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Temporal Change in Traffic Congestion Pattern of the Intersection at Lucknow Smart City Using Geospatial Technology

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Abstract: ***Traffic congestion is the most common problem in an urban area. The presence of various facilities or intersections of major as well as minor roads can cause hindrance in the path. Congestion on the intersection, near the markets, government offices, etc. can cause problems in the free flow of traffic at an intersection. Road connectivity is also affected due to the presence of congestion on the routes. Traffic congestion varies as time passes, due to an increase in illegal parking, unauthorized vending sites, unauthorized stoppage points for transit vehicles, accidents, etc. therefore there is a change in the traffic pattern at the intersection which affects the public.***
Keywords: Traffic Congestion, Intersection, Peak hours, Connectivity, Traffic congestion pattern, Level of Service.

I. INTRODUCTION

The efficiency of an urban area is due to the efficiency of the roads as well as the public facilities around it. Intersections are the points where more than two roads meet. Junctions/intersections are the connecting points of the city. As these are the connecting points of the city there is the requirement of proper traffic management. Traffic congestion is caused due to a lack of proper management at the junction. Causes of congestion can be haphazard parking of vehicles, faulty intersections, absence of strict enforcement of traffic rules, unplanned movement of vehicles, etc.

Some of the disadvantages of congestion are

1) Emission of harmful gases from the vehicles.
2) Waste of time and fuel of the public
3) Probability of accidents is increased etc.

Throughout the day traffic pattern changes which depend on various factors like office hours at the institutions on working days of the week, illegal vending sites, unauthorized on-street parking areas, type of roads connecting at the junction, type of vehicles on the road, etc.

II. OBJECTIVE

The main objective of the study is to find –

1) Identification of peak hours of the day.
2) Change in traffic congestion pattern and its cause
3) Identification of the location of congestion.

