EAP

Equitable Accessibility Planning to Public Facilities

Faridabad

BY:
SHIVANI KHURANA

01 INTRODUCTION

PROBLEM STATEMENT

Distance is often the **most significant barrier in accessing the activities** of daily requirement like going to work places, health centres and educational areas.

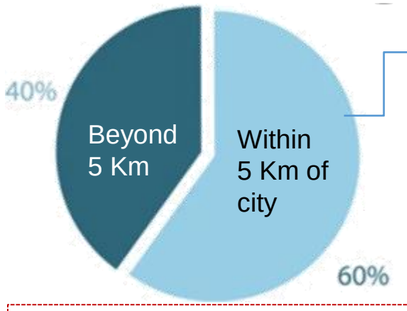
The degraded Urban Street Infrastructure affects the people from accessing these activities. Citizens get affected by higher travel time, distance, cost and safety on routes thus making them inaccessible for its users.

NEED OF THE STUDY

The need of an equitable distribution of Urban street Infrastructure is to bring all the **disadvantage people** under the lens of equity **ensuring more accessible, affordable and safe network routes.**

Accessibility will allow people to **reach the opportunities** they wanted to participate in social and economic life. It will enable them to get jobs to **earn a living**, students to get to school to **obtain education**, or people to see doctor **to get healthy**. People often travel to access these various essential activities and to bring destinations and services closer to home is the sole purpose of transportation system.

According to the 2011 Census



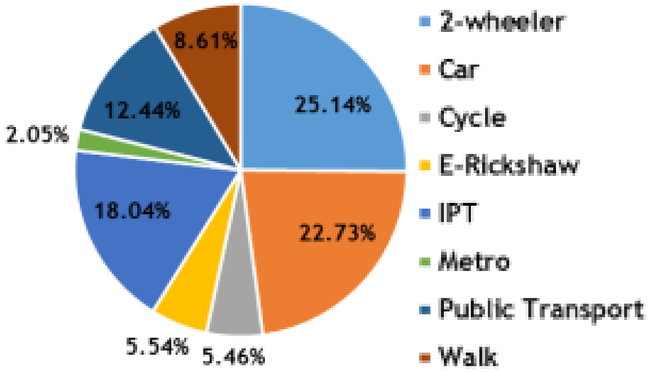
About **40 per cent** of its trips are on foot and bicycles.

The share of walking and cycling is dominant in cities, which reflects low vehicle ownership as well as low affordability.

Census 2011 put the share of people using personal modes to travel to work at less than 14 per cent.

Do we still have the adequate urban street infrastructure for these users ???

Mode share_ MCF



There are 48% of the users who prefer two wheelers or car, rest 52% people are dependent on public transport, NMT, Walking and cycling.

The need of my research is to distribute Urban street Infrastructure equitably at the routes carrying these 52% of mobility users and are exposed to vulnerable community.

As per MoHUA_2019

1. More than **50 per cent** of the funds were invested in **road-building**, including on expansion of roadways, improving their aesthetics, etc.
2. This is in contrast to the **barely 7 per cent funds** spent **on footpaths and NMT** and the mere 17 per cent spent on public transport.
3. This means that about **50 per cent investment is made for 15 per cent of the users** and only **24 per cent for 85 per cent of affordable transport users, clearly demonstrating that inequity and imbalance persist**

INFERENCES:

The **UN SDG Target 11.2, 4, 8 and 10** states that **by 2030** "countries should provide access to safe, affordable, and sustainable transport systems for all, with special attention to the needs of those in vulnerable situations (women, children, persons with disabilities and older persons).

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02 WHY THE STUDY AREA ???

New Industrial Town, Faridabad

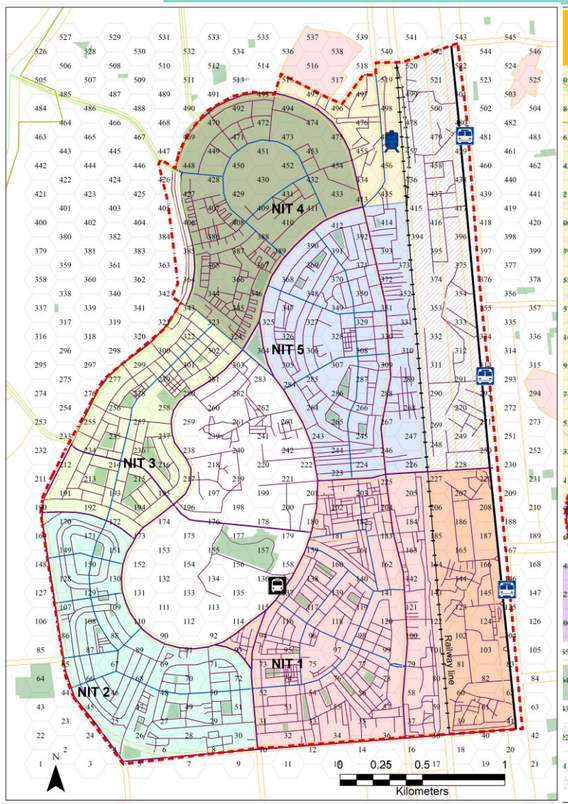
Faridabad city is situated on National Highway 44, and it is located 44 km away fro Delhi.

Faridabad is the **ninth largest industrial estate** in Asia . It is also a **part of National capital region**, generating 60% of revenue to the state due to 13,412 small, medium and large scale industries. (2016).

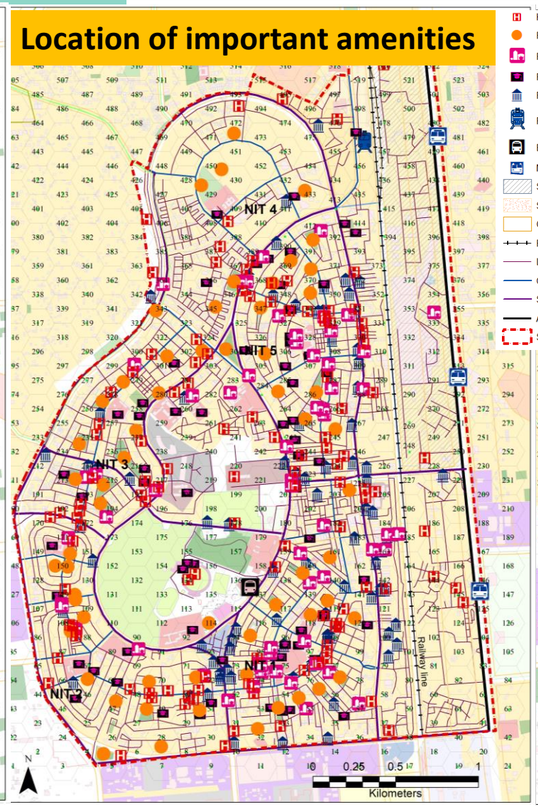
The city has a national highway that passes through the centre of the city, it also has **mass rapid transit system** along the highway providing it high level of connectivity.

Emerging growth drivers of city:
1. KMP western expressway
2. EPE: Covering Haryana, Delhi and UP
3. Dedicated fright corridor linking Delhi and Mumbai
4. Industrial Model Township to integrate industrial, commercial, residential and institutional sites.

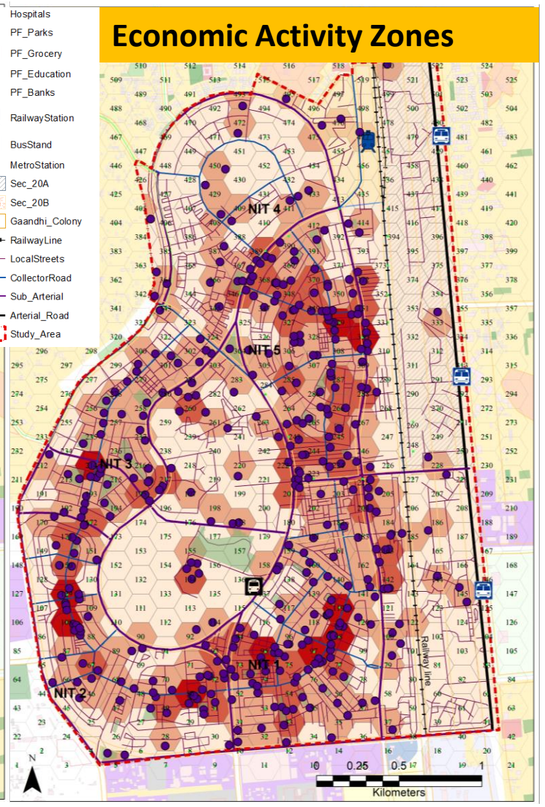
Source: Yadav A (2015), Haryana TPO website



Location of important amenities



Economic Activity Zones



Regular hexagons are the closest shape to a **circle** and can be effectively used to form an evenly spaced grid.
This grid has been selected to **understand** the aspect of **connectivity between different users and land use activities.**
In this grid system, **the edge of grid is same on each side and centroid portrays equal distance in all the six directions of hexagon.**

Spatial Join_ Economic Activities

0	No Economic Activity zone
1 - 2	Rare Economic Activity zone
3 - 4	Scattered Economic Activity zone
5 - 8	Dense Economic Activity zone

Inference:
The map here highlights the grid with varied number of economic activities which included all the 5 public facilities.

