

**LANDSCAPE ENHANCEMENT AND INTERVENTION IN THE  
URBAN PRECINCT OF DWARKA THROUGH  
SUSTAINABLE STREETScape  
CASE OF DWARKA, DELHI.**

**DESIGN THESIS**

*Thesis submitted in partial fulfillment of the requirements for  
the award of the degree of*

**MASTER OF LANDSCAPE ARCHITECTURE**

By  
**Raktim Saha**  
2014MLA018



**SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL  
NEELBAD ROAD, BHOURI  
BHOPAL (MP)-462 030**

**May, 2016**

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**THESIS COMMITTEE**



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## DECLARATION

I **Raktim Saha**, Scholar No. **2014MLA018** hereby declare that the thesis titled **Landscape Enhancement and Intervention in the Urban Precinct of Dwarka through Sustainable Streetscape: Case of Dwarka, Delhi.** submitted by me in partial fulfilment for the award of **Master of Landscape Architecture**, at **School of Planning and Architecture, Bhopal**, India. is a record of bonafide work carried out by me. The matter/result embodied in this thesis has not been submitted to any other University or Institute for the award of any degree or diploma.

Date: 20/05/2016

Raktim Saha

## CERTIFICATE

This is to certify that the declaration of **Raktim Saha** is true to the best of my knowledge and that the student has worked under my guidance for one semester in preparing this thesis.

RECOMMENDED

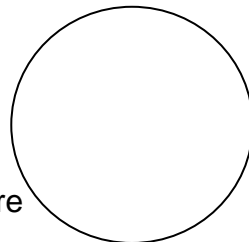
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## **ABSTRACT**

### **LANDSCAPE ENHANCEMENT AND INTERVENTION IN THE URBAN PRECINCT FOR DWARKA THROUGH SUSTAINABLE STREETScape.**

Sustainable streetscape plays an important role in forming the visual image of sustainable cities, as it is one of the most important factors which helps in city success, and tourist attractions.

However, there are many cities whose visual image is lacking the presence of correct and sustainable streetscape, which negatively affects the visual image of these cities, and consequently the place of those cities globally. In this context, with landscape insert generate a sustainable streetscape and adopt an approach to provide, attractive and safe sustainable urban environment, and to sustain the development process for the visual image of cities, especially in Dwarka, Delhi's largest and one of the most sought-after residential areas in the city, through focusing on the elements and basic principles of sustainable streetscape that should be taken into account to define it.

Through this research I want to willingly derive the various terms and nomenclature which explains elaborately a Sustainable Streetscape catering to a socially stable street. Analyse how the open spaces are used and what are the probable methods which can revive these abandoned/ deserted spots with possibilities to link them. Understand the street character, its behaviour and Land-use use. Compare and analyse the existing Land-use Plan 2001, as well as the proposed Plan 2021, for the concerned precinct. Henceforth, delineate design alternatives to lure large masses by inducing proposals/ policies which make streets more fit, stable and safe for public to access, initiating a more vulnerable culturally happening street.

I would like to conclude and significantly narrate the importance of developing an urban environment by investigating the cultural, social and significant aspects of the society, and help in catering to the public dwelling in the vicinity through the role of streetscape with a suitable sustainable development.

**Keywords:** Visual Image, Street Character, Sustainable Urban Environment and Land-use Pattern

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# 1. INTRODUCTION

## 1.1 STREETS

A public way or thoroughfare in a city or town, usually a sidewalk.

OR

A public way or road along with houses or buildings abutting it.

## 1.2 STREETScape

Streetscape is a term used to describe the:

- Natural
- Built fabric of the street,

Interpreted as the design quality of the street and its visual effect, particularly how the paved area is laid out and treated. It includes buildings, the street surface, and also the fixtures and fittings that facilitate its use – from bus shelters and signage to planting schemes all falls under the same domain.



**Figure 1.1:** Panoramic View of a Street (Source: Google; Metro Jacksonville Street Policy)

## 1.3 SUSTAINABLE STREETScape

Sustainable streetscape ensures that spaces are long-lasting and function as a part of the greater ecosystem employing technologies that manage storm-water runoff and reduce carbon footprint.

How does it contribute in creating a better places for present and future residents. It can coined as a media which controls the overall natural ecosystem depletion with ample eyes on the street view as well.

1.4 UNDERSTANDING THE STREET CHARACTER

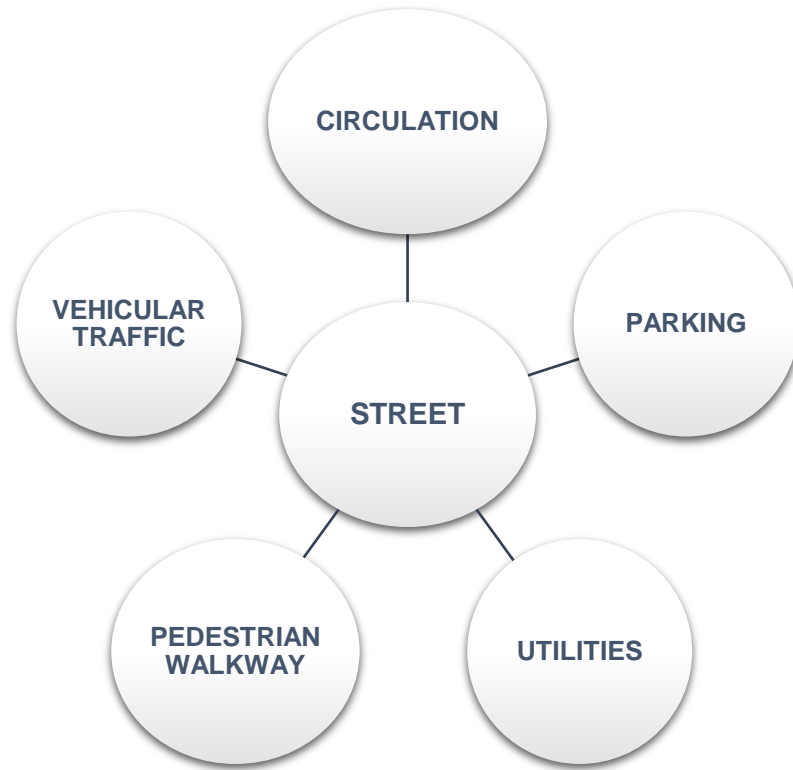


Figure 1.2: Reading the Street Character

(Source: Google)

## 1.5 WHAT ELEMENTS ADDS TO STREET TONE

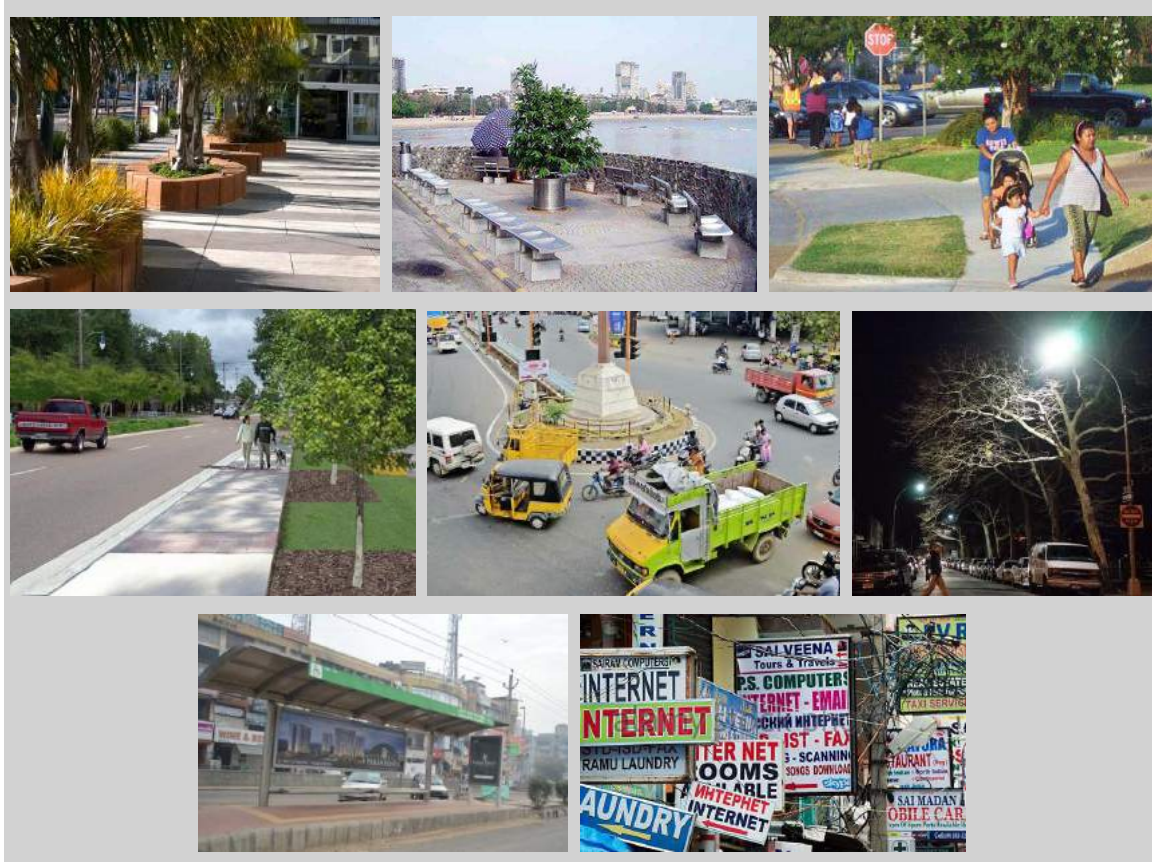
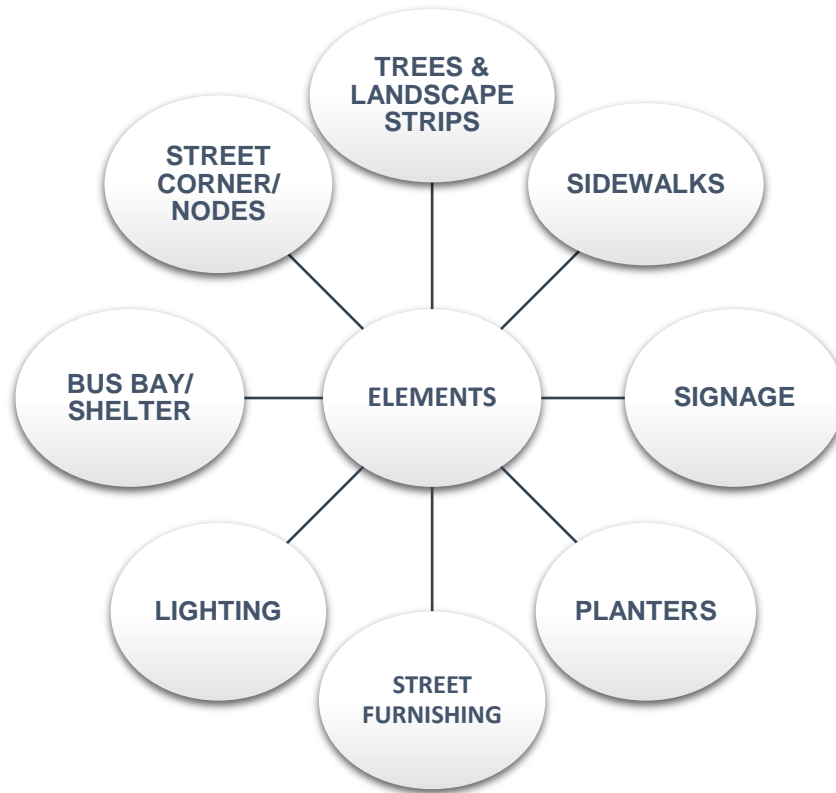


