

Analysis of Traffic Congestion of Hingna Region in Nagpur City

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Abstract: Traffic condition which is day by day leading a severe problem of Nagpur city. Now a days the proper signal control policies on the intersections help in developing the progress and in minimize the congestion problems in the Hingna region. Proper design of the Roads and the plan the better PTS for the particular area. As the area covers very much important flow are on the particular patch there are number of colleges and also presence of MIDC where number of companies present. Several factors or parameter were such as peak hour traffic volume, traffic flow, signal timings, Up flow and Down flow traffic on each seven Intersections, emissions from the vehicle etc., use of Instrument NPM-HVS/R High Volume Sampler to determine SPM and RSPM will be considered. Noise level survey at seven intersections from Subhash to YCCE for the period of morning peak hour time and evening peak hour and also evaluated on Leq. Noise level were recognized and helpful are also suggested to reduce the noise level on particular patch. And lastly details about the species of tree to reduce air pollutant percentage. The presently research aim is to evaluate various specific characteristics of PM of size 10μ in diameter i.e., PM₁₀ traffic flows volume and noise study of Hingna Road, Nagpur city by taking investigations and SPM & RSPM value is to known at seven intersections from Subhash Nagar to YCCE on different days for peak hours. Also implementation of Noise level data at seven intersections from Subhash Nagar to YCCE on different days for peak hours Survey during morning peak hour and evening peak hour. Leq value is to be determined with the given equivalent noise level expression. This research first aim to assess the traffic flow at seven intersection and noise pollution of Nagpur city by performing investigations data collection at specific span of distance for getting such an important several factors.

Keywords: Traffic volume, type of vehicles, speed of vehicles, Noise level, etc.

1. INTRODUCTION

Generally Traffic is defined as the movement of a person vehicles or any type of goods or person in between the site locations, and thus includes pedestrians and all types of vehicles mechanized, motorized or non-

motorized. Nagpur is at present third largest city in Maharashtra which faces traffic congestion problems mostly in the different road intersection due to rapid development of the infrastructure and increasing population. While the seven intersection the vehicles are stopping for their turn to clear the particular patch of road, on the signal point the vehicle traveler us to keep their vehicle engine on so that it leads to loss of fuel and they also keep unnecessary Thus it leads to delay in vehicle & noise pollution generally increased at the signal or seven intersections. This used to reduce congestion on the particular intersections the Bus Bay is to be provided for the city buses moving on the particular patch. Today man has his own vehicles to get transport from one place to another place. The Noise pollution, congestions and air pollution and the results in ill effects to the health and frustration have become addicted now a day. In this Analysis respectively increase in demand for survey is to be taken for vehicle count and analysis is done to increase future development of Transport Network in Nagpur city. In this Traffic volume analysis is give an idea to make better planning of roads routes, flyovers and in future Metro. To reduce the environment impacts the species of some plants which absorbs air pollutants is described.

2. Study Parameters

2.1 Time of Survey: As per to the data collection the traffic volume survey is done while the peak hours of morning and evening time. The peak hours which refers time on morning high traffic volume and same for evening (9:00 am to 11:30 am and 5:00 PM to 6:30 PM) were taken into attention for getting of the maximum traffic moving on the seven intersections. The term peak hours defined by the number of city buses or ST, office Bus traveling people, shop owners, school and college going students majorly the maximum flow of traffic. Peak hours are the time at which traffic volume is maximum.

2.2 Up Flow / Down Flow: The Up flow and the Down flow of the seven intersections was

recorded by manual count so that the total number of vehicles count on that road on that particular Peak hours were done respectively at in between seven intersections from Subhash Nagar to YCCE.

2.3 Methodology for Counting:

Manual counts are typically used to collect data for purpose of vehicle identification, on turning, travel on which direction, pedestrian on road or vehicle usage by the particular person. Manually count is to be done on the seven intersections by getting the number of vehicles i.e. HMV, LMV, etc. on different days in peak hour time i.e. from 9 am to 11 am on every day. Further is the collection of data is given as up and down represents adding and getting out at the particular intersection.

