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Traffic Volume and Safety Measures Study on National Highways

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Abstract: ***The attainment of safe and time efficient movement of people and goods on roadways depends on traffic flow, which is directly related to traffic characteristics. The three main parameters of traffic flow are volume, speed and density. In the absence of effective planning and traffic management of cities and towns, the current road infrastructure cannot meet the future needs. Due to rise in human population as well as increase in automobile production, there has been a significant increase in the quantity of pedestrians and vehicles in the last decade.***
The present studies are carried out to find the traffic volume fluctuations on NH-72 which connects two major cities Ambala and Haridwar of India via Shahzadpur and Nariangarh. The traffic volume data has been collected for 18 hours per day for a period of 14 days constituting 252 hours of field work to get a clear idea about high volume and density periods. The data also provide information about traffic stream performance and facilitate to predict the problems faced by the commuters.
The main objective of this study is to recommend the various measures to reduce the traffic safety issues caused by the traffic volume overburden on existing roadways.
Keyword: traffic volume, safety, national highway.

I. INTRODUCTION

A. General

Currently transportation is one of the most burning problems in every territory of the globe. Every country is approaching as per their desires and try to resolve transportation issues as per the capabilities and resources they owe. Traffic volume researches are performed to determine the count, movement and classification of roadway vehicles at a given location so as to become aware of critical time flow periods, the influence of heavy vehicles or pedestrians on vehicular traffic flow or traffic volume trends.
The Nagpur Road Plan of 1943 has broadly defined the national highways as the roadway that run throughout the latitudinal and longitudinal extent of India, linking different states, various ports, state capitals, major cities, large industrial places and the roads required for country's defence.
Road traffic safety in simple terms means safe traffic operations which involves measures and methods to prevent road users from being injured or killed. It is not only gaining knowledge and understanding safety but changing attitudes and behaviors towards road usage.
Hence it is necessary to evaluate the various factors causing inconvenience to the road traffic such as congestion, travel time delays etc. The study of traffic volume will give us an idea of various locations where the congestion is prevailing leading to unsafe travel experience and consequently the various measures will be suggested to safeguard the road users.

II. STUDY AREA PROFILE AND METHODOLOGY

The study has been carried out to determine the traffic volume on a selected stretches of national highway 72 which connects two famous cities of India Ambala and Haridwar via Shahzadpur and Nariangarh. The observation sites were selected between Shahzadpur and Nariangarh as there are various intersecting roads on this stretch of national highway. From Ambala city, Shahzadpur lies at distance of 28.00 km whereas Nariangarh at 39.00 km along NH-72.

