

## CONCLUSIONS AND RECOMMENDATIONS

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#### 1. CONCLUSIONS; TRANSPORT MASTER PLAN

##### Transport System

- A bus favored policy by encouraging bus operation with coexisting of bus and 2-wheel vehicles is selected as the most appropriate transport system approach in view of traffic flow condition, system efficiency, environmental impact and social acceptance.
- This system is required particularly in the near future when the social and economic activities are revitalized with the economic development and population increase, thus requiring the shift from para-transit oriented public transport system (motodop) to a comprehensive system (bus with motodop).

##### (2) Road Development

- In the urbanized area (inside Inner Ring Road) where the road network is well developed, pavement improvement of existing arterials, collectors and local streets is of a very urgent need.
- In the suburban area which will have to accommodate future development demands, an efficient road network is required to connect development areas and strengthen connections with the national road network, including the improvement of the following:
  - Northern New Trunk Road
  - Southern New Trunk Road
  - Intermediate Ring Road
  - Outer Ring Road

##### (3) Public Transport

- Bus services are planned to be operated initially only on limited high-demand routes (84 km by the Year 2005) and then to be extended in the future according to the demand growth and road network improvement (148 km by Year 2015). Accordingly, improvement of bus terminals, stops, shelters and depots is highly required to attract bus passengers.
- Other public transport modes such as taxi, motodop, cyclo are proposed to be operated in accordance with their characteristics and function in co-existence with bus services.

For example, cyclo plays a role to attract tourists in tourism and heritage areas.

- Policy on such co-existence shall be established including a zone system for motodop and cyclo and traffic regulation of 2-wheel vehicles on major roads.

##### Traffic Management

- Traffic management is identified as an effective measure, especially in the urbanized area, to be implemented in the short-term with low cost, in order to prevent future deterioration of traffic condition and traffic nuisance as well as traffic accidents.
- Measures to be undertaken in the short-term include the provision of traffic signals (33 intersections by Year 2005), improvement of on-street parking facilities, development of accident analysis system and implementation of enforcement and education.

##### (5) Institution and Capacity Development

- Organizational reform involving establishment of budget formulation unit, public transport management unit, laboratory and data base formulation unit as well as urban transport research center is required.
- Human resource capacity is urgently needed to be developed in all fields covering top management and computer operation technique, and achieved through on-the job training and foreign-assisted training program.

##### (6) Legislation and Finance

- The sub-decrees and details of present legislation related to transport sector are recommended to be prepared and promulgated to safeguard the transport system, including vehicle registration system and driver's license system, among others.
- The fund for the implementation of the Plan is expected to be arranged through local fund, ODA and private participation. The local fund includes revenue contributions from fuel tax and vehicle ownership tax. Private participation is highly recommended to be encouraged in all possible ways.

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### 2. CONCLUSIONS; FEASIBILITY STUDY

#### (1) Bus Service Implementation

- 1) The Project aims to provide the bus service, co-existing with the motodop, as a safe, comfortable, reliable and efficient means of transportation in order to offer the most appropriate public transport system, which can cope with the future traffic demand and sustainability of urban development.
- 2) The Project is also envisaged to promote the tourism industry by promoting the favorable urban environment, and to contribute to the vitalization of urban activities.
- 3) The Project is evaluated to be feasible from technical and economical aspects with the economic internal rate of return (EIRR) of 21.9% and the benefit-cost (B/C) ratio of 1.46.

However, the financial internal rate of return (FIRR) is only 1.6% and the benefit-cost (B/C) ratio of 0.8 that suggests the negative viability in terms of finance.

- 4) Notwithstanding the negative financial viability, the introduction of bus services is considered to be of great and urgent need because of public demand at present and necessity in the future.

It is therefore suggested that the bus service shall be executed with the following system;

- Implementing Agency  
The Government, preferably MPP
- Operating Corporation
  - Phnom Penh Transport Authority (PPTA) under the supervision of DPWT.
- MPP Responsibility
  - Purchase of bus fleet.
  - Preparation of land for bus facilities.
- PPTA Responsibility
  - Operation of bus services.
  - Self-reliance management shouldering operational, general and administrative expenses.

- 5) The stage implementation of bus service operation is suggested in order to avoid the huge initial investment.
  - First Phase: Immediate Action Plan for pilot bus operation for one year.

- Second Phase: Short-term Plan for official introduction of the bus service.

