Workshop: Bringing Gold-Standard BRT to Nairobi

Annie Weinstock
November 4, 2014
Ensuring quality: The BRT Standard

Gold: 85 points or above

Silver: 70–84 points

Bronze: 50–69 points
## BRT Standard

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# BRT Standard

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<td><strong>A</strong> Dedicated right-of-way</td>
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<td><strong>B</strong> Busway alignment</td>
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<td><strong>E</strong> Platform-level boarding</td>
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</table>
Dedicated right-of-way

Dedicated BRT lanes are critical to system speed & capacity
B. Busway alignment

Median lanes

> Reduce conflict with property entrances, parking, turning vehicles
> Reduce conflict with pedestrians, cyclists
> Increase driver stress and productivity
Busway Alignment: Bus lanes separated from traffic with a median alignment

Curitiba, Brazil: RIT corridors
Busway Alignment: Bus lanes separated from traffic with a median alignment

Cape Town, South Africa
Why curb-side alignment doesn’t work

> Parked vehicles block the bus lane
Why curb-side alignment doesn’t work (cont.)

> Turning movements reduce bus speeds
Off-board fare collection

- Convenience for passengers
- Reduced revenue leakage
- Automated ridership data for service optimisation
Off board fare collection

Mexico City, Mexico: Metrobus
Off board fare collection

Lima, Peru: Metropolitano
Intersection treatments

Prohibiting turns across the busway has the biggest time savings at intersections.
Preventing right turns across the busway

Three left turns

Left turn + U-turn

Left turn + two right turns
Platform-level boarding at stations

Janmarg, Ahmedabad
Buses should not have inside steps.
Kerb extends beyond platform, creating a large gap
# BRT Standard

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<td>Located in top 10 corridors</td>
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<td>F</td>
<td>Hours of operation</td>
<td>2</td>
</tr>
<tr>
<td>G</td>
<td>Multi-corridor network</td>
<td>2</td>
</tr>
</tbody>
</table>
Multiple routes

Terminals

Intermediate transfer stations

Trunk-feeder services

Direct services

2-A
Multiple routes

One service per corridor

Multiple services per corridor
What can happen with a trunk-and-feeder system?
In Nairobi, we have collected tons of data & looked at different route/service options.
Modeled a trunk-feeder scenario
Trunk-feeder southern section
Best performing service plan for Nairobi (northern section)
Best performing service plan for Nairobi (southern section)
Express services

Local service
Stops at all stations

Express service
Limited stops

> Passing lanes are required for express services
Control centre
Located in top ten corridors
In Nairobi, we have chosen good corridors
TransMilenio runs through Bogota's downtown
“City centres are where most buses face the worst congestion and pick up the most passengers. BRT, therefore, needs to go through the city centre.”
Dar es Salaam’s BRT runs through the downtown
Mexico City’s BRT has helped transform the downtown
Current BRT Design goes right past Downtown Nairobi
But most matatus go directly into the CBD
Proposed BRT Infrastructure in Downtown Nairobi
Prioritizing BRT into Downtown Nairobi
Where BRT Stations are most needed
Concept Design for Moi Ave

Moi Avenue 50m (Existing Conditions)

Moi Avenue 50m Off Station
Concept Design for Haile Selassie Ave
Multi-corridor network 2-G

> Is the corridor part of a phased expansion plan?
<table>
<thead>
<tr>
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<tbody>
<tr>
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<td></td>
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<tr>
<td>A</td>
<td>Passing lanes at stations</td>
<td>4</td>
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<td>B</td>
<td>Minimizing bus emissions</td>
<td>3</td>
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<td>C</td>
<td>Stations set back from intersections</td>
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<td>D</td>
<td>Center stations</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>Pavement quality</td>
<td>2</td>
</tr>
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Passing lanes

- Passing lanes can increase system capacity to 45,000 pphpd
Passing Lanes at stations

Johannesburg, South Africa
Passing Lanes at stations

Bogota, Colombia: TransMilenio
Minimizing bus emissions

> Euro 4 or better emissions technology
Stations set back from intersection

A setback from the junction increases the number of buses that can dock at the station during each signal cycle.  

