

## 14.3 PROPOSED ROAD PROJECTS

### 14.3.1 Urbanized Area

As has been repeatedly stated, the most urgent problem in the urban road network is the poor pavement condition. In addition, the construction of two (2) missing links is proposed. Figure 14.3-1 shows the locations of the proposed urban road projects other than pavement improvement.

#### (1) Improvement of Pavement

Table 14.3-1 shows the road length for which the pavement is proposed for improvement. For the pavement in bad condition, the pavement should be reconstructed or newly constructed, while pavement in fair condition should be resurfaced (overlaid).

#### (2) Construction of Missing Links

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

- (i) Connection between Tuol Kork Residential Area and Russian Blvd.
- (ii) Shortcut Between Preah Monivong Blvd and Inner Ring Road

Descriptions of these projects are given in Appendix 14-1.

#### (3) Improvement of Intersections

Among the irregular-shaped intersections, two (2) intersections are proposed for improvement, as presented in Table 14.3-1:

- (i) Intersection of Charles de Gaulle Blvd. with Preah Sihanouk Blvd.
- (ii) Intersection of Samdach Monireth Blvd. with Inner Ring Road

Descriptions of these projects are given in Appendix 14-2.

Table 14.3-1 List of Proposed Road Project (Urbanized Area)

Project No	Project Name	Present Condition	Improvement Type	Length (km)
U1	Pavement Improvement of Arterial and Collector	Fair (Arterial)	Resurfacing (Overlay)	9.4
		Bad	Reconstruction	48.5
Sub Total				57.9
U2	Pavement Improvement of Local Streets	Bad	New Construction /Reconstruction	227.2
Sub Total				285.1
U3	Construction of Missing Link			
	Tuol Kouk-Russian Blvd	1 lane, unpaved	4 lane, paved	2.4
	Monivong Blvd-Inner Ring Road	0.5 lane, unpaved	4 lane, paved	1.0
Sub Total				3.4
U4	Improvement of Intersection			
	Charles de Gaulle/ Preah Sihanouk	Eccentric rotary island	Shift rotary island	-
	Samdach Monireth/ Inner Ring Road	Staggered intersection	Re-alignment	-
Sub total				-

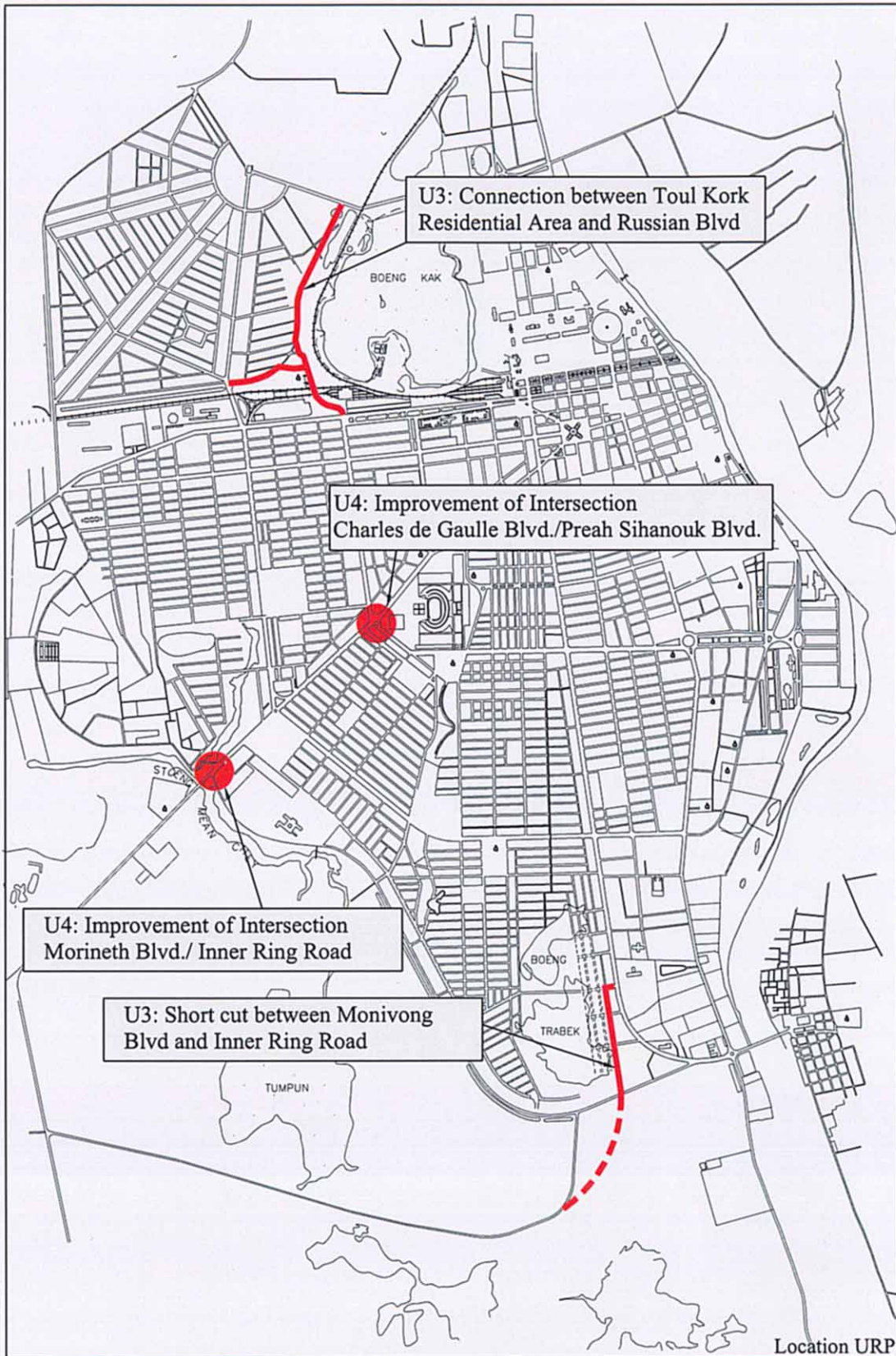


Figure 14.3-1 Location of Proposed Urban Road Project

### **14.3.2 Suburban Area**

In contrast to the urban road network, suburban road network is undeveloped and incomplete, and cannot support the present daily socioeconomic activities and the future development. To solve the problems of the suburban road network, a new network was proposed in Section 14.2. Based on the proposed road network, thirty-eight (38) projects are proposed. Table 14.3-2 shows the list of the proposed suburban road projects.

