

## **CHAPTER 14**

### **ROAD DEVELOPMENT PLAN**

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#### 14.1 PLANNING CONCEPT

##### 14.1.1 Present Road Network Problems

The Study Area is divided into two (2) areas - urbanized area and suburban area - from the point of view of urban development level and road network configuration. The urbanized area is the area surrounded by the Inner Ring Road with high-level urban activities and densely developed road network, while the suburban area is outside the Inner Ring Road and enclosed by the Outer Ring Road with random land development and sparse road network. The present road networks in the two areas are separately assessed because of the following different network characteristics.

##### (1) Urbanized Area

- **Road Network Configuration and Functional Hierarchy**  
The road network in the area is well developed with grid-type configuration and functional hierarchy system composed of arterial, collector and local streets.
- **Poor Pavement Condition and Traffic Concentration**  
Although the network is well arranged, the pavement condition of most sections of road is very poor; 32 % of arterial roads, 61 % of collector and more than 80 % of local streets are evaluated as bad or very bad. Due to this fact, traffic is concentrated only on roads with fair and good pavement condition creating excess concentration of traffic resulting in traffic congestion.
- **Disorderly and Mixed Traffic Flow**  
The motorcycle (private motorcycle and motodop) shares 80 % of the total traffic volume, followed by only 11 % for cars. This high percentage of slow-moving 2-wheel vehicles considerably disturbs the flow of fast-moving vehicles because of different running speed, resulting in the decrease of level service in traffic flow condition. The driving manner of motorcycles also aggravates the disorderly traffic flow.
- **Decrease in Traffic Capacity due to On-Street Parking**  
The on-street parking on both sides of roads, even on major arterial roads, narrows down the vehicle running spaces, resulting in a decrease in the traffic capacity of roads.
- **Inadequate Design and Signalization of At-grade Intersections**  
At-grade intersections are not channellized and provide no lane for left-turning vehicles, and generally the intersections are not signalized.

##### (2) Suburban Area

- **Incomplete Road Network**  
National roads that form the radial arterial system in the area are directly connected with the urbanized area although some sections are unpaved. The Inner and Outer Ring Roads do not effectively serve to distribute traffic entering to the urban center because of poor capacity and bad pavement condition. Collectors and local roads do not exist except small unpaved farm roads.
- **Traffic Congestion on Arterial Roads**  
Because of the lack of collector and local roads, most sections of arterial national roads are congested, particularly at the entrance to the urbanized area.

- **Lack of Access to Strategic Development Areas**  
Development areas are proposed on the west side of the suburban area between the Inner Ring and Outer Ring Roads. Access to these areas are not provided yet.
- **Disorderly Progress of Land Development**  
Disorderly and random land development are observed along the existing roads. Land development should be strictly controlled. Implementation of a road development plan integrated with a land use development plan is urgently required.

#### **14.1.2 Road Development Plan Integrated with Land Use Plan**

Given the future development scheme as described in Chapter 10, a basic framework for the future transport system was planned considering the following aspects:

- To support the future development toward the west, the road network and other transport facilities need to be strengthened in the east-west direction.
- The present pattern of traffic is such that the majority of the traffic has origin/destination in the present urbanized area, as indicated by the fact that the existing arterial roads are predominantly in the radial direction.
- To prevent unnecessary traffic entering the present urbanized area, circular roads need to be strengthened.

Figure 14.1-1 schematically illustrates the concept of transport system integrating the land development plans. (The roman numerals in the figure correspond to the numerals of the following explanation). This plan also aims at alleviating traffic congestion occurring on the national roads on the outskirts of the urbanized area. The main features of this plan are as follows:

