WORLD BANK GUIDELINES FOR 
THE INCLUSIVE DESIGN OF 
BUS RAPID TRANSIT

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### BRTs in Developing Countries

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<th>Region</th>
<th>City</th>
<th>Year</th>
<th>Kilometers</th>
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<td>Asia</td>
<td>Hangzhou (China)</td>
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Curitiba (Brazil)

- First busway in 1974
- Five busways now, 65 km
- Integrated transport system
- Trunk (bi-articulated buses – 260 pass/bus), feeder, express services
- High station platforms, fare prepayment
Goyânia (Brazil)

- First busway opened in 1976, remodelled 1999
- 89 articulated buses with doors on left side
- High-level platforms and fare prepayment
- Second busway, low-level platforms, bus doors on right side
**Quito (Ecuador)**

- **Trolleybusway (“El Trole”) -1995**
  - 17 km of busway
  - 113 articulated Trolleybuses, Diesel standby motors, **right**-hand doors
  - High station platforms, fare prepayment
- **Ecovía Busway (Diesel) - 2003**
  - 9 km of busway
  - 42 articulated buses, with **left**-hand doors
- **Central-Norte Corridor (Diesel) - 2004**
  - 11 km of busway
  - Articulated trunk buses with **right**-hand doors
  - Passing lanes at intermediate stations
Bogotá (Colombia)  
TransMilenio

- **Phase 1 (2000-2002)**
  - 42 km of busway, of which 25 km are 2+2 lanes
  - 57 stations and 4 transfer terminals (connecting with 39 feeder lines)
  - 470 articulated trunk-line and 235 feeder-line buses

- **Phase 2 (2003-2006)**
  - 42 km of busway, 50 stations and 5 terminals
  - 335 articulated trunk-line and 146 feeder buses

- **Operations**
  - Similar to Curitiba, but much higher volumes
  - Rapid implementation, reform of bus industry
  - Commercial success, excellent image
  - May 2006 volume 1.4 million passengers/day, maximum load point 45,000 pphpd (2+2 lanes)
León (Mexico)

- Started operation in 2003
- 26 km of trunk line
- 2 terminals and 51 intermediate stations
- High station platforms
- Fare prepayment
- 52 articulated trunk-line buses (doors on left)
- 31 feeder routes with 209 conventional buses
• Started operation in June 2005
• 19.5 km of trunk line
• 2 terminals and 34 intermediate stations
• Fare prepayment
• High station platforms
• Buses with left-hand entry
• 80 articulated trunk buses
• 250,000 passengers/day in first three weeks of operation when no fare was charged
• 220,000 passengers/day after July 10, with a 32 US Cents equivalent fare
• Overcrowding and other teething problems at beginning

Mexico City
Beijing (China)

- 5-km busway opened in 2004
- Low passenger volumes initially
- Full 16-km “pilot route” opened in December 2005
- Second busway under construction
- Aim: 300 km for 2008 Olympics
- Modeled after Curitiba
- High-level entry CNG buses, doors on left, articulated, made in Italy
- Average commercial speed expected to be 35km/h, including express services
Jakarta (Indonesia)

- 13 km of trunk line, opened in Jan. 2004
- Built after Governor’s visit to Bogotá
- Many operational shortcomings at beginning, now much improved
- Standard-sized buses with one(!) high-level door on the “wrong” side
- Long dwell times at stops → bus queues
- Bogotá-style stations with turnstiles
- At some stations, passenger access via pre-existing overpasses
- Some stations offer wheelchair access
- Parallel buses operate in same corridor
- No feeder buses
- 65,000 daily passengers in mid-2005
- Two additional corridors (33km) opened in January 2006
- Nine further corridors to open in 2007, before Governor’s term ends

Source: ITDP
Hangzhou (China)

- Opened April 2006
- 10 km of bus lane
- 48 articulated buses (160 pax) low-floor, doors on right side
- 55 km by end-2006
- 142 km by 2010
- Fare prepayment at BRT stations
- 16 months for planning and construction

Sources: Georges Darido, University of Florida and ITDP
**What do these BRTs have in common?**

- Physically segregated busways
- Controlled operation of trunk+feeder buses
- High station platforms
- Fare prepayment, flat fares, free transfers with feeder buses
- LRT- or metro-like appearance and performance
- Distinct identity and good image
- Mostly operated by private bus companies
- High passenger volumes
- High commercial speeds of bus operations
- *Much lower cost than LRT or metro alternative*
What do these BRTs have in common?

Physically segregated busways

Curitiba

Bogotá

Quito
What do these BRTs have in common?

**Trunk-feeder operation**

**Advantages of “open” operation**
- Fewer passenger transfers
- No need for transfer terminals
- Less bus route restructuring

**Advantages of trunk-feeder operation**
- Better bus control → higher capacity
  and → faster + more reliable flow
- Special trunk-line buses can be used
- Fare prepayment and faster boarding/alighting
- Distinct (usually more attractive) image
What do these BRTs have in common?

