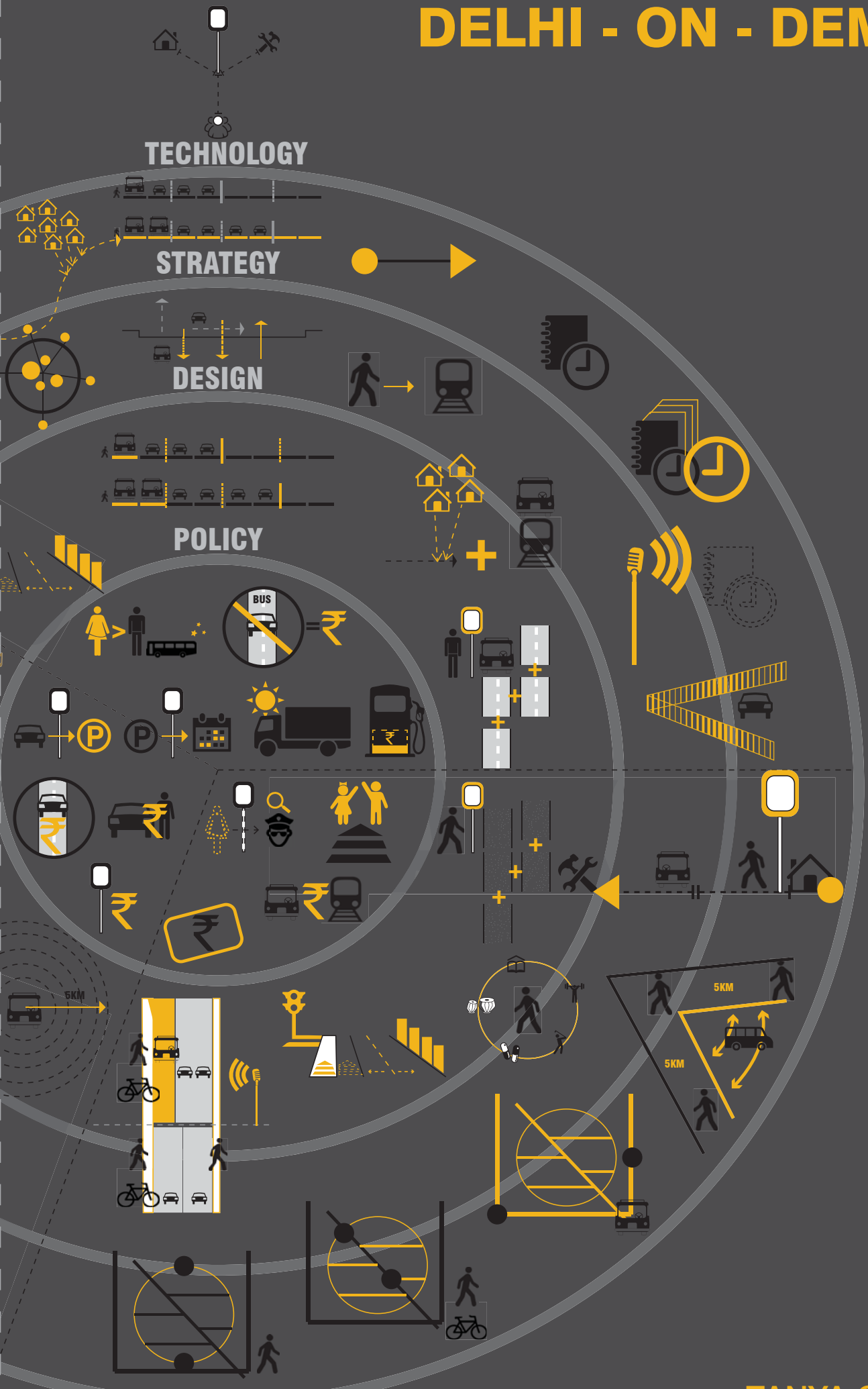
DELHI - ON - DEMAND



TANYA CHANDRA

FACE 2 FACE

politics of forgetting forgotten by politics

I choose this studio to test the challenges of a balanced urban transformations in an emerging economy.

RESEARCH QUESTION : How to reduce socio-spatial segregation created by 'image building' planning and growing car culture in the National capital region of Delhi by improving the mobility of people within the city?

Tanya Chandra 4321391
MSc 3 & 4: Urbanism + Design as Politics

1st Mentor : Marta Relats
2nd Mentor : Dominic Stead
3rd Mentor : Akkieles V. Nes
External Examiner : Henri van Bennekom

June, 2015 Delft

urban equity initiated through mobility

Poetic gesture towards *isms*,
is an unpoetic dialogue,
Between man and thought,
construed by convenience,
as historically plot.

Some had, carried the charge,
others were trailing in the road,
Now behind a green mile,
Is a mark dividing,
anything under the sun,
and an imaginative overrun!

- author
September, 2014

SUMMARY

City-on-Demand is a technology, it gathers the demand of commuter (public transport or walking) and urban residents (public spaces) and interprets the spatial requirement and changes the city's infrastructure accordingly. Thus creating a real-time dynamic system of demand and supply. Making a city smarter by having a demand based supply chain management of its resources.

It stems from my research on Delhi, where resource (supply) and demand are mismatched and there is an explosion of image based planning resulting in a gentrified and inaccessible city; plagued by pollution, congestion, high car ownership growth, safety and lack of urban commons for its growing density.

ACKNOWLEDGEMENT

This year has been challenging as well as fun, for both I would like to thank my mentors: Marta Relats, Dominic Stead & Akkieles van Nes. Marta's philosophical and architecture background balanced me between my thoughts and their execution. Domini's experience honed my research into questions and questions into a utopia. Akkieles's spirit and specialisation helped me further into finding my own niche in Urbanism. I found an exponential growth in my approach to the project under their guidance. I also thank my external examiner Henri van Bennekom for making my presentations' journey transition smoothly and bringing a new perspective for my project.

Sangita, Dhiraj, Shikhar, Richa, Rawat, Radhe, Shami, Puran, Suraj and Savitri are the people who through their experiences with the city of Delhi brought life to my project. Their daily lives grounds my project in reality and how & what should be done to make their city experience more enjoyable; at the same time making the city accessible by people from all walks of life residing in Delhi. Their inputs helped me grit my project into finer details. I would also like to especially thank Sangita (my mother) for helping me collect data and take interviews back home when I felt immobile in Netherlands.

The project couldn't have sparked ahead without the research from researchers that I have referred too. My project wouldn't be at this stage without the many inspiring studies that I have read and come across.

The last thank you but not the least is to my family and friends for bearing up with my eccentric disposition throughout the last year. As support is what can help project one forward!

CONTENT

RESEARCH PHASE

DESIGN PHASE

Delhi's income group wise housing and transport options; source author, 2015

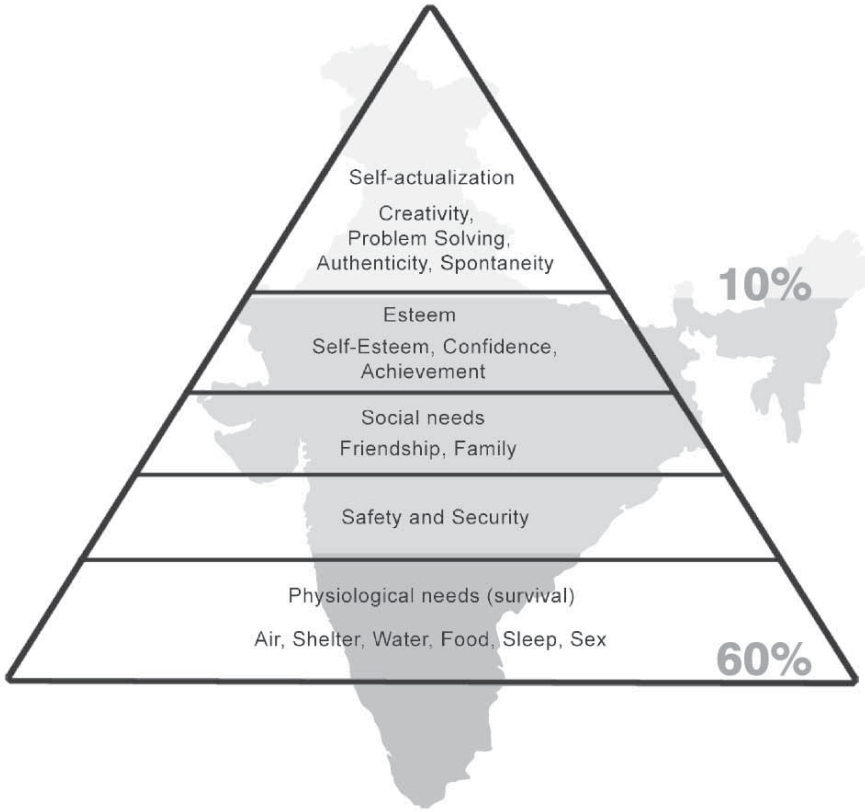
"To put it paradoxically, there is today so much communication, means of communication, and communication theory, that there isn't any community; So much socialism, social-agency, and sociology that there isn't any society of work and living."– Goodman & Goodman, 1947, p104

As a kid, I remember watching a cartoon about people from the future travelling back in time, what fascinated me about it even now is them celebrating the 'Word Unification day'. Though this dream is light years away from reality but holds the crux to my idea of an ideal community - Working together, travelling far & wide and being tolerant while understanding each other.

As an student of urbanism from India, I have grown up seeing cities with bi-polar disorder, transcending from social, cultural and economic factors and translating into spatial qualities of the city. This bi-polar nature of Indian cities is spatially derived from the inversely proportional system of distribution. While the nation is running behind the global capital model of 'competitive economy', the human capital is competitively deteriorating. This is for me is Dystrophic Utopia.

In 'Wealth of Cities', John Friedmann put a city's true wealth in its human asset – people and the quality of their lives and livelihood. For a human the basic needs are shelter which he can call his and mobility through which he can fend for himself. Thus, an ideal community for me is where urban equity exists especially when it comes to housing and mobility. A community that provides the covers at night and mode of resource in the daily life. An understanding of this multi-nodal network which helps them to work, live and grow together.

As,
"A city is said to be an assembly of people, a congregation drawn together to the end they may thereby the better live at their ease in wealth and plenty. And the greatness of a city is said to be, not the largeness of the site or the circuit of the walls, but the multitude of the inhabitants and their power."- Kostof, 1999, Introduction



Maslow's Pyramid & income group division of the Indian population within it; source author, 2015

AIM OF THE PROJECT

'What is the solution, when solution is the problem?'(Pritchett & Woolcock, 2004). Delhi is going through massive urban upgradation in terms of infrastructure and development for its attainment of 'world-city' title. Promoting high technological solutions for public transport, encouraging suburban gated communities served by cars and resettlement of urban poor at the periphery of the city, which form 55 percent of the population and depends extensively on non-motorized modes of transport.

This urban re-configuration for 'progress' creates a socio-economic segregation and making Delhi a bi-polar city. A city which gives priority to motorize based development and causes a peripheral push to those who cannot afford this type of urban development.

Thus, Mobility is a tool for urban development and land-use pattern, therefore, it is also primary symptom of urban decay. Therefore, the project aims to study the causes and symptoms of Delhi's socio-spatial deterioration due to segregation between different economic groups through their options of mobility.

Mobility being part of everyone's urban life and need. It is also a key for social-interaction, accessibility to the city & its amenities and key to urban development and land-use. By making mobility for people equitable, one can achieve social and urban equity.

PERSONAL RELEVANCE

"*If you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places.*"
- Streets are People Places, Fred Kent, 2005

India is my home, I have lived, work and travelled almost all corners of it. Not even one corner even in its magnificences does not paint a picture of social inclusion. As am emerging economy, to me it seems, people are just running behind what is shinier. But, unfortunately in their run they forget to see who they are trampling. And cities have become best example of this pit of social decay.

As a student of urbanism this is what I chosen to study and hopefully cure this urban decay. And as ground is where everyone is equal, mobility seems to be the key to start with.

ETHICAL SUBSTANTIATION

As the Maslow's pyramid states that without the basic needs you cannot move forward. Thus, with 60% of the population struggling to enter the base of the pyramid, Delhi, India cannot make a true progress.

The aim of any economy is progress and its directly effects the urban life, development and distribution. Thus ethically to start with a profession of Urbanism it is important to understand the urban question of progress and/vs needs.

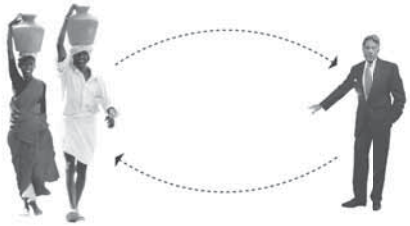
The Great Indian Story BY AECOM:
Being able to learn from the landscape, respect traditions, cultures and heritage are fundamental, as well as working collaboratively towards the common goal to ensure future generations are able to enjoy and celebrate the uniqueness of India.

Source AECOM, Noida project

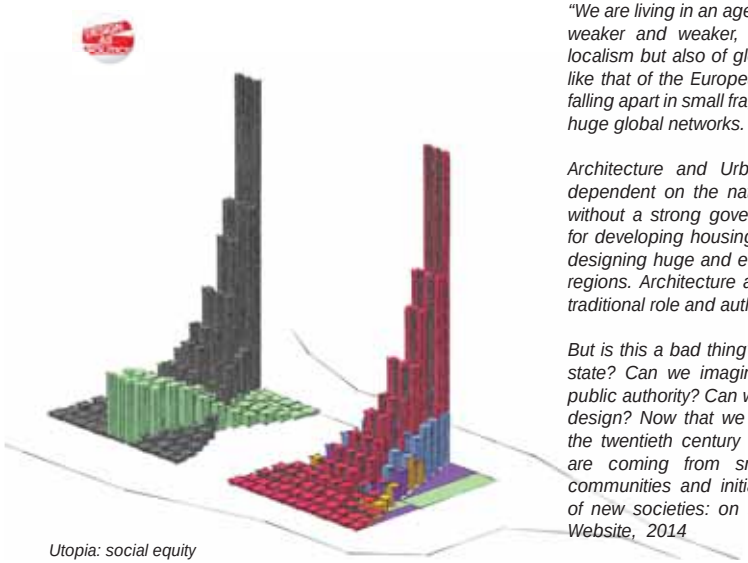
Indian cities are broadly characterized as having high densities, intensely mixed land-use patterns, short trip distances and high share of walking and non-motorized transport (Tiwari, 2002). Although, systematic failure in Delhi is evident by the current state of city. As per the first Delhi Master Plan in 1962 laid a green belt around the city which has been exploited by gated communities by private developers.

Source darkhartetravel.wordpress.com, 2013

Income group co-dependency:
"*Often a job in the formal sector requires services provided by the informal sector: each high income household is dependent on 5-6 lower income household*"- (Tiwari, 2003, p446). Thus, the extensive mixed land-use based on transport pattern and porous labour market of Delhi (Thakuriah, 2009) generates issues to job accessibility for lower income groups who are pushed on the periphery of the city creating long distance commute.



Source author



Utopia: social equity
Source author

Studio Description:
"We are living in an age where nation states seem to become weaker and weaker, under the influence of privatisation, localism but also of globalisation and supra-national politics like that of the European Union. Countries seem to be both falling apart in small fragments as well as being dissolved into huge global networks.

Architecture and Urbanism have for a long time been dependent on the nation state. We cannot imagine doing without a strong government and huge public investments for developing housing projects and public buildings, or for designing huge and even utopian visions for new cities and regions. Architecture and planning are starting to lose their traditional role and authority to represent the nation.

But is this a bad thing? Can we imagine a world without the state? Can we imagine architecture and planning without public authority? Can we imagine a purely community based design? Now that we see the structures and certainties of the twentieth century crumbling around us, the new ideas are coming from small, autonomous even anarchistic communities and initiatives. Here we find the imagination of new societies: on the ruins of the welfare state" - DaP Website, 2014

RUINS OF DELHI

Newton's third law of motions defines mobility and function of a city. As a change in one leads to a ripple effects in another. Urban land-use transport models incorporate the most essential processes of spatial development in a city (Wegener, 2004). The urban fabric contains land-use patterns and infrastructure network which evolve slowly with time. Where on one hand workplaces and housing follow a similar pace of change but on another hand employment and residential population adapt their spatial behaviour with the changing times far rapidly. This process in Delhi is interpreted through one criteria - economics.

"*Capitalist development must negotiate a knife-edge path between preserving the values of past commitments made at a particular place and time, or devaluing them to open up fresh room for accumulation*."– (Harvey, 1985, p150). But, as Reinier de Graaf points out in the "The smart city is not so smart", Design Middle East that contemporary urban planning operates on artificial 'tabula rasa', where this race to modernise usually overlooks that is closest. Thus using the fresh room option of capitalism as place making.

In Delhi the social construction is not a private taste or preference but a political project of class formation (Fernandes, 2004). And urban projects are undertaken as 'concentration on spectacle and image rather than on the substance of economic and social problems' (Harvey, 1989: 16). Transport being the under belly of this machine of 'urban spectacle' (Gotham, 2002). Where high technological solutions for transport in a developing countries are hardly appropriate to the needs of the majority of urban residents (Choguill, 1993). Thus restructuring of the urban space using 'politics of forgetting' of marginalized social groups is leading to polarization of the city (Dupont, 2011; Fernandes, 2004).

The project studies how through history, the city's image-ability became important to showcase its progress and led to the current state of social-segregation. While pointing out that, how image building is being done through transport using it as a tool and how it is further contributing to socio-economic burden for the urban poor. Thereby leading to the urban consequences of this way of planning which is fragmented urban fabric and unsustainable urban growth.

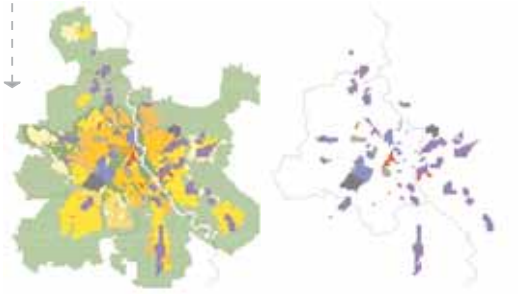
Economic policies support increase in car and 2-wheeler productions and further making easy credit availability for purchase, subsidization of petrol and diesel prices, availability of parking and entering throughout the city. Further policies that fuel this phenomenon are construction of expensive public transportation, lack of policies to price personal auto travel and as discussed through the paper the spatial mismatch between job and residential location (Thakuriah, 2009).

India is a subsidize state, it ruins being the economically failing urban transport system which are too expensive to masses of lower income group but easily affordable to middle income group. Leading to socio-spatial segregation and urban decay.


NEW YORK
TOKYO
LONDON

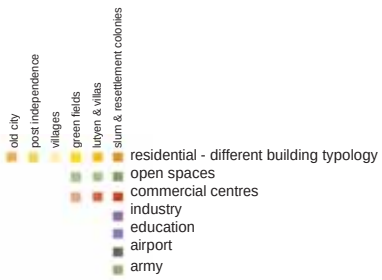
EXISTING

RIPPLE EFFECT OF MAKING A WALKING ONLY CITY.

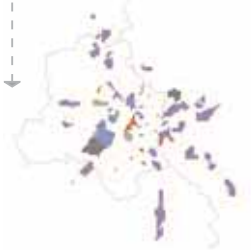


land-use

centres



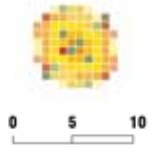
WALK-ABILITY : A TOOL FOR LAND-USE RECONFIGURATION



walk-ability sphere

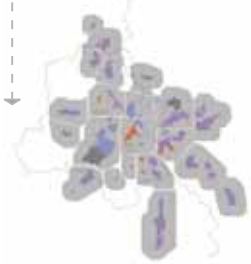
residential sphere & centres

mixed income housing
& amenities distribution



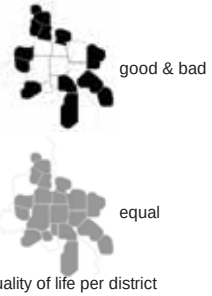
mixed income housing
& amenities module

DISTRICT



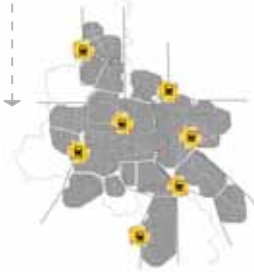
district created

might lead to specialized functions

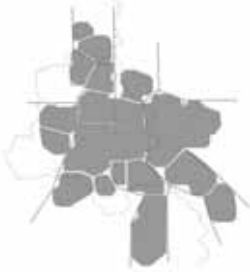


quality of life per district

NETWORK : PEOPLE AND GOODS



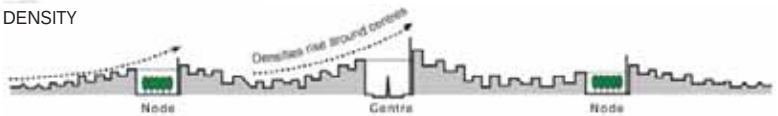
node



peripheral transit mode for
goods and emergencies

walking network per
district for people

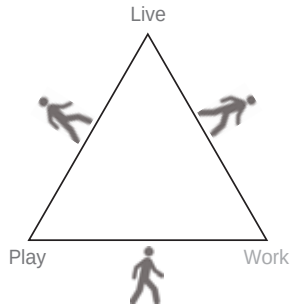
DENSITY



source: author

source: Wright, 1999

UTOPIA : WALK DELHI | CHALO DILLI - 22 millions people



On ground everyone is equal!

The project is named face to face as it is about socio-spatial segregation in Delhi, which due to its planning has created a bi-polar city. 35% of the city that walks but planning is done for car and expensive public transport not affordable by 55% of its population.

Walk-ability is aimed as a trigger for urban change. My utopia has just one clause, everyone walks to live, work and play. Thereby, understanding the co-dependency of each income group on another and bringing them closer to live, play and work together. With the absence of motorized traffic, the project aims to shed away the bubbled life that one lives in a car and gated community. Thereby, re-configuring the land-use and making the open network of transport as not only a place of mobility but social-interaction between different groups. Hence, reconfiguring the city into smaller district of compact living and facing & understanding each other.

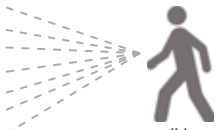
As walking is the only mode that doesn't need an economic backing as a choice of transit mode, thus it becomes a pioneer in bring all income to ground reality of urban life - a safe and diverse environment.

THEMATIC RELEVANCE

The topic of this year studio is 'New Utopias on the Ruins of the Welfare State'. The ruins is the bi-polar city created by continuous subsidizes provided to middle and higher income group which encourage car travel, unaffordable public transport and thereby gated communities. Through my Utopia I challenge the notion of that motorized traffic is the only way to serve the city's growing needs and bring to light the 35% of the population that walks for whom there are no provisions provided in the network. Creating a new society where understanding the co-dependency is the key to living. *I use my Utopia as a guiding goal (Immanuel Kant) for my project.*

Place that contribute as a whole to social, economic and environmental benefits have (Britain, 1999):

compact form
diversity
connectivity
ecological awareness
good governance
social inclusion
good design



walking

	SOCIAL	POLITICAL	ECONOMICAL
IDEOLOGICAL BASE	public urban environment should be shared equally by all income groups, with road infrastructure 21% of Delhi it should have the ground reality as an urban commons.	walking reduces the distances between different income groups by increasing the realisation of each groups co-dependency, creating a community that need to communicate to survive leading to a more democratic society instead of a capitalist on.	with increase in mixed land-use and job-accessibility, there would lead to higher quality of life which leads to good production and increase in small business also walking as the only mode of transport leads to reduction in pollution and environmental related cost
URBAN EFFECTS	- increase in density - creating a network of public spaces such that public realm becomes a public responsibility - mixing uses - mixing households - increase access and permeability	- preparing single strategy for public realm and open spaces - strategy based on character and context of the place - mixed use and mixed income planning	- compact and well connected city - improving environment - optimising land-use and density - stimulating demand - use transport infrastructure cost (25% of Delhi's budget) into walking provision and urban regeneration of excessive space occupied by current infrastructure
PROJECT SCOPE	reducing socio-spatial segregation through affordable and accessible transport increasing accessibility to job and the city	creating a new set of travel choices - prioritizing walking and public transport on the transport network	creating a transport network that works on hierarchy instead of all roads for cars, with basic connections made by walking and cycling and longer by public transport. Thereby, redefining the role of a pedestrian network by inducing land-use to encourage walking

BANKSY DOES DELHI

PROBLEM DEFINITION - INTRODUCTION

As an emerging market, Indian cities are faced with rapid urban changes for 'progress'. We are exchanging human scale with technology that reduce one in a bubbled life of gated communities and private motorized transport. Delhi as the capital faces this image planning since 1980s.

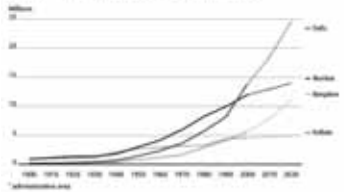
The repercussions of image planning in Delhi has led to the growing car culture and with the focus of governmental developmental on high technological public transport (Metro rail), both of which are unaffordable by the 55% of lower income group helpless.

This problem is accentuated further when the urban poor is driven to periphery of the city, where affordable transport is lacking and non-motorized transport is limited by its range. Leading to poor quality of life for the urban poor due to limited job accessibility, strenuous commuting hours, poor provision for pedestrian and cyclist, unavailable public transport, lack of accessibility to social amenities and poor job security due to lack of job choices.

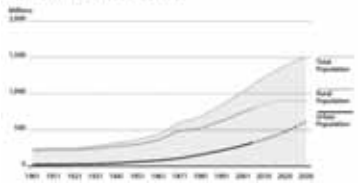
Due to socio-spatial segregation, there is creation of socio-economic burden on the urban poor which is reflected clearly through their options of transit mode. Though the make the majority in number but or the most public space, the roads, they make a minority in priority.

source: author

POPULATION GROWTH IN FOUR INDIAN CITIES[1]



POPULATION GROWTH IN INDIA



INDIA

area (km²)	population[1] (millions)	density (pers/km²)	rel. GDP[2] (% higher level)	number of states	no. of elected officials[3]
3,287,590	1,131.04	344	6.9%	29	545/250

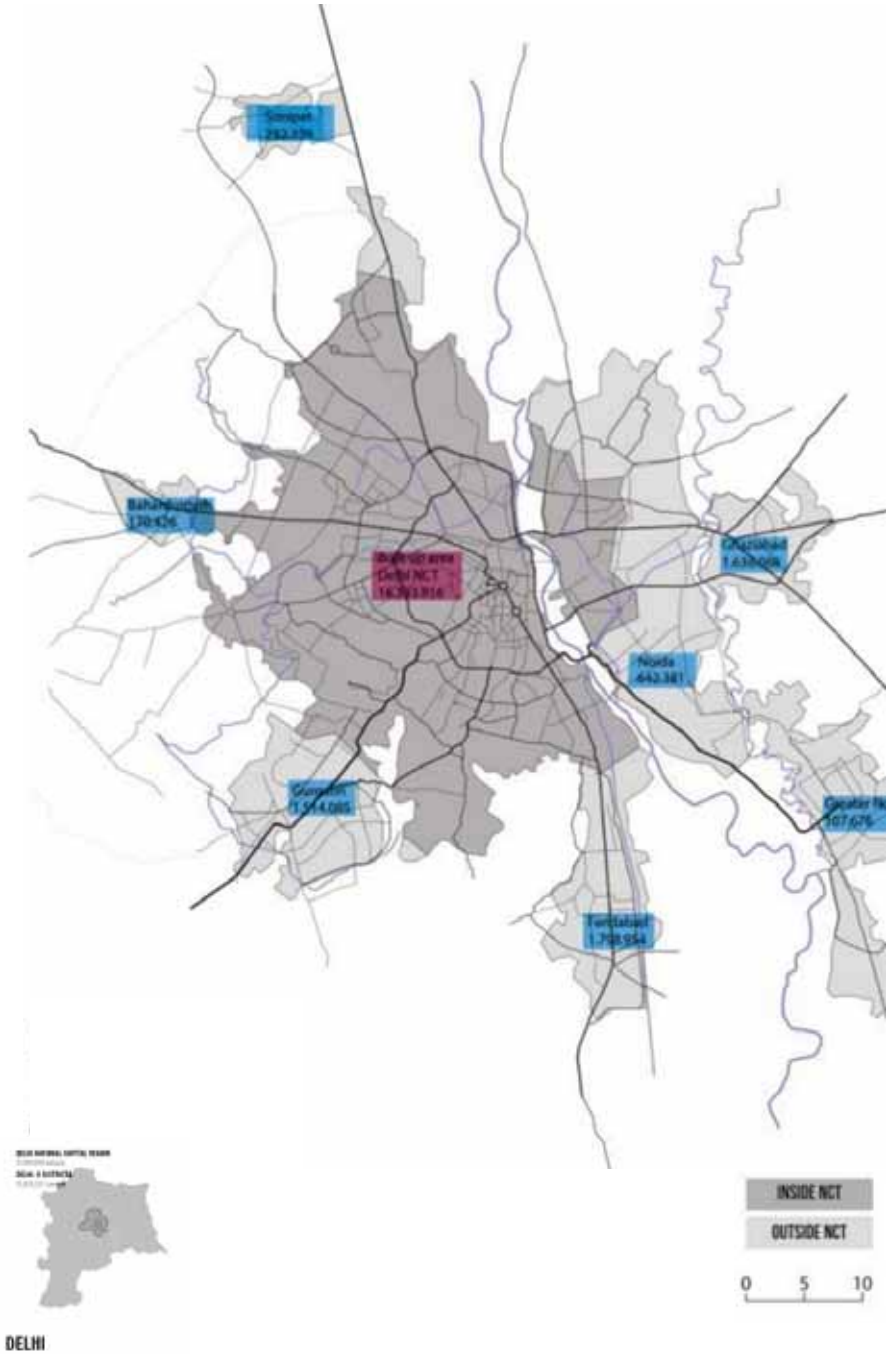
NATIONAL CAPITAL REGION

area (km²)	population (millions)	density (pers/km²)	rel. GDP (% higher level)	number of districts	no. of elected officials
30,242	37.10	1,227	n/a	n/a	n/a

DELHI

area (km²)	population (millions)	density (pers/km²)	rel. GDP[2] (% higher level)	number of districts	no. of elected officials[3]
1,483	13.85	9,340	4%	9	70/272

source: LSE cities, urban age conference 2007



Population & urbanised area 2011, source VenhovenCS, 2012; DDA, 2007

CATALYST TO THE PROBLEM GROWTH

IMAGE PLANNING AND SOCIAL-RESTRUCTURING OF DELHI

Background

Image-ability was brought in as a tool for urban planning in Delhi after the revolt of 1857, its base was the historical Mughal centre 'Shajahanabad' within Delhi, the labyrinth street network being unfamiliar to European eyes made it difficult to curb the revolt. As a result, post mutiny the settlement was damned as potential danger, dissention and of disease. Leading to European ideas of city order and planning to ameliorate the poor condition of the city and how city's residents lived (Batra & Mehra, 2008). Thus, Lutyen's axial Delhi was made as an extension of 'modern' Delhi, on the same pretext as Haussmann's Paris.

Post-Independence

Indian cities have a highly centralised planning process, leaving a little space for elected representative and bureaucrats of the city government to play a part. Thereby, reducing democratic processes at municipality level and reducing chances of modification of plans (Ghertner, 2011). This coupled with place-making and urban 'boosterism' (Harvey, 1989) we get urban projects that revolve around being modern, 'modern' being 'non-traditional' (Hosagrahar, 2005).

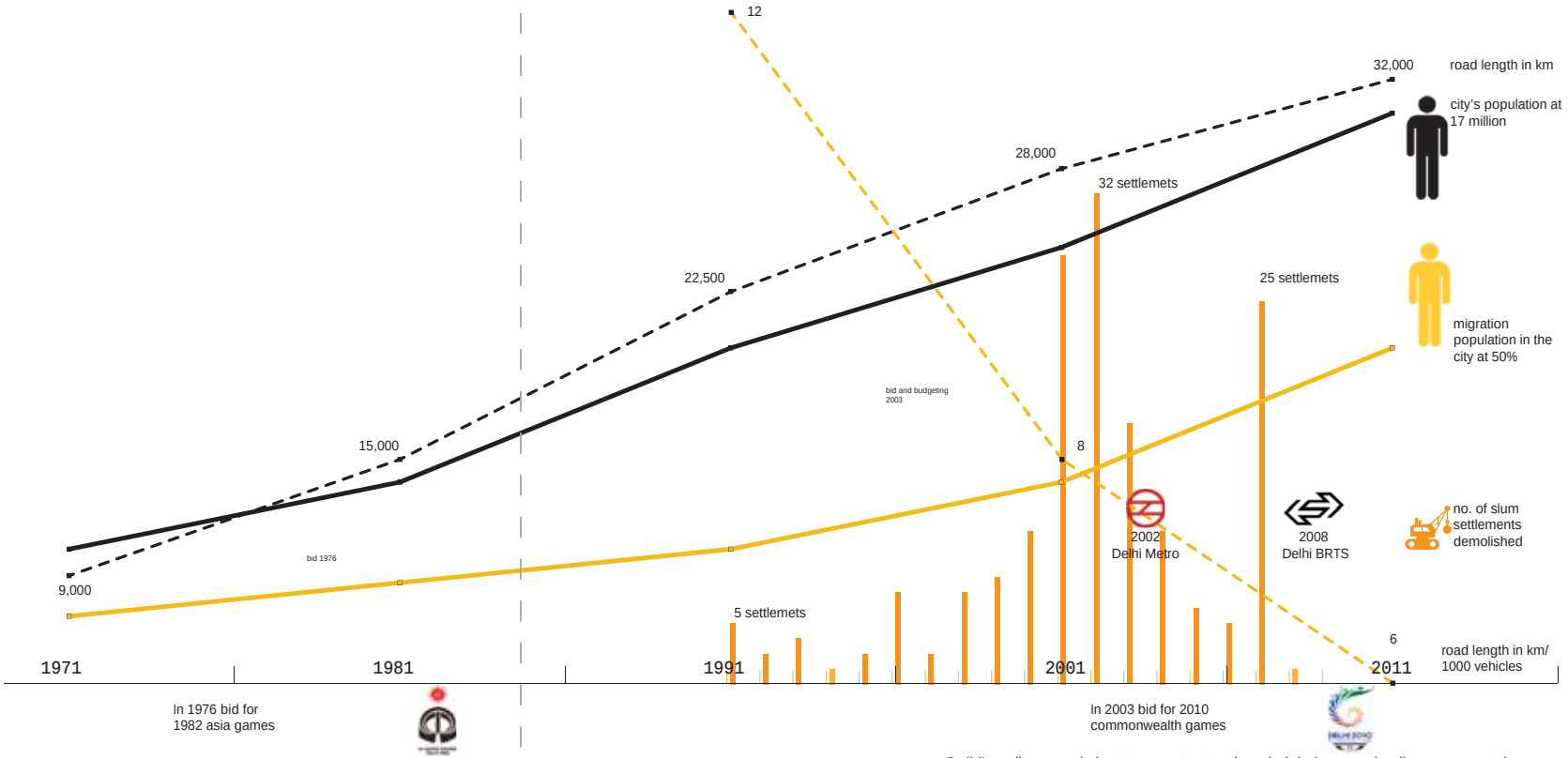
In 1957 Delhi development authority (DDA) was established. But as Gyan Pandey (2002) criticises that the urban question was absent at the time of independence, with Gandhi striving for self-reliant villages and Nehru of a modern India (Batra, 2009). Thus, DDA's was primarily a tool for acquisition, development and disposal of massive tracts of agricultural lands (Batra & Mehra, 2008), with the first master plan of Delhi being published in 1962. The Urban land policy of 1961 premised DDA to control land within the urbanisable limits of Delhi, outside the national capital territory (NCT). Leading to new gated neighbourhoods in satellite cities (Gurgaon and NOIDA) projected as genuine urban entities but developed by private property developers (Dupont, 2011; Ghertner, 2010; Gugler, 2004).

In 1980s the Indian government recognized its cities as a major contributor to the GDP (Gross Domestic Product) and with economic liberalization came the deep rooted ambition to develop large metropolises into global cities. This lead to series of economic and administrative reforms in 1985 (Dupont, 2011).

Economic Liberalisation

Delhi in the wake of economic liberalization in 1991 saw a major restructuring of its urban space resulting in aggravation of socio-spatial inequalities (Dupont, 2011). Delhi being the capital city comes under special attention and used as an example by the government. This was followed by generation of a 'new' Indian middle class, characterized with consumerism, leading to re-structuring of urban spaces as the demand for real estate and motorized modes increased. In 1992 the Urban sector was inflicted with strategies promoting decentralization, deregulation and privatization (PPP models), such that Indian cities can be part of the network of larger global economy. In 1999 urban land ceiling & regulation act was repealed leading to land speculation and pushing the growth outside NCT of Delhi into the satellite cities.

1985	1991	1992	1997	1999	2000	2005	2007
delhi recognised by government of India as a potential global metropolis	economic liberalisation of India	decentralised strategic governance & promoted participatory democracy	white paper on pollution in delhi with an action plan towards transport planning	repeal of urban land ceiling & regulation act	Bhagidari Scheme: 'legal'citizen government partnership programme	JNNURM (JawaharLal Nehru New urban renewal mission) rehabilitation scheme and city development	Chief Minister's vision 2021 for Delhi as global metropolis & World class city



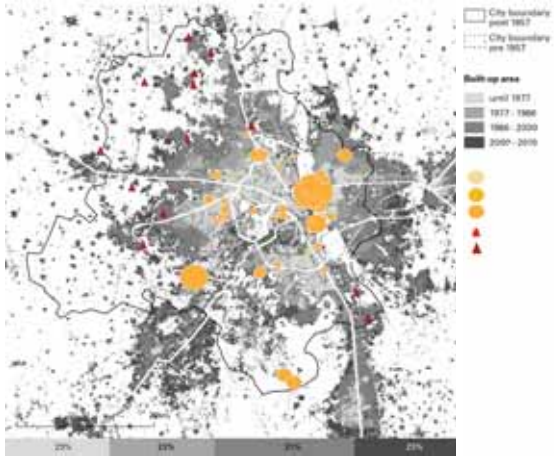
Delhi's policy, population, transport network and global events timeline, source author

until 1977

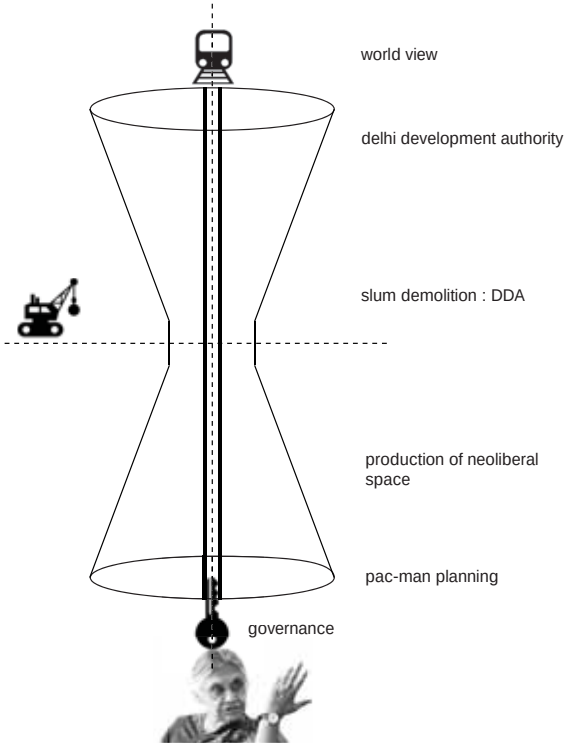
1977 - 1986

1986 - 2000

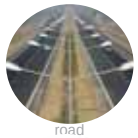
2000 - 2010



Delhi's growth and slum demolition and resettlement,
source author adapted from Dupont, 2011; LSE cities Delhi Urban Age conference, 2014



global city network: saskia sassen



road

metro

brts

slum before 2004

redevelopment 2010 commonwealth games

Delhi state vs Netherlands

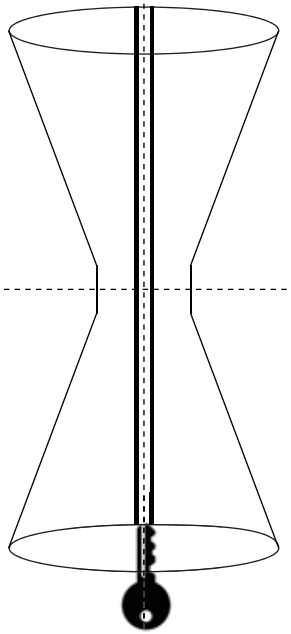
This social restructuring led to growth in second tier cities like Gurgaon and NOIDA constructed and marketed by private developers (Dupont, 2005) and having limited public transport. "The implications of the drive for global status for Delhi's socio-spatial restructuring further confirm the critique of Robinson (2002; 2006) and Lemanski (2007) regarding the problematic implementation of a Western construct – the global-city model – in countries of the South with limited resources." (Dupont, 2011).

Social-segregation through urban development policies
The major hit came for socio-spatial inequalities with introduction of 'Green Delhi, clean Delhi' movement in 2000 post 1997 white paper on Delhi pollution, followed by 'Bhagidari' scheme, 2000 and JNNURM, 2005. These schemes later formed the base for 'gentrification aesthetics' (Chang, 2004) in acquiring 'world-city' title.

'Green Delhi, Clean Delhi' movement helped legalize status to slum demolition requests by Residential welfare society (for middle income groups) under Bhagidari scheme at Delhi high court. Bhagidari scheme helped 'legal' citizens and government partnership programmes, it gave decision making tool only to middle and higher income groups leaving the socially marginalized group settlements (slums) to be pushed 10-25km away from their original location. Further justified with JNNURM (JawaharLal Nehru New Urban Renewal Mission) scheme in 2005, which provided slum resettlements and public transport. But these scheme fail to realize the consequences to 10-25km resettlement shifts and job accessibility. The public transport scheme were plagued by only providing to NCT and not the satellite towns, whereas resettlement colonies are relocated at the border of NCT. Whereas, Metro which aims to serve the larger national capital region is limited due to its affordability, but currently on the main agenda for public transport development. Creating a vicious cycle of dispelling lower income group from the inner city further and providing public transport which is economically unavailable to them.

Transport is the Key
Urban transport is a key to Delhi's spatial expansion and economic viability as aimed for in the Master Plan for Delhi 2021: "Vision-2021 is to make Delhi a global metropolis and a world-class city" (DDA, 2007: Introduction). Mega infrastructure projects are taken to ease vehicular traffic by constructing 28 flyovers (2007-10), bridge over Yamuna, metro (first line opened in December 2002), high capacity bus system with dedicated corridors (later revoked due to protest by car owners) and modernization of Delhi airport in 2006. This "overdue modernization" was considered "an essential step towards improving connectivity within India and with the rest of the world" (Vinayak and Ghosh, 2006: 22) and also observed in other aspiring global cities (Gugler, 2004). Whereas, it does not account for the marginalized social groups which make 55% of Delhi's population for whom bus is economical limit (Fernandes, 2004).

The mega projects of transportation play like the two sides of a coin, they are promoted as transport need for the city by planners and another side are criticized by transport expert for being capital intensive project yet badly responding towards ridership, reduction of pollution and lack of financial sustainability (Modan, 2008). They are rather used as a hidden agenda to portray as a symbol of progress (Siemiatycki, 2006). Transport planning in Delhi thus shown to be "a vehicle for societal transformation" but instead panned to be "the triumph of image over substance" (Harvey, 1989: 13)."



POLITICS

URBANISM

HARD INFLUENCE

- 21 % of delhi is roads
- influences
  - land-use
  - FSI
  - height of building
  - type of function

SOFT INFLUENCE

- most public part of the city
- influences
  - social interactions (bus story)
  - economic competitiveness
  - city experience
  - exclusive / inclusive

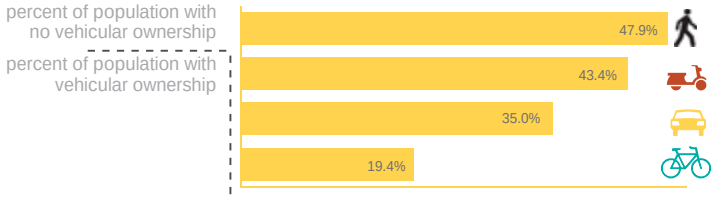
There is an increasing socio-spatial segregation in Delhi, with economically marginalized groups hanging on the edge of the city with minuscule support to access the city and thus increasing the burden on them. But, it is important to note that each income group is co-dependent. In a competitive economy, most times lower income groups are sacrificed in the name of 'progress'. This can be clearly seen in the transport planning of Delhi. Where high-technology public transport and car planning are given emphasis as development goals by the city whereas 55% of the city's population cannot afford them.

Leading to areas developed around these transport network being occupied by higher income group and lower income group being removed (slum demolition) and resettled in areas that do not have a strong transport link or not affordable by them.

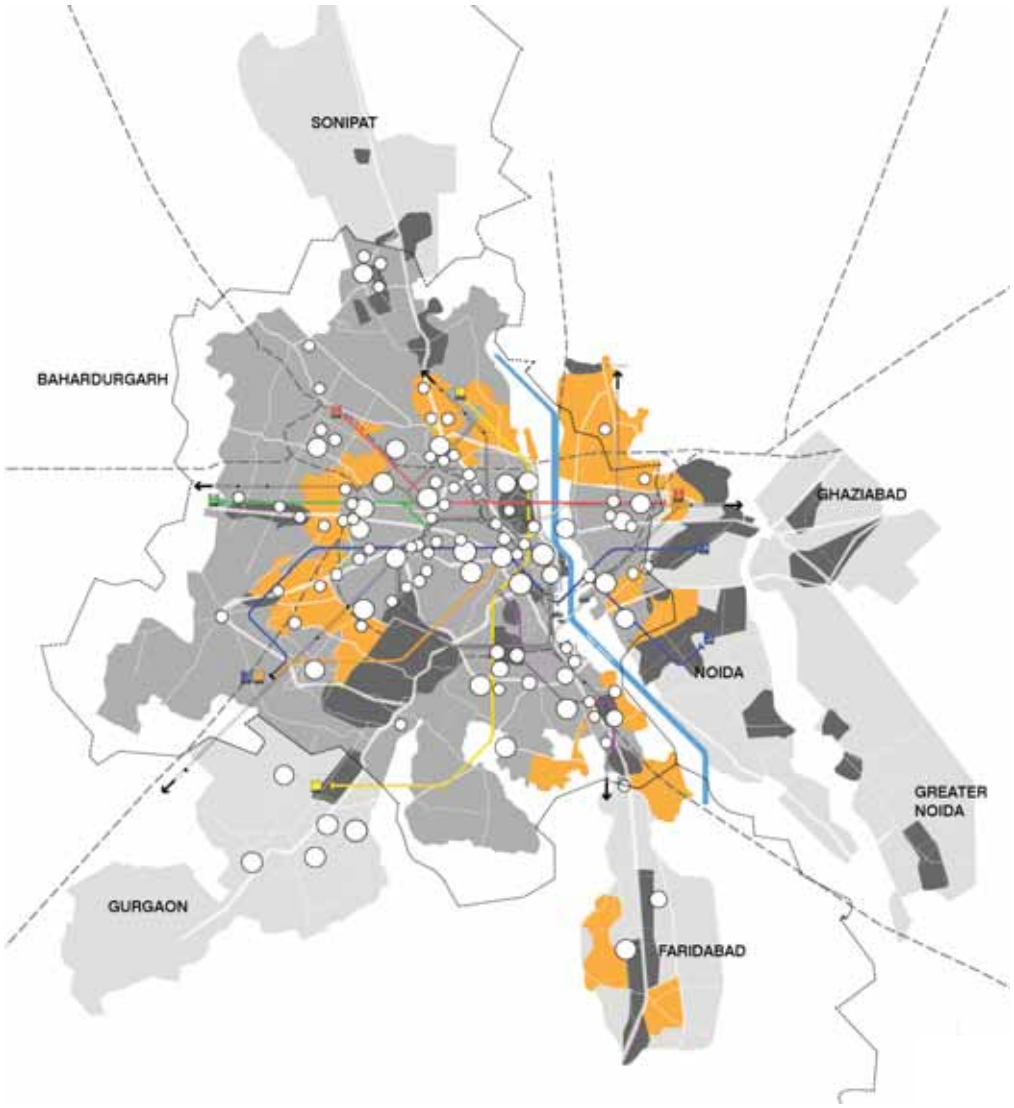
Thus, to achieve social equity and thereby economical vitality, the challenge lies in a balanced urban transformation which is led by a sustainable and public - mobility network for people. As, transport is a tool for urban change and dictates where the city is *going*.

"important quality a city can have is not actually visual. It is: SYNERGY! – a multiplier that can transform a human settlement into much more than the sum of its parts.
This is a concept of crucial importance to the developing World. For across our planet, rural migrants are pouring into towns and cities. It is one of the biggest watersheds in the history of mankind – perhaps since nomadic Man built his first homestead. And however much housing we construct for these desperate migrants, we must never forget they are coming to the city not for housing, but for jobs."

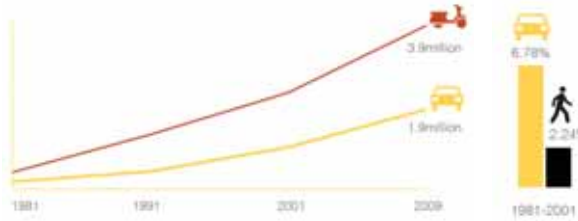
- Charles Correa, Great city...Terrible Place, 2015



Vehicular ownership percentage; Source: Tiwari, 2003; economic survey 2007-08, Delhi planning department



Delhi's transport network, slum & resettlement colonies and different industrial and commercial centres, source author



Delhi's increase in private motorization; source: adapted from Delhi planning department, Economic Survey 2007-08

The only other growth rate in Delhi which is higher than its population growth rate is its increasing car numbers, tripling each year compared to its residential rate growth.

Urban changes in developing countries are marred with rapid motorization, rising incomes, urban sprawl, undeveloped road systems and spatial mismatches with time losses estimated from traffic jams to compromise 2% of GDP in Europe and 2-5% in Asia (Cervero, 2013).

Cervero lists the contrasting features of urban form context between a developed and developing countries. Firstly, developing countries have more primacy and therefore are mono-centric with few cities containing large shares of inhabitants. As in India only 100 of the 5,000 cities have formal public transport (Jain, 2011). Secondly, developing countries' cities are considered twice as dense as European and five times when compared to a city in United States and Australia, but rapid decentralisation is leading to further chocked urban transport arteries and putting a burden on the limited resource to expand affordable public transport to all. Thirdly, sparse road densities and poor road hierarchies seems to fuel the problem further, Delhi for example has devoted 21% of its land area to roads alone, whereas Mumbai has 11% and Kolkata 5%, the other two metropolitans in India. Lastly, Social geographies of a developing country is quite different from a developed country, where spatial mismatches underline housing of poor and needy to where formal jobs with liveable wages are stretched across the city.

Indian cities are broadly characterized as having high densities, intensely mixed land-use patterns, short trip distances and high share of walking and non-motorized transport (Tiwari, 2002). Although, systematic failure in Delhi is evident by the current state of city. As per the first Delhi Master Plan in 1962 laid a green belt around the city which has been exploited by gated communities by private developers. But, the resettlement colonies and industrial areas which were to act as ring around the city have been redundant to suburbs. Roads leading to satellite cities are dotted around with urban sprawl and are the most congested in the region (Tiwari, 2003).

Comprehension of transport and land-use patterns in the city is made difficult due to complexity increase by mass poverty and non-motorised transport whereas planning are looked with a glass eye of motorised planning methods. This spatial mismatch is leading to growing urban issues especially in terms of transportation planning. This results in environmental decay, congestion and poor health conditions.

Regions defined in the model	New urban land area with probability greater than zero (km²) by probability quartile range (regional percentage)				2000 urban extent (km²) (regional percentage)
	>0-25	>25-50	>50-75	>75-100	
Central America	22,600 (0.8)	6,100 (0.2)	6,125 (0.2)	41,025 (1.5)	13,500 (0.5)
China	1,349,650 (14.6)	38,600 (0.4)	27,175 (0.3)	219,700 (2.4)	80,525 (0.9)
Eastern Asia	10,825 (1.7)	5,675 (0.9)	5,800 (0.9)	29,800 (4.7)	28,075 (4.5)
Eastern Europe	12,850 (0.1)	3,750 (0.0)	32,400 (0.2)	3,975 (0.0)	70,275 (0.3)
India	546,000 (16.7)	18,600 (0.6)	8,600 (0.3)	107,275 (3.3)	30,400 (0.9)
Mid-Asia	5,950 (0.2)	2,025 (0.1)	2,175 (0.1)	24,225 (0.9)	16,500 (0.6)
Mid-Latitudinal Africa	531,125 (2.8)	33,025 (0.2)	23,875 (0.1)	180,125 (1.0)	19,675 (0.1)
Northern Africa	30,000 (0.4)	6,450 (0.1)	5,350 (0.1)	46,875 (0.6)	13,350 (0.2)
Northern America	175,775 (0.9)	21,075 (0.1)	5,875 (0.0)	118,175 (0.6)	130,500 (0.7)
Oceania	5,300 (0.1)	1,675 (0.0)	4,725 (0.1)	9,700 (0.1)	10,450 (0.1)
South America	264,175 (1.5)	33,600 (0.2)	16,150 (0.1)	134,050 (0.8)	80,025 (0.5)
Southern Africa	10,950 (0.4)	2,575 (0.1)	2,400 (0.1)	17,475 (0.7)	8,425 (0.3)
Southern Asia	70,900 (2.1)	10,725 (0.3)	17,175 (0.5)	72,400 (2.1)	16,250 (0.5)
Southeastern Asia	58,400 (1.3)	7,775 (0.2)	8,275 (0.2)	69,450 (1.5)	27,275 (0.6)
Western Asia	966,875 (21.4)	45,575 (1.0)	38,200 (0.8)	62,625 (1.4)	26,800 (0.6)
Western Europe	141,400 (3.8)	13,075 (0.3)	4,525 (0.1)	73,600 (2.0)	80,800 (2.2)
World	4,202,775 (3.2)	250,300 (0.2)	208,825 (0.2)	1,210,475 (0.9)	652,825 (0.5)

Job Accessibility

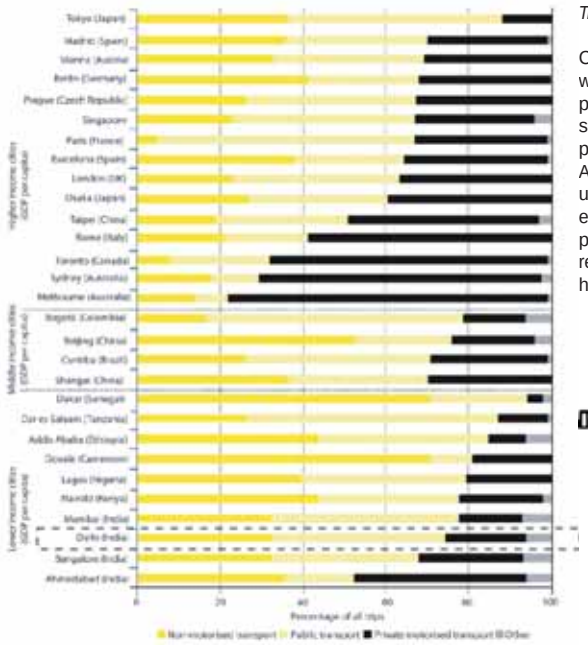
Employment in industry grew in 1951-17%, 1981-29%, 1991-33% whereas, between 1961-71 industries employed less than 10 workers by 444% in Delhi compared to 51% in Mumbai (Tiwari, 2003). “Often a job in the formal sector requires services provided by the informal sector: each high income household is dependent on 5-6 lower income household”- (Tiwari, 2003, p446). Thus, the extensive mixed land-use based on transport pattern and porous labour market of Delhi (Thakuriah, 2009) generates issues to job accessibility for lower income groups who are pushed on the periphery of the city creating long distance commute.

District	Area (km²)	Percent Share of Population	Population Density (per km²)	Percent Decadal Population Growth	Percent of Total Business Enterprises
North-West	440	20.65	6,471	+60.12	17.33
South	250	16.37	9,033	+50.27	14.16
West	129	15.37	16,431	+47.81	13.39
North-East	60	12.77	29,395	+62.52	12.02
South-West	420	12.67	4,165	+61.29	8.26
East	64	10.57	22,637	+41.61	12.22
North	60	5.64	12,996	+13.30	10.56
Central	25	4.67	25,760	-1.91	10.29
New Delhi	35	1.29	4,909	+2.47	1.73
NCT Delhi	1,483	100.00	9,294	+46.31	100.00

District wise area, population and economic statistics in National Capital Territory of Delhi; source author’s diagram adapted from table Thakuriah, 2009

District	Total Jobs	Total Workers by Residence	Total Jobs to Worker Ratio	Number of Persons Usually Working	Main Workers by Residence	Persons usually Working to Main Workers
North-West	768,560	919,483	0.83	585,635	872,278	0.67
South	836,554	778,495	1.07	685,596	739,276	0.92
West	582,463	720,848	0.80	463,510	686,572	0.67
North-East	554,362	500,361	1.10	432,019	471,011	0.91
South-West	452,764	602,505	0.75	377,713	569,861	0.66
East	518,153	475,371	1.08	405,088	458,198	0.88
North	501,702	258,574	1.95	395,125	244,851	1.61
Central	487,062	223,843	2.08	388,495	213,307	1.82
New Delhi	356,779	87,598	5.27	45,871	64,426	5.36

District wise employment statistics in National Capital Territory of Delhi; source author’s diagram adapted from table Thakuriah, 2009



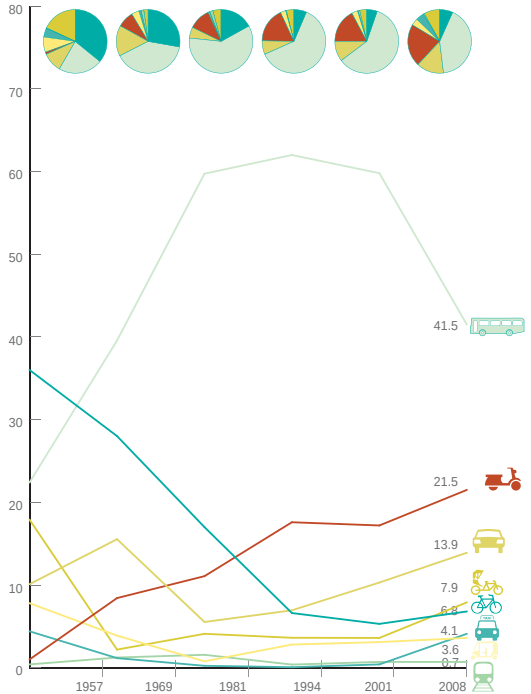
Modal share of selected cities; source Rode & Floater, 2014

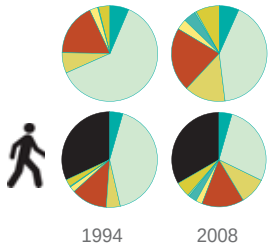
Transport Policies Adopted

Contradictory to the numbers, following transport policies were adopted after the release of White paper on Delhi pollution in 1997. Construction of express-ways, grade separated intersections, one-way streets, metro construction, phasing of old buses and bus fleet to run on natural gas. And as Choguill, 1993 noted that usually high technologies urban development in developing countries does not serve entire urban residents. Thus, there are no changes in walking percentage instead middle income have moved to metro reducing bus usage and importance, which is vital for poor households.