3. DATA COLLECTION

3.1 Selection of Site

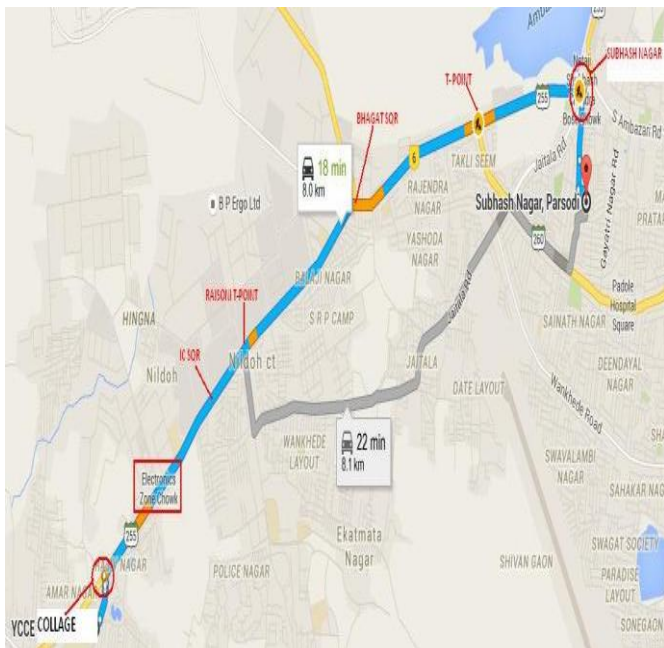


Fig-1: site selection Subhash Nagar sq. To YCCE

Data Collection on Seven Intersections

Table-1: Traffic volume on Seven Intersections from Subhash Nagar sq. To YCCE Nagpur

Location	Side	Time	Moto r cycle	Cars	Buse s/ truck s	cycle s/ Auto s	Wrong Sides
Subhash Nagar sq	Up	9-10 am	230	39	13	38	7
	Down	9-10 am	198	32	11	42	4
Priyadarshani T-point	Up	9-10 am	414	58	25	48	5
	Down	9-10 am	260	53	18	41	3
BhagatSq	Up	9-10 am	402	58	25	48	5
	Down	9-10 am	248	53	18	41	4
Raisoni T-point	Up	9-10 am	206	32	23	42	10
	Down	9-10 am	184	29	16	37	10
IC Square	Up	9-10 am	198	28	22	36	9
	Down	9-10 am	179	25	15	39	10
Electronic s zone sq	Up	9-10 am	194	25	20	34	6
	Down	9-10 am	172	23	12	32	7
YCCE	Up	9-10 am	190	23	20	33	5
	Down	9-10 am	169	20	11	30	7

