

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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Urban Mobility India 2010 Conference, New Delhi, Dec 3-5, 2010

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
- In India, the projects are being administered by The United States Education Foundation in India (USEFI), established through a bi-national agreement made in 1950. In 2008, India started contributing funds to this program; hence, the name has been changed as United States - India Education Foundation (USIEF)
- All Fulbright Research Projects, performed in India, are officially approved by the Government of India

Trip Distribution By Mode in Chennai

<u>Travel Mode</u>	<u>Person Trips</u> (2004)	<u>Vehicle Trips</u> (2005)
Bus	29%	<1%
Walk	28	-
Motorcycle/Scooters	18	75
Bicycle	13	-
Train	5	-
Car	4	19
Autorickshaws	2	3
Others (including trucks)	1	3

Source: Draft Master Plan II for Chennai Metropolitan Area, CMDA, 2007

Priorities for improvement in Chennai

<u>Mode</u>	<u>Person Trips</u>	<u>Vehicle Trips</u>	<u>Priority</u>
1. Bus	29 %	<1 %	3
2. Walk	28	-	1
3. Motor Cycle / Scoot	18	75	5
4. Bicycle	13	-	2
5. Train	5	-	-
6. Car	4	19	6
7. Auto Rickshaw	2	3	4
8. Others (incl Trucks)	1	3	-

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 ?**

Delphi Technique

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



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JEFFERSON STATION

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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.

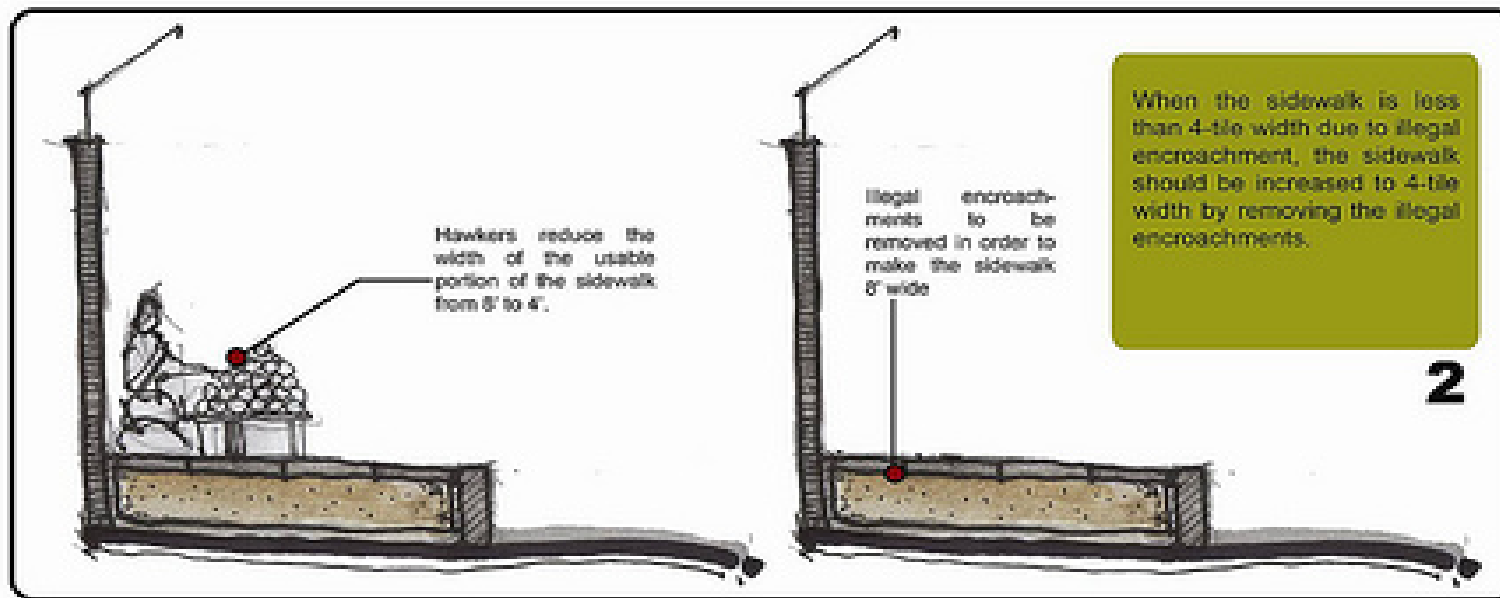
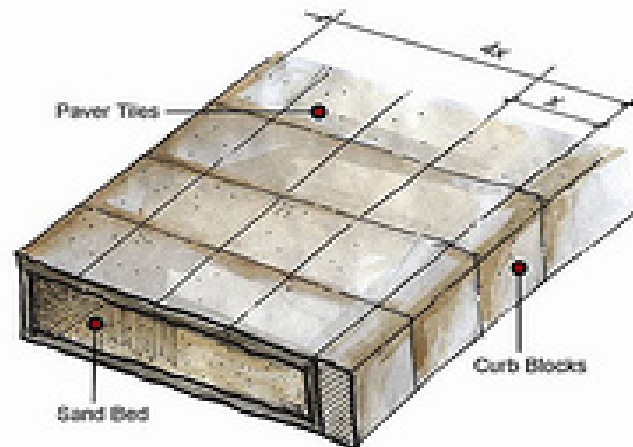
3. Pavement should be even and safe to walk without any cracks or tiles missing

