

# IMPROVEMENT OF TRAFFIC FLOW THROUGH PLANNING INTERVENTIONS: CASE OF FAIZABAD ROAD FROM NISHANTGANJ CHAURAHA TO POLYTECHNIC CHAURAHA, LUCKNOW

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## Abstract

This Paper attempted to highlight the importance of Transportation within the limited scope and framework. Moreover, in the process, the study has acquired a better understanding of Planning According to a set of rules. The analysis of a respective Stretch (Nishant Ganj chauraha to Polytechnic chauraha) Will depicts the impact of many activities happens.

In this paper, we have shown the Level of service by primary survey and implemented to improve L.O.S. To improve safety and to provide orderly movement of vehicles, improvements in junctions such as installation of traffic signals, geometric improvements has been done.

Though this study does not intend to arrive at any universal hypothesis in terms of Transportation, it could drive certain aspects based on the analytical understanding of the studies. These aspects do not ensure the success of any design (design of interaction spaces or academic institutions) but at least it calls the attention of the Planner to issues that are often neglected or ignored.

Keyword – Transportation, Level of service, safety, movement of vehicles, improvements in junctions, geometric improvements

## Introduction

The sustainability and quality of life in any urban center are closely linked to the quantity and quality of transport infrastructure facilities that support it. Road transport infrastructure forms one of the key sectors, which is defined as the road network and associated physical infrastructure such as signage, lighting, and vehicle refueling service.

Urban roads in India have a heterogeneous mix of traffic. These include the pedestrians, slow-moving vehicles like bicycles, rickshaws both for passenger and freight movement, and fast motorized vehicles like motorcycles, scooters, three-wheelers, cars, and public transport vehicles. The space occupied by each of these vehicles and speeds by each user is variable. Therefore, to achieve a smooth and safe flow of traffic space allocation for different vehicles has to be carefully ensured.

This road is situated in Lucknow city Faizabad road, Uttar Pradesh, India.

## Classification of road

As we know that there is a classification of roads are: -

The accessibility, mobility, and connection of roads determine their classification.

In terms of this, the type of road has accessibility. Various rates as shown in FIG.1

Whereas Efficiency of the road network system is related to mobility and connectivity.