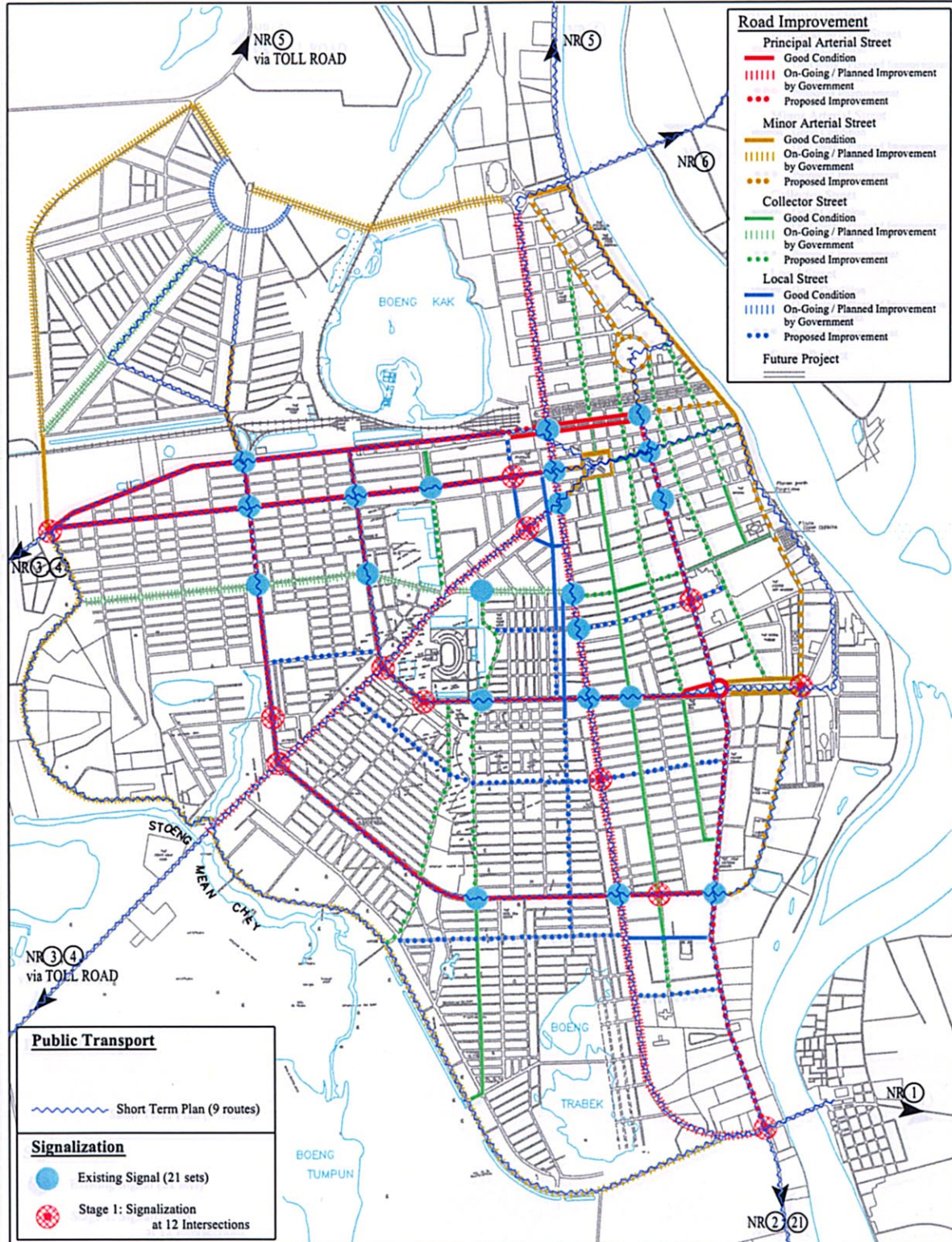
Under the MPP executing system, the profit-loss flow of PPT as the operation entity shows that the immediate action plan is profitable after 2nd year and the short-term plan after 7th year from the start of bus operation.

- 6) The environmental assessment shows the favorable impact on air pollution and public acceptance of the bus service.
- 7) Based on the above findings, the bus service operation is recommended to be urgently implemented, especially the immediate action plan under the condition that MPP is the executing agency and PPT as the self-reliance management and operation entity.

#### (2) Traffic Control System

- 1) The Project aims to improve the disorderly traffic flow, increase traffic capacity and minimize traffic accidents at major intersections by providing sophisticated traffic signals and improving intersection geometries.
- 2) The Project is also anticipated to reduce noxious gases such as CO, CO<sub>2</sub>, NO and NO<sub>x</sub> as well as noise and vibration so that a favorable urban environment can be further improved and maintained.
- 3) The Project is evaluated from technical, economic and environmental aspects to be feasible with the high economic internal rate of return of approximately 45% and the benefit cost ratio of 3.4.
- 4) The urgency of project implementation is recognized from the present congestion degree at the proposed intersections.
- 5) The environmental assessment shows favorable impacts, especially on quality level of air, noise and vibration.
- 6) Based on the above analysis, the early implementation of the project is recommended with the emphasis that the Project requires relatively small cost and short time for implementation.