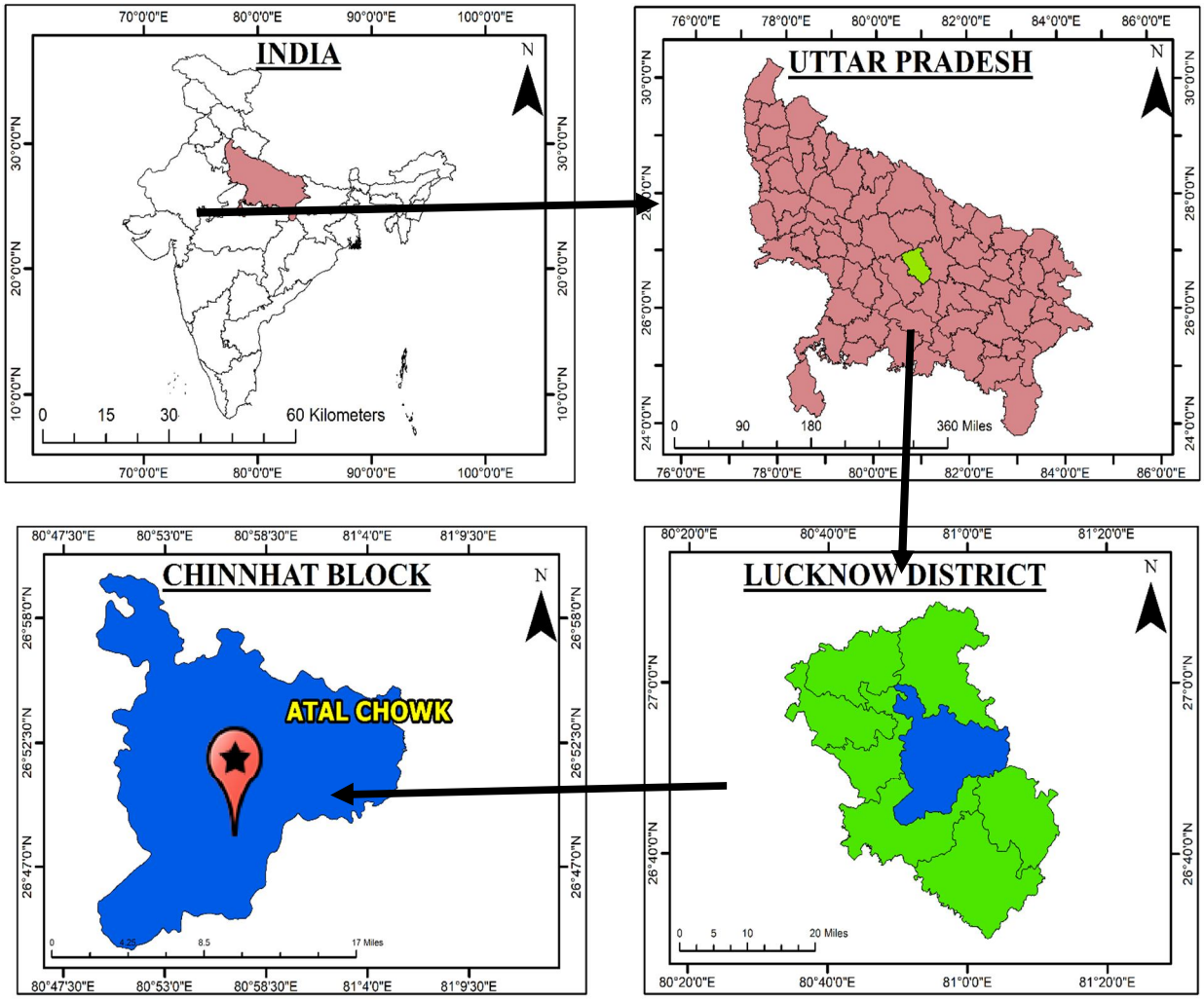
III. STUDY AREA

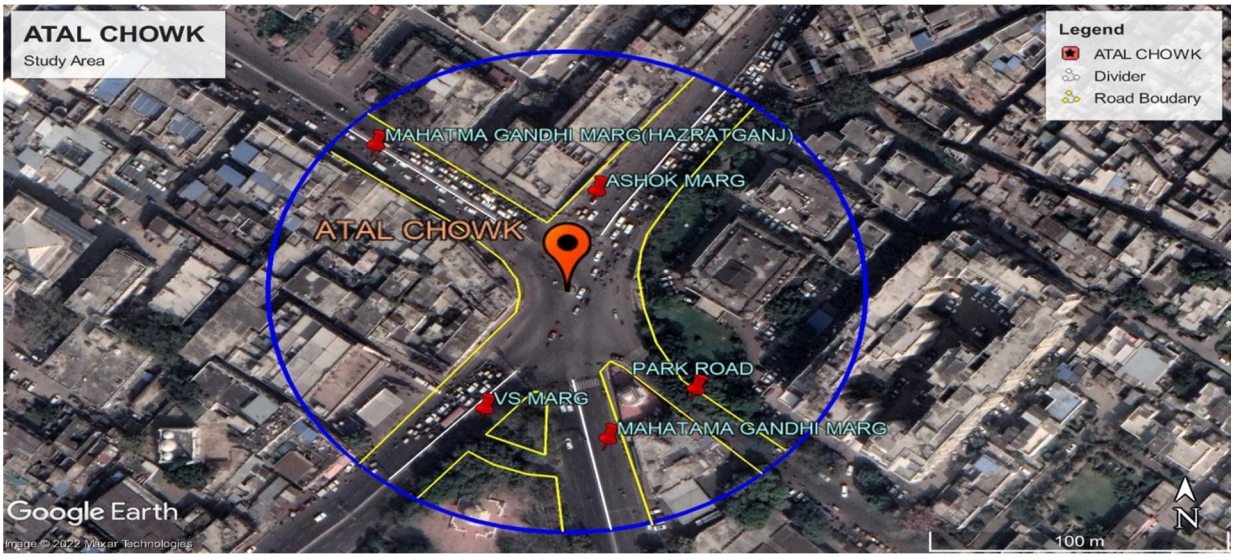
The study area is the intersection of Chinhat Block, Lucknow, Uttar Pradesh, India i.e. Atal Chowk (26°50'48.03"N, 80°56'46.21"E). Atal Chowk lies at the center of Lucknow city and is surrounded by markets, government offices, residential areas, etc., of the city. It is a 5-legged intersection merging the roads listed below.