Figure 1.3: Street and its Elements

(Source: Google Image)

## **1.6 WHY DWARKA**

- Dwarka is an affluent neighborhood of New Delhi (district of South-West Delhi) in India, it is an up-market and one of the most sought-after residential areas in the city.
- It is one of the Asia's largest residential neighborhoods and is also referred to as a Sub-City after Narela.
- It is a well planned neighborhood with robust infrastructure and several urban amenities. A second diplomatic enclave is being planned in Dwarka for 39 countries on 34-hectare, after Chanakyapuri.
- The existing condition yells massive degeneration of streets which lay deserted in most part of the day. This is accelerating and triggering habitation of unlawful activities.
- Over the years, the residents and pedestrian have take a backseat in order to avoid any mishap with cases like eve teasing, chain snatching. Henceforth, earning a bad image for the urban fabric.

## **1.7 CONCLUSION**

It through this thesis that I want to address to the alarming issues significantly highlighted and produce a design module in order to bring about a balance between the society with more socio-cultural exchange of dialogue/ ideas and the streets following a sustainable approach for the inhabitants and making streets more safer, sound inviting more pedestrians with increased social movements and activities rather vehicular domination, that would contribute to a structured and improved public health on the streets.

**1.8 AIM:**

Landscape Enhancement and Intervention in the Urban Precinct for Dwarka through Sustainable Streetscape.

**1.9 RESEARCH OBJECTIVES:**

- i. Identify the main principles that should be considered to define sustainable streetscape with active inputs for socially and culturally stable society.
- ii. To explore the visual and spatial potential of various open spaces in the precinct of Dwarka.
- iii. To derive and understand the street character/ behavior of different fragments of it and how will interconnecting them would bring in new dimension.
- iv. To reach sustainable landscape design through the achievement of environmental efficiency and economic operations of streetscape; generating sample scopes to invite people on the streets.

**1.10 OBJECTIVES:**

- i. Identify the agents of environmental degradation and improve environmental quality of the streetscape.
- ii. Sustain social well-being by making the streets fitter and safer for public pedestrian walking and regenerate gathering places where social interaction can occur on a regular basis, and encourage healthy outdoor activities.
- iii. Intense concern on how can a particular street be more happening and live for more socially active activities and foster more public interaction.
- iv. Analyze and assess the most frequently and sensitively used fragment of number of streets i.e. the open arena in precinct of Dwarka with prime objective to connect such nodes and transform into a happening breeding spot.
- v. It is essential to diagnose the open spaces, analyze the current landuse and make sure that the volume of social engagements shoot up giving an edge to the deserted streets and making them more safer.

- vi. Studying and Analyzing of the above would speed up in promoting and imbuing a healthy optimistic approach in the mind frame of public resulting in volumetric participation in the outdoor activities.
- vii. The outdoor activities actually makes the residents and the daily user to use the streets more frequently and generate visual eyes on the them making it more safer and less vulnerable to the illicit activities.

#### **1.11 METHODOLOGY:**

- i. Expanding the objectives specified and understood regarding the sub-city and streets of Dwarka through accumulation of primary data, referring various literature, conducting survey, case studies and analyzing it comprehensively.
- ii. Deriving inferences out the conducted case studies, structured & unstructured surveys, understanding the site character and public behavior with necessary documentation.
- iii. It is necessary to study initially and understand the role of streets as public open realm, which would help in deriving a successful sustainable street design implemented worldwide also how it has restructured a new balance in the society.

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## 2. LITERATURE REVIEW

### 2.1 Effect Of Skeletal Streetscape Design On Perceived Safety.

The paper discusses the various key elements that variably contribute in forming a street skeleton. It widens our perspective by exploring and elaborating as to how psychologically safety parameters likely tree canopy, narrow street amidst two buildings etc. are sublimely embedded in the users mind. It is the characteristics of the street and the trees planted or existing along provide a basis of safety, trees also coherently cater to the architectural style induced, sidewalks, landscape elements and fixtures installed rather helping in producing a complete streetscape. The author here does mention the feeling and the sense of enclosure which surely insists people to enter and sense the real space. It is seen that the division of large streets into segments shapes up more compact spaces helping in the creation of a small microclimate. A microclimate does help in making the space a healthy breeding spot with increased socio-economic activities along with amplified interaction. The paper also highlights apart from all triggering sense of enclosure and compactness it does leave an impression of entrapment along.

### 2.2 **STREETS** by *Cliff Mougton*

The paper discusses and throws highlights to the primitive form of street setup delineated namely by tragic, comic and satyric.

- i. **Tragic** delineated with pediments, statues and columns.
- ii. **Comic** representing doors, rows of windows in ordinary form.
- iii. **Satyric** devoting scenes decorated with trees, mountains etc.

Alberto and Palladio explain to us the fact that there are two types of streets, one which are within the city limits and the other one which runs amidst the city periphery. It has been that these scholars either want trees on both sides of the road to save themselves to show the lavishness and royalness of the space.

Roads in this article has been defined by linear surface where major movement occurs. A street can then be termed as enclosed 3-Dimensional space with roads with two lines of adjacent buildings. Function of the streets are to generate socio-cultural upliftment of the society with sidewalks providing effective eyes on the street, at the same time should not discard the initial factors like who are the primary users and its functions demanded with its linking with adjoining important nodes.

The desertification streets have also been significantly raised compelling people to restrict themselves to their homes and workplaces, thus triggering more social imbalance. Intrinsic classification has been done and detailed out for the streets when hierarchies like form, scale, proportion etc. also contribute for its sustenance.

### 2.3 OPEN SPACE:

Undeveloped land that is protected from the development by legislation.

**OR**

- i. It is any Open piece of land that is undeveloped (has no buildings or other built structures) and is accessible to the public. Open space can include: Green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation).

**OR**

- ii. Open space provides recreational areas for residents and helps to enhance the beauty and environmental quality of neighbourhoods.



**Fig. 2.1:** Classification of Open Spaces at Neighbourhood Level

### IMPACT:

But with this broad range of recreational sites comes an equally broad range of environmental issues. Just as in any other land uses, the way parks are managed can have good or bad environmental impacts, from pesticide runoff, siltation from overused hiking and logging trails, and destruction of habitat.



### 2.3.1 NODES:

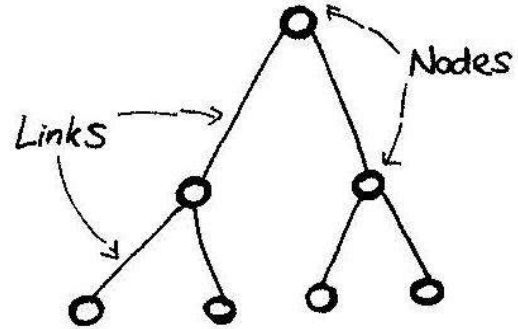
The intersections of two or more such arteries would clearly become major nodes of traffic and urban activity.

OR;

A Node is either a connection point, a redistribution point, or a communication endpoint.

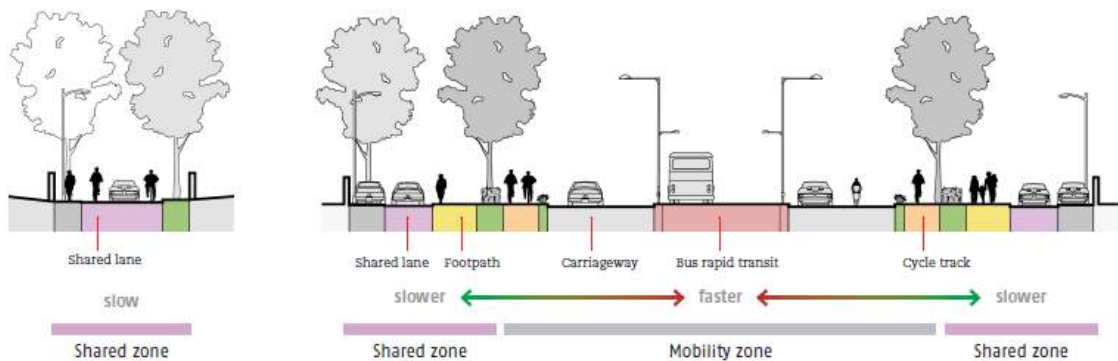
### 2.3.2 JUNCTION:

A place or point where two or more things (railroad, road or converge/cross/diverge)



## 2.4 What makes up a complete street?

A complete street that caters to all users can take on a variety of forms, depending on factors such as the available right-of-way, traffic volumes, street-side activities, and adjacent land uses.



**Figure 2.1:** The 7.5m street (left) is designed as a shared space. The 42 m street (right) includes a slow-speed shared lane similar to the 7.5 m section, but it also provides separate spaces for mobility, including a cycle track, carriageway, and bus rapid transit lanes.

Smaller right-of-ways can function as slow shared spaces used by both pedestrians and vehicles. Street vending and social activities can also take place in the shared space. A narrow driving lane and other traffic calming elements help keep vehicle speeds low, so that vehicle movement remains compatible with the other uses.

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A larger street can cater to walking and stationary activities as well as through movement, but it often makes sense to differentiate the slow, shared zone from the mobility zone to ensure comfort and safety for pedestrians and stationary users. The cycle track, though part of the mobility zone, is also segregated from motor vehicle traffic. (Example: 42 m wide street)

## 2.5 Principles for Street Design

### 2.5.1 Safety:

Streets must be safe for all users. This implies that every street needs to have a slow zone where pedestrians have priority. In smaller streets with a shared space format, the entire street becomes a slow zone for all users, including pedestrians, vendors, cycles, and cars.



### 2.5.2 Mobility:

Larger roads can also include a mobility zone. These used for private vehicles and public transport physically separated from the slow zone. The mobility zone may include a physically segregated cycle track if the speed differential between cyclists and motor vehicles is high. In addition, dedicated bus lanes can improve service quality for public transport users.



### 2.5.3 Pedestrian accessibility:

All streets need to have continuous footpaths with minimal grade differences and adequate clear width for pedestrian through movement.



#### 2.5.4 Liveability:

Elements such as tree lines, landscaping, and furniture enhance a street's slow zone, creating space for relaxation, interaction, vending, and other activities.