Fundamentally, the number of lanes of each road was selected based on the functional class of the road; 4 lanes for arterial and collector roads, and 2 lanes for local roads. However, where the forecasted traffic volume does not warrant 4 lanes, tentative 2-lane construction is proposed. On the contrary, 4-lane construction is proposed for a local road where the traffic volume is forecasted to exceed the capacity of 2-lane road. Brief descriptions of the proposed projects are given in Appendix 14-3.

### **14.3.3 Bridge Project**

There are 30 bridges in the Study Area. As described in Appendix 5-4, these bridges, except 6 bridges on NR 6, are either damaged or congested. Accordingly, 24 bridges need rehabilitation or widening. In addition, new construction of 2 bridges on the Outer Ring Road is necessary. Therefore, 26 bridges in total, are proposed for rehabilitation, improvement, widening and new construction. Table 14.3-4 shows the list of the bridges to be rehabilitated/improved/widened. Figure 14.3-2 shows the locations of these bridges. No. U1 (Japan Br.) and No. U2 (Monivong Br.) are two major bridges serving the traffic which cross Tonle Sap and Bassac Rivers. No. U3 (Stueng Mean Chey Br) is located near the intersection of Charles de Gaulle/ Preah Monireth Blvd and Inner Ring Road, and carries heavy traffic entering from/ going out to the southwestern side of the city. The present traffic volumes on these bridges are in the vicinity of the traffic capacities of these bridges.

Bridges No. 1 to 5, 7, 8,14 and 15 are small bridges, but are located on the arterial and collector roads serving remote villages. Present condition and problems of the bridges are given in Appendix 5-4.

Bridges U1 to U3 are proposed to be widened to ease the traffic congestion. It is most practical and efficient that a new bridge with 2lane width be constructed along each of these bridges. By introducing one-way regulation on the existing and new bridge (the two bridges in opposing direction), the capacity is expected to become approximately four (4) times of that of the existing bridge alone. (Two bridges will function as a separated 4-lane road while the existing bridge is functioning an undivided 2-lane road.)

General views of the proposed bridges are shown in Appendix 14-4.

## **14.4 STAGING PLAN**

### **14.4.1 Preliminary Cost Estimate**

#### **(1) Unit Cost**

In the preliminary cost estimation of the proposed road project, the unit costs shown in Table 14.4-1 were used.

#### **(2) Basic Cost per Kilometer**

Based on the unit costs shown in Table 14.4-1 and the assumed cross section for each class of road shown in section 5.2, the basic costs per kilometer were estimated for each class of road and/or type of improvement as shown in Table 14.4-2. In the case of suburban roads, these basic costs per kilometer were adjusted where necessary, considering such factors as the width and height of necessary road embankment and necessary special works such as soft ground treatment.

Also, tentative 2lane construction is proposed wherever the traffic volume warrants in order to save the project cost. In the case of improvement of pavement of urban roads, contract prices of the recent pavement improvement or repair works contracted by DPWT were also considered.

In the case of bridges, the costs were individually estimated based on the past cost examples of similar length, width and bridge types.

Table 14.3-2 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**
<b>Arterial Road</b>							
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					
<b>Collector Road</b>							
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					
<b>Local Road</b>							
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  
See Section 14.2.3 for explanation of target type.

Table 14.3-3 Proposed Bridge Project

No	Bridge Name	Road Classification	Length (m)	Related Road Project No.
<b>1B. Bridge Reconstruction Projects (Severely Damaged Bridges)</b>				
1	Phum Mul	Arterial	30	A13
2	Phum Kadal	Arterial	10	A13
3	Phum Ralours	Arterial	10	A13
4	Phum Bakou	Arterial	30	A13
5	Wat Ha	Local	90	L12
6	Wat Bakou	Arterial	90	A13
7	Prey Sa	Collector	27	C7
8	Sak Sampov	Collector	25	C8
11	Preaek Pra	Collector	16	C10
12	Champous Khaek	Collector	16	C10
14	Bayab	Arterial	13	A8
15	Anlong Kngan	Collector	10	C2
U4	Boeng Salang	Urban Local	10	U2
U5	Boeng Trabaek	Urban Local	20	U2
<b>2B. Reconstruction of Existing Bridge on National Roads (Temporary or Old Bridges)</b>				
9	Takhmau Conerete	Arterial	92	(NR2, NR21)
10	Takhmau Steel	Arterial	70	(NR2, NR21)
NR2-1	Preaek Ho	Arterial	100	(NR2)
NR2-2	Preaek Kampis	Arterial	55	(NR2)
<b>3B. Widening of Bottleneck Bridges</b>				
U1	Japan	Arterial	700	(NR6)
U2	Monivong	Arterial	280	(NR1)
U3	Stueng Mean Chey	Arterial	100	A9, A13
<b>4B. Construction of New Bridge along Proposed Arterial Road (Outer Ring Road)</b>				
OR1	Ta Roath	Arterial	740	A2
OR2	Svay Ralom	Arterial	740	A7

