SOME COMMENTS ON PROPOSED BRT SCORING SYSTEM

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ITDP Transport Systems Summit
Bogotá, June 22, 2011
Proposed Framework of Scoring Criteria

- **A - Service planning**
  - 13 items – 42 points in total

- **B - Infrastructure**
  - 7 items – 30 points

- **C - Station design and station-bus interface**
  - 3 items – 12 points

- **D - Quality of service & passenger information systems**
  - 3 items – 8 points

- **E - Integration and Access**
  - 4 items – 8 points
A - Service Planning (key elements)

• Off-vehicle fare collection (7 points)
• Peak period frequency (4)
• Off-peak frequency (3)
• Limited and local stop services (3)
• Enforcement of right-of-way (2)
• Operates late nights and weekends (2)
• Operational control to reduce bus bunching (2)

In red: Suggestion to give higher weights than indicated
A - Service Planning (some questions)

• Routes in top 10 demand corridors (4 points).
  – A low-ranking corridor in a big city can be a better BRT than the highest corridor in a small city. For example: Do Cleveland and Eugene really merit more points than Ahmedabad or Guadalajara?
  – Suggest to replace this criterion with passenger volume (pax/day)

• Integrated fare collection with other public transport (3)

• Part of (planned) multi-corridor BRT network (3).
  – Both are desirable transit objectives. But are they a defining factor for BRT?
  – NYC merits 3 points because of its overall fare integration, but does the Fordham Road corridor deserve 3 times the score of TransMilenio?
  – An isolated demonstration corridor (Insurgentes) later generates an overall plan.

• Performance-based contracting for operators (3)
  – More a question of managing transit operators (anywhere) – not just BRT.
  – Most Latin American BRT systems work on this basis and get 3 points, while the US operators get nothing. Is it correct to reward (or penalize) BRTs en bloc, just because the country’s management philosophy is different?
  – Why do León and EdoMex get 0 points?
A - Service Planning (major questions)

- Peak-period pricing (2)
  - Premium fares are a good idea to flatten peak transit demands (the DC and Santiago metros do it) – but this is not really BRT related.
  - Not surprisingly, all of the BRTs reviewed got 0 points.

- Multiple routes use same BRT infrastructure (4 points)
  - The old ‘BRT-lites’ of Bogotá and Lima had multiple routes which caused much busway congestion. Getting rid of multiple routes (using the trunk-feeder concept) was a key element for the BRT success.
  - One major problem of the New Delhi and Pune ‘BRTs’ is that they have the multiple bus routes on the same busway.
  - Even at Transmilenio, the complexity of multiple bus routes has caused many problems.
  - Guangzhou’s BRT flows well, but passenger waiting times at stations are long
  - [see graph on next slide]

Suggestion: Consider dropping these two criteria.
Service Plans for High- and Low-Volume BRTs

GREEN ➔ Advantages
RED ➔ Disadvantages

Trunk-feeder services
- Requires restructuring of existing bus routes
- Superior bus control on busway
- Less waiting time on trunk busway
- More passenger transfers required
- Need to build transfer stations
- Fewer buses required
- Preferred for high-volume BRTs

Direct services
- Easier to adapt existing routes to new BRT
- More bunching of buses
- Busway often not fully segregated
- More passenger accumulation at stops
- Thus: longer stations along busway
- Fewer passenger transfers
- More buses required
- Preferred for low-volume BRTs
B – Infrastructure (key elements)

- Physically separated right-of-way (7)
- Physically separated passing lanes at station stops (4)
- Stations set back from intersection (3)
- Stations in center and shared by both directions of service (2)
- **Bus lanes in central verge of road (7 points)**
  - Yes. But systems with busway sections in one-way streets (Guayaquil, Quito, Lima, León...[see examples on next slides]..) should not be penalized if in the other sections the busway is in center of road.

In red: Suggestion to give a higher weight for passing lanes at station stops
Lima: High-Standard BRT with Busway on Side of Road
Guayaquil: High-Standard BRT with Busway on Side of Road
Pereira: High-Standard BRT with Busway on Side of Road
B – Infrastructure (some questions)

• Stations occupy former road/median space (not sidewalk space) (3 points)
  – With one-way busways at the edge of the road (such as Pereira, Quito, Guayaquil), it is OK that the stations are on the sidewalk.
  – Some busways (such as Transmilenio) were built as part of extensive street widening – so former sidewalks were gobbled-up by the new road and then rebuilt on the widened space.
  – What matters is that the resulting avenue has sufficient sidewalk space.
  – Does the quality of a BRT depend on the history how it was planned and implemented, as long as the result is OK?
  – Suggestion: Consider deleting this criterion

• Intersection treatments – elimination of turns across the busway and signal priority (4 points)
  – Very important, but there is much more to it than prohibiting left turns
  – Maintaining acceptable mixed-traffic flow is a key element of good BRT planning
  – Signal priority OK for low-volume busways, but marginal for high-demand ones
  – Give extra points for grade separated busways (Bogotá, Lima, Istanbul ..)