KEY MAP: NIT, Faridabad

Legend
- RailwayStation
- BusStand
- MetroStation
- Hexagonal_Grid
- Study_Area
- Park
- Green Belt
- RailwayLine
- LocalStreets
- CollectorRoad
- Sub_Arterial
- Arterial_Road
- NIT_1
- NIT_2
- NIT_3
- NIT_4
- NIT_5
- Sec_20A
- Sec_20B
- Gaandhi_Colony

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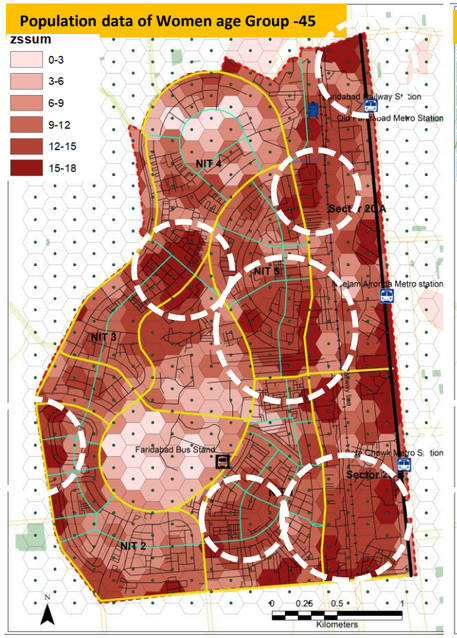
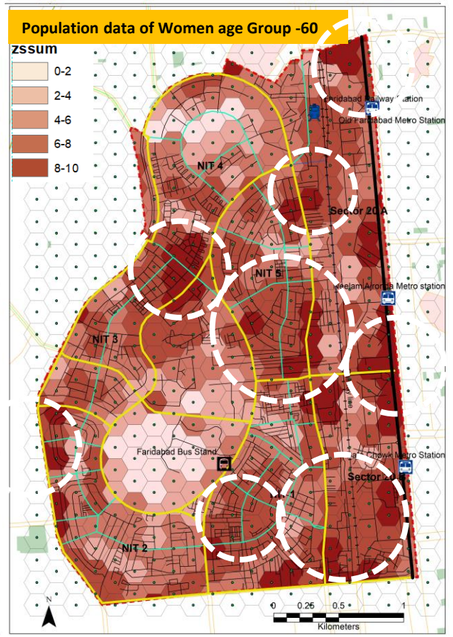
02 Socio Demographic Groups

New Industrial Town, Faridabad

Working Women



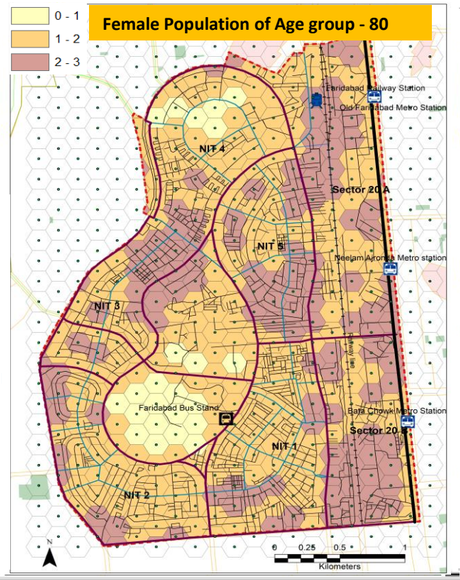


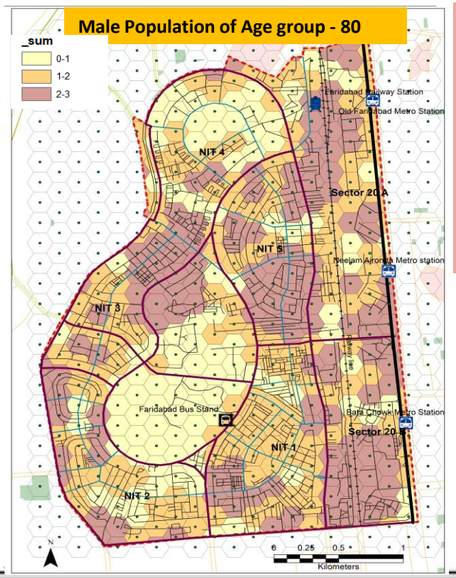
Around 26% of the grids have Low income group, spatially distributed.

The Women population in age group 25 to 60 have been considered as the age group of working women category.

A significant number of girls and women use non motorised transport modes, Walking and bicycling to travel to work.

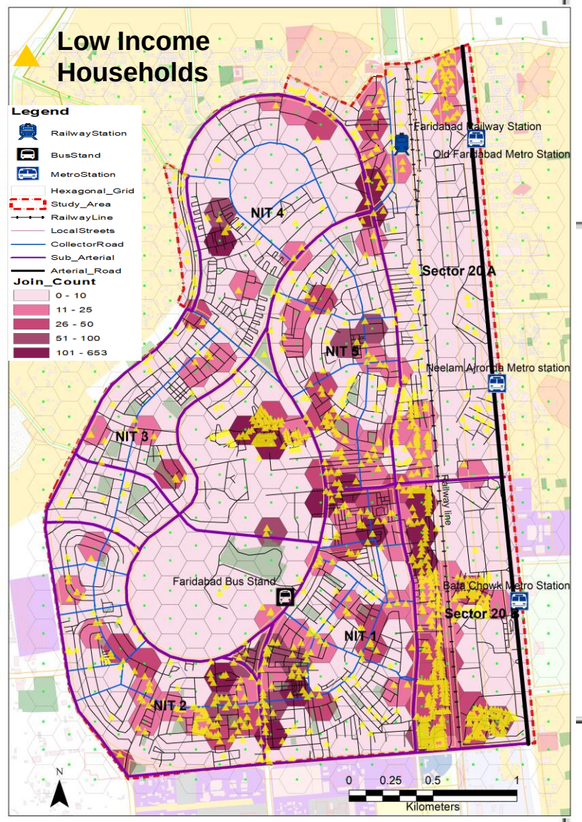
Old age people





Old Age people-The population mapping of senior citizen from age group 60 to 80 years was extracted using world pop data to understand the spatial distribution of the vulnerable age group people.

The Vulnerable population ranges from 0-10 households per grid to 653 households per grid and they are mostly located along the railway line and old market areas.



Low Income Group

The Map here shows the distribution of low income group households over the study area.

The grids having high number of Low income group households have been highlighted to understand the spatial distribution of these **vulnerabilities.**

KEY MAP: NIT, Faridabad

Accessibility depends on 3 broad parameters

1. **Spatial distribution of opportunities.**
2. **Socio-Demographic groups.**
3. **Mobility of the system.**

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03

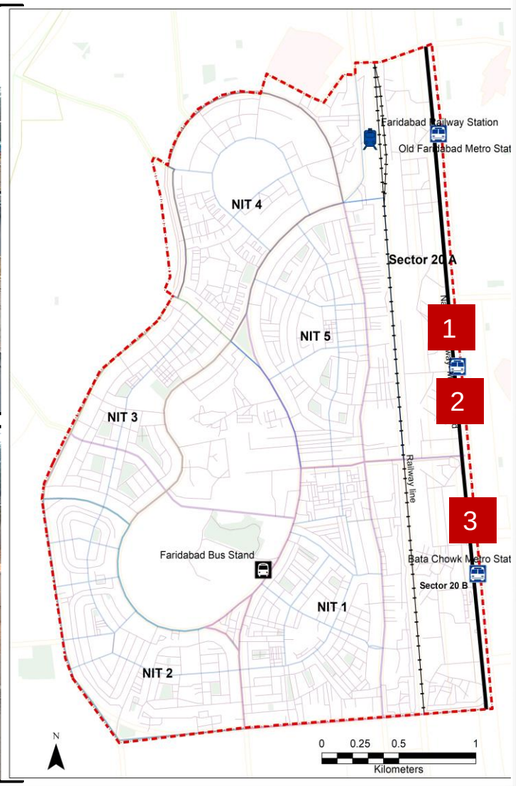
STREET MATRIX

ARTERIAL ROAD

New Industrial Town, Faridabad

Street Accessibility Matrix

Categories			Mobility							Street infrastructure					Scoring
Attributes		Length	Pakka Road	Cycle track	Continuous Footpath	Surface Parking	Road Crossing	Universal Accessibility	potholes free street	Drainage & Sewerage network	User information (Sign boards)	Active Frontage	Street Lights	Trees (Shaded Streets)	All attributes Total
Street no /Value		KM	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	12
Arterial	Mathura Road	4.175	1	0	1	1	1	0	1	1	1	0	1	0	8



KEY MAP: NIT, Faridabad

Legend

- RailwayStation
- BusStand
- MetroStation
- Study_Area
- Park
- RailwayLine
- LocalStreets
- CollectorRoad
- Sub_Arterial
- Arterial_Road

SOURCES:

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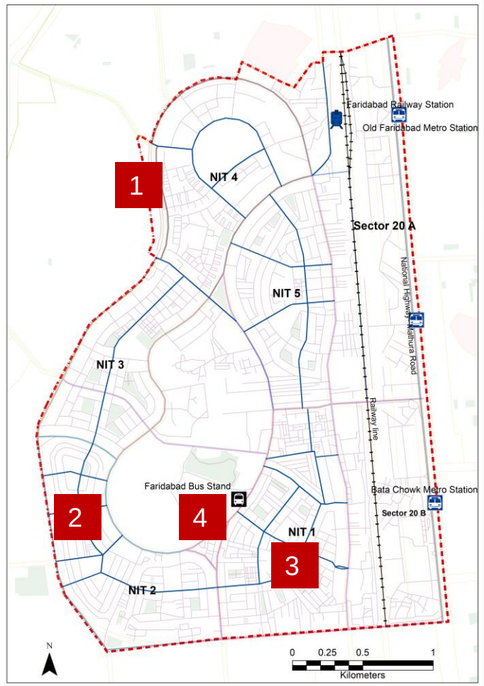
03 STREET MATRIX

