Pre-Feasibility Study
Urban Transport for Surakarta, Indonesia

June 2011
Executive Summary

Prepared by Mott MacDonald Group
A. **Background**

1. Mott MacDonald Group was appointed in October 2010 by GIZ under the three year CDIA Pre-Feasibility Studies (PFS) framework (Contract Number 81124179) to undertake an urban transport study for Surakarta, Indonesia. The project was undertaken between October 2010 and June 2011 (eight months). CDIA’s main objective in carrying out such studies is to bridge the gap between city transport plans and actual investment in transport infrastructure projects. The emphasis is therefore to provide investors with sufficient background information to make effective investment decisions.

2. Consequently the key objectives of the study and of transport investment in Surakarta are:
   
   2.1. To establish an urban transport sector strategy in Surakarta and formulate necessary policy and regulatory frameworks to implement the strategy.
   
   2.2. To identify priority and bankable transport investments that do not have any direct negative impacts on the environment and which contribute to improved environmental conditions and mitigate climate change.
   
   2.3. To strengthen the capacity of key institutions involved in the management and service delivery of the urban transport sector, including local and provincial level agencies, as applicable.

3. The focus of this document is to the prioritised investment proposals within the context of the agreed five year action plan and the pre-feasibility studies prepared as part of this assignment.

B. **City Profile**

4. Surakarta is located in Central Java. There are six adjacent kabupaten and together the seven regions form Subosukawonosraten, or the Greater Surakarta Region. Surakarta itself is a regional centre for trade and commerce and attracts a high commuting population from neighbouring areas. The city is also a hub for Central Java for regional rail, with a number of railway stations located within the city boundaries. Commuting is a major task for the transport system with the greater area of Surakarta comprising more than one million inhabitants. Private car use and growth in ownership and use of motorcycles has developed very quickly resulting in increasing levels of congestion in the city.

C. **Development Issues and Trends**

5. Current development trends tend to ‘suburbanisation’ with development following road corridors. Rising incomes have accelerated this trend by increasing car and motorcycle ownership that favours longer distance movement to cheaper residential land. Such trends have, along with the challenges faced by public transport, directly caused a decline in public transport mode share.

6. One concern is that as a result of imbalanced development, there is currently a concentration of trips moving towards the south of the city. This has caused some problems in terms of transport operation due to capacity constraints on both roads and junctions in this part of the city.
D. Demographic Condition and Trends

7. By 2030 the Surakarta population is estimated to grow to 616,000 from 523,000 in 2008. Recent growth has been more significant in the fringe areas in the adjacent regencies where lower housing densities and greenfield sites allow growth.

8. The overall growth in population for the Greater Surakarta area was 1,158,000 people in 2008. This is estimated to grow to give a population of 1,525,000 people by 2030.

E. Economic Growth

9. The economic growth of Surakarta has closely followed the national trend. During the period of year 2001-2009, the economic growth of Municipality of Surakarta was 5.6% per annum.

10. Regional Income per Capita. From 2000 to 2009, real Regional Income in Gross Regional Domestic Product (GDRP) per capita increased by 48% which indicates an increased capacity to pay on average for improved urban services. In 2009 the income per capita was Rs.7,900,000.

F. Developing the Long Term Transport Strategy

11. The vision and guiding transport strategy/policy framework (15-20 years) has been developed through our participation with stakeholders and through a review and analysis of past studies and plans to appreciate the previous efforts to deal with Surakarta’s transport issues.

12. The Mayor's vision and implied objectives for Surakarta have provided overall guidance for the Long Term Transport Strategy. These policies have been derived from an analysis of current problems and the desired vision and goals of the Mayor of Surakarta. We have expanded the Mayor's appraisal of problems to state our assessment of the core problems that have given rise to the current transport situation.

12.1. Uncoordinated land use, transport and development;

12.2. Inadequate road network development and management;

12.3. Low quality public transport;

12.4. Inadequate priority for non-motorised transport; Increased costs for freight transport; and

12.5. Inadequate resources and capacity.

13. The policies proposed in this report are designed to address the needs identified. There are four policy areas as summarised below:

13.1. Supporting economic development. The transport system should be developed to support the economic development for Greater Surakarta;

13.2. Improving the fairness and accessibility of transport;

13.3. Reducing the environmental impacts of transport / improving the safety and security of transport; and
13.4. Strengthening institutions, procedures and capacity.

