Overview of Urban Mobility in Surabaya and the Implementation of an Area Traffic Control System
Part 1: ATCS

ATCS locations
Existing equipment
  Controllers
  Lanterns
  Pedestals
  Countdown clocks
Detectors
U-turns
Benefits of ATCS (Green Wave Coordination)
Integration with Public Transport
Sites to be connected to ATCS (stage 1)

>60000 vehs/day

Jalan Diponegoro

Two intersections operated from one controller (RA Kartini and Dr. Sutomo)
Traffic Volumes (23/06/09)
Jalan Diponegoro

Traffic Volumes (Northbound)

Traffic Volumes (Southbound)
Existing Equipment

Traffic Signal Controllers – are not supported and do not provide real time adaptive operation. Some controllers have suspect interlocking (operating green/green conflicts)

Lanterns – require upgrading and a review of standards.

Pedestals – require terminal strip covers and review locations.
Traffic Signal Controllers

New designs are required with the latest features. Need to map detector inputs and signal group outputs.

Consider UPS (Uninterrupted Power Supply) required to power a site for minimum of 6hrs (without mains power), but typically can power a site for at least 9hrs.

Consider ELV (Extra Low Voltage) Safer for technicians and public - in the case of electrocution, 42 volts is non-deadly. 5-10% reduction in power consumption.
New Traffic Signal Designs

- **Vehicle Detector Loops**
- **Detector Sensor Unit**
- **Pedestrian Push Buttons**
- **Logic Module**
  - **Personality**
  - **24 Outputs**
- **Vehicle Signal Group**
  - **Telecom Line**
  - **32 Inputs**
- **SCATS – Regional Computer**
  - **Pedestrian Signal Group**
Detectors

Use a combination of inductance detectors on the main road where there is full depth asphalt and video detectors on side road where the surface may be poor and generally no kerb and channel.
Lanterns

No backup lantern displays for vehicles at the stop line
Lanterns

LEDS
Some locations, have LED lanterns, it is recommended that all lanterns are eventually upgraded to LED. The benefits of LED are as follows:
- 80% reduction in power consumption.
- The typical reliability of today's LEDs are 7 - 10yrs, whereas an incandescent bulb can fail within 1yr.
- The LED aspect is only deemed as 'failed' when more than 20% of the pixels are expired.
- LEDs are more brighter and conspicuous - proven to increase intersection safety.
- LEDs can operate via a UPS, due to the low power that is drawn.
Pedestrian Lanterns and Push Buttons

Ped lanterns not working, no p.b.s

Arrow display in conflict with ped. movement

PB too high
Pedestrian Lanterns and Push Buttons

Push Button located at each pedestrian refuge

Audio tactile devices

Pedestrian & Bicycle lanterns
Pedestals

Use turning path templates Corner radii to a minimum to reduce turning speeds, to minimise clearance times for pedestrians and vehicles and to optimise signal post locations. Minimum clearance 0.5 m kerb to signal equipment and at least 1.2 m wide for 3 aspect lanterns. Pedestrian refuge width 1.8 m minimum Wide medians increase clearance times
Countdown Clocks

Fixed time systems use Count down clocks, however adaptive systems can count down 10 secs before the end of the green time, if required (ex. Kuala Lumpur).
U-turns

U turn can operate in the shadow of the signalised intersection. Also a controlled pedestrian movement could be included in the design.
Benefits of SCATS

Evaluation results (from Australia and USA) are available for SCATS suggest the typical savings due to SCATS implementation are:

- 6.6% to 32% reduction in travel time (average 7.8%);
- Up to 28% reduction in delay; and
- Up to 42% reduction in stops.

With Green Wave Coordination, reduced cycle times and adaptive phase times. SCATS in Asia Pacific Region (Australia, Singapore, Malaysia) – assist with training and support.
Green Wave Coordination

Jln Diponegoro (Jln. Pasar Kembang to Jln. Raya Darmo)
Public Transport Priority

SmartBus Technology – How does it work?
Traffic Management Centre

Congestion data from SCATS

CCTV, VMS

Traffic Management, Police, PT operators
Part 2: Urban Mobility

• Overview
• Public Transport System
• Public Transport Development Strategy
• Mass Transit Proposals
• Bus Rapid Transit
• BRT and ATCS
• Non-Motorized Transport
• Recommendations to Improve Urban Mobility
Overview

- Coherent spatial development strategy
- Broad elements of the transport system to serve it
Overview

• Since 2000, the city has made efforts to:
  😊 Improve ambient air quality
  😊 Reduce pollution; and
  😊 Improve the road network

BUT....

