APPENDIX 8

TRANSPORT LEGISLATION, FINANCE AND OPERATION

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A8 TRANSPORT LEGISLATION, AND OPERATION

A8.1 MAJOR LAWS AND REGULATIONS RELATED TO THE TRANSPORT SECTOR IN CAMBODIA

Category	Name of the Laws and Regulations	Promulgated year	Objective	Institution/Organization established based on the Laws	Remarks
Urban Planning & Development	Law on the Country Planning, Urbanization and Construction (CNATUC LAW)	May 1994	To promote the Organization and embellishment of the urban and rural area throughout the country with the purpose of assuring the development of the country in the spirit of; 1) respecting both common and individual interests, private rights, observing laws and regulations, and overseeing on the construction matters, 2) assuring through the development process an equilibrium between the cities/towns and rural areas based on their geographical conditions and special characteristics; and 3) assuring the value of natural and cultural wealth, ensuring the development of the economic and tourist sectors and maintaining the quality of the environment.	- National Committee for Country Planning, Urbanization and Construction - Committee for Planning, Urbanization Construction (Municipality of Phnom Penh)	
Land Law	Land Law	1992	All the land in Cambodia belongs to the State and shall be governed and protected in agreement by the State. The State does not recognize the land property right existing before 1979. The property right and any other rights related to the land shall be governed by this law. (Art.1)		UNTAC
Land Acquisition Law	Land Acquisition Law	Under preparation			
Construction Permit	Sub-Decree on Construction Permit		To serve as a site-specific control on new construction to ensure all future development meets appropriate standards.		
Traffic Law	Law on Overland Traffic	1991	To promote prestige and effectiveness in protecting traffic safety, maintaining public security and social order, protecting public property, lives and interests in legality of individuals and to educate people to love and obey the law to be against and prevent breach of traffic regulations.		New Law is under preparation. Table of Contents is attached as Appendix 8-2.
Motorcycle Registration Procedure	Order on the Price determination for Motorcycle certificate and Plate of Motorcycle	Jan. 2000	To determine and order the price of new motorcycles certificate, new plate and motorcycle's owner replacement		
Environment	Law on Environment Protection and Natural Resources Management (EPNRM)	1996	(See Chapter 9 Environmental Conditions)		

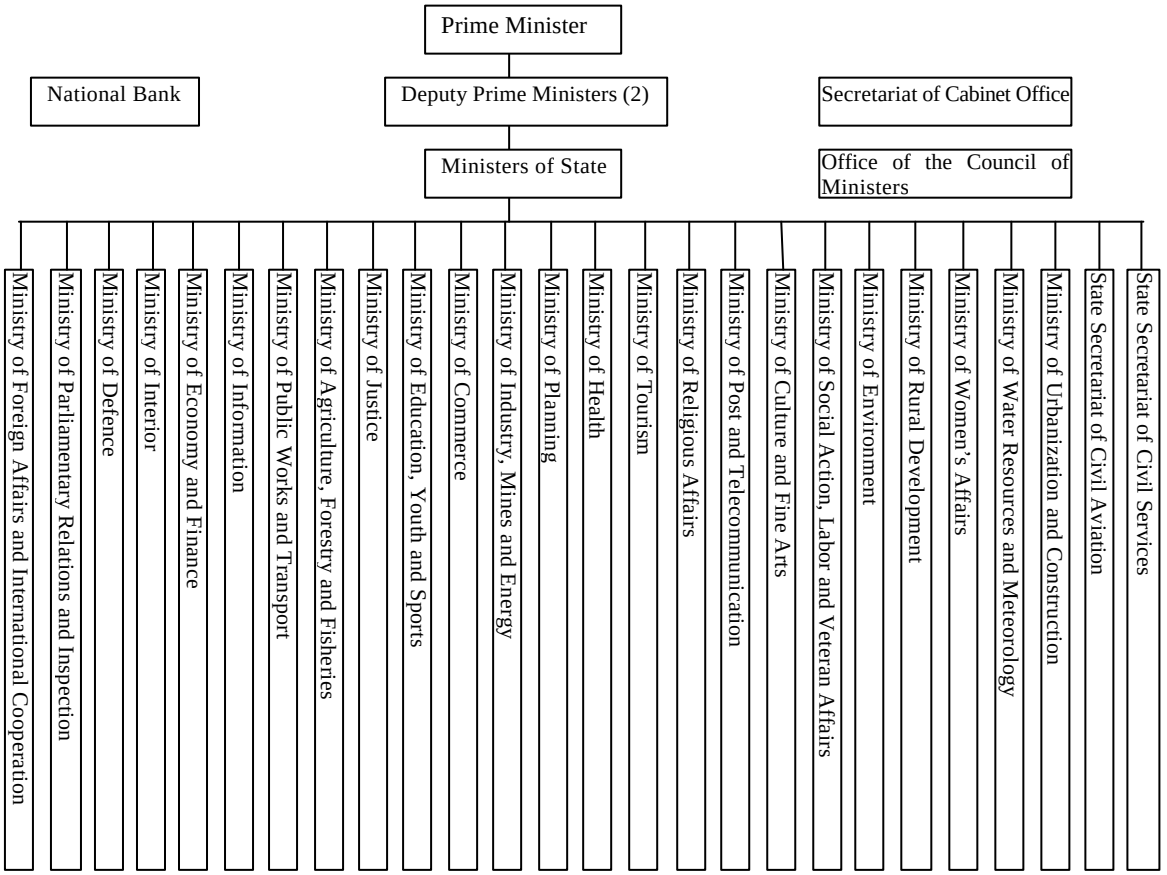
A8.2 DETAILS OF PENALTY PROVISION ON VIOLATION OF TRAFFIC REGULATION

From the stipulation of the Chapter 6, penalty provision on violation of traffic regulation is summarized as followings;

Who	Violation of traffic regulation	Liable for:	Art. No.
1) Driver 2) Individual entity or anyone who orders to the driver	Causing accident	1) Penal code or if no one who orders, both the penal and civil code. 2) Civil code	46
Any person Drivers of any kind of vehicles Any Vehicle	Breaching the following articles: Art. 5 (Right hand side traffic) Art. 7 (Traffic of the pedestrian) Art. 9 (Those riding or leading animals) Art. 11 (point 1: Traffic lines in the street) Art. 12 (Banned from driven neck and neck) Art. 15 (Length and gap for group of vehicles in procession) Art. 16 (Length and gap for Motorcycle towing cart , animal-pulled cart) Art. 23 (Vehicles and Commuters to stop on their right and commence traffic of fire trucks, ambulance, police cars and so on) Art. 26 (Priority at the Ferry) Art. 27 (Vehicle traffic crossing the rail road)	Education or warning	47
Any person Any driver	Contravenes the following articles: Art. 17 (User have to use road set by Provincial People Committee) Art. 18 (Narrow road, passing the another car ahead, at slope, big light turned off at night when vehicles meet each other, etc) Art. 19 (Overtaking on the left, signal for passing another, etc) Art. 20 (Slowing down the speed at road junction, small, narrow, dusty crowded road, crossing bridge, etc) Art. 21 (Speed limit) Art. 22 (Priority for big road with sign) Art. 24 (Priority for vehicle on the right, and vehicle at the roundabout) Art. 25 (Close to and on the Bridge) Art. 28 (Parking) Art. 33 (Number plate and lights) Art. 35 (width, length and load of the vehicle, animal pulled cart, cyclo)	Fine from 500 to 1,000 riel	48
Any person	Contravenes the following articles: Art. 11 (point 2: Signal lights, point 3: Sign of traffic controllers) Art. 13 (Chain-wheeled vehicles) Art. 29 (Driver's license) Art. 30 (Five kinds of driver's licenses) Art. 32 (technical characteristics of motor vehicles) Art. 34 (Vehicles with trailers) Art. 36 (Length of vehicles) Art. 37 (Tires)	Fine from 1,001 to 1,500 riel	49

Who	Violation of traffic regulation	Liable for:	Art. No.
Any person	1) Who drinks alcoholic or wine while driving 2) In case of repeated offenses	1) Confiscation of driver's licenses for a term from 1 to 6 months and subject to fine from 1,501 to 12,000 riel 2) Permanent deprivation of driver's license and subject to a tripled fine.	50
1) Any person who let his pets wander for fodder 2) Parents who let their child/children under 6 years old loiter in the public roads	Causing traffic accident	Civil code	51
Any person who stores stuff or equipment	Which hinders the traffic and damaging the state property or others' property	Civil code	52
Any person	Violates Art. 14 (Vehicle which totally weighs over 20 tons)	Fine for 1 ton with 5,000 riel	53
Any person	Violates Art. 10 ()	Education and warning In case of repeated offenses, fine from 10,000 to 20,000 riel.	54
Any person	Use of unlicensed car, falsified car number plate, counterfeited driver's license, Car ID, etc.	A term of imprisonment from 1 to 3 years	55
Any person	Hurting other out of work	A term of one month to 1 year in prison	56
Any person	Causing other disable, some parts of the body hurt, physical disability, loss of limb or sense	From one to 3 years in prison	57
Any person	Drive under the confiscated driver's license or using of other driver's license	From one to 3 years in prison	58
Any driver who violates traffic regulation	Causing others harmful to health, lives and then escaped	Additional imprisonment from one month to one year	59
Any driver	Causes fatal accident to other intentionally	Imprisonment for 1 to 5 years	60

A8.3.1 Governmental Organizations Chart



A8.3.2 Major Governmental Organizations related to the urban transport sector

Name of the Organization	Established Year	Roles and Functions	Remarks
Council for the Development of Cambodia (CDC)	June 1995	(1) to be the "Etat Major" and the "One-stop Service" of the Royal Government responsible for rehabilitation, development and investment activities, (2) to guide the preparation and the conception of development frameworks and strategies for Cambodia in cooperation with the relevant institutions, (3) to coordinate contributing countries, bilateral/multilateral organizations and NGOs in the National Programme to Rehabilitate and Develop Cambodia to ensure an efficient acceptance and reallocation of external aid according to the needs and priorities of the nation, (4) to facilitate and coordinate inter-ministerial activities, as well as the activities of the ministries and institutions involved with donor countries, organizations and investors, (5) to provide guidance in the utilization of public and private resources in the development process of Cambodia, (6) to facilitate and streamline administrative procedures for donor countries and investors, and (7) to review and decide all the matters pertaining to the rehabilitation and development and other public sector investments through the "one-stop service" mechanism of CDC. The organizational structure is two Co-chairmen, the First Prime Minister and the Second Prime Minister, and Vice-chairman, senior minister in charge of Rehabilitation and Development, and eight members manage CDC.	**The Cambodian Rehabilitation and Development Board (CRDB)** and the **Cambodian Investment Board (CIB)** are under the direct supervision of a Secretary-General. The General-Secretariat of CDC is also under the direct supervision of the Secretary-General of CDC. Four divisions, namely Legal and Dispute Resolution, Finances and Administration, Personal Management, and Strategic Planning, shall support the General-Secretariat.
Ministry of Economy and Finance (MEF) and Ministry of Planning (MOP)	MEF MOP	Ministry of Economy and Finance (MEF) is responsible for preparation of the national budget. This includes estimating the total expected government revenues for the coming year, establish budgetary priorities and activities within the constraints imposed by available revenues and borrowing limit including grants. MEF will also play a key role in programming the Public Investment	

Name of the Organization	Established Year	Roles and Functions	Remarks
		Program with the Ministry of Planning (MOP) who is responsible for economic and social development and statistic practice of the country. In the process of selecting appropriate projects for capital investment, MEF works with line ministries and the MOP to prepare the annual investment budget.	
Ministry of Foreign Affairs and International Cooperation (MFAIC)		The agency responsible for foreign assistance. Any request for foreign assistance is first sent from a respective ministry to the Council for the Development of Cambodia (CDC). The CDC accordingly checks upon discussions with relevant agencies the conformity of the subject request to the national plan, and decides adoption/dismissal, and give priority for the adopted ones. When the request for the foreign assistance is approved, it is sent to the MFAIC.	
CNATUC (Comite National de l'Amenagement du Territoire, d'Urbanisme et de Construction = National Committee for Country Planning, Urbanization and Construction)	May 1994	It is created by "Law on the Country Planning, Urbanization and Construction (CNATUC Law) According to the sub-decree passed in June 1997, the president of CNATUC is the Minister in charge of State, Urbanization and Construction, and the vice president is the Minister of Interior or his/her representative. Permanent members are representatives of the MPWT, MOE, MAFF, MEF, co-ministers of Defense or their representatives, a delegate of the Municipality of Phnom Penh, the co-ministers representing the Council of Ministers, and other concerned Ministers as the President decides.	
Committee for Planning, Urbanization and Construction (CATUC)		It was particularly established for the capital city of Phnom Penh. This Committee is headed by the Chairman of the CNATUC and includes its members a Governor, Vice Governor and a relevant competent technical body. CATUC of the Municipality of Phnom Penh, though not yet organized in reality, is designated to draw up own development master plans for the reorganization and development of the municipality. CATUC is also responsible to establish land use master plans that clearly indicate the areas to be allocated for national defense, agriculture, commerce, industry, handicraft, culture, tourism, religion and administrative and public facilities. The land use master plan shall be firstly approved by CATUC for the municipality and subsequently by the CNATUC.	

A8.4 Public Investment Program for Transport Sector (1998 - 2003)

Unit: Million US$

No.	Project Name	Funding Agency	Implement. Agency	Implement. Period	Programmed Investment 1998	1999	2000	2001	2002	2003	Total project Cost
16	Asian Highway Phase I (NR1. Neak Luang - Boarder)	ADB	MPWT	1998-2003	4.0	8.0	16.8	13.7	5.0	0.3	52.5
27	Rehabilitation RN 5:PNH-BTBG-Poipet	ADB	MPWT	1994-2000	0.0	2.5	2.5				18.5
30	Bridges Reconstruction	Australian Aid	MPWT	1995-1998	1.5	1.5	1.5	0.0	0.0		12.2
35	Maintenance of National Roads (4)		MPWT	1996-2000	0.0	1.3	3.5				4.7
	Provincial and Rural Infrastructure Project	Nego. with WB	MPWT	2002-2006				0.0	1.0	2.0	50.0
54	Phnom Penh Road Improvement		MPP	1999-2002	0.0	1.3	2.8				19.4
211	Rural Infrastructure Improvement	ADB	MRD	1998-2002	6.5	6.7	5.7	6.0	1.3	0.0	25.1
222	Reconstruction RN 78		MPWT	2000-2003	0.0	0.0	0.7				8.1
235	Route No. 2 Rehabilitation		MPWT	2000-2002	0.0	0.0	0.4				3.0
237	Reconstruction RN 3		MPWT	2000-2001	0.0	0.0	1.1				2.6
242	Route No. 73 Rehabilitation		MPWT	1999-2000	0.0	1.5	3.6				5.0
246	RN 48 Road Rehabilitation	ADB	MPWT	1999-2003	0.0	0.5	2.5				37.5
249	RN 11 Rehabilitation	ADB	MPWT	1999-2000	0.0	0.6	0.6				1.2
250	Route No.33 Rehabilitation		MPWT	1999-2000	0.0	0.8	2.3				3.1
254	Mekong Bridge at KompongCham	Japan	MPWT	1997-2003	13.7	11.1	19.9	11.1	1.3	0.0	56.9
278	Highway 1 project	World Bank	MPWT	2001-2006	0.0	3.0	3.4	6.7	11.0	11.5	39.2
284	Primary Road Network Improvement	ADB	MPWT	1999-2004	0.0	1.2	5.0	31.8	29.7	25.3	88.3
290	Reconstruction NR6 & NR7	Japan	MPWT	1997-2000	4.0	8.6	18.2				38.0
297	Topographic Reh. & Main. of 411.5Km Rural Road	F/S required	MRD	2002-2005	0.0	0.9	3.0	0.0	2.0	2.0	9.5
327	Provincial Towns Improvement Project	ADB	MPWT	2001-2006				4.8	1.8	1.8	5.6
430	Rural roads maintenance programme 2,236.85Km	F/S required	MRD	2002-2005			0.0	0.0	1.0	1.5	18.0
458	Rehabilitation NR 7K Cham-Thai Tutung	F/S required	MPWT	2002-2005			0.0	0.0	0.6	1.0	14.0
459	Improvement of National Highsways NR 6	Japan	MPWT	2002-2005				2.5	10.0	0.0	8.0
460	Reconstruction of Bridge No.NR 6A	Japan	MPWT	2001			0.0	4.8	0.0		4.8
463	Bridge Construction NR 5	Discuss with Aust. AID	MPWT	2002-2005			0.0	0.0	0.9	1.2	10.0
467	Rehabilitation of NR 5	F/S required	MPWT	2002-2005			0.0	0.0	0.0	0.0	29.1
472	Rehabilitation of NR 11		MPWT	2002-2005			0.0	0.0	0.0	0.0	0.6
473	Emergency Repair & Maintain of NR & Provincial roads	F/S required	MPWT	2002-2005				0.0	1.5	1.7	20.0
474	Rehabilitation of Rural roads 433.1Km	F/S required	MRD	2002-2005				0.0	1.0	1.2	4.0
645	Small Repairs-National Road Network	National Budget	MPWT	2002-2005				0.0	1.0	1.0	4.5
647	Road Maintenance Capability	F/S required	MPWT	2002-2005					1.0	1.0	3.7
660	National Transport Network-EFRP	ADB	MPWT	2001-2003				16.8	15.0	15.0	46.8
662	Rural lnfrastructure-EFRP		MRD	2001-2003				4.6	4.0	4.0	12.6
	Roads Sector Total				**29.7**	**49.3**	**93.3**	**102.8**	**89.0**	**70.5**	**656.5**
232	Thailand Rail-Link Restoration	Discuss. with Thailand	MPWT	2002-2005	0.0	0.0	0.0	0.0	2.0	2.0	22.0
256	Rehabilitation of the southern railway line	F/S required	MPWT	2002-2005	0.0	2.1	3.4		1.4	2.9	29.0
636	Rehabilitation-Northern Railway Line	F/S required	MPWT	2002-2005				0.0	1.0	1.0	35.4
	Rail Total				**0.0**	**2.1**	**3.4**	**0.0**	**4.4**	**5.9**	**86.4**
31	Upgrading Ferry Facilities	Danish IDA	MPWT	1995-1998	7.0	0.0	0.0				23.0
293	Renovation of Sihanouk Ville Quay	Japan	MPWT	2001-2005				15.7	16.9	8.2	42.6
466	Regional Mekong GIS Data base for Cambodia	F/S required	MPWT	2002-2005				0.0	0.7	1.0	7.0
469	Dredging access of Mekong Channel & Island	F/S required	MPWT	2002-2005			0.0	0.0	0.0	1.0	4.5
470	Improvement Waterways Tounlesap Lake	F/S required	MPWT	2002-2005				0.0	0.1	1.0	11.8
638	Construction New Cargo Wharf	F/S required	MPWT	2002-2005				0.0	0.4	1.0	22.0
	Ports and Waterways Total				**7.0**	**0.0**	**0.0**	**15.7**	**18.0**	**12.1**	**110.9**
5	Improve. Siem Reap Airport	ADB/National Budget	SCA/CAA	1998-2002	1.1	4.6	4.8	5.4	5.1	0.0	17.5
420	Mondulkiri Airport	F/S required	SCA/CAA	2002-2005			0.0	0.0	0.3	0.6	1.4
	Aviation Total				**1.1**	**4.6**	**4.8**	**5.4**	**5.4**	**0.6**	**18.9**
	Transport Sector Public Investment Total				**37.8**	**55.9**	**101.5**	**123.8**	**116.8**	**89.1**	**872.7**

Source: PIP 1998-2000, 1999-2001 (Apr. 2000), and 2000-2003

Remarks: Technical assistance is not included.

A8.4 PRIVATE SECTOR PARTICIPATION

Existing Situation:

Huge and acute demands for rehabilitation and improvement of the transport infrastructure and operations are causing the government into increasing difficult situation for various transport projects implementation. Therefore, the Cambodian government has been vigorously promoting inducement of private sector participation to those projects within the framework of the macroeconomic development strategies.

As discussed in the following section, private sector operators run most of the passenger and cargo land transportations in accordance with the regulations set forth by the government. Also, most of the bus terminals within the Study Area are being developed by the private investors with operational management and control by the Transport Office, Department of Public Works and Transport of the Phnom Penh Municipality.

As for the transport infrastructure, there is a toll road running east-west direction to the south of Pochentong Airport, Phnom Penh. It was developed and operated by a private investor on a BOT (Build, Operate and Transfer) arrangement. Similarly, in the civil aviation sub-sector, runway, terminal and communications facilities of the Pochentong Airport have been improved and rehabilitated by a French company on the BOT arrangement, and this company operates the airport. Same BOT concession agreement has recently been applied to the French company on improvement and operation of the Siem Reap Airport.

In the railway sub-sector, the government has intention to invite private sector participation on a BOT arrangement on a 9.4 km section from Phnom Penh Station for possible commuter service operations. But the government does not work out the details of the arrangement.

Government Policy on Private Participation:
The principal development strategies for private sector participation to the transport sector set forth by the Socioeconomic Development Plan emphasize the private investment in transport infrastructure and operation be promoted and expedited to ensure adequacy of high quality standards and adherence to the operational regulations, management and procedures for convenience and safety of the users. In drawing up a financial package classification, the costs distributions for construction and operations as well as maintenance between public and private sectors shall be carefully taken into account.

A8.5 PUBLIC TRANSPORT OPERTATION

A8.5.1 CLASSIFICATION OF PUBLIC TRANSPORT OPERATIONS

The existing public transport services are catered for by many different modes of transport, namely; passenger road transport for inter-city by bus and multi-purpose vehicles, and for intra-city by taxi and para-transit services like motodop, motorumok and syclo. As for the inter-city cargo transport, track and trailer are playing predominant roles. Railway, civil aviation and inland waterway services are other modes of transport operating mainly for inter-city (aviation includes international services) transport of passengers and cargoes, but their shares are very small due to inferior infrastructure.

With regard to the road public transport by type of operators' entities, they can be classified as follows:

Inter-city Operators:

mode	usage	entity of operator
1) Bus	passenger	public corporation (for international route) private corporation & self-owned individual
2) Multi-purpose	passenger	private corporation & self-owned individual
3) Truck	cargo	private corporation

4) Railway	passenger/cargo	autonomous body (CFRC/CRA)
5) Aviation	passenger/cargo	autonomous body (CAA)
6) Waterway	passenger/cargo	private corporation & self-owned individual
7) Ferry	passenger/cargo	government direct operation for 4 main crossings
		private corporation and self-owned individual

Intra-city Operators:

1) Taxi(sedan type)	passenger	private corporation (mainly for airport/city service)
2) Multi-purpose Vehicles	passenger	private corporation or self-owned individual
3) Para-Transit		
- Motodop	passenger	self-owned individual
- Motorumok	passenger/cargo	self-owned individual
- Cyclo	passenger	self-owned individual (some rent vehicle)

A8.5.2 BUS OPERATION

Reviews on the business conditions of existing bus transport operations are made on the two (2) typical bus operators in order to grasp the current operational conditions and environments. They are two (2) entities engaging in regular bus transport services with the head office location in Phnom Penh. The first is an autonomous body, Phnom Penh Transport [Authority] (PPT), and the second is Ho Wah Genting Transport Co., Ltd. (HWG).

