TRAFFIC SURVEYING AND ANALYSIS

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ABSTRACT

Rapid industrialization and the consequent urbanization has brought about an unprecedented revolution in the growth of motor vehicles all over the world and India is no exception. Such growing urbanization, combined with rising number of vehicle ownership, has led in recent years to an increased demand of traffic survey and analysis, for both long term and short term period. Traffic analysis is basically the process of intercepting and examining the number of vehicles on the road and deducing the pattern of traffic movement. A Traffic survey on specific road sections of Nagpur city has been carried out which included Calculation of present traffic density and comparison with previous year data, Average velocity of traffic. Manual method of counting was used with the help of video recording.

Key Words: - Traffic density, Average velocity of traffic

1. INTRODUCTION

Traffic is generally defined as the movement of people, goods or vehicles between spatially separated points, and thus includes pedestrians and all types of vehicles mechanized, motorized or non motorized. Today man and his transport vehicles occupy a large share of the urban space. Traffic congestions, air pollution and noise pollution and the resultant ill effects and frustration have become the order of the day. The demand for traffic survey and analysis is likely to increase for future development of Transport Network. Traffic analysis is fundamental to planning of roads and flyovers. It also provides the basis for determining the no of traffic lanes to be provided for different road sections having regards to volume, composition and other parameters of traffic. Alternatively, for an existing road network traffic analysis provides a means of assessing the traffic conditions. Traffic analysis can therefore help further in the evaluation of investment needed for the future road constructions and improvements. Such traffic surveys are a valuable source of data for planning of highways, flyovers, roads etc. As such, these should be a regular feature in all the traffic departments. Nagpur, being a developing metro, has got a traffic density which is growing at a rapid pace. The ever increasing no of two wheelers, four wheelers along with public transport and pedestrians poses a serious a serious question mark for a smooth and congestion free movement of traffic. As we have seen effective management of traffic has been carried out at the heavily crowded areas like Sitabuldi, Wardha road, Sakardhara, Mihan, Railway station etc. Flyovers of effective design of have been constructed keeping in view the density of the flow of the traffic and the roads underneath it. They have provided flexible options to the commuters and thereby redistributed the traffic efficiently. Traffic surveys are an integral component of a comprehensive traffic and transportation study. Appreciation of existing traffic and travel characteristics is extremely important for the development of comprehensive traffic and transportation plan.

1.1 Study Magnitude
1.1.1. Time of the day: The traffic flow was seen varying during the peak hours and the non-peak hours. The peak hours (9:30 AM to 11:30 AM and 5:30 PM to 7:30 PM) were taken into consideration for the recording of the maximum traffic movements. The peak hours are defined by the buses, office going people, shopkeepers, school and college going people majorly. This is the time at which traffic movement is maximum and therefore the actual capacity of the road under consideration is measured.

1.1.2. Morning / Evening: The recordings at a single place were taken twice that is once in the morning and again in the evening respectively. The morning data was directly compared to the evening, giving better estimate for the study.

1.1.3. Inflow / Outflow: The inflow as well as the outflow of the same road was recorded so that the total no of vehicles on that road on that particular time were recorded accordingly.

1.1.4. Vehicle Type: The types of vehicles running during these hours were also observed. For example no of buses, cars, auto rickshaws, two wheelers and bicycles were head counted separately and compared accordingly.

1.2 Types of Traffic Survey

The following traffic surveys can be conducted for appreciating the existing traffic and travel demand characteristics and to prepare the transport infrastructure improvement plans.