• Little progress has been achieved in:
  😞 Managing demand
  😞 Improving public transport; and
  😞 Improving mobility for pedestrians and non-motorized transport
Overview: Results

• Good primary road network
Overview: Results

- Average speeds of 34 km/h
- VC Ratios below 1.0
  on all but 4 sections of most heavily trafficked roads
Overview: Results

• Increased car volumes; and

• Significant increase in motorcycle ownership and use

From 631,000 in 2002 to 1 million in 2008
Public Transport System

- 270 City buses on 20 routes
- 5,000 Microbuses on 58 routes
- 40,000 Becaks
- Limited rail service
Public Transport Issues: City Buses

- No schedules
- Only serves north-south corridor
- Buses uncomfortable
- Many not roadworthy
- Most bus stops are inaccessible
Public Transport Issues: Microbuses

- No schedules
- Wait until full
- Multiple transfers
- Multiple fares
- Hard to regulate
Public Transport Issues: Rail

• Single track operation
• Limited schedule and no east-west links
• 11 level (at grade) road crossings
Public Transport Issues: Becaks

- Restricted to neighborhoods
- But use main roads
- Unsafe
- Hard to regulate
Public Transport Development Strategy

- Mass transit
- CBD Hub
- Feeder services link districts
Mass Transit Proposals: 2005 Monorail

- Proposed by Department of Transportation, Province of East Java
- Status: Unknown
Mass Transit Proposals: 2005 Commuter Rail

- Proposed by Ministry of Transport, Jakarta
- Status: Unknown
Mass Transit Proposals: 2006 Bus Rapid Transit

- Proposed by City of Surabaya
- Status: On hold
Mass Transit Proposals: 2009 Light Rail Transit

- Proposed by Ministry of Transport, Jakarta
- Status: Unknown
Bus Rapid Transit (BRT)

- BRT network
- Phase 1 = heavily trafficked north-south corridor
- 40 km is length with 47 stations
- Estimated demand
  - Peak = 3,868 pass/hr/dir with 75 buses (1.5 min headway)
  - Off-Peak = 1,627 pass/hr/dir with 32 buses (5 min headway)
- Total bus fleet requirements = 83 buses with 85 passengers
- Buses and stations would be air conditioned and “high floor” similar to those adopted in the TransJakarta system.
Bus Rapid Transit (BRT): Alignment

- Separate busway: Alongside the median

- Separate busway: Kerbside along one-way system within CBD
Bus Rapid Transit (BRT): Demand projections

- Demand projections assume transfers of passengers from:
  - City buses (that would be replaced by the BRT)
  - Microbuses
  - Private car users; and
  - Motorcyclists

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<th>No</th>
<th>Vehicle Type</th>
<th>Passengers/hour/direction</th>
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<td>City Bus</td>
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<td>4</td>
<td>Motor Cycle</td>
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</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>3,868</strong></td>
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</table>
Bus Rapid Transit (BRT): Issues

Demand projections

• Until there are demand management measures that will encourage private car users and motorcyclists to shift to BRT, it is unlikely that the system will attract this group of potential passengers

• Sensitivity analysis is required assuming:
  (a) only city bus passengers use the BRT; and
  (b) city bus and microbus passengers use the BRT

• More work will therefore be necessary to assess how the BRT can be made attractive to non-public transport users (especially motorcyclists).
Bus Rapid Transit (BRT): Issues

Busway design

- The current BRT busway design is only diagrammatic

- Essential to undertake detailed analysis of the existing road and junction conditions (including turning movements and frontage access requirements)

- And then to design the busway at a scale of 1:500 along with changes that will be required to existing roads, junctions, sidewalks and so on to accommodate the BRT system.
Bus Rapid Transit (BRT): Issues

Right of Way (ROW)

- The BRT busway can be integrated within the existing ROW
- Except at Mayangkara Utara where the BRT would have to operate in mixed traffic and use the two lane flyover over the railway line

- This section will require extensive study and possibly extensive civil works and resettlement to enable the BRT line to pass through without hindrance from traffic and frontage activities.
- There may be a case here to develop a shopping/market concourse above and integrated with the BRT station.
Bus Rapid Transit (BRT): Issues

Stations

• Stations need to be of a size and scale to accommodate passengers safely and allow for speedy boarding and alighting.
• Proposed width of 3.5 m for an “island” station is a minimum.
Bus Rapid Transit (BRT): Issues

Stations

• Examples from Curitiba Brazil
Bus Rapid Transit (BRT): Issues

Stations

• High Floor or Low Floor?
Bus Rapid Transit (BRT): Issues

Stations
• High Floor or Low Floor?
Bus Rapid Transit (BRT): Issues

Stations

• Transfer and Interchange
Bus Rapid Transit (BRT): Issues

Private Sector Participation

• Opportunities should be investigated for private sector involvement in the design and implementation of the BRT system.

• It will be especially important to examine land and mixed development opportunities (Mater Hill Clinic complex in Brisbane)
Bus Rapid Transit (BRT): Issues

Integration with Non-Motorized Transport

• Opportunities should also be looked at for integrating BRT with pedestrian streets within the central area.
• This approach can often be attractive to developers
Bus Rapid Transit (BRT): Issues

BRT and microbuses

• Essential to bring microbus owner-drivers (and their respective associations) into the design process

• Discuss possibilities to be involved in the operation and management of the system

• Convert the microbus system in Surabaya from a marginal activity into a viable public transport enterprise that will attract passengers

• And don’t forget the Becaks....
Bus Rapid Transit (BRT): Issues

Where does the BRT proposal stand?

