

Neighborhood Planning for Sustainable Transport

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Abstract— Indian cities are experiencing rapid urbanization as an effect of economic growth and industrialization. The urbanization process impacts the spatial distribution of land uses and travel demand created by the distribution of activities. Therefore it becomes imperative that the mobility of people and goods should be planned appropriately to minimize congestion and other environmental impacts on the cities. Mobility demand of people living in urban and metropolitan areas has continuously been growing due to the increasing socio-economic needs which lead to varied activities. Hence, people tend to use individual motorized transport modes in order to satisfy this ever-changing mobility demand. Mobility and accessibility are an integral component for planning and design of road transport infrastructure. Pedestrian traffic is most neglected road users while planning and designing the road transport infrastructure. In 1988 Indian Roads Congress (IRC) released the guidelines for pedestrian facilities (IRC: 103-1988) after getting the approval from the Highways Specifications and Standards Committee. The guidelines kept forward an argument that pedestrians are more vulnerable to being involved in accidents and it is imperative that adequate consideration should be given to their safety (IRC: 103-1988, 1989). It recommended that pedestrian facilities should be planned in an integrated manner to ensure a continuous pedestrian flow and an overall strategic plan should be made to ensure that. Another important recommendation by the guidelines was that the convenience of the pedestrian should be a paramount consideration; otherwise the facilities provided will not be fully used. This paper is an effort to look into the status of mobility pattern in Delhi's different kind of neighborhoods (Residential, Commercial, and Institutional) and give solution for their needs. Aim of the study is to give a mobility and accessibility plan for neighborhood according to sustainable transport to ensure safe & secure movement. This paper focuses on the understanding of urban mobility, and its issues related to economy, society and environment. The paper proposes a definition of sustainable urban transport by incorporating the mobility and accessibility needs of the people and goods, by emphasizing the relation and interdependence of land use and transportation system.

Keywords: Neighbourhood Planning, Mobility and Accessibility, Sustainability, Pedestrian etc.

I. Introduction

Mobility demand of people living in urban and metropolitan areas has continuously been growing due to the increasing

socio-economic needs which lead to varied activities. Hence, people tend to use individual motorized transport modes in order to satisfy this ever-changing mobility demand. Increasing trend of modal shift in favor of the private car results in adverse impacts on the environment and these impacts have to be reduced in order to make the transport sector more environmentally sustainable. Modal substitution represents hence an important strategy of demand management for the achievement of sustainable transportation. This task can be accomplished by providing better modal options such as urban public transport systems characterized by high quality levels.

Determining the performance of accessibility that has been a challenging problem and several measures have been developed and evaluated for the solution. Infrastructure-based, person-based, utility-based and the location-based measures are the mostly used types. Both measures and their related components should be specified according to certain criteria in order to provide consistency between the problem and accessibility perspective.

Mobility and accessibility are an integral component for planning and design of road transport infrastructure. Pedestrian traffic is most neglected road users while planning and designing the road transport infrastructure. Present approach for planning and designing for mobility traffic is not user friendly. Need for innovative approach to ensure safe & secured movement of traffic in along/across congested roads in urban areas.

The National Urban Transport Policy (NUTP) and National Mission on Sustainable Habitat (NMSH) have stressed the need for an approach that focuses on people and not vehicles. Road design must not increase dependence on and usage of personal vehicles. This is possible only if cities are built to priori se public transport, walking and cycling and clean (NMSH, 2011). Urban Transport is a means of access and not mobility. At present, most of the urban residents in India depend upon non motorized transport (NMT), which includes walking, cycling and cycle rickshaws to meet their access needs. This is because many of them cannot afford other modes of transport. These users are dependent on walking and cycling (Tiwari, 2002). NMT also includes tri- wheeled pedal rickshaws used for passenger and goods as well as four wheeled trolley used by street vendors and hawkers ([Kamat. R, 2013](#)) ([Kamat. R, 2012](#)) The passenger and goods cycle rickshaws (together with cycles referred to as Non Motorized Vehicles or NMVs), form the primary source of mobility and livelihood to a considerable proportion of the population. NMT dominates the modal share of Indian cities. Its high ownership, low cost and easy use make it a desirable mode of transport for students and low income

citizens. Even in megacities (population > 8 million), the modal share of NMT ranges between 40% – 50%. This is attributed to the shorter trip lengths in Indian cities and the availability of NMT as the only available mode of transport for low income households. Amongst the informal sector workers, the location of the work place and the residence are the biggest determinants of the ridership; almost all the people whose work involved distribution activities (eg:-Painters, plumbers, electricians, gardeners, couriers, postmen, milkmen, newspapermen, etc.) use bicycles; above 80% of factory / shop workers and 73% of office workers use bicycles. (TRIPP, 2006)