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, carriage way should be reduced; but, not the other way at the sacrifice of sidewalk

Footpath : Guidelines 1 and 2

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

1



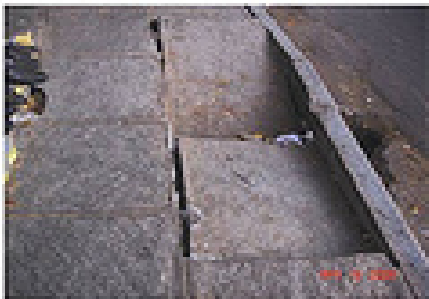
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Footpath: Guidelines 3 and 4



X

3

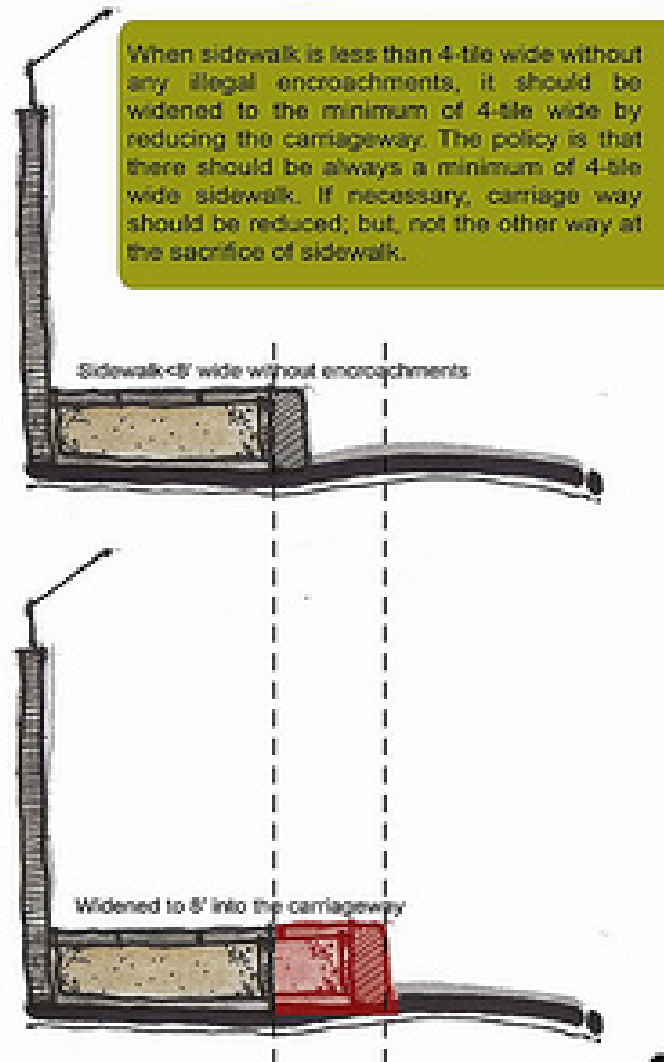


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✓

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



4

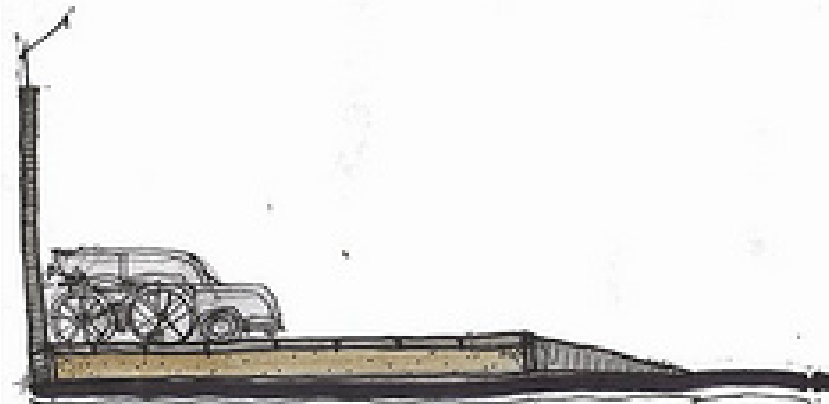
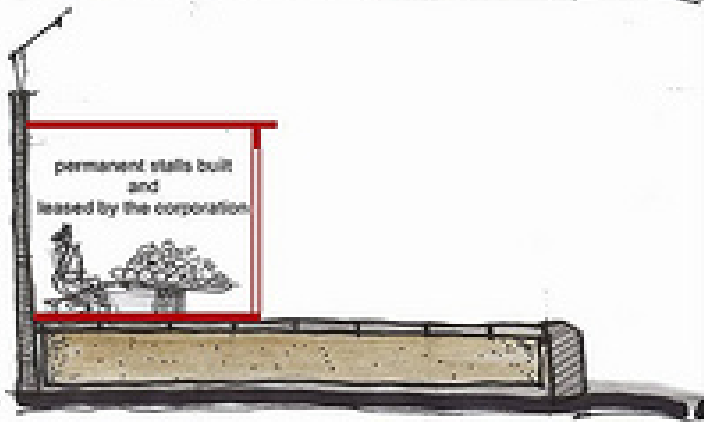
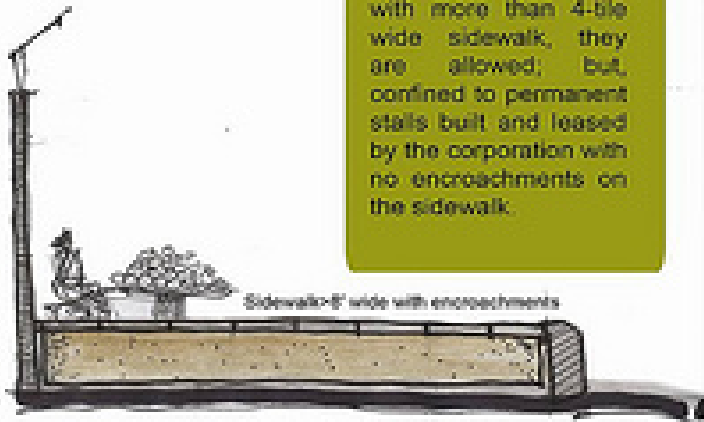
Guidelines for Footpaths (5 to 8)

