



CITY LEVEL PROJECTS

RAJINDER NAGAR

Site Specific Design for Ward Number 149





सत्यमेव जयते

Delhi Urban Art Commission

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Preface



The city of Delhi, capital of this vast land of diversities, is a city laden with layers of history, a place where civilizations have lived, prospered and perished over centuries. The modern city today, built over and around a rich tapestry of heritage, presents an opportunity at every turn, to allow for coexistence of the past, present and the future. In order to understand this multidimensional urban spectrum and attempt to plan the future, various city level studies have been initiated by the DUAC. I hope that these studies will help the planners of modern day Delhi to carefully articulate urban space, structure, form and environment and sensitively address future requirements.

I convey my thanks to all the Consultants and Members of the Commission who have tirelessly worked on this research project to bring out this document. I also take this opportunity to place on record my sincere appreciation of the efforts of Secretary and other staff of DUAC for providing the necessary administrative support to make this happen.

I fondly hope that the authorities of the local, state and national government take these studies seriously and implement, in right earnest, the suggestions given herein.

December 2020

Sd/-

Prof. Dr. P.S.N. Rao

Chairman, DUAC

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Summary

Rajinder Nagar is a residential colony in Central Delhi which was planned as a refugee settlement. The area is well connected with other parts of the city by major transport modes i.e. Metro, Bus, Arterial roads etc. The Central Ridge Protected forest which hosts a variety of indigenous flora and fauna located within the ward acts as a green buffer for the colony.

The ward has seen transformation over the years and thus there is a need for a holistic intervention to cater to the issues of infrastructure and supporting facilities. With the advancement of Metro phase I in 2006 (Blue line), the ward and its precincts modified substantially with PUSA roundabout undergoing multiple changes giving rise to incremental and organic islands to accommodate the metro pillars. The result is a complex geometry presently seen contributing to the conflict at the junction. The proposed solution is a Signal free, amoeboid loop which minimises the merging and diverging conflicts and utilises the opportunities and constraints offered by the site.

Rajinder Nagar holds one of the eminent hospitals of Delhi i.e. Sir Ganga Ram hospital within its vicinity which attracts high volumes of traffic going to and from the hospital, leading to overcrowding on the stretch hence causing delays for emergency vehicles. A segregated lane for movement of emergency vehicles on Sir Ganga Ram Marg and a dedicated access to the hospital from Vandematram Marg is proposed to curb the current situation.

Due to excessive commercialization and increase in mix land use development the pressure on the existing infrastructure has accelerated. The spill over of the commercial activities from Karol Bagh can be seen on Pusa Road, Shankar road and Bada Bazaar Marg. IAS institutes have also started booming in this neighbourhood especially along Bada Bazaar Marg creating a hub for diverse age groups. To enhance the experience of the residents and frequent visitors, the pedestrianization of Bada Bazaar Marg has been suggested. The absence of motor vehicles creates interactive spaces for public gathering which are safe, inclusive and vibrant.

This comprehensive approach towards upgradation of Urban fabric within Rajinder Nagar and it's precincts will enable a better environment and a smoother movement within the ward and also cater to the immediate needs of people. The proposals are a pragmatic approach to address the issues of mobility, sustainability and diversity.

1.1 City Level Location

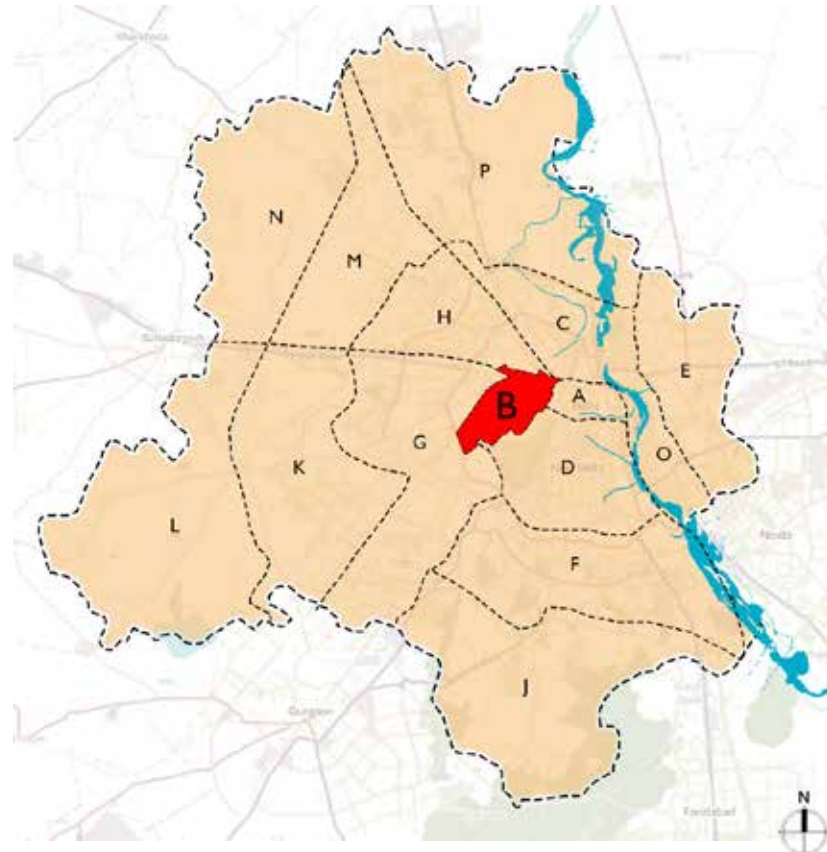
Location

Rajinder Nagar is a residential colony in Central Delhi, India. This resettlement colony established after the partition of India, is name after Dr. Rajendra Prasad, the first President of India.

It is bordered by the Central Ridge protected forest on the east and south, the Indian Agricultural Research Institute (IARI) on the west, and Karol Bagh on the north.

The NCTD has been divided into 15 planning Zones (Divisions) designated as 'A' to 'P' (except zone 'I') in the Master Plan 2021.

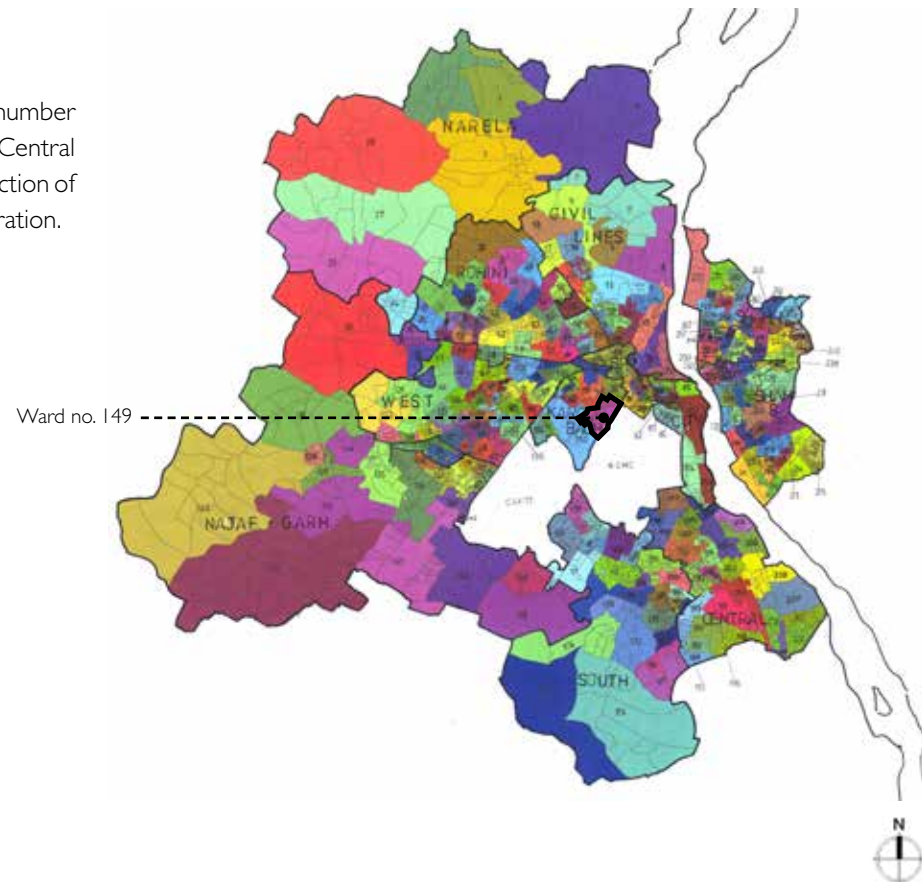
The ward lies in Zone 'B' as notified by DDA (Delhi Development Authority).



Delhi district map highlighting in Zone B

Ward location

Rajinder Nagar lies in ward number 149 which is situated in the Central Zone of MCD under the jurisdiction of North Delhi Municipal Corporation.



MCD Ward Map highlighting location of ward no. 149

(Source: Delhi Ward Map 2007 (Municipal Corporation of Delhi))

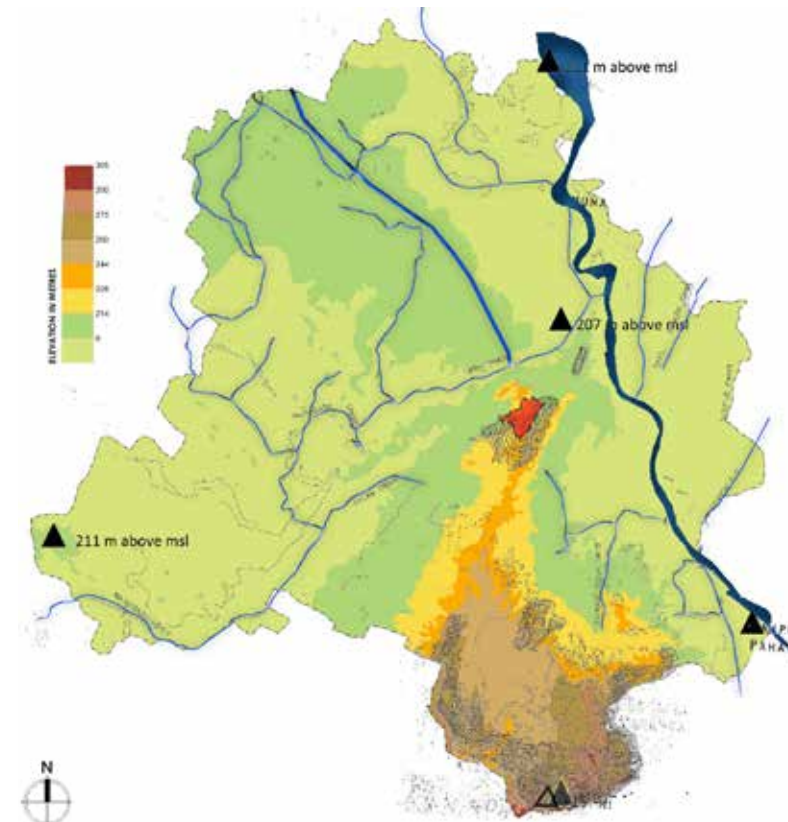
1.2 City Level Features

Topography

The Aravali Ridge and Yamuna River form major physical features that have shaped the city of Delhi.

A major part of the ward comes under the Central ridge which makes the largest part of this ward ecologically sensitive.

Also owing to the underlying topography the ward has large chunks of green cover.



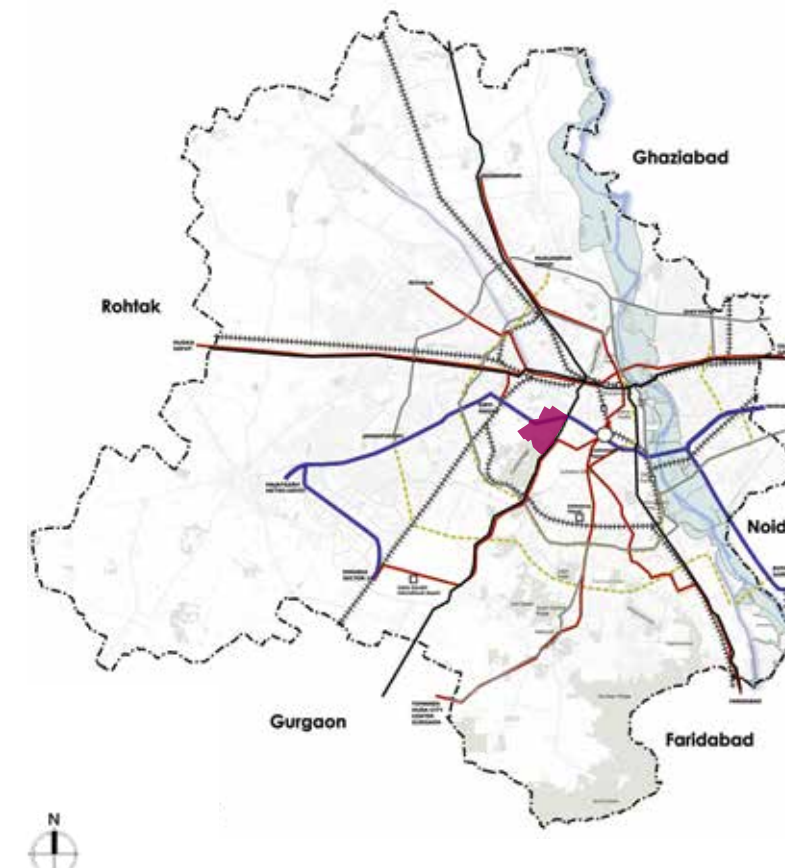
Major Physical Features of Delhi

(Source: Delhi: A living Heritage, INTACH, 2010)

Connectivity to the ward

The major roads abutting the ward are Sadhu Vaswani Marg (Pusa Road), Patel Road, Shankar Road and Vandematram Marg.

A well developed public transit infrastructure makes it easily accessible from most parts of the city, as well as to and from the airport, and the New Delhi railway station.



Connectivity Map of Ward No. 149

LEGEND

- Regional boundary
- == National highway
- Ring road
- ++++ Railway network
- Other Metro Corridor
- Blue Metro Corridor
- Proposed Metro Corridor
- Landmarks

1.3 Master Plan Framework



Master Plan 2021 Plan highlighting Zone B

The majority of land use of the ward is as per the Master Plan of Delhi 2021. Old and New Rajinder Nagar are largely residential development. The edge of both settlements are witnessing a rapid conversion to commercial/ mixed use streets.

S No.	Landuse	Area (as indicated in ZDP- 2001)		Area (Proposed in ZDP- 2021)	
		Ha.	%age	Ha.	%age
1.	Residential	945.8	53.28	1040.26	58.60
2.	Commercial	41.15	2.3	35.0	1.97
3.	Manufacturing	151.81	8.5	174.45	9.81
4.	Recreational	163.25	9.19	137.30	7.72
5.	Public & Semi-Public	101.8	5.73	111.90	6.29
6.	Government (use undetermined)	76.0	4.3	-	-
7.	Utility	3	0.2	3.0	0.16
8.	Transportation	268.7	15.1	274.6	15.45
9.	Vacant Unutilized	25	1.4	-	-
	Total	1776.51	100	1776.51	100
10.	IARI (Pusa Institute)	497.57	-	497.57	-
	Grand Total	2274.08	-	2274.08	-

Landuse analysis of Zone 'B' at master plan level

Source: Delhi Development Authority, (2010) Zonal Development Plan for ' Zone B'- Karol Bagh and city Extension, New Delhi

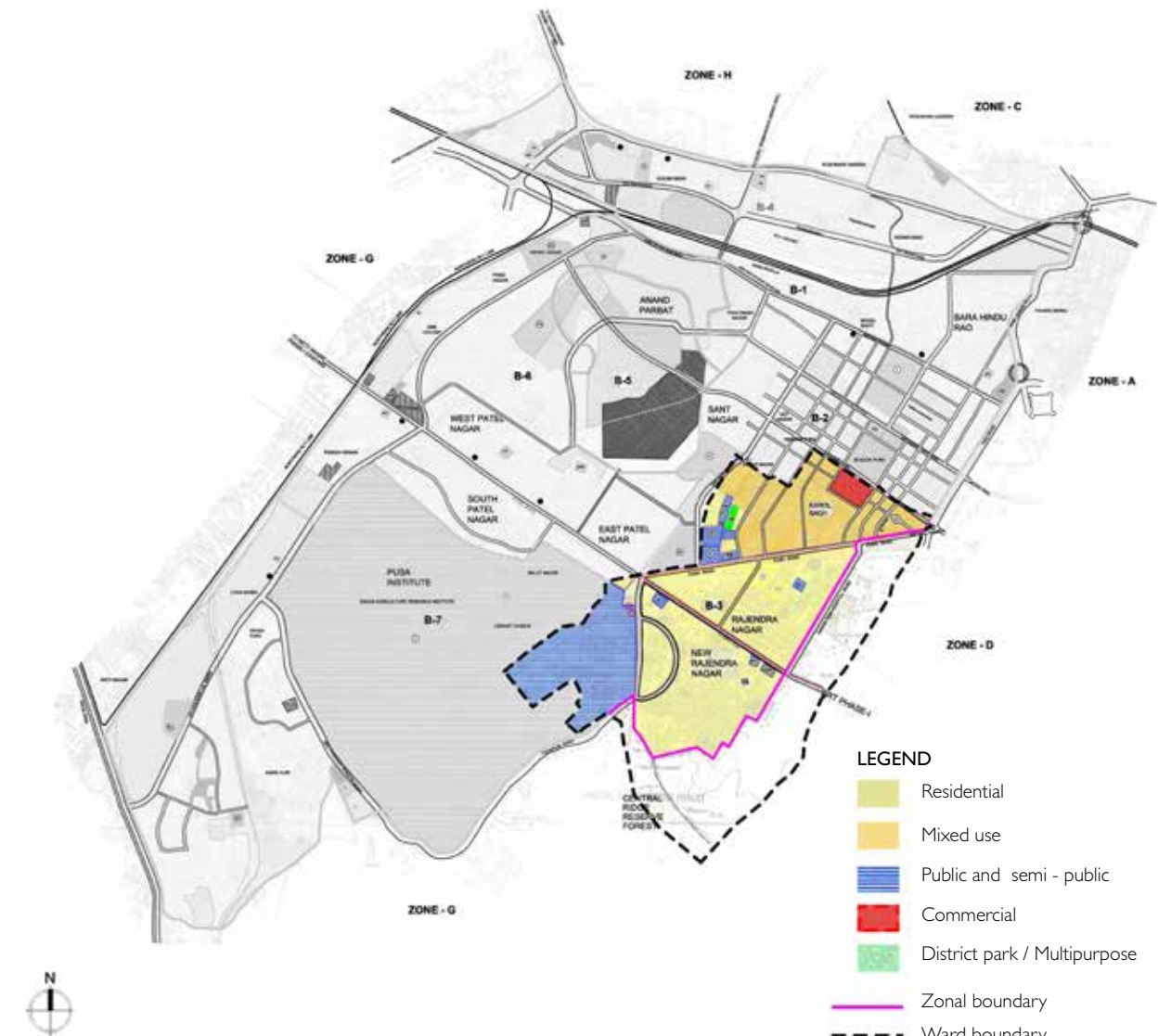
Consistent with the MPD-2021 framework the Zonal Development Plan has detailed out the provisions and proposals of the Master Plan particularly with reference to various use zones, circulation, public and semi-public facilities, infrastructure and recreational etc. The existing and proposed land use analysis at Master Plan level is given in the table.