- (i) Two new trunk roads towards the west of the present urbanized area are proposed; one on the north side of the existing railway (extension of Bayab Road) and another on the south side of the existing toll road which runs to the south of the airport. These two new trunk roads are connected to the western section of the Outer Ring Road and form a circular route approximately surrounding the future new city. The Northern New Trunk Road is proposed to be given a possibility of further extension towards the west to provide access to the future new international airport and the candidate location of the new city.
- (ii) The Inner Ring Road is proposed to be improved as the distributor route for the traffic that does not need to enter the present urbanized area.
- (iii) One road in the north-south direction is proposed midway between the existing Inner Ring Road and the airport (Phnom Penh Thmei). This road connects the Northern New Trunk Road and the Southern New Trunk Road, and forms a new circular route immediately west of the Inner Ring Road where rapid urbanization is taking place. This road further extends to the north and reaches to the future Outer Ring Road in the west of its intersection with NR 5. With this connection, this road is expected to function as the bypass for the road described in (vi).
- (iv) Towards the south, the existing road passing through the village of Cheung Aek is proposed to be improved and connected to NR 2 at its intersection with the future Outer Ring Road. This road is to directly lead the traffic on NR 2 from/to south to the urbanized area via the Southern New Trunk Road and Stueng Mean Chey Bridge (proposed to be widened), and reduce the traffic on NR 2 at the intersection in the west of Monivong Bridge.