(1) Phnom Penh Transport [Authority] (PPT):

Entity:
The Phnom Penh Transport [Authority] (PPT) is a public corporation, administered by the Transport Office, Department of Public Works and Transport (DPWT), Municipality of Phnom Penh (MPP). PPT was originally started a direct non-stop international bus transport service in 1983 between Phnom Penh city (PHN) and Ho Chi Minh city (HCM) in Vietnam, under the supervision of the Land Transport Department, General Directorate of Transportation, Ministry of Public Works and Transport (MPWT), endorsed by a friendship treaty between the two countries. Later in 1993 after the general election, the operation of the PPT was transferred from the MPWT to the MPP. There is a committee composed of the senior officials of MPP for supervising the management and operation of PPT. The purposes of this operation are intended for the following:

- To maintain friendly relationship between the two counties,
- To raise available revenue to MPP, and
- To improve the level of service in higher operational frequency and bus fleet in better quality and larger size, after completion of the Asian Highway network

Organization:
PPT is organized by nine (9) staff, comprising 3 managerial staff (1 director, 1 deputy director and 1 chief accountant) and 6 employees of line functions (1 cashier, 3 drivers and 2 co-drivers). The director and the chief accountant are dispatched from the DPWT, MPP and the rest of 7 employees are hired on a contract basis, who may have a chance to be permanently employed depending on the productivity and performance factors. The PPT head office serving also as the PHN terminal, depot and ticketing office is located within the premise of the DPWT building, and is the property of MPP.

Fleet:
For this bilateral international bus transport service, PPT, as the Cambodian side, has one (1) bus with the capacity of 25 passengers. The bus together with some spare parts was given to PPT by MPP at time of the administrative transfer from the MPWT. The fuel for bus operation is also being provided by MPP, while the new spare parts are borrowed from the private sectors. The Vietnamese counterpart has one (1) bus of 15-passenger capacity.

Operations:
The international bus transport service started in April 2000 after operational suspension for several years. The operational frequency of PPT bus is once a week to depart PHN on every Wednesday bound for HCM on RN 1 and its extension in Vietnam for a length of 233 km with the traveling time of approximately eight (8) hours including the times required for ferry ride and clearance formalities at the border. The return from HCM to PHN is on every Saturday on the same route. The Vietnamese counterpart operates with the same frequency on the same departure dates with reverse direction to the PPT bus.

There is no bus stop for getting-on and getting-off of the passengers on this route, with exception of the regulatory stop at the customs and immigration offices at the territorial border. For crossing the border, PPT is given permission by the Ministry of Interior to enter into and return from Vietnam, based on the treaty between the two (2) countries. The PPT drivers should carry with them each time the letter of permission authorizing the border crossing. For crossing the Mekong River at Neak Loeang, the bus uses the ferry service paying the regular fare.

Fare:
The one-way bus fare is set for US $20.00, but the fare normally discounted for group and poor passengers within a range of approximately 10 %. This discount arrangement seems to maintain competitive position of PPT to the private tour operator whose fare is about US $16.00. The actual difference of the fare being about US $2.00 can be forfeited by the advantage of PPT bus which can drive through the border, while the bus of the private tour operators can operate from PHN up to the border where the passengers should change to a Vietnamese bus after walking through the customs and immigration clearances.

This private tour operator is called Kapitol, organizing tours with twice a day departures to Vietnam including hotel accommodation, meals and transportation. It is one of the affiliated companies of Kapitol Group dealing with hotel and packaging tools manufacturing businesses. PPT is investigating on the possibility to organize similar package tours, in particular, historical and cultural tours by improving the quality of service with new and high-grade bus, but seems not possible for the time being due to shortage of investment fund for such improvement.

Passengers and Seat Factor:
The number of passengers on the PPT buses ranges from 7 to 12 persons (seat factor: 28 to 48 %), depending on the traffic demands on seasonal fluctuation for this service. In addition to the transport of normal passengers, as one of the functions of PPT the buses sometimes carry emergency patients and their attendants requiring urgent international transport between the two cities.

Future Plan:
For the purposes of raising investment fund for operational improvement aiming at soliciting more passengers by high quality buses and introduction of the package tours, PPT is looking for private sector investors with whom PPT will establish a joint venture, and extend the service routes, possibly covering the intra-urban areas. But so far this idea has no substantial foundation.

(2) Ho Wah Genting Transport Co., Ltd. (HWG)

Entity:
This bus operator is a Malaysia-based private company, one of the affiliates of the Ho Wah Genting Group, with the core companies dealing with bus assembly and resort development businesses in Malaysia and Indonesia. The company started the intra-city and inter-city bus transport operations in December 1996 based on the exclusive agreements for a period of 25 years, with the Transport Office, DPWT, MTT for intra-city service, and with the Land Transport Department, General Directorate of Transport, MPWT for inter-city service. Regarding the intra-city bus service, the company stopped the entire operations of four (4) routes after 3 months from December 1996 due to huge operational loss.

Organization:
The head office and the main terminal of the HWG is located at the southwestern quadrant of the Central Market in PHN, and led by a managing director. There are three (3) organizational units under him, namely, operations, maintenance, and administration. The marketing activity is supervised by the managing director with the staff of administration unit. The operations unit includes 65 drivers on one-month employment contract basis, conductors and inspectors.

Fleet:
The bus fleet of the HWG consists of 45 air-conditioned buses (10 x 45 passenger capacity, 20 x 25 p.c. and 15 x less 25 p.c.). Those buses of 25 passenger capacity and the less are normally being used for the short distance services, while the buses with larger capacity are used for long haul services.

Operations and Fares:
As described earlier, HWG operated the intra-city bus service for only 3 months from December 1996 and February 1997. This service had been made for 2 circular and 2 radial routes from 6 a.m. to 6 p.m. in Phnom Penh with 8 air-conditioned buses of 35-passenger capacity. The reason for this operational suspension was that HWG could not yield expected operational performance in terms of number of passengers (240 passengers per bus/day) and in traveling speed. In other words, this intra-city bus service could not compete with the so densely dominated and widely prevailed motodop services, which had been catering for door-to-door transport.

Since December 1996 HWG has been operating the inter-city regular services with the main terminal at the Central Market in PHN, catering for the following 10 destinations and returns there from with indication of distances and one-way fares as per Table A8.5-1:

Table A8.5-1: Inter-City Regular Bus Transport Operation

Destination	Frequency / day	Distance in km	Fare in Riels
1) Sihanouk Ville	5 departures	230	R. 10,000
2) Kompong Cham	8 departures	124	R. 5,000
3) Kompong Chhnang	9 departures	91	R. 4,500
4) Takeo	9 departures	87	R. 4,500
5) Neak Loeang	10 departures	60	R. 4,000
6) Kompong Speu	9 departures	48	R. 4,500
7) Ou Dong	17 departures	37	R. 2,500
8) Ro Ka Kaung	23 departures	40	R. 3,000
9) Timber Factory RN1	25 departures	24	R. 2,000
10) Takmau	51 departures	15	R. 1,200

Passengers:
According to the managing director of the company, the average number of passengers in total of 10 destinations on the round trip basis ranges 5,000 to 6,000 persons per day, and in the peak season it increases to approximately 7,000 to 8,000 passengers.

It is to be mentioned that the same company started intra-city bus transport operation with 8 air-conditioned buses with the capacity of 35 passengers at the same time with inter-city services, with 2 circular and 2 radial routes from 6 a.m. to 6 p.m. in Phnom Penh. But, it stopped the services in three months due to the fact that it could not secure expected operational performance in terms of number of passengers (240 passengers per bus/day) and in traveling speed. In other words, this intra-city bus service could not compete with the so widely prevailed motodop services.

(3) Other Bus Operators:

Regarding the intra-urban public bus transport services, there is no such service at present either by public or private sector as discussed earlier. However, in 1994 there was a public corporation called Phnom Penh State Enterprise, which was catering the intra-city bus services on the following two (2)

routes with 20 buses.

Route	Distance	Fare in Riel (US $)
1) Central Market – Chbar Ampauv Market	7 km	300 ($0.12)
2) Central Market – Takmao Terminal	12 km	700 ($0.28)

The operation of these services was suspended in 1996, due to heavy loss incurred on these two routes.

Apart from the regular bus services, there are many small private companies and self-owned individuals that are operating on-demand type inter-city passenger services to and from Phnom Penh with many more destinations than the regular services by HWG, such as Skun, Kompong Thom, Siem Reap, Pursat and Battambang. There are ten (10) inter-city bus terminals located at the main markets of the city and along the national roads at: Central Market (the largest of all), Olympic Market, Dang Kao Market, Chbar Ampauv Market (RN1), Orussey Market (under construction), Chak Angrae Leu (RN2), Chaom Chau (RN3 & 4), Chrang Chamreh Pir (RN5) and Preaek Lieb (RN6), in addition to the international bus terminal at Traffic Office, DPWT, MPP. The vehicles they are using can be classified as the multi-purpose cars or taxis converted from pick-up, wagon or small truck. Their normal capacity ranging from 7 to 15 persons, but these vehicles are actually accommodating far more than 20 passengers and stop at any place where they can catch passengers on the way to destinations. To the same destinations, their fares are normally much lower than those of the regular services.

A8.5.3 REVIEWS ON FINANCIAL ASPECTS OF THE BUS OPERATORS

Referring to the bus transport operations of the two (2) operators as discussed in Section A8.5-2, the identification and review of their financial status have been attempted in terms of revenue and operational expenditure, as an input datum to the preliminary cost estimate. The basic data and information for this purpose are limited to minimum availability, and therefore, several assumptions have been applied for revenue and expenditure calculations.

(1) Phnom Penh Transport (PPT): International Route

PPT re-started the international bus transport service between Phnom Penh and Ho Chi Minh in Vietnam in April 2000, but due to the deteriorated road conditions on this route caused by the flooding in September PPT suspended the service in October 2000.

The statement on revenues and expenses of this operation for the period of 6 months from April to September 2000 is shown in Table A8.5-2

Table A8.5-2: PPT Revenue & Expenses for 6 Months in 2000

[Unit: US $]

No.	Month	Nos. of Trip	Revenue	Expenses				Balance	Remarks
				Operation	Maint.	Others	Total		
1	April	5	463	503	57	189	749	-286	
2	May	4	338	390	0	39	429	-91	
3	June	4	466	371	49	47	467	-1	
4	July	5	644	470	100	56	626	18	
5	August	4	806	366	259	43	668	138	
6	September	1	0	92	30	64	186	-186	Flooding
	Total	23	2,717	2,192	495	438	3,125	-408	

Source: Transport Office. DPWT. MPP

Note: Details of Expenses: (Salary is not included, see Note 4), and fare varies by discount for poor and group)

1) Operational Expenses: Round trip fuels, Ferry fares, Customs documents cost, Accommodation charge of drivers (4 days per trip).
2) Maintenance Expenses: Charged oil, Repair cost
3) Others: Visa documents cost, Office materials
4) According to the sub-decree, starting from April 2000 during 6-month trial period, the salaries of the PPT will be paid by the government (MPP), and after that period PPT is responsible for salary payment.

This statement shows that the sole revenue source of PPT is bus fare and the operational revenue for 6-month period is US $2,717, while the total operational expense for the same period accrues US

$3,125, incurring the loss of US $408. It is to be mentioned that at time of starting the bus service, all the necessary costs for the initial investment were given by MPP, namely; the bus and spare parts, the office and terminal land spaces and buildings including depot, in addition to the salaries of the PPT staff. Therefore, the review on just the operation, the expense does not include the wages, depreciation and interest.

In addition to above, due to the flooding in the month of September there is no passenger on this route. Therefore, for analytical purpose the estimations of the total revenues and expenses, and those of per-trip are attempted for 5-month period between April and August 2000. For this calculation, the salaries paid by MPP to the PPT staff are added to the operational expenses. The results of the estimations are shown in Tables A8.5-3 and A8.5-4.

The estimation as per Table A8.5-3 shows that the total revenue and expense for 5-month period including salaries of 9 PPT staff are US $2,717 and US $3,579 respectively, incurring the loss of US $862. As to the compositions of revenue and expenses, when setting the revised total expense being 100, breakdowns of expenses for operation, maintenance, others and salaries are calculated to be 58.7%, 13.0%, 10.4% and 17.9 % respectively, while the revenue accounted for 75.9 %, indicating 24.1 % of the total expense to be the operational loss. When the compositional base is set on the revenue being 100, the rate of loss is calculated to be 31.7 %.

Table A8.5-3: Estimate of PPT Revenues & Expenses for 5 Months in 2000

[Unit: US $]

No.	Month	Nos. of Trip	Revenue	Expenses				Salary	Revised Expenses	Balance original	Balance Revised	Remarks
				Operation	Maint.	Others	Total					
1	April	5	463	503	57	189	749	128	877	-286	-414	
2	May	4	338	390	0	39	429	128	557	-91	-219	
3	June	4	466	371	49	47	467	128	595	-1	-129	
4	July	5	644	470	100	56	626	128	754	18	-110	
5	August	4	806	366	259	43	668	128	796	138	10	
Total		22	2,717	2,100	465	374	2,939	640	3,579	-222	-862	
Share-1 (%)			75.9	58.7	13.0	10.4	82.1	17.9	100.0	-6.2	-24.1	
Share-2 (%)			100.0	77.3	17.1	13.8	108.2	23.6	131.7	-8.2	-31.7	

Source: JICA Study Team, Jan. 2001
Note; Salary Table as per Appendix 6.1

Table A8.5.4: Estimate of PPT Per-Trip Revenues & Expenses for 5 Months in 2000

[Unit: US $]

No.	Month	Nos. of Trip	Revenue per trip	Av. nos. of pax/trip		Av. Nos of pax/month		Expenses/trip					Balance per trip
				Unit $18	Unit $20	Fare $18	Fare $20	Total	Oper.	Maint.	Others	Salary	
1	April	5	92.6	5.1	4.6	25.7	23.2	175.4	100.6	11.4	37.8	25.6	-82.8
2	May	4	84.5	4.7	4.2	18.8	16.9	139.3	97.5	0.0	9.8	32.0	-54.8
3	June	4	116.5	6.5	5.8	25.9	23.3	148.8	92.8	12.3	11.8	32.0	-32.3
4	July	5	128.8	7.2	6.4	35.8	32.2	150.8	94.0	20.0	11.2	25.6	-22.0
5	August	4	201.5	11.2	10.1	44.8	40.3	199.0	91.5	64.8	10.8	32.0	2.5
Total		22	123.5	6.9	6.2	30.2	27.2	162.7	95.5	21.1	17.0	29.1	-39.2
Share-1 (%)			75.9					100.0	58.7	13.0	10.4	17.9	-24.1
Share-2 (%)			100.0					131.7	77.3	17.1	13.8	23.6	-31.7

Source: JICA Study Team, Jan. 2001

The similar estimation on the "Per-Trip Operational Revenue and Expense" in Table A8.5-4 shows that on the same 5-month period the revenue accounts for US $123.50, while the expense stands for US $162.70, incurring the loss of US $29.10 per trip. Also, since the bus fare varies depending on the income level of the passenger and whether the passenger(s) is(are) individuals or group basis, average numbers of passengers are calculated by the variation of average fares, which result in the average number of 6.9 passengers per trip in case of the average fare being US $18.00, and 6.2 passengers if the average fare being US $19.00.

Based on above estimations and calculations, estimate of the break-even fare of this international bus transport service has been attempted with an assumption that the average number of passengers being

Table A8.5-5: Break-Even Estimates of PPT Revenues & Expenses for 5 Months in 2000
(with estimations of revenue and expenses according to variations of number of passengers per trip and bus fares)

No.	Month	Nos. of Trip	Nos of pax	Nos of Pax	Revenue	Expenses					Balance	Remarks
			per trip	per month	per month	Operation	Maint.	Others	Salary	Total		
1	April	5	9	45	810	480	110	85	128	803	7	
2	May	4	9	36	648	384	88	68	128	668	-20	
3	June	4	9	36	648	384	88	68	128	668	-20	
4	July	5	9	45	810	480	110	85	128	803	7	
5	August	4	9	36	648	384	88	68	128	668	-20	
	Total	22	45	198	3,564	2,112	484	374	765	3,735	-171	
(1) Nos. of pax		22	{9.5] pax	209	3,762	2,112	484	379	765	3,740	22	no. of pax.=9.5/trip
(2) Nos. of pax		22	[10] pax.	220	3,960	2,112	484	384	765	3,745	215	no. of pax.=10/trip
(3) Fare Rate		22	45	198	3,762	2,112	484	374	765	3,735	27	fare=19.0
(4) Fare & pax no.		22	[10] pax.	220	4,180	2,112	484	384	765	3,745	435	fare=19.0, pax=10

Source: JICA Study Team, Jan. 2001

Note: (1) Case 1= Estimation by the number of passengers per tirp being 9.5 persons
(2) Case 2= Estimation by the number of passengers per trip being 10 persons.
(3) Case 3= Estimation by the average bus fare being US $19.00
(4) Case 4= Estimation by the number of passengers per trip being 10 persons & average bus fare of US $19.00.
Referring to Appendix 6.2, Bus Service City Comparison by World Bank Survey, average ratio of depreciation and interest of the bus operators is estimated to be approximately 10 % of the total operational expense. In consideration of the depreciation and interest, the Break-Even fare is estimated to be approximately US $0.082/km or US $0.41/5 km with the average number of passenger per trip being 10 persons.

10 persons per trip and the amounts of depreciation and interest being 10 % of the total operational expense. The result of the estimate has been calculated to be US $0.08 per km or US $0.41 per 5 km, as shown in Table A8.5-5

It is to be pointed out that these break-even fares are just analytical purposes. For practical performance of the bus operations, PPT and any other bus operators have to face very severe competition not only among the bus operators but also with the different transport modes. Therefore, as to the intra-urban bus transport services every effort shall be taken to increase the revenue and to reduce the operational expenses so that the operation shall be on a sound and steady financial standing. As one of the means to increase the operational revenue other than from fares, introduction of the advertisement on outside and inside of the bus and on the bus stops, and the special development charges to the bus terminal developers can be considered. As to the expense reduction, very precise planning to reduce the initial investment costs is the pre-requisites and improvement of operational management shall be implemented so that the bus operation shall be run with the minimum staffing (reduction of fixed expense), while maintaining the service quality. These measures are very hard to accomplish but are worth challenging.

(2) Ho Wah Genting Transport Co., Ltd. (HWG): Inter-city Route

According to the managing director of this private company, the total operational expenditure amounts to about US $80,000 in which employees' salaries and drivers' wages account for about US $30,000. In addition to the total operational expenditure, it is said that about 15 % of this amount is necessary to continue the inter-city bus service. The numbers of passengers on the total of 10 routes are approximately 5,000 to 6,000 persons in the normal season (7 months), and 7,000 to 8,000 persons in the peak season (5 months).

Judging from above information, estimation of the monthly operational revenue and average fare for the inter-city bus transport service of the company is attempted. As shown in Table A8.5-6, it is calculated that the weighted average one-way fare of 10 destinations is Riel 2,860 or US $0.714, and in the normal season average monthly revenue is calculated to be approximately US $118,000 and in the peak season it comes up to US $161,000.

According to this table, weighted average numbers of passengers per trip are calculated to be 16.6 persons in the normal season and 22.6 persons in peak season. Taking into account the seasonal fluctuation, the average monthly revenue comes to approximately US $135,700. As to the operational expenditure, it is estimated to be approximately US $92,000 and the total expenses is to be

US$101,200 taking account the depreciation and interest being about 10 % of the operational expenses. Based on these figures, the profit of the company is calculated to be about US $34,390 per month or about 25.4 % of the operational revenue, as shown in Table A8.5-7.

Table A8.5-6.: Monthly Revenue and Average Fare Calculation

No	Destination	Distance	Departure	Trip	Total	Fare	Fare Total	Normal Season	Peak Season
		km	per day	RT	oneway	one-way	per pax	persons/day	persons/day
1	Sihanoukville	230	5	2	10	10,000	100,000	166	226
2	Kompong Cham	124	8	2	16	5,000	80,000	265	361
3	Kompong Chhang	91	9	2	18	4,500	81,000	298	407
4	Takeo	87	9	2	18	4,500	81,000	298	407
5	Neak Loeung	60	10	2	20	4,000	80,000	331	452
6	Kompong Speu	48	9	2	18	4,500	81,000	298	407
7	Ou Dong	38	17	2	34	2,500	85,000	563	768
8	Ro Ka Kaung	40	23	2	46	3,000	138,000	762	1,039
9	Timber Factory RN1	24	25	2	50	2,000	100,000	828	1,130
10	Takmau	15	51	2	102	1,200	122,400	1,690	2,304
	Total	757	166		332		948,400	5,500	7,500
	Average Fare (Riel)						2,857		
	Average Fare (US$)						0.714		
	Monthly operating days						30		
	Average no. of passenger/bus							16.57	22.59
	Average Revenue/month(US$)							117,836	160,685

Source: Ho Wah Genting Transport Co., Ltd. Dec. 2000

Table A8.5-7: Estimated Revenue and Expenses of HWG`s Inter-city Bus Operations

[Unit: US $]

No.	Item	normal season	peak season	annual ave. rev./month
1	Annual Averagte Revenue	824,851	803,426	1,628,277
2	Annual Averagte Revenue/month			135,690
3	Average Ope. Expenditure/month			92,000
4	Average Total Expenditure/month			101,200
5	Average Profit/month			34,490
6	Profit Ratio/Revenue (%)			25.4

Source: Ho Wah Genting Transport Co., Ltd., Dec. 2000
Note: Estimation by JICA Study Team, Jan. 2001

The bus fare structures of the 10 routes are also reviewed, as shown in Table A8.5-8. The fare rates per km range from the highest 94 Riels or US $0.0234 on the Kompon Speu route with the distance of 48 km to 83 Riels or US $0.021 on the Timber Factory route on RN 1 and the lowest rate of 40 Riels or US $0.01 on the Kompon Cham route. The fluctuation of the fare rates is also shown in Figure A8.5-1.

It is to be noted that with exception of the rate on the Kompong Speu route with the distance of 48 km, the rates have the tendency of decreasing with increasing of distances.

With regard to the break-even fare based on the operational performance of HWG, it is calculated that the overall average fare of the 10 routes would be 2,130 Riels or US $0.532 and those of the 10 routes are shown on the Break-even fare rate columns of Table A8.5-8.

Since the information on the details of the initial investment costs, depreciation and interest is not available, these considerations are not included in above estimates. Because of the reason that its parent company having their plants in Malaysia and Indonesia engages in bus manufacturing business, it seems for this company to have quite an advantage for procurement or leasing of the bus fleet at the times of initial investment or for expansion of operations. Also, it is not clear whether the operational expenditure would include depreciation of the facilities (terminal office, garage, ticketing booths, etc.) and vehicles or not. Therefore, it may be too early to determine the profitability of the company, but there may be a chance for private investors to enter into inter-city bus operation business as competitors.