1.4 Zone and Ward Level Study



Delhi is divided into various municipal zones such as South West, South, East, North and Central zone. Out of these the study area falls under Central- West Zone.

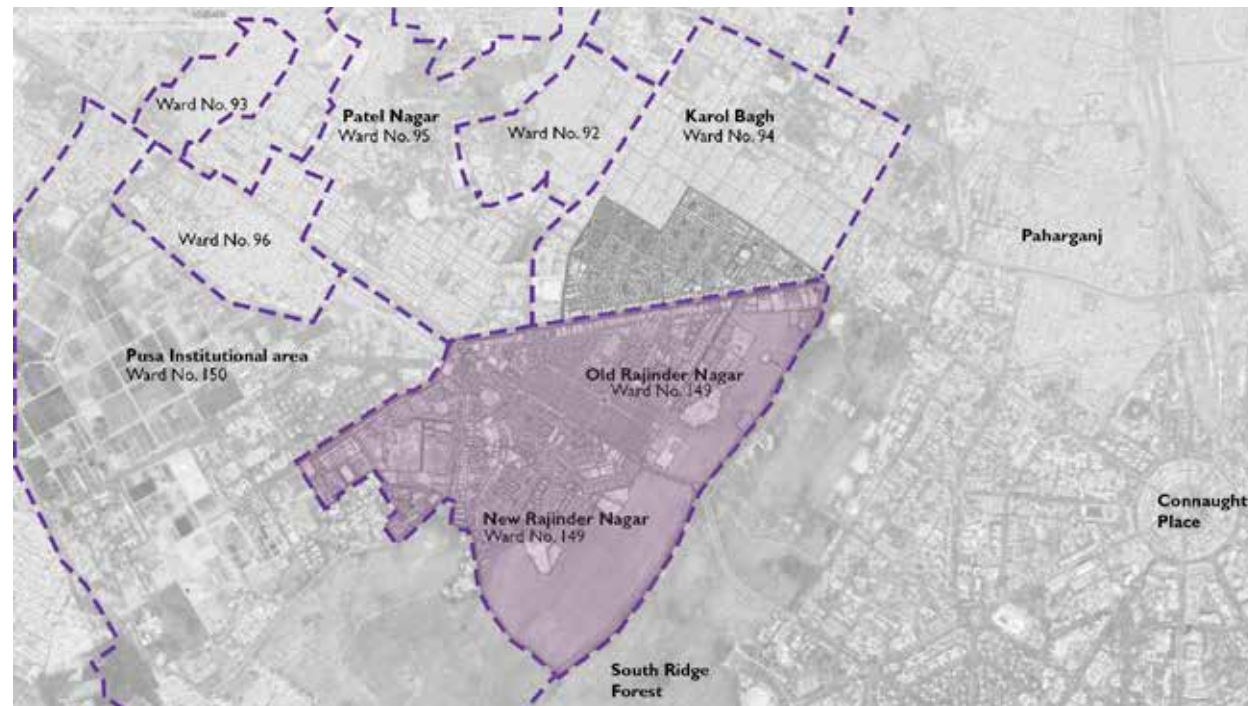
Sub Zone	Name	Area in ha.
B-1	Kishan Ganj	127.46
B-2	Karol Bagh	320.00
B-3	Rajinder Nagar	174.74
B-4	Sarai Rohila	274.18
B-5	Anand Parbat	129.35
B-6	Patel Nagar	437.36
B-7	Naraina	810.94



The area of study i.e... **Zone 'B'** popularly known as Karol Bagh and City extension covers an area of about 2304 hectares and consists of 7 sub zones B-1 to B-7.

Source: Delhi Development Authority, (2010) Zonal Development Plan for ' Zone B'- Karol Bagh and city Extension, New Delhi

1.5 Ward and its Precinct

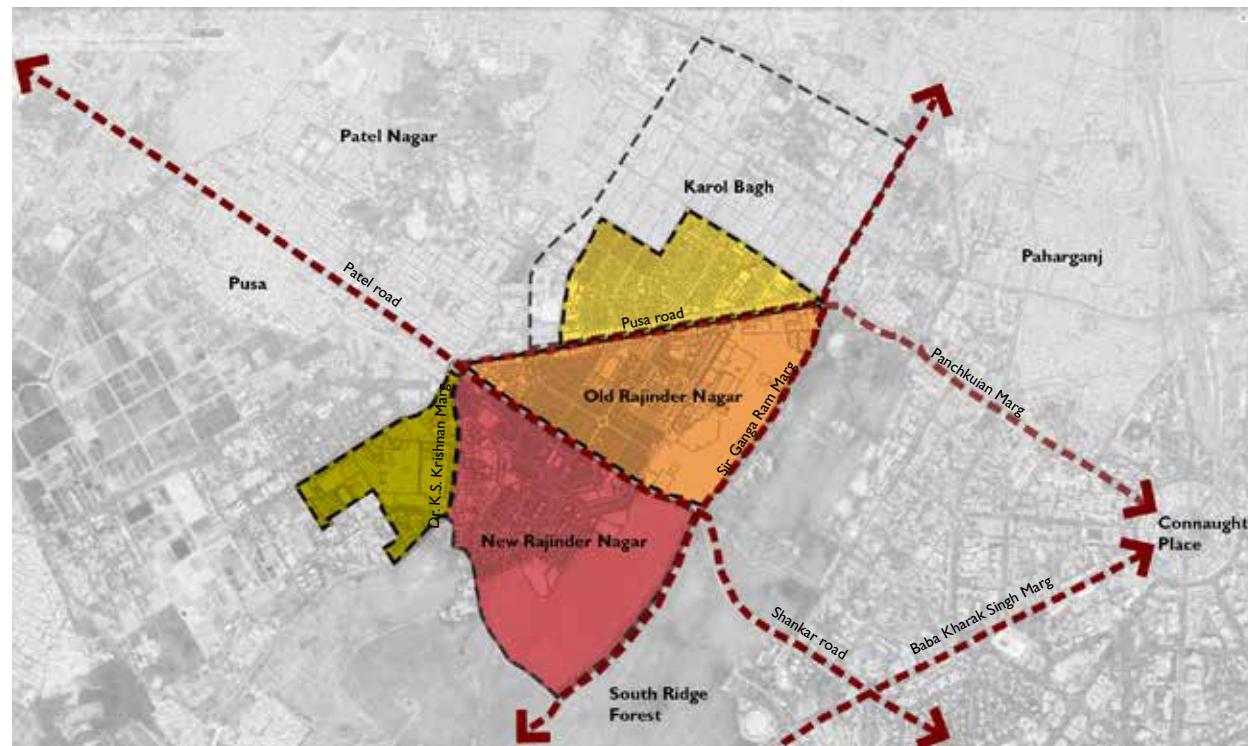


Source : <http://alpha.mapmyindia.com/mcdApp/>

The Ward consists of 4 different areas-

- **Part of Karol Bagh**- Karol Bagh and the contiguous area in between has been designated as Special Area . It is characterized by a mix of different land uses and have similarities in compact built form, narrow circulation space and low-rise , high-density developments.
- **Old Rajinder Nagar**- It is a residential colony which was developed in the 1950s, and was primarily a Punjabi Refugee colony which came up during the Partition of India in 1947,
- **New Rajinder Nagar**
- **Part of Pusa Institutional Area**

1.6 Ward and its Connectivity



The area is accessed by Patel Road, Pusa Road (aka Sadhu Vasvani Marg) and Vandematram Marg. Patel road and Pusa road mostly experience heavy traffic movement. The major congestion point in the area is the Pusa roundabout where Patel road, Pusa Road and Shankar Road intersect.

Chapter 2 - Area level study

2.1 Urban roads and transportation

2.1.1 Road Typologies

2.1.2 Traffic Pattern study

2.1.3 Transportation systems

2.2 Major Landmarks

2.3 Current Land Use Mapping

2.4 Social Infrastructure

2.5 Commercial Infrastructure

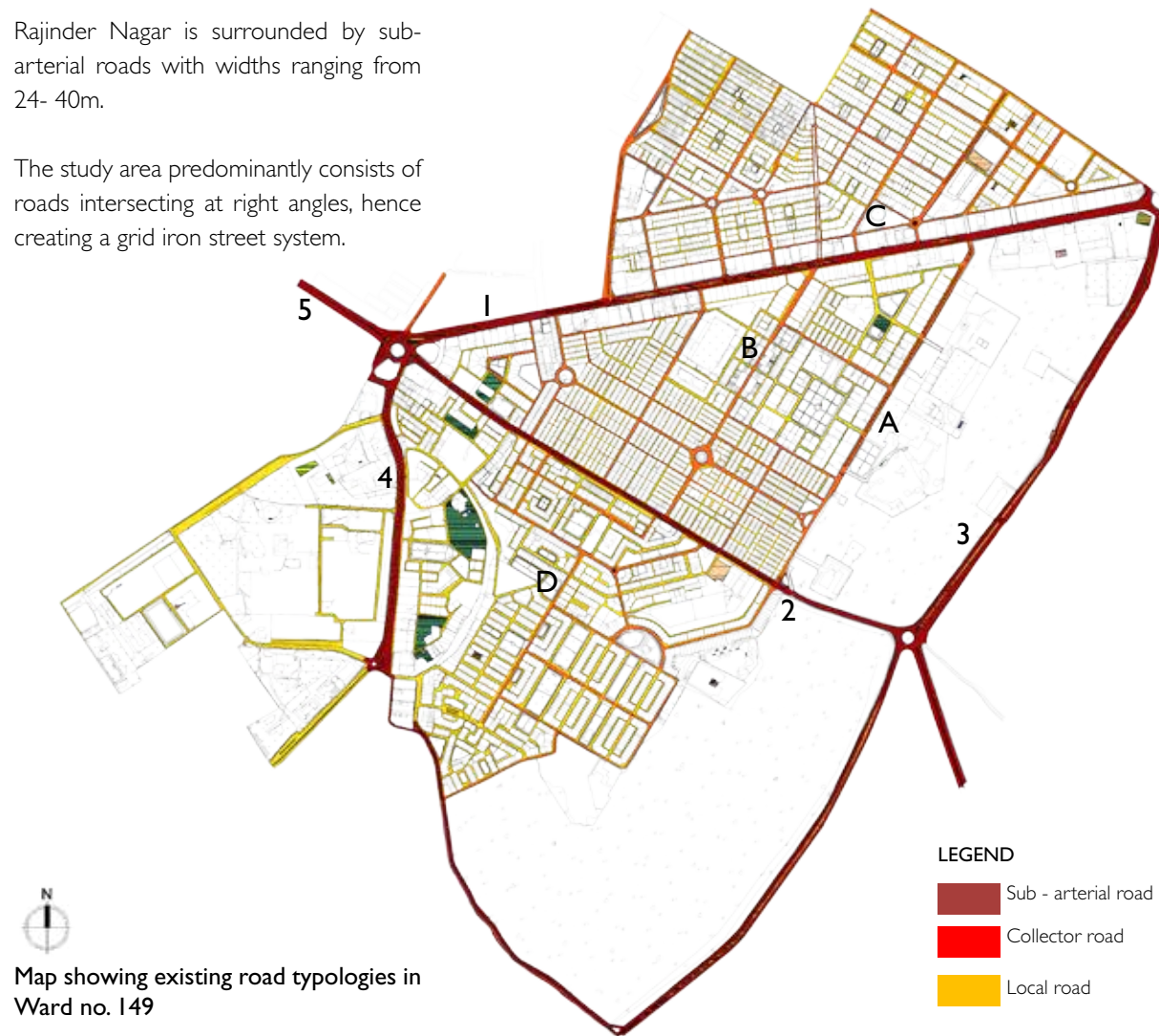
2.6 Physical Infrastructure

2.1 Urban Roads & Transportation

2.1.1 Road Typologies

Rajinder Nagar is surrounded by sub-arterial roads with widths ranging from 24- 40m.

The study area predominantly consists of roads intersecting at right angles, hence creating a grid iron street system.



The Sub - arterial roads in the area comprises of-

1. Pusa road aka Sadhu Vasvani Marg
2. Shankar Road
3. VandeMatram Marg
4. Dr.K.S. Krishnan Marg
5. Patel Road

The Collector road in the area comprises of-

- A. Sir Ganga Ram Marg
- B. Bada Bazar Marg
- C. Ajmal Khan road
- D. Andh Kanya Vidyalaya Marg

The Local roads provide access to the plots in the ward.



View of Vandematram Marg
Source: DUAC, 2017 (photograph), New Delhi

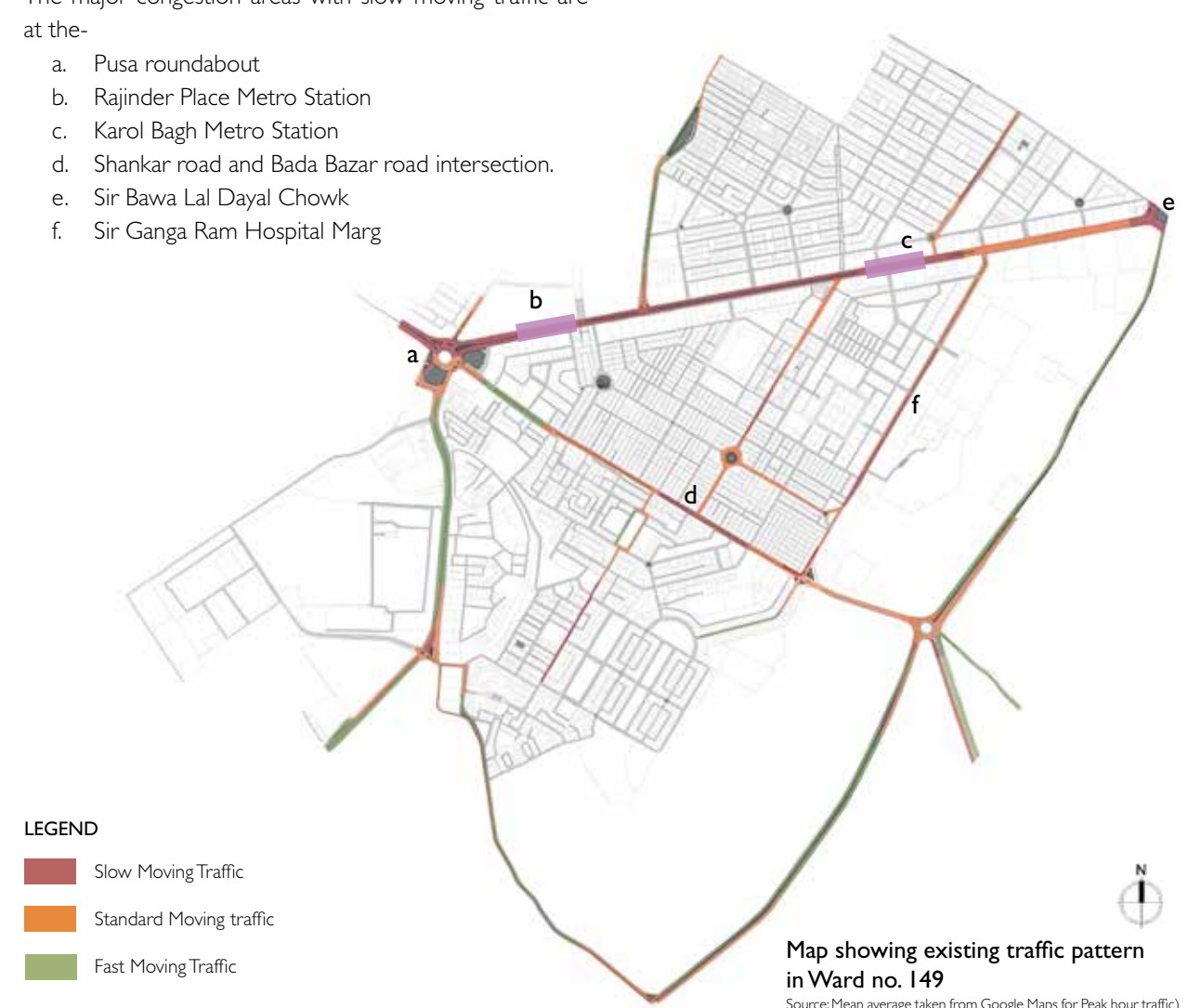


View of Sir Gangaram Hospital Marg
Source: DUAC, 2017 (photograph), New Delhi

2.1.2 Traffic Pattern Study

The major congestion areas with slow moving traffic are at the-

- a. Pusa roundabout
- b. Rajinder Place Metro Station
- c. Karol Bagh Metro Station
- d. Shankar road and Bada Bazar road intersection.
- e. Sir Bawa Lal Dayal Chowk
- f. Sir Ganga Ram Hospital Marg



Pusa Roundabout
Source: DUAC, 2017 (photograph), New Delhi



Rajinder Nagar Metro Station
Source: DUAC, 2017 (photograph), New Delhi



Sir Bawal Lal Dayal Chowk
Source: DUAC, 2017 (photograph), New Delhi



Sir Gangaram Hospital Marg
Source: DUAC, 2017 (photograph), New Delhi

2.1.3 Transportation Systems

Rajinder Place and Karol Bagh metro stations connect Rajinder Nagar to Noida and Dwarka through blue metro corridor.

Effective bus routing enables short distance connectivity from Rajinder Nagar to other parts of Delhi.



Map showing existing transport systems in Ward no. 149



Intersection on Pusa road
Source: DUAC, 2017 [Photograph], New Delhi



Public Vehicle Parking
Source: DUAC, 2017 [Photograph], New Delhi



Rajinder Place metro station on blue metro line
Source: DUAC, 2017 [Photograph], New Delhi



Karol Bagh metro line on blue metro line
Source: DUAC, 2017 [Photograph], New Delhi

2.2 Major Landmarks

Landmarks are typically point of references for the observer; within this area, few examples of such buildings have been listed below.



Map showing major landmarks in Ward no. 149



Pusa Roundabout
It is a 5 arm signalised roundabout and is located at the intersection of Patel road, Pusa road and Shankar road which causes a situation of chaos and congestion on the road.
Source: DUAC, 2017 [Photograph], New Delhi



Rajinder Place Metro Station
This Metro station is extremely popular and hence this station attracts a lot of IPTs which leads to traffic jams.
Source: DUAC, 2017 (photograph), New Delhi



BLK Hospital
A 650 bed Multi- Speciality hospital in the heart of West Delhi. Spread on five acres of land BLK is ranked amongst the top 10 Multi- speciality hospitals in Delhi NCR
Source: [Online]. Available from: <https://www.lyfboat.com/hospital/blk-super-speciality-hospital/>



Gurdwara Nanaksar
Gurdwara Nanaksar encompasses an area of 1.5 acres in Rajinder Nagar of Delhi on Sir Gangaram Hospital road. The Gurdwara was built in 1976.
Source: [Online]. Available from: <http://gurdwaar.com/images/Gurdwara+Nanaksar+New+Delhi/>



Hotel Jaypee Siddhartha
Located within a 5km radius of Connaught Place and a 45 minute drive from Indira Gandhi international Airport, Jaypee Siddhartha is one of the major landmarks of the area.
Source: [Online]. Available from: <http://www.indiaprofile.com/images/hotels/delhi/first-class-hotels-around-delhi/>



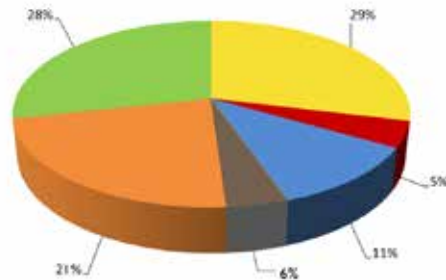
Sir Ganga Ram Hospital
Sir Ganga Ram Hospital is a 675-Beded multi-speciality state-of-the-art Hospital in India. The Hospital is committed to provide world class healthcare, teaching, training and research.
Source: [Online]. Available from: <https://www.medfee.com/list/best-gynaecology-hospitals>

2.3 Current Land Use Mapping



Map showing current land use in Ward no. 149

- LEGEND**
- Residential
 - Mixed use
 - Public semi - public use
 - Neighbourhood greens / Open areas
 - City forest
 - Commercial use
 - Roads



- Rajinder Nagar and surrounding areas are predominately residential colonies with commercial activities on the edges of Shankar and Pusa Road.
- Karol Bagh and precincts are essentially mixed use with dense compact development.
- The ward has small scattered greens as well as the Central Ridge, which constitutes a major part of the green cover.
- Commercial pockets are mostly along the Bada Bazaar and Shankar Road.
- A considerable part of land use is dedicated under Public / Semi public building, which constitute of hospitals, schools, institutes, colleges etc. The major ones include- BLK hospital, Sir Gangaram Hospital, Springdales School, Bal Bharti School.