#### 2.5.5 Sensitivity to local context:



Street design should factor in local street activities, patterns of pedestrian movement, and nearby land uses.

#### 2.5.6 Creative use of street space:

For example, the width occupied by a parking lane can become multi-functional if it includes occasional bulb-outs for street vending or street furniture.



### 2.6 Need for Street Design Guidelines

#### ***UTTIPEC : Unified Traffic and Transportation Infrastructure Planning & Engineering Centre***

It propagates that Streets are valuable public spaces as well as movement corridors. Design of Streets is a function of the Street Hierarchy and Adjacent Land uses.

Increased Pedestrian Design consideration in Streets would provide:

- i. Comfortable last mile connectivity from MRTS Station- therefore increased ridership of Buses and Metro.

- 
- 
- ii. Reduced dependency on the car, if shorter trips can be made comfortably by foot.
  - iii. Prioritization of public transport and non-motorized private modes in street design.
  - iv. Reduced car use leading to reduced congestion and pollution.
  - v. More equity in the provision of comfortable public spaces and amenities to all sections of society.

## **2.7 Existing Framework and Legislation**

### **2.7.1 *National Urban Transport Policy 2006.***

It recommends to ensure an encouraging integrated land use and transport planning in the city so that travel distance are minimized and access to livelihood, education, and other social needs, especially for the marginal segments of the Urban Population is improved.

- i. Improving access of business to markets and the various factors of production.
- ii. Bringing about a more equitable allocation of road space with people, rather than vehicles, as its main focus.
- iii. Encourage greater use of public transport and non-motorized modes by offering Central financial assistance for this purpose.
- iv. Enabling the establishment of quality focused multi-modal public transport systems that are well integrated, providing seamless travel across modes.
- v. Establishing effective regulatory and enforcement mechanisms that allow a level playing field for all operators of transport services and enhanced safety for the transport system users.
- vi. Establishing institutional mechanisms for enhanced coordination in the planning and management of transport systems.
- vii. Introducing Intelligent Transport Systems for traffic management.
- viii. Addressing concerns of road safety and trauma response.

- ix. Reducing pollution levels through changes in travelling practices, better enforcement, stricter norms, technological improvements etc.
- x. Building capacity (institutional and manpower) to plan for sustainable urban transport and establishing knowledge management system that would service the needs of all urban transport professionals, such as planners, researchers, teachers, students, etc.
- xi. Promoting the use of cleaner technologies.
- xii. Raising finances, through innovative mechanisms that tap land as a resource, for investments in urban transport infrastructure.
- xiii. Associating the private sector in activities where their strengths can be beneficially tapped.
- xiv. Taking up pilot projects that demonstrate the potential of possible best practices in sustainable urban transport.

**2.7.2 Master Plan of Delhi 2021 specifies:**

- i. All roads should be made pedestrian, disabled and bicycle friendly.
- ii. Provision of adequate pedestrian facilities.
- iii. Removal of encroachments from sidewalks.
- iv. Provision for introducing cycle tracks, pedestrian and disabled friendly features in arterial and sub-arterial roads.
- v. In urban extension, cycle tracks should be provided at the sub-arterial and local level roads and streets.
- vi. In specific areas, like the Walled City / Chandni Chowk / Sadar Bazar / Karol Bagh / Lajpat Nagar and Trans Yamuna Area, the use of cycles / rickshaw as a non-motorized mode of transport should be consciously planned along with pedestrianization.

## 2.8 Design Principles and Functional Characteristics(Crossing)

Maximum height of Median kerb is 150 mm. If higher medians are needed, they should be crash barriers. Instead of fences, Medians should be landscaped and used for storm-water management wherever possible. Plantings should use drought-tolerant, low maintenance species, and preferably capable of storm water filtration as well.

Since Pedestrians must be given the shortest possible direct route to cross the street, the most preferred Crossing for them is “at-grade”. Mid Block Crossings must be provided for people to cross the street safely between building entries or bus stop locations or active land uses on opposite sides of the street. Mid-block crossings may be provided with pedestrian operate signals and table top crossings. At-grade Pedestrian crossings must be provided at all T-junctions.



**Figure 2.2:**

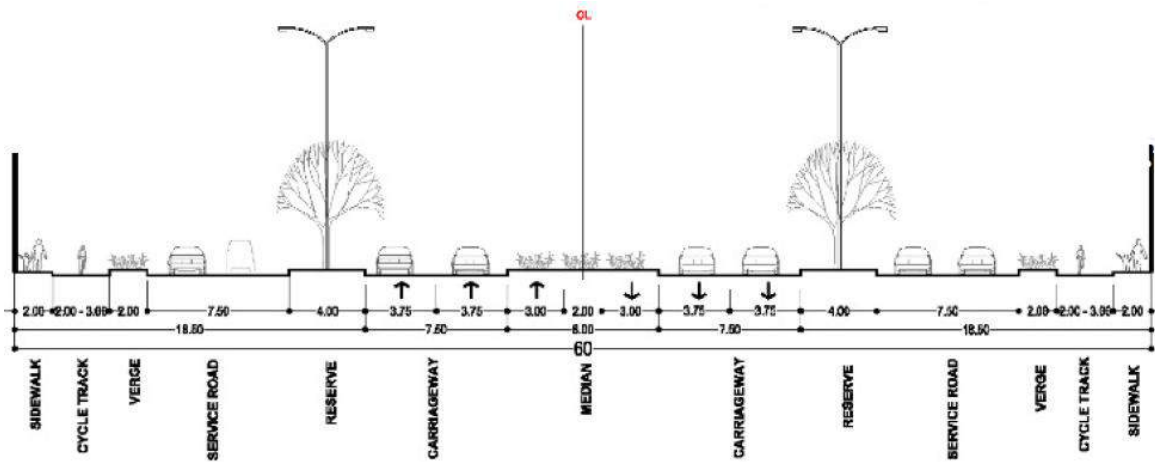
*Vehicles encroaching pedestrian space where it is the most needed.*



**Figure 2.3/ 2.3:** *Uneven Surface due to lack of proper base that obstruct the walkway.*

## 2.9 Design Principles and Functional Characteristics (Road)

### 2.9.1 IRC Cross section arterial street (4-Lane Divided)



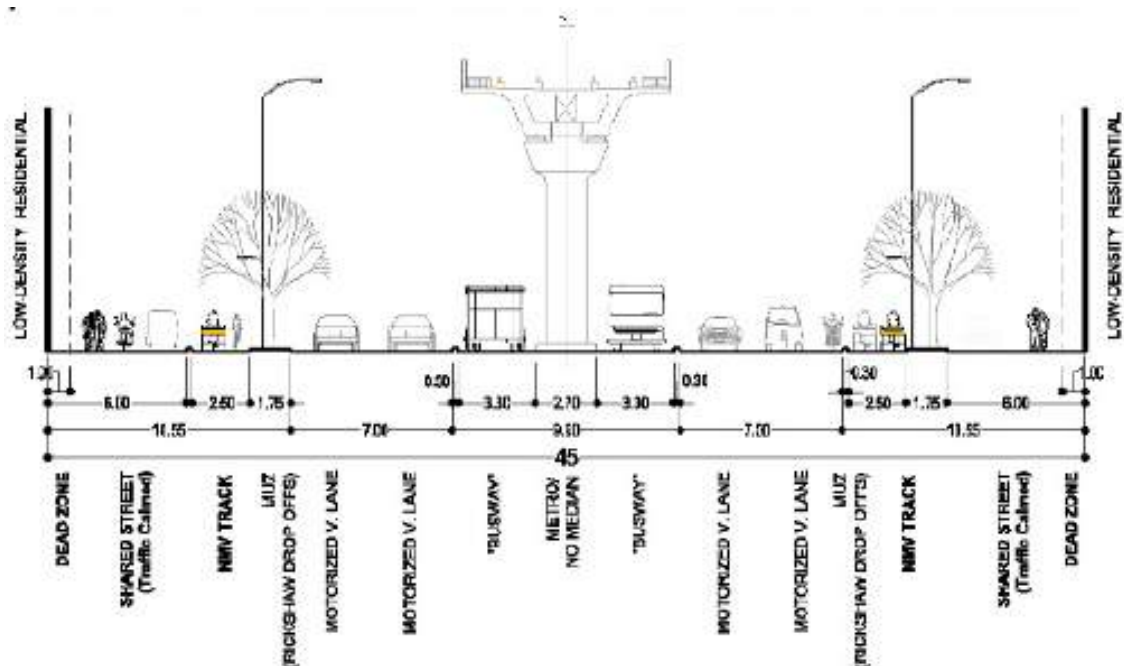
#### 2.9.1.1 Inference/ Conclusion:

The streets planned and designed have different implemented layout. The main arterial road wears a different design unlike the aforesaid with service lanes catering to residential parking.

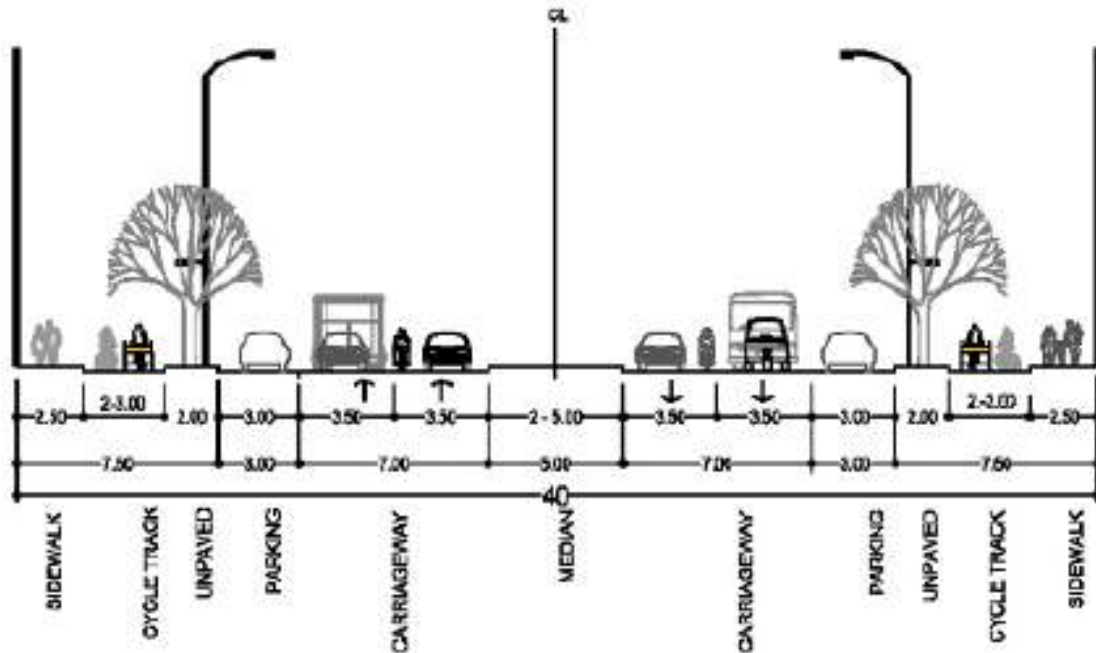
It is witnessed that the pollution and the smart transport system proposal has not yet come out significantly.