Table 14.4-1 Unit Cost for Preliminary Cost Estimate of Road Project

No.	Item	Unit	Unit Price (\$)
1	Embankment Filling	m <sup>3</sup>	7.24
2	Excavation of Soil	m <sup>3</sup>	0.73
3	Transportation 5km	m <sup>3</sup>	3.21
4	Leveling and Compaction	m <sup>3</sup>	0.94
5	Shoulder Compaction	m <sup>3</sup>	1.80
6	Slope Treatment	m <sup>3</sup>	1.56
7	Slope Finishing Cover with top soil	m <sup>3</sup>	0.46
8	Sodding, Planting Tree	m <sup>3</sup>	1.40
9	Site Clearing	m <sup>3</sup>	0.89
10	Grading Sub-grade	m <sup>3</sup>	0.41
11	Sub-base Course t = 20 cm	m <sup>3</sup>	4.69
12	Base Course t = 15 cm	m <sup>3</sup>	3.73
13	Binder Course t = 5 cm	m <sup>3</sup>	7.55
14	Wearing Course t = 5 cm	m <sup>3</sup>	7.69
15	Wearing Course t = 3 cm	m <sup>3</sup>	5.82
16	Lane Marking	m <sup>2</sup>	14.00
17	Concrete Curb	m	18.04

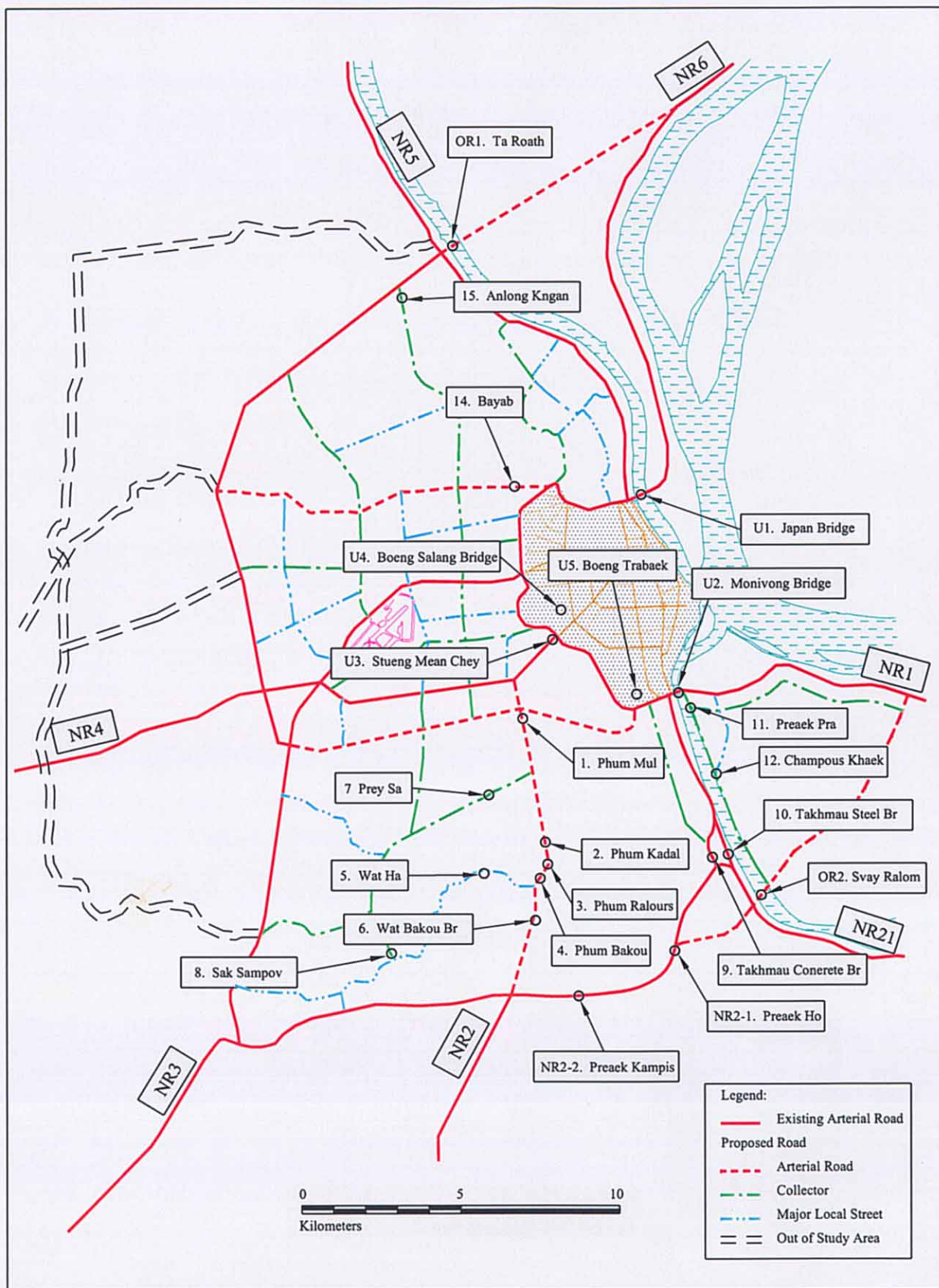


Figure 14.3-6 Location of Bridge Projects

Br-Location

Table 14.4-2 Basic Cost per Kilometer

Road Class	Type of Improvement	Cost per km (\$1,000)
<b>Urban Street</b>		
Arterial	Pavement reconstruction	510
	Overlay	280
Collector	Pavement reconstruction	310
	Overlay	160
Local	Pavement reconstruction	220
	Overlay	100
<b>Suburban Road</b>		
Arterial	New construction	1,000
	Improvement of existing road	760
Collector	New construction	800
	Improvement of existing road	470
Local	New construction	500
	Improvement of existing road	330

(3) Estimated Cost

The estimated costs of the proposed projects are shown in Tables 14.4-3 to 14.4-5.

