

# Need Assessment and Intersection Redesign Using NMT Approach For an Urban Arterial Road of Surat

<sup>1</sup>Siddharthkumar Shambhubhai Lukhi, <sup>2</sup>Bhasker V. Bhatt

<sup>1</sup>Post Graduate Student, <sup>2</sup>Assistant professor

<sup>1</sup>Civil Engineering Department,

<sup>1</sup>Sarvajanik College of Engineering and Technology, Surat, India

**Abstract**— Transportation demands are created by desired of the people and their needs for goods. Typically, the present and future demand is supplied by new physical infrastructure. New infrastructure in terms of new roads, bridges and flyover in expectation of this demand would inevitably attract additional users, eventually become saturated, and thus provide a justification for the next round of physical expansion. Present research focuses on it towards an attempt to evaluate and suggest redesigning the major intersection of Varachha road in Surat city. Varachha Road in Surat is one of the most congested major urban arterial roads. CVC is conducted in the course of study to obtain traffic volume data. Details of intersections and links are collected to evaluate the situation and propose remedial designs keeping special context of NMT users.

**Index Terms**—Transportation, NMT, Non-Motorized Transport, Pedestrianisation

## I. INTRODUCTION

Transportation is essential for providing mobility to the people, and for movement of goods. Transportation facilitates a broad spectrum of opportunities for an individual for desired activities. Transportation demands are created by desired of the people and their needs for goods. Typically, the present and future demand is supplied by new physical infrastructure. New infrastructure in terms of new roads, bridges and flyover in expectation of this demand would inevitably attract additional users, eventually become saturated, and thus provide a justification for the next round of physical expansion. Moreover, the new physical infrastructure will require huge capital investment. . So, one of the primary tasks of the planning fraternity is to look in to the management of the existing transportation infrastructure available and make its potential use especially for the old urban areas.

Transportation in urban area has generally two main components: 1) Motorized Transport and 2) Non-motorized Transport

### Aim

To propose a design for non-motorised traffic mode users through redesigning of major intersections of Varachha Road in Surat City.

### Objective

- To study & analyse existing NMT travel pattern and travel flow in peak hours.
- To improve the safe mobility for NMT.
- To redesign the major road intersections with special considerations of NMT provisions

### Non Motorized Transport

In India, Guidelines and Toolkits for Urban Transport Development were prepared by a Technical Assistance on Urban Transport Strategy. It was funded by the Asian Development Bank for the Ministry of Urban Development (MoUD), Government of India. In this toolkit, guidelines are designed to help decision makers and practitioners in states and municipal governments who are concerned with urban transport development in medium-sized cities in India. The detailed tasks required for the planning of Non-Motorized Transport (NMT) projects are highlighted in this guidelines within the context of an inclusive transport strategy. According to this guide lines NMT can be defined as any mode of the transportation that is not using any motor like mechanism. Non-motorized modes include walking, bicycle and cycle rickshaw. In many Indian cities, cycle rickshaw is an important non-motorized mode of intermediate para-transit (IPT).

Characteristics Indian cities traffic flow is greatly different from the traffic characteristics in foreign countries. It is generally observed with mixed traffic. This mixed traffic flow comprises of motorized vehicles, non-motorized vehicles, and pedestrians which is an important characteristic of the existing urban traffic of India.

### Mixed Traffic and Congestion

The speed of travel and on the reliability of travel conditions, both are affected by mixed traffic.

Effect of congestion on the traffic:

- Slower speeds
- More time spent stationary
- Longer journey times
- Increased queuing at junctions or bottlenecks (generally junctions act as the bottleneck of the city streets)
- Increased stopping and starting

**Study area**

In 2013, a study was carried out by students of LD Engineering College, Ahmedabad, on transportation scenario of Surat City. In that study, it was found that after Sahara Darwaja – Bardoli Road, Varachha Road has maximum share in PCU among the major arterial roads of the city.

Sr. No.	Road Name	PCUs	Share in Total
1	Udhna Navsari Road	42280	13.42
2	Magdalla Road	18890	5.99
3	Athwa Dumas Road	32098	10.19
4	Dindoli Main Road	15678	4.97
5	Amroli Main Road	41932	13.31
<b>6</b>	<b>Varachha Road</b>	<b>51345</b>	<b>16.30</b>
7	Variyav Road	9855	3.12
8	Rander Olpad Road	11342	3.60
9	Palanpur Road	13564	4.30
10	Adajan Hazira Road	16587	5.27
<b>11</b>	<b>Bardoli Road</b>	<b>61385</b>	<b>19.49</b>



Source: Google Earth

**Data Collection**

Classified Vehicle Volume count survey is carried out by playing CCTV recording at the CCTV Control Room, Police Commissioner Office, Surat.