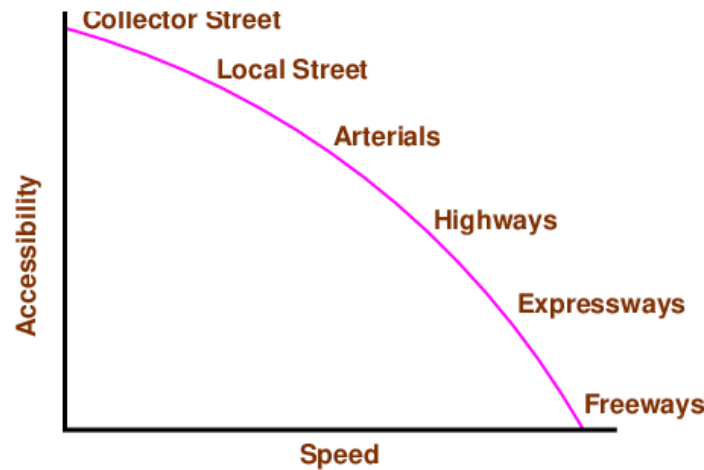


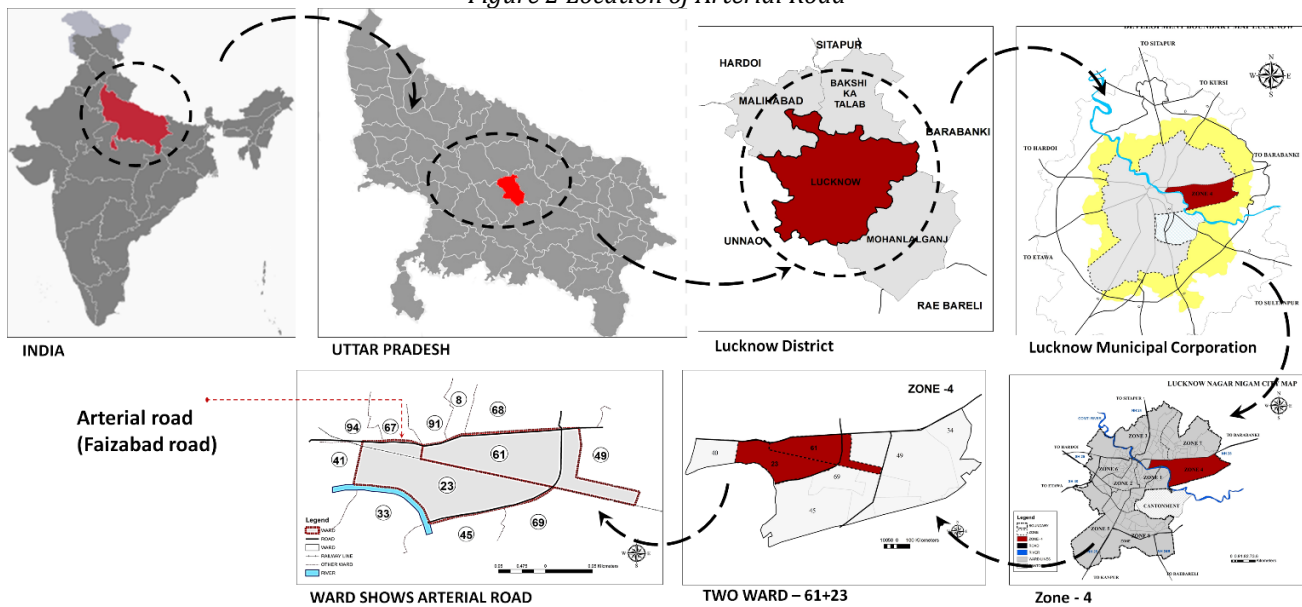
Figure 1 Speed vs accessibility

About Analyzed Road of Transportation:

Out of this type of road, the Stretch I Analyzed is Arterial Road.

The location of Road is in Lucknow municipal corporation as shown in FIG.2.

Figure 2 Location of Arterial Road



Ward 23 (Papermill) and ward 61 (Gomti Nagar) lay in Zone 4 of the LMC boundary.

Numerous National Highways (NH) and State Highways (SH) passes around the periphery of the ward, whereas NH-28 is passing through the ward. Wards are having connectivity with a surrounding area like on the ring road and to Hazratganj CBD of Lucknow. To further analyze the on-ground realities of the ward's transport system, primary data has been collected by doing various types of surveys whereas secondary is also collected to complement the process.

The total length of Arterial Road covers in Ward no.-61+23 is 7.4 km as shown in Table no.2 & out of that length of road from Nishantganj chauraha to Polytechnic chauraha is 4.25 km which is 57.5% of the arterial road of both wards. with Average width of 30 to 35 m wide road currently (2021) as shown in Table.1.

But according to master plan 2031, the road should be 76m & 45m wide (As from Nishantganj to kukrail pull is 45m wide and from kukrail pull to Polytechnic is of 76 m wide road).

The road faces traffic congestion due to encroachment by the vendors and shops which needs to improve the smooth flow of traffic. Faizabad road is an important sub-arterial road connecting N.H.24 in Polytechnic chauraha which plays an important role in our wards.

From Nishantganj to Polytechnic it has 3 more intersections, their names are – Badshahnagar, Lekhraj chauraha & Bhoothnath. Due to High Traffic volume density, this stretch doesn't have any Traffic lights or any Cameras from the Smart city of Lucknow. The character of roads changes from the regional roads to urban roads. Major land uses of Lucknow are situated along the national highway; state highways, as well as major road arterial, sub-arterial, are not according to URDPFI standards. Due to this, the road network faces major issues on the roads.

Table 1 Urban Road network distribution (Existing and according to IRC)

S.No.	Hierarchy	Right Of Way	IRC Guidelines
1	Arterial road	30 – 35 Mt	50 – 60 Mt

**TOTAL AREA OF WARD 23 & 61 IS 6.05 SQ KM ROAD AREA IS 1.0698 Sqkm**

Cover 17.68% of the Total area of Ward 23+61 (6.05 Sqkm) as shown in Chart no.1 Given below.

**Ward 23 (305 Ha. Area) Road area (55.62 Ha. Area) = 52%**

**Ward 61(300 Ha. Area) Road area (51.35 Ha. Area) = 48%**

Out of that Total % of Arterial Road is 7.5 % of Total Road in ward 23+61.