Categories		Mobility							Street infrastructure					Scoring
Attributes	Length	Pakka Road (vehicular movement)	Cycle track	Continous Foot path	Surface Parking	Road Crossing	Universal Accessibility (Slopes/ width)	potholes free street	Drainage & Sewerage network	User information (Sign boards)	Active Frontage	Street Lights (Illumination)	Trees (Shaded Streets)	All attributes Total
Street no /Value	KM	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	12
1.1	2.04	1	0	0	0	0	0	1	1	0	1	0	0	4
1.2	0.18	1	0	0	0	0	0	0	1	0	1	0	0	3
1.3	0.295	1	0	0	1	0	0	1	1	0	1	0	0	5
1.4	0.235	1	0	0	1	0	0	1	0	0	0	0	0	3
1.5	0.763	1	0	0	1	0	0	1	1	0	1	0	0	5
1.6	0.548	1	0	0	0	0	0	1	1	0	0	0	0	3
1.7	0.301	1	0	0	0	0	0	1	1	0	0	0	0	3
1.8	0.341	1	0	0	1	0	0	1	1	0	0	0	0	4
2.1	1.14	1	0	0	0	0	0	1	1	0	1	0	0	4
2.2	0.531	1	0	0	0	0	0	1	1	0	0	1	0	4
2.3	0.415	1	0	0	0	0	0	1	1	0	0	1	0	4
2.4	0.465	1	0	0	0	0	0	1	1	0	1	1	0	5
2.5	0.928	1	0	0	0	0	0	1	1	0	0	1	0	4
3.1	0.731	1	0	0	0	0	0	1	1	1	0	1	0	5
3.2	1.41	1	0	0	1	0	0	1	1	0	1	1	0	6
4.1	1.31	1	0	0	0	0	0	1	1	1	0	1	1	6
4.2	0.647	1	0	0	0	0	0	1	1	0	0	0	0	3
4.3	0.473	1	0	0	1	0	0	1	1	1	0	0	1	6
5.1	0.693	1	0	0	0	0	0	1	1	0	0	1	0	4
5.2	1.603	1	0	0	0	0	0	1	1	0	1	1	0	5
5.3	0.75	1	0	0	0	0	0	1	1	0	1	1	0	5
5.4	0.851	1	0	0	0	0	0	0	0	0	1	0	0	2



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Legend

- Railway Station
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- Railway Line
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- Collector Road
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- Study_Area

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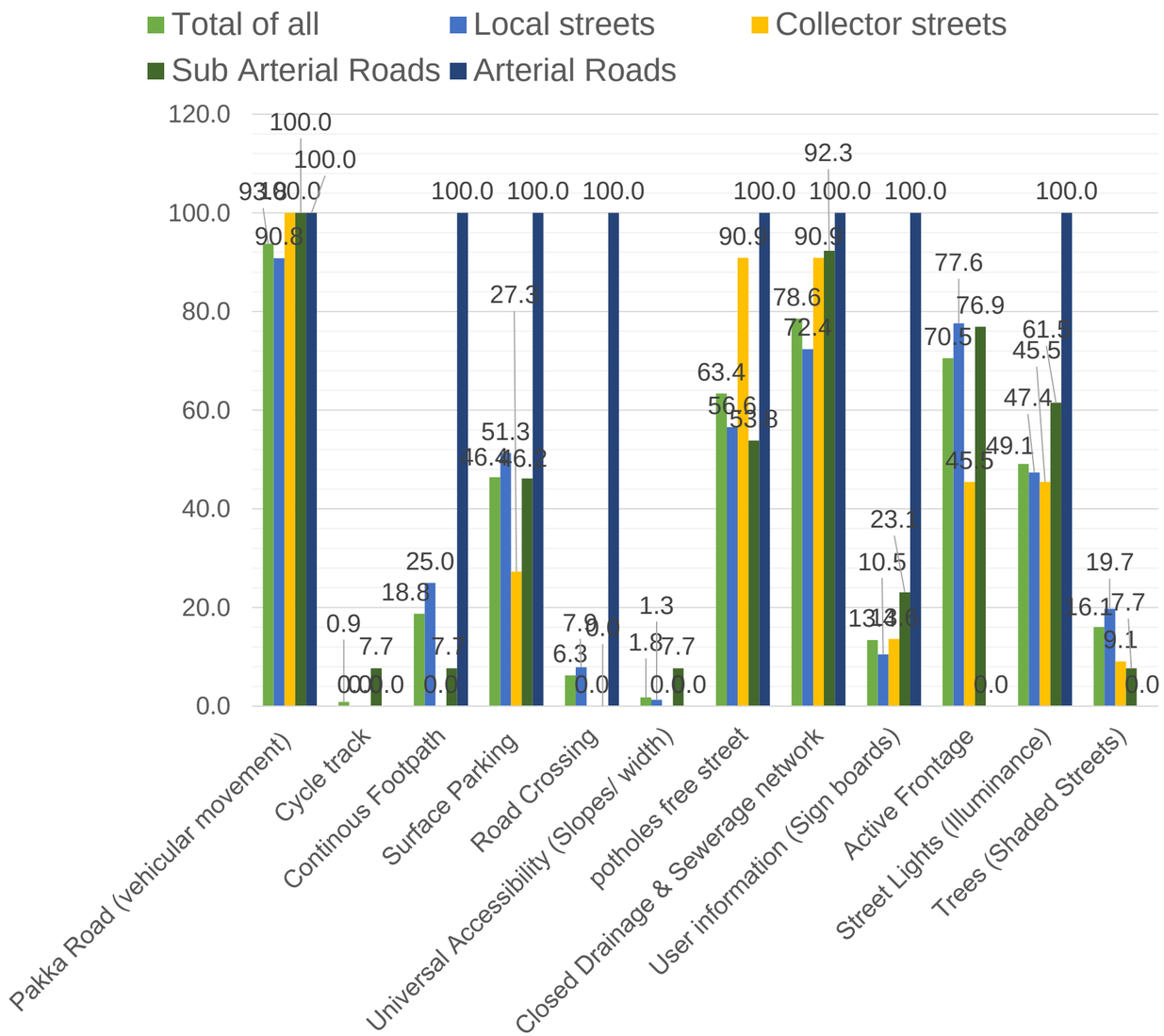
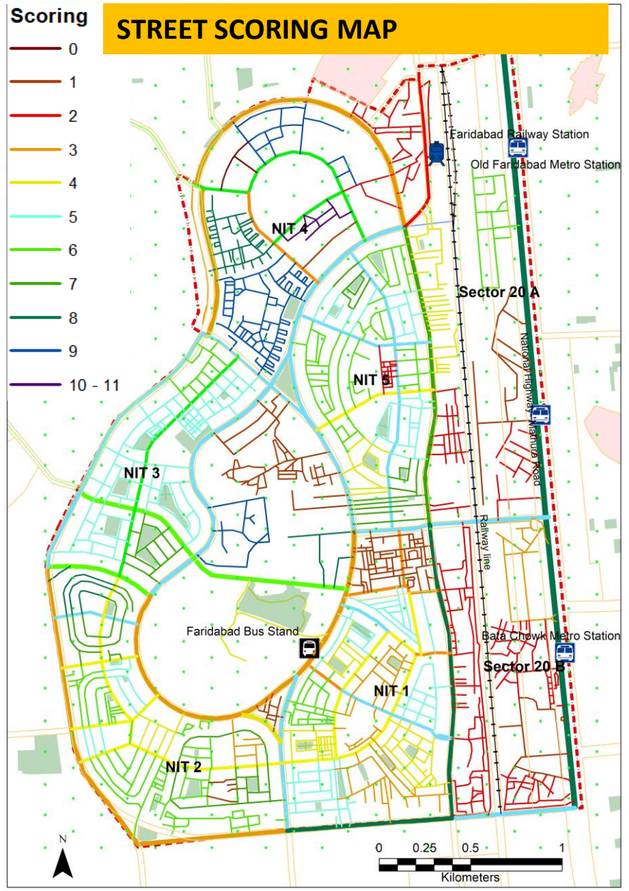
STREET MATRIX

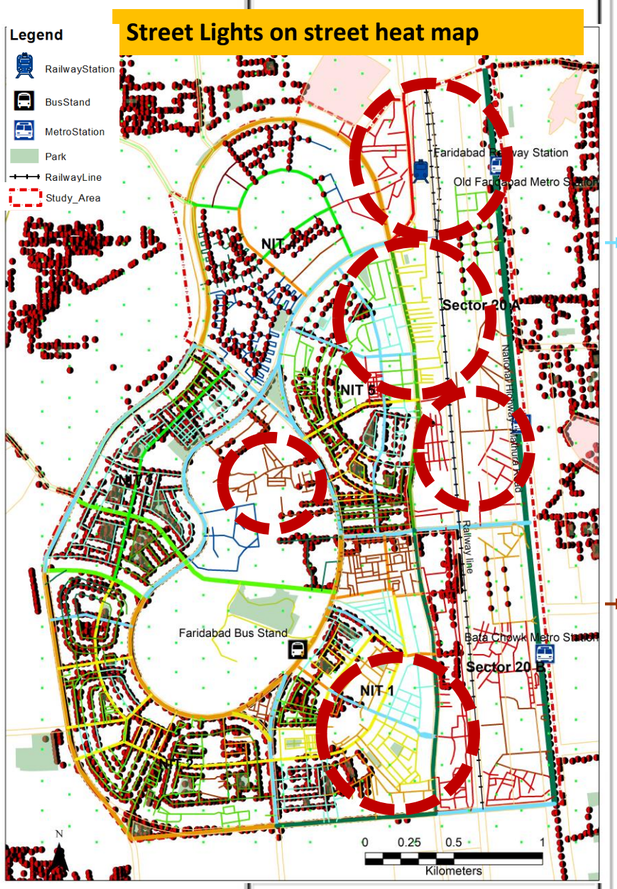
INVENTORY ANALYSIS



STREET SCORING MAP



Street Lights on street heat map



After Importing all the amenities on street map, we can observe the areas with more number of diverse activities and street scoring.

After Importing all the Street lights Locations on street map, we can observe the areas with dark spaces and are not safe for people, specially women.