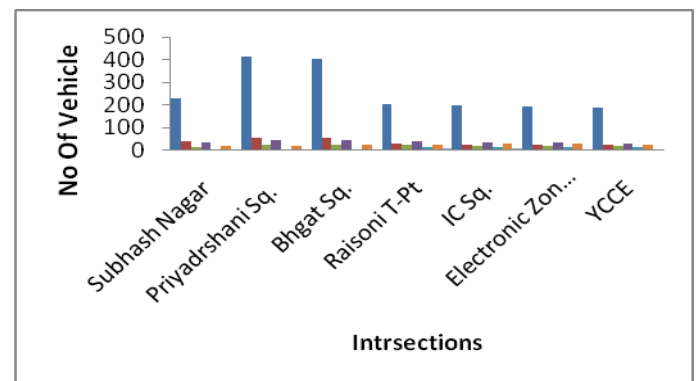


Chart-1: Traffic flow for Upcoming on Intersection

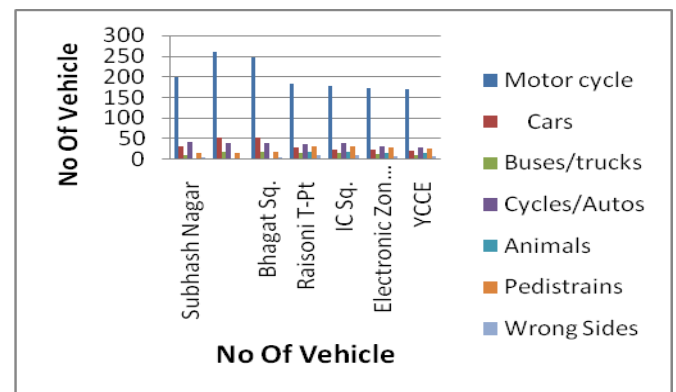


Chart-2: Traffic flow going Down on Intersections

4. **PM₁₀**: Particles size is 10 μ in diameter.
- Air which is drawn through a size of selective inlet and through a 20.3 cm x 25.4 cm filter at a flow rate of about 1000/min.
 - Particles with diameter which is less than the cut point of the inlet area and collected by filter. The weight of these particles is determined by the difference in weights of filter paper after sampling 12 hr. is done.
 - The value of PM₁₀ is to be estimated by the filter paper weight by the initial and total value of the filter paper weight filter by the volume of air sampled.

4.1 HVS Apparatus(High Volume Sampler)

- (Manual of Instrument NPM-HVS/R).High Volume Sampler
- for PM₁₀ Sampling Cyclonic Size Selective Inlet is used
- 12 hourly For Peak Hour average concentrations of major pollutant such as SPM and RSPM were analyzed at seven different locations (industrial at Hingna MIDC Rd Intersection, commercial YCCE at and Residential at Subhash Nagar).
- Sampling was carried out using HVS at the flow rate of 1.3-1.5 m³/min.
- The size of filter paper is 8"×10" kept the top most surface of the HVS apparatus paper is weighted initially and then final weight by this value of RSPM is to be estimated by the given formulae for the seven locations and same as for the SPM the cup weight i.e., weighted initially and then final weight is to be taken after 12 hours so the volume of air pollutant is to be measured put it in the given formulae and results appeared.



Fig-2: Showing details of HVS apparatus

4.2 Calculations

$$V = \frac{f1+f2}{2} \times ts \times 10^6$$

V=volume

f1= initial flow rate of 1.3-1.5 m³/min.

f2=final flow, ts=time set for 12/24 hours

Then, from this

- Calculation of PM₁₀ in ambient air :

$$PM_{10} \text{ (as } \mu\text{g/m}^3\text{)} = \frac{(W2 - W1)}{V} \times 10^6$$

- Where,

PM₁₀ = mass of particulate matter

Less than 10 μ diameter, in m³;

W1 = initial weight of filter paper, 2.799gm.

W2 = final weight of filter paper, (after 12 hr. wt. of paper) in gm.

V = volume of an calculated sample from flows, in m³; and

10⁶ = conversion of gm. to μg.

Similarly Calculation of SPM in ambient air:

$$SPM \text{ (as } \mu\text{g/m}^3\text{)} = \frac{(C2 - C1)}{V} \times 10^6$$

C1=initial weight of cup 22.44 gm.

C2=final weight of cup in gm.

V = volume of calculated sample from flows, in m³; and

10⁶ = conversion of gm. to μg.

Table 2: Concentration of Air pollutant at seven intersections

Location	Standard	SPM	RSPM
Subhash Nagar sq.	Residential	16.46	20.57
Priyadarshani T-point	Residential	147.77	82.22
BhagatSq.	Industrial	16.36	23.55

Raisoni T-point	Residential	41.15	31.89
IC Square	Industrial	175.55	86.66
Electronics zone sq.	Industrial	88.29	44.64
YCCE	Residential	21.60	20.57

5. TRAFFIC NOISE POLLUTION

5.1 TRAFFIC NOISE OF ROAD

- Road traffic noise is the most important major source of people noise especially near important road intersections with high volume of traffic of the city.
- The Roads are in bad condition in the country in certain region, and poorly maintained and has considerable the usage of the number of vehicles travelled in particular patch of old model technology, the road traffic noise adopts much more importance.