1. Road inventory survey
2. Classified traffic volume count survey
3. Origin and destination survey
4. Household interview survey
5. Speed and delay
6. Parking survey
7. Pedestrian survey
8. Intermediate public transport operator survey
9. Intermediate public transport user survey

1.3 Methods of Counting:

The selection of study method should be determined using the count period. The count period should be representative of the time of the day, day of month, month of year for the study area. For example counts at a summer resort would not be taken in January. The count period should avoid special event or compromising weather conditions. Count period may range from 5 minutes to 1 year.

i) Manual Method: These are mainly visual counts carried out by operator. It is time consuming

ii) Automatic Method: There are various devices and software available, which enables easy and accurate traffic count

2. DATA COLLECTION

2.1. Site Selection

Routes of Study

- Sadar Main Road
- Anjuman College Square
- Liberty Square

The Sadar road is basically a narrow road which has got a heavy traffic flow due to prominent commercial establishment, Anjuman Polytechnic college and Mangalwari market. Apart from this the road is a connecting road of the city to North direction and has major establishment like government offices, schools and commercial markets. So this route is taken under the case study and the traffic flow was observed to estimate the traffic density.

- WHC Road

Organized By: GNI Nagpur, India
1. Law College Square
2. Shankar Nagar Square

WHC road is one the busiest routes for pedestrians as well as vehicular movement. As there are numerous prime commercial establishments on this road, parking is another major concern apart from the heavy traffic flow. Many a times a wrong parking also disrupts the traffic movement along the way. Also, there are a few points on this route on which the road bottlenecks and thereby slowing down the traffic flow. This route also covers a major market, (Gokulpeth) and a school (Saraswati Vidyalaya) on the way where the traffic passes majorly.

2.2 EQUIPMENTS USED
1) **Sony handycam** (32x zoom): A high definition Sony handycam was extensively used over various locations to record and demarcate the number of vehicles plying on that particular road over on a particular time of the day/night. The camera was placed on such an elevation and place that the whole square (and particularly one direction of inflow and outflow) of the traffic movement was recorded. The zoom was set in such a manner that all the vehicles were easily distinguished.

2) **Sony tripod**: A light and sturdy Sony tripod was used to fix the handycam at various angles and elevations. The height was adjusted in such a manner that the camera covered the whole movement of the traffic below.

3) Sony mini DV cassettes: These types of cassettes with recording length 1 hour were extensively used to record the traffic flow over different locations. Each cassette was marked separately according to their respective locations.

4) **Picture motion browser software**: This software was essentially required to convert the recorded video into computer playable format for a more convenient view and re-usage of the cassettes.

5) **Measuring tape**: A measuring tape was used to measure the road breadth over various locations.

2.3 ORIGIN AND DESTINATION STUDIES
In order that traffic may flow as smoothly and safely as possible, it may become necessary to collect data as to where the traffic came from and where it is going. That is the purpose of origin and destination study.

An origin-destination study is used to determine travel patterns of traffic on an installation during a typical day. They are useful in assisting long-range traffic planning, especially when there are substantial changes anticipated in the installation mission or strength. This is a study to determine and analyze trips. Trips are defined as one-way movement, from where a person starts (origin) to where the person is going (destination). Trips are further classified as follows:

- **Internal**: From one point on post to another point on post.
- **External**: From on-post to off-post or vice versa.
- **Through**: From off-post to off-post, by going through the installation.

The information gathered may be used to modify the circulation pattern or assist in other long range planning activities. These studies are time consuming and rather complex. They also require the cooperation and assistance of the public.

There are five different methods of conducting origin destination studies.

1. **Vehicle Occupancy Studies**
   Vehicle occupancy studies are often used in conjunction with volume studies. The study is conducted by observing the number of people in each vehicle as it passes a given point. They can be used to determine the need for car pools. The data can also be used in public information programs to encourage the use of car pools and thus reduce traffic volume. They may also be used to determine the need for mass transit, as well as parking facilities.

2. **Speed Delay Study**
   A speed delay study is conducted by having an unmarked vehicle enter the flow of traffic during different time periods. It then follows a prescribed route and notes the time it takes to get from one landmark to another along the route. More than one vehicle can be used. The route is travelled repeatedly and at different times. The results of this type of study assists in determining speed variations along a route. From the data gathered, the number, location, cause, frequency, and duration of delays can be determined. The data also reflects the overall speed and travel time along a route at various times of the day. This locates points of congestion or insufficient road capacity. It may also indicate the need for traffic control device studies to be made to determine the adequacy of such devices. Priorities for traffic control and future construction programs can also be determined.

