

6.2 Sector Approaches

6.2.1 Objectives of Road Development

The main objectives of road development in the study area are as described below;

- **To provide the sufficient road network and function for smooth transportation.**
This can be achieved by developing/improving road network adequately to the traffic demand. In addition, it is mandatory to maintain roads diligently in keeping road functions.
- **To satisfy tourists in visiting Angkor Heritages and staying in Siem Reap.**
Without satisfaction of tourists, there is no way to sustainable development of Siem Reap. In visiting heritages, rehabilitation/improvement of access route to every heritage into weather-proof condition is one of the essential points to achieve this objective. In the meantime, improvement of road in urban area into pedestrian-friendly is another indispensable aspect to achieve this objective.
- **To lead the urbanization by following the urban planning.**
Development of infrastructures such as road, water supply, and energy is essential to implement the programmed urban planning. In developing infrastructures, road development should be put first priority, because water pipes and electric wires are generally installed along roads. Therefore, this objective can be achieved by developing roads in the planned urban area prior to the urbanization.

6.2.2 Sector Approaches for Road Development

The following five approaches were set to achieve the above objectives.

Sector Approach 1: Improvement of Bottlenecks and Development of Sub-arterial Road Network in the Urban Area

In the present road network in Siem Reap, traffic converges to limited arterial roads i.e. NR6, Hsar de Gold St. (road to Angkor Gate), Sivatha St. and NR63. Especially for the east-west direction, NR6 is the only arterial road. Moreover, there are some physical bottlenecks on these arterial roads. These problems must cause the serious traffic congestion in urban area near in future.

Therefore, it is the top priority to improve the bottlenecks on the arterial road, and to develop the sub-arterial road network to divert the converged traffic from limited arterial road.

Sector Approach 2: Improving the Road Condition and Facility in the Urban Area

Existing road condition in the urban area is improper to be the international tourism city. Tourists have to pay attention to their foot and surrounding when they walk around the city, because of insufficient and blocked pedestrian space, and unsanitary and dusty

surface condition. In addition, lack of road lighting and drainage make tourists abandon to walk in the nighttime and after the squall respectively.

Improving above condition by securing pedestrian space, paving roads, strengthening road cleaning and installing road facilities will help in making more tourists to visit the downtown area and activating downtown area more.

Improvement of traffic manner is also essential factor not only to achieve the satisfaction of tourists but also to secure the people from traffic accident.

Sector Approach 3: Road Network Development in the Future Urbanization Area

In this master plan, urban area is planned to expand to the south-east area. To guide the new habitants to this area efficiently, main road network should be developed prior to the full-dress urbanization. Before that, reservation of right of way must be started as the determination of road network plan to minimize the cost for land acquisition.

In addition, the construction of bypass route of NR6 should be considered in the road network in the future urbanization area in case of a big raise of through traffic.

Sector Approach 4: Access Improvement to Angkor Heritages

Present situation in accessing heritages are not sufficient to satisfy tourists. In the suburban or remote area, there are several valuable heritages left in the hard condition to access especially in rain season. Improving road condition to these heritages into weather-proof road helps the diversification of heritage tourism. Major suburban/remote heritages left in the hard access are as follow; Phnom Kulen, Kubal Spean, Beng Mealea, Koh Ker, Bakan and Preah Vihear and Banteay Chhmar. It is noted that some routes to these heritages are under rehabilitation.

Traffic control in the AAP is another component of this approach. Installation of public circular route transportation system and restriction of private car entry are essential to achieve the following challenges;

- Providing the transportation adequate to future tourists demand, and
- Minimizing the negative impact to heritages caused by transportation

Sector Approach 5: Establishment of an Efficient Road Maintenance System

In Cambodia, most roads other than several national roads are still in severe condition and waiting for rehabilitation and periodic maintenance. Against this situation, relating organizations continue to make effort in improving road condition. However, at present, its progress cannot satisfy the people's requirement because of the limitation of budgets and human resources.

Implementation of appropriate road maintenance and eradication of over-loaded truck are indispensable to keep the function of road. To maximize the benefit of road maintenance work with a limited budget, it is essential to maximize the efficiency of road maintenance system.

6.3 Projects/Programs

6.3.1 Long List of Projects/Programs

To achieve the approaches shown above, series of projects/programs are proposed as listed in Table III.6.14. Ten (10) projects have been identified in the transportation sector. Estimated costs shown here include construction cost, engineering service fee and land acquisition cost.

Each project was evaluated with five criterion i.e.

- Emergency Requirement; facing or overhanging serious problem,
- People's Needs; according with the needs of people in Siem Reap and tourists,
- Effectiveness of the project,
- Realization; technical, environmental or economical difficulty in project implementation, and
- Sustainability of project effectiveness.

The outline of projects/programs is mentioned in the following section. The details of the proposed projects are shown in the project sheets attached in the Appendix.

Table III.6.14 Proposed Projects/ Programs

No	Project Title	Project Site	Project Component	Implementation Agency
TR-1	French Bridge Improvement Project	Central Area	Construction of new bridge: 40m Improvement of Roundabout Intersection	MPWT
TR-2	Sub-arterial road network project (Phase1) - North road parallel with NR6 - South road parallel with NR6 - Connecting road with NR6	Urban Area	New construction: 6.0km Widening and rehabilitation: 7.3km Pavement: Asphalt Concrete	Siem Reap Province
TR-3	Sub-arterial road network project (Phase2) - Completion of Hun Sen Pease Road	Urban Area	Rehabilitation: 10.7km New Bridge: 30m Pavement: Asphalt Concrete	MPWT
TR-4	Sub-arterial road network project (Phase3) - Inner half circular road - Other main roads in urban area	Urban Area	New construction: 5.8km Widening and rehabilitation: 23.3km New Bridge: 30m Pavement: Asphalt Concrete	Siem Reap Province
TR-5	Sub-arterial road network project (Phase4) - Main roads in peri-urban area	Urbanization Area	New Construction: 18.4km Rehabilitation: 33.5km Pavement: Asphalt Concrete	Siem Reap Province
TR-6	Institutional improvement and campaign for road safety	-	Institutional program	DPWT
TR-7	Rural heritage network rehabilitation project	North west region (4 provinces)	Road rehabilitation: approximately 300km Pavement: DBST	MPWT, MRD
TR-8	Introduction of environmental public transport in the AAP	AAP	Procurement of Bus: 20 vehicles Rehabilitation of bus route: approximately 10km Pavement: Asphalt Concrete	APSARA
TR-9	Bicycle track construction project	AAP	Bicycle track construction: approximately 30km	APSARA
TR-10	Institutional improvement for efficient road maintenance	Siem Reap Province	Road Inventory Survey Road monitoring	DPWT and PDRD

6.3.2 Outline of Projects/Programs

(1) Road Network Development/Improvement in the Urban Area

To achieve the Sector Approach 1 “Improvement of Bottlenecks and Development of Sub-arterial Road Network in the Urban Area”, and Sector Approach 3 “Road Network Development in the Future Urbanization Area”, following projects are identified.

1) TR-1: French Bridge Improvement Project

(a) Background and Objective

Existing concrete bridge on the NR6 called French Bridge is the biggest bottleneck in Siem Reap. Its insufficient width causes traffic congestion in peak hours.

Against this problem, MPWT has started the construction of temporary bridge at about 200m upstream from French Bridge as the detour route for the traffic from east to west to resolve the congestion temporarily. (see Figure III.6.16)

The objective of the project is to resolve the bottleneck by constructing new bridge parallel with existing bridge.

(b) Project Component

- New bridge construction on the upstream side of existing bridge. (40m in length)
- Improvement of roundabout intersection at the west side of the bridge.

It is noted that new bridge will be used as one way from east to west while existing one will be used for another direction only.

