Technical Session 3 – Problems for Small and Medium Towns & Introduction of Public Transport Systems

AMRITSAR METRO BUS - A NEW JOURNEY BEGINS

Urban Mobility India 2019

PRESENTED BY:

R S Bal,
General Manager (Projects & Finance)
PIDB & UMTC Team
CATEGORY: Best Urban Mass Transit Project

NAME OF THE PROJECT: Bus Rapid Transit System in Amritsar
| **AMRITSAR METRO BUS**  
**GoI & GoP Initiative** |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approved Project Cost (as per Detailed Project Report)</strong></td>
</tr>
</tbody>
</table>
| **Project Funding Ratio**  
GoI / GoP / MC, Amritsar | 50:20:30 |
| **Additional Cost for GoP – Bus Purchase** | 54.38 Cr |
| **Project Implementation Agency** | Punjab Bus Metro Society / Punjab Bus Metro Society |
| **Project Management Services (PMS)** | Urban Mass Transit Company Limited (UMTC) |
| **Total length** | 31 Kms |
Key System Features of Amritsar BRTS

- **31 km** of network including *~ 8 kms of elevated*
- **3 major corridors**, essentially for exclusive bus operations, Route length approx. 90 km
- **47 technology enabled BRT bus stations**; Access Controlled, Automatic Fare Collection, Level Boarding
- **2 ROBs** – Bhandari and Verka ROB enable smooth traffic flow for all vehicles
- **93 AC BRT Buses**, 12 meter length with **VTS and PIS** (900mm BS-IV AC Front Engine Diesel Tata Buses)
Unique Features of Amritsar BRTS

• Conceived after *site visits to several Domestic and International BRT* projects
• **Implementation vehicle** is a Society (PBMS)
• A first time attempted *Retrofitting of Elevated road* to suit BRT requirements in Asia
• A first time implemented *Dedicated Elevated BRT* for 3.2 km length in India
• **Single Consultant** - PBMS engaged UMTC for Conceptualization, Planning & Design, Approvals, Tender Process, GFCs, Construction Supervision and Operational Hand Holding after commission; thus leaving no scope for anomalies that typically arise due to involvement of various agencies
• Splitting of BRT lanes on narrow roads - Mall road
• Coverage of 40% of the total City's core road network
• Storm water drainage system all along the BRT corridor
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Existing Route Details</th>
<th>Route Length in kms (one way)</th>
<th>Headway (minutes)</th>
<th>One side Running Time (minutes)</th>
<th>Terminal halt or turnaround Time (minutes)</th>
<th>Fleet size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India Gate to MCA gate</td>
<td>16.2</td>
<td>4</td>
<td>48</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>India Gate to Verka Canal</td>
<td>18.4</td>
<td>4</td>
<td>54</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>3</td>
<td>Verka Canal to MCA gate</td>
<td>13.0</td>
<td>4</td>
<td>39</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>47.6</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>86</strong></td>
</tr>
<tr>
<td>Total buses in Depot with 93% Vehicle Utilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>93</td>
</tr>
</tbody>
</table>
# BRT Routes in Operation – Daily Ridership

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>MONTH (in 2019)</th>
<th>Avg. DAILY RIDERSHIP</th>
<th>Avg. Daily Fare Collection</th>
<th>Avg Fare collection per passenger</th>
<th>Avg Fleet Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>May</td>
<td>22038</td>
<td>190173</td>
<td>8.63</td>
<td>72</td>
</tr>
<tr>
<td>2</td>
<td>June</td>
<td>18786*</td>
<td>154843</td>
<td>8.24</td>
<td>72</td>
</tr>
<tr>
<td>3</td>
<td>July</td>
<td>21614</td>
<td>164200</td>
<td>7.60</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>August</td>
<td>24376</td>
<td>179730</td>
<td>7.37</td>
<td>72</td>
</tr>
<tr>
<td>5</td>
<td>September</td>
<td>25499</td>
<td>172602</td>
<td>6.77</td>
<td>72</td>
</tr>
<tr>
<td>6</td>
<td>October</td>
<td>23149*</td>
<td>156227</td>
<td>6.75</td>
<td>76</td>
</tr>
</tbody>
</table>

* Vacation times

---

The graph shows the monthly ridership from May to October 2019, with vacation times indicated for June and October.
Edge to Edge Development - Jallandhar Road

- Service Road
- Footpaths
- Mixed Traffic
- BRT Station - 36 m length, 3 m wide
- 2 way Dedicated BRT Lanes, 8.5 m wide
- Mixed Traffic lane
- Service Road
- Footpaths

12th Urban Mobility India Conference & Expo 2019
Edge to Edge Development – Khalsa College Road