G. **Recommended Long Term Transport Strategy**

14. The Recommended Long Term Transport Strategy is built around 7 key elements:

14.1. Promoting the Use of Sustainable Modes of Transport;

14.2. Transport Demand Management;

14.3. Road Network and Traffic Development;

14.4. Public Transport Development;

14.5. Non-Motorised Transport;

14.6. Freight Transport;

14.7. Environmental / Social Considerations; and


H. **Prioritised Investment Programme**

15. The study followed a logical process to select an investment programme for pre-feasibility study. The selection is consistent with the city’s policies, strategies and lists of projects identified in existing plans and previous studies and also projects identified during our review of urban transport in Surakarta. The Pre-Feasibility Study was scoped to include following two groupings of components as follows:

15.1. Development of BST Line 2 and revisions to BST Line 1:

15.1.1. A BST Route 2 connecting south and west areas of the city and revisions to BST Line 1;

15.1.2. Rationalisation of existing bus services to complement the BST service including rearrangement of small bus services as feeder services;

15.1.3. One grade separation of road and rail;

15.1.4. Improvement of junction designs to enhance junction efficiency including integration of pedestrian and NMT movements into the junction controls;

15.1.5. Improvement of NMT facilities: pedestrian infrastructure and improved access facilities for NMT modes to BST stops; and

15.1.6. Rationalisation of on-street parking and provision of off-street parking and park and ride.
15.2. Development of BST Lines 3 and 4:

15.2.1. Two new BST Routes: Line 3 to run north-south and Line 4 from east to west passing north of the city centre;

15.2.2. Rationalisation of existing bus services to complement the BST service including rearrangement of small bus services as feeder services;

15.2.3. Three grade separations of a major roads and railway line.

15.2.4. Improvement of junction designs to enhance junction efficiency including integration of pedestrian and NMT movements into the junction controls;

15.2.5. Improvement of NMT facilities including pedestrian infrastructure and as well as improved access facilities for NMT modes to BST stops.

15.2.6. Rationalisation of on-street parking in the corridor to free up roadspace for buses, pedestrians and NMT.

16. The location of the physical project components is illustrated in Figure 1. They show a good geographical spread across the city and especially in the main activity centres close to Jl Slamet Riyadi, Jl Yos Sudarso and Pasar Gede. Implementation of the project components will give the City’s long term transport strategy impetus for further development of public transport and non-motorised transport facilities.

17. In addition to the two project packages described above there are two items that are more general in nature and not related to specific lines:

17.1. Institutional and regulatory actions needed to facilitate the implementation of the project.

17.2. Improvement of the facilities and services of the Central Control Room (CCR) located at DisHub.

18. Indonesia Infrastructure Initiative or Indii (AusAid) has since then taken up the second of these project packages and has funded further consultancy services to review the CCR and recommend development of operations and further roll out to enhance operational monitoring of BRT.
I. Stakeholder Consultations

19. Wide stakeholder consultations have been undertaken through individual meetings and a project workshop was held in December 2010. This workshop sought feedback on urban transport issues and generated discussion on previous and new proposals. For key stakeholders there has been continuing involvement in discussion of issues and proposals through meetings with the Technical Team.

J. Finance and Economics

Capital Costs
20. Capital costs for BST Line 2 and revisions to BST Line 1 are estimated at $16m (excluding project costs and tax). On the same basis the BST Lines 3 and 4 capital costs are estimated at $26m. The total capital costs, including project costs and tax, are estimated at $49m.

Economic Analysis
21. General features of the economic evaluation results are:

21.1. In accordance with ADB guidelines a discount rate of 12% was used and sensitivity tests were conducted with discount rates of 10% and 15%.

21.2. Sensitivity tests are also presented to indicate the effect of higher and lower project costs and benefits.
21.3. Benefit-cost ratio (BCR), net present value (NPV), and economic internal rate of return (EIRR) are shown as performance indicators for the evaluation.

22. The principal evaluation is based on the best estimate of total project costs and benefits. This includes use of a best estimate of cost with a small added allowance for planned risk (and which is approximated by the assumed contingency) but excludes any allowance for unplanned risk.

23. For BST Line 2 the results of the evaluation show a BCR of 1.13 with a NPV of $2.6 million using a discount rate of 12% pa, and an EIRR of 14.2%.

24. For BST Lines 3 and 4 combined the results of the evaluation show a BCR of 1.33 with a NPV of $8.2 million using a discount rate of 12% pa, and an EIRR of 16.9%.

25. These results assume a very low value of travel time and also include the costs of some items for which the benefits have not been calculated e.g. pedestrian improvements.

26. These results of the sensitivity tests suggest that it is likely that the BCR for the project will be more than one for a very broad set of circumstances.