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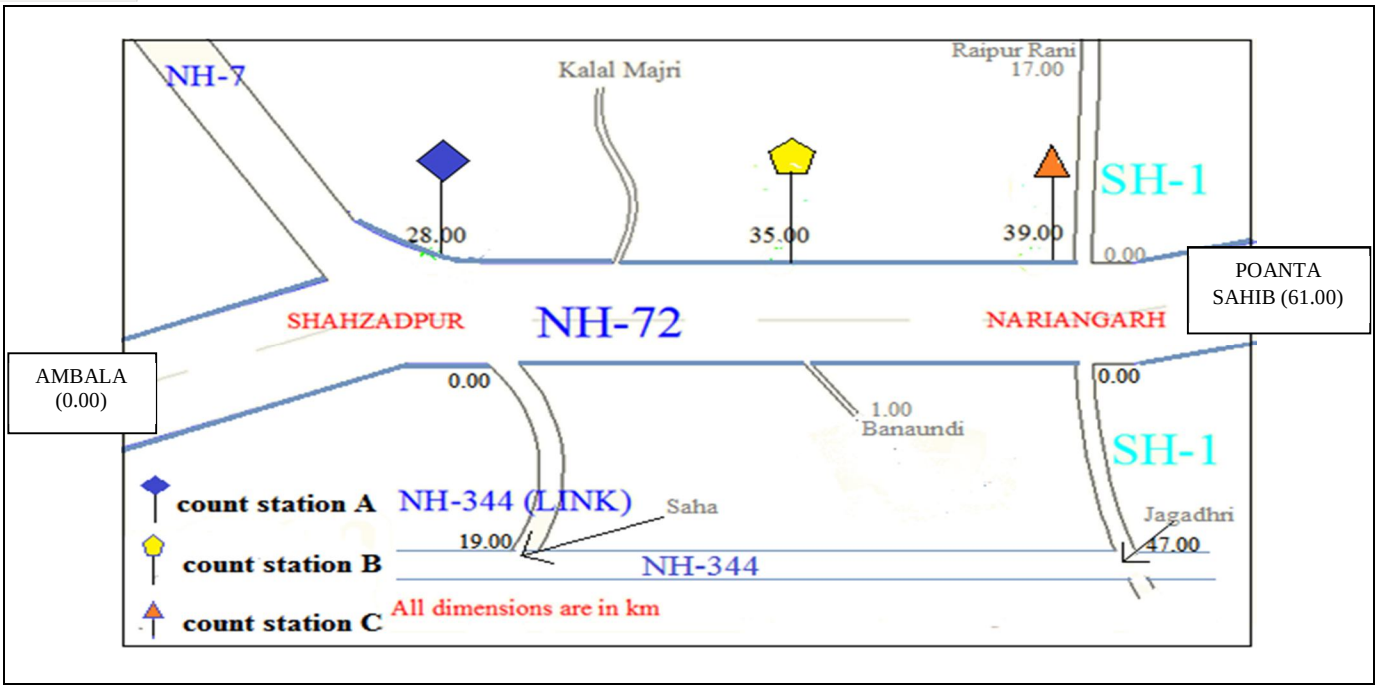


Fig. 1 Layout plan of NH-72

The traffic volume data can be collected by manual or automatic methods. In this study manual method has been used. There are two methods of manual volume survey and they are:

A. Direct Method.

This method has been employed in this study during the low traffic volume or off peak hours. In this method a surveyor or a team of surveyors are placed at the station points to obtain the traffic volume data. Firstly the stretch of a road and time interval is selected. After that the surveyor notes down the number of vehicles that pass through that stretch in a selected time interval. This directly gives us the traffic volume in terms of number of vehicles per hour.

ii) Indirect method

It is the method in which counting of vehicles is done manually but the data is obtained by using video camera. The video camera is kept at station point to capture the traffic flow. The captured video is re-winded from which the number and type of vehicles is determined. This method has been applied in this study during the peak hour flow durations.

III. OBSERVATIONS AND DATA ANALYSIS

Observations made to study the effect of vehicles coming from intersecting major and minor roads on national highway are:

The provision for setback distances and speed control devices at intersections were completely missing. There were no traffic safety devices or sign boards that could help road users to safely enter or cross main national highway. The trucks were parked on shoulders of national highway thereby decreasing the lane capacity. Another observation was that pavement markings like center lines, turn markings, stop lines, cross walk lines, edge lines and approaching to obstruction markings were completely missing along the study stretch of national highway. The glare effect was major problem for safe driving during night hours.

The analyzed data at study locations are given below:

Table 1 Traffic volume from Monday to Sunday at Shahzadpur

DAY	Cars	Buses and Trucks	Two Wheelers	Auto Rickshaws	LMVs	NMVs	Total PCU
Monday	6361	1780	4974	1289	3981	1291	21394.5
Tuesday	5862	1684	4635	1034	3458	987	19204
Wednesday	5632	1628	4359	1048	3512	1064	18851.5

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Thursday	5352	1572	4471	987	3321	945	18029
Friday	5428	1621	4562	1152	3467	1003	18695.5
Saturday	6221	1752	4815	1261	3975	1187	20901
Sunday	3732	1612	3315	785	2432	812	14660.5
Total	38588	11649	31131	16441	24146	7289	140621

