(3) Road Network

Road Network in Urbanized Area

The road network in the urbanized area is well developed with radial-circumferential type configuration consisting of the following roads:

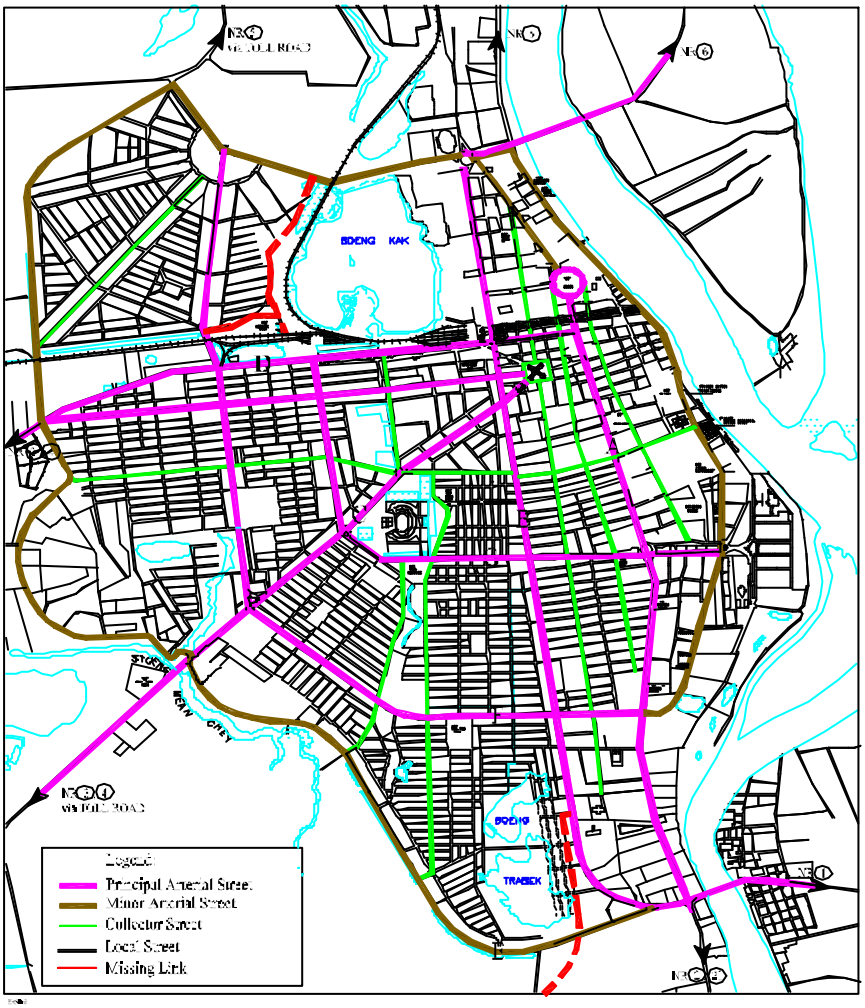
Road Length by Classification

Functional Classification	Total Length (km)	Composition by Condition			
		Good	Fair	Bad	Very Bad
Principal Arterials	27.2	10.9	4.8	5.0	6.5
Minor Arterials	26.8	4.8	4.6	7.2	10.2
Collectors	26.0	2.1	4.3	10.3	9.3
Local Streets	230.9	1.8	1.9	19.6	207.6
Total	310.9	19.6	15.6	42.1	233.6

Major Issues of Road Network in Urbanized Area

Major issues are as follows:

- There are two missing links to complete the road network: one in the north and the other in the south.
- Pavement condition is generally poor. In particular most of local streets are in very bad condition.
- Poor condition of local streets causes the excess concentration of traffic on the arterials, making the road network inefficient as a whole.
- Some road sections are frequently inundated with a depth of about 50cm.



Present Road Network in Urbanized Area

Section	Hour	LoS	
		N-bound/ E-bound	S-bound/ W-bound
A	AM Peak	C	C
	Noon	C	C
	PM Peak	C	D
B	AM Peak	D	C
	Noon	C	C
	PM Peak	D	D
C	AM Peak	D	D
	Noon	C	D
	PM Peak	D	D
D	AM Peak	C	C
	Noon	B	B
	PM Peak	C	C
E	AM Peak	D	D
	Noon	C	C
	PM Peak	D	D
F	AM Peak	D	C
	Noon	C	C
	PM Peak	C	D
G	AM Peak	D	D
	Noon	C	C
	PM Peak	D	D