Mode	Low-income population	High-income population
cycle	38.87	2.75
bus	31.43	36.20
car	0	28.35
scooter/motorcycle	2.48	29.29
three-wheeled scooter taxis	0.96	1.74
taxi	0	0.4
rail	1.79	0
other vehicles	2.34	0
walking	22.12	1.62

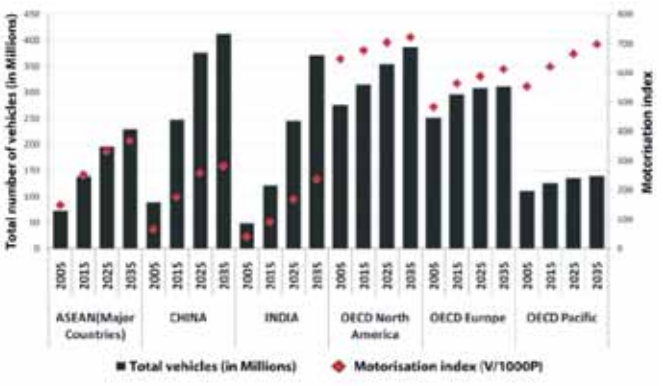
Estimated shares of transport modes in Delhi, source Tiwari, 2003



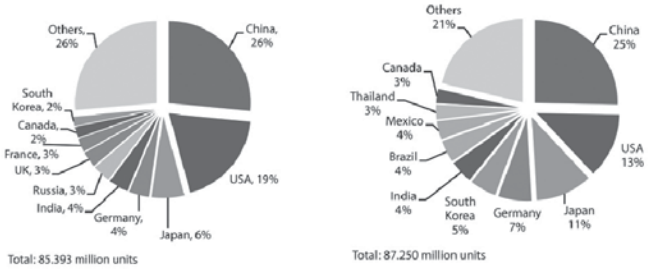


Transit mode share when walking is taken into account

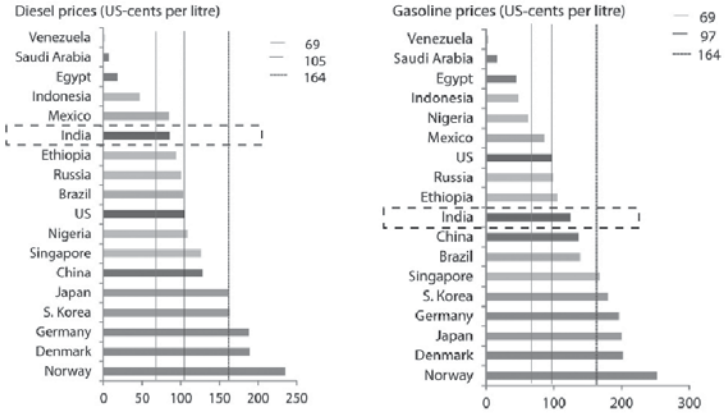
Delhi’s transit mode share, source adapted from Tiwari, 2003; Economic survey 2007-08



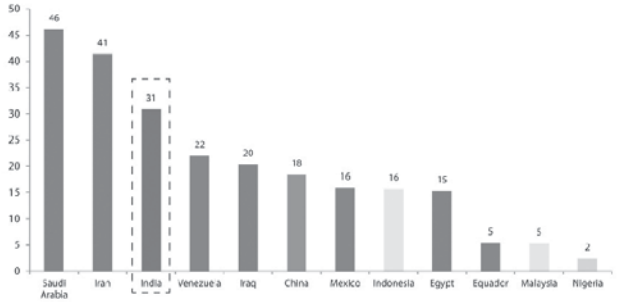
Number of vehicles worldwide and motorization index by region (2005 and projections to 2035); source Rode & Floater, 2014



Top 10 countries in global automobiles sales (L) and production (R) in 2013; source Rode & Floater, 2014



Global diesel (L) and gasoline (R) prices in US$ billion (2012); source Rode & Floater, 2014



Estimates of oil consumption subsidies in US$ billion (2011); source Rode & Floater, 2014

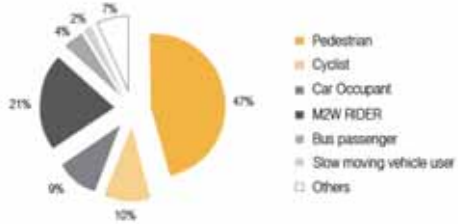
Reasons of Car Growth

The growing car culture of Delhi is not only a product of status symbol but also a series of policies that support its need and want in a city. Economic policies support increase in car and 2-wheeler production and further making easy credit availability for purchase, subsidization of petrol and diesel prices, availability of parking and entering throughout the city. Further policies that fuel this phenomenon are construction of expensive public transportation, lack of policies to price personal auto travel and as discussed through the paper the spatial mismatch between job and residential location (Thakuriah, 2009).

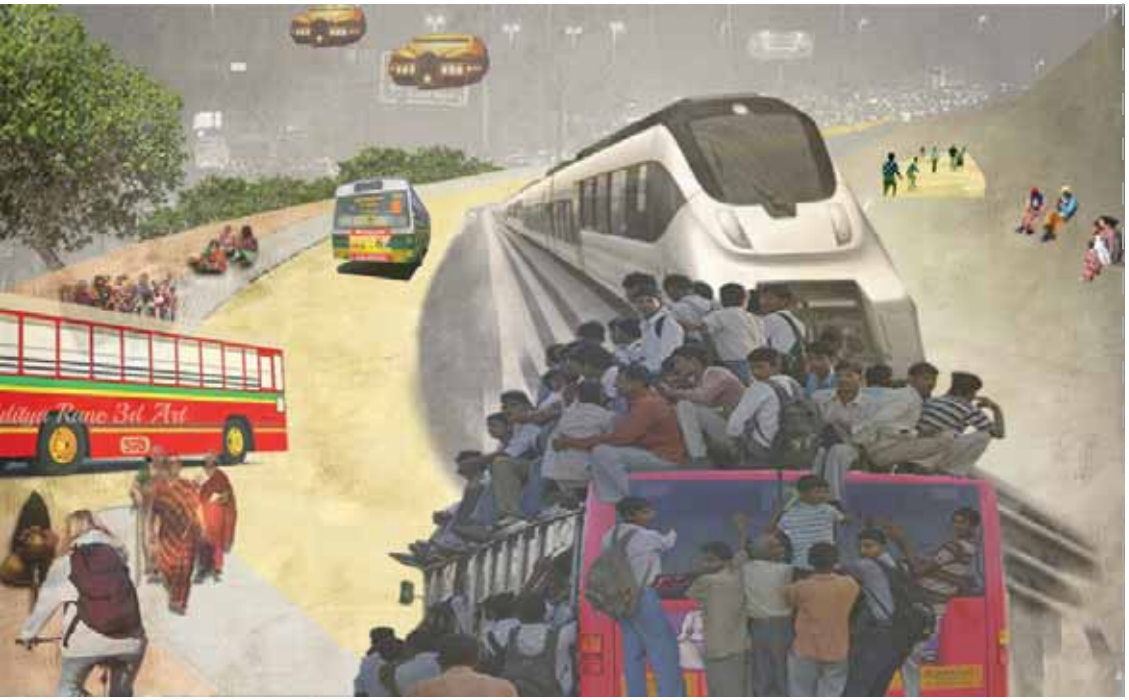
On transport planning besides it affordability factor, time consuming public transport does not ease the burden. On the other hand mixed traffic or popularly known as shared street in west make walking and bicycling unsafe in Delhi. Hence, increase road fatalities of cyclist and pedestrian (Tiwari, 2003; 2002; Mohan, 2008).

Socio-Economic Burden to urban poor
The various issues related to transport planning in Delhi have adverse effects on the most economically critical groups of the society (Tiwari 2002, 2003; Thakuriah, 2009)

o Low income households spend large portions of their income on transport thereby limiting their economic choices of their other basic needs (food, shelter and health)
o 70% of slum residents in Delhi find commuting to work most dangerous aspect of their work (Hazard centre, 1998)
o Commuting to work for poor households is not a matter of choice but necessity for survival, therefore irrespective of mode facilities available or not they continue accommodate themselves in continuous spatial re-configuration.
o Exposure to high rates of traffic fatalities and pollution intensities
o Reduction of employment opportunities and dampening effect in wages, due to lack of adequate access to job sites
o Housing in slum dwellings close to temporary or seasonal jobs



Profile of persons killed in road accidents in Delhi; source Agarwal, 2006



Source author

RESEARCH QUESTIONS

MAIN RESEARCH QUESTION

How to reduce socio-spatial segregation created by ‘image building’ planning and growing car culture in the National capital region of Delhi by improving the mobility of people(public transport and walk-ability) within the city?

SUB - RESEARCH QUESTION

1.How to establish a dual system of walkable neighbourhoods and public transport city network (especially in socio-spatially segregated neighbourhoods)?

2. How through urban design and policy can one reverse the car culture?

3. How can one convert the current over-built transport network for cars into a sustainable networks of walking & cycling (neighbourhood scale) and mass-transport systems (city scale)?

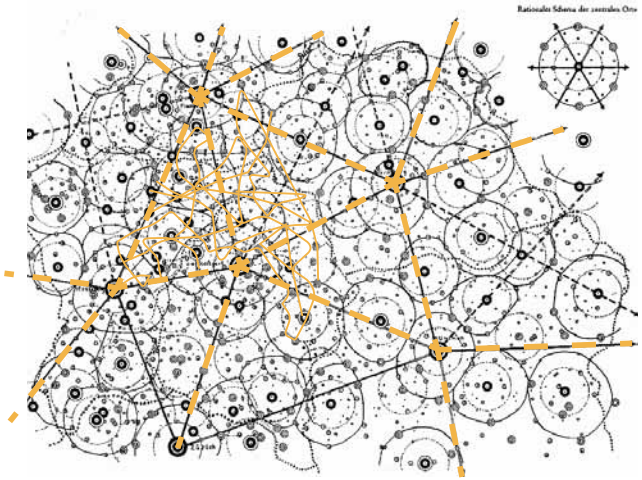
4. How to implement the challenge of a balanced urban transformation in an emerging economy?

Utopia's Ideology

Utopia : peripheral network

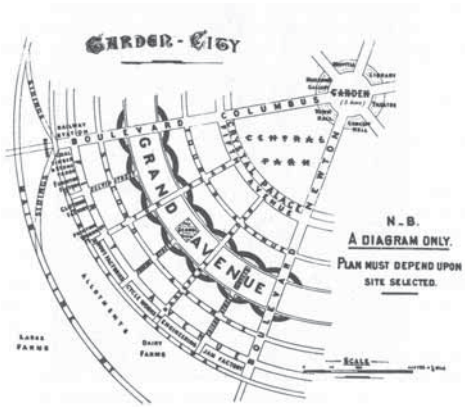
Utopia : walk-ability

Garden cities of tomorrow adaptation to walk-ability and peripheral network



Central place theory adaptation to walk-ability and peripheral network

GARDEN CITIES OF TOMORROW - E. HOWARD, 1898



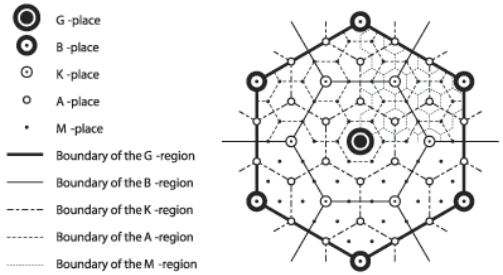
Garden cities of tomorrow, Howard, 1898

What is the theory?
Even after more than a century later it is still the most referred and applied urban model, disfigured by technological advancements in transport made in 1950s. Designed with a vision of slum and pollution free towns, enjoying benefits if both countryside and a city. Thus, bringing balance between individual and community needs.

Why is it applicable for the project?
The theory works on the links between the city and the towns giving the same configuration between National capital territory of Delhi and its satellite towns, a direct adoption of the theory in the capital city. It is important to understand what the theory wanted to achieve compared to what was applied that has led the city to socio-spatial segregation.

How is theory and project linked?
The project uses the peripheral faster connection of public transport and slower intermediate connections as a transport strategy which comes from understanding the function of each district and where and which type of mode should function to get balance between individual and community as aimed by the theory.

CENTRE PLACE THEORY - W. CHRISTALLER, 1933



Central place theory, Christaller, 1933

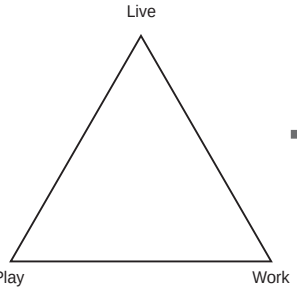
What is the theory?
The theory was proposed by Walter Christaller, who stated that settlements simply functioned as 'centre places' providing service to surrounding areas. The base of the theory is that every function has a threshold and range. The computation of this theory results in model that concludes with larger settlements are fewer in number, larger the settlement have greater distance between them, as a settlement increase in size the range of its functions increases and expansion of a settlement results in greater degree of specialisation in services.

Why is it applicable for the project?
The theory is important for the project, as it highlights the strong connection between function and transport network and that when balance have a direct effect on the size of the settlement. A direct effect at the neighbourhood level while designing a network and what should it connect and which functions should be introduced to serve its inhabitants.

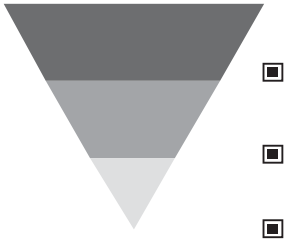
How is theory and project linked?
When the utopian ideology of walk-ability is applied to this urban model one sees a clear distinction in its network of hierarchy, connecting larger range functions with higher hierarchy connections and smaller range functions with lower and quicker hierarchy connections.

What a city should have and how should it be distributed?

Parameters to evaluate different urban models and see their effectiveness



+

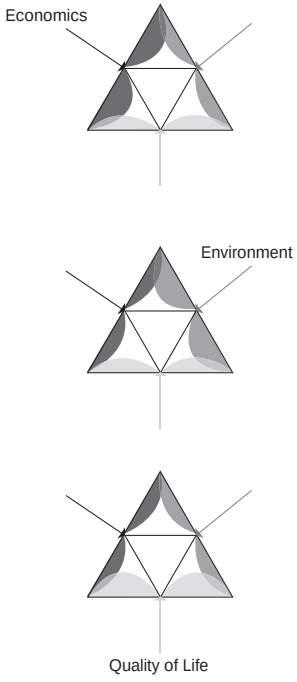


=

patrick geddes
lewis mumford
ebenezer howard
jane jacobs
doxiadis
chicago school

jane jacob
john friedmann
communitas - goodman
achieving sustainable urban form
spiro kostof
althasser
manual castells

PUSH



PULL

middle income

rising real-estate price

urban sprawl

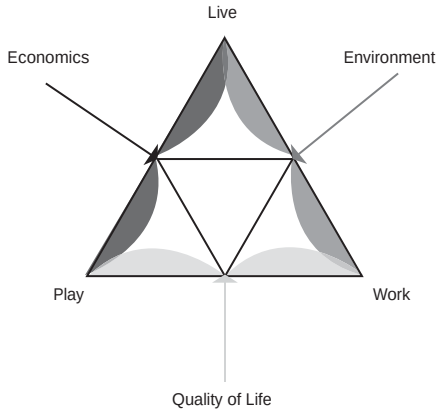
urban pollution

demand of suburban homes

urban congestion

mall culture in suburbs

FINDING THE BALANCE



Balance and unbalance; source author

The urban model like garden cities and centre place theory and urban theories of Jane Jacobs are based on the underlying connections between live, work and play. Playing around the distances between these functions and redefining each theory with new parameters to understand the relationship between them for a healthier life.

Whereas, urban critics judge and research these theories on the parameters of economics, environment and quality of life. Each parameter has different importance depending of the outlook of the researcher.

But, magic of urban environment happens when you combine these six parameters together and if they all are in perfect balance, one gets a balanced urban life. But, perfection is difficult to achieve in a competitive economy. Thus, one should consider the six parameters while design any urban design element especially the urban connections which bring them together. Mobility is the tool of urban design and key to its balance.

PUSH AND PULL OF THE SYSTEM TO BALANCE

PULL

economically weak

migration as urban poor

slum creation

lack of services

ingenious illegal and legal ways to service

low amenities accessibility

recreation in unhealthy environment

As perfection of urban life is difficult to achieve, the urban life tends to balance itself in its own absurd accord. When pushed in any criteria of economics, quality of life and environment the urban fabric reacts to get in balance but what would a continuous state of push and pull will result into?

Middle income and economically weaker section of society cope with different push by the parameters in a different way as a way to survive. As can be seen in the adjacent table of diagrams and pictures.

BALANCE AND URBAN MODEL - LINK BETWEEN THEORY AND UTOPIA

It is important to understand this balance and push and pull when applying a urban model because they define the context of each city and neighbourhood making the design applied to be customized with context of the culture and lifestyle of each place.

Through my project I want to adapt walk-ability in terms what it means to the city of Delhi. Thus, acknowledging hawkers, street vendors and informal economy of a place and neighbourhood and take them into account when designing a pedestrian network as they thrive on them. Also, taking into account that street vendors and hawkers are like service points to pedestrian under the Indian sun as gas station on a highway is to a car. This is one of the many considerations that Indian context brings in.

PLACE

PLACE	OSAKA, JAPAN	SINGAPORE	BOGOTA, COLOMBIA	SWEDEN	NEW YORK CITY
REASON OF SELECTION	how to use old infrastructure with new technology	economic boon lead by car-usage growth	global south; social spatial inequalities; priority given to people and public transport	road safety & human scale considerations	extensive car-usage and public spaces
TRIGGER (WHO)	engineers & planners	Government policies	Mayor: Enrique Penalosa	traffic safety strategist	commissioner of department of transport: Janette Sadik-Khan
SPHERE (WHAT THEY DID)	implementation of new high technology trains carriers on old rail lines using old stations creating higher opportunities and choices to travel	many economic and spatial policies was implemented by the government to reduce car's on road and as a choice of transport mode	implemented bus rapid transit systems from favelas (slums) at the periphery to inner city, also giving it a higher priority and dedicated lane system	implementation of policy reducing speed of the car called vision zero	proposed as temporary conversion of large traffic inter-section like Broadway street and time square into pedestrian only zones as an urban experiment
WHY THEY DID SO	to use the existing resource as way of cost and implementation time reduction	to control the growing car culture	to increase social equity in the city and increase usage of public transport	to reduce fatality by road accident as the at impact of collision is less also giving time for driver to react	due to lack of open public spaces and deteriorating urban environment and life
SPATIAL EFFECTS					
APPLICATION IN DELHI?	there is alreeady ample infrastructure resource in Delhi which are under-used or abused. Delhi's roads occupy 21% of the city land; there is sub-urban rail that is only used for goods	Delhi is going through the same car culture surge as in 1980s Singapore did; government is already removing subsidies on oil consumption and therefore could implement stronger policies on car usage by using the carrot & sticks implementation as used in Singapore; a method that has worked money loan systems for housing and education in India	the technology was developed in Delhi primarily but because of implementation and site choices faults didn't succeed, hence the road selected for implementation and the density and typology it connects should be kept in mind	seeing the fatality rate is rising in Delhi it is must that we think about road safety; speed limit and lane separation methods are only possible with parallel policies connected to car reduction	this method can be only adopted once public transport becomes more evident on the road and there is car-usage reduction; at the same time using the method of implementing an idea as an experiment works in a better way at the time of acceptance of the idea.

The case studies of good practices has been done as one of the methodology to understand the issues with implementation, who implements them and how can they be done.; with a critical outlook on how they can work in Delhi. Thus, giving an outlook to how the project should be framed and what are other elements are needed to support the design - strategy, phasing plan and policies both spatial and economical to determine the end products of this project.

TECHNOLOGY & CONTEXT

Bogota & Curitiba - BRTS for social equity

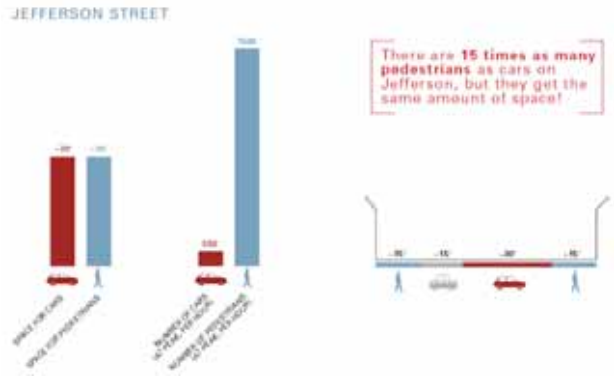
Randstad - Rail, tram and metro connections to realize the Randstad development zone

Caracas - Rope-way for social equity working with the topography of the region that had favelas.

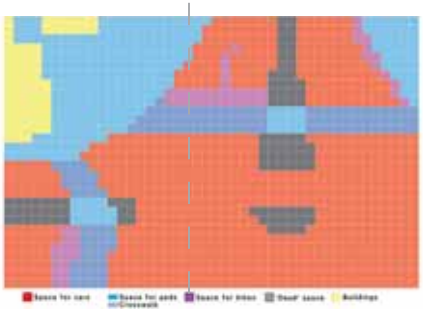
Another part of case studies of good practices is the technological aspects of the project which shows trends, usage and importance of using technology to inform the project. This is just a list of practices that has success stories in terms of its design and usage-ability as per the context. This segment is important to reflect on what technology should be develop to serve the Delhi's context and its spatial implications.

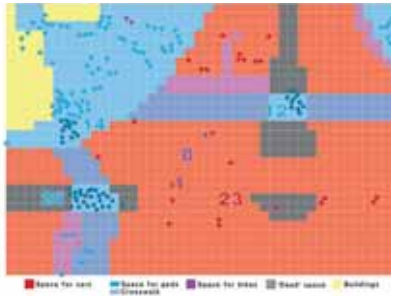
This segment discusses the different spatial analysis and arguments that can be used for implementing pedestrian friendly and sensitive design. This is crucial as many times implementations and design of pedestrian systems in India have been fought against and ridiculed as being to liberal with space, whereas the numbers using walking as a mode is higher than the number using private - motorized traffic. Therefore topic of walk-ability should have sound reasoning in the Indian context. Thus, making it an important part of my design process.

1. Jan Gehl's mode usage vs space allotted diagram and the distance that can be covered by pedestrian and how the activities should be linked. source ghel, jefferson street

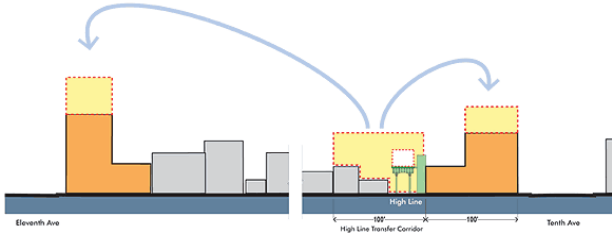


2. Arrogance of space a method to reduce motorised traffic by seeing the pattern of each mode and space it covers and actually required compared to mammoth infrastructure that is built for it. source: copenhagenize.com

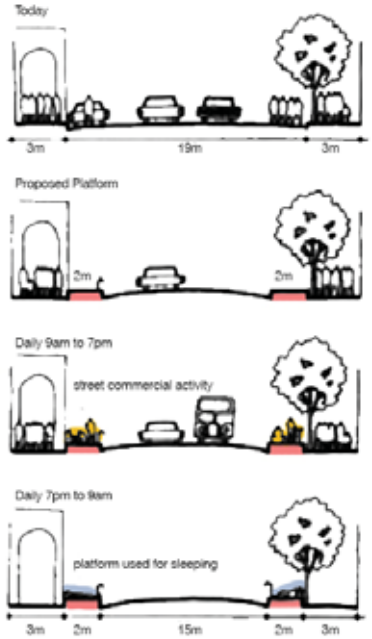


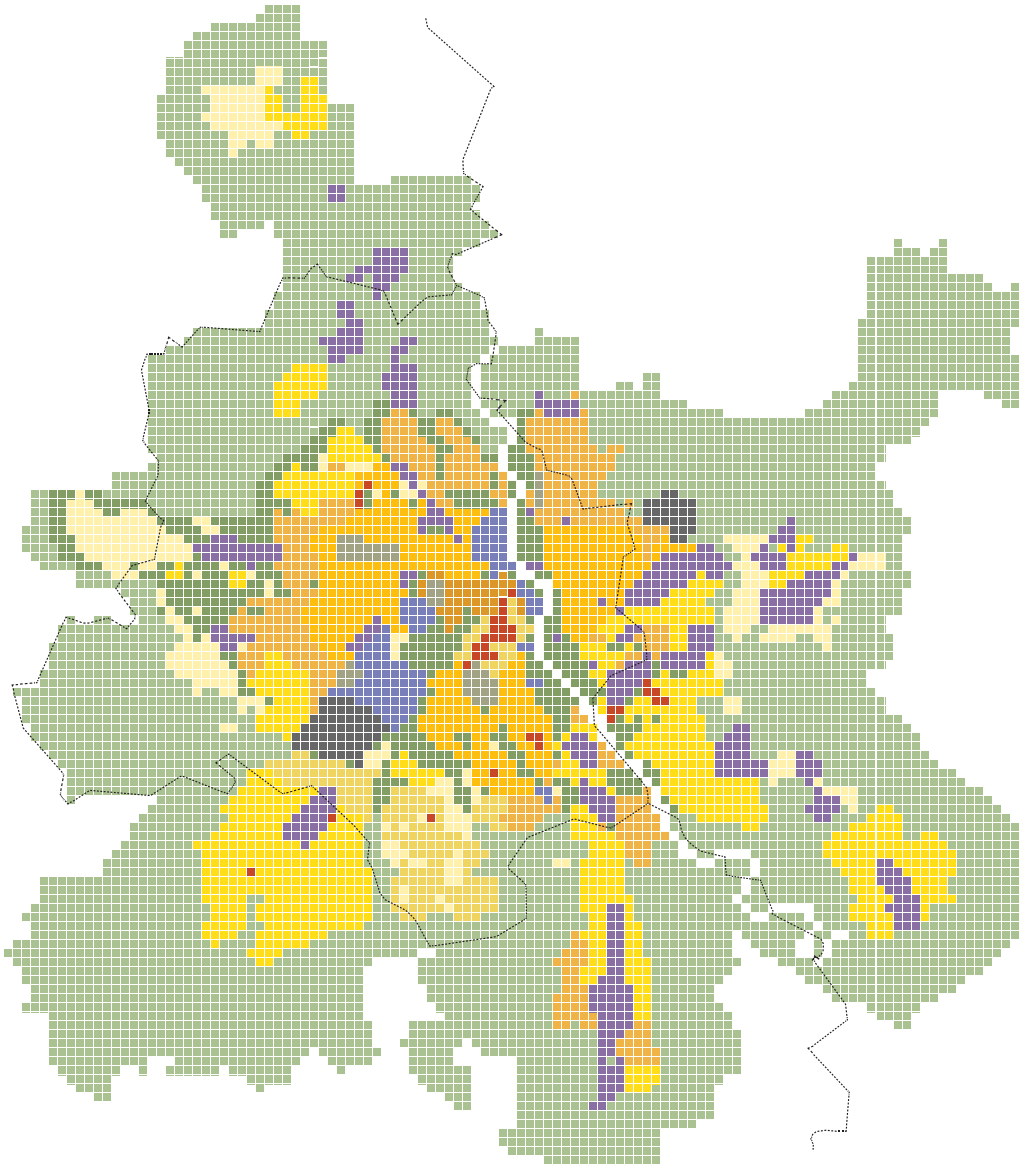


3. Economical: Funding and possibility to execute the New york highline in a real-estate hungry city. By selling the surplus build-up that can be made if highline is removed to the new developments coming around. source: New york planning department



4. Charles Correa's dual usage of footpath to accommodate hawkers and homeless in Mumbai. The function of the large pedestrian way changes from night to day and also gives an area to hawkers that provide service (goods and refreshments) to the pedestrians.





Delhi Land-use 2011; source author adapted from DDA,2007

MODE OPTION

BUILDING TYPOLOGY

Slum and resettlement colonies

Old city

post - independence

green fields

villas

Lower income

Middle income

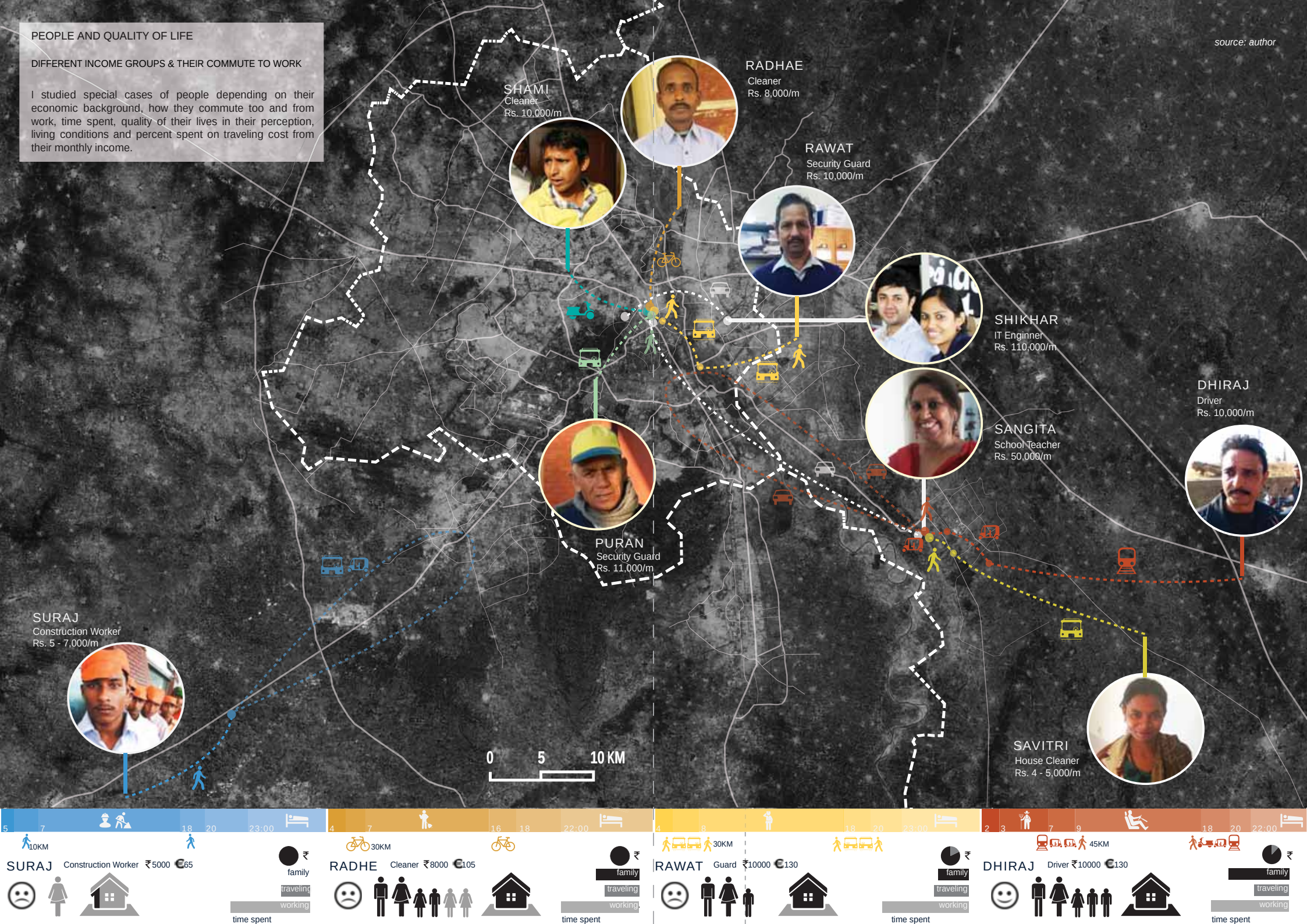
Higher income

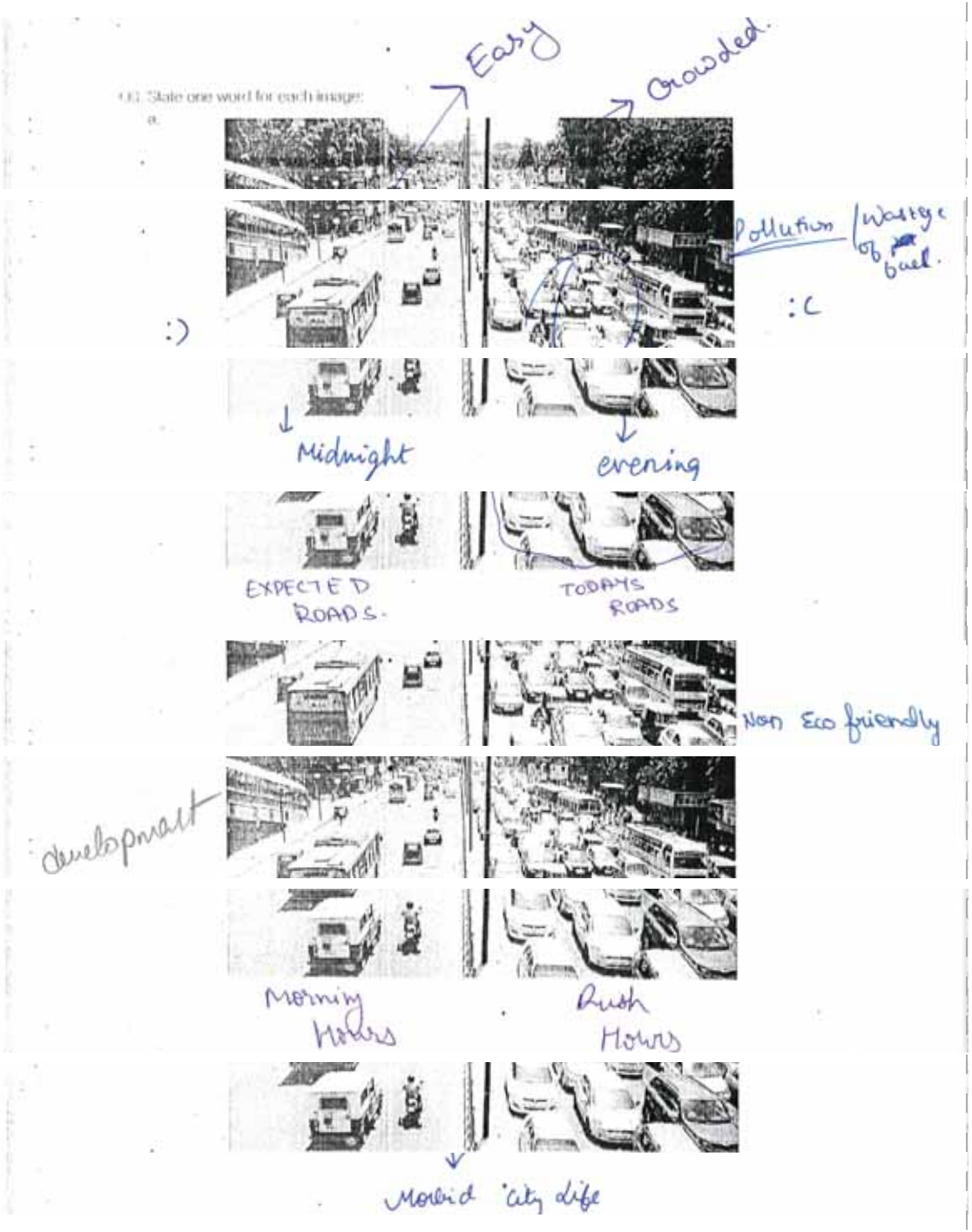
PEOPLE AND QUALITY OF LIFE

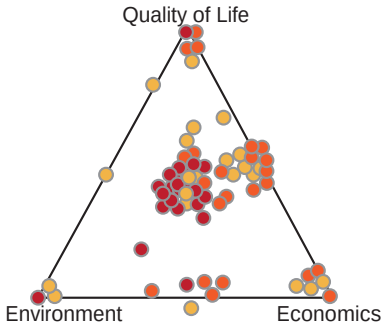
DIFFERENT INCOME GROUPS & THEIR COMMUTE TO WORK

I studied special cases of people depending on their economic background, how they commute too and from work, time spent, quality of their lives in their perception, living conditions and percent spent on traveling cost from their monthly income.

source: author







- you
- Delhi's Outlook
- What should be Delhi's Outlook

source author

I conducted a questionnaire in the summer of 2014 of people's perception of their daily commute in school (St. Columbus), offices (Schenck RoTec, Noida; Dhampure sugar Mill, Delhi) and Localities of greater NOIDA. With total questionnaires filled 156.

Aim of the Questionnaire: To understand people's perspective regarding Indian cities and its many dualities especially on the aspects of mobility and different strata's of society.

As a conclusion I am putting two drawings, one shows what people think their quality of life should be and where it is going and second the dual perception of the same road indicating the absence of realization to the urban environment and urban decay felt during the commute.

Delhi's Indraprashta Marg (Road) - Central District; source author

LOWER INCOME GROUP **55%** HIGHER INCOME GROUP

22.1% 38.8% 31.4% 36.2% 29.3% 28.4%

₹ for 10 KM 5 5 12 15 20 25 50 89 151

TRANSIT MODE SHARE

32.3% 4.4 5.1 0.5 26.9 13.9 2.7 9.1 2.3 2.7

INFRASTRUCTURE SHARE AND DEVELOPMENT EMPHASIS

lack of infrastructure

accessibility

mixed traffic and lack if development priority

target audience mis-match

petrol subsidy & cheap model availability

source: author

DESIGN GOAL

GOAL : UTOPIA TO DESIGN

The design goal from my project comes from my utopia of walk-ability and the network of high-speed and pedestrian network combinational works. Thus the diagram below suggests. The aim is such to provide the city with affordable and accessible public transport network (especially for the socially and economically marginalized group) and reduce car usage which is unsustainable both as a mode of development and environmentally.

Thereby the project requires a critical look on Delhi's transport infrastructure on a strategical point of view. To insure usage of public transport for longer distances and pedestrian pathway connecting to these high speed link for dual purposes, as a support to the network & safer and accessible exchange within the neighbourhood.

Thus, a re-interpretation of the utopia of this project where the peripheral high speed transfer of the districts results in strong public transport link connecting the various functions to the areas where lower income group stays. And walk-ability of the districts results in neighbourhood level intervention by down-sizing extensive infrastructure for car traffic into pedestrian only zones which cuts across socially marginalized groups and gated communities and further connecting to the public transport network. Hence trying to achieve a balanced urban transformation.

LINK BETWEEN GOAL AND *RESEARCH & THEORY*

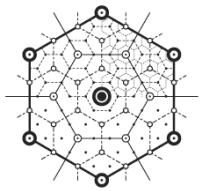
The end products of my project is in four parts as it's a multi-scalar issue and how should it be implemented:
1. Transport strategy that is affordable and accessible for national capital region of Delhi.
2. Spatial look of this strategy at a neighbourhood scale
3. A phasing plan for the strategy
4. Policies needed to aid the Strategy.

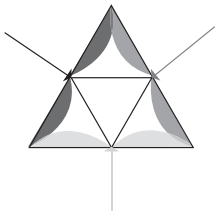
DELHI

Policy Package & Phasing Plan
Literature Review & Context Study

Strategy : City Scale
Technology and context
Literature review
Perception of commute
Ripple effect of Utopia

Design: Neighbourhood Level
urban models: Functions & connections
Case studies: Space and design analysis
Case Studies: Different income groups
Ripple effect of Utopia





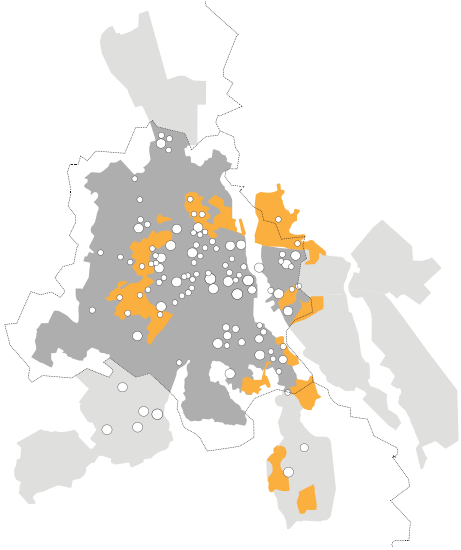
Theoretical Framework

Utopia : walk-ability

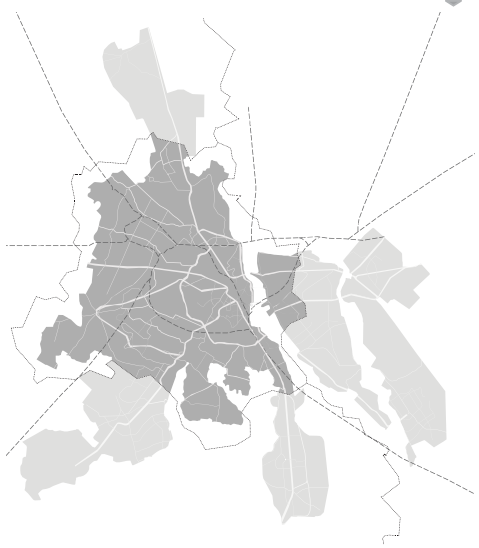
Utopia : peripheral network

Utopia's Ideology

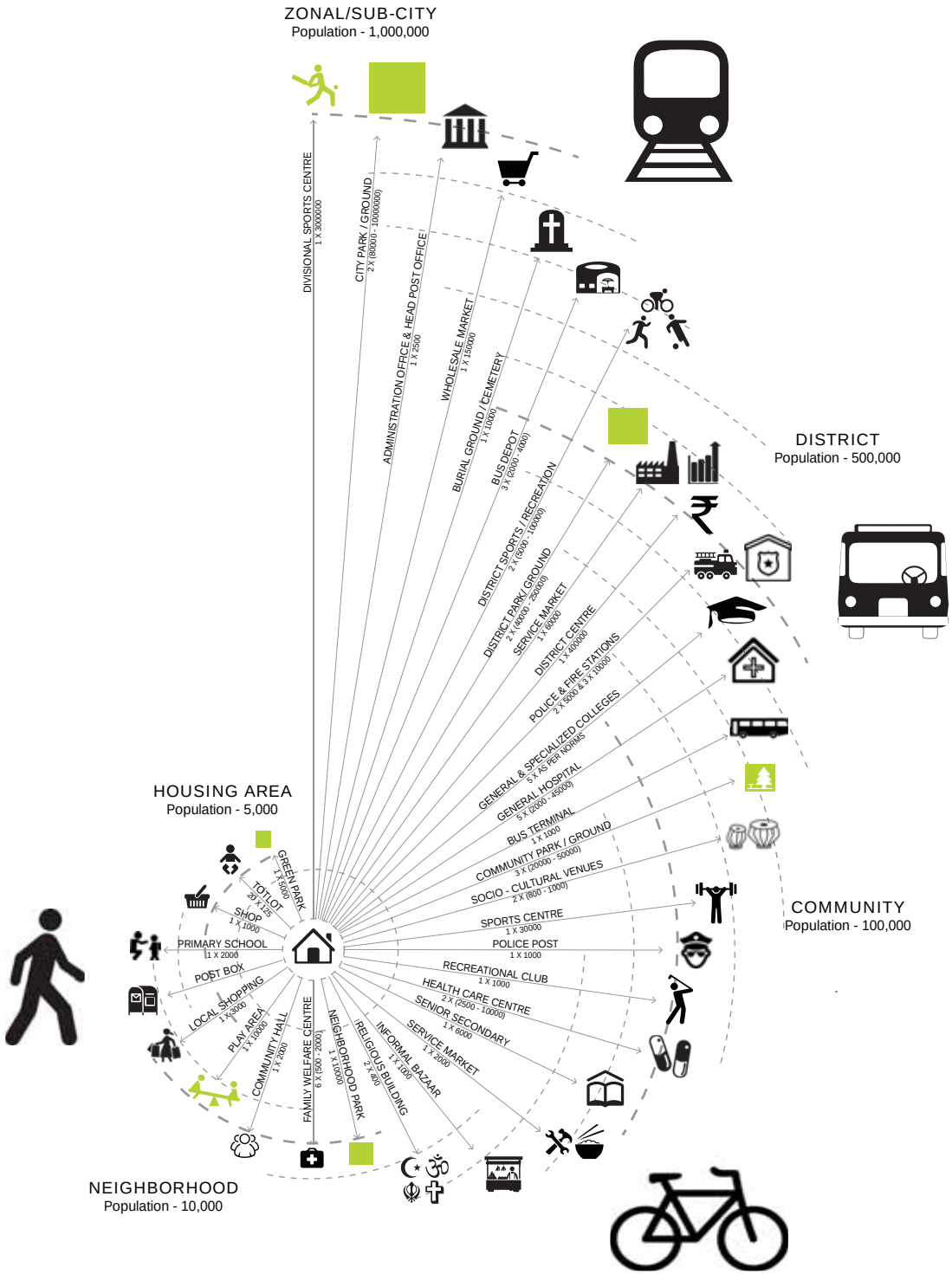
Socially Marginalised Group & Centre



Rail and Road Network



City's Framework: Context



AN URBAN TECHNICAL, PHYSICAL AND IDEOLOGICAL SOLUTION

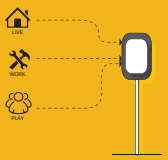
The project stems from accessibility to the city and its urban resources. So the main question to be answered first before going forth with design development was - Accessibility to what? and for whom?

This resulted in a further inquiry of why is the city not accessible.who is excluded and how are they coping or not currently. This has been answered in my research phase extensively, and the conclusion that I had put forward was that in Delhi resource shortage is not the problem but its allocation. The economically weaker population is not choosing to live far from work but are pushed out to city's shifting urban periphery with little or no resource. This urban push is in the plight to make the city aesthetically pleasing for achieving a *global city* recognition. Thus to me its a city of unbalanced urban transformation, where being a *global city* is far bigger goal than *right to the city*.

My choice for the project's design phase thus resulted to a utopia of a demand based allocation of mobility and urban space in its network and infrastructure . A utopia for walking which comes from the 55% of the population that walks in the unsafe and unaffordable roads of Delhi, a utopia where people can demand this right and yet not be labelled an activist but a citizen asking for the urban commons that they rightly deserves, a utopia of the diverse social mix that usually the city claims to be, a utopia for a better tomorrow, advanced yet humane.

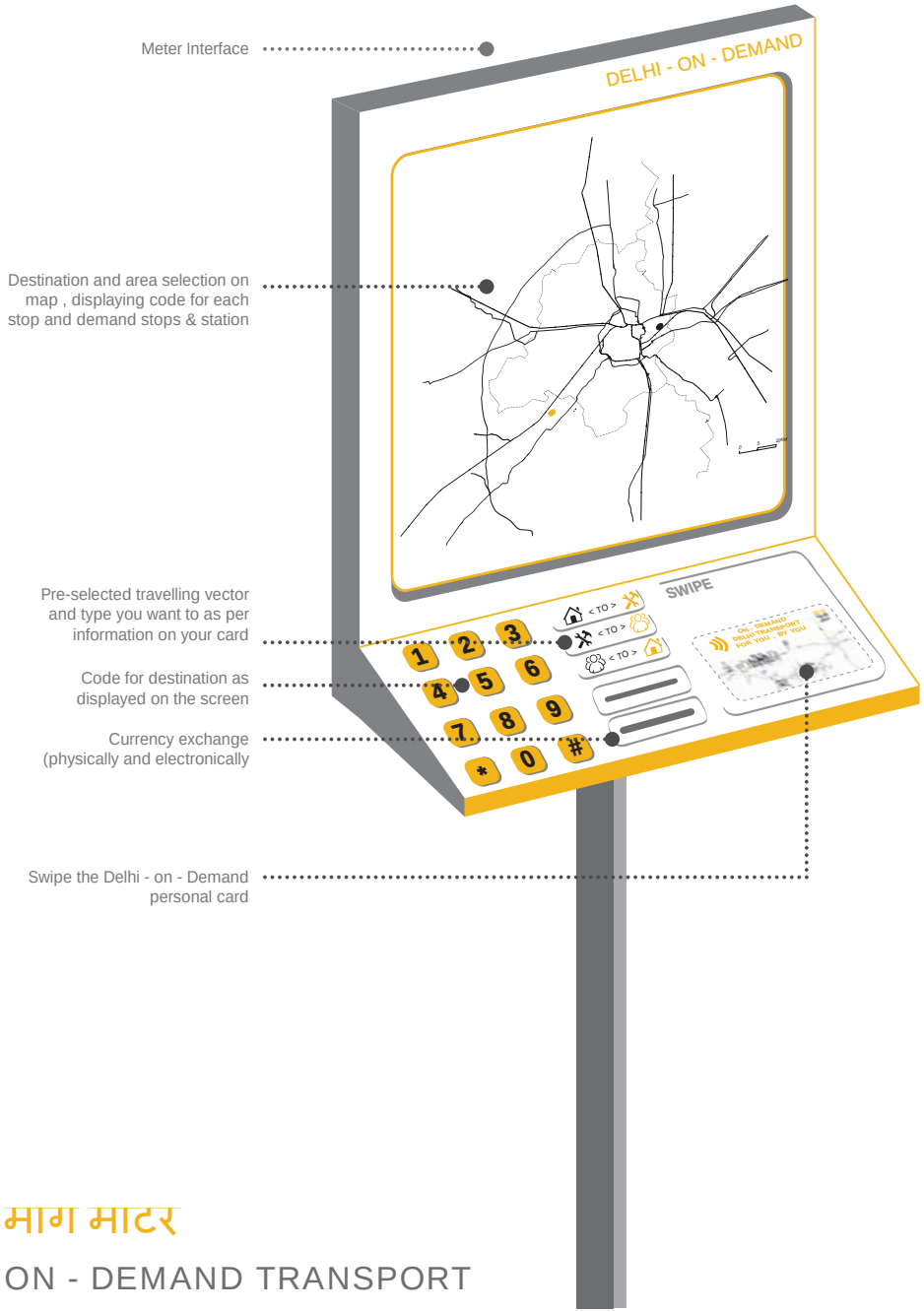
This was a long list of *utopias* which made the ingredients for Delhi-on-demand system. A system that is run by the people for the urban common, which links a pedestrian to the city and the city with its population. Instead of a general top-down allocation. The resource of transportation(speed scale), streets & networks (walking scale) and urban space (still scale). It integrates to an extent that one can demand ahead, their right to walking space to their destination before even reaching there, right to urban public space and right to public transport in the city network thus connecting from home(200m maximum accessibility range) to destination (60km maximum accessibility range) as per implementation of the technology.

This technology is meant to adapt itself with the given network and by understanding its capacity it delineates space for the intended mode (selected), also it in-turn adapts the urban system to change with the technology which is demonstrated ahead in the design chapters.



CHAPTER

TECHNOLOGY



मांग मीटर

ON - DEMAND TRANSPORT

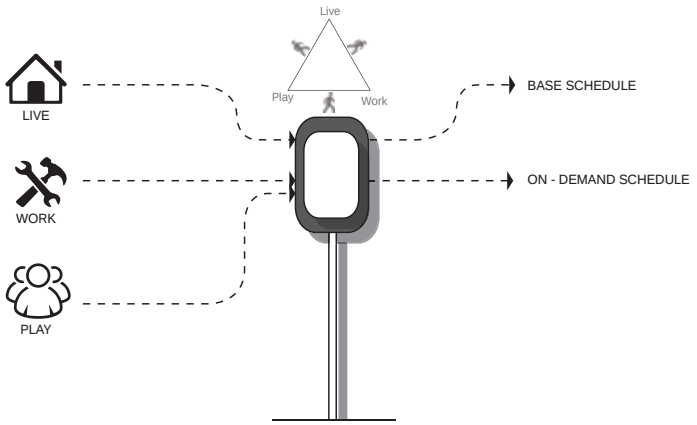
TECHNOLOGY

A Smart City? *Delhi-on-Demand* is system that aids the current smart city movement. This technology gathers the demand of commuter (speed or walking) and urban residents (public spaces) and interprets the spatial requirement and changes the city's infrastructure accordingly. Thus creating a real-time dynamic system of demand and supply. Making a city smarter by having a demand based supply chain management.

The technology sprouted from the current issues of poor allocation of urban resource and lack of accessibility for economically weaker residents to the city. Thus, the technology conceptualised is based on demands that can be made for travelling per neighbourhood, henceforth increasing the priority to not only provide public transport to those neighbourhood but increase its availability and frequency to the said neighbourhood as per its density vs demand output. This combines with the utopia imagined of walk-ability by making public transport available within a certain accessibility range per neighbourhood and filtering out private transport in each range circle. Thus a city(Delhi) that has an approximate diameter of 60km, is broken down to walk-able districts and neighbourhoods and intra city travel of distance larger that 2km can be travelled using public transport.

The technology helps to realise where the need is and how much should be allocated similarly. Hence bringing the resource closer to people who need it and demand it from the city.

The technology works on selected routes which have high connectivity and functionality as per the scale requirement and a tool box of design elements have been created as per route type, width and conditions that can to applied if different case scenarios. The design elements that are direct resultant of the technology are technical and symbolic type; whereas the precipitated resultants are those that initiate social, cultural, economical and service aspects which covers the soft aspects of urban design.



Electronic Card for 'Delhi - on - Demand' system

Methods of procurement and payment for the Electronic card

SPEED SCALE - CITY ACCESSIBILITY

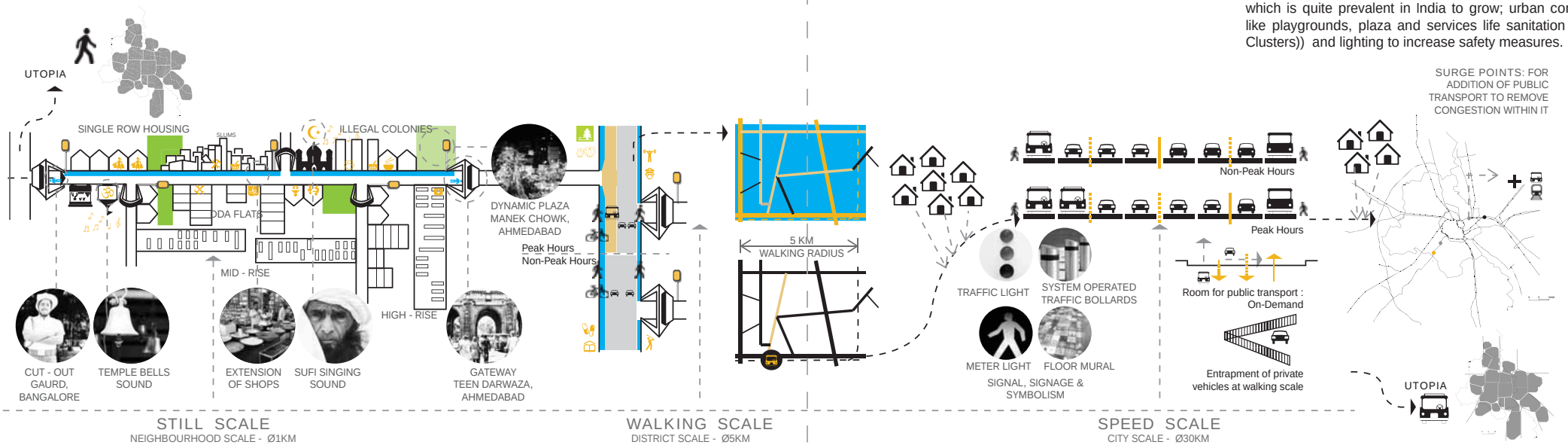
Delhi faces high intra-city travel as the centre of works are concentrated whereas the people have been displaced throughout the city especially the economically weaker on the fringes. This scale make accessibility an affordable and safer option through public transport and at the same time comfortable through surge point interventions and changing lane concept which are operated by the system which is fed by demand data collected per user. Thus its shows how technology operates the urban design and planning of the selected routes which allow higher speed of travelling.

WALKING SCALE - DISTRICT ACCESSIBILITY

Intra district connectivity is challenged at this scale. Delhi districts mostly contain each with more than a million population. Therefore it is essential for the system to react to travel and connectivity within districts which are mainly based on motorised traffic which are either privately owned or hired. The system thus tries to break the large district into neighbourhoods and splits the system into connecting these neighbourhoods via public transport which due to the range are difficult to walk; whereas neighbourhoods themselves are resource with dynamic walking streets connecting daily basic function and activities and inter neighbourhoods connecting non-daily but essential administrative and economical activities. It aides people with a walk-able solution to daily chores which are otherwise hindered with motorist and polluted which parking and / or physical obstruction of routes.