EXISTING LANDUSE SEGREGATION



Rajinder Nagar has a range of green parks / open spaces catering to the ward and its surroundings, spanning from neighbourhood parks to institutional greens to city forest i.e. The ridge.

Neighbourhood greens : The neighbourhood parks are scattered around the ward but are not uniformly distributed.

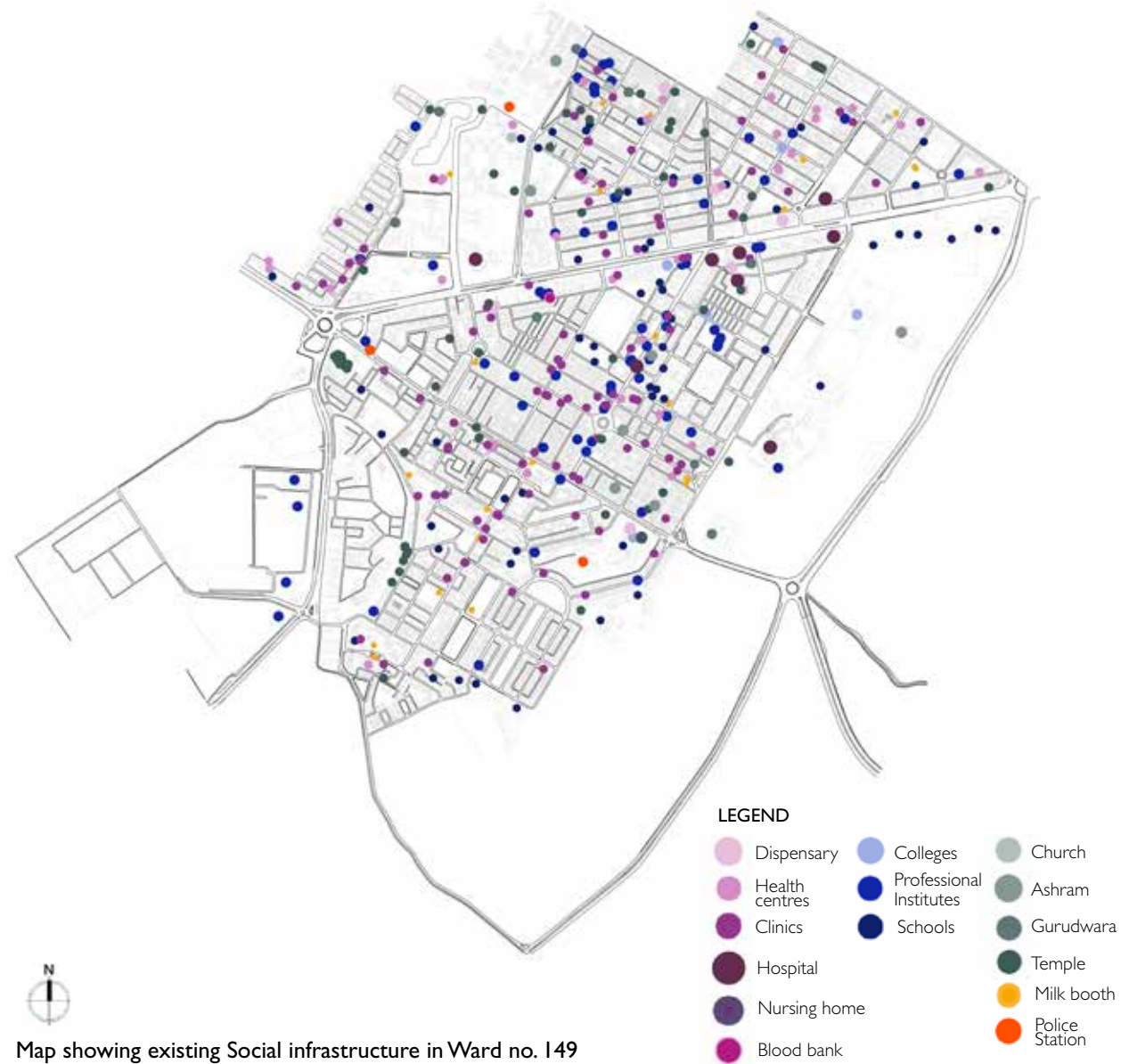
Avenue plantation : The major streets are lined with trees thus shading the various stretches and enabling comfortable walking.

Central Ridge : A part of Central ridge falls in ward No. 149 which is demarcated by a high 7 feet wall all around it. This wall acts a barrier between the residential settlement and the forest and thus does not allow the inhabitants to experience the city's priced possession.



Green / Open spaces

2.4 Social Infrastructure



Map showing existing Social infrastructure in Ward no. 149



Medical Infrastructure

As per ZDP 2001, 7 hospitals of various categories are existing and the bed strength in these hospitals are 820 i.e. 1.44 beds/1000 population. However the hierarchies of Health facilities have changed and norms have been reduced in MPD 2021 therefore no additional hospital is proposed considering the saturated holding capacity of this zone.

Religious Infrastructure

Religious infrastructure in the ward consists of numerous churches, temples, Gurudwaras, Arya Samaj Mandirs, Radha Soami Beas Satsang grounds, Babu Asaram Ashram etc.

Source: Delhi Development Authority, (2010) Zonal Development Plan for ' Zone B'- Karol Bagh and city Extension, New Delhi

Institutional Infrastructure

As per ZDP 2001, there are 57 Sr. Sec. Schools existing. The proposal of ZDP 2001 that 10 schools could be located in different zones is retained and no new school is proposed in this plan considering saturated holding capacity of this zone.

2.5 Commercial Infrastructure

The commercial infrastructure has Retail Shopping, Commercial and Government Offices, Local Body/Public Sector Undertaking offices, Cinema / Cineplexes, Hotels, Restaurants, Banquet halls and Guest House, Nursing Home, Dispensary, Clinical Laboratory, Clinic & Poly Clinic facilities together with other community facilities as per MPD 2021.

The major concentration of commercial activities in the area are located in Karol Bagh, Shankar Road and Bada Bazar Marg.

Karol Bagh is a mixed use development with high density low rise development.

Whereas Shankar road market and Bada Bazar market cater to local residences for their day to day shopping needs.

LEGEND

- Cinema
- Eateries
- Club
- Public convenience
- Community centre
- Shops
- Hotels
- Guest houses
- Retail
- ATM's
- Offices



Map showing existing commercial infrastructure in Ward no. 149



Karol Bagh Market
Source: [Online], Available from: <http://www.livemint.com/r/LiveMint/Period1/2015/08/01/Photos/KAROL.jpg>

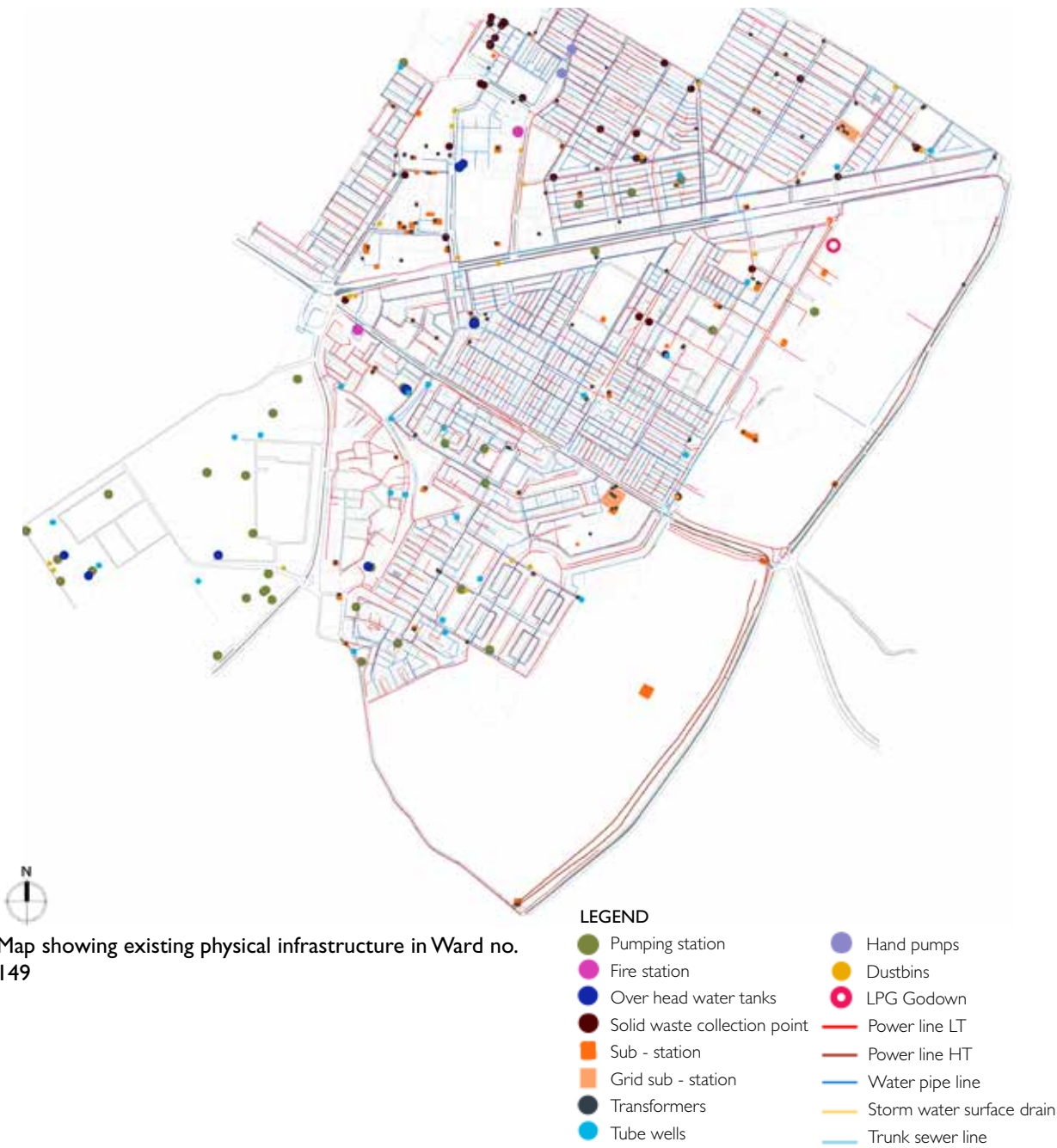


Bada Bazar Marg Market
Source: DUAC, 2017 [Photograph], New Delhi



Shankar road Market
Source: [Online], Available from: <http://www.dnaindia.com/locality/gu/new-delhi/shankar-road-market-gets-new-street-lights-30956>

2.6 Physical Infrastructure



Map showing existing physical infrastructure in Ward no. 149

WATER SUPPLY: Based on the norms, the minimum water requirement of the zone works out to 50.40 MGD.

SEWERAGE: About 80% of the total water requirement would go into sewerage thereby the total sewerage disposal requirement for the zone would be of the order of 40.32 MGD per day.

SOLID WASTE DISPOSAL: The solid waste disposal requirement based on the existing norms could be disposed of outside the zone by the local body and the sites identified for the purpose.

POWER: The power distribution is mainly through existing 33 KV sub-stations located in the zone. Two ESS sites as suggested by Delhi TRANSCO including a site for 220 KV at Pusa Agricultural Institute area is proposed in addition to augmentation of the existing distribution system as per requirement.

The sites required for any of the utilities in the zone could be considered for processing as per the requirement of the local body

Source: Delhi Development Authority, (2010) Zonal Development Plan for ' Zone B'- Karol Bagh and city Extension, New Delhi

Chapter 3 - Site analysis

3.1 Existing Scenario

3.2 Study Area-01- Sir Gangaram Marg

3.2.1 Issues

3.2.2 Analysis

3.3 Study Area-02- Bada Bazar Marg

3.3.1 Issues

3.3.2 Analysis

3.4 Study Area-03- Pusa Roundabout

3.4.1 Issues

3.4.2 Analysis- traffic Volumes

3.5 Summary of Issues

3.1 Existing scenario

The major issues in and around the ward are due to the growing pressures on the existing infrastructure. The increase in commercial activity within the area has amplified the demand of community services such as parking.

Overall the ward has the following issues:

- Lack of open spaces and recreational areas
- On street parking causing congestion on main roads and also hindering the movement of emergency vehicles.
- IPT (Intermediate public transport) parking on the road leads to overcrowding on various stretches.
- Encroachment by Informal vendors near facilities like hospitals etc. induces obstruction, sanitation and waste management issues.



Map highlighting intervention areas in Ward no. 149

3.2 Study area 01 - Sir Ganga Ram Marg

3.2.1 Issues



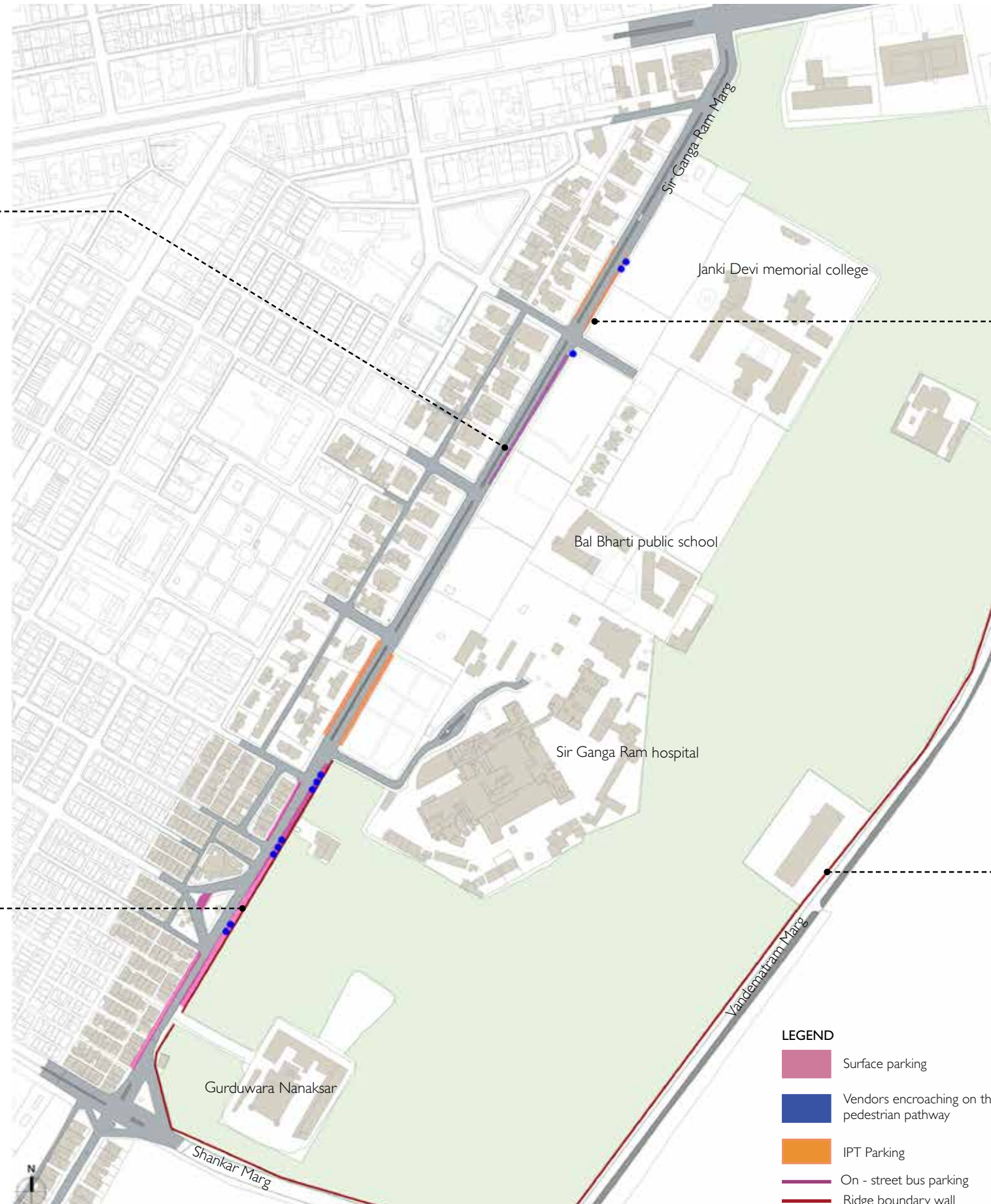
ENCROACHMENT

- Visitors to Sir Ganga Ram hospital park their vehicles on the footpath.
- Informal shops like eateries, tea kiosk etc. have encroached upon the pedestrian pathway breaking their continuity thus discouraging walking on an otherwise shaded footpath.



ON STREET CAR PARKING

- Car and scooter repair shops park their vehicles on both sides of the road encroaching the pedestrian pathway and the shoulder.
- Unauthorized surface parking reduces the effective carriageway resulting in congestion on the road.



Map showing existing scenario on Sir Ganga Ram stretch



ON - STREET IPT PARKING

- Electric rickshaws line up outside Sir Ganga Ram hospital to pick up and drop passengers to and from metro stations and bus stops.
- The on - street parking takes up one lane from the existing carriageway and overcrowds the road, hence blocking the way for emergency vehicles.



HIGH AND OPAQUE BOUNDARY WALL

- The high boundary wall along the ridge does not allow a view inside the forest acting as a visual barrier, which leads to illegal activities within the ridge.
- The wall also disturbs the ecology and hinders with the movement of the natural systems i.e. the flow of water, propagation of vegetation and movement of animals.

Source: DUAC, 2017 [Photograph], New Delhi

3.2 Study area 01 - Sir Ganga Ram Marg

3.2.2 Analysis



Current Landuse map

The character of the street is changing from residential to mixed use due to its location and facilities nearby. Mixed use requires extra parking provision for visitors to the market which is not yet provided. Thus the spill over creates congestion on the streets.

Informal activities and hawkers around various institutional complexes like Janki Devi Memorial college, Ganga Ram hospital etc. add to the chaos on the road. They often encroach the pedestrian pathway and take up one lane carriageway on the road, thereby slowing the traffic movement.



Open spaces

The major part of green in Rajinder Nagar comprises of the Central Ridge which is inaccessible because of the high opaque wall which becomes a visual and physical barrier.

