







# CAPACITY ASSESSMENT AND ENHANCEMENT FOR SAFE STREET DESIGN AND ENABLING NON-MOTORIZED TRANSPORT INFRASTRUCTURE IN COIMBATORE

**VOLUME 2: CURRICULUM AND MODULES** 

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• Working with above grade utilities

Introduction to tactical urbanism

Design review and feedback



# 1. Introduction

#### Project context

In the bilateral Government to Government Negotiations 2015, the Government of India and Germany had agreed to jointly launch a technical cooperation fostering sustainable urban transport system. Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) GmbH implements this project with Ministry of Housing and Urban Affairs as its political partner. The objective of the "Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)" project is to improve the planning and implementation of sustainable urban transport in selected Indian cities. The implementation focuses on the pilot cities of Bhubaneswar, Coimbatore,

and Kochi, which were selected by the German Government for special support on their way to becoming a Smart City.

Against this background, a Capacity Development Strategy (CDS) framework was developed by the SMART-SUT project to support relevant state and city institutions to improve planning and implementation of sustainable urban transport in Coimbatore, by developing common understanding of the activities involved and promoting coordinated action. The CDS sought to answer the following questions-

1.

What capacities are present within the existing system for developing strategies, making cooperation sustainable, taking decisions and managing processes? What action is needed as a result?

2.

What needs to change and who needs to change what, so that the desired objectives and results will be achieved? How can that take place? Who needs to learn what on which level, so that the changes can be sustainable and mainstreamed?

3.

How can the SMART-SUT project bring about a change in co-operation systems and enabling frameworks, keeping in mind the current socio-political contexts?

#### Framework for this assessment

In Coimbatore, the CDS framework is centred around the Coimbatore City Municipal Corporation. The methodology adopted for this assignment is outlined in the work flow diagram as shown in the following page. The methodology is embedded with three broad objectives -

- 1. Diagnosis
- 2. Formulating recommendations
- 3. Implementing recommendations

For the purpose of this capacity assessment and enhancement plan, the entire research and analysis is consistently carried out and presented under 5 main components of realizing NMT infrastructure-

Standards & Guidelines

This sections covers the questions regarding road standards, transportation policies, and important concepts in NMT projects.

Design, Planning, Materials & Specifications

This section covers questions regarding street design process, level of knowledge on various material specifications and components of NMT projects such as - street hierarchies, walking & cycling facilities, barrier free environment etc.

Tendering process and Budgeting

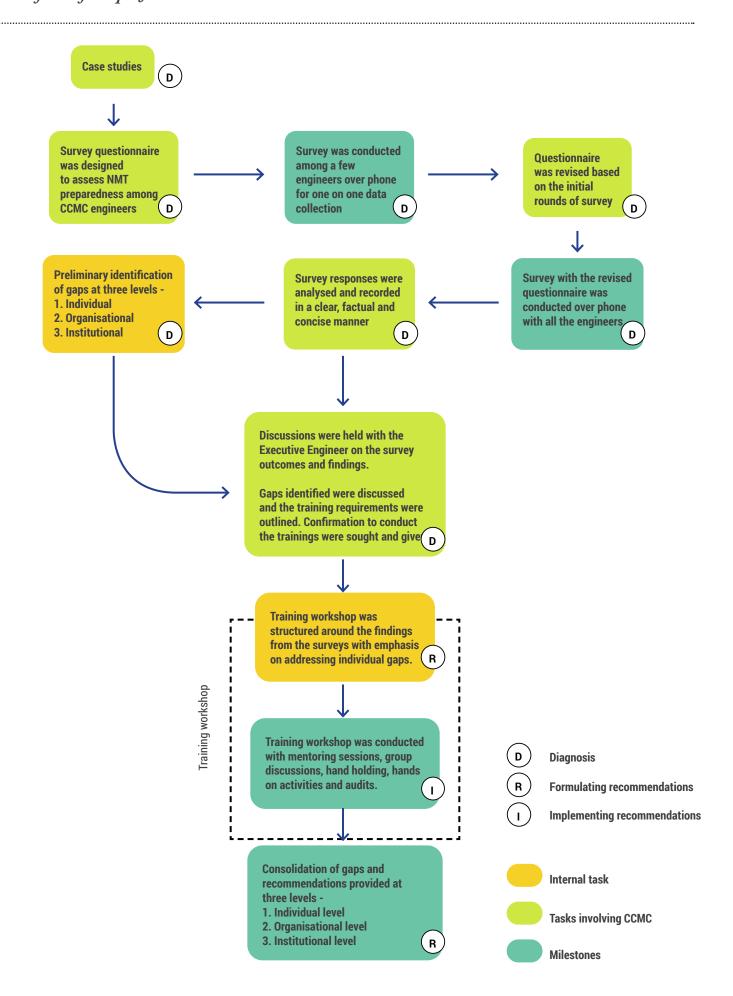
This section is directed towards level of knowledge regarding the tendering and funding procedures for different projects as well as maintenance.

Implementation and Operations & Maintenance

This section of the survey covers the implementation aspect of NMT projects, with focus on inter agency coordination during implementation and other processes involved in this phase.

**Enabling Frameworks** 

This section is directed towards finding the required amount of training and the kind of gaps the engineers experience frequently.





# 2. Purpose of this document

This document is intended to offer comprehensive guidance for staff of urban local bodies to build capacity to take up projects with an emphasis on non-motorized transport and their implementation across Indian cities. This document has been prepared in partnership with the municipal corporation of Coimbatore as an aid to creating long term measures regarding NMT knowledge and processes. By using this toolkit provided in this document, Measures to improve NMT readiness within municipal bodies in Tamil Nadu can be institutionalised. This toolkit is organised in two parts

# Part A - Capacity Enhancement Program for creating Safe Streets and enabling NMT infrastructure

which outlines the following:

- Objectives of the training program
- · General prerequisites for conducting the training program
- Structure of the training program
- Prerequisites for each day of the training program
- Activities involved
- · Objectives and learning outcomes of each activity
- Material and logistics requirements for each activity

#### Part B - Instructor Manual

comprised of:

- Instructions for training instructors to conduct the activities outlined in the training program
- Links to training materials (presentations and print material)



# 3. Part A - Capacity Enhancement Program for creating Safe Streets and enabling NMT infrastructure

- Objectives of the training program
- Recommended structure of the training program
- General prerequisites for organising and conducting the training program on NMT readiness
- Prerequisites for each day of the training program
- Activity wise description

- 1. To impart a basic understanding of the processes involved in the conceptualization and implementation of NMT projects.
- 2. To help the participants gain a practical sense of challenges faced by pedestrians while using streets.
- 3. To create awareness about the needs and issues from the perspective of different user groups that inhabit a street.
- 4. To give a hands-on experience to the participants on street documentation and analysis as the basic requirement for taking up NMT projects in future.
- 5. To help participants understand the value of non-motorised transport modes over other modes of transportation.
- 6. To help learn about designing street sections and intersection design by strategically placing the street elements to solve the challenges of the site.
- 7. To give the participants a hands-on experience with designing streets with an emphasis on non-motorised transport as as way to achieve safe streets for all.
- 8. To help them understand how to deal with above ground utility design in the context of walkability.
- 9. To impart understanding on tactical urbanism as a way to test their designs on the ground.
- 10. To introduce the participants to the basics of network planning for non-motorised transport.