In 2008, Delhi Development Authority (DDA) released a notification forming UTTIPEC with a view to enhance mobility, reduce congestion and promote traffic safety by adopting standard transport planning practices, capacity building, laying enforcement measures, promoting road safety audits, introducing pedestrian-friendly traffic engineering practices and better organizational co-ordination for improved traffic management. The last agenda was proposed to be served by efficient lane capacity and work zone management, utilities coordination, developing traffic culture and avoiding transport planning pitfalls in the National Capital Territory of Delhi. As per the notification, all transportation projects/ transport engineering solutions in Delhi by any agency having road engineering/ infrastructure implication would require clearance of the Centre (UTTIPEC). UTTIPEC in the year 2009 prepared the street design guidelines for creating better designed inclusive streets for Delhi. These guidelines were adopted by DDA in the year 2010 (UTTIPEC, 2010).

The modal share of walking and bicycling in Delhi's trips was very substantial. A survey of passenger trips was also done by RITES in 2001, which recorded 33 per cent trips as walking trips and 3.6 per cent as bicycling trips. In 2007-08, RITES carried out another Transport Demand Forecast Study- "without walk trips" which concluded that the share of bicycle in modal split increased from 5.3 per cent to 6.8 per cent. (DIMTS, 2011). Wilbur Smith Associates and Ministry of Urban Development (2008) found the modal share of walking and bicycling in Delhi to be 21 per cent and 12 per cent respectively. Another matter of concern was the share of pedestrians and bicyclists in road accidents, which was found to be 24 per cent and 6 per cent. This was crucial as walking and bicycling were also the most prominent modes used by the urban poor in Delhi. As per TRIPP (2005) modal share of walking and bicycling for low income households of Delhi to access their workplace was 22.1 percent and 38.9 percent respectively. Buses contributed to 31.4 percent in the modal share. This meant that modal share of walking; bicycling and public transport was 92.4 per cent for the low income households.

II. Background Study

Table 1: Modal Share in Different Countries

City	Modal share, percent		
	Car + MTW	PT	W&C
Bristol, UK	65	12	23
Leeds, UK	61	36	3
Nantes, France	58	14	28
Helsinki, Finland	54	20	26
Marseille, France	53	12	35
Edinburgh, UK	52	29	19
Newcastle, UK	48	19	33
Brussels, Belgium	44	18	38
Frankfurt, Germany	42	21	37
Stuttgart, Germany	36	25	39
Amsterdam, Neth's	32	16	52

	Modal share, percent		
	Car + MTW	PT	W&C
Delhi, India	23	33	44
Mumbai	15	52	33
Kolkata	12	58	30
Chennai	31	39	30

Source: RITES Transport Demand Forecast Study: May 2008

- ❖ 34% of the population engages in "Walk-only" trips for their daily travels, needs or errands.
- ❖ Only 14% population of Delhi rides private cars.
- ❖ 40% of the total Road Length of Delhi has NO Sidewalks.
- ❖ And the ones having sidewalks, lack in quality in terms of surface, width and geometrics.
- ❖ India already has high mode share for Non-motorized Modes.

Table 2: Modal share in Delhi

MODE	% of PERSON TRIPS		
	WITH WALK TRIPS (2007-08)		
•CAR/TAXI	9.09	23	Motorized Private Transport
•2W	14.07		
•AUTO RICKSHAW	2.36		
•BUS	27.12		
•METRO	2.66	33	Public/ Para-Transport
•TRAIN (IR)	0.42		
•BICYCLE	4.46		
•CYCLE RICKSHAW	5.16	44	Non-motorized Public/ Private Transport
•WALK	34.67		
TOTAL	100		
TOTAL TRIPS/DAY	219.87 LAKH	100	