### 2.9.2 45m Road with Bus-ways/Metro at MID Block

(with Service-Lane)



**2.9.3 IRC 40m Sub Arterial Street with Extra Parking Lane (4 Lane Divided)**



**2.9.3.1 Inference/Conclusion:**

It is seen that in both the above shown case has entertained more street encroachments along with unorganized parking, compelling pedestrians to use road as walking ways. The pathway have become new dumping ground and are less preferred in both the cases.

**2.10 Design Principles and Functional Characteristics (Drainage)**

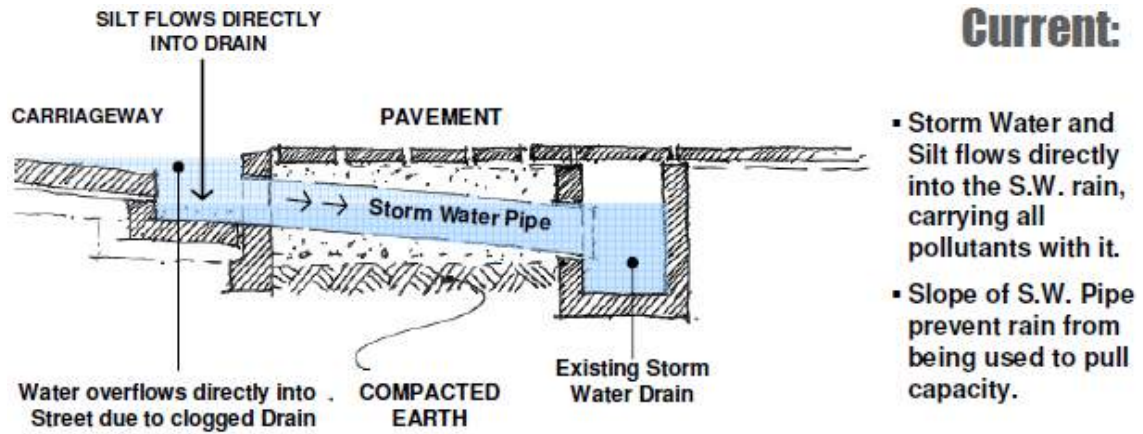


**Figure 2.4:** Overflowing Drain(Water-logging)



**Figure 2.5:** Unmanaged Water/ Sewage/ Storm-water Discharge.





*Figure 2.6:* The Existing Storm-water Setup

### 2.10.1 Inference/ Conclusion:

With the present services layout it is clearly visible that the vacant land/ plots cater to the sewer overflow and also highlights the alarming need of an efficient **Sewage Treatment Plant (SWP)** and smart waste management disposal.

### 3. CASE STUDY

#### 3.1 SITE STUDY 1: CHANDIGARH (PRIMARY)

- i. It was the first planned city post independence from British rule in 1947.
- ii. It is the capital city of the states of Punjab and Haryana.
- iii. The city is located at the picturesque junction of foothills of the Himalayas Mountain range and the Ganges plains.
- iv. It houses a population of 1,054,600 inhabitants (2001) and is one of the richest cities of the nation.
- v. American architects Albert Mayer and Mathew Novicki were the first architects to be appointed for the project. After the death of Novicki in 1950, Le Corbusier was commissioned.



**Figure 3.1:** Fan-shaped Master Plan proposed by Albert Mayer.



**Figure 3.2:** Grid-Iron Master Plan proposed by Le Corbusier.

#### 3.1.1 BASIC PLANNING CONCEPTS

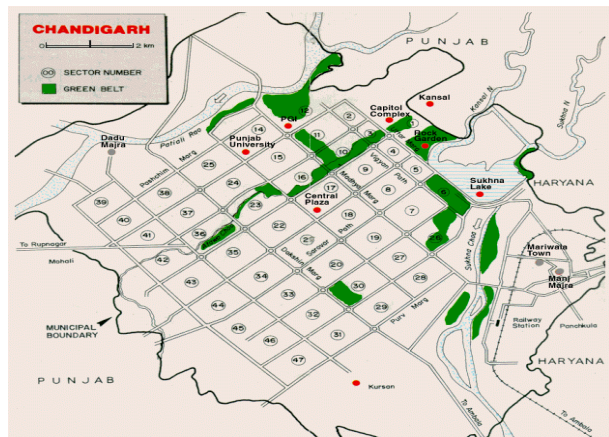
The city plan was conceived as post war 'Garden City' wherein vertical and high rise buildings were ruled out, keeping in view the living habits of the people.

*Le Corbusier* conceived the master plan of Chandigarh as analogous to human body, with a clearly defined:

- i. *Head* (the Capitol Complex, Sector 1),
- ii. *Heart* (the City Centre Sector-17),
- iii. *Lungs* (the leisure valley, innumerable open spaces and sector greens),
- iv. *Intellect* (the cultural and educational institutions),
- v. *Circulatory system* (the network of roads, the 7Vs) and
- vi. *Viscera* (the Industrial Area).

### 3.1.2 SECTORS

- i. The primary module of city's design is a Sector, a neighborhood unit of size (800 x 1200) meters.
- ii. Each SECTOR is a self-sufficient unit having shops, school, health centers and places of recreations and worship with population varying from 3000-20,000 depending on the size of the plot.
- iii. A green strip oriented longitudinally stretching centrally along the sector in the direction of the mountains. The green strip should stay uninterrupted and accommodate schools, sports fields, walks and recreational facilities for the sector.
- iv. Vehicular traffic is completely forbidden in the green strips, where tranquility shall reign and the curse of noise shall not penetrate.



### 3.1.3 HIERARCHY of GREEN AREAS

- i. A Hierarchy of Green Spaces can be observed in both the layout ranging from Public Greens at City Level to Semi-Private to Private Green Areas.

- ii. City Level Public Green Space with Artificial Water Body
- iii. Free-Flowing Green Space, connecting the entire site.
- iv. Semi-Private Green Areas for neighborhood pockets.
- v. Private Green Areas for Residential Units



**Figure 3.3:** Sectoral Set-out (Chandigarh City)

The landscaping of this city is based on careful observation of the vegetation of India. Selected ornamental trees, shrubs and climbers have been planted according to color schemes to beautify it.

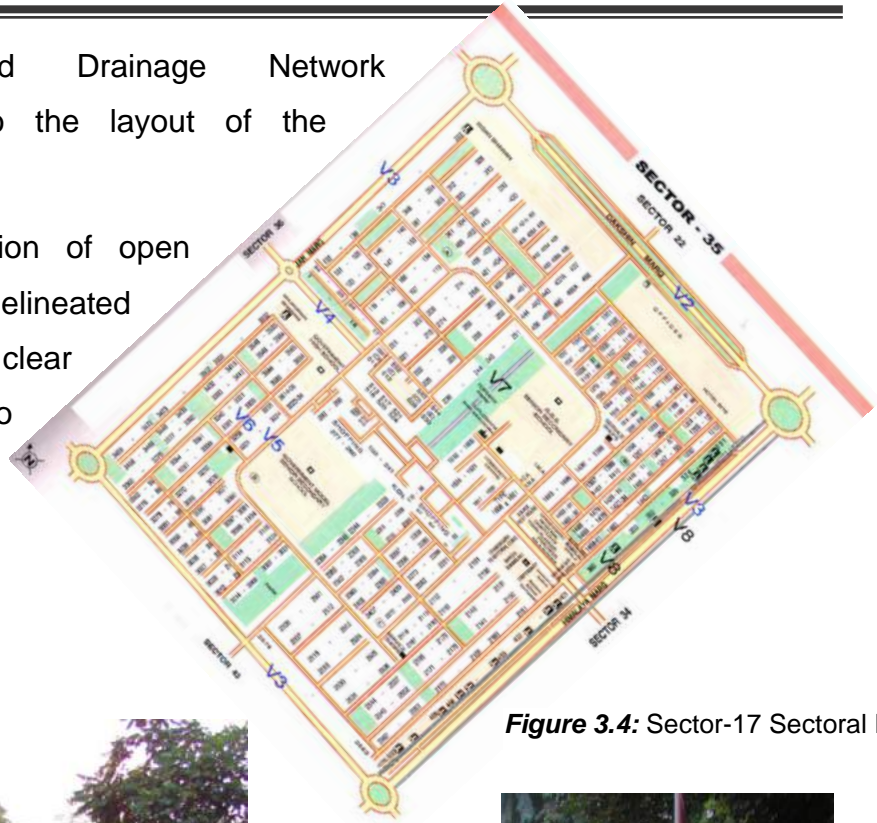
### **3.1.4 BUILDING TYPOLOGIES:**

The Basic Building Typology observed here is extremely Rectilinear with similar proportions. They are arranged around a common open space but with different building layout.

### **3.1.5 SECTOR 17: COMMERCIAL/ PUBLIC, SEMI-PUBLIC LAYOUT (OBSERVATIONS)**

- i. The primary concern about Public Safety and comfort given utmost priority.
- ii. Intelligently interconnected service lane to the main Marg avoiding congestion and bottleneck situation.

- iii. Sewage and Drainage Network compliment to the layout of the Sector.
- iv. Proper utilization of open plot with delineated parking and clear signs of no encroachment scheme.



**Figure 3.4:** Sector-17 Sectoral Plan



- v. Residential Area have proper delineation to parking spots and have clear access and exit.



**Figure 3.5:** Clear pedestrian walkway.

- vi. Clear indication of sense of livability with Public Convenience amidst two building blocks giving more public leisure and shows sense of sanity.
- vii. Segregated delineated Parking keeping pedestrian safety utmost priority.
- viii. Amenities and public insert at regular interval does not make the stretch look lengthy and tiresome.

- ix. It is virtually uninhabited, but it is enlivened during the daytime by the many shops, bazaars, restaurant, cafes, banks and department stores.
- x. The vast open areas can be quite unpleasant due to lack of shaded patch.



**Figure 3.6:** Designated Parking Spot keeping congestion at Bay.



- xi. Service have been catered and dealt cynically which don't disrupt vehicular as well as pedestrian movement.

**Figure 3.7:** Disabled-Friendly Walkway

- xii. Small pathway lead to broader avenue with huge scale and generate opportunity for more public recreational activities.

**Figure 3.9:** Signage's Maintaining Fluidic Traffic Movement



**Figure 3.8:** No Roadside Encroachment

- xiii. Narrow Alleys are shaded it is devoid of any sort of vegetation.



**Figure 3.11:** Landscape Insert.



**Figure 3.10:** Disabled Friendly Design

### 3.1.6 SECTOR 22: COMMERCIAL LAYOUT (OBSERVATIONS)



**Figure 3.12:** Delineated Public Parking Spot



**Figure 3.13:** Pedestrian Access



**Figure 3.15:** Disabled Friendly Design



**Figure 3.16:** Clear Walkway

### 3.1.7 SECTOR 23: RESIDENTIAL LAYOUT (OBSERVATIONS)

- i. Delineated Public Parking and individual parking zone.
- ii. Street Crowning giving a grand vista to the residential layout.