There are few small neighbourhood parks and playgrounds within this area but are not sufficient to cater to the entire community.

Also there is a lack of maintenance and dumping of garbage by various institutional complexes and other illegal activities making it unsafe.



Permeability

Towards Shankar road the plots are smaller in size with mixed land use. These plots are divided by roads at frequent intervals, thus increasing their permeability, causing congestion. The large number of intersections are also more prone to accidents.

3.3 Study area 02 - Bada Bazar Marg

3.3.1 Issues



Bada Bazaar is primarily a mixed use street (notified in the zonal plan by DDA) which has IAS coaching institutes and supporting facilities like :

- Guest houses / PG's for students
- Libraries and reading rooms
- Stationary shops
- Eateries

A defined market is present but the central space is under utilized due to unorganised parking and haphazard informal activities like Kiosks, vendors, utilities etc.

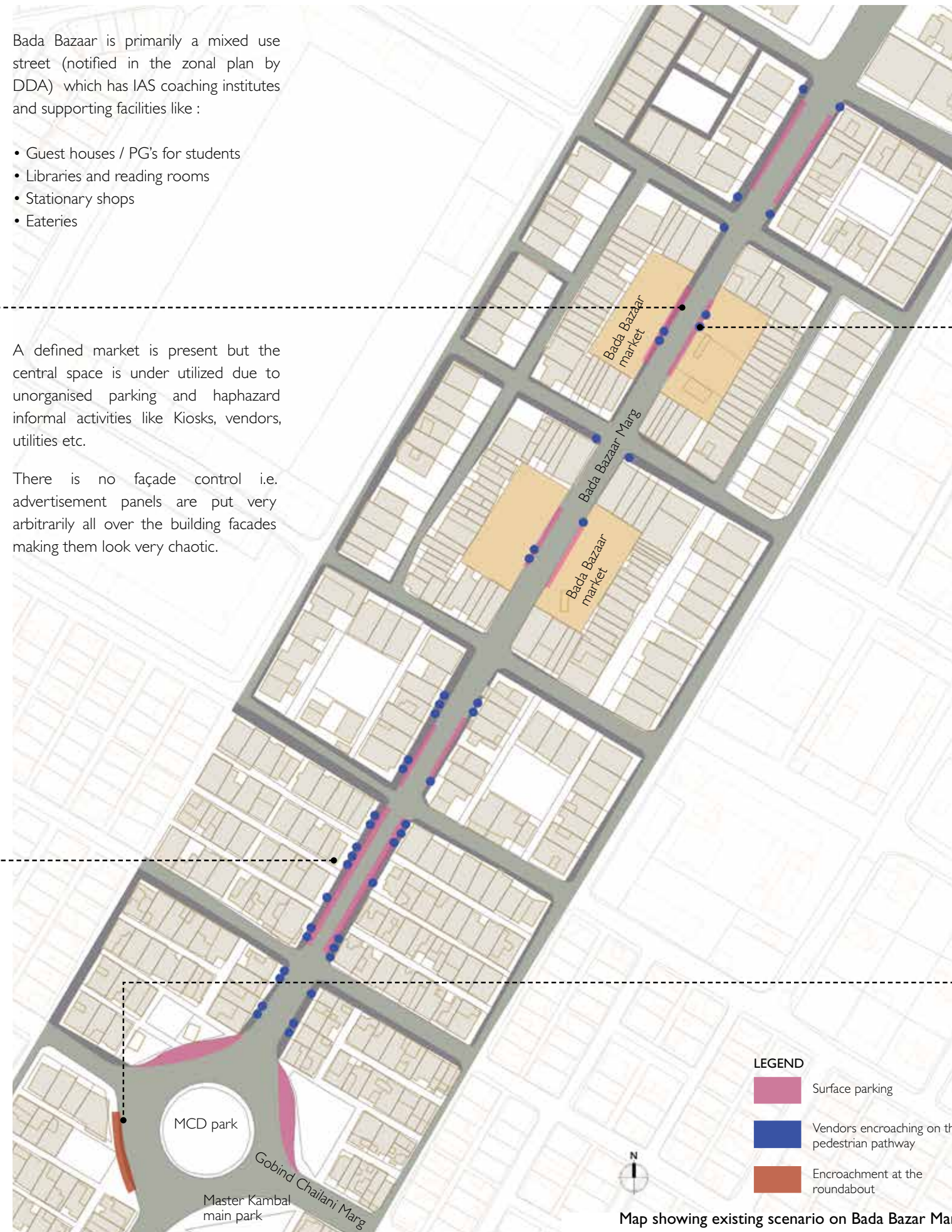
There is no façade control i.e. advertisement panels are put very arbitrarily all over the building facades making them look very chaotic.



Encroachment by fruit & vegetable vendors on pedestrian



Signage by various establishments disfigure the facade and deteriorate the character of the road.



Map showing existing scenario on Bada Bazar Marg



Un-organised car parking by the shopkeepers, visitors and residents at the public plaza degrades the quality of plaza and makes it unusable as an open space for public.



No space available for car parking leads to double lane car parking around the roundabout taking space from the existing carriageway and degrading the quality of the roundabout.

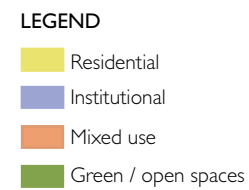


Utilities like Solid waste management do not have designated spots in the ward leading to spilling of waste on the streets

Source: DUAC, 2017 [Photograph], New Delhi

3.3 Study area 02 - Bada Bazar Marg

3.3.2 Analysis



Current landuse Map

As the street is a notified mixed use street, much part of it is used for commercial purposes on the ground floor and residential on the upper floors. Thus, the street is an active street with major pedestrian footfall especially near the market complex.

Also since the street is dominated by student accommodation and supporting facilities the residential character is mostly rental accommodation within each plot.



Permeability map

The stretch is very uniformly designed with intersections coming at regular intervals.

The entire stretch is very walkable if the encroachment and pedestrian width is taken care of.

Since it is a mixed use street it becomes very safe and comfortable for pedestrians due to the activeness on the street.



Built V/S Open

The settlement being a planned development has grid-iron pattern, but over the years the plots encroachment has led to narrower streets with very less light and ventilation.

The market has central open plaza but is mostly encroached by randomly parked private vehicles and goods vehicles catering to the market.

3.4 Study area 3 - Pusa Roundabout

3.4.1 Issues

The roundabout at Pusa is unusual not only because its a five arm roundabout, but also because of its non-conforming geometry. The images below show the evolution of its geometry while the adjoining map shows the location of the junction within the context, all the major roads and landmarks surrounding the junction have been highlighted. The observations used for assessment and analysis later are supported using photographic evidence. The roundabout has undergone multiple geometric changes since its design and these changes have been incremental and organic in nature instead of being planned.

Temporal Changes



Time Line year: 2000
A five arm roundabout connecting Central Delhi to North & North- west Delhi

Source: Google Earth, 2000, Rajinder Nagar- New Delhi



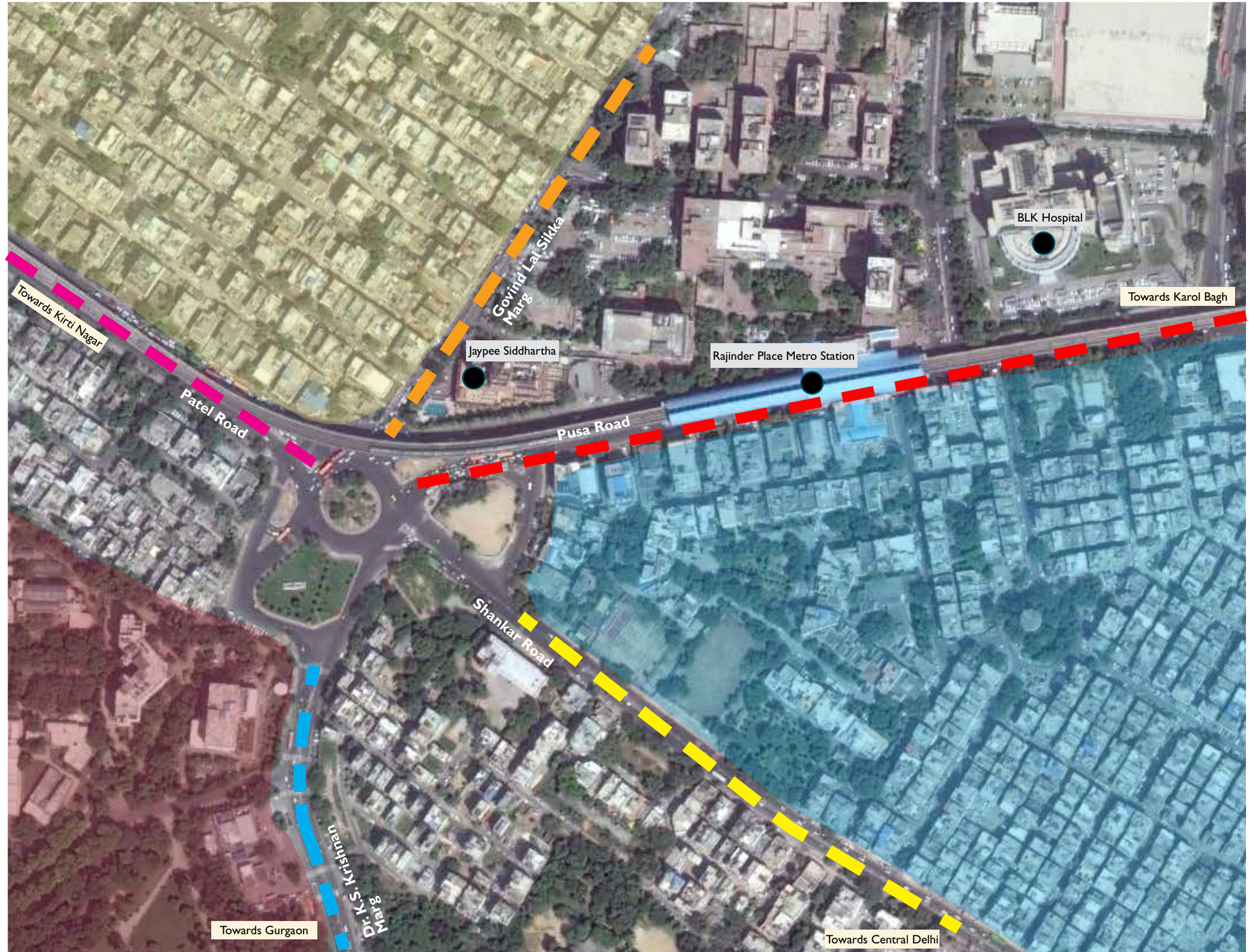
Time Line year: 2004
The size of the roundabout was reduced to incorporate metro piers and also to accommodate the increased traffic volume.

Source: Google Earth, 2004, Rajinder Nagar- New Delhi



Time Line year: 2010
The roundabout was re-structured by adding another arm from Dr. K.S. Krishnan Marg. To manage the increased traffic and multiple traffic islands the roundabout was signalled.

Source: Google Earth, 2010, Rajinder Nagar- New Delhi



Time Line year: 2016

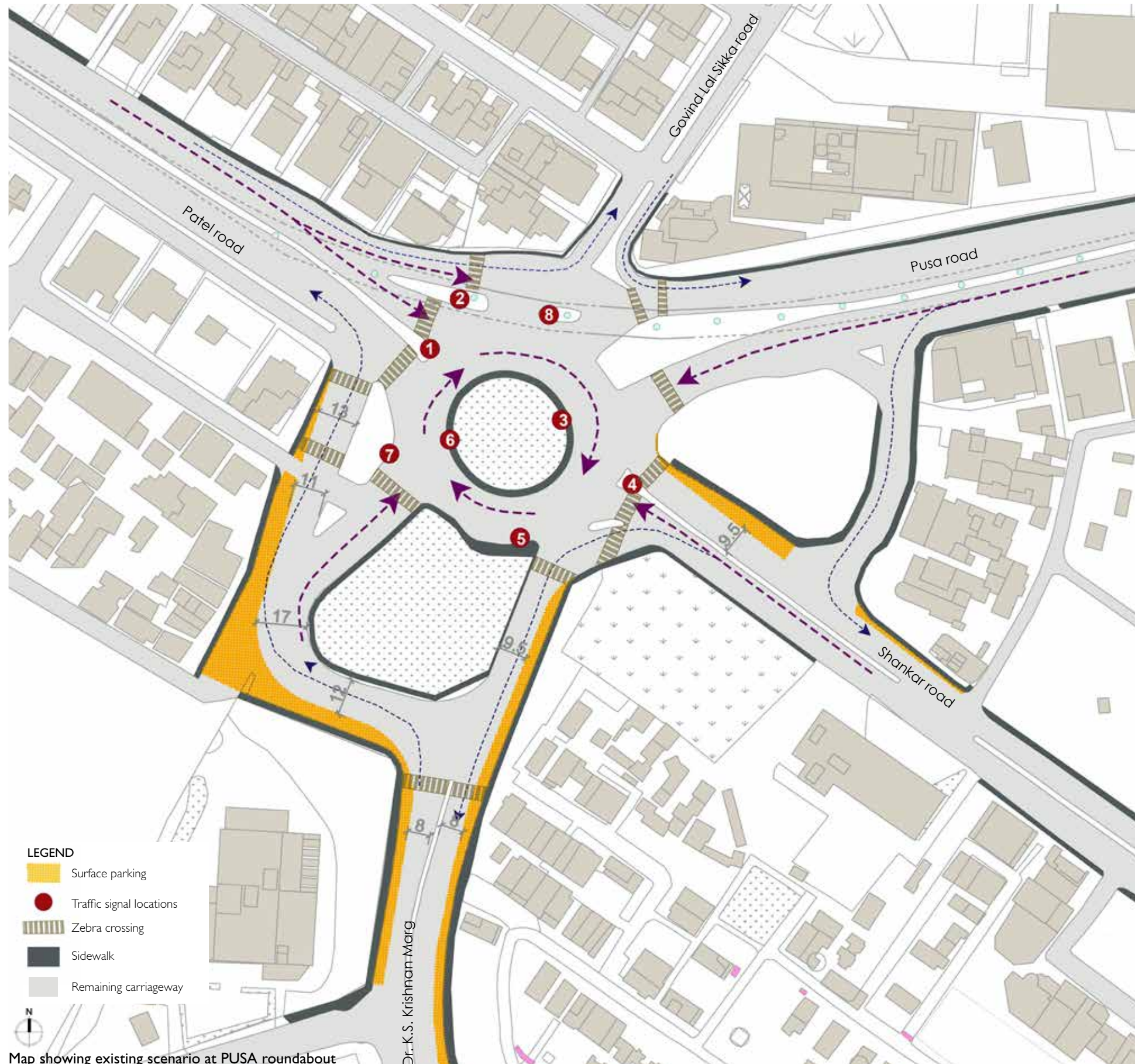
Source: Google Earth, 2016, Rajinder Nagar- New Delhi

This has led to creation of multiple alternatives for traffic streams causing confusion. For example, traffic from Shankar road and Pusa road can choose to move behind the model library island or continue around the circle as shown in the map using continuous flow lines.

3.4 Study area 3 - Pusa Roundabout

3.4.1 Issues

The map shows all the road widths (existing and effective), traffic movement patterns, and signals. It also shows the existing pedestrian infrastructure including provisions for crossing.



Map showing existing scenario at PUSA roundabout



Multiple alternatives for traffic flow (due to numerous traffic islands) leads to gridlock situation



Numerous Traffic islands gives the vehicle more manoeuvrable space which leads into a traffic jam.



- Eight signals currently used to manage the junction. In case of signal failure it becomes extremely difficult to manage the traffic.
- Lack of homogeneity in the road widths creates unnecessary bottlenecks causing congestion.



- Lack of signage
- Pedestrian infrastructure is not disabled friendly.

Source: DUAC, 2017 [Photograph], New Delhi

3.4 Study area 3 - Pusa Roundabout

3.4.2 Analysis - Traffic Volume

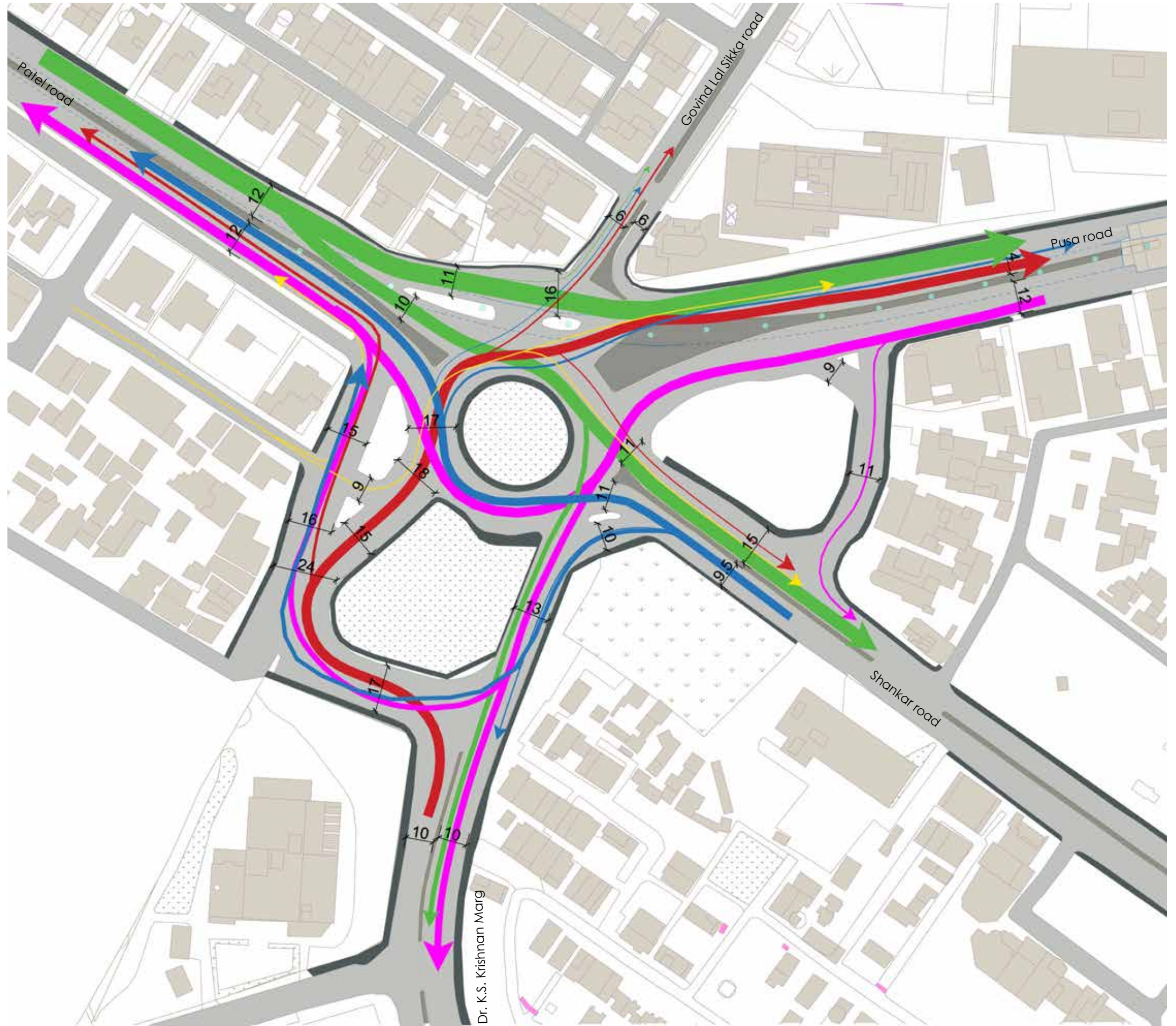
In order to analyze traffic movement patterns across the junction, sample surveys were carried out. Mode-wise traffic volumes obtained through video recordings clubbed with sample origin destination surveys on each arm were utilized to obtain the flow patterns for all arms. From the data, the following observations can be made -

- The roundabout is used by heavy traffic volumes during peak hours.
- Number of buses passing through the junction is very high given the arterial function played by Pusa and Patel roads.
- The heavy volumes are primarily across :
 - Patel road – Pusa road
 - Patel road – Shankar road
 - Dr. KS Krishnan Marg - Pusa road

The table below gives the flow volumes in terms of passenger car units to enable a direct comparison of congestion load by each direction of traffic.