Source: RITES Transport Demand Forecast Study: May 2008

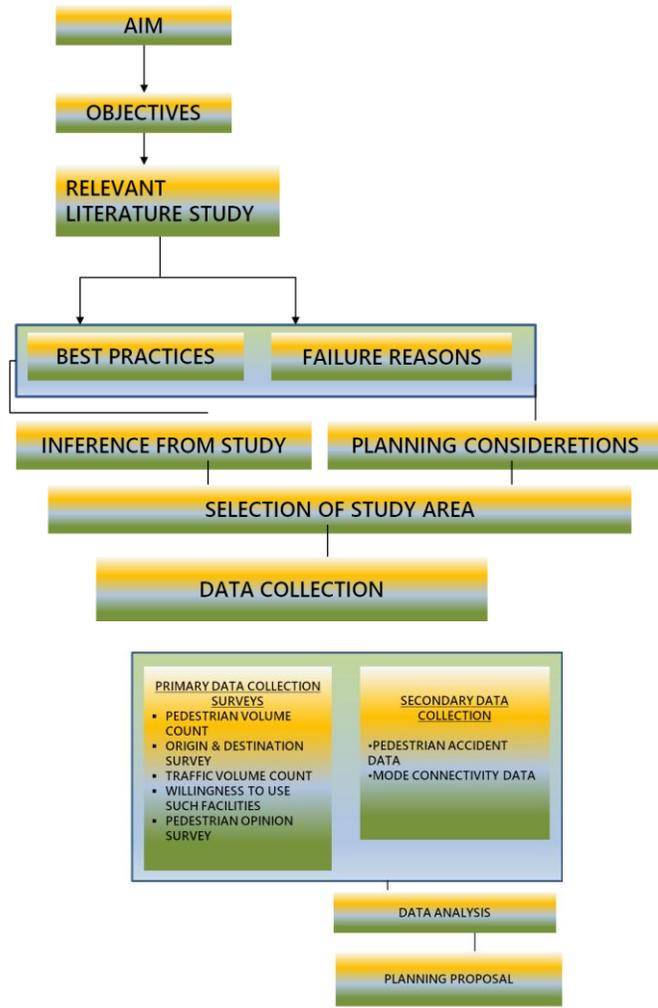
III. Aim

To give a mobility and accessibility plan for neighborhood according to suitable transport to ensure safe & secure movement.

IV. Objectives

1. To study the socio-economic trip characteristics of the study area.
2. To study the existing mobility infrastructure in the study area.
3. To identify issues, constraints and potential in neighborhood planning for suitable transport.

V. Methodology



VI. Issues Of Urban Transport

Economics	Social	Environmental
Traffic congestion	Mobility for vulnerable groups	Air pollution
Infrastructure costs	Human health impacts	Habitat loss
Consumer costs (fares, automobiles, etc.)	Community cohesion and street life loss	Hydrologic impacts
Mobility barriers	Community livability	Depletion of non-renewable resources
Accident damages	Aesthetics	Noise
Productive rural land loss	Isolation in suburbs	Urban sprawl
Urban land loss to bitumen surface	Public safety	
Time loss due to sprawl		Photo chemical smog, lead and benzene

VII. Policies & Guidelines In Master Plan 2021

A.) The Provision Regarding Non-Motorized Transport (Nmt)

The provision is given in para 12.7.1, wherein the following is mentioned:

“Bicycle/ cycle-rickshaw could be an important mode of travel, particularly with reference to short and medium trip lengths. The following actions have been suggested for promoting Bicycle/NMT.

1. Prepare a cycling Master Plan for the city that creates a network of routes integrating all arterial roads, eco-mobility corridors along nallahs, heritage routes, school precincts as well as other recreational routes.
2. On all arterial roads fully segregated cycle/NMT tracks should be provided with provision for safe parking in park and ride lots. Wherever full ROW is not available, the cycles/ NMT may be allowed to flow in mixed-traffic condition.
3. In urban extension, cycle tracks should be provided at the sub-arterial and local level roads and streets.
4. In all areas of the city, the use of cycles/rickshaw as a non-motorized mode of transport should be consciously planned along with pedestrianization.
5. Plan and implement city wide, affordable and accessible cycle sharing / rental schemes to encourage public transit users in particular and public in general to use cycle as a mode to perform their first and last mile journey as well as to make regular short trips without using private vehicles.
6. A cycle sharing/ rental system could be planned/ implemented by any public/ private agency comprising of an owner and an operator, with the govt. playing the role of facilitator. The extant guidelines in this regard may be followed.

VIII. Study Area

RESIDENTIAL AREA- EAST OF KAILASH

1) Aim

To find out how the 8 transport aspects affect the study area.

2) Objectives

✓ To identify the different problems present in the study area. ‡

✓ To find out the nature and cause of these problems ‡.

✓ To see to what extent the key transport objectives are covered.