INFERENCES:

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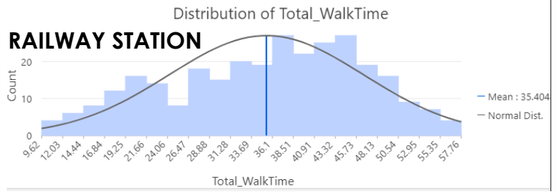
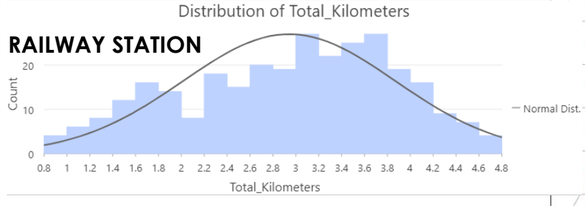
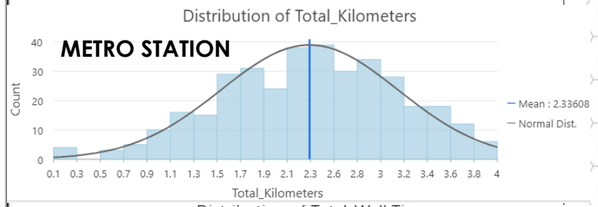
04 Shortest Route_ RAILWAY STATION and METRO STATION

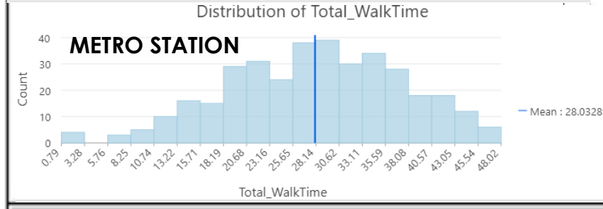
Walking is considered as the most convenient, and affordable means of accessibility.

- In the map shown on right, the shortest routes were calculated from each centroid grid to the transit node.
- The walking time was calculated on the shortest route assuming the speed to be 5Km/hr.

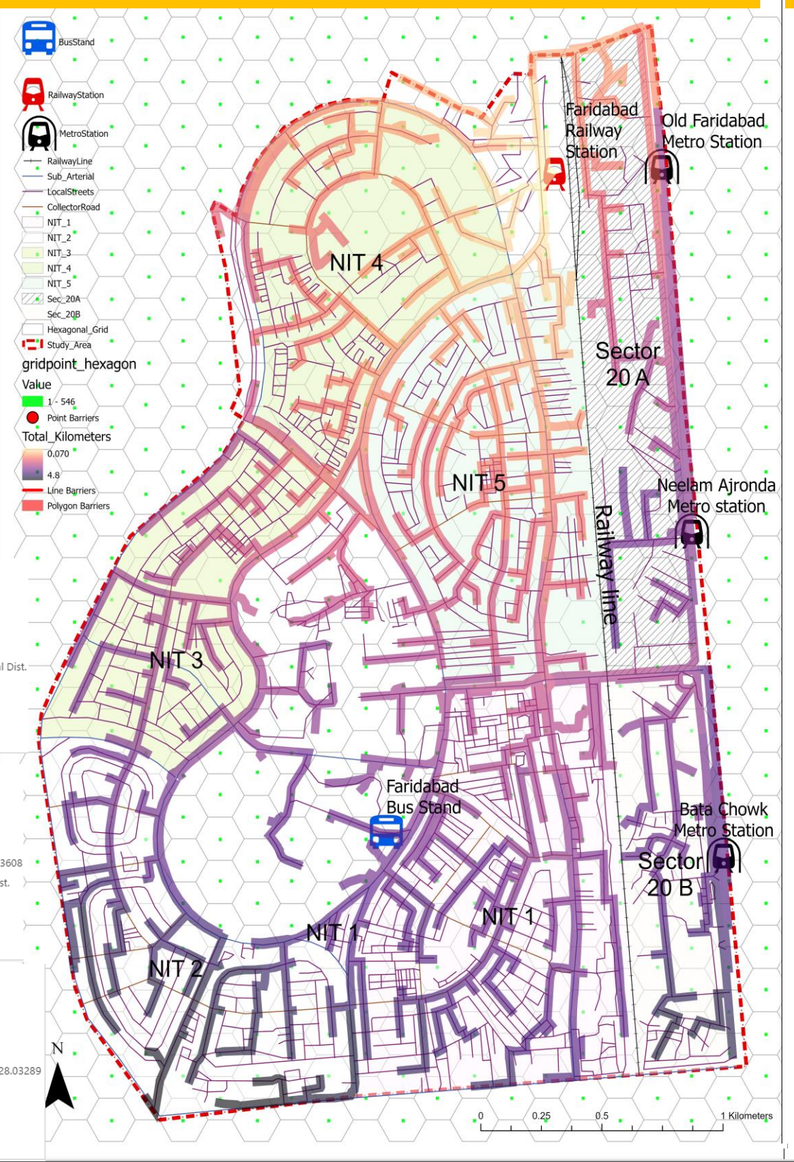




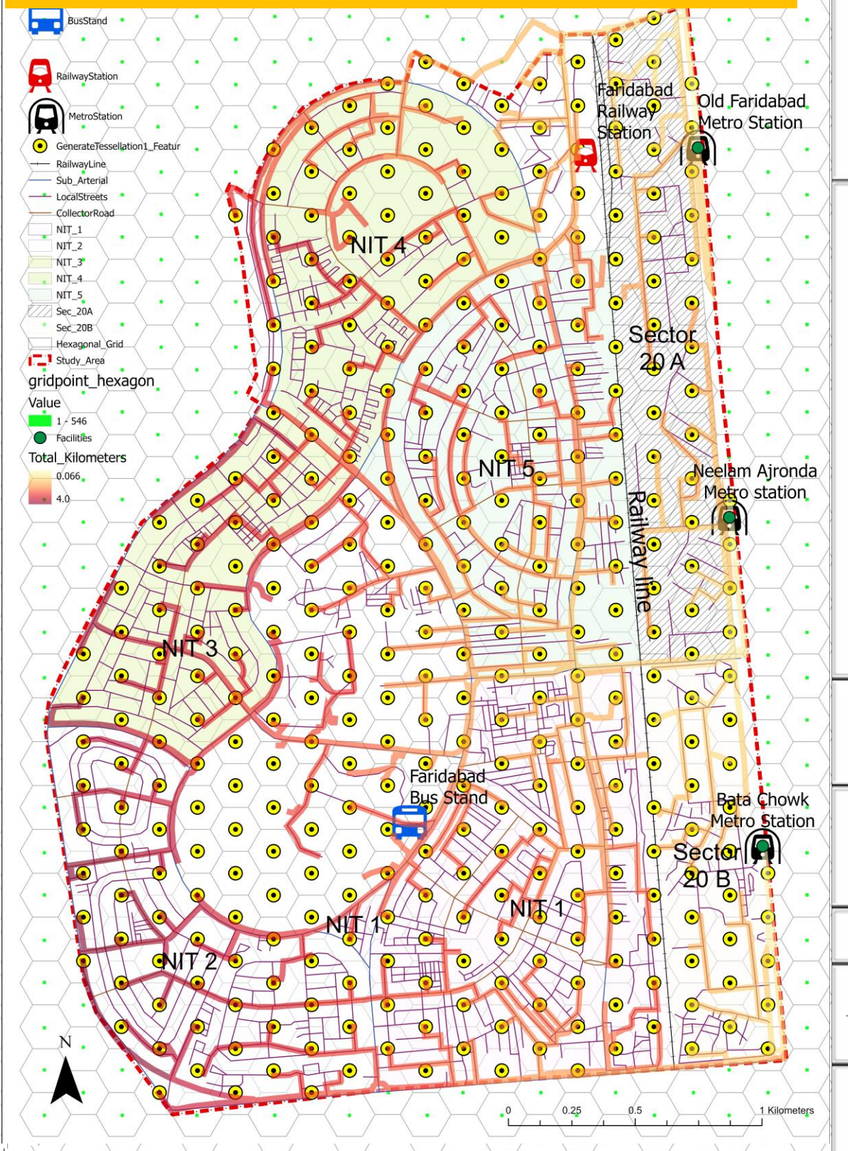




WALKING DISTANCE AND TIME TO RAILWAY STATION



WALKING DISTANCE AND TIME TO METRO STATION



KEY MAP: NIT, Faridabad

LEGEND:

SOURCES:

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04 LINEAR REGRESSION

Dependant Variable: EWS_ Count

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.741[a]	.549	.245	79.650

Model		B	Std. Error	Beta	t	Sig.
	IPT_cyc_2	-674.146	428.824	-.824	-1.572	.120
	IPT_dra_2	374.321	159.060	1.254	2.353	.021
	IPT_foo_2	83.419	138.110	.267	.604	.548
	IPT_pak_2	-395.426	189.960	-.781	-2.082	.041
	IPT_par_2	-30.675	77.705	-.119	-.395	.694
	IPT_pot_2	-190.896	91.114	-.733	-2.095	.040
	IPT_roa_2	-965.860	316.810	-2.552	-3.049	.003
	IPT_sig_2	-272.065	117.240	-1.057	-2.321	.023
	IPT_str_2	141.170	107.254	.565	1.316	.192
	IPT_tre_2	-229.072	140.823	-.645	-1.627	.108
	IPT_uni_2	281.659	294.305	.380	.957	.342
	Amen_act_3	25.003	73.270	.102	.341	.734
	Amen_cyc_3	435.630	221.975	.708	1.963	.054
	Amen_dra_3	-349.597	114.789	-1.529	-3.046	.003
	Amen_foo_3	-147.628	97.832	-.543	-1.509	.136
	Amen_pak_3	129.645	118.416	.441	1.095	.277
	Amen_par_3	4.167	67.070	.020	.062	.951
	Amen_pot_3	163.775	80.885	.766	2.025	.047
	Amen_roa_3	788.017	267.968	1.717	2.941	.004
	Amen_sig_3	162.442	105.151	.593	1.545	.127
	Amen_str_3	.147	81.927	.001	.002	.999
	Amen_tre_3	156.986	89.930	.578	1.746	.085
	Amen_uni_3	-148.347	273.631	-.266	-.542	.589