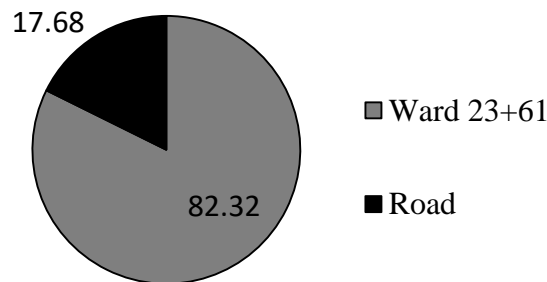


Chart 1 61 & 23 Ward Contain Road

Total Arterial road of ward 23+61 and their respective percentage with total area taken from all over ward area is shown in table.2 .

Table 2 Road Length

S.No.	Road Types	Length (km) Of Ward 23+61	Percentage (%) Of Ward 23+61	Area covered (sqkm) of Ward 23+61
1	Arterial Road	7.4	7.5	0.296

**Parking**

Parking is a major problem due to the shortage of off-street parking facilities. Parking generally takes place along the roads in front of the commercial establishments, public and semi-public establishments. On-street parking causes bottlenecks and hampers smooth movement of traffic as shown in FIG.4. The local traders and shop owners are using these areas for parking. As per CMP 2012 of Lucknow City parking survey, 56% and 26% of the total parked vehicles are two-wheelers and four-wheelers respectively and the remaining are three-wheelers.

**Off-street parking** in Lucknow is maintained by LDA and LMC.

The users of **on-street parking** are casual users who use the space for a short period.

Figure 4 unauthorized parking on Faizabad road



Figure 3 Congestion created in Polytechnic Chauraha by Paratransit



Figure 6 Badshah Nagar Railway Parking

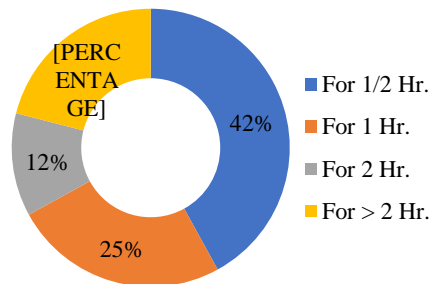


Figure 5 Badshah Nagar Metro Parking



Availability of parking is maximum at the Faizabad road. Badshah Nagar railway station has a capacity of 200 two-wheeler parking at a time as shown in FIG.6. No traffic signals are present over there. Even Badshahnagar metro station has public parking as shown in FIG.5. There is a lack of parking places at the intersections.No proper bus/ taxi stops. There is a lot of street parking of public/ private vehicles which are using up the lanes and thus causing traffic congestion. and they take a certain duration as shown below in chart.2 and park in an unauthorized area

Chart 2 Distribution of duration of parked vehicles



Findings related to at what time traffic congests the most

Traffic congests the most at 10:00 AM and 6:00 PM. And we got No. of the vehicle on average peak hour are shown in table.3.

Table 3 AM and PM Peak Hour

	Polytechnic	Indira Nagar	Bhootnath	Badshanagar
10:00 AM	Car - 46 Bike - 86 Tempo - 26	Car - 33 Bike - 64	Car - 12 Bike - 32	Car - 24 Bike - 127 Tempo - 24
6:00 PM	Car - 53 Bike - 141 Tempo - 36	Car - 61 Bike - 104	Car - 61 Bike - 103	Car - 71 Bike - 191 Tempo - 28

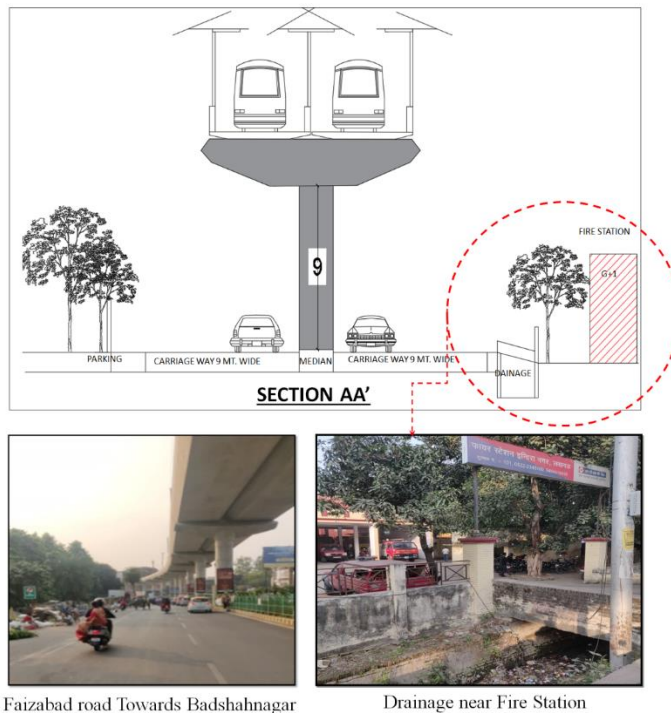
Road sections

Figure 7 Road Hierarchy Plan



The primary function of an **Arterial Road** is to deliver traffic from collector roads to freeways or expressways, and between urban centers at the highest level of service possible.