With regard to the break-even fare based on the operational performance of HWG, it is calculated that

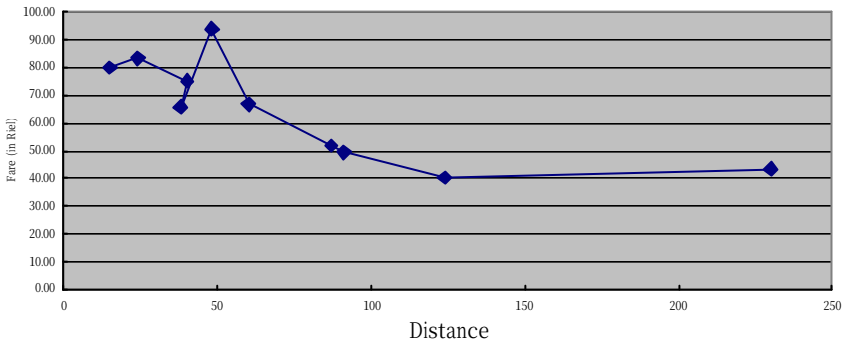
the overall average fare of the 10 routes would be 2,130 Riels or US $0.532 and those of the 10 routes are shown on the Break-even fare rate columns of Table A8.5-8.

Table A8.5-8: Average Bus Fares & Estimated Break-Even Fare Rates

No	Destination	Distance	Departure	Trip	Total	Fare	Total Dist.	Fare rate		Breakeven fare(oneway) One-way		Fare rate	
		km	per day	RT	oneway	one-way	km/day	Riel/km	US $/km	Riel	US $	Riel/km	US $/km
1	Sihanoukville	230	5	2	10	10,000	2,300	43.48	0.0109	7,460	1.865	32.43	0.008
2	Kompong Cham	124	8	2	16	5,000	1,984	40.32	0.0101	3,730	0.933	30.08	0.008
3	Kompong Chhang	91	9	2	18	4,500	1,638	49.45	0.0124	3,357	0.839	36.89	0.009
4	Takeo	87	9	2	18	4,500	1,566	51.72	0.0129	3,357	0.839	38.59	0.010
5	Neak Loeung	60	10	2	20	4,000	1,200	66.67	0.0167	2,984	0.746	49.73	0.012
6	Kompong Speu	48	9	2	18	4,500	864	93.75	0.0234	3,357	0.839	69.94	0.017
7	Ou Dong	38	17	2	34	2,500	1,292	65.79	0.0164	1,865	0.466	49.08	0.012
8	Ro Ka Kaung	40	23	2	46	3,000	1,840	75.00	0.0188	2,238	0.560	55.95	0.014
9	Timber Factory RN1	24	25	2	50	2,000	1,200	83.33	0.0208	1,492	0.373	62.17	0.016
10	Takmau	15	51	2	102	1,200	1,530	80.00	0.0200	895	0.224	59.68	0.015
	Total	757	166		332		251,324						

Source: Ho Wah Genting Transport Co., Ltd.
Note: 1) Estimation by JICA Study Team, Jan. 2001
2) Conversion rate: US $1.00=Riel 4,000

Figure A8.5-1:Fare Rates by Distance



A8.5.4 TAXI OPERATION

It is to be pointed out that definition of taxi in Cambodia shall be interpreted as the normal sedan type taxi and the multi-purpose vehicles converted from pick-up, wagon, or small truck. It is to be understood that taxi means those vehicles that go to any destinations as passengers' requests.

According to the Transport Office, DPWT, MPP there are 87 sedan type taxis in the municipality, mainly for arrival passenger transport services at the Pochentong Airport to their destinations (mainly to hotels in the city). These taxis are distinctive with the yellow stripes with indication of 5 digit taxi numbers and roof signs. Their services are controlled and confined to the service areas within the metropolitan premise. Also, approximately 20 to 30 taxis of same type are rendering intra-city transport services to the passengers who come to Dang Koa Market, which is one of the inter-city bus terminals.

As discussed in the preceding section, most of the multi-purpose vehicles called taxis are rendering inter-city transport services, and some of them are observed to cater intra-city commuting services when there are such needs arise violating the prevailing municipal traffic regulations. The total number of these taxis coming in to and going out of 10 bus terminals are counted for about 1200 vehicles.

A8.5.5 PARA-TRANSIT OPERATION

In this Study Para Transit is interpreted as on-demand type door-to-door intra-city transport services catered by three types of vehicles, so-called "Motodop", "Motorumok" and "Cyclo". Most of the

operators of these vehicles are self-owned individuals with exception of some of the Cyclos where the drivers should rent them from the owner of several Cyclos.

Motodop
The vehicle of Motodop is a motorcycle with a back seat extended to about 55 cm in length for accommodating as many as 3 passengers. It is supposed to get 1 or 2 passengers, but in many occasions it is accommodating 4 passengers (3 in the back seat and 1 in front). The fares range from Riel 500 for the minimum up to around Riel 2,000 for a distance of 3 km.

Motodop is considered to come into the intra-city transit services just meeting the demands of the consumers for very handy, convenient, and economical means of transport mode. Most of the Cambodian people prefer to choose motodop for their transit services not only in the metropolitan areas but also everywhere in the country. The number of motodop is said to be more than 10,000 vehicles in the municipal areas and its share among the intra-city transport services is dominating and overwhelmingly high, so that for a time being it seems to be very difficult to introduce intra-city bus services without certain traffic restriction of motodop on the primary arteries in the city.

Motorumok
Motorumok is an articulated motorcycle with a 2-wheel cart attached behind, for catering passenger and light cargo transport services between the markets/bus terminals located along the national roads on RNs 1, 2, 3 &4, 5 and the houses in the suburban areas. The number of motorumok is estimated to be about 230 vehicles, and is usually accommodating 10 to 15 passengers per vehicle (normal capacity is 7 persons), but in some of the cases they squeeze up nearly 30 passengers.

Most of the passengers on motorumok are carrying light cargoes of agricultural products to the markets, goods purchased at the markets. Also, students are using motorumok for commuting services. It is observed that many motorumoks are predominant means of suburban transport at Chbar Ampauv Market on RN1, but at Preaek Lieb Market on RN6 these motorumok are rarely found. The fares range from Riel 500 to Riel 1,500.

Cyclo
Cyclo is a three-wheel man-powered slow moving vehicle, for catering passenger and light cargo transport services within the urbanized areas in the municipality. It gives a on-demand type services on the urban streets like normal taxi services found in many of the cities in the world, but its slow travel speed and sporadic maneuvering on the urban streets are quite hazardous to the traffic flows. The fares range from Riel 1,500 to around Riel 4,000.

It is observed that the operation of these para-transit vehicles are not only quite a hazards to the traffic flows on the roads causing heavy congestions at many of the road sections and intersections, but also endangering safety of the passengers and drivers themselves. But since their services are very extensively and deeply popularized in the daily needs of the customers, gradual traffic control and restriction are suggested to streamline the traffic flows on the main urban arteries and for introduction of intra-city bus transport services.

A8.5.6 RAILWAY OPERATION

The national railway is operated by the Chemins de Fer Royaux du Cambodge (CFRC), is in the process of corporatization to be a national operating entity. It is also planned that a Cambodian Railway Authority is to be established by enactment of a law to be the regulator of the railway. CFRC has a total of 14 diesel locomotives, 2 steam engines and 7 shunting locomotives, which are out of use. Regarding passenger transport, there are 2 railcars of German origin, 11 passenger trailers and 22 coaches in use, which requires either replacement or possible repaired. For cargo transport there are 91 wagons in use of 10 tons capacity, some 5-wheel wagons for salt transport and 26 gondola wagons of 20 tons capacity for ballast, bitumen and wood transport. The numbers of employees are shown in Table A8.5-9, indicating 1951 persons in 1995 and 1822 persons in 1999 showing gradual decrease.

CFRC is currently operating passenger and cargo transport services on two lines. The first is the Northern or Old Line constructed from 1929 to 1942, which runs from Phnom Penh for 385 km to the Thai border at Poy Pet. This line suffered from damages during the conflict period on a 15 km section between Poy Pet and Aranyaprathet at Thai border. The line has never been renewed and the track conditions are very poor causing quite a reduction of running speed. The operational frequency of passenger trains is normally 3 times a week, and of cargoes it is irregular depending on the availability of economic volumes for formation of cargo train operations.

Table A8.5-9: Number of Employees

No.	Department/Railway District	1995	1996	1997	1998	1999
A	Administrative Service	310	305	304	304	300
B	Telecommunication & Exploitation Service	246	239	235	226	224
C	Bridges and Tracks Service	434	414	404	296	390
D	Rolling Stock Service	433	410	398	390	389
E	Kampot District	113	109	109	109	73
F	Sihanoukville District	77	73	73	73	149
G	Pursat District	184	179	174	157	157
H	Battambang Distrcit	154	149	145	140	140
Total		1,951	1,878	1,842	1,695	1,822
	Male	1,739	1,668	1,632	1,485	1,612
	Female	212	210	210	210	210

Source: CFRC

The operational records of the passengers and cargoes on the Northern Line for the years 1993-1999 are shown in Table A8.5-10.

Table A8.5-10: Railway Traffic Volume Records 1993-99

Transport	Unit	1993	1994	1995	1996	1997	1998	1999
Northern Line								
Goods	tons	114,200	48,200	33,290	50,180	102,334	208,010	189,268
	T km	30,100,000	11,400,000	5,306,700	6,303,300	24,620,469	65,109,238	60,284,421
Passengers	persons	611,000	294,000	236,200	200,000	383,175	319,539	301,940
	P km	58,000,000	18,300,000	17,398,600	14,500,000	34,683,806	3,321,789	38,215,010
Luggages	tons	12,000	7,600	7,200	12,500	10,996	6,540	3,473
	T km	1,700,000	810,000	693,200	1,365,000	1,225,204	765,157	510,427
Southern Line								
Goods	tons	15,600	12,000	16,500	25,807	67,149	86,441	80,272
	T km	3,900,000	2,700,000	2,490,900	3,396,500	11,471,190	10,675,772	17,101,116
Passengers	persons	270,000	220,000	287,500	396,000	147,084	118,065	127,171
	P km	22,300,000	20,300,000	21,045,000	26,752,500	18,452,057	10,645,000	11,994,224
Luggages	tons	1,800	4,600	5,900	5,400	4,265	1,836	669
	T km	170,000	550,000	588,700	590,300	599,322	202,782	626,753

Source: CFRC

Note: 1) Northern Line= Phnom Penh - Battanbang - Sisophon
2) Souther Line = Phnom Penh - Sihanoukville

The records reveal that the number of passengers transported on this line fluctuates in the range from 200,000 to 383,000 persons with exception of the year 1993 and does not show increasing trend, while in terms of passenger-kilometers it shows remarkable increase from 18.3 million P km in 1994 to 38.2 P km. As for the cargoes, the tonnages carried also fluctuate between 100,000 and 210,000 tons, and also in terms of ton-kilometers it also show ups and downs in the range from 11.4 million T km to 65.1 T km and does not show steady increase.

The second is the Southern or New Line constructed from 1960 to 1969, which runs from Phnom Penh for 236 km to Sihanouk Ville. This line also suffered from inferior formation on the wooden sleepers and poor embankment that often cause offloading even in the dry season. The line has never been neglected its maintenance for security reasons during and after the internal conflict and barely keeping its operations thereafter. The operational frequency of passenger trains is normally 3 times a week, and of cargoes it is depending on the demand of the cargo customers. The operational records of the passengers and cargoes on the Southern Line for the years 1993-1999 are also shown in Table A8.5-10. The records show that the number of passengers transported on this line fluctuates in the range from

118,000 to 395,000 persons in a decreasing trend in recent years, and this trend is similar in terms of passenger-kilometers in the range from 10.6 million P km to 26.8 million P km. This fact reveals that the rail passenger transport cannot compete the road transport by buses. On the other hand, the cargo tonnages and ton-kilometers have remarkably increased from 12,000 tons and 2.7 T km to 80,300 tons and 17.1 million T km in 1999 due to increased trade activities.

Table A8.5.11 summarizes the financial operational performance of the CFRC for the period of 6 years from 1993 to 1998, which shows continuous deficit ranging from 15 to 47 % of the revenues.

Table A8.5-11: Operating Revenues & Expenses

Item	1993	1994	1995	1996	1997	1998
Revenues	2,580,046	4,614,074	4,594,948	4,326,561	3,968,951	5,820,358
Expenses	3,047,746	5,363,648	5,306,583	5,683,638	5,844,696	7,193,284
Balance	-467,700	-749,574	-711,635	-1,357,077	-1,875,745	-1,372,926
Operating Ratio (%)	118.13	116.25	115.49	131.37	147.26	123.59

Source: CFRC

It is observed that the Southern Line requires further rehabilitation to reduce excessive operating costs and thereby enable effective competition with road transport. Also additional rolling stock and track maintenance operations together with upgrading of signaling equipment, development of efficiency standards and cost recovery management will be needed in order to cater for the increasing traffic with an adequate level of service.

A8.5.7 INLAND WATERWAY OPERATION

There are 2 departments in MPWT which are administering water transports in the country; Department of Water Transport for ports of Phnom Penh, Sihanoukville and Koh Kong and Department of Inland Waterway mainly for river transport. In this section the Study is confined to the river transportation in the Phnom Penh metropolitan areas.

Cargo Transport:
There are 4 main navigable waterways converging at the Quatre Bras in Phnom Penh, which include the lower and upper reaches of the Mekong, the Tonle Sap and the Bassac. The lower reach of the Mekong between Phnom Penh and the sea can accommodate vessels of up to 2,000 dwt the whole year, provided that regular dredging at three sites on the Cambodian side of the border is carried out.

The upper reach of the Mekong between Phnom Penh and Kratie can accommodate vessels of only a few hundred mt, due to a lack of dredging in recent years. The stretch between Kratie and Stung Treng is navigable to vessels of 20-50 tons only.

The Tonle Sap can accommodate vessels of up to some 150 tons through the Tonle Sap Lake to Siem Reap at high water. However, the entrance to the lake is heavily silted, with a depth of only 0.5 m in the dry season. The Cambodian side of the Bassac River can accommodate vessels of up to 100 tons.

Phnom Penh's main cargo port is made up of 2 sites, located on the Tonle Sap River in the center of the city. Port No. 1 (Municipal Port) rehabilitated by the Japanese grant aid has a cargo handling capacity of about 0.6 million mt per year, and Port No. 2 with pontoon wharves is mainly used for domestic traffic.

Two separate terminals handle petroleum products, at km 4 and km 13 north of the city on the Tonle Sap River. Most of POL traffic comes from Singapore along the Mekong through Vietnam, in 600-1,000 dwt vessels.

Passenger Transport:
There are 2 wharves for inland water transport administered by the Traffic Office, DPWT, MPP in Phnom Penh. One is located along the RN 5 about 300 m north of the Chruoy Chagvar Bridge, and the

other along the Sisovath Street just south of the Port No. 1. These 2 wharves are catering for the transport of passengers traveling between Phnom and the destinations in the province of Prey Veng located in the vicinity of the metropolis. The vessels used are in the range from some 20 tons to 50 tons and carrying the passengers with small cargoes. The fares range from Riel 500 up to around Riel 2000.

Also, there are 7 piers located close to the municipal passenger wharf along RN 5, which are operating long distance transportation by speedboats. One of the operators has 7 speedboats (6 x 130 passengers capacity and 1 x 60 passengers capacity), and operates from Phnom Penh to 2 destinations, Siem Reap and Kratie. The traveling time to Siem Reap is about 4.5 hours with the fares of US $25 for foreigners and of Riel 50,000 (US $12.5) for domestic passengers. For Kratie there are no foreign passengers on this route, and it takes about 5 hours from Phnom Penh with the fare is set at Riel 30,000 (US $7.5). The average number of passengers per day accounts for about 80 persons on peak season (8 months) and about 50 persons on off-season (4 months). It is estimated that the number of passengers per year would be around 25,200 persons.

(End of Appendix 8)

APPENDIX 10

FUTURE SOCIOECONOMIC FRAMEWORK

APPENDIX 10 FUTURE SOCIOECONOMIC FRAMEWORK

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Table A10.1-1 Demographic and Social Data by Traffic Zone (2000)

Traffic Zone		Population	Household	Employees		Students	
				Residence Base	Work Place Base	Residence Base	School Base
1	Tonle Basak	46,084	9,233	24,541	27,769	12,972	10,451
2	Boeng Keng Kang Muoy	14,913	2,511	7,942	10,892	4,198	4,204
3	Boeng Keng Kang Pir	12,764	2,195	6,797	1,892	3,593	1,360
4	Boeng Keng Kang Bei	24,035	4,117	12,799	3,977	6,766	3,419
5	Oulampik	10,375	1,681	5,525	8,286	2,921	2,225
6	Toul Svay Prey Muoy	14,214	2,340	7,569	2,682	4,001	1,594
7	Toul Svay Prey Pir	12,271	1,941	6,534	3,627	3,454	4,494
8	Tumnob Tuek	14,204	2,428	7,564	9,138	3,998	1,832
9	Tuol Tumpung Pir	8,796	1,423	4,684	3,689	2,476	4,177
10	Tuol Tumpung Muoy	10,667	1,733	5,681	5,185	3,003	11,091
11	Boeng Trabaek	9,786	1,624	5,211	4,082	2,755	8,740
12	Phsar Daem Thkov	16,832	2,872	8,963	4,580	4,738	7,004
13	Phsar Thmei Muoy	7,622	1,313	4,059	7,317	2,146	0
14	Phsar Thmei Pir	7,954	1,362	4,236	3,741	2,239	0
15	Phsar Thmei Bei	13,464	2,358	7,170	4,161	3,790	4,560
16	Boeng Reang	7,986	1,337	4,253	6,146	2,248	8,193
17	Phsar Kandal Muoy	11,355	1,867	6,047	5,418	3,196	5,744
18	Phsar Kandal Pir	8,048	1,387	4,286	4,717	2,265	0
19	Chakto Mukh	12,648	2,210	6,735	8,008	3,560	5,085
20	Chey Chumneah	13,011	2,051	6,928	5,549	3,662	3,712
21	Phsar Chas	8,336	1,410	4,439	2,564	2,346	3,368
22	Srash Chak	34,516	6,095	18,381	11,248	9,716	16,512
23	Voat Phnom	8,870	1,478	4,724	15,882	2,497	4,808
24	Ou Ruessey Muoy	9,335	1,678	4,971	9,157	2,628	0
25	Ou Ruessey Pir	10,974	1,939	5,844	1,406	3,089	0
26	Ou Ruessey Bei	8,719	1,553	4,643	4,373	2,454	0
27	Ou Ruessey Buon	9,338	1,627	4,973	1,550	2,629	0
28	Monourom	13,286	2,298	7,075	2,417	3,740	0
29	Mittapheap	12,395	2,202	6,601	8,857	3,489	0
30	Veal Vong	22,401	3,915	11,929	13,243	6,306	19,051
31	Boeng Prolit	12,575	2,037	6,697	4,031	3,540	2,866
32	Phsar Depou Muoy	10,765	1,741	5,733	4,393	3,030	0
33	Phsar Depou Pir	10,477	1,849	5,579	1,960	2,949	733
34	Phsar Depou Bei	10,333	1,768	5,503	4,881	2,909	0
35	Tuek L'ak Muoy	13,795	2,436	7,346	6,369	3,883	18,602
36	Tuek L'ak Pir	11,578	1,801	6,165	2,335	3,259	0
37	Tuek L'ak Bei	17,689	3,011	9,420	8,184	4,979	7,148
38	Boeng Kak Muoy	18,935	3,049	10,083	7,893	5,330	8,049
39	Boeng Kak Pir	27,547	4,678	14,669	3,413	7,754	7,933
40	Phsar Daeum Kor	16,939	2,841	9,020	5,986	4,768	3,025
41	Boeng Salang	25,496	4,640	13,578	3,307	7,177	6,030
	Total of Urbanized Area	591,329	102,029	314,898	254,301	166,456	186,019
42	Dangkao	11,291	2,177	5,463	9,310	3,178	4,129
43	Trapeang Krasang	3,722	672	1,801	11,718	1,048	1,178
44	Kouk Roka	5,456	1,108	2,640	220	1,536	2,013
45	Phleung Chheh Rotech	4,496	847	2,175	177	1,266	1,704
46	Chaom Chau	24,385	4,176	11,797	29,934	6,864	7,153
47	Kakab	19,759	3,514	9,559	25,799	5,562	4,706
48	Pong Tuek	6,869	1,273	3,323	185	1,934	2,734
49	Prey Veang	3,155	590	1,526	49	888	1,497
50	Samraong Kraom	4,508	859	2,181	226	1,269	2,004
51	Prey Sa	5,214	1,058	2,523	1,204	1,468	2,249
52	Krang Thnong	3,194	600	1,545	219	899	1,274
53	Krang Pongro	2,158	476	1,044	79	608	1,036
54	Prateah Lang	4,440	906	2,148	172	1,250	1,355
55	Sak Sampov	2,010	423	973	34	566	835
56	Cheung Aek	5,413	1,147	2,619	49	1,524	1,394
57	Stueng Mean Chey	39,208	6,798	18,969	16,149	11,037	7,825
58	Boeng Tumpun	35,186	6,193	17,023	10,487	9,905	5,261
59	Preaek Pra	12,147	2,126	5,877	2,367	3,419	3,438
60	Chbar Ampov Muoy	10,988	1,863	5,316	5,797	3,093	2,695
61	Chbar Ampov Pir	25,937	4,693	12,548	7,421	7,301	3,464
62	Chak Angrae Leu	17,380	3,042	8,408	15,382	4,892	2,591
63	Chak Angrae Kraom	21,446	3,452	10,375	15,971	6,037	5,061
64	Nirouth	14,628	2,663	7,077	1,356	4,118	6,112
65	Khmuonh	8,100	1,500	3,919	4,845	2,280	2,289
66	Tuol Sangkae	28,526	4,926	13,801	35,923	8,030	1,968
67	Svay Pak	13,058	2,309	6,317	14,863	3,676	1,979
68	Kiloumaetr Lekh Prammuoy	16,518	2,946	7,991	6,170	4,650	946
69	Phnum Penh Thmei	21,903	3,933	10,596	12,786	6,166	4,350
70	Ruessey Kaev	22,711	4,107	10,987	11,166	6,393	10,349
71	Tuek Thla	40,157	6,698	19,427	49,725	11,304	5,488
72	Praek Lieab	12,241	2,051	5,922	11,056	3,446	5,009
73	Praek Ta Sek	5,168	954	2,500	162	1,455	1,723
74	Chrouy Changva	18,360	3,367	8,882	1,831	5,168	4,680
75	Chrang Chamreh Muoy	7,744	1,402	3,746	6,740	2,180	3,236
76	Chrang Chamreh Pir	13,623	2,345	6,591	5,450	3,835	2,531
77	Kandal Stueng	9,475	1,915	4,584	374	2,667	2,461
78	Kien Svay	24,215	4,700	11,715	4,818	6,816	5,260
79	Ta Khmau	36,190	6,512	17,508	11,594	10,187	14,363
80	(Airport area)	0	0	0	184	0	0
	Total of Suburban Area	560,980	100,323	271,397	331,994	157,913	138,350
	Ground Total	1,152,309	202,352	586,294	586,294	324,369	324,369