STILL SCALE - NEIGHBOURHOOD ACCESSIBILITY

The still routes are instilled within each neighbourhood to make permanent add-ons to the existing network which help in balancing the neighbourhood in its lack of social and cultural meeting places, space for informal economy which is quite prevalent in India to grow; urban commons like playgrounds, plaza and services life sanitation (for JJ Clusters)) and lighting to increase safety measures.



Conceptual route on 'Delhi - on - Demand' system

SCENARIOS

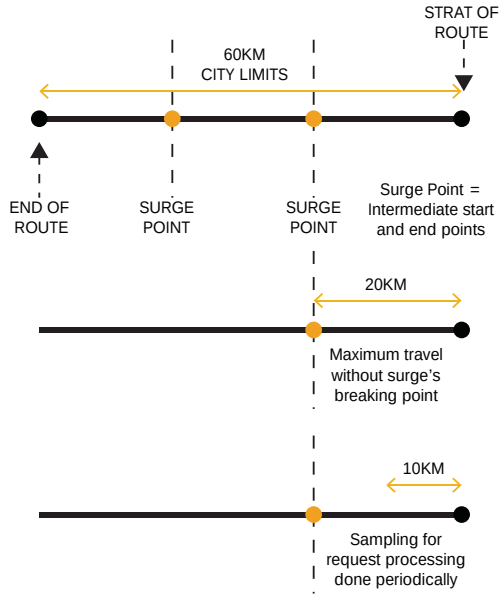
Conceptual example for start and destination with various conditions and reaction of system as per demand when it increases and decreases peaking at 9:00am

DEMAND

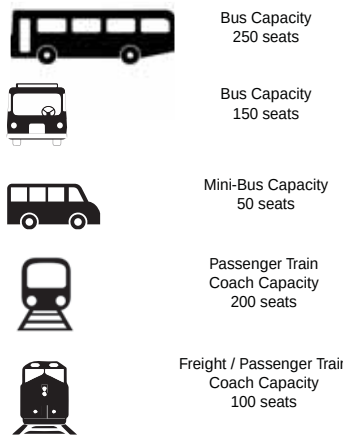
6:00 and earlier	Below Capacity Priority
6:30	Below Capacity Priority
7:00	Base Line
7:30	Base Line
8:00	Medium Priority
8:30	High Priority to first Surge point then Medium Priority the route later
9:00	High Priority to first Surge point and later route
9:30	High Priority to first Surge point then Medium Priority the route later
10:00	High Priority to first Surge point then Medium Priority the route later
10:30	Medium Priority to first Surge point then Medium Priority the route later
11:00	Base Line to first Surge point and later route
11:30	Base Line
12:00	Below Capacity Priority

RULES : CAPACITY CONTROLLED DEMAND FULFILMENT

PHYSICAL CONDITION OF SYSTEM



RESOURCE CONDITION OF SYSTEM



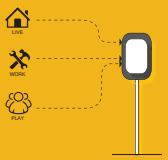
RULES PER CONDITION OF SYSTEM

HIGH PRIORITY: 75% and above capacity of maximum carrier in the mode type with demand made within half the distance to next surge point.

MEDIUM PRIORITY: 50 - 74.99% capacity of maximum carrier in the mode type with demand made within half the distance to next surge point.

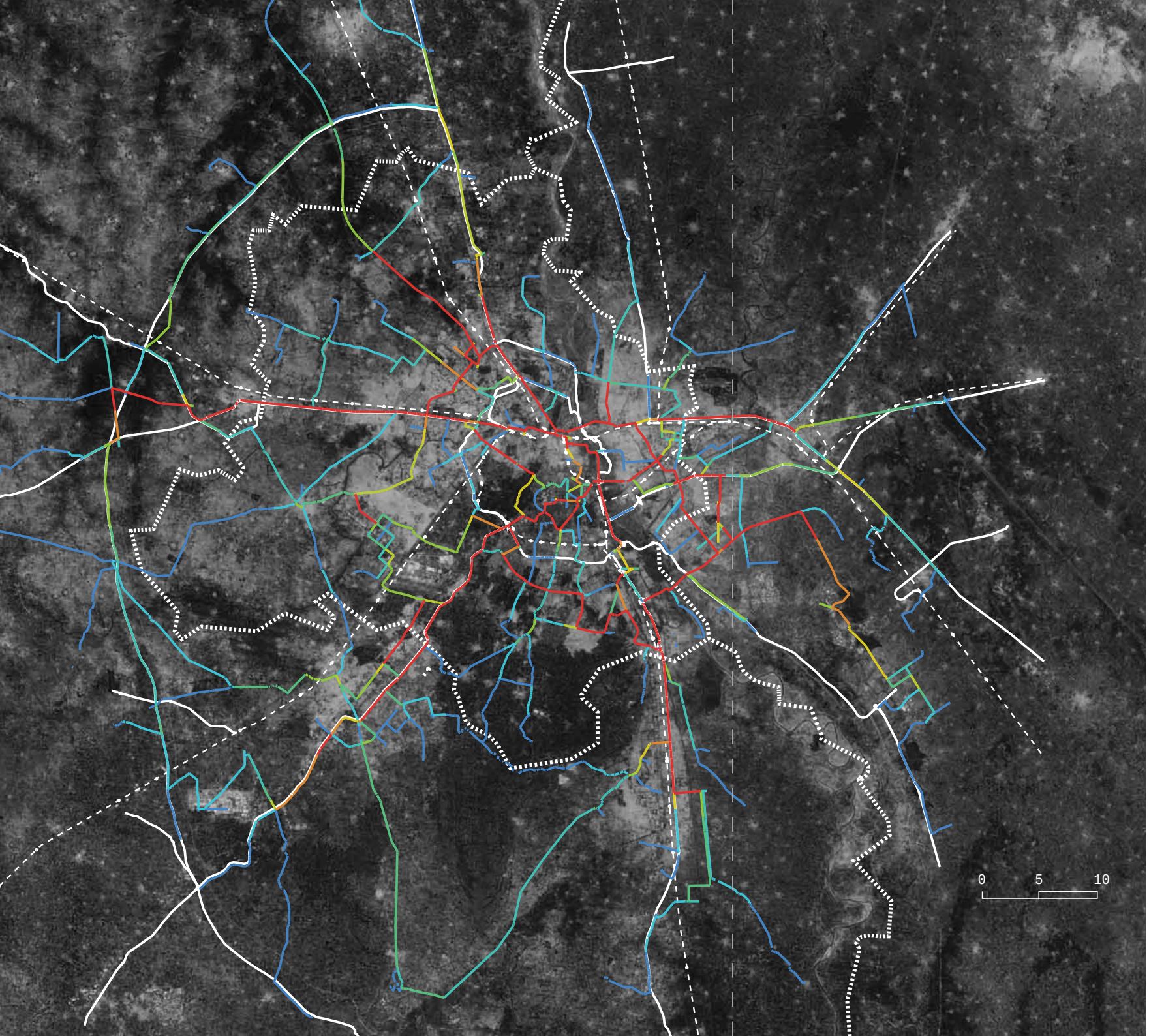
BASE LINE: 25 - 49.99% capacity of maximum carrier in the mode type with demand made within half the distance to next surge point. In this request the bus anyway runs every half in hour

LOW PRIORITY: Below 24.99% capacity of maximum carrier in the mode type with demand made within half the distance to next surge point. Also, the carrier of lower capacity is taken thus making demand for the mode used as 50%.



CHAPTER

ANALYSIS

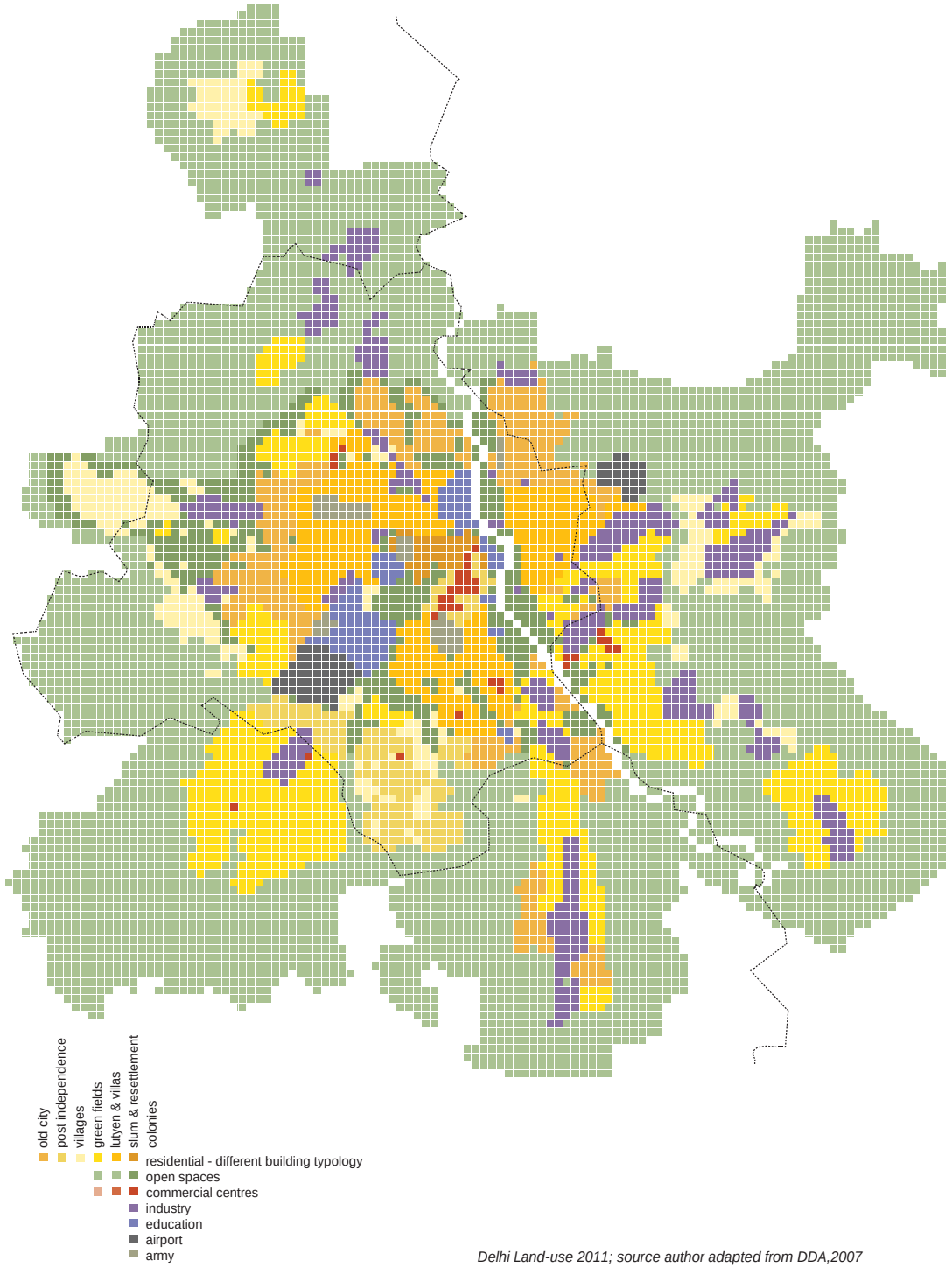


CITY OF DELHI
SPACE SYNTAX: TOPOLOGICAL CHOICE 50KM

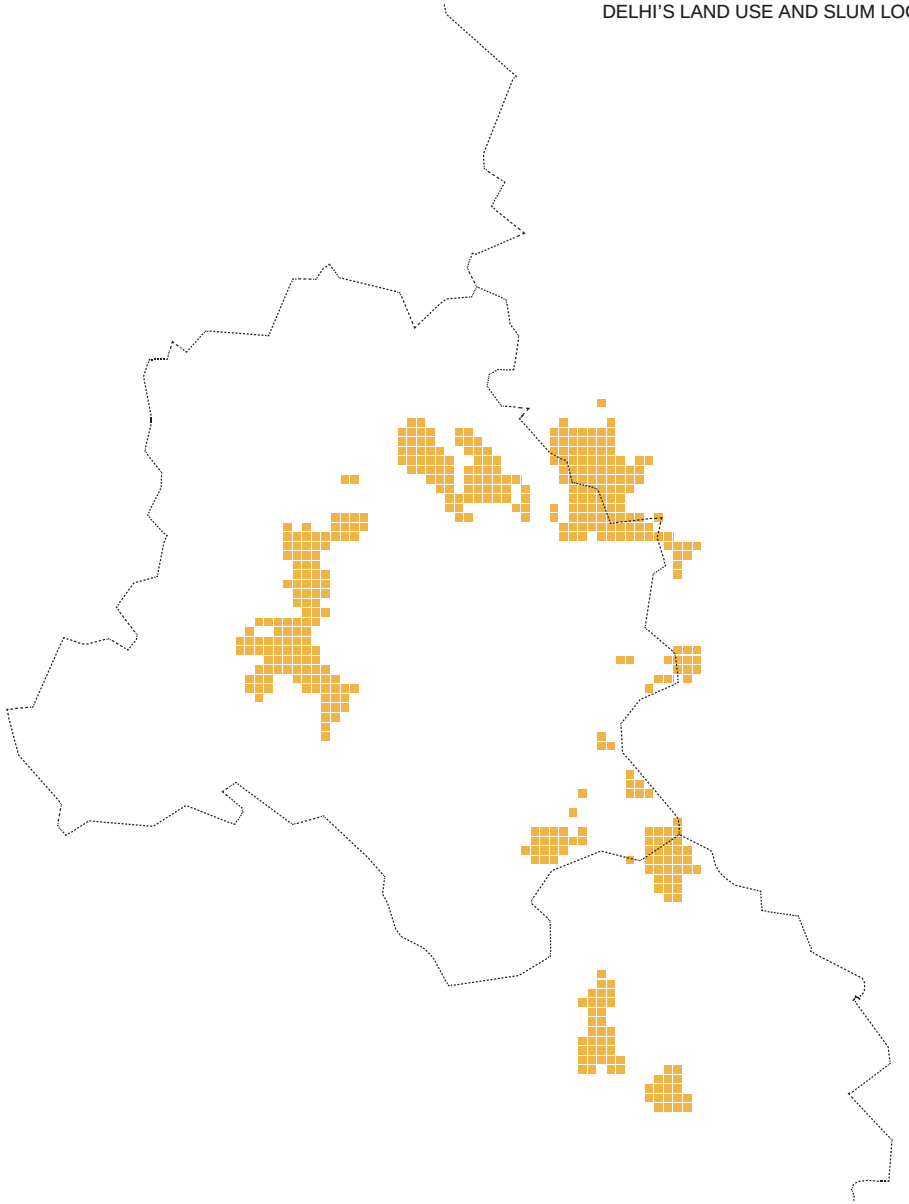
The city analysis was mostly covered during the research phase of the project, following are few key element and drawings that was considered as essential to developing a strategy - connectivity(space syntax), landuse, housing typology, economic mobility& centres and routes that are harmful currently for pedestrians and cyclist.

As the design revolves around providing accessibility to the city, especially for the dislocated of economically weaker sections, high density neighbourhoods, analysis of the above stated data / map helps in focusing the design around functionality, network and healthy urban environment.

Topological choice 50km superimposed on Delhi's rail and highway network



Delhi Land-use 2011; source author adapted from DDA,2007



0 5 10

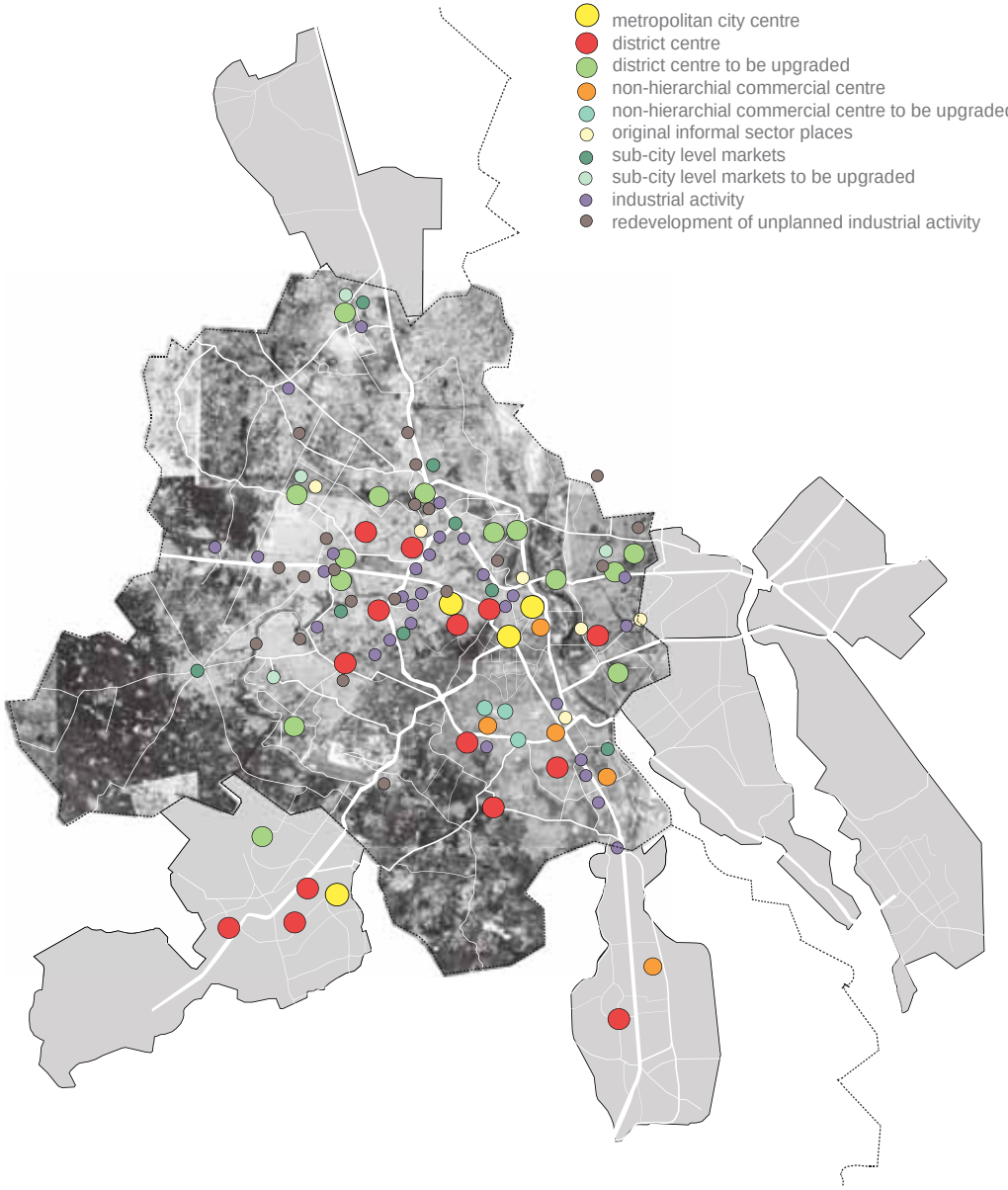
Slum Location 2011; source author adapted from DDA,2007

istrict	Area (km²)	Percent Share of Population	Population Density (per km²)	Percent Decadal Population Growth	Percent of Total Business Enterprises
orth-West	440	20.65	6,471	+60.12	17.33
outh	250	16.37	9,033	+50.27	14.16
est	129	15.37	16,431	+47.81	13.39
orth-East	60	12.77	29,395	+62.52	12.02
outh-West	420	12.67	4,165	+61.29	8.26
ast	64	10.57	22,637	+41.61	12.22
orth	60	5.64	12,996	+13.30	10.56
entral	25	4.67	25,760	-1.91	10.29
ew Delhi	35	1.29	4,909	+2.47	1.73
CT Delhi	1,483	100.00	9,294	+46.31	100.00

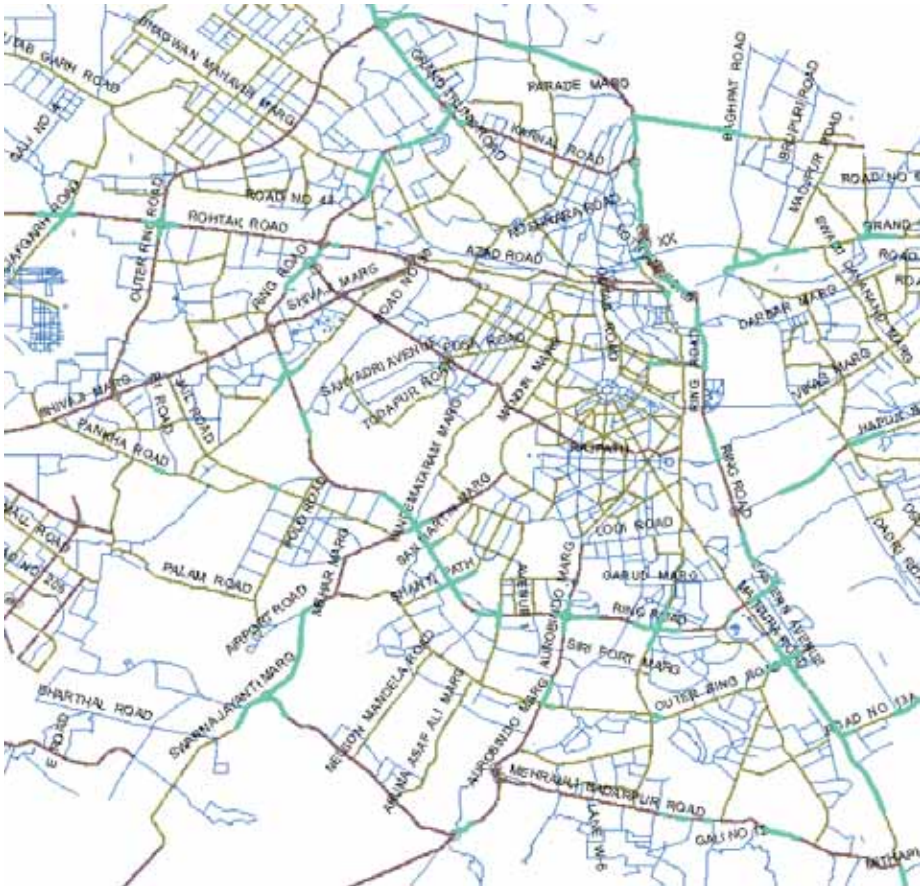
District wise area, population and economic statistics in National Capital Territory of Delhi; source author's diagram adapted from table Thakuriah, 2009

District	Total Jobs	Total Workers by Residence	Total Jobs to Worker Ratio	Number of Persons Usually Working	Main Workers by Residence	Persons usually Working to Main Workers
North-West	768,560	919,483	0.83	585,635	872,278	0.67
South	836,554	778,495	1.07	685,596	739,276	0.92
West	582,483	720,848	0.80	463,510	886,572	0.87
North-East	554,382	500,381	1.10	432,019	471,011	0.91
South-West	452,764	602,505	0.75	377,713	569,861	0.66
East	516,153	475,371	1.08	405,088	456,198	0.88
North	501,702	256,574	1.95	395,125	244,851	1.61
Central	467,082	223,843	2.08	389,495	213,307	1.82
New Delhi	358,779	67,596	5.27	45,871	64,426	5.36

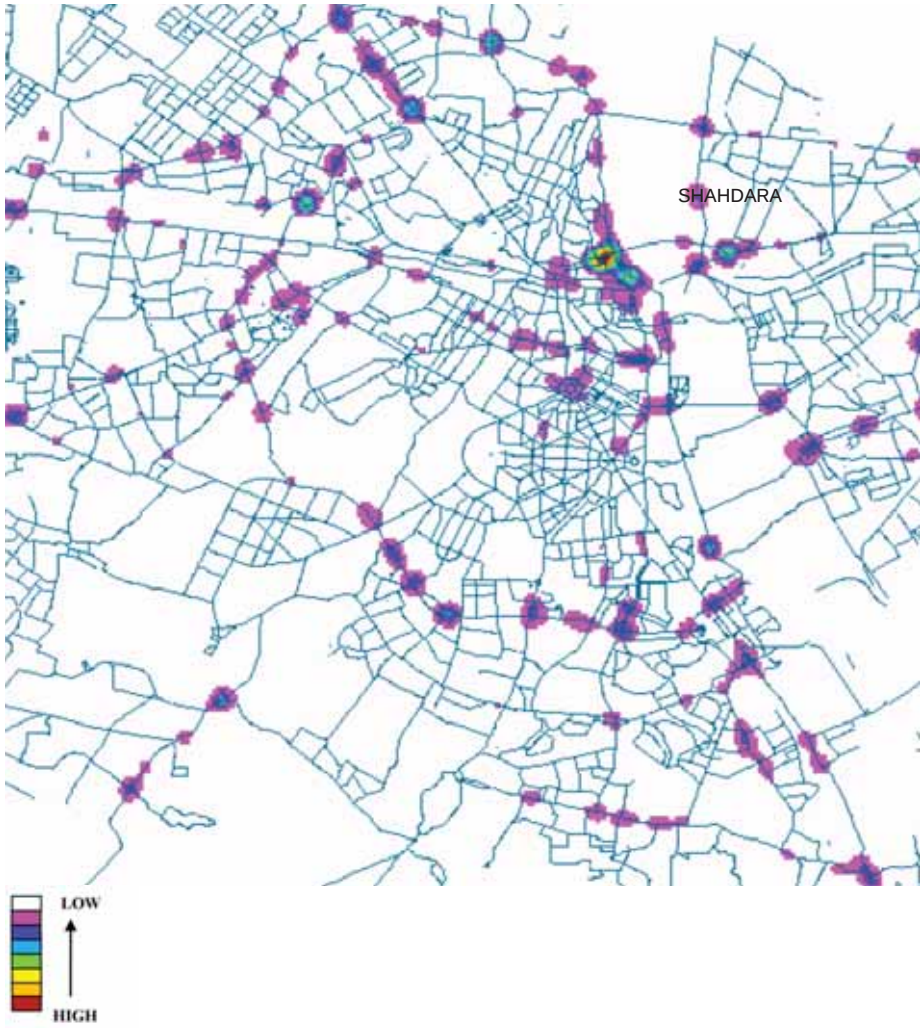
District wise employment statistics in National Capital Territory of Delhi; source author's diagram adapted from table Thakuriah, 2009



Delhi's transport network and different industrial and commercial centres, source author adapted from koshy ,2014-TU reporsitory



Critical Road sections for pedestrian accidents in Delhi, 2006-09
by Rankavat and Tiwari, 2013



Density map for pedestrian accidents in Delhi, 2006-09
by Rankavat and Tiwari, 2013

SHAHDARA'S NETWORK

Various tools of analysis has been used to understand the reality of the most densely populated district of India, which lies in North-east in the city of Delhi.

I looked into facts and numbers by various research papers and census of India to understand the demographic profile of the area and it's growing and working trends.

The study of *arrogance of space* was used to understand the priority and space given to each mode within this site.

Space syntax was used to understand the connectivity of he site within the district and its connectivity to the city.

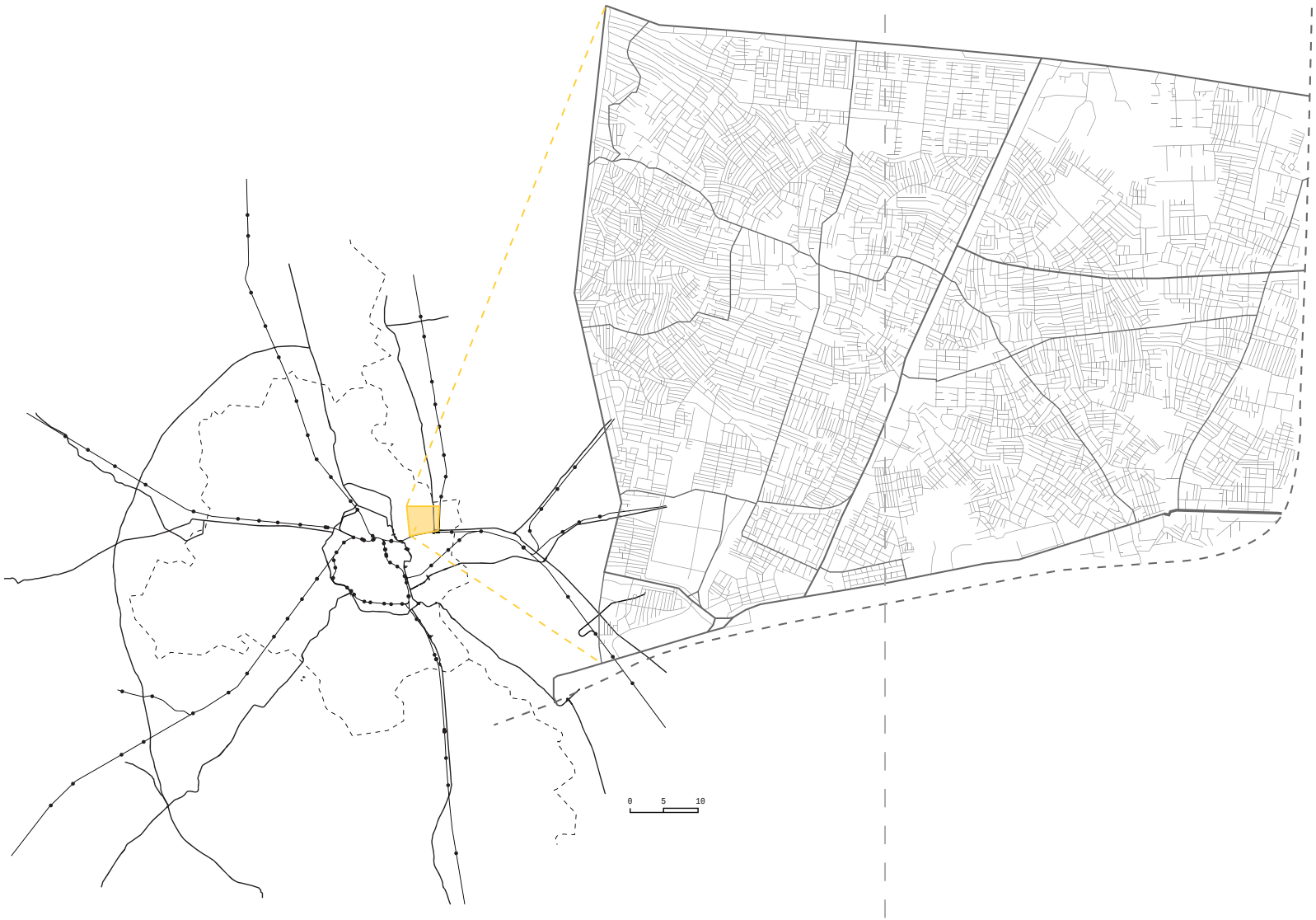
The study of functions in the site gave a broader view on the result of space syntax and also its limitations which were created by density and sometimes local function could be seen in interior streets which are not that well connected further outwards.

Leading to a comprehensive socio-spatial analysis of the site which forms the base on which the design is build on, which is further explained in the following chapters.

As discussed earlier in the technology chapter, the different scales where design and strategy is executed - speed, walking and still scale. To demonstrate this technology into design, three sites of 500m diameter was selected within the chosen district of 'Shahdara'.

The trial site 1 demonstrates speed scale interaction to the neighbourhood. The trial site 2 shows how the neighbourhood works within with the public transport and walking routes. And finally trial site 3 is where the design explains the walking neighbourhood and how life would change in the living environment.

District's Network map - Shahdara



DENSITY: Shahdara is not only the most densely populated in Delhi but also India, with population density accounted at 37,346sq/km (Census of India, Municipality of Delhi, 2011)

WORKERS TO JOB: Shahdara has highest population density and one of the lowest percentage of business enterprise percentage in Delhi (12.02%); whereas the job to workers ratio is again lowest in Delhi at 0.83. Making the resident travel further out of the district to find a job (Thakuriah, 2009)

HOUSING TYPOLOGY: Shahdara has mixed typology of JJ cluster (illegal housing made of temporary material), illegal colonies from the time of the 1947 partition, illegal housing colonies, mid-rise made by Delhi Development authority and new high-rises as gated communities

JJ CLUSTER AND ILLEGAL COLONIES (from 1947): More than 50% percent of the site faces housing in congested conditions which lack basic services and urban common (Bhavikar, 2003)

EAST DELHI MUNICIPALITY: The municipality that Shahdara falls under is the poorest in Delhi, which major resources diverted to south Delhi due to higher income households in that district. It faces maximum the poor allocation of resources in Delhi's image based planning. (Urban age conference LSE, 2014)

WATER ZONE: As being subjugated to poor resource allocation, the district also faces one of the slowest in water supply and sanitation services that is worsened by the high density. (Census 2001, check appendix for maps)

HISTORICAL RELEVANCE: Shahdara was resettlement from the time when Delhi became the Mughal Kingdom's capital and is considered part of *Purani Dilli* (Old Delhi)

SYMBOLICAL: Shahdara's name comes from Urdu language, in which it means 'doors of kings' from Persian language where shah means king and *dara* means doors. Thus symbolically linking to the design ideology of using a gate's system which is closing and opening of a object as per the demand made and thereby controlling the kind of traffic and type of modes.

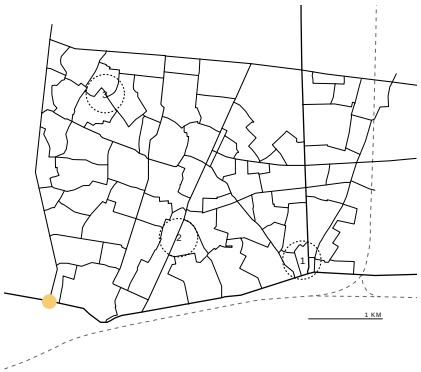
STATISTICS WISE REASONS

Statistically speaking the district of Shahdara is not only the most densely populated in Delhi but also India, with population density accounted at 37,346sq/km and an urbanisation level at 92%. Shahdara has a mixed typology housing with the settlement dating back to Mughal settlements in Delhi, yet the population decadal growth being highest in Delhi at 62%.

Its has a high working population which travels outward intra-city or to its various growing satellite cities for employment. And it has one of the lowest percentage of owning a motorised vehicle. Thus, making it an ideal experiment cell for a new technology that instigates public transport and walking, which combines well with its high ownership of mobile phones unlike other poorer districts.

	NORTH EAST	NEW DELHI	CENTRAL	NORTH	NORTH WEST	WEST	EAST	SOUTH WEST	SOUTH	NOIDA	FARIDABAD	GURGAON	GHAZIABAD
Demographic													
Population	2,240,749	133,713	578,671	883,418	3,651,261	2,531,583	1,707,725	2,292,363	2,733,752	1,674,714	1,798,954	1,514,085	4,661,452
(%) in 2011	26.73%	-25.35%	-10.48%	13.04%	27.63%	18.91%	16.68%	30.62%	20.59%	39.32%	-18.03%	-8.81%	41.66%
Population density (persons per sq km)	37,346	3,820	23,147	14,973	8,298	19,625	26,683	5,445	10,935	1,306	2,298	1,241	3,954
Sex ratio	849	792	842	827	820	830	843	784	799	841	840	873	860
females per 1000 males - (%) in 2001	1.43%	-0.13%	-3.44%	0.98%	-0.24%	-2.12%	-0.35%	-1.38%	-0.09%	2.94%	1.45%	0.23%	2.38%
Geographical Area (km)	60	35	25	59	440	129	64	421	250	1442	2151	2714	1148
Level of urbanization	92	100	100	94	91	96	99	87	93	37	56	22	55
(%) in 2001	203.63%	75.13%	571.14%	360.78%	387.63%	2031.11%	341.07%	798.97%	302.16%	161.54%	209.44%	-72.25%	-10.68%
Population decadal growth rate	62.9	6.2	-1.5	13.8	60.9	48.6	43.1	61.4	50.9	41.5	48.6	44.9	47.2
(%) in 2001	-48.69	-63.53%	-70.00%	213.64%	-23.30%	-1.62%	-32.66%	2.16%	-2.49%	-11.13%	-2.41%	37.31%	13.19%
Main working population	622,443	56,471	195,978	283,583	1,135,126	839,621	555,026	749,995	869,086	458,492	495,316	487,441	1,252,911
male	566,028	44,916	169,963	248,547	983,392	708,262	469,593	636,474	735,535	377,875	422,503	400,386	1,071,029
female	56,415	11,555	26,015	35,036	151,734	131,359	85,433	113,521	133,551	80,617	72,813	87,055	181,882
Non working population	1,580,238	82,463	374,946	591,532	2,467,994	1,668,923	1,129,654	1,497,606	1,807,536	1,079,006	1,230,504	969,716	3,161,107
male	594,072	31,002	130,200	217,427	938,503	623,642	420,549	578,606	691,836	446,830	489,177	384,234	1,257,219
female	986,166	51,461	244,746	374,105	1,529,491	1,045,281	709,105	919,537	1,115,700	632,176	741,327	585,482	1,930,888
Marginal worker population	38,943	3,070	11,396	12,863	53,419	34,699	24,666	45,357	55,307	110,617	83,913	57,275	267,627
Education													
Literacy rate	82.8	89.4	85.3	86.8	84.7	87.1	88.8	88.8	87	82.2	83	84.4	85
(%) in 2011	-1.08%	1.92%	-2.79%	2.86%	0.91%	-1.00%	2.00%	0.92%	2.27%	9.31%	9.99%	5.16%	13.94%
Adult literacy rate(age +15)	74.3	81.7	77.8	78.2	78	81.9	83.4	81.6	80	64.7	66.4	59.9	66.4
Gender Gap in literacy rate	15.8	12.3	6.7	10.1	13.6	9.9	10.4	14.3	14.3	27.6	25.2	28.4	21.8
(%) in 2001	-23.30%	-6.11%	-30.21%	-9.01%	-17.58%	-13.16%	-28.77%	-17.34%	-11.18%	-29.77%	-21.25%	-13.94	-22.42%
Household and Living condition													
Number of households	406125	33208	119639	180044	736253	533221	358937	494439	574133	327090	358919	326428	850676
Living in own house	86.8	79	82.6	88	90.2	92.2	88.9	90	91.2	93.2	95.6	96.2	90.5
Household who own mobile phone	72.1	82.4	82.6	75.3	71.5	79	79.9	82.6	76.9	48.7	55.2	66.8	52.3
Household who own motorized vehicle	33.9	38.6	45	32.4	36.8	46.9	42.5	41.5	38.3	27.4	31.2	35.5	31.2
Household who own televesion	81.9	84.5	89.9	79.9	82.2	86.4	83.9	85.7	78.9	55	61.7	67.5	61.8
Household with Toilet facility	98	95.8	97.4	94.3	90.8	97.1	96	92.1	85.8	51.5	59.2	65.5	82.5

Census comparison between Delhi's districts and its satellite cities; Census of India,2011 & UNICEF



A point location within the district(Shahdara) chosen(above) shows how massive infrastructure for motorised traffic is dropped down in a place where everyone only affords to walk.

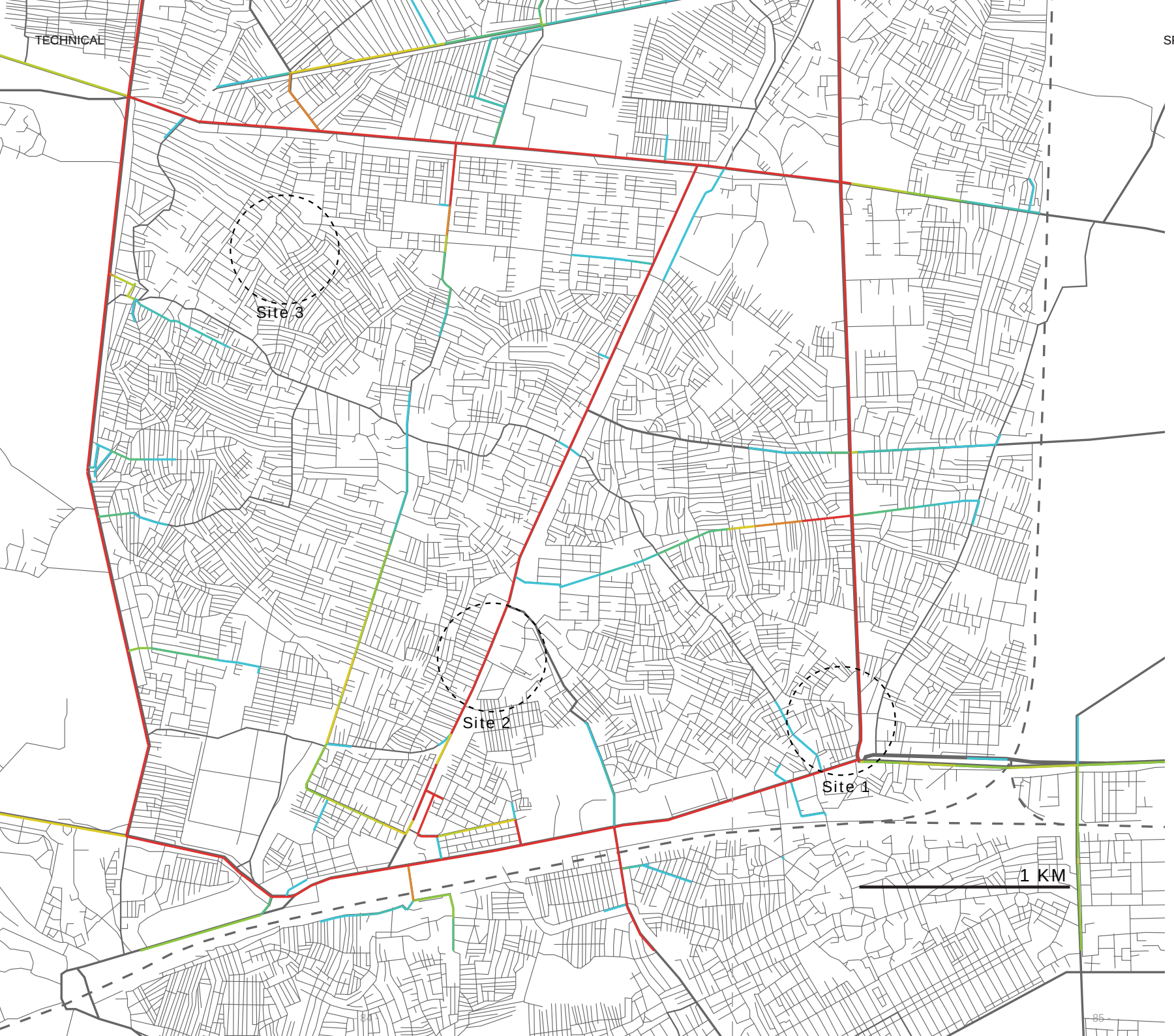
This creates a huge highway to be occupied by pedestrians at peak hours in traffic and also a situation which is not safe for them due to the high speed traffic moving on that road.

Also it displays the disconnection of the location to public transport which is to where it is needed and where they are located on such routes.

SPACE SYNTAX - TYPOLOGICAL CHOICE 5KM

Through space syntax the chosen district ‘Shahdara’, shows the speed routes of the area which acts as more a through road than as binders for within the district. These roads highlight important roads for the district as well as surrounding areas that helps connect to central Delhi.

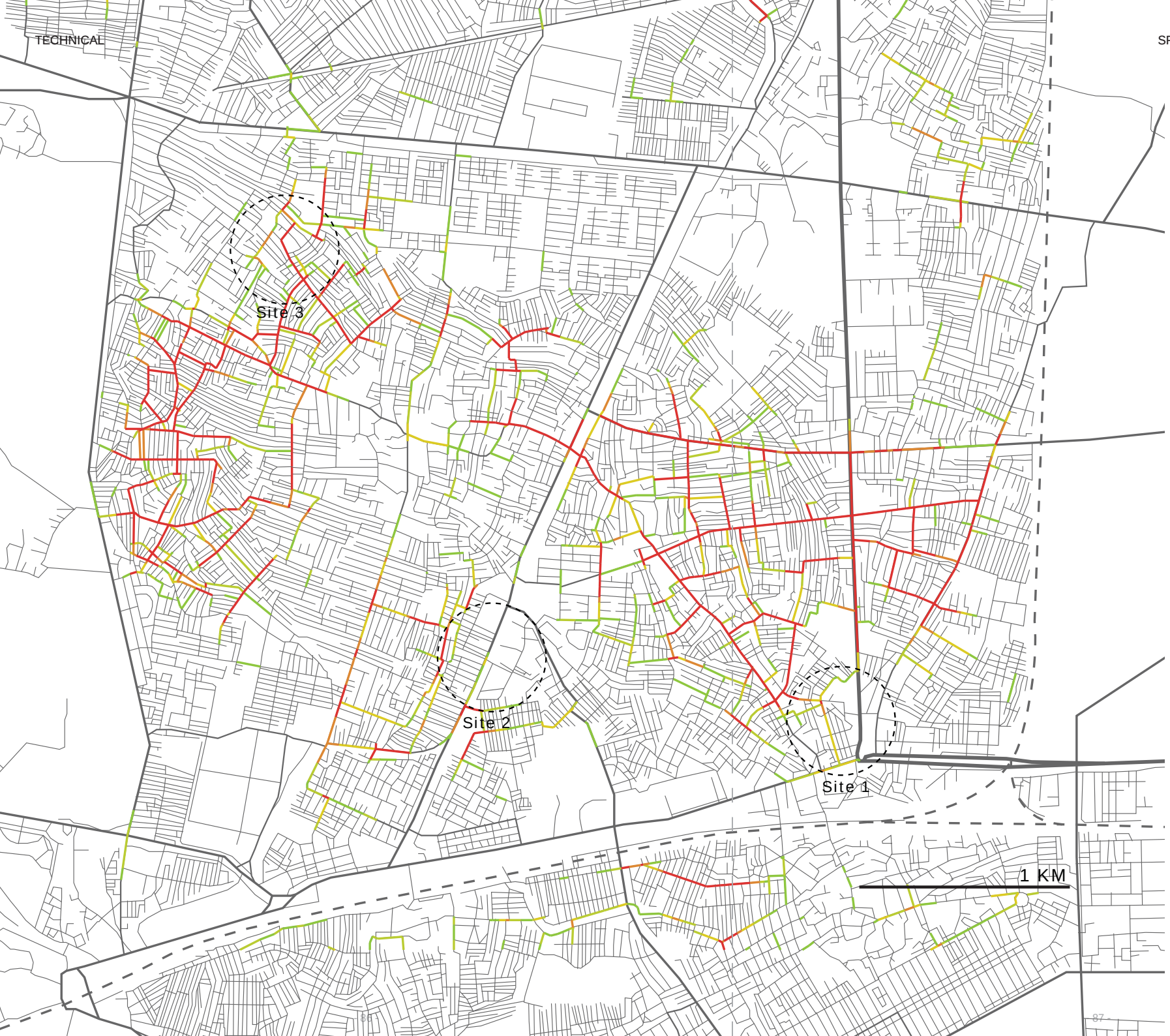
The roads are encroached with activities that have a large catchment area(maximum 30km) and serve residents even outside the neighbourhood.



Space syntax: Typological choice 5km
District’s Network map - Shahdara

SPACE SYNTAX - TYPOLOGICAL CHOICE 500M

A local integration in space syntax of the district revealed the essential connectors within the neighbourhood. These roads are speed routes for vehicles and short-cuts for pedestrians. They serve as connectors for mainly the residents of the district of 'Shahdara'. Hence on these roads one can find activities or function which have a medium or small catchment area (0.2-5km) and make up the necessary resource requirement for the neighbourhood to function.



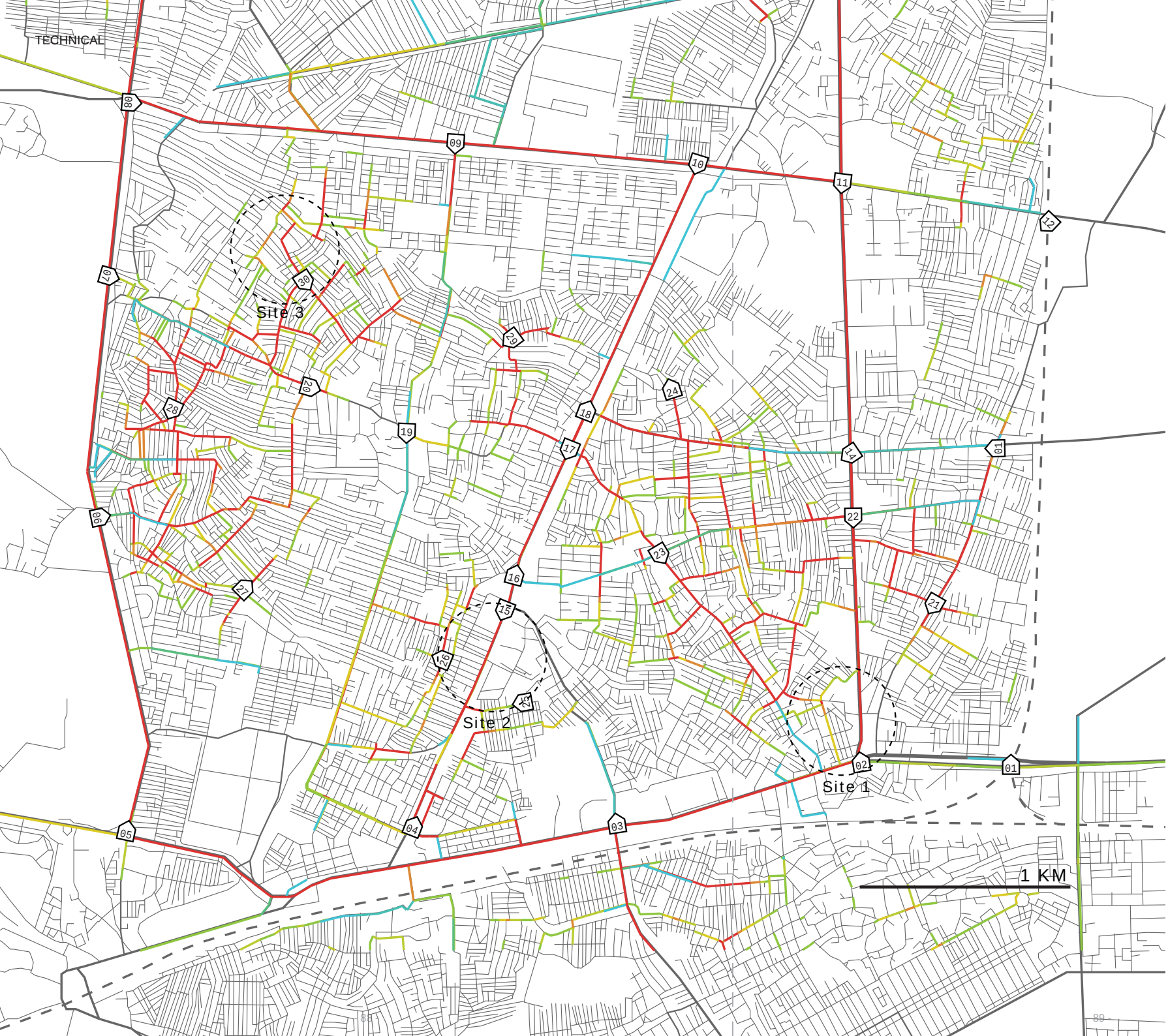
Space syntax: typological choice 500M
District's Network map - Shahdara

Arrogance of space is a study conducted to understand the ratio between usage and space given, through it one can understand the priority and hierarchy of each mode in the network and neighbourhood (urban space)

Through this studies I understood the spatial configuration of the district of Shahdara and realised that there is no room for a pedestrian in most streets and usually are left to make a pseudo shared street which is governed by motorised traffic as demonstrated in the following pages.

The study was re-purposed in the context of Shahdara, factors considered was the spatial usage by vehicular or non-vehicular traffic to the space given for either in the road/street design. For this various types of routes and sizes were considered to gage difference of street use vs their location in the district.

This study helps facilitate the understanding of function, their catchment area and how one accesses them in the current scenario.



Arrogance of space analysis locations
District's Network map - Shahdara


1


2


3


4


5


6


7


8


9


10


11


12


13

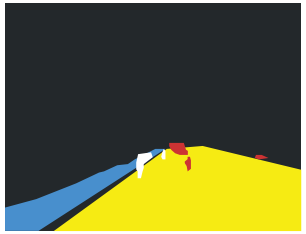

14


15

Non-Vehicular *Vehicular* *Space for Vehicles* *Space for Non-Vehicles*

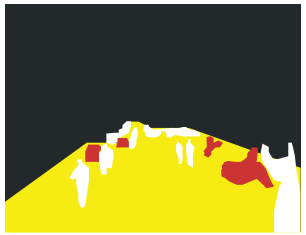

1


2


3


4


5


6


7


8


9


10


11


12


13


14


15

70% of slum residents in Delhi find commuting to work most dangerous aspect of their work (Hazard centre, 1998)


16


17


18


19


20


21


22


23


24


25


26


27


28


29


30

Non-Vehicular *Vehicular* *Space for Vehicles* *Space for Non-Vehicles*


16


17


18


19


20


21


22


23


24


25


26


27


28


29


30

Through this map one delineates the housing typology and the function distribution around it. As I observed that the functions largely depend on the route type and try to service a larger flow of population, but with housing one can also see that many functions resonates with type of housing it is attached too. For example the JJ Clusters (temporary housing with a slum typology) is deprived of many functions within their community; whereas the gated communities have higher percentage of open space resource, leisure areas and community based functions integrated with it compared to rest of the neighbourhoods.

The purpose of this map is see which areas are deprived and how can one design to give them a accessible network to functions at the same time induce certain function within these neighbourhoods when designing the network typology.

(For a detailed function mapping, refer appendix)

JJ Cluster - slums housing made from temporary material

Row houses - Low rise

Gated Community: Row house - Low rise

Gated Community: Row house - Mid Rise

Housing Typology and fucntions
District's Network map - Shahdara

For detailed function location for district map refer to Appendix

Gated Community: Row house - Mid Rise





Gated Community: Row house - Low rise

Row houses - Low rise

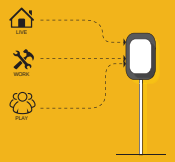







JJ Cluster - slums housing made from temporary material

District's Network map - Shahdara



CHAPTER

STRATEGY

STRATEGY - ROUTE DIVIDE

Space syntax is an amazing tool to understand the connectivity of a given network and also indicated thus where most activities is popped up. Similarly density also has a similar function. And given the scenario and working with India's densest district, sometime gave obscured function to route connectivity. Thus I approached my strategy through the order of the following rules:

a) Route selection hierarchy for different scales (speed, walking and still) according to the connectivity they give

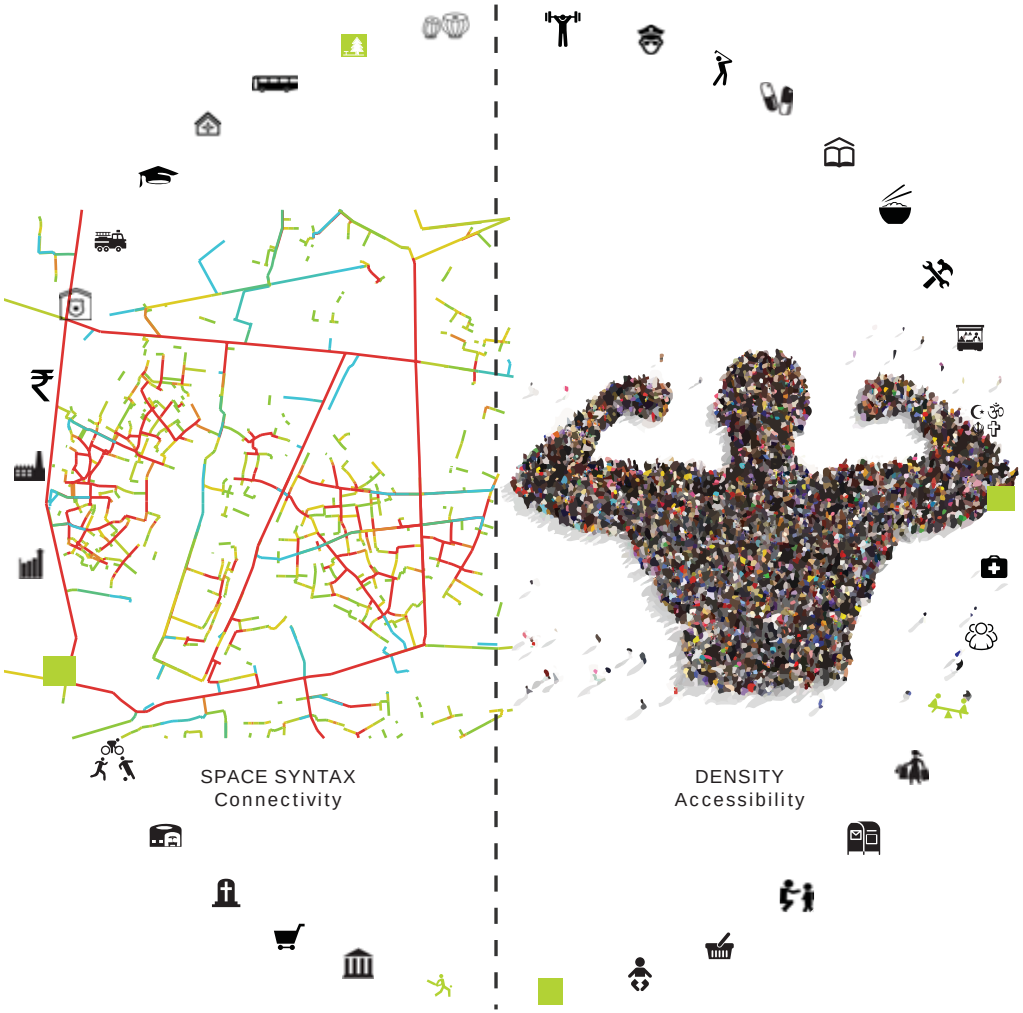
b) the functions in the neighbourhood made the second layer of twisting around with the routes.