**Figure 3.17:** Grand Street Vista



**Figure 3.18:** Strict No Roadside Parking

- iii. The residential units are set such that they have eye on the street.

### 3.2 SITE STUDY 2: CHANDNI CHOWK (PRIMARY)

- i. It is one of the oldest and busiest markets in Old Delhi, India. Chandni Chowk is located close to Old Delhi Railway Station and the monument Red Fort.
- ii. Built in the 17th century by Mughal Emperor of India Shah Jahan, and designed by his daughter Jahan Ara, the market was once divided by canals (now closed) to reflect moonlight, and it remains one of India's largest wholesale markets.
- iii. Chandni Chowk, or the Moonlight Square, was designed and established by Princess Jahanara, Shah Jahan's favorite daughter, in 1650 CE.
- iv. Chandni Chowk was once the grandest of the markets in India. In fact, the Mughal imperial processions used to pass through Chandni Chowk. The tradition was continued when Delhi Durbar was held in 1903. Delhi Town Hall was built in 1863 by the British.



**Figure 3.19:** Chandni Chowk Street Stretch

Source: Google Earth

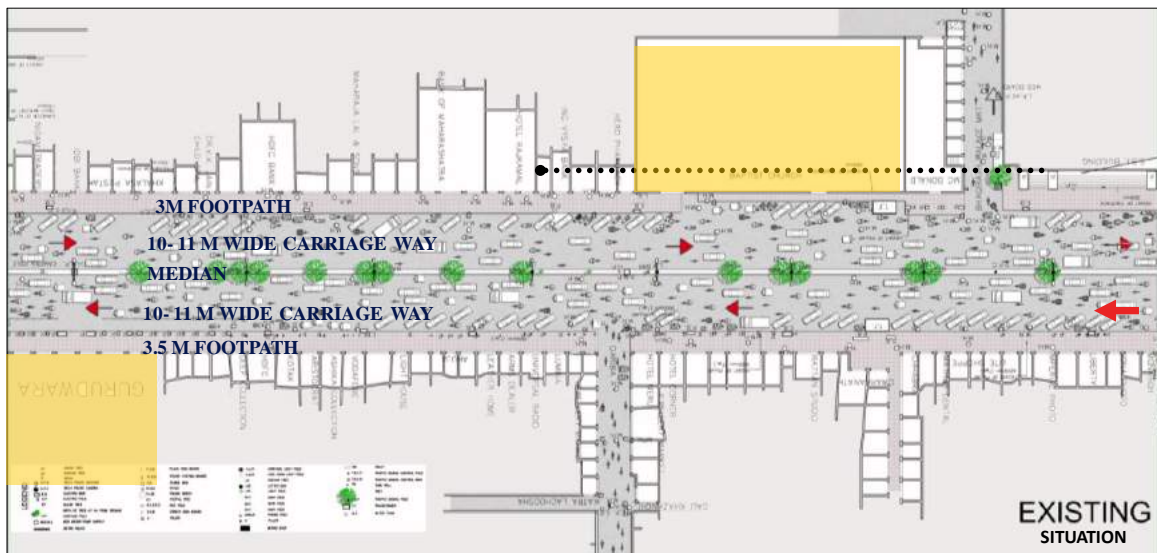


**Figure 3.20:** Street Stretch with Dense Encroachments (Towards Fatehpuri Masjid)





**Figure 3.21:** Street Encroachment and Congestion Scenario (Existing)



**Figure 3.22:** Existing Street Right of Way(ROW)  
Source: C.S.I.R & M.C.D, Abhimanyu Dalal Architect

### 3.2.1 OBSERVATIONS (TOWARDS FATEHPURI):

- i. Pedestrian Pathway and vehicular movement space tremendously encroached.
- ii. Sense of Security due to shops opening on the Street.
- iii. Lack of shaded places, passage with no clear walkway shows clearly the indifferent attitude by civic authorities.
- iv. All the open spaces are majorly encroached by kiosks and street vendors disturbs the movement heavily.

- v. Pedestrian safety takes a drastic dip post dusk.

### 3.2.2 OBSERVATIONS (FROM LAL-QUILA):



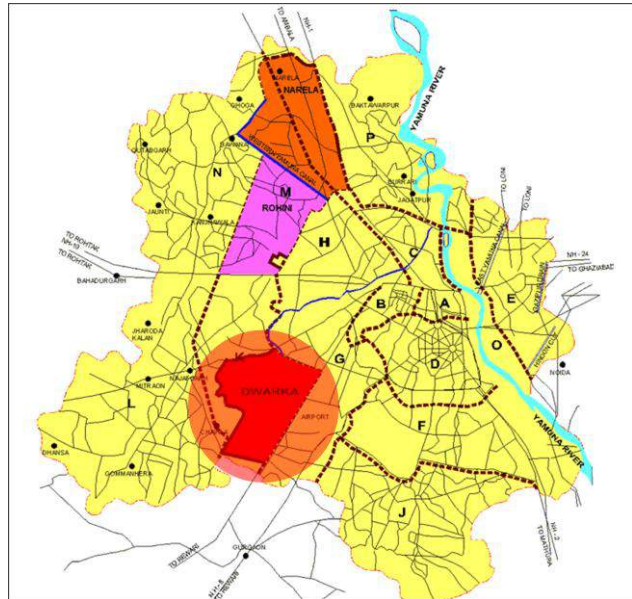
**Figure 3.22:** Bottleneck Nodal Points (From Lal Quila)



**Figure 3.23:** Intersection Points with No-free Pedestrian Movement.

## 4. DWARKA: LARGEST SUB-CITY

- i. Dwarka is an affluent neighborhood of New Delhi (district of South West Delhi) in India, it is an up-market and one of the most sought-after residential areas in the city.
- ii. It is one of Asia's largest residential neighborhoods and is also referred to as a Sub-City. It is a well planned neighborhood with robust infrastructure and several urban amenities.
- iii. A second diplomatic enclave is being planned in Dwarka for 39 countries on 34-hectare, after Chanakyapuri.
- iv. It is named after the legendary Dwaraka Kingdom. It is a short distance away from Gurgaon which is a major hub for large corporations in the country and about 10 km away from Indira Gandhi International Airport.
- v. One of the largest residential areas in Asia, it is supposed to have a “Zero Tolerance” policy.
- vi. Planned urban development in the Dwarka sub-city was initiated in 1987, however, construction is still ongoing and the sub-city is in a slow process of transformation.
- vii. Dwarka is also known for its higher quality and much better maintained infrastructure like roads etc.
- viii. Unlike Gurgaon or Noida, Dwarka - mainly as a residential township.



### FACTFILE:

1.	<b>Population and area Population – 1,000,000</b>
2.	<b>Total area – 5648 ha.</b>
3.	<b>Dwarka project is planned with 29 sectors.</b>
4.	<b>Layout plans of 1 to 26 sectors already stand approved.</b>

4.1 VARIATION IN EXISTING AND PROPOSED MASTER PLAN

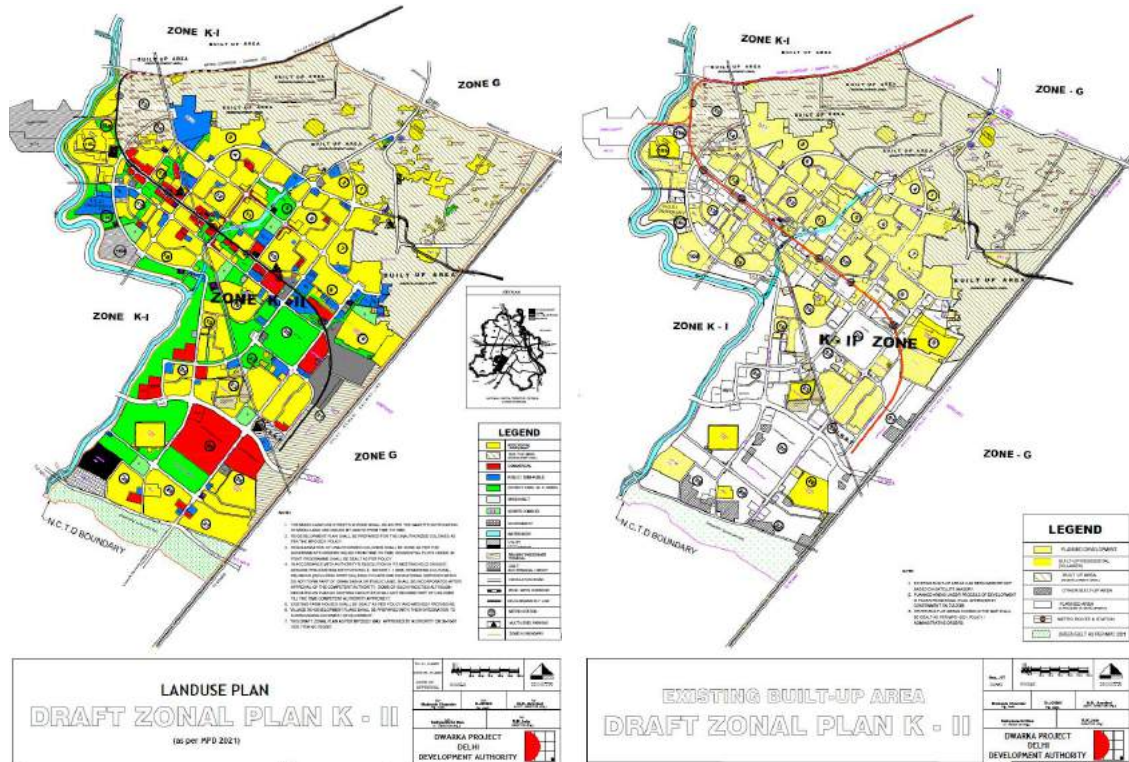


Figure 4.1: Proposed Master Plan 2021

Figure 4.2: Existing Master Plan (2001)

Sl. No.	Description	MPD 2001	MPD 2021	Remarks
1	Name of the zone	Zone K (Part) Dwarka Sub-city	Zone K – II	
2	Area	5648 Ha.	5924 Ha	Area between the Najafgarh –Bijwasn road and NCTD boundary is added in MPD 2021.
3	Proposed Population	11 Lakh	13 Lakh	
3	Green belt	-	264 Ha	Earlier area between the Najafgarh –Bijwasn road and NCTD boundary was rural use zone, now it is notified as Green belt as per MPD 2021 landuse plan.
4	Unauthorized Colonies	Approximately 30 % of the zone area is under built-up area.	In addition to the earlier one, unauthorized colonies in sector 14,15,16 & 23 is shown in the Zonal plan as built-up area.	The entire built-up area is proposed as "Redevelopment Area" and its re-development shall take place as per the policy on the subject.