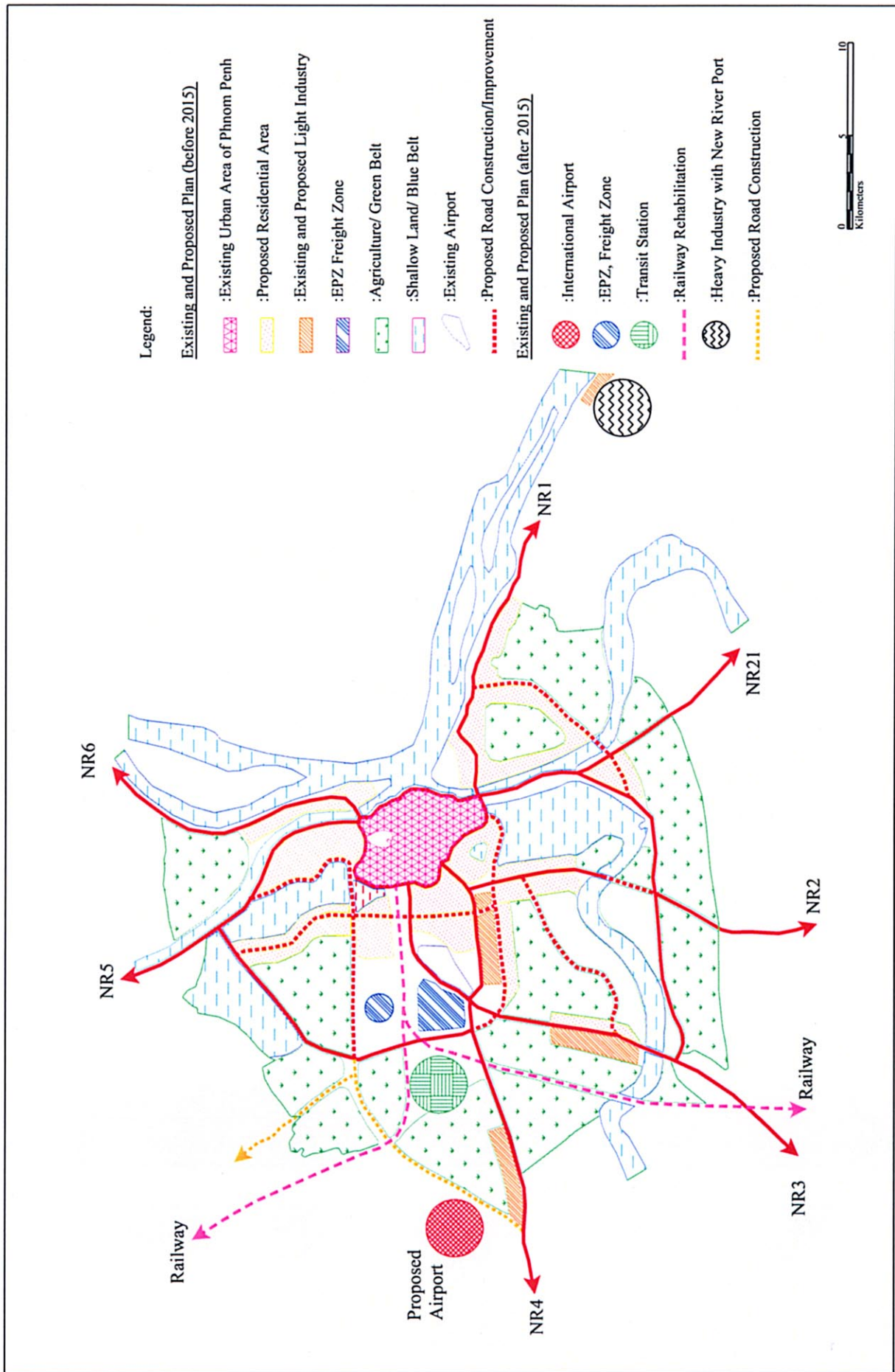


Figure 14.1-1 Land Use Plan and Transport Intergrated Plan

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- (v) Towards the southwest, the existing Prey Sa Road is proposed to be strengthened to shoulder the traffic on NR 3 from/to south west Provinces, and reduce the traffic congestion at the intersection of NR 3 and NR 4 to the west of the present airport. This road is also expected to upgrade the quality of life of the residents in the south western suburbs.
- (vi) In the north, the existing road passing the western periphery of Ruessei Kaev Commune is proposed to be improved to share the traffic on NR 5 and reduce the congestion in the northern outskirts of the present urbanized area.

### **14.1.3 Basic Direction of Road Network Development**

In line with the urban transport planning policy and conceptual road development plan integrated with the land use plan, road network development is planned in the basic direction as described below.

#### **(1) Urbanized Area**

- Full utilization of existing facilities  
Since the urban planning policy emphasizes the preservation of the historic city with the urban environment and tourism heritage in the urbanized area, new physical improvement of road facilities shall be minimized by fully utilizing the existing facilities.
- Urgent need of pavement improvement  
The pavement of local streets as well as arterial and collector streets is in urgent need of improvement to let the vehicles fully utilize these streets. Improved pavement is expected not only to distribute local traffic on local streets, thus relieving traffic congestion on arterial streets but also to improve the urban environment.
- Minimum/selected implementation of new construction  
Although the present road network is well developed, there exist certain missing links of important roads, which should be newly provided as minimum physical improvement measures.

#### **(2) Suburban Area**

- Implementation of functional hierarchy road network  
The collector and local road system to support the arterial roads shall be developed in the entire suburban area with emphasis on the planned development area.
- Improvement of congested national roads  
Six (6) national roads are very congested because of concentration of traffic, and shall be improved by widening the existing roads or providing alternative roads.
- Reconstruction of existing bridges  
There exist many deteriorated or collapsed bridges along existing farm roads, which are not usable, particularly during rainy seasons. The urgent reconstruction of these bridges shall be undertaken.

## **14.2 PROPOSED ROAD NETWORK**

### **14.2.1 Procedure of Formulation**

The proposed road network is formulated following a procedure shown in Figure 14.2-1, with four (4) steps.