#### 2/Recommended structure of the training program

The workshop should be conducted for the span of 6 days, This is required to ensure that all the activities are conducted and sufficient discussions and reviews are conducted on the activities undertaken. The training should ideally be conducted continuously for the span of 6 days, but the availability of the engineers should also be taken into consideration.

It is essential to undertake all the activities mentioned in the schedule below to give the engineers a holistic understanding of designing and executing NMT priority projects.

10 00 10 20 Introductory presentation 20 minutes Indoor Overview of the workshop - Objectives and activities	Instructor: 1
10.00 10.05 Tulmul	
10 20 10 35 Tea break 15 minutes Indoor	
10 35 11 30 Tutorial on conducting Pedestrian 55 minutes Indoor Environment Audit - Part 1	Instructor: 1
11 30 13 30 Pedestrian Environment Audit - Part 1 2 hours Outdoor	Facilitators: 1 for two teams
13 30 14 30 Lunch break 1 hour Indoor	
11 30 13 30 Pedestrian Environment Audit - Part 1 2 hours Outdoor  13 30 14 30 Lunch break 1 hour Indoor  14 15 15 45 Creating awareness to prioritise NMT on our 1 hour 30 minutes Indoor streets - NMT Gaming session  15 45 16 00 Tea break 15 minutes Indoor  16 00 16 30 Introduction to network planning for NMT 30 minutes Indoor	Facilitators: 1 per table/ game board
15 45 16 00 Tea break 15 minutes Indoor	
16 00 16 30 Introduction to network planning for NMT 30 minutes Indoor	Instructor: 1
16 30 17 00 Mapping user groups based on observations 30 minutes Indoor from Pedestrian Environment Audit - Part 1	Instructor: 1
10 00 10 15 Introduction to Day 2 activities 15 minutes Indoor	Instructor: 1
10 15 10 45 Presentation of outcomes of Pedestrian 30 minutes Indoor environment audit - Part 1	Instructor: 1
10 45 11 00 Tea break 15 minutes Indoor	
11 00 12 00 Role play exercise 1 hour Indoor	Facilitators: 2
the second secon	Facilitators: 1 per team
13 00 14 00 Lunch break 1 hour Indoor	
17 00 12 00 Role play exercise Thour Indoor  18 00 13 00 Mapping user groups and their needs Thour Indoor  19 00 13 00 Lunch break Thour Indoor  10 00 14 00 Lunch break Thour Indoor  10 00 14 45 Tutorial on conducting Pedestrian Fourier Part 2  10 00 12 00 Role play exercise Thour Indoor  10 00 12 00 Role play exercise Thour Indoor  10 00 12 00 Role play exercise Thour Indoor  10 00 12 00 Role play exercise Thour Indoor  10 00 12 00 Role play exercise Thour Indoor  11 00 12 00 Role play exercise Thour Indoor  12 00 13 00 Role play exercise Thour Indoor  13 00 14 00 Lunch break Thour Indoor  14 00 14 45 Tutorial on conducting Pedestrian Four Pedestrian Four Part 2 Thour Indoor  14 00 14 45 Tutorial on Conducting Pedestrian Four Part 2 Thour Pedestrian Four Part 2 Thour Pedestrian Four Ped	Instructor: 1
14 45 18 00 <b>Pedestrian Environment Audit - Part 2</b> 3 hours and 15 Outdoor minutes	Facilitators: 1 per team

Day	Start	End	Activity	Duration	Location	Training Personnel required
	10 00	10 15	Introduction to Day 3 activities	30 minutes	Indoor	Instructor: 1
	10 15	10 30	Tutorial on Designing the street section	15 minutes		Instructor: 1
g an	10 30	10 45	Tea break	15 minutes	Indoor	
rning or-1	10 45	13 30	Designing the street section	2 hours 45 minutes	sIndoor	Facilitators: 1 per team
Day 3: Designing an NMT corridor–1	13 30	14 30	Lunch break	1 hour	Indoor	
, 3: I IT ca	14 30	16 30	Translating the street section into a plan	2 hours	Indoor	Facilitators: 1 per team
Day NN	16 30	16 45	Tea break	15 minutes	Indoor	
	16 45	17 00	Working with above grade utilities	15 minutes	Indoor	Instructor: 1
	10 00	10 45	Tutorial on Intersection design	45 minutes	Indoor	Instructor: 1
an	10 45	11 00	Tea break	15 minutes	Indoor	
ning r-2	11 00	12 30	Designing the Intersection fix	1 hour 30 minutes	Indoor	Facilitators: 1 per team
esig rridd	12 30	13 30	Preparation for first jury/ review session	1 hour		Facilitators: 1 per team
Day 4: Designing an NMT corridor–2	13 30	14 30	Lunch break	1 hour	Indoor	
> M						
Day NN	14 30	16 30	Review session	2 hours	Indoor	
Day NN	14 30 16 30	16 30 17 00	Review session  Tea break and Closing Comments	2 hours 30 minutes	Indoor Indoor	
					Indoor	Facilitators: 1 per team
	16 30	17 00	Tea break and Closing Comments  Continuation of street design working	30 minutes	Indoor	Facilitators: 1 per team
	16 30 10 00	17 00 11 30	Tea break and Closing Comments  Continuation of street design working session	30 minutes 1 hour 30 minutes	Indoor	Facilitators: 1 per team Instructor: 1
: Testing the	16 30 10 00 11 30	17 00 11 30 11 45	Tea break and Closing Comments  Continuation of street design working session  Tea break	30 minutes 1 hour 30 minutes 15 minutes	Indoor Indoor Indoor	
Day 5: Testing the Day design	16 30 10 00 11 30 11 45	17 00 11 30 11 45 12 30	Tea break and Closing Comments  Continuation of street design working session  Tea break  Introduction to tactical urbanism	30 minutes 1 hour 30 minutes 15 minutes 45 minutes	Indoor Indoor Indoor Indoor Indoor	
: Testing the	16 30 10 00 11 30 11 45 12 30	17 00 11 30 11 45 12 30 13 30	Tea break and Closing Comments  Continuation of street design working session  Tea break  Introduction to tactical urbanism  Lunch break  Testing of design on ground - tactical	30 minutes 1 hour 30 minutes 15 minutes 45 minutes 1 hour	Indoor Indoor Indoor Indoor Indoor SOutdoor	Instructor: 1
Day 5: Testing the design	16 30 10 00 11 30 11 45 12 30 13 30	17 00 11 30 11 45 12 30 13 30 17 00	Tea break and Closing Comments  Continuation of street design working session  Tea break  Introduction to tactical urbanism  Lunch break  Testing of design on ground - tactical urbanism	30 minutes 1 hour 30 minutes 15 minutes 45 minutes 1 hour 3 hours 30 minutes	Indoor Indoor Indoor Indoor Indoor SOutdoor	Instructor: 1 Facilitators: 1 per team
Day 5: Testing the design	16 30 10 00 11 30 11 45 12 30 13 30	17 00 11 30 11 45 12 30 13 30 17 00	Tea break and Closing Comments  Continuation of street design working session  Tea break  Introduction to tactical urbanism  Lunch break  Testing of design on ground - tactical urbanism  Preparation for final review	30 minutes  1 hour 30 minutes  15 minutes  45 minutes  1 hour  3 hours 30 minutes  1 hour 15 minutes	Indoor Indoor Indoor Indoor Indoor Indoor Indoor Indoor Indoor	Instructor: 1 Facilitators: 1 per team
Day 5: Testing the design	16 30 10 00 11 30 11 45 12 30 13 30 10 00 11 15	17 00 11 30 11 45 12 30 13 30 17 00 11 15 11 30	Tea break and Closing Comments  Continuation of street design working session  Tea break  Introduction to tactical urbanism  Lunch break  Testing of design on ground - tactical urbanism  Preparation for final review  Tea break	30 minutes 1 hour 30 minutes 15 minutes 45 minutes 1 hour 3 hours 30 minutes 1 hour 15 minutes 15 minutes	Indoor Indoor Indoor Indoor Indoor Indoor Indoor Indoor Indoor	Instructor: 1  Facilitators: 1 per team  Facilitators: 1 per team
Day 5: Testing the design	16 30 10 00 11 30 11 45 12 30 13 30 10 00 11 15 11 30	17 00 11 30 11 45 12 30 13 30 17 00 11 15 11 30 13 00	Tea break and Closing Comments  Continuation of street design working session  Tea break  Introduction to tactical urbanism  Lunch break  Testing of design on ground - tactical urbanism  Preparation for final review  Tea break  Preparation for final review	30 minutes 1 hour 30 minutes 15 minutes 45 minutes 1 hour 3 hours 30 minutes 1 hour 15 minutes 15 minutes 1 hour 30 minutes	Indoor	Instructor: 1  Facilitators: 1 per team  Facilitators: 1 per team
: Testing the	16 30 10 00 11 30 11 45 12 30 13 30 10 00 11 15 11 30 13 00	17 00 11 30 11 45 12 30 13 30 17 00 11 15 11 30 13 00 14 00	Tea break and Closing Comments  Continuation of street design working session  Tea break  Introduction to tactical urbanism  Lunch break  Testing of design on ground - tactical urbanism  Preparation for final review  Tea break  Preparation for final review  Lunch break	30 minutes  1 hour 30 minutes  15 minutes  45 minutes  1 hour  3 hours 30 minutes  1 hour 15 minutes  15 minutes  1 hour 30 minutes  1 hour	Indoor	Instructor: 1  Facilitators: 1 per team  Facilitators: 1 per team