Figure 8 Section AA'



The width of section AA' is near about 35 M Wide Road whereas it took 2 M wide median, & 3 lane in each road with 3 to 3.5 M (Lane width) as shown in FIG.8 of section AA', this road contains an elevated metro line which is shown in FIG.8 (below-left

side). According to analysis, this road width is not sufficient as infrastructure in that Arterial Road, because it is a very Important Lane for All types of Vehicle.

Whereas LOS of this Area is Around 'D' which is quite more congested.

On this Road, only One fire station comes near Bhoothnath which leads to the Indiranagar area which is shown in FIG.8 (below right side). Out of 8 fire stations all over LMC (Lucknow Municipal Corporation).

The width of the road according to master plan 2031 is 76M wide but it is not, cause of encroachment of Area by complex and residence.

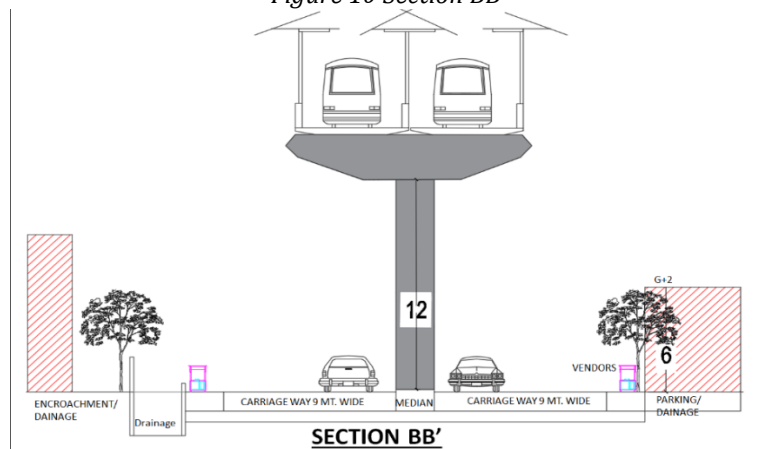
Parking on this road only has in Metro station and Low parking area makes the biggest problem for traffic jam.

Mostly Vendors are situated in Non-vending Zone even there is No vending sign is present as shown in FIG.10

Figure 9 No vending Zone near Lekhraj Market



Figure 10 Section BB'



In Section BB' Road with is nearly 40M wide but encroached with many vendors on pavement in both side of the road. With create a Market foot fall highly & makes difficulties for vehicle, create Traffic jam.

L.O.S. (Level of service) is 'E' of this road according to primary survey took in peak hr. (including morning and evening basis) as show in FIG.11.

Different sub stretch road have different LOS. As shown in table.4, which is Survey shows L.O.S. of arterial road.

Figure 11 Unauthorized shop on pathways and even on roads.

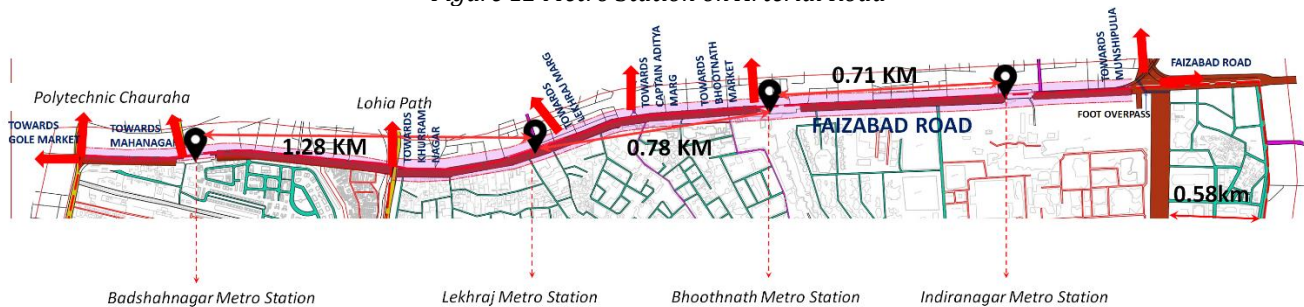


Table 4 Survey shows L.O.S. of arterial road

Survey Area	Volume Traffic (Average In Hr.)	V/C Ratio	Los	Arterial Road Class
Nishantganj To Falmandi	615.5	1	E	--
Nishantganj To Badshahnagar	2250	1	E	2
Badshahnagar To Lekhraj Strech	5071	0.93	D	2
Lekhraj To Bhoothnath	4354	0.81	D	2