Shortest route — EWS — Quality of street Infrastructure

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-16.225	78.923		-.206	.838
	Rail_act_1	226.443	288.638	.373	.785	.435
	Rail_cyc_1	328.754	572.679	.140	.574	.568
	Rail_dra_1	90.864	313.176	.259	.290	.773
	Rail_foo_1	-11.771	286.291	-.012	-.041	.967
	Metro_activ	-410.368	288.905	-1.002	-1.420	.160
	Metro_cycle	-614.975	521.732	-.504	-1.179	.242
	Metro_drain	-42.061	508.003	-.108	-.083	.934
	Metro_footp	651.916	665.597	1.494	.979	.331
	Metro_pakka	934.958	543.781	1.243	1.719	.090
	Metro_parki	-525.891	456.124	-1.202	-1.153	.253
	Metro_potho	4.734	333.533	.013	.014	.989
	Metro_scori	63.334	442.454	.829	.143	.887
	Metro_signa	-18.553	527.629	-.046	-.035	.972
	Metro_stree	124.051	590.250	.314	.210	.834
	Metro_tress	-470.263	636.253	-.691	-.739	.462
	Metro_uniac	108.079	1556.877	.023	.069	.945
	Rail_pak_1	-597.106	279.109	-.661	-2.139	.036
	Rail_par_1	315.344	186.664	.628	1.689	.096
	Rail_pot_1	-155.992	216.957	-.360	-.719	.475
	Rail_roa_1	-619.278	477.869	-.382	-1.296	.199
	Rail_sig_1	130.207	187.224	.247	.695	.489
	Rail_str_1	-592.687	290.825	-1.187	-2.038	.045
	Rail_tre_1	342.425	248.336	.435	1.379	.172
	Rail_uni_1	-959.278	1212.015	-.231	-.791	.431

The 11 Variables strongly impacting the EWS clustered population are:

1. Pakka Roads and availability of street lights to shortest route of railway station.
2. Drainage network, pakka road, pothole streets, road crossing and user information on the shortest route to IPT.
3. Cycle track, Drainage network, pothole free street, and road crossing on the shortest route to Amenities.

SOURCES:

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LINEAR REGRESSION

Dependant Variable: Working Women and old people

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.612[a]	.374	.304	4.5569409063

a. Predictors: (Constant), Metro_uniac, Metro_scori, Metro_cycle, Metro_pakka, Metro_tress, Metro_activ, Metro_drain, Metro_stree, Metro_potho, Metro_parki, Metro_signa, Metro_footp

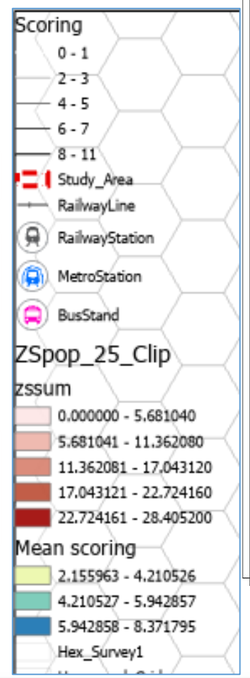
Coefficients[a]

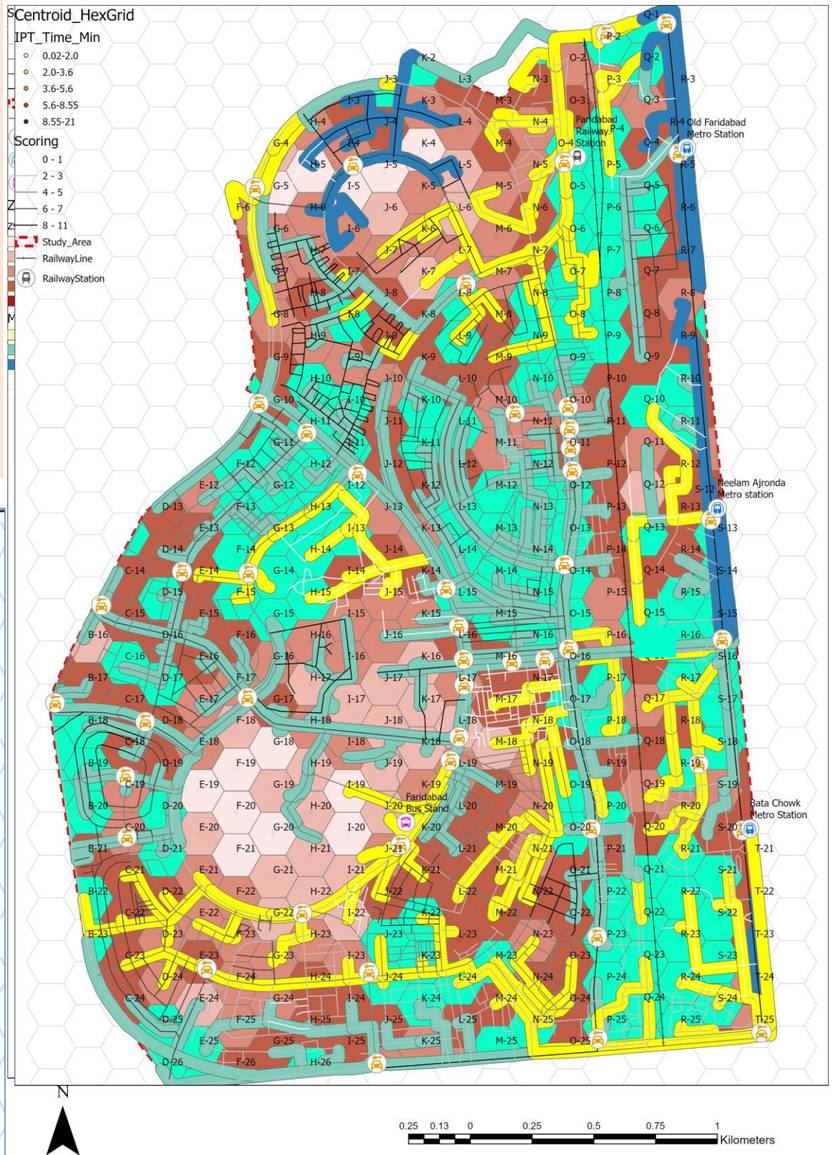
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	23.776	3.825		6.216	<.001
Metro _Active Frontage		21.857	6.382	.895	3.425	<.001
Metro _ Cycle Track		10.458	8.313	.144	1.258	.211
Metro _Drainage Net		19.620	8.809	.846	2.227	.028
Metro _ footpath		39.792	13.971	1.530	2.848	.005
Metro _ Pakka Street		15.107	9.834	.337	1.536	.127
Metro_ Stre. Parking		30.366	8.835	1.165	3.437	<.001
Metro_ potholes free		11.614	6.748	.553	1.721	.088
Metro_ Score		-20.572	7.728	-4.518	-2.662	.009
Metro - User Info		23.390	9.469	.971	2.470	.015
Metro – Street Light		29.108	10.536	1.235	2.763	.007
Metro_ Tree Shade		5.555	7.693	.137	.722	.472
Metro_ Uni. Acc		26.346	25.072	.096	1.051	.296

a. Dependent Variable: WW_Sum_25

In the map shown on right,
The following attributes have been overlaid:

- Spatial distribution of Women with age group 25.
- Shortest route from each hexagonal grid to closest metro station.
- Mean Quality of street infrastructure.





KEY MAP: NIT, Faridabad

LEGEND:

1. Active frontage
2. Drainage networks on metro routes
3. Footpath
4. User information
5. Street light
6. Overall scoring

Grids with high number of women age 25

SOURCES:

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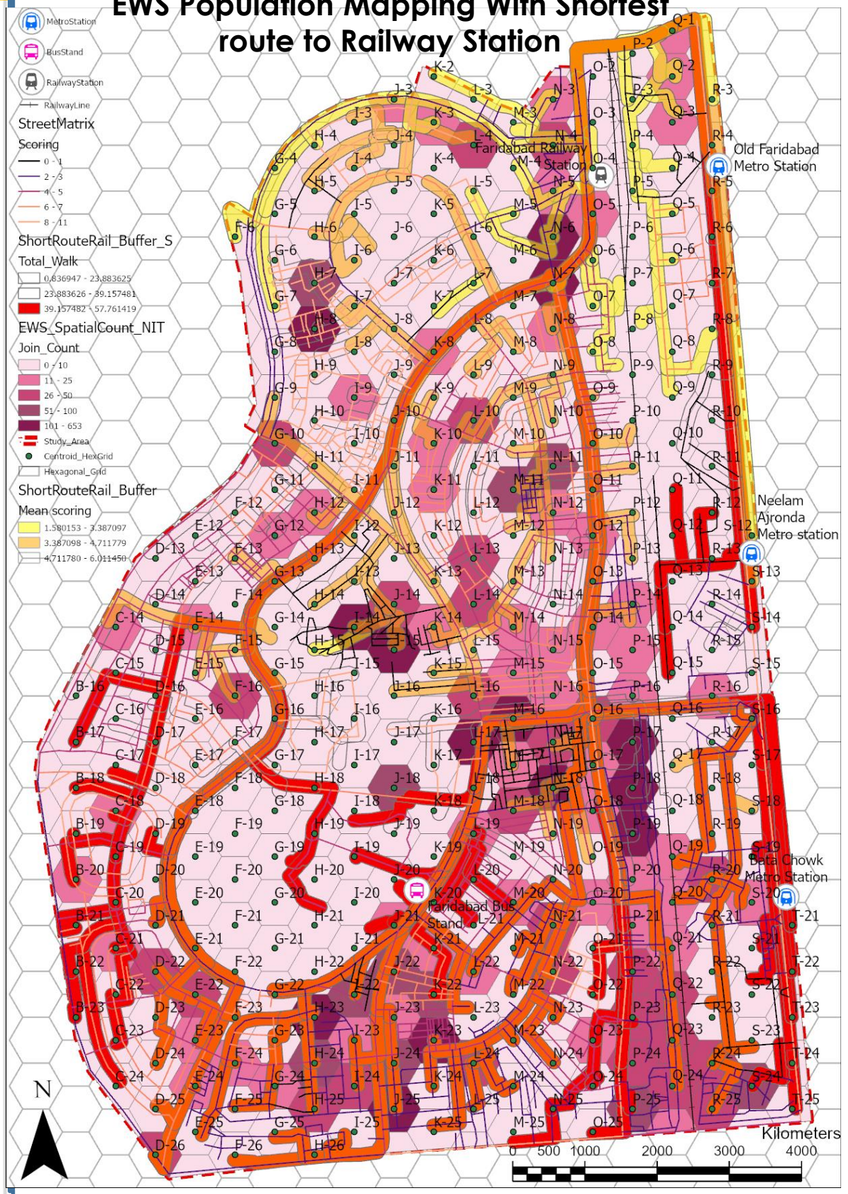
Equitable Accessibility Planning to Public Facilities, Case study of Faridabad

04 ISSUES

EWS Population Mapping With Shortest route to Railway Station



Socio demographic Vulnerability
ECONOMICALLY WEAKER SECTION

Highly Vulnerable routes to reach Railway stations

- With minimum infrastructure
- And Walking travel time beyond15 minutes

The table shows the **hexagonal grids with highest population** density of Economically weaker Section having **lowest street infrastructure** quality to railway station routes.

