Inclusive Design of Bus Rapid Transit
Experience from Latin America

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Outline of Presentation

1 - Bus Rapid Transit in Latin America
2 - The Lima Transport Project
3 - Inclusive Design in BRT Schemes
4 - Conclusions
1. BRT in Latin America

- Existing Systems
  - Curitiba (and other Brazilian cities)
  - Quito
  - Leon de Guanajuato
  - Bogotá

- Systems under Implementation
  - Santiago de Chile
  - Lima
Curitiba (Brazil)

- Segregated Busways
  - First busway in 1973
  - Five busways now, 60 km

- Operational Aspects
  - Trunk (bi-articulated buses)
  - Feeder, express services
  - High-level platforms, fare prepayment

- Transport - Land Use Coordination
  - High-density development along busways
Quito (Ecuador)

- **Trolleybus-way ("Trole")**
  - Started operation in 1996
  - Initial system: 16 km, 32 stations,
  - **High-level platforms**, fare prepayment
  - **Electric trole through historic city streets**

- **Ecovías Busway**
  - Started operation in 2002
  - Diesel buses
  - **high-level left-hand doors**
Leon de Guanajuato

- Started operation in 2003
- 26 km of busway
- 52 stations
- High station platforms
- Fare prepayment
- 120 articulated trunk-line buses (doors on left)
- 31 feeder routes with 209 conventional buses
• TransMilenio Phase 1 (1998-2002)
  – 41 km of busway, 57 stations and 4 transfer terminals
    (connecting with 39 feeder lines)
  – 470 articulated trunk-line and 243 feeder-line buses
  – Similar to Curitiba, but much higher volumes

• TM Phase 2 (2003-2005)
  – 40 km busway, 57 stations, 3 terminals
  – 335 trunk-line and 170 feeder line buses
Santiago de Chile

- **Integrated Transport System**
  - Full-scale reform, to start mid-2005
  - Covers 100% of public transport
  - Full ticket and fare integration

- **Busways**
  - *Alameda* and Santa Rosa in 2005
  - Other busways in subsequent years
  - Some bus lines extend beyond busway
  - Low-floor buses, doors on the right
2. The Lima Transport Project

- Similar concept to Bogotá
- 28.6 km of exclusive busway, 35 stations
- 50 km of feeder bus routes
- construction in 2004-2007
- 519,000 passengers per day (forecast for 2007)
- WB and IDB loans approved in late 2003
- Total investment: US$ 134 million, including complementary works, goods and services. Overall average cost: US$4.7 million per km of busway
- Subsequent system expansion planned
The Lima-Callao Metropolitan Area

• Population: 8 million
  – 30% of Peru
  – Lima 90% - Callao 10%

• Average annual income/capita: US$2600
  – Accounts for 50% of Peru’s GDP
  – Accounts for 85% of Peru’s tax collection

• 38% below poverty line
Traffic Conditions in Lima

- 800,000 motor vehicles – old and polluting
  - Approx. 600,000 cars – of which 30% operate as taxis
  - 55,000 buses – up from 11,000 in 1990
  - 45,000 motorized tricycles

- Public Transport carries 81% of trips
Existing Public Transport in Lima

- Government bus company dissolved in 1990

Deregulation of bus services resulted in:
- Vastly increased, but dispersed supply
- 82% of passengers enjoy direct connections
- Reduced queues and waiting times
- Oversupply, bus congestion and pollution
- Informality, bad image and high fares
**Existing Busways in Lima**

- **Vía Expresa**
  - Started operation in 1972
  - 7.5 km, in median of 6-lane motorway
  - 8 stops (without passing lanes)

- **Additional busways with at-grade intersections**
  - Total length 9.4 km, mostly four-lane, built in 1986
  - Informal buses + minibuses, poor image

- **Main lessons**
  - Bus capacity on Vía Expresa is restricted by layout of bus stops
  - Informal bus operation limits potential benefits
Lima Transport Project components

- Construction of a transport corridor (28.6 km), including busway and improvements to the adjacent traffic and pedestrian facilities
- Construction of bus stations, transfer terminals, and bus depots
- Paving and other improvements to bus feeder roads in poor areas
- Improvements to pedestrian and vehicle circulation in central Lima
- Recovery of public space and other improvements for pedestrians and cyclists
- Restructuring bus service supply
- Outreach and social action program
- Air quality monitoring: Stage 1
- Traffic safety program
Access to Vía Expresas Busway in Lima