Metro Station on That Road

Figure 12 Metro Station on Arterial Road



Metro stations of selective stretch contain 4 stations at a respective distance as shown in FIG.12.

This Route Contain 22 North-South Station out of which:

- I. 4 STATION IS IN WARD 61 & 23
- II. ELEVATED METRO LINE IN WARD 61 & 23
- III. SINGLE ROUTE
- IV. PREPARED BY DELHI METRO RAIL CORPORATION LTD.

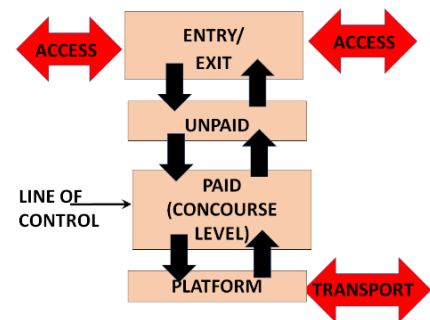


Figure 13 Typical Station Component

Metro station has a Typical station component and it has the same method as shown in FIG.13. The reason to propose Metro Station is to strengthen the public transport system in the city. According To Lucknow Metro DPR (October 2013) - Daily Station Loading (6:00 Am to 10:00 Pm (Include From Both Side) is shown in table.5 given below.

Table 5 DAILY STATION LOADING by DPR

METRO STATION	2015	2020	PERCENTAGE INCREASED
INDIRANAGAR	15930	21310	74.75
BHOOTHNATH MARKET	10410	16470	63.20
LEKHRAJ MARKET	21220	32100	66.10
BADSHAHNAGAR	13480	26270	51.31
TOTAL	61040	96150	63.48

REFERENCE 1 Lucknow Metro DPR (October 2013)

But when we Started Primary Survey in December 2020 as shown below, we got that the value is very low compared to the given DPR maybe because of the first pandemic that occurred and also the causes of unawareness of metro facilities provided by the government.

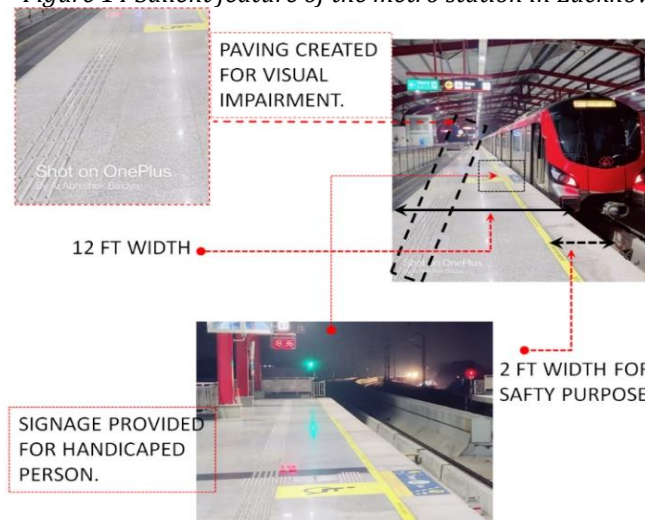
Daily Station Loading (6:00 AM TO 10:00 PM ON 8/12/2020 AND 9/12/2020) Table.6 is:

Table 6 Daily Station Loading by Primary Survey

Metro Station	2020	Difference Between (Dpr & Own Survey)	Time Taken in Min
Indiranagar	5376	15934 ↓	↓ 1.5
Bhoothnath Market	5568	10902 ↓	↓ 1.5
Lekhraj Market	5184	26916 ↓	↓ 2.5
Badshahnagar	6336	19934 ↓	
<b>Total</b>	<b>22,464</b>	<b>73686 ↓</b>	

In the station they made infrastructure applying all 7 Principles which is good for all public. They created a path for physically disabled persons to understand, they provided a lift to enter in Concourse level without any difficulties, similarly, they also provided a special path element which helps blind people & these all features are tried to show in FIG.14.