1) VS Marg
2) Mahatma Gandhi Mar
3) Park Roa
4) Ashok Marg
5) Mahatma Gandhi Road (towards Hazratganj Market)

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IV. DATA AND SOFTWARE USED

ArcGIS, Google Earth Pro, Google Maps.

V. FLOW OF STUDY

DATA COLLECTION

1.FINDING THE PEAK HOURS OF EACH DAY OF THE WEEK.

1.ANALYSIS OF TRAFFIC CONGESTION PATTERN ON THE BASIS OF LEVEL OF SERVICE OF THE INTERSECTION.

1.CAUSE OF CONGESTION.

VI. METHODOLOGY

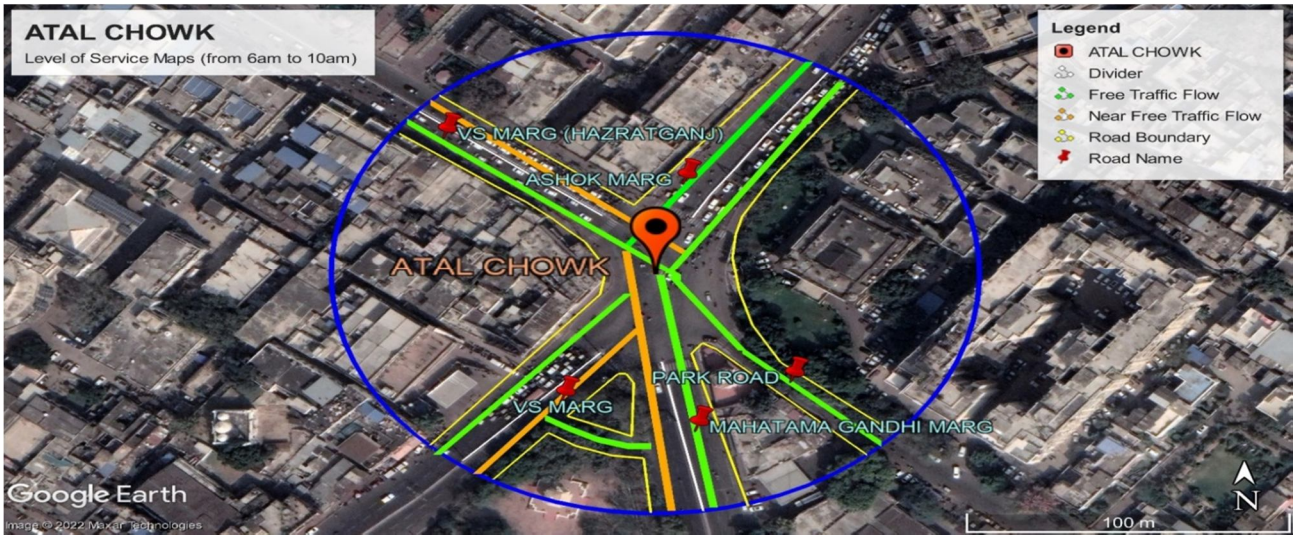
A. Data Collection.

1) Google maps are used for the analysis.
2) Screenshot of each hour is taken for the analysis.
3) Level of service map is prepared for each day (i.e. Monday to Sunday).