In addition, water pipes and relating facilities buried around the existing bridge as shown in Figure III.6.17 must be into consideration in designing the new bridge.

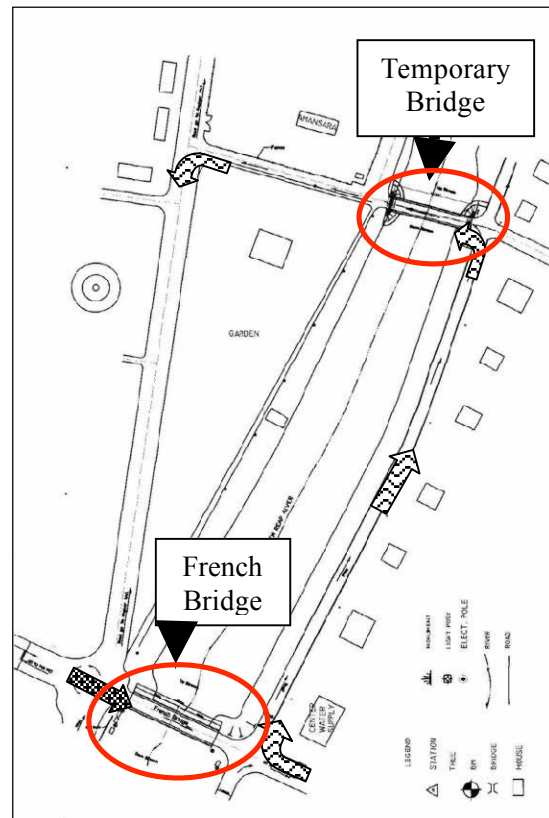


Figure III.6.16 Temporary Detour Route of French Bridge

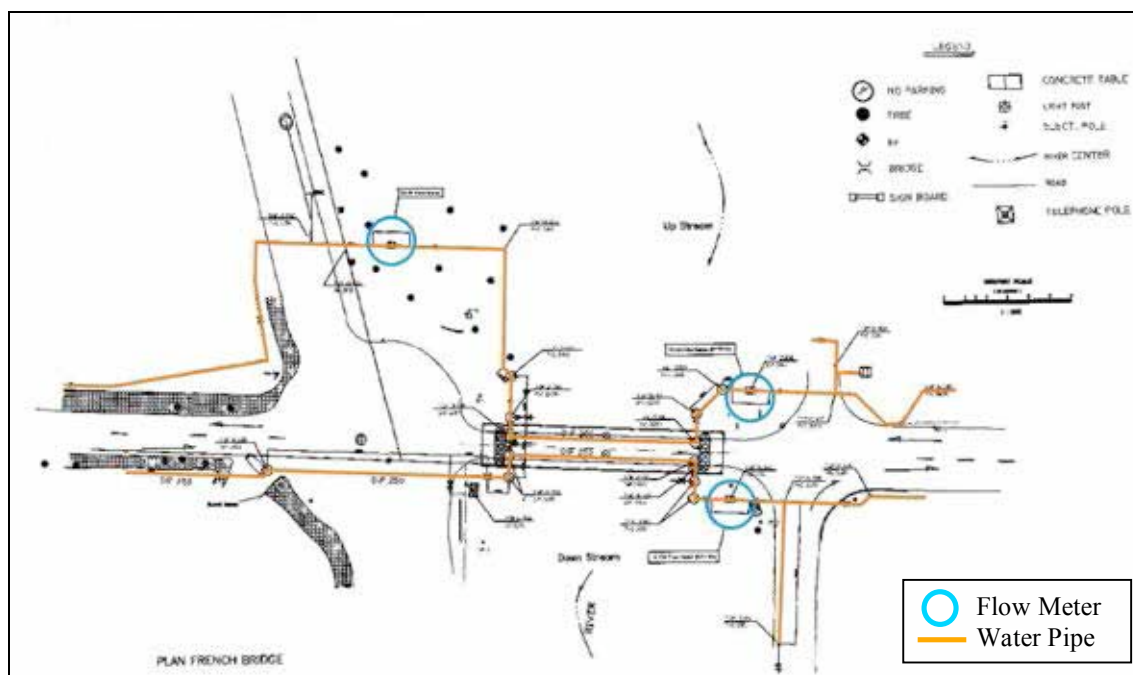


Figure III.6.17 Water Pipes around French Bridge

2) Sub-arterial Road Network Project

Figure III.6.18 and 6.19 show the proposed future arterial and sub-arterial road network in 2012 and 2020 respectively. The proposed road development shall be divided into four (4) phases (TR2, 3, 4 and 5) as mentioned hereinafter.

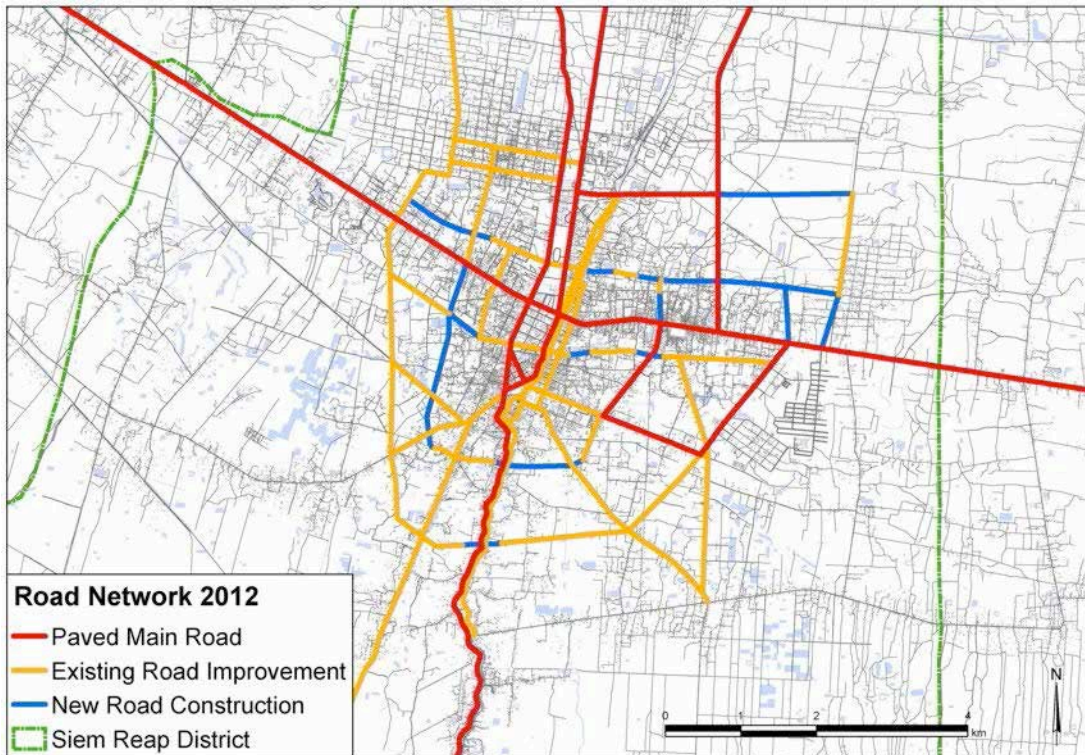
In the course of development of proposed network, improvement of intersections and installation of signal, road lighting and drainage should be executed.

(a) Sub-arterial Road Parallel to the NR6 (TR-2: Phase 1)

To untying the traffic concentration to the NR6, road development that run through the urban area to the east-west direction are indispensable. Therefore, it is proposed to improve/construct sub-arterial roads parallel with the NR6 on the north and south. For the tourists, the north sub-arterial road will be convenient to come and go between Angkor area and their hotels along the NR6. In the meantime, the south road has an advantage to reach the old market and its surrounding restaurant area. For the inhabitants of Siem Reap, these sub-arterial roads can be the useful alternative route in reaching or running through the central city area.