Table 14.4-3 Estimated Cost of Proposed Road Projects (Urbanized Area)

Project No	Project Name	Present Condition	Improvement Type	Length (km)	Estimated Cost (million\$)
U1	Pavement Improvement of Arterial and Collector Streets	Fair	Resurfacing (Overlay)	9.4	2.63
		Bad	Reconstruction	48.5	20.81
Sub Total				57.9	23.44
U2	Pavement Improvement of Local Streets	Bad	New Construction /Reconstruction	227.2	49.98
Sub Total				227.2	49.98
Total of U1 and U2				285.1	73.42
U3	Construction of Missing Link				
	Tuol Kork-Russian Blvd	1 lane, unpaved	4 lane, paved	2.4	1.20
	Monivong Blvd-Inner Ring Road	0.5 lane, unpaved	4 lane, paved	1.0	0.50
Sub Total				3.4	1.70
U4	Improvement of Intersection				
	Charles de Gaulle/ Preah Sihanouk	Eccentric rotary island	Shift rotary island	-	0.05
	Samdach Monireth/ Inner Ring Road	Staggered intersection	Re-alignment	-	0.15
Sub Total					0.20
Total					75.32

**14.4.2 Prioritization Criteria**

Priority of a road project was assessed from the four (4) viewpoints each of which consists of several items as shown in Table 5.4-6.

Planning Aspect

- (i) Compatibility with Development Plans
- (ii) Impact on Socio-economic Activity / Basic Human Needs
- (iii) Multifunction of Road

Table 14.4-4 Estimated Cost of Propose Projects (Suburban Road)

No.	Road Name	Road Class	No. of Lane	Length (km)	Cost (\$ mill.)
A1	Inner Ring Road	Arterial	2	13.9	10.6
A2	Outer Ring Rd sec-1	Arterial	2	8.6	8.6
A3	Outer Ring Rd Sec-2	Arterial	2	13.4	10.2
A4	Outer Ring Rd Sec-3	Arterial	2	3.7	2.8
A5	Outer Ring Rd Sec-4	Arterial	2	2.0	2.0
A6	Outer Ring Rd Sec-5	Arterial	2	8.8	6.7
A7	Outer Ring Rd Sec-6	Arterial	2	11.2	11.2
A8	Northern New Trunk Road	Arterial	2	11.0	8.4
A9	Southern New Trunk Rd	Arterial	4	7.4	7.4
A10	Phnom Penh Thmei Rd-1	Arterial	4	3.0	2.3
A11	Phnom Penh Thmei Rd-2	Arterial	4	4.3	3.3
A12	Tumpum Dike Rd	Arterial	4	4.2	3.2
A13	Cheung Aek Bypass	Arterial	4/2	10.3	7.8
	Sub Total			101.8	84.5
C1	Russei Kaev Bypass	Collector	4	6.6	3.1
C2	Khmuonh Rd	Collector	2	7.0	3.3
C3	Tang Krasang Rd	Collector	2	8.4	4.0
C4	Krang Thnong-Dei Thmei Rd	Collector	4	9.0	4.2
C5	Northbridge Rd	Collector	2	6.9	5.5
C6	Trapeang Rumchek Rd	Collector	2	4.5	2.1
C7	Prey Sa Rd	Collector	2	7.3	3.4
C8	Tuol Sambo Rd	Collector	2	1.8	0.9
C9	Phnom Penh-Kandal Bypass	Collector	2/4	4.8	3.8
C10	Preaek Pra Rd	Collector	2	6.7	3.2
C11	Veal Sbov Bypass	Collector	2	7.1	5.7
	Sub Total			70.1	39.2
L1	Russei Kaev Rd	Local	2	2.2	1.1
L2	Tuol Sangkae Rd	Local	2	7.1	3.6
L3	Samarong Rd	Local	2	4.3	2.2
L4	Poung Peay Rd	Local	2	3.6	1.8
L5	Dei Thmei Rd	Local	2	2.1	0.7
L6	Kouk Chambak Rd	Local	2	3.5	1.4
L7	Trapeang Chrey Rd	Local	2	6.0	3.0
L8	Prey Tea Rd	Local	2	3.6	1.8
L9	Ou Baek Kaam Rd	Local	2	3.0	1.2
L10	Boeng Krop Rd	Local	4	1.6	1.1
L11	Chaom Chau Rd	Local	2	1.5	0.8
L12	Krang Pongro-Sak Sampov-Baku Rd	Local	2	13.9	7.0
L13	Tuol Kei Rd	Local	2	4.1	2.1
L14	Preah Ponlea	Local	2	2.6	0.9
	Sub Total			59.1	28.7
	Grand Total			231.1	152.4



Table 14.4-5 Estimated Cost of Proposed Bridge Projects

No	Bridge Name	Road Classification	Length (m)	No. of Lane	Cost (\$ 1,000)	Related Road Project No.
<b>1B. Bridge Reconstruction Projects</b>						
1	Phum Mul	Arterial	30	4	392	A13
2	Phum Kadal	Arterial	10	2	43	A13
3	Phum Ralours	Arterial	10	2	43	A13
4	Phum Bakou	Arterial	30	2	196	A13
5	Wat Ha	Local	90	2	1,174	L12
6	Wat Bakou	Arterial	90	2	1,174	A13
7	Prey Sa	Collector	27	2	148	C7
8	Sak Sampov	Collector	25	2	136	C8
11	Preaek Pra	Collector	16	2	104	C10
12	Champous Khaek	Arterial	16	2	104	C10
14	Bayab	Arterial	13	2	142	A8
15	Anlong Kngan	Collector	10	2	43	C2
U4	Boeng Salang	Local	10	2	43	U2
U5	Boeng Trabaek	Local	20	2	87	U2
	Total				3,629	
<b>2B. Reconstruction of Existing Bridge on Arterial Roads</b>						
9	Takhmau Conerete	Arterial	92	2	1,200	(NR2, NR21)
10	Takhmau Steel	Arterial	70	2	761	(NR2, NR21)
NR2-1	Preaek Ho	Arterial	100	2	1,087	(NR2)
NR2-2	Preaek Kampis	Arterial	55	2	478	(NR2)
	Total				3,526	
<b>3B. Widening of Bottleneck Bridges</b>						
U1	Japan	Arterial	700	4	16,626	(NR5)
U2	Monivong	Arterial	280	6	16,100	(NR1)
U3	Stueng Mean Chey	Arterial	100	4	1,087	A9, A13
	Total				33,813	
<b>4B. Construction of New Bridge along the Proposed Arterial Road (Outer Ring Road)</b>						
OR1	Ta Roath	Arterial	740	2	16,195	A2
OR2	Svay Ralom	Arterial	740	2	16,195	A7
	Total				32,390	
	Grand Total				73,292	