B. Finding the Peak Hours of Each Day of the Week.

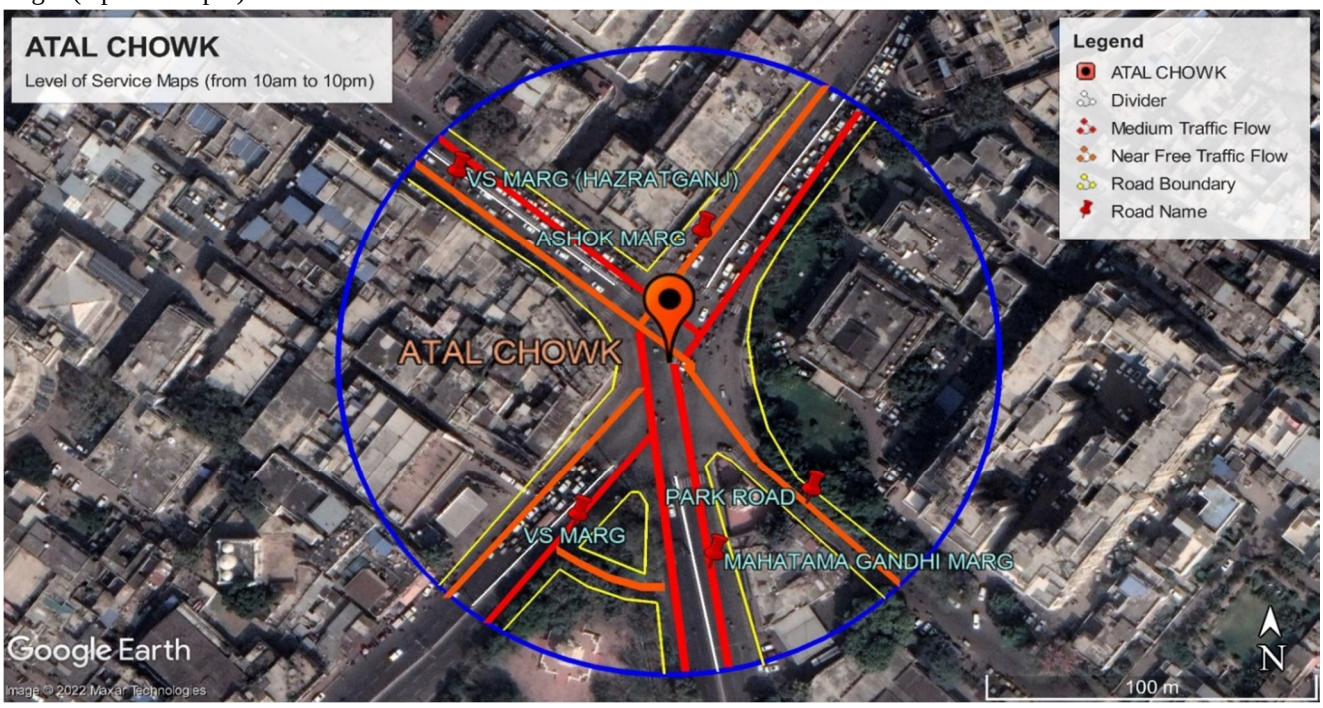
1) Analysis is done for the time duration from 6 am to 10 pm.
2) Different time slots are made as listed below-

a) Morning (6 am to 10 am)