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Location Map of F/S Candidate Projects

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### (3) Urban Street Improvement

- 1) The Project aims to increase the road capacity, reduce the traffic cost and distribute properly the traffic on the functionally classified roads as well as to provide a favorable environment with the reduction of road dust, enhancement of community development and promotion of tourism industry.
- 2) The Project is also expected to contribute to the realization of the proposed bus service operation by providing high capacity roads for bus and paved roads for motodops, which are preferably restrained to travel on bus routes.
- 3) The Project is justified to be technically and economically feasible except for the reconstruction of local streets for which the economic internal rate of return is 11.3%, slightly below 12%, and the benefit cost ratio of 0.94.
- 4) The urgency of project implementation is assessed to be very high because of severely damaged road surface with frequent flood, which are seriously hampering the socio-economic activity of people.
- 5) The environmental assessment indicates a favorable impact, given that only reconstruction of existing roads are planned requiring no new right of way acquisition for road improvement.
- 6) It is, however, noted that there is a tendency of increasing traffic accidents as road surfaces are improved and running speeds are increased.

Therefore, it is highly recommended that traffic management and safety measures shall be taken, prior to and simultaneously with the project implementation.

- 7) Based on the above findings, the Project is recommended to be implemented at the soonest possible time with the special caution taken on the possibility of increasing traffic accidents and on the required countermeasures thereof.

### (4) The Three Projects Described above are Designed to Help Each Other

Accordingly, the three projects should be implemented in a synchronized manner.

## 3. RECOMMENDATIONS

- 1) Plan Authorization
  - The Transport Master Plan was formulated for the Phnom Penh Metropolitan Area to the target year 2015, in order to solve various transport problems and to support sustainable urban development.
  - For this purpose, it is highly recommended that the Plan should be authorized for smooth implementation of recommended projects and measures.
- 2) Plan Premise

The Plan was drawn up on the basic premise of development policy established by the Municipality of Phnom Penh;

  - Urbanized Area  
Preserving landscape, cultural heritage and environment as well as easing concentration of population.
  - Suburban Area  
Achieving spatial distribution of urban activities, creating progress region with urban structure, enhancing high development potential with amenity and achieving the planned population growth.

For this reason, the development policy shall take effect immediately prior to the implementation of the Plan.
- 3) Effective Organization
  - The Plan recommends the numbers of projects and measures which require huge investments and implementation capacity and therefore effective organization to ensure a systematical implementation approach and process is the vital key in the successful realization of the Plan.
  - For these purposes, the recommended organizational reform shall be executed to be suitable for the characteristics of the projects and measures.

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- 4) Professional Skill
  - The effective organization with skillful administrative and technical staff is an absolute requirement to systematically implement the projects and measures. Such effective organization staffed with professional shall be established under appropriate institutions and with legislation.
  - For these purposes, recommended human resource capacity development programs shall be carried out prior to and during the implementation of the Plan.
- 5) Fund Preparation
  - The fund required for implementation of the projects and measures is recommended to be prepared through project categorization suitable to fund characteristics. An example of categorization is;
    - Local Finance Type
    - Official Development Assistance Type
    - Government/Private Partner Type
    - Private Participation Type
  - Attraction of private participation is recommended to be encouraged to execute projects and measures in which high commercial returns are expected.
- 6) Road Improvement with Land Development
  - Road improvement, which leads to land development by private sector, shall be implemented prior to or simultaneously with land development so that systematic and controlled land development can be achieved.
  - Some roads with high potential of land development are recommended to be improved by private participation interested in such land development.
- 7) On-schedule Implementation
  - Project and measures are composed to help and support each other, and their implementation timings were examined in such a way that they work most efficiently.
  - The Plan should be implemented according to their schedule in order to bring the optimum benefits.
- 8) Traffic Education
  - The education on traffic rules, regulation, and driving manner is an essential element of the Plan, and its importance cannot be neglected. It should be clearly understood that road improvement tends to increase the number and severity of traffic accidents.
  - Prior to, during and after the implementation of any project and measure, the public shall be properly warned that the duty of the Government is to educate the public, but the duty of the public is to control themselves.
- 9) Early Implementation of Feasibility Study Projects
  - Three (3) projects, namely bus service implementation, traffic control system and urban street improvement, are rationalized to be feasible from technical, economical, financial and environmental aspects as well as the institutional and human capacity viewpoints.
  - The Projects are, therefore, recommended to be implemented immediately with the special attention mentioned in the conclusions.
    - Bus Service Implementation; Execution by the Government for implementation of the immediate action plan.
    - Traffic Control System; Installation of sophisticated traffic signal.
    - Urban Street Improvement; Traffic safety measures against possible increase of traffic accidents.

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### **JICA Advisory Committee**

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