The reason for lowest scoring on railway routes can also be identified from street quality index, as the attributes which are **closest to 0**, have the **poor quality of infrastructure.**

	KM	Min	Street Quality Index_ Shortest Route to Railway stations																
GRID_ID	Distance	Walk Time	Active Front	Cycle	Drain	Footpath	Pakka Road	Street Parking	Pot Holes	Road Crossing	Signage	Street Light	Tree shade	Univ. Acc	Scoring	EWS_Count	Pop_ weightage	EWS_ priority	Scoring _priority
H-23	3.93	47.13	0.88	0	0.81	0.11	1.00	0.36	0.52	0.01	0.41	0.34	0.03	0	4.48	653	0.50	1.00	0.75
H-24	4.10	49.23	0.88	0	0.78	0.11	1.00	0.34	0.54	0.01	0.39	0.33	0.03	0	4.42	89	0.64	0.14	0.73
H-7	1.66	19.89	0.50	0	0.78	0.35	0.99	0.34	0.73	0.06	0.59	0.35	0.37	0	5.06	99	0.60	0.15	0.84
H-8	1.61	19.31	0.54	0	0.76	0.30	0.99	0.29	0.71	0.06	0.56	0.30	0.32	0	4.83	348	0.76	0.53	0.80
I-14	2.34	28.09	0.80	0	0.57	0.07	0.79	0.13	0.47	0.05	0.43	0.22	0.07	0	3.60	258	0.80	0.40	0.60
I-22	3.70	44.35	0.86	0	0.78	0.12	1.00	0.37	0.52	0.01	0.42	0.33	0.03	0	4.43	66	0.40	0.10	0.74
J-15	2.37	28.42	0.81	0	0.54	0.07	0.75	0.12	0.44	0.05	0.41	0.21	0.06	0	3.47	261	0.43	0.40	0.58
J-18	3.10	37.21	0.92	0	0.83	0.16	1.00	0.49	0.66	0.03	0.54	0.47	0.03	0	5.13	83	0.35	0.13	0.85
J-22	3.56	42.69	0.92	0	0.84	0.14	1.00	0.40	0.60	0.01	0.45	0.39	0.02	0	4.77	80	0.68	0.12	0.79
J-24	3.94	47.22	0.92	0	0.85	0.12	1.00	0.36	0.62	0.01	0.41	0.42	0.02	0	4.73	87	0.94	0.13	0.79
J-25	4.11	49.29	0.92	0	0.85	0.12	1.00	0.35	0.59	0.01	0.39	0.40	0.02	0	4.67	185	0.72	0.28	0.78
K-22	3.73	44.73	0.92	0	0.84	0.24	1.00	0.38	0.64	0.01	0.41	0.44	0.02	0	4.90	81	0.80	0.12	0.82
K-23	3.89	46.72	0.77	0	0.76	0.12	1.00	0.38	0.60	0.00	0.29	0.31	0.00	0	4.25	255	0.85	0.39	0.71
L-17	2.61	31.31	0.96	0	0.82	0.16	1.00	0.50	0.67	0.01	0.60	0.45	0.01	0	5.18	405	0.56	0.62	0.86
M-11	1.51	18.08	1.00	0	0.63	0.07	1.00	0.25	0.55	0.00	0.33	0.36	0.04	0	4.23	63	0.60	0.10	0.70
M-16	2.40	28.82	0.98	0	0.82	0.17	1.00	0.54	0.69	0.00	0.62	0.48	0.00	0	5.30	102	0.72	0.16	0.88
N-11	1.37	16.43	1.00	0	0.76	0.21	1.00	0.48	0.54	0.00	0.52	0.39	0.00	0	4.90	99	0.42	0.15	0.81
N-18	2.56	30.72	0.78	0	0.63	0.17	1.00	0.42	0.48	0.00	0.43	0.38	0.00	0	4.30	346	0.66	0.53	0.71
N-6	0.41	4.89	1.00	0	0.12	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0	2.12	188	0.68	0.29	0.35
N-7	0.52	6.28	1.00	0	0.25	0.10	1.00	0.07	0.13	0.00	0.13	0.07	0.00	0	2.74	190	0.70	0.29	0.46
P-17	2.54	30.48	0.97	0	0.78	0.26	1.00	0.55	0.60	0.00	0.51	0.51	0.00	0	5.24	179	0.98	0.27	0.87
P-18	2.65	31.83	0.99	0	0.71	0.19	1.00	0.46	0.54	0.00	0.51	0.42	0.00	0	4.82	118	0.96	0.18	0.80
P-19	2.70	32.41	0.95	0	0.71	0.25	1.00	0.50	0.56	0.00	0.44	0.47	0.00	0	4.96	550	0.69	0.84	0.83
S-24	4.37	52.48	0.67	0	0.74	0.29	0.94	0.45	0.65	0.18	0.54	0.43	0.06	0	4.96	62	0.93	0.09	0.82

KEY MAP: NIT, Faridabad

LEGEND:

SOURCES:

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05

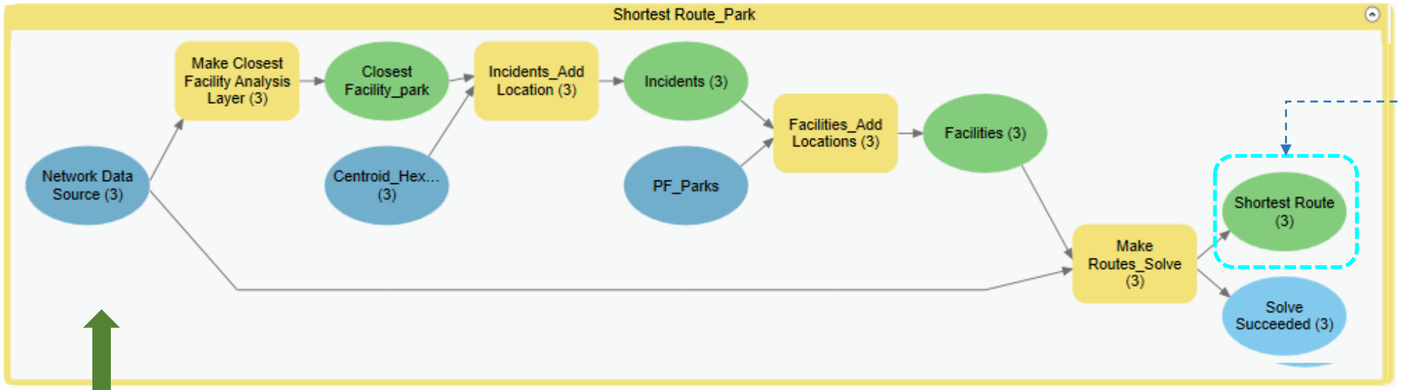
Preparing tools for calculating Shortest distance travel to Public facilities

The Model was prepared to calculate the shortest distance with minimum walking and driving time to different public facilities.

These tools can be used on different neighborhoods or at city level, and it will help in developing the shortest route to public facilities which can be analyzed in relation to the spatially distributed vulnerabilities.

The quality of each street can be analyzed with **Street Quality Index** and overlaid on each hexagonal grid.

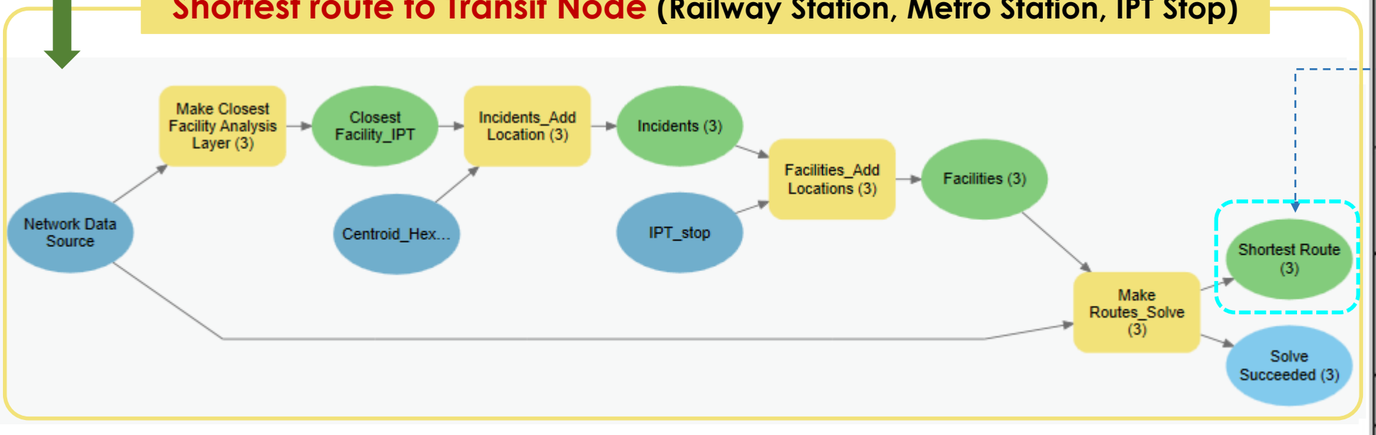
Shortest route to public facilities (Hospitals, Banks, Grocery shops, Education Inst., & Parks)