Table 2 Traffic volume from Monday to Sunday at Nariangarh

DAY	Cars	Buses and Trucks	Two Wheelers	Auto Rickshaws	LMVs	NMVs	Total PCU
Monday	5538	2040	6038	1218	3541	1372	21494
Tuesday	5127	1845	5861	1079	3261	1131	19629
Wednesday	4936	1769	5654	1025	3142	1079	18855.5
Thursday	4762	1687	5581	1046	3097	948	18178.5
Friday	5121	1864	5886	1112	3117	1087	19515.5
Saturday	5637	2131	6124	1221	3628	1256	21825
Sunday	3462	1324	4797	813	2174	794	14010.5
Total	34583	12660	39941	7514	21960	7667	133508

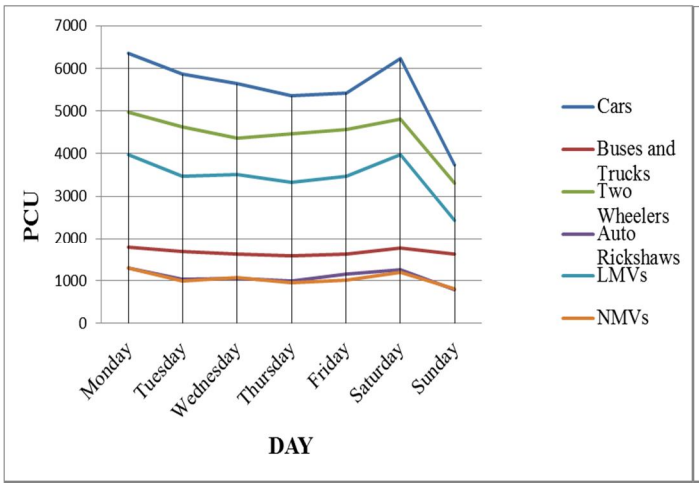


Fig. 2 Daily classified traffic volume at Shahzadpur

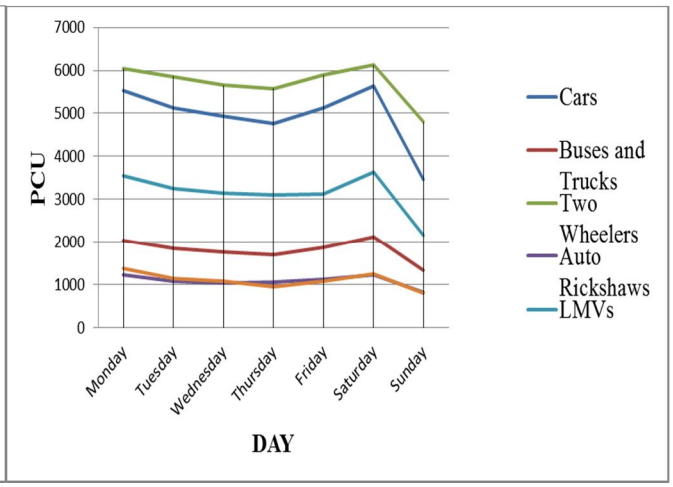


Fig. 3 Daily classified traffic volume at Nariangarh

Table 3 Traffic Average hourly spot speeds

Time Period	6:00AM - 7:00AM	7:00AM - 8:00AM	8:00AM - 9:00AM	9:00AM - 10:00AM	10:00AM - 11:00AM	1:00PM - 2:00 PM	2:00PM - 3:00 PM
Spot Speed (kmph)	51.17	48.32	31.07	28.51	33.71	38.12	27.36
Time Period	3:00PM - 4:00PM	4:00PM - 5:00PM	6:00PM - 7:00PM	7:00PM - 8:00PM	8:00PM - 9:00PM	9:00PM - 10:00PM	12:00PM - 5:00AM
Spot Speed (kmph)	30.31	36.37	38.42	34.21	36.8	45.21	56.72