Figure 14 Salient feature of the metro station in Lucknow





### Public Transport On That Road

Bus service: Lucknow Mahanagar Parivahan Sewa is an urban bus service of Uttar Pradesh State Road Transport Corporation which operates in the city of Lucknow. All the buses run on compressed natural gas (CNG).

Operated city buses which pass through analyzed arterial road having many Busses which have their definite routes and bus no. are:

Route no. – 11 A.C.: B.B.D. to S.G.P.G.I.

Route no. – 12: B.B.D. to Scooter India.

Route no. – 23: Gudamba to Rajni Khand

Route no. – 23A: Gudamba to Manyavar Kanshi Ram Awasiya Yojna

Route no. – 24: Engineering College to Scooter India

Route no. – 24A: Alambagh to Picnic spot

Route no. – 31: Alambagh to I.I.M.

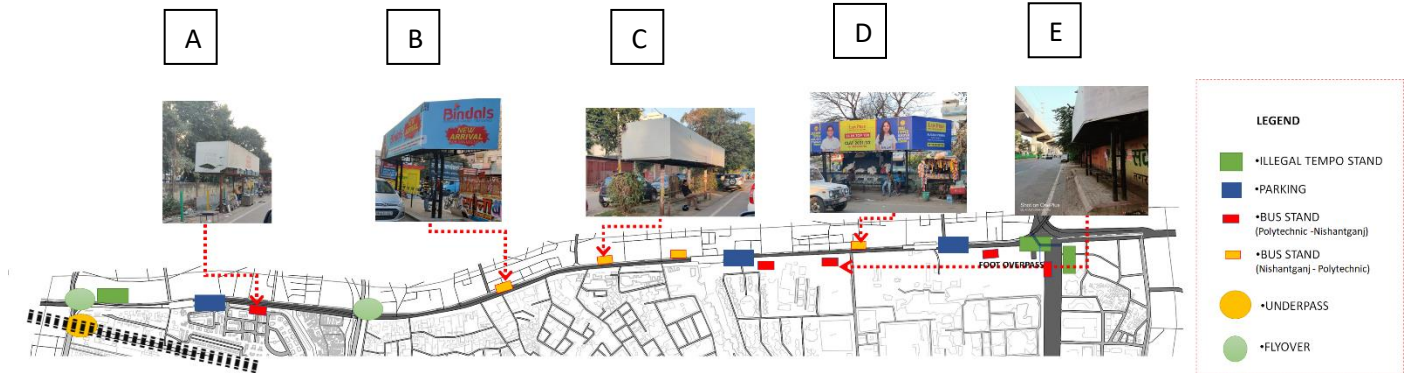
Route no. – 33 & 33 A.C.: Engineering College to Scooter India

Route no. – 45: Viraj Khand to Pasi Qila

Route no. – 66: Gol Market to Kakori Mod Tiraha

Route no. – 68: Gol Market to Rajajipuram

Figure 15 shows existing bus stands, parking, and illegal tempo stands



Above FIG.15. showing existing bus stands, parking & illegal tempo stands in which,

Point 'A' is a bus stop which is now vacant and unauthorized vendors are selling on the stand, earlier stand was used to pick persons for traveling in a bus which comes from polytechnic and goes towards Badshahnagar.

Point 'B' is a bus stop which is still in use but is not so much active & it helps to the person who wants to go towards Bhoothnath market or so on.

Point 'C' is a bus stop which is also working but not so much active & stand is situated for the bus goes from Badshah Nagar to Lekhraj chauraha.

Point 'D' is a bus stop which is very less active in this stretch and stand is situated for the bus goes from Bhoothnath to polytechnic chauraha.

Point 'E' is a bus stop which is vacant now and is not in use, as it is situated in between Indiranagar metro station and polytechnic chauraha.

It has many bus stops, but most of them are not in public use, as most of them are vacant or any vendors are present. So, we need to improve basic needs like a proper bus stop to play a role, so, that public can take advantage and use public transport like bus & will help to improve Traffic flow of road and better Level of Service of transportation.

According to a survey we got the result is we have maximum road density is in Faizabad rd. (arterial rd.) and have less rd. width.

A trip made by a person shows that Faizabad rd. contain all type of trip which is:

- Internal To External
- Internal To Internal.
- External To Internal
- External To External.

And that makes an important road of the city, which connects other areas (outside of the city).