Financial Analysis

27. A preliminary financial analysis has been undertaken based on three procurement options. The first option is a traditional public procurement method where the public sector (i.e. DAMRI) procures and operates the buses. The second and third options involve private participation in the delivery of bus services or Public Private Partnership (PPP). The private sector involved in the project as a bus operator is assumed to take the form of a Special Purpose Vehicle (SPV) according to applicable laws and regulations in Indonesia. Two models of PPP, gross cost and net cost, were analysed. Each PPP model has a different structure of risks and benefits allocation and provides different advantages and disadvantages in terms of overall return of the project, efficiency gains, cost to the government and attractiveness to the private sector.

28. The project period is assumed to be 14 years covering two franchise periods of seven years each (for the PPP option). In the PPP case, the capital investments (mainly bus purchases) and all operating and maintenance are absorbed by the private operator for both PPP options.

29. In the PPP gross cost model, it is assumed that the private operator receives a fee for service for a contracted level of service output plus certain level of profit margin to be agreed with the government. The government receives fare revenue and other revenues associated with the running of buses such as sales of advertisement. The government uses the revenue received to pay for the operator fees. In the gross cost model, ridership risk is wholly transferred to the public sector who will collect and manage the fare revenue. Operating risk belongs to the private sector.

30. For the PPP net cost model, the private operator receives the box fare revenue and associated revenue (e.g. sales of advertisement) as well as a fixed level of government subsidy as additional income. The government subsidy is needed to make the projects financially viable and attractive to private investors. The subsidy is assumed to take the form of annul lump sum payment throughout the project period. The private sector, thus, takes ridership risks but the risks are mitigated to certain level with financial support from the government.
31. The financial analysis undertaken showed that:

32. Use of the private sector for bus service provision offers value for money (VfM) compared to the option of traditional procurement that is assumed to be via DAMRI.

32.1. Dependent on realised patronage, local government financial support is likely to be needed annually through the life of the bus concession. Expansion of the BST model and implementation of the whole medium term Action Plan in the context of the Long Term Strategy will ‘optimise’ any ongoing financial support.

32.2. Separate analysis indicated that a competitively procured ‘gross cost’ or ‘availability’ form of operational concession with payments for defined services, and where the private sector also has to supply and finance buses, would be superior to the alternative of net cost including bus supply and finance with subsidy.

K. Sources of Investment

33. Given the magnitude of the investment funding required, and the limited financial capabilities of the Surakarta City government, it is clear that external assistance will be required to achieve the city’s policy objectives. Following consideration by the consultants, and discussion with local government officials, two main investment schemes have emerged as possibilities:

33.1. A conventional public sector approach, in which national government is asked to provide funding - possibly through APBN Special Allocation Funds; and

33.2. An innovative approach, which would involve a wider range of stakeholders in a public-private partnership (PPP) arrangement.

34. Conventional Public Sector approach: This would involve different agencies from the city, province and national government, implementing project components that fall within their respective areas of responsibility, using the budget funding allocated to them. However, the availability of such funding is likely to be limited, and its timing is uncertain.

35. Public-Private Partnership (PPP) approach: A possible alternative involves the creation of a ‘public-private partnership’ operating through a Special Purpose Vehicle (SPV) – a non-government entity that:

35.1. brings together elements of the public and private sectors in a coordinated effort to implement a particular project or projects;

35.2. has the capability to borrow, from both local and international sources;

35.3. can commission and implement project components, and any associated preparatory studies that may be required; and

35.4. provides the framework for the management of funds, including loan applications, debt service (repayments), receipt and distribution of project revenues, utilisation of equity investments, and payment of dividends to equity investors.
Each party would bring expertise and funding to the partnership according to its abilities

36. Enhanced involvement of the private sector through PPP would allow the City to draw on resources, expertise, and capital from the private sector. Such opportunities may exist in terminal and bus operation and management of car parking.

37. Figure 2 below illustrates the possible application of a SPV PPP model in Surakarta.

**Figure 2: Possible application of a SPV PPP model in Surakarta**

38. However, there are a number of issues that would warrant attention. In the short term, in Surakarta, the SPV model could be applied to BST lines 2, 3 and 4 etc. where the focus would be initially on improved bus services.

39. 40. The simplest form of the SPV model would be a private entity established under the Indonesian Corporations Law that could be contracted to provide desired bus service services and supporting facilities and this is recommended as an initial application of a SPV model in Surakarta.

**L. Social and Environmental Issues**

41. The social impacts of the projects are generally positive and improve the accessibility of communities, including the poor, to employment, local markets, the city centre, and so on. Safety along the BST corridors, which contain many schools, would be improved. There are however likely to be some job losses for the lower income population who would work as parking attendants and bus crews. There would also be impacts on PKL/warung through relocation but in the past these have been well mitigated owing to the sensitive way the City Government has handled this issue.