- 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

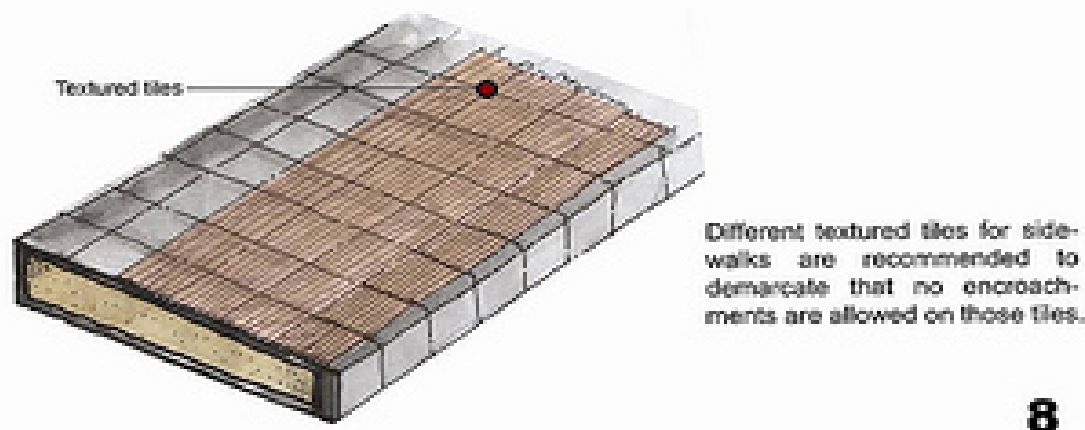
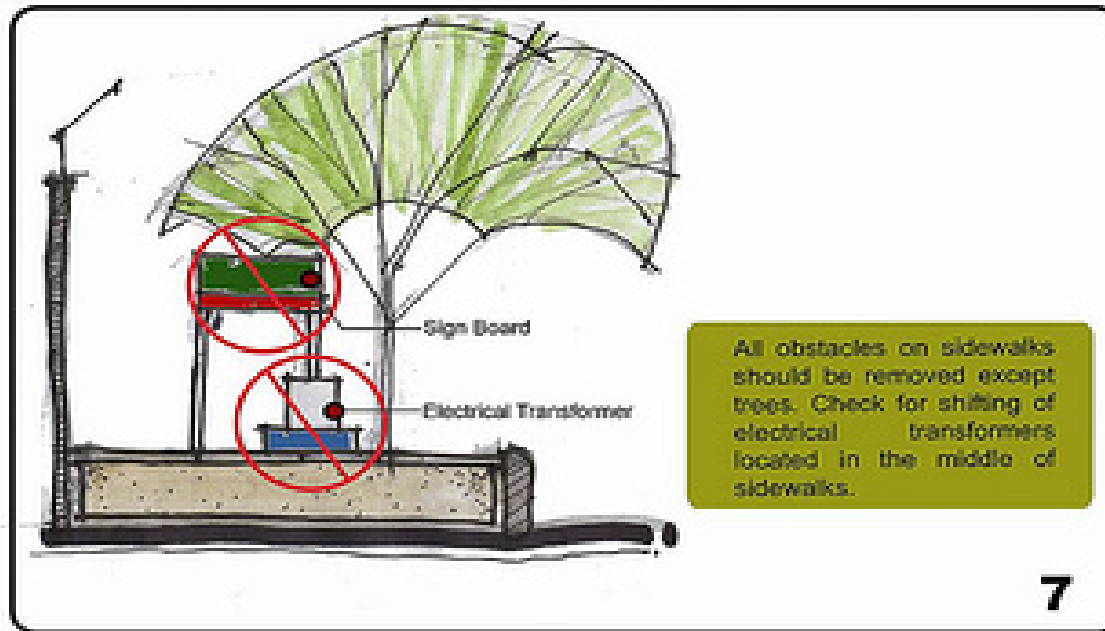
When illegal stalls exist on a sidewalk with more than 4-tile wide sidewalk, they are allowed; but, confined to permanent stalls built and leased by the corporation with no encroachments on the sidewalk.