Table A10.1-2 Demographic and Social Data by Traffic Zone (2005)

Traffic Zone		Population	Household	Employees		Students	
				Residence Base	Work Place Base	Residence Base	School Base
1	Tonle Basak	50,797	10,465	26,130	31,538	13,810	12,688
2	Boeng Keng Kang Muoy	16,438	2,821	8,456	12,332	4,469	4,664
3	Boeng Keng Kang Pir	14,891	2,632	7,660	2,461	4,048	2,671
4	Boeng Keng Kang Bei	28,041	4,947	14,425	4,519	7,623	5,613
5	Oulampik	12,104	2,077	6,226	10,113	3,291	2,932
6	Toul Svay Prey Muoy	16,130	2,738	8,297	2,927	4,385	2,919
7	Toul Svay Prey Pir	14,316	2,385	7,364	4,174	3,892	4,730
8	Tumnob Tuek	15,657	2,708	8,054	10,395	4,257	2,968
9	Tuol Tumpung Pir	9,403	1,577	4,837	4,009	2,556	3,832
10	Tuol Tumpung Muoy	11,403	1,917	5,866	5,631	3,100	8,736
11	Boeng Trabaek	10,787	1,822	5,549	4,596	2,933	7,119
12	Phsar Daem Thkov	18,553	3,206	9,544	4,999	5,044	6,796
13	Phsar Thmei Muoy	8,148	1,548	4,191	7,972	2,215	0
14	Phsar Thmei Pir	8,502	1,534	4,373	4,306	2,311	0
15	Phsar Thmei Bei	14,392	2,606	7,403	4,565	3,913	4,948
16	Boeng Reang	8,803	1,531	4,528	6,810	2,393	6,856
17	Phsar Kandal Muoy	11,751	2,018	6,045	5,867	3,195	5,418
18	Phsar Kandal Pir	8,328	1,493	4,284	4,989	2,264	0
19	Chakto Mukh	13,089	2,326	6,733	8,935	3,558	5,107
20	Chey Chumneah	13,103	2,193	6,740	5,863	3,562	4,125
21	Phsar Chas	8,482	1,479	4,363	3,106	2,306	3,454
22	Srash Chak	35,720	6,544	18,375	12,915	9,711	18,530
23	Voat Phnom	9,180	1,588	4,722	17,187	2,496	4,521
24	Ou Ruessey Muoy	9,979	1,849	5,133	9,525	2,713	0
25	Ou Ruessey Pir	11,731	2,135	6,035	1,516	3,189	0
26	Ou Ruessey Bei	9,321	1,718	4,795	4,529	2,534	0
27	Ou Ruessey Buon	9,982	1,803	5,135	1,696	2,714	0
28	Monourom	14,202	2,554	7,306	2,610	3,861	0
29	Mittapheap	12,613	2,298	6,488	9,928	3,429	0
30	Veal Vong	25,421	4,609	13,077	15,276	6,911	20,562
31	Boeng Prolit	14,271	2,445	7,341	4,717	3,880	5,940
32	Phsar Depou Muoy	11,866	2,028	6,104	5,013	3,226	0
33	Phsar Depou Pir	11,199	2,003	5,761	2,195	3,045	2,240
34	Phsar Depou Bei	11,219	1,973	5,771	5,292	3,050	0
35	Tuek L'ak Muoy	14,977	2,658	7,704	6,989	4,072	16,482
36	Tuek L'ak Pir	12,570	2,050	6,466	2,552	3,417	0
37	Tuek L'ak Bei	18,909	3,237	9,727	9,118	5,141	7,410
38	Boeng Kak Muoy	26,470	4,435	13,616	8,855	7,196	9,669
39	Boeng Kak Pir	34,656	5,932	17,827	3,847	9,422	10,307
40	Phsar Daeum Kor	19,762	3,389	10,166	7,183	5,373	4,928
41	Boeng Salang	27,682	4,957	14,240	3,656	7,526	7,640
	Total of Urbanized Area	654,848	116,228	336,859	284,706	178,027	203,804
42	Dangkao	12,532	2,414	6,447	11,245	3,407	4,863
43	Trapeang Krasang	4,387	783	2,257	12,543	1,193	1,272
44	Kouk Roka	5,740	1,145	2,953	241	1,560	1,968
45	Phleung Chheh Rotech	5,299	989	2,726	3,046	1,441	1,783
46	Chaom Chau	28,739	4,909	14,784	31,559	7,813	7,841
47	Kakab	21,709	3,824	11,167	27,522	5,902	5,062
48	Pong Tuek	8,096	1,480	4,165	741	2,201	2,838
49	Prey Veang	3,288	616	1,691	133	894	1,423
50	Samraong Kraom	4,787	905	2,462	3,253	1,301	1,934
51	Prey Sa	6,869	1,334	3,533	1,445	1,867	2,351
52	Krang Thnong	3,391	634	1,744	301	922	1,242
53	Krang Pongro	2,292	490	1,179	2,788	623	993
54	Prateah Lang	5,233	1,038	2,692	6,608	1,423	1,474
55	Sak Sampov	2,095	434	1,078	37	570	802
56	Cheung Aek	5,819	1,201	2,993	56	1,582	1,428
57	Stueng Mean Chey	61,613	10,534	31,694	23,731	16,750	12,836
58	Boeng Tumpun	53,633	9,323	27,589	11,735	14,581	10,107
59	Preaek Pra	14,550	2,596	7,485	2,828	3,956	3,615
60	Chbar Ampov Muoy	12,820	2,191	6,595	6,249	3,485	2,948
61	Chbar Ampov Pir	31,067	5,489	15,981	8,019	8,446	5,392
62	Chak Angrae Leu	19,724	3,428	10,146	23,515	5,362	3,541
63	Chak Angrae Kraom	26,341	4,355	13,550	28,881	7,161	5,916
64	Nirouth	16,600	3,074	8,539	1,464	4,513	5,340
65	Khmuonh	10,081	1,857	5,186	5,002	2,741	2,643
66	Tuol Sangkae	32,372	5,632	16,652	39,437	8,801	4,442
67	Svay Pak	15,641	2,755	8,046	21,301	4,252	2,856
68	Kiloumaetr Lekh Prammuoy	25,957	4,685	13,352	8,426	7,057	3,997
69	Phnum Penh Thmei	28,856	5,170	14,844	14,451	7,845	5,910
70	Ruessey Kaev	34,618	6,501	17,808	13,952	9,411	10,696
71	Tuek Thla	61,210	10,310	31,487	61,743	16,641	11,186
72	Praek Lieab	14,947	2,582	7,689	11,762	4,064	5,065
73	Praek Ta Sek	5,555	1,021	2,858	242	1,510	1,668
74	Chrouy Changva	21,581	4,023	11,101	2,446	5,867	5,200
75	Chrang Chamreh Muoy	9,276	1,683	4,772	9,641	2,522	2,931
76	Chrang Chamreh Pir	17,139	3,037	8,816	7,639	4,659	3,435
77	Kandal Stueng	11,170	2,228	5,746	518	3,037	2,769
78	Kien Svay	26,085	5,029	13,418	4,060	7,091	5,641
79	Ta Khmau	46,673	8,202	24,009	12,581	12,689	13,953
80	(Airport area)	0	0	0	246	0	0
	Total of Suburban Area	717,785	127,901	369,234	421,387	195,138	169,361
	Ground Total	1,372,633	244,129	706,093	706,093	373,165	373,165

Table A10.1-3 Demographic and Social Data by Traffic Zone (2010)

Traffic Zone		Population	Household	Employees		Students	
				Residence Base	Work Place Base	Residence Base	School Base
1	Tonle Basak	55,510	11,696	28,606	35,307	14,298	14,526
2	Boeng Keng Kang Muoy	17,963	3,130	9,257	13,773	4,627	4,900
3	Boeng Keng Kang Pir	17,018	3,069	8,770	3,030	4,383	4,077
4	Boeng Keng Kang Bei	32,047	5,776	16,515	5,060	8,255	7,885
5	Oulampik	13,833	2,474	7,128	11,940	3,563	3,586
6	Toul Svay Prey Muoy	18,047	3,135	9,300	3,172	4,648	4,324
7	Toul Svay Prey Pir	16,361	2,828	8,431	4,721	4,214	4,692
8	Tumnob Tuek	17,110	2,989	8,817	11,652	4,407	4,140
9	Tuol Tumpung Pir	10,010	1,732	5,158	4,328	2,578	3,150
10	Tuol Tumpung Muoy	12,138	2,102	6,255	6,077	3,126	5,281
11	Boeng Trabaek	11,788	2,020	6,075	5,111	3,036	4,665
12	Phsar Daem Thkov	20,274	3,541	10,448	5,418	5,222	6,077
13	Phsar Thmei Muoy	8,673	1,783	4,469	8,627	2,234	0
14	Phsar Thmei Pir	9,051	1,707	4,664	4,871	2,331	0
15	Phsar Thmei Bei	15,321	2,854	7,895	4,969	3,946	5,076
16	Boeng Reang	9,620	1,726	4,957	7,475	2,478	4,763
17	Phsar Kandal Muoy	12,147	2,169	6,260	6,316	3,129	4,651
18	Phsar Kandal Pir	8,609	1,598	4,436	5,262	2,217	0
19	Chakto Mukh	13,530	2,442	6,972	9,862	3,485	4,782
20	Chey Chumneah	13,194	2,336	6,799	6,178	3,398	4,343
21	Phsar Chas	8,628	1,548	4,446	3,649	2,222	3,320
22	Srash Chak	36,924	6,993	19,028	14,582	9,511	19,701
23	Voat Phnom	9,489	1,698	4,890	18,492	2,444	3,863
24	Ou Ruessey Muoy	10,622	2,020	5,474	9,892	2,736	0
25	Ou Ruessey Pir	12,488	2,330	6,435	1,627	3,217	0
26	Ou Ruessey Bei	9,922	1,883	5,113	4,686	2,556	0
27	Ou Ruessey Buon	10,626	1,978	5,476	1,841	2,737	0
28	Monourom	15,119	2,811	7,791	2,803	3,894	0
29	Mittapheap	12,830	2,393	6,612	10,999	3,305	0
30	Veal Vong	28,442	5,304	14,657	17,311	7,326	20,980
31	Boeng Prolit	15,966	2,853	8,228	5,404	4,112	9,256
32	Phsar Depou Muoy	12,967	2,315	6,682	5,632	3,340	0
33	Phsar Depou Pir	11,922	2,156	6,144	2,430	3,071	3,911
34	Phsar Depou Bei	12,105	2,178	6,238	5,703	3,118	0
35	Tuek L'ak Muoy	16,160	2,880	8,328	7,610	4,162	12,780
36	Tuek L'ak Pir	13,563	2,299	6,989	2,769	3,494	0
37	Tuek L'ak Bei	20,128	3,463	10,372	10,051	5,185	7,219
38	Boeng Kak Muoy	34,005	5,820	17,524	9,817	8,759	10,966
39	Boeng Kak Pir	41,765	7,187	21,522	4,280	10,758	12,475
40	Phsar Daeum Kor	22,585	3,936	11,639	8,380	5,817	6,894
41	Boeng Salang	29,867	5,274	15,391	4,005	7,693	9,066
	Total of Urbanized Area	718,367	130,426	370,191	315,112	185,035	211,350
42	Dangkao	15,014	2,889	7,737	15,116	3,867	6,331
43	Trapeang Krasang	5,051	894	2,603	13,368	1,301	1,366
44	Kouk Roka	6,024	1,182	3,104	263	1,552	1,923
45	Phleung Chheh Rotech	6,102	1,132	3,145	5,914	1,572	1,862
46	Chaom Chau	33,094	5,641	17,054	33,183	8,524	8,529
47	Kakab	23,659	4,134	12,192	29,245	6,094	5,419
48	Pong Tuek	9,322	1,686	4,804	1,298	2,401	2,942
49	Prey Veang	3,421	642	1,763	217	881	1,348
50	Samraong Kraom	5,066	950	2,611	6,280	1,305	1,863
51	Prey Sa	10,180	1,887	5,246	1,928	2,622	2,554
52	Krang Thnong	3,589	667	1,849	383	924	1,210
53	Krang Pongro	2,425	504	1,250	5,497	625	949
54	Prateah Lang	6,026	1,170	3,105	13,044	1,552	1,592
55	Sak Sampov	2,180	444	1,123	40	562	770
56	Cheung Aek	6,630	1,310	3,417	70	1,708	1,496
57	Stueng Mean Chey	84,018	14,271	43,296	31,314	21,641	17,847
58	Boeng Tumpun	72,080	12,453	37,144	12,983	18,566	14,954
59	Preaek Pra	16,953	3,066	8,736	3,289	4,367	3,792
60	Chbar Ampov Muoy	14,651	2,520	7,550	6,702	3,774	3,201
61	Chbar Ampov Pir	36,198	6,285	18,654	8,618	9,324	7,321
62	Chak Angrae Leu	22,067	3,814	11,372	31,648	5,684	4,492
63	Chak Angrae Kraom	31,236	5,258	16,097	41,790	8,046	6,771
64	Nirouth	18,573	3,485	9,571	1,572	4,784	4,567
65	Khmuonh	12,062	2,214	6,216	5,160	3,107	2,996
66	Tuol Sangkae	36,219	6,339	18,664	42,952	9,329	6,915
67	Svay Pak	18,224	3,201	9,391	27,740	4,694	3,733
68	Kiloumaetr Lekh Prammuoy	35,396	6,424	18,240	10,682	9,117	7,048
69	Phnum Penh Thmei	42,763	7,644	22,037	17,781	11,015	9,029
70	Ruessey Kaev	46,525	8,895	23,975	16,738	11,984	11,043
71	Tuek Thla	82,263	13,921	42,392	73,761	21,189	16,883
72	Praek Lieab	20,360	3,644	10,492	13,173	5,244	5,177
73	Praek Ta Sek	6,329	1,155	3,261	401	1,630	1,559
74	Chrouy Changva	28,023	5,334	14,441	3,677	7,218	6,241
75	Chrang Chamreh Muoy	10,807	1,964	5,569	12,542	2,784	2,626
76	Chrang Chamreh Pir	20,654	3,729	10,643	9,828	5,320	4,338
77	Kandal Stueng	12,864	2,542	6,629	661	3,313	3,076
78	Kien Svay	29,826	5,687	15,370	2,545	7,682	6,403
79	Ta Khmau	57,156	9,893	29,454	13,568	14,722	13,542
80	(Airport area)	0	0	0	307	0	0
	Total of Suburban Area	893,030	158,870	460,199	515,278	230,024	203,708
	Ground Total	1,611,397	289,296	830,390	830,390	415,058	415,058

Table A10.1-4 Demographic and Social Data by Traffic Zone (2015)

Traffic Zone		Popualtion	Household	Employees		Students	
				Residence Base	Work Place Base	Residence Base	School Base
1	Tonle Basak	57,867	12,312	31,989	37,192	15,133	16,806
2	Boeng Keng Kang Muoy	18,727	3,285	10,352	14,493	4,897	5,439
3	Boeng Keng Kang Pir	18,083	3,288	9,996	3,314	4,729	5,252
4	Boeng Keng Kang Bei	34,050	6,191	18,823	5,331	8,905	9,889
5	Oulampik	14,699	2,672	8,125	12,854	3,844	4,269
6	Toul Svay Prey Muoy	19,005	3,334	10,506	3,295	4,970	5,520
7	Toul Svay Prey Pir	17,384	3,050	9,610	4,994	4,546	5,049
8	Tumnob Tuek	17,836	3,129	9,860	12,281	4,664	5,180
9	Tuol Tumpung Pir	10,313	1,809	5,701	4,488	2,697	2,995
10	Tuol Tumpung Muoy	12,506	2,194	6,914	6,300	3,271	3,632
11	Boeng Trabaek	12,288	2,119	6,793	5,368	3,213	3,569
12	Phsar Daem Thkov	21,135	3,708	11,684	5,628	5,527	6,138
13	Phsar Thmei Muoy	8,936	1,901	4,940	8,954	2,337	0
14	Phsar Thmei Pir	9,325	1,793	5,155	5,153	2,439	0
15	Phsar Thmei Bei	15,785	2,978	8,726	5,171	4,128	5,565
16	Boeng Reang	10,028	1,823	5,544	7,807	2,623	3,893
17	Phsar Kandal Muoy	12,345	2,245	6,825	6,540	3,228	4,566
18	Phsar Kandal Pir	8,749	1,651	4,837	5,399	2,288	0
19	Chakto Mukh	13,751	2,500	7,602	10,326	3,596	4,974
20	Chey Chumneah	13,240	2,407	7,319	6,335	3,462	4,826
21	Phsar Chas	8,701	1,582	4,810	3,920	2,276	3,508
22	Srash Chak	37,527	7,217	20,745	15,416	9,814	22,000
23	Voat Phnom	9,644	1,753	5,331	19,144	2,522	3,781
24	Ou Ruessey Muoy	10,944	2,105	6,050	10,076	2,862	0
25	Ou Ruessey Pir	12,866	2,428	7,113	1,682	3,365	0
26	Ou Ruessey Bei	10,223	1,966	5,651	4,764	2,673	0
27	Ou Ruessey Buon	10,948	2,066	6,052	1,914	2,863	0
28	Monourom	15,577	2,939	8,611	2,900	4,074	0
29	Mittapheap	12,939	2,441	7,153	11,534	3,384	0
30	Veal Vong	29,952	5,651	16,557	18,328	7,833	22,929
31	Boeng Prolit	16,814	3,057	9,295	5,747	4,397	11,998
32	Phsar Depou Muoy	13,517	2,458	7,473	5,942	3,535	0
33	Phsar Depou Pir	12,283	2,233	6,790	2,548	3,212	5,232
34	Phsar Depou Bei	12,548	2,281	6,936	5,909	3,281	0
35	Tuek L'ak Muoy	16,751	2,991	9,260	7,920	4,381	11,590
36	Tuek L'ak Pir	14,059	2,424	7,772	2,878	3,677	0
37	Tuek L'ak Bei	20,738	3,576	11,464	10,518	5,423	7,688
38	Boeng Kak Muoy	37,773	6,513	20,881	10,298	9,878	12,635
39	Boeng Kak Pir	45,319	7,814	25,052	4,497	11,851	14,788
40	Phsar Daeum Kor	23,997	4,210	13,266	8,979	6,276	8,634
41	Boeng Salang	30,960	5,432	17,115	4,180	8,096	10,656
	Total of Urbanized Area	750,130	137,526	414,678	330,315	196,170	232,999
42	Dangkao	16,875	3,245	9,329	18,019	4,413	7768.5
43	Trapeang Krasang	9,039	1,558	4,997	18,318	2,364	2,019
44	Kouk Roka	7,730	1,405	4,273	391	2,021	1,727
45	Phleung Chheh Rotech	10,920	1,985	6,037	23,125	2,856	2,440
46	Chaom Chau	59,220	10,037	32,737	42,931	15,487	13,231
47	Kakab	35,358	5,993	19,546	39,584	9,247	7,900
48	Pong Tuek	16,683	2,927	9,222	4,635	4,363	3,727
49	Prey Veang	4,218	796	2,332	720	1,103	942
50	Samraong Kraom	6,738	1,225	3,725	24,444	1,762	1,505
51	Prey Sa	12,663	2,302	7,000	2,290	3,312	2,829
52	Krang Thnong	4,773	868	2,638	876	1,248	1,066
53	Krang Pongro	3,226	586	1,783	21,750	844	721
54	Prateah Lang	10,782	1,960	5,960	51,658	2,820	2,409
55	Sak Sampov	2,688	507	1,486	56	703	601
56	Cheung Aek	7,238	1,392	4,001	80	1,893	1,617
57	Stueng Mean Chey	95,220	16,139	52,638	35,105	24,901	21,274
58	Boeng Tumpun	81,304	14,018	44,945	13,607	21,262	18,165
59	Preaek Pra	18,154	3,301	10,035	3,520	4,747	4,056
60	Chbar Ampov Muoy	15,567	2,684	8,606	6,928	4,071	3,478
61	Chbar Ampov Pir	38,763	6,683	21,429	8,917	10,137	8,660
62	Chak Angrae Leu	23,239	4,007	12,846	35,715	6,077	5,192
63	Chak Angrae Kraom	33,684	5,709	18,621	48,245	8,809	7,526
64	Nirouth	19,559	3,690	10,813	1,627	5,115	4,370
65	Khmuonh	23,948	4,354	13,239	6,103	6,263	5,350
66	Tuol Sangkae	38,142	6,692	21,085	44,709	9,975	8,522
67	Svay Pak	19,515	3,424	10,788	30,959	5,104	4,360
68	Kiloumaetr Lekh Prammuoy	40,116	7,294	22,176	11,810	10,491	8,963
69	Phnum Penh Thmei	53,193	9,499	29,406	20,278	13,911	11,884
70	Ruessey Kaev	52,478	10,092	29,010	18,131	13,724	11,724
71	Tuek Thla	92,789	15,727	51,295	79,770	24,266	20,626
72	Praek Lieab	24,419	4,440	13,499	14,231	6,386	5,499
73	Praek Ta Sek	6,910	1,256	3,820	520	1,807	1,544
74	Chrouy Changva	32,854	6,318	18,162	4,600	8,592	7,340
75	Chrang Chamreh Muoy	11,573	2,104	6,398	13,992	3,026	2,586
76	Chrang Chamreh Pir	22,412	4,075	12,389	10,923	5,861	5,007
77	Kandal Stueng	23,032	4,421	12,732	1,522	6,023	5,146
78	Kien Svay	32,632	6,180	18,039	1,409	8,534	7,291
79	Ta Khmau	62,398	10,738	34,494	14,062	16,318	13,941
80	(Airport area)	0	0	0	338	0	0
	Total of Suburban Area	1,070,050	189,633	591,532	675,895	279,834	243,005
	Ground Total	1,820,180	327,159	1,006,210	1,006,210	476,004	476,004

Table A10.2-1 Land Use by Traffic Zone (2000)