Traffic Volume at junction in PCUs (Passenger Car Unit)					
Origin \ Destination	Patel road	Pusa road	Shankar road	Dr. K.S. Krishnan Marg	Access to colony
Patel road	0	345	298	106	0
Gobind Lal Sikka Marg	21	0	27	58	0
Pusa road	617	0	84	345	53
Shankar road	472	69	0	45	0
Dr. K.S. Krishnan Marg	181	245	50	0	0
Access to colony	0	0	0	0	0

Source: DUAC, 2017 [Table], New Delhi



Map showing traffic volumes at PUSA roundabout

3.5 Summary of Issues



SURFACE PARKING

Unavailability of designated parking for cars, buses and IPTs lead to un-authorized and irregular parking on the road causing:

- Reduction in effective carriageway width hindering the movement of vehicles.
- Overcrowding on the street.
- Encroachment on pedestrian walkways.



EMERGENCY VEHICLE MOVEMENT

Emergency vehicles are permitted by law to break conventional road rules in order to reach their destinations in the fastest possible time, such as driving through an intersection when the traffic light is red, or exceeding the speed limit.

Due to heavy congestion on the road these vehicles are not able to manoeuvre through the traffic resulting in avoidable delays.



LACK OF PUBLIC OPEN SPACES

Overloading and over populating of cars in the area have encroached on all the available open spaces for the purpose of parking.

Public plazas and spaces currently available are unusable as they lack in identity and their quality is degraded.



PEDESTRIAN MOBILITY

The streets do not provide a safe and comfortable environment for the residents to walk. The footpaths are broken, discontinuous and not shaded.

Due to lack of proper pedestrian infrastructure people have to depend on motorized vehicles even for short trips which also leads to adverse effects on the environment.

Chapter 4 - Design Proposal

4.1 Comprehensive Design Proposals

4.2 Design Proposal-01- Sir Gangaram Marg

4.2.1 Dedicated grade separated access to Sir Gangaram Hospital

4.2.2 Redesign of Sir Gangaram Marg

4.3 Design Proposal- 02

4.3.1 Pedestrianization of Bada Bazar Marg

4.3.2 Redesign of Bada Bazar Marg

4.4 Design Proposal 03 - Redesign Signal free loop

4.5 Proposed Vehicular Circulation

4.6 Proposed Public Transport Circulation

4.1 Comprehensive Design Proposals

The various strteches were independently studied and redesigned to achieve a pragmatic solution.

1. Sir Ganga Ram Marg

- Redesigned with a segregated lane for emergency vehicles and maintaining a One - way movement from PUSA Road towards Shankar Road to reduce traffic congestion.
- Proposing uninterrupted connection from Vandematram marg via a dedicated flyover to Sir Ganga Ram hospital to enable prompt access in emergency cases.

2. **Bada Bazaar Marg** : Proposing a pedestrian only street (partially) to activate the neighbourhood market and make it pedestrian friendly.

3. **Redesign of PUSA Roundabout** :To decongest the signalised 5-arm roundabout and make it a continous signal free loop with appropriate pedestrian connctcions at various grades.



PUSA roundabout

Unsignalised loop

Redesign of Bada Bazaar marg

A pedestrian only street

Redesign of Sir Ganga Ram marg

Provision of dedicated emergency lane alongwith one way movement

Vandematram Marg

Proposal of a dedicated elevated flyover for Sir Ganga Ram hospital



Aerial view showing the proposed interventions in Rajender Nagar ward

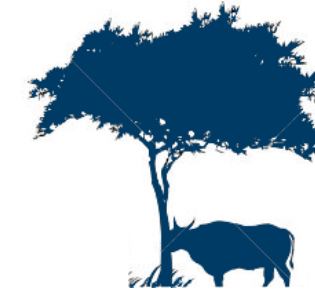
4.2 Design Proposal- 01- Sir Gangaram Marg



Map showing intervention areas for Sir Gangaram Marg

ADOPTED STRATEGIES

The following approaches are encouraged for better functioning of Vandematram Marg.



ENABLING INCLUSION OF ECOSYSTEM IN THE CITY FABRIC
Vandematram Marg divides the Central Ridge into two parts. Removal of the ridge boundary wall would ensure the possibility of movement of animals.



DIRECT ACCESS TO HOSPITAL
Sir Gangaram Hospital is one the leading hospitals in the country and hence only one access to this hospital does not fulfil it's demand. Therefore, a dedicated flyover from Vandematram Marg to the hospital will help in managing the demand.



RIDGE WALL REDESIGN
The high opaque wall disconnecting the Central Ridge is redesigned to include the ecosystem and create a visual and physical barrier free environment.



PEDESTRIAN SAFETY
A well defined pedestrian infrastructure is created along Vandematram Marg with street furniture, lighting etc. in order to make pedestrians feel safe and comfortable while walking on this otherwise poorly lit road.

4.2 Design Proposal 01 - Sir Gangaram Marg

4.2.1 Part A- Dedicated grade separated access to Sir Gangaram Hospital from Vandematram Marg



Proposed flyover connecting Vandematram Marg to Sir GangaRam hospital

Sir Gangaram road is a busy road with major landmarks like Sir Gangaram hospital , Janki Devi Memorial college and Bal Bharti Public school .

As a result this road remains congested throughout the day due to which the movement of emergency vehicle is not seamless and uninterrupted.

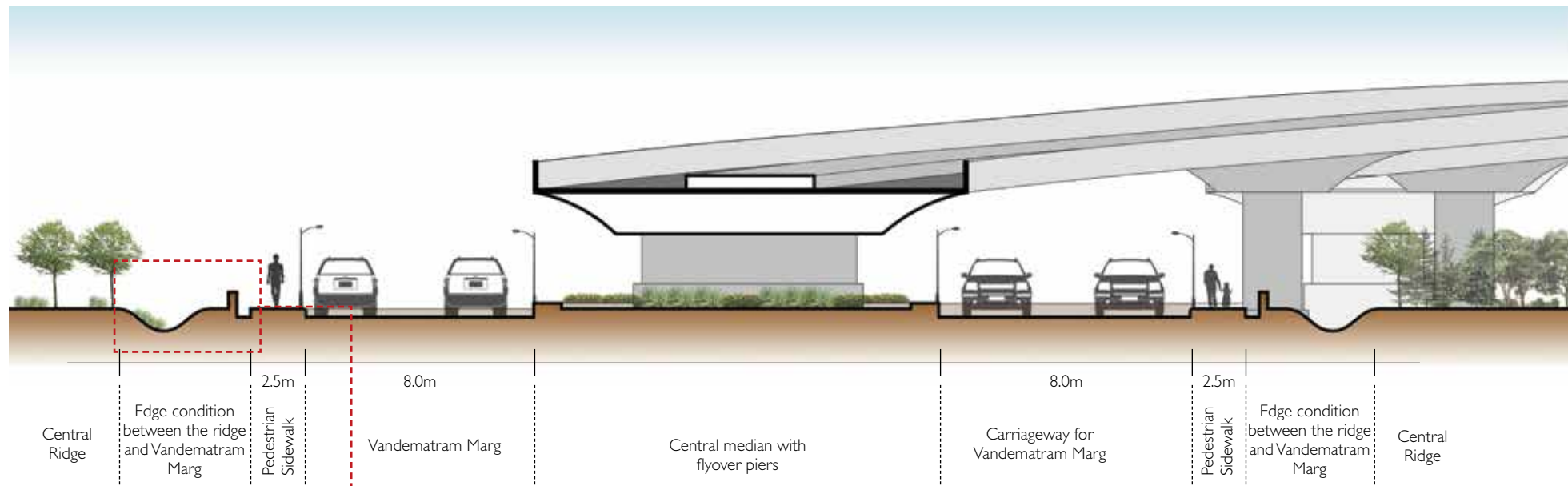
Thus , to decongest the road and also to provide an uninterrupted , continuous access to the hospital especially for emergency vehicles, a flyover across the ridge is proposed to connect Vandematram Marg to Sir Gangaram Marg

4.2 Design Proposal 01 - Sir Gangaram Marg

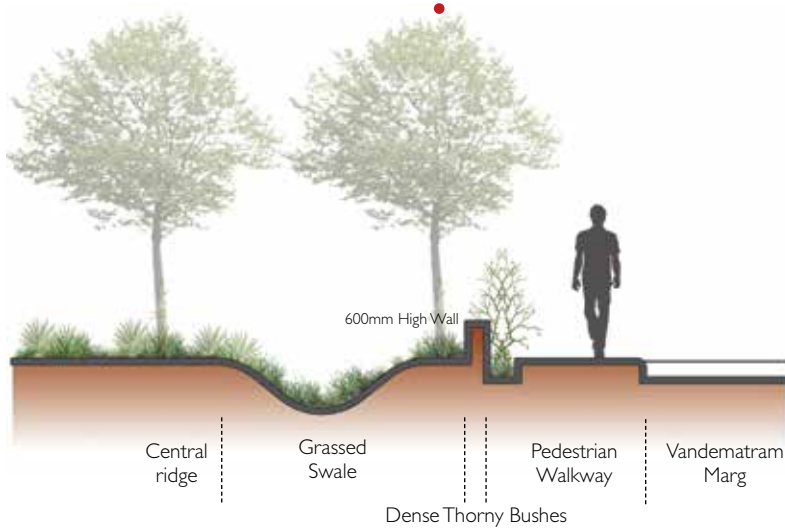
4.2.1 Part A- Dedicated grade separated access to Sir Gangaram Hospital from Vandematram Marg



PROPOSED SECTION THROUGH THE RIDGE



DETAIL AT A



PROPOSED EDGE SECTION AT VANDEMATRAM MARG

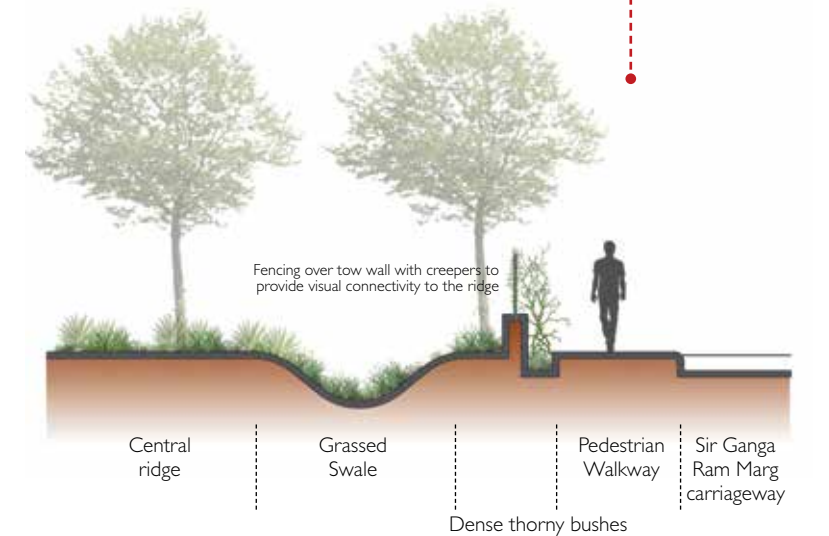


EXISTING EDGE SECTION

Central Ridge is a protected forest with an area of 864 ha. out of which 50% lies with forest department. Refugees were given land in the Central and Southern Ridges, causing severe damage to the natural flora and fauna, consequent ecological disruption through erosion caused due to the indiscriminate and unscientific denudation of forests.

(Source: an introduction to Delhi Ridge. Department of forest and wildlife, 2014)

KEY PLAN



PROPOSED EDGE SECTION AT SIR GANGARAM MARG



EXISTING EDGE SECTION



The high opaque wall is a physical and visual barrier and encourages people, especially migrants living around the forest to encroach upon the forest area. They tend to dump their domestic waste inside the forests, thus polluting it. There are many workshops, small industrial units near the boundary of the forests. They not only pollute the water sources inside the forests due to their toxic discharges, but they also tend to dump their wastes inside the forests.

(Source: an introduction to Delhi Ridge. Department of forest and wildlife, 2014)



To stop these menaces a low tract land is created as an edge condition, it is a recessed landscape design element that creates a vertical barrier while preserving an uninterrupted view of the landscape beyond.

This will create favourable conditions for protection and development of wildlife and enhance aesthetic beauty of the forest, provide shade along the length of strips passing through the city and to create recreational centres.

Source: [Online]. Available from: <http://www.alamy.com/stock-photo/garden-ha-ha-wall.html>

4.2 Design Proposal 01 - Sir Gangaram Marg

4.2.1 Part A- Dedicated grade separated access to Sir Gangaram Hospital from Vandematram Marg



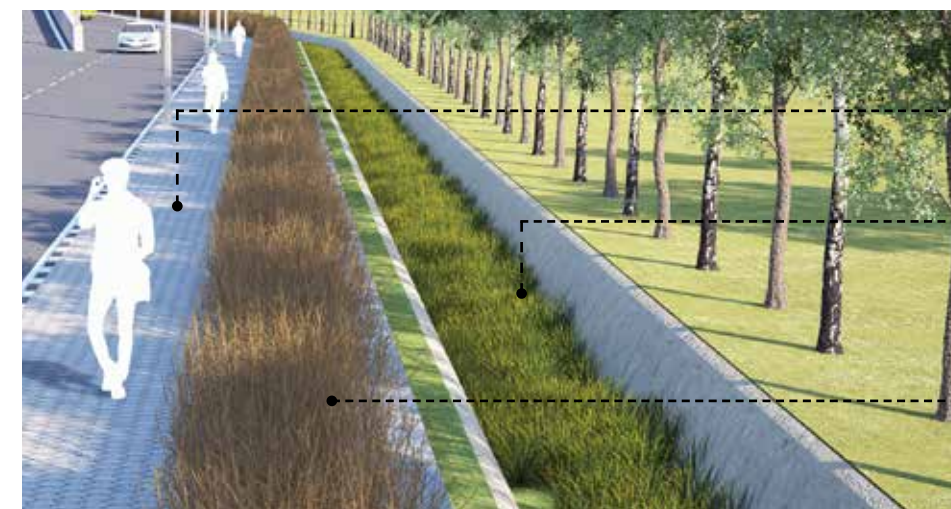
Two-Way Flyover from Vandematram Marg to Sir Gangaram Hospital

One-way access of vehicles from Vandematram Marg to Sir Gangaram Hospital

Aerial View showing the Flyover connecting Sir Gangaram Hospital from Vandematram Marg



View of Vandematram Marg focusing on direct access to Sir Gangaram Marg



Pedestrian Pathway

Grassed Swale

Dense thorny bushes

View of Proposed Edge condition on Vandematram Marg

4.2 Design Proposal 01 - Sir Gangaram Marg

4.2.2 Part B- Redesign of Sir Gangaram Marg



Adopted Strategies



ONE WAY MOVEMENT

It helps reduce the congestion by eliminating the thoroughfare movement.



DESIGNATED PARKING

Providing dedicated parking zones for different modes of transportation.



RIDGE WALL REDESIGN

Redesigning the current opaque high boundary wall to a natural swale which helps demarcate the two zones and also allows visibility into the ridge.



ACCESS CONTROL

To avoid thoroughfare traffic the residential neighbourhoods adjacent to the street would have access control which allows only residences and their visitor's cars to enter.



RETRACTABLE BOLLARDS

These bollards provide clear visual and physical barriers to restrict vehicle access, while allowing short- or long-term passage when retracted.



PRICING POLICY

All designed surface parking will be substantially charged in order to discourage long-term parking of cars on the road,



EMERGENCY VEHICLE

Lane segregated for the movement of emergency vehicles, in order to avoid traffic jams and attain seamless movement for the vehicle.

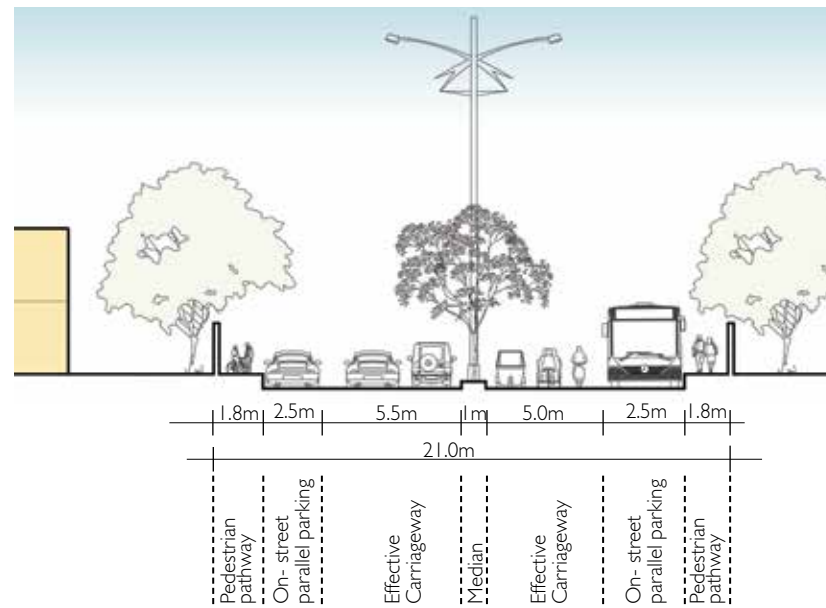


IPT PARKING

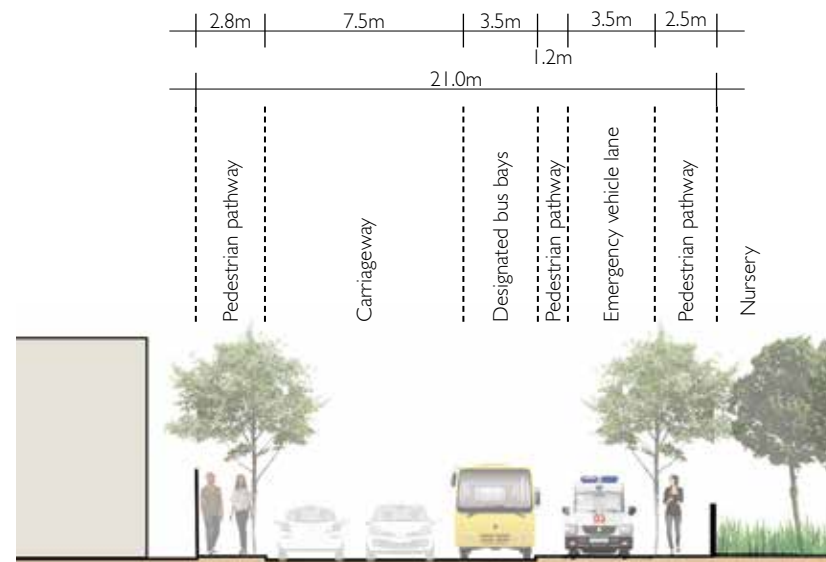
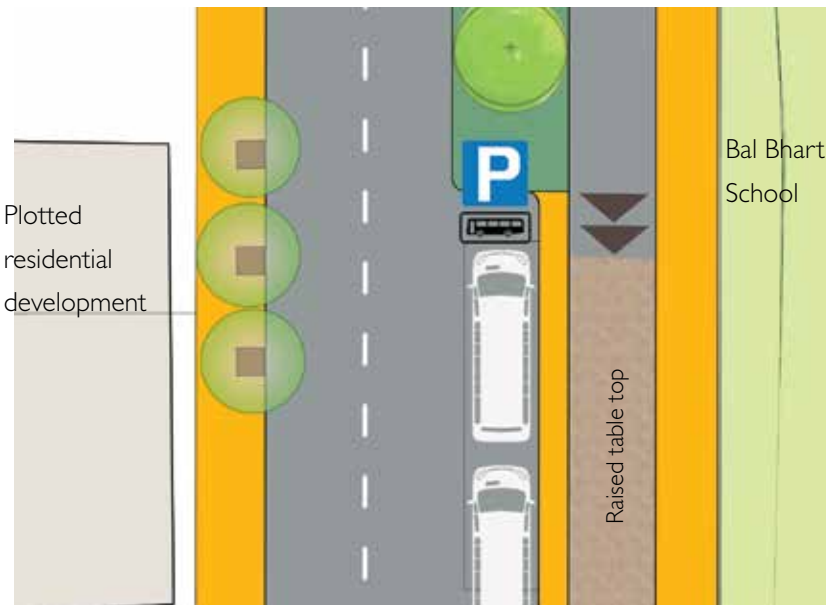
Designated spaces allotted for IPTs to park, pick-up, drop-off and idle.