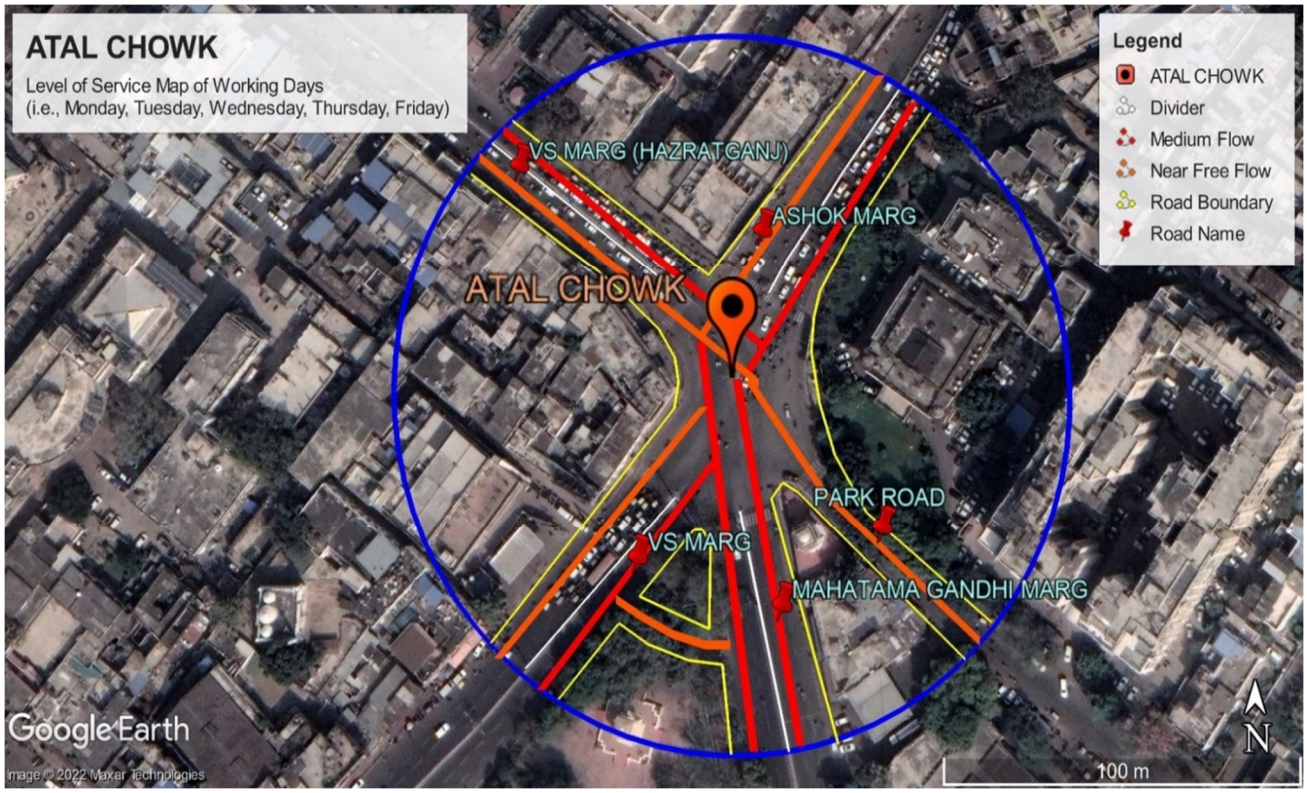
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b) Morning-Afternoon (10 am to 2 pm)
c) Afternoon-Evening (2 pm to 6 pm)
d) Night (6 pm to 10 pm)