Traffic Zone		Total	Land	Residential	Commercial	Industrial	Institution	Parks & Recreation	Open Space	Agriculture& Livestock	Flood Area	Water Surface Area
1	Tonle Basak	316	283	131.3	82.9	30.1	21.9	2.9	0.0	13.7	0.0	33.0
2	Boeng Keng Kang Muoy	100	100	61.6	36.4	0.0	2.0	0.0	0.0	0.0	0.0	0.0
3	Boeng Keng Kang Pir	34	34	25.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Boeng Keng Kang Bei	64	64	44.8	19.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Oulampik	30	30	7.3	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Toul Svay Prey Muoy	56	56	39.6	16.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Toul Svay Prey Pir	38	38	22.2	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Tumnob Tuek	82	82	31.2	25.4	0.0	25.4	0.0	0.0	0.0	0.0	0.0
9	Tuol Tumpung Pir	45	45	24.9	20.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Tuol Tumpung Muoy	59	59	40.5	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Boeng Trabaek	49	41	24.1	15.9	0.2	1.0	0.0	0.0	0.0	0.0	8.0
12	Phsar Daem Thkov	86	65	43.4	21.6	0.0	0.0	0.0	0.0	0.0	0.0	21.0
13	Phsar Thmei Muoy	18	18	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Phsar Thmei Pir	11	11	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Phsar Thmei Bei	34	34	9.7	20.1	0.0	4.2	0.0	0.0	0.0	0.0	0.0
16	Boeng Reang	38	38	8.6	29.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Phsar Kandal Muoy	41	27	2.7	24.1	0.0	0.0	0.2	0.0	0.0	0.0	14.0
18	Phsar Kandal Pir	15	15	4.5	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Chakto Mukh	111	86	47.4	31.6	0.0	0.0	7.0	0.0	0.0	0.0	25.0
20	Chey Chumneah	77	50	12.3	2.2	0.0	32.3	3.2	0.0	0.0	0.0	27.0
21	Phsar Chas	10	10	0.0	7.9	0.0	2.1	0.0	0.0	0.0	0.0	0.0
22	Srash Chak	315	195	119.6	33.2	7.3	27.3	7.7	0.0	0.0	0.0	120.0
23	Voat Phnom	64	55	18.0	15.6	0.0	10.7	10.7	0.0	0.0	0.0	9.0
24	Ou Ruessey Muoy	8	8	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	Ou Ruessey Pir	8	8	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	Ou Ruessey Bei	5	5	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	Ou Ruessey Buon	10	10	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	Monourom	16	16	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	Mittapheap	40	40	12.3	12.1	0.0	15.6	0.0	0.0	0.0	0.0	0.0
30	Veal Vong	96	91	40.8	50.2	0.0	0.0	0.0	0.0	0.0	0.0	5.0
31	Boeng Prolit	37	36	20.8	12.2	0.0	3.0	0.0	0.0	0.0	0.0	1.0
32	Phsar Depou Muoy	32	32	11.3	20.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	Phsar Depou Pir	20	20	11.8	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	Phsar Depou Bei	30	30	0.0	20.8	0.0	9.2	0.0	0.0	0.0	0.0	0.0
35	Tuek L'ak Muoy	91	89	20.8	30.3	0.3	37.6	0.0	0.0	0.0	0.0	2.0
36	Tuek L'ak Pir	44	44	29.5	13.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0
37	Tuek L'ak Bei	113	111	82.9	22.5	5.6	0.0	0.0	0.0	0.0	0.0	2.0
38	Boeng Kak Muoy	160	157	127.0	0.0	24.9	0.0	5.0	0.0	0.0	0.0	3.0
39	Boeng Kak Pir	169	168	144.5	12.7	10.8	0.0	0.0	0.0	0.0	0.0	1.0
40	Phsar Daeum Kor	47	47	24.6	22.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	Boeng Salang	89	80	68.6	11.4	0.0	0.0	0.0	0.0	0.0	0.0	9.0
	Total of Urbanized Area	2,708	2428	1313.9	791.6	79.9	192.3	36.7	0.0	13.7	0.0	280.0
42	Dangkao	1,383	1107	429.1	41.5	54.2	11.4	0.0	0.0	572.7	86.8	189.2
43	Trapeang Krasang	905	905	163.9	0.0	66.8	0.0	88.7	0.0	587.0	0.0	0.0
44	Kouk Roka	3,267	1657	309.4	0.0	0.0	0.0	0.0	0.0	1,356.6	1,341.5	268.5
45	Phleung Chheh Rotech	963	961	253.8	0.0	0.0	0.0	0.0	0.0	710.2	0.0	2.0
46	Chaom Chau	2,260	2260	610.1	62.6	338.6	48.2	0.0	0.0	1,198.0	0.0	0.0
47	Kakab	888	888	194.0	51.8	385.6	0.0	0.0	0.0	255.8	0.0	0.0
48	Pong Tuek	1,114	1114	263.7	0.0	0.0	0.6	0.0	0.0	852.7	0.0	0.0
49	Prey Veang	907	902	198.1	0.0	0.0	10.6	0.0	0.0	693.2	0.0	5.0
50	Samraong Kraom	1,219	1219	216.1	0.0	26.8	0.0	151.1	0.0	826.3	0.0	0.0
51	Prey Sa	1,323	1315	250.4	0.0	6.3	0.0	0.0	0.0	1,061.3	0.0	8.0
52	Krang Thnong	660	660	44.3	0.0	0.0	0.0	0.0	0.0	615.7	0.0	0.0
53	Krang Pongro	696	653	129.8	0.0	0.0	0.0	103.5	0.0	418.6	0.0	43.0
54	Prateah Lang	842	832	137.6	0.0	0.0	10.7	0.0	0.0	686.6	0.0	10.0
55	Sak Sampov	586	544	127.5	0.0	0.0	0.0	0.0	0.0	419.5	0.0	42.0
56	Cheung Aek	1,324	753	370.3	0.0	0.0	6.5	0.0	0.0	384.1	441.3	129.7
57	Stueng Mean Chey	1,200	1153	376.0	29.9	152.4	0.0	0.0	39.6	552.9	0.0	47.0
58	Boeng Tumpun	443	404	217.1	68.6	13.2	0.0	0.0	0.0	104.3	0.0	39.0
59	Preaek Pra	839	254	155.6	7.7	9.0	0.0	0.0	0.0	81.5	356.0	229.0
60	Chbar Ampov Muoy	49	41	2.8	38.1	0.0	0.0	0.0	0.0	0.0	0.0	8.0
61	Chbar Ampov Pir	132	90	28.0	47.7	0.0	0.0	0.0	0.0	14.3	0.0	42.0
62	Chak Angrae Leu	309	86	27.1	12.2	46.4	0.0	0.0	0.0	0.0	105.8	117.2
63	Chak Angrae Kraom	953	156	70.2	0.0	85.8	0.0	0.0	0.0	0.0	523.1	273.9
64	Nirouth	1,161	361	290.3	10.0	0.0	0.0	0.0	0.0	60.6	363.8	420.2
65	Khmuonh	1,991	1335	356.8	0.0	30.1	0.0	0.0	0.0	948.1	527.5	128.5
66	Tuol Sangkae	276	252	0.0	37.8	195.8	20.1	0.0	0.0	0.0	0.0	24.0
67	Svay Pak	397	208	115.6	0.0	92.4	0.0	0.0	0.0	0.0	133.4	55.6
68	Kiloumaetr Lekh Prammuoy	564	459	160.2	8.4	37.0	8.9	0.0	10.2	234.3	51.9	53.1
69	Phnum Penh Thmei	2,055	1644	585.0	19.4	65.2	0.0	0.0	0.0	974.4	243.2	167.8
70	Ruessey Kaev	518	399	172.0	8.6	62.5	9.2	0.0	0.0	146.8	20.4	98.6
71	Tuek Thla	674	674	134.0	45.0	269.0	0.0	0.0	227.4	0.0	0.0	0.0
72	Praek Lieab	2,013	1150	263.6	75.7	9.6	0.0	0.0	0.0	801.1	245.8	617.2
73	Praek Ta Sek	1,511	853	109.6	0.0	0.0	0.0	0.0	0.0	743.4	455.6	202.4
74	Chrouy Changva	962	514	197.4	10.8	0.0	0.0	0.0	0.0	305.8	0.0	432.0
75	Chrang Chamreh Muoy	230	188	146.8	0.0	41.2	0.0	0.0	0.0	0.0	29.3	12.7
76	Chrang Chamreh Pir	414	274	183.2	0.0	30.9	0.0	0.0	14.2	45.7	96.0	44.0
77	Kandal Stueng	1,945	1804	167	0	0	0	0	0	1,653	0	141
78	Kien Svay	2,462	1469	486	0	22	0	28	0	932	423	556
79	Ta Khmau	1,295	953	366	74	17	56	10	39	391	213	130
80	(Airport area)	454	454	0.0	0.0	0.0	454.0	0.0	0.0	0.0	0.0	0.0
	Total of Suburban Area	41,184	30945	8307.6	650.0	2058.6	636.0	381.3	330.4	18,626.8	5,657.4	4,536.0
	Ground Total	43,892	33,373	9,621	1,442	2,139	828	418	330	18,641	5,657	4,816

Table A10.2-1 Land Use by Traffic Zone (2015)

Traffic Zone		Total	Land	Residential	Commercial	Industrial	Institution	Parks & Recreation	Open Space	Agriculture& Livestock	Swamp Area	Water Surface Area
1	Tonle Basak	316	283	131.3	82.9	30.1	21.9	2.9	0.0	13.7	0.0	33.0
2	Boeng Keng Kang Muoy	100	100	61.6	36.4	0.0	2.0	0.0	0.0	0.0	0.0	0.0
3	Boeng Keng Kang Pir	34	34	25.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Boeng Keng Kang Bei	64	64	44.8	19.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Oulampik	30	30	7.3	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Toul Svay Prey Muoy	56	56	39.6	16.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Toul Svay Prey Pir	38	38	22.2	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Tumnob Tuek	82	82	31.2	25.4	0.0	25.4	0.0	0.0	0.0	0.0	0.0
9	Tuol Tumpung Pir	45	45	24.9	20.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Tuol Tumpung Muoy	59	59	40.5	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Boeng Trabaek	49	41	24.1	15.9	0.2	1.0	0.0	0.0	0.0	0.0	8.0
12	Phsar Daem Thkov	86	65	43.4	21.6	0.0	0.0	0.0	0.0	0.0	0.0	21.0
13	Phsar Thmei Muoy	18	18	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Phsar Thmei Pir	11	11	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Phsar Thmei Bei	34	34	9.7	20.1	0.0	4.2	0.0	0.0	0.0	0.0	0.0
16	Boeng Reang	38	38	8.6	29.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Phsar Kandal Muoy	41	27	2.7	24.1	0.0	0.0	0.2	0.0	0.0	0.0	14.0
18	Phsar Kandal Pir	15	15	4.5	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Chakto Mukh	111	86	47.4	31.6	0.0	0.0	7.0	0.0	0.0	0.0	25.0
20	Chey Chumneah	77	50	12.3	2.2	0.0	32.3	3.2	0.0	0.0	0.0	27.0
21	Phsar Chas	10	10	0.0	7.9	0.0	2.1	0.0	0.0	0.0	0.0	0.0
22	Srash Chak	315	195	119.6	33.2	7.3	27.3	7.7	0.0	0.0	0.0	120.0
23	Voat Phnom	64	55	18.0	15.6	0.0	10.7	10.7	0.0	0.0	0.0	9.0
24	Ou Ruessey Muoy	8	8	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	Ou Ruessey Pir	8	8	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	Ou Ruessey Bei	5	5	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	Ou Ruessey Buon	10	10	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	Monourom	16	16	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	Mittapheap	40	40	12.3	12.1	0.0	15.6	0.0	0.0	0.0	0.0	0.0
30	Veal Vong	96	91	40.8	50.2	0.0	0.0	0.0	0.0	0.0	0.0	5.0
31	Boeng Prolit	37	36	20.8	12.2	0.0	3.0	0.0	0.0	0.0	0.0	1.0
32	Phsar Depou Muoy	32	32	11.3	20.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	Phsar Depou Pir	20	20	11.8	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	Phsar Depou Bei	30	30	0.0	20.8	0.0	9.2	0.0	0.0	0.0	0.0	0.0
35	Tuek L'ak Muoy	91	89	20.8	30.3	0.3	37.6	0.0	0.0	0.0	0.0	2.0
36	Tuek L'ak Pir	44	44	29.5	13.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0
37	Tuek L'ak Bei	113	111	82.9	22.5	5.6	0.0	0.0	0.0	0.0	0.0	2.0
38	Boeng Kak Muoy	160	157	127.0	0.0	24.9	0.0	5.0	0.0	0.0	0.0	3.0
39	Boeng Kak Pir	169	168	144.5	12.7	10.8	0.0	0.0	0.0	0.0	0.0	1.0
40	Phsar Daeum Kor	47	47	24.6	22.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	Boeng Salang	89	80	68.6	11.4	0.0	0.0	0.0	0.0	0.0	0.0	9.0
	Total of Urbanized Area	2,708	2428	1,313.9	791.6	79.9	192.3	36.7	0.0	13.7	0.0	280.0
42	Dangkao	1,383	1107	560.0	51.5	54.2	11.8	2.5	0.0	428.9	86.8	189.2
43	Trapeang Krasang	905	905	361.9	10.0	106.8	0.4	89.9	0.0	337.4	0.0	0.0
44	Kouk Roka	3,267	1657	386.5	12.0	0.0	0.4	15.0	0.0	1,252.1	1,341.5	268.5
45	Phleung Chheh Rotech	963	961	363.8	10.0	250.0	0.4	15.0	0.0	324.8	0.0	2.0
46	Chaom Chau	2,260	2260	940.1	93.6	565.0	48.6	8.0	0.0	603.2	0.0	0.0
47	Kakab	888	888	354.0	64.8	400.0	0.4	4.4	0.0	63.7	0.0	0.0
48	Pong Tuek	1,114	1114	329.6	12.0	44.0	1.0	12.0	0.0	718.4	0.0	0.0
49	Prey Veang	907	902	209.1	10.0	0.0	10.9	10.0	0.0	661.8	0.0	5.0
50	Samraong Kraom	1,219	1219	232.3	12.0	243.0	0.4	161.1	0.0	571.5	0.0	0.0
51	Prey Sa	1,323	1315	371.4	10.0	56.3	0.4	10.0	0.0	869.9	0.0	8.0
52	Krang Thnong	660	660	64.3	10.0	0.0	0.4	0.4	0.0	585.0	0.0	0.0
53	Krang Pongro	696	653	189.8	10.0	0.0	0.4	103.8	0.0	348.0	0.0	43.0
54	Prateah Lang	842	832	307.6	10.0	210.0	11.1	10.0	0.0	286.2	0.0	10.0
55	Sak Sampov	586	544	132.4	10.0	0.0	0.4	5.0	0.0	399.2	0.0	42.0
56	Cheung Aek	1,324	753	343.5	10.0	40.0	6.9	19.0	0.0	341.5	441.3	129.7
57	Stueng Mean Chey	1,200	1153	800.0	69.9	200.0	0.4	23.0	39.6	17.9	0.0	47.0
58	Boeng Tumpun	443	404	299.4	79.6	13.2	0.4	10.7	0.0	0.0	0.0	39.0
59	Preaek Pra	839	254	221.8	12.7	9.0	0.4	9.9	0.0	0.0	356.0	229.0
60	Chbar Ampov Muoy	49	41	2.8	38.1	0.0	0.0	0.0	0.0	0.0	0.0	8.0
61	Chbar Ampov Pir	132	90	40.4	48.7	0.0	0.4	0.5	0.0	0.0	0.0	42.0
62	Chak Angrae Leu	309	86	27.1	12.2	46.4	0.0	0.0	0.0	0.0	105.8	117.2
63	Chak Angrae Kraom	953	156	70.2	0.1	85.8	0.0	0.0	0.0	0.0	523.1	273.9
64	Nirouth	1,161	361	319.8	20.0	45.0	0.4	18.0	0.0	140.7	180.8	420.2
65	Khmuonh	1,991	1335	460.4	15.0	80.1	0.4	25.5	0.0	753.6	527.5	128.5
66	Tuol Sangkae	276	252	0.0	37.8	195.8	20.0	0.0	0.0	0.0	0.0	24.0
67	Svay Pak	397	208	115.6	0.0	92.4	0.0	0.0	0.0	0.1	133.4	55.6
68	Kiloumaetr Lekh Prammuoy	564	459	397.0	37.1	37.0	9.6	20.0	10.2	0.1	0.0	53.1
69	Phnum Penh Thmei	2,055	1644	810.0	54.4	110.2	0.4	30.0	0.0	639.0	243.2	167.8
70	Ruessey Kaev	518	399	307.9	32.6	62.5	9.5	6.9	0.0	0.0	0.0	98.6
71	Tuek Thla	674	674	304.7	50.0	309.0	0.4	2.0	9.3	0.0	0.0	0.0
72	Praek Lieab	2,013	1150	390.6	85.7	9.6	0.4	3.2	0.0	660.6	245.8	617.2
73	Praek Ta Sek	1,511	853	122.2	10.0	0.0	0.4	5.0	0.0	715.4	455.6	202.4
74	Chrouy Changva	962	514	341.2	22.8	0.0	0.4	7.0	0.0	142.7	0.0	432.0
75	Chrang Chamreh Muoy	230	188	146.8	0.0	41.2	0.0	0.0	0.0	0.1	29.3	12.7
76	Chrang Chamreh Pir	414	274	218.8	7.8	30.9	0.4	2.0	14.2	0.0	96.0	44.0
77	Kandal Stueng	1,945	1804	254.0	15.0	50.0	0.4	20.0	0	1,480.1	0	141
78	Kien Svay	2,462	1469	593.0	15.0	72.3	0.4	47.9	0	739.5	423	556
79	Ta Khmau	1,295	953	610.3	99.2	37.3	58.3	20.2	39	88.3	212.6	130
80	(Airport area)	454	454	0.0	0.0	0.0	454.0	0.0	0.0	0.0	0.0	0.0
	Total of Suburban Area	41,184	30945	12,000	1,100	3,497	650	718	112	13,170	5,402	4,536
	Ground Total	43,892	33,373	13,314	1,891	3,577	842	754	112	13,184	5,402	4,816

Table A10.3 Number of Household, Population and Household Size by Traffic Zone (2000-2015)