42. Environmental impacts are mainly during the construction period and these can be mitigated through adoption of good practice by contractors. There would be some loss of
mature trees and greenery and this should be addressed during the feasibility stage or detailed design. The reconfiguration of junctions would reduce delays and hence emissions. The operation of new, efficient BST buses would also contribute to reduced emissions.

43. In summary, the project impacts are supportive of the City’s transport policies as they are well aligned with core policies of supporting economic development, improving the fairness and accessibility of transport and reducing the environmental impacts, safety and security of transport. In addition the projects are demonstrated to support the City’s vision of promoting sustainable transport and equitable modes of transport and improving the attractiveness and usage of public transport.

M. Implementation Issues and Project Packaging

44. With support from donors and PPP entities, the project implementation is visualised as taking place in the medium term period to 2015. The first implementation risk is to put funding in place together with the necessary modalities in a timely fashion. The choice of funding modality will to a large extent determine the packaging of contracts for implementation. The second implementation risk is to progress the restructuring of public transport in time to commence the new bus operations once the infrastructure and equipment has been procured.

45. Table 1 below shows the possible packaging of components into homogenous packages together with cost, comments on viability and potential financiers. Following this, one-page descriptions of each package are given.
### Table 1: Project Packaging

<table>
<thead>
<tr>
<th>Package</th>
<th>Cost (USD '000)</th>
<th>Viability</th>
<th>Potential Financiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>BST Line 2: buses, haltes, terminals interchanges and associated</td>
<td>2,733</td>
<td>Strong +ve</td>
<td>PPP, APBN (buses), APBD (other)</td>
</tr>
<tr>
<td>infrastructure and equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BST Lines 3 and 4 (buses, haltes, terminals interchanges and associated</td>
<td>3,084</td>
<td>Strong +ve</td>
<td>PPP, APBN (buses), APBD (other)</td>
</tr>
<tr>
<td>infrastructure and equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junction Improvements – 29 no plus provision of bus lanes in one-way</td>
<td>4,722</td>
<td>Strong +ve</td>
<td>ADB, IBRD, JBIC, etc.</td>
</tr>
<tr>
<td>section of JI Slamet Riyadi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade Separations – 4 no</td>
<td>25,397</td>
<td>Marginal or -ve</td>
<td>ADB, IBRD, JBIC, etc.; APBN</td>
</tr>
<tr>
<td>Parking Management – including off-street car parks</td>
<td>6,337</td>
<td>-ve if land</td>
<td>PPP, APBD</td>
</tr>
<tr>
<td>NMT Improvements – including 2 pedestrian over-bridges</td>
<td>6,266</td>
<td>Marginal or -ve</td>
<td>APBN, APBD</td>
</tr>
<tr>
<td>CCR Enhancement</td>
<td>300</td>
<td>Marginal or -ve</td>
<td>Bilateral agency (grant or loan)¹</td>
</tr>
</tbody>
</table>

¹ Indii (AusAid) has since financed further consultancy service to review requirements and possible further areas of support.
### Project Implementation of BST Line 2