- Stations will be rebuilt (median instead of on two sides). Extra bus passing lanes will be added.
- Elevators will be added for passengers with disabilities.
3. Inclusive Design in BRT Systems

• **Investment and operating costs – must be kept low**
  - extra infrastructure costs borne by (financially constrained) Government
  - extra bus costs are ultimately borne by (generally poor) passengers

• **Many aspects do not cost more**
  - Colour schemes of stops and buses
  - Clear, well lit, colour coded signs
  - Space for wheelchair passage
  - Often: ramps instead of steps

• **Many are important for safety, security and image**
  - At stops and terminals: illumination, benches, cleanliness, assistants
  - In bus: illumination, driver actions, seats for infirm (considerate behavior)
  - Approaching bus stop: raised crosswalks, sidewalk ramps, illumination
  - Improved enforcement reduces petty crime and vulnerability
Design Elements to be Specified for Buses

Assist the mobility impaired
- Carefully consider platform connection (transition plate: yes or no?)
- At least one wheelchair space with fastening device on each bus
- Signs reserving seats for pregnant women, the elderly and infirm

Assist the sight impaired
- Contrasting colour schemes for stanchions, holding bars, doors
- Consider lit signs to indicate next station
- Consider public address system to announce next station
- Specify good lighting in busses and at stops
With or without Transition Plate? (1)

facilitates boarding for all passengers
With or Without Transition Plate? (2)

... it is possible to manage without
Design Elements for Buses (3)

Assist the sight impaired
- Contrasting color schemes for stanchions, holding bars, doors
- Consider lit signs to indicate next station
- Consider public address system to announce next station
- Specify good lighting in busses and at stops
Design Elements for Bus Stops and Terminals

• Passenger Platforms (planned to be high level)
  - Bright and vandal-proof illumination, contrasting color schemes
  - Station names should be easily visible from inside the buses
  - Clear and simple signs to easily identify different bus services
  - Tactile strips ahead of platform edge for the visually impaired
  - Include at least one bench on each platform

• Access
  - Raised crosswalks (*camellones*) to reach bus stops
  - On feeder roads, include *camellones* or (depressed) sidewalk ramps
  - Avoid steps wherever possible
  - Where stairs are unavoidable, provide at least one ramp access
  - Wheelchair lifts only in exceptional situations
  - At least one turnstile per entrance must permit wheelchair entry
Access to Bus Stops in Bogotá
Practices to be Specified for Bus Operation

Operation of Stops and Terminals
- Uniformed assistants in each stop (model: misión Bogotá)
- Keep stops clean, well-lit and repair damage immediately

Operation of Buses
- Set criteria for drivers (acceleration, breaking, curves)
- Announce route, direction and next station
- Foster cultural change - encourage passengers to behave considerately
- Keep buses clean and well-lit
- Training module for bus drivers and other operations staff - raising awareness of constraints faced by disabled passengers
Bus Stop Assistants in Bogotá

trained assistants at stops can do much to improve access
4. Conclusions

• Bus Rapid Transit is becoming established technology in large Latin-American cities - some planning in Asia and Africa

• Objectives for BRT usually include:
  – independent from growing traffic congestion
  – reform and modern management result in better services and fewer buses
  – better services attract more passengers, incl. potential car users
  – fewer and newer buses result in less air pollution
  – investment and operation is usually less costly than metro or LRT

• BRT also provides new opportunities for inclusive transport
  – Recent BRT systems have incorporated inclusive design principles
  – Important aspect to also consider: Access to BRT stations
Access to BRT Stations

• Feeder services (bus, taxi, three-wheeler)

• Pedestrian mobility to BRT stations →
  → → ensure traffic safety and personal security

• Pedestrian access must be well designed on the approaches to BRT stations:
  – unobstructed and level layout of footways and sidewalks
  – ramps (instead of curbs) at street crossings
  – adequate sidewalk maintenance
  – sidewalks free from trash and parked vehicles
Sidewalks are critical
3 horrors ...

and 1 model