Final Result

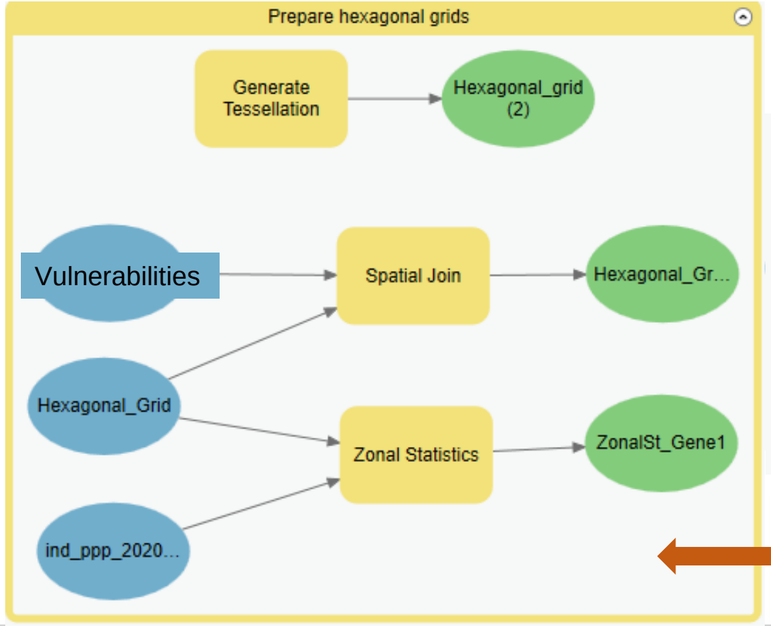
The model here employs ArcGIS' network analysis to build the shortest route to various public facilities, with the origin of each route being the centroid of a hexagonal grid and the destination of each route being the public facility that has been indicated.

Shortest route to Transit Node (Railway Station, Metro Station, IPT Stop)



Final Result

Model for Preparing Hexagonal Grid



This tool will help in generating hexagonal grids on the study area using Generate Tessellation command, after which zonal statistics will help in transferring demographic data on to hexagonal grids.

INFERENCES:

SOURCES:

SHEET NO.

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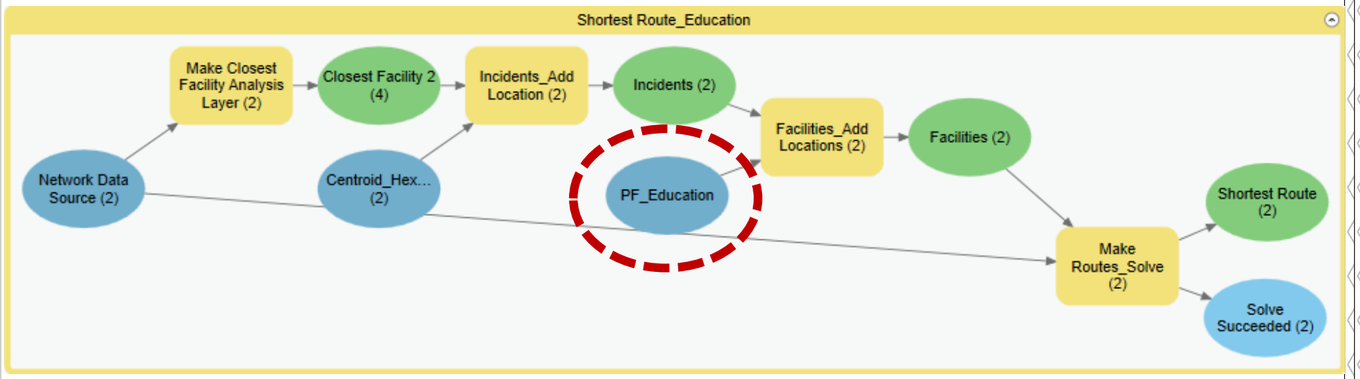
05

Preparing tools for calculating Shortest distance travel to Public facilities

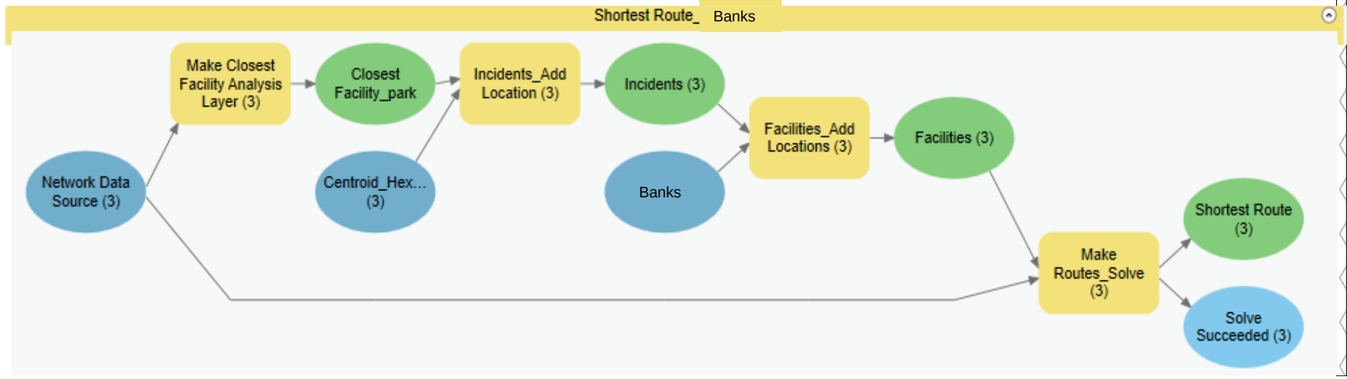
To calculate shortest route to Educational Facility_ Walking / Driving Time

TWO CLICK TOOL

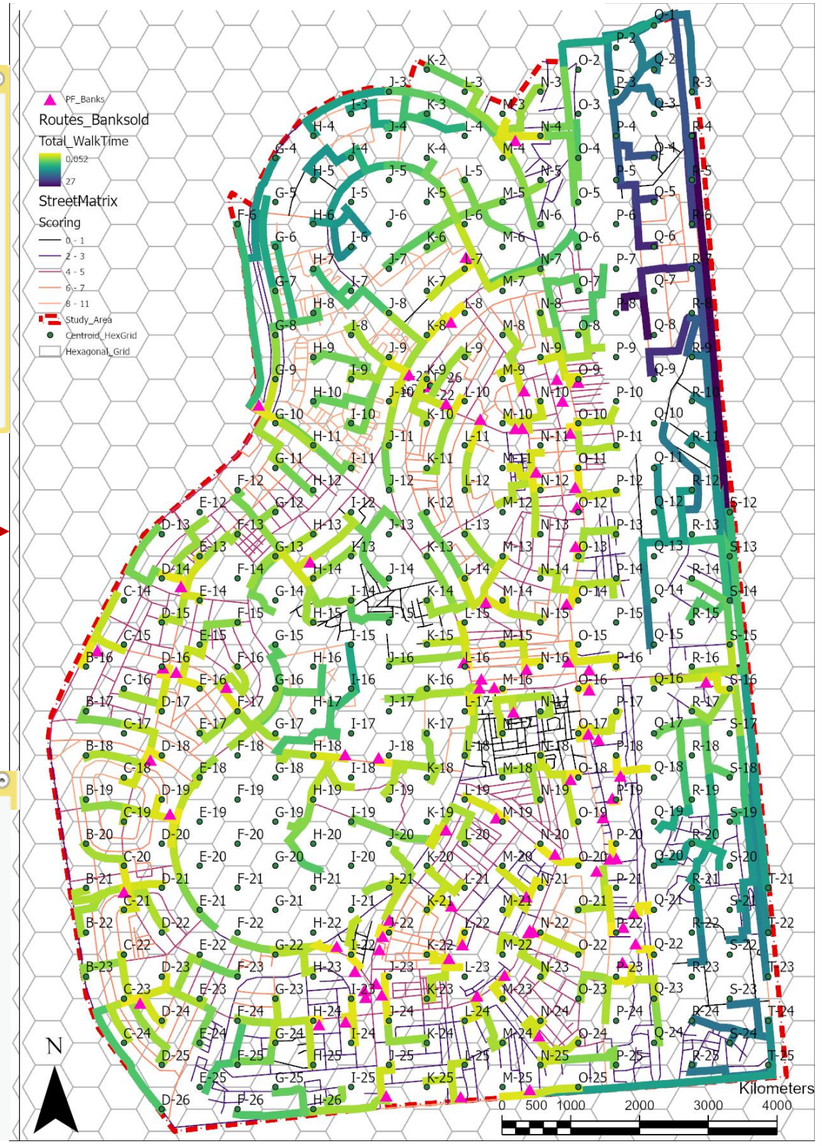


EDUCTAION.SHP + **RUN**

This tool will calculate the shortest distance from each hexagonal grid cell to the public facility with walking and driving time of peak and non peak hours.



Shortest route to Banks



INFERENCES:

Limitations of the model:
The model can run on 5000 origin points only under student Id.