**Note:** The timings on the above structure have been provided as an example. It is recommended to not change the sequence of the activities throughout the workshop as the flow follows the general process involved while working on NMT projects. For example, the workshop begins with auditing a street and progresses to making design proposals for that street and concludes with testing the design on ground through a tactical urbanism project.

# 3/General prerequisites for organising and conducting the training program on NMT readiness

It is recommended that this training program on NMT readiness should be conducted for city engineers at all levels especially those working on projects involving streets.

#### **Pre-training prerequisites:**

- 1. A set number of streets/ street stretches need to be identified for the participants to work with during the course of the workshop.
- 2. Based on a calculation of allocating a 0.5 kilometre street segment for a team of two participants, the total length of all the streets should be a minimum of 3.5 kilometres and a maximum of 7.5 kilometres. 0.5 kilometre is selected as the segment length as it is the maximum distance that can be walked without fatigue in one go.
- 3. With regard to street stretch selection-
  - It is Ideal to choose commercial streets with mixed landuse and dense population, so that there is complexity in issues to be understood and resolved.
  - Each street stretch must have at least one major intersection.
  - It is recommended to consider streets are due for upgrading under any project schemes or the regular maintenance schedule
  - The selected streets should be accessible for documentation and testing of design on ground.
     For example, streets which have construction or maintenance activities must be avoided.
     Likewise, streets on which there is spillover of

- cultural/ festival related activities at the time of the workshop should be avoided.
- 4. Instructors must familiarise themselves with the entire structure of the workshop as well as the objectives and outcomes for each activity prior to conducting the workshop.
- 5. All logistical arrangements must be adhered to as mentioned for each day/ activity of the workshop.
- 6. Invitations to other stakeholders such as the Commissioner, Traffic police, other city officials, subject matter experts, citizen group representatives for the design review sessions must be given and confirmations procured well in advance of the start of the workshop.
- 7. Other recommendations:
  - Instructors can study NMT projects in other
     Indian cities to use as references while making presentations.
  - A survey to understand the NMT knowledge of the participants can be conducted prior to conducting the workshop.

#### **Post-training prerequisites:**

1. An exhibition of the outcomes of the workshop can be organised to invite public inputs on the designs.

#### 4/Prerequisites for each day of the training program

# Day 1 - General Sensitization workshop

- Ensure that there are adequate number of facilitators based on the number of participants in a 1:4 ratio.
- Ensure that there is a 400-500 metre street segment with one or two intersections identified for a team of two participants to document and work with.
- Ensure the following are printed
  - Pedestrian Environment Audit Part 1 -One form per participant (Find this form here)
  - Satellite map of the entire city with the set of streets identified by the instructor marked on it - One copy of this map must be printed in large format size.
  - All contents of the board game One set for every six participants
- It is recommended that the facilitators are familiar with their roles and responsibilities for each activity for the day. It is recommended that they visit the street stretches and play the NMT game prior to the workshop.
- The instructor is required to compile a set of reference images which are preferably from the local context to support the orientation session for conducting the Pedestrian Environment Audit - Part 1.
- Ensure that the digital version of the Pedestrian Environment Audit - Part 1 is ready for facilitators to enter the data immediately after returning from the site visit.

#### Day 2 - Understanding the site and its users

 Ensure that there are adequate number of facilitators based on the number of participants in a 1:5 ratio.

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- Ensure that the data entry of the audit responses is complete and a quick compilation of the outcomes emphasizing the gaps/issues identified are in presentation format.
- Divide the participant pool into groups of 5 members each and assign one of the identified street segments measuring 400-500m and including 1 or 2 major intersections in each segment
- Ensure the following are printed:
  - Role play cards (Find these cards here)
  - Survey drawings of all the selected streets in 1:500 scale across multiple A3 size sheets with clear overlaps for easy identification - One set for each participant and one set for the facilitator. Use Open Street Map or Google Map Terrain View if survey drawings are not available.
  - Open Street Map or Google Terrain View map of 1 kilometre radius around each segment in 1:1000 or appropriate scale (1 copy per group)
  - Pedestrian environment audit Part 2 One form per participant
- The instructor is required to prepare

   a presentation on how to conduct the
   Pedestrian Environment Audit Part 2 on site
   using the reference slide deck provided in the
   instructor guidance section of this document.