4.2 Design Proposal 01 - Sir Gangaram Marg

4.2.2 Part B- Redesign of Sir Gangaram Marg



Existing road section



Proposed road section

ISSUES:

1. No designated space available for the buses catering to Bal Bharti School.
2. Unauthorized on-street car parking.
3. Pedestrian walkway not maintained.

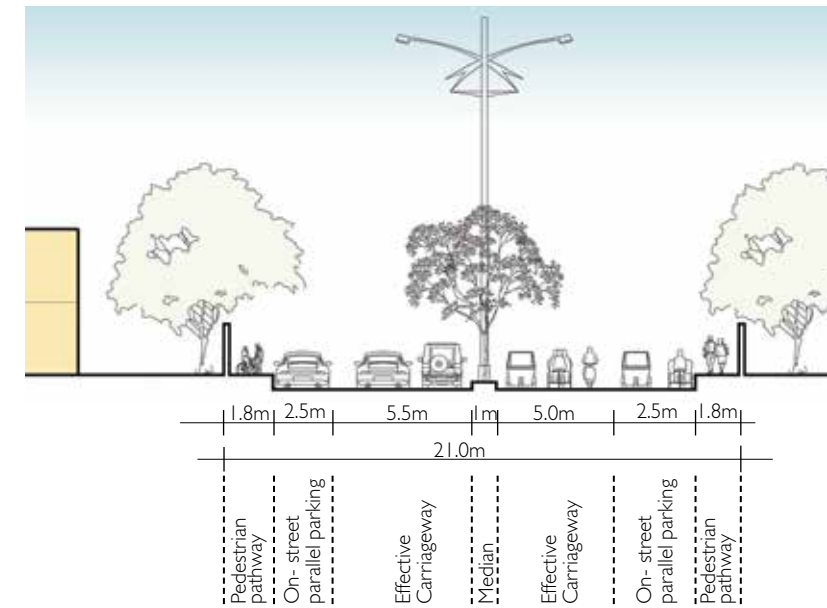
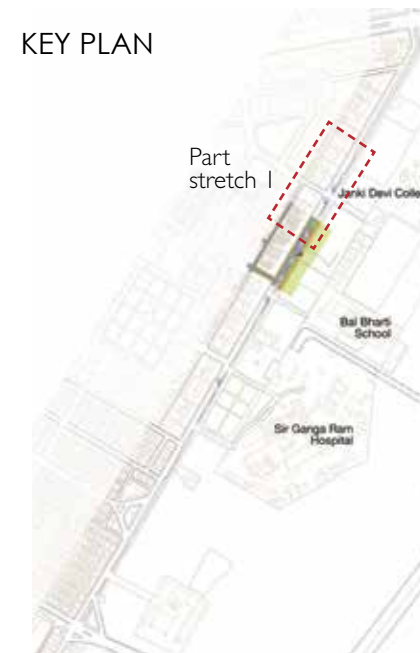
PROPOSALS:

1. Designated space provided for bus parking.
2. Table top crossing provided for the ease of pedestrians.
3. Separate lane dedicated for the movement of emergency vehicle to and from Sir Gangaram Hospital.

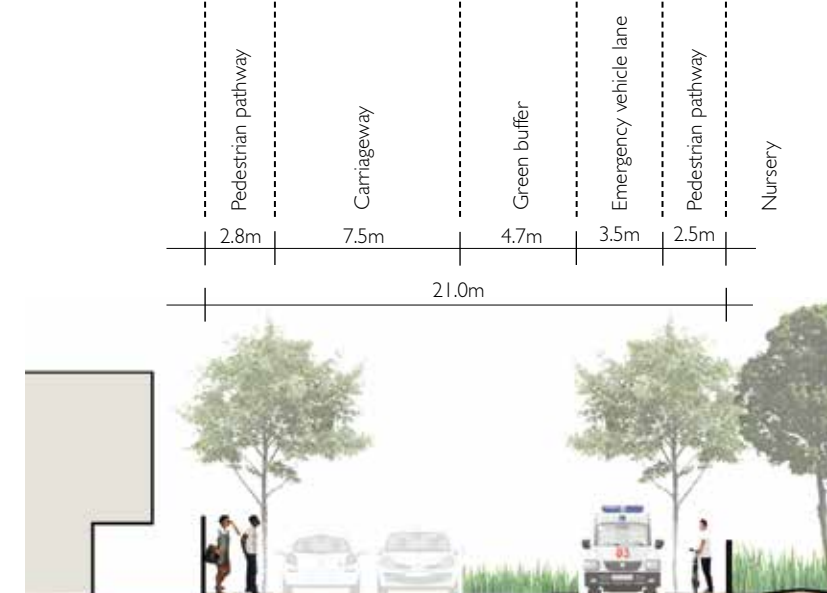
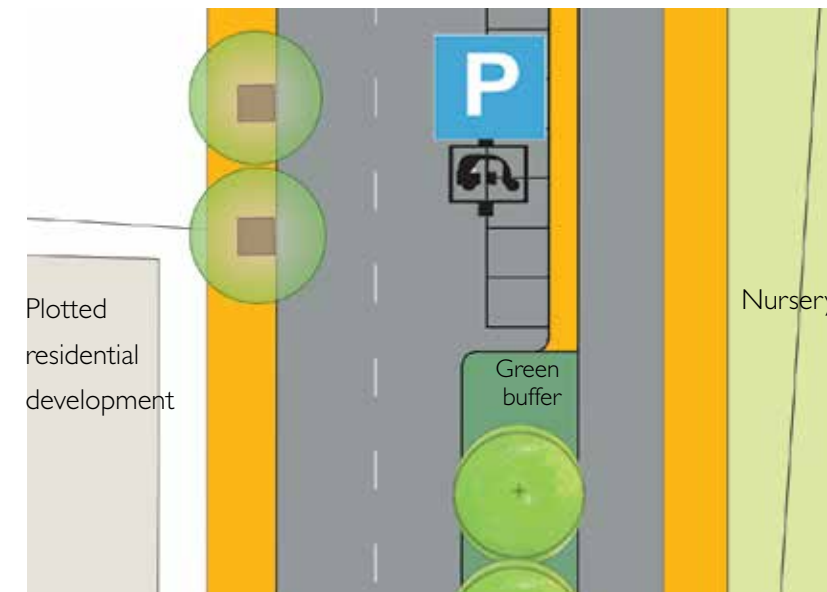
LEGEND

- Bus parking
- IPT parking
- Pedestrian sidewalks
- Green / open spaces
- Roads

KEY PLAN



Existing road section



Proposed road section

ISSUES:

1. Unauthorized IPT stands on the carriageway reduces the effective width of the road.
2. Private vehicles parked on the carriageway creates congestion and traffic jam which affects the movement of emergency vehicles.

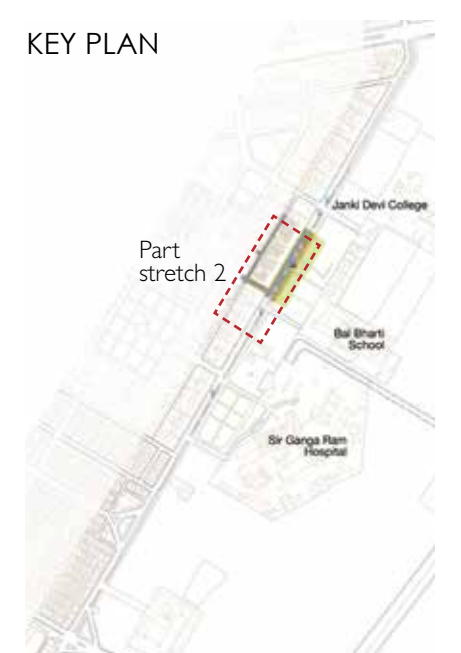
PROPOSALS:

1. Designated space provided for IPT parking.
2. Paid private vehicle surface parking provided without hindering the movement on the carriageway.
3. Separate lane dedicated for the movement of emergency vehicle to and from Sir Gangaram Hospital.

LEGEND

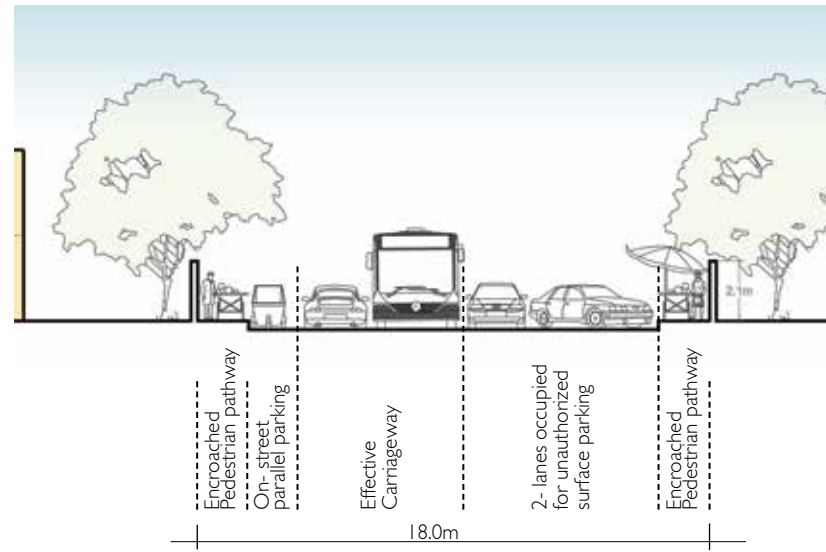
- Bus parking
- IPT parking
- Pedestrian sidewalks
- Green / open spaces
- Roads

KEY PLAN

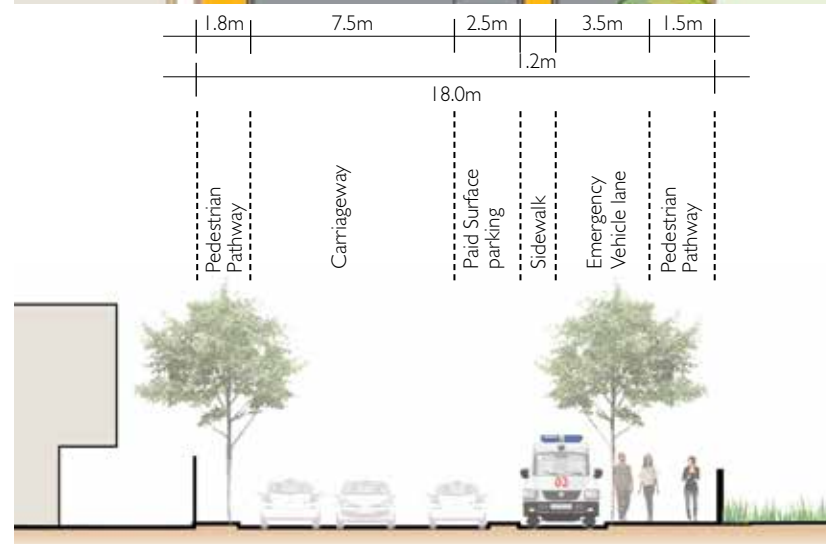


4.2 Design Proposal 01 - Sir Gangaram Marg

4.2.2 Part B- Redesign of Sir Gangaram Marg



Existing road section



Proposed road section

ISSUES:

1. High footfall of visitors coming to the hospital park the cars on the street and on footpaths causing traffic jams.
2. Numerous number of illegal vendors and hawkers are stationed outside the hospital to cater to the visitor's needs.

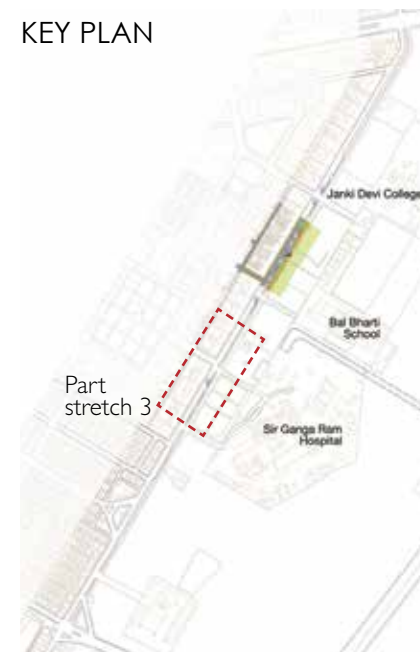
PROPOSALS:

1. Subsidized or free parking to be encouraged within the hospital complex to avoid over crowding on the road.
2. Spaces identified for paid surface parking outside the hospital complex not hindering the traffic flow.

LEGEND

- Bus parking
- IPT parking
- Pedestrian sidewalks
- Green / open spaces
- Roads

KEY PLAN



4.2.3 Redesign of Sir Ganga Ram Marg



Part Stretch 2 :View showing lane segregation outside Sir Ganga Ram hospital

IPT Parking (Auto/Taxi) Dedicated lane for Emergency vehicles



Part Stretch 1 :View showing parking outside Bal Bharti Public School

Pedestrian footpath kept intact Raised Table top crossing for pedestrians Bus parking bay

4.3 Design Proposal 02 - Bada Bazar Marg

4.3.1 Option A- Pedestrianization of Bada Bazar Marg



Map presenting Pedestrianization of Bada Bazar Marg

- LEGEND**
- Pedestrianised road
 - Pedestrian sidewalks
 - Road

Adopted Strategies

The following activities are encouraged by rearranging the section along Bada Bazaar Marg to make it an active, pedestrians - only street.



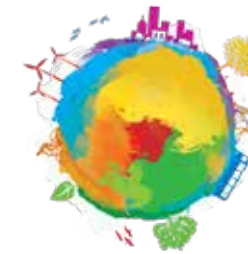
PEDESTRIAN SAFETY

The absence of motor vehicles which remain the major source of human injuries in city streets. With the cars gone, the roadways become solely dedicated to people, where they can safely move around and mingle with one another.



HUMAN MOBILITY

A car-less culture is espoused as the better alternative for short trips because automobile traffic is avoided. One can even safely estimate a time of arrival to a destination point; something which has become difficult in a maze of vehicles entangled in traffic.



ENVIRONMENTAL BENEFIT

With less people dependent on cars and gasoline, a worthy contribution to ecological preservation is thus made possible.



WALKING AS A HEALTHFUL ALTERNATE

In this day and age where everyone finds it difficult to allocate time to do any active exercise, walking to a destination has been accepted as worthwhile alternative.



ACTIVATING PUBLIC SPACES

Creating interactive spaces for public gatherings which are safe, inclusive and vibrant. Infusing activities in the designed spaces to enhance user experiences and facilitate the retail business.

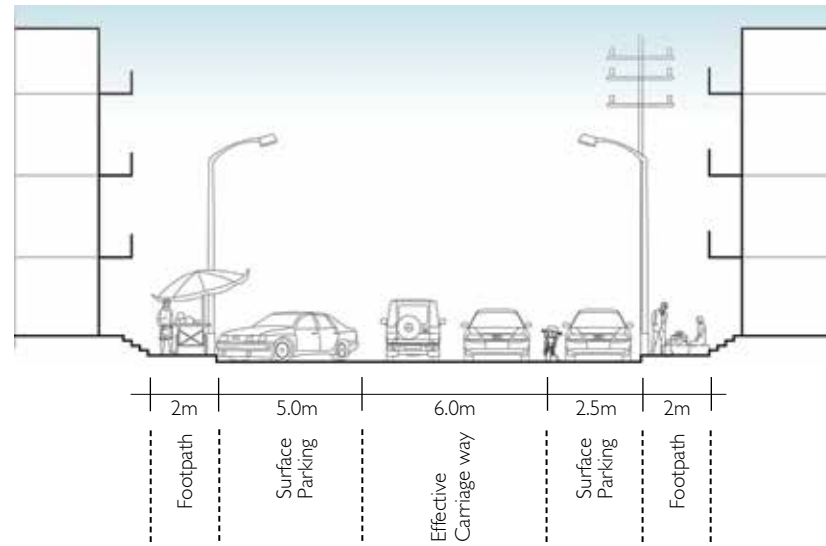


PARKING

For long term parking, mechanized basement parking is constructed at subsidized rates, while small amount of surface parking with exponential rates is designed for short term parking.

4.3 Design Proposal 02 - Bada Bazar Marg

4.3.1 Option A- Pedestrianization of Bada Bazar Marg



ISSUES:

1. Encroachment of street vendor and hawkers on pedestrian walkway make shopping inconvenient for the residents.
2. No green or shading available for pedestrians to walk on the footpath comfortably.
3. Unauthorized on street car parking.
4. Pedestrian walkway not maintained.