#### Technical Aspect

- (iv) Urgency (Degree and scale of problems)
- (v) Role in Road Network
- (vi) Technical Difficulty

#### Environment Aspect

- (vii) Effect on Health
- (viii) Social Impact
- (ix) Natural Impact
- (x) Social Acceptance

#### Benefit Aspect

- (xi) Traffic Demand
- (xii) Cost
- (xiii) Benefit Scale

These criteria are summarized in Table 14.4-6.

Priority of each proposed suburban road project was evaluated by applying the above criteria. Points of 1 (low) to 3 (high) were given for each Aspect of the evaluation criteria. These points were summed for each road project and listed as "Score". Since there are four Aspects to be evaluated, the possible highest score is 12 and the possible lowest score is 4. Projects with a score of 7 or less were categorized as "Low priority (L)". Similarly, projects with score of 8 to 9 were categorized as "Medium priority (M)", and project with score of 10 or more were categorized as "High priority (H)". Table 14.4-7 shows the result of the evaluation.

### **14.4.3 Staging Plan**

Considering the total amount of the fund needed, the projects need to be implemented in stages of short, medium and long term.

#### (1) Urban Road Project

As for urban road projects, improvement of pavement is urgent and is desired to be implemented in the Short Term period. However, considering fund constraints, it is proposed that the pavement of the arterial and collector streets plus one-third of the local streets be improved in the Short Term period, and the pavement improvement for the remaining two-thirds of the local roads be implemented in the Medium Term Period. Construction of missing links and improvement of intersection are proposed for implementation in the Short Term. Table 14.4-8 summarizes the proposed implementation schedule of the urban road projects.

#### (2) Suburban Road Projects

In making the staging plan of suburban road projects, the following policy was applied to determine priority for implementation, in addition to the priority criteria described in Section 14.4.2 above.

- (i) Arterial and critical bottleneck: implemented in the Short Term
- (ii) Collector and support to arterial: implemented in the Mid-Term
- (iii) Arterials crossing Tonle Sap River and Bassac River (with large bridge) and local road: implemented in the Long Term

Table 14.4-9 (a) to (c) shows the projects to be implemented in the short, medium and long term. Figure 14.4-1 shows the locations of the project roads implemented in each term.

Table 14.4-6 Prioritization Criteria of Road Project

Aspect	Evaluation Item	Indicator	Priority		
			High (H)	Medium (M)	Low (L)
Planning Aspect	1) Compatibility with Development Plans	<ul style="list-style-type: none"> <li>• Related to Municipality's Development Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Essential</li> </ul>	<ul style="list-style-type: none"> <li>• Support Development</li> </ul>	<ul style="list-style-type: none"> <li>• Little effect</li> </ul>
	2) Impact on Socio-Economic Activity / Basic Human Needs	<ul style="list-style-type: none"> <li>• No. of Public Facilities, Tourist Spots</li> </ul>	<ul style="list-style-type: none"> <li>• 3 or more</li> </ul>	<ul style="list-style-type: none"> <li>• 1 to 2</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>
	3) Multifunction of Road	<ul style="list-style-type: none"> <li>• Degree of importance of Function other than Transport</li> </ul>	<ul style="list-style-type: none"> <li>• High Importance</li> </ul>	<ul style="list-style-type: none"> <li>• Medium Importance</li> </ul>	<ul style="list-style-type: none"> <li>• Low Importance</li> </ul>
Technical Aspect	4) Urgency	<ul style="list-style-type: none"> <li>• Present Level of Service</li> </ul>	<ul style="list-style-type: none"> <li>• E, F</li> </ul>	<ul style="list-style-type: none"> <li>• D</li> </ul>	<ul style="list-style-type: none"> <li>• A, B, C</li> </ul>
	Existing Road New Road	<ul style="list-style-type: none"> <li>• Status of Land Development</li> </ul>	<ul style="list-style-type: none"> <li>• Developing</li> </ul>	<ul style="list-style-type: none"> <li>• Development to start</li> </ul>	<ul style="list-style-type: none"> <li>• Development in Future</li> </ul>
Environmental Aspect	5) Role in Road Network	<ul style="list-style-type: none"> <li>• Function Classification</li> </ul>	<ul style="list-style-type: none"> <li>• Arterial</li> </ul>	<ul style="list-style-type: none"> <li>• Collector</li> </ul>	<ul style="list-style-type: none"> <li>• Major Local</li> </ul>
	6) Technical Difficulty	<ul style="list-style-type: none"> <li>• Type of Work Required</li> </ul>	<ul style="list-style-type: none"> <li>• Mostly Earth Work / Pavement</li> </ul>	<ul style="list-style-type: none"> <li>• Minor Structure</li> </ul>	<ul style="list-style-type: none"> <li>• Large Scale Structure</li> </ul>
	7) Effect on Health	<ul style="list-style-type: none"> <li>• Impact on Air Pollution / Mitigation</li> </ul>	<ul style="list-style-type: none"> <li>• High</li> </ul>	<ul style="list-style-type: none"> <li>• Medium</li> </ul>	<ul style="list-style-type: none"> <li>• Low</li> </ul>
	8) Social Impact	<ul style="list-style-type: none"> <li>• Right-of-Way Acquisition and Resettlement of People</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal</li> </ul>	<ul style="list-style-type: none"> <li>• Intermediate</li> </ul>	<ul style="list-style-type: none"> <li>• Extensive</li> </ul>
	9) Natural Impact	<ul style="list-style-type: none"> <li>• Impact on Flora and Fauna</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal</li> </ul>	<ul style="list-style-type: none"> <li>• Medium</li> </ul>	<ul style="list-style-type: none"> <li>• High</li> </ul>
	10) Social Acceptance	<ul style="list-style-type: none"> <li>• Degree of Acceptance</li> </ul>	<ul style="list-style-type: none"> <li>• Very High Acceptance</li> </ul>	<ul style="list-style-type: none"> <li>• High Acceptance</li> </ul>	<ul style="list-style-type: none"> <li>• Medium Acceptance</li> </ul>
Benefit Aspect	11) Traffic Demand	<ul style="list-style-type: none"> <li>• Traffic Volume in 2015</li> </ul>	<ul style="list-style-type: none"> <li>• Over 30,000</li> </ul>	<ul style="list-style-type: none"> <li>• 10,000 ~ 30,000</li> </ul>	<ul style="list-style-type: none"> <li>• Less than 10,000</li> </ul>
	12) Cost	<ul style="list-style-type: none"> <li>• Construction Cost</li> </ul>	<ul style="list-style-type: none"> <li>• Small</li> </ul>	<ul style="list-style-type: none"> <li>• Medium</li> </ul>	<ul style="list-style-type: none"> <li>• Large</li> </ul>
	13) Benefit Scale	<ul style="list-style-type: none"> <li>• Relative Benefit Scale</li> </ul>	<ul style="list-style-type: none"> <li>• Large</li> </ul>	<ul style="list-style-type: none"> <li>• Medium</li> </ul>	<ul style="list-style-type: none"> <li>• Small</li> </ul>