3) Primary Data (Transport Survey)

A). Road Inventory & Hierarchy

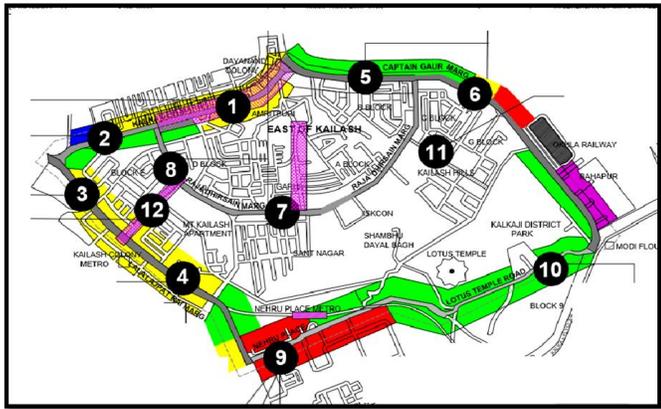


Figure 1 Road Inventory Survey Locations
Source: Primary survey

Table 3 Road Inventory Analysis

S.NO.	AREA	ROAD TYPE	ROW
1,2	Kalka Devi Marg	Collector	26.5
3,4	Lala Lajpat Rai Road	Sub-Arterial Road	30.5
5,6	Captain Gaur Marg	Sub-Arterial Road	41.8
7,8	Raja Dhisen Marg	Collector	25.4
9	Nehru Place Road	Collector	29.6
10	Lotus Temple Road	Collector	15.4
11	Hills Road	Local Street	17
12	Lala Lajpat Rai Road	Local Street	23.4

Source: Primary survey

a) Observations

- No Service Lanes and NMT lanes were observed on Lala Lajpat Rai Road.
- Public toilets which should be present at a distance of every 500-800m were absent on Lala Lajpat Rai Road.
- NMT Lane was absent but Service Lane was present on Captain Gaur Marg Road.
- Shoulder of 2.3m was present on Kalka Devi Marg Road.
- Median width is observed to be equal on all the existing collector roads in the study area.
- Footpath width on Lala Lajpat Rai Road was found to be less than that of Kalka Devi Marg.
- Shoulder width of 2-7m was observed on Kailash Hills Road, i.e. a Local Road.

- Significant tree plantations were observed on all the different hierarchies of roads.

B). Traffic Volume Count

OBSERVATIONS

1. MODAL SPLIT:

- Two wheelers are more on Raja Dhirsain Marg as it provides through movement.
- Cars are maximum on sub-arterial roads as they connect the Ring Road with the Outer Ring Road..
- NMT is present more on Kalka Devi Marg and Raja Dhirsain Marg (both secondary collector) as they provide for through movement within the study area.

2. PHF:

PHF in almost all the cases is close to 1, i.e. there is minimal abruptness in the peak hour volumes, except for Location - 6, Raja Dhirsain Marg, where a peak hour is observed in the afternoons with a PHF of 0.43 due to presence of a school, thus giving rise to false peak hours.

3. V/C RATIO:

- Effective V/C Ratio is more than 1 in 7 out of 8 locations (this implies to congestion at peak times), and maximum V/C Ratio is at Location 5, i.e. 1.5 at Nehru Place Road.
- V/C Ratio (with assigned capacities) is less than 1 only in case of Raja Dhirsain Marg, this highlights congestion in other areas even in case of maximum carriageway usage.

4. VEHICULAR COMPOSITION ON THE BASIS OF SPEED:

- Maximum amount as well as percentage of non-motorized vehicle were on Kalka Devi Marg primarily due to the service market which attracted more cyclists used by workers, rickshaws used by nearby residents.
- Raja Dhirsain Marg has second highest percentage of non-motorized vehicles being a secondary collector road thus attracting more cycles and rickshaws.
- Sub arterial roads Lala Lajpat Rai Marg & Captain Gaur Marg have negligible percentage of non-motorized vehicle as high speed vehicles ply on this hierarchy of road.
- Almost double number of vehicles ply at Location 6 as compared to Location 7 and 8 due to the direct access this location provides between Kailash Colony Metro Station and Kalka Devi Marg.

C). Public Transport

Modes Of Public Transport Catering In Our Study Area

- Delhi Metro -Violet line
- Bus system
- IPT - (auto-rickshaws, cycle rickshaws)