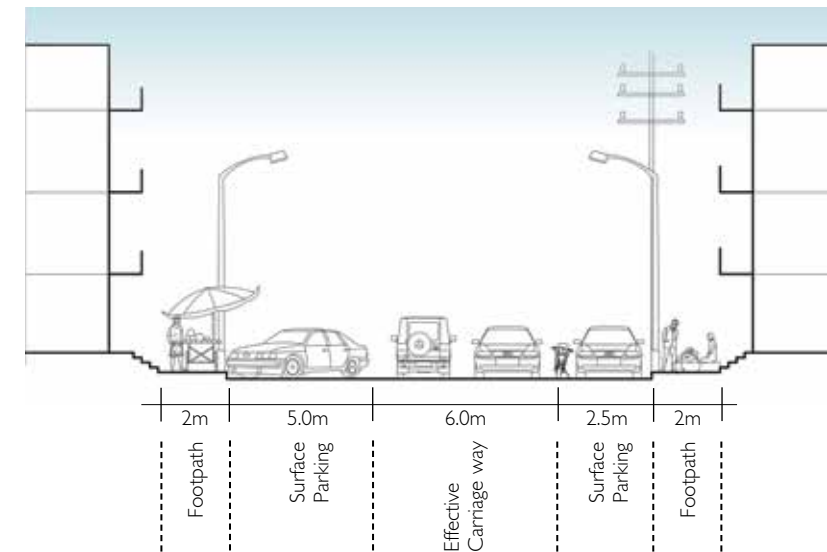
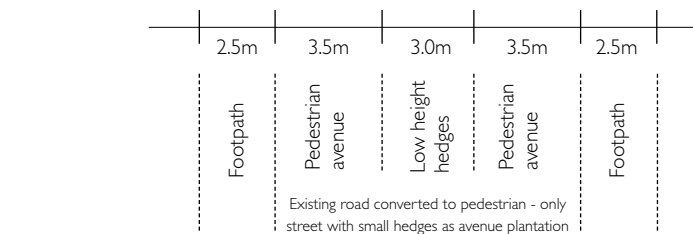
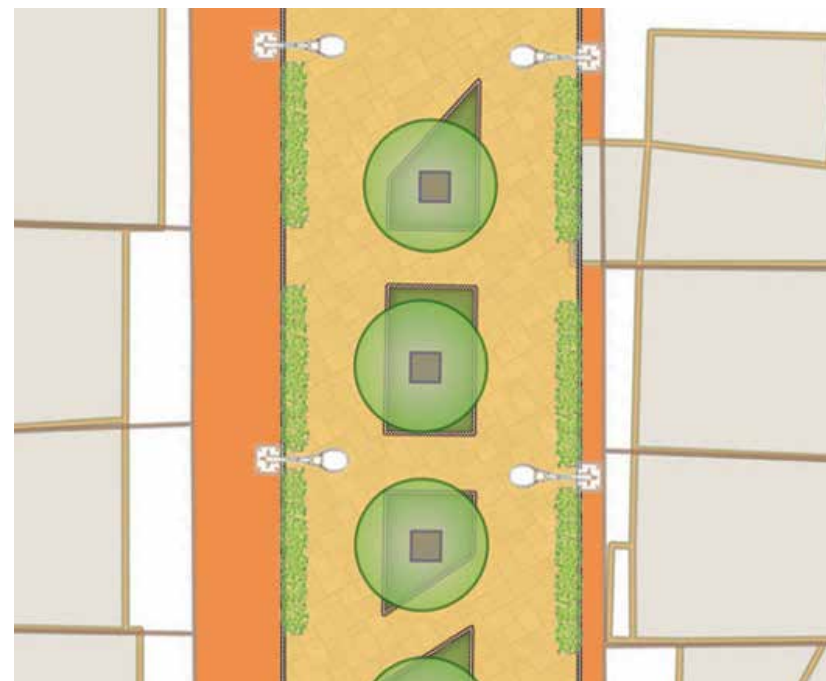
PROPOSALS:

1. The entire Bada Bazar market street has been pedestrianized to enhance the shoppers experience.
2. Shaded pedestrian avenues created with pause points.
3. All surface car parking removed from the street.

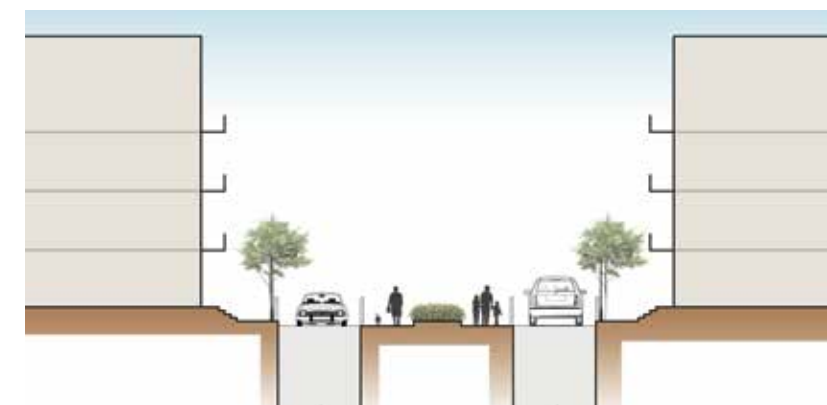
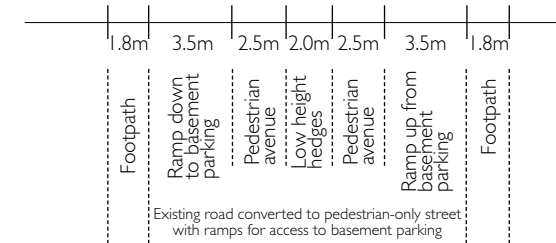
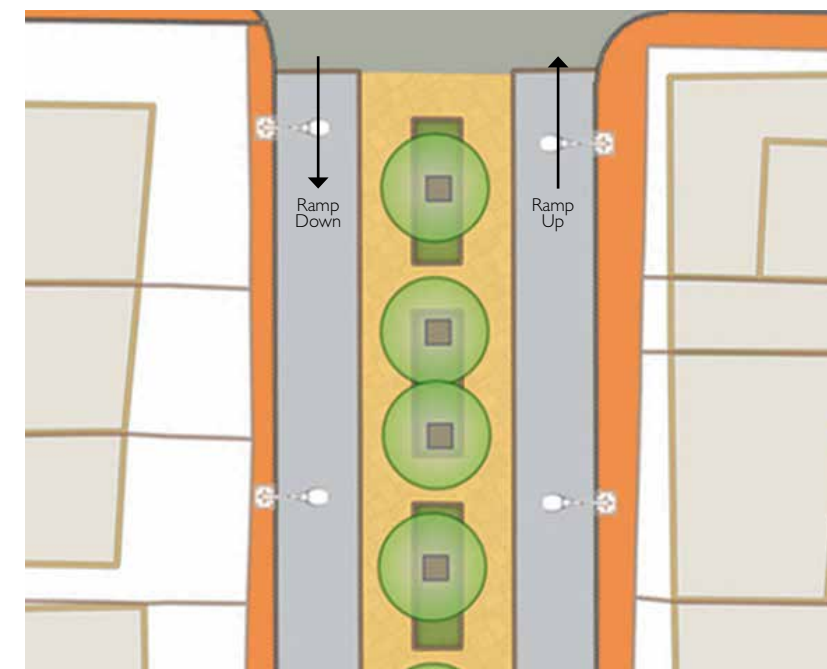
LEGEND

- Pedestrian sidewalks
- Green / open spaces
- Roads
- Existing Footpath

EXISTING ROAD SECTION



EXISTING ROAD SECTION



ISSUES:

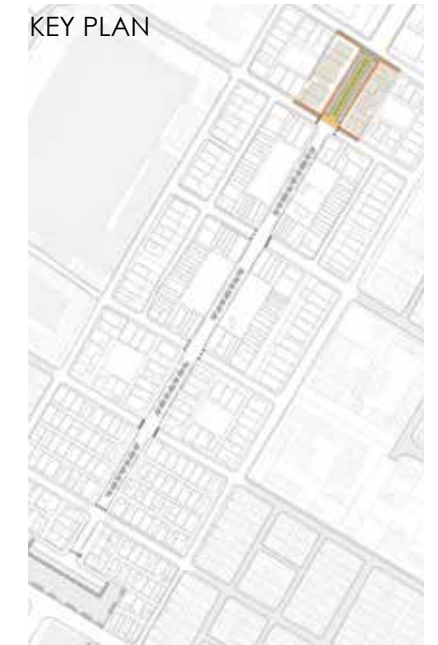
1. No designated space for shopkeepers/ visitors parking which result in un-authorized surface parking.
2. Encroachment of street vendor and hawkers on pedestrian walkway make shopping inconvenient for the residents.
3. No green or shading available for pedestrians to walk on the footpath comfortably.

PROPOSALS:

1. Mechanised basement parking provided for shopkeepers and visitors to park.
2. The entire Bada Bazar market street has been pedestrianized to enhance the shoppers experience.

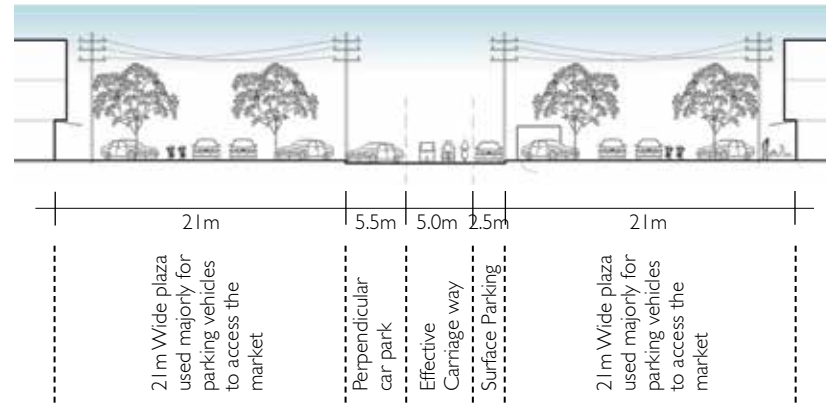
LEGEND

- Pedestrian sidewalks
- Green / open spaces
- Roads
- Existing Footpath



4.3 Design Proposal 02 - Bada Bazar Marg

4.3.1 Option A- Pedestrianization of Bada Bazar Marg



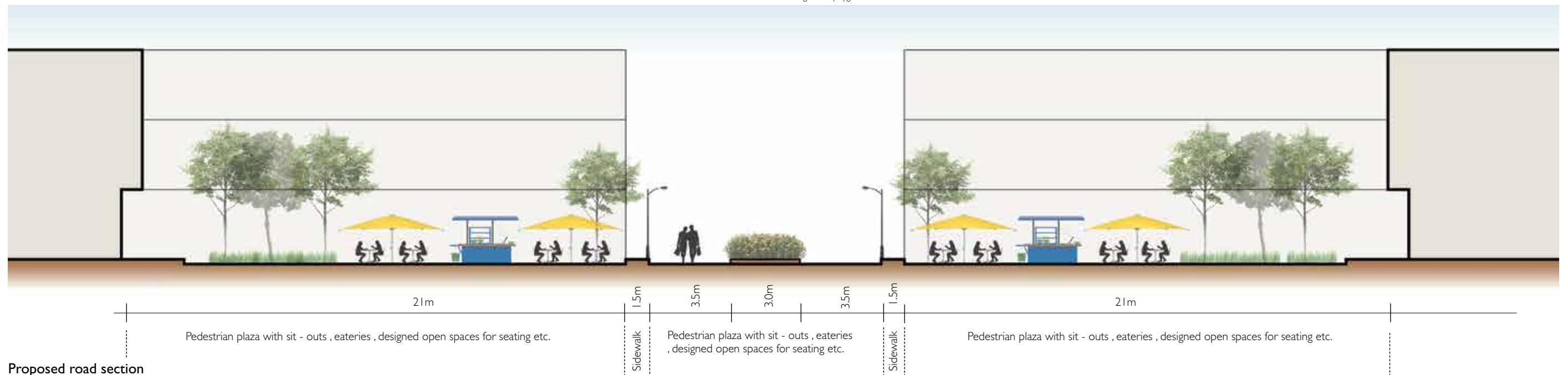
ISSUES:

1. The plaza is overcrowded with the cars parked by the shopkeepers for long durations.
2. No infrastructure available for pedestrians (seating spaces, drinking water, toilets etc.).

LEGEND

- Pedestrian sidewalks
- Green / open spaces
- Roads
- Existing Footpath

KEY PLAN



Enhanced Pedestrian experience



Source: [Online], Available from: <http://list25.com/25-most-pedestrian-oriented-and-walkable-cities/2/>



Source: Ben Hamilton-Baillie [Online], Available from: https://www.allianz.com/en/about_us/open-knowledge/topics/mobility/articles/120416-how-mingling-road-users-improves-safety.html/#1m95b46d17-f740-4530-9e23-dad396d71d42

To enable safe and comfortable movement of the pedestrians continuous, shaded walkways along the road are proposed. Table top crossings for safe pedestrian access to be provided at each crossing.

Activating Public spaces

The new designed open spaces need to be activated. Therefore, various activities are suggested to be induced like outdoor cafes, kiosks and shaded seating areas in the plaza.



Source: [Online], Available from: <http://www.france-voyage.com/frankrijk-toerisme/valence-319.htm>



Source: [Online], Available from: <http://www.flatirondistrict.nyc/news-and-events/newsroom/detail-news/177>

Physical activity and play



Source: [Online], Available from: <http://www.ccdparks.org/sister-cities-park/imagination-playground>



Source: [Online], Available from: <http://www.sfbetterstreets.org/find-project-types/activating-street-space/play-streets/>

The street which is functionally open for pedestrians only can be 'Play Streets' where they are open for physical activities and play for all ages and groups, making them more inclusive.

4.3.1 Option A- Pedestrianization of Bada Bazar Marg



- Existing colonnaded market complex
- Bada Bazaar road proposed to be converted to a pedestrian only street as an avenue with central broken greens
- Continuous footpath along the street
- Central plaza with provision of outdoor shaded seating, kiosks and pause points for interaction and resting
- Flower beds

SALIENT FEATURES



Outdoor Seating



Designated Kiosk / Vendor spaces



Pedestrian / Cyclist only street

Proposed aerial view showing redesigned plaza in the market with provision of shaded seating, stepped seating and kiosks

SALIENT FEATURES



Bollards to segregate street use i.e. movement and plaza



No Vehicle Zone



Stepped seating



Stepped seating to cater to the market

Shaded seating

Bollards to segregate the plaza from pedestrian footpath

Pedestrian only street with appropriate flooring and crossing

Proposed view showing redesigned plaza in the market

4.3 Design Proposal 02 - Bada Bazar Marg

4.3.2 Option B- Redesign of Bada Bazar Marg to accomodate parking



Adopted strategies



INCREASED PEDESTRIAN USE

More pedestrians are attracted to walk as the street becomes more comfortable and safe to walk



MORE USER DIVERSITY

All kinds of users i.e. Senior citizens, Disabled, Children etc. are able to use the section as it is developed keeping in mind design and safety standards for all.



CREATE LIVELINESS

Spaces are carved out for various activities like Outdoor seating, pause points etc. for people to relax and utilize the open spaces in various ways.



INCREASED ECONOMIC POTENTIAL

More people and more diversity increases the commercial activity on the street. Also they increase more 'Eyes on the street' making them safe.



PARKING

Basement parking is carved beneath the public plaza to cater to long term parking requirements of shopkeepers and visitors. Surface parking is provided at regular intervals for short term halting for shoppers convenience

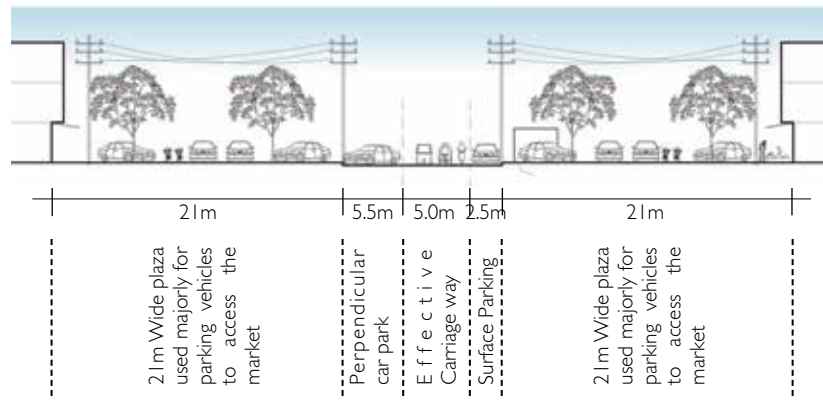


INCREASED ECONOMIC POTENTIAL

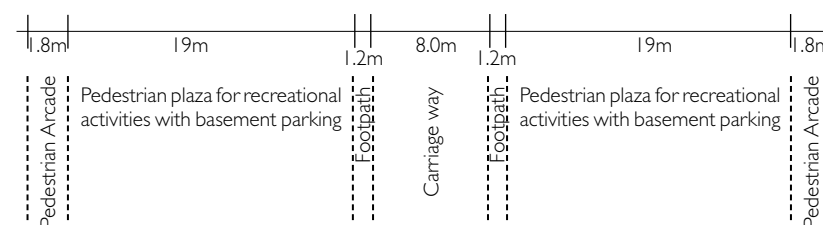
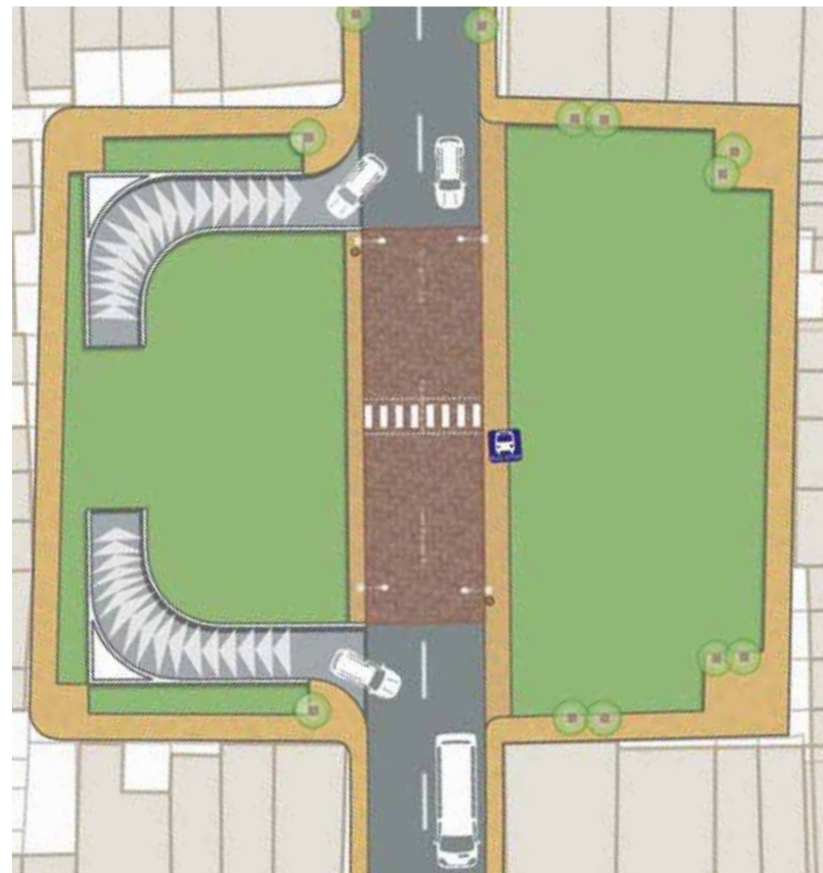
For better management of traffic flow within the ward Bada Bazar road is redirected as a one way street to improve the holding capacity of the street.

4.3 Design Proposal 02 - Bada Bazar Marg

4.3.2 Option B- Redesign of Bada Bazar Marg



Existing road section



Proposed road section

ISSUES:

1. The plaza is overcrowded with the cars parked by the shopkeepers for long durations.
2. No infrastructure available for pedestrians (seating spaces, drinking water, toilets etc.).