#### Day 3 - Designing a NMT corridor - 1

- Ensure these items are printed for the session
  - Street section elements and dimension chart - One set for each group
- All the elements for the street design exercise to be arranged at the table for each group prior to the start of the exercise.

#### Day 4 - Designing a NMT corridor - 2

- Instructor is expected to gather case examples and references of street design drawings showing detailing of the street right-of-way and intersection designs for participants to observe and absorb into their own designs.
- Ensure that invitees for the design review session will be there and are aware that they are expected to provide inputs on the design for improvement

#### Day 5 - Testing the design

 Ensure the availability of all the requirements for the on ground testing such as cones, ropes, chalk, tape.

.....

 Ensure that all necessary permissions are procured from the traffic police and other relevant agencies..

#### Day 6 - Exhibiting ideas and designs

- Ensure that invitees for the design review session will be there and are aware that they are expected to provide inputs on the design for improvement
- Ensure all arrangements are done for the public exhibition (if required)

<i>5/</i>	'Activity	wise	description
	9		1

#### Activity 1 - Introductory presentation on Safe Streets for All

Day on which this activity needs to be conducted: Day 01

Location: Indoor

Number of facilitators: 1

**Duration of the activity:** 20 minutes



This activity sets the tone of the workshop by introducing the participants to the concept of safe streets for all. The participants are also apprised of the objectives of the workshop to set the context for all the activities.

#### **Objectives**

- To introduce concepts of safe streets for all
- To bring about a basic understanding of NMT projects and its implementation in the Indian context.
- To outline the basic objectives and time table of the training workshop

#### **Outcomes**

 Participants develop an understanding of the need for NMT components while designing streets.

#### Logistical requirement

Projector and laptop

#### Activity 2 - Tutorial and Pedestrian environment audit - Part 1

Day on which this activity needs to be conducted: Day 01

Location: Indoor & Outdoor

**Number of facilitators:** 1 per group.

**Duration of the activity:** 55 minute indoor tutorial and 2 hours on-site activity



This activity is a hands on exercise for participants to observe and understand the various factors that discourage walkability at different times of the day. The audit measures the usability of the streets across eight aspects - Footpath, Crossing/ Intersection/ Signage, Personal safety, Adjacent traffic, Aesthetics and Amenities, and, Public transport/ Para transit.

Presentation on audit form and clarification of doubts

On ground survey of the selected stretch

Presentation / Discussions on learnings from pedestrian audit

#### **Objectives**

- To gain a practical sense of the challenges faced by pedestrians while walking.
- To understand the existing condition of the street under the lens of safety, comfort and convenience for the pedestrians.
- To identify different user groups associated with the activities and usability of the street

#### **Outcomes**

 Participants understand how to visually audit a street to understand the issues faced by various users of the streets with respect to safety and comfort

#### Materials required

- · Pens / markers
- Writing pad
- Prints of audit forms (one for each participants)

#### Logistical requirement

- Transport to drop people at site and pick them up
- Mobile / cameras
- Projector & laptop

# Activity 3 - Creating awareness to prioritise NMT on our streets - Gaming session

Day on which this activity needs to be conducted: Day 01

Location: Indoor

**Number of facilitators:** 1 per group - 6 participants per group

Duration of the activity: 1 hour 30 minutes



The activity is designed to develop understanding about the different modes of transportation and the pros and cons associated with each mode; eventually highlighting the significance of NMT through a creative board game format. The game format engages the interest of the participants and turns into an effective learning activity.

#### **Objectives**

- To help the participants understand the significance and benefits of NMT over other modes of transportation
- To make the participants aware of integration of different transport modes in a city.

#### **Outcomes**

- Participants learn about the the importance of mobility options in a city as well as how to make informed choices about which mode to use.
- Participants also learn about the consequences of their choice of transportation mode from a time and cost benefit perspective.

#### Materials required

- Pencil
- Game board & other contents
  - Dice

#### Activity 4 - Introduction to network planning for NMT

Day on which this activity needs to be conducted: Day 01

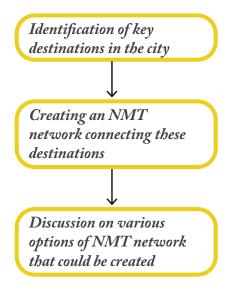
**Location:** Indoor

Number of facilitators: 1 person

**Duration of the activity:** 30 minutes



The activity orients the participants to a larger city level context and understand NMT projects through the lens of city wide networks as opposed to standalone pieces of infrastructure.



#### **Objectives**

- To help the participants understand NMT projects as a city level network connecting key destinations in a city.
- To create an NMT network connecting various identified destinations.

#### **Outcomes**

 Participants learn to see NMT projects as a network instead of disconnected pieces of infrastructure.

#### Materials required

- Pen / Marker
- Sticky notes
- Printout of the city's satellite map with the identified set of streets marked.

#### Logistical requirement

 Pin up arrangements (Easels, board, tape / ropes/ etc.)

#### Activity 5 - Role play exercise

Day on which this activity needs to be conducted: Day 01

Location: Indoor

Number of facilitators: 2 - 3 people

**Duration of the activity:** 1 hour



Cards with roles are handed out to teams of participants. Participants need to reflect on the walkability levels of the street where they conducted the pedestrian environment audit from the perspective of the user assigned to them through the role play cards.

#### **Objectives**

- To make the participants aware of the various user groups on a street
- To understand needs and issues faced by different user groups (pedestrians, cyclists, women, children, vendors, business owners etc.)

#### **Outcomes**

 Participants learn to be aware of the needs and issues of various user groups on a street and that an efficient street design should keep all the users as priority.

#### Materials required

- Role play cards
- Notepad
- Pen / Marker

#### Activity 6 - Mapping user groups and their needs

Day on which this activity needs to be conducted: Day 02/03

Location: Indoor

**Number of facilitators:** 1 person **Duration of the activity:** 1 hour



In continuation of the role play exercise, this activity encourages participants to map the different user groups as identified during the pedestrian environment audit and understand their needs and issues.

Identifying key user groups in pedestrian audit -1

Framing questions and design of questionnaire

Mapping user groups and their activities

Analysing on needs and issues of each user group.

Presentation on user analysis and discussion

#### **Objectives**

- To map various user groups and activities documented during technical audit.
- To help participants understand the role of various stakeholders in streets and analyse needs and issues of the each stakeholder/ user group.

#### Outcomes

• Participants learn about the role of various users/ stakeholders in a street including their needs and requirements.

#### Materials required

- Pen / Marker
- Chart paper
- Sticky notes

#### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
  - Bulletin board

#### Activity 7 - Pedestrian environment audit - Part 2

Day on which this activity needs to be conducted: Day 02

Location: Indoor & Outdoor

Number of facilitators: 1 per group

**Duration of the activity:** 45 minutes indoor tutorial session and 3 hours 15 minutes on-site activity



The activity aims to develop an in depth understanding of the street by dealing with systematic data collection including detailed on site measurements of the street.