<table>
<thead>
<tr>
<th><strong>Project</strong></th>
<th><strong>Implementation of BST Line 2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>The Batik Solo Trans (BST) system has one existing line serviced by a fleet of 21-seat air-conditioned buses with high floors. Bus stops (haltes) have raised platforms and allow level boarding to the buses. A flat fare of Rp.3000 per trip ($US 0.30) is charged. Ticketing is done on the bus. Provision has been made for a smart card system although the interim operation uses a conductor to collect fares. BST Line 1 provides an east-west. In the westbound direction the service loops south of the city centre because of the lack of a suitable westbound road. The Pre-Feasibility Study proposes creation of a contra-flow lane in Jl Slamet Riyadi, the major road spine in the city, to give a better level of service to passengers. BST Line 2 will operate from Solobaru, a rapidly growing new residential area on the southern fringe of the city, and Adi Sumarmo Airport to the north-west of the city and will pass through the city centre. Part of the route will share the contra-flow section of Jl Slamet Riyadi and easy interchange between the two routes is planned. The route length (one-way) will be 17 km and a fleet of 22 buses will be required to service the route.</td>
</tr>
<tr>
<td><strong>Social / Environmental Impacts</strong></td>
<td>The operation of high quality modern buses will improve air quality; The poorer sections of society will have improved access to employment and to local markets, schools, etc.; The restructuring of bus routes and of on-street parking may lead to some job losses by small bus crews and parking attendants; Erection of haltes/interchanges may need relocation of street vendors and kiosks.</td>
</tr>
<tr>
<td><strong>Institutional and other Support</strong></td>
<td>The City is committed to improving public transport and raising its market share and intends to restructure the bus industry and route network to support expansion of the BST system with city buses and small buses providing complementary services. A programme of junction and highway network improvements is planned that will aid movement of buses and also improve conditions for non-motorised transport, including pedestrian facilities, and this will also improve access to bus services.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$2.5m including buses, haltes/interchanges, and depot.</td>
</tr>
<tr>
<td><strong>Viability</strong></td>
<td>Economic and financial viability were investigated during the Pre-Feasibility Study.</td>
</tr>
<tr>
<td><strong>Economic Viability</strong></td>
<td>The project is viable economically.</td>
</tr>
<tr>
<td><strong>Financial Viability</strong></td>
<td>The project would require financial support from Government to be viable for investors, the amount of support will depend on the type of contract and risk sharing between the Government and investor.</td>
</tr>
<tr>
<td><strong>Potential Funding Sources</strong></td>
<td>Private sector investors in partnership with Government. There is good potential for a Special Purpose Vehicle to allow a PPP type of arrangement.</td>
</tr>
<tr>
<td><strong>Project Risks</strong></td>
<td>Operation of city buses in the BST corridor undermines demand; The prescribed fares do not keep pace with cost increases (if operator takes revenue risk).</td>
</tr>
<tr>
<td>Project</td>
<td>Implementation of BST Lines 3 and 4</td>
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<td>---------</td>
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</tr>
<tr>
<td><strong>Description</strong></td>
<td>The Batik Solo Trans (BST) system has one existing east-west line serviced by a fleet of 21-seat air-conditioned buses with high floors. Bus stops (haltes) have raised platforms to allow level boarding to the buses. There is a flat fare of Rp.3000 per trip ($US 0.30). Ticketing is done on the bus. Provision has been made for a smart card system although the interim operation uses a conductor to collect fares. BST Line 3 will operate from Solobaru, a rapidly growing new residential area on the southern fringe of the city, and Kadipiro to the north of the city and will pass through the city centre. The service will have interchange points with BST Lines 1, 2 and 4 and will also pass close to the Inter-City Bus Terminal at Tirtonadi. The route length (one-way) will be 9 km and a fleet of 15 buses will be required. BST Line 4 will operate from Jebres, in the east of the city, and Kerten Bus Terminal, in the west of the city. The route will be 7 km in length and will pass to the north of the city centre. It will have interchange points with the Inter-City Bus Terminal at Tirtonadi and also with BST Lines 1, 2 and 3. A fleet of 12 buses will be required.</td>
</tr>
<tr>
<td><strong>Social / Environmental Impacts</strong></td>
<td>The operation of high quality modern buses will improve air quality; The poorer sections of society will have improved access to employment and to local markets, schools, etc.; The restructuring of bus routes and of on-street parking may lead to some job losses by small bus crews and parking attendants; Erection of haltes/interchanges may need relocation of street vendors and kiosks.</td>
</tr>
<tr>
<td><strong>Institutional and other Support</strong></td>
<td>The City is committed to improving public transport and raising its market share and intends to restructure the bus industry and route network to support expansion of the BST system with city buses and small buses providing complementary services. A programme of junction and highway network improvements is planned that will aid movement of buses and also improve conditions for non-motorised transport, including pedestrian facilities, and this will also improve access to bus services. The works include improvement of an existing, but sub-standard, railway underpass on the route plus the construction of a new grade separation at a railway level crossing.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$3.1m including buses, haltes/interchanges, and depot.</td>
</tr>
<tr>
<td><strong>Viability</strong></td>
<td>Economic and financial viability was investigated during the Pre-Feasibility Study. <strong>Economic Viability.</strong> The project is viable economically. <strong>Financial Viability.</strong> The project would require financial support from Government to be viable for investors, the amount of support will depend on the type of contract and risk sharing between the Government and investor.</td>
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<tr>
<td><strong>Project Risks</strong></td>
<td>Operation of city buses in the BST corridor undermines demand; The prescribed fares do not keep pace with cost increases (if operator takes revenue risk).</td>
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</tbody>
</table>
### Project: Junction and Traffic Improvements

**Description**

The city is experiencing a moderate level of traffic congestion and traffic movements are hampered by the lack of key connections. Jl Slamet Riyadi, the major spine road of the network, operates one-way eastbound and there is no matching route for westbound traffic.