Traffic Zone Code	Population Census Code	District/ Commune	1998 Number of Household	1998 Population	1998 Household Size	2000 Number of Household	2000 Population	2000 Household Size	2005 Number of Household	2005 Population	2005 Household Size	2010 Number of Household	2010 Population	2010 Household Size	2015 Number of Household	2015 Population	2015 Household Size
1	0101	Tonle Basak	8,823	44,513	5.05	9,333	46,084	4.88	10,260	51,012	4.87	11,326	53,939	4.78	12,313	57,867	4.70
2	0102	Boeng Keng Kang Muoy	2,408	14,405	5.98	2,513	14,913	5.94	2,769	16,184	5.84	3,037	17,455	5.77	3,285	18,727	5.70
3	0103	Boeng Keng Kang Pir	2,049	12,055	5.88	2,195	12,764	5.82	2,559	14,537	5.68	2,923	16,310	5.58	3,288	18,083	5.50
4	0104	Boeng Keng Kang Bei	3,841	22,708	5.91	4,117	24,035	5.84	4,809	27,374	5.69	5,500	30,712	5.58	6,191	34,050	5.50
5	0105	Olympic	1,549	9,799	6.33	1,681	10,375	6.17	2,012	11,816	5.87	2,342	13,257	5.66	2,672	14,699	5.50
6	0106	Tuol Svay Prey Muoy	2,208	13,575	6.15	2,348	14,214	6.07	2,673	15,811	5.92	3,003	17,408	5.80	3,334	18,805	5.70
7	0107	Tuol Svay Prey Pir	1,793	11,588	6.46	1,941	12,271	6.32	2,310	13,975	6.05	2,680	15,679	5.85	3,050	17,384	5.70
8	0108	Tumnob Tuek	2,334	13,728	5.88	2,428	14,204	5.85	2,661	15,415	5.79	2,895	16,625	5.74	3,129	17,836	5.70
9	0109	Tuol Tumpung Pir	1,371	8,594	6.27	1,423	8,796	6.18	1,551	9,302	6.00	1,680	9,807	5.84	1,809	10,313	5.70
10	0110	Tuol Tumpung Muoy	1,672	10,422	6.23	1,733	10,667	6.15	1,887	11,280	5.98	2,041	11,893	5.83	2,194	12,506	5.70
11	0111	Boeng Trabaek	1,558	9,452	6.07	1,624	9,786	6.03	1,789	10,620	5.94	1,954	11,454	5.86	2,119	12,288	5.80
12	0112	Phsar Daem Thkov	2,760	16,258	5.89	2,873	16,832	5.86	3,150	18,266	5.80	3,429	19,701	5.75	3,708	21,135	5.70
13	0201	Phsar Thmei Muoy	1,234	7,447	6.03	1,313	7,623	5.81	1,509	8,060	5.34	1,705	8,498	4.98	1,901	8,936	4.70
14	0202	Phsar Thmei Pir	1,305	7,771	5.95	1,363	7,954	5.84	1,506	8,411	5.58	1,650	8,868	5.38	1,793	9,325	5.20
15	0203	Phsar Thmei Bei	2,275	13,154	5.78	2,358	13,464	5.71	2,565	14,237	5.55	2,771	15,011	5.42	2,978	15,785	5.30
16	0204	Boeng Reang	1,273	7,714	6.06	1,337	7,986	5.97	1,499	8,667	5.78	1,661	9,348	5.63	1,823	10,028	5.50
17	0205	Phsar Kandal Muoy	1,817	11,223	6.18	1,867	11,395	6.10	1,993	11,685	5.86	2,119	12,015	5.67	2,245	12,345	5.50
18	0206	Phsar Kandal Pir	1,352	7,954	5.88	1,387	8,048	5.80	1,475	8,282	5.61	1,563	8,515	5.45	1,651	8,749	5.30
19	0207	Chakto Mukh	2,171	12,501	5.76	2,218	12,648	5.70	2,307	13,016	5.64	2,403	13,383	5.57	2,500	13,751	5.50
20	0208	Chey Chumneah	2,004	12,988	6.48	2,051	13,011	6.34	2,170	13,087	6.03	2,289	13,163	5.75	2,407	13,240	5.50
21	0209	Phsar Chas	1,387	8,287	5.97	1,418	8,336	5.91	1,467	8,458	5.76	1,525	8,579	5.63	1,582	8,701	5.50
22	0210	Srah Chak	5,945	34,115	5.74	6,095	34,516	5.66	6,469	35,520	5.49	6,843	36,523	5.34	7,217	37,527	5.20
23	0211	Voat Phnum	1,441	8,767	6.08	1,478	8,870	6.00	1,570	9,128	5.82	1,662	9,386	5.65	1,753	9,644	5.50
24	0301	Ou Ruessey Muoy	1,621	9,128	5.63	1,678	9,335	5.56	1,820	9,871	5.42	1,962	10,408	5.30	2,105	10,944	5.20
25	0302	Ou Ruessey Pir	1,874	10,722	5.72	1,938	10,974	5.66	2,102	11,605	5.52	2,265	12,236	5.40	2,428	12,866	5.30
26	0303	Ou Ruessey Bei	1,498	8,518	5.69	1,553	8,719	5.61	1,691	9,221	5.45	1,828	9,722	5.32	1,966	10,223	5.20
27	0304	Ou Ruessey Buon	1,569	9,123	5.81	1,627	9,338	5.74	1,773	9,874	5.57	1,920	10,411	5.42	2,066	10,948	5.30
28	0305	Monourom	2,212	12,981	5.87	2,298	13,286	5.78	2,511	14,050	5.59	2,725	14,814	5.44	2,939	15,577	5.30
29	0306	Mittapheap	2,170	12,323	5.68	2,202	12,395	5.63	2,282	12,577	5.51	2,362	12,758	5.40	2,441	12,939	5.30
30	0307	Veal Vong	3,684	21,394	5.81	3,915	22,401	5.72	4,494	24,918	5.54	5,073	27,435	5.41	5,651	29,952	5.30
31	0308	Boeng Proluet	1,901	12,018	6.32	2,037	12,575	6.17	2,377	13,988	5.88	2,717	15,401	5.67	3,057	16,814	5.50
32	0401	Phsar Depou Muoy	1,645	10,398	6.32	1,741	10,765	6.18	1,980	11,682	5.90	2,219	12,600	5.68	2,458	13,517	5.50
33	0402	Phsar Depou Pir	1,798	10,236	5.69	1,848	10,477	5.67	1,977	11,079	5.60	2,105	11,681	5.55	2,233	12,283	5.50
34	0403	Phsar Depou Bei	1,699	10,038	5.91	1,768	10,333	5.85	1,939	11,071	5.71	2,110	11,809	5.60	2,281	12,548	5.50
35	0404	Tuek L' ak Muoy	2,362	13,401	5.67	2,436	13,795	5.66	2,621	14,781	5.64	2,806	15,766	5.62	2,991	16,751	5.60
36	0405	Tuek L' ak Pir	1,718	11,247	6.55	1,801	11,578	6.43	2,009	12,405	6.18	2,216	13,232	5.97	2,424	14,059	5.80
37	0406	Tuek L' ak Bei	2,936	17,282	5.89	3,011	17,689	5.87	3,199	18,705	5.85	3,387	19,722	5.82	3,576	20,738	5.80
38	0407	Boeng Kak Muoy	2,587	16,423	6.35	3,048	18,935	6.21	4,203	25,214	6.00	5,358	31,494	5.88	6,513	37,773	5.80
39	0408	Boeng Kak Pir	4,260	25,177	5.91	4,678	27,547	5.89	5,723	33,471	5.85	6,768	39,395	5.82	7,814	45,319	5.80
40	0409	Phsar Doeum Kor	2,658	15,998	6.02	2,841	16,939	5.96	3,297	19,292	5.85	3,754	21,644	5.77	4,210	23,997	5.70
41	0410	Boeng Salang	4,535	24,768	5.46	4,648	25,496	5.49	4,904	27,318	5.57	5,168	29,139	5.64	5,432	30,960	5.70
42	0501	Dangkao	2,035	10,547	5.18	2,177	11,291	5.19	2,533	13,153	5.19	2,889	15,014	5.20	3,245	16,875	5.20
43	0502	Trapeang Krasang	554	3,013	5.44	673	3,722	5.54	968	5,494	5.68	1,263	7,267	5.75	1,558	9,039	5.80
44	0503	Krok Roka	1,068	5,153	4.82	1,108	5,456	4.93	1,207	6,214	5.15	1,306	6,972	5.34	1,405	7,730	5.50
45	0504	Phleung Chhek Rotes	695	3,648	5.24	847	4,406	5.31	1,226	6,638	5.41	1,606	8,779	5.47	1,985	10,920	5.50
46	0505	Chaom Chau	3,395	19,748	5.81	4,174	24,385	5.84	6,130	35,986	5.87	8,084	47,608	5.89	10,037	58,220	5.90
47	0506	Kakab	3,184	17,679	5.55	3,514	19,759	5.62	4,341	24,959	5.75	5,167	30,158	5.84	5,993	35,358	5.90
48	0507	Pong Tuek	1,053	5,561	5.28	1,273	6,869	5.38	1,825	10,141	5.56	2,376	13,412	5.65	2,927	16,683	5.70
49	0508	Prey Veaeng	563	3,013	5.35	598	3,155	5.34	659	3,589	5.33	727	3,864	5.31	796	4,218	5.30
50	0509	Samraong Kraom	810	4,211	5.20	859	4,508	5.25	981	5,251	5.35	1,103	5,994	5.43	1,225	6,738	5.50
51	0510	Prey Sa	892	4,221	4.73	1,058	5,214	4.93	1,473	7,687	5.23	1,888	10,160	5.39	2,302	12,663	5.50
52	0511	Krang Thnong	564	2,983	5.29	608	3,194	5.33	689	3,720	5.40	778	4,246	5.46	868	4,773	5.50
53	0512	Krang Pongro	461	2,016	4.37	476	2,158	4.54	513	2,514	4.90	550	2,870	5.22	586	3,226	5.50
54	0513	Prateah Lang	765	3,594	4.70	908	4,440	4.89	1,257	6,554	5.21	1,609	8,668	5.39	1,960	10,782	5.50
55	0514	Sak Sampov	412	1,928	4.68	423	2,010	4.75	451	2,236	4.96	479	2,462	5.14	507	2,688	5.30
56	0515	Choeung Aek	1,114	5,178	4.64	1,147	5,413	4.72	1,228	6,022	4.90	1,310	6,630	5.06	1,392	7,238	5.20
57	0601	Stueng Mean Chey	5,552	31,748	5.72	6,798	39,208	5.77	9,911	57,879	5.84	13,025	76,549	5.88	16,139	95,220	5.90
58	0602	Boeng Tumpun	5,150	29,037	5.64	6,193	35,186	5.68	8,801	50,559	5.74	11,410	65,931	5.78	14,018	81,304	5.80
59	0603	Preaek Pra	1,969	11,346	5.76	2,126	12,147	5.71	2,517	14,149	5.62	2,909	16,151	5.55	3,301	18,154	5.50
60	0604	Chbar Ampov Muoy	1,754	10,378	5.92	1,863	10,988	5.90	2,137	12,515	5.86	2,410	14,041	5.82	2,684	15,567	5.80
61	0605	Chbar Ampov Pir	4,428	24,227	5.47	4,693	25,937	5.53	5,357	30,212	5.64	6,020	34,488	5.73	6,683	38,763	5.80
62	0606	Chak Angrae Leu	2,913	16,599	5.70	3,043	17,380	5.71	3,363	19,333	5.75	3,685	21,286	5.78	4,007	23,239	5.80
63	0607	Chak Angrae Kraom	3,151	19,814	6.29	3,452	21,446	6.21	4,204	25,525	6.07	4,957	29,604	5.97	5,709	33,684	5.90
64	0608	Nirouth	2,526	13,971	5.53	2,663	14,628	5.49	3,005	16,272	5.41	3,348	17,916	5.35	3,690	19,559	5.30
65	0701	Khmuonh	1,120	5,987	5.35	1,500	8,100	5.40	2,452	13,383	5.46	3,403	18,665	5.49	4,354	23,948	5.50
66	0702	Tuol Sangkae	4,691	27,244	5.81	4,926	28,526	5.79	5,515	31,731	5.75	6,103	34,936	5.72	6,692	38,142	5.70
67	0703	Svay Pak	2,160	12,197	5.65	2,339	13,058	5.58	2,680	15,210	5.67	3,052	17,363	5.69	3,424	19,515	5.70
68	0704	Kilomaetr Lekh Prammuoy	2,366	13,372	5.65	2,946	16,518	5.61	4,395	24,384	5.55	5,844	32,250	5.52	7,294	40,116	5.50
69	0705	Phnom Penh Thmei	3,191	17,731	5.56	3,933	21,903	5.57	5,788	32,333	5.59	7,644	42,763	5.59	9,499	53,193	5.60
70	0706	Ruessey Kaev	3,309	18,742	5.66	4,107	22,711	5.53	6,102	32,633	5.35	8,097	42,555	5.26	10,092	52,478	5.20
71	0707	Tuek Thla	5,494	33,130	6.03	6,698	40,157	6.00	9,708	57,781	5.94	12,717	75,285	5.92	15,727	92,789	5.90
72	0708	Preaek Lieb	1,733	10,617	6.13	2,051	12,241	5.97	2,848	16,380	5.72	3,644	20,380	5.59	4,440	24,419	5.50
73	0709	Preaek Ta Sek	914	4,936	5.40	954	5,168	5.42	1,055	5,749	5.45	1,156	6,330	5.48	1,256	6,910	5.50
74	0710	Chrouy Changvar	2,974	16,427	5.52	3,367	18,360	5.45	4,351	23,191	5.33	5,335	28,023	5.25	6,318	32,854	5.20
75	0711	Chrang Chamres Muoy	1,308	7,233	5.53	1,402	7,744	5.52	1,636	9,020	5.51	1,870	10,296	5.51	2,104	11,573	5.50
76	0712	Chrang Chamres Pir	2,114	12,451	5.89	2,345	13,623	5.81	2,921	16,553	5.67	3,488	19,482	5.57	4,075	22,412	5.50
77	0801	Kandal Stueng	1,581	7,668	4.85	1,915	9,475	4.95	2,751	13,994	5.09	3,586	18,513	5.16	4,421	23,032	5.14
78	0802	Kien Svay	4,503	23,093	5.13	4,708	24,215	5.15	5,193	27,030	5.20	5,687	29,836	5.25	6,180	32,652	5.35
79	0811	Ta Khmau	5,949	32,696	5.50	6,513	36,190	5.56	7,921	44,916	5.67	9,330	53,662	5.75	10,738	61,398	5.77
80	0516	(Airport Area)	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
	0100	Chamkar Mon	32,366	187,082	5.78	34,098	194,942	5.72	38,429	214,592	5.58	42,760	234,241	5.48	47,092	253,891	5.39
	0200	Doun Penh	22,308	131,913	5.91	22,867	133,880	5.85	24,520	138,598	5.65	26,190	143,291	5.47	27,851	148,032	5.32
	0300	Prampir Meakkakra	16,529	96,192	5.82	17,249	99,024	5.74	19,050	106,103	5.57	20,851	113,183	5.43	22,653	120,263	5.31
	0400	Tuol Kouk	26,198	154,968	5.92	27,814	163,554	5.88	31,853	185,017	5.81	35,892	206,481	5.75	39,931	227,945	5.71
Central		Subtotal	97,296	570,155	5.86	102,029	591,329	5.80	113,861	644,263	5.66	125,694	697,196	5.55	137,526	750,130	5.45
	0500	Dangkao	17,505	92,461	5.26	19,827	106,071	5.35	25,481	140,098	5.50	31,135	174,124	5.59	36,788	208,150	5.66
	0600	Mean Chey	27,443	157,112	5.73	30,830	176,921	5.74	39,297	226,444	5.76	47,764	275,966	5.78	56,231	325,489	5.79
	0700	Ruessey Kaev	31,374	180,076	5.74	36,539	208,108	5.70	49,451	278,188	5.63	62,362	348,268	5.58	75,274	418,349	5.56
	0800	Kandal	12,033	63,456	5.27	13,128	69,880	5.32	15,865	85,941	5.42	18,602	102,001	5.48	21,339	118,062	5.53
Suburb		Subtotal	88,415	493,105	5.58	100,323	560,980	5.59	130,093	730,670	5.62	159,863	900,360	5.63	189,633	1,070,050	5.64
Area		Total	185,711	1,063,260	5.73	202,352	1,152,309	5.69	243,954	1,374,933	5.64	285,557	1,597,556	5.59	327,159	1,820,180	5.56
Phnom Penh		Subtotal	173,678	999,804	5.76	189,224	1,082,429	5.72	228,089	1,288,992	5.65	266,955	1,495,555	5.60	305,820	1,702,118	5.57

APPENDIX 14

ROAD DEVELOPMENT PLAN

APPENDIX 14 ROAD DEVELOPMENT PLAN

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A14 ROAD IMPROVEMENT PLAN

A14.1 CONSTRUCTION OF MISSING LINKS

The urban road network in the Study Area is well developed and does not need large scale construction of a new street. The following two projects are proposed as the construction of missing links.

(1) Connection between Tuol Kork Residential Area and Russian Blvd.

Presently, there are only three streets connecting the residential area in Tuol Kork District, on the west of Boeng Kak Lake, and the center of the urbanized area; Kim Il Sung Blvd and Inner Ring Road (St.598). The traffic concentrates on these streets and these streets are congested especially during peak hours. There is a minor street from Russian Blvd to Tuol Kork residential area, which scarcely allows passage of 4-wheel vehicles, about 800 m east to the intersection with Kim Il Sung Blvd, where J. Nerhu Blvd intersects Russian Blvd (Figure A14.1-2).

Because of its narrowness, this road cannot shoulder the traffic on Kim Il Sung Blvd and Inner Ring Road. By Year 2015, the VCR on these three (3) streets exceeds the critical value of 1.5. To disperse the traffic on these streets, the existing narrow street is proposed to be widened to full 4-lane street. In addition, a new street is proposed to be extended, traversing the west coast of Boeng Kak Lake. The proposed street is also expected to allow the traffic coming from the west of the urbanized area to detour to the eastern section of the Inner Ring Road (Street No. 70).

(2) Shortcut Between Preah Monivong Blvd and Inner Ring Road

When Project Road No. A12, Tumpum Dike Road will be improved, large volume of traffic is expected to flow from Preah Monivong Blvd to Inner Ring Road. Present intersection of Monivong Blvd and Inner Ring Road has very small intersecting angle, and it is very hard to turn. To mitigate this problem and also to shorten the travel time between Monivong Blvd and Tumpum Dike Road, a new street is proposed to be constructed on the west side of "Mekong Committee" building (Figure A14.1-3). This street is expected to encourage diversion of the traffic on the route of S. Monireth Blvd - Toll Road to Tumpum Dike Road – Monivong Blvd route.

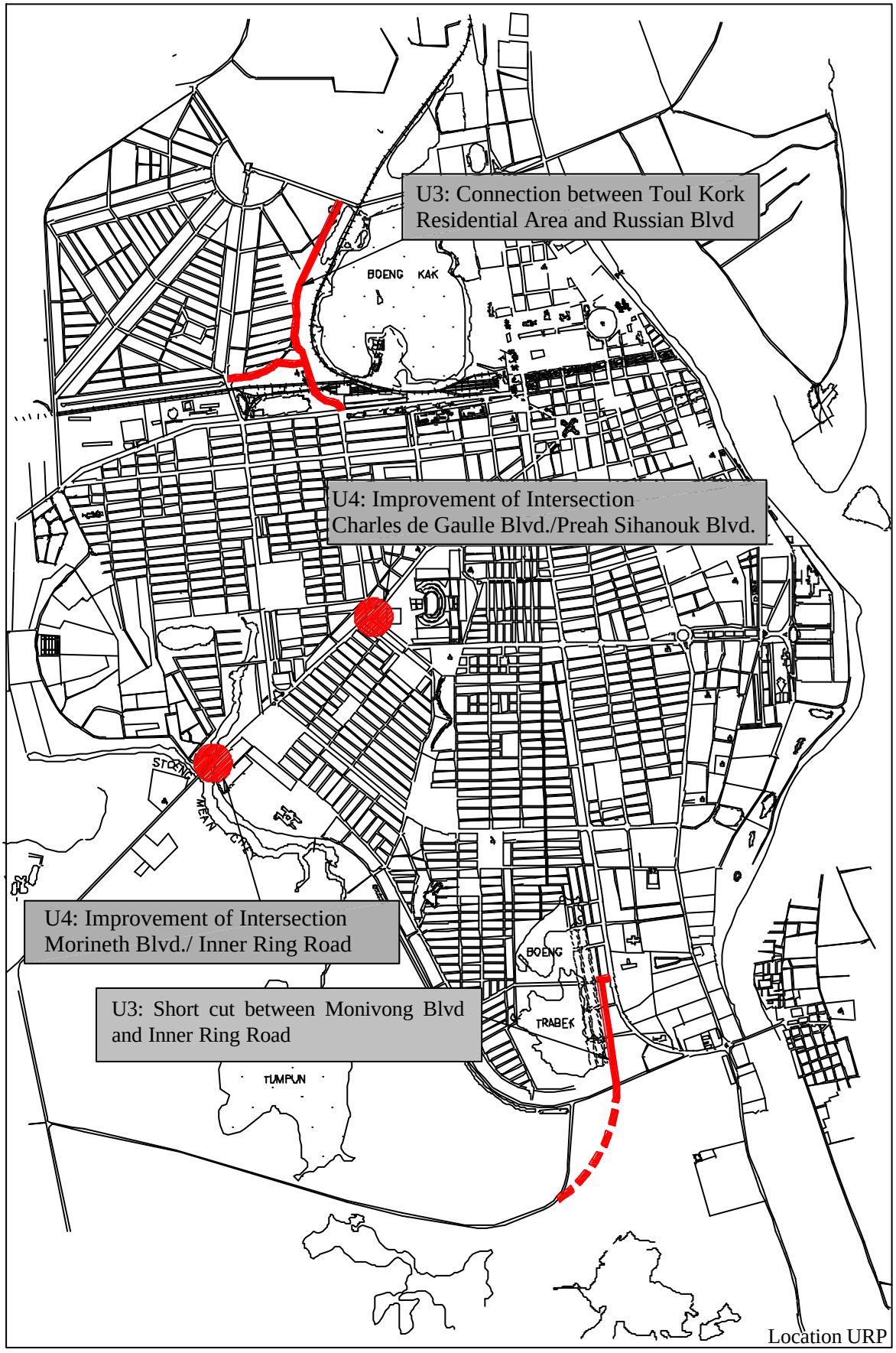


Figure A14.1-1 Location Map of Proposed Urban Road Project

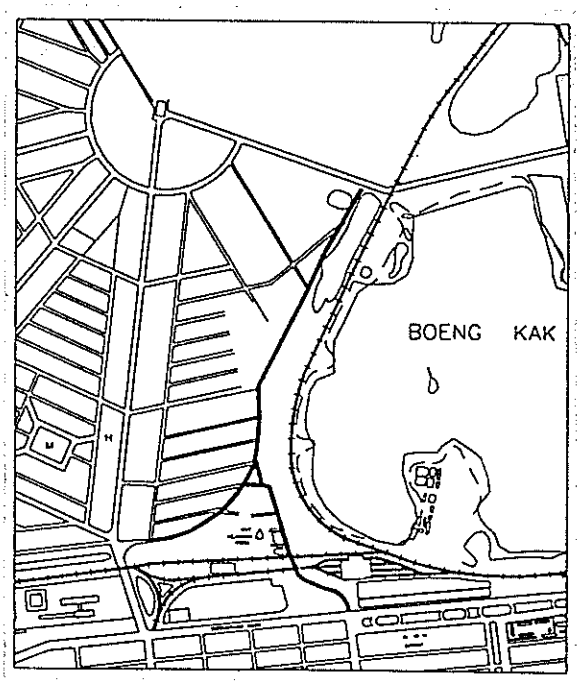


Figure A14.1-3 Shortcut between Preah Monivong Blvd and Inner Ring Road

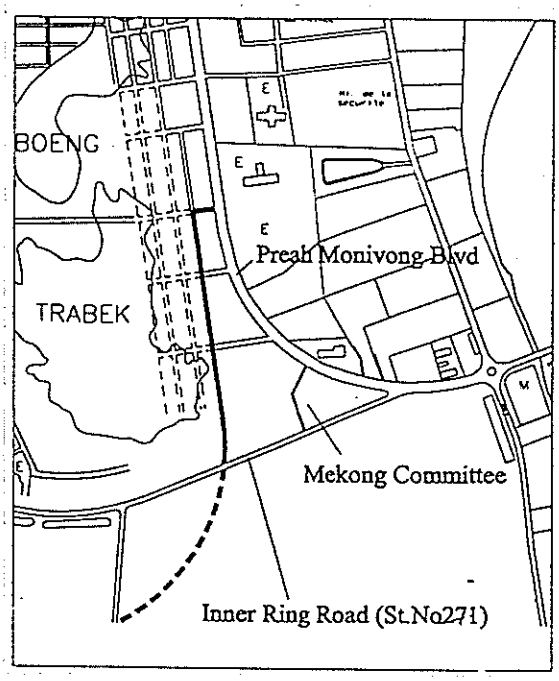


Figure A14.1-2 Connection Between Tuol Kouk Residential Area and Russian Blvd

A14.2 IMPROVEMENT OF INTRSECTION

There are several intersections with undesirable configuration. Here, two (2z9 intersections are proposed to be improved.

(1) Intersection in front of Olympic Stadium
This is the intersection of Samdach Preah Sihanouk Blvd and Charles de Gaulle Blvd. This is a roundabout-type intersection and the rotary island is located eccentric. Traffic congestion is occurring, especially during peak hours, and is expected to be amplified as the traffic volume increases. Improvement of this intersection can be done with relatively small work; move the rotary island to the proper position (to coincide with the center line of the street). (Figure A14.2-1)

(2) Intersection of Samdach Monireth Blvd and Inner Ring Road
This intersection is a staggered intersection. It is not bottleneck at present, but when the Inner Ring Road will be improved and the traffic volume on the Inner Ring Road will increase, this intersection will become a serious bottleneck. Also, the Seung Mean Chey Bridge which is close to this interchange is proposed to be improved to relieve the present traffic congestion. Without improvement of this intersection, the congestion on the bridge will not be reduced. Therefore, it is proposed to improve this intersection at same time with the improvement of the Inner Ring Road and/or Steung Mean Chey Bridge.(Figure A14.2-2)

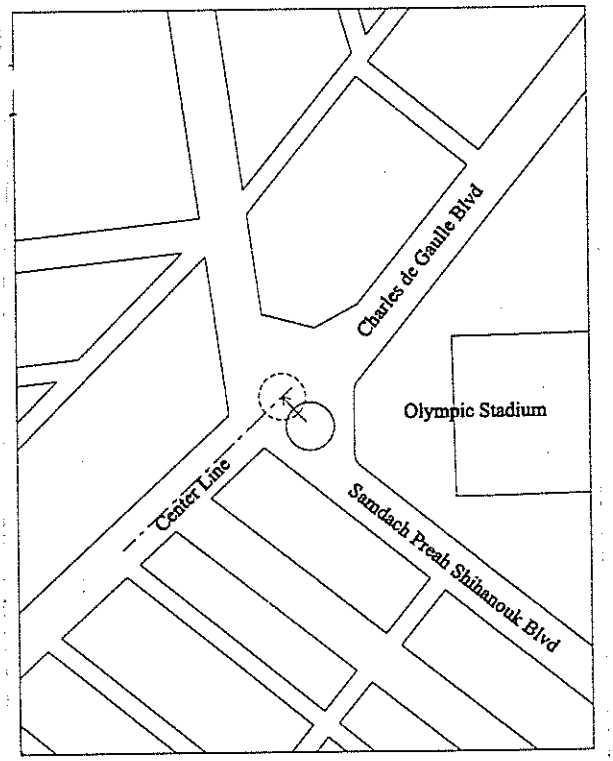


Figure A14.2-1 Improvement of Intersection in front of Olympic Stadium

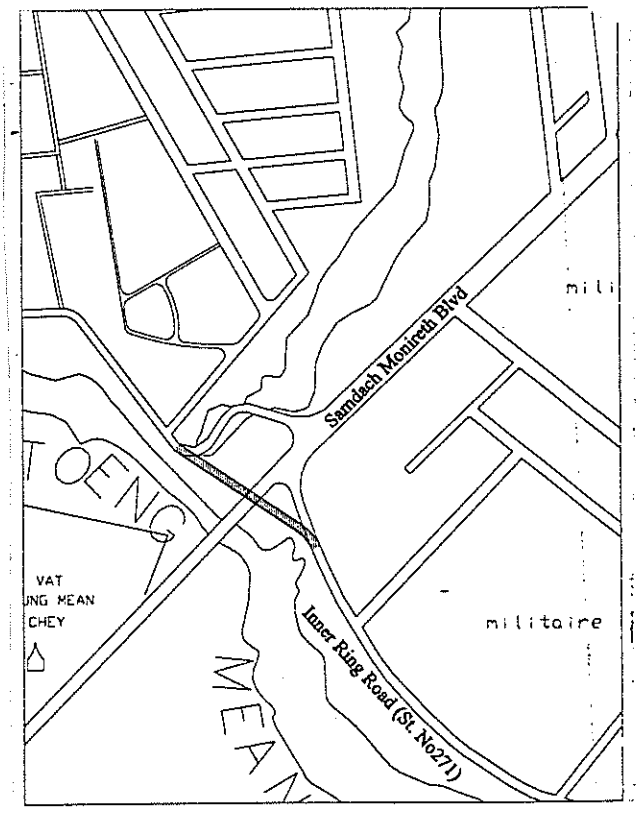


Figure A14.2-2 Improvement of Intersection of Monireth Blvd and Inner Ring Road

A14.3 DESCRIPTION OF SUBURBAN ROAD PROJECTS

In contrast to the urban road network, suburban road network is undeveloped and incomplete. To solve the problems of the suburban rod network, thirty-eight (38) projects are proposed. Table A14.3-1 show the list of the proposed suburban road projects. Figure A14.3-1 shows the location of the project roads. The outlines of the Projects are described in the following pages.