Average Speed
LoS B 31-40 km/hr
C 21-31 km/hr
D 14-21 km/hr

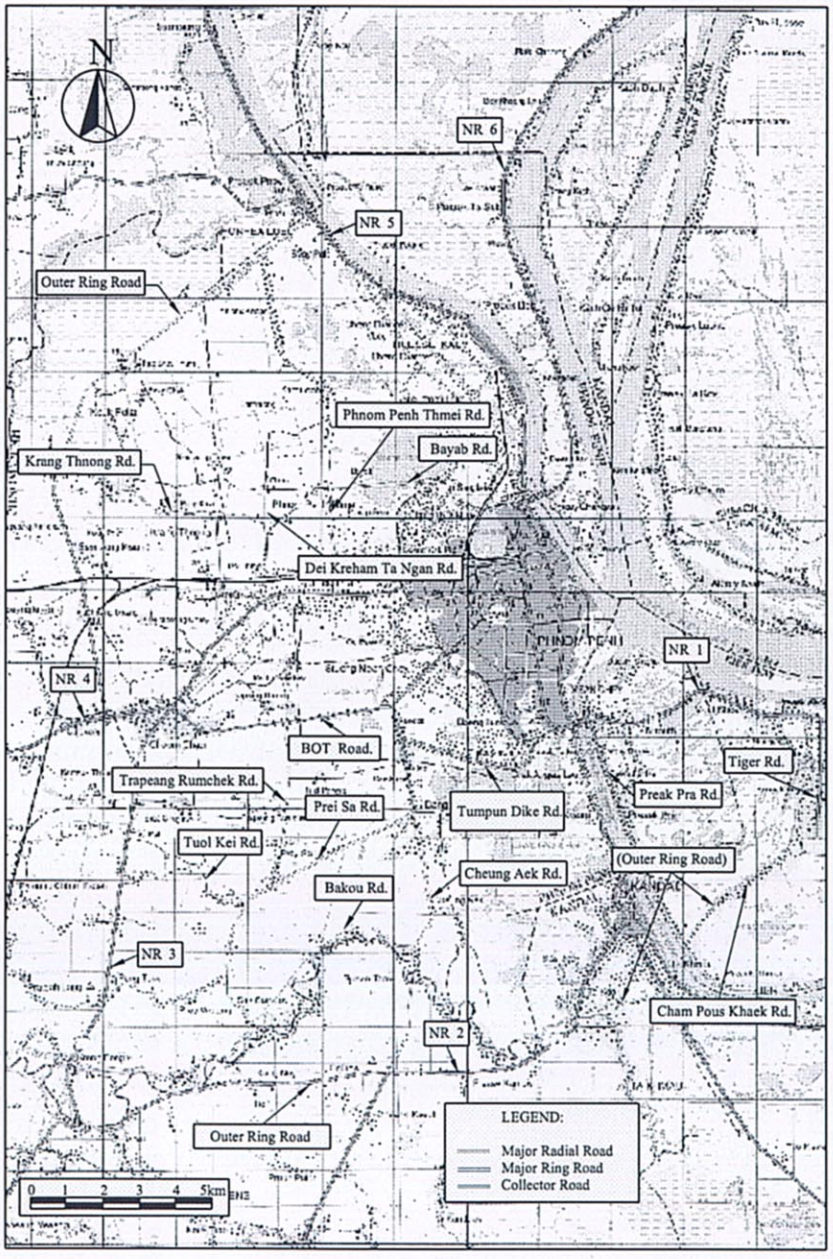
Level of Service (LoS)

Road Network in Suburban Area

The road network in the suburban area is formed basically in radial-circumferential type though it is incomplete with many missing segments. Total road length is about 480 km. All major National Roads are connected to Phnom Penh, except for NR7 that branches off from NR6 at Skun, a city located about 55 km northeast of Phnom Penh. National Roads are functioning as principal arterials mainly in the radial directions and partially forming a part of circumferential road, while Municipal Roads are functioning as collectors.

Major Issues of Road Network in Suburban Area

- The road network is incomplete. Even arterial system is not complete with many missing segments.
- Due to lack of alternative or collector/ distributor roads, arterials are congested.
- Access to strategic development areas is insufficient so that the land development may not be realized.
- Road condition is generally poor.
- Many bridges have been destroyed or severely deteriorated interrupting the traffic.



Road Network in Suburban Area

Road in Bad Condition

Disconnected Road

Development in Suburban Area

Destroyed Bridge

(4) Public Transport

Present Public Transport System

Various modes of public transport are currently operated in the Study Area.