In the part of data collection Pedestrian count & classified volume count is carried out for Varachha Road at the following locations.

- Suryapur Railway Underpass
- Rajhans Point (Over Varachha Fly over)
- Hirabag Intersection
- Kapodra Intersection
- Spinning Mills Intersections

For this research work, PCU factors are taken as follows:

Transport Mode	Vehicle Type	Equivalency Factor	Unit
Motorised Transport	Passenger car, Tempo, Auto Rikshaw, Jeep	1	PCU
	Truck, Bus, Tractor	3	
	Motor Cycle, Scooter	0.5	
Non-Motorised Transport	Cycle	1	Cycle
	Animal Drawn Vehicle, Hand Drawn Vehicle	12	
Pedestrian	-----	-----	Persons

Source: IRC-86:1983

Survey was conducted for three consecutive days: Saturday, Sunday & Monday. Traffic characteristics in week days (Monday to Friday) is generally observed similar in nature, while for Saturday and Sunday traffic characteristics and traffic pattern differs from weekdays. So this survey was carried out for Saturday, Sunday and Monday (7:00 am to 10:00 pm).

Maximum peak found for NMT and Pedestrian from all three days is shown in below table:

Location	NMT PCU MAX		PEDESTRIAN COUNT MAX	
	Day	Max Value & Hour	Day	Max Value & Hour
Suryapur Underpass	Sunday	458 (9:00 to 10:00 am)	Sunday	1467 (11:00 to 12:00 am)
Hirabag Intersection	Monday	179 (8:00 – 9:00 am)	Monday	1585 8:00 – 9:00 pm
Kapodra Intersection	Monday	308 (1:00 – 2:00 pm)	Monday	3170 8:00 – 9:00 pm

Spinningmills Intersection	Saturday	374 8:00 – 9:00 am	Sunday	1283 11:00 – 12:00 pm
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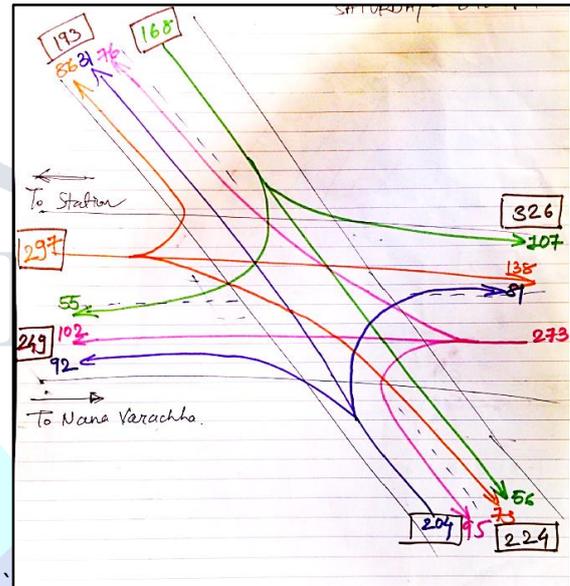
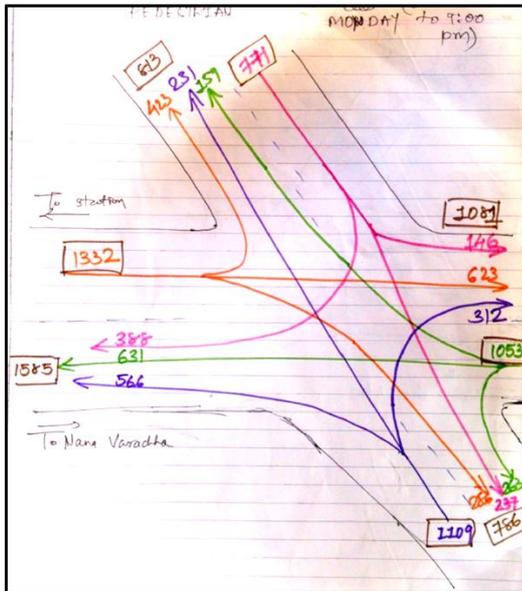
From this table, giving priority to the pedestrian, it was found that Hirabag and Kapodra intersections are having more pedestrian density than other two locations. So considering the time limit of dissertations work, at present these two intersections are redesigned in this study, remained two intersections can also be given same treatment in the future. For redesigning of intersections, pedestrian and NMT peak value is required at each arm of the intersection. So for the peak hour only, directional movement survey at Hirabag and Kapodra intersection was done. It was limited to NMT and pedestrian only.