**High station platforms**

- only BRT buses have access
- rapid boarding and alighting
- disability-friendly

**Bogotá**

**Quito**

**León**
What do these BRTs have in common?

Fare prepayment

Bogotá

Quito
Comments on BRT as a public transport mode

• Bus Rapid Transit is a new and accelerating trend in large cities of the Americas. BRT planning has started in other Continents.

• The usually given objectives for BRT include:
  – BRT is independent from growing traffic congestion
  – Bus reform and modern management result in better services and fewer buses
  – Better services result in more passengers, incl. potential car users
  – Fewer and newer buses result in less air pollution
  – Its implementation and operation is less costly than metro or LRT
  – It can also provide better service (express buses, greater frequency) than rail

• BRT also provides great opportunities for inclusive transport:
  – Recent BRT systems have incorporated inclusive design principles
  – *Accessibility Guidelines prepared for new BRT systems in Colombia*
New Latin American BRTs expected to open in 2006 - 2008

Opening in 2006

- Pereira (Colombia) 17
- Guayaquil (Ecuador) 45

Expected to open in 2007-2008

- Medellín (Colombia) 13
- Bucaramanga (Colombia) 8
- Cali (Colombia) 49
- Barranquilla (Colombia) 13
- Cartagena (Colombia) 15
- Guatemala City 11
- Lima (Peru) 32
- Posadas (Argentina) 2

In Red: Systems for which accessibility guidelines were prepared
• To open in August 2006 (first phase)
• 17 km of bus corridor
• 2 terminals
• 34 standard stations
• 51 artic. buses
• 81 feeder buses
• 250,000 pass/day
• Metr. population 0.7 million

Source: Megabús, Pereira
Guayaquil

- To open in August 2006
- 45 km of bus corridor
- 4 terminals
- 105 standard stations
- 210 artic. trunk-line buses
- 490,000 passengers per day
- Metr. population: 2.2 million

Source: César Arias
Medellín

- To open in 2007
- **Complements existing metro**
- 13 km of bus corridor
- 6 inter-modal stations
- 16 standard stations
- 72 rigid trunk-line buses
- 26 feeder buses
- 130,000 pass/day
- Metr. Population: 3.4 million

Source: MetroPlus Medellín
Bucaramanga

- To open in September 2007
- 8 km of bus corridor
- 4 terminals
- 10 standard stations
- 40 articulated trunk-line buses
- 100 rigid trunk-line buses
- 250,000 pass./day
- Metr. population: 1 million

Source: Metrolínea Bucaramanga
Cali

- To open in 2007
- 49 km of bus corridor
- 9 terminals
- 77 standard stations
- 163 artic. trunk-line buses
- 840 feeder buses
- 1,470,000 passengers per day
- Metr. population: 2.6 million

Source: Ministry of Transport, Colombia
Barranquilla

• To open in 2007
• 13 km of bus corridor
• 2 terminals
• 16 standard stations
• 62 artic. trunk-line buses
• 40 rigid trunk-line buses
• 240 feeder buses
• 310,000 passengers per day
• Metr. population: 1.9 million

Source: Ministry of Transport, Colombia
Cartagena

- To open in 2008
- 15 km of bus corridor
- 1 terminal
- 17 standard stations
- 50 artic. trunk-line buses
- 40 rigid trunk-line buses
- 81 feeder buses
- 490,000 passengers per day
- Metr. population: 1.1 million

Source: Ministry of Transport, Colombia
Content of BRT Accessibility Guidelines

• Public Participation
• Access to Fixed Facilities
  – Public space
  – Fare collection
  – Trunk line stations
  – The platform-bus gap
  – Access to feeder line stops
• Bus Access
  – Bus specifications
  – Signage and announcements
  – Bus entrance and interior design
  – Feeder line deployment and wheelchair access
• Public Information and Training
Public Participation

- **Focus Groups**
  - 6-12 participants
  - Persons with physical, sensory and cognitive impairments
  - Also: Pregnant women, seniors
  - See: TRL Overseas Road Note 21

- **Create Advisory Committee**
  - Meet periodically with Government planners
  - Ensure that inclusive transport is put on the agenda
  - Prioritize actions
  - Avoid costly mistakes
  - Monitor results
Public Space

• Sidewalks and Paths
• Intersections and Crossings
• Signalization
• Pedestrian Grade Separations
• Pedestrian Access Roads

Bogotá (1): Easy walk for pedestrians
Bogotá (2): Vehicles must slow down
Fare Collection

- Single flat fare
- Fare cards
- Fare card vending sites
- Fare cards for passengers with special needs
- At least one turnstile appropriate for wheelchairs