Table 14.4-7 Result of Priority Evaluation

No.	Road Name	Criteria				Score/ Priority
		Planning	Technical	Environ- mental	Benefit	
A1	Inner Ring Road	3	3	3	2	11 / H
A2	Outer Ring Rd Sec-1	3	2	2	1	8 / M(L)*
A3	Outer Ring Rd Sec-2	3	3	3	1	9 / M(H)*
A4	Outer Ring Rd Sec-3	3	3	3	1	10 / H
A5	Outer Ring Rd Sec-4	3	3	3	1	10 / H
A6	Outer Ring Rd Sec-5	3	3	3	1	10 / M
A7	Outer Ring Rd Sec-6	3	2	2	1	8 / M(L)*
A8	Northern New Trunk Road	3	2	3	1	9 / M
A9	Southern New Trunk Rd	3	3	3	1	10 / H
A10	Phnom Penh Thmei Rd-1	2	3	3	2	10 / H
A11	Phnom Penh Thmei Rd-2	2	3	3	2	10 / H
A12	Tumpum Dike Rd	3	3	3	2	11 / H
A13	Cheung Aek Bypass	2	2	3	2	9 / M
C1	Russei Kaev Bypass	2	3	2	2	9 / M(H)*
C2	Khmuonh Rd	2	2	3	2	8 / M
C3	Tang Krasang Rd	1	2	3	1	7 / L
C4	Krang Thnong-Dei Thmei Rd	2	3	3	2	10 / H
C5	Northbridge Rd	2	2	2	2	8 / M
C6	Trapeang Rumchek Rd	1	3	3	1	8 / M
C7	Prey Sa Rd	2	2	3	1	8 / M
C8	Tuol Sambo Rd	2	2	3	1	8 / M
C9	Phnom Penh-Kandal Bypass	1	2	2	2	7 / L
C10	Preaek Pra Rd	2	2	2	1	7 / L
C11	Veal Sbov Bypass	2	2	2	2	8 / M
L1	Russei Kaev Rd	2	2	2	1	7 / L
L2	Tuol Sangkae Rd	2	2	2	1	7 / L
L3	Samarong Rd	1	2	2	1	6 / L
L4	Poung Peay Rd	1	2	2	1	6 / L
L5	Dei Thmei Rd	1	2	3	1	7 / L(M)*
L6	Kouk Chambak Rd	1	2	3	1	7 / L(M)*
L7	Trapeang Chrey Rd	2	2	2	1	7 / L
L8	Prey Tea Rd	2	2	2	1	7 / L
L9	Ou Baek Kaam Rd	1	2	2	2	7 / L
L10	Boeng Krop Rd	1	3	2	2	8 / M
L11	Chaom Chau Rd	1	2	2	1	6 / L
L12	Krang Pongro-Sak Sampov-Baku Rd	1	2	2	1	6 / L
L13	Tuol Kei Rd	1	2	2	1	6 / L
L14	Preah Ponlea	2	3	2	2	9 / M

Score	7	8 ~ 9	10
Priority	Low (L)	Medium (M)	High (H)

\* Priority of these roads are modified as indicated in ( ) for the purpose of the staging plan. The reason of modification is described in Subsection 14.4.3 (2).

Table 14.4-9 Implementation Schedule of Road Projects (Urbanized Area)

Project No	Project Name	Length (km)	Estimated Cost (\$ mil.)
<b>Short Term</b>			
U1	Pavement Improvement of Arterial and Collector Streets	57.9	23.44
	Sub Total	57.9	23.44
U2	Pavement Improvement of Local Streets	9.8	2.15
	Sub Total	9.8	2.15
	Total of Pavement Improvement	67.7	25.59
U3	Construction of Missing Link		
	Tuol Kork-Russian Blvd	2.4	1.20
	Monivong Blvd-Inner Ring Road	1.0	0.50
	Sub Total		1.70
U4	Improvement of Intersection		
	Charles de Gaulle/ P. Sihanouk	-	0.05
	S. Monireth/ Inner Ring Road	-	0.15
	Sub Total		0.20
	Total of Short Term		27.49
<b>Medium Term</b>			
U2	Pavement Improvement of Local Streets	217.4	47.83
	Sub Total	217.4	47.83
Grand Total of Urban Road Project		285.1	75.32

(2) Bridge Projects

Among the bridge projects listed in Table 14.4-5, the most urgent projects are the reconstruction of the existing bridges (No. 1 to 8 and 11,12, and 14 to 17). Among the projects requiring widening of bottleneck bridges, No. U3 Steung Mean Chey Bridge is as urgent as the bridge reconstruction projects due to the degree of congestion. These projects are proposed for implementation in the Short Term period.