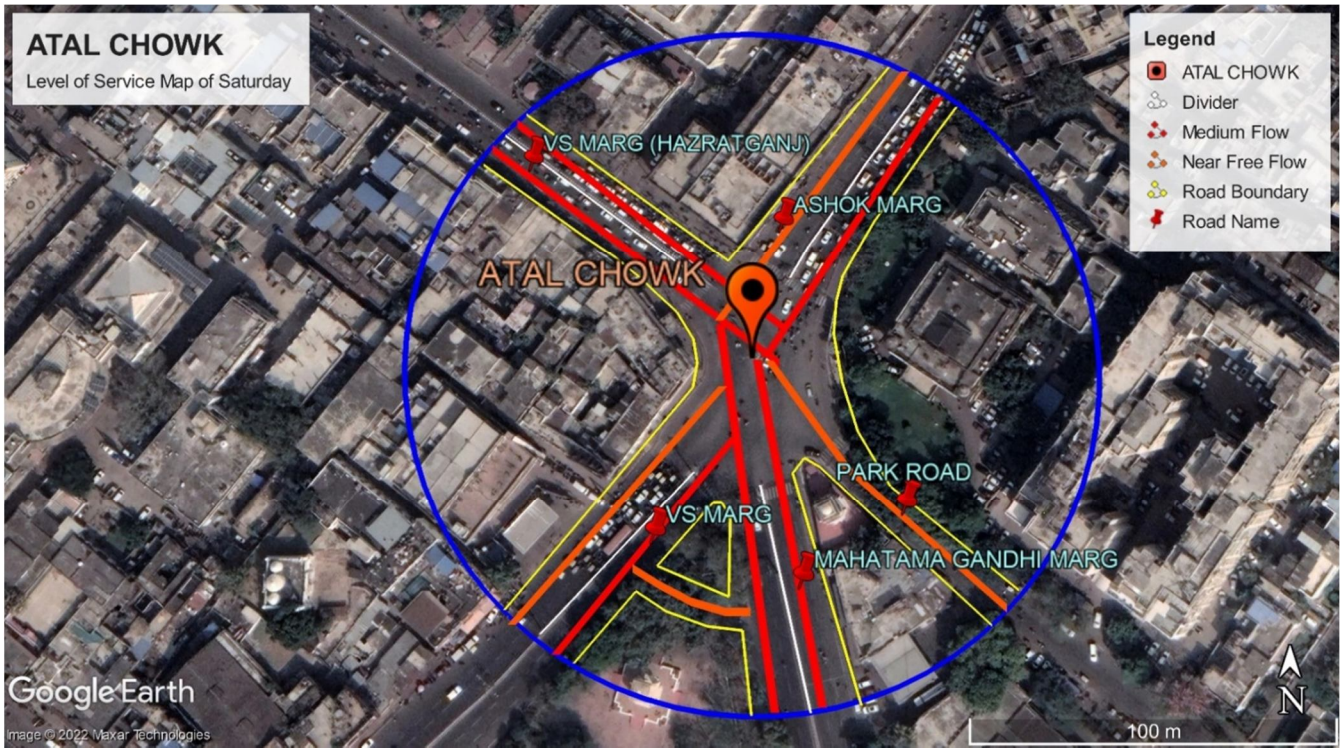


C. Analysis of Traffic Congestion Pattern on the basis of Level of Service of the Intersection.

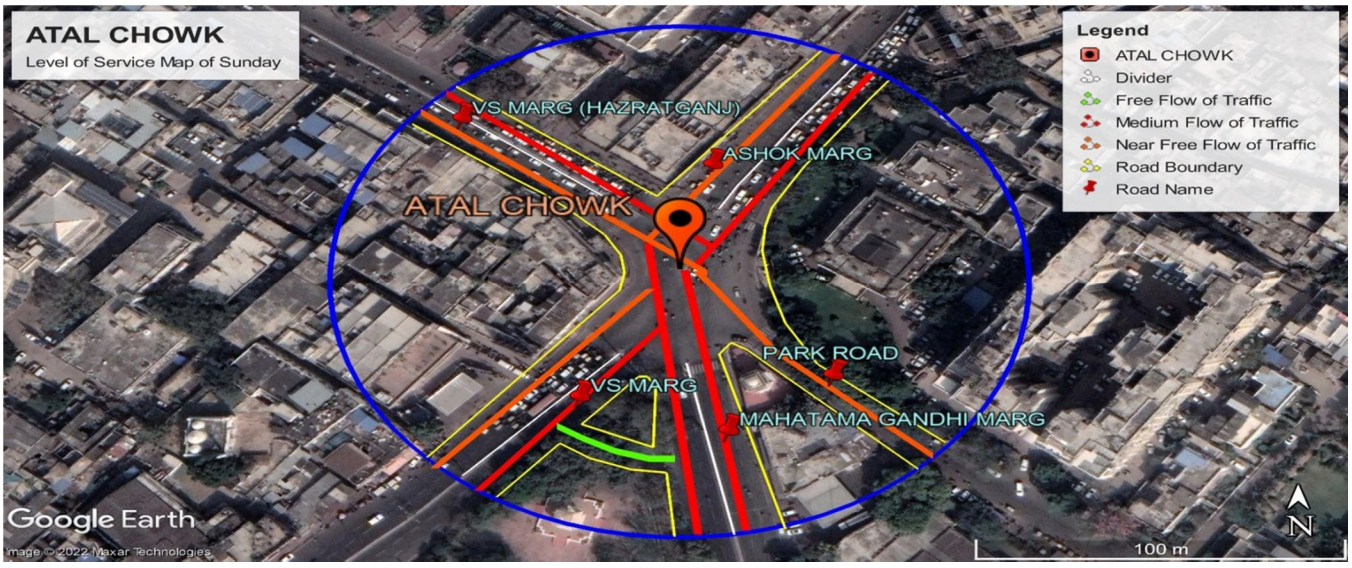
1) It is observed from the LOS Maps (Atal Chowk) that
2) Monday to Friday the traffic is the same every day (working days).