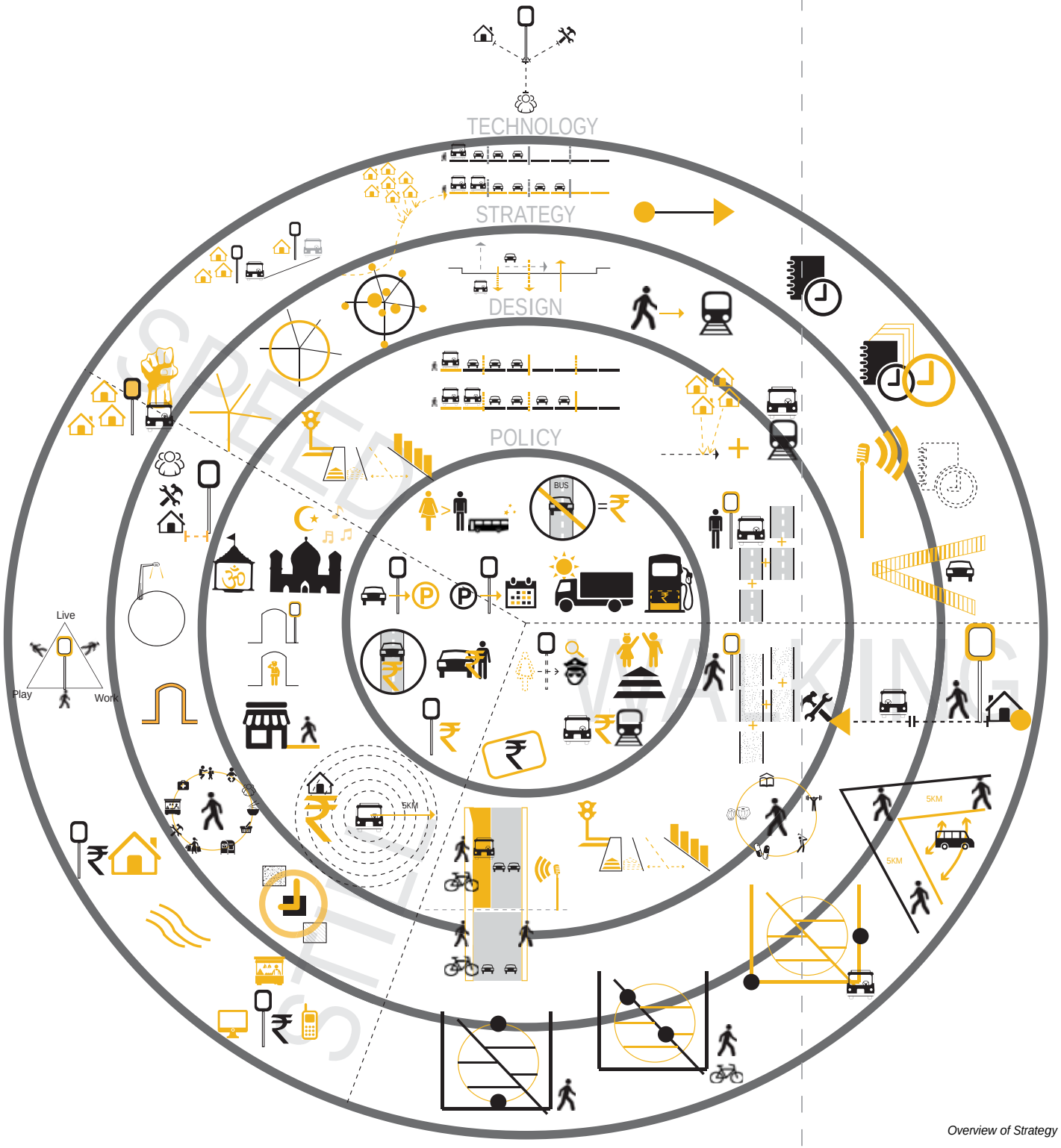
c) typology of the route

1. For speed in is necessary that they use wider roads, are best connected and approachable by all also higher the width it should always border a neighbourhood but never cut across
2. For walking routes, these were selected every 500m on their connectivity to speed scale and would always cut across the neighbourhood to engage with a large audience.
3. For still routes, they usually disconnected with speed routes and always bordered the walking route instead. They were selected with their lack of functions which have a larger catchment area and disrupt the a softer social life of the neighbourhood.

These routes are also demarcated by gateways to symbolised and use the features of a doorway which is to regulates traffic. Each of there doors have a meter to access the demand system to make a demand. The doorway is used as a design element and is elucidated further in design chapter.

The routes always have a portion exclusively demarcated to pedestrians and which phasing one reaches the utopia of walk-ability.





Overview of Strategy

The Dynamic system while controlling flow of the registered demand, also changes the urban system to make it comfortable for the ones travelling in public transport or by foot. It does so by strategy based on accessibility to various functions, design elements injection and further they are safe guarded by policies. The phasing suggested notices the current trends and practices in the political system of the city and country and tries to take advantage of it to reach utopia of *walk-ability.*

The route distribution and hierarchy in itself is taken as the point for a strategy, where a route's width doesn't just suggests the amount of flow of traffic but also the type of mode on that route and how it facilitates a healthy, affordable and accessible way to access the city through public transport and by walking in otherwise personal motorised transport depended Delhites.

Delhi - on - Demand system makes it possible to achieve the utopia of a walk-able metropolitan city, with an healthier and safer environment. An urban environment that through the system can be shared by everyone and is instructed by the demand of everyone, making it for the people, from the people and of the people!

STRATEGY - ROUTE DIVIDE

As explained the route are divided further into hierarchy of the speed one is moving at, the kind of transport is available to them through the Delhi-on-Demand system and the distance that can be covered optimally on this route before it intersects with a similar route further. The routes are as follow:

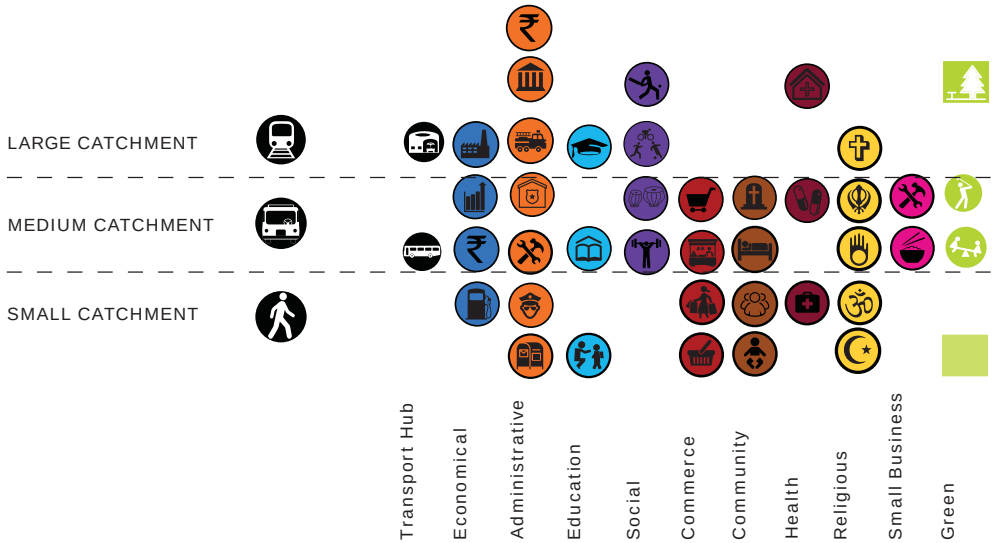
A) Speed Routes
1. Railway line covering intra city distance of 60km
2. City Speed route | Bus | 30km
3. District Speed Route - Primary | Bus | 5km
4. District Speed Route - Secondary | Bus | 2km

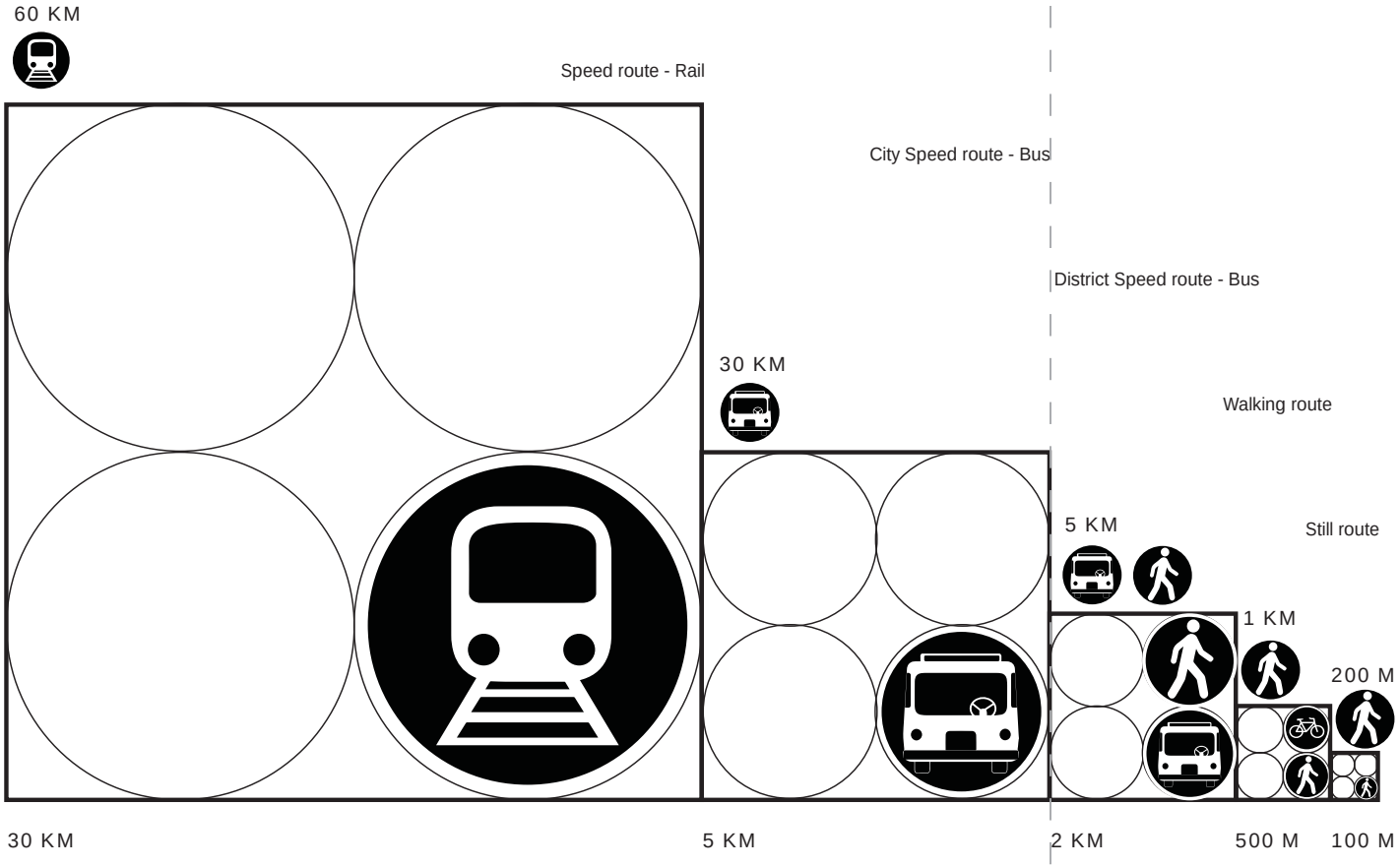
B) Walking Routes:
1. Footpath | Walking | 1 - 5km
2. Dynamic Walkway | Walking | 500m

C) Still routes:
1. Urban space (streets) closed for motorised traffic | social, cultural, economical | 200m

These routes follow these rules to make the on-demand network and are directly linked when one demands a particular space and indirectly linked as the load of walking and still route is transferred to speed traffic making the dependency of public transport higher as a result of its efficiency and ease of movement within the speed routes for larger distances when compared to personal motorized traffic.

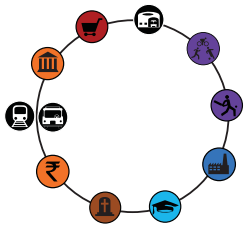
id earlier that every route has a certain function that it connects the resident with and each mainly handles the load for a particular function as donated in the adjacent figure.



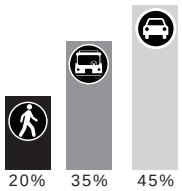


CITY SPEED ROUTE (RAILWAY)

FUNCTION RING



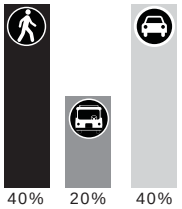
SHARE IN ROAD SECTION

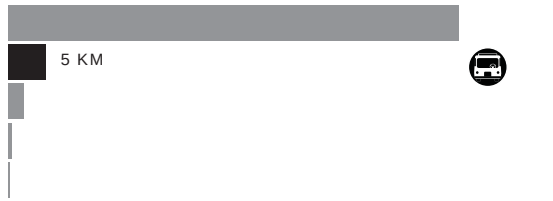


PRIORITY OF MODE WHEN SYSTEM IS ACTIVE

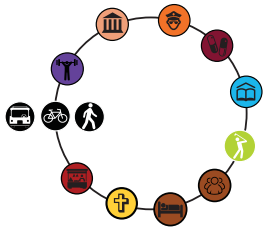
ACCESSIBILITY RANGE

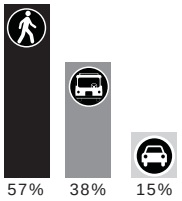
CITY SPEED ROUTE (ROADWAYS)



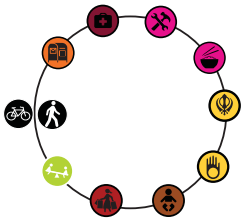


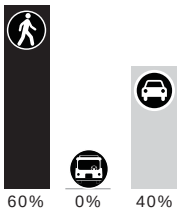
DISTRICT SPEED ROUTE (PRIMARY AND SECONDARY)



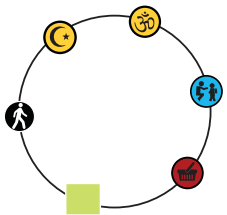


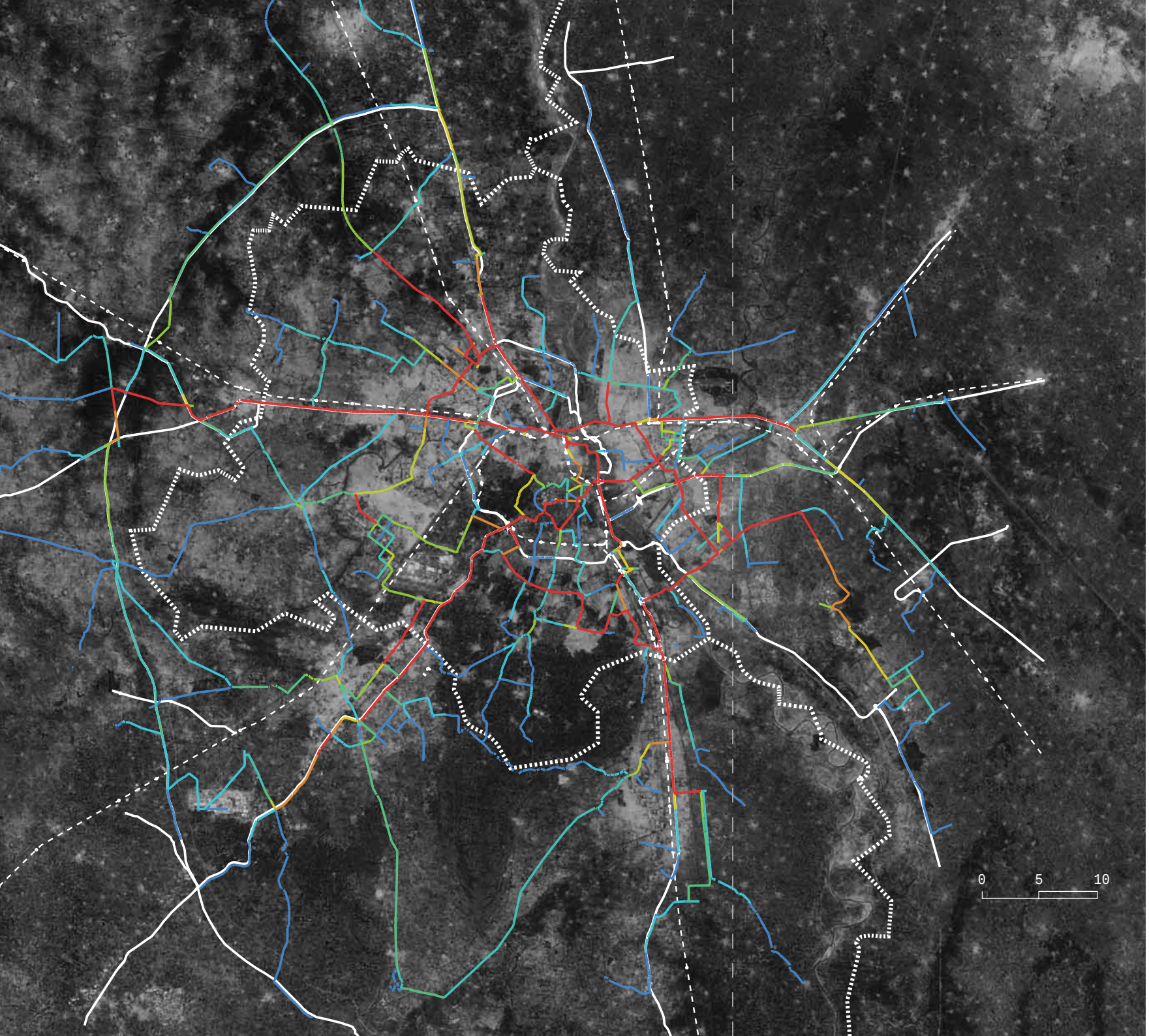
NEIGHBOURHOOD WALKING ROUTE





NEIGHBOURHOOD STILL ROUTE





CITY SPEED ROUTE

SPEED SCALE (CITY) AND SPACE SYNTAX

The Space syntax tool is used as an indicator for selection of route for this route divide at various scale - Speed(city), walking(district) and still(neighbourhood).

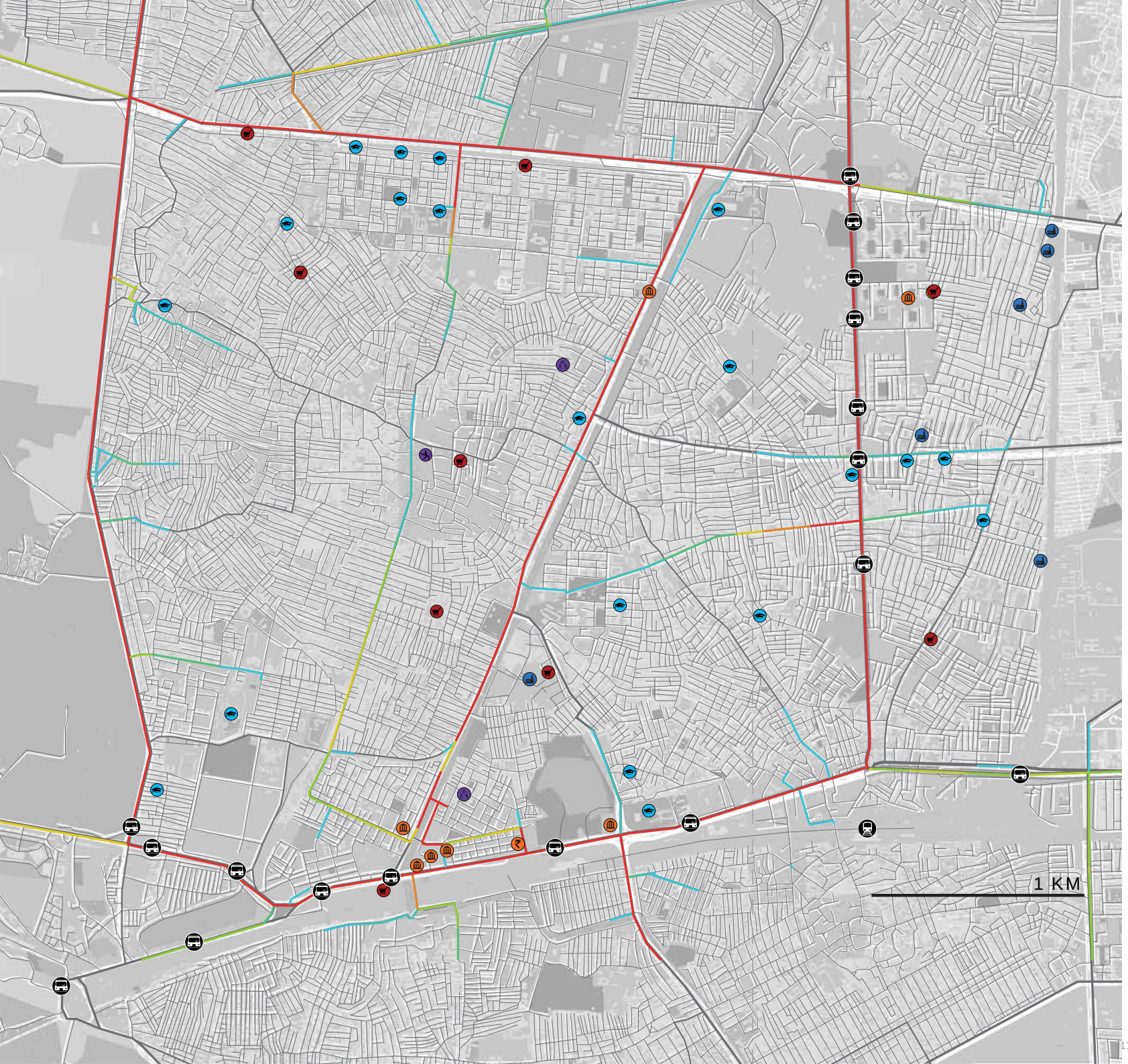
On the City scale taking the topological choice of 50km and seeing the wider network for intra and inter city travel to understand which routes should be given priority in the system as city speed route. There route work with the intra-city rail network to form the systems long distance travel and thereby making functions which have a large catchment area or for people who have been displaced to the outer fringes of the city under the various slum resettlement schemes.

This network also open the city in off-demand time for freight corridors which were earlier not possible, during the day time and were only allowed from 10pm to 6am

These routes also contains a strategic design elements called surge points and like a surge gate in a water systems, these points are in the network for the relief, expansion of stay of different modes of public transport. This is further explained in the design element section.

The reason why the scales are named on movement is not only for project's focus humour but also that they give a sense of how would a person experience an urban space in that scale. The size description doesn't justify this feeling of a urban dweller and hence the speed, walking and still scale names have been adopted.

Topological choice 50km superimposed on Delhi's rail and highway network



CITY SPEED ROUTE

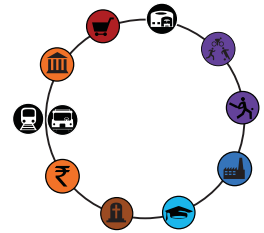
SPEED SCALE FUNCTION AND SPACE SYNTAX

- bus terminal
- train station
- bus depot
- bus stop
- administration body
- district centre
- city service market
- wholesale market
- divisional sports centre
- district sports centre
- burial grounds
- college, university, vocational training

Topological choice 5km superimposed on Shahdara's district network and large catchment function ring as per city speed route

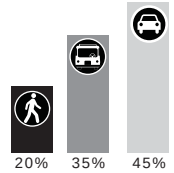
WHAT IS MADE ACCESSIBLE?

Function Ring



HOW IS IT USED AND BY WHICH MODE?

Percentage of mode type in a road Section

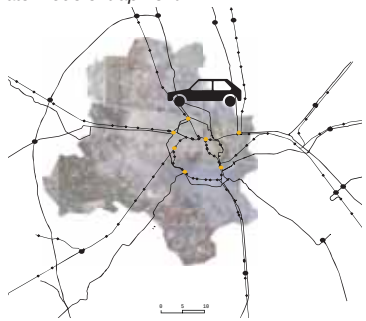


Priority Mode type

ROUTE'S ACCESS RANGE

Route Type : City Speed Route

Private mode entrapment



City speed route selected shown in part in Shahdara - the project's experimental district

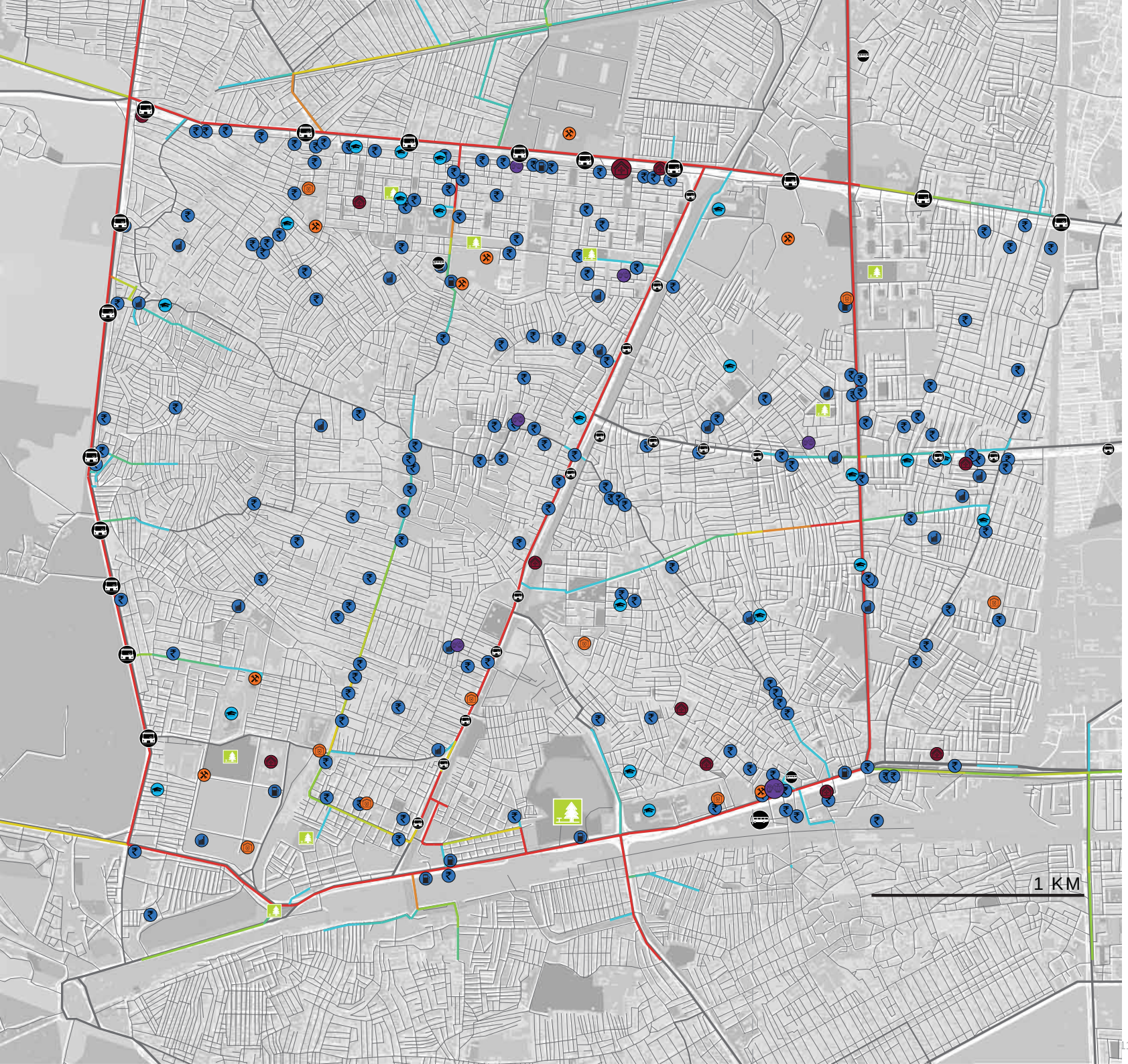
Existing

Delhi - on - Demand Visual

Existing - Diagram

Non Active- Diagram

Active - Diagram



DISRICT SPEED ROUTE (PRIMARY)

SPEED SCALE FUNCTION AND SPACE SYNTAX

- bus depot
- bus stop
- cyclist way
- pedestrian way
- fire station
- police station
- city's service plants
- district service market
- petrol pump
- bank & ATM
- socio-cultural venues
- district green
- college, university, vocational training
- general hospital

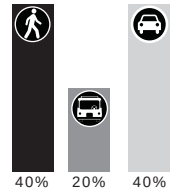
Topological choice 5km superimposed on Shahdara's district network and large catchment function ring as per district speed route

WHAT IS MADE ACCESSIBLE?

Function Ring

HOW IS IT USED AND BY WHICH MODE?

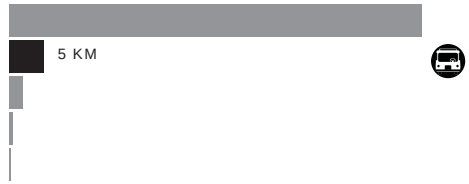
Percentage of mode type in a road Section



Priority Mode type

ROUTE'S ACCESS RANGE

Route Type : District Speed Route (Primary)



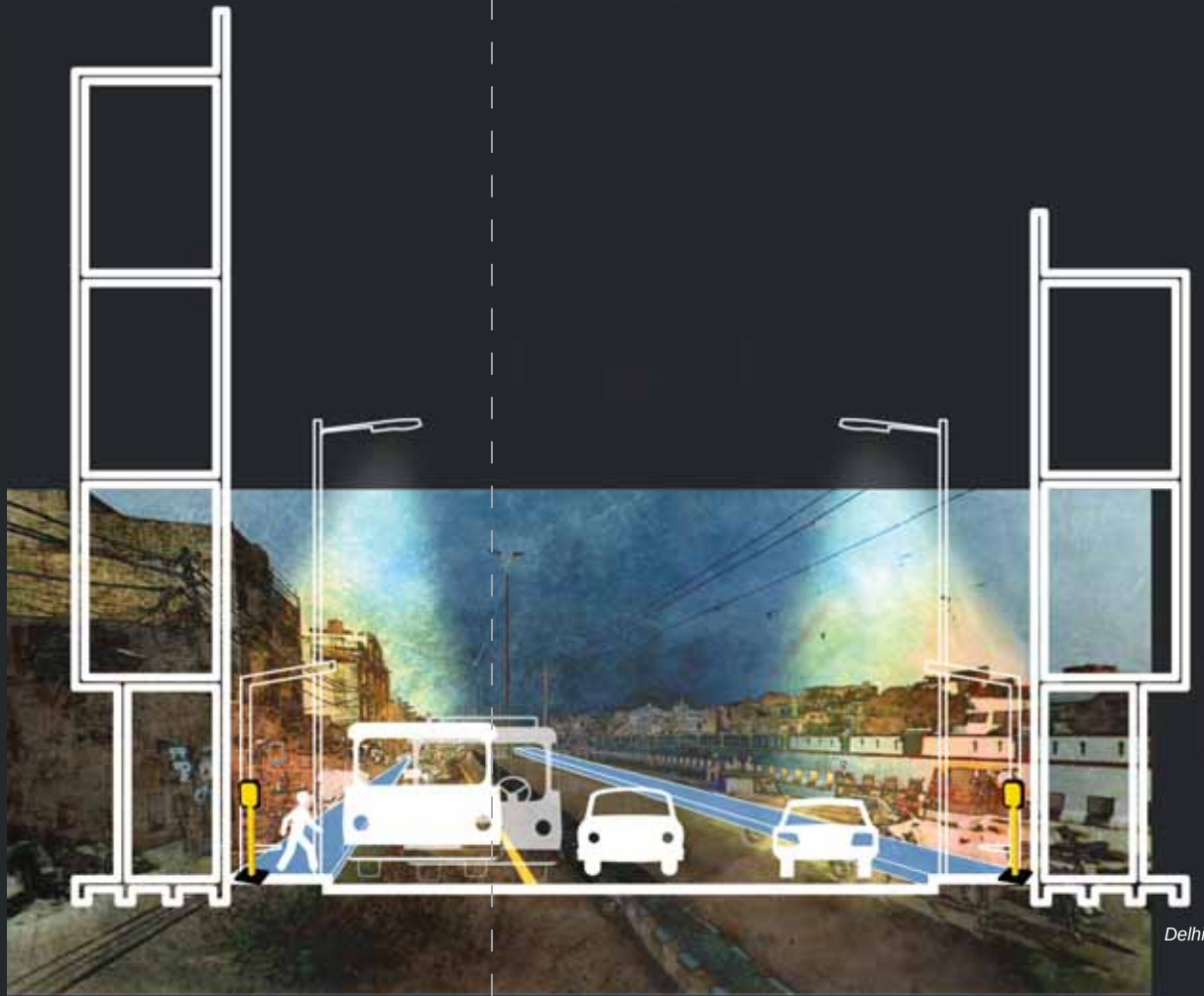
Private mode entrapment

1 KM

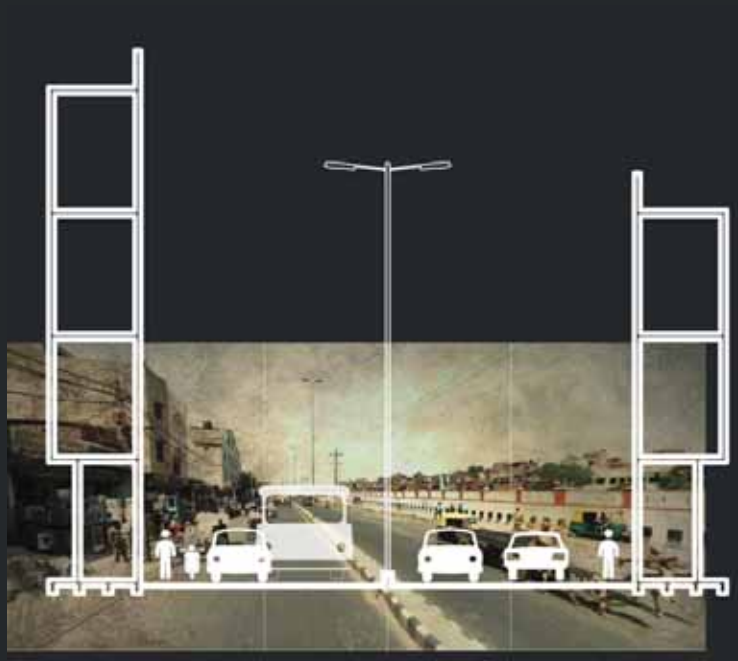
Primary District speed route selected shown in part in Shahdara - the project's experimental district

DISTRICT SPEED ROUTE (PRIMARY)

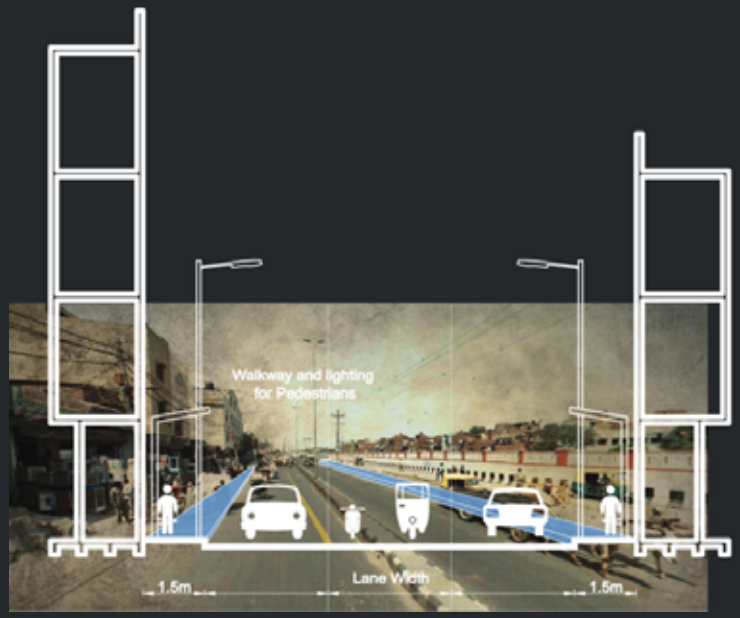
Existing



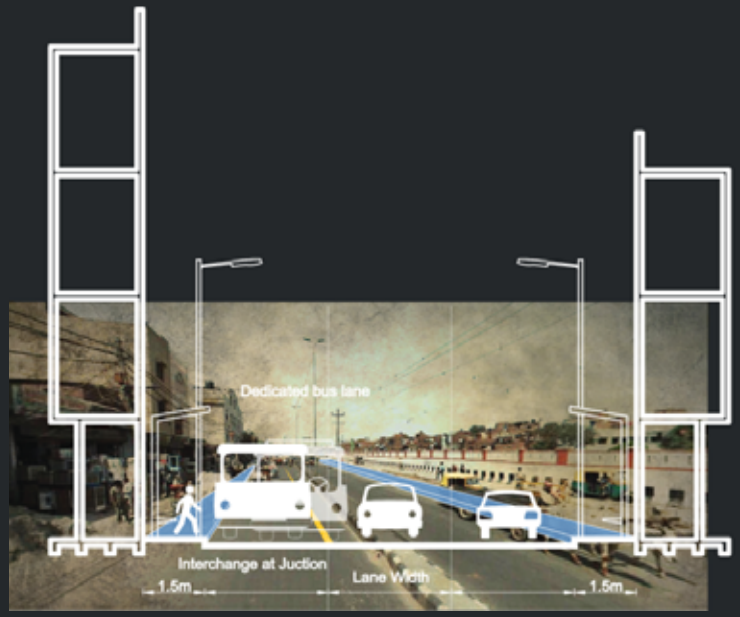
Delhi - on - Demand Visual Strategy



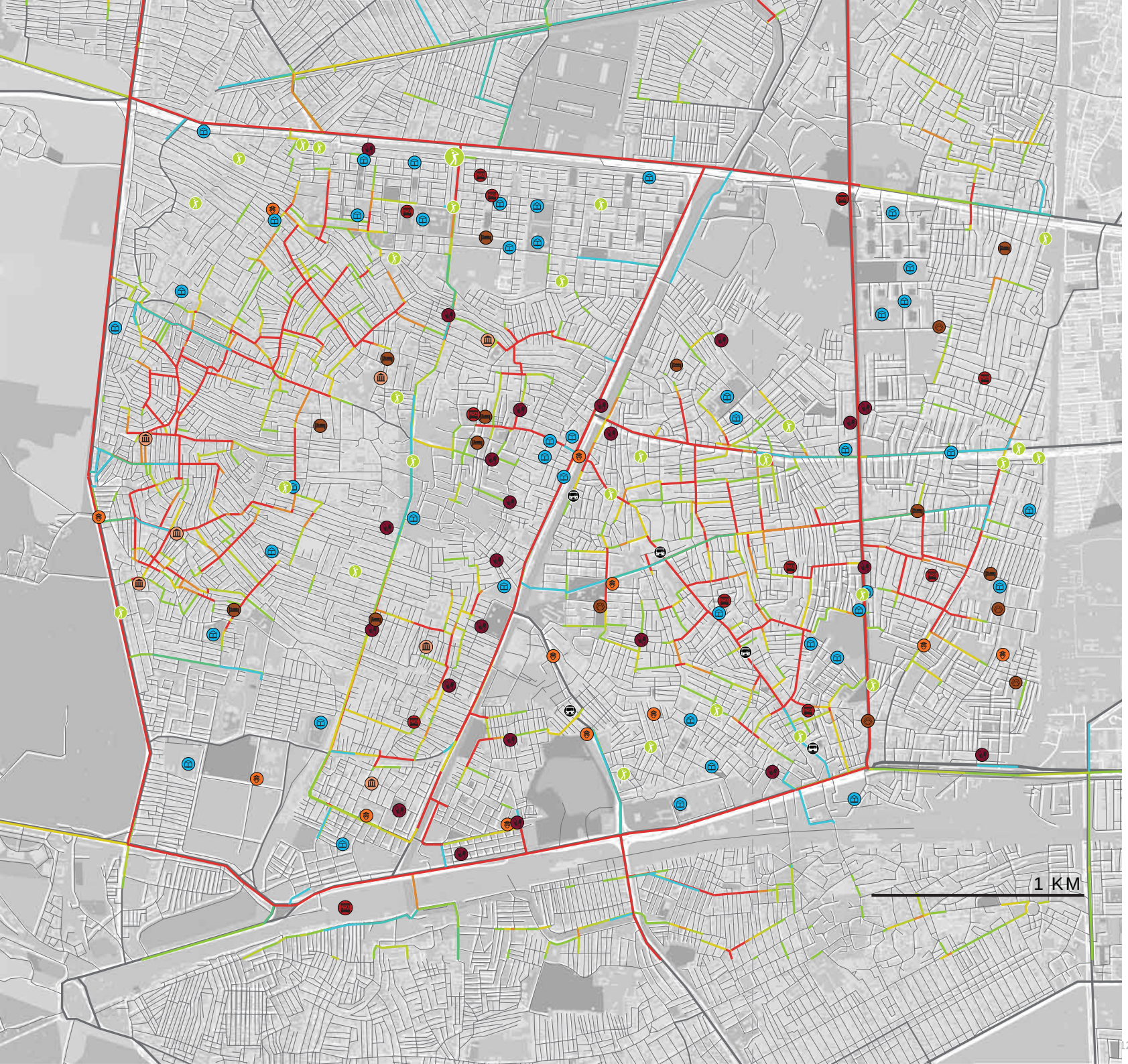
Existing



Non Active- Diagram



Active- Diagram



DISTRICT SPEED ROUTE (SECONDARY)

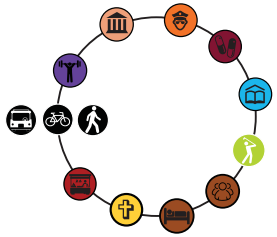
SPEED SCALE FUNCTION AND SPACE SYNTAX

- bus stop
- cyclist way
- pedestrian way
- political party's office
- police post
- neighbourhood sport cen
- recreational activity
- secondary school
- health care centre
- informal market
- church
- community space
- dharamshala

Combined Topological choice 5km and 500m superimposed on Shahdara's district network and large catchment function ring as per district speed route

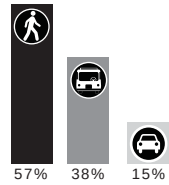
WHAT IS MADE ACCESSIBLE?

Function Ring



HOW IS IT USED AND BY WHICH MODE?

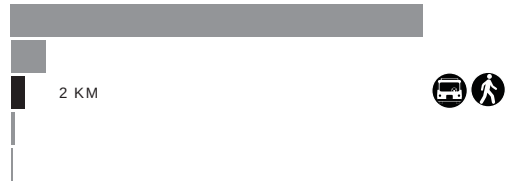
Percentage of mode type in a road Section



Priority Mode type

ROUTE'S ACCESS RANGE

Route Type : District Speed Route (Secondary)



Private mode entrapment

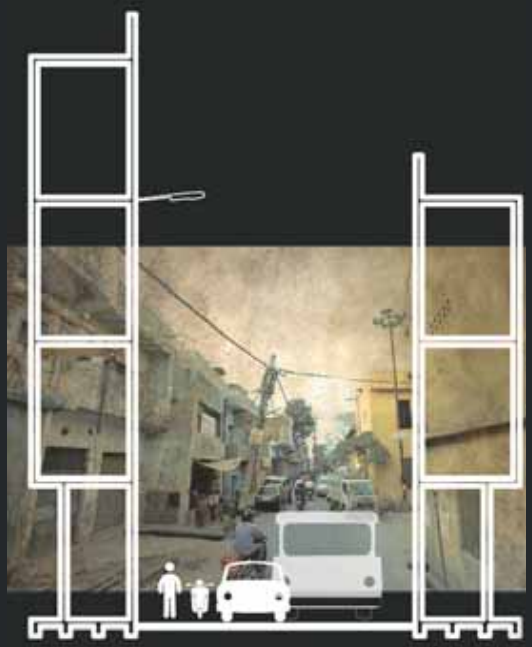
1 KM

Secondary District speed route selected shown in part in Shahdara - the project's experimental district

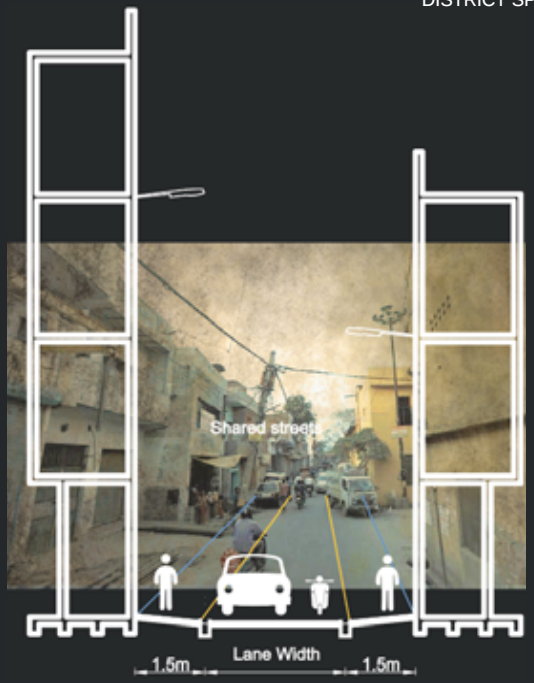
Existing

DISTRICT SPEED ROUTE (SECONDARY)

Delhi-on-Demand Visual
Strategy

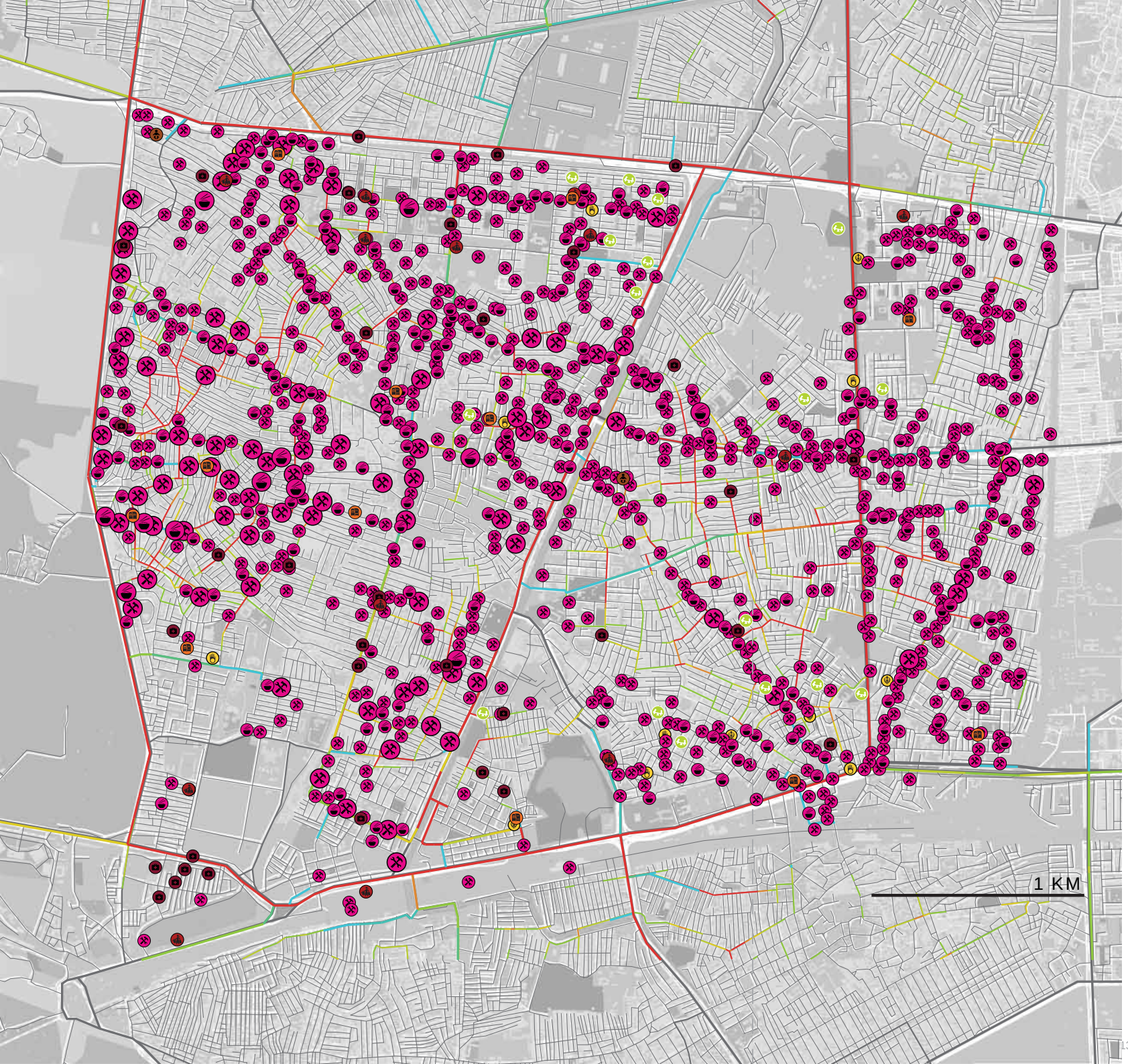


Existing - Diagram



Non Active- Diagram

Active- Diagram



NEIGHBOURHOOD WALKING ROUTE

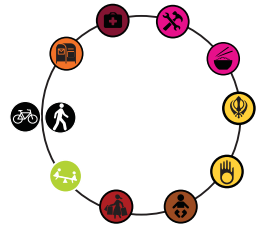
WALKING SCALE FUNCTION AND SPACE SYNTAX

- cyclist way
- pedestrian way
- post office
- neighbourhood playgr
- clinics
- local shopping
- gurudwara
- jain temple
- day care - créche
- general service shop
- food based service

Combined Topological choice 5km and 500m superimposed on Shahdara's district network and medium catchment function ring as per neighbourhood walking route

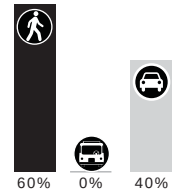
WHAT IS MADE ACCESSIBLE?

Function Ring



HOW IS IT USED AND BY WHICH MODE?

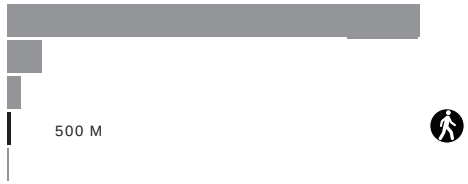
Percentage of mode type in a road Section



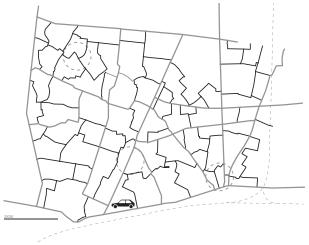
Priority Mode type

ROUTE'S ACCESS RANGE

Route Type : Neighbourhood Walking Route



Private mode entrapment



1 KM

Neighbourhood walking route selected shown in part in Shahdara - the project's experimental district

Approach to a religious centre

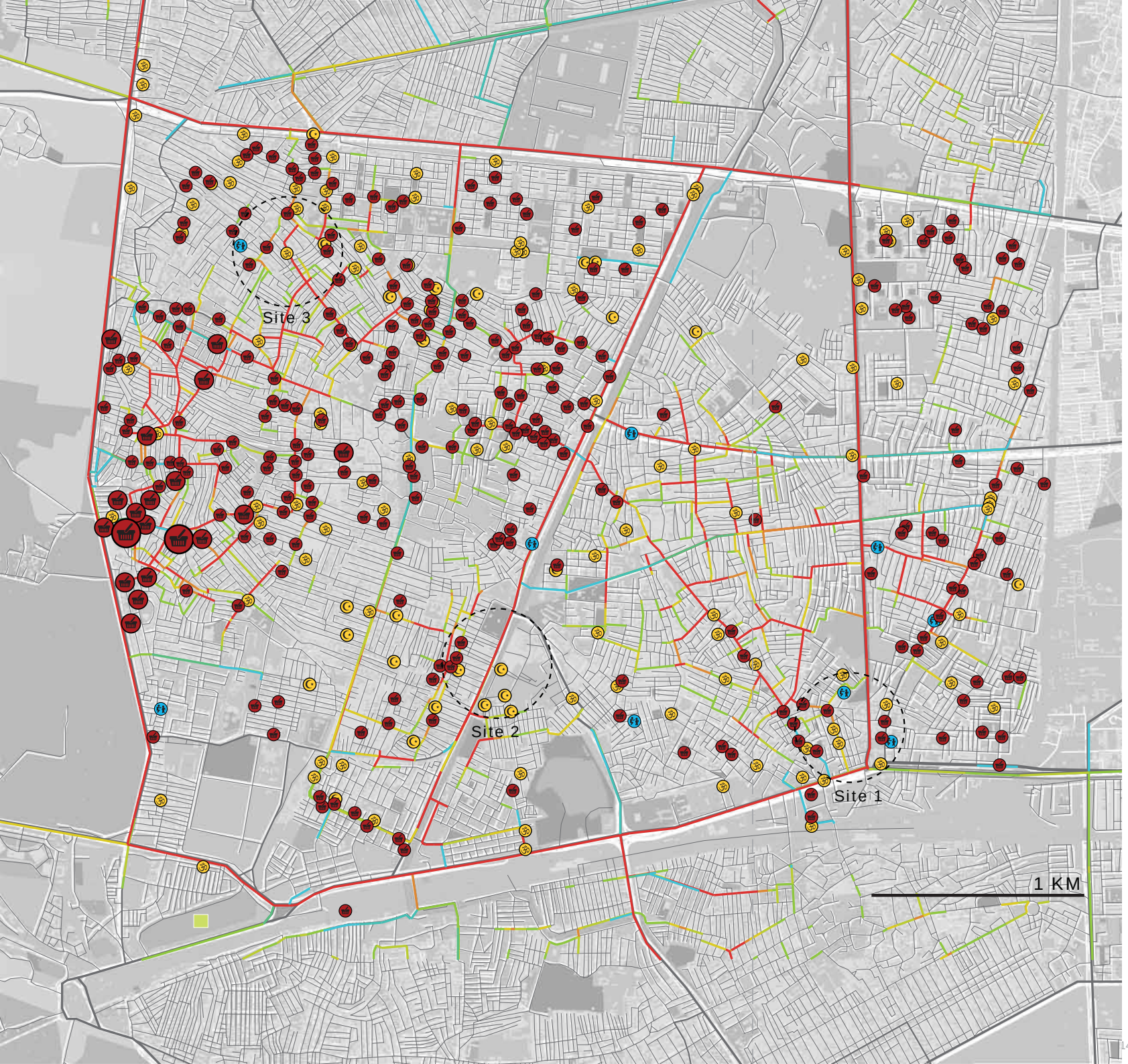
Approach to a school

Shopping street

Residential street

Existing

Delhi-on-Demand Visual Strategy



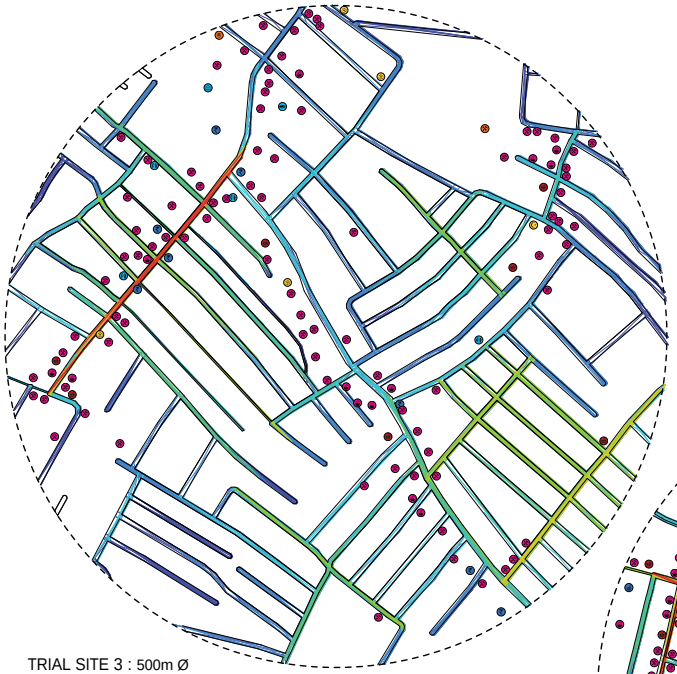
NEIGHBOURHOOD STILL ROUTE

STILL SCALE FUNCTION AND SPACE SYNTAX

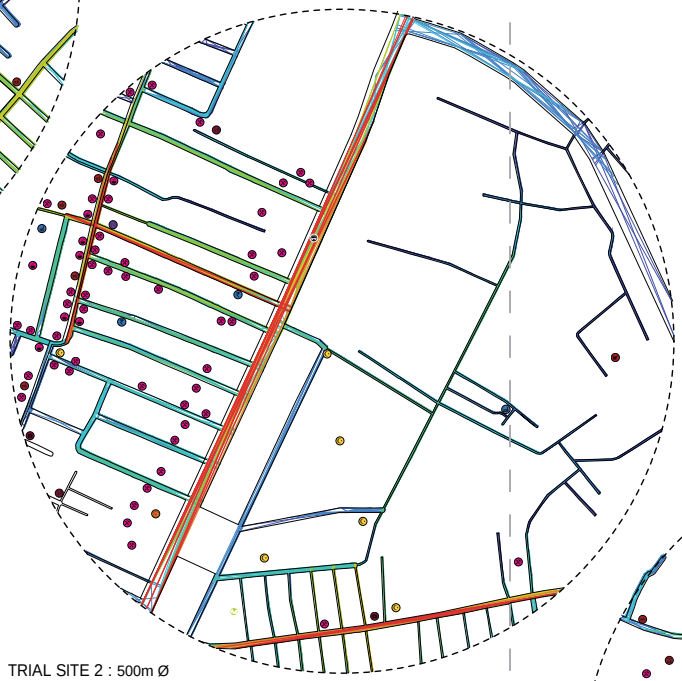
pedestrian way
neighbourhood playgr
general stores
mosque
hindu temple
primary school

Combined Topological choice 5km and 500m superimposed on Shahdara's district network and small catchment function ring as per nieghbourhood still route

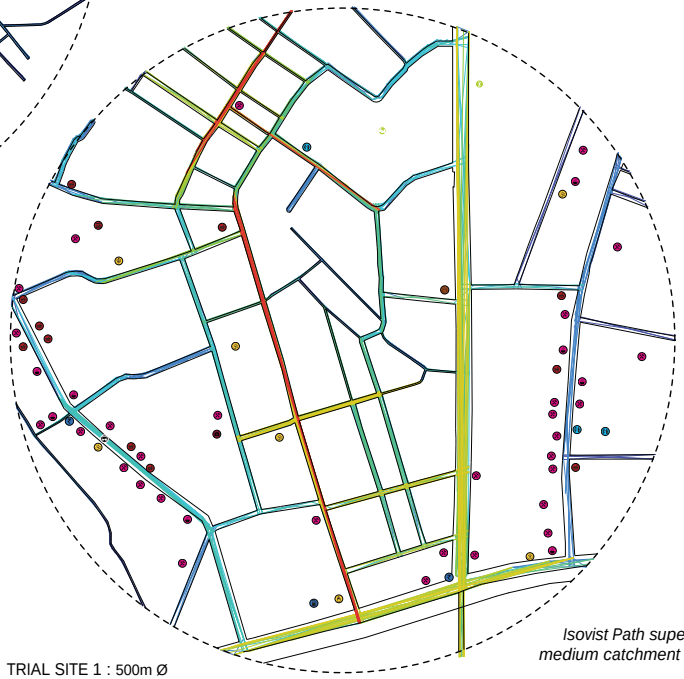
Strategy



TRIAL SITE 3 : 500m Ø



TRIAL SITE 2 : 500m Ø



TRIAL SITE 1 : 500m Ø

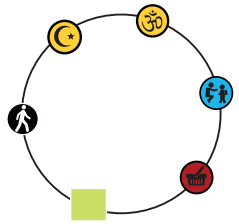
NEIGHBOURHOOD STILL ROUTE

STILL SCALE FUNCTION AND SPACE SYNTAX

The still routes occur every 200m, thus for these routes a more thorough study at neighbourhood level is required compared to other routes. As it requires softer characters of urban life of social interaction and cultural and economical growth at local or community level. Therefore it is important to test the routes on also these basis for which three different trial sites selected in the district to test how would the urban design/ fabric function with *Delhi-on-Demand system.*

WHAT IS MADE ACCESSIBLE?