- There appear to be jurisdictional issues concerning the ability of the city to implement a BRT system on a national road.
  - *Discussions need to be held urgently with Bina Marga*
- There also appears to be an interest on the part of BPJT to develop an elevated toll road along part of the BRT alignment
  - *Discussions need to be held urgently with BPJT*
- There also appears to be a concern that the microbus owners may oppose a BRT system for fear of losing passengers
  - *Involve microbus owner-drivers in design and operation*
- There is a LRT proposal along the BRT Phase 1 alignment
  - *Rationale, backing and status of the LRT proposal should be clarified by the Ministry of Transport*
BRT and ATCS

- The lack of decision concerning the BRT proposal will not in itself cause any delay in the implementation of the first phase of the proposed ATCS.
- The proposed ATSC system can be adapted to a BRT system.
- Clearly it would be preferable if the BRT detailed design was available and approved as the ATCS system could then dovetail perfectly with the location and operation of the BRT.
Non-Motorized Transport

- GTZ proposals only partially implemented – sidewalk improvements but not NMT routes
Pedestrian Facilities

• Since 2006, sidewalk improvements have been made to many primary roads in and around the CBD
Pedestrian Facilities

- In 2010 raised pedestrian crossings are being implemented in 20 locations where secondary roads intersect with primary roads.
- They need to be replicated at ALL pedestrian crossings, especially those along the primary roads and those controlled by traffic signals.
Pedestrian Facilities

- Surveys need to be undertaken of footpaths conditions....
Non-motorized vehicles and cyclists

- assess the potential for cycling and for providing a comprehensive cycle network in anticipation of changes in behavior and technology.....
Recommendations to Improve Urban Mobility

Strategic Vision and Urban Mobility Planning

• Provide technical assistance to assist the city in developing a coherent and comprehensive urban mobility strategy that draws on local initiatives and international best practice to improve mobility for all citizens in a sustainable and cost effective manner and reduce dependence on private cars and motor cycles.

• This would include investigating options for improved coordination at the city level and the for the Surabaya metropolitan area (in cooperation with the provincial government and surrounding municipalities).

• In addition, there will be a need for workshops, training and stakeholder involvement on how to manage transport demand within the Surabaya context (this is probably the greatest challenge confronting the city in terms of urban mobility).
Recommendations to Improve Urban Mobility

Bus Rapid Transit

• In order to develop the existing BRT pre-feasibility study into a viable and implementable project, the city will require technical assistance and exposure to appropriate international best practice on the following:
  • Busway alignment through congested areas, narrow cross sections and at critical intersections.
  • Station design to ensure rapid boarding and alighting, as well as easy and safe pedestrian access.
  • Ease of transfer and interchange and integrated fare systems, ideally using smart card technology, with capable and independent overall management.
  • Bus specification.
Recommendations to Improve Urban Mobility

Bus Rapid Transit

[Diagram of project timeline with activities and milestones]
Recommendations to Improve Urban Mobility

Bus Rapid Transit and Microbus Owner-Drivers

• Technical assistance and access to international best practice will be required to assist the city in ensuring that microbus owner-drivers are fully integrated within the BRT system design process.

• This will also provide opportunities to discuss ways to improve microbus services throughout the city (such as introducing scheduling, integrated fares, etc.) and improve the quality and maintenance of the vehicles (through access to micro-credit facilities).

• In addition, this will provide an opportunity to assess driver training needs as well as micro-business management training needs and develop responsive training programs.
Recommendations to Improve Urban Mobility

Non-Motorized Transport

- Technical assistance and access to international best practice will be required to assist the city in undertaking extensive pedestrian movement surveys throughout the city, especially within the CBD and market areas.
- Surveys also need to be undertaken of the physical condition of footpaths and pavements throughout the city.
- The results of this work would be used to undertake pilot projects to assess the viability and impact of remedial measures (such as raised pedestrian crossings, pedestrian refuges, etc) at high concentrations of pedestrian movement.
- In addition, the potential for cycling should be investigated as, despite climatic conditions, with the introduction of priority measures to ensure safety, cycling can become an attractive alternative to motorized transport.
Recommendations to Improve Urban Mobility

Origin-Destination data and transport models

- There has been no origin-destination surveys or transport modeling undertaken in Surabaya since 1997.
- With the increase in population, activities, vehicles and road network, it is certainly time to undertake a comprehensive survey of trip patterns.
- Many of the decisions concerning mass transit and public transport require an understanding of current and future travel patterns.
- Technical assistance is therefore required to assist the city in determining the type of transport model that would be appropriate (and cost effective) and be capable of providing updated information in the future.
Recommendations to Improve Urban Mobility

Leadership and stakeholder participation

• A new Mayor will be appointed within the next few months, the time is therefore ripe for the strategic visions and ideas prepared by the technical staff to be presented and discussed with the city leadership in a convincing and politically attractive manner.

• At the same time, stakeholders and the population at large need to be informed and consulted about the technical options that are available to improve mobility in the city.

• Both activities require special skills that could be strengthened and provided by targeted technical assistance familiar with the local situation.
Thank You