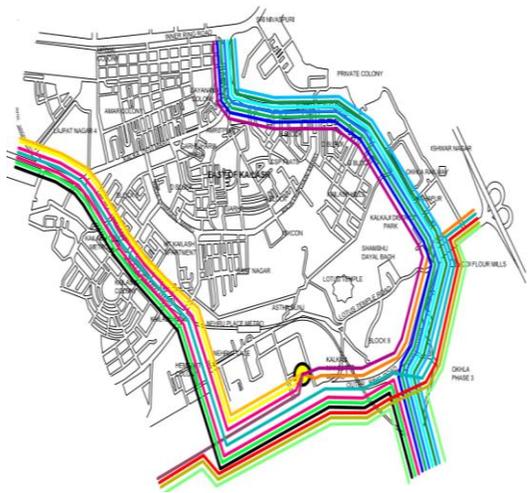


Figure 2: Existing Bus Route Map in Kalkaji
 Source: Primary survey

- ✓ The maximum number of people using the bus stops are pedestrians.
- ✓ People using feeder or walking are travelling within a radius of 1 km.
- ✓ In bus stops 1 to 5, a maximum 50% of the users were travelling for work or office purpose.
- ✓ In bus stops 6 to 9, maximum percentage of people are coming from the lotus temple and kalkaji mandir being the next.
- ✓ It was observed that the people who were availing the metro facility came to the metro station mostly by walk and then by auto-rickshaws and cycle rickshaws and the maximum number of people using the metro station were going for shopping.

IX. Proposal

764 ROUTE-

- The route passes through Kalkaji metro, kailash colony and kailash kunj in study area.
- The route is taken as: Frequency: HIGH with Boarding/Alighting: MODERATE As a result some buses can be made to pass through the proposed route instead.

764X (PROPOSED ROUTE)-

- The route passes through Kalka Devi Marg, which has no bus routes.
- The route is more accessible and increase connectivity through the area.

- The route connects ISKON, Garhi, Block A and B to CBD, India Gate and New Delhi Railway Station.

433 ROUTE-

- The route passes through A Block, B Block, Dayanand colony in the study area.
- The route is taken as: Frequency: HIGH Boarding/Alighting: HIGH Demand is high for the route.

433X (PROPOSED ROUTE)

- The proposed route connects A Block, ISKON, Garhi, sant nagar to Sarai Kale Khan, Nizamudin Railway station.
- The route is more accessible and increase connectivity of the areas like connects A Block, ISKON, Garghi, sant nagar.

OVERALL VIEW

1. The proposed routes cover the residential areas like block a, b, c and dayanand colony.
2. The proposed bus routes serve 38.75% of the feeder trips made in the area.

Out of the total trips made from the area, 19.27% of the feeder trips are from the area which have no bus routes passing near the area.

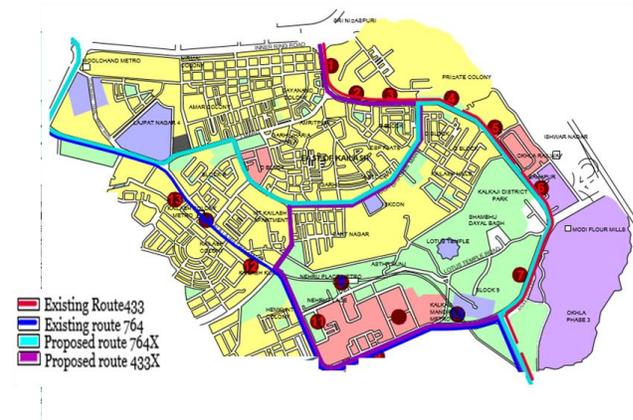


Figure 3 Proposed Bus route Map in Kalkaji

RECOMMENDATIONS:

- Vehicles halting on carriage way shall be restricted.
- Signages shall be provided.
- Dustbins shall be properly maintained.
- Green space shall be cleared & (that is vacant at present) can be designated for parking area of okhla subzi mandi.
- Un-interrupted, paved footpath, shall be constructed. Urban Floods disrupt the social systems of the countries and the cities, and cause enormous economic losses. Impacts produced by increased runoff in urban setting by Flooding of streets, intersections and

transportation systems, causing traffic delays. (Kamat R. 2017).

- Encroachments by the vendors and tree plantations shall be removed.
- Drain & dustbins shall be properly maintained.
- Traffic lights at intersections and crossing shall be provided wherever required.
- Parallel parking shall be encouraged.

Proposal-2

Since, widening of R.O.W is not possible in the study area, certain measures which are practically possible in the study area to increase the effective carriageway are :

- Recessed bus bays decreases congestion on carriage way caused due to bunching of buses.
- Multi level car parking reduces on street parking and hence reduces congestion.
- Bollards separate carriage way and footpath and adds to the safety of pedestrians specially children.
- Multi utility zones for hawkers and reduces the inconvenience in pedestrian flow and also traffic flow.

On the basis of rating, proposals to be done in different phases :-
PHASE-1

- MUZ to be provided on the footpaths so that pedestrian flow should not be hindered by vendors and hawkers.

PHASE-2

- Allocation of Tow- Away zones and fine for those who park their vehicles in 'No Parking Zone'.

PHASE-3

- Bollards and Guard rails should be provided to separate carriage way and footpath and also for safety point of view

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