Figure 4.3: Variation in Proposed and Existing Master Plan

4.1.1. POPULATION AND EMPLOYMENT

- As per MPD-2021, the holding capacity of Zone K-II, has been proposed for a population of 13 lakh.

- The Dwarka Sub-city has an area of 5648 ha. Out of this, 1688 ha is designated as built-up and the balance 3960 ha is under planned/ regulated development comprising sector 1- 29.
- The estimated population for the planned sectors of Dwarka i.e. sector 1 to 23 is 7 lakhs. In the remaining residential area sector 19,23, 24 & 26 about 90 ha, only 50,000 population can be accommodated.
- Sector 27, 28 & 29 are to be planned for low intensity development.

Sl. No.	Landuse	Area (in Ha) 2001	%	Area (in Ha.) 2021	%
1.	Residential	2912.3	51.56	2956.65	49.91
2.	Commercial	352.13	6.24	342.82	5.78
3.	Govt. Use	91.36	1.62	99.97	1.69
4.	Public & Semi Public	369.94	6.55	363.00	6.13
5.	Utilities	138.76	2.46	154.66	2.61
6.	Recreational	1006.18	17.81	979.30	16.53
7.	Transportation	777.33	13.76	763.60	12.89
8.	Green belt	--		264.00	4.46
	TOTAL	5648.00	100	5924.00	100

**Figure 4.4:** Land-use Variation

Hence, the additional population as projected by MPD-2021 shall be accommodated in the existing built-up area under various re-development schemes. The population to be accommodated in the built-up area shall be about 6.5 lakhs.

#### 4.1.2. SOCIAL INFRASTRUCTURE

- In the Zonal Plan of Zone K-II, Social Infrastructure has been provided as per the MPD- 2001 norms.
- For the additional population which is proposed to be accommodated as per MPD- 2021 in the built-up area, the facilities of social infrastructure are to be provided based on reduced area norms. The social infrastructure includes health, education, sports facilities, communications, security & safety & other facilities.

#### 4.1.3. RESIDENTIAL DEVELOPMENT

- ***New Housing areas including facility-corridor in urban extensions:***
  - In Dwarka the new housing area units are proposed in part of sector 19, 23, 24 & 26.
  - These sectors are to be developed on low density.

- 
- 
- ***Restructuring and upgrading/redevelopment of existing built-up areas:***

The entire built up area of 1688 ha. is proposed for Redevelopment area, for which redevelopment schemes shall be taken up. In this area mixed use and commercial streets/roads shall be as per notification issued time to time by Local Body/ Government.

#### **4.1.4. TRANSPORTATION NETWORK**

##### **4.1.4.1 Road, Rail, Air:**

Dwarka sub-city requires a highly efficient mass transportation system for enhancement of intra-city and intercity movement. Therefore, a multi mode transport system has been envisaged which consists of a hierarchy of road network supported with railway corridor.

The hierarchy of road system adopted in Dwarka sub-city are as under:

- (i) Primary Arterial Roads -100mts ROW & 80mts ROW
- (ii) Other Primary Arterial Roads – 60mts ROW & 45mts ROW
- (iii) Primary Sub-Arterial (Collector) – 30mts
- (iv) Secondary Sub-Arterial (Collector) - 15mts.

##### **4.1.4.2 MRTS CORRIDOR:**

- The K-II zone up to Sector 21 is connected by the MRTS corridor of ITO Barakhamba Road- Najafgarh Line.
- A new corridor shall be developed starting from Sector 21, along the 100m. road in South-west, West & North connecting Rohini & Narela Projects.
- It is also proposed to connect Sector 21 Dwarka with I.G.I Airport and City Centre (Rajiv Chowk).

#### **4.2 DWARKA AND CONNECTIVITY:**

- i. Well connected by metro rail with the city center and other major parts of the city.

- ii. Total of 8 metro stations in Dwarka and 2 under construction.
- iii. Now connected through metro rail to Noida (UP) and Anand Vihar.
- iv. If entering from the north, a 45 meter wide road connecting Pankha Road partly by covering Palam drain.
- v. Entering from the west, a 60 meter wide road connecting Najafgarh Road.
- vi. Entering from the east, a 45 meter wide road through Cantonment area with a fly-over near Palam.



**Figure 4.5:** Road Network Layout

- vii. Entering from the southeast, a 60 meter wide road from NH-8 (with a rail underpass). The road was already constructed.
- viii. A special metro line known as the Airport Express line will also connect Dwarka to the IGIA.
- ix. Dwarka is also expected to be connected to Gurgaon by metro.

### 4.3 IRC ROAD HIERARCHY (DWARKA)

#### 4.3.1 ARTERIAL ROAD (R3- 60mts; Primary Collector Road)

Vehicular routes carrying heavy volumes of traffic, BRT route may also be allowed on these roads. The recommended ROW in existing urban area is 45-60mts and minimum 60mts in the proposed urban extension. Cycle tracks should also be constructed along all other primary roads wherever possible.

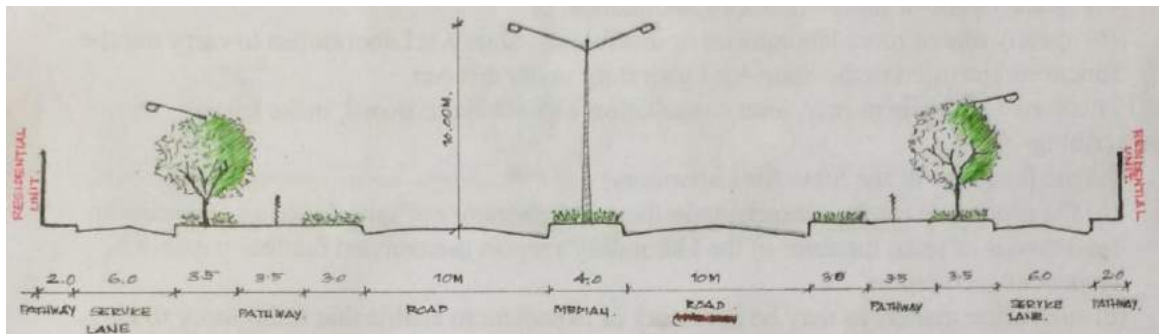


Figure 4.6: Schematic Section of Arterial Road (Dwarka)

#### 4.3.2 SUB-ARTERIAL ROAD (R1- 30mts; Secondary Collector Road:)

These roads are intended to collect traffic from local streets within one residential district. The recommended ROW in existing urban area is 18-24mts. and minimum 30mts. in the proposed Urban extension.

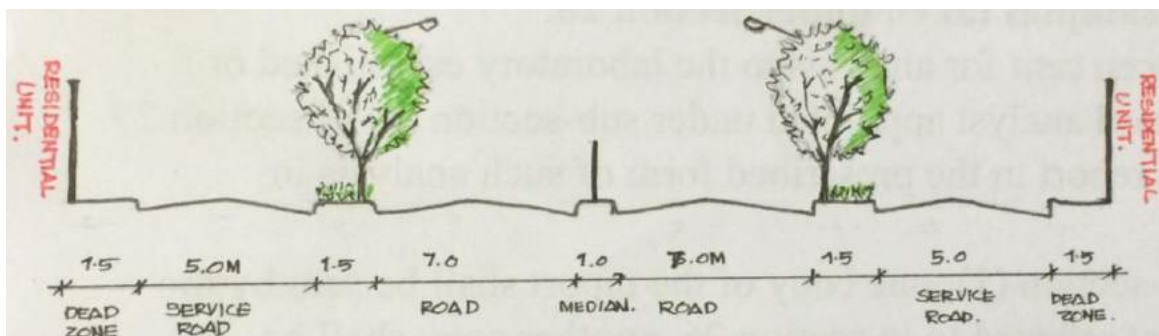


Figure 4.7: Schematic Section of Sub-Arterial Road (Dwarka)

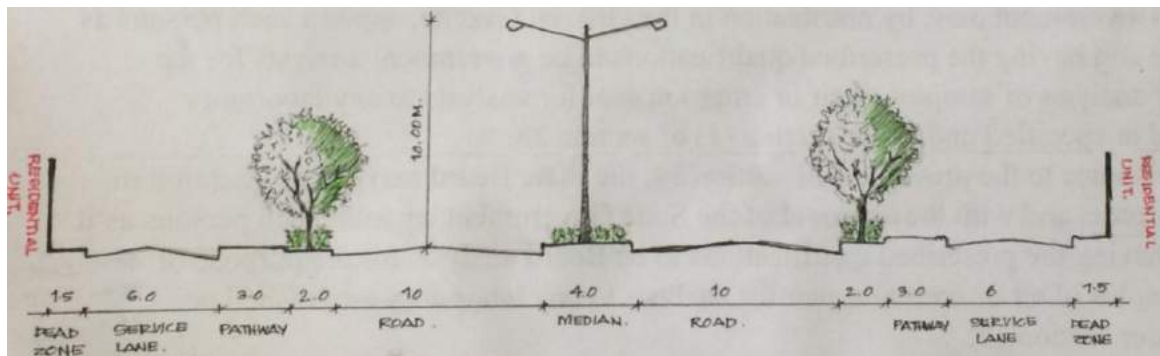


### 4.3.3 R4- 80mts; Primary Collector Road

Vehicular routes carrying heavy volumes of traffic will generally have free / stable flow conditions with controlled access. The recommended ROW in existing urban area is 60-80mts. and minimum 80mts. in the proposed urban extension. Cycle tracks should also be constructed along all arterial roads wherever possible.

### 4.3.4 R2- 45m; Primary Collector Road:

These roads will connect major arterial roads and inter residential district collectors. The recommended ROW in existing urban area is 30-40mts. and minimum 45mts. in the proposed urban extension. In addition to this, a separate cycle track should be provided wherever possible.



**Figure 4.8:** Schematic Section of Primary Collector Road (Dwarka)

**4.3.5 R5- 15mts; Local Streets**

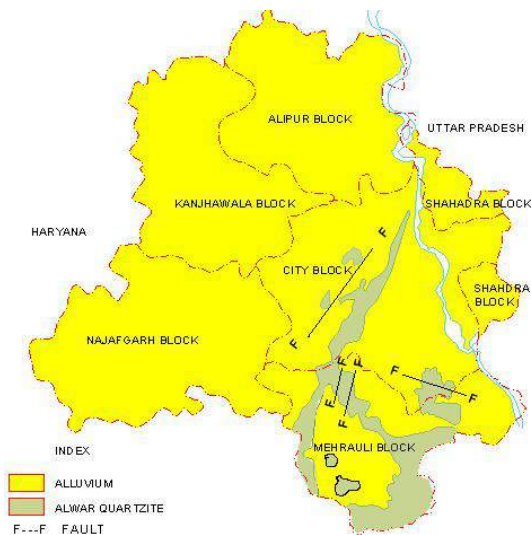
These are intended for neighbourhood (or local) use on which through traffic is to be discouraged. The suggested ROW is 12 to 20mts. in the existing and proposed urban area. These roads should be made pedestrian and bicycle friendly by using modern traffic calming designs to keep the speeds within limits as per design.

