Abatement of Traffic Congestion on Multilane Highway

Kritika Rajput[1] Prof. Buddhartna Godboley[2]
[1]Student [2]Assistant Professor
[1,2]Department of Civil Engineering
[1,2]GHRCE, Nagpur

Abstract— Congestion is one of the supreme problem in maneuvering of traffic on highway This paper presents an analysis of traffic congestion issues in NAGPUR CITY and studied for finding out the reasons and solution of problems. The increase in different types of vehicles on the roads has caused a major reason the accidents. The traffic in developing nations like India is highly different types of vehicles, different sizes, different shapes, different speeds and different operating vehicles sharing the same roads. A research is found out, based on the measurement such as road accidents, traffic volume, traffic speed and density. This paper analysis of traffic congestion on urban road for the selected patch and congestion analysis through the HCS-2000 (Highway capacity software). This paper focus has only been on traffic congestion measure and reduces congestion and To avoid accidents and to save human life and To develop proper solutions for congestion.

Key words: Traffic Congestion, Multilane Highways, Congestion Measurement, Level of Service, Video Logy Method

I. INTRODUCTION

Traffic congestion has been one of the major public problems. This paper analysis an presents into traffic congestion on multilane highways. It is linked to the difference between the actual system performance and how the system actually performs. It reflects conditions of slower driving speeds, longer travel timing and highly traffic volumes and reflects negative impacts on the quality of life. Due to congestion, there is possibility of accidents because of lower traffic management. It is one of the situation on road networks and characterized by slow driving speeds, longer travel timings, highly traffic volumes. So it is prime challenge for all urban areas. When traffic is great enough such that the connect between traffic slow the speeds of the stream, this is traffic congestion.

Fig. 1: Traffic Screenshot

Congestion takes on some different points and congestion is caused by some faces:

- Congestion
- Impact of congestion
- Causes of congestion
- Major reasons of congestion
- Major Sources of congestion
- Negative impacts of congestion

A. Traffic Congestion:

One of the serious ill- effects of traffic is the loss of road space and In all conditions where capacity cannot be provided for the peak situations, traffic delay and waiting are inevitable. In traffic especially, the peaking impact is very pronounced, giving to congestion.

For given road, the greater the traffic density, traffic volume, the larger the chances of one vehicle delaying the other vehicle and hence larger is the congestion.

B. Impact of Congestion:

Traffic Congestion impacts are slower traffic speeds, long travel timing, queuing and generate many impacts on urban causes.

C. Causes of Congestion:

Congestion involves low road space, traffic rules violation, and increased population, improper management of roads, in -adequate traffic.

D. Major Reasons of Congestion:

- Over population on road
- Unplanned roads
- Poor roadway system
- Insufficient parking management
- Unplanned road blockage

E. Major Sources of Congestion:

Sources - Percentage of sources

- Bottleneck conditions – 40%
- Traffic incident – 25%
- Work zone - 10%
- Bad weathers – 15%
- Poor signal timings – 5%
- Special event – 5%

F. Negative Impacts of Congestion:

Negative impact includes wasting time, delay, pollution, human's health and emergencies etc.

II. OBJECTIVES

- To analysis of traffic congestion on highway.
- To count volume, speeds and density for selected patch.
- To reduce the traffic congestion on highway.
- To optimize the travel time and reduce the delay in urban patch.

III. METHODOLOGY

- To select the study area.

– Data collection:
  1) Accident data
  2) Traffic data
– Analysis in software.
– To reduce congestion (Use HCS software)

IV. STUDY AREA

Two lane highways (MSH-255) were selected for analysis of congestion after that select the study area and collect the accident data. Traffic surveys are conducted to collect the traffic data of vehicular speed, volume and density on the selected patch. Videography surveys are carried out for information recording road characteristics, lane width, travel time, speed and volume. On the basis of surveys the detailed survey are planned. The survey is conducted on working days during morning and evening peak periods traffic condition and traffic flow behaviors.
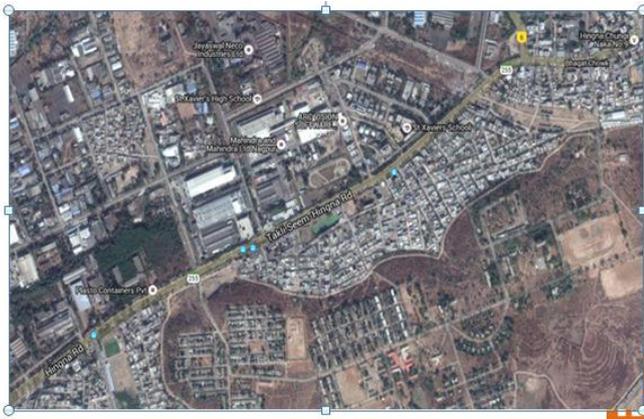