3. **Motor Vehicle Volume Study**

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This type of study is made to determine the number, direction, and variations in the volume of vehicles passing through an intersection or along a major route.

4. **Roadway Capacity Study.**
These are studies to determine the practical capacity of roads and streets. They may also provide a basis for changing traffic regulations. They measure the traffic density and the traffic capacity. Traffic density is the number of vehicles per hour passing a given point. Traffic capacity is the maximum traffic density a given stretch of road can accommodate at a set speed without causing delay.

5. **Accident Record Studies.**
The purpose of studying traffic accident records is to find measures to increase vehicle safety and reduce accidents. Traffic accident prevention programs are never finished. There must be a continuous study of accidents, violations, and the driver record program to update vehicle safety. The study of these records helps to identify high accident rate locations. It contributes to the evaluation of roadway design factors. These studies aid in planning remedial actions, and Selective and preventive enforcement programs. They may also be used to evaluate the effectiveness of changes through before and after comparisons. The studies are conducted by recording data from traffic accident investigations and violations.

### 3 DATA ANALYSIS:

**ANJUMAN SQUARE:**

**Survey station : Anjuman college square**

**Direction of travel : Anjuman Square to Liberty Square**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Motor Cycles</th>
<th>Cars</th>
<th>Buses/Trucks</th>
<th>Cycles/Auto</th>
<th>Animals</th>
<th>Pedestrians</th>
<th>Wrong Siders</th>
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LIBERTY SQUARE:

Survey station : Liberty Square
Direction of travel : Liberty Square to Anjuman Square

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**LAW COLLEGE SQUARE:**

Survey station : Law college square  
Direction of travel : Law College Square to Shankar Nagar Square

<table>
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**SHANKAR NAGAR SQUARE**

Survey station : Shankar Nagar square  
Direction of travel : Shankar Nagar Square to Law College Square

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<thead>
<tr>
<th>Date</th>
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<th>Buses/Trucks</th>
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4. CONCLUSIONS

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<th>DIRECTION</th>
<th>MORNING</th>
<th>EVENING</th>
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<td>LAW COLLEGE SQUARE TO SHANKAR NAGAR SQUARE</td>
<td>1352</td>
<td>1134</td>
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<tr>
<td></td>
<td>SHANKAR NAGAR SQUARE TO LAW COLLEGE SQUARE</td>
<td>1697</td>
<td>1100</td>
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</table>

1. Width of the Residency Road 7.4 meters Traffic density per hour for Residency Road is 5002 vehicles
2. Width of the WHC Road is 8.85 meters & Traffic density per hour for West High Court Road is 1697 vehicles
3. The traffic density from liberty square to Smruti Theatre square is 5000 vehicles per hour which is substantially more than Wardha Road where flyover has been constructed hence there is an urgent need to distribute heavy traffic density at Residency Road
4. The width of the Residency Road is 7.4 meters which is comparatively less than that of Wardha Road hence frequent traffic congestions are observed
5. There are schools on the Residency road & during school timing more traffic flow is observed.
6. Possibilities of restricting four wheelers during peak traffic hours need to be examined.
7. On street parking of vehicles should be prohibited.
8. Taking into account development taking place in western Nagpur, WHC road with limited width will not be able absorb increase in vehicular traffic. Hence, traffic distribution through alternative routes or construction of flyover may be envisaged.
9. Two wheelers, particularly motorcycles is the most preferred mode of transport.
10. Public transport system needs to be strengthened so that use of individual vehicles is restricted, thereby reducing traffic density.

5. REFERENCES
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- IRC-106-1990 Guidelines for capacity of urban roads in plain areas
IRC-108-1996 Guidelines for traffic prediction on rural highways
IRC SP-12-1973 Tentative recommendation on the provision of parking spaces for urban areas
IRC SP-43-1994 Guidelines on low cost traffic management technique for urban areas

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