[see next slides]
BRT Sections in Motorway

Lima

Bogotá

Istanbul
C - Station Design and Station-Bus Interface

- Articulated buses have 3+ doors and standard buses 2+ very wide doors (4)
  - Should read: 3+ wide doors ... 2+ wide doors
- Multiple docking bays and sub-stops, separated by at least half a bus length (3)
  - Drawback: can create very long stations – barriers inhibiting cross movement
  - Only makes sense for very high-volume BRTs. Would not be appropriate for smaller-volume BRTs, such as Curitiba, Quito, Guyaquil, Pereira ... and US cities.
- Platform level boarding (5 points)
  - Yes, but how to define?
  - So-called low-level buses still require a step up. They also cost more and often have a complicated interior layout
  - Docking of buses just as important. Low-level buses often do not dock well
  - [see examples on next slides]

Consider replacing last item by a performance measure, e.g. commercial speed
Boarding a High-Level Bus

Lima

Guayaquil

Ahmedabad
Boarding a Low-Level Bus

Guangzhou

Santiago

Jaipur
Boarding a Low-Level Bus (2)
Boarding a Low-Level Bus (3) -- Pune
Interior Layout of Low-Entry Buses

Santiago

Beijing

Istanbul
Choice of High and Flat floor bus for Janmarg
(Source: Shreya)

Low floor bus

Janmarg bus – Flat floor

Semi - Low floor bus
D - Quality of Service and Passenger Information Systems

• Branding of vehicles and system (3 points)
  – yes

• Safe, wide, weather-protected stations with artwork (3)
  – Yes, very important
  – Perhaps more important than artwork is an effort to have architects design visually pleasing stations (ex: Quito in city center, Lima in Barranco, Bucaramanga, Johannesburg .. )
  – Also: an extra point could be given for automatic glass doors at bus entrances

• Passenger information at stations and in vehicle (2)
  – Yes
  – Ensure that bus arrival information in stations gives correct data

In red: Suggestion to give higher weight for attractive stations
E - Integration and Access

- Bicycle lanes in corridor (2)
  - Nice, but irrelevant for quality of BRT operation
  - Suggest to **omit** this item [*see next slide*]

- Bicycle sharing systems in BRT corridor (2)
  - **Omit** – see above

- Improved safe and attractive pedestrian access system and corridor environment (2)
  - By far the most important element in this group
  - Suggest to give a weight of 4

- Secure bicycle parking at station stops (2)
  - Again: nice, but marginal in terms of generating BRT ridership
  - Even in bicycle friendly Bogotá, only 0.16 of one percent of – less than 2 per 1000 – TransMilenio passengers use bike parking (2008)
  - **OK as an indicator, but certainly much less so than pedestrian access.** [*see following slide*]
Bicycle Lanes in Corridor

Pune

Delhi

Santiago
Bike Parking at BRT Terminals

Bogotá

Lima
Additional parameters worth considering

• **Performance measures, such as**
  - Passenger volumes (pax/day)
  - Peak passenger throughput (pphpd)
  - Peak passenger volumes at stations
  - Commercial speed
  - Efficiency indicators (IPK)
  - Financial indicators

• **Planning and design aspects, such as:**
  - Connections to / integration with shopping areas
  - Insertion into urban space – minimization of barrier effect
  - Exclusivity of corridor, removal of parallel conventional buses
  - Emission standards, both GHG and local pollution
  - Most importantly, access for passengers with disabilities
Access for passengers with disabilities

- >10% of people have some sort of handicap
- An ever larger proportion of the population will be > 65 years
- Groups representing persons with disabilities have become politically powerful, in the US and elsewhere
- BRT (in part because of its level-boarding requirement) provides a good opportunity to improve the accessibility for persons with disabilities
- Measures that have been incorporated in Latin American BRTs include
  - Avoidance of steps or stairs, provision of ramps
  - Wide turnstiles, ticket machines – ticket windows convenient for disabled people
  - Voice announcements and electronic signs for the seeing or hearing impaired
  - Seats or ischiatic bars for old passengers, color contrasts for the (almost) blind
  - Station assistants to help persons with physical, hearing, seeing and mental difficulties
- Many accessibilitysures cost little if incorporated in the initial design
- They do not only benefit the old and disabled, but also make the entire system safer and more attractive to everybody.
- Suggestion: Include this element in the scoring system, with a weight of 3 or 4.

[see next slides]
Station Assistants in Bogotá
Sillas Preferenciales

Cedamos el puesto a quien más lo necesita

From a Pereira publication
Pictures from Pereira (2007)
Services for Passengers with Disabilities in Guatemala City
Other Examples of Measures for the Disabled
A General Comment, and two Questions

• Many elements of high-capacity BRTs are not really appropriate for low-capacity BRTs, and vice-versa
  – Trunk-feeder vs. multiple routes feeding in and out
  – High-level vs. low-level buses and station platforms
  – Fare payment at turnstiles before entering station vs. payment in bus
  – Multiple docking bays at station vs. short station without barrier effect
  – Large, frequent buses vs. smaller less frequent buses
  – Segregated passing lanes at stops vs. single-lane stops