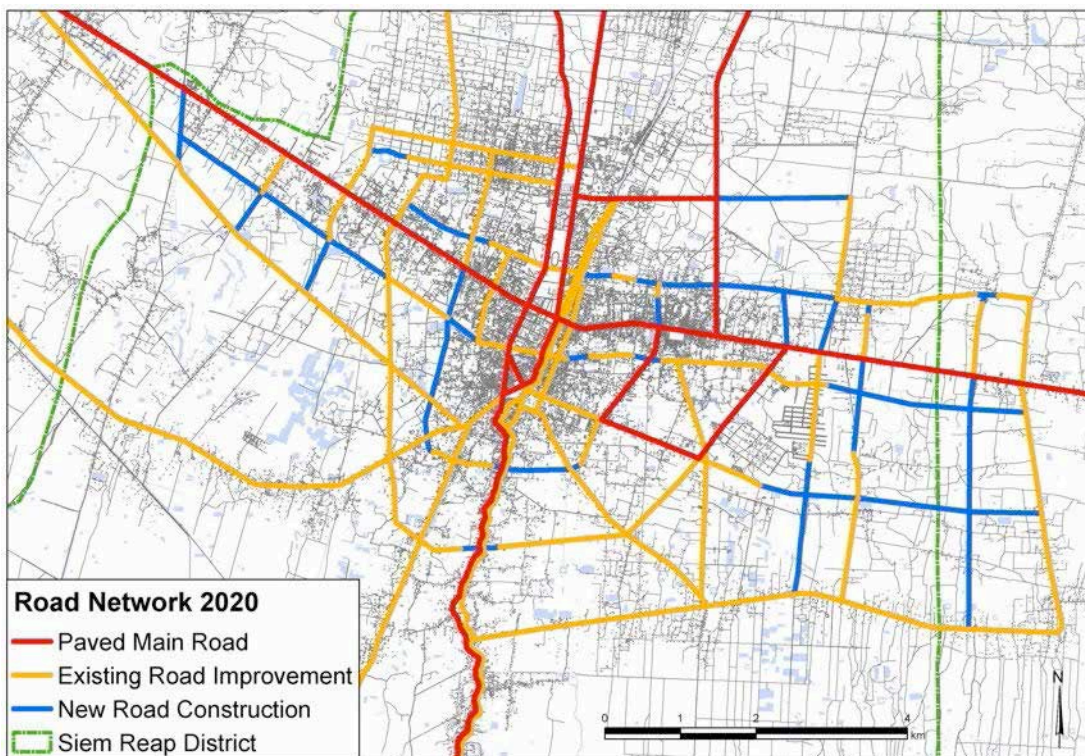
Project components are;

- South sub-arterial road construction/rehabilitation (5.2km),
- North sub-arterial road construction/rehabilitation including bridge (5.7km), and
- Connection roads construction/rehabilitation with NR6 (2.5km in total).



Source: JICA Study Team

Figure III.6.18 Principal Road Network in 2012



Source: JICA Study Team

Figure III.6.19 Principal Road Network in 2020

(b) Upgrading of the Hun Sen Peace Road (TR-3: Phase 2)

There exists a half circular road on the south side of Siem Reap constructed in 2002. The radius of the circle is between 2.5 and 3.0km and originally constructed as laterite road. However, a bridge on Siem Reap River had not been constructed so that the original objective of this road has not been achieved yet. This half circular road will formulate the outer boundary of urban area up to 2012, and be a part of bypass route in the mid or long term.

Project components are;

- Bridge construction on Siem Reap River (about 40m),
- New construction at a missing section (about 300m), and
- Rehabilitation of existing laterite/macadam road (about 10.4km)

(c) Completion of Sub-arterial Road Network in the Urban Area up to 2012 (TR-4: Phase 3)

Following the urban planning in this master plan, principal road network inside Hun Sen Peace Road will be completed before 2012.

Project component is;

- Construction/rehabilitation of sub-arterial roads inside of Hun Sen Peace Road (30.2km in total)

(d) Completion of Sub-arterial Road Network in the Urban Area up to 2020 (TR-5: Phase 4)

Following the urban planning in this master plan, principal road network on future urbanization area will be constructed between 2012 and 2020.

Project component is;

- Construction/rehabilitation of sub-arterial roads in future urbanization area (52.0km in total)

(e) Cross Section

With reference to the Road Design Standard of Cambodia (CAM PW.03.101.99), proposed sub-arterial road shall be classified as U4 (average daily traffic in PCU is between 3,000 and 10,000). However, it is noted that Hun Sen Peace Road should be designed as U6 (the highest design standard) with the consideration to the future usage as bypass route of NR6. The proposed cross section for each road category following the design standard is shown in Figure III.6.17.

Every sub-arterial road in urban area should have sufficient sidewalk in order to achieve the tourist friendly road network. It should be considered to reduce traffic lane and keep it one way to secure the pedestrian space, if there is a difficulty in land acquisition for pedestrian space.

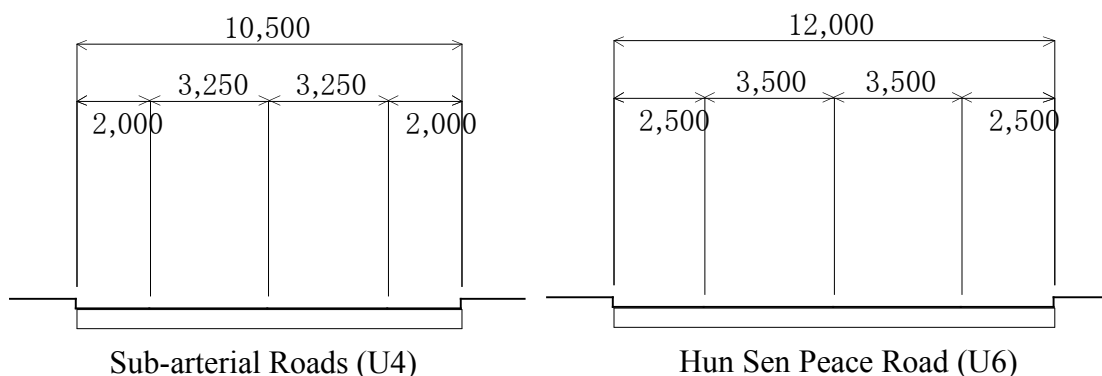


Figure III.6.20 Cross Section for Sub-arterial Road

(2) Improvement of Road Condition and Safety in the Urban Area

The project to achieve Sector Approach 2 “Improving the Road Condition and Facility in the Urban Area” is identified in Urban Development sector (project code: U-1). In this sector, therefore, main focus is put on the achievement of traffic safety.

TR-6: Institutional Improvement and Campaigns for Road Safety

Cambodian Government has set fifteen (15) action plans for road safety as shown in Table III.6.15. These action plans can be classified into two categories. One is mainly implemented or prepared by the National Government, and another is which Provincial Government can implement by his own effort. Following eight (8) action plans shall be classified in the latter category and shall be included in this program. Detailed program shall be followed by the Road Safety Action Plan.

(a) Publication of Road Safety Audit and Hazardous Locations

Road and bridges are factors of road accident because in some places there are a lot of potholes and in the other places roads are too narrow, or roads are wide but bridges are narrow and there are no signs of narrow road at place, or roads are curving too harsh. Thus auditing is needed in order to improve safety for road users.

(b) Improvement of Roads Environment and Road Design

Public roads must be designed in an environment that can always ensure safety for road users, e.g. road signs and signals, street lighting etc. must in place. On street parking and off street parking should be in place sufficiently in the build up areas or business areas. Special lanes must be designated for motorbikes, bicycles and pedestrians.