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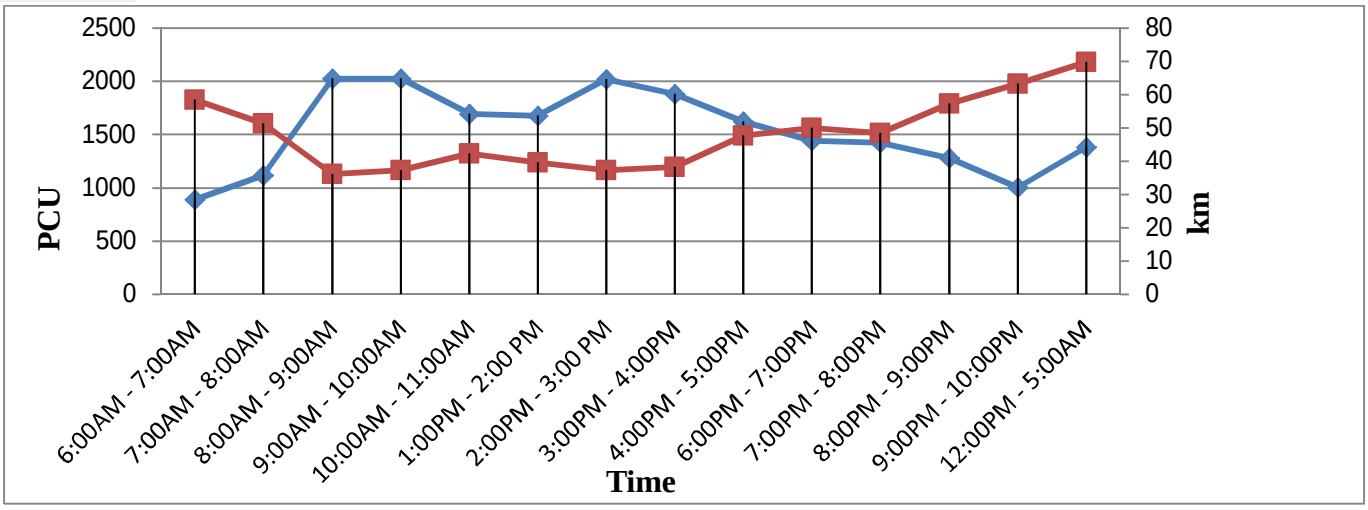


Fig. 4 traffic volume variation with spot speeds

The analyzed data shows that maximum traffic occurs mostly on Monday and Saturday. The reason may be that mostly all the offices are closed on Sundays so people working in cities and residing at temporary accommodations prefer to go homes on Saturdays. The analyzed data also gave us traffic volume and corresponding speed fluctuations that occurs from hour to hour. When traffic volume and spot speed data is compared it can be clearly seen that whenever traffic volume is less, speed of vehicles increases thereby increasing chances of road mishaps especially on un divided and non kerbed roads. On the other hand when traffic volume is high although vehicle speed decreases but number of vehicles per kilometer i.e. density keeps on increasing which eventually leads to traffic congestion.

IV. CONCLUSIONS

A. Following Conclusions Are Drawn

Whenever a national highway is designed future increase in traffic volume must be considered. It is the parameter that always goes on increasing because of rise in population and increase in vehicle production.

Rather than converting all vehicles into PCU classified volumes should be used in designing a highway so that separate lanes can be designed for LMVs and heavy goods vehicles to achieve hassle free movement.