Presentation on how to conduct techincal audit and doubt clarificaiton

On ground technical survey of the stretch

Presentation / Discussions on learnings from the audit

# **Objectives**

- To give a hands on experience on how to document streets.
- To gather data in a manner that it helps take design related decisions for the street.

#### **Outcomes**

- Participants learn how to document a street and collect data pertaining to traffic flows, counts, age and gender mix, vendor mapping and activity mapping.
- They also learn how to record this data in a manner that facilitates decision making while designing.

#### Materials required

- Counters
- Pens / markers
- Writing pad
- Prints of audit forms (one for each participants)
- Prints of base maps
- Measuring tape

#### Logistical requirement

- Transport required to drop people at site and pick them up
- Mobile / cameras
- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
  - Bulletin board

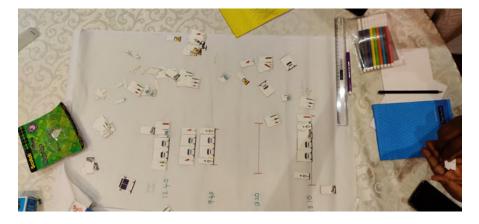
#### Activity 8 - Designing Safe streets for all

Day on which this activity needs to be conducted: Day 03

Location: Indoor

Number of facilitators: 1 per group

Duration of the activity: 3 hours



#### a. Designing the street section

The activity uses all the data collected from the on-site audits and verifications to design a reconfigured street section. Various street elements are provided in the form of cut outs which participants use to design a street section.

Tutorial on how to proceed with the activity Preparing 2-4 street section options with different combinations of elements

Discussion on the options to finalise one option to be translated to a plan

#### **Objectives**

- To understand what a street right-of-way is and how various street elements are configured with the right-of-way.
- To be able to reconfigure an existing street right-of-way based on data collected from the pedestrian environment audits.

#### **Outcomes**

- Participants learn to arrive at options for reconfiguring a given street right-of-way.
- They also learn to integrate various user activities and elements based on data collected from the site.
- They also learn that there are many different possibilities for a street section and that they must chose the one that is equitable to most user groups.

#### Materials required

- Butter sheets / Chart papers
- Print out of street section elements
- Pen / Marker / sketch pens / Colour pencils
- Triangular Scale
- Scale

#### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
- Bulletin board
  - Drafting table / table

Day on which this activity needs to be conducted: Day 03

Location: Indoor

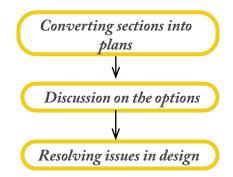
Number of facilitators: 1 per group

**Duration of the activity:** 2 hours



# b. Translating the street section into a plan

The activity has participants translating their chosen street section into plan drawings.



### **Objectives**

• To be able to translate a street section into a plan drawing and resolve any issues that may arise while doing so.

#### **Outcomes**

- Participants understand the feasibility of their proposed street sections as they see its applicability onto the street base map.
- Participants learn how to work with different scales.
- They also learn how to resolve issues while transferring a street section onto the street base map.

#### Materials required

- Butter sheets / Chart papers
- Print out of the segment map in 1:500 scale
- Pen / Marker / sketch pens / Colour pencils
- Triangular Scale
- Scale

#### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
- Bulletin board
- One working table for each group

Day on which this activity needs to be conducted: Day 04

Location: Indoor

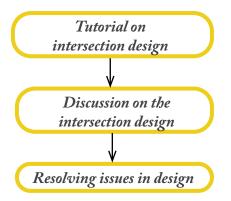
Number of facilitators: 2 -3 people

**Duration of the activity:** 2 hours 15 minutes



#### c. Intersection fix

In continuation of the previous activity, this activity introduces the principles of intersection design and apply these to their designs.



#### **Objectives**

- To give the participants an understanding of the principles of intersection design.
- To help the participants work on redesigning intersections on their street stretches.

#### **Outcomes**

- Participants get a hands on experience of working with intersection design based on collected data.
- Participants get a basic understanding of various conflicts / issues that arise from poor intersection design.

#### Materials required

- Butter sheets / Chart papers
- Print out of the segment map in 1:500 scale
- Pen / Marker / sketch pens / Colour pencils
- Triangular Scale
- Scale

#### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
- Bulletin board
- One working table for each group

Day on which this activity needs to be conducted: Day 04

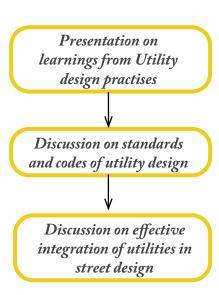
Location: Indoor

**Number of facilitators:** 2 - 3 people **Duration of the activity:** 15 minutes



# d. Working with above grade utilities

The activity introduces the basics of utility design and their placement on street section. This activity is discussion based and participants share their knowledge on utility design as they encounter it in their daily line of work.



#### **Objectives**

 To introduce the concept of zoning utilities on the street and demonstrate how to place them on streets with least obstruction to other users.

#### **Outcomes**

• Participants learn the do's and dont's related to working with above-grade utilities.

#### Logistical requirement

- Projector
- Bulletin board

#### Activity 9 - Introduction to tactical urbanism

Day on which this activity needs to be conducted: Day 05

**Location:** Indoor and Outdoor

Number of facilitators: 2 - 3 people

**Duration of the activity:** 45 minute tutorial followed by 3 hours and 30 minutes on on-site activity



\*Tactical urbanism is a temporary arrangement of the proposed street design on the street using cones and rope to test the viability of the proposal

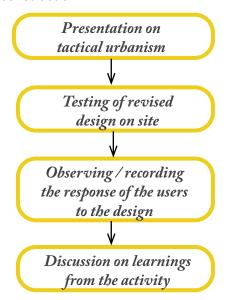
#### **Objective**

- To introduce the concept of tactical urbanism including its applications and benefits.
- To get participants to test their designs through a tactical urbanism approach and evaluate the designs based on how users respond to the temporary arrangements on the street.

#### **Outcomes**

- Participants learn about the significance and benefits of tactical urbanism towards successful implementation of NMT projects
- Participants get a hands on experience of implementing their design on site and are able to observe and evaluate what works and what doesn't.

This activity introduces tactical urbanism\* as a quick and effective approach to test designs before actually finalising them for construction.



#### Materials required

- Rope / Yarn
- Chalk powder
- Measuring Tape
- Cones
- Chalk

#### Logistical requirement

- Projector (for orientation & briefing)
- Transport required to drop off people at site and pick them up
  - Mobile / cameras

#### Activity 10 - Design review and feedback

Day on which this activity needs to be conducted: Day 06

Location: Indoor

Number of facilitators: 1-2 people

Duration of the activity: 2 hours



Design reviews are included as key milestones within the training program schedule for participants to take stock and present their designs to an audience in a way that aids the improvement of the proposed designs.

#### **Objectives**

- To give an opportunity for participants to take stock, clarify technical doubts and check adherence to standards and codes.
- To allow participants to hear from subject matter experts / associated department experts/ any other stakeholders and evaluate/ refine their designs.