6

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

Footpath: Guidelines 7 and 8



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

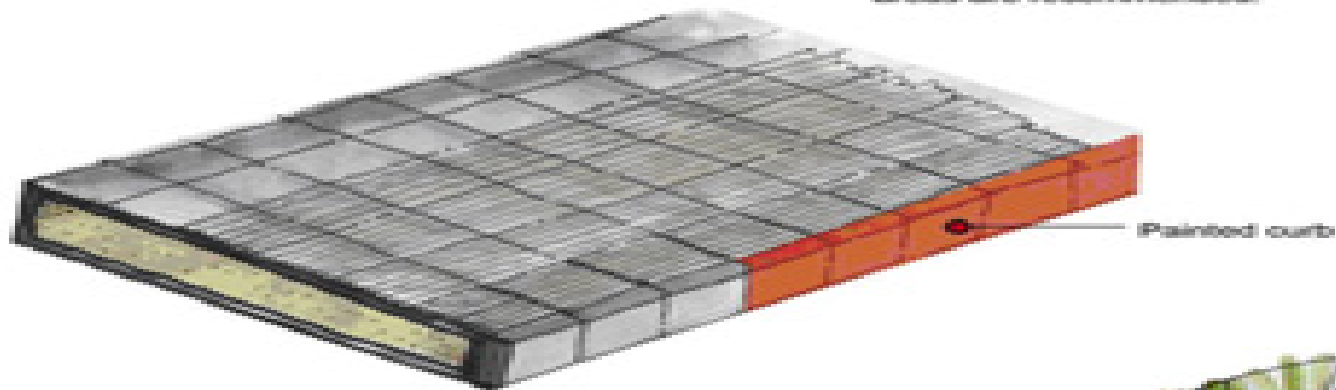
11. Encourage school children to walk to school by providing continuous and safe sidewalks and crosswalks