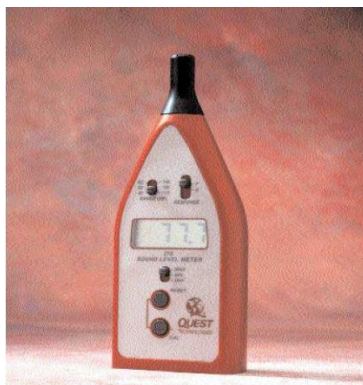


Fig-3: Noise level Meter

5.2 Methods and Measurements

5.2.1 Selection of Study location

The different parameter for the study is the Noise parameters which is the functions of the composition traffic, traffic flow, time and day of recording data on the morning peak hour time in morning 9 am to 11 am and same for evening from 4:30 pm to 6:00 pm. Location for the Noise parameter is same from subhash nagar to Ycce college

5.3 Noise Measurement

Noise measurements were carried out in weightage in fast mode using the sound level meter 210 sound level meters. It is measured in "dB" i.e. decibel Noise levels were recorded on seven intersections on the given site locations during morning and evening peak hours. The Noise levels at a rate of one reading per 30 min were noted. The distance of sound level meter is kept 3-4 feet from the level of the pavement surface.

The equivalent noise level is expressed in units of dB. Expression as

$$Leq = L_{50} + \frac{(L_{10} - L_{90})^2}{56}$$

5.4 Result of Noise Measured

Table 3: Changes for all seven Intersections of Noise Level

Intersections / Time	L Equivalent (dB)						
	Subhash Sq.	T-point	Bhagat sq.	Raisoni T-point	IC Sq.	Electronic Zone	YCCE Collage
9.00am-9.30 am	85.4	93.9	81.5	91.5	82.6	86.6	88.3
9.30m-10.00am	85.8	81.5	81.9	81.6	85.5	81.1	86.5
04.30pm-5.00pm	85.8	92.3	85.6	80.3	85.6	79.6	82.3
5.00 pm-5.30 pm	76.3	86.9	82.3	80.5	81.3	78.5	87.5
5.30 pm-6.00 pm	72.3	90.2	80.3	79.3	80.1	81.3	88.1

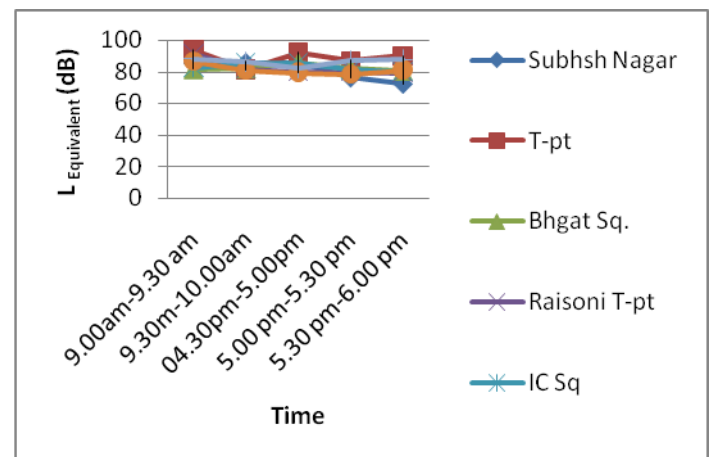


Chart-3 L_{Eq} Changes for all seven Intersections of Noise Level

6. Suggestions for Reducing Congestion in the Particular Patch

6.1 Design for Bus bay

A suggestion for a design of bus bay because the amount of city buses is more in the particular area and off road normal section of a roadway that provides for the pickup and drop of passengers. Such designs of bus bay which allow the continue traffic flow without any disturbance to another traffic

Bus bays should be considered at a location is as follows when...