Source: TransMilenio S.A., Bogotá
Trunk Line Stations (1)

- Uniform station design
- Gentle ramps to stations
- Station entrances and exits
- Good lighting
- Station Assistants
Trunk Line Stations (2)

- Seats and Supports
- Sliding Doors
- Visual Elements
- Audible Elements
- Tactile Elements
- Features at Terminals
  - Added Information
  - Elevators >>>> see next slide
Elevators in Exceptional Situations

Existing busway in Lima

Bogotá: elevator at TransMilenio transfer station (Av. Jiménez)
**The platform-bus gap (1)**

- **With bus-mounted bridges**
  - Examples: Curitiba, Quito, Guayaquil
  - Additional cost: $3,000 per bus (Quito)
  - Additional time for automatic deployment of bridge: 5 sec. per station (Quito)

- **Without bus-mounted bridges**
  - Examples: BRTs in Colombia, Mexico
  - **Maximum permissible gap: 10 cm**
  - Careful bus docking at stations
  - Front-door entry for wheelchairs

- **Importance of station assistants**
The platform-bus gap (2)

Bogotá (no bridge)

Curitiba (with long bridge)

Quite (with bridge)

Beijing (with bridge and assistant)
Access to feeder line bus stops

• Prioritizing selected bus stops
  – Designate formal stops
  – Identify stops with highest passenger volumes
  – Select those that have accessible links with neighborhood

• Bus stop access features
  – Paved platform
  – Shelter where possible
  – Seats or ischiatic supports
  – Good lighting
Bus specifications

To assist the mobility impaired
- Carefully consider platform connection (bus-mounted bridge: yes or no?)
- Space with fastening device for at least one wheelchair per bus
- Lifts where there is no level boarding (i.e. feeder buses)
- Signs reserving seats for pregnant women, the elderly and infirm

To assist the sight impaired
- Contrasting color schemes for stanchions, holding bars, doors
- Consider public address system to announce next station
- Specify good inside lighting

To assist the hearing impaired
- Specify lit signs to indicate next station

Coordinate physical and operational planning of BRT
Signage and announcements

Outside bus

- Large bus route and destinations signs
- Signs in front and at entrance doors
- Contrasting colors and illumination at night
- Announcements of bus destination

Inside bus

- Readable maps of system or route
- Electronic visual displays of next stop
- Audible announcements of next stop
- Audible warnings of door opening/closing
- Signs and color schemes to identify priority seating
Bus entrances and interior design

(Entries for standard high-floor trunk services were discussed before)

Mixed (trunk and local) services
- High-floor conventional - São Paulo
- Low-floor – manual ramps in Santiago
- High (left door) and step-down (right door) — Bucaramanga, Medellín, Cartagena,

Feeder bus entrances
- Minimize vertical distance
- Handrail to ease exiting
- Retractable step (or kneeler feature)
- No turnstiles inside bus

Interior bus design
- Non-skid flooring
- Priority seating
- Wheelchair securement
- Stop request signals
- Stanchions in contrasting colors
Feeder line deployment and wheelchair access

• Accessible feeder buses on one route at a time
• Low-floor buses
• Wheelchair lifts
• Personal assistance
• Wayside platforms

Bogotá, Colombia

Pretoria, RSA
Public information and training

System information
• Route and system maps
• Tariff structure and special fares
• Accessible service center
• Accessible website (example: Santiago)

Operation of buses
• Service concessions must specify criteria of driving behavior (acceleration, breaking, curves)
• Special training module for bus drivers, raising their awareness of the constraints faced by disabled passengers
• Keep buses clean and well-lit

Public education
• Teach passengers to be considerate
• Explain needs of persons with disabilities
Considerations for inclusive BRT design

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

• **Many aspects of inclusive design do not cost more**
  → Color schemes of stops and buses
  → Clear signage
  → 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, driving manner, seats for infirm (considerate behavior)
  → Walking to bus stop: raised crosswalks, sidewalk ramps, illumination
  → Improved enforcement reduces crime and sense of vulnerability
Thank you for listening!

Author of Guidelines:
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The guidelines can be downloaded from:
www.worldbank.org/disability
  → topics  → accessibility  → transportation

Acknowledgements:  Ministry of Transport, Colombia; Megabús, Pereira; Metroplus, Medellín; Metrolínea, Bucaramanga; TransMilenio S.A., Bogotá; Darío Hidalgo, Bogotá; César Arias, Quito; Charles Wright, IADB; Mauricio Cuéllar, Rosangela Berman-Bieler and others at the World Bank; ITDP, New York; Breakthrough Technologies Institute, Washington; Georges Darido, University of Florida; Christo Venter, CSIR Pretoria; Christopher G B (Kit) Mitchell, UK.