- Buses and tax-buses provide mainly inter-city services. Bus terminals are located at the Central Market. In addition, there are four terminals for taxi-buses in the CBD, mostly located near markets. Vans, pickups and sedans are used for taxi-buses. In principle, taxi-buses have specific routes but sometimes they assume the function of hired taxis according to the request of passengers.
- 82 taxis are operated in the Study Area and these stand by at the airport waiting for passengers. There is no ordinary taxis operating in the Study Area.
- Motodops are the most common public transport mode in the Study Area. More than 6,000 motodops are currently in operation and provide door-to-door services.
- Cyclos are also a common public transport mode but the number of cyclos has drastically decreased from more than 10,000 in 1980s to 1,200 in recent years due to the slow speed and the friction with other vehicles on roads.
- Motorumoks are operated in the suburban area, used mainly by factory workers to commute and by farmers to transport products to the market.
- Cycle-rumoks are operated in the southern outskirts of the metropolitan area.
- River transport is operated on 7 routes: 3 intra-city and 4 inter-city services.
- Railways are operated by Royal Railways of Cambodia on 650-km a railway network consisting of 2 routes in the country, but not used for urban transport within the Study Area.
- Air transport is operated on 9 international routes and 7 domestic routes from/to Pochentong International Airport. Available access to the airport is only airport taxi and private transport.

The estimated number of workers who are directly involved in public transport services excluding river transport, railways and sea transport is 27,400 representing about 6.5% of the 423,700 workers in the Study Area.


Taxi Bus


Motodop

Cyclo

Motorumok

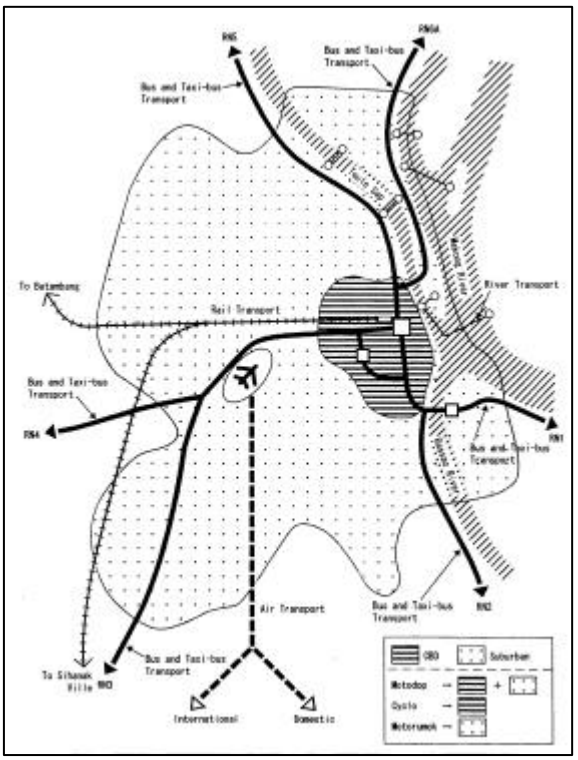
Characteristics of Public Transport

Present public transport system in the Study Area is characterized as follows:

- The para-transit such as motodop, cyclo and motorumok is the predominant mode.
- There is no city bus service except the city bus operation introduced as a public experiment in the Study and continued by the Municipality of Phnom Penh for one month each.
- There is no taxi service other than airport taxis.

Characteristics of Para-Transit

	Motodop	Cyclo	Motorumok
Number of fleet	6,098	1,203	227
Average number of trips per day	9.5	8.7	5.2
Average number of passengers per trip	1.4	1.6	7.0
Average fare per passenger per trip (Riel)	808	755	945
Average trip length (km)	4.1	1.8	20.1



Present Public Transport Network

Major Issues of Public Transport

Overall

- Transport system is dominated by private transport modes, which result in higher risk of accident and less reliability.

Bus/Taxi-bus

- Only one inter-city bus company has an off-road terminal. And others use the road as terminals are causing traffic disturbance.
- Most of bus and taxi-bus terminals located at strategic points of urban transport, such as markets, are aggravating the traffic congestion by merging of large number of busses/taxi-buses.

Taxi

- There is no city taxi.
- Those passengers with heavy baggage, urgent business and tourists who are not familiar with location are often experience inconvenience.

Para-transit

- Motodops are a primary contributor of the traffic problems on the roads, especially arterials.
- Cyclos cause a significant disturbance to the traffic flow due to their slow speed.
- The operation of motorumoks is dangerous, especially when they run on the narrow and/or heavily trafficked roads.

River

- The river transport, an environmentally friendly mode, is utilized in the areas where land transport is not served. But facilities are deteriorated.

Railway

- Utilization of the existing railway is extremely low despite the approximately 640 km railway network in the country.

Air Transport

- Access to/from the Pochentong International Airport is served only by airport taxi and private mode. Access to the airport will have to be strengthened to meet the increasing demand.

(5) Traffic Management

Characteristics of Traffic Flow

Mixed Traffic

Various types of vehicles, including passenger cars, trucks, buses, motorcycles, cyclos, bicycles and even pedestrians, create a highly mixed traffic. Such a highly mixed traffic causes a significant decrease of road capacity.

Driving Behavior

Many road users, especially motorcyclists, drive in a poor and undisciplined manners such as sudden lane changing, no "give way" to pedestrians crossing the road, entry to the opposite directional lane before and after left turning, entry to the intersection when the downstream exit is choked with vehicles creating gridlock situation, etc.