**4.3.6 R6- 100mts; National Highway**

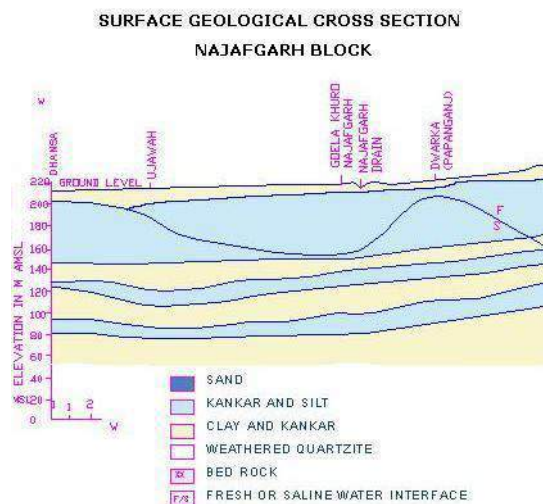
Vehicular routes carrying heavy volumes of traffic will generally have free / stable flow conditions with controlled access. The recommended ROW in existing urban area is 60-80mts.and minimum 80mts. in the proposed urban extension. While designing roads with 30mts. ROW and above, provision should also be made for public mass rapid transport system. Cycle tracks should also be constructed along all arterial roads wherever possible.

**4.4 SUB-SURFACE GEOLOGY**

In the Dwarka clay and Kankar formation exists in the top layer up to a depth of 4mts below ground level. This layer of clay is followed by Kankar and silt up to a depth of 68mts below ground level



**Figure 4.9:** Geological Set- out of Dwarka

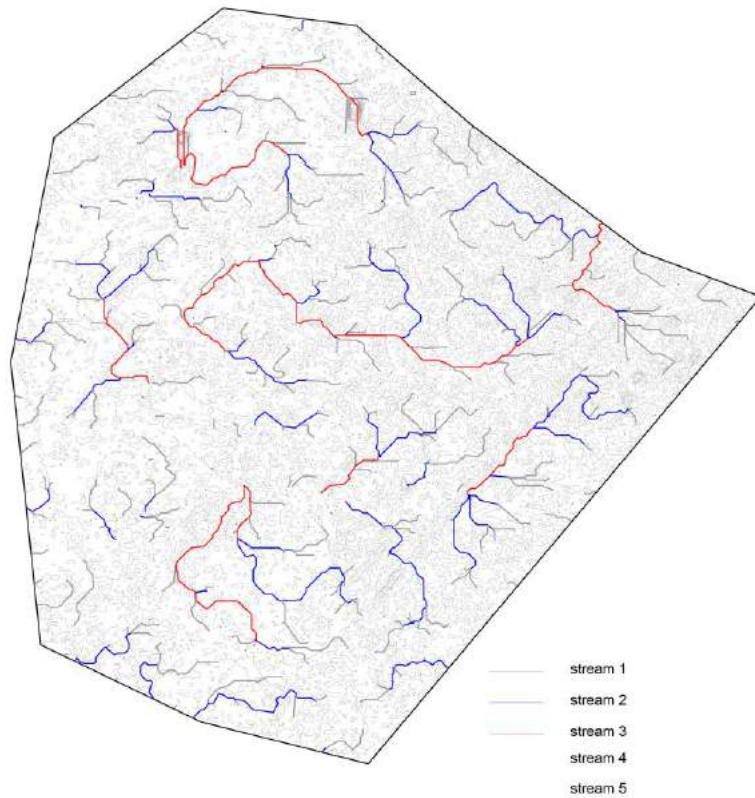


**Figure 4.10:** Geological Cross- Section

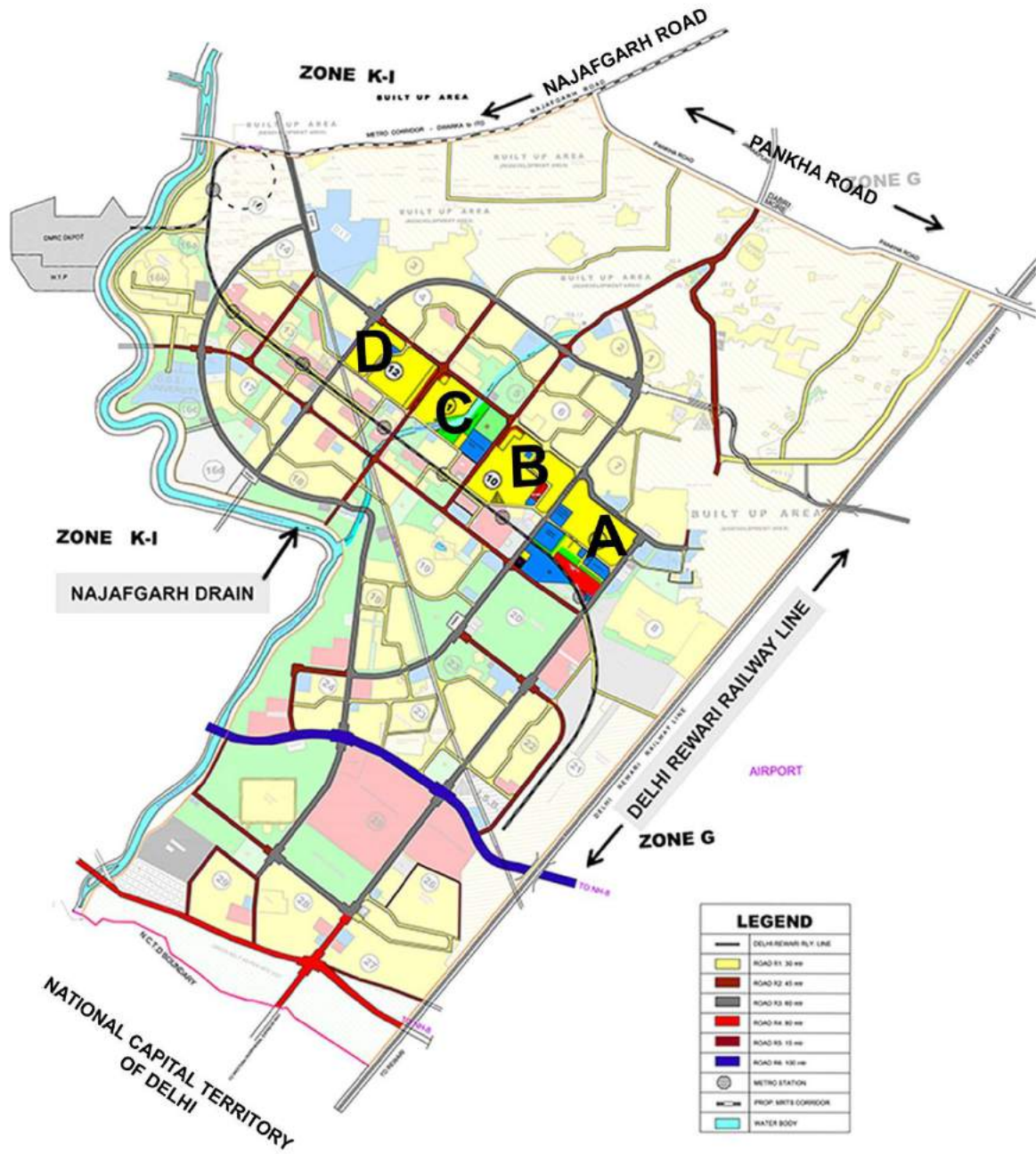
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## 4.5 HYDROLOGY MAP

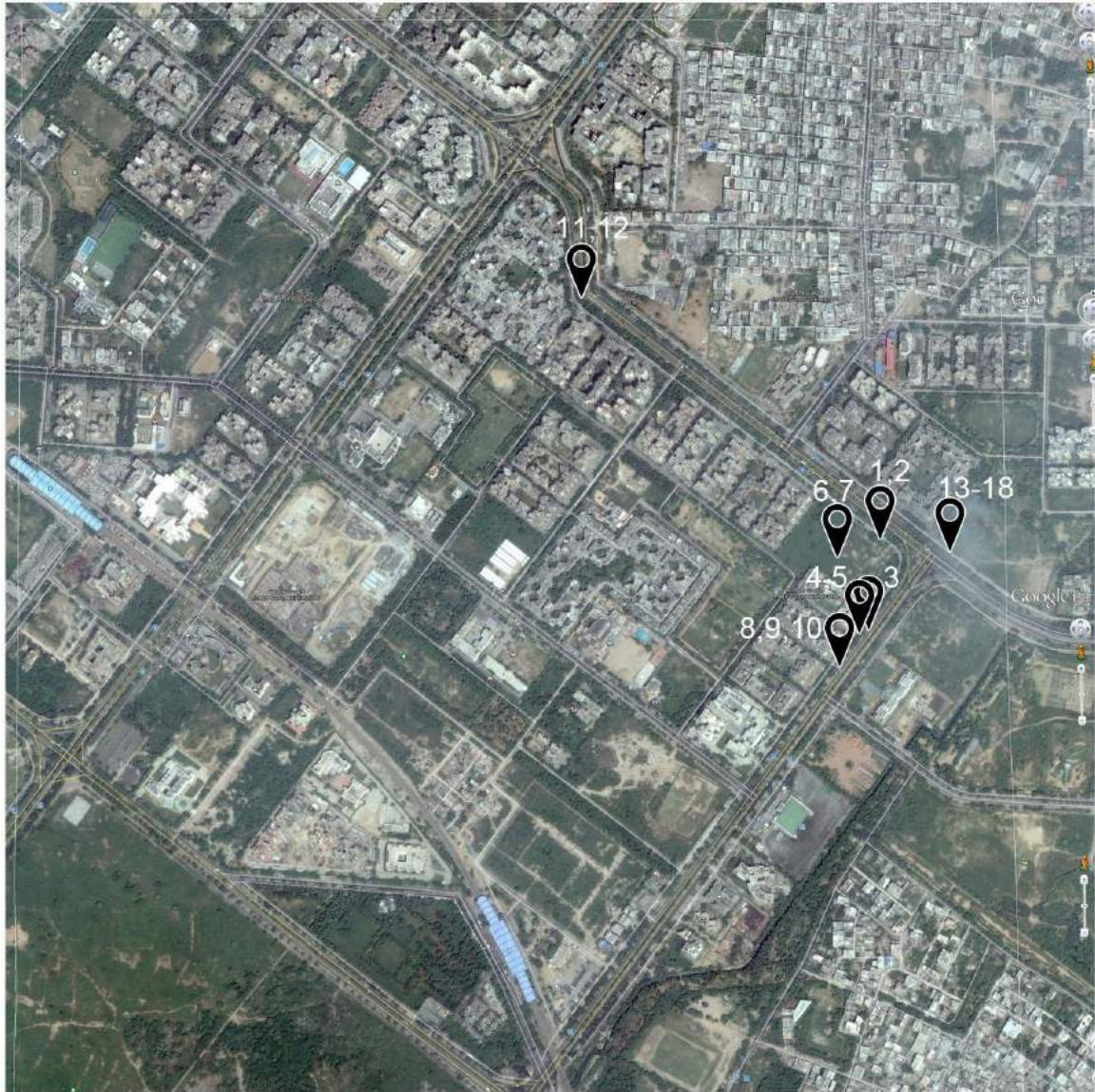
There are 5-types of streams that flow and ultimately coincide and merge into the Palam Drain, taking out the sewage and the surface- run off from th