#### **Outcomes**

- Participants learn the importance of a review process at various stages of the design process before finalising a design to take forward to construction.
- They also learn the need to consult with various stakeholders to finalise the design as opposed to working in silos.

#### Who to call for the review?

- Other department officials e.g. traffic police
- Subject matter experts
- City officials
- Local resident group representatives
- Citizen group representatives
- NGOs working in the sector

#### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/ etc/ board pins.)
- Bulletin board
- One working table for each group



# 4. Part B - Instructor Manual

This section contains specifics for instructors to successfully conduct workshops including guidance notes for conducting each activity along with material and printing requirements. This section is an add on to Part A - where each activity was elaborated on with objectives and outcomes. Each activity in this sections can be cross-referred with the corresponding activity from Part A to gain a holistic understanding. The activities covered in this section is as follows:

- Activity 1 Introductory presentation on Safe Streets for All
- Activity 2 Pedestrian Environment Audit Part 1
- Activity 3 Creating awareness to prioritise NMT on our streets Gaming session
- Activity 4 Introduction to network planning for NMT
- Activity 5 Role play exercise
- Activity 6 Mapping user groups and their needs
- Activity 7 Pedestrian Environment Audit Part 2
- Activity 8 Designing Safe streets for all
- Activity 9 Introduction to tactical urbanism
- Activity 10 **Design review and feedback**

#### Activity 1 - Introductory presentation on Safe Streets for All



## **Location** Indoor



**Duration** 20 minutes

#### **General Instructions:**

- Get to know the participant pool their background, line of work, years of experience etc.
- Make the introductory presentation to the training program.
- Engage in an ice breaker discussion covering participants' expectations from the program as a way to make yourself comfortable with the group as well as to customise any of the activities based on this discussion.

#### Logistical requirement

Projector & laptop



#### Location

Indoor



#### Duration

55 minutes

#### Preparing and orienting participants to the audit:

- Divide the participants in groups of two and one street segment needs to be alloted to each group.
- Ensure each question in the audit form is explained with references to the local context as a part of the orientation.
- Clarify where and how to record the data. For example:
  - Street: To be observed & recorded along the entire Right of Way (RoW) from property edge to property edge after walking along the property edge on both sides of the street
  - Intersection: All arms of the intersection to be recorded.
- Convey that the data is to be recorded both from the auditor's experience of the street and also based on observations during the audit as to how other users are experiencing the street.
- The participants need to be instructed to identify various user groups on site.



#### Location

Outdoor



Duration





#### Location

Indoor



Duration

30 minutes

#### While at site:

- Ensure that participants walk along the entire stretch, on both sides of the street and then fill up all the questions in the audit form based on the observations made.
- Auditing on site can also be done digitally through an online form provided there is adequate access to technology.

#### **Presenting the inferences:**

- Create a presentation summarising all the key findings from audit.
- Initiate discussion to address findings and common gaps identified from the audit

#### Materials required

- Pens / markers
- Writing pad
  - Prints of audit forms (one for each participants)

#### Logistical requirement

- Transport to drop people at site and pick them up
- Mobile / cameras
- Projector & laptop



#### Printing instructions:

S. No.	File to be printed	No. of pages	Size	Mode	Medium	Copies
1.	Pedestrian Environment Audit - Part 1	8	A4	Cover page - Colour; others - B & W	Paper	One for each participant

#### Activity 3 - Creating awareness to prioritise NMT on our streets -

#### Gaming session



#### **Location** Indoor



#### Duration

1.5 hour

#### Setting up & facilitating the game:

- Finalise the number of boards as per the number of participants (maximum of 6 per board) and assign one facilitator per board to facilitate the game.
- Refer to the game rules for complete instructions on how to play the game.
- The contents of the board game must be sorted and arranged board wise prior to commencement of the game and not during the orientation of the game.
- It is recommended to have the game briefing done individually on the board rather than a single general orientation.
- The player with the maximum destinations reached and the highest amount of money at the end of the game wins. In case of a tie on the number of destinations the person with the higher amount of money wins.
- Declare the winner for every board and also across all boards.

#### Materials required

- Pencil
- Game board & other contents
  - Dice



#### Printing instructions:

S. No.	File to be printed	No. of pages	Size	Mode	Medium	Copies
1.	Game board rules	2	A4	B & W	Paper	1 copy/ per board
2.	Chance cards + Parking cards	7	A4	B & W	180 gsm board	1 copy/ per board
3.	Destination chits and player coins	1	А3	Colour	180 gsm board	1 copy/ per board
4.	Currency printing - Re 1	1	A4	Colour	Paper	7 copies/ per board
5.	Currency printing - Rs 5	1	A4	Colour	Paper	7 copies/ per board
6.	Currency printing - Rs 10	1	A4	Colour	Paper	6 copies/ per board
7.	Currency printing - Rs 50	1	A4	Colour	Paper	6 copies/ per board
8.	Currency printing - Rs 100	1	A4	Colour	Paper	3 copies/ per board
9.	Currency printing - Rs 200	1	A4	Colour	Paper	2 copies/ per board
10.	Green signal card	1	АЗ	Colour	180 gsm board	1 copy/ board
11.	Game board	1	A1	Colour	Foam board	1 copy/ board

Note: The contents shall be multiplied based on the number of boards needed according to the number of participants

### Activity 4 - Introduction to network planning for NMT



### Location

Indoor



### Duration

30 minutes

#### **General Instructions:**

- Ensure the city's satellite map is printed in an appropriate scale & size in large format with the identified set of streets marked on it.
- On the printed map of the city, ask the participants to identify and drop sticky notes on prominent landmarks, key destinations and transit nodes across the city.
- Once these have been marked, ask the participants to connect these markers via major/ minor roads to create a network.
- Discuss the opportunities and feasibility of converting these roads to NMT corridors.

### Materials required

- Pen / Marker
- Sticky notes
- Printout of the city's satellite map with the identified set of streets marked.

### Logistical requirement

 Pin up arrangements - (Essels, board, tape / ropes/etc.)



S. No.	To be printed	Size	Mode	Medium	Copies
1.	City Satellite map	As appropriate	Colour	As appropriate	1 сору



### Location





# **Duration**1 hour

#### **General Instructions:**

- Distribute role play cards among the groups of participants; 1 card per group.
- Instruct the participants to come up with at least 3 challenges they would face on the street where they conducted the pedestrian environment audit on from the point of view of the role they have been assigned to in the card.
- Give the participants 10 minutes to discuss and write down the challenges they have identified.
- Instruct each group to individually speak on the role they have been assigned and the challenges they have identified.
- Encourage other participants to ask questions and discuss how these challenges can be resolved.

