web site of port around Ho Chi Minh

Figure 2.5-18 Location Map of Ho Chi Minh Port

Table 2.5-6 Cargo Handling Volume at Ho Chi Minh Port

	Unit	2010	2011	2012
Number of vessel calls	Calls	6,161	6,444	
Total volume of cargoes	Million tons	59.3	54.7	
Container throughput	1000 TEU	3,861	3,631	

Source : website of ports around Ho Chi Minh

(2) Major Ports in Thailand

Major marine ports in Thailand are a) Leam Chabang Port, located around 130 km from southeast of Bangkok and Bangkok Port, located along the river of Chao Phraya River.

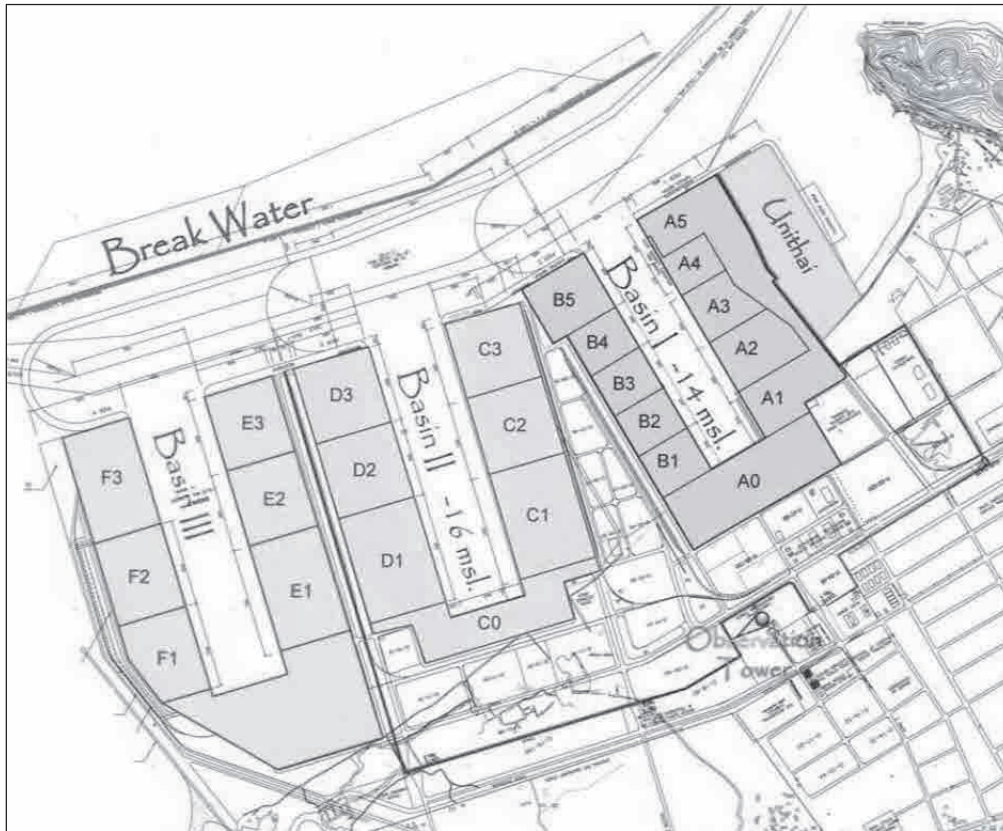
They are as follows:

(a) Leam Chabang Port

Leam Chabang Port is located at southeast of Bangkok and at the most developing area - so called as east coast industrial development area - in Thailand.

A layout plan of Leam Chabang port is shown in **Figure 2.5-19**. Basin I has been already operating since 1991 while Basin II has been operating 4 berths among 7 berths but the remaining 3 berths are still being constructed at present.

Cargo handling volume at Leam Chabang Port is shown in **Table. 2.5-7**.



Source: The Project for the Study on Strengthening Competition and Development of Sihanoukville Port in 2012, JICA

Figure 2.5-19 Layout Plan of Berths at Leam Chabang Port

Table 2.5-7 Cargo Handling Volume at Leam Chabang Port

Item	Unit	2007	2008	2009	2010
Number of vessel calls	Calls	6,645	7,012	6,288	n/a
Total volume of cargoes	Million tons				n/a
Import	Million tons	15,478	20,150	15,791	
Export	Million tons	29,114	34,411	31,190	
Transshipment	Million tons	272	276	107	
Container throughput	1000 TEU				
Import laden	1000 TEU	975	1,266	990	1,312
Export laden	1000 TEU	2,311	2,614	2,272	2,673
Empties (Import + Export)	1000 TEU	4,641	5,240	4,622	5,190

Source: The Project for the Study on Strengthening Competition and Development of Sihanoukville Port in 2012, JICA

(b) Bangkok Port

The Bangkok Port is pointed at showing terminals located along Chao Phraya River. **Figure 2.5-20** shows major terminals of the Bangkok Port. The Bangkok Port has demerits such as not enough land to handle incoming and outgoing cargoes and not enough depth. Leam Chabang Port is therefore constructed outside of Chao Phraya River area.

Table 2.5-8 shows cargoes handling volume at Bangkok Port.



Source: The Project for the Study on Strengthening Competition and Development of Sihanoukville Port in 2012, JICA

Figure 2.5-20 Location Plan of Bangkok Port

Table 2.5-8 Cargo Handling Volume at Bangkok Port

		Unit : TEU			
Item	Unit	2006	2007	2008	2009
PAT Terminal	Inbound	747,900	783,442	719,751	679,740
	Outbound	789,707	792,122	655,417	655,063
	Total	1,537,607	1,575,564	1,375,168	1,334,803
Private Terminals	Inbound	166,556	170,832	240,628	200,787
	Outbound	80,588	85,250	161,131	149,037
	Total	247,144	256,082	401,759	349,824
Total of Bangkok Port	Inbound	914,456	954,274	960,379	880,527
	Outbound	870,295	877,372	816,548	804,100
	Total	1,784,751	1,831,646	1,776,927	1,684,627

Source: The Project for the Study on Strengthening Competition and Development of Sihanoukville Port in 2012, JICA

2.5.5 Summary

Table 2.5-9 shows the container throughput at major ports in Cambodia, Vietnam and Thailand.

Table 2.5-9 Summary of Container Throughput in Cambodia and Adjacent Countries

		Unit: 1000 TEU		
Item		2009	2010	2011
Cambodia				
Sihanoukville Port		208	223	238
Phnom Penh Port		43	60	82
Neighboring Countries				
Cai- Mep Thi- Vai Port		n/a	308	794
Ho Chi Minh Port		n/a	3,861	3,631
Leam Chabang Port		7,884	9,175	n/a
Bangkok Port		1,684	n/a	n/a

Source: JICA survey team, based on the previous data