(c) Road Safety Education for Children

Road safety education for children is very important as they can know and understand traffic law and regulations from their childhood so that they can take care on themselves while traveling from home to school or from school to home or to anywhere. Education should be done from the first grade to the eighth grade with the participation of their teachers and parents so that they are well aware about the traffic laws and regulations and will not infringe the law and regulations while traveling.

(d) Law Enforcement

In order to reduce road accidents, law enforcement shall be “swift, certain and severe” in order to correct dangerous road user behavior.

(f) Vehicle Technical Inspection

Vehicles must be subject to the periodic technical inspection according to the laws and regulations, so that they are roadworthiness. The vehicles which are not subject to periodic inspection may encounter break failures, tire blowout, steering wheel problems or broken headlight and cause accidents during the traffic.

(g) Drivers Training

The statistics of road accidents show that 92% of the accident is caused by human errors. Thus, training of road users on traffic law, road safety, self-protecting driving and driving carefully is one of the priorities.

(h) Emergency Assistance to Traffic Victims

The duties of the Emergency Assistance teams are to bring the serious victims to the hospital as soon as possible and provide them the first aid during the transportation.

(i) Road Safety Public Campaigns

These campaigns should be targeted on pedestrians, bicyclists and motorcyclists who are the most vulnerable road users to the accidents.

(3) Improvement of Accessibility to the Heritages

Three projects are identified to achieve the Sector Approach 4: “Access Improvement to Angkor Heritages” as mentioned below.

1) TR-7: Rural Heritage Network Rehabilitation Project**(a) Background and Objective**

At present, major tourism resources are concentrated to the AAP and its suburbs. It is said that the number of tourists of Angkor Wat temple reaches its capacity. To disperse the tourists from Angkor Wat and make tourists stay longer in Siem Reap, development of new attractive tourism resource is indispensable. In the rural area, there are many heritages still undeveloped and not restored.

The objective of this project is to rehabilitate the access route to the following five (5) remote heritages; Kubal Spean, Bakan, Preah Vihear, Koh Ker and Phnom Kulen. It is noted that access route to Beng Mealea, Sambor Prei Kuk and Banteay Chhmar are under rehabilitation.

(b) Project Component

The objected road to each heritages and present status are summarized below.

Table III.6.15 Road Sector Strategy in TSS (2002)

Heritage	Road Number	Approx. Length (km)	Present Status
Kubal Spean	NR64	10	Laterite
Bakan	NR66	70	Earth
Preah Viher	NR64	105	Laterite
	PR274	95	Laterite
	NR62	20	Laterite/Earth
Koh Ker	PR2646	10	Laterite
	PR210	60	Laterite
Phnom Kulen	PR2642	25	Laterite/Earth

2) TR-8: Introduction of Environmental Public Transport in the AAP**(a) Background and Objective**

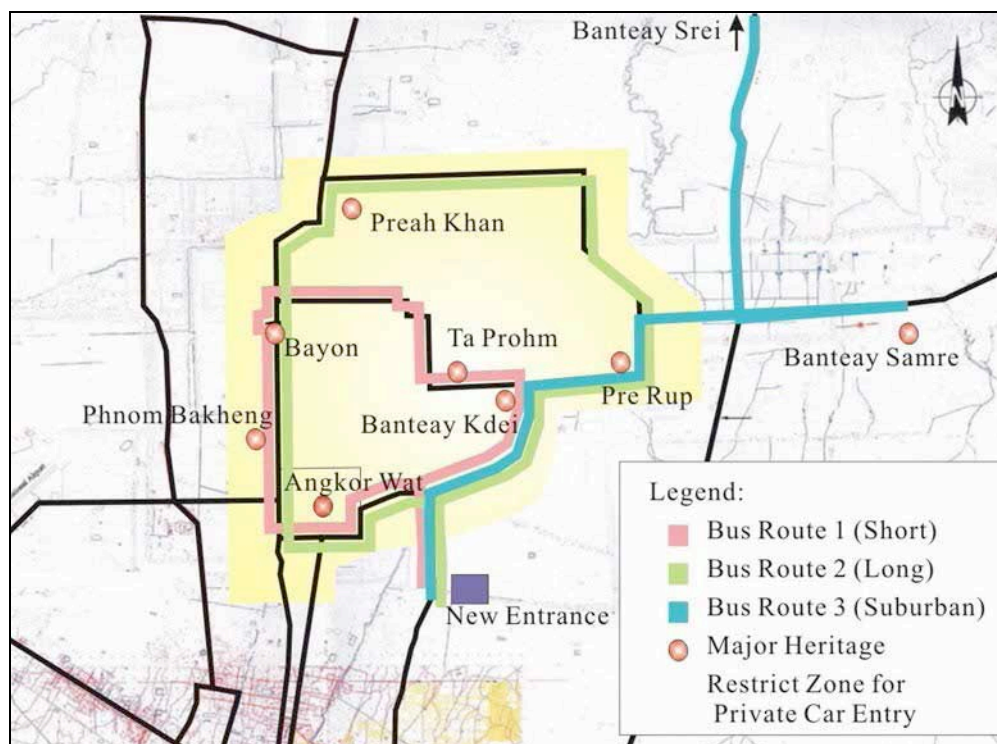
At present, the AAP doesn't have sufficient road network adequate for the future tourism population. From the viewpoint of heritage conservation, the expansion of road capacity and much increase of traffic volume are not acceptable.

The objective of this project is to provide the pleasant transportation for increasing tourists. At the same time, private car including tourist bus should be restricted to entry into the AAP.

(b) Project Components

- Procurement of environmental bus
- Installation of bus stops and relating facilities
- Construction of depot

The proposed bus route and restriction zone for private car entry are shown in Figure III.6.20. Three routes are proposed here. One is short circuit route which connects Banteay Kdei, Ta Prohm, Bayon, Phonm Bakheng and Angkor Wat. The second is long circuit route which includes Pre Rup and Preah Khan plus short circuit route other than Ta Prohm. And the last route is suburban course which is destined to Banteay Srei via Banteay Samre. It is proposed that the new bus system is operated by APSARA Authority and the fare of it is included in the admission fee to the AAP.



Source: JICA Study Team

Figure III.6.21 Proposed Bus Route and Restrict Zone for Private Car Entry

3) TR-9: Bicycle Track Construction in the AAP

(a) Background and Objective

Considerable numbers of tourists visit the AAP by bicycle. In addition, APSARA Authority has started the rental service of electric bicycle in the AAP. At present, however, cyclists share the road with vehicles including heavy track and tourist bus.

The objective of this project is to separate bicycles from automobile traffic to achieve the safety and comfortable tourism.

(b) Project Components

- Construction of bicycle track along existing road (28.5km in total)

(4) Efficient Road Maintenance

Following project is identified to achieve the Sector Approach 5: “Establishment of an Efficient Road Maintenance System” In the identification of the project, the priority is put on which Provincial Government can implement by his own effort.

TR-10: Institutional Improvement for Efficient Road Maintenance

To maximize the efficiency of road maintenance, appropriate selection of objected route is one of the most important factors. At present, there are not any criteria and detailed road inventory which is applicable in selecting the objected road for maintenance. At present, objected road is selected based on the request from districts or communes. In

addition, DPWT and PDRD select their objected road separately. Therefore, there are many area strategies and objectives in road maintenance. Following programs are proposed to improve the efficiency and effectiveness of road maintenance;

(a) Preparation of Road Inventory

Road inventory is one of the most fundamental data to manage roads. Therefore, all the roads in the responsible area except for private roads must be covered in it and items showing in Table III.6.16 should be covered. Prioritization of objected road for rehabilitation and periodic maintenance should be done by referring this inventory and national/provincial road development strategy. It is proposed to manage the inventory as GIS data.