3) On Saturday the traffic is more on every lane due to the weekends.



4) Sunday the diverging traffic from Mahatma Gandhi Marg to VS Marg is minimum throughout the day.



D. Cause of congestion.

1) Main cause of congestion at Atal chowk is

2) Central part of the city.

3) Due to the presence of nearby government places and administrative places of the whole state (i.e., Vidhan Sabha, Sachivalaya).

4) Presence of the marketplace (Hazratganj) nearby.

VII. RESULTS AND CONCLUSION

A. There is traffic congestion at the intersection throughout the day, due to commercial areas and Government offices nearby.

B. A congested flow of traffic is present at the intersection in peak hours.

C. The table below shows the variation in traffic flow pattern-

LOS	Quality
A	Free Flow of Traffic
B	Near to free flow of traffic
C	Congested flow of traffic

TIME	ROAD	LANE	MON	TUE	WED	THUR	FRI	SAT	SUN
6 to 10	VS Marg (Hazratganj)	towards	A	A	B	B	B	B	A
		away	A	A	A	A	A	A	A
	Ashok Marg	towards	A	A	A	B	B	A	B
		away	A	A	A	A	A	A	A
	Park Road	away	A	A	A	A	A	A	A
	Mahatama Gandhi Marg	towards	A	A	B	B	B	B	B
		away	A	A	B	A	B	B	A
		Left turn	A	A	A	A	B	A	A
	VS Marg	towards	A	A	A	A	A	A	A
		away	A	A	B	B	B	B	B
10 to 14	VS Marg (Hazratganj)	towards	C	C	C	C	C	C	C
		away	B	B	B	B	B	B	B
	Ashok Marg	towards	C	C	C	C	C	C	C
		away	B	B	B	B	B	C	B
	Park Road	away	B	B	B	B	B	B	B
	Mahatama Gandhi Marg	towards	C	C	C	C	C	C	C
		away	C	C	C	C	C	C	C
		Left turn	B	B	B	B	B	B	A
	VS Marg	towards	B	B	B	B	B	B	B
		away	C	C	C	C	C	C	C
14 TO 18	VS Marg (Hazratganj)	towards	C	C	C	C	C	C	C
		away	B	C	B	B	B	C	B
	Ashok Marg	towards	C	C	C	C	C	C	C
		away	B	B	B	B	B	B	B
	Park Road	away	B	B	B	B	B	B	B
	Mahatama Gandhi Marg	towards	C	C	C	C	C	C	C
		away	C	C	C	C	C	C	C
		Left turn	B	B	B	B	B	B	A
	VS Marg	towards	B	B	B	B	B	B	B
		away	C	C	C	C	C	C	C
18 TO 20	VS Marg (Hazratganj)	towards	C	C	C	C	C	C	C
		away	B	B	B	C	B	C	C
	Ashok Marg	towards	C	C	C	C	C	C	C
		away	B	B	B	B	B	B	B
	Park Road	away	B	B	B	B	B	B	B
	Mahatama Gandhi Marg	towards	C	C	C	C	C	C	C
		away	C	C	C	C	C	C	C
		Left turn	A	A	B	B	B	B	A
	VS Marg	towards	B	B	B	B	B	B	B
		away	C	C	C	C	C	C	C