Many major roads are wide but the control of traffic operations is suboptimal because of: inefficient designs of junctions; poor control of roadside activities including businesses operating on the footways or in the road; parking. The lack of adequate footways and road crossing points make conditions for pedestrians very poor in many locations. To mitigate this situation the project will entail:

- Construction of a contra-flow bus lane in Jl Slamet Riyadi to allow BST buses to travel westbound in the road;
- Upgrading of 29 junctions, most of which now have traffic signals; the improvements would entail a reconstruction of some of the key junctions to give more efficient designs; at all junctions there is a need to provide traffic signals for pedestrians to allow safe crossing points; at some junctions the signal equipment will need to be replaced with modern signal sets.

**Social / Environmental Impacts**

Construction works will have environmental impacts such as dust, noise, vibration and temporary diversion of traffic;

- The safety and amenity of pedestrians and other non-motorised transport modes will be improved;
- The poorer sections of society will have improved mobility and hence improved access to employment and to local markets, schools, etc.;
- The works may require the relocation of some street vendors and kiosks;
- Works in Jl Slamet Riyadi will have a significant impact on trees, and other planting; the junction improvements may also have some adverse impacts on planting but to a lesser degree.

**Institutional and other Support**

The City is committed to improving public transport and facilities for non-motorised transport (NMT) modes. Traffic-related improvements will support bus operations and NMT facilities through a set of coordinated actions.

The City intends to extend the Batik Solo Trans (BST) system with the introduction of 3 new lines. Three new grade separations and one improvement are planned for road/railway crossings. There are also plans to enhance pedestrian footways and to rationalise on-street parking and displace some of this to off-street sites.

**Cost**

$5.0m including project costs and tax.

**Viability**

Economic viability was investigated during the Pre-Feasibility Study and the project is considered to be economically viable.

**Potential Funding Sources**

The project is a candidate for national funding, possibly with some local counterpart funding. It is also suitable for funding by bi-lateral IFI's or by the larger agencies as part of a larger package of urban improvements.

**Project Risks**

Public sentiment is against key improvements such as a contra-flow lane in Jl Slamet Riyadi.
### Project: Grade Separations of Road and Railway

#### Description
The major east-west railway line passes through Surakarta. There is also a railway line branch serving areas to the north, including Semarang. There are many locations in the city where railway lines cross major roads. Of these, only one has grade separation and it is substandard. The east-west line carries a high volume of passenger trains and is also used for freight services. Consequently, there are frequent disruptions to both motorised and non-motorised traffic when level crossing barriers are closed during the passage of trains.

The project entails the provision of grade separation structures, preferably by underpass, of three intersection points of road and rail plus the improvement of one sub-standard rail underpass.

#### Social / Environmental Impacts
- Construction works will have environmental impacts such as dust, noise, vibration and temporary diversion of traffic;
- The safety and amenity of pedestrians and other non-motorised transport modes will be improved at the crossing points;
- The poorer sections of society will have improved mobility and hence improved access to employment and to local markets, schools, etc.;
- The works may require the relocation of some street vendors and kiosks;
- The works may require the removal of some areas of planting, including mature trees.

#### Institutional and other Support
- The City is committed to improving public transport and facilities for non-motorised transport (NMT) modes. Traffic-related improvements are targeted at improving conditions and facilities for bus and NMT and entail a set of coordinated actions for public transport and road network improvements.
- The City intends to extend the Batik Solo Trans (BST) system with the introduction of 3 new lines. An extensive programme of junction improvements with full pedestrian facilities is planned. There are also plans to enhance pedestrian footways and to rationalise on-street parking and displace some of this to off-street sites.

#### Cost
$25.4m including project costs and taxes

#### Viability
Economic viability was investigated during the Pre-Feasibility Study. The project is unlikely to be economically viable.

#### Potential Funding Sources
The project is a candidate for national funding, possibly with some local counterpart funding. It may also be suitable larger IFI’s, as part of a wider package.