Table III.6.16 Items of Road Inventory

Category	Items
1 General	1-1 Road category and name
	1-2 Start point and end point
	1-3 Responsible organization
	1-4 Section No. (km post)
2 Pavement	2-1 Cross section profile
	2-2 Pavement type
	2-3 Pavement condition (roughness, crack, pot hole etc.)
3 Culvert	3-1 Structure profile
	3-2 Structural health (crack, deterioration etc.)
4 Bridge	4-3 Structure profile
	4-4 Structural health (crack, deterioration, corrosion, deflection, erosion etc.)
5 Traffic	5-1 Traffic volume
	5-2 Heavy vehicle ratio
	5-3 Average travel speed
6 Others	6-1 Maintenance record
	6-2 Roadside land use

(b) Monitoring of Road Condition

Structural road condition, especially in case of non weather proof road, changes time by time. Therefore, frequent monitoring of road condition is mandatory to keep road inventory as the latest. Early finding of damages or foretastes of damage can prevent brakeage of road and traffic accident, in addition, early repair of damage save the maintenance cost.

Traffic volume, especially its heavy vehicle ratio, is one of the dominant factors in deciding the road specification and its maintenance period. Periodic traffic survey should be conducted on the major roads, at least once a year, and its result should be reflected to the annual road development and maintenance plan.

(c) Coordination on Road Maintenance Policy between DPWT and PDRD

To improve the efficiency and effectiveness of road maintenance, road maintenance plan must be prepared by considering whole road network including rural roads. Relating organizations on road development/maintenance should discuss closer in planning the road development and maintenance. Especially, DPWT and PDRD should

have concrete consensus in their road maintenance plan and maximize the effectiveness of road maintenance.

6.3.3 Priority Projects/Programs

Among the proposed projects/programs shown above, following ones were selected as priority project/program.

TR-1: French Bridge Improvement Project

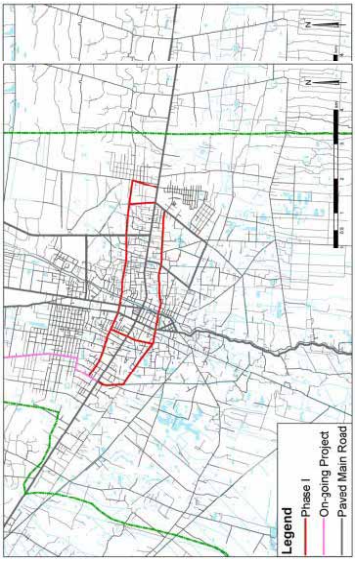
TR-2: Sub-arterial road Network Project (Phase 1)

TR-7: Rural Heritage Network Rehabilitation Project

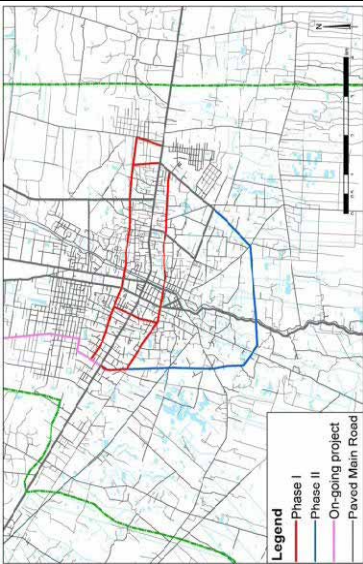
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Project Brief
Sector: Transportation

ID No.	Project Title		Beneficiaries and/or Target Group		Assumed Fund	Estimated Cost	Project Priority
TR-1	French Bridge Improvement Project		Residents in Siem Reap and Tourists		International	957 (thousand US\$)	Priority
	Project Site	Implementation Agency	Department	Contact Person	Telephone	E-mail	
	Siem Reap city	Ministry of Public Works and Transport	DPWT				
Background: 1) Existing concrete bridge on the NR6 called French Bridge is a traffic bottleneck in Siem Reap. 2) MPWT has started the construction of temporary bridge at about 200m upstream from French Bridge as the detour route for the traffic from east to west to resolve the congestion temporarily. Project and Program Outline/Components: 1) Construction of new bridge next to the existing one - Bridge length: 40m - New bridge will be used as one way from east to west while existing one will be one way from west to east. 2) Improvement of roundabout intersection at the west end of French Bridge.							
Project Purpose: 1) Resolve the traffic bottleneck by constructing new bridge parallel with existing French Bridge.							
Project Output: 1) Traffic flow on NR6 will be improved by new bridge							
Environmental and Social Impact: 1) Water pipe and facilities buried around the bridge will be affected by construction works.							
Related Projects: 1) Temporary detour bridge is under construction at about 200m upstream from French Bridge							
			Implementation Schedule: 1) Land acquisition Mar-06 Sep-07 2) Funding arrangements Mar-06 Sep-06 3) Feasibility study and detailed design Sep-06 Dec-06 4) Tender and award Jan-07 Mar-07 5) Construction Mar-04 Dec-07			Project Cost: ('000 USD) 1) Direct costs 713 2) Physical coat. 71 3) Price Escalation 71 4) Engineering service 71 sub-total 927 5) Land acquisition 30 TOTAL 957	

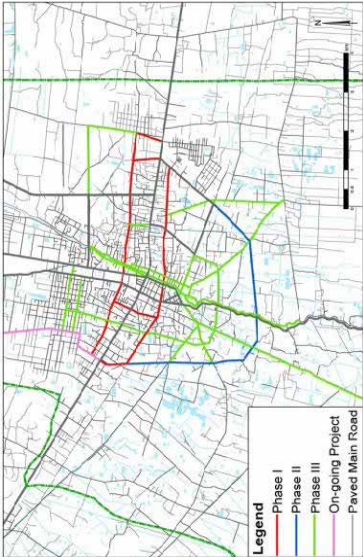
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ID No.	Project Title		Beneficiaries and/or Target Group		Assumed Fund	Estimated Cost (thousand US\$)	Project Priority																																			
	Project Site	Implementation Agency	Residents in Siem Reap and Tourists	Contact Person			Telephone	Priority	Priority																																	
TR-2	Siem Reap city	Provincial Government	Residents in Siem Reap and Tourists	DPWT	International	10,800		E-mail																																		
<p>Background:</p> <ol style="list-style-type: none"> Ribbon development of hotels and restaurants along NR6. Traffic concentration to the NR6 because of insufficient arterial and sub-arterial road network especially for east-west direction. Traffic demand forecast that shows the capacity over of traffic on the NR6 near in future. Poor road condition in width and surface pavement. 		<p>Project and Program Outline/Components:</p> <ol style="list-style-type: none"> North Road (2-lane carriageway + sidewalk) <ul style="list-style-type: none"> - new road construction for about 4.1km - widening of existing road for about 1.6km - construction of concrete bridge for about 30m South Road (2-lane carriageway + sidewalk) <ul style="list-style-type: none"> - new road construction for about 1.2km - widening of existing road for about 4.0km Approach road (2-lane carriageway + sidewalk) <ul style="list-style-type: none"> - new road construction for about 0.8km - widening of existing road for about 1.7km 																																								
<p>Project Purpose:</p> <ol style="list-style-type: none"> To unify the traffic concentration to the NR6 by developing the sub-arterial roads that run through the central city to the east-west direction. To improve the road condition in the residential area. 		<p>1) and 2) is proposed to be paved by asphalt concrete. 3) is proposed to be paved by DBST</p>																																								
<p>Environmental and Social Impact:</p> <ol style="list-style-type: none"> Resettlement is unavoidable in the expansion/construction of the objected road. 		<p>Project Output:</p> <ol style="list-style-type: none"> Dispersion of concentrated traffic from NR6. Acceleration of development other than along NR6 Separation of living traffic from tourism traffic.. 																																								
<p>Related Projects:</p> <ol style="list-style-type: none"> KOICA "Bypass Construction" project 		<p>Implementation Schedule:</p> <table border="0"> <tr> <td>1) Land acquisition</td> <td>Mar-06</td> <td>Sep-07</td> </tr> <tr> <td>2) Funding arrangements</td> <td>Jul-06</td> <td>Dec-07</td> </tr> <tr> <td>3) Feasibility study and detailed design</td> <td>Jan-07</td> <td>Sep-07</td> </tr> <tr> <td>4) Tender and award</td> <td>Oct-07</td> <td>Dec-07</td> </tr> <tr> <td>5) Construction</td> <td>Jan-08</td> <td>Dec-08</td> </tr> </table>		1) Land acquisition	Mar-06	Sep-07	2) Funding arrangements	Jul-06	Dec-07	3) Feasibility study and detailed design	Jan-07	Sep-07	4) Tender and award	Oct-07	Dec-07	5) Construction	Jan-08	Dec-08					<p>Project Cost: ('000 USD)</p> <table border="0"> <tr> <td>1) Construction Cost</td> <td>2,841</td> </tr> <tr> <td> North Road</td> <td>2,032</td> </tr> <tr> <td> South Road</td> <td>474</td> </tr> <tr> <td> Approach Road</td> <td>sub-total 5,347</td> </tr> <tr> <td>2) Physical conti.</td> <td>535</td> </tr> <tr> <td>3) Price Escalation</td> <td>535</td> </tr> <tr> <td>4) Engineering service</td> <td>535</td> </tr> <tr> <td>5) Land acquisition</td> <td>3,888</td> </tr> <tr> <td>TOTAL</td> <td>10,839</td> </tr> </table>		1) Construction Cost	2,841	North Road	2,032	South Road	474	Approach Road	sub-total 5,347	2) Physical conti.	535	3) Price Escalation	535	4) Engineering service	535	5) Land acquisition	3,888	TOTAL	10,839
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Sector: Transportation