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

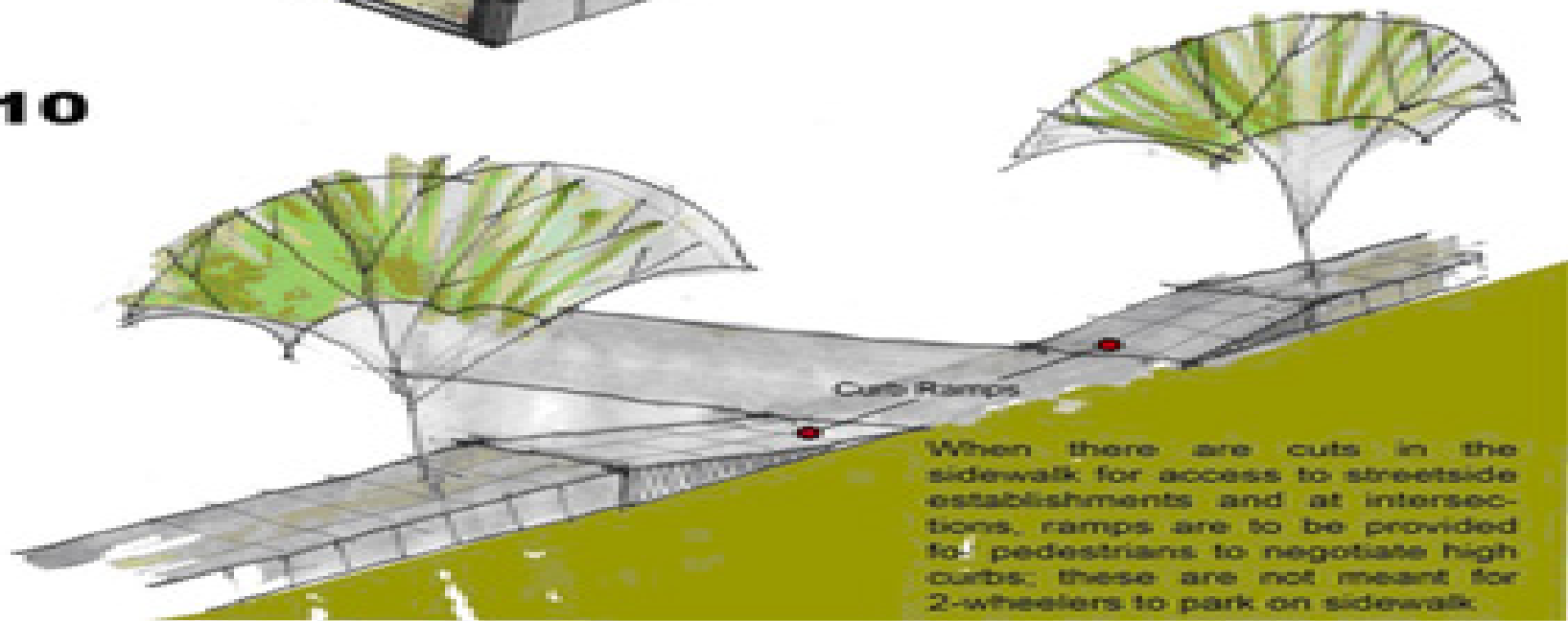
Footpath: Guidelines 9 and 10

9

Colored curbs to indicate no parking areas are recommended.



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

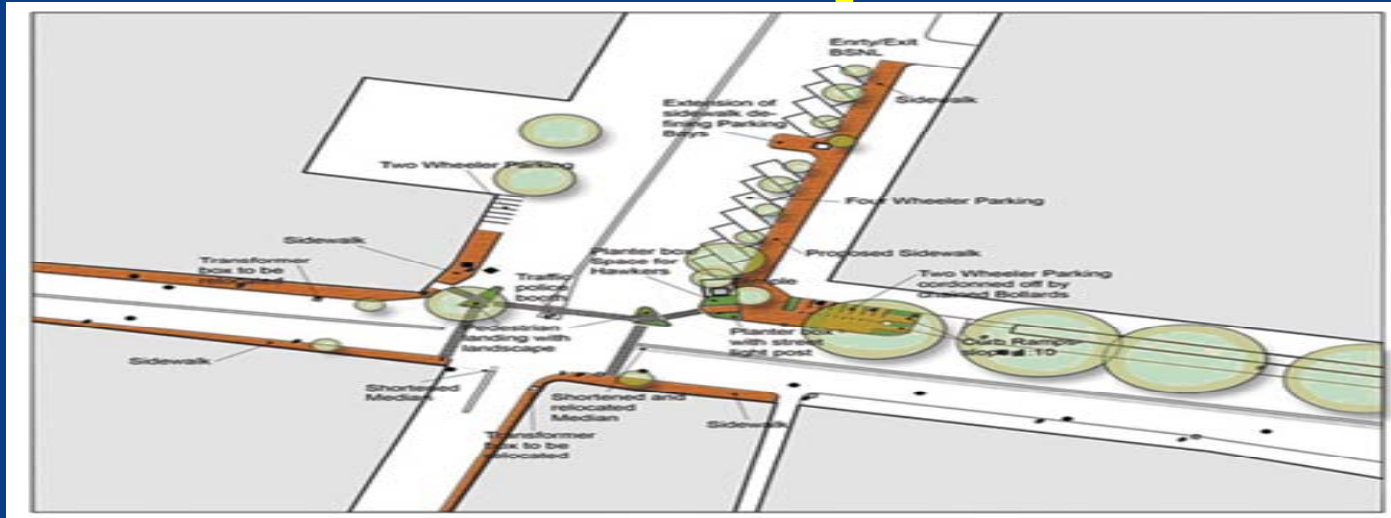
Task 7: Present Solution to Decision Makers of Public Agencies and Stakeholders

- 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