Cost-Effective and Implementable Solutions to Reduce Traffic Congestion in Indian Cities – Demonstration Project in Chennai
(Performed under Fulbright Research Grant at IIT Madras, Chennai During Sept 2007 – Sept 2008)

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Need to Reduce Congestion on Heavily Travelled Arterials

- Increasing Congestion in Old and Highly Patronized Retail Shopping Strips
- New Projects (Metros, BRTs, Road Widening, etc.) are not effective in these areas
- Improvements are needed without limiting the existing travel modes
- Cost-Effectiveness and Implementability are the two key requirements
Title of the Fulbright Research Project

Cost-Effective and Implementable Solutions for Congestion on Multi-modal Urban Streets in Developing Countries - Case Studies in Chennai, India
Fulbright Research Projects

- Sponsored and funded by the US Government through its Department of State as Exchange Program between US and other countries
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- All Fulbright Research Projects, performed in India, are officially approved by the Government of India
## Trip Distribution By Mode in Chennai

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Bus</td>
<td>29%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Walk</td>
<td>28</td>
<td>-</td>
</tr>
<tr>
<td>Motorcycle/Scooters</td>
<td>18</td>
<td>75</td>
</tr>
<tr>
<td>Bicycle</td>
<td>13</td>
<td>-</td>
</tr>
<tr>
<td>Train</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Car</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>Autorickshaws</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Others (including trucks)</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Draft Master Plan II for Chennai Metropolitan Area, CMDA, 2007
# Priorities for improvement in Chennai

<table>
<thead>
<tr>
<th>Mode</th>
<th>Person Trips</th>
<th>Vehicle Trips</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bus</td>
<td>29%</td>
<td>&lt;1%</td>
<td>3</td>
</tr>
<tr>
<td>2. Walk</td>
<td>28</td>
<td>-</td>
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</tr>
<tr>
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<td>-</td>
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</tr>
<tr>
<td>6. Car</td>
<td>4</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>7. Auto Rickshaw</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. Others (incl Trucks)</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
</tbody>
</table>
Reasons for Traffic Congestion in Indian Cities

- Pedestrians and Bicycles using carriageway
- Bus users waiting on carriageway
- Buses not pulling to the curbside
- Increasing vehicular Traffic
- Increasing Motorcycles/Scooters
- Lack of lane discipline by vehicular traffic, especially by motorized two- and three-wheelers
What to do?

• Do not waste time in studies, establishing policies, and developing standards. Now, it is time to do.
• Solve immediate problems
• Corridor by corridor all-modes analysis and improvement
• Multi-disciplinary approach
• Involvement of government agencies and other stakeholders
• There are simple and low cost solutions. Explore them
• Determination and dedication to improve the image of the city through improving mobility to users of all travel modes, all income groups, all ages, and handicapped

• Then, How to do?
The Delphi Technique is based on the Hegelian Principle of achieving Oneness of Mind through a three step process:

1. Thesis: A recommendation or plan will be developed and presented to the stakeholders.

2. Antithesis: All stakeholders present their opinions or views on the recommendation or plan, expressing their views and opposing views.

3. Synthesis: Opposites are brought together to form the new thesis. All stakeholders are then to accept ownership of the new thesis and support it, changing their own views to align with the new thesis.

Through a continual process of meetings with stakeholders, Oneness of Mind will supposedly occur.

This technique, which has been successfully applied by the author in the US, has been modified to suit to Indian conditions.
Tasks to be accomplished

1. Collect Data
2. Perform Field Visits
3. Identify Problems
4. Identify Reasons for Congestion and Establish Guidelines
5. Organize Workshop
6. Develop solution
7. Present Solution to Decision Makers of Public Agencies and Stakeholders
8. Refine the Developed Solution Continually
Task 1: Data Collection

• Each street segment is **unique**
• Information on **all modes**
• In developing countries, very **little data** is available.
• Effort should be **reasonable in terms of time and budget**
• The **time and day for data collection** (Early and Peak hours)
• A **compromise** is needed in collecting essential data to identify congestion problems and reasons for the congestion and then, to develop implementable solutions.
Task 2: Field Visits

Field visits are the only basis for gathering the data. **Photos and videos** are the key tools for:

• Identifying congestion problems and reasons behind congestion
• Presenting at public meetings
• Using as virtual walk through the street segment in meetings and discussions later
• Comparing before and after conditions
Task 3. Problem Identification

- **System-wide** observation is necessary. System means not just vehicular traffic. Every mode starting from walk has to be considered.