### Materials required

- Role play cards
- Notepad
- Pen / Marker



S. No.	File to be printed	No. of pages	Size	Mode	Medium	Copies
1.	Role play cards	23	A5	Colour	Paper	2 sets

### Activity 6 - Mapping user groups and their needs



**Location** Indoor



**Duration** 1 hour

#### **General Instructions:**

- Make a presentation on the wide range of user group categories related to street design.
- Instruct the participants to make a list of all the different users they identified during
  the pedestrian environment audit along with a set of questions to ask each user
  group with regard to walkability on the street.
- Discuss and review all the identified stakeholders and the questions.
- Instruct the participants on how to conduct interviews/ surveys with the user groups during part 2 of the Pedestrian environment audit.
- On conducting interviews, participants should be able arrive at a list of needs and challenges for each individual user group

#### Materials required

- Pen / Marker
- Chart paper
- Sticky notes

### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
- Bulletin board

### Activity 7 - Pedestrian environment audit - Part 2



# **Location** Indoor



**Duration** 45 minutes

#### Preparing and orienting participants to the audit:

- Divide the participant pool into groups of 5 members each and assign one of the identified street segments measuring 400-500m and including 1 or 2 major intersections in each segment and allot 1 segment to a group of 5.
- Ensure to give a detailed presentation on how and what data to record for each and every mapping and count in the Pedestrian environment audit Part 2.



# **Location** Outdoor



**Duration** 3.5 hours

#### Conducting the audit:

• Instruct the participants on where exactly they need to be positioned to take the various counts and clarify their doubts on the site.

#### Materials required

- Counters
- Pens / markers
- Writing pad
- Prints of audit forms (one for each participants)
- Prints of base maps as mentioned below
- Measuring tape

#### Logistical requirement

- Transport required to drop off people at site and pick them up
- Mobile / cameras
- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
- Bulletin board



S. No.	File to be printed	No. of pages	Size	Mode	Medium	Copies
1	Pedestrian environment audit	14	A4	B & W	Paper	One for each participant
2	Open Street Map or Google Terrain View map of one kilometre radius	1	as appropriate	Colour	Paper	2 copies per segment
3	Segmented plans for each stretch in 1:500	as per the no. of parts	A3	B & W	Paper	6 copies / segment
4	Base map of entire network containing all stretches	1	A1/ A0	Colour	Paper	1 copy

### Activity 8 - Designing Safe streets for all



**Location** Indoor

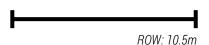


**Duration** 3 hours

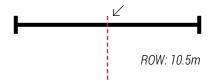
### a. Designing the street section

#### **General Instructions:**

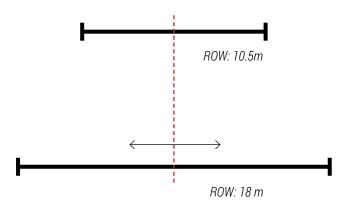
- Make a brief introduction to the activity with the presentation.
- Ensure there is 1 facilitator for every group to guide the participants through the process.
- The steps listed below have to be explained to all the participants by the instructor:
- 1:100 scale.



2 Next, instruct the participants to mark the mid point of the ROW and draw the centre line perpendicular to the ROW.

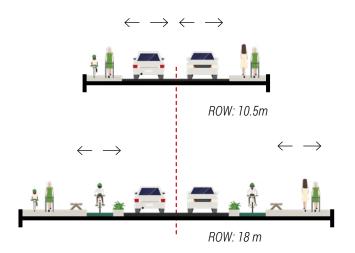


**3** Keeping this centre line as a reference, instruct the participants to draw the ROW with the maximum width as shown below.



4

Instruct the participants to arrive at 4-5 street section options for the street ensuring continuity between the minimum and maximum right-of-ways.



- Encourage the participants to try out options that prioritise NMT and also accomodating all the user groups requirements.
- Discuss and review the sections' appropriateness to the site and all user group requirements as reflected from the Pedestrian environment audits.
- At the end of the discussion, ensure that participants finalize one option to be translated into a plan drawing.

### Materials required

- Butter sheets / Chart papers
- Print out of street section elements
- Pen / Marker / sketch pens / Colour pencils
- Triangular Scale
- Scale

### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
- Bulletin board
- Drafting table / table



S. N	o. File to be printed	No. of pages	Size	Mode	Medium	Copies
1	Street section elements	1	АЗ	Colour	180 GSM board	1 copy / group



**Location** Indoor



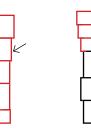
**Duration** 2 hours

### b. Translating the street section into a plan

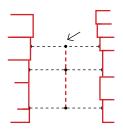
#### **General Instructions:**

• The steps shown in the diagrams below have to be explained to all the participants by the instructor.





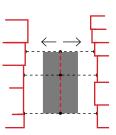




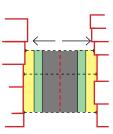
Instruct the participants to trace the property edge from the base maps and verify the right of way measurement across the stretch.

Mark the centre line on the plan of the street. In order to mark the centre line, the property edges need to be connected and the mid point needs to be marked at several locations on the plan. These midpoints have to be connected to form the centre line. The centre line will need to be smoothened to avoid any kinks.





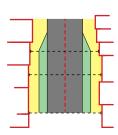
4

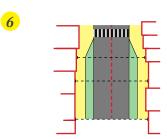


Based on the finalised street section, offset the widths of the carriageway lanes from the centre line.

Once the carriageway has been delineated add the other elements from the street section with their corresponding widths such as cycle tracks, parking zones, pedestrian walkways etc.







In case of varying righ-of-ways in the same street, carefully delineate the right of way configurations from maximum right of way to minimum right of way keeping the centre line intact. Add pedestrian crossings at logical locations i.e. intersections and mid blocks crossing points.

- The streets can have trees, designated vending areas, parking and other street elements based on space availability.
- Refer the ready reckoner for all standards and guidelines with respect to NMT elements.
- Hold discussions regularly during the working session with each group to check the progress and help them resolve issues.
- Show references of good drawings to help participants detail out their plans.

### Materials required

- Butter sheets / Chart papers
- Print out of the segment map in 1:500 scale
- Pen / Marker / sketch pens / Colour pencils
- Triangular Scale
- Scale

### Logistical requirement

- Projector
- Pin up arrangements (Easels, board, tape / ropes/etc/ board pins.)
- Bulletin board
- One working table for each group

### Activity 9 - Introduction to tactical urbanism



#### Location

Indoor



### Duration

45 minutes

#### **General Instructions:**

- Introduce the activity with the presentation so that participants are prepared for the task at site.
- Ensure that all the permissions are sought and material is ready to execute the exercise on site.



### Location





# **Duration** 3.5 hours

#### **General Instructions:**

- Select a stretch with one major intersection for the tactical urbanism exercise.
- Measure the right-of-way for different segments of the road and mark the midpoints of these segments.
- Join these points to identify the centreline for the street.
- Offset the centreline with the width of the carriageway lanes based on the proposed design.
- Delineate the sidewalk, cycle tracks and parking zones with traffic cones and/ or ropes.
- The above steps are to be repeated along different segments of the same streets.
- Once the markings have been made, they should be connected.
- The intersections need to be as per the required turning radius fixed in a similar manner.
- Ensure adequate documentation of the before and after conditions of the vehicular and pedestrian movement through videos and photographs.
- Discuss the observations and their inferences.