Function Ring



Isovist Path superimposed on Shahdara's district network and medium catchment function ring as per neighbourhood still route

Strategy

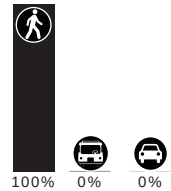
TRIAL SITE 3 : 500m Ø

TRIAL SITE 2 : 500m Ø

TRIAL SITE 1 : 500m Ø

HOW IS IT USED AND BY WHICH MODE?

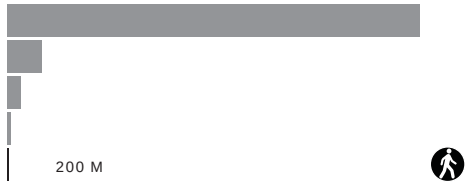
Percentage of mode type in a road Section



Priority Mode type

ROUTE'S ACCESS RANGE

Route Type : Neighbourhood Still Route



Private mode entrapment

Route distribution

bus lane

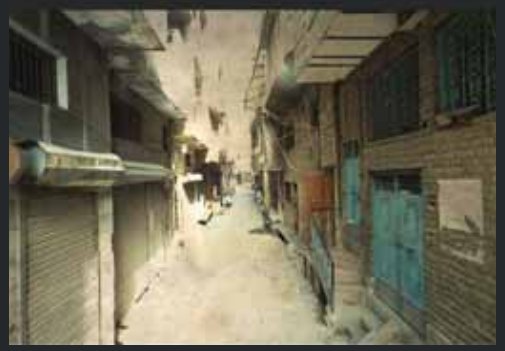
walking route

still route

Neighbourhood still route selected shown in part in Shahdara - the project's experimental district

Strategy

Social Interaction



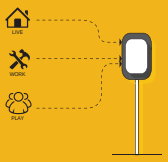
Public Playground

Dynamic Plaza

Informal Economy

Existing

Delhi-on-Demand Visual
Strategy



CHAPTER

DESIGN

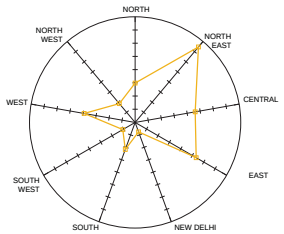
TECHNICAL

SYMBOLIC

SOCIAL

SERVICE

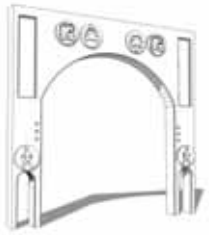
PERMANENT



Surge Point

Meter for the technology

Traffic Bollards



City Gate

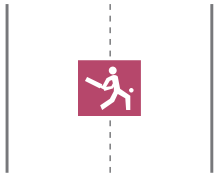
District Gate: Community

District Gate: Bus only

Neighbourhood Gate: Tree

Footpath

Seating on the streets converted to still routes



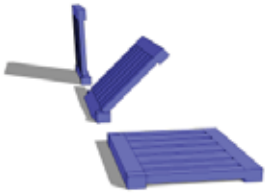
Public playground on street converted to still route

Toilet Box on routes converted to still route

DYNAMIC

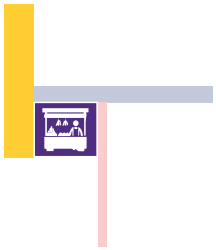
Demand Stops and stations

Neighbourhood Gate: Guard

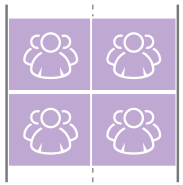


Dynamic Walkway

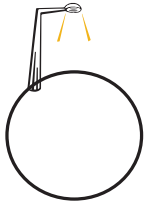
CULTURAL & INFORMAL ECONOMY



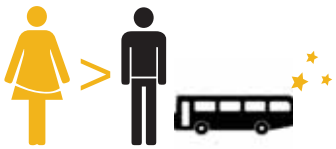
Plaza with dynamic activities



Platform on streets converted to still route



Lighting



Night Bus

The design elements have been categorised into five categories:

1) Technical : Elements that facilitate the operation of the dynamic system *Delhi-on-Demand*

2) Symbolic : These are elements that acts as a remembrance of old planning methods in historical cities and current elements of road design. Symbolism is key method to familiarize the residents to the design intervention faster.

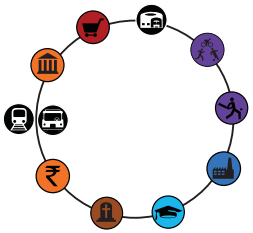
3) Social : These elements are added in more interior routes which are mainly residential. The are added to induce urban public space.

4) Cultural & Informal economy : In Indian traditions most of the festivals are celebrated in open community areas. Cities lacking such space, streets are in-formalised to serve this purpose from time to time. In the same way informal economy (street hawkers and vendors) form a large part of urban economy and bring certain functions that are lacking in the neighbourhood. But with increased formalisation of Indian cities they are being pushed away. Thus, these elements provide the necessary space for them. As the are Dynamic these spaces are occupied only when demanded, hence optimising the urban spaces currently used as dump or parking.

Service: The elements in this category are introduced as an added benefit of this technology, in areas or fields that lack them. They thus service the design and technology to improve urban environment and safety.

These elements have been further allocated as per their way of functioning in the system as permanent or dynamic elements.

Function Ring



Occurrence: Route Type

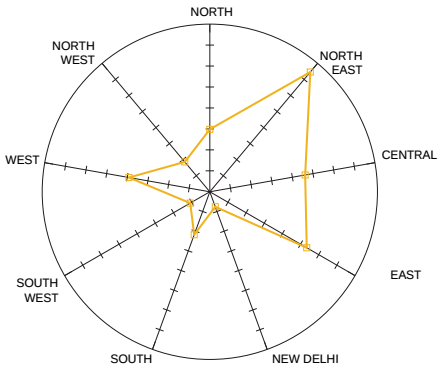
Permanent

Dynamic

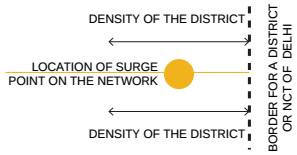
Surge Points:

These are bus and train depots where either bus changes or coaches can be added to trains to increase their capacity, making it a relief point for the mode. The also in turn can reduce in capacity seeing the decrease in demand on further route. Seeing the two mode, their limitation comes in level of cost reduction through this method. The bus has the flexibility and actual running cost reduction, whereas the train faces reduction cost only in maintenance of coaches through this method. Thus attaching the coaches to already running freight trains is a better economical model for the mode. Therefore using different capacity buses is the chosen model with the given system and its design, for train a simplest way is adding coaches for high and medium priority but for base line and low priority may be redesigning coaches that are dynamic in their distribution of freight to passenger would be ideal.

The diagram variance show the extreme situations that can happen when it comes to modes interaction with the surge points.

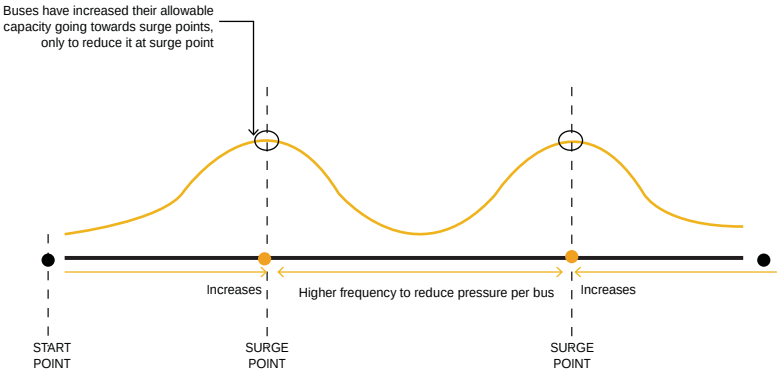


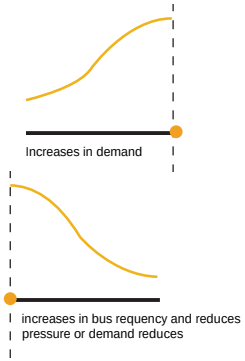
Density vs districts on the city route network diagram



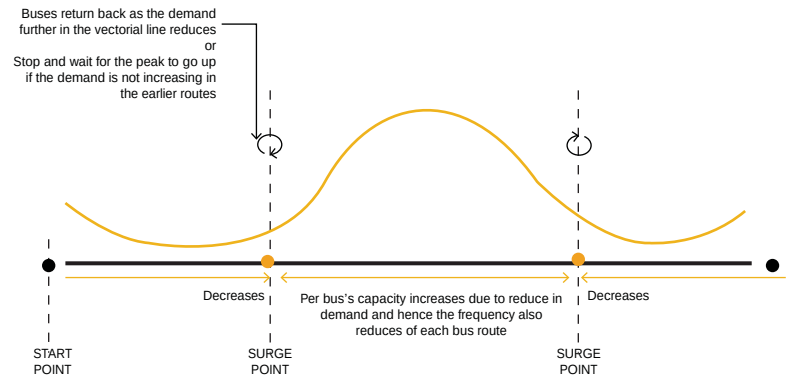
Density vs districts on the city route network RULE

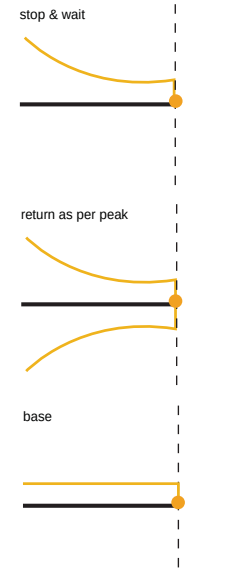
WHEN THE VECTOR OF DEMAND IS ACROSS THE CITY AND CONSEQUETLY INCREASES FROM START TO END





WHEN THE VECTOR OF DEMAND IS ONLY TILL SURGE POINT AND CONSEQUETLY REDUCES AS IT MOVES ACROSS THE CITY



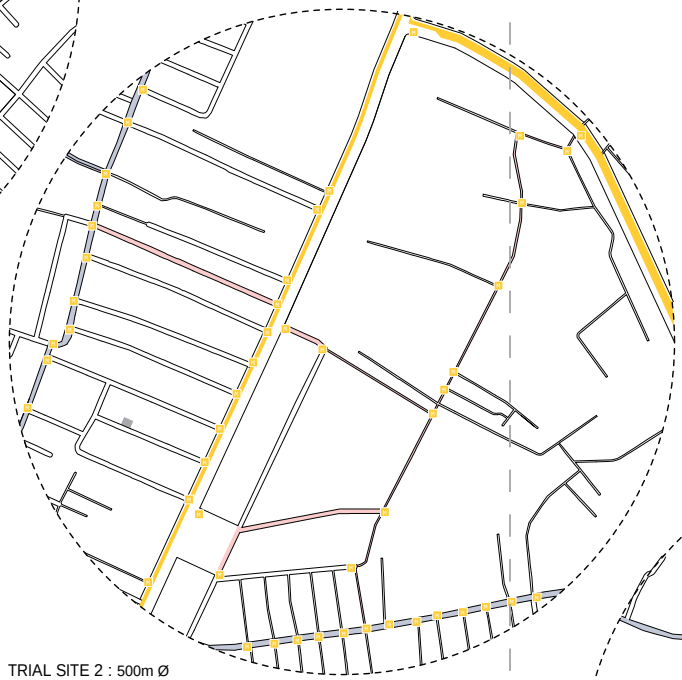


TRIAL SITE 3 : 500m Ø

TECHNICAL

Permanent

Dynamic



TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: This trial site displays how the a neighbourhood itself functions alone in the *Delhi-on-Demand* system. Thus showing the usage of meter for demanding walking space within the neighbourhood connecting daily based activities and accessibility outwards to the district. It shows how accessing school, shopping for grocery, space for social interaction & informal economy can flourish using the new technology.

TRIAL SITE 2: This trial site displays how the a neighbourhood connects to the district which links further to the city based accessibility. Therefore on this site the meter acts to display not only the demand route but also dynamic walking routes and how a JJ Cluster will be able to access the routes and how it helps in initiating accessibility for all. The walking time is moderate due to the presence of demand speed routes within these neighbourhoods.

TRIAL SITE 1: As the meter exists at every route, thus its presence is on all trial site, starting with the first phasing route, which are speed routes that this trial site displays well, is how the district is attached to city speed routes. Therefore the site displays how larger city functions that can be accessed by speed routes are linked to the district. This site helps in noting while designing the urban systems to adapt to *Delhi-on-Demand* system .by why and where the meter is checked in and out. The walking time is lesser in this site as its closer to main city route for city based accessibility.

METER

Functions Accessed

Occurrence: Route Type

TRIAL SITE 1 : 500m Ø

METER (All Routes):

Design Element type: TECHNICAL

It occurs on the all route types as through it public can demand public transport on speed route, walking and public space in walking route. They also exist in still routes but do not directly engage in its spatial transformation over they day but because other routes take the load of these routes that get converted into non-motorized vehicular space that is administrated by the meter and in-turn the *Delhi-on-Demand* system.

Functionally thus the meter interacts with various design elements of the system directly or indirectly. But also makes accessing various activities and functions that the city provides.

Meters play a vital role in phasing as the location development controls the development of *Delhi-on-Demand* system.

TRIAL SITE 3 : 500m Ø

TRIAL SITE 3: The Bollards are absent in this trial site which was selected for showing walk-ability within the neighbourhood, which functionally is opposite to what traffic bollards are assigned to which is administrating high speed traffic.

TRIAL SITE 2: The trial site 2 is where one can see the transition from walking route to district speed routes thus here the dynamic walking route have been translated to permanent footpath to ensure safety and dis-attachment of it from the system is at speed route is considering priority to public transport and making a permanent way for a walking individual. Therefore the bollards only engage in the speed traffic flow and don't control the foot traffic.

TRIAL SITE 1: The trial site is closest to speed route and also is divided by the district speed route, thus the bollards are best demonstrated on this site as per its functionally, showing the transition from district to city speed routes at 'city gate' design element. While designing this junction was integral for working our how would a district attach itself to the city and how and which mode should get the priority and that walk-ability should be clearly segregated from the speed route due to the nature of route.

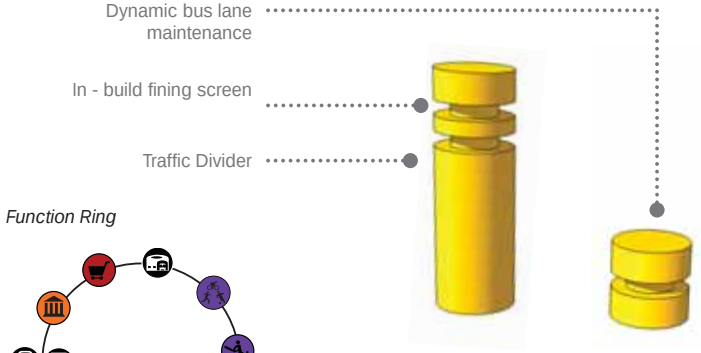
TECHNICAL

Permanent

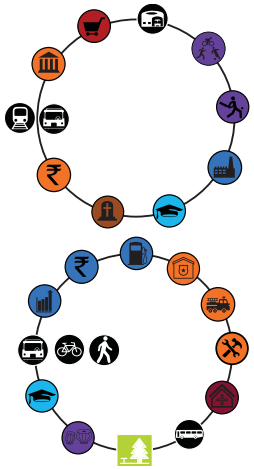
Dynamic

TRIAL SITE 2 : 500m Ø

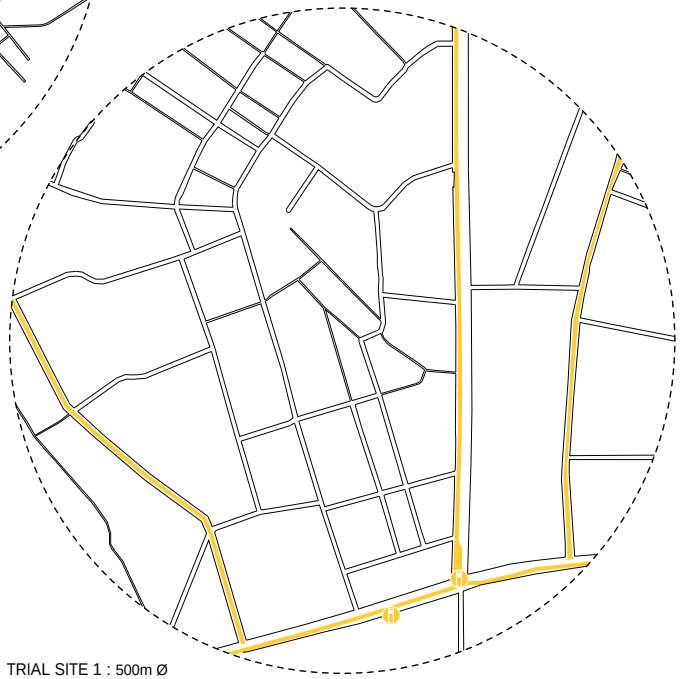
TRAFFIC BOLLARDS



Function Ring



Occurrence: Route Type



TRIAL SITE 1 : 500m Ø

TRAFFIC BOLLARDS (Speed Route):

Design Element type: TECHNICAL

The traffic bollards/ pegs are used to control traffic lanes and thus are used mainly in speed routes of the city and on gates of speed routes to and within the district. They help in giving priority and maintaining that priority to bus lanes. The bollards are operated via the *Delhi-on-Demand* system as per the demand rate and thus traffic flow in a particular direction which comes in vectorial form through the demand data.

Functionally the bollards interact with speed traffic and thus are unimportant to walking and still routes and thus to the walking individual. Bollards play a vital role in route definition as speed route and thus come as a design element earlier in phasing which deals with promoting the public transport for intra-city travel.

TECHNICAL

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø

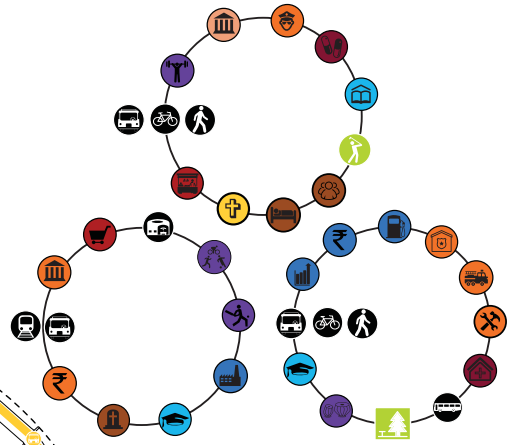
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: Demand stops are absent in this trial site which was selected for showing walk-ability within the neighbourhood, whereas demand stop have occurrence on only speed routes.

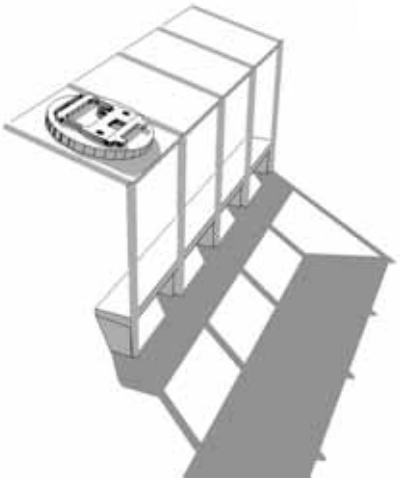
TRIAL SITE 2: The number of demand stop reduces in this site as the mixture of walking route to speed route is increased. But are still relevant to show that there is a stop increase when it comes to walking and still route intersecting with speed routes and there in turn making accessing the city for JJ cluster dwellers easier which were otherwise blocked by traffic routes around its borders and yet neglected from connectivity to the city.

TRIAL SITE 1: Many demand stops occur on site 1 due to the presence of speed route also showcasing where the stops occur when it comes to walking route meeting the speed route. These stops thus are physically present all day but are dynamic in terms of functionality.

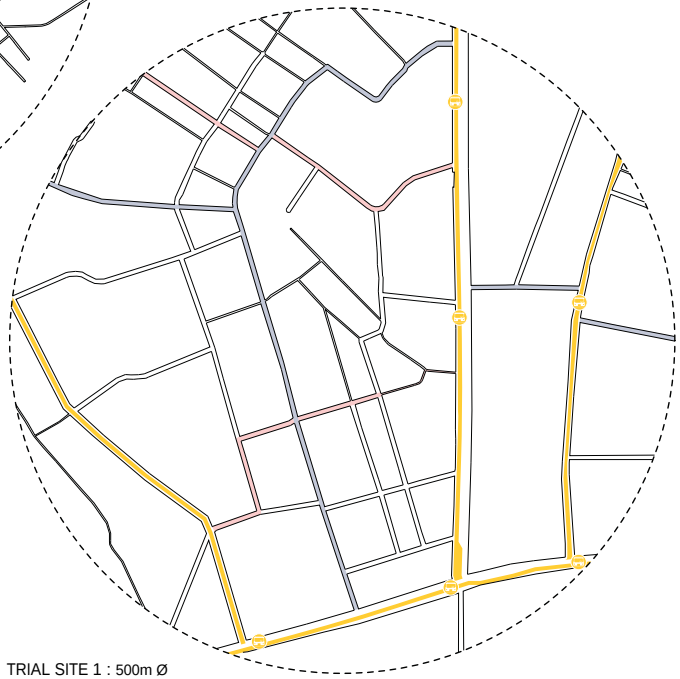
DEMAND STOPS



Function Ring



Occurrence: Route Type

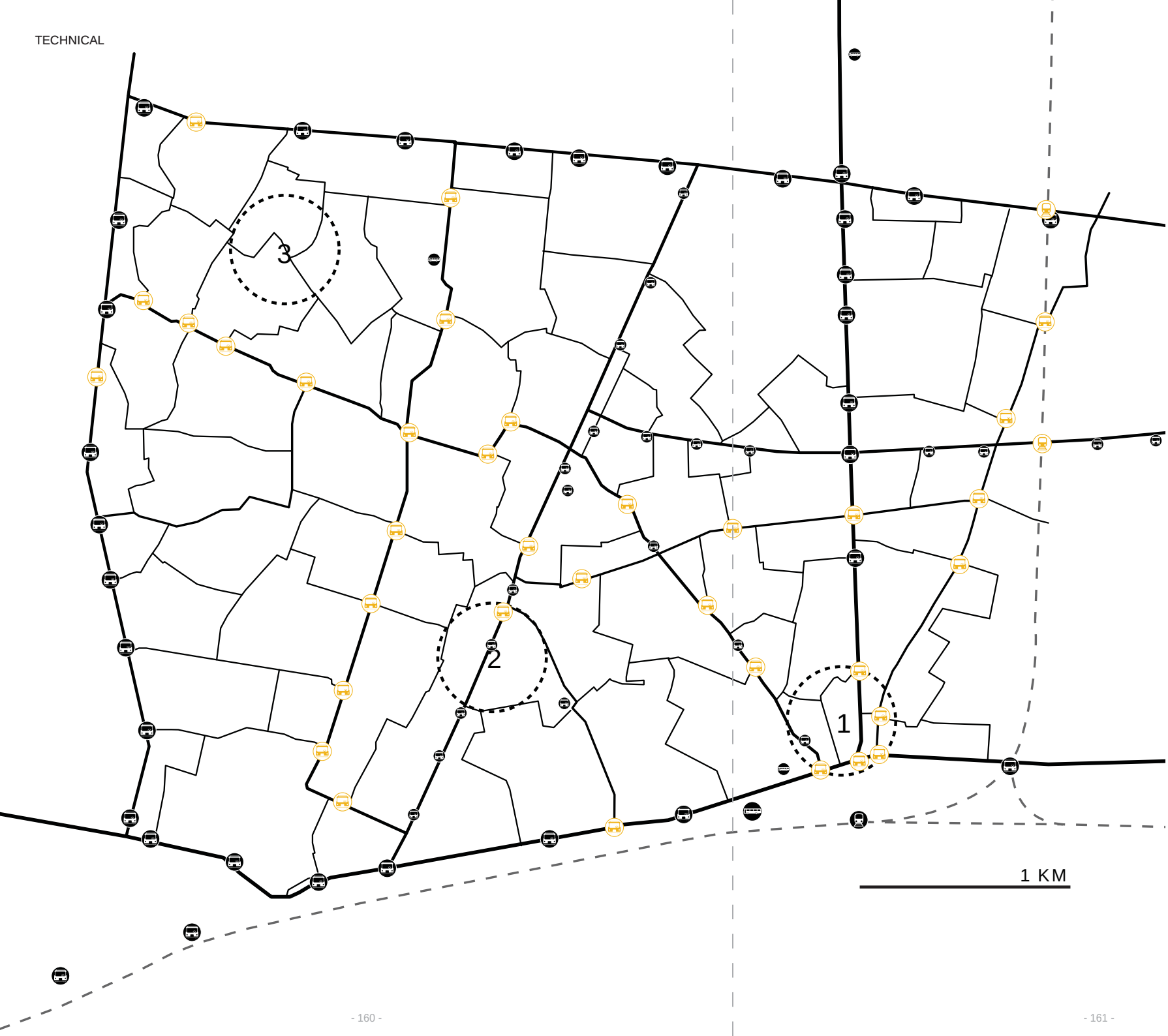


TRIAL SITE 1 : 500m Ø

DEMAND STOP (Speed Route):

Design Element type: TECHNICAL

Demand stops are bus-stops or train station which fall on speed routes both district or city which are exists on the confluence of *Delhi-on-Demand* network, such that one can take the still route and walking dynamic route for safe walking to the speed route and create their own demand stops. Thus as per walking route rule that exist every 500m, so does demand bus-stop occur every 500m. The demand station exists only at the intersection of the train like with speed route therefore they occur at a distance of every 2-5km. The operator of the mode gets the signal for stops where to stop while picking passenger and not stop of stops that do not demand a stoppage. Therefore resources (time and stops) are distributed where demand is made. One can make a demand from home and thus insuring a stop even in a hurry.



District map - Demand Stops and Stations

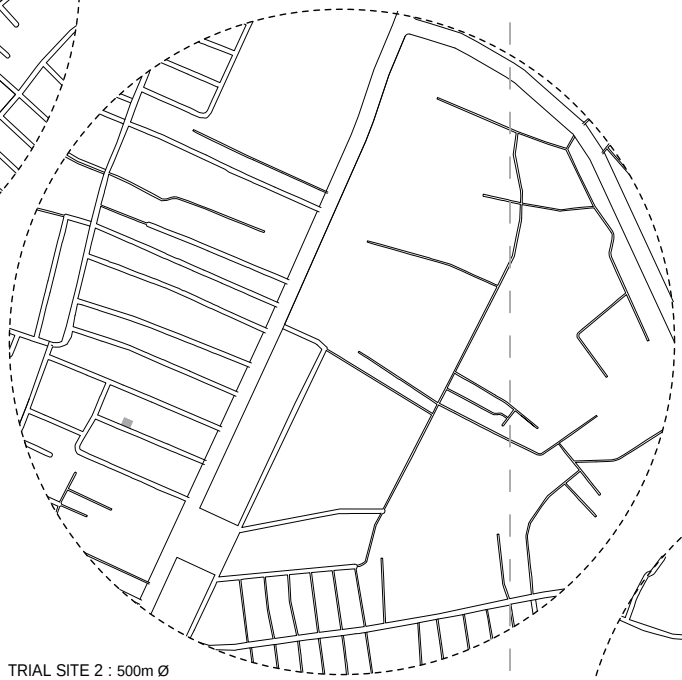
Design Elements

TRIAL SITE 3 : 500m Ø

SYMBOLIC

Permanent

Dynamic



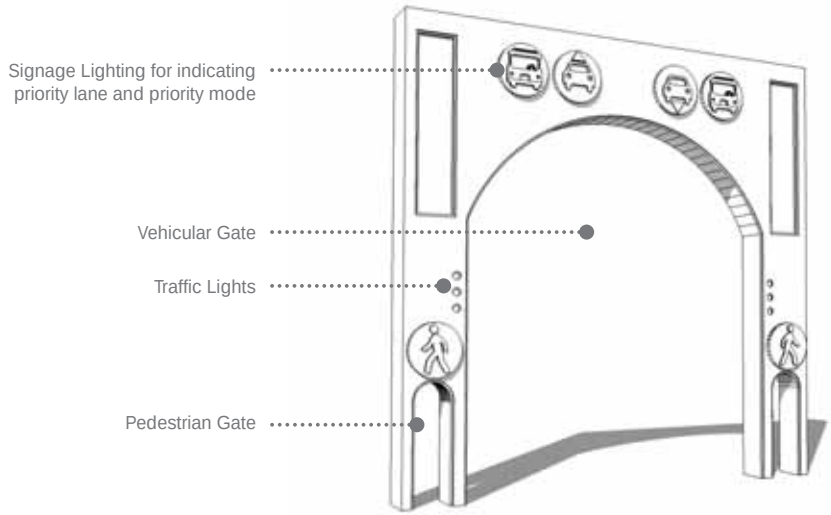
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: City Gate are absent in this trial site which was selected for showing walk-ability within the neighbourhood, whereas it exists at the intersection of speed routes.

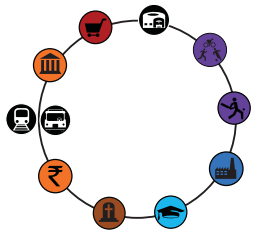
TRIAL SITE 2: City gates are absent from this site as well due to lack of any intersection of speed routes of city with district. It also indicates that one is much more in the interior of the district, therefore gates symbolically indicate where you are and which route one should follow to reach a desired destination. One can follow the district speed routes on site to reach the city speed route. This hierarchy helps to positioning yourself in the city which is otherwise difficult to decipher as all streets are occupied by private motorized vehicle and the width only indicates the amount of traffic.

TRIAL SITE 1: The city gate occurs once on this trial site indicating the width of district route, also it further due to its height of opening is the only gate that allows freight movement in the district, there by restricting the function of freight movement within the neighbourhood and controlling unwanted neighbourhood functions like good-downs and large freight storage and factories where residential activities are.

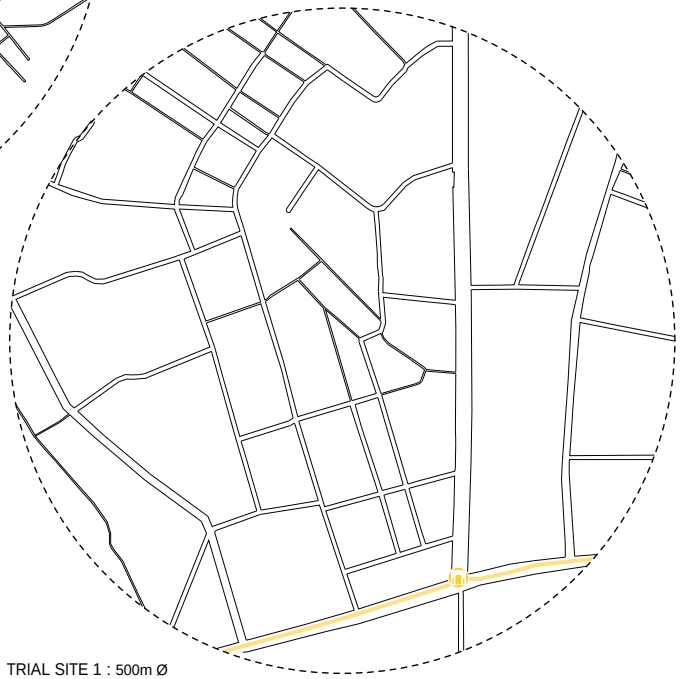
CITY GATE



Function Ring



Occurrence: Route Type



TRIAL SITE 1 : 500m Ø

CITY GATE (Speed Route):

Design Element type: SYMBOLIC

The city gate design element only occurs at the intersection of district speed route to city speed route. It marks the route selection for the *Delhi-on-Demand* system. Thus it deals with speed traffic as well as due to its design with foot traffic. Its a permanent feature in the network. While being used symbolically to depict an entry to a district it also has features for signage, signalling and priority lane for the speed traffic flow, while keeping pedestrian gates within it as a permanent and only symbolic function.

It lets a passenger know they have entered a district and therefore are likely to encounter other types of routes from the system as the travel inwards. While phasing, they occur earlier on in as being part of the speed route network.

Existing

Delhi-on-Demand Visual
Design Elements

SYMBOLIC

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø

TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: As the site is a way to examine the case interior to a neighbourhood, therefore apart from absence of occurrence of the particular gate, it is also not appropriate for a space that attracts a larger community approach. Thus its absence in this case scenario.

TRIAL SITE 2: This site is a mixture of speed route and walking& still routes an is ideal result for catching a large audience for a community space. This gate can be reached from within the neighbourhood in various modes of travel - walking and public transport making sure that the intentions of a gate and the space attached is met with approachability.

TRIAL SITE 1: The site lacks a common junction between district routes and therefore lacks these particular gates. Also being on the edge of the site these gates are not used due to lack of the appropriate catchment area for the community based activity required.

DISTRICT GATE - COMMUNITY

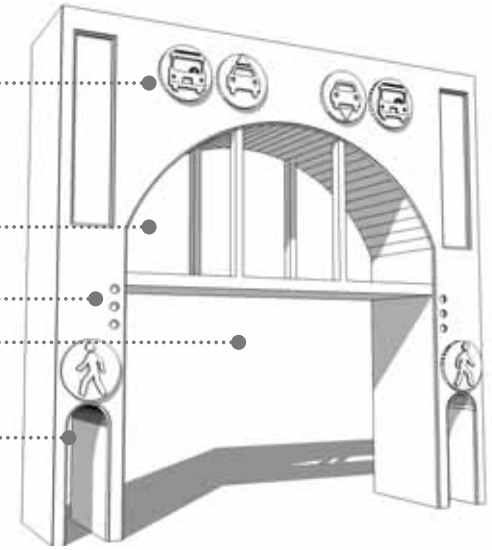
Signage Lighting for indicating priority lane and priority mode

Common space provided for community based activity on lower traffic routes

Traffic Lights

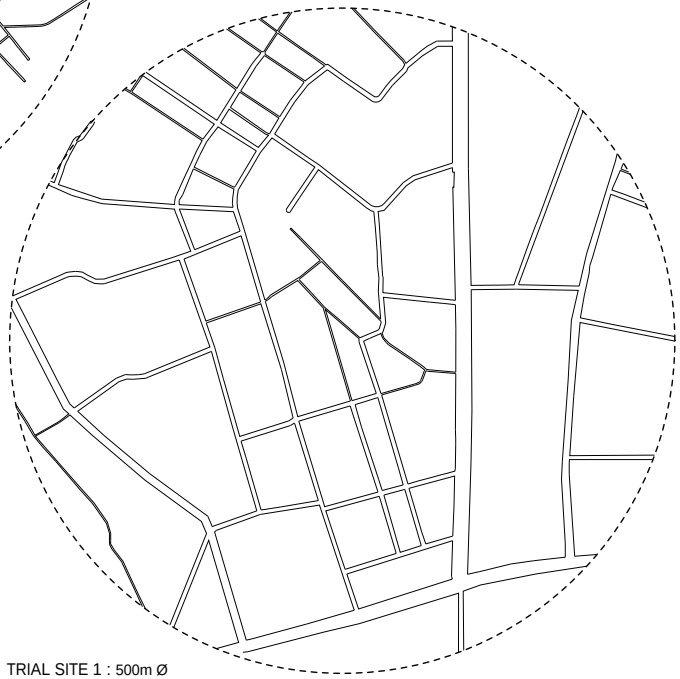
Vehicular Gate - Controlled height to control freight on the route

Pedestrian Gate



Function Ring

Occurrence: Route Type



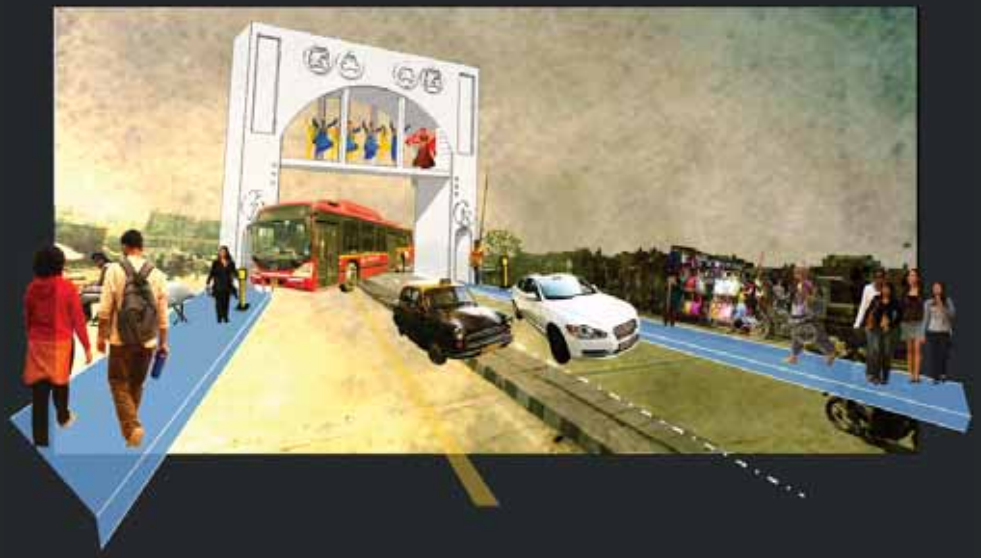
TRIAL SITE 1 : 500m Ø

DISTRICT GATE - COMMUNITY (Speed Route):

Design Element type: SYMBOLIC

This design element only occurs at the intersection of a district speed routes larger than 12m and has an addition activity attached when compared to city gate - community space. Firstly the occurrence controls freight traffic within due to height restriction caused by space above and secondly it occurs on large roads to engage in a large community based activity.

This space addition apart from its activities of signage and signal is a direct result from learning from the sites which lacked any common enclosed space in its highly dense urban environment. Also because of the site configuration it occurs more in the centres of the district, serving a large audience. Therefore in phasing it occurs when the district accessibility is under question.



Existing

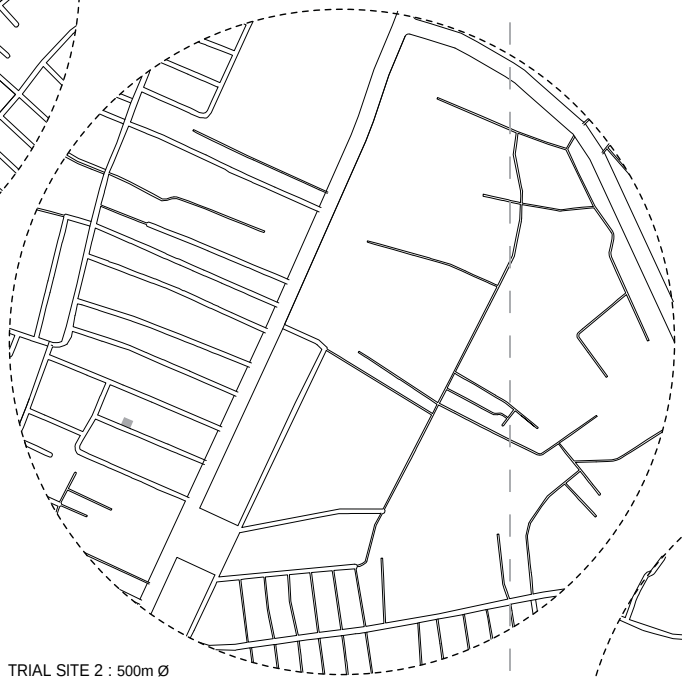
Delhi-on-Demand Visual
Design Elements

TRIAL SITE 3 : 500m Ø

SYMBOLIC

Permanent

Dynamic



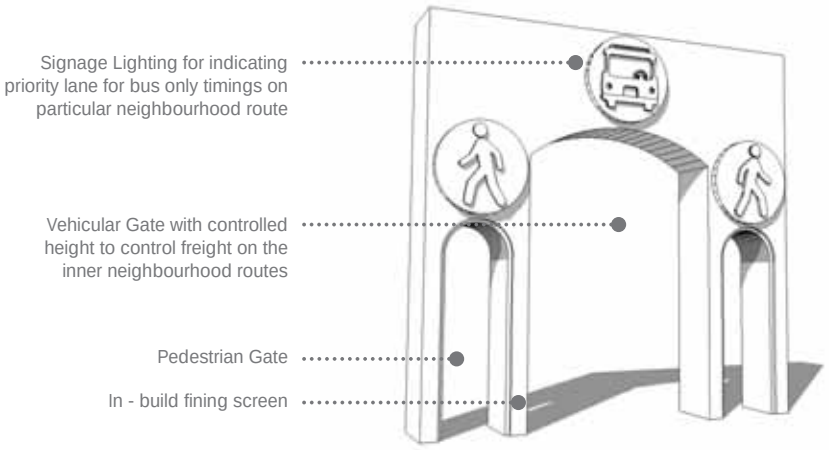
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: As the site is a way to examine the case interior to a neighbourhood, therefore is absent from the current scenario

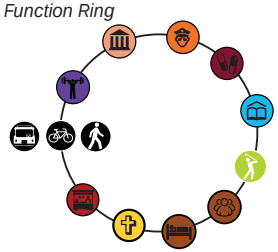
TRIAL SITE 2: The trial site lacks any condition of district route that intersect other lesser width district speed routes.

TRIAL SITE 1: The site displays when 6-7m width routes are intersected with city speed routes. One cannot place community gates due to not only width rule but also the catchment area for the community. Therefore for this condition the district gate is ideal for the selected *Delhi-on-Demand* route which controls fright traffic and as per is width still gives priority to bus on the route, making it sometimes bus only.

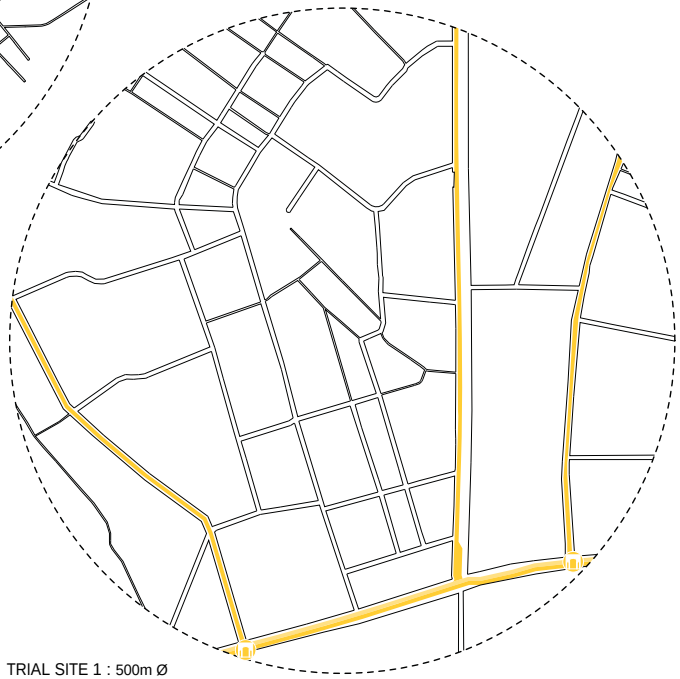
DISTRICT GATE - BUS ONLY



Function Ring



Occurrence: Route Type



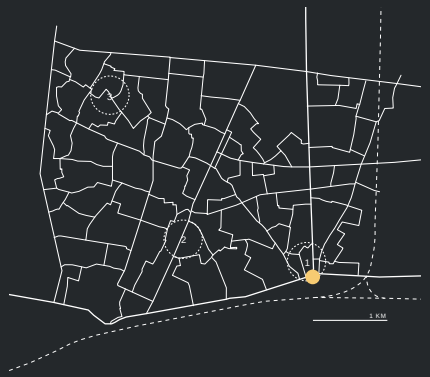
TRIAL SITE 1 : 500m Ø

DISTRICT GATE - BUS ONLY (Speed Route):

Design Element type: SYMBOLIC

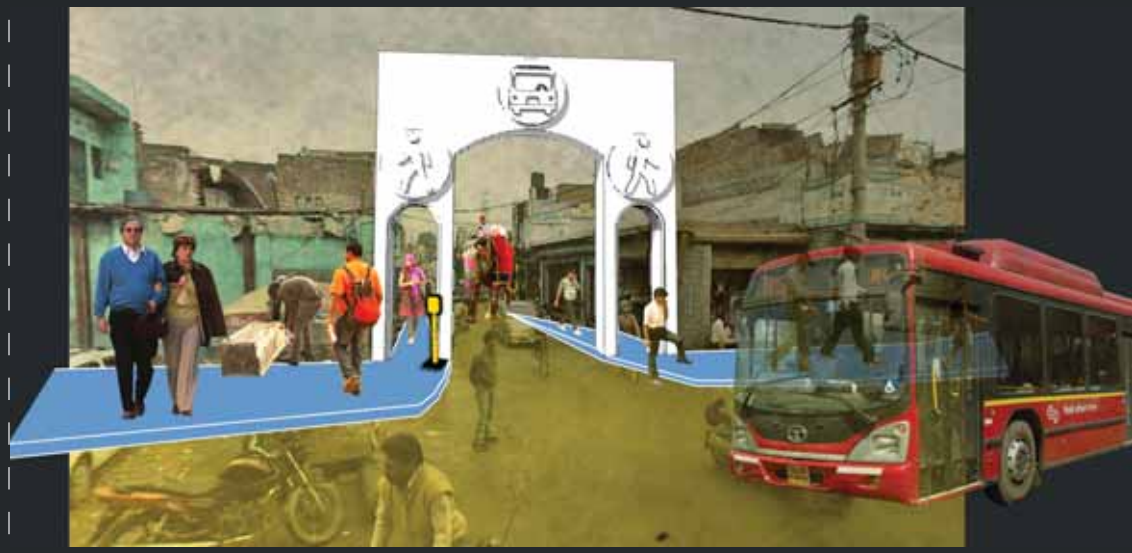
This occurs at the intersection of a district speed route larger than 6m with various other speed routes both city and district type. It helps in regulating traffic in the route ahead from a city speed route. It is a variates in functionality in smaller width route by making it dynamically through the demand rate a bus only route.

The gate is added in the design elements tool box to remove any anomalies in conditions and not to replicate many community based gates all over the place that reduces catchment area from one to another. Unlike the above speed gates this gate's phasing depends on the location and condition so it can occur earlier when incurred with city routes and later when there is a condition in district routes.



Existing

DISTRICT GATE - BUS ONLY



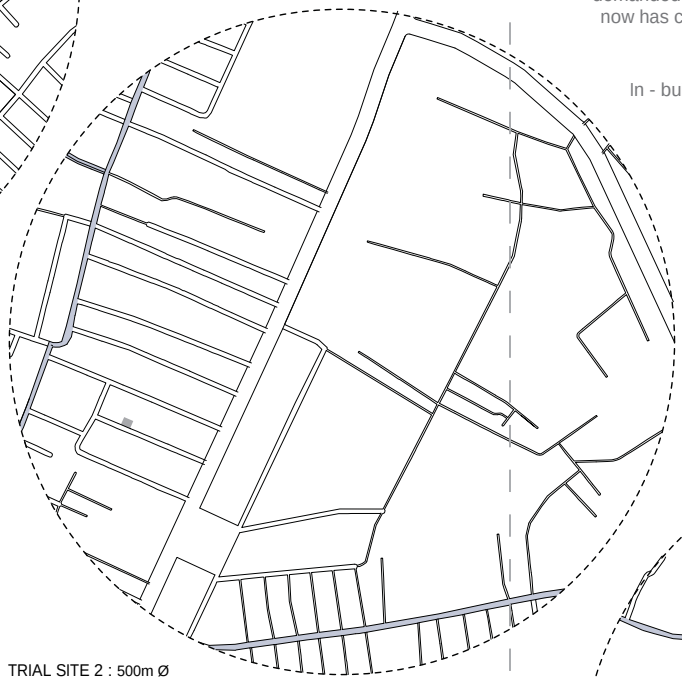
Delhi-on-Demand Visual
Design Elements

SYMBOLIC

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø



TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: As these gates occur being and end of the dynamic walk route, follows the rules similar to the route's rules in terms of occurrence and function ring, and one can come across one within 500m of walking in any direction. The site is ideal to see this happening.

TRIAL SITE 2: This site has a mixture of almost all traffic flows (speed and foot), one can notice in the design of this site that the walking route doesn't end or start therefore the gates are not indicated. Therefore during this site the walkway evolved its function which was later applied as a general rule for it. For the rule refer the site when dynamic walkway is explained.

TRIAL SITE 1: Similar gate is used when the walkway meets speed route, but as the half the width can be used my motorized traffic there for this site helps in solving the anomaly through signage on this gate when the walkway meets a bus only route as the time when the system has a high demand of the route.

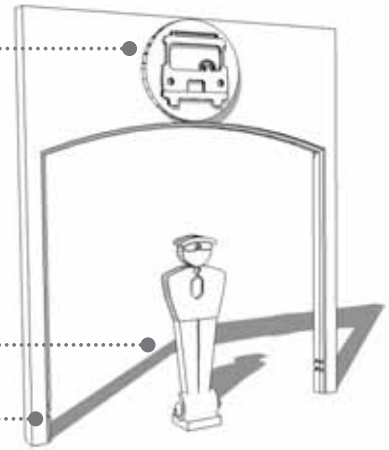
The Automated Guard - Divider/ Symbolic Stop Sign

NEIGHBOURHOOD GATE - GUARD - DYNAMIC WALK

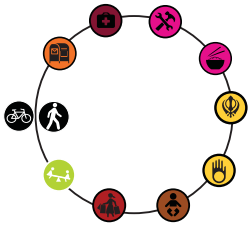
Signage Lighting for indicating priority lane for bus only timings on particular neighbourhood route while coming from dynamic walking lane

Automated guard cut-out to indicate the street was demanded for walking and now has converted to half walking routes

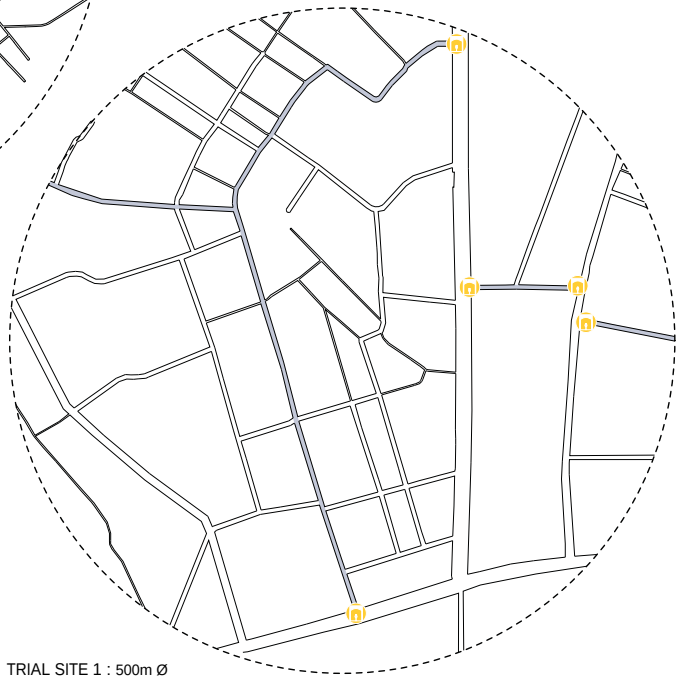
In - build fining screen



Function Ring



Occurrence: Route Type



TRIAL SITE 1 : 500m Ø

NEIGHBOURHOOD GATE - GUARD (Walking Route):

Design Element type: SYMBOLIC

This occurs at the start and end of a dynamic walking route. They symbolic guard cut-out rises up when the half the with of the route has been converted to a walkway which controls the amount of flow of traffic in or outward. The guard is otherwise in a non demand condition is in-active and is seemed as a part of divider for the route. These gates help indicating that the route is part of the walk-ability route of the *Delhi-on Demand* system. It also symbolically donates activities in the route that have functions that are based on neighbourhood level catchment area. While in phasing these gates are introduced once the neighbourhood's demand increases for the system and introduction of walk-ability is favoured to make accessibility safer and comfortable by foot

Existing

Delhi-on-Demand Visual
Design Elements

SYMBOLIC

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø

TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: As these gates occur with still routes one can feel their presence every 200m of any neighbourhood or district. Which this site as an example depicts.

TRIAL SITE 2: This site shows how one can walk through the still route to avoid a busy route which is indicated via this gate. While one is walking on these routes they can rest assured that they will never be bulldozed by speed traffic and can enjoy the company of residents that live on the street.

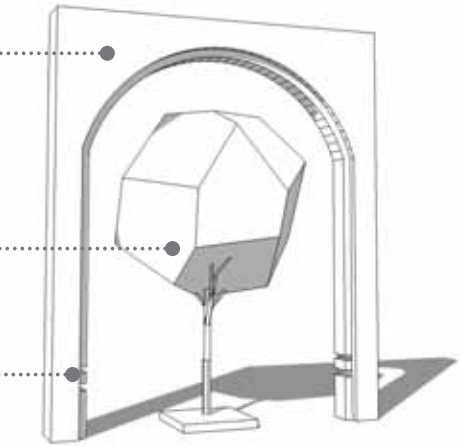
TRIAL SITE 1: The site should that still route occur irrespective of closeness to the speed route every 200m, and the gates mark a clear demarcation that one can enjoy a walk or access daily function no matter where they live in the neighbourhood..

NEIGHBOURHOOD GATE - TREE - STILL STREETS

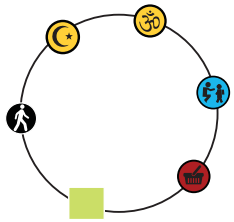
Symbolic Gate depicting a semi-public area

Use of Still object to show that the function within is constant throughout the day

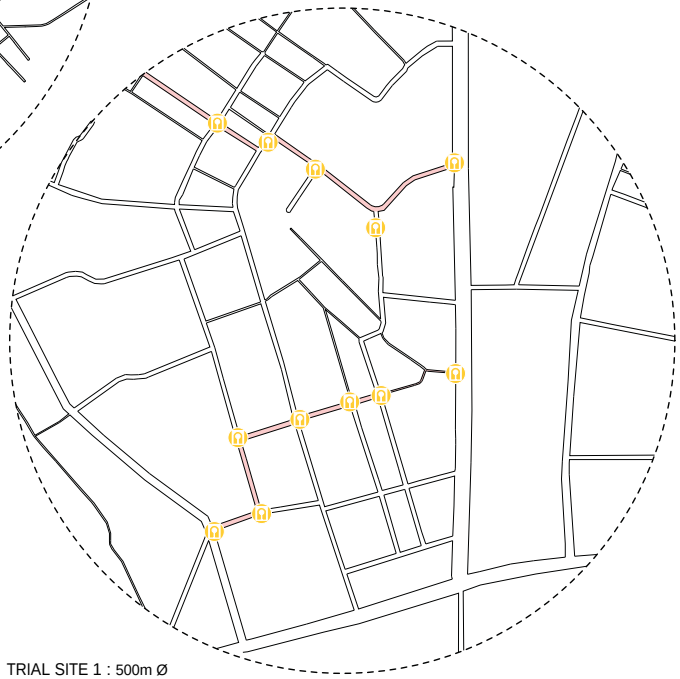
In - Build Fining Screen



Function Ring



Occurrence: Route Type



TRIAL SITE 1 : 500m Ø

NEIGHBOURHOOD GATE - TREE (Still Route):

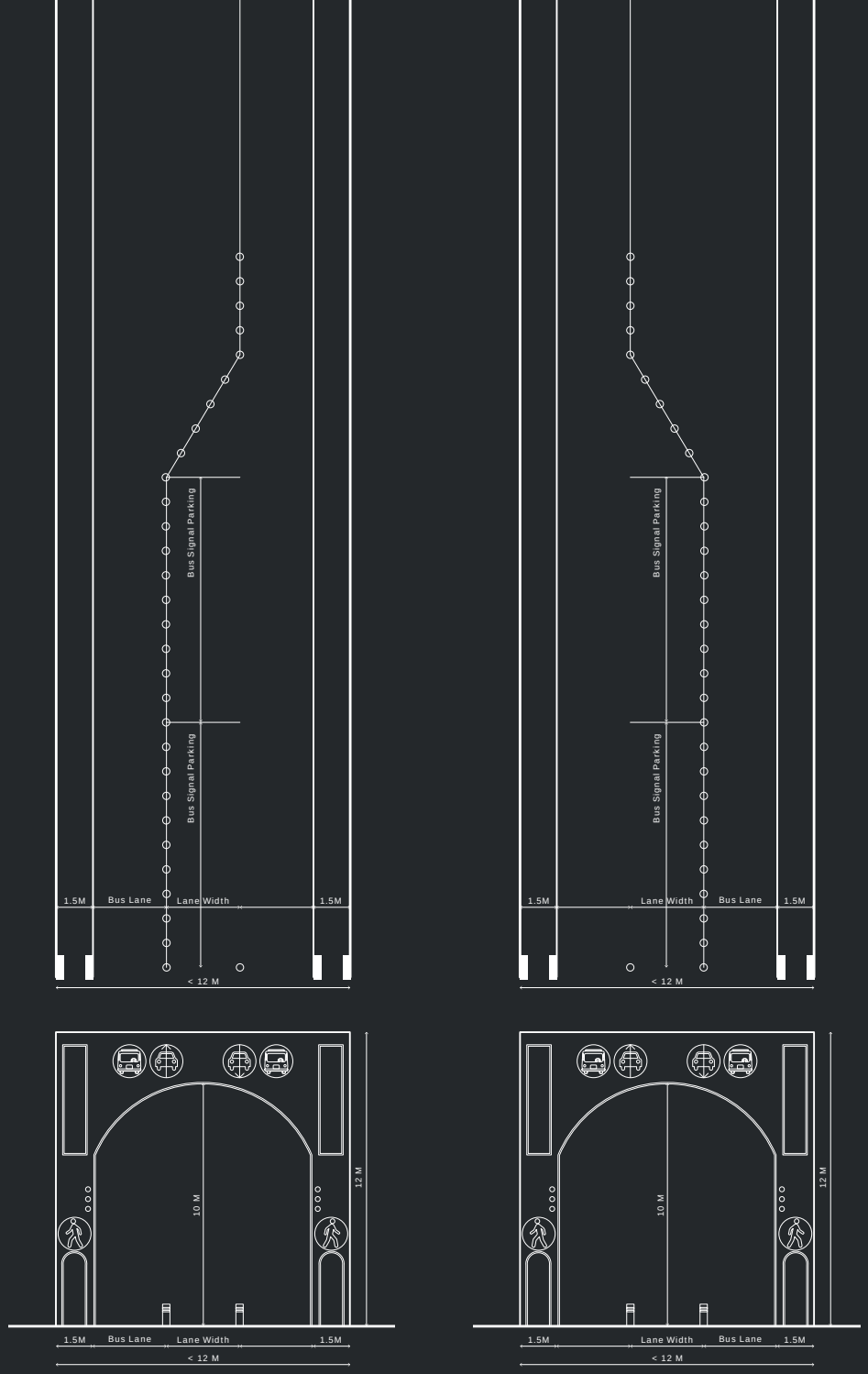
Design Element type: SYMBOLIC

These gates occur on still routes which are dedicated to zero motorized vehicular based activities and can be found in areas with higher percentage of residential typology. There occurrence on the streets increase if they are intersecting with other routes to forbid traffic on still routes. Like the route it is dedicated, it has a tree at its centre point - a still object and also an obstruction for speed traffic. The gate like other gates has a fining screen to note down law breakers that enter the route with a motorised vehicle for a non-emergency based activity.