- Knowing the concern of **all stakeholders** irrespective of their social level and users of **all travel modes** is essential to identify and understand the actual problems.

- **Informal interviews and questionnaire surveys** are to be conducted to understand these concerns.

- Congestion problems are to be **identified and further confirmed** at public meetings.
Task 4: Identify Reasons for Congestion and Establish Guidelines

- Relate the problems expressed by the public at the interviews and public meetings and observed during field observations with the data collected on traffic volumes and existing physical features to identify reasons behind the traffic congestion in the street segment.

- At this stage, a set of guidelines suitable to the physical conditions and adjacent land use of the corridor has to be established. These guidelines should be corridor-specific. They might not confirm to the established engineering standards due to the limitations of the features in the corridor.
Guidelines for Footpaths (1 to 4)

1. There should be a **minimum width of 4 tiles**. Currently, on LB Road sidewalk, each tile is about 2 feet square

2. When the sidewalk is **less than 4-tile width** due to illegal encroachment, the sidewalk should be increased to 4-tile width by removing the illegal encroachments, following the criteria below:
   
   Shifting free-standing illegal stalls to permanent stalls, provided by the corporation at nearby locations.

   If legal street-side shops extend illegally onto sidewalks, the illegal extensions are to be removed.

3. Pavement should be **even and safe** to walk without any cracks or tiles missing

4. When sidewalk is **less than 4-tile wide** without any illegal encroachments, it should be widened to the minimum of 4-tile wide by reducing the carriageway. The policy is that there should be always a minimum of 4-tile wide sidewalk. **If necessary, carriageway should be reduced; but, not the other way at the sacrifice of sidewalk.**
Footpath: Guidelines 1 and 2

1. There should be a minimum width of 4 tiles on the sidewalk.

2. When the sidewalk is less than 4-tile width due to illegal encroachment, the sidewalk should be increased to 4-tile width by removing the illegal encroachments.

Hawkers reduce the width of the usable portion of the sidewalk from 8’ to 4’.

Illegal encroachments to be removed in order to make the sidewalk 8’ wide.
Footpath: Guidelines 3 and 4

When sidewalk is less than 4-tile wide without any illegal encroachments, it should be widened to the minimum of 4-tile wide by reducing the carriageway. The policy is that there should be always a minimum of 4-tile wide sidewalk. If necessary, carriageway should be reduced; but, not the other way at the sacrifice of sidewalk.

Pavement should be even and safe to walk without any cracks or tiles missing.
Guidelines for Footpaths (5 to 8)

5. When illegal stalls exist on a sidewalk with more than 4-tile wide, they are allowed; but, confined to permanent stalls built and leased by the corporation with strict enforcement that no encroachments on the sidewalk

6. Motor cycle and car parking to be provided only after there is clear 4-tile wide sidewalk and without conflicting with pedestrians on sidewalk

7. All obstacles on sidewalks should be removed except trees. Check for shifting of electrical equipment located in the middle of sidewalks with the Corporation and concerned electrical departments

8. Different textured tiles for sidewalks are recommended to demarcate that no encroachments are allowed on those tiles
Footpath: Guidelines 5 and 6

5. When illegal stalls exist on a sidewalk with more than 4-foot wide sidewalk, they are allowed; but, confined to permanent stalls built and leased by the corporation with no encroachments on the sidewalk.

6. Motor cycle and car parking to be provided only after there is clear 4-foot wide sidewalk and without conflicting with pedestrians on sidewalk.
Footpath: Guidelines 7 and 8

Guideline 7:

- All obstacles on sidewalks should be removed except trees. Check for shifting of electrical transformers located in the middle of sidewalks.