### Materials required

- Rope / Yarn
- Chalk powder
- Measuring Tape
- Cones
  - Chalk

### Logistical requirement

- Projector (for orientation & briefing)
- Transport required to drop off people at site and pick them up
- Mobile / cameras

### Activity 10 - Design review and feedback

Checklist for design review

The instructor can ensure that all participant groups are structuring their presentation to include the following:

- 1. Name of the street:
- 2. Starting point & ending point:
- 3. RoW measurements:
- 4. Mapping:
- Building use
- Important landmarks & building names
- Vehicular access to properties
- Pedestrian access to properties
- Activity mapping
- Vendor mapping
- Parking
- Intersection flows

#### 5. Counts:

- Pedestrian counts
- Age & Gender
- Vehicular counts
- Parking counts
- 6. List of stakeholders mapped
- 7. Design options for street section configurations
- 8. Finalized street section
- 9. Plan with resolved intersections
- 10. Inferences from the on-ground testing

It is recommended for the participants to explain their designs with the support of documentation and emphasis on how they have resolved the challenges.

# Sample - Post-training Feedback form for participants

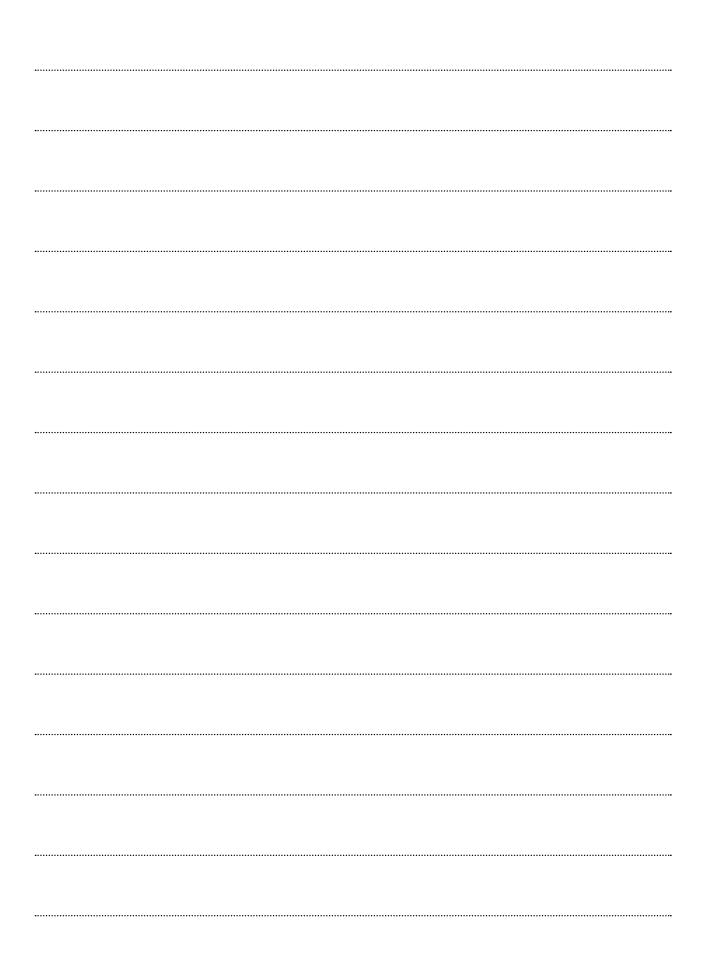
Name: Date:	
Q.1 What did you like the most in the overall workshop?  Design and flow of the training Teaching methods and techniques used Usefulness of the discussions and interactions Usefulness of the field/outdoor exercises Time management and schedule of the workshop Overall arrangements and event organization	
Q.2 How did you find tutorials used in the training?  Easy to understand tutorials & presentations (language, conveying speed, clarity)  Ease of implementing classroom concepts during on-site activities  Organization and flow of tutorials/presentations well organized  Good balance of theory and outdoor activities  Ability of trainers to respond to participants' questions/doubts	
Q.3 Learning outcomes and application  Usefulness and applicability of the topics taught in your work  All the information I was looking to learn about NMT was covered  Rate your level of confidence to now work on NMT and related topics is now much improved  My understanding and clarity on NMT and related topics is now much improved  My understanding and clarity on NMT and related topics is now much improved	
Q.4 What is your favorite segment of the workshop?	
Q.5 Key learnings from the on-site survey activities and pedestrian audit	
Q.6 Has your outlook/working style towards NMT changed after attending this workshop?  Please elaborate how.	

Q.7 Key learnings from the street design activity					
Q.8 How will you use what you had learnt from this wo there any challenges you foresee?	orkshop	in your v	vork envi	ronment	? Are
Q.9 Please provide your rating on various aspects of the "very low or poor" and 5 being "very high or excellent")	worksh	op, on a s	cale of 1	to 5: ( 1 l	peing
<ul> <li>Relevance of the topics covered in workshop</li> <li>Teaching methods and techniques used</li> <li>Usefulness of the discussions and interactions</li> <li>Usefulness of the field/outdoor exercises</li> <li>Overall arrangements and event organization</li> <li>Usefulness and applicability of the topics</li> <li>Rate your level of confidence to now work on NMT</li> </ul>		2 0 0 0 0 0 0 0	3 O O O O	4	5 0 0 0 0 0 0
<ul> <li>Projects after today's training</li> <li>Rate your satisfaction with the range and depth of topics covered today</li> <li>Understanding and clarity on NMT and related topics</li> <li>Ease of implementing classroom concepts during</li> </ul>	0	0	0	0	0
<ul> <li>on-site activities?</li> <li>There is a good scope for implementing what I learnt today in CCMC's future projects</li> <li>Good balance of theory and outdoor activities</li> <li>Ability of trainers to respond to participants' doubts</li> </ul>	0	0	0	0	0
Q.10 Any other feedback					

Note: This form can be used as a sample to structure a feedback form for the instructor to evaluate the efficacy of the training modules as well as its execution.



Note



Ministry of Housing and Urban Affairs (MoHUA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH are jointly implementing the technical cooperation project "Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)", commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The project works with the three Smart Cities of Bhubaneshwar, Coimbatore, and Kochi and respective state governments of Odisha, Tamil Nadu, and Kerala to promote low carbon mobility planning, and to plan and implement sustainable urban transport projects in the fields of public transport, non-motorised transport and modal integration.

As part of the Indo-German bilateral cooperation, both countries have also agreed upon a strategic partnership - Green Urban Mobility Partnership (GUMP) between Ministry of Housing and Urban Affairs (MoHUA) and Federal Ministry for Economic Cooperation and Development (BMZ). Within the framework of the partnership's technical and financial cooperation, the German government will support improvements in green urban mobility infrastructure and services, strengthen capacities of national, state, and local institutions to design and implement sustainable, inclusive, and smart mobility solutions in Indian cities. As part of the GUMP partnership, Germany will also be supporting expansion of public transport infrastructure, multimodal integration, low-emission or zero-emission technologies, and promotion of non-motorised transport in India. Through this strategic partnership, India and Germany intend to jointly achieve effective international contributions to fight climate change.