#### Project Risks
- Feasibility study determines that some land acquisition needed which will impose delays to construction;
- Political pressure from frontage owners delays construction.
<table>
<thead>
<tr>
<th>Project</th>
<th>Rationalisation of On and Off-Street Parking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The city is experiencing a moderate level of traffic congestion. Many major roads are wide but the control of traffic operations is poor because of inefficient designs and poor control of traffic operations. Parking at the kerbside and on footways is one aspect which hampers the movement of both motorised and non-motorised traffic. To mitigate this situation the project will entail:</td>
</tr>
<tr>
<td></td>
<td>- Rationalisation of on-street parking by rearranging designated parking areas, both in terms of the extent of parking and its configuration (e.g. angle parking replaced by parallel parking);</td>
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<tr>
<td></td>
<td>- Provision of off-street parking facilities in areas where parking on-street will be displaced; in some cases Government land suitable for use as parking lots may not be available and private land may have to be acquired;</td>
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<td></td>
<td>- Park and Ride. Provide facilities at public transport terminals.</td>
</tr>
<tr>
<td>Social / Environmental Impacts</td>
<td></td>
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<tr>
<td></td>
<td>- The rationalisation of on-street parking may lead to some job losses for parking attendants;</td>
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<tr>
<td></td>
<td>- The amenity and safety of pedestrians in activity centres in the city will improve as the clutter of parking, including illegal parking on footways, is reduced; pedestrian safety will also improve as footways are freed of parked vehicles which often compel people to walk in the road; and</td>
</tr>
<tr>
<td></td>
<td>- The project is neutral in terms of its effect on the poorer sections of society who are not owners of motorised vehicles although they would share in the safety and amenity benefits above.</td>
</tr>
<tr>
<td>Institutional and other Support</td>
<td>The City is committed to improving public transport and facilities for non-motorised transport (NMT) modes. Traffic-related improvements are targeted at improving conditions and facilities for bus and NMT and entail a set of coordinated actions for public transport and road network improvements. The City is also committed to a review of its parking tariff structure to enhance its control over the type and extent of parking (short/long term) and will also examine restructuring of its current system of tendering car parking operations.</td>
</tr>
<tr>
<td>Cost</td>
<td>$6.3m including project costs and taxes.</td>
</tr>
</tbody>
</table>
| Viability | **Economic Viability.** The economic viability of all traffic-related actions has been assessed and is viable although the parking component was not analysed as a stand-alone project. The procurement and operation of off-street car parking is unlikely to be economically viable.  
**Financial Viability.** There is scope for investors to construct and operate off-street car parks, possibly with operation of adjacent car parking as a supplement. |
<p>| Potential Funding Sources | The project is a candidate for national funding or local funding. There is good potential for a Special Purpose Vehicle to allow a PPP type of arrangement with an investor constructing and operating off-street car parks potentially with operation of on-street parking included. |
| Project Risks | |
| | - The level and structure of parking tariffs set by the City are too low; |
| | - Ineffective control of on-street parking undermines the demand for off-street parking. |</p>
<table>
<thead>
<tr>
<th><strong>Project</strong></th>
<th><strong>Non-Motorised Traffic Improvements</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>The operation of Surakarta City's road network is dominated by the needs of private motorised modes: cars and motorcycles. There are no public transport priorities and facilities for non-motorised transport modes (NMT – comprising pedestrians, becak, bicycles) are generally poor. Footways are often not continuous along roads, are often occupied by vendors and kiosks and are not user-friendly in terms of their design and lack of maintenance. Road crossing points are also inadequate. NMT facilities are also important as the provide access to public transport. The project will: Upgrade existing footways on the existing BST line and proposed three new lines and provide good quality footways where none now exist; and Provide for wheeled NMT modes by repairing and upgrading existing facilities including service lanes, waiting/parking at activity centres and bus stops.</td>
</tr>
<tr>
<td><strong>Social / Environmental Impacts</strong></td>
<td>The improvement of footways and other NMT facilities will have safety and amenity benefits for pedestrians and users of becak and bicycles; The improvements will be of particular benefit to the poorer sections of society who depend on walking and public transport in order to fulfil their daily travel needs; Footway improvements will require relocation of vendors and kiosks now occupying the footways.</td>
</tr>
<tr>
<td><strong>Institutional and other Support</strong></td>
<td>The City is committed to improving public transport and facilities for non-motorised transport (NMT) modes. Traffic-related improvements will support bus operations and NMT facilities through a set of coordinated actions. The City intends to keep footways clear of vendors, kiosks and other business activities. A programme of junction and other traffic improvements will coordinate with the footway and NMT improvements to provide safe crossing facilities at junctions and also mid-block locations. Rationalisation of parking on-street is intended to remove parked cars and motorcycles from footways.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$6.3m including project costs and taxes.</td>
</tr>
<tr>
<td><strong>Viability</strong></td>
<td>Economic viability has not been investigated for this component during the Pre-Feasibility Study. The project, while possessing safety and amenity is unlikely to be economically viable.</td>
</tr>
<tr>
<td><strong>Potential Funding Sources</strong></td>
<td>The project is a candidate for national funding or local funding.</td>
</tr>
<tr>
<td><strong>Project Risks</strong></td>
<td>Vendors and kiosks occupying footways cannot be relocated owing to unsuitable alternative sites.</td>
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<tr>
<td>Project</td>
<td>Enhancement of Central Control Room</td>
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<tr>
<td><strong>Description</strong></td>
<td>The Central Control Room (CCR) is a successful initiative of the Surakarta City Government. It was implemented in 2006 to monitor traffic operations and conditions on the road network and take any necessary interventions for maintaining effective operation of the road network including assisting the movement of buses. The project is to procure services and equipment to enhance the operation of the Central Control Room with particular reference to supporting bus operations in the city. The project focus is on short-term support which may include capacity building, procurement of equipment and implementation of new procedures and processes.</td>
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<tr>
<td><strong>Social / Environmental Impacts</strong></td>
<td>The project will improve the effectiveness of traffic control and thus reduce journey times, mainly for public transport users, but also improve journey time reliability for all modes of traffic; The poorer sections of society who are dependant on public transport will have improved access to employment and to local markets, schools, etc.;</td>
</tr>
<tr>
<td><strong>Institutional and other Support</strong></td>
<td>The City is committed to improving public transport and facilities for non-motorised transport (NMT) modes. Traffic-related improvements will support bus operations and NMT facilities through a set of coordinated actions. The current regulations control the DisHub organisation structure and do not make allowance for recruiting permanent staff for the CCR and the City needs to negotiate this issue with Central Government.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$0.3m including project costs and taxes.</td>
</tr>
<tr>
<td><strong>Viability</strong></td>
<td>Economic viability was investigated during the Pre-Feasibility Study. The project viability was not investigated as a stand-alone project. However, it is considered is likely to be economically viable as it will deliver improved road and traffic operations – and hence savings in travel time, vehicle operating costs and accident costs – which would yield a positive NPV.</td>
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<tr>
<td><strong>Potential Funding Sources</strong></td>
<td>The project is a candidate for national funding and/or local funding. It is also suitable bi-lateral IFI’s. The AusAid funded Indonesia Infrastructure Initiative (IndII) are currently undertaking a study of the of the CCR’s functions related to bus operations with a view to potential funding of CCR expansion.</td>
</tr>
<tr>
<td><strong>Project Risks</strong></td>
<td>Institutional constraints make it difficult to strengthen CCR staffing by making key technical staff permanent, thus undermining training needs; Sole supplier issues make procurement of equipment expensive.</td>
</tr>
</tbody>
</table>
N. Institutional and Capacity Development Requirements