**Pedestrian Directional Movement at Hirabag Intersection**

It was carried out at Monday for peak hour only(8:00 to 9:00 pm).

**NMT Directional Movement at Hirabag Intersection**

It was carried out at Saturday for peak hour only(6:00 to 7:00 pm).

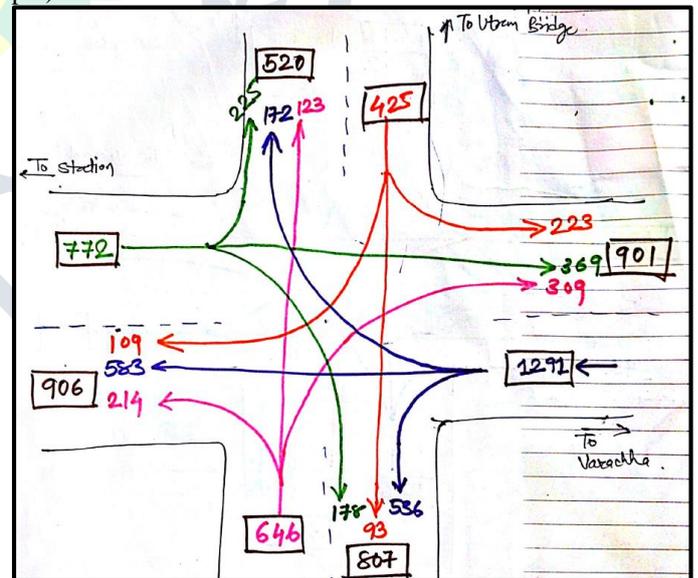
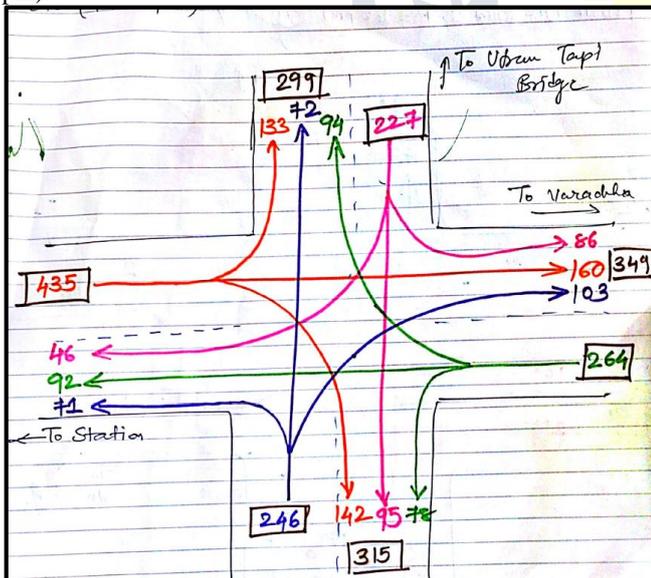


**NMT Directional Movement at Kapodra Intersection**

It was carried out at Saturday for peak hour only(7:00 to 8:00 pm).

**Pedestrian Directional Movement at Kapodra Intersection**

It was carried out at Saturday for peak hour only(7:00 to 8:00 pm).



**Recommendations**

- For observed flow of NMT and Pedestrian at both the intersections, as per IRC-86:1983, there is a need of 2 m wide footpath and 3 m wide cycle track at both of the sides of the roads.

- As the flyover is passing over the Varachha road, the space below the flyover and between the supports of the fly over should be used for constructing BRTS stations rather consuming road space for Stations.
- At Hirabag intersection, Foot Over Bridge is required to be constructed with ramps on the three sides (one on 60 m road and 2 on 45 m road) and feasibility should be checked whether it is possible to provide one ramp direct to the BRTS station or not.
- There is a need of continuous Sky walk throughout the stretch of Varachha road with landing and approach at major street linkages.
- In the direction towards Nana Varachha, to minimise the motorised traffic at Kapodra intersection, one ramp to the flyover is required to be constructed.
- Informal activity taking place at the intersections consumes the road space, it should be banned and this road space should be used to prepare cycle track and pedestrian, thus NMT safety will also be improved.

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## III. REFERENCE

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