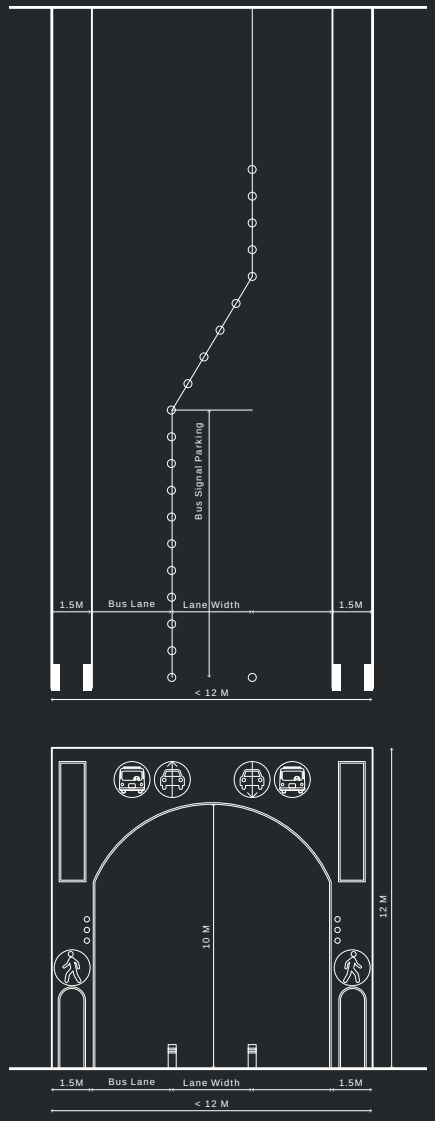
Following the rules of function ring and occurrence, in phasing as well it occurs later after one has established speed and then walking routes, while establishing still routes.

Existing

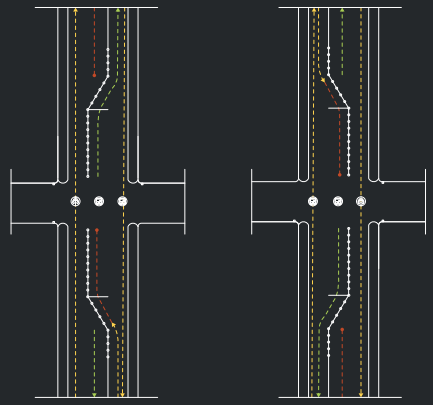
Delhi-on-Demand Visual
Design Elements



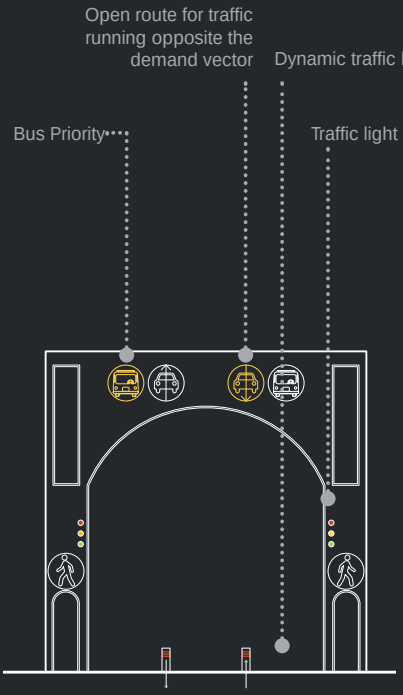
City Gate - With variation of lane traffic with change in demand's vector



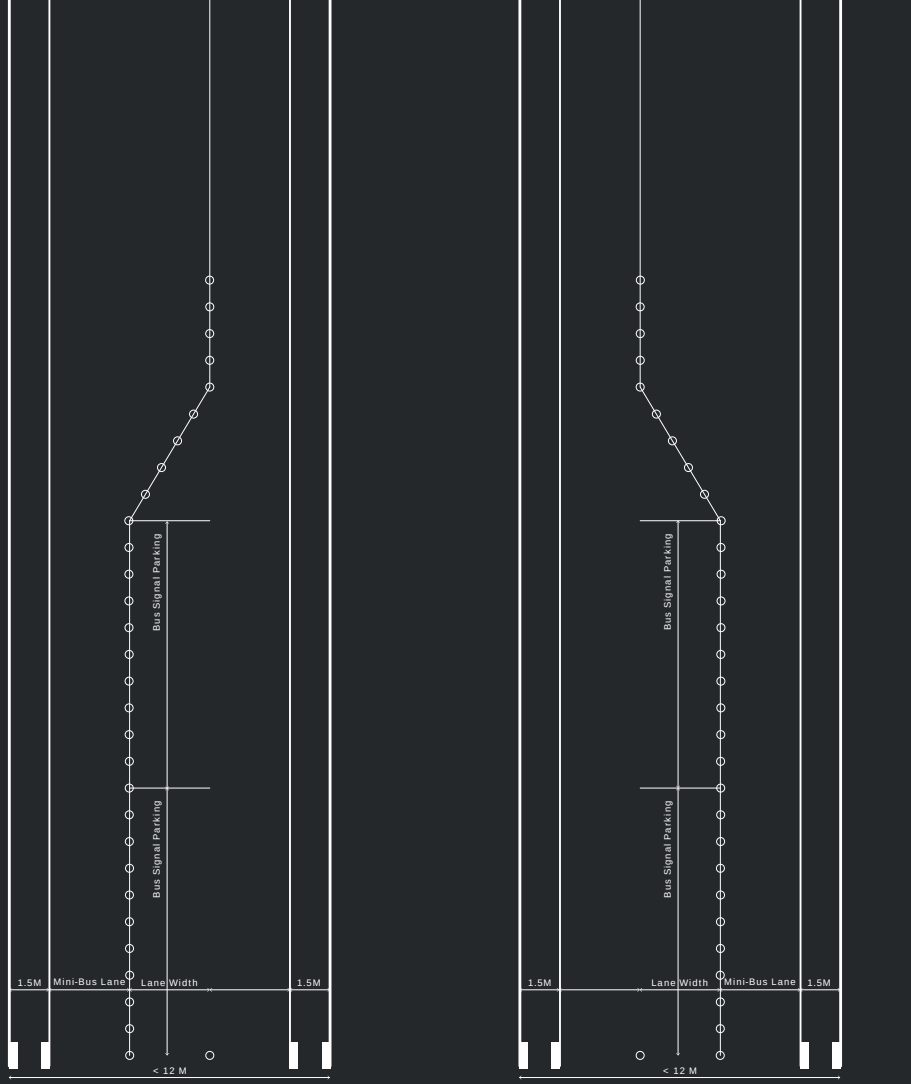
City Gate - With reduced bus stoppage

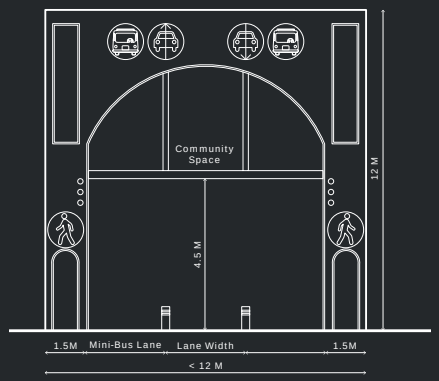


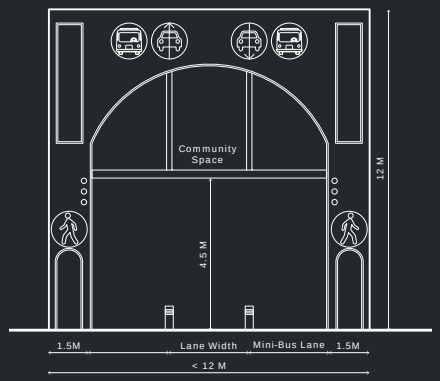
City Gate - Intersection on the district speed route



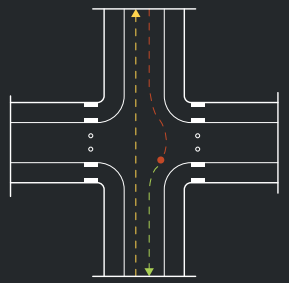
City Gate - Signage & Signalling



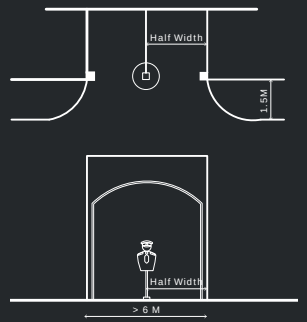




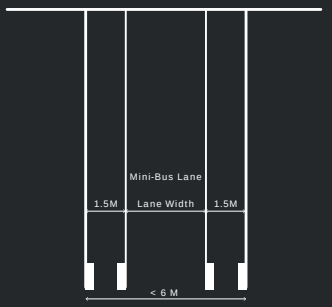
District Gate: Community - With variation of lane traffic with change in demand's vector

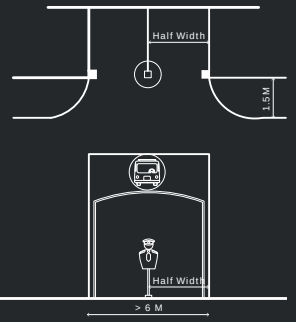


District Gate: Bus Only - Intersection on district speed route with width below 6m

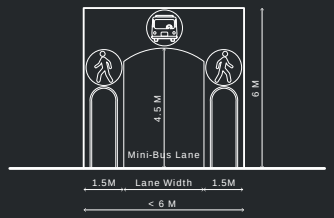


Neighbourhood Gate: Guard

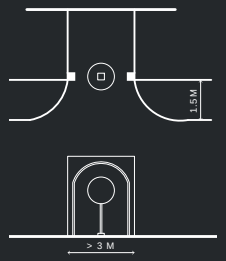




Neighbourhood Gate: Guard - Bus Only



District Gate: Bus Only



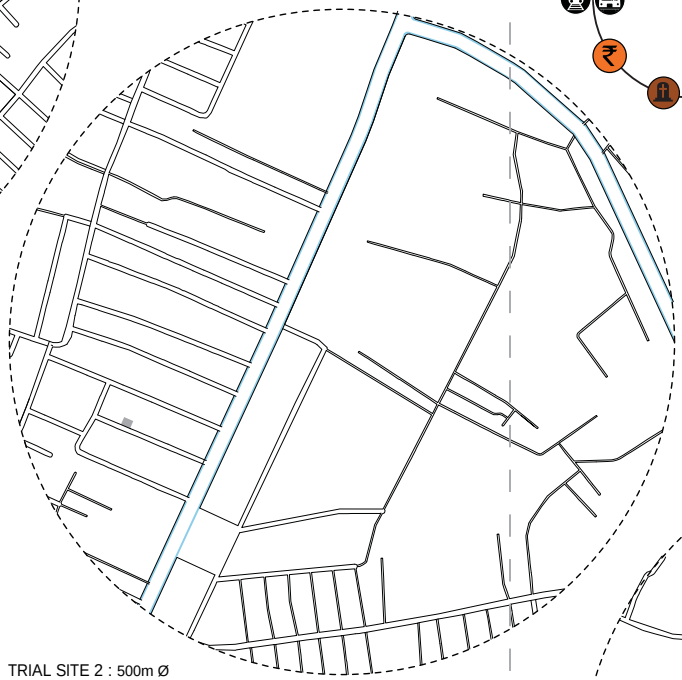
Neighbourhood Gate: Tree

TRIAL SITE 3 : 500m Ø

SYMBOLIC

Permanent

Dynamic



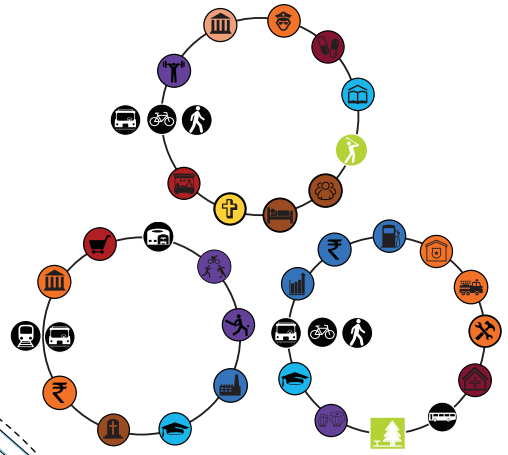
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: In the similar fashion as earlier speed route related design elements, the footpath which is a permanent feature is absent on the site which operates of dynamic waking more being interior in the district and facing more local residents travel and not crossing across travel.

TRIAL SITE 2: The site depicts the diminishing need of a permanent feature of walk-ability in areas that are more residential having locally based functions.

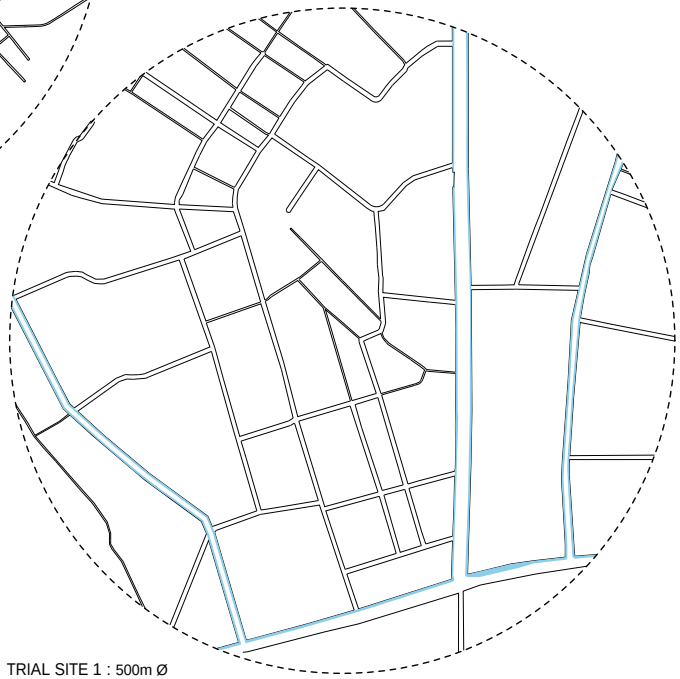
TRIAL SITE 1: The site demonstrates the network of footpath from different speed routes within the district entering the city speed route. These footpath extend to walking routes in form of dynamic walk during peak hours but closing the loop of a resident walking from inside the district outward to the city route where there is an option of public transport further for distances greater than 5km which are difficult to walk.

PERMANENT WALKWAY / FOOTPATH



Function Ring

Occurrence: Route Type



TRIAL SITE 1 : 500m Ø

FOOTPATH (Speed Route):

Design Element type: SYMBOLIC

The footpath are a permanent feature in any speed routes of *Delhi-on-Demand* system. They make sure the safety and availability of space for walking. After studying Shahdara through the study of 'Arrogance of Space', one realises the lack of walk-able space for the pedestrian in the current condition. This element is a traditional old element to road design but should be highlighted an essential integer of the system.

It is phased with the speed routes and as they are considered the first move to establish the *Delhi-on-Demand* system, so are footpaths which make sure even easier passenger accessibility to the public transport.

City Route

District Route (Primary)

District Route (Secondary)

Existing

SYMBOLIC

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø

TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: The site 3 is an ideal for depicting of walking route connections within the neighbourhood making school, shops, health and small business which have smaller catchment area safely accessible by all ages.

TRIAL SITE 2: The site 2 depicts the ease that walk-able routes can provide in connecting to not only the public transport but informal and formal commerce of the neighbourhood. Its also brought to light that a rained platform the entire length of the route will further help in entrapping motorized traffic from at-least one side of the route, forcing the change in attitude of single driven motorist.

TRIAL SITE 1: The walkways show its power in connecting the inner neighbourhoods to the speed route for functions that require a longer accessibility route. They make super one can approach the demand stops or speed routes safety and comfortable. It also in-turn shows the power of common resident to work together to achieve walk-ability and motor related pollution free urban environment. A walkway that makes sure a slum dweller or economically weaker section of society is not denied to use to make it safer to travel in city which is considered the most hazardous environment (CO2 emissions) and highest road accidents rates in the country.

The Automated Walkway - Falls or pulls out from the walk

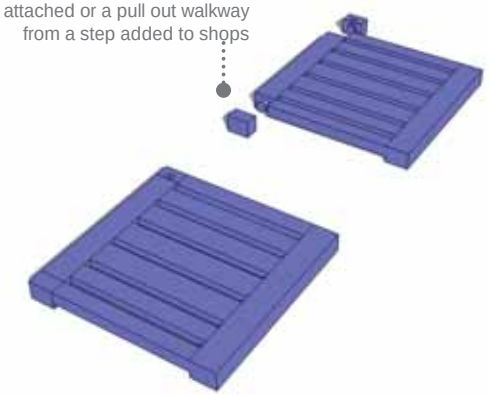
DYNAMIC WALKWAY / FOOTPATH

Demand to be made : Calculations
1 WALKWAY = 500m * 2.25 (average half width) = 1125sqm
1 person to take 2 steps takes 1.5m averagely, take that as a square for any direction movement = 2.25sqm of space per walker.
Thus, at a given demand time maximum number contained in the walkway = 500 people

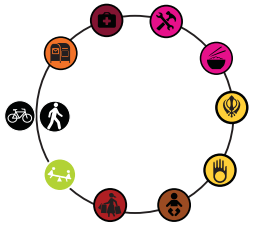
Urban common would be 50%, thus the demand required which is periodically checked to change routes to half walking is 250 people.

Shahdara's density is 37,346 persons/sqkm, making the demand required as only 1.34% of the density.

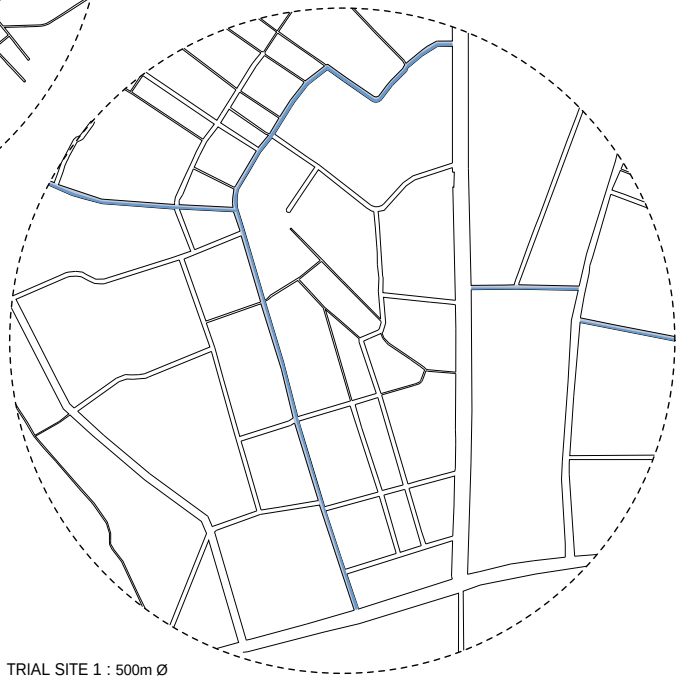
Pivoting walkway from the wall attached or a pull out walkway from a step added to shops



Function Ring



Occurrence: Route Type



TRIAL SITE 1 : 500m Ø

DYNAMIC WALKWAY (Walking Route):

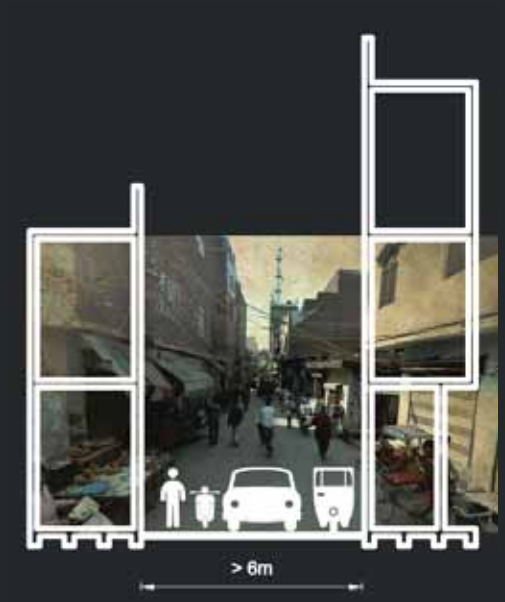
Design Element type: SYMBOLIC

The dynamic walkway are categorized in symbolic category though have a technical function, as it creates a symbol of a walkway, with its distinct colour and also being higher than the road level, physically and symbolically creating a barrier. The walkway occurs in walking routes which can be make walk-able if people demand the connection for accessing various district functions or public transport to access the district of the city. These Walkways do not contain monetary charge as it is being considered as an urban commons therefore, they also run on certain percentage of demand made to ensure it is identified as one rather than individualistic need. A complete demand request holds good for half an hour, time taken for operation and walking by all ages and physical abilities.

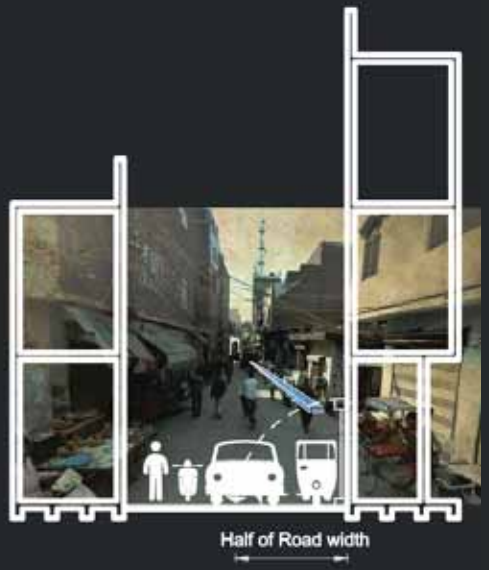
Approach to a Religious Centres

Existing

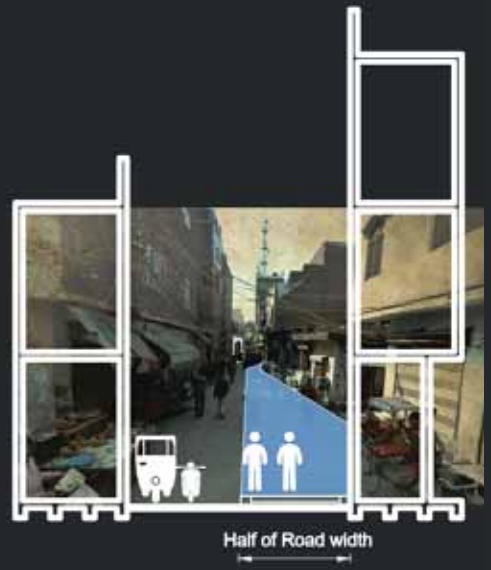
Delhi-on-Demand Visual
Design Elements



Existing - Diagram



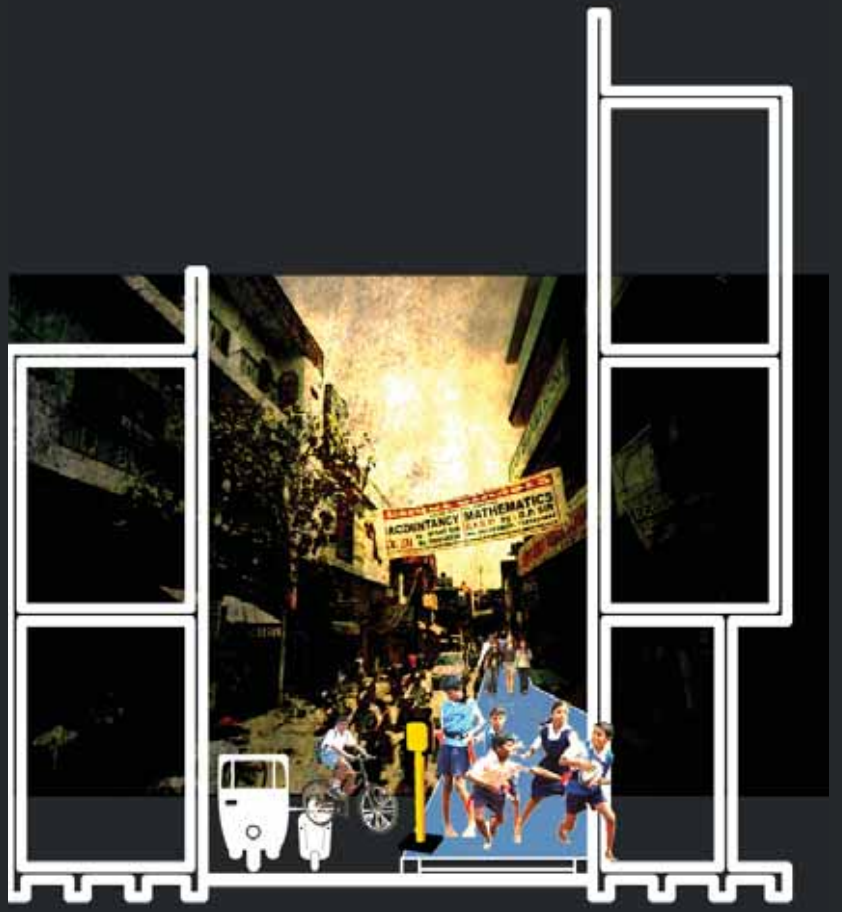
Non-Active - Diagram



Active - Diagram

Approach to a School

Existing



Delhi-on-Demand Visual
Design Elements

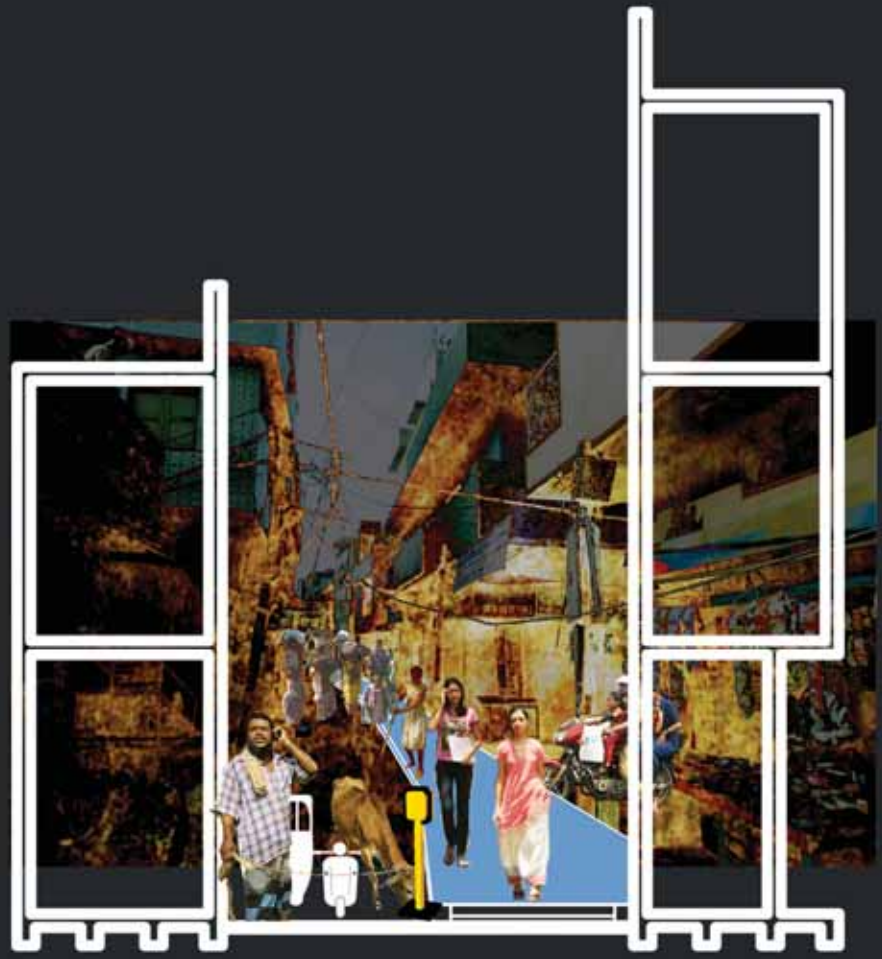
Existing - Diagram

Non-Active - Diagram

Active - Diagram

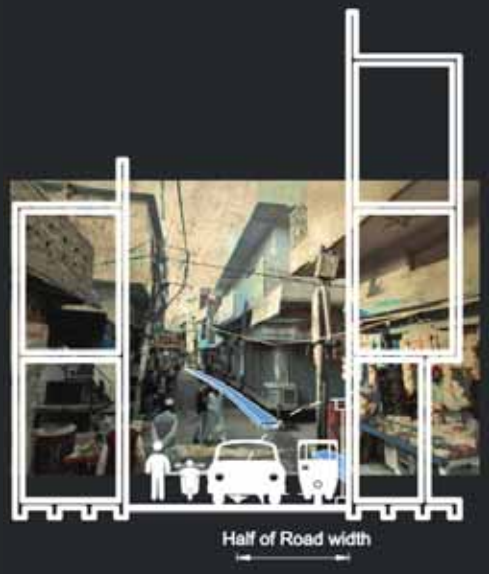
Approach via Shopping area

Existing

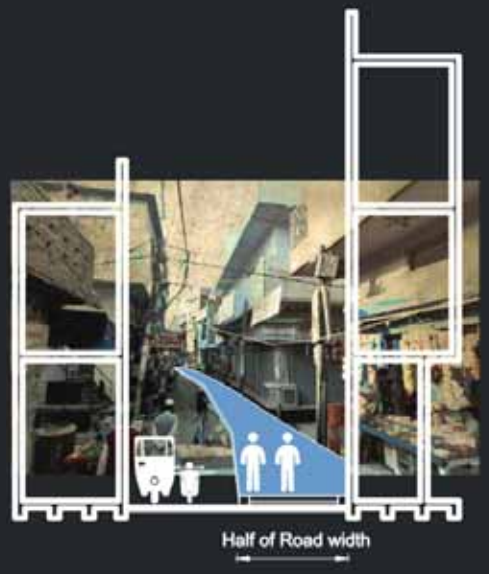


Delhi-on-Demand Visual
Design Elements

Existing - Diagram



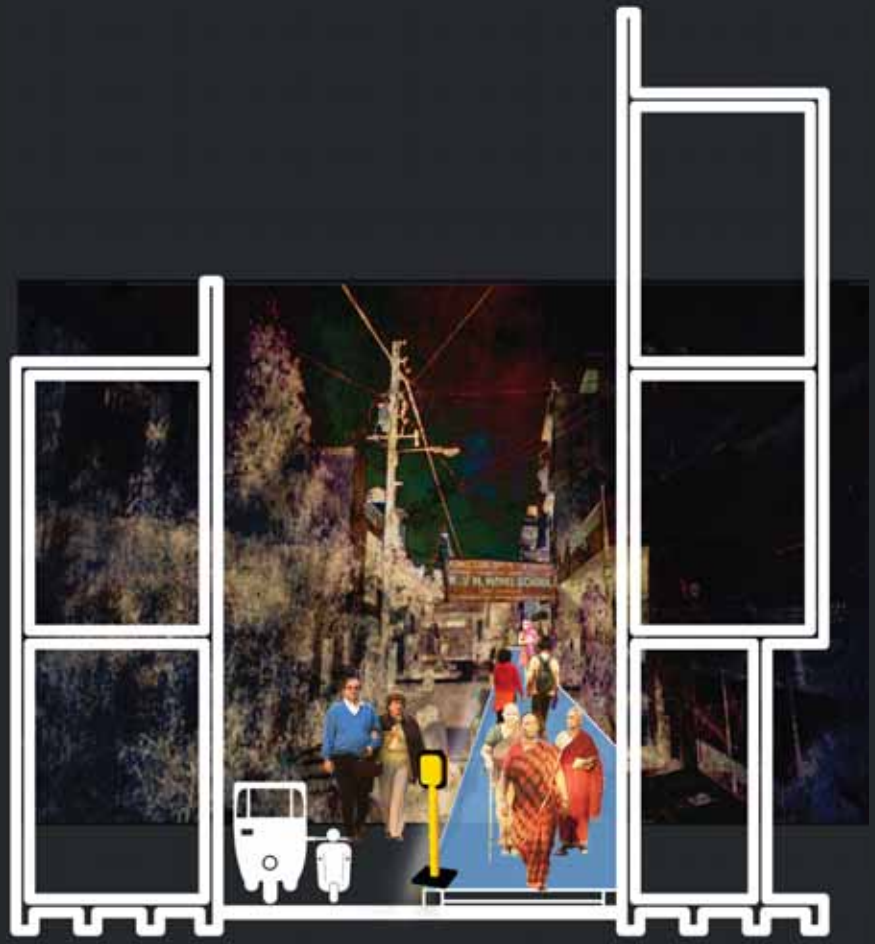
Non-Active - Diagram



Active - Diagram

Approach though Residential area

Existing



Delhi-on-Demand Visual
Design Elements

Existing - Diagram

Non-Active - Diagram

Active - Diagram

SOCIAL

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø

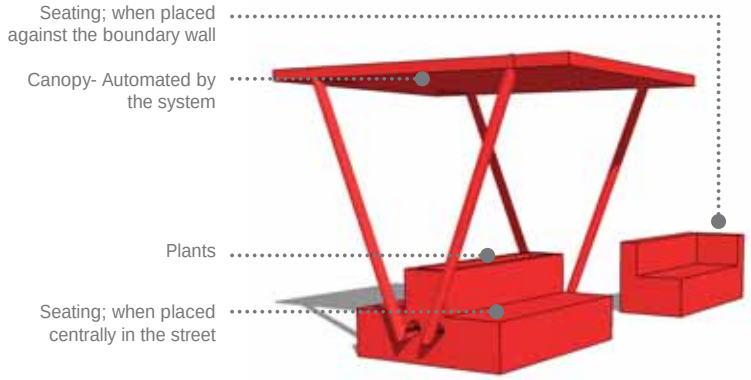
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: The occurrence of still routes have been made such that its equally distributed throughout the neighbourhood. Thus this feature also is equally distributed to initiate social interaction in public space and give life and an eye to residential streets of the neighbourhood. This function is permanent and therefore not demanded but the luxury uncommon to Delhi's street is only achieve in the last stage of phasing

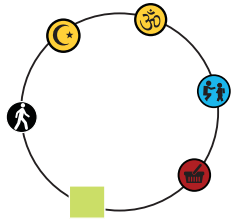
TRIAL SITE 2: One can notice these elements added centrally to JJ clusters and dense illegal post-partition colonies . Giving these communities which are strongly bonded in themselves an urban space to interact.

TRIAL SITE 1: Similarly the site that depicts speed of the system has also been engaged in balancing basic urban commons throughout the district as everyone needs a place to interact irrespective one's economic and social stature.

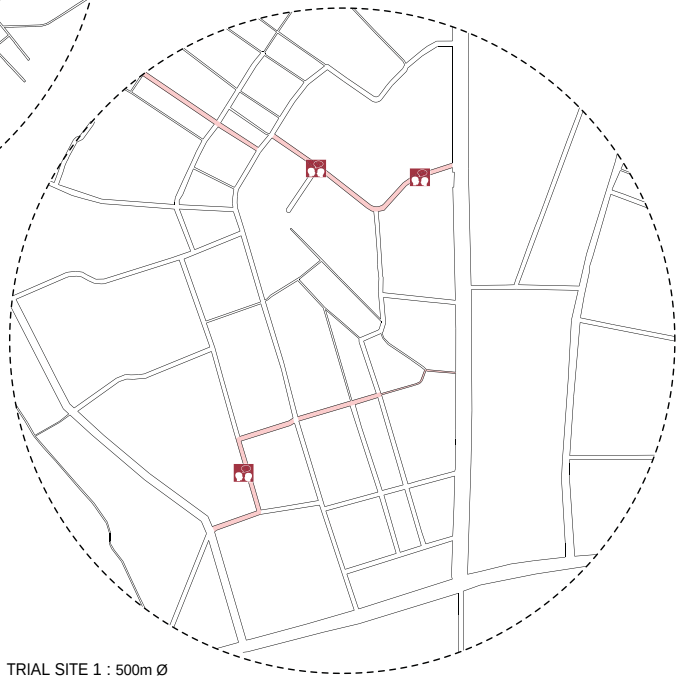
PUBLIC GATHERING



Function Ring



Occurrence: Route Type



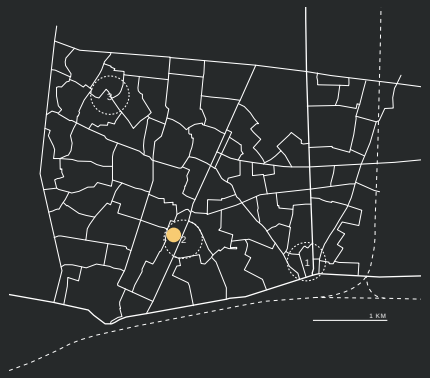
TRIAL SITE 1 : 500m Ø

SEATING (Still Route):

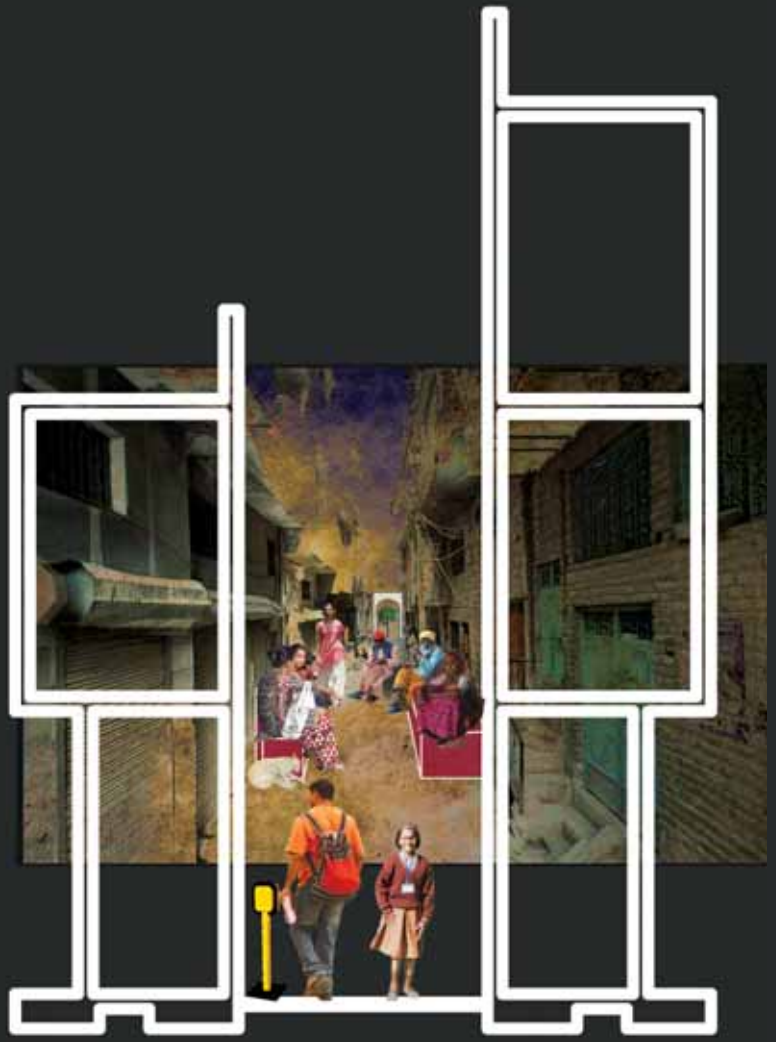
Design Element type: SOCIAL

Seating is provided as a design element due to the decreased amount or public spaces for social interactions per person in a highly dense districts of Delhi. These are permanent features with a variety to be placed centrally to the street or against a buildings wall. This depends of the width of streets. The element like the route they are affiliated to occur every 200m with the width of the street varying from 1- 3m.

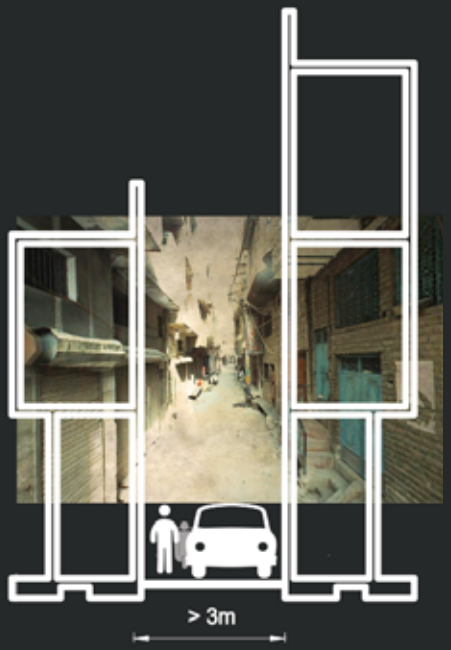
The permanent element when placed centrally have canopy which is operate-able manually. It is accompanied by other socially, culturally or economically activities which are usually seen on more residential based streets in India, with an added advantage of not being surprised by a motorist.



Existing



Delhi-on-Demand Visual
Design Elements



Existing - Diagram

Active - Diagram

SOCIAL

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø

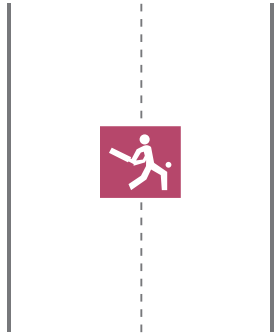
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: The occurrence of still routes have been made such that its equally distributed throughout the neighbourhood. Thus this feature also is equally distributed for kids in any neighbourhood.

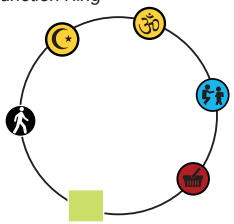
TRIAL SITE 2: This not so common urban common is for all and thus one has to add it on the still route running centrally in the JJ clusters and illegal colonies.

TRIAL SITE 1: Similarly the site that depicts speed of the system has also been engaged in balancing basic urban commons throughout the district as everyone needs a game of cricket from time to time.

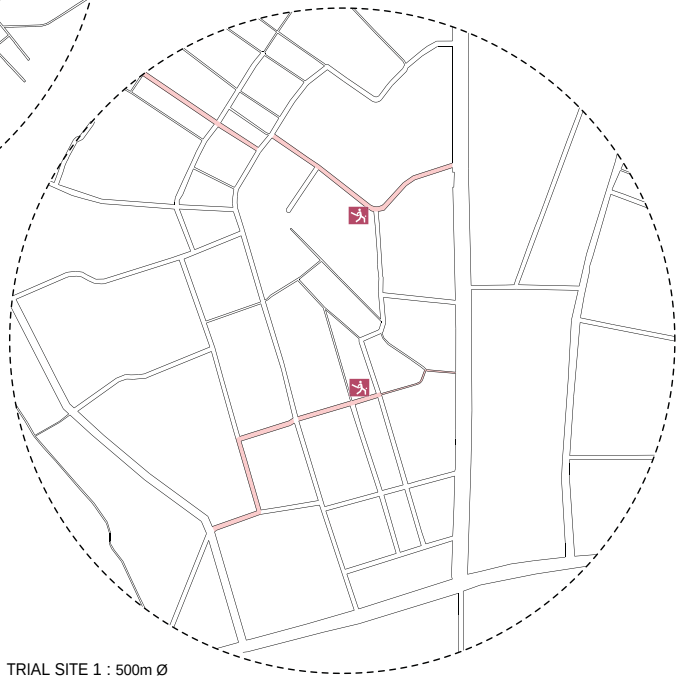
PUBLIC PLAYGROUND



Function Ring



Occurrence: Route Type



TRIAL SITE 1 : 500m Ø

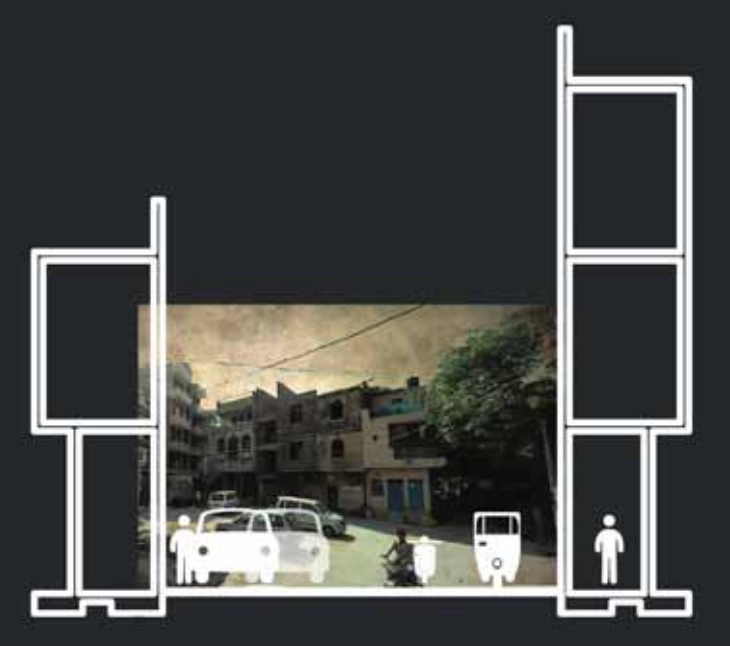
PUBLIC PLAYGROUND (Still Route):

Design Element type: SOCIAL

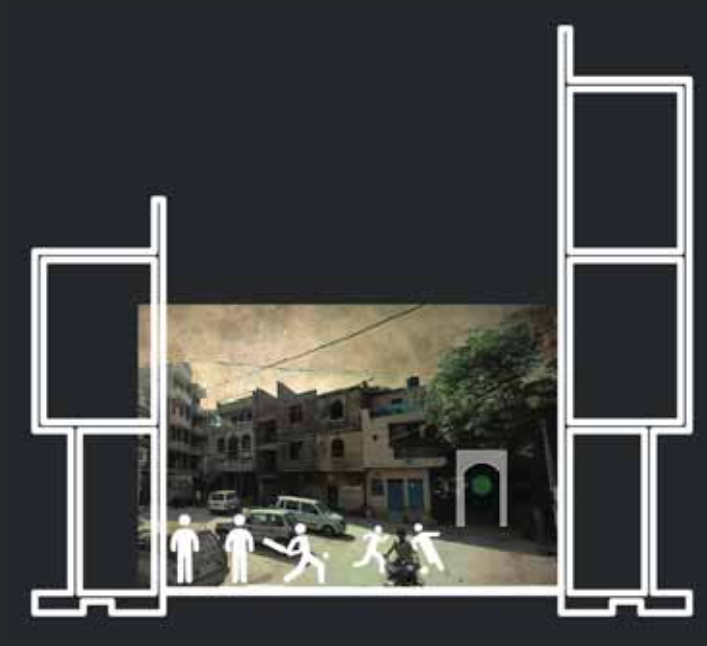
Shahdara's decadal population growth was 62% in the census of 2011, the highest of Delhi. Thus, one can assume atleast of the contribution is the young population. But Delhi usually bannered under 'Clean Delhi, Green Delhi' is plagued by the usual issues that Indian cities faced that is urban spaces and especially playground. The current situation in Shahdara shows even a bleaker picture due to its density and privately owned or administrated parks. Thus, an element which encourages kids, who anyway play of the street with adjusted rules of cricket as 'street cricket' to enjoy their free time near their homes wihtout worrying to be killed by a motorist in the midst of a catch. Or a kid flying kite to not worry about the roof's limitation but be on ground.

Existing

Delhi-on-Demand Visual
Design Elements

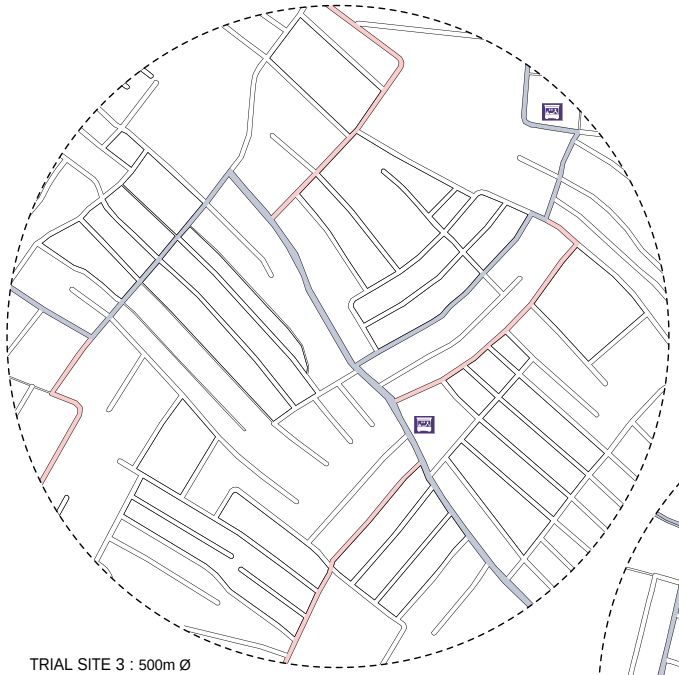


Existing - Diagram

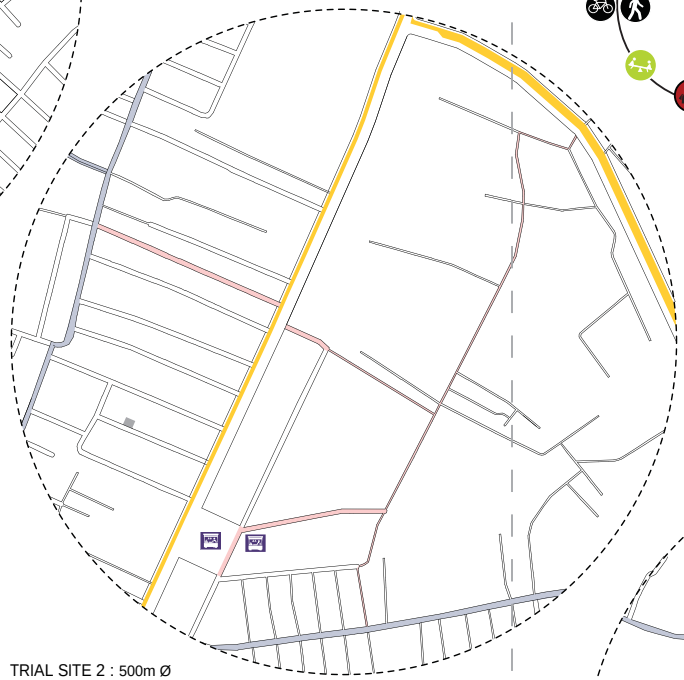


Active - Diagram

CULTURAL AND INFORMAL ECONOMY



TRIAL SITE 3 : 500m Ø



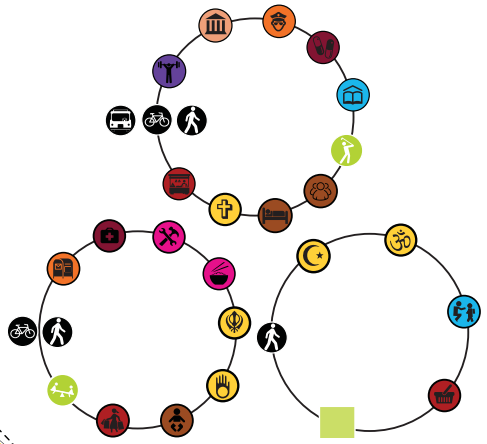
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: This feature occurs on crossroads of different streets and thus are placed such that it atleast occurs every 500m before hitting a high speed route. Its central location is integral for it to function as programme of the system and the activities that can take place have a large catchment area.

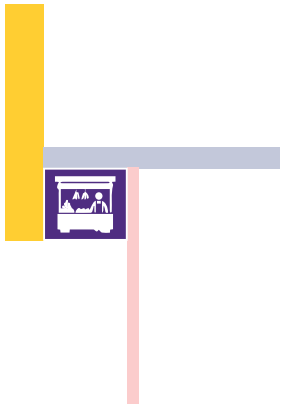
TRIAL SITE 2: One can notice these elements added centrally to JJ clusters and dense illegal post-partition colonies . Giving these communities which are strongly bonded in themselves an urban space to interact and support their informal economic ventures.

TRIAL SITE 1: Similarly the site that depicts speed of the system has also been engaged in balancing basic urban commons throughout the district as everyone needs street food.

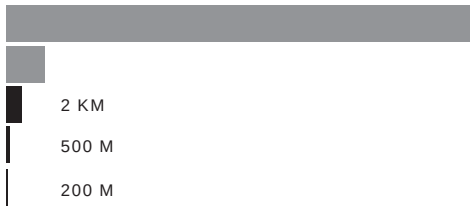
PLAZA

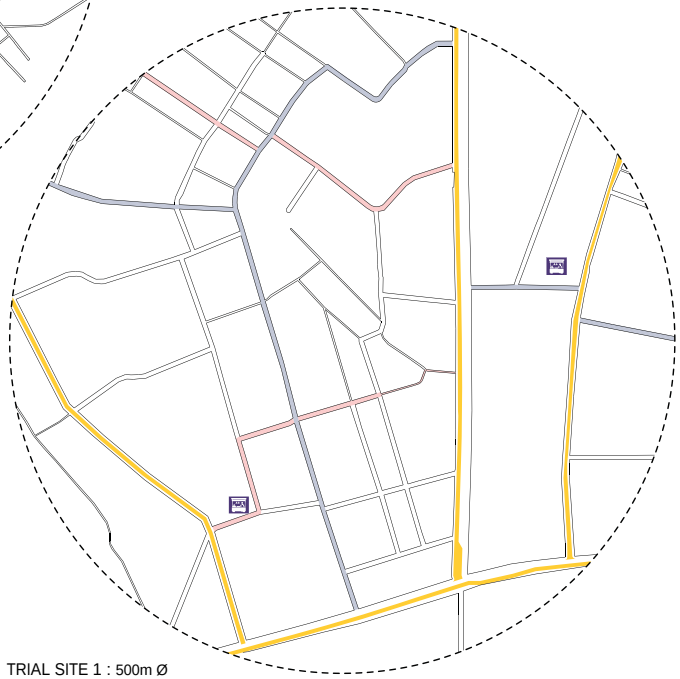


Function Ring



Occurrence: Route Type





TRIAL SITE 1 : 500m Ø

DYNAMIC PLAZA (Still Route):

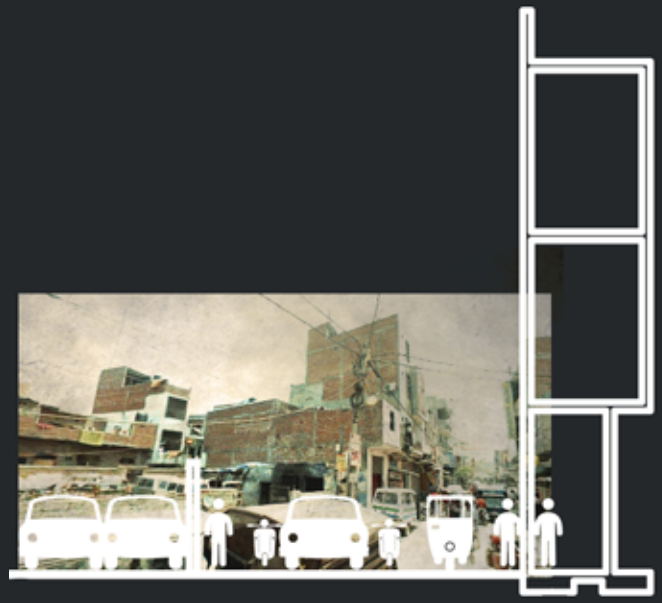
Design Element type: CULTURAL AND INFORMAL ECONOMY

The plaza as a physical form stays permanent but the activities on it changes to suite the resident as well vendors and hawker. A meter specifically alone administers the demand. One can procure economic feature of their electronic card to demand commerce space for a day. Similarly one can demand for a open space for cultural function like *satsangs.* On another hand protest can be made on this plaza. If their is demand for a particular activity from a certain plaza one can arrange it seeing the capacity of the plaza and fulling 50% occupancy of it.