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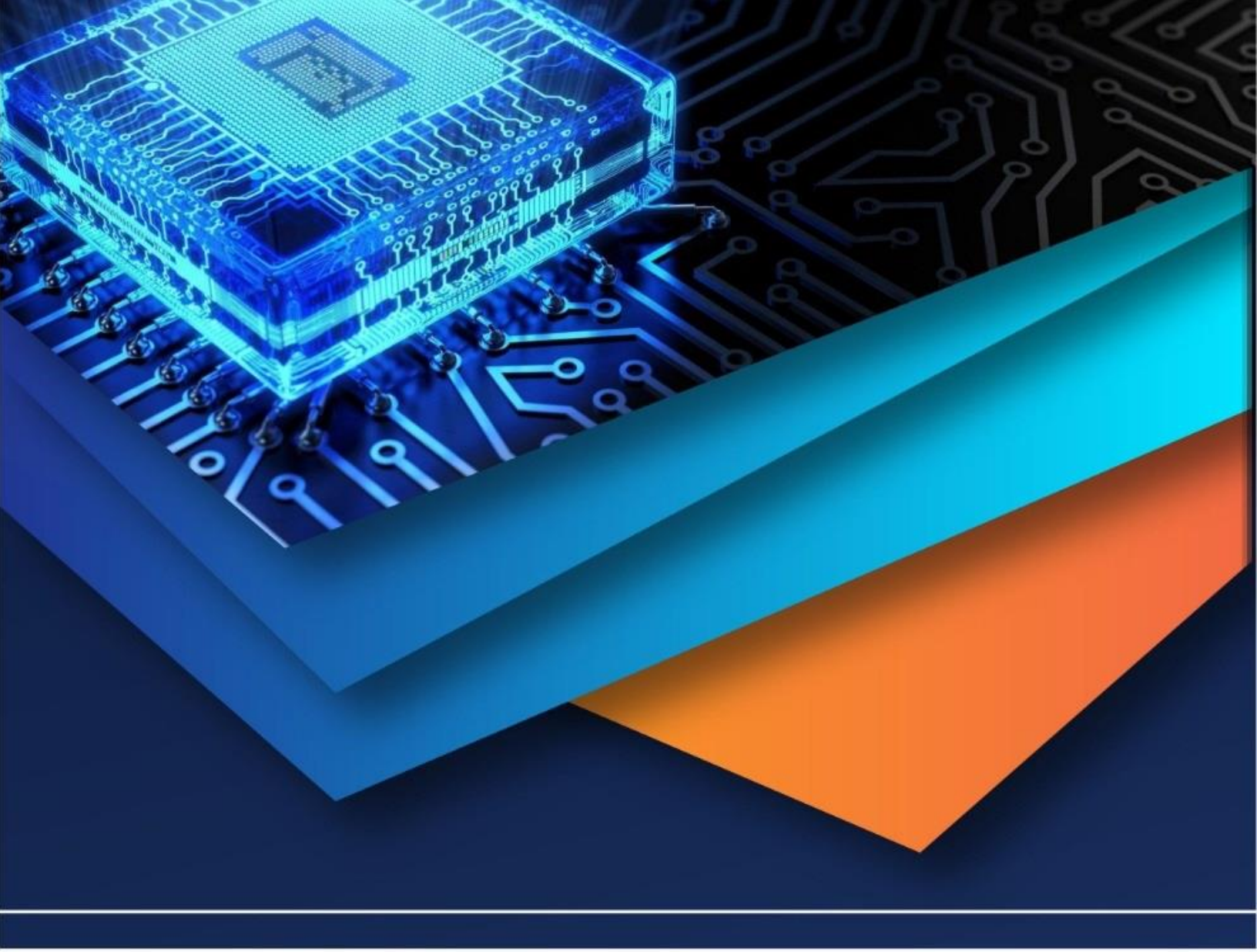
It is clear that peak hours of the week are-

Time Duration	Day	Road
10 am to 2 pm	Saturday	Ashok Marg
2 pm to 6 pm	Tuesday and Friday	VS Marg
6 pm to 8 pm	Thursday and Saturday	VS Marg (Hazratganj)

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