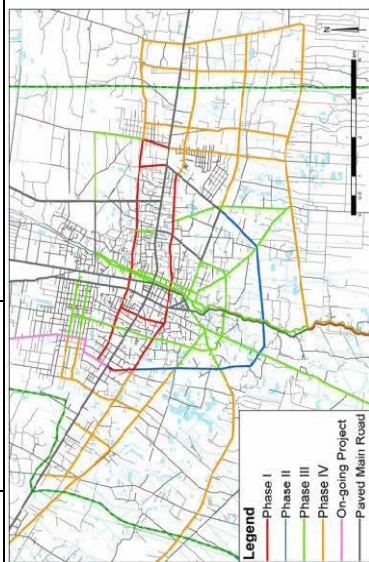
ID No. TR-3	Project Title Sub-arterial road network project (Phase 2) - Completion of Hun Sen Peace Road	Assumed Fund International	Estimated Cost (USD) (thousand US\$) 6,817	Project Priority																												
Project Site Siem Reap city	Implementation Agency Ministry of Public Works and Transport	Department DPWT	Contact Person	E-mail																												
<p>Background:</p> <ol style="list-style-type: none"> Ribbon development of hotels and restaurants along NR6. Traffic concentration to the NR6 because of insufficient trunk road network especially for east-west direction. Poor road condition (width and surface condition) in the residential area. Incompletion of Hun Sen Peace Road as a half circular road. <p>Project Purpose:</p> <ol style="list-style-type: none"> To accelerate and support the development in the southern area of Siem Reap city. To provide the alternative route especially for heavy vehicle which is restrained to enter the urban area. 	<p>Beneficiaries and/or Target Group Residents in Siem Reap and Tourists</p> <p>Project and Program Outline/Components:</p> <ol style="list-style-type: none"> Rehabilitation of existing Hun Sen Peace Road (2-lane carriageway + sidewalk) - Project length: 10.7km Completion of unfinished section of Hun Sen Peace Road (2-lane carriageway + sidewalk) - Section length: 0.3km Bridge construction on Siem Reap river (about 40m in length) 	Telephone																														
<p>Environmental and Social Impact:</p> <ol style="list-style-type: none"> Few number of resettlement will be required. Improve the surface condition of existing Hun Sen Peace road. <p>Related Projects:</p> <ol style="list-style-type: none"> Request for Japan grant aid was submitted in 2003 and 2004 	<p>Project Output:</p> <ol style="list-style-type: none"> Development in the southern area of Siem Reap Secureness of alternative route for heavy vehicle <p>Implementation Schedule:</p> <table border="1"> <tr><td>1) Land acquisition</td><td>Apr-07</td><td>Sep-07</td></tr> <tr><td>2) Funding arrangements</td><td>Jul-06</td><td>Mar-07</td></tr> <tr><td>3) Feasibility study and detailed design</td><td>May-07</td><td>Dec-07</td></tr> <tr><td>4) Tender and award</td><td>Jan-08</td><td>Mar-08</td></tr> <tr><td>5) Construction</td><td>Apr-08</td><td>Mar-09</td></tr> </table>	1) Land acquisition	Apr-07	Sep-07	2) Funding arrangements	Jul-06	Mar-07	3) Feasibility study and detailed design	May-07	Dec-07	4) Tender and award	Jan-08	Mar-08	5) Construction	Apr-08	Mar-09	Project Cost: ('000 USD)	<table border="1"> <tr><td>1) Direct costs</td><td>5,133</td></tr> <tr><td>2) Physical conti.</td><td>513</td></tr> <tr><td>3) Price Escallation</td><td>513</td></tr> <tr><td>4) Engineering service</td><td>513</td></tr> <tr><td>sub-total</td><td>6,673</td></tr> <tr><td>5) Land acquisition</td><td>144</td></tr> <tr><td>TOTAL</td><td>6,817</td></tr> </table>	1) Direct costs	5,133	2) Physical conti.	513	3) Price Escallation	513	4) Engineering service	513	sub-total	6,673	5) Land acquisition	144	TOTAL	6,817
1) Land acquisition	Apr-07	Sep-07																														
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3) Feasibility study and detailed design	May-07	Dec-07																														
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JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Transportation

ID No. TR-4	Project Title Sub-arterial road network project (Phase 3) - Peri Urban Area	Beneficiaries and/or Target Group Residents in Siem Reap and Tourists	Assumed Fund International	Estimated Cost (USD) 16,736 (thousand US\$)	Project Priority														
Project Site Siem Reap city	Implementation Agency Provincial Government	Department DPWT	Contact Person	Telephone	E-mail														
<p>Background:</p> <ol style="list-style-type: none"> Ribbon development of hotels and restaurants along NR6. Traffic concentration to the NR6 because of insufficient trunk road network especially for east-west direction. Traffic demand forecast that shows the over capacity traffic volume on the NR6 near in future. Poor road condition (width and surface condition) in the residential area. <p>Project Purpose:</p> <ol style="list-style-type: none"> To formulate the fundamental road network in urban area which complement the function of sub-arterial road constructed/rehabilitated in Phase 1 and 2. To improve the road condition in the residential area. 	<p>Project and Program Outline/Components:</p> <ol style="list-style-type: none"> Inner ring road <ul style="list-style-type: none"> New road construction for about 4.0km Widening of existing road for about 2.2km Construction of concrete bridge (about 40m) Utilization of existing road for about 1.4km Other main roads <ul style="list-style-type: none"> New road construction for about 1.8km Rehabilitation of existing road for about 22.2km 																		
<p>Environmental and Social Impact:</p> <p>1) Resettlement is unavoidable in the expansion/construction of the objected road.</p> <p>Related Projects:</p> <ol style="list-style-type: none"> (TR-2and3) Sub-arterial road network project Phase 1 and 2 	<p>Project Output:</p> <ol style="list-style-type: none"> Inner ring road formulate the southern half boundary of planned urban area up to 2012 Weather-proof road condition in the urban area 	<p>Project Cost: ('000 USD)</p> <table border="0"> <tr> <td>1) Direct costs</td> <td align="right">7,504</td> </tr> <tr> <td>2) Physical conti.</td> <td align="right">750</td> </tr> <tr> <td>3) Price Escallation</td> <td align="right">750</td> </tr> <tr> <td>4) Engineering service</td> <td align="right">750</td> </tr> <tr> <td>sub-total</td> <td align="right">9,755</td> </tr> <tr> <td>5) Land acquisition</td> <td align="right">6,981</td> </tr> <tr> <td>TOTAL</td> <td align="right">16,736</td> </tr> </table>	1) Direct costs	7,504	2) Physical conti.	750	3) Price Escallation	750	4) Engineering service	750	sub-total	9,755	5) Land acquisition	6,981	TOTAL	16,736			
1) Direct costs	7,504																		
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JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Transportation