**Conclusion**

The reasons for Traffic congestion are mentioned below:

- Absence of traffic lights and signals at some junctions. The junctions which have traffic signals, the people barely obey the traffic lights, i.e. no proper administration to manage the offenders breaking the traffic rules. Which is the main cause of traffic congestion and improper traffic management by the traffic police.
- Driving habits cause more congestion than other issues, e.g., some drivers illegally enter their vehicles into an intersection, and some drivers drive on the wrong side of the road. Vehicles crawl along looking for passengers and even stop on the running road to drop or pick up the passenger which also gives rise to congestion.
- Lack of parking place at the intersection. No proper bus/taxi stops are constructed in the area and there's lots of on-street parking of public transport which are using up the lanes and that causes traffic congestion.
- Illegal and unauthorized shops on pathways and even on the roads.
- Footpaths are not properly built or lack proper facilities for people on the footpath. Some areas don't have a separate footpath which led people to walk on the road and make more congestion.
- Fail to mark traffic lanes and zebra crossing. Some marking of traffic lanes and zebra crossing has faded away in some zones.
- Traffic diversions at Badshah Nagar crossing.
- Due to the fruit market below the Nishat Ganj flyover, ROW has considerably reduced which results in more time for clearance of traffic at the Nishat Ganj crossing.

**Recommended improvement from traffic congestion**

**Improvement of existing road**

Commercial areas have congested roads, partly because of encroachment and hawkers. Thus, considering this aspect has identified roads for widening by removing encroachments from footpaths and carriageways. Road improvement is key to alleviating traffic congestion.

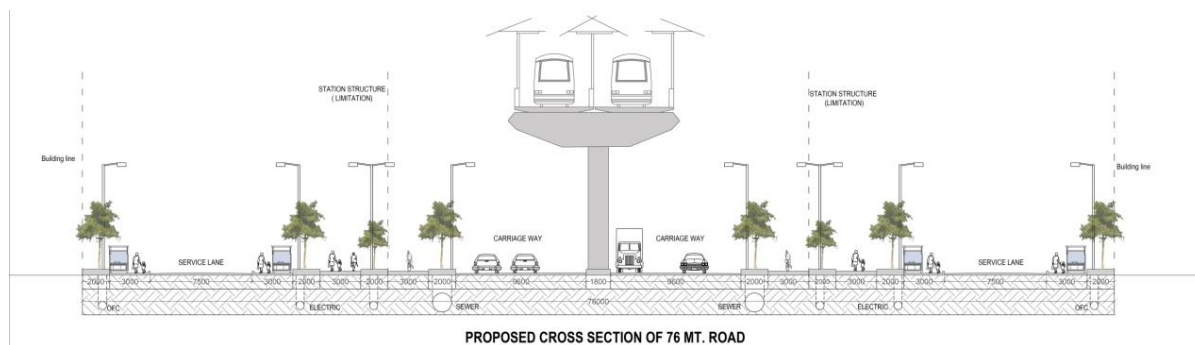
According to the Master plan, 2031 Road width is Shown in the table. 7

*Table 7 Proposed ROW in Lucknow master plan 2031*

S.No.	Roads	ROW
1.	Polytechnic to kukrail overbridge	76 M
2.	Kukrail overbridge to Nishatganj chauraha	45 M

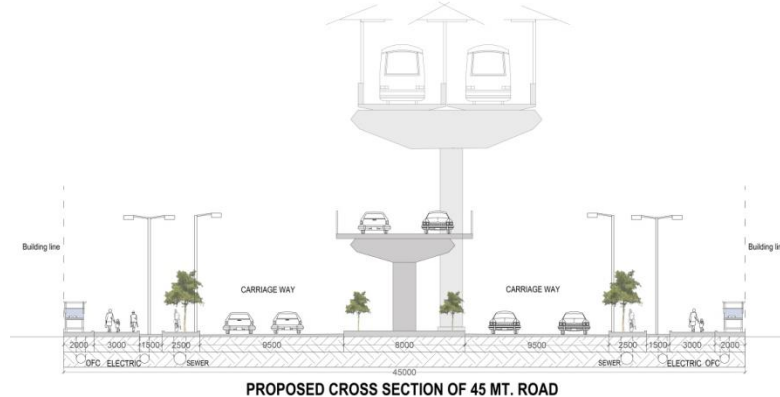
AS in FIG.16 given below is proposing 76M wide road in which we segregated Vendor's zone, service lane, and main roadways, creation of beautiful green environment mix with the pedestrian area, in this FIG.16 we also shown bicycle track as it plays NMT (Non-Motor Vehicle) too.