For the Medium Term period, widening of Monivong Bridge is proposed considering the present degree of congestion and future increase in the traffic.

The remaining bridge projects, reconstruction of the existing bridges on the arterial roads and widening of Japan Bridge are proposed for implementation in the Long Term period considering fund constraints. Construction of new bridges along Project Roads No A2 and No. A7 (Outer Ring Road, Sections 1 and 6) should be implemented to coincide with the construction of these roads.

Table 14.4-10 summarizes the implementation plan of the bridge projects.

Table 14.4-9 Implementation Schedule of Road Projects (Suburban Area)

No.	Name of Road	Length (km)	Cost (\$ mil.)	Road Class	Improve Type*	Remarks
(a) Short Term (Year 2001-2005)						
A1	Inner Ring Road	13.9	10.6	Arterial	P	
A3	Outer Ring Road Sec-2	13.4	10.2	Arterial	P+W	Kab Srov Dike, 2 lane
A4	Outer Ring Road Sec-3	3.7	2.8	Arterial	P	Circular arterial
A5	Outer Ring Road Sec-4	2.0	2.0	Arterial	NC	Same as above
A9	Southern New Trunk Road	7.4	7.4	Arterial	NC	E-W Corridor
A10-1	Phnom Penh Thmei Road-1-1	0.8	0.6	Arterial	W+P	Currently developed area
A11	Phnom Penh Thmei Road - 2	4.3	3.3	Arterial	W+P	Currently developed area
A12	Tumpun Dike Road	4.2	3.2	Arterial	P+W	Flood control
C1	Russei Kaev Bypass	6.6	3.1	Collector	P+W	Bypass for NR 5
C4	Krang Thnong- Dei Thmei Rd	9.0	4.2	Collector	NC+P	E-W Corridor
	Total	65.3	47.4			
(b) Medium Term (Year 2006-2010)						
A6	Outer Ring Road Sec-5	8.9	6.7	Arterial	P	Between NR 3 & NR 2
A8	Northern New Trunk Road	11.0	8.4	Arterial	NC+W+P	E-W Corridor
A10-2	Phnom Penh Thmei Road-1-2	2.2	1.7	Arterial	W+P	Currently developed area
A13	Cheung Aek Bypass	10.3	7.8	Arterial	W+P	Bypass for NR 2
C2	Khmounh Road	7.0	3.3	Collector	P	Connect NR 5 to New Develop. Area
C5-1	Northbridge Road Sec – 1	0.8	0.6	Collector	NC	From L10 to east
C6	Trapeang Rumchek Road	4.5	2.1	Collector	P+W	Serve to S-W suburbs
C7	Prey Sa Road	7.3	3.4	Collector	P+W	Same as above, BP of NR 3
C8	Toul Sambo Road	1.8	0.9	Collector	P	Connected to C7
C11	Veal Sbov Bypass	7.1	5.7	Collector	NC	Bypass of NR 1
L5	Dei Thmei Road	2.1	0.7	M. Local	P+W	N-S link at middle of New Develop. Area
L6	Kouk Chambak Road	3.5	1.4	Local	P+W	Same as above
L10	Boeng Krop Road	1.6	1.1	Local	W+P	Connect Toll Road and C5
L14	Preah Ponlea Road	2.6	0.9	Local	W+P	Implement together with the above
	Total	69.9	44.7			
(c) Long Term (Year 2011-2015)						
A2	Outer Ring Road Sec 1	8.6	8.6	Arterial	NC	Northeast end section, High const. cost
A7	Outer Ring Road Sec-6	11.2	11.2	Arterial	NC	Southeast end section, Large bridge const
C3	Trapang Krasang Road	8.4	4.0	Collector	P+W	Serve to N-W suburbs
C5-2	Northbridge Road Sec – 2	6.1	4.9	Collector	NC	At the middle of Airport Rd and Toll Road
C9	Phnom Penh-Kandal Bypass	4.8	3.8	Collector	NC	Bypass for NR 2
C10	Preak Pra Road	6.7	3.2	Collector	W+P	East bank of Bassac Riv.
L1	Russei Kaev Road	2.2	1.1	Local	W+P	Same as above
L2	Toul Sankae Road	7.1	3.6	Local	W+P	Develop Russei Kaev
L3	Samarong Road	4.3	2.2	Local	NC	Connect C2 & 3C
L4	Poung Peay Road	3.6	1.8	Local	NC	Currently develop. Area
L7	Trapeang Chrey Road	6.0	3.0	Local	NC	Together with develop.
L8	Prey Tea Road	3.6	1.8	Local	NC	Same as above
L9	Ou Baek Kaam Road	3.0	1.2	Local	P+NC	Currently develop. Area
L11	Chaom Chau Road	1.5	0.8	Local	W+P	Connect Toll Road & South. New Trunk Rd
L12	Krang Pongro-Sak Sampov-Baku Road	13.9	7.0	Local	W+P	Along Preaek Tanot Riv.
L13	Tuol Kei Road	4.1	2.1	Local	W+P	Connect NR 3 & C7
	Total	95.9	60.3			
	Grand Total of (a) (b) (c)	231.1	152.4			