Pedestrian Behavior

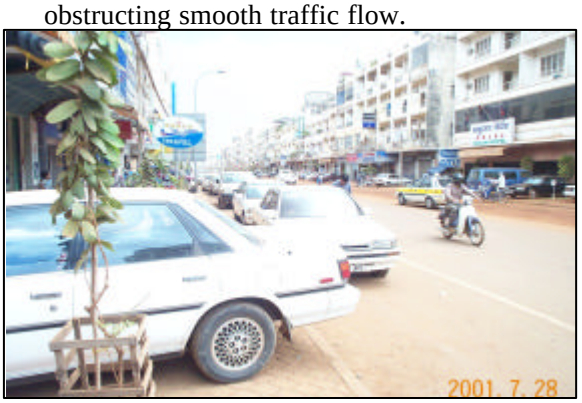
Pedestrians often enter the carriageway not only to cross the road but also to walk along the road when the sidewalk is in muddy condition or is blocked by parked vehicles.

Traffic Flow at Intersection

The principle of the 4-wheelers running inside lane and others running on the outside lane is not followed at intersections resulting in disordered traffic flow.

On-street/on-sidewalk Parking

Roadside parking is a common practice found on most streets. In addition, sidewalks are sometimes used for parking. Such parking is obstructing smooth traffic flow.



On-street/on-sidewalk Parking

Present Traffic Control Measures

- Signal control at 21 intersections.
- One-way operation of several road sections.
- No left turn at several intersections.
- Ban of motorcycles/cyclos at several road sections.
- No parking on specific road sections.
- No entry to the city center for heavy vehicles during daytime.

Issues Related to Traffic Management

Disordered Flow

Due to mixture of different types of vehicles and improper driving behavior, the traffic flow is disordered resulting in a significant decrease of road capacity.

Limited Capacity of Roundabout

The capacity of roundabout is limited especially where the radius is small, thus the traffic volume is approaching the capacity.

Congested Roundabout

Problems on Present Signal System

Some intersections are signalized, although there are some problems, such as signal parameters not corresponding to the traffic demand, no "all red" phase, limited phase given for pedestrian crossing, no exclusive left-turn phase, etc.

Many Intersections Required to be Signalized

Lack of Proper Traffic Control Measures

Traffic control measures to maximize the operational efficiency are lacking, such as one-way, no entry for specific vehicles, segregation of motorcycles/cyclos, no left-turn, etc.

Necessity of On-street Parking Control

Traffic Accidents

Most of traffic accidents are caused by mixture of different types of vehicles, improper drivers' and/or pedestrians' behaviors, and complicated movements at intersections, etc.

Insufficient Considerations for Pedestrians

Improvement of sidewalk, provision of marking for pedestrian crossing, etc. are required.

Lack of Traffic Safety Education

Lack of Traffic Rule Enforcement

(6) Legislation and Management

Transport Legislation

- Traffic law was promulgated, but sub-decrees, which provide details of enforcement, such as compulsory insurance, are not announced.
- New regulation including rules of services, rules on roads, rules on government involvement, are required particularly for the introduction of new transport systems and inviting private participation.
- There are no detailed and reliable statistics available on the vehicles and drivers licenses because computerized network systems are not yet introduced.

Institutional Structure

The present institutional structures suffer from several malfunctions because of improper organizational structures, unclear responsibilities of management, insufficient staff with technical skill and insufficient budget allocation. These malfunctions are the required to be urgently improved to in order to implement projects and measures on transportation.

Human Resource

The capable administrative and technical staffs are one of the key elements for successful implementation of projects. On-the job training is encouraged through all stages of project cycles including planning, engineering, construction, maintenance, and monitoring.

Transport Operation

The problems on the road public transport operation are summarized as:

- Increasing dominance of non-regulated mixed traffic of different modes and different travel speeds represented by motodop, motorumok and cyclo on the urban streets.
- No intra-urban public bus service catering for the citizens as the major mass transit system suitable for the Study Area.
- Management and operation of road public transport mostly by private sector under loose control of the Government.

Mixed Traffic Operated by Private Sector

Financing

- Finance for the development of transport infrastructure is depending upon the foreign finance, mainly on the Official Development Assistance (ODA) because domestic finance resource base is weak and vulnerable, and investment climate for foreign private investor has not yet been established.
- The size of domestic financing in the government budget is getting bigger due to introduction of VAT, however domestic finances are still not enough to cope with the demand.
- External grant assistance may not be able to meet the requirement of transport sector development. External input may be required.
- Road sector has potential to produce own financing resources such as tax on gasoline, on-road parking fee, vehicle registration fee and fines, etc.
- The Government should improve the private foreign investment promotion systems and induce the private foreign investors to participate in the urban transport infrastructure development.

Private Land Development