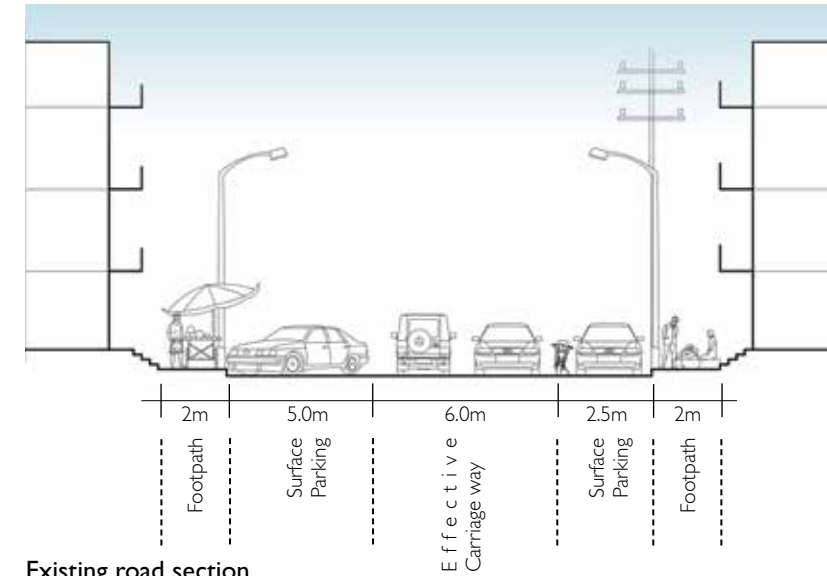
PROPOSALS:

1. The plaza is redesigned in order to create a well developed pedestrian infrastructure and enhance user experience.
2. Mechanized basement to enable long term parking at subsidized rates to discourage surface parking.
3. Table top crossing added to reduce the speeds of motorized vehicles and also to enable pedestrians to cross over between the plazas.

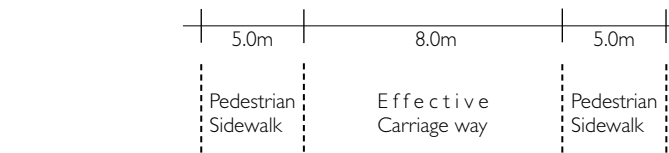
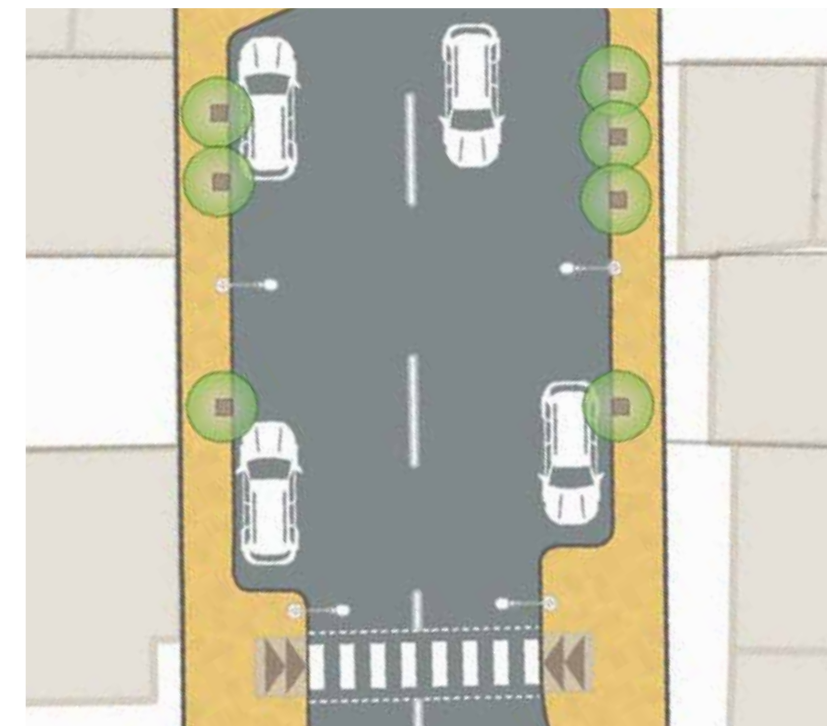
LEGEND

- Pedestrian sidewalks
- Green / open spaces
- Road
- Basement Ramps
- Table Top

KEY PLAN



Existing road section



Proposed road section

ISSUES:

1. Encroachment of street vendor and hawkers on pedestrian walkway make shopping inconvenient for the residents.
2. No green or shading available for pedestrians to walk on the footpath comfortably.
3. Unauthorized on street car parking.
4. Pedestrian walkway not maintained.

PROPOSALS:

1. Disincentivize surface parking by providing very limited parking space on the carriageway and applying premium charges with incremental rates.
2. Shaded avenue created to increase walkability of pedestrians.
3. Vendor policy to be formulated earmarking dedicated spaces for hawking/ vending.

LEGEND

- Pedestrian sidewalks
- Green / open spaces
- Road
- Basement Ramps
- Table Top

KEY PLAN



4.4 Design Proposal 03 - Redesigned Signal free LOOP

Lack of adequate thought given to the changes has also resulted in conflicting movements. The four conflict points identified have been shown on the map. Another resulting issue is the creation of redundant spaces at the junction (considering the sprawled extent) which are being used for parking of commercial and private vehicles. Parking as an activity is strictly avoided upto 50 meters of intersections to prevent disruption of traffic flow.

The junction, due to the sprawl is managed via 8 signals causing the traffic to more often than not halt twice before finally clearing the junction. Due to the sprawl manually managing the roundabout is very difficult as visible range is restricted. At present, signal failure which is not uncommon at the site leads to completely grid-locked traffic that may take hours to clear up.

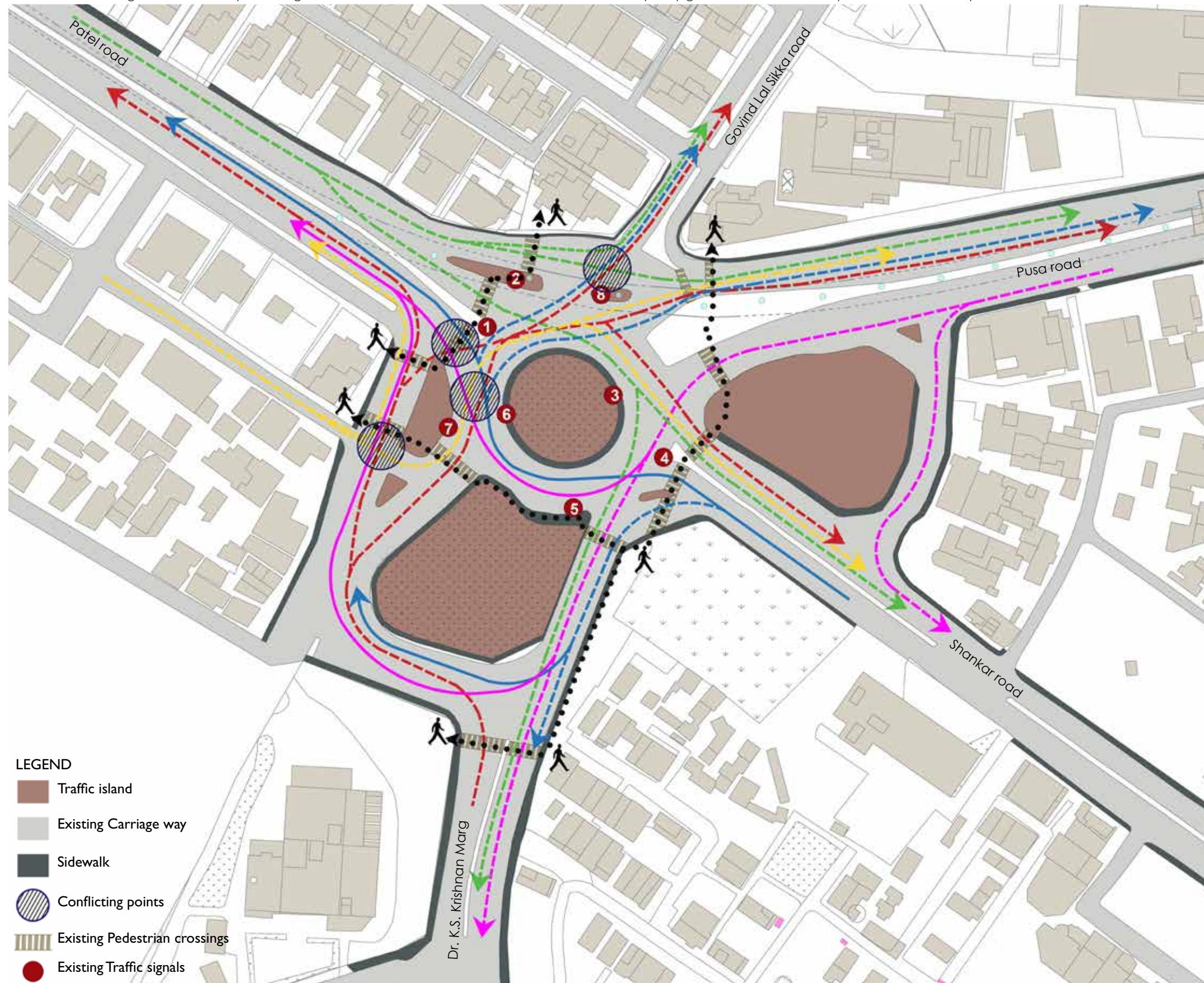


Image showing the conflict point at the Pusa roundabout



Image showing the merging traffic from various points at Pusa roundabout

ISSUES:

1. Incremental changes in geometry with time have led to
 - Multiple flow alternatives
 - Conflicting movements
 - Redundant road spaces
2. The resulting sprawl of the junction causes:
 - Difficulty in managing the junction manually (in case of signal failure) - 8 signals currently used to manage the junction
 - Difficulty for pedestrian navigation at the junction

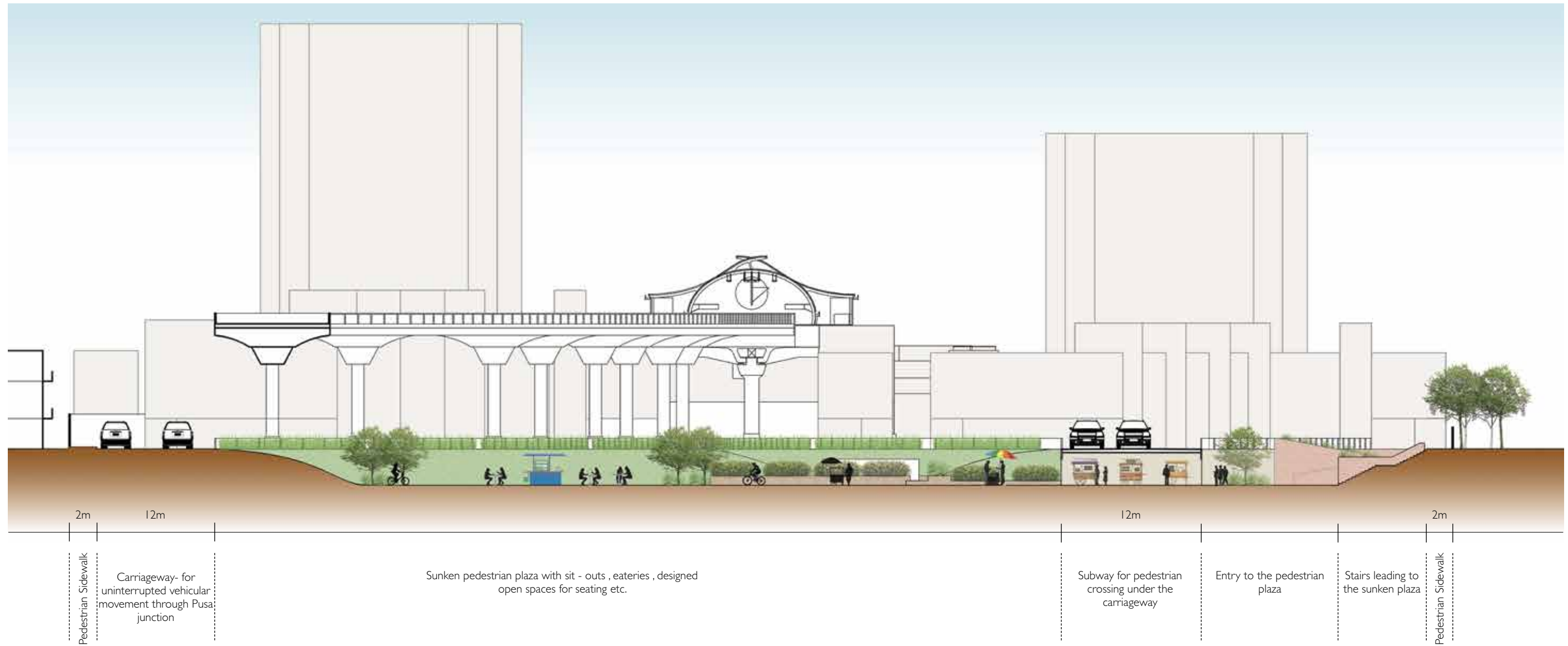
RECOMMENDATIONS:

1. Channelize the road widths homogeneously in order to avoid creation of bottle necks.
2. Provision of Table-Top crossing in order to enable better ease of crossing for pedestrians.
3. Reducing the number of traffic lights to navigate the traffic in a better manner and avoid chaos and confusion.



Map showing traffic related issues at PUSA roundabout

4.4 Design Proposal 03 - Redesigned Signal free LOOP



Proposed plaza section



View focusing on the Lily Pond created within the Plaza to control the micro climate



View focusing on the subway connection for pedestrians

4.4 Design Proposal 03 - Redesigned Signal free LOOP

Aerial view of the Amoeboid Signal-free Loop



Blue metro line with metro stations Karol Bagh and Rajinder Place in the vicinity

Hedges and green buffer between the road and the plaza

Pedestrian walkways linking the plaza and other recreational activities

Continuous loop road around the plaza giving access to roads like PUSA Road, Shankar Road, Patel Road etc.

Subway for access to the open plaza

Free standing tensile canopies installed to provide shade

Table top crossing for pedestrians at each junction

Food stalls and kiosks

Lily pond within the Plaza to enhance the micro climate.

Kid's Play Area

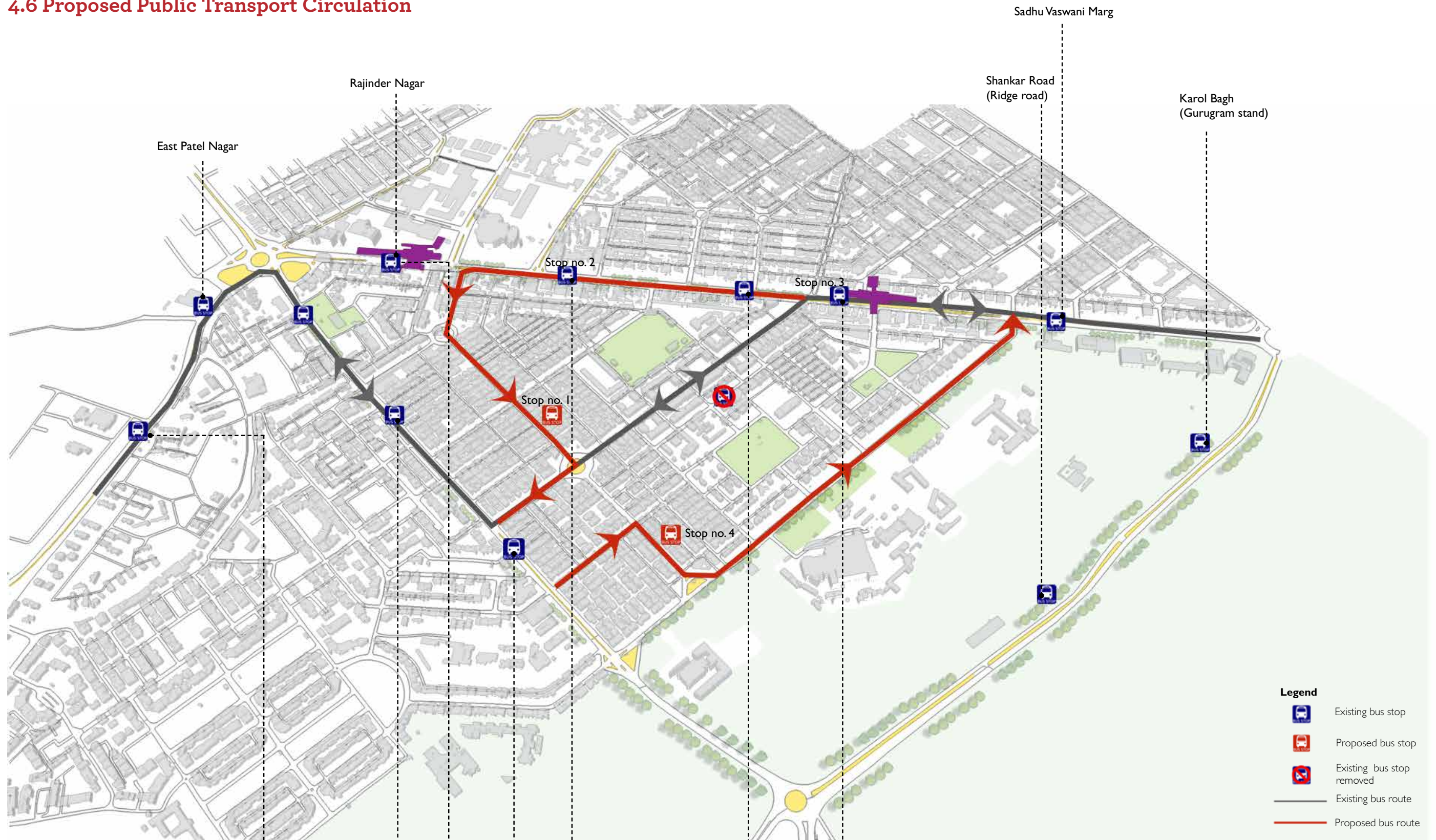
4.5 Proposed vehicular circulation

- The proposed vehicular circulation displays the re-routing of traffic within the ward to reduce the congestion and avoid thoroughfare traffic.
- The traffic moving from Sir Gangaram Marg to Pusa roundabout via the residential colony is discontinued by placing dead ends at Bada Bazaar road intersections.
- Similarly, the traffic moving from Shankar road to Pusa road has multiple one way movements for better management of traffic



Map showing proposed vehicular movement in and around ward no. 149

4.6 Proposed Public Transport Circulation



Map showing public transportation (existing and proposed) in and around ward no. 149

Route no. 522A (DTC bus route) which services Rajinder Nagar and surroundings

	Origin	Stops				Destination
Existing	R - block , New Rajinder Nagar	Shankar road	Rajinder Nagar market	-	-	Hamdard Nagar
Proposed			Stop no. 4			
	Origin	Stops				Destination
Existing	Hamdard Nagar	Rajinder Nagar market	Shankar road	-	-	R - block , New Rajinder Nagar
Proposed		Stop no. 3	Stop no. 2	Stop no. 1	Shankar road	

Reference list

- Delhi Development Authority, March 2017, 'Master Plan of Delhi 2021', Available at: http://dda.org.in/tendernotices/docs/may1_MPD-2021_31.03.2003041717.pdf
- Delhi Development Authority, 1998, ' Zonal development plan F', Available at: <http://dda.org.in/ddanew/planning.aspx#>



दिल्ली नगर कला आयोग

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