*Figure 16 76-Meter-Wide Proposed Road Section*



As in FIG.17 shown below is proposing 45M wide road in which again we tried to provide service lane including pedestrian

Figure 17 45-Meter-Wide Proposed Road Section



- unauthorized parking on the side of the road should be strictly prohibited.
- Shops at pathways and on the road should be Legally established properly.

#### Non – Motorized transport strategy

The objective is to provide continuous, encroachment-free pedestrian and NMT facilities across the city. The proposed measures to develop facilities for pedestrians and bicyclists on the streets include:

Provide pedestrian paths/footpaths. Establish connected walking networks.

Prevent vendors, pavement dwellers, vehicle parking, and other uses from blocking walkways. Dedicated cycle track. Use street furniture (e.g., benches) and pedestrian-friendly design features. Integrate cycling with transit. Providing bicycle parking/rickshaw stands.

- Proper pathways should be created.

#### Shared bus – auto/tempo lane

The shared lane is not a high-comfort facility, nor is it appropriate at very high bus volumes. However, buses and other IPTs will often compete for the same space near the curb.

Shared lanes can accommodate both modes at low speeds and moderate bus headways, where buses are discouraged from passing, and autos/tempo pass buses only at stops. Inappropriate conditions, bus-auto/tempo lanes are an option on streets where dedicated bus and separate high-comfort facilities cannot be provided.

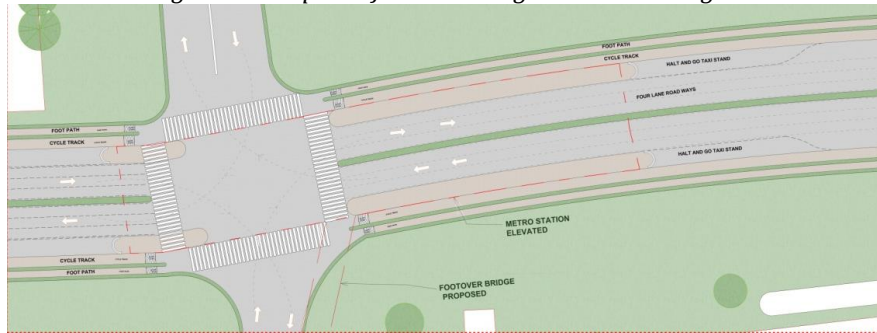
#### Construction of footpaths and Zebra Crossings

- Marking of traffic road lines and zebra crossing lines should be visible and should be preferably light reflective so that they will be visible during the night also or install “smart” pedestrian crosswalks which light up when people cross the road at night or in foggy and rainy conditions.
- Traffic lights and signals should be installed.

#### Junction improvement

- As traffic increases on Faizabad road, to improve safety and to provide orderly movement of vehicles, improvements to junctions such as installation of traffic signals, geometric improvements, etc. are necessary.
- The observed issues on the junctions mainly include congestion, interlocking (of traffic) at junctions, and on-street parking. It has been concluded through observations that these issues are a result of the undefined available right of way for usage by different modes and vehicular movement, pedestrian movement, etc.

Figure 18 Proposed Junction design at Badshahnagar



Above FIG. 18 shows the proposed Junction design at Badshahnagar which has a Zebra crossing and shows the connectivity with footpath, bus stop, metro station & railway station.

Problems and suggestions on the junction of Badshahnagar are shown in the table.8 given below.

Table 8 Problems and suggestions on Badshahnagar junction

Problems at Junction	Suggestion
<ul style="list-style-type: none"> <li>• Encroachment</li> <li>• Lack of pedestrian facilities</li> <li>• Boarding and alighting takes place at the junction</li> <li>• Heterogeneous traffic</li> <li>• Parking of vehicles</li> <li>• No designed stop for IPT</li> </ul>	<ul style="list-style-type: none"> <li>• Provision of footpath</li> <li>• Removal of temporary encroachment</li> <li>• Pedestrian crossing</li> <li>• Road markings</li> <li>• Proper signals and signages</li> </ul>

This will help to improve L.O.S. of roadways and become less traffic volume density of road.

Reference

1. City mobility plan of Lucknow 2012.
2. URDPFI Guideline 2014
3. DPR of Lucknow Metro Rail, 2013
4. Smart city Lucknow.