Table A14.3-1 List of Proposed Road Project

No.	Road Name	Length (km)	Present Condition		Proposed Improvement		
			No. of Lanes	Surface Condition	No. of Lanes	Surface Condition *	Type of Target**
Arterial Road							
A1	Inner Ring Road	13.9	2	Improved, destroyed	2	AC	N
A2	Outer Ring Rd sec-1	8.6	0	New construction	2	AC	N
A3	Outer Ring Rd Sec-2	13.4	2	Gravel/Earth	2	AC	N
A4	Outer Ring Rd Sec-3	3.7	2	Gravel/Earth	2	AC	D
A5	Outer Ring Rd Sec-4	2.0	0	New construction	2	AC	D
A6	Outer Ring Rd Sec-5	8.8	2	Gravel/Earth	2	AC	N
A7	Outer Ring Rd Sec-6	11.2	0	New construction	2	AC	N
A8	Northern New Trunk Road	11.0	2 – 1	Laterite/Earth	2	AC	D
A9	Southern New Trunk Rd	7.4	0	New construction	4	AC	D
A10	Phnom Penh Thmei Rd-1	3.0	2	Gravel/Laterite	4	AC	D
A11	Phnom Penh Thmei Rd-2	4.3	2 (Part. 0)	Gravel/Laterite	4	AC	D
A12	Tumpum Dike Rd	4.2	2	Gravel/Earth	4	AC	D
A13	Cheung Aek Bypass	10.3	2	Gravel/Earth	4/2	AC	C
	Sub Total	101.8					
Collector Road							
C1	Russei Kaev Bypass	6.6	2	Gravel/Earth	4	AC	C
C2	Khmuonh Rd	9.2	2	Earth	2	AC	N
C3	Tang Krasang Rd	8.4	2 – 0.5	Gravel/Earth	2	AC	N
C4	Krang Thnong-Dei Thmei Rd	9.0	2 – 0	Laterite/None	4	AC	D
C5	Northbridge Rd	6.9	0	New construction	2	AC	D
C6	Trapeang Rumchek Rd	4.5	2	Gravel/Earth	2	AC	N
C7	Prey Sa Rd	7.3	2 – 1	Gravel/Earth	2	AC	N
C8	Tuol Sambo Rd	1.8	2	Gravel/Earth	2	AC	N
C9	Phnom Penh-Kandal Bypass	4.8	0	New construction	2/4	AC	C
C10	Preaek Pra Rd	6.7	2 – 1	AC, Damaged/Earth	2	AC	N
C11	Veal Sbov Bypass	7.1	0	New construction	2	AC	C
	Sub Total	70.1					
Major Local Road							
L1	Russei Kaev Rd	2.2	2 – 1	Gravel/Earth	2	AC	D
L2	Tuol Sangkae Rd	7.1	2 – 1	Gravel/Earth	2	AC	D
L3	Samarong Rd	4.3	0	New construction	2	AC	N
L4	Poung Peay Rd	3.6	0	New construction	2	AC	D
L5	Dei Thmei Rd	2.1	2 – 1	Gravel/Earth	2	AC	D
L6	Kouk Chambak Rd	3.5	2 – 1	Gravel/Earth	2	AC	D
L7	Trapeang Chrey Rd	6.0	0	New construction	2	AC	D
L8	Prey Tea Rd	3.6	0	New construction	2	AC	D
L9	Ou Baek Kaam Rd	3.0	2 (Part. 0)	Gravel/Earth/ New construction	2	AC	D
L10	Boeng Krop Rd	1.6	2 – 1	Gravel/Earth	4	AC	C
L11	Chaom Chau Rd	1.5	2 – 1	Gravel/Earth	2	AC	D
L12	Krang Pongro-Sak Sampov -Baku Rd	13.9	1 – 0.5	Gravel/Earth	2	AC	N
L13	Tuol Kei Rd	4.1	2 – 1	Gravel/Earth	2	AC	N
L14	Preah Ponlea Rd	2.6	2 – 1	Gravel/Earth	2	AC	C
	Sub Total	59.1					
	Total	231.1					

* AC: Asphalt Concrete ** Type of Target: C; Congestion Alleviation N; Network Formation D; Development Promotion

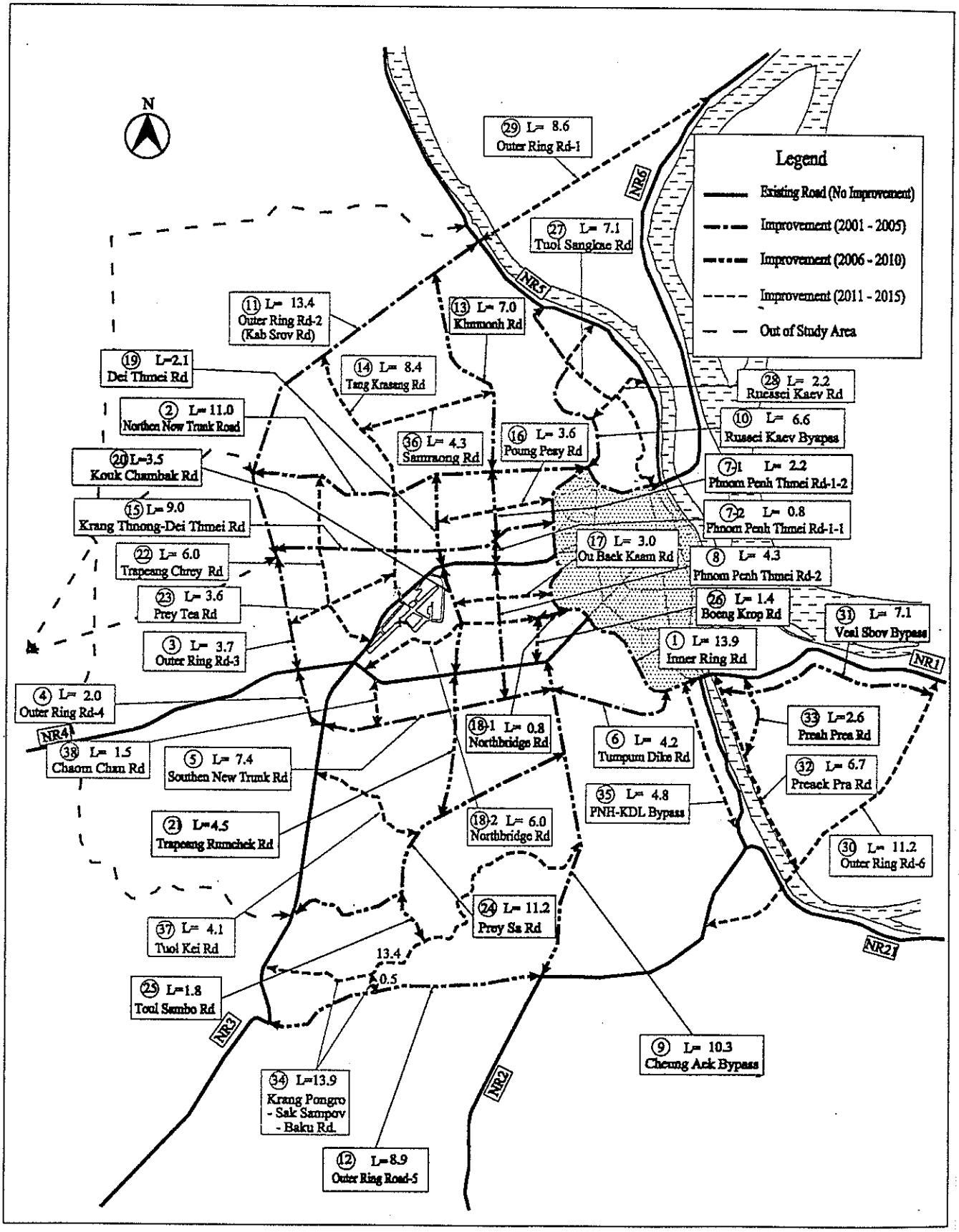


Figure A.14-3-1 Location Map of Project Road

(1) Arterial Road

A1: Inner Ring Road (IRR)

This road is very important arterial both in the urban and suburban road networks. Nevertheless, the present surface condition is very poor. The travel speed on this road is in the proximate of 20 km/hr. There are several important public facilities including two (2) major hospitals where major portion of the existing ambulance vehicles in the City are stationed, two (2) major schools, and pumping stations to protect the urbanized area from flooding. Improvement of pavement is urgent requirement. The both sides of the road is densely populated, and relocation of these houses becomes necessary if this road is to be widened to full four (4) lanes. This relocation is expected to give considerably large social impact. It is proposed to improve pavement for 2 lanes urgently and widen after 2015 when the traffic volume approaches 20,000 veh/day levels. Because the roadside is densely populated, land acquisition may not be easy, and, thus, early start of the action to acquire the additional right of way needed for 4-lane is recommended so that the works of widening can be quickly implemented as the widening becomes necessary.

A2: Outer Ring Road Section 1

This section is the future extension of the Outer Ring Road (ORR) connecting NR 5 and NR 6. The alignment passes mostly swampy area and extensive work of soft ground treatment will be necessary. Considerable portion may have to be constructed as viaducts or bridges. Also, a bridge of about 700 meter needs to be constructed to cross Tonle Sap River. Accordingly, the construction cost is supposed to be considerably higher than other projects. Judging from the forecast traffic volume, tentative 2-lane construction can cater the demand. The length is estimated to be about 8.6 km

A3: Outer Ring Road Section 2 (Kab Srov Dike Road)

The existing road for this section of the ORR is Kab Srov Dike which is the premier protection line against the flooding to the north of the city. In the future, this road is expected form a part of the Asian Highway System and caters the traffic, which needs to detour Phnom Penh, coming from the Cambodia-Thailand border and going to Ho Chi Min City, Viet Nam. Therefore, international standard (4 lanes) is required. However, the forecast traffic volume indicates tentative 2-lane construction sufficient up to Year 2015.

A4: Outer Ring Road Section 3

This is the 6.5 km-long section of the ORR which stretches from its intersection with NR 4 towards north and connected to the proposed Northern New Trunk Road. This road forms an important part of the future network. The existing road is unpaved road of about 7 m wide. The functional class of this road (arterial), divided 4-lane structure is appropriate. However, the projected traffic volume does not warrant 4 lanes and tentative 2-lane construction is recommended. Even so, minor, additional low embankment works for widening to full 2 lane and pavement is needed. Effort to acquire additional right of way needed for future widening should be started as early as possible.

A5: Outer Ring Road Section 4

Presently, this is "missing link" of ORR between NR 3 and NR 4 and needs completely new construction. This section needs to be completed to form a circular route together with the proposed Northern New Trunk Road (A8) and Southern New Trunk Road (A9). The length of the road is about 2.0 km. Like Project Road A4 (ORR Sec 3), tentative 2-lane construction is recommended considering the projected traffic volume.

A6: Outer Ring Road Section 5

This road is the southeastern end section of ORR connecting NR 2 and NR 3 in the southwestern suburbs of Phnom Penh. The existing road is earth road of 7 to 8 meter wide. Again, 4-lane structure is appropriate as an arterial road, but the projected traffic volume shows that tentative 2-lane is sufficient.

A7: Outer Ring Road Section 6

This section is the southeastern end section of ORR, connecting NRs 2 and 21 to NR 1. This project

needs a construction of a 700 meter-long bridge to cross Bassac River near Kandal City. The east-end section of this road can utilize the existing Tiger Road, but for more than two thirds of the section needs relocation of the houses along the narrow exiting road. To avoid the relocation of large number of houses, the alignment of the project road needs to pass about 500 meter to 1 km southeast of the existing road. Also here, tentative 2-lane construction is considered to be sufficient.

A8: Northern New Trunk Road

This road connects IRR and ORR, passing the northern periphery of the future development area. The length of the road is about 11.0 km. The eastern half of this road can utilize the existing road which is 8 m wide laterite road. The This road, together with the proposed Southern New Trunk Road, will become the main traffic line to support the development towards west. High geometric standard is desired to be applied on this road. At the same time, the road should be provided with environmental buffer zone on the both sides to protect the roadside environment and, thus, promote desirable form of development. Tentative 2-lane construction is proposed considering the forecast traffic volume.

A9: Southern New Trunk Road

This road is another main traffic line to promote the development. Entire section will be new construction. The proposed alignment starts at the intersection of Tumpum Dike Road and the future Cheung Aek Bypass, and passes 500 meter to 1 km south of the existing Toll Road This road is to form a circular route together with ORR and Northern New Trunk Road. The area along the route is mostly rice field presently. However, the adjacent area is being developed rapidly and this area will be developed soon. Therefore, at least the right of way should be secured as soon as possible. High geometric standard should be applied. The length is 7.4 km.

A10: Phnom Penh Thmei Road 1 and A11: Phnom Penh Thmei Road 2

These roads are to connect the Northern New Trunk Road, Airport Road, Toll Road and Southern New Trunk Road at about 1.8 km west of IRR. To the north, they are to be extended as Project Road C2 (Khmuonh Road) and connected to ORR Section 2. These roads are to function as collector streets in the presently being developed area adjacent to the present urbanized area, and are expected to help sound development of the area. Entire section of Project Road A10 is to be constructed on the exiting road with right of way about 10 m wide. For the northern half of the Project Road A12, from Airport Road to the intersection with Northbridge Road (about 1.3 km), there is a paved existing road. From this intersection to about 100 m north of Toll Road, unpaved road with a width of about 12 to 15 m exists. Hence, construction of these roads is relatively easy.

A12: Tumpum Dike Road

This is to widen and improve the existing Tumpum Dike Road which is currently used as a 2-lane road with earth surface. The dike has been proposed to be reinforced in the JICA Study on Flood Control and Drainage Rehabilitation. It is proposed that this road be widened to divided 4-lane as an arterial road because of the traffic demand grows. Length of the road is 4.2 km.

A13: Cheung Aek Bypass

This road is intended as the bypass for NR 2 by connecting NR 2 and the extension of Samdech Monireth/ Charles de Gaulle Blvd. There is an existing road from beginning at the Toll Road at its east end (extension of Samdech Monireth Blvd) and extends to the intersection of NR 2 with the Outer Ring Road. The roadside areas on the both sides of the northern half of the existing road are residential areas and old trees on the both sides hedge the road. The width of the existing road is about 5 to 7 meters, and the trees of either side may have to be cut to secure sufficient lane widths. The monument of "Killing Field" is located along this road at about 5 km south from its intersection with the Toll Road. Because of very rough surface condition, vehicles (buses, cars and even motodops) carrying tourists going to the Killing Field Monument are forced to travel at very slow speed, making this one of the principal tourist spot difficult place to visit.Improvement of this road is important also from the viewpoint of tourism. About 1 km-long section between the Toll Road and proposed Southern New Trunk Road is proposed to be widened to be divided 4-lane, and 2-lane construction is recommended for the remaining section. There is a destroyed bridge (Wat Bakou Br.) where this road crosses Preak

Tnaot River, and this bridge needs to be repaired. The estimated length of this bridge is about 135 meter. To the south of the river, there is an scarcely-used, poorly-maintained existing road with width of 5 to 6 meter.

(2) Collector Road

C1: Ruessei Kaev Bypass
This is an improvement of the existing road, which is about 10-meter wide gravel road. This road is expected to function as the bypass for NR 5 to cater the traffic entering/exiting the urbanized area from/to the north. Four (4) lanes are needed.

C2: Khmounh Road
This is an extension of Project Road No. A10 (Phnom Penh Thmei Road-1) and reach to the Project Road No. A3 (ORR Section 2). The present land use of the roadside area is sparsely populated villages. This area is planned to be residential area in future development plan. This road is expected to serve to the traffic between the future development area and northern out skirt of the city via ORR. The existing road is about 6-meter wide earth/ laterite road. Tentative 2-lane can cater the traffic demand.

C3: Tang Krasang Road
This road, like Project Roads No. A11 and C2, is to connect the future development area to the outer ring road. Opposed 2-lane structure is considered to be enough. Then, the project is mostly improvement pavement of the existing road.

C4: Krang Thong-Dei Thmei Road
This is the main collector road running through the future development area in east-west direction along the railroad on its north side. The entire length is estimated to be about 9 km. Considering the estimated traffic volume, the entire section), needs to be constructed as a 4-lane road. For about 1.8 km-long section on its east end (between the Inner Ring Road and Project Road No. A10 there is an existing road for this section is about 7 to 8 meter wide, and with acquisition of additional right of way, this road can be used as a part of the project road. From Project Road A10 to west, new construction is needed, but land acquisition does not seem to be serious problem at present.

C5: Northbridge Road
The eastern half of this road (Inner Ring Road ~ Kouk Chambak/ Wat Oung Ta Meung) runs approximately parallel to the Toll Road at 700 m~1 km north of the Toll Road. The western half is proposed to take the route along the southern fence of the Airport and then take the route of the existing road to reach the Toll Road at Chaom Chau (about 500 m east of the intersection of BOT Road and Airport Road). The roadside area of the eastern half of this road is being rapidly developed and several land plots for factory have been constructed. Therefore, ROW should be secured as early as possible. On the other hand, the area along the western half of this road is still undeveloped, and land acquisition does not seem to be difficult. The entire section is proposed to be constructed as a tentative 2-lane road.

C6: Trapeang Rumchek Road
This road is to serve as a collector street connecting the Toll Road, Southern New Trunk Road, Project Road No.L6 and Project Road No. C7. This project is mainly widening and improvement of the existing road.

C7: Prey Sa Road
This road is to serve as the main collector street traversing the southwestern suburbs, and connect Project Road A13 and NR 3. Accordingly, this road is expected to shoulder some portion of the traffic on NR 3 and Toll Road. The project is mainly widening and improvement of the existing road which is mostly earth road about 7 meter wide. Rehabilitation of one small bridge is necessary. The length of the project road is about 7.3 km.

C8: Toul Sambo Road
This road is to connect Project Road C7 and Project Road L12 and serve to the remote area in the southwest of the Municipality. The length of the road is about 1.8 km.

C9: Phnom Penh-Kandal Bypass
This project is to construct a bypass to ease the congestion on the section of NR 2 between the intersection on the west of Monivong Bridge and Kandal City. The narrow zone, with a width of about 100 to 200 meters, on the west side of the existing road is densely populated and expanding towards west (to Boeng Ansaong Andael) The proposed alignment passes the boundary between the populated zone and the Boeng to minimize relocation of houses. A considerable portion of the project road may need to be constructed in the swampy area. Tentatively estimated road length is about 10.3 km. About 1 km-long section at the north end of this road needs to be constructed as 4-lane, while tentative 2-lane is sufficient for the remaining section.

C10: Preaek Pra Road
This project is widening and improvement of the existing road to serve the traffic on the east bank of Bassac River. The length of the project road is 6.7 km.

C11: Veal Sbov Bypass
This project is to construct a bypass for NR 1 to avoid the congestion on the east side of the Bassac River (Mean Chey). The bypass is recommended rather than widening of the existing NR 1 to avoid extensive relocation of houses. However, moderate extent of relocation of houses may become necessary depending on the alignment. The length of the tentatively proposed route is about 7 km. The entire length can be constructed as a 2-lane road.

(3) Local Road

L1: Russei Kaev Road and L2: Toul Sangkae Road
These roads are major local streets traversing the future residential area of Ruessei Kaev. The projects are mainly widening and improvement of the existing roads. The lengths of the roads are 7.1 km and 1.6 km, respectively.

L3: Samarong Road
This project is to construct a major local street connecting Project Roads No. 13 and 14 in the northern suburbs and serve to the villages in this area. The selection of alignment has a substantial freedom owing to the present land use, which is agricultural. The length of the tentatively proposed alignment is 4.3 km.

L4: Poung Peay Road
This road is to serve as a major local street in the northern half of the future development area adjacent to the present urbanized area. Entire section of about 3.6 km needs to be newly constructed.

L5: Dei Thmei Road and L6: Kouk Chambak Road
These roads are to serve as major local streets running in north-south direction at the middle of the future development area. These roads are to connect the Northern New Trunk Road and the Toll Road, and further to the Southern New Trunk Road via Project Road No. C6. Project Road L5 can be constructed by widening and improving the exiting road of 4.5 to 6 meters wide. Moderate extent of relocation will be needed especially near the intersection with the Airport Road. Length of the road is about 2.1 km. Project Road L6 needs a new construction. Land use along the assumed route is mostly agriculture and land acquisition does not seems to be a serious problem except near the intersection with the Airport Road. The length of the road is estimated to be about 3.5 km.

L7: Trapeang Chrey Road and L8: 23 Prey Tea Road

These roads are to serve as the major local streets in the western part of the future development area. The exact alignment should be determined together with the development plan of the area. The lengths of tentatively proposed routes are about 6 km and 3.6 km, respectively. Present land use is mostly agriculture, but there is an area used as a military facility.

L9: Ou Baek Kaan Road (Northbridge Road)

This road connects the Inner Ring Road and L6 Road at about 1.3 km south of Airport Road. The eastern half of this road is already exists with laterite surface. About 250 m section between the intersection with Project Road A12 and Northbridge International School is paved. To the west of the intersection with Project Road A12, there is an unpaved road with a width of about 8.5 m up to the connection point with Project Road No. L9. The projected traffic volume indicates that this road needs four (4) lanes.

L10: Boeng Krop Road

This road is a major local street in the area currently being developed in the immediate west of the present urbanized area. The project is mainly widening and improvement of the existing road which is about 4 to 6 meter wide. The Length is about 1.6 km.

L11: Chaom Chau Road

This project is to strengthen the existing road connecting the Project Road C7 and NR 3, and to improve the service to the nearby area. The length of the road is 4.1 km.

L12: Krang Pongro - Sak Sampov- Baku Road

This road is the major road serving the villages along the north bank of Preak Tnaot River. The existing road is earth road about 3 meters wide. Substantial volume of embankment is necessary to widen the existing road. The total length of the road is about 14. 4 km including the branch road to cross the Preak Tnaot Rive and connecting with ORR.