These plaza occur and the confluence of different types of route and can attract a large audience.

Existing

Delhi-on-Demand Visual
Design Elements



Existing - Diagram

Non-Active - Diagram

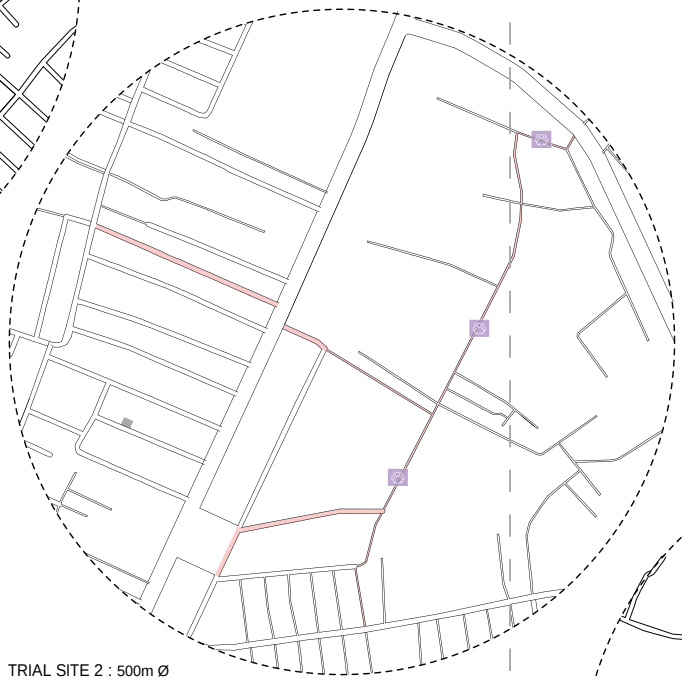
Active - Diagram

CULTURAL AND INFORMAL ECONOMY

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø



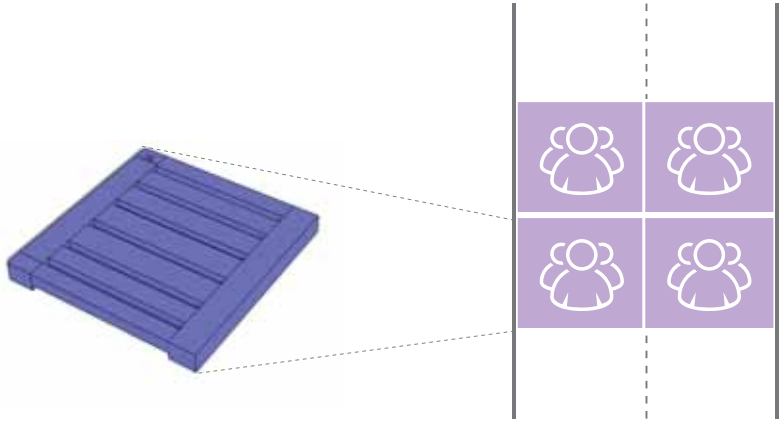
TRIAL SITE 2 : 500m Ø

TRIAL SITE 3: JJ Clusters are absent thus as a design feature have not been added but the residents together can request for this addition when the phasing is done for the site.

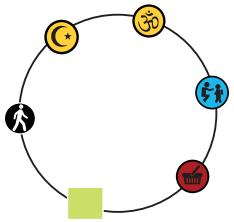
TRIAL SITE 2: The JJ clusters are the only one which have the benefit of added functions that further their social, cultural and economic based activities.

TRIAL SITE 1: JJ Clusters are absent thus as a design feature have not been added but the residents together can request for this addition when the phasing is done for the site.

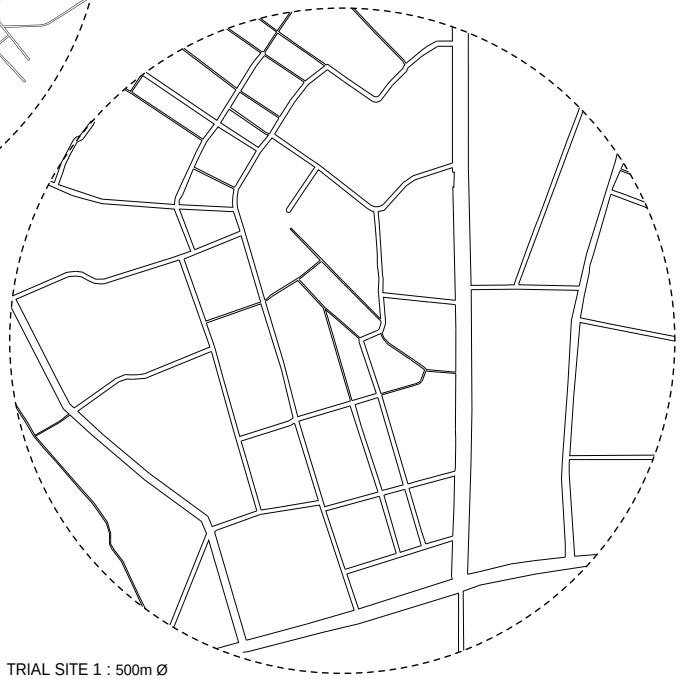
PLATFORM



Function Ring



Occurrence: Route Type



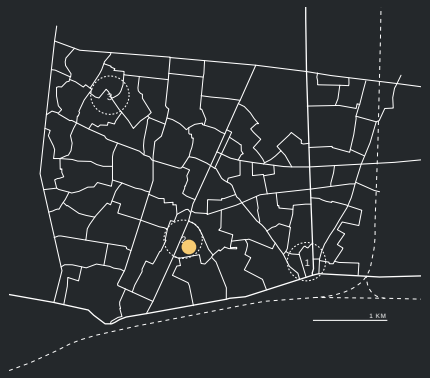
TRIAL SITE 1 : 500m Ø

PLATFORM (Still Route):

Design Element type: CULTURAL AND INFORMAL ECONOMY

The platforms are smaller versions of plaza but are also dynamic physically. If their is demand for a particular activity from a certain plaza one can arrange it seeing the capacity of the plaza and fulling 50% occupancy of it. They use the boards of dynamic walkway but are placed on either side of the street to occupy the complete street, creating a platform in the middle of the street as a demarcation.

These platforms have been provided in JJ clusters due to lack of personal space within homes to carry out informal activity based economic growth which area key occurrence in an informal settlements, which lack common places especially delineated for urban common based functions



Existing

Delhi-on-Demand Visual
Design Elements

Existing - Diagram

Active - Diagram

SERVICES

Permanent

Dynamic

TRIAL SITE 3 : 500m Ø

TRIAL SITE 2 : 500m Ø

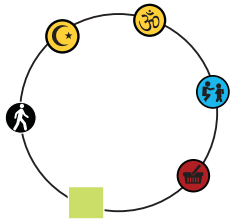
TRIAL SITE 3: JJ Clusters are absent thus as a design feature have not been added but the residents together can request for this addition when the phasing is done for the site.

TRIAL SITE 2: The JJ clusters are the only one which have the benefit of this added function as this housing typology is associated with severe lack of sanitation services.

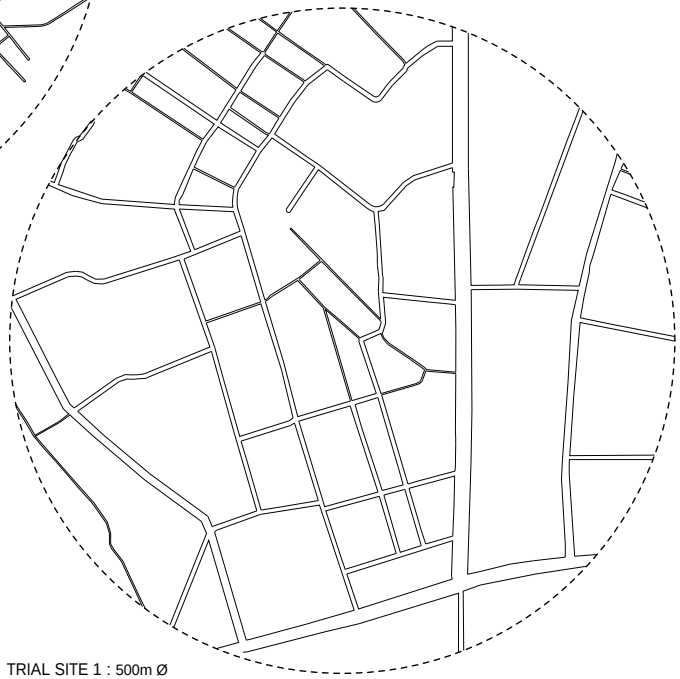
TRIAL SITE 1: JJ Clusters are absent thus as a design feature have not been added but the residents together can request for this addition when the phasing is done for the site.

TOILET BOX

Function Ring



Occurrence: Route Type

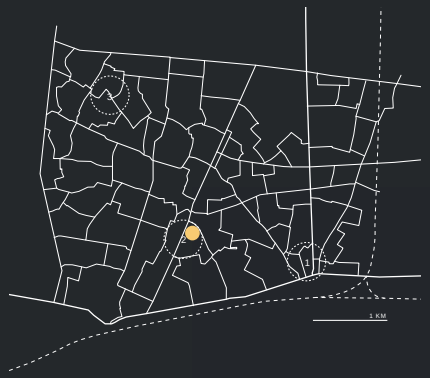


TRIAL SITE 1 : 500m Ø

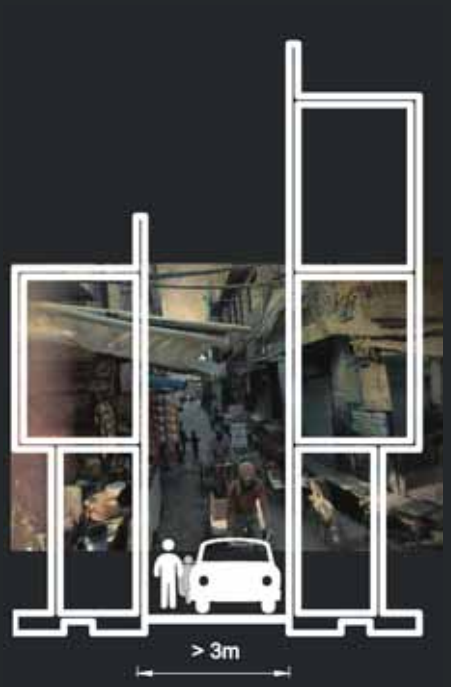
TOILET (Still Route):

Design Element type: SERVICES

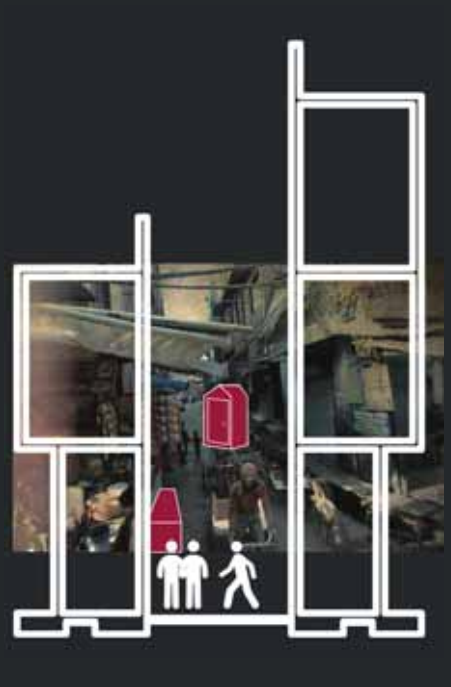
These toilet boxes have been provided in JJ clusters these housing typology being identified by poor sanitation based services. Its a permanent feature and can be used by any one in the line to it.



Existing



Existing - Diagram



Active - Diagram

City Gate

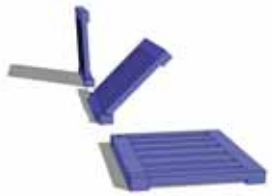
District Gate:
Community

District Gate:
Bus only

Neighbourhood Gate:
Guard

Neighbourhood Gate:
Tree

Demand Stops and stations

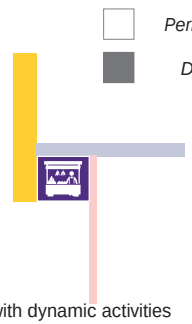


Dynamic Walkway

Footpath

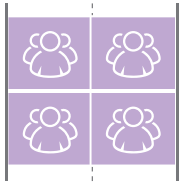
Traffic Bollards

Meter for the technology



Plaza with dynamic activities

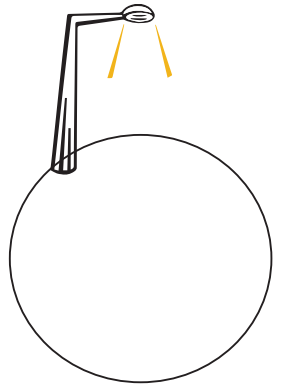
Platform on streets converted
to stil route



Public playground on street
converted to still route

Toilet Box on routes
converted to still route

Seating on the streets
converted to still routes



Function Ring

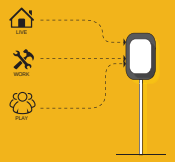
Occurrence: Route Type

LIGHTING (All Route):

Design Element type: SERVICES

Each physical design features come with integrated lights. The lighting works if the street is in demand and the daylight has diminished, both information can be feed by the system depending on daily weather report and demand data of the street. Thus making it an intelligent, optimum usage of resource.

The lights also consider if it is dark and it a female has demanded for walking a particular route, where the demand data priority is not required as the walkway or dynamic features which only activate their light and not get physically changed.



CHAPTER

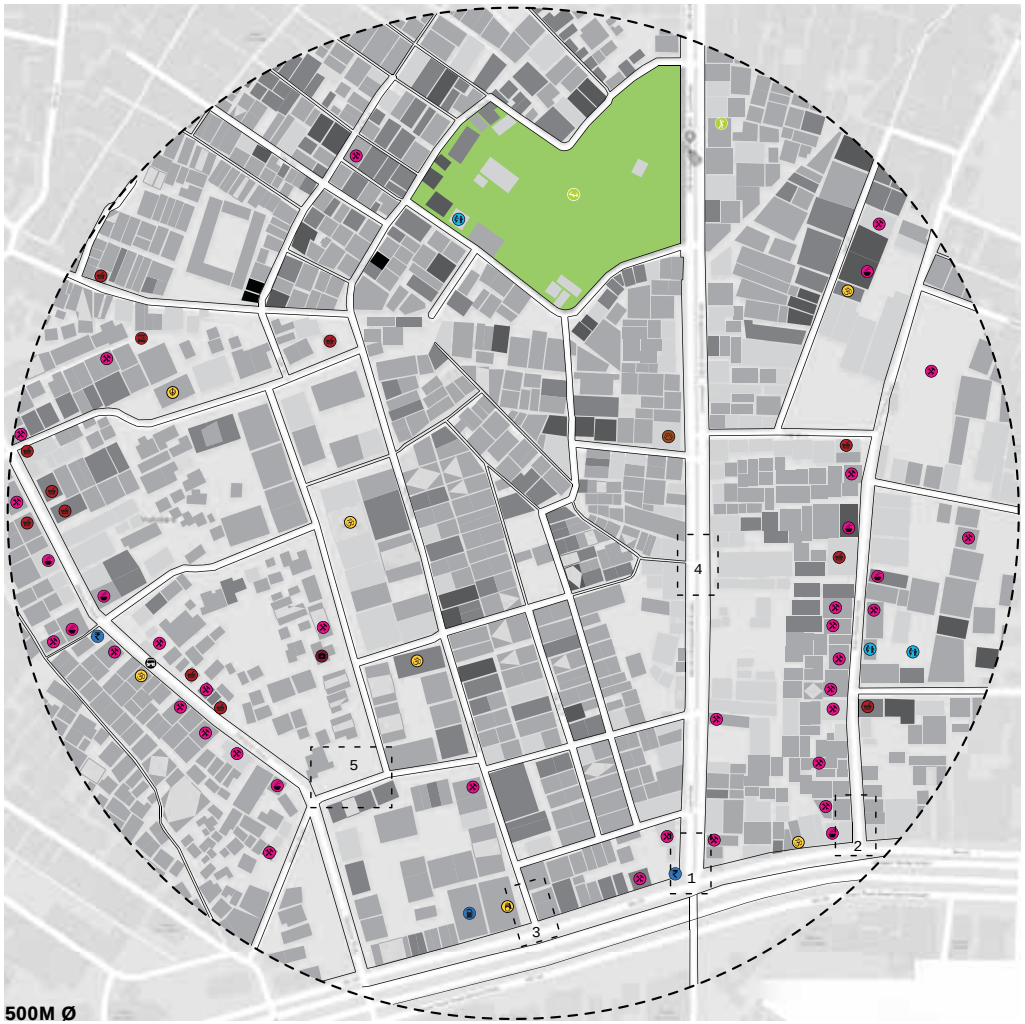
DESIGN SCENARIO

WHY THIS SITE ?

This trial site serves the purpose of exhibiting how a neighbourhood interacts with the city speed route and what happens at the junction of when different types of speed routes meet.

It also demonstrates how one's life changes due to the system in respect to a working mother and her child as demonstrated further.

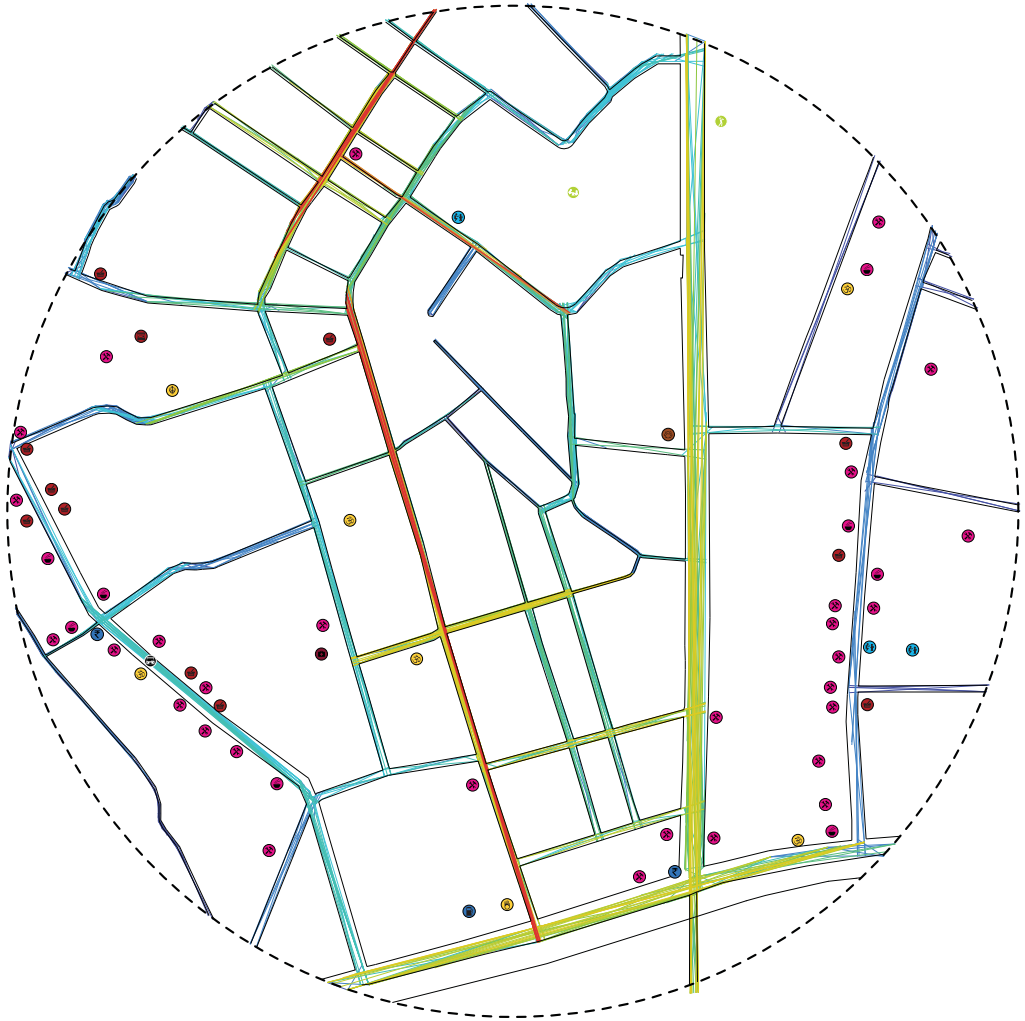
ground
g +1
g +2
g +3
g +4



Housing volume and function

bus stop
hindu temple
gurudwara
jain temple
primary school
neighbourhood playgr
recreational activity
informal market
general stores
general service shop
food based service
clinics
petrol pump
bank & ATM
community space

The strategy used to select and design routes are speed and walking scale, the same has been applied at still scale. Using the strength of connectivity of current network understood by space syntax and how functions are laid out in the trial site one determines the still routes and urban public spaces and playgrounds. But these activities are determined by lesser strength street as still routes are not used as through road but as urban activities.



Space syntax(Isovist path) and function

TRIAL SITE 1: DESIGN ELEMENTS

ENGAGING THE DESIGN ELEMENTS

SEATING
still routes

DISTRICT GATE: BUS ONLY
district speed routes

DISTRICT GATE: BUS ONLY
district speed routes

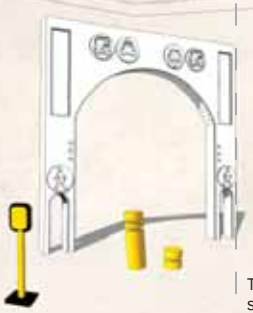
CITY GATE
speed route

NEIGHBOURHOOD GATE: TREE
still routes

NEIGHBOURHOOD GATE: GUARD
walking routes

DYNAMIC WALKWAY
walking routes

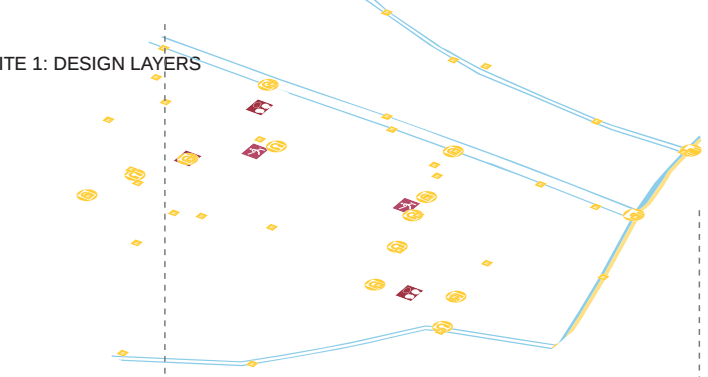
DEMAND STOP
speed routes / confluence of routes



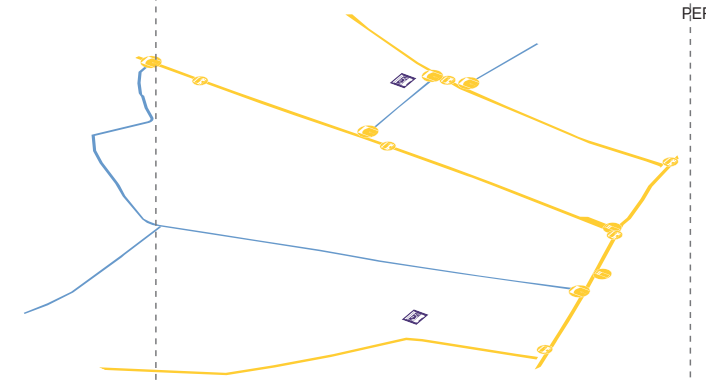
CITY GATE
speed route

TRAFFIC BOLLARDS
speed routes

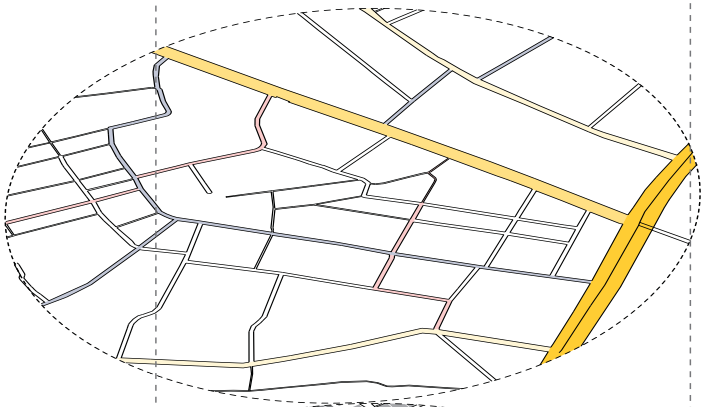
SCHOOL AND WALKWAY
walking routes



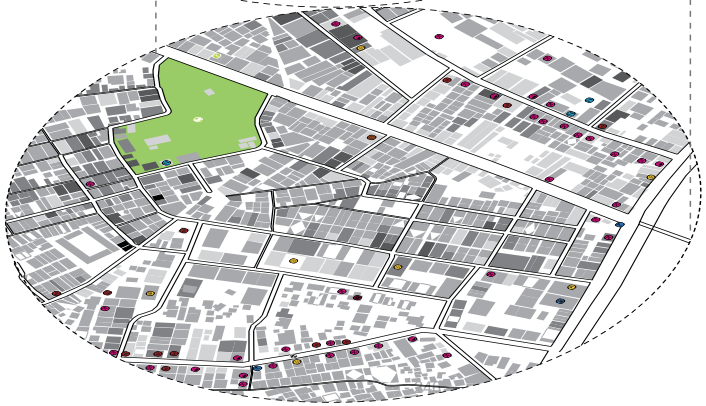
PERMANENT DESIGN ELEMENTS



DYNAMIC ELEMENTS



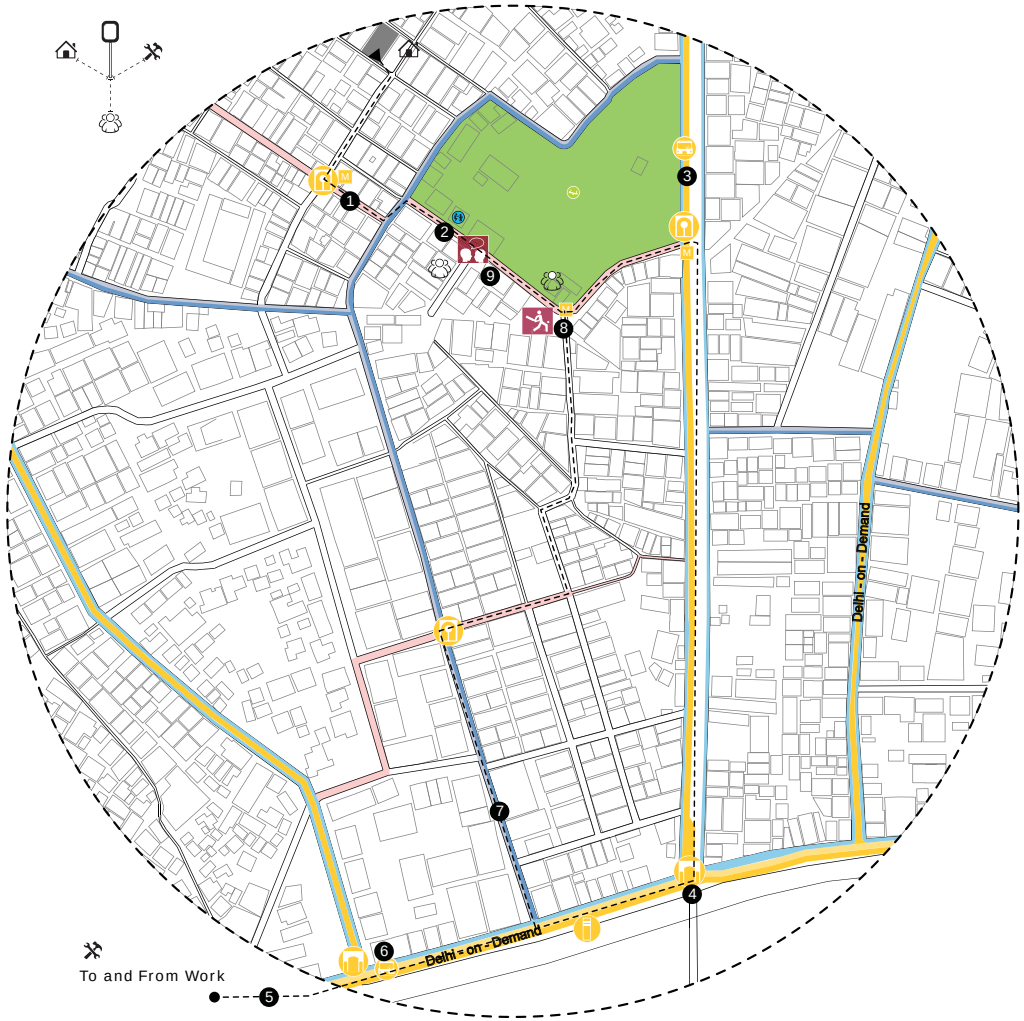
SYSTEM'S ROUTE SELECTED



500M Ø

HOUSING AND FUNCTION

- bus lane
- walking route
- still route
- footpath
- dynamic walkway
- city and district gate
- guard gate
- tree gate
- demand stop
- traffic bollards
- seating
- public playground
- dynamic plaza
- meter



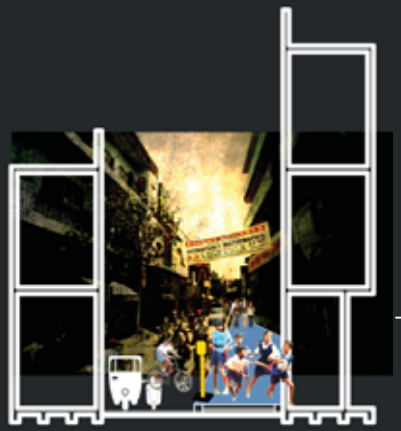
A case scenario of the life of a resident living in this trial site

Trial Site Design

1

walking through the still route

2



dropping your child to the school

3

catching a bus near you home at the stop you demanded

4

get down at the demanded stop in the district nearest to your home

5

travelling on city speed route to and back from work

6

Shop at the gate to walk inwards

7

demanding dynamic walkway

8

pick you child from the playground on the still route

9

socialize before heading home

WHY THIS SITE ?

This trial site serves the purpose of exhibiting how a neighbourhood interacts with the district speed route and how would different housing typology can interact with the new urban system *Delhi-on-Demand.*

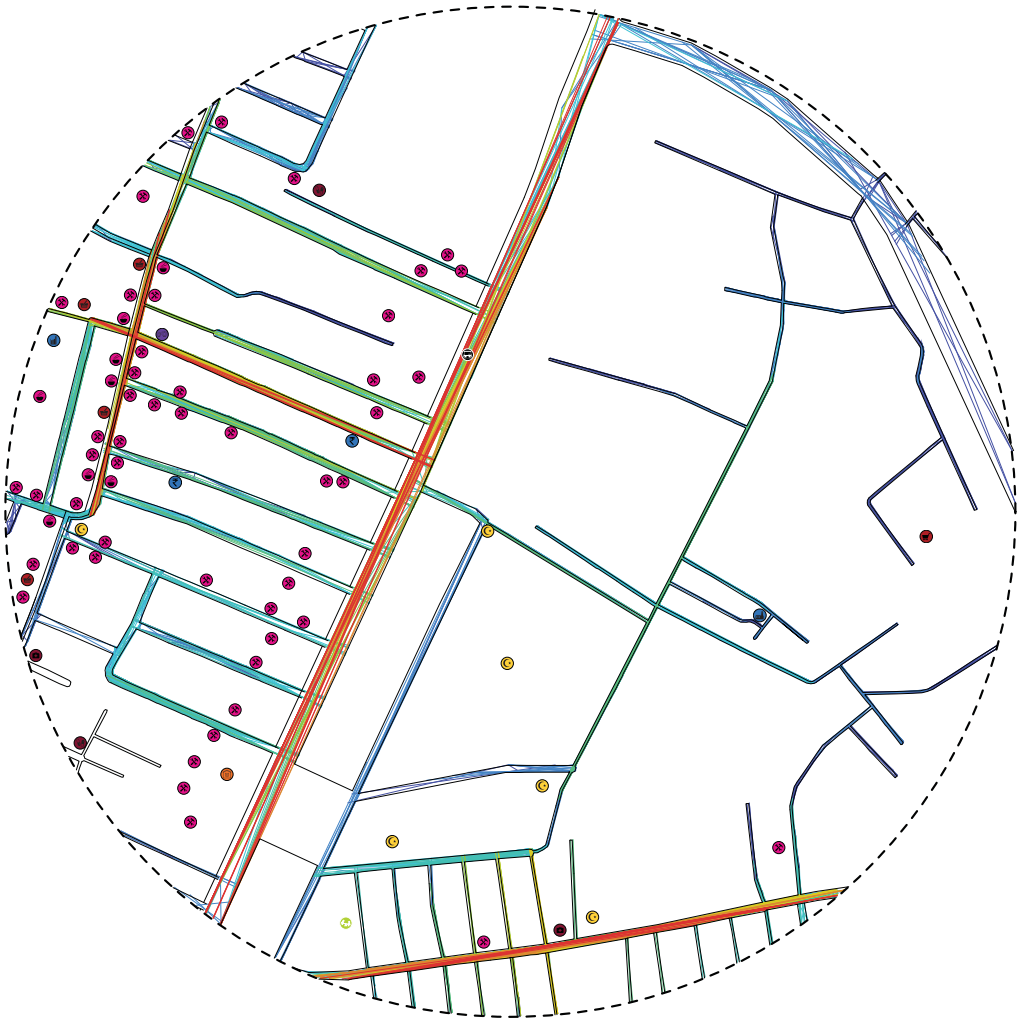
It also demonstrates how one's life changes due to the system in respect to slum dweller and his increase in accessibility to the city, functions within the neighbourhood and services that he can enjoy through the system.

ground
g +1
g +2
g +3
g +4

Housing volume and function

bus stop
mosque
recreational activity
police station
wholesale market
general stores
socio-cultural venu
general service shop
food based service
clinics
health care centre
city service market
district service market
bank & ATM

The strategy used to select and design routes are speed and walking scale, the same has been applied at still scale. Using the strength of connectivity of current network understood by space syntax and how functions are laid out in the trial site one determines the still routes and urban public spaces and playgrounds. But these activities are determined by lesser strength street as still routes are not used as through road but as urban activities.



Space syntax(Isovist path) and function

TRIAL SITE 2: DESIGN ELEMENTS

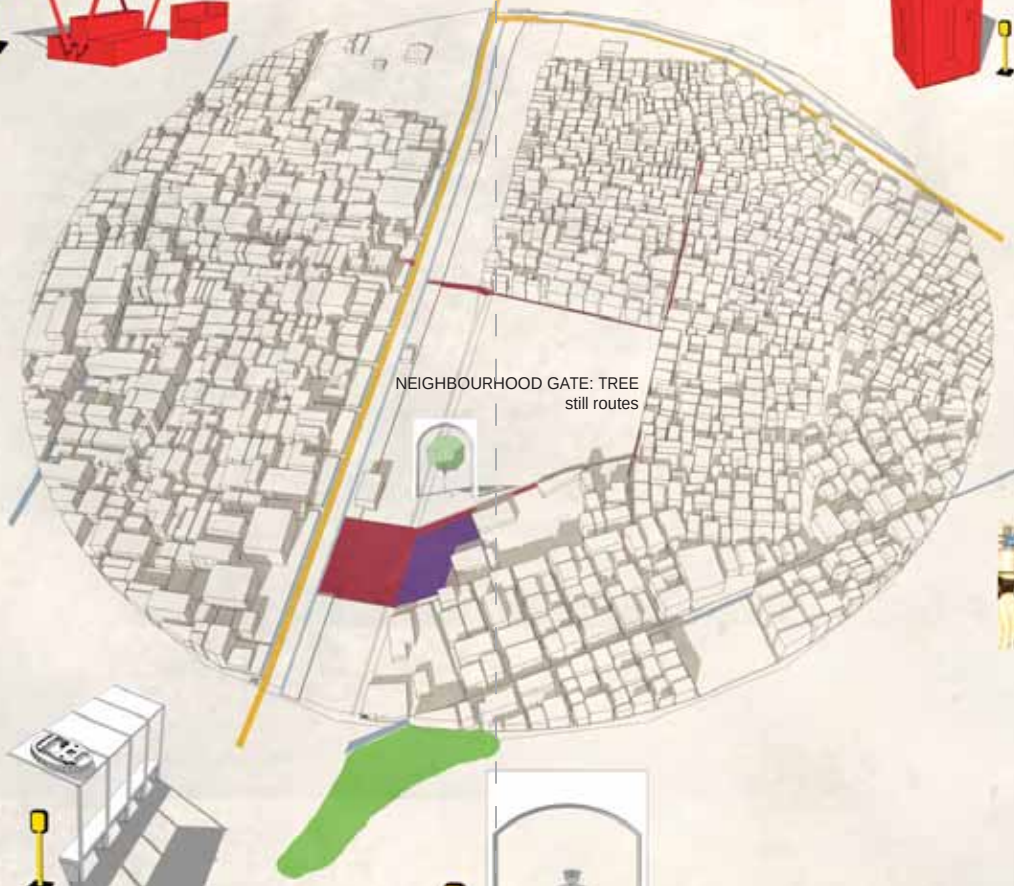
ENGAGING THE DESIGN ELEMENTS

DISTRICT GATE: COMMUNITY
district speed routes

SEATING
still routes

TOILET BOX
still routes

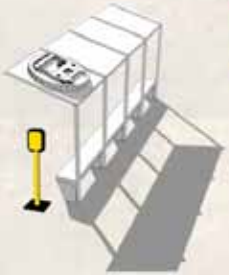
DISTRICT GATE: BUS ONLY
District speed routes



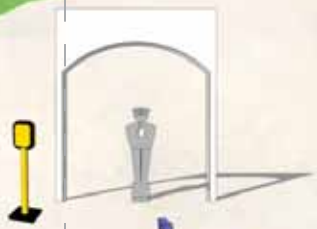
NEIGHBOURHOOD GATE: TREE
still routes

SHOPPING ON WALKWAYS
walking routes

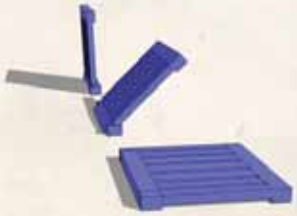
DYNAMIC WALKWAY
walking routes



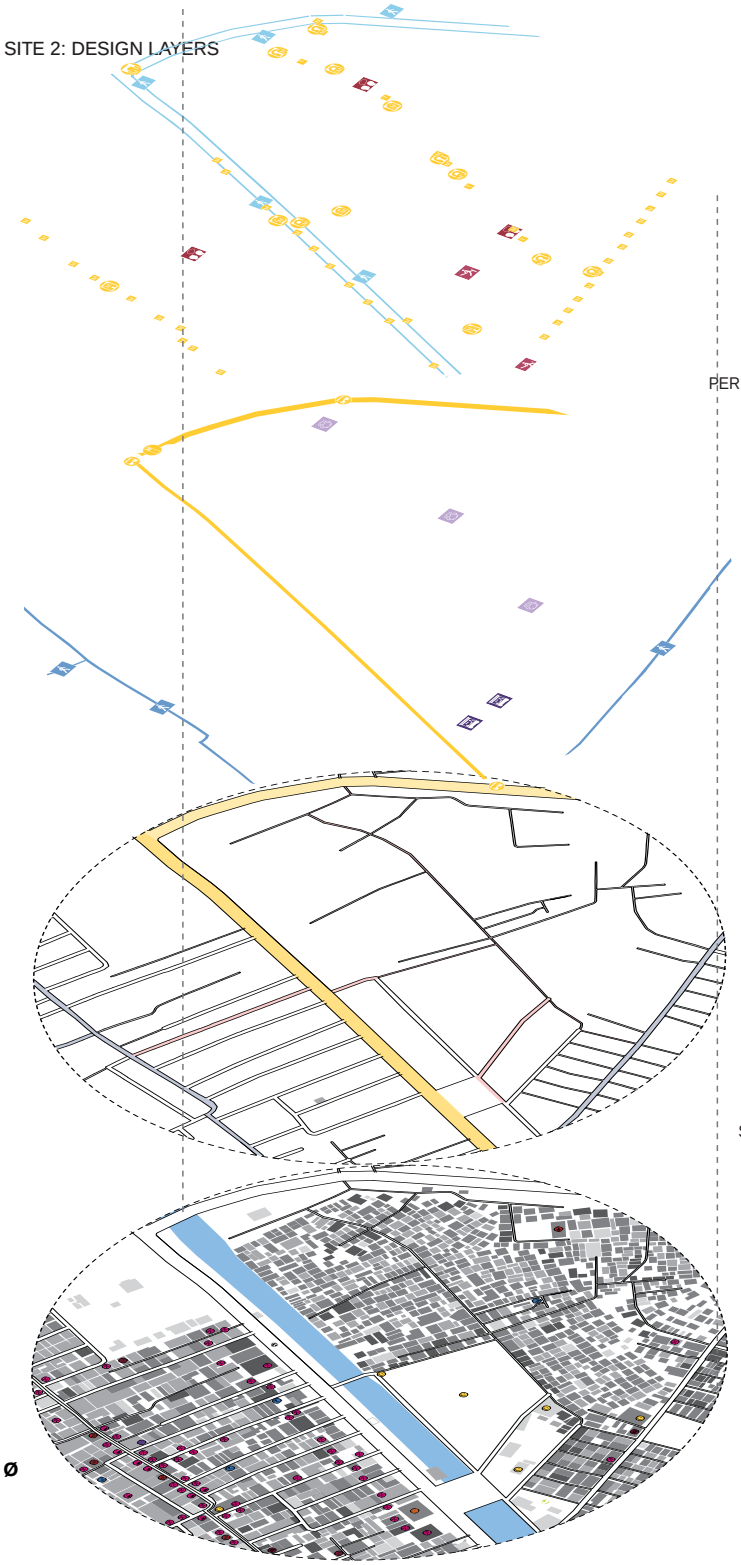
DEMAND STOP
speed routes / confluence of routes

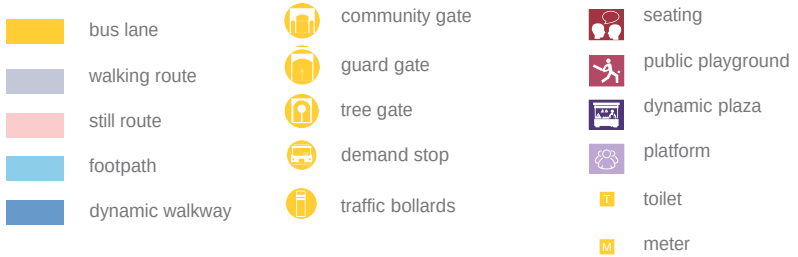


NEIGHBOURHOOD GATE: GUARD
walking routes



DYNAMIC WALKWAY
walking routes





A case scenario of the life of a resident living in this trial site

1

travelling on city speed route back from work on a bus

2

crossing the community gate near your neighbourhood

3

get down at the demanded stop in the district nearest to your home

4

buy grocery at the neighbourhood's platform

5

use the toilet in the demand system

6

either relax and socialize on the still street

7

or go safely to shopping

WHY THIS SITE ?

This trial site serves the purpose of exhibiting how a neighbourhood interacts within itself using the walking and still routes that have been implemented in the urban system.

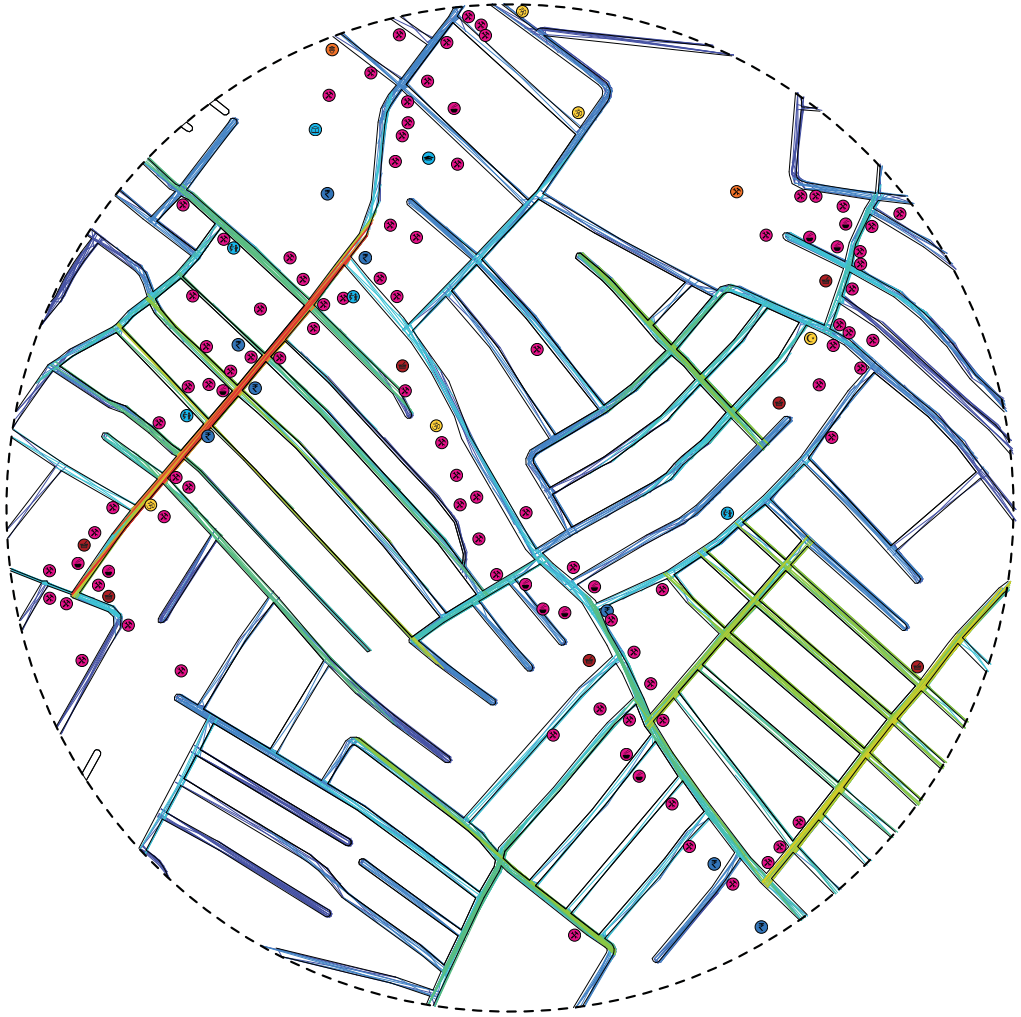
It also demonstrates how one's life changes due to the system in respect to a resident working in centre and using the walking route as a way to enjoy the new urban environment that the system provides.

ground
g +1
g +2
g +3
g +4

Housing volume and function

mosque
hindu temple
college, university, vocational training
secondary school
primary school
general service shop
food based service
bank & ATM
police post
city's service plants
general stores

The strategy used to select and design routes are speed and walking scale, the same has been applied at still scale. Using the strength of connectivity of current network understood by space syntax and how functions are laid out in the trial site one determines the still routes and urban public spaces and playgrounds. But these activities are determined by lesser strength street as still routes are not used as through road but as urban activities.



Space syntax(Isovist path) and function

ENGAGING THE DESIGN ELEMENTS

NEIGHBOURHOOD GATE: TREE
still routes

INFORMAL ECONOMY
walking routes

PUBLIC PLAYGROUNDS
still routes

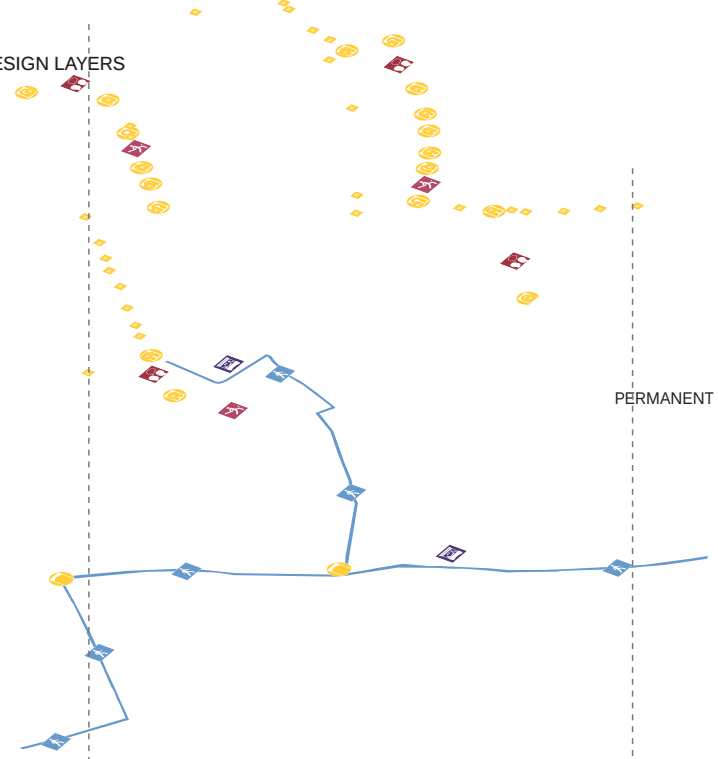
APPROACH TO RELIGIOUS PLACES
walking routes

SEATING
still routes

DYNAMIC PLAZA
confluences of routes

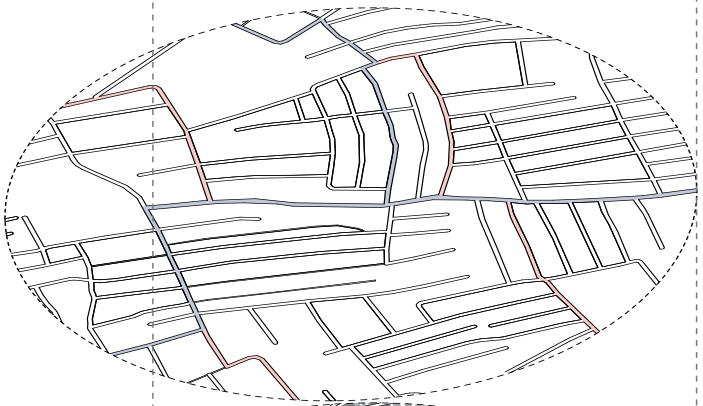
NEIGHBOURHOOD GATE: GUARD
walking routes

DYNAMIC WALKWAY
walking routes

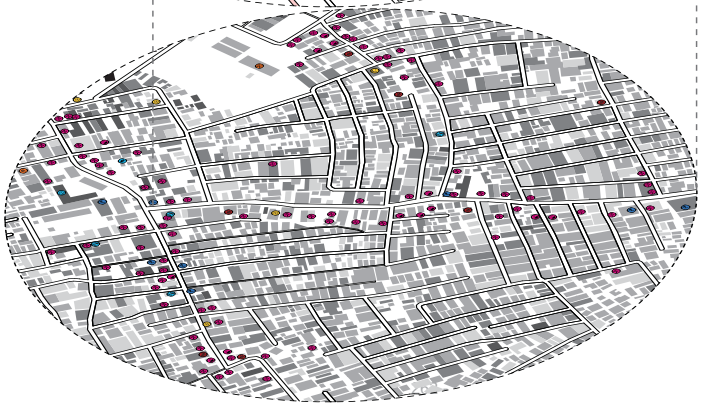


PERMANENT DESIGN ELEMENTS

DYNAMIC ELEMENTS



SYSTEM'S ROUTE SELECTED

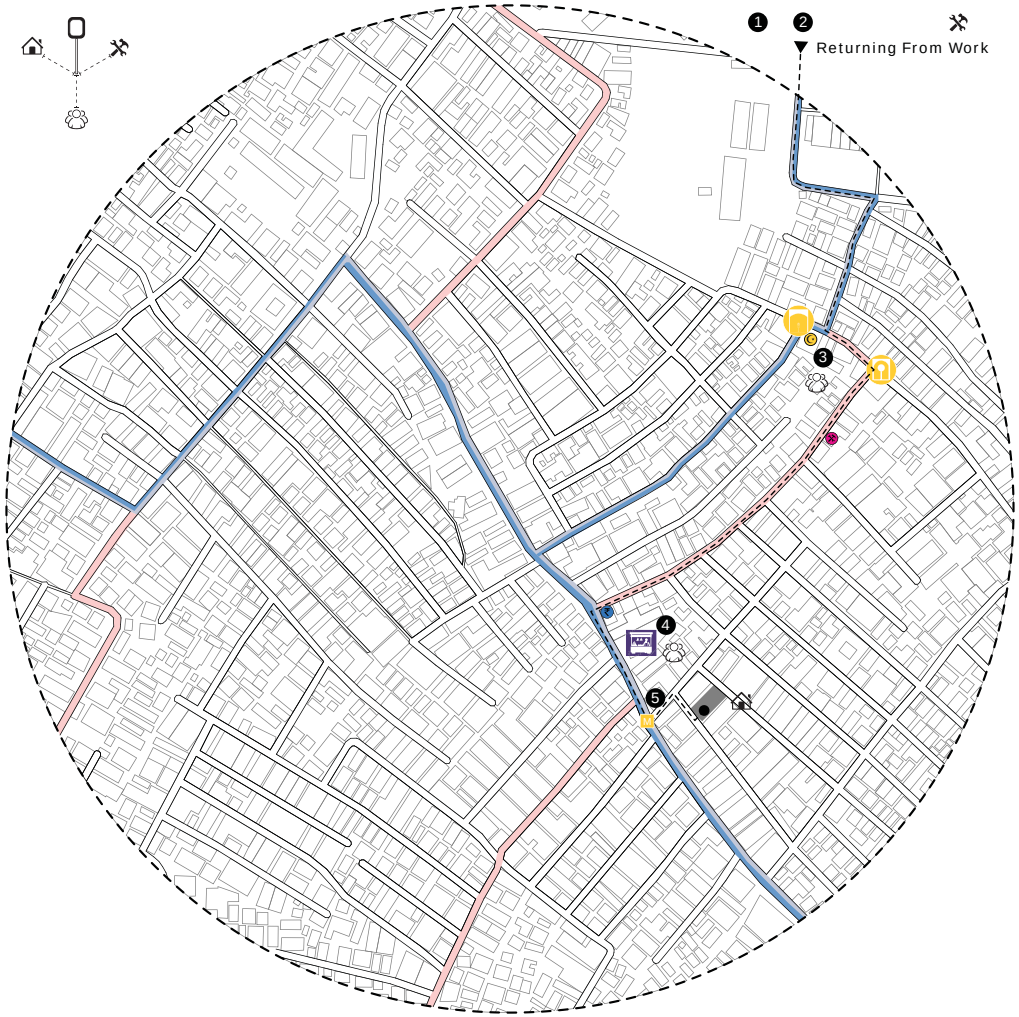


500M Ø

HOUSING AND FUNCTION

bus lane
walking route
still route
footpath
dynamic walkway

guard gate
tree gate
seating
public playground
dynamic plaza
meter



A case scenario of the life of a resident living in this trial site

1

travelling on city speed route back from work on a bus

2

taking the district speed route from city speed route to reach the demanded stop

3

walking though the street leading to the mosque, hearing the evening prayer

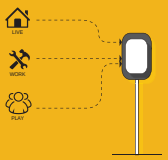
4

choosing a quieter still route to walk

shopping or stopping at dynamic plaza

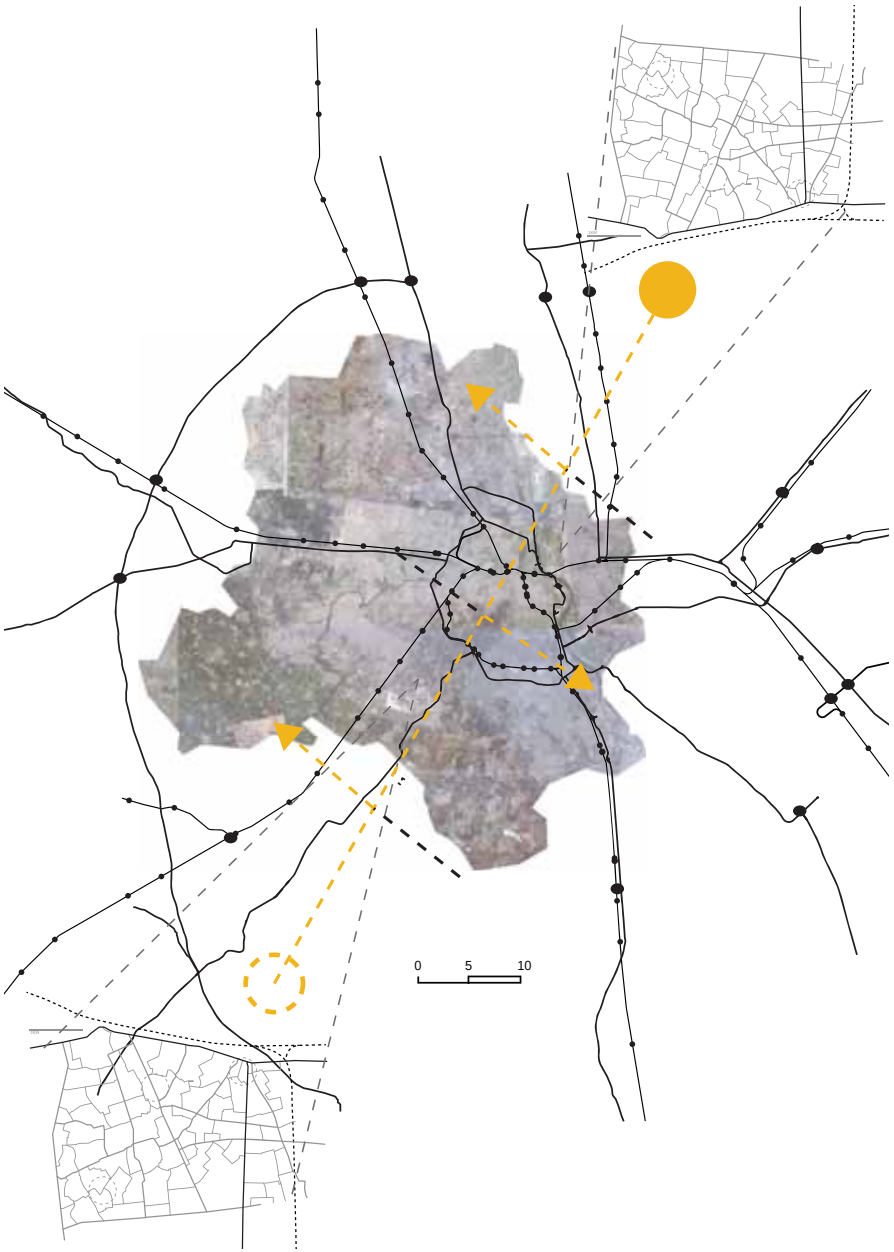
5

walking through residential street



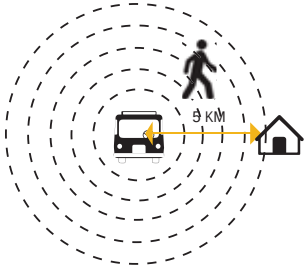
CHAPTER

PHASING & POLICY

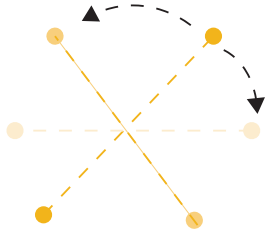


Experience Cell

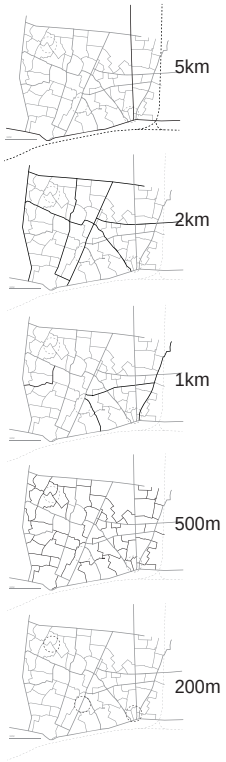
PHASING - STEPS OF PREPARATIONS



Growing into a Utopia



Demand wise growth of the system from experience cells



Accessibility Range

STEP 1

EXPERIENCE CELL

Creating diagonally across experience cells, of test sites one being the current side chosen ‘Shahdara’ and the other diagonally opposite is the satellite city of Gurgaon which has extreme class divide with new gated neighbourhood made on village land and marked with heavy migrant flow as labour for building this upcoming city. The trial sites are not only polar opposite but follow class divide and have bad public transport link.
The diagonal is taken such that people come across the system and how the urban infrastructure changes as per demand in favour of public transport without visiting these sites triggering a intrigue or demand for the system in their neighbourhood.