ID No.	Project Title		Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost (USD)	Project Priority
TR-5	Sub-arterial road network project (Phase 4) - Future Urbanization Area		Residents in Future Urbanization Area	National Budget	14,921 (thousand US\$)	
	Project Site	Implementation Agency	Department	Contact Person	Telephone	E-mail
	Siem Reap city (peri-urban area)	Provincial Government	DPWT			
	Background: 1) In this master plan, urban area is planned to expand to south-east of Siem Reap 2) Existing road network in the future urban area is quite poor		Project and Program Outline/Components: 1) Sub-arterial roads in future urbanization area Total Length: approximately 52 km			
	Project Purpose: 1) Urge an urbanization in the south-east Siem Reap by following the urban planning 2) Provide the sub-arterial road network to the future urbanization area		Project Output: 1) Efficient urbanization in the south-east area 2) Vehicles passing through Siem Reap detour the central area 3) Weather-proof road condition in the future urban area			
	Environmental and Social Impact: 1) Land acquisition should be started before urbanization in order to minimize the involuntary resettlement.		Implementation Schedule: 1) Land acquisition Jun-06 Dec-12 2) Funding arrangements Jan-10 Dec-12 3) Feasibility study and detailed design Jan-13 Sep-13 4) Tender and award Oct-13 Dec-13 5) Construction Jan-14 Dec-16		Project Cost: ('000 USD) 1) Direct costs 7,975 2) Physical conti. 798 3) Price Escalation 798 4) Engineering service 798 sub-total 10,368 5) Land acquisition 4,553 TOTAL 14,921	
	Related Projects: 1) (TR-2, 3 and 4) Sub-arterial road network project Phase 1, 2 and 3					



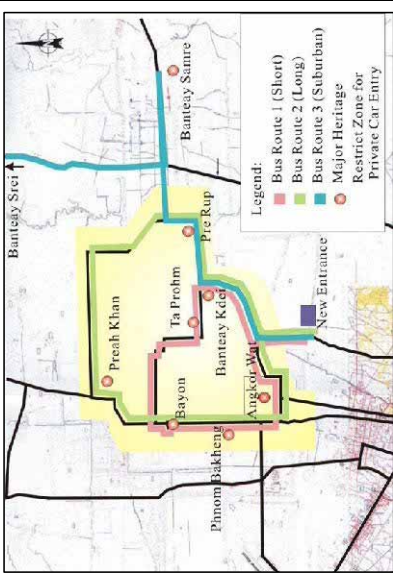
JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Transportation

ID No.	Project Title	Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost (USD 1,000 /year (thousand US\$))	Project Priority
TR-6	Institutional Improvement and Campaign for Road Safety	All Road Users	National Budget		
	Project Site Siem Reap District	Department DPWT / Police	Contact Person	Telephone	E-mail
Background: 1) Lack of driving license system for motorcycle 2) Large number of unregistered vehicles (motorcycles and passenger cars) 3) Lack of vehicle inspection system 4) Increasing traffic accident caused by the growing traffic volume and higher vehicle speed.	Implementation Agency Provincial Government	Project and Program Outline/Components: Following eight (8) components described in the Cambodian Road Safety Action Plan are included in this program. Close cooperation between provincial government, police authority, DPWT and schools is indispensable to achieve the sufficient result.			
Project Purpose: 1) Acquisition of traffic rule and improvement of traffic manner of drivers. 2) Strengthen the institutional capacity of vehicle registration and inspection. 3) Reduction of defective vehicles especially in safety device.		1) Publication of Road Safety Audit and hazardous Locations 2) Improvement of Roads Environment and Road Design 3) Road Safety Education for Children 4) Law Enforcement 5) Vehicle Technical Inspection 6) Drivers Training 7) Emergency Assistance to Traffic Victims 8) Road Safety Public Campaigns			
		Project Output: 1) Reduction of traffic accident			
Environmental and Social Impact: Any negative impact is expected.		Implementation Schedule: All the programs shall be implemented continuously		Project Cost: (0000 USD)	
Related Projects:					

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Transportation

ID No.	Project Title		Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost	Project Priority																													
TR-7	Rural Heritage Road Network Rehabilitation Project		Residents in Rural Area and Tourists	International	33,150 (thousand US\$)	Priority																													
Project Site		Implementation Agency	Contact Person	Telephone	E-mail																														
North West Region of Cambodia		DPWT																																	
<p>Background:</p> <ol style="list-style-type: none"> 1) Tourist destination is over-concentrated to Angkor Wat. 2) There are many heritages still undeveloped and not restored in the rural area. 3) Hard accessibility to the rural heritages, especially in rainy season. 																																			
<p>Project and Program Outline/Components</p> <ol style="list-style-type: none"> 1) Rehabilitation of roads between Siem Reap and Rural heritages, as listed below, into weather-proof condition. (Approx. 300km in total) <ul style="list-style-type: none"> - Kubal Spean, - Bakan, - Preah Vihear, - Koh Ker, and - Phnom Kulen. <p>It is noted that access route to Beng Mealea, Sambor Prei Kuk and Banteay Chhmar are under rehabilitation.</p>																																			
<p>Project Purpose:</p> <ol style="list-style-type: none"> 1) Diversification of concentrated tourists from Angkor Wat and other famous heritages 2) Provision of the various heritage tourism other than Angkor Wat 3) Provision of the weather-proof road network in the rural area. 																																			
<p>Project Output:</p> <ol style="list-style-type: none"> 1) Diversification of heritage tourism other than in AAP 2) Weather-proof road condition in the rural area 																																			
<p>Project Cost: ('000 USD)</p> <table border="1"> <tr> <td>1) Direct costs</td> <td>25,500</td> </tr> <tr> <td>2) Physical conti.</td> <td>2,550</td> </tr> <tr> <td>3) Price Escalation</td> <td>2,550</td> </tr> <tr> <td>4) Engineering service</td> <td>2,550</td> </tr> <tr> <td>5) Land acquisition</td> <td>sub-total 33,150</td> </tr> <tr> <td></td> <td>N/A</td> </tr> <tr> <td>TOTAL</td> <td>33,150</td> </tr> </table> <p>Implementation Schedule:</p> <table border="1"> <tr> <td>1) Land acquisition</td> <td>Jun-06</td> <td>Dec-09</td> </tr> <tr> <td>2) Funding arrangements</td> <td>Jul-06</td> <td>Dec-08</td> </tr> <tr> <td>3) Feasibility study and detailed design</td> <td>Jan-07</td> <td>Sep-09</td> </tr> <tr> <td>4) Tender and award</td> <td>Oct-07</td> <td>Dec-09</td> </tr> <tr> <td>5) Construction</td> <td>Jan-08</td> <td>Dec-10</td> </tr> </table> <p>Environmental and Social Impact:</p> <ol style="list-style-type: none"> 1) Some forest may be affected by the road expansion or improvement of existing alignment. <p>Related Projects:</p> <ol style="list-style-type: none"> 1) ADB "NR6 rehabilitation project between Siem Reap and Poipet" 2) WB "Provincial and Rural Infrastructure Project (PRIP)" 3) ADB "Northwest Regional Development Project (NRDP)" 4) Thai Government "NR64 Urgent Rehabilitation and F/S for Rehabilitation" 							1) Direct costs	25,500	2) Physical conti.	2,550	3) Price Escalation	2,550	4) Engineering service	2,550	5) Land acquisition	sub-total 33,150		N/A	TOTAL	33,150	1) Land acquisition	Jun-06	Dec-09	2) Funding arrangements	Jul-06	Dec-08	3) Feasibility study and detailed design	Jan-07	Sep-09	4) Tender and award	Oct-07	Dec-09	5) Construction	Jan-08	Dec-10
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1) Land acquisition	Jun-06	Dec-09																																	
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JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Transportation