- Service Road
- Mixed Traffic Lane
- BRT Station - 36 m length, 3m wide
- 2 way Dedicated BRT Lanes, 8.5m wide
- Mixed Traffic lane
- Footpaths
- Access for Differently Abled
- Cycle Track
- Service Road
- Footpaths

Edge to Edge Development – Khalsa College Road
Edge to Edge Development - Mall Road with single lane BRT

- Footpath cum Parking
- Mixed Traffic
- Dedicated BRT Single Lane
- BRT Bus Shelter
- Mixed Traffic
- Footpath cum Parking
Aerial View - Elevated BRT (3.2 Km) on Verka/Batala Road

- Elevated BRTS Station 4.0m (accessible by Elevator and Stairs)
- 8.5m Elevated BRTS Corridor
- 2 + 2 MV Lanes for Mixed Traffic
- Mixed Land Use
- 30m ROW Road
- Mixed Land Use
Aerial View - Retrofitted BRT on existing Elevated Road (2.6 km) on Jallandhar Highway

- Elevator and Staircase for Access
- Elevated BRTS Station
- Mixed Traffic Lane
- Merging BRTS Lane
- Diverging BRTS Lane
- Elevator and Staircase for Access
Aerial View- Retrofitted BRT on existing Elevated Road on Jallandhar Highway-BRTS Bus stop integrated with the ISBT
Provisions For Specially-abled Persons

• Tactile paving – Guiding and warning tiles
• Level boarding & alighting
• Entrance ramps to Stations
• Buses with uniform floor level
• Designated spaces for wheelchair inside buses
• Automated doors

Space for wheelchair in Bus

Level Boarding – Alighting

Access to bus stops by Ramp - Suitable for Specially-abled
**Public Interface & Feedback**

**News**

At 71K, BRTS ridership affects auto drivers

Auto drivers have chosen routes where metro bus services are missing.

---

**Amritsar Tribune**

**Protest, 4th salary**

The municipal council has decided to give a fourth salary.

**Frequency of Metro buses increases**

Officials reduce time gap between two buses on BRTS lane to five minutes.

---

**Sudarm Shuruat**

Bhai Aravindas vasi m deyogas, kileja kshetrala harati.

---

**Play Video:** customer_satisfaction.mp4
CITY BEFORE AND AFTER BRTS
Batala Road

Batala Road (Before)  Batala Road (After)

Both Side Unpaved Land
Sher Shah Suri Road

Before

After
# Fare Structure

<table>
<thead>
<tr>
<th>Km Slab</th>
<th>Fare (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>5</td>
</tr>
<tr>
<td>Above 3 upto 6</td>
<td>10</td>
</tr>
<tr>
<td>Above 6 and upto 12</td>
<td>15</td>
</tr>
<tr>
<td>Above 12 and upto 20</td>
<td>20</td>
</tr>
<tr>
<td>Above 20</td>
<td>Rs. 20 + Rs. 1/Km</td>
</tr>
</tbody>
</table>

- Concessional Fare for students (66% discount for college students, 100% Discount for school students)
- 20% Discount for Smart Card Holders, 50% Discount for Senior citizens and Physically Challenged thru Smart Card, Rs. 25 daily pass for students and Senior Citizens and for others Rs. 50 Daily Pass

FARES COMPETITIVE WITH THE EXISTING IPT (SHARED AUTO)
## Comparison of Travel Time by Shared Auto & BRTS

<table>
<thead>
<tr>
<th>Route Name</th>
<th>Distance Traveled (in Kms)</th>
<th>Average Trip Time (in Mins)</th>
<th>BRTS Bus</th>
<th>Auto</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amritsar Railway station to India gate</td>
<td>8.5</td>
<td></td>
<td>0:24:53</td>
<td>0:51:10</td>
<td>00:26:17</td>
</tr>
<tr>
<td>India Gate to Amritsar Railway Station</td>
<td>8.5</td>
<td></td>
<td>00:24:41</td>
<td>0:37:10</td>
<td>00:12:29</td>
</tr>
<tr>
<td>Amritsar Railway station to Verka Railway Station</td>
<td>9.5</td>
<td></td>
<td>0:21:57</td>
<td>0:36:15</td>
<td>00:14:18</td>
</tr>
<tr>
<td>Verka Railway Station to Amritsar Railway Station</td>
<td>9.5</td>
<td></td>
<td>0:30:30</td>
<td>0:37:45</td>
<td>00:07:15</td>
</tr>
<tr>
<td>Verka Railway Station to Amritsar Entry Gate</td>
<td>13</td>
<td></td>
<td>00:34:18</td>
<td>00:40:35</td>
<td>00:05:53</td>
</tr>
<tr>
<td>Amritsar Entry Gate to Verka Railway Station</td>
<td>13</td>
<td></td>
<td>00:34:05</td>
<td>00:39:55</td>
<td>00:05:55</td>
</tr>
</tbody>
</table>

BRTS Journey speeds are 1.25 times to more than 2 times of the Auto speed, thus considerable travel time savings being realized in BRTS travel.
Emissions - Towards a Cleaner Amritsar

### Total Carbon Emissions and Vehicle Emissions for BRTS Buses and Shared Autos (both Diesel)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Occupancy</th>
<th>Fleet Size</th>
<th>Total Kilometer Per Day ('000')</th>
<th>Vehicle KM Travelled</th>
<th>Total Pollutant emission</th>
<th>Total Carbon Emission</th>
<th>Total Vehicle Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>42</td>
<td>80</td>
<td>226</td>
<td>18,080</td>
<td>3,65,379</td>
<td>1,36,08,816</td>
<td>1,39,74,195</td>
</tr>
<tr>
<td>Auto-Rickshaw</td>
<td>4</td>
<td>840</td>
<td>226</td>
<td>1,89,840</td>
<td>9,38,759</td>
<td>2,85,82,310</td>
<td>2,95,21,069</td>
</tr>
</tbody>
</table>

### Carbon Emissions and Vehicle Emissions per vehicle (g/km) as per MoUD 2014

<table>
<thead>
<tr>
<th>Mode</th>
<th>PM 2.5</th>
<th>NOx</th>
<th>CO</th>
<th>HC</th>
<th>Pollutants (g/km)</th>
<th>CO2</th>
<th>Total Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>0.504</td>
<td>16.788</td>
<td>2.352</td>
<td>0.565</td>
<td>20.209</td>
<td>752.7</td>
<td>772.909</td>
</tr>
<tr>
<td>Auto-Rickshaw</td>
<td>0.224</td>
<td>0.921</td>
<td>2.616</td>
<td>1.184</td>
<td>4.945</td>
<td>150.56</td>
<td>155.505</td>
</tr>
</tbody>
</table>

Thus, 80 buses replace 840 Shared Auto rickshaws. Shared Autos emit more than 3 times the total Pollutants and more than 2 times the total Carbon emissions than BRTS Buses.
BRTS AMRITSAR : Measures for Sustainability

- PBMS handholding and supporting BRTS Amritsar
- **Urban Transport fund** set up at state level through the Act
- **Advertisement revenue to be shared** between MC Amritsar and PBMS - will help reduce the Viability Gap
- **Fruit & Snacks kiosks** to be set up at 10 BRTS stations as a pilot - will add on to the non-fare revenues
- **Public Bike Sharing scheme** proposals being actively considered for ensuring last mile connectivity and shared mobility (proposal from Hero cycles received)
• Amritsar BRTS is carrying more passengers on a daily basis than some of the new Metros constructed at 6-10 times of the cost of Amritsar BRTS.

• BRTS PHASE 1 covers 31 kms of the City’s core road network of 75 Kms, the mass public transport availability has to be ensured for the maximum part of the core road network.

• Considering the popularity and patronage among commuters due to distinct advantages and features of BRTS system, PBMS can now actively plan Phase 2 of Amritsar BRTS.
Immediate Improvements

Immediate Measures (within 1 year)

• Routes to be extended in mixed traffic, with roadside Bus Stops

• Mixed BRT sections to be taken up for improvements-resurfacing and improved traffic signal, feeder routes to BRT by city buses need to be planned

• BRTS Infrastructure maintenance to be improved-lifts, AFC gates, surveillance cameras, lighting etc

• Construction and upgradation of footpaths to maintain adequacy and continuity in the by-lanes near BRT Bus stops

• Tourist attractions lying on /near BRT corridors to be highlighted through signages & AV media
BRT Routes - Phase 2 – Proposed Extensions – At a glance
Amritsar BRTS - Phase 2 Extensions

Stage 1 Extensions: To nearby settlements, can be taken up immediately
- MCA Gate to ACET via Manewala - 6.2 kms, 2 Bus Stops in mixed traffic
- Verka canal to Jethowal via Muddal - 4.7 kms, 2 Bus Stops in mixed traffic
- India Gate to Khasa Village via Dograi Brigade station - 5.6 kms, with 3 Bus Stops in mixed traffic

Stage 2 Extensions: To locations within the City or those which can be taken at a later date
- Elevated dedicated BRT from Kichlu Chowk to Airport, via Kucheri Chowk - 8.5 kms
- Civil hospital to Hall Gate - 0.6 kms, 2 Bus stops
- Albert Chowk to Lohgarh Chowk via Rigo Bridge - 1.5 Kms, 2 bus stops
- Kichlu Chowk to 4S Chowk via Ranjeet Avenue, Trillium Mall, Majitha road - 8.5 kms, 7 stops
- Brothers dhaba to Wagah Border, 23 kms
Immediate Improvements

Provisions of information signages for tourist attractions located on/near BRT Bus Stops

- Urban Haat - near Crystal chowk
- Sada Pind - near Khalsa College Chowk
- War Memorial - near India Gate
- Maharaja Ranjit Singh’s Gobindgarh Fort – near Albert Chowk
Expected Outcomes with Improvements in system

- Increased Accessibility for Public Transport, enhanced Ridership

- Reduced traffic, Reduction in shared autos

- Reduction in overall carbon footprint, as shared autos are 2/3 times more polluting than the BRT Buses

- Increase in Revenues, Reduction in Viability gap

- Improvement of City’s overall Tourist attraction index
Comparative Analysis of Operational Metro and BRT Systems

<table>
<thead>
<tr>
<th>S. No.</th>
<th>City</th>
<th>Total Length of System (KM)</th>
<th>Daily Ridership - 2019</th>
<th>Ridership/ System Length (km)</th>
<th>Capital Cost in Crore per Km</th>
<th>Motorized Average TL (km)</th>
<th>Average Cost per Daily Rider in Lacs of Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Delhi</td>
<td>343.36</td>
<td>3000000</td>
<td>8737</td>
<td>205</td>
<td>11.2</td>
<td>2.35</td>
</tr>
<tr>
<td>2</td>
<td>Hyderabad</td>
<td>55.3</td>
<td>255000</td>
<td>4611</td>
<td>250</td>
<td>10.0</td>
<td>5.42</td>
</tr>
<tr>
<td>3</td>
<td>Chennai</td>
<td>45.1</td>
<td>90,000</td>
<td>1996</td>
<td>443</td>
<td>13.3</td>
<td>22.20</td>
</tr>
<tr>
<td>4</td>
<td>Bangalore</td>
<td>42.3</td>
<td>400000</td>
<td>9456</td>
<td>366</td>
<td>10.0</td>
<td>3.87</td>
</tr>
<tr>
<td>5</td>
<td>Kolkata</td>
<td>27.22</td>
<td>700000</td>
<td>25716</td>
<td>332</td>
<td>10.0</td>
<td>1.29</td>
</tr>
<tr>
<td>6</td>
<td>Lucknow</td>
<td>23.7</td>
<td>67,000</td>
<td>2827</td>
<td>276</td>
<td>6.5</td>
<td>9.76</td>
</tr>
<tr>
<td>7</td>
<td>Kochi</td>
<td>18.4</td>
<td>50,000</td>
<td>2717</td>
<td>201</td>
<td>10.8</td>
<td>7.40</td>
</tr>
<tr>
<td>8</td>
<td>Gurgaon</td>
<td>11.7</td>
<td>55,000</td>
<td>4701</td>
<td>367</td>
<td>9.3</td>
<td>7.81</td>
</tr>
<tr>
<td>9</td>
<td>Mumbai</td>
<td>11.4</td>
<td>405000</td>
<td>35526</td>
<td>350</td>
<td>10.0</td>
<td>0.99</td>
</tr>
<tr>
<td>10</td>
<td>Jaipur</td>
<td>9.63</td>
<td>20,000</td>
<td>2077</td>
<td>277</td>
<td>6.4</td>
<td>13.34</td>
</tr>
<tr>
<td></td>
<td>Amritsar</td>
<td>31</td>
<td>26100</td>
<td>842</td>
<td>18</td>
<td>7.2</td>
<td>2.14</td>
</tr>
<tr>
<td>2</td>
<td>Pune Pimpri Chinchwad</td>
<td>61</td>
<td>145000</td>
<td>2377</td>
<td>17</td>
<td>8.0</td>
<td>0.72</td>
</tr>
<tr>
<td>3</td>
<td>Ahmedabad</td>
<td>125</td>
<td>370,000</td>
<td>2960</td>
<td>34</td>
<td>8.1</td>
<td>1.15</td>
</tr>
<tr>
<td>4</td>
<td>Rajkot</td>
<td>10.5</td>
<td>17000</td>
<td>1619</td>
<td>10</td>
<td>5.1</td>
<td>0.62</td>
</tr>
<tr>
<td>5</td>
<td>Surat</td>
<td>102</td>
<td>80,000</td>
<td>784</td>
<td>16</td>
<td>6.4</td>
<td>2.04</td>
</tr>
<tr>
<td>6</td>
<td>Indore</td>
<td>11.7</td>
<td>50,000</td>
<td>4274</td>
<td>14</td>
<td>7.1</td>
<td>0.33</td>
</tr>
<tr>
<td>7</td>
<td>Hubli-Dharwad</td>
<td>22</td>
<td>60,000</td>
<td>2727</td>
<td>43</td>
<td>8.6</td>
<td>1.58</td>
</tr>
</tbody>
</table>

As Amritsar BRT will achieve its potential ridership, it will be among the most economical mass transit systems in terms of cost per daily rider.
Thank You