STEP 2

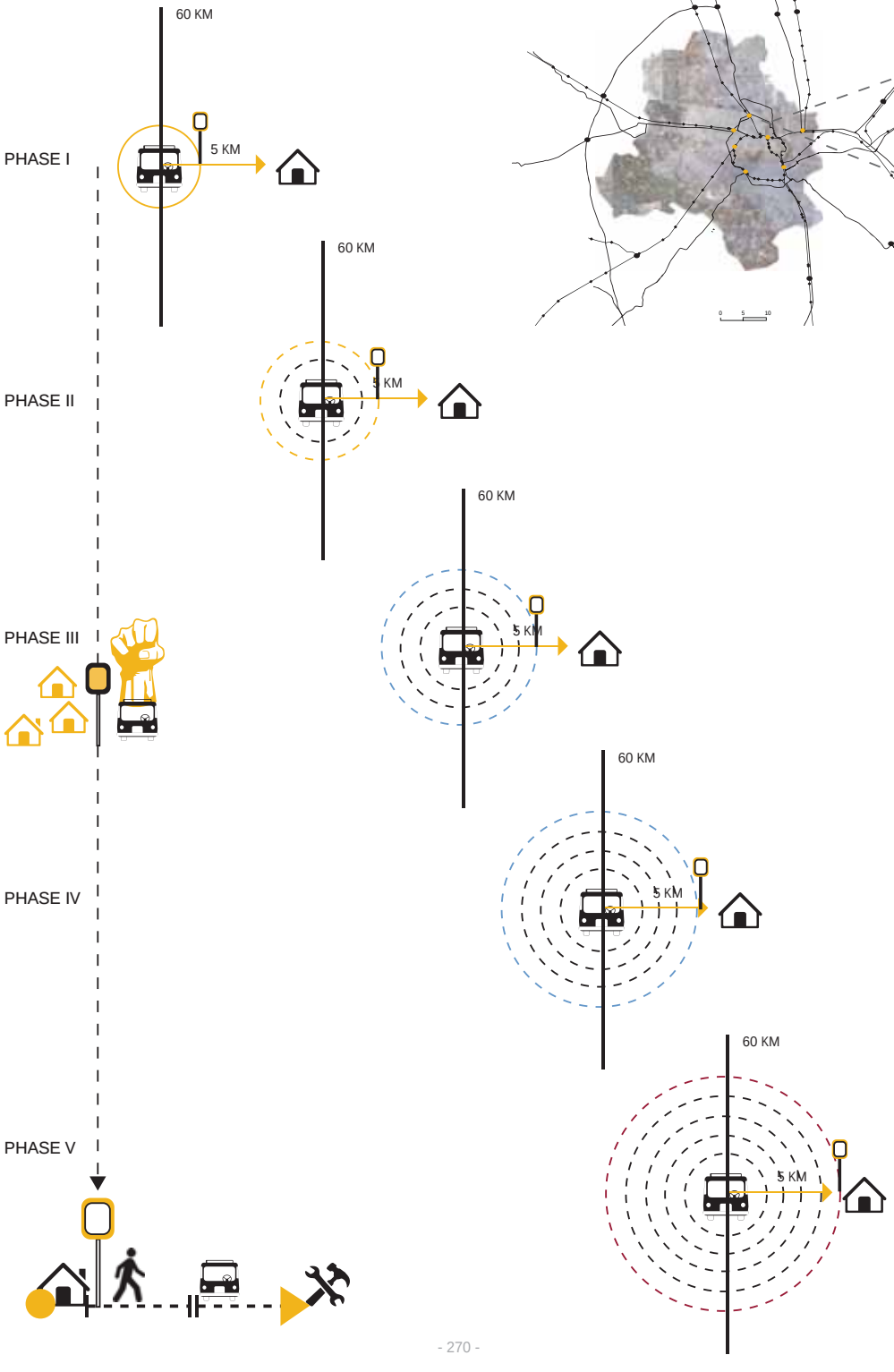
DEMAND WISE GROWTH OF THE SYSTEM

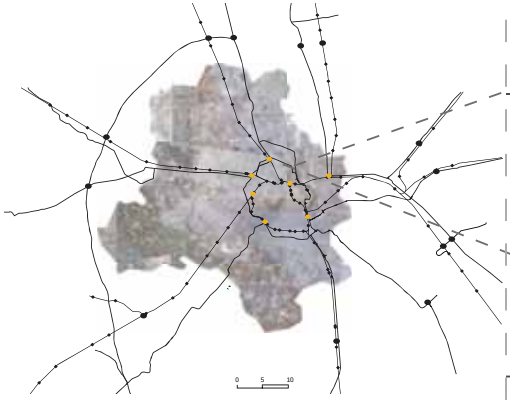
As the demand verbally and data wise is increased the system is implemented in those neighbourhood where demand is there thus allocating resources where required and giving priority to the need instead of top-down planning order.

STEP 3

DISTANCE IMPLEMENTATION

Implementation is done in each district/ neighbourhood by accessibility range or rings, starting with city routes to still routes, thus reaching the utopia of Walk-ability.





PHASING

PHASE I : Technical Introduction on Speed Scale

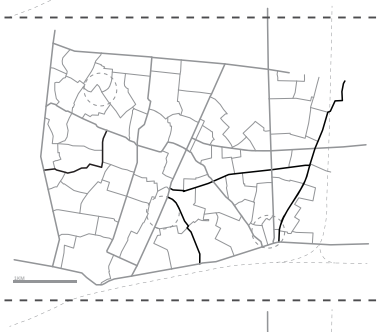
SYSTEM AVAILABILITY - meters at city speed routes
ROUTE TYPE: Intra city - speed routes
MAXIMUM ACCESSIBILITY RANGE to demand system: 5km

GOAL : affordable accessibility for intra city travel from one district to another especially for large lower income groups staying in the out-skirts of the city

PHASE II : Strengthening Neighbourhood towards Public Transport

SYSTEM AVAILABILITY - meters at district speed routes
ROUTE TYPE: District speed routes
MAXIMUM ACCESSIBILITY RANGE to demand system: 2km

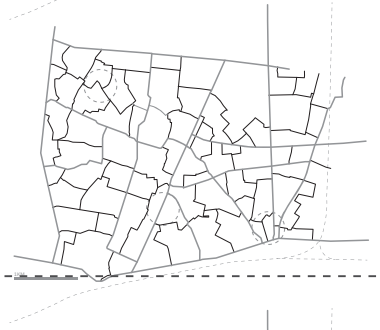
GOAL : accessibility to intra city travel from inner district areas.



PHASE III : Laying the ground for walking and finishing requirement of the system's know-how and implementations for public transport.

SYSTEM AVAILABILITY - meters at neighbourhood speed routes
ROUTE TYPE: Neighbourhood speed routes
MAXIMUM ACCESSIBILITY RANGE to demand system: 1km

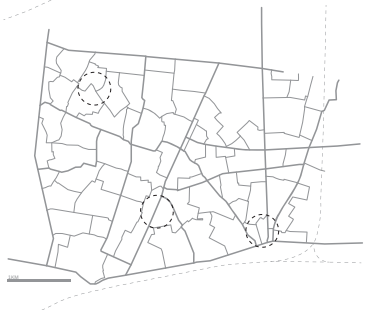
GOAL : Priority to public transport achieved at each scale



PHASE IV : Walking prioritized in neighbourhoods

SYSTEM AVAILABILITY - meters at dynamic walking routes
ROUTE TYPE: Walking neighbourhood routes
MAXIMUM ACCESSIBILITY RANGE to demand system: 500m

GOAL : Priority to walk-ability to the system and within the neighbourhood

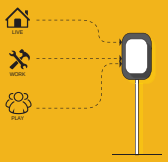


PHASE V : Social, Cultural, Economical and service design

SYSTEM AVAILABILITY - meters at still routes at each neighbourhood
ROUTE TYPE: Still neighbourhood routes
MAXIMUM ACCESSIBILITY RANGE to demand system: 200m

GOAL : Public space and services within each neighbourhood. Also the demand system by now exist for each resident within walking distance.

	POLITICAL				PROJECT'S DESIGN AND TECHNOLOGY	POLICY AND TECHNICAL IMPLICATIONS		PRIMARY SOURCE OF POLICIES ADOPTED	POLICY TYPE
5 YEARS	POLITICAL BANNER: - Smart Cities - Women's Safety POLITICAL TRENDS: - Concerns as per global issues and image of India	CITY SCALE	ROUTE TYPE: SPEED - CITY	DESIGN ELEMENTS: TECHNICAL	PHASE I : Technical Introduction on Speed Scale - Metering system on the main speed routes selected at the city level to integrate and strengthen the routes on which demand is high and also collection of data of usage and area - Paper to electronic ticketing - Night buses facility by these electronic ticket for women especially. - Traffic shifting bollards on main city routes which connect the various districts - Surge points and systems acting on surge principles	- slow reduction of current subsidies on personal usage of fossil fuels. - promotion of electronic cards compared to paper ticket through subscription offers - women given priority for public transport demand, to run the night buses effectively - taxation for vehicular ownership - availability for procuring the electronic card online, smart phones, local shops - *Kirana* and supermarkets - free shuttle service to speed routes for resettled slum dwellers placed in villages at the state borders	ISSUE ADDRESSED: GLOBAL IMAGE PLANNING	Singapore : economic boon followed by car-usage growth similar to India but they subsequently added carrot and stick method to curtail car growth. This phase is meant for empowering the public transport on a city wide scale and hence curtailment of private vehicles are required.	Fiscal Infrastructure
10 YEARS	POLITICAL BANNER: - Accessibility for All POLITICAL TRENDS: - Concerns as per global issues and image of India	DISTRICT SCALE	ROUTE TYPE: SPEED - DISTRICT		PHASE II : Strengthening Neighbourhood towards Public Transport - meters at inner district speed routes - neighbourhood speed scale equipped by buses and mini bus, with priority lanes for buses - freight to passenger inclusive intra city trains - lighting of design elements on priority routes with the neighbourhoods - check in and out selection to routes at the meter points - changing lanes to bus lane on the city speed routes	- higher taxation for green maintenance of vehicles - fee in city and district centres in rush hours/ peak demand time of that area - fining private vehicles in bus lane - parking space reduction at bus stops and stations on the selected routes on which demand system is applied - subsidized rail travel - check-in and out used as a method for reporting missing women to apply women safety for nominated person to police and vice versa - parking synced and priced by the system		Osaka, Japan : how to use old infrastructure with new technology As researched and proven earlier in the report their is abundance of infrastructure resource in Delhi, what the city is lacking is adapting its use to new technology as well as for public transport which the project is aimed for.	Fiscal Infrastructure
15 YEARS	POLITICAL BANNER: - Demand like its your birth right POLITICAL TRENDS: - Comes from the current protest by rising middle class which wants better enforcement of civil rights in the growing capitalist economy and unsafe cities	DISTRICT SCALE	ROUTE TYPE: WALK - DISTRICT	DESIGN ELEMENTS: SYMBOLIC	PHASE III : Laying the ground for walking and finishing requirement of the system's know-how and implementations for public transport. - meters at inner neighbourhood speed routes - introduction of demand stops and station on various routes with opening routes to walking only leading to them - changing walking routes at district level - changing lane system for bus only or bus priority lanes at district and neighbourhood level.	- priority for buses and public transport on different routes selected and as demanded by the public - subsidized public transport when demand grows - fining of cars in lanes for buses or changed to bus lanes as per the demand by the system - integration of existing metro usage with the demand system and applying same rules of demand usage as done for other modes of public transport - monetary returns on electronic card for low personal usage of petrol per user in private vehicles - ticket subsidies for resident checking-in further away from stops and station to encourage walking	ISSUE ADDRESSED: STATE RESOURCE PLANNING	Bogota, Colombia : global south; social spatial inequalities; priority given to people and public transport. Providing not only accessibility but also voice to people who otherwise are not able to voice there needs and demands in the capitalist economy of cities.	Fiscal Infrastructure Building regulation
20 YEARS	POLITICAL BANNER: - *Bhagidari* (translated from Hindi as any stakeholders) Empowerment POLITICAL TRENDS: - Comes from the current protest against FDI (Foreign Direct investment) from local business owners that are apprehensive regarding subsidized international competition	NEIGHBOURHOOD SCALE	ROUTE TYPE: WALK - NEIGHBOURHOOD		PHASE IV : Walking prioritized in neighbourhoods - meters at inner neighbourhood walking routes - dynamic walkways and gate implementation at neighbourhood level - online function vs neighbourhood needs app for small business that are starting up and want to reach the target audience quicker - syncing various online apps and calender to system for smart technology residents - children are requested of various schools to direct traffic when new routes open	- shops and local business encouraged fiscally at the walking routes to use the platform created by the route - for road safety within these neighbourhoods vehicles speed limits are lowered - congestion tax is applied for larger vehicles within these dynamic routes to control the traffic on half of the width open for traffic flow - when walking space is demanded within the district the system doesn't charge you to convert route to dynamic walkway as your *right to city.* - parking is allowed on these route in off peak hours		Sweden: road safety & human scale considerations This is the phase when we get to human scale consideration and also to human scale accessibility issues and solution within the demand system.	Fiscal Infrastructure Building regulation Education
25 YEARS	POLITICAL BANNER: - Right to City POLITICAL TRENDS: - The *Ugly Indian* movement which is led on the basis of keeping the cities clean by local residents	NEIGHBOURHOOD SCALE	ROUTE TYPE: STILL NEIGHBOURHOOD	DESIGN ELEMENT: SOCIAL, CULTURAL, ECONOMY AND SERVICES	PHASE V : Social, Cultural, Economical and service design - meters at inner neighbourhood still routes - certain routes as per still routes rule that is every 200m are converted as public space. These route chosen are more residential typology - making and integrating public spaces created by still routes to the existing on-demnd network and system.	- for road safety within these neighbourhoods motorized vehicles speed limits are lowered - when public space is demanded within the district the system doesn't charge you to convert route to dynamic activities. - informal but non-permanent activities are open in plaza area, such that plaza could be used for economical as well as cultural activities. - parking is not allowed in the still routes any time - still routes can be rented for schools with limited grounds on daily basis for different non-permanent activities	ISSUE ADDRESSED: URBAN DESIGN	New York: extensive car-usage and public spaces. New york recently was in the news for vision zero policy application and converting large spaces at traffic jammed routes to public areas eg. highline and times square.	Building regulation Education



CHAPTER

REFLECTION
REFERENCE
APPENDIX

REFLECTION

The relationship between research and design

Through research of asking why Delhi was becoming so centric to private vehicles and why and how do economically weaker groups are marginalised to the fringes of the city, I came to my design and technological solution of Delhi-on-Demand system. As the new urban system of demand based planning stem from the fact that Delhi is going through a massive unbalanced urban transformation and bases it's planning on image-ability more than need, something I learnt from the various series of why I asked in research. The design in itself evolves how the system adapts to the current socio-economic and spatial configuration of the city and vice versa adapts the city to the demands made by the citizens. Thus answering the questions that lingers from research, how do people currently travel and how would they like to change it? How can the current structure adapt to an urban transformation of this kind to serve the demands of the people? Where should the resource of infrastructure be allocated and where is its most needed? How can walk-ability of 22 million residents of Delhi be made possible? Thus my answering these loops of questions I came to the conclusion in design phase that it develop in a way that it is by the people, for the people and from the people and therefore a logical solution for me was Delhi-on-demand system.

The relationship between the theme of the graduation lab and the subject/case study chosen

The topic of this year studio is 'New Utopias on the Ruins of the Welfare State'. The ruins is the bi-polar city created by continuous subsidizes provided to middle and higher income group which encourage car travel, unaffordable public transport and thereby gated communities. Through my Utopia I challenge the notion of that motorized traffic is the only way to serve the city's growing needs and bring to light the 35% of the population that walks for whom there are no provisions provided in the network. Creating a new society where understanding the co-dependency is the key to living. I use my Utopia as a guiding goal (Immanuel Kant) for my project. Thereby coming to the design intervention and strategy through a smart technology of Delhi-on-demand system, which in itself is a Utopia to begin with and serves the demand of the people of Delhi in terms of mobility infrastructure for foot traffic and mass transit traffic and allocates resources where it is required instead of a top-down planning approach. The precipitated results was also urban design interventions in the form of social, cultural and economic (informal) at neighbourhood scale.

The relationship between the methodical line of approach of the graduation lab and the method chosen

The methodical line of approach of the graduation lab in my eyes is to questions the current trends and system that is delivered by state and see if it really aids the citizens or attacks them. My approach to the project was thus as stated earlier was series of why questioning which were intrinsic to how the planning is done currently in the city, what is its political agenda behind it and whether or not these agendas match the need of the common man. Being part of Design as politics one realises that in my chosen profession of Urbanism one does need to take a political stand-point before any design or planning decision can be executed due to the scale of lives an urban intervention effects. A better understanding of politics aids one in what has to be done and how should it be presented to intended audience. Thus, in my phasing especially I have taken to account what are the current political trends in Delhi and how in every political term this large scale urban system: Delhi-on-Demand can be executed in piecemeal to still reach my utopia in a course of 25 years.

The relationship between the project and the wider social context.

As an emerging market, it is important for India to consider a way of development which sustainable both economically and environmentally. This can be done when the planning is done for all sections of the society. While considering the transport links in the city it is thus important to consider lower income groups as they form the labour force to the society and thus establish a co-dependent system of all income groups. Where higher income groups are dependent of lower income groups for manual labour and lower income groups are dependent on higher income groups for intellectual labour. Thus as a soon to be an urbanist, one should not forget this dynamics that the society works on. Hence, in my design I came with a technology that changes this urban system of mobility according to people's demand, allocating the urban resource of infrastructure where the need is instead of large scale development to make the city look just 'beautiful'.

SCIENTIFIC

Scientifically this project attempts to raise the question of why are planning bodies in developing countries fail to see the context of their society and simply borrow international planning methods.

At the same time on international grounds, the project aims to raise questions of healthier society models that can be seen in urban fabrics by mixing income households, diversity, stimulating demand through walk-ability. Looking at old urban models with new light of walk-ability and trying to see the mutations to the same model on walking basis.

Agarwal, O. P. (2006). Urban Transport. India Infrastructure Report, 6(8), 106.

Ahmed, W. (2011). Neoliberal utopia and urban realities in Delhi. ACME: An International Journal for Critical Geographies, 10(2), 163–188.

Albrechts, L. (2006). Bridge the Gap: From Spatial Planning to Strategic Projects. European Planning Studies, 14(10), 1487–1500. doi:10.1080/09654310600852464

Batra, L. (2009). A review of urbanization and urban policy in Post Independent India. New Delhi: Centre for the Study of Law and Governance, Jawaharlal Nehru University.

Batra, L., & Mehra, D. (2008a). Slum demolitions and production of neo-liberal space: Delhi. Inside the Transforming Urban Asia: Processes, Policies and Public Actions, 391–414.

Batra, L., & Mehra, D. (2008b). Slum demolitions and production of neo-liberal space: Delhi. Inside the Transforming Urban Asia: Processes, Policies and Public Actions, 391–414.

Cervero, R. (2013). Linking urban transport and land use in developing countries. Journal of Transport and Land Use, 6(1), 7–24.

Chang, T. (2014). “New uses need old buildings”: Gentrification aesthetics and the arts in Singapore. Urban Studies. doi:10.1177/0042098014527482

Chin, A., & Smith, P. (1997). Automobile ownership and government policy: The economics of Singapore’s vehicle quota scheme. Transportation Research Part A: Policy and Practice, 31(2), 129–140. doi:10.1016/S0965-8564(96)00012-2

Choguill, C. L. (1994). Crisis, Chaos, Crunch? Planning for Urban Growth in the Developing World. Urban Studies, 31(6), 935–945. doi:10.1080/00420989420080761

DDA. (2007a). Master Plan for Delhi 2021. Delhi Development Authority.

Dupont, V. (2004). Socio-spatial differentiation and residential segregation in Delhi: a question of scale? Geoforum, 35(2), 157–175. doi:10.1016/j.geoforum.2003.08.003

Dupont, V. (2007). Conflicting stakes and governance in the peripheries of large Indian metropolises – An introduction. Cities, 24(2), 89–94. doi:10.1016/j.cities.2006.11.002

Dupont, V. (2011). Infrastructure project, beautification and forced evictions in Delhi–The exemplary story of a cluster of slum dwellers rendered homeless. In Rethinking Development in an Age of Scarcity and Uncertainty : New Values, Voices and Alliances for Increased Resilience. New York.

Dupont, V. D. N. (2011). The Dream of Delhi as a Global City: The dream of Delhi as a global city. International Journal of Urban and Regional Research, 35(3), 533–554. doi:10.1111/j.1468-2427.2010.01027.x

El-Khoury, R., & Robbins, E. (Eds.). (2013). Shaping the city: studies in history, theory and urban design (2nd Edition.). New York: Routledge, Taylor & Francis Group.

Fernandes, L. (2004). The politics of forgetting: class politics, state power and the restructuring of urban space in India. Urban Studies, 41(12), 2415–2430. doi:10.1080/00420980412331297609

Friedmann, J. (1986). The World City Hypothesis. Development and Change, 17(1), 69–83. doi:10.1111/j.1467-7660.1986.tb00231.x

Friedmann, J., & Wolff, G. (1982). World city formation: an agenda for research and action. International Journal of Urban and Regional Research, 6(3), 309–344. doi:10.1111/j.1468-2427.1982.tb00384.x

Ghertner, D. A. (2010). Calculating without numbers: aesthetic governmentality in Delhi’s slums. Economy and Society, 39(2), 185–217. doi:10.1080/03085141003620147

Ghertner, D. A. (2011). Gentrifying the State, Gentrifying Participation: Elite Governance Programs in Delhi: Gentrifying the local state in India. International Journal of Urban and Regional Research, 35(3), 504–532. doi:10.1111/j.1468-2427.2011.01043.x

Ghertner, D. A. (2012). Nuisance Talk and the Propriety of Property: Middle Class Discourses of a Slum-Free Delhi. Antipode, 44(4), 1161–1187. doi:10.1111/j.1467-8330.2011.00956.x

Gidwani, V., & Baviskar, A. (2011). Urban Commons. Economic & Political Weekly, 46(50), 42–43.

Goodman, P., & Goodman, P. (1947). Communitas: means of livelihood and ways of life. New York: Vintage Books.

Gotham, K. (2002). Marketing Mardi Gras: Commodification, Spectacle and the Political Economy of Tourism in New Orleans. Urban Studies, 39(10), 1735–1756. doi:10.1080/0042098022000002939

Great Britain. (1999). Towards an urban renaissance. (R. G. Rogers, Ed.). [London: Spon].

Gugler, J. (Ed.). (2004). World cities beyond the West: globalization, development, and inequality. Cambridge ; New York: Cambridge University Press.

Han, S. S. (2010). Managing motorization in sustainable transport planning: the Singapore experience. Journal of Transport Geography, 18(2), 314–321. doi:10.1016/j.jtrangeo.2009.06.010

Harvey, D. (1985). The geopolitics of capitalism. In D. Gregory & J. Urry (Eds.), Social Relations and Spatial Structures (pp. 128–163). New York: St. Martin’s Press.

Harvey, D. (1989). The condition of postmodernity: an enquiry into the origins of cultural change. Oxford [England] ; Cambridge, Mass., USA: Blackwell.

Harvey, D. (2013). Rebel cities: from the right to the city to the urban revolution.

Hosagrahar, J. (2005). Indigenous modernities: negotiating architecture and urbanism. London ; New York: Routledge.

Hull, A. (2008). Policy integration: What will it take to achieve more sustainable transport solutions in cities? Transport Policy, 15(2), 94–103. doi:10.1016/j.tranpol.2007.10.004

Jacobs, J. (1961a). The death and life of great American cities (50th anniversary ed., 2011 Modern Library ed.). New York: Modern Library.

Jacobs, J. (1970). The economy of cities. New York: Vintage Books.

Jain, A. K. (1990). The making of a metropolis: planning and growth of Delhi. New Delhi: National Book Organisation.

Jenks, M., Williams, K., & Burton, E. (Eds.). (2000). Achieving sustainable urban form. London ; New York: E & FN Spon.

Kostof, S. (1992). The city assembled: the elements of urban form through history (1st North American ed.). Boston: Little, Brown.

Kumar Bose, R., & Sperling, D. (2002). Transport in Delhi, India: Environmental Problems and Opportunities. Transportation Research Record, 1815(1), 3–10. doi:10.3141/1815-01

Lebel, L., Garden, P., Banaticla, M. R. N., Lasco, R. D., Contreras, A., Mitra, A. P., … Sari, A. (2007). Management into the Development Strategies of Urbanizing Regions in Asia: Implications of Urban Function, Form, and Role. Journal of Industrial Ecology, 11(2), 61–81. doi:10.1162/jie.2007.1185

Lefebvre, H. (1968). The Right to the City. In Writings on cities (pp. 147–159). Cambridge, Mass, USA: Blackwell Publishers. May, A. D., & Roberts, M. (1995). The design of integrated transport strategies. Transport Policy, 2(2), 97–105. doi:10.1016/0967-070X(95)91989-W

Mohan, D. (2008). Mythologies, metro rail systems and future urban transport. Economic and Political Weekly, 43(4), 41–53.

Olszewski, P., & Turner, D. J. (1993). New methods of controlling vehicle ownership and usage in Singapore. Transportation, 20(4), 355–371. doi:10.1007/BF01100464

Peer Review. (2003). OECD Publishing. Retrieved from http://www.oecd-ilibrary.org/economics/peer-review_9789264099210-en-fr

Potter, S., & Skinner, M. J. (2000). On transport integration: a contribution to better understanding. Futures, 32(3-4), 275–287. doi:10.1016/S0016-3287(99)00097-X

Pritchett, L., & Woolcock, M. (2004). Solutions When the Solution is the Problem: Arraying the Disarray in Development. World Development, 32(2), 191–212. doi:10.1016/j.worlddev.2003.08.009

Rode, P., & Floater, G. (2014). Accessibility in Cities: Transport and Urban Form (No. 3). London: LSE Cities.

Santos, G., Behrendt, H., Maconi, L., Shirvani, T., & Teytelboym, A. (2010). Part I: Externalities and economic policies in road transport. Research in Transportation Economics, 28(1), 2–45. doi:10.1016/j.retrec.2009.11.002

Santos, G., Behrendt, H., & Teytelboym, A. (2010). Part II: Policy instruments for sustainable road transport. Research in Transportation Economics, 28(1), 46–91. doi:10.1016/j.retrec.2010.03.002

Santos, G., Li, W. W., & Koh, W. T. . (2004). 9. TRANSPORT POLICIES IN SINGAPORE. Research in Transportation Economics, 9, 209–235. doi:10.1016/S0739-8859(04)09009-2

Sassen, S. (2005). The global city: introducing a concept. Brown Journal of World Affairs, 11(2), 27–43.

Satsangi, P. S. (1977). A Physical System Theory Modeling Framework for Transportation System Studies. IEEE Transactions on Systems, Man, and Cybernetics, 7(11), 763–778. doi:10.1109/TSMC.1977.4309621

Siemiatycki, M. (2006). Message in a Metro: Building Urban Rail Infrastructure and Image in Delhi, India. International Journal of Urban and Regional Research, 30(2), 277–292. doi:10.1111/j.1468-2427.2006.00664.x

Singh, J., & Aggarwal, M. K. (2009). Case Study of Delhi’s BRT System. Public Transport International, 58(5), 28–29.

Spencer, A. H., & Sien, C. L. (1985). National policy towards cars: Singapore. Transport Reviews, 5(4), 301–323. doi:10.1080/01441648508716609

Srinivasan, S. (2005). Linking land use and transportation in a rapidly urbanizing context: A study in Delhi, India. Transportation, 32(1), 87–104. doi:10.1007/s11116-004-2216-y

Thakuriah, P. (2009). Transportation and employment accessibility in a changing context of metropolitan grawth: The case of Delhi, India. MIT Journal of Planning, 9(9), 58–80.

Thynell, M., Mohan, D., & Tiwari, G. (2010). Sustainable transport and the modernisation of urban transport in Delhi and Stockholm. Cities, 27(6), 421–429. doi:10.1016/j.cities.2010.04.002

Tiwari, G. (2002). Urban Transport Priorities. Cities, 19(2), 95–103. doi:10.1016/S0264-2751(02)00004-5

Tiwari, G. (2003). Transport and land-use policies in Delhi. Bulletin of the World Health Organisation, 81(6), 444–450.

Tiwari, G. (2011). Key Mobility Challenges in Indian Cities (International Transport Forum Discussion Papers No. 2011/18). Retrieved from http://www.oecd-ilibrary.org/transport/key-mobility-challenges-in-indian-cities_5kg9mq4m1gwl-en

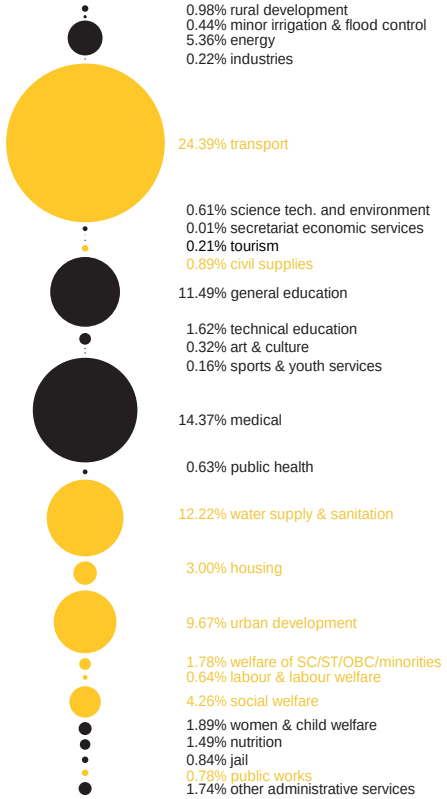
UN Habitat. (2013). Draft concept paper. In Urban Equity in Development - Cities for Life. Medellin: UN Habitat.

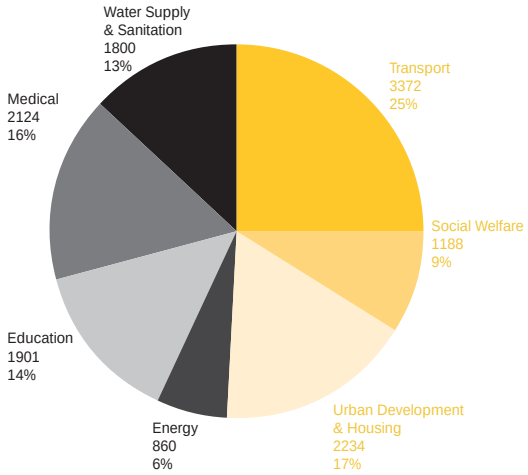
Uppal, V., & Ghosh, D. (2009). The impact of the Commonwealth Games 2010 on urban development of Delhi. Theoretical and Empirical Researchers in Urban Management, 4(10), 7–26.

Wegener, M. (2004). Overview of land-use transport models. In Handbook of transport geography and spatial systems (Vol. 5, pp. 127–146).

Yedla, S., & Shrestha, R. M. (2003). Multi-criteria approach for the selection of alternative options for environmentally sustainable transport system in Delhi. Transportation Research Part A: Policy and Practice, 37(8), 717–729. doi:10.1016/S0965-8564(03)00027-2

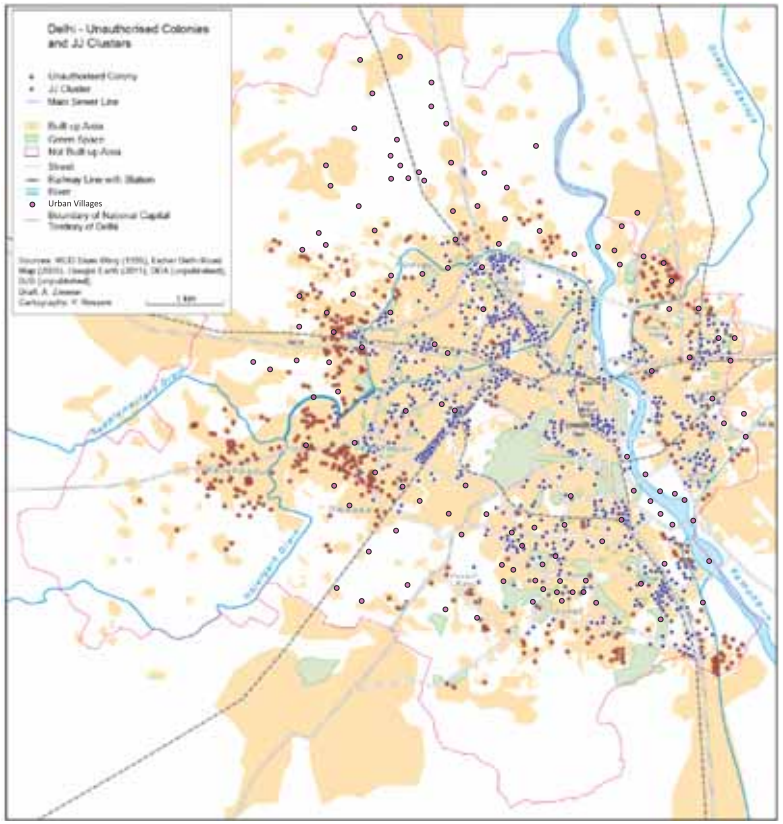
BUDGET OF DELHI FOR 2012 - 17

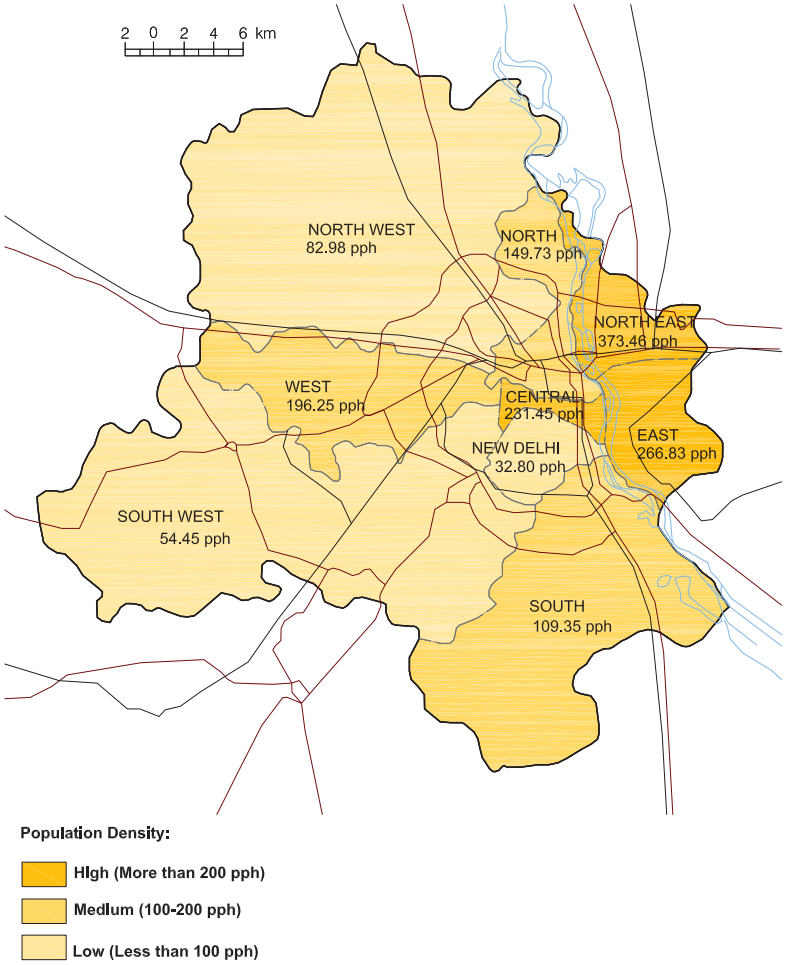




For the 12th Five year plan (2012-17) 90000 crore rupees have been alloted, that is, > 11 billion Euros

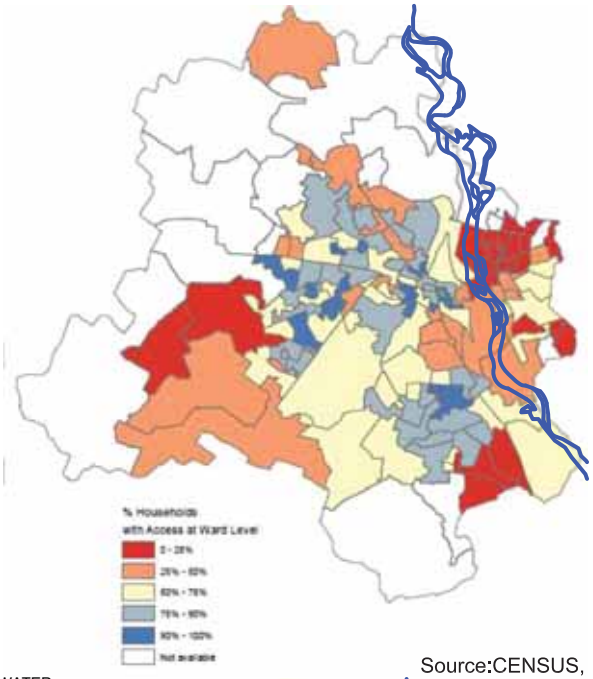
Plan Outlay is the allocated amount for expenditures on plan projects, schemes and programmes approved in the Plan
Source: Economic Survey of Delhi 2012-13, as per five year plan 2012-17





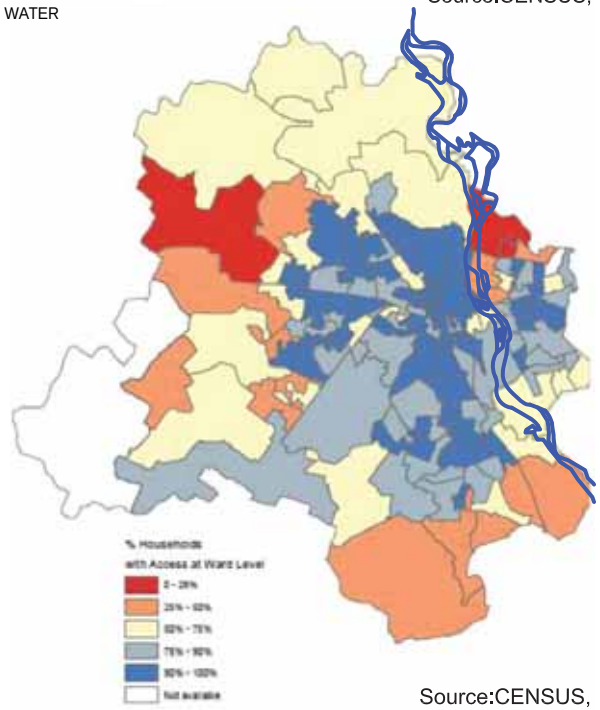
Source: Census of India, 2001

DELHI - ACCESS TO SANITATION



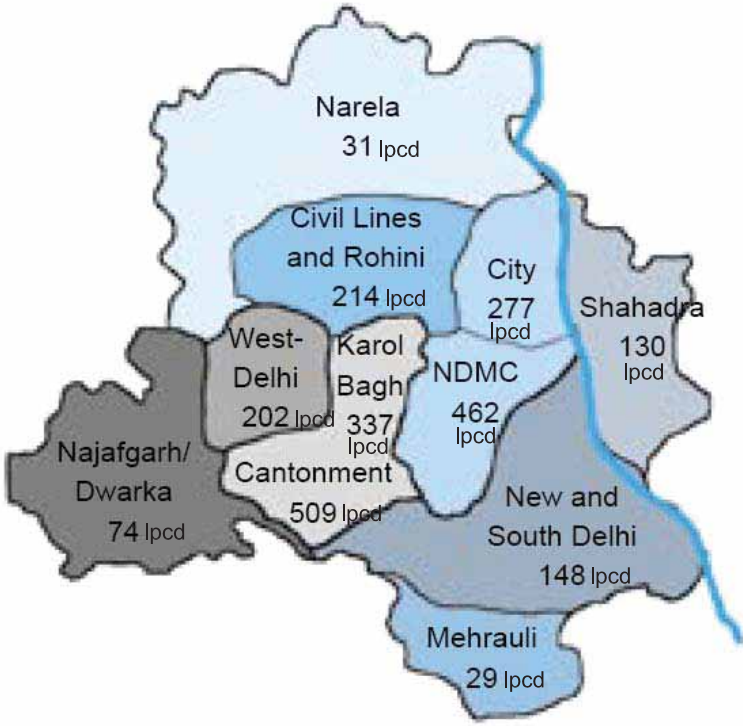
Source:CENSUS,

DELHI - ACCESS TO PIPED WATER



Source:CENSUS,

DELHI - WATER ZONES: UNEQUAL DISTRIBUTION

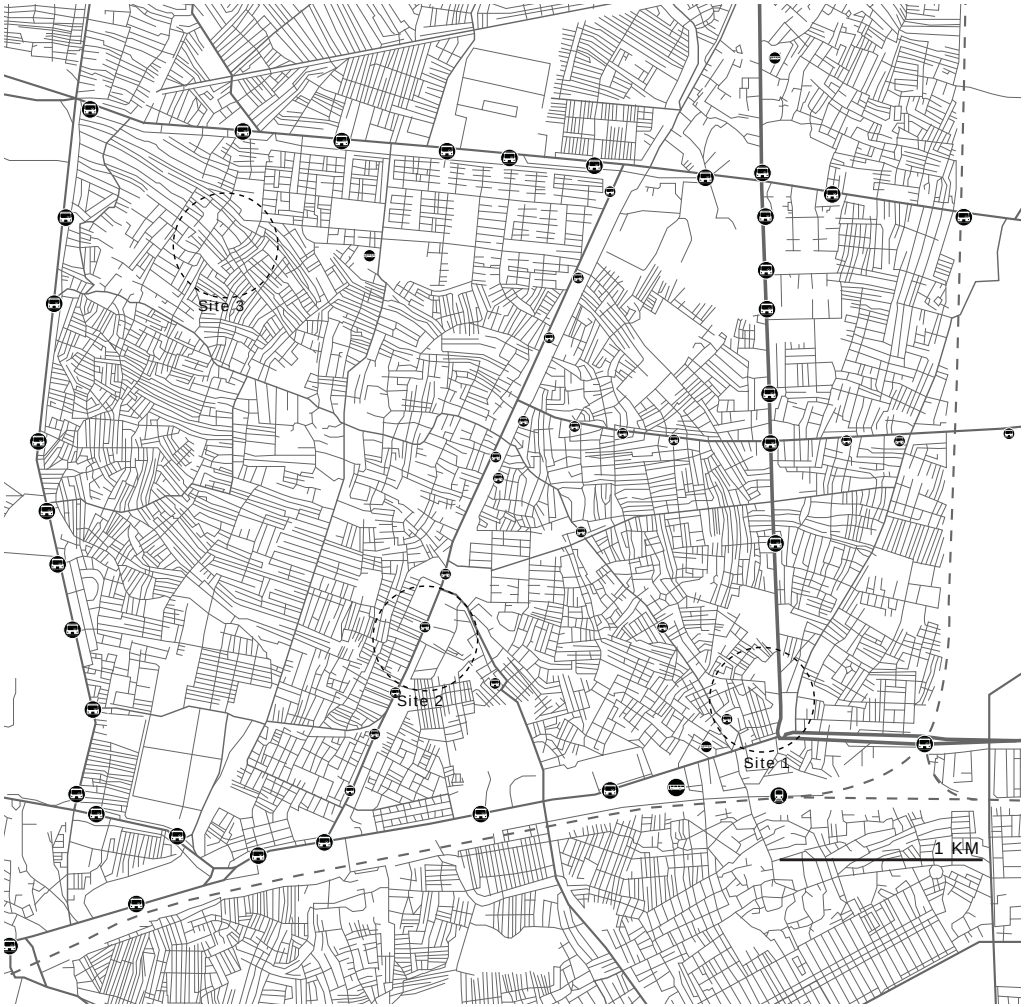


Source:DJB, 2014

Source: Census of India, 2001

TRANSPORT

- bus terminal
- train station
- bus depot
- bus stop



Transport Hubs and Stops
District's Network map - Shahdara

RELIGION

- mosque
- church
- hindu temple
- gurudwara
- jain temple

Religious Centres
District's Network map - Shahdara

EDUCATION

college, university, vocational training

secondary school

primary school

Educational Centres
District's Network map - Shahdara

COMMERCIAL VENUES

wholesale market

informal market

local shopping

general stores

Commercial Venues
District's Network map - Shahdara

general service shop

food based service

Local businesses
District's Network map - Shahdara

city service market

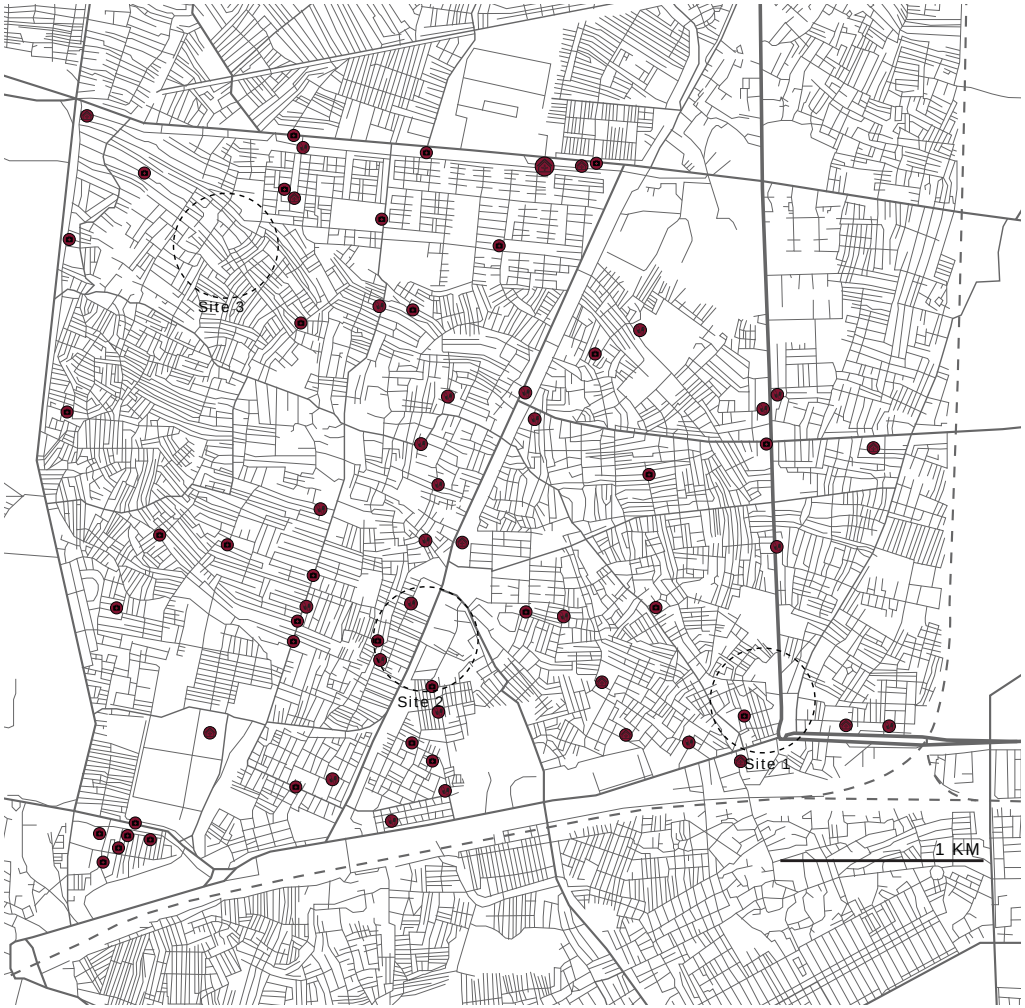
district service market

petrol pump

bank & ATM

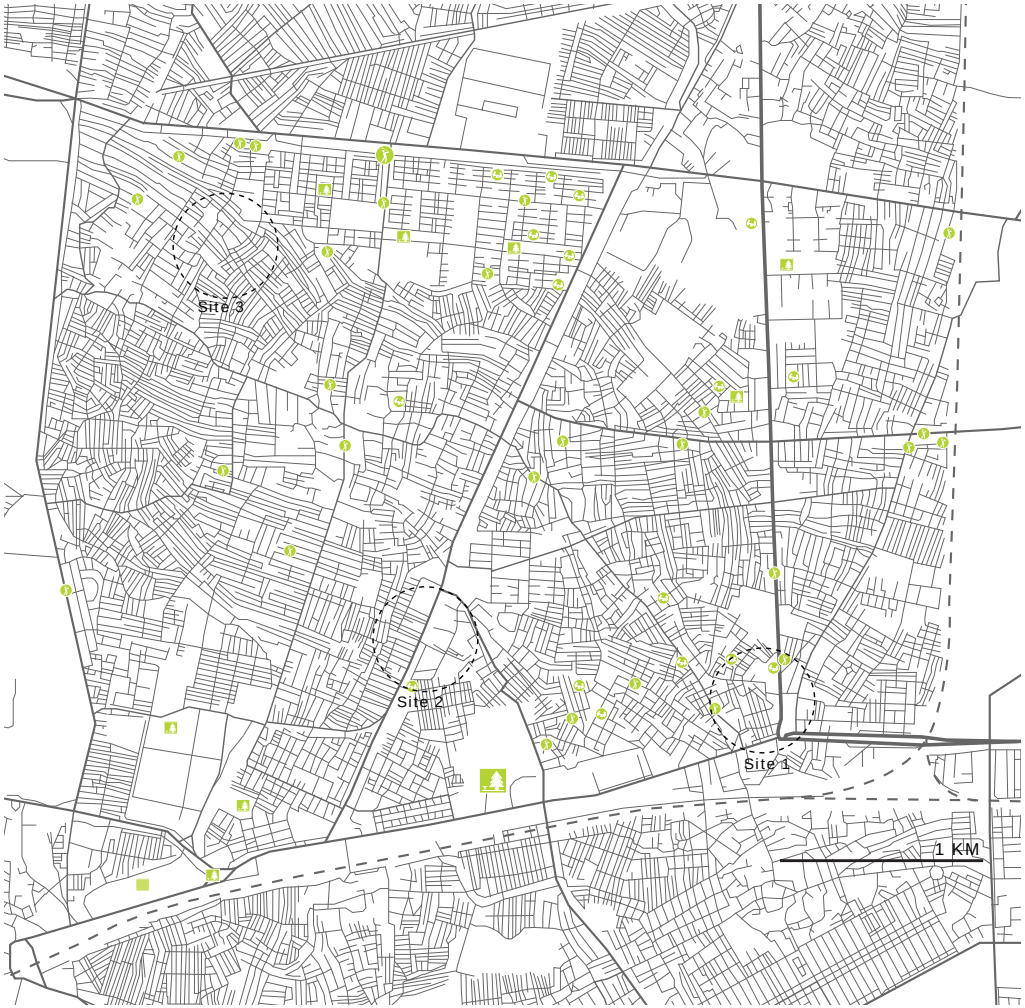
Financial
District's Network map - Shahdara

general hospital
clinics
health care centre



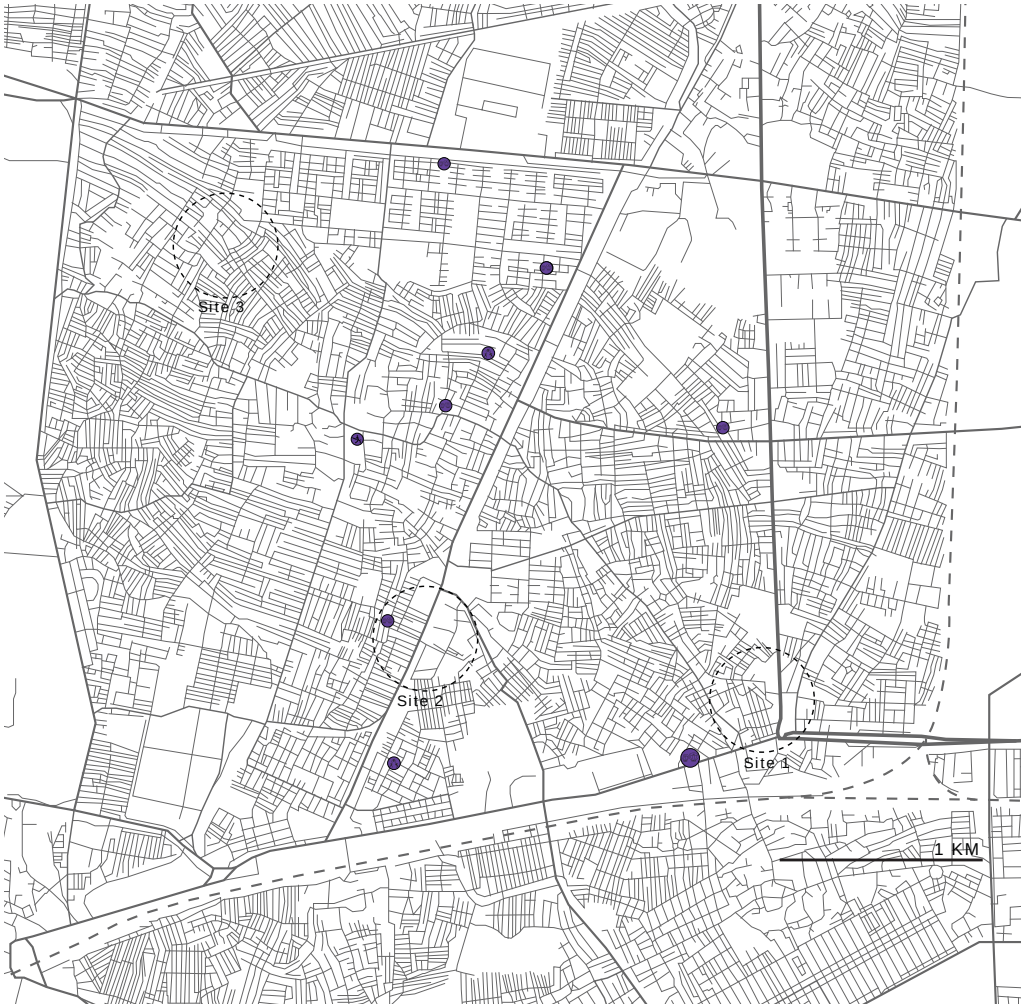
Health
District's Network map - Shahdara

district green
neighbourhood playgrounds
recreational activity
neighbourhood green



Green and Recreational spaces
District's Network map - Shahdara

- divisional sports centre
- district sports centre
- socio-cultural venues
- neighbourhood sport centre



Socio & Cultural Venues
District's Network map - Shahdara

- community space
- dharamshala
- day care - créche
- burial grounds

Community based functions
District's Network map - Shahdara

ADMINISTRATION

- fire station
- administration body
- political party's office
- police station
- city's service plants
- post office
- police post
- district centre

Administrative functions
District's Network map - Shahdara

Tanya Chandra
Faculty of Architecture, TU Delft
tanya.chandra@gmal.com
Delft June, 2015