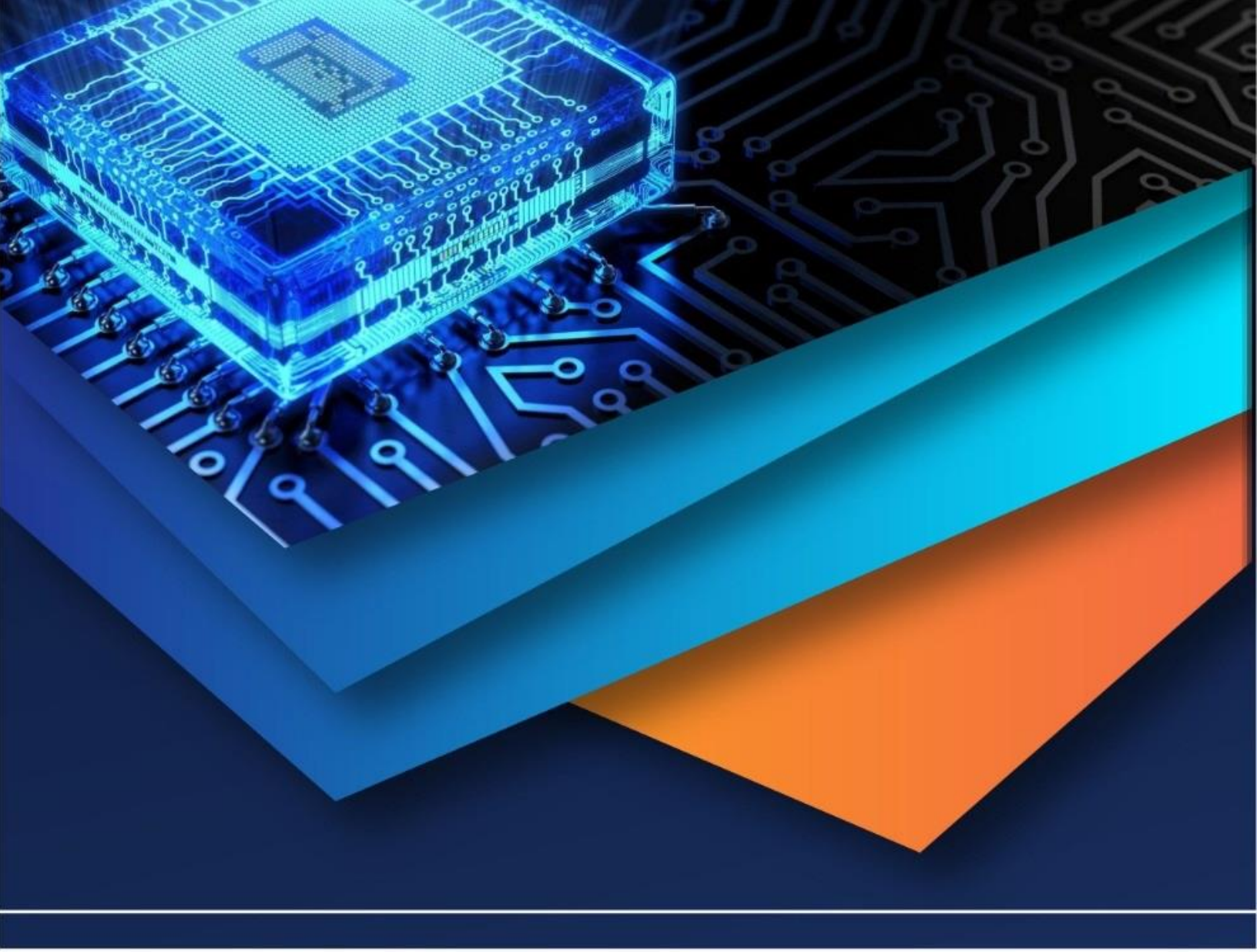
All the intersections should be properly designed. The most affected locations along any roads especially national highways are the intersections. As there are many procedures to cater the problems at intersections like construction of islands, channelization of flow, constructing over or under passes and installation of traffic signals. Cross walk markings must be painted on pavements at these intersections to improve the safety of people

The shoulders along the national highways should be properly maintained. The practice of parking vehicles on the road shoulders should be banned. As most of the national highways are constructed on embankments the guard rails must be placed along the sides of roadway to reduce the chances of mishaps. For the safety of animals the national highways should be barricaded on sides. Traffic police personals should be placed at regular intervals along national highways to monitor the traffic speed, violators of traffic rules and to provide help during accidents.

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