Fig. 2: Map

A. Data Collection

– Accident data
– Traffic data

1) Accident data:

Accident data were collected for choose of spots and perform the video logy techniques in this area.
In fig; where
TW- Two wheeler
P- Pedestrian
C- Cycle
M- Motor cycle
T- Tractor
Auto
S- Sooty
HH- Hero- Honda
3W- Three Wheeler
4W- Four wheeler

Fig. 3: Accident study (In 6 years 2010-2016)

2) Traffic Data
Traffic Data (Spots)
– CRPF Gate
– Mahindra company
– Balaji Nagar
– Wadi T Point

a) At CRPF Gate (in morning peak):

Sr. No.	Vehicle type	Volume (veh/hr)	Volume (pcu/hr)	Speed (km/hr)	Density
1.	Two wheeler	1509	754.5	36	41.91
2.	Bus	37	166.5	27	1.37
3.	Truck	17	76.5	36	0.47
4.	LCV	212	593.6	36	5.88
5.	HCV	3	18	21.6	0.13
6.	Car	220	220	36	6.11

Table 1: At CRPF Gate (in morning peak)

b) At Mahindra Company (in evening peak):

Sr.No.	Vehicle type	Volume(veh/hr)	Volume(pcu/hr)	Speed(km/hr)	Density
1.	Two wheeler	1590	795	27	58.88
2.	Bus	23	103.5	21.6	1.06
3.	Truck	17	76.5	18	0.94
4.	LCV	102	285.6	21.6	4.72
5.	HCV	4	24	13.5	0.29
6.	Car	274	274	27	10.14

Table 2: At Mahindra Company (in evening peak)

c) At Balaji Nagar (in morning peak):

Sr.No.	Vehicle type	Volume(veh/hr)	Volume(pcu/hr)	Speed(km/hr)	Density
1	Two wheeler	3156	1578	27	116.8
2	Bus	40	180	27	1.48
3	Truck	29	130.5	18	1.6
4	LCV	232	649.6	21.6	10.7
5	HCV	1	6	13.5	0.07
6	Car	258	258	27	9.55

Table 3: At Balaji Nagar (in morning peak)

d) At Wadi T Point (in evening peak):

Sr.No.	Vehicle type	Volume(veh/hr)	Volume(pcu/hr)	Speed(km/hr)	Density
1.	Two wheeler	2506	1253	36	69.61
2.	Bus	25	112.5	36	0.69
3.	Truck	8	36	27	0.29
4.	LCV	134	375.2	27	4.96
5.	HCV	2	12	21.6	0.09
6.	Car	148	148	36	4.11

Table 4: At Wadi T Point (in evening peak)

3) Speed - Flow Relationship
Speed- flow relation shows the relationship between speed and total volume of traffic.

a) Speed flow relationship at CRPF gate:

CRPF GATE		
	Volume(veh/hr)	Speed(veh/hr)
morning 1st day	2277	28.29
evening 1st day	3689	30.51
morning 2nd day	2323	28.26
evening 2nd day	2444	27.97

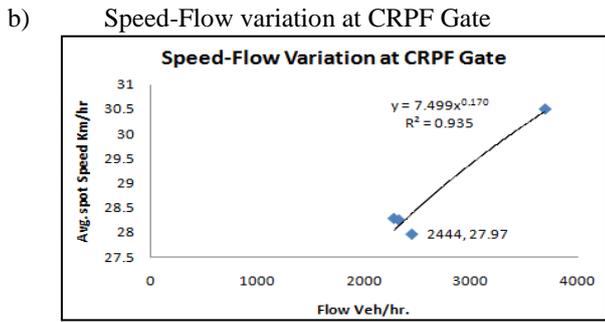Table 5: Speed flow relationship at CRPF gate

b)   Speed-Flow variation at CRPF Gate

Fig. 4: Speed-Flow variation at CRPF Gate

c)   Speed flow relationship at Mahindra Company:

	Volume(veh/hr)	Speed(veh/hr)
morning 1st day	3202	24.9
evening 1st day	2267	18
morning 2nd day	2443	19.92
evening 2nd day	2487	18.65

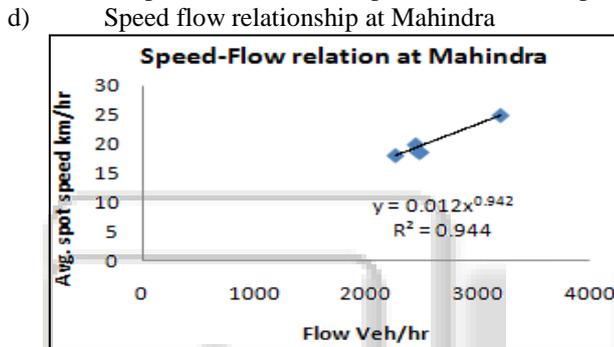Table 7: Speed flow relationship at Mahindra Company

d)   Speed flow relationship at Mahindra

Fig. 5: Speed flow relationship at Mahindra

e)   Speed flow relationship at Balaji Nagar:

	Volume(veh/hr)	Speed(veh/hr)
morning 1st day	4044	21.89
evening 1st day	2734	18.43
morning 2nd day	3553	20.44
evening 2nd day	2743	19.14

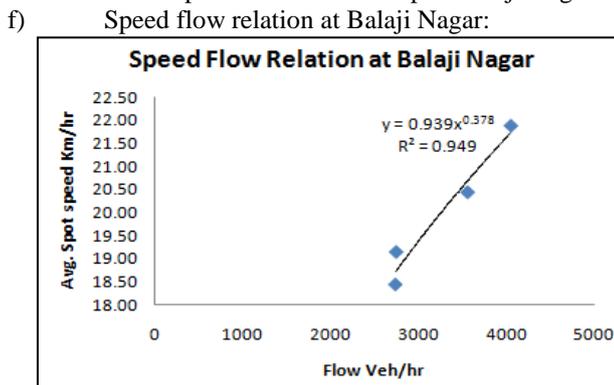Table 8: Speed flow relationship at Balaji Nagar

f)   Speed flow relation at Balaji Nagar:

Fig. 6: Speed flow relation at Balaji Nagar

g)   Speed flow relationship at Wadi T Point:

	Volume(veh/hr)	Speed(veh/hr)
morning 1st day	1932	22.55
evening 1st day	2902	23.18
morning 2nd day	1723	21.94
evening 2nd day	3034	23.75

Table 9: Speed flow relationship at Wadi T Point

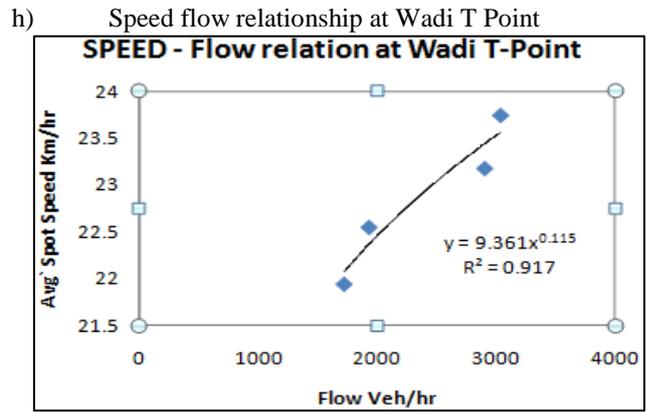h)   Speed flow relationship at Wadi T Point

Fig. 7: Speed flow relationship at Wadi T Point

B. Analysis of Congestion in Software:

Two lane highways (MSH-255) were selected for analysis of level of service. Level of service of each highway section is assessed by using Highway capacity software-2000.

1) *Analysis:*

Fig. 8: Analysis

2) *Analysis of Flow Rate:*

Fig. 9: Analysis of flow rate

V. RESULTS

Fig. 10: Results

A. Method for Reducing Congestion:

It includes two ways of analysis as,
- Comparative Analysis
- Increase public transportations

1) Comparative Analysis

Spots	Level of service (2 lane)	Level of service (3 lane)
Crpf gate morning	D	C
Crpf evening	F	D
mahindra morning 1st day	D	C
mahindra evening 1st day	E	C
mahindra morning 2nd day	E	D
mahindra evening 2nd day	D	C
Balaji nagar morning 1st day	F	D
Balaji nagar evening 1st day	E	C
Balaji nagar morning 2nd day	F	
Balaji nagar evening 2nd day	E	C
Wadi T point morning 1st day	C	B
Wadi T point evening 1st day	E	D
Wadi T point morning 2nd day	E	C
Wadi T point evening 2nd day	C	B

Table 10: Comparative Analysis

2) Increase Public Transportations

Spots	Level of service (2 lane)	Level of service (increase public transport)
Crpf gate morning	D	C
Crpf evening	F	E
mahindra morning 1st day	D	C
mahindra evening 1st day	E	D
mahindra morning 2 nd day	E	D
mahindra evening 2nd day	D	C
Balaji nagar morning 1st day	F	F
Balaji nagar evening 1st day	E	D
Balaji nagar morning 2nd day	F	E
Balaji nagar evening 2nd day	E	D
Wadi T point morning 1st day	C	C
Wadi T point evening 1st day	E	D
Wadi T point morning 2nd day	E	D
Wadi T point evening 2nd day	C	B

Table 11: Increase Public Transportations

VI. CONCLUSIONS

The scope of this paper is limited to the analysis of congestion for morning peak hours and evening peak hours. Since the level of service (use HCS software) is a function of temporal as well as spatial variation as well as traffic speed, it is necessary to analysis the level of service over a period of time in order to mitigate the congestion and provide the long term or short term remedial measures for the congestion.

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