- Traffic volume in curb lane go above 250-300veh/hr. while peak hour
- Traffic speed of the vehicle greater than 40-45 km/h
- Number of Bus are 10-15 or more than this in peak hour
- Passenger volume exceeds 25 to 50 boarding an hour
- History of repeated traffic and/or pedestrian accidents at stop location
- Improvements, such as extra width of road are planned for a major highway.

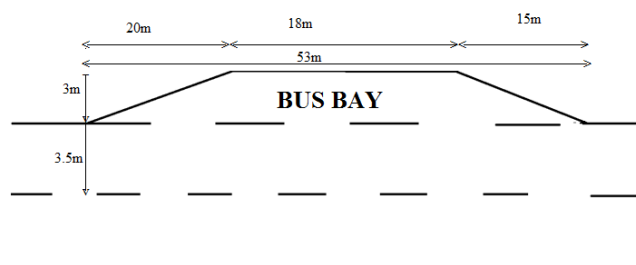


Fig-4: Bus Bay Stop Dimension

7. Implementation of the Species to reduce impact on Environment

7.1 Selection of tree Species

Rural Areas:

Common plants generally suggested for NH and SH going through village areas are Amaltas (Cassia fistula), Neem (Azadirachta indica), Jamun (syzygiumcumini), Imli (Tamarindusindicus). Tall trees like Eucalyptus are not suitable (except for waterlogged areas). Because of interfere with electric and telephone lines and safety hazards on the road. trees like Acacia auriculiformis, Gravilearobusta, are suitable. In India, temperature during summer month's rise up to maximum 46°C or

more, the 'shade' is very helpful for travelers. Thorny trees like Acacia Arabica and Ber (Zizyphusjuzuba) are avoided, these type of trees created nuisance for the pneumatic tyre of motor vehicles.

Urban Areas

Near market places or in crowd places and congested areas, the trees known as 'pollution sink' are proposed. But fact is the trees generally absorbs the pollutants, filter the air from pollutants, and act as noise control but some trees like Neem (AzadirachtaIndica), Mango (MangiferaIndica), Shisham (DalbergiaSisso), Imli (TamarindusIndica), Karanj (Pongamia sp.), and some flowering trees like Amaltas, Gulmohar, Kachnar etc. can do 't in a good way.

Near public places like schools and hospitals, large height trees with canopiethick in size and can create a wind weather through which the air can be filtered and gives fresh air in the surrounding and the noise levels be reduced. Some such trees are Pongamia sp., Acacia auriculiformis and Gravilearobusta. Tall shrubs like Casiabiflora, hamelia patens etc. are also provided at the sensitive noise receptors for maximum possible screening.

8. RESULT & CONCLUSION

Traffic congestion is a global as well as local problem. All over the world, the major cause of traffic congestion is on street parking of the buses or any other vehicles.

In Hingna Road, traffic congestion is a common issue like Nagpur city. Different infrastructural and managerial projects are granted for reducing traffic jam. However in Hingna Road this type of policy is not adopted yet.

Plantation of the species it reduces the pollution.

By providing the bus bay at an intersection the congestion may be reduced Traffic congestion limitations can be upgraded by implementing various strategies such as road widening, improved road infrastructures, restricting routes for Rickshaw and hawkers, and application of Fly over, in future metro.

As per Indian standards for noise level values particularly area in city in commercial area is in between 65 dB to 55 dB for Industrial area is in between 75 dB to 70 dB and for Industrial area is in between 55 dB to 45 dB for day time and night time respectively. Average noise level of seven intersection of Subhash Nagar Square to YCC College Hingna, Nagpur city are 87.11 dB and 84.5 dB during daytime and night time respectively, which is ill effective on human health and environment

9. REFERENCES

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