≥ 26 m
Centre stations

Central stations:
> Reduced construction and operational costs
> Better convenience for passengers

Side platforms
Centre Stations

Rio de Janeiro, Brazil: TransOeste
Pavement Quality

Concrete at stations

Concrete along entire corridor

Asphalt/bitumen pavement
## BRT Standard

<table>
<thead>
<tr>
<th></th>
<th>Stations</th>
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<tbody>
<tr>
<td>4</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>Distances between stations</td>
<td>2</td>
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<tr>
<td>B</td>
<td>Safe and comfortable stations</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>Number of doors on bus</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>Docking bays and sub-stops</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>Sliding doors in stations</td>
<td>1</td>
</tr>
</tbody>
</table>
Distance between stations:

- < 300 m: Incorrect
- 300 - 800 m: Correct
- > 800 m: Incorrect
Safe and comfortable stations
High-quality stations: Wide, weather protected, safe, well-lit
High-quality stations: Wide, weather protected, safe, well-lit
High-quality stations: Wide, weather protected, safe, well-lit

Guadalajara, Mexico
Number of doors 4-C

- Single narrow door ☠️
- Double doors ✅
Double doors
Docking bays and sub-stops
Station with two docking bays

Docking bay 1
Docking bay 2
Station with two sub-stops
Sliding doors in stations
## BRT Standard

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<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Branding</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>Passenger information</td>
<td>2</td>
</tr>
</tbody>
</table>
A. Branding
Strengthening the system identity

Original name & logo

Unique station design

Coordinated signage & passenger information
Passenger information:

Dynamic information:
• Visual displays
• Audio announcements

Static information:
• Network maps
• Schedules
• Fare charts
## BRT Standard

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<tr>
<td>6</td>
<td><strong>Universal access</strong></td>
<td>3</td>
</tr>
<tr>
<td>A</td>
<td><strong>Integration with other public transport</strong></td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td><strong>Pedestrian access</strong></td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td><strong>Secure bicycle parking</strong></td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td><strong>Bicycle lanes</strong></td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td><strong>Bicycle-sharing integration</strong></td>
<td>1</td>
</tr>
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</table>
Universal access

Access ramps (1:12 gradient)

Accessible fare collection area
Integration with other public transport

6-B

METRO

BRT

Link Bridge

Drop-off

Drop-off
Ensure that station access points are accessible
> Minimum bollard spacing at least 800 mm
> No level differences
At-grade station access is preferred

Foot overbridges:
> Increased walking distance/time
> Unsafe
> Inaccessible
Pedestrian access
Secure bicycle parking

Cycle parking in paid area of BRT station
Secure bicycle parking at stations

Los Angeles, California: Orange Line
Bicycle lanes

Clear width $\geq 2$ m
Bike lanes along the corridor

Cape Town, South Africa
Poor design discourages use
Bicycle-sharing integration

Cycle sharing station

BRT station
# BRT Standard

<table>
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<th>Point deductions</th>
<th>Value</th>
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<tbody>
<tr>
<td>A Commercial speeds</td>
<td>-10</td>
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<tr>
<td>B Minimum pphpd below 1,000</td>
<td>-5</td>
</tr>
<tr>
<td>C Lack of enforcement</td>
<td>-5</td>
</tr>
<tr>
<td>D Gap between station and bus</td>
<td>-5</td>
</tr>
<tr>
<td>E Overcrowding</td>
<td>-5</td>
</tr>
<tr>
<td>F Poorly maintained stations and buses</td>
<td>-10</td>
</tr>
<tr>
<td>G Low peak frequency</td>
<td>-3</td>
</tr>
<tr>
<td>H Low off-peak frequency</td>
<td>-2</td>
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</tbody>
</table>
A. Low commercial speeds
B. Low demand
C. Lack of enforcement
D. Significant gap between station and bus
E. Overcrowding