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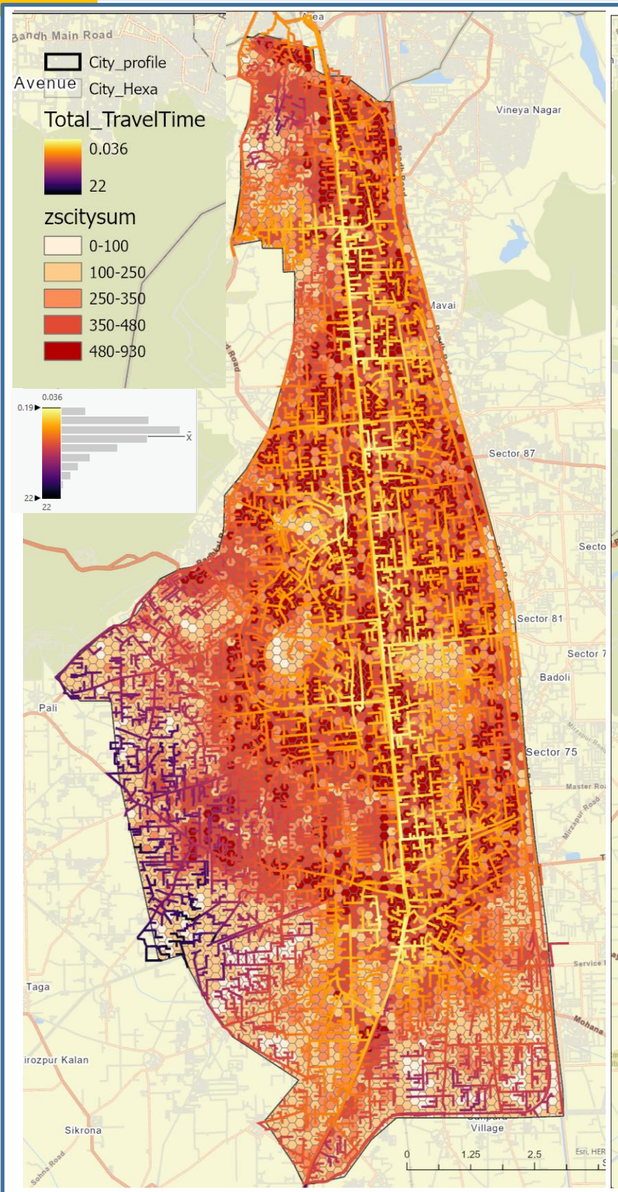
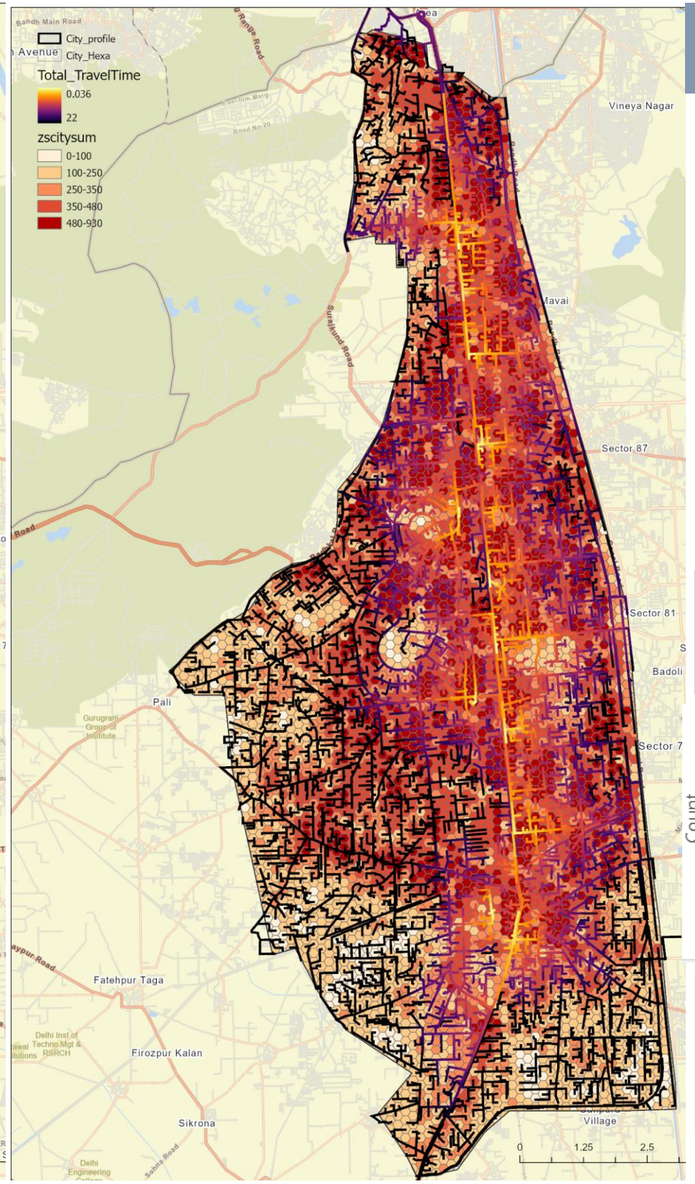
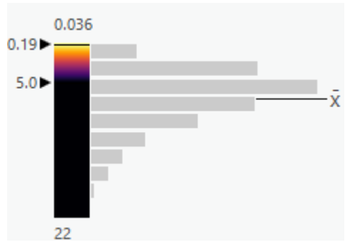
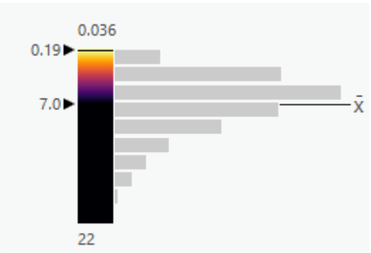
05 Driving Time to Metro stations and Railway Stations Faridabad





Routes that are accessible in 7 minutes Driving distance from metro stations / railway stations

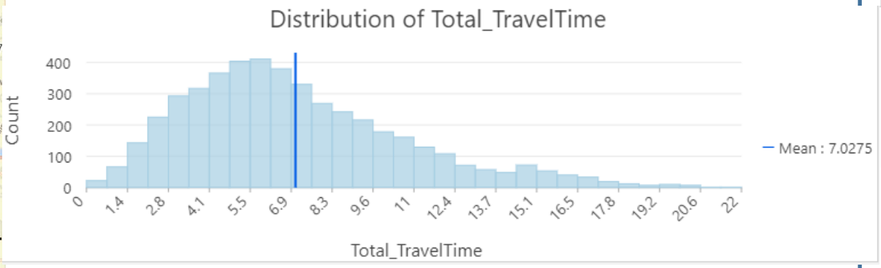




The tools allows us to identify the driving time required to access the metro stations and railway stations.

In the adjacent map, we can see the accessible routes within 5 minutes and 7 minutes of driving time

The maximum driving time travelled to reach the nearest station is 22 minutes and the mean time is 7 minutes.



Overlaying these routes with density map shows the area with high density and lower accessibility, with this map we can work on strategies to improve the accessibility of these highly dense vulnerable areas.

KEY MAP: NIT, Faridabad

LEGEND:

- City_Transit Nodes
- Urban Area

Total_WalkTime

0.15 Minutes

91 Minutes

SOURCES:

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05 CONCLUSION

The urban street infrastructure quality was assessed with the shortest route to different public facilities that are impacting the most vulnerable community & measures were taken to reduce the impacts of inaccessibility on these communities.

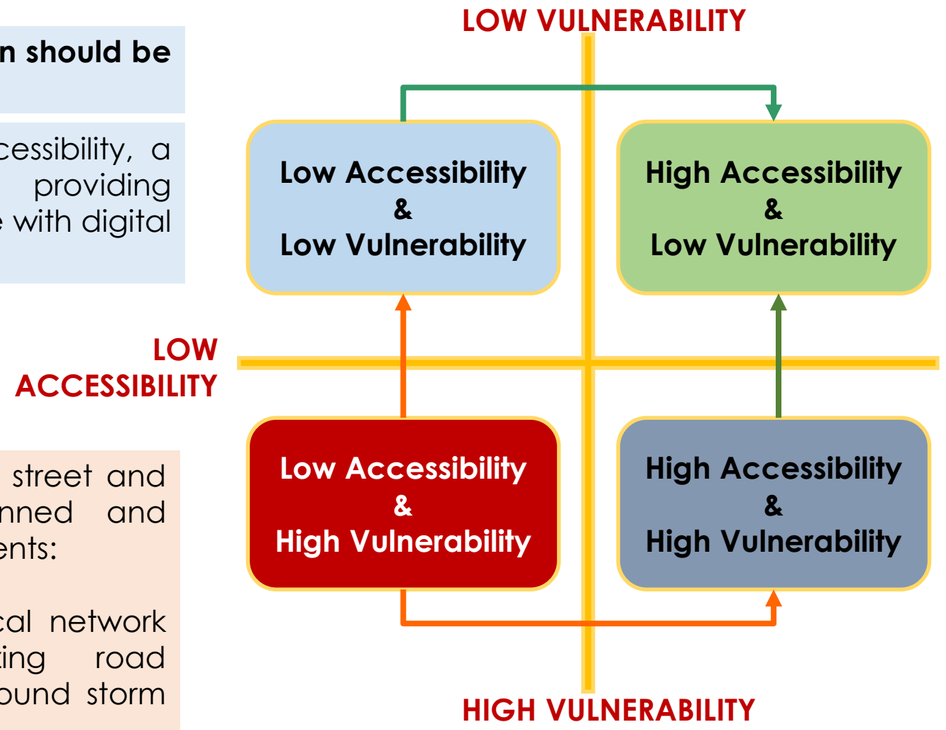
Concept of shared street design should be used

To improve door to door accessibility, a special helpline number providing technical assistance for people with digital impairment.

Frame guidelines for improving street and access infrastructure in planned and unplanned low income settlements:

Guidelines are needed for local network improvement by concretizing road surfaces and building underground storm water and utility duct systems.

Special incentives should be given to vulnerable community in terms of minimum fare charges, fixed transit rotes to accommodate the vulnerable people.



Data driven actions for targeted improvements in all settlement

Need for an Institutional Framework

Need for funding strategy at state level and local level administration

Equity should be considered as important framework for City wide plan for deployment of integrated and affordable public transport services to all settlements, especially to vulnerable communities

Settlement wise plan for improvement in accessibility and connectivity.

Area level Infrastructure should be assessed and measures should be adopted for minimum level of accessibilities towards services.

Mixed use development should be promoted

TOD policy should be implemented: **Compact high density, mixed land-use and mixed-income development** within 400–500 m radius of transit nodes like a Metro stations is needed.

INFERENCES:

SOURCES:

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THANK YOU

BY:

SHIVANI KHURANA