## 5. SITE VISIT AND ANALYSIS



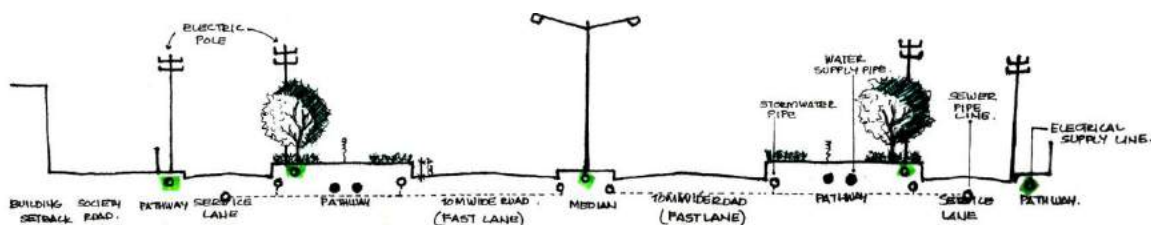
**SECTOR 9**



Landscape Enhancement And Intervention In The Urban Precinct For Dwarka Through Sustainable Streetscape: Case of Dwarka, Delhi

**5.1. INFERENCE/ OBSERVATIONS:**

- i. The pedestrian pathway are least accessed as they increase the vulnerability mentally of an unsafe environment.
- ii. The services hinder clear movement showing complete negligence by the civic authorities compelling people/ daily user to take stroll using service lane
- iii. The canopy of the trees shade the sidewalks properly throughout the day, but post dusk they become breeding spot for illicit activities
- iv. These place are then avoided and then tend to become unsafe.
- v. The open spaces delineated for entertaining recreational activities lay abandoned.
- vi. Each and every sector entertains pocket of open spaces, but these spots are used for throwing garbage, peeing and drinking.
- vii. The service lane now caters as a parking space for the society's car users, which tends to block the fluent movement.
- viii. It is seen that vendors/ hawkers partially occupy main road edges illegally, as they have no valid permit to set their shops bribing the police has become a common practice.
- ix. it is an usual tendency to dump garbage on the outer periphery of the society or near the footpath as they are usual seen less accessed and maintained
- x. Parking and waste disposal has become a menace
- xi. Road edges and the service lane lay unhygienic situation should be heavily considered for maintenance
- xii. With open drain and potholes the road fatalities increases as the public amenities are not in working state.



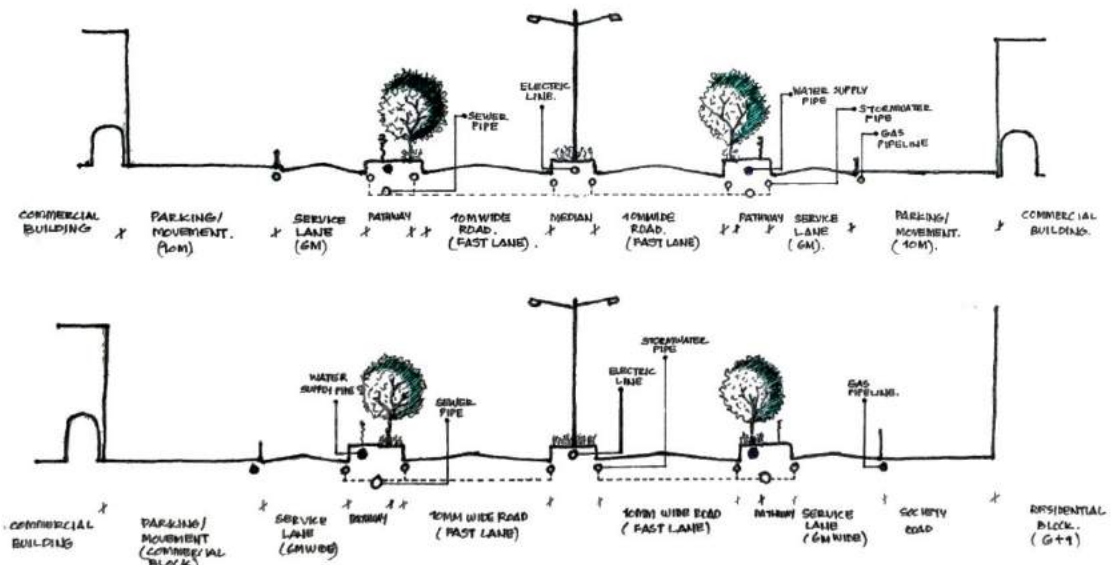
**SECTOR 10**



Landscape Enhancement And Intervention In The Urban Precinct For Dwarka Through Sustainable Streetscape: Case of Dwarka, Delhi

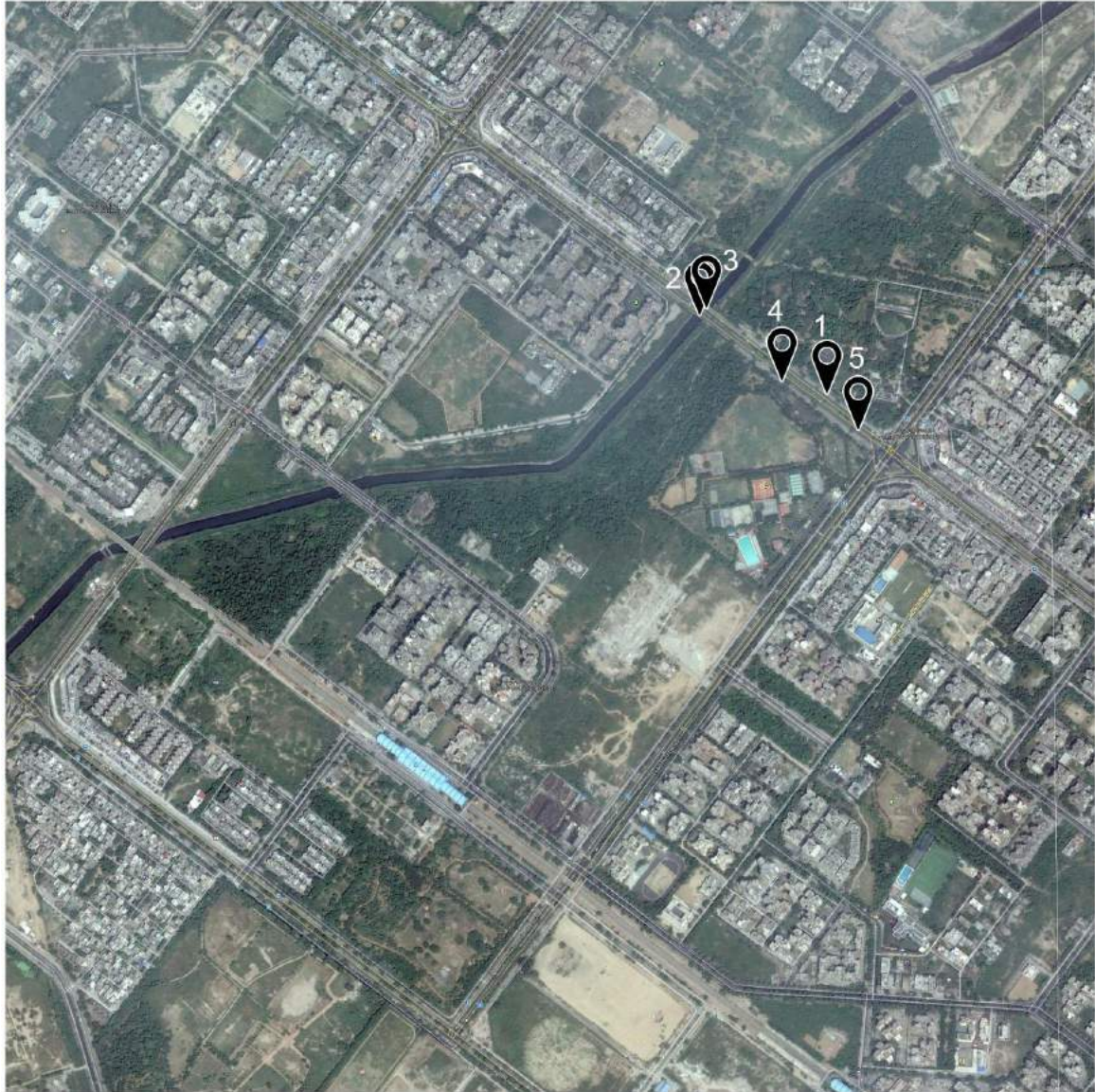
**5.2. INFERENCE/ OBSERVATIONS:**

- i. The delineated Open Spaces wear shady looks and are usually avoided by the residents
- ii. The street has a neat and clean layout with comfortable public and vehicular movement
- iii. Places near Commercial Plazas, they have become dumping yard and parking spot in order to cater to the inefficient parking layout proposed
- iv. The Open Spaces are utilized as shortcuts to access the society and commercial plazas as the only resort to avoid vehicles.
- v. The deserted Open Space amidst two residential society
- vi. The kerb height with uneven finished surface generates uneasiness and difficulties for aged people residing around.
- vii. The street light are not lit provoking chaos and traffic havocs
- viii. The street banks on the illumination by the shops and vendors near the road edges.





**SECTOR 11**



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**5.3. INFERENCES/ OBSERVATIONS:**

- i. The stream now turned Nalah is a easy and visible spot for dumping waste
- ii. The service road across the dense lush-green natural cover gives a horrifying scene of the lack of maintenance work although the DDA site office sits right next to it.
- iii. The dusk time portrays unsafe vibes for the pedestrian and commuters, so it is less accessed by residents and other pedestrians.

**SECTOR 12**



Landscape Enhancement And Intervention In The Urban Precinct For Dwarka Through Sustainable Streetscape: Case of Dwarka, Delhi

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**5.4. INFERENCES/ OBSERVATIONS:**

- i. The Venue does not entertain a pedestrian friendly walkway
- ii. The road and the pedestrian walkway give a glimpse of excessive use and pressure.
- iii. The street do not have disabled approach with improper kerb heights varying giving torrid time to the user
- iv. The road edges have degenerated over the time and need extensive maintenance work to inculcate safe environment for the user daily users especially aged people and disabled
- v. The canopies cover the street lights decreasing the clear visibility
- vi. The misuses of open spaces in alarming and started acting as breeding spots for criminal activities.

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