• Don’t systems in the USA have more in common with the BHLS of Europe than with the BRT of developing countries?
  – The BHLS (Buses with high level of service) lines range from 24,000 to 66,000 passengers per day
  – They usually complement existing urban rail systems
  – The BRTs in Developing Countries range from 115,000 (Pereira) to 600,000 passengers per day (bogotá has 1.7 million)
  – With a few exceptions, they are the main mass transit mode, as there are no existing rail lines

• Is it appropriate to have the same scoring system for BRT and BHLS?
thanks for listening!
6 more slides on BHLS systems in Europe
BHLS in Europe (Buses with a High Level of Service)

- In the 1990s, BHLS emerged in Europe in order to “increase bus service quality and ridership”
- The Context: Most medium-sized and large European cities were already served by trains (S-Bahn, RER, etc), metros and trams. The BHLS were to fill the gap between regular buses and rail-based systems.
- BHLS has been adapting some BRT elements to the conditions of European cities with their often historical pattern of relatively narrow streets and mixed land use.
- The main objectives of BHLS are to provide
  - Reliable and regular bus services
  - Accessibility and passenger comfort
  - Improve the quality of the urban environment

This part of the presentation is based on talks by Giorgio Ambrosini and Julien Allaire at the ITDP Annual Meeting on October 1, 2010
### Characteristics of selected BHLS systems

<table>
<thead>
<tr>
<th>Name of System</th>
<th>Reserved Lanes (km)</th>
<th>Passengers per day</th>
<th>Pk Headway (minutes)</th>
<th>Dedicated Fleet?</th>
<th>Ridership increase</th>
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<tr>
<td>Amsterdam Zuid-Tangent</td>
<td>33</td>
<td>40,000</td>
<td>6</td>
<td>Yes</td>
<td>+47%</td>
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<td>Dublin QBC</td>
<td>8.4</td>
<td>34,000</td>
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<tr>
<td>Gothenburg TrunkBus</td>
<td>7.5</td>
<td>24,000</td>
<td>3.3</td>
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<td>+73%</td>
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<tr>
<td>Hamburg MetroBus</td>
<td>4.0</td>
<td>60,000</td>
<td>3.5</td>
<td>Yes</td>
<td>+20%</td>
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<tr>
<td>Helsinki Jokeri Line</td>
<td>6</td>
<td>25,000</td>
<td>5</td>
<td>Yes</td>
<td>+100%</td>
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<tr>
<td>Madrid Bus-VAO</td>
<td>16.1</td>
<td>33,000</td>
<td>&lt; 1</td>
<td>No</td>
<td>+70%-100%</td>
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<tr>
<td>Nantes BusWay</td>
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<td>24,600</td>
<td>3.3</td>
<td>Yes</td>
<td>+55%</td>
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<tr>
<td>Paris TVM</td>
<td>19</td>
<td>65,800</td>
<td>3.5</td>
<td>Yes</td>
<td>+134%</td>
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<tr>
<td>Prato LAM</td>
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<td>n/a</td>
<td>7</td>
<td>Yes</td>
<td>+57%</td>
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<td>Stockholm Blue Line</td>
<td>12</td>
<td>36,575</td>
<td>5</td>
<td>Yes</td>
<td>+27%</td>
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</table>
BHLS program in France

- 10 BHLS systems operating now
- 23 BHLS systems to operate by 2013
- 40 BHLS systems planned to operate by 2015
1st BHLS example:  
**Transval de Marne**

- Opened 1993
- Located in suburban Paris
- Length: 22 km (13.5 in 1993 and extension in 2007).
- Cost (2nd phase: 7 km): $9.1 million (rolling stock excluded)
- Commercial speed: 23 km/h
- Demand: 65,000 passengers/day

**PICTURE ON RIGHT:**  
Single-lane busway for peak direction, buses in off-peak direction use mixed traffic lanes.
2nd BHLS example:

TEOR in Rouen

- Rouen is a city 400,000 of inhabitants about 100 km northwest of Paris
- BHLS was implemented after the city had first built a tramway line
- Opened in 2001 and extended in 2007
- Investment: $20 million per km
- 11.5 km of dedicated bus lanes
- Demand: 45,000 passengers per day
3rd B HLS example: **Busway® in Nantes**

- Nantes is a city of 600,000 inhabitants near the west coast of France
- It was the first French city to build a modern tramway in 1985
- The Busway® opened in 2006
- It is considered like the 4th tramway line
- Investment: $10 million per km, tram lines cost 3 times as much
- 7 km length (87% dedicated bus lanes)
- Headway: 4-6 min in peak
- Demand: 28,000 passengers per day
BRT Definitions

- Bus Rapid Transit (BRT) is a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service. (BRT Planning Guide, ITDP, 2006)

- Bus Rapid Transit is high-quality, customer-orientated transit that delivers fast, comfortable and low-cost urban mobility. Its key characteristics are (a) Segregated busways, (b) Rapid boarding and alighting, (c) Efficient fare collection, (d) comfortable shelters and stations, (e) Clean bus technologies, (f) Modal integration, (g) Sophisticated marketing identity, (h) Excellence in customer service. (Source: ITDP India).