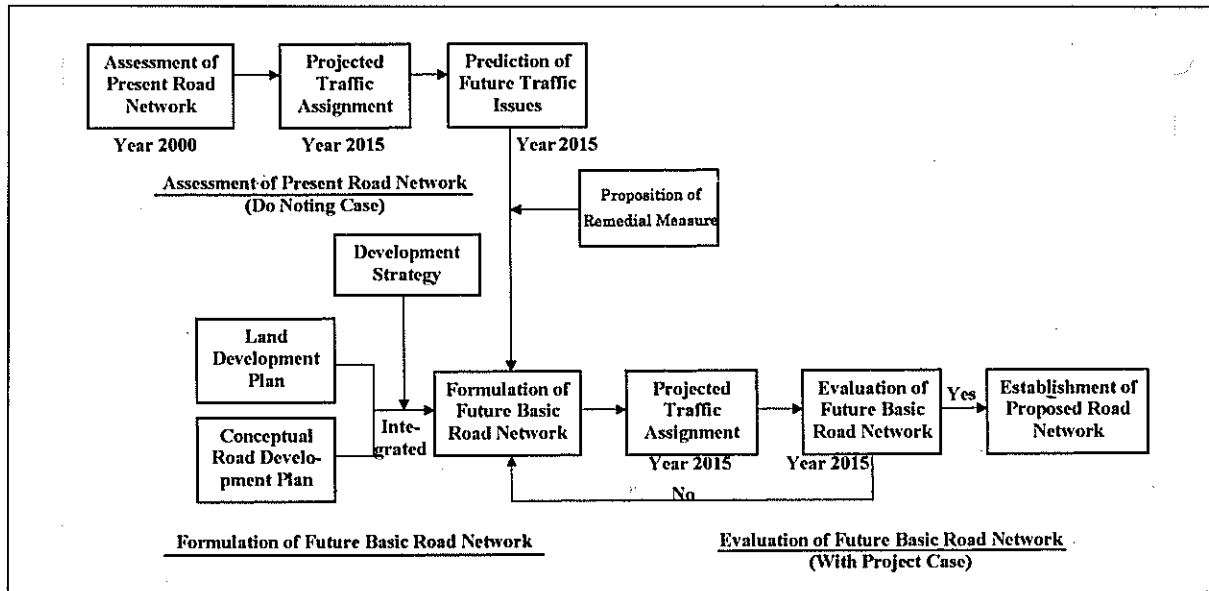


Figure 14.2-1 Procedure of Formulation of Proposed Road Network

**First Step: Assessment of Present Road Network**

The future traffic issues are identified by estimating projected traffic assignment on the present road network. Remedial measures are proposed based on these identified issues.

**Second Step: Formulation of Future Basic Road Network**

The future road network is formulated based on the approved land development plan and the conceptual road development plan. The remedial measures proposed in the First Step are incorporated.

**Third Step: Evaluation of Future Basic Road Network**

The traffic assignment on future road network is examined to evaluate the traffic efficiency of the said network. If the result of the evaluation shows that the proposed network does not satisfy the requirements, the proposed network is reviewed and necessary revision, such as adjustment in number of lanes and addition/reduction of links, is made. Then, the traffic assignment is carried out on the revised road network. This process is repeated until the requirements are satisfied.

**Fourth Step: Establishment of Proposed Road Network**

When the result of the evaluation shows that the conditions required for the network is satisfied, the proposed road network is established.

**14.2.2 Road Network in Urbanized Area**

The proposed functional road network is shown in Figure 14.2-2. As the road network has already been well formed, no major additional roads were proposed, except two missing short sections to be constructed: One is located in the north running parallel to Kim Il Sung Blvd and the other is located in the south to connect Monivong Blvd and Inner Ring Road/ Tumpum Dike Road. Explanation of these missing links is given in Section 14.3. Road length by functional classification is shown in Table 14.2-1.

Table 14.2-1 Road Length by Functional Classification (Urbanized Area)

Classification	Road Length (km)	Road Density (km/km <sup>2</sup> )
Arterial Street	54.0	2.00
Collector Street	26.0	0.96
Local Street	230.9	0.92
Total	310.9	8.55