\*P: Mostly improvement of pavement, may be with minor widening

W: Widening, may be with minor new construction

NC: New construction

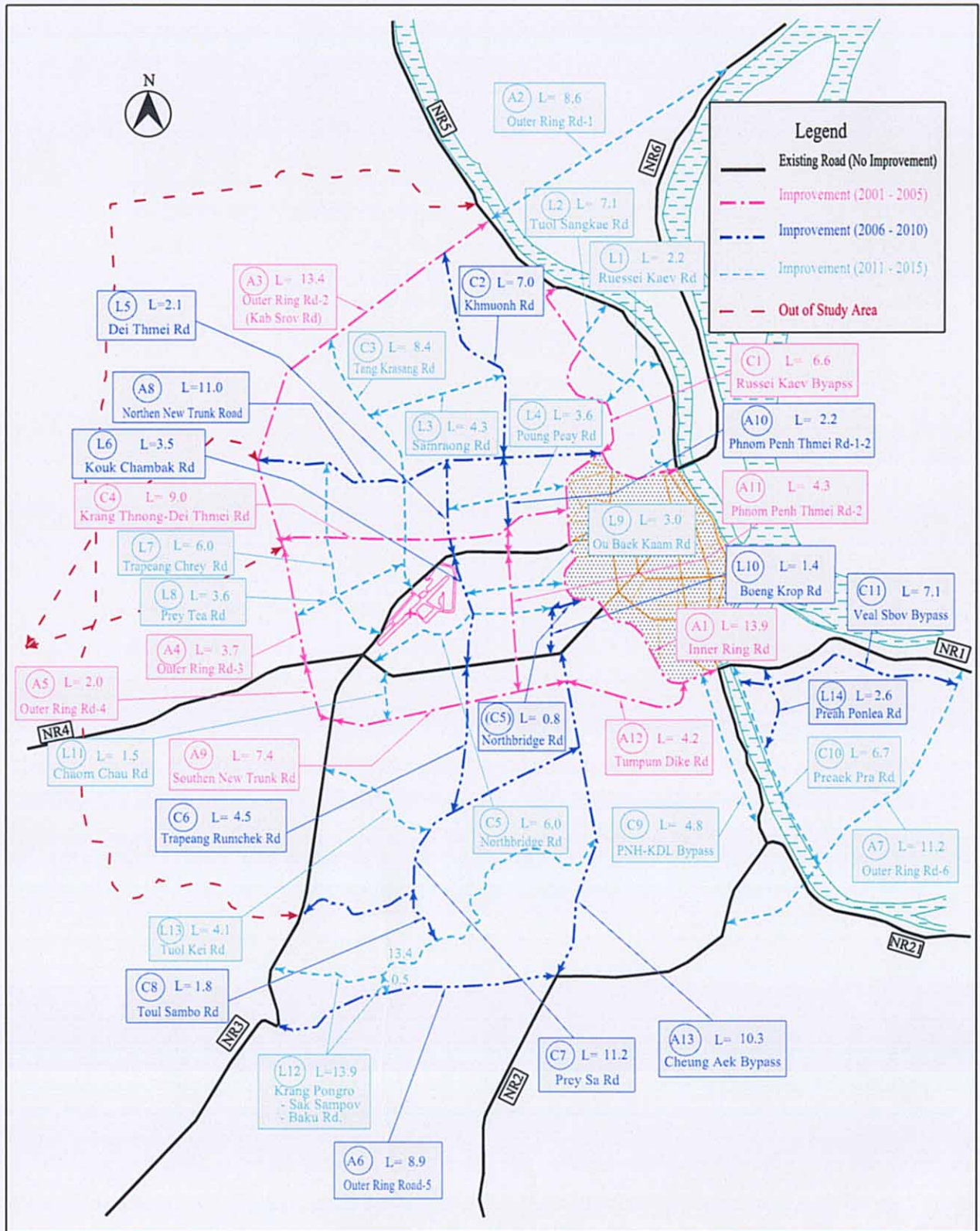


Figure 14.4-1 Implementation Plan of Suburban Road Project

Table 14.4-10 Implementation Plan of Proposed Bridge Projects

Br. No	Bridge Name	Road Classification	Length (m)	Cost (\$ 1,000)	Related Road Project No.
<b>Short Term</b>					
Project No.1B: Bridge Reconstruction Projects					
1	Phum Mul	Arterial	30	392	A13
2	Phum Kadal	Arterial	10	43	A13
3	Phum Ralours	Arterial	10	43	A13
4	Phum Bakou	Local	30	196	A13
5	Wat Ha	Arterial	90	1,174	L12
6	Wat Bakou	Arterial	90	1,174	A13
7	Prey Sa	Collector	27	148	C7
8	Sak Sampov	Collector	25	136	C8
11	Preaek Pra	Collector	16	104	C10
12	Champous Khaek	Arterial	16	104	C10
14	Bayab	Arterial	13	142	A8
15	Anlong Kngan	Collector	10	43	C2
U4	Boeng Salang	Local	10	43	U2
U5	Boeng Trabaek	Local	20	87	U2
Sub Total				3,629	
Project No. 3B: Widening of Bottleneck Bridges					
U3	Steung Mean Chey	Arterial	100	1,087	A9, A13
Sub Total				1,087	
Total for Short Term				4,716	
<b>Medium Term</b>					
Project No. 3B: Widening of Bottleneck Bridges					
U2	Monivong	Arterial	280	16,100	(NR1)
Sub Total				16,100	
Total for Medium Term				16,100	
<b>Long Term</b>					
Project No. 2B: Reconstruction of Existing Bridge on Arterial Roads					
9	Takhmau Conerete	Arterial	92	1,200	(NR2, NR21)
10	Takhmau Steel	Arterial	70	761	(NR2, NR21)
NR2-1	Preaek Ho	Arterial	100	1,087	(NR2)
NR2-2	Preaek Kampis	Arterial	55	478	(NR2)
Sub Total				3,526	
Project No. 3B: Widening of Bottleneck Bridges					
U1	Japan	Arterial	700	16,626	(NR6)
Sub Total				33,813	
Project No. 4B: Construction of New Bridge along Project Road No 29 / 30					
OR1	Ta Roath	Arterial	740	16,195	No.29
OR2	Svay Ralom	Arterial	740	16,195	No.30
Sub Total				32,390	
Total for Long Term				52.5	
Grand Total				73,292	