46. In view of the need to be realistic and appropriate two feasible institutional improvement options are proposed but which have different time frames for implementation:

**Option 1:** Transport Authority for Surakarta – Strengthen the capacity and functions of DisHub to better perform needed transport functions within the municipality of Surakarta and support enhanced sub-regional coordination;

**Option 2:** Transport Authority for Greater Surakarta - In the event that local government reform was to take place, to amalgamate relevant local governments. This would be an extension of Option 1 but operating at the level of Greater Surakarta. This is regarded as a long term option.

47. Our recommended strategy is to Implement Option 1 with donor support and move to upgrade to Option 2 at a time when this is practicable.

48. The proposed new Authority would remain a department of the Municipality and would be staffed by senior officials. Different skills are required than those that are present today and new skills in economic regulation and contract management of public transport services will be needed. We recognise that the organisational structure of DisHub is not within control of the City but is stipulated by central government and therefore any changes to the structural will be difficult to achieve. For that reason we propose that, until the organisational structure can be altered, DisHub should endeavour to achieve recommended changes through redefined functions rather than changes to DisHub’s structure. The main functional groups should consist of:

48.1. Transport policy and planning;

48.2. Transport safety;

48.3. Sustainable infrastructure engineering and operations;

48.4. Public transport route planning and procurement;

48.5. Vehicle registration and vehicle testing for safety and emissions; and

48.6. Finance, legal and administrative functions.

49. In the context of Surakarta, a model of technical assistance is recommended where support is provided to the head of DisHub and delivered as needed to various arms of DisHub and other departments has merit. This model depends, as do all, on the leadership of the Mayor and the holding of the head of DisHub accountable for implementation. The hybrid model therefore provides the head of DisHub with skills and resources to support implementation and so meet his or her obligations.

50. Figure 3 below illustrates the institutional delivery arrangements for project development, which explains the functions that DisHub requires. Additional staff capability is either being sourced internally or through selective technical support.
O. Road Map for Future Development of BST Services

51. This PFS proposes revisions to the existing BST line and the expansion of the system through implementation of three new lines. Beyond this phase further new routes should be added improve bus service, allow maximum participation and involvement of the various players in the public transport industry and thus make the BST network sustainable. A longer term BST network has been prepared with an additional three lines (see Figure 4 below). No PFS has been carried out on these three lines but they appear to be the most promising routes as the next priorities for implementation and are worthy of further study.

52. Together with route planning there is a need to restructure the current informal public transport system into a more formal system mainly through changes in institutions and regulations.
Figure 4. Potential Future BST Network