Guideline 8:

- Different textured tiles for sidewalks are recommended to demarcate that no encroachments are allowed on those tiles.
Guidelines for Footpaths (9 to 12)

9. Colored curbs to indicate no parking areas are recommended

10. When there are cuts in the sidewalks for access to street-side establishments and at intersections, ramps are to be provided for pedestrians to negotiate high curbs; these are not meant for 2-wheelers to park on sidewalk.

11. Encourage school children to walk to school by providing continuous and safe sidewalks and crosswalks.

12. Proper sidewalk ramps are to be provided at locations where significant handicapped (deaf, blind, and wheelchair-bound) and senior citizens travel, such as hospitals and schools.
Guideline 9: Colored curbs to indicate no parking areas are recommended.

Guideline 10: When there are cuts in the sidewalk for access to streetside establishments and at intersections, ramps are to be provided for pedestrians to negotiate high curbs; these are not meant for 2-wheelers to park on sidewalk.
Guidelines for Intersections

• Safe striped crosswalks should be provided at each intersection
• Pedestrians should have the priority at crosswalks and the green time should be set by considering both the pedestrian traffic and vehicular traffic at any intersection
• At major intersections near schools, during school opening and closing times, there should be school guards helping children to cross streets
• In long blocks, mid-block crosswalks with pedestrian signals should be provided
Guidelines for Bus Stops

• Long bus stops (sometimes for the entire block)
• Number of bus bays (based on buses serving in peak period)
• No waiting on the carriageway to board buses
• Sufficient space to wait inside bus stop
• Boarding and deboarding of passengers at bus stops only
• Drivers should know this rule
• In a long term, all buses should be equipped with doors
• Sidewalks behind bus shelters at the bus stops
Task 5: Organize Workshop

- *invitees-only* workshop attended by decision makers of public agencies and key transportation professionals

- Present the problems and reasons for congestion as identified in the earlier tasks and also the guidelines established for the corridor

- Seek consensus and input to develop solutions to the problems through brain-storming session

- Well organized to give opportunities to every participant to express his/her opinion without any reservations so that the participants recognize that they are part and parcel of decision making.
Task 6: Develop Solution

- Moving more people rather than more vehicles
- Existing problems should have immediate priority
- Solution need not be expensive to be efficient
- Recommendations should be in detail by dividing the corridor into several sections or blocks (between successive intersections)
- Existing problems and proposed recommendations are to be described in detail for each section in terms of the established corridor-specific guidelines
Task 7: Present Solution to Decision Makers of Public Agencies and Stakeholders

• Present solution in a convincing manner with factual conditions and how it relieves congestion
• Provide order-of-magnitude cost estimate (not precise)
• Costs and benefits in achieving immediate relief
• Simple, straight forward, and understandable solution leads to quick implementation
• Majority of congestion problems could be solved with proper improvements in walk and bicycle facilities, bus operations, and bus stops
Task 8: Refine the Developed Solution

- Based on the comments received at the presentations, appropriate changes have to be made in the developed solution.
- Present again the refined solution explaining what comments have been incorporated and what comments could not be incorporated with reasons for not incorporating them.
- Repeat the process of Presentation and Refinement until the final solution is acceptable to all government agencies and stakeholders.
Intersection Improvement Example

Recommended

Existing
Current Status of the Demonstration Project

• Happy to inform that Chennai City Corporation is implementing the recommended improvements in the demonstration corridor (LB Road in Adyar, close to IIT Madras). Please see on internet (Google) under “LB Road Project”

• Chennai is also trying to improve footpaths city wide and experimenting with bicycle paths in certain sections of the city
Conclusions

• Needs corridor-by-corridor analysis
• Solutions are simple
• Need multidisciplinary approach
• These simple solutions are being ignored because they require complex cooperation among various stakeholders
• Providing convenient, comfortable, continuous, and safe sidewalks and bicycle paths to keep the pedestrians and bicycles away from carriageway, thus leaving the carriageway for automated vehicles is the key to reduce congestion
• This research project through demonstration has shown that the needed cooperation could be achieved through Delphi technique, a systematic process, involving public agencies and stakeholders
Thanks
to each of you
for your attention