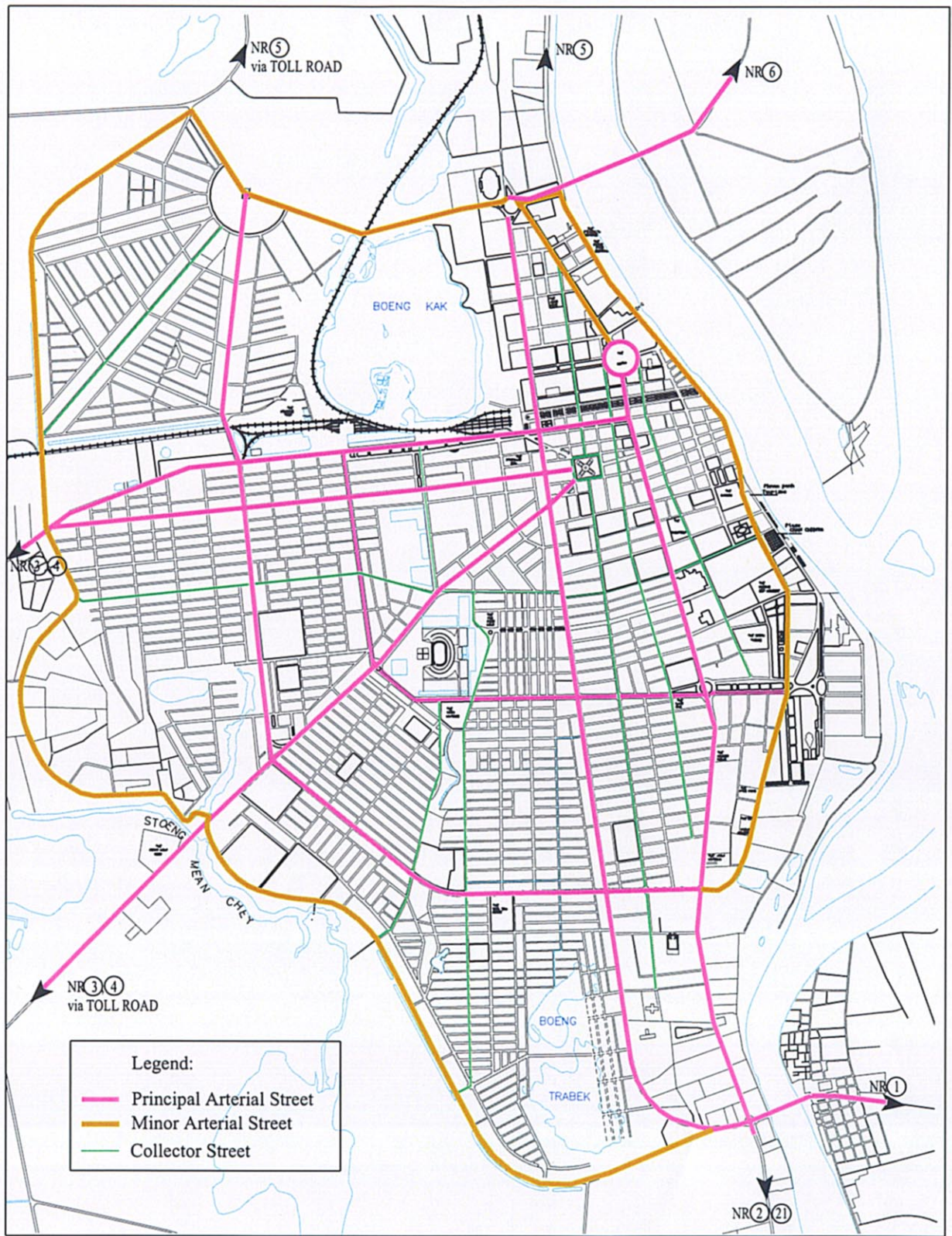


Figure 14.2-2 Proposed Functional Road Network in Urbanized Area

### 14.2.3 Road Network in Suburban Area

Based on the road network development policies and the concept to integrate the land use plan and the transport system, the future basic road network system was developed as described in Chapter 12. Components of the future basic road network are classified based on their purpose and target, as follows. (The locations of roads which appear in the following explanation are shown in Figure 14.3-1.)

- **Congestion Alleviation Type**  
One of the main targets of the Master Plan is to alleviate existing and expected traffic congestion. Bypasses and detour routes needed to reduce the congestion are incorporated in the proposed network. An example of this type of roads is Project No. A13 “Cheung Aek Bypass”. This road is expected to shoulder the traffic on NR 2 and reduce congestion on it.
- **Network Formation Type**  
This type of roads is to form a functionally balanced road network. An example of this type is Project No. C7 “Prey Sa Road” which traverses and is to serve the southwestern suburbs.
- **Development Promotion Type**  
Still another type of road is required to promote the planned development. Examples of this type are Project No. A9 “Southern New Trunk Road”, and Project No. C4 “Krang Thnong - Dei Thmei Road”.

The proposed functional road network, which was developed based on the previous discussions, is shown in Figure 14.2-3. (Target of each road is shown in Table 14.3-2 on page 14-13). Road length by functional classification is shown in Table 14.2-2. (The local roads shown in Figure 14.2-3 and Table 14.2-2 are major local roads where 4-wheel vehicles can travel over a substantial length. Accordingly, the total length of the local road shown here does not agree with the figure indicated in Chapter 5.)

Table 14.2-2 Road Length by Functional Classification (Suburban Area)

Classification	Road Length (km)	Road Density (km/km <sup>2</sup> )
Arterial Road	101.6	0.29
Collector Road	70.1	0.20
Local Road	59.1	0.17
Total	227.8	0.64

#### *Standard Cross Section*

Typical standard cross-sections to be adopted for roads in the suburban area are presented in Figure 14.2-4. A lane width of 3.5m for arterial roads is commonly used in many Asian countries including Thailand, Indonesia and Japan. Narrower lane widths are used for lower-class roads.



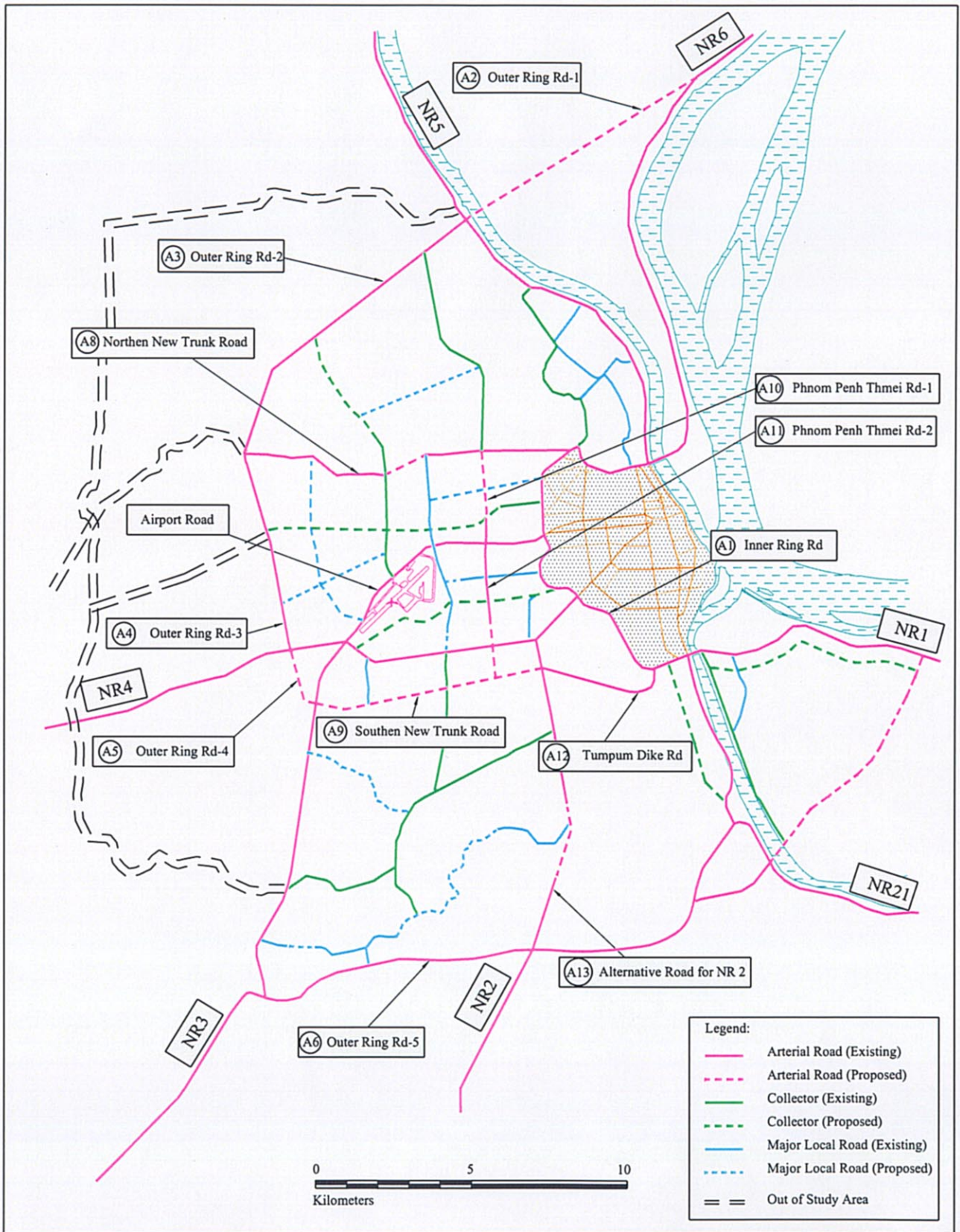


Figure 14.2-3 Proposed Functional Road Network (Suburban Area)

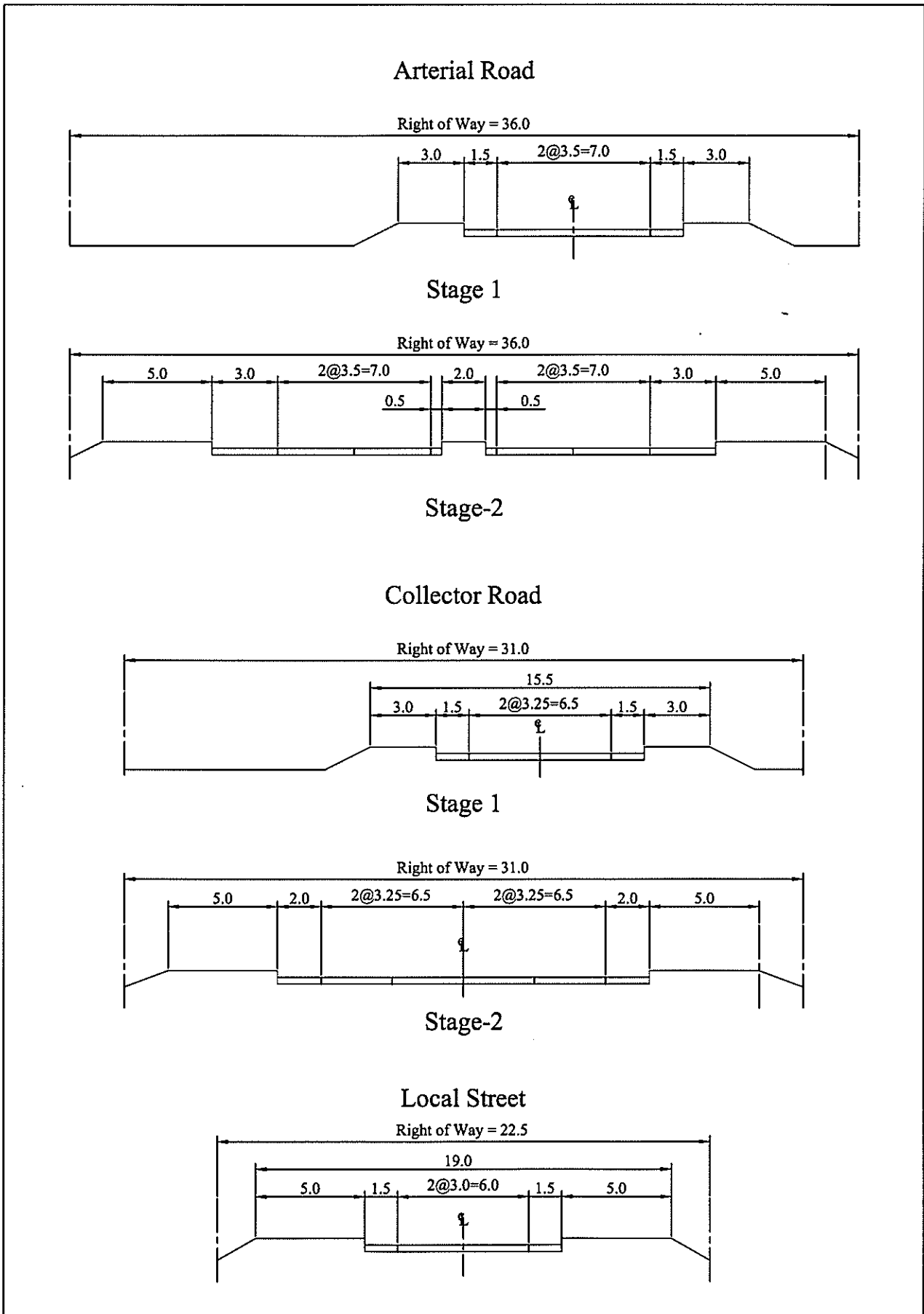


Figure 14.2-4 Standard Cross-Section in Suburban Area