ID No. TR-8	Project Title Introduction of Environmental Public Transport in the Angkor Archaeological Park	Assumed Fund International	Estimated Cost 7,104 (thousand US\$)	Project Priority																								
Project Site Angkor Archaeological Park	Beneficiaries and/or Target Group Tourists	Department Angkor Conservation Compound	Telephone	E-mail																								
<p>Implementation Agency APSARA Authority</p> <p>Background:</p> <ol style="list-style-type: none"> 1) Insufficient road capacity in the AAP adequate for the increasing tourists. 2) From the viewpoint of heritage conservation, the expansion of road capacity and much increase of traffic volume are not acceptable. 3) Over loaded trucks passing through the AAP damage the road in the park. <p>Project Purpose:</p> <ol style="list-style-type: none"> 1) Reduce the amount of vehicles in the AAP to protect the heritages 2) Provide the sufficient transportation for tourists in the AAP 3) Reduce the road management cost by restricting the heavy vehicle traffic 	<p>Contact Person</p> <p>Project and Program Outline/Components: Following three components are included in this project:</p> <ol style="list-style-type: none"> 1) Procurement of environmental bus and installation of bus stops 2) Construction of bus depot including maintenance facilities 3) Restriction of private car entry into the AAP <p>Proposed bus route are shown in the figure</p>	 <p>Legend:</p> <ul style="list-style-type: none"> Bus Route 1 (Short) Bus Route 2 (Long) Bus Route 3 (Suburban) Major Heritage Restrict Zone for Private Car Entry 																										
<p>Project Output:</p> <ol style="list-style-type: none"> 1) Tourists visit heritages in the AAP by environmental transportation without any extra fee other than admission fee 2) Heritages and natural resources in the AAP are protected from negative impact from increasing vehicles 	<p>Project Cost: ('000 USD)</p> <table border="1"> <tr><td>1) Direct costs</td><td>5,380</td></tr> <tr><td>2) Capacity building</td><td>100</td></tr> <tr><td>3) Physical conti.</td><td>538</td></tr> <tr><td>4) Price Escallation</td><td>548</td></tr> <tr><td>5) Engineering service</td><td>538</td></tr> <tr><td>TOTAL</td><td>7,104</td></tr> </table>	1) Direct costs	5,380	2) Capacity building	100	3) Physical conti.	538	4) Price Escallation	548	5) Engineering service	538	TOTAL	7,104	<p>Implementation Schedule:</p> <table border="1"> <tr><td>1) Feasibility study and detailed design</td><td>Jan-07</td><td>Jun-07</td></tr> <tr><td>2) Funding arrangements</td><td>Apr-06</td><td>Dec-06</td></tr> <tr><td>3)</td><td>Jul-07</td><td>Sep-07</td></tr> <tr><td>4) Construction</td><td>Oct-07</td><td>Jun-08</td></tr> </table>	1) Feasibility study and detailed design	Jan-07	Jun-07	2) Funding arrangements	Apr-06	Dec-06	3)	Jul-07	Sep-07	4) Construction	Oct-07	Jun-08		
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1) Feasibility study and detailed design	Jan-07	Jun-07																										
2) Funding arrangements	Apr-06	Dec-06																										
3)	Jul-07	Sep-07																										
4) Construction	Oct-07	Jun-08																										
<p>Environmental and Social Impact:</p> <ol style="list-style-type: none"> 1) Reduces the negative health impacts from exhaust gus 2) Reduces the negative impact to heritages <p>Related Projects:</p>																												

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Transportation

ID No.	Project Title	Beneficiaries and/or Target Group		Assumed Fund	Estimated Cost	Project Priority
TR-9	Bicycle Track Construction in Archaeological Park	Tourists		National Budget	7,104 (thousand US\$)	
	Project Site	Department	Contact Person	Telephone		E-mail
	Angkor Archaeological Park	Angkor Conservation Compound				
	Implementation Agency	Angkor Conservation Compound				
	APSARA Authority	Angkor Conservation Compound				
	Background:	Project and Program Outline/Components:				
	1) Considerable numbers of tourists visit the AAP by bicycle.	1) Construction of bicycle track along existing road (28.5km in total)				
	2) APSARA Authority has started the rental service of electric bicycle in the AAP.	2) Construction of bicycle parking at heritages				
	3) Cyclists share the road with vehicles including heavy track and tourist bus.					
	Project Purpose:	Project Output:				
	1) Improve the safety of cyclists	1) Tourists visit heritages by bicycle in safely and comfortably				
	2) Increase the amount of cyclists in the AAP	2) Increase in cyclists contribute to the reduction of the demand of vehicle transportation in the AAP.				
	Environmental and Social Impact:	Implementation Schedule:		Project Cost: ('000 USD)		
	Any negative impact is expected.	1) Feasibility study and detailed design	Jan-07	Jun-07	1) Direct costs	1,090
		2) Funding arrangements	Apr-06	Dec-06	2) Physical conti.	109
		3)	Jul-07	Sep-07	3) Price Escallation	109
		4) Construction	Oct-07	Mar-08	4) Engineering service	109
	Related Projects:				sub-total	1,417
					5) Land acquisition	Nil
					TOTAL	1,417

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Transportation

ID No.	Project Title		Beneficiaries and/or Target Group		Assumed Fund	Estimated Cost	Project Priority
TR-10	Institutional Improvement of Efficient Road Maintenance		All Road Users		National Budget	300 (thousand US\$)	
Project Site Siem Reap Province	Implementation Agency DPWT / PDRD	Department	Contact Person	Telephone	E-mail		
Background:							
1) Short for budget for road maintenance.							
2) There are not any criteria and detailed road inventory which is applicable in selecting the objected road for maintenance.							
3) Lack of collaboration or strategy between DPWT and PDRD on road maintenance							
Project Purpose:							
1) Improve the effectiveness and efficiency of road maintenance							
<p>Project and Program Outline/Components: To achieve the effective and efficient road maintenance with limited budget, following programs should be implemented in advance to increase the budget for maintenance works.</p> <p>1) Preparation of road inventory A: General Information B: Pavement Condition C: Culvert and Bridge Condition E: Traffic Condition F: Others (Maintenance record, Roadside land use etc.)</p> <p>2) Monitoring of road condition To keep the road inventory latest, pavement, structure and traffic condition should be monitored at least once a year.</p> <p>3) Coordination on road maintenance policy between DPWT and PDRD DPWT and PDRD should have concrete consensus in their road maintenance plan and maximize the effectiveness of road maintenance.</p> <p>Project Output: 1) Completion of road inventory 2) Implementation of road monitoring 3) Efficient road maintenance planning</p>							
Environmental and Social Impact:							
Any negative impact is expected							
Related Projects:							
<p>Implementation Schedule: All the programs shall be implemented continuously</p> <p>Project Cost: (000 USD) 1) Road Inventory Preparation 300 2) Annual road monitoring 150</p>							