

Analysis on Different Roads of Meerut City

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Abstract: Traffic engineering is the application of engineering principles and techniques to the safe and efficient flow of people and products on highways. The safe and timely movement of people and products is based on traffic flow, which is inextricably linked to traffic characteristics. Volume, speed, and density are the three primary factors of a traffic flow. The present road infrastructure cannot meet the city's future demands in the absence of comprehensive city planning and traffic management. Because of changes in the economy of middle-class households, pedestrian and car traffic have grown dramatically in the recent decade. The current work investigates traffic characteristics in the city of Meerut at a single high-traffic intersection. The emphasis in this work was on traffic volume, and the research was carried out using primary traffic flow surveys from in Meerut city. Manual approaches are used to study traffic flow. A traffic survey is carried out to have a better knowledge of the current state of traffic flow at the intersection. Our renowned course co-coordinators of the course CE452 presented a calculation of Passenger Car Units (PCUs) for various vehicle kinds. An attempt had been made to study traffic patterns throughout various time periods using data collecting. The features of the traffic flow also influence traffic control at that intersection. As a consequence, the findings of this study are useful in regulating traffic at the intersection and in recommending some corrective steps to improve traffic safety in the region. Based on the results of the work, corrective actions such as enlarging the road, altering it from four to six lanes, or providing additional public transportation may be proposed.

Keywords: Traffic flow, Traffic composition, Traffic congestion, Passenger car unit, Traffic volume, Traffic density.

1. Introduction

The study's goal is to monitor traffic volume during peak hours, traffic congestion, determine service levels, and propose solutions to minimize congestion and improve service levels. Meerