ASSESSMENT OF UTILISATION OF FOOT OVER BRIDGES IN DELHI

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ITU FOB

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• Safety, continuity, and comfort: principles for planning pedestrian infrastructure
• Walkability- extent to which characteristics of built environment & land use support pedestrian-friendly environment
• Mobility parameters such as accessibility, safety, comfort, environmental effect, quality, and location

• Gender perspective
  ▪ Transportation plays a key factor that allows women to participate in the workforce and access social opportunities

• In India, transportation sector accounts for 14% of total GHG emissions (TERI, 2021)
• Road transport accounts for over 90% of emissions

• On comparing CO2 emissions emitted (gm/passenger-km)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Emissions (gm/passenger-km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Car</td>
<td>188.6</td>
</tr>
<tr>
<td>BRTS (AC bus)</td>
<td>36.9</td>
</tr>
<tr>
<td>2-wheeler</td>
<td>36.5</td>
</tr>
<tr>
<td>Metro (in Delhi)</td>
<td>19.7</td>
</tr>
<tr>
<td>Walking and cycling</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Life cycle analysis of transport modes, TERI

• Pedestrian public spaces
  • Encroached by motorized traffic
  • 27% of trips by private motor vehicles occupy 75% of RoW (ITDP & MoHUA, 2019)
• Modal share of work trips
  • 23% of people walk
  • 3% use cars/vans/jeeps
  • 13% use scooters/motorcycles/ mopeds (TERI, 2019)
• Registered vehicles: 11.4 million vehicles (2019); Compounded yearly growth: 6% (Road Transport Yearbook, 2017-18 & 2018-19)
• Number of cars/1000 persons = 424
• Traffic accidents accounted for 39.9% of major causes of accidental deaths in India (National Crime Records Bureau, 2021)
• Number of Traffic Accidents - 4715 in Delhi (2020) (National Crime Records Bureau, 2021)
• 42% of total persons killed in road accidents were pedestrians (Government of NCT of Delhi, 2022)
• Total number of FOBs in Delhi: 90 (2020-21)
OBJECTIVES

1. To assess the current FOB infrastructure with regard to mobility parameters

2. To understand the perspectives of different groups of society towards foot over bridges in Delhi

LITERATURE REVIEW

• Pedestrian Crossing Infrastructure - FOBs
  ▪ Ensure safety by reducing conflict points
  ▪ Inconvenient: Increases walking length and effort, inaccessible for vulnerable users, Costs 20x at-grade signalized crossings

• Across Indian cities, high budgetary allocations for FOB construction

• Guidelines related to FOBs
  ▪ UTTIPEC Guidelines, 2009: shortest possible direct route to cross must be to pedestrians
  ▪ MPD 2041: pedestrians should remain at grade with comfortable & safe access; Grade-separated infrastructure be avoided

Figure 3: IIT Gate FOB

Source: Authors
### METHODOLOGY

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Azadpur Chowk FOB</th>
<th>IIT Gate FOB</th>
<th>ITO FOB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographical spread</td>
<td>North Delhi</td>
<td>South Delhi</td>
<td>Central Delhi</td>
</tr>
<tr>
<td>Road Name</td>
<td>Ring Road</td>
<td>Outer Ring Road</td>
<td>IP Marg</td>
</tr>
<tr>
<td>Barricading</td>
<td>Open at-grade crossing</td>
<td>Barricading on median with a gap in between</td>
<td>Complete barricading on median</td>
</tr>
<tr>
<td>Access to FOB</td>
<td>Ramp and escalators</td>
<td>Stairs and lifts</td>
<td>Stairs and escalators</td>
</tr>
<tr>
<td>Nearest public transit</td>
<td>Metro and public bus stop</td>
<td>Public bus stop</td>
<td>Public bus stop</td>
</tr>
</tbody>
</table>

Figure 4: Heat map of fatal crashes in Delhi 2020-21  
(Source: Government of NCT of Delhi, 2022)
COMFORT

• Shade
• Riser/Height of the stair
• Resting/Seating places on FOB

Figure 5: IIT Gate FOB

Figure 6: Broken shade at Azadpur Chowk FOB & ITO FOB

Figure 7: 5 cm riser at ITO FOB

Source: Authors
ACCESSIBILITY

- Escalator
- Lift
- Ramp
- Tactile paving/tiles

Figure 8: Tactile paving/tiles missing at Azadpur Chowk FOB

Figure 9: Lift at IIT Gate FOB

Figure 10: Non-functional escalators at Azadpur Chowk and ITO FOB

Source: Authors
OBSERVATIONS

SECURITY

• Lighting on the FOB
• Security Guards
• Presence of street vendors

Source: Authors
CONNECTIVITY
• Public amenities
• Signage about FOB
• Nearest Public transit stop

Figure 15: Signage about IIT Gate FOB
Figure 16: No signage at the entrance of Azadpur Chowk FOB
Figure 17: Bus stop at the foot of IIT Gate FOB

Source: Authors
### SCORING OF THE FOBs

**Comfort**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Azadpur Chowk</th>
<th>IIT Gate</th>
<th>ITO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Shade</td>
<td>75</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>2 The riser of the stair</td>
<td>0</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>3 Resting/ seating places on FOB</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total score (x)</strong></td>
<td><strong>75/300</strong></td>
<td><strong>125/300</strong></td>
<td><strong>175/300</strong></td>
</tr>
<tr>
<td><strong>Average score (x/3) (out of 100)</strong></td>
<td><strong>25.00</strong></td>
<td><strong>41.67</strong></td>
<td><strong>58.33</strong></td>
</tr>
</tbody>
</table>

**Accessibility**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Azadpur Chowk</th>
<th>IIT Gate</th>
<th>ITO</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Escalators</td>
<td>50</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>5 Lift</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>6 Ramps</td>
<td>75</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7 Tactile paving/ tiles</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total score (x)</strong></td>
<td><strong>125</strong></td>
<td><strong>100</strong></td>
<td><strong>50</strong></td>
</tr>
<tr>
<td><strong>Average score (x/4) (out of 100)</strong></td>
<td><strong>31.25</strong></td>
<td><strong>25</strong></td>
<td><strong>12.5</strong></td>
</tr>
</tbody>
</table>

**Security**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Azadpur Chowk</th>
<th>IIT Gate</th>
<th>ITO</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Lighting on the FOB</td>
<td>50</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>9 Security Guards</td>
<td>0</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>10 Presence of street vendors</td>
<td>75</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total score (x)</strong></td>
<td><strong>125/300</strong></td>
<td><strong>100/300</strong></td>
<td><strong>150/300</strong></td>
</tr>
<tr>
<td><strong>Average score (x/3) (out of 100)</strong></td>
<td><strong>41.67</strong></td>
<td><strong>33.33</strong></td>
<td><strong>50.00</strong></td>
</tr>
</tbody>
</table>

**Connectivity**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Azadpur Chowk</th>
<th>IIT Gate</th>
<th>ITO</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Public amenities</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12 Signage about FOB</td>
<td>0</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>13 Nearest public transit stop within 500 m</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total score (x)</strong></td>
<td><strong>100/300</strong></td>
<td><strong>125/300</strong></td>
<td><strong>100/300</strong></td>
</tr>
<tr>
<td><strong>Average score (x/3) (out of 100)</strong></td>
<td><strong>33.33</strong></td>
<td><strong>41.67</strong></td>
<td><strong>33.33</strong></td>
</tr>
</tbody>
</table>

• Indicators: **comfort, accessibility, security, & connectivity** (ITDP, 2013; Arellana et al, 2022; Gao et al, 2022; Jafari et al, 2022)

• **13 sub-indicators**: based on equal weights each measured and scored through **on-site observations**

• Sociological aspects of pedestrians studied by conducting primary surveys for a sample of 20 at each FOB through questionnaire
**UTILISATION RATE**

- Measured in three 10-minute time intervals by manual counting taken at peak hours during weekdays
- At Azadpur Chowk observations were taken from 8:50-9:20 am, at IIT Gate from 9:00-9:30 am, and at ITO from 17:00-17:30 pm
- Pedestrians crossing using FOB and crossing at grade, categorized as users and non-users respectively

<table>
<thead>
<tr>
<th></th>
<th>Azadpur Chowk</th>
<th>IIT Gate</th>
<th>ITO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>User</td>
<td>Non-user</td>
<td>User</td>
</tr>
<tr>
<td>1st Interval</td>
<td>95</td>
<td>154</td>
<td>6</td>
</tr>
<tr>
<td>2nd Interval</td>
<td>80</td>
<td>148</td>
<td>5</td>
</tr>
<tr>
<td>3rd Interval</td>
<td>42</td>
<td>134</td>
<td>4</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>72</td>
<td>145</td>
<td>5</td>
</tr>
</tbody>
</table>

**Percentage of usage**

- **Azadpur Chowk**: 33.2%
- **IIT Gate**: 46.9%
- **ITO**: 100.0%

Source: Authors

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**Figure 18: Road characteristics at Azadpur Chowk, IIT Gate, and ITO**
If the pedestrians have to cross a road more than once in a day they would prefer at-grade crossings.

**Characteristics of Users of FOB**

**Usage in a day**

Users in the age bracket of 21-30 years used FOBs more.
Group characteristic

Group of pedestrians chose riskier behaviour as they chose at-grade crossing over FOB, a group more visible to incoming traffic.

Educational level

Higher educational level of a pedestrian did not play a factor in choosing FOB.
Preference for security measures

- It was observed that males do not consider lighting on FOB as important in comparison to females.
- Last preference is CCTV cameras as it is perceived to only help after an incident.

Preference for accessibility measures

- Escalators were considered most important. Secondly, ramps were considered more accessible compared to lifts as lifts are considered secure by female pedestrians.
**RECOMMENDATIONS**

- **Maintain infrastructure**
  - Functional escalators and lifts
  - Shade roofing for thermal comfort
  - Lighting on FOB for security
  - Visible signages about FOB crossing
  - Install resting/seating places

- **Universal design**
  - Tactile paving/tiles and auditory signages
  - Separate street lights at height of pedestrians
  - Public amenities
  - FOBs with cycle ramp such as at ITO FOB

- **Road Design**
  - Wide table-top at-grade crossings with signals
  - Continuous footpath with 3 zones - frontage, pedestrian, & furniture zone
  - Shallow pedestrian underpass midway below street level
  - Improvement for motorized transport: enforcement of speed limits, traffic-calming measures, etc

Figure: 19: Public amenities should be provided around FOBs
THANK YOU
References


28. TERI. 2020. Road map for Electrification of Urban Freight in India. New Delhi: The Energy and Resources Institute


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