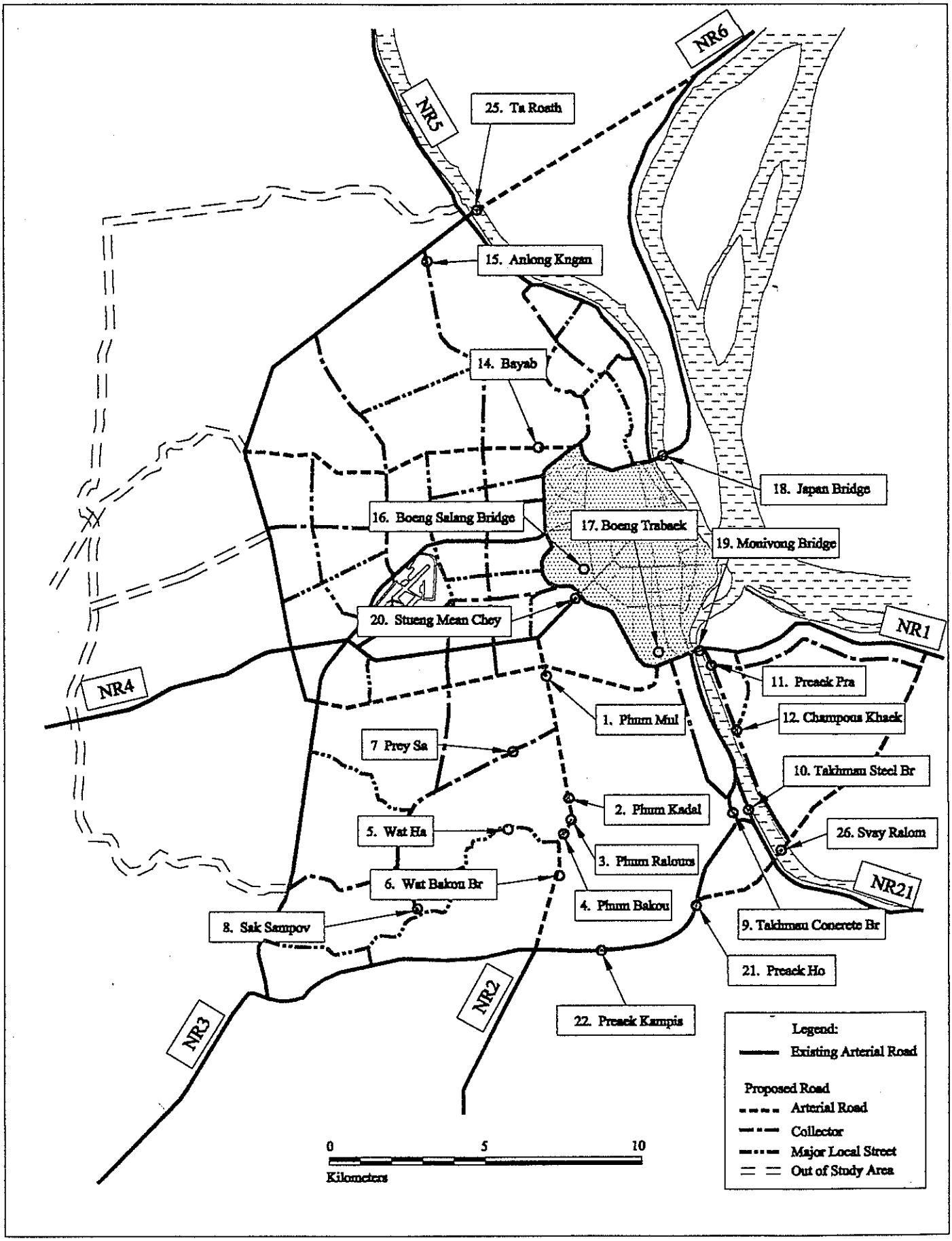
L13: Toul Kei Road

This road is to connect the Toll Road and the Southern New Trunk Road on the east side of the NR 3 for better flow of traffic. The entire section of about 1.5 km long is to be a new construction.

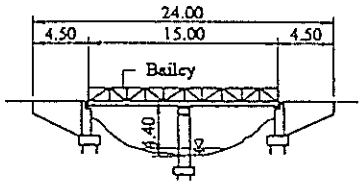
No. L14 Preah Ponlea Road

This project, like Project No. C10, is widening and improvement of the existing road to serve the traffic on the east bank of Bassac River. This project includes renewal of two small bridges. The length of the project road is 2.6 km.

A14.4 GENERAL VIEW OF PROPOSED BRIDGES



Location of Proposed Bridge Projects



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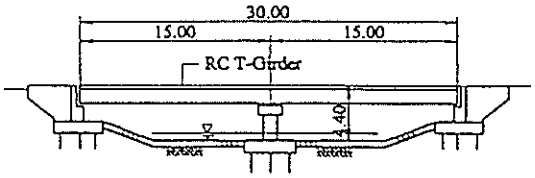
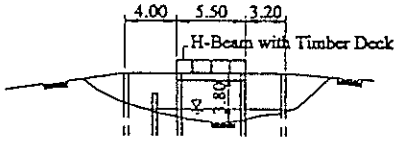


Proposed Bridge

Bridge No.01



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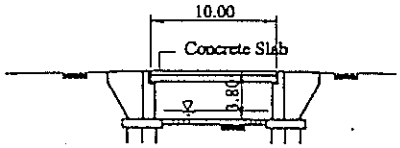
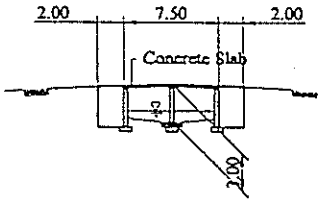


Proposed Bridge

Bridge No.02



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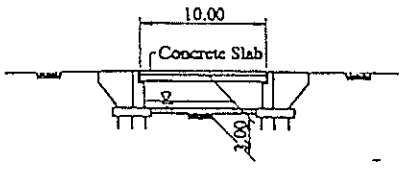
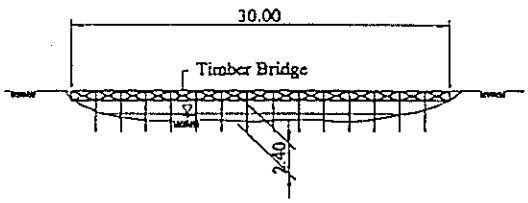


Proposed Bridge

Bridge No.03

Figure A5.1 General View of Proposed Project Bridges (1/7)



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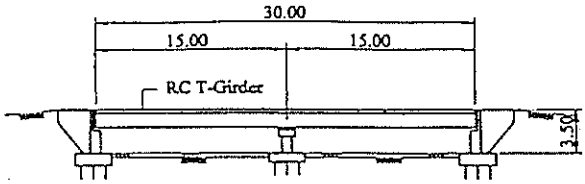
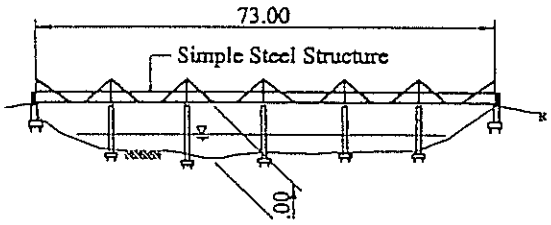


Proposed Bridge

Bridge No.04



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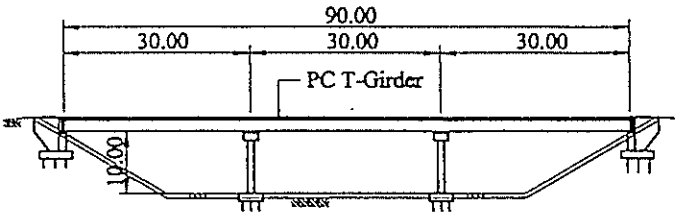
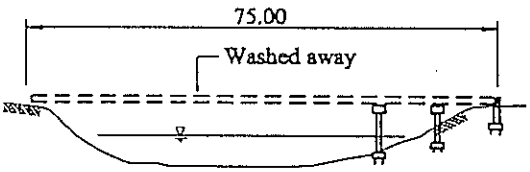


Proposed Bridge

Bridge No.05



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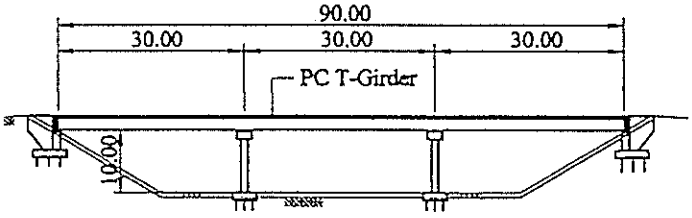
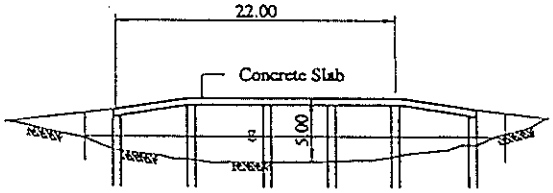
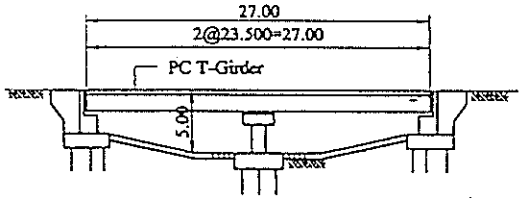


Proposed Bridge

Bridge No.06



Existing Bridge



Proposed Bridge

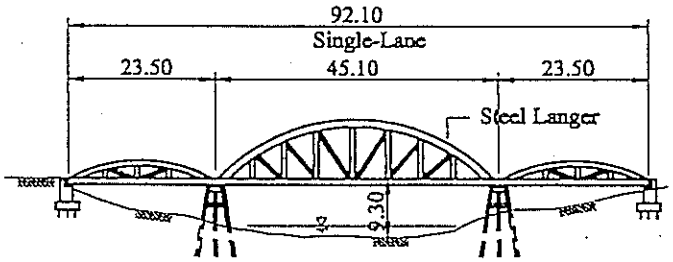
Bridge No.07

Figure A5.1 General View of Proposed Project Bridges (2/7)

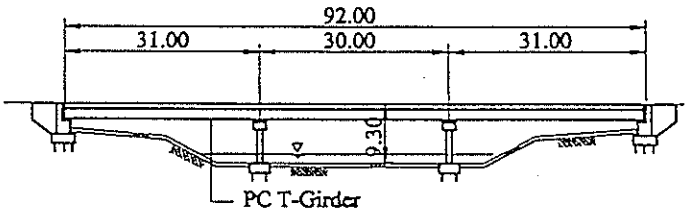
Existing Bridge

Proposed Bridge

Bridge No.08

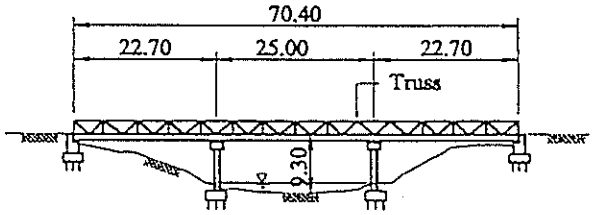


Existing Bridge

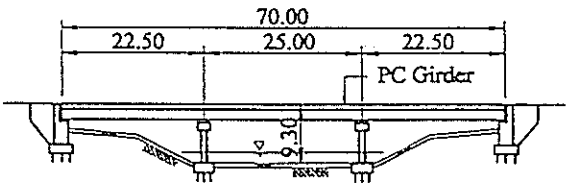


Proposed Bridge

Bridge No.09



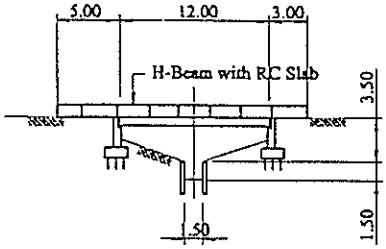
Existing Bridge



Proposed Bridge

Bridge No.10

Figure A5.1 General View of Proposed Project Bridges (3/7)



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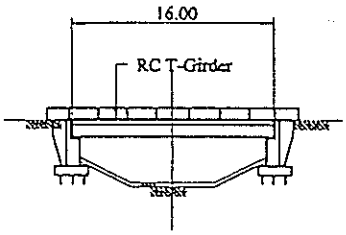
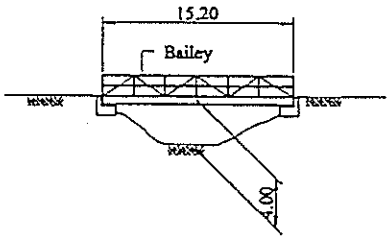


Proposed Bridge

Bridge No.11



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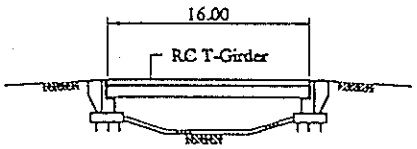
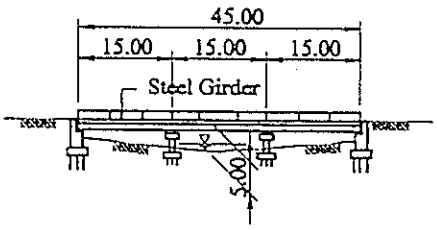


Proposed Bridge

Bridge No.12



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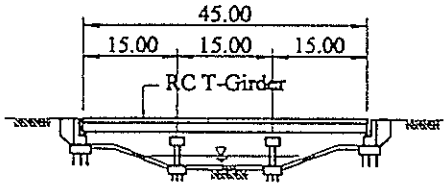
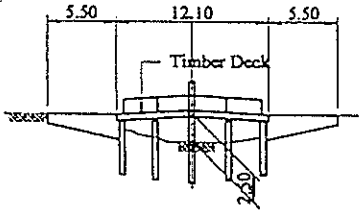


Proposed Bridge

Bridge No.13



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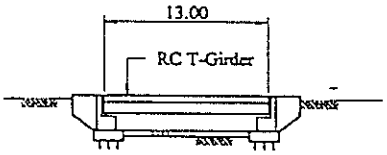
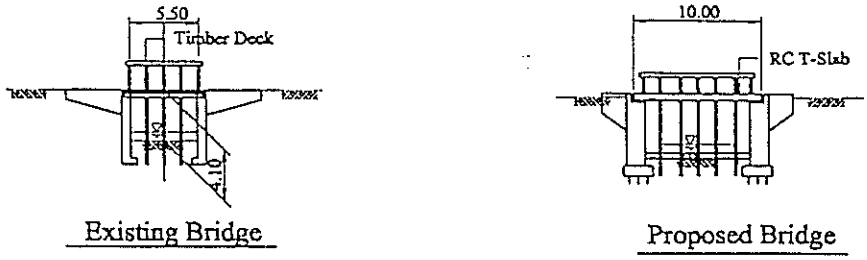


Proposed Bridge

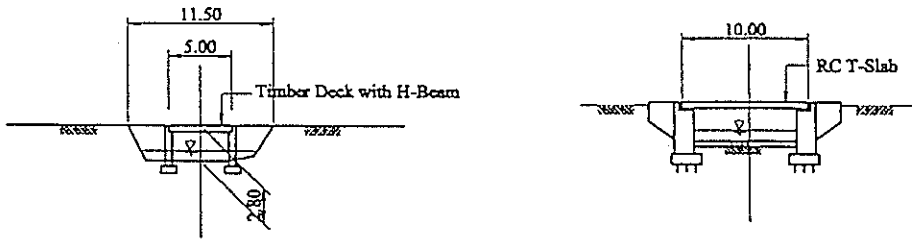
Bridge No.14

Figure A5.1 General View of Proposed Project Bridges (4/7)



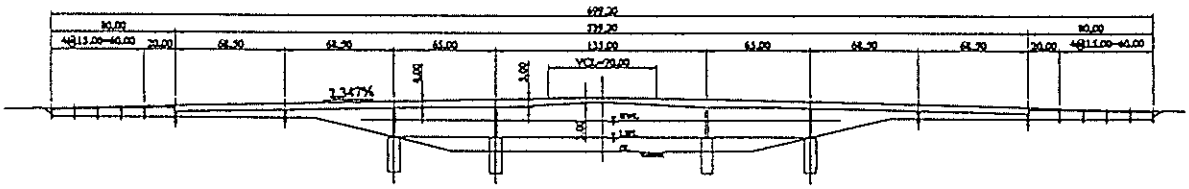
Existing Bridge　　Proposed Bridge

Bridge No.15



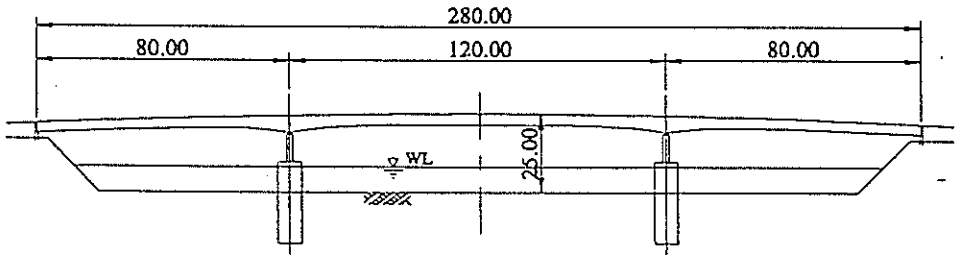
Existing Bridge　　Proposed Bridge

Bridge No.16



Existing Bridge　　Proposed Bridge

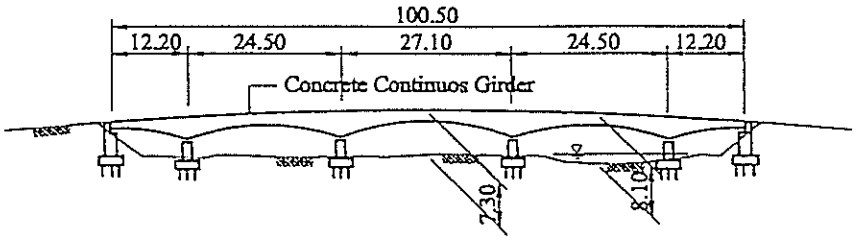
Bridge No.18



Existing Bridge　　Proposed Bridge

Bridge No.19

Figure A5.1 General View of Proposed Project Bridges (5/7)



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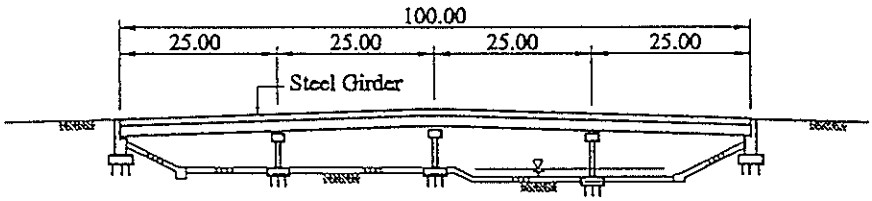
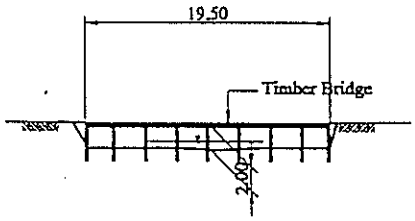
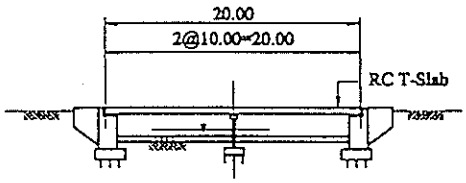


Proposed Bridge

Bridge No.20



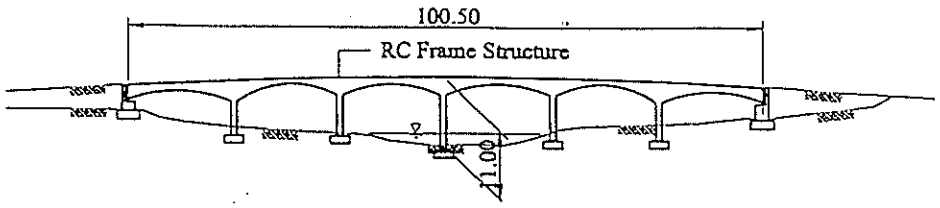
Existing Bridge



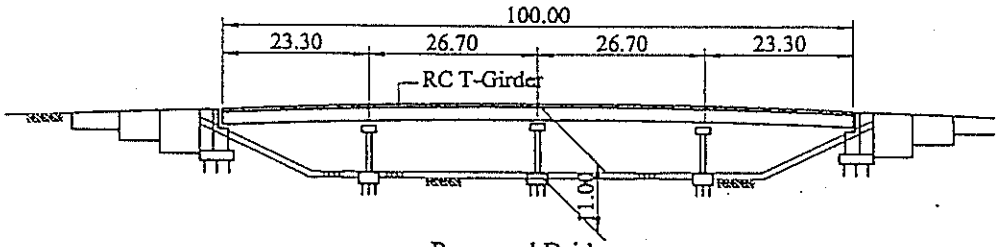
Proposed Bridge

Bridge No.17

Figure A5.1 General View of Proposed Project Bridges (6/7)

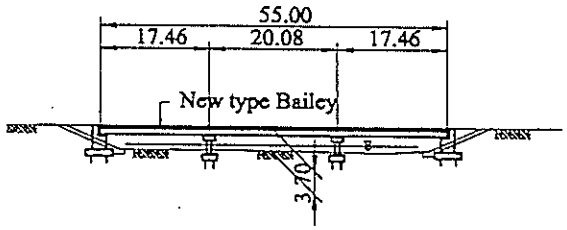


Existing Bridge

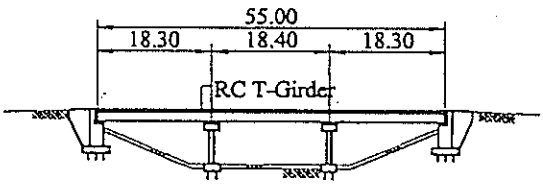


Proposed Bridge

Bridge No.22

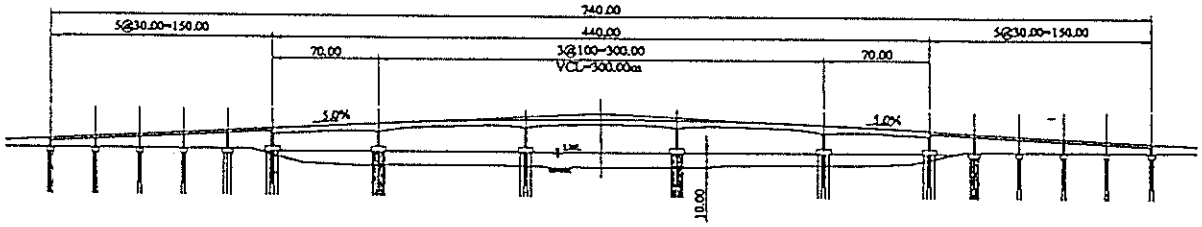


Existing Bridge



Proposed Bridge

Bridge No.23



Proposed Bridge

Bridge No.25

Bridge No. 26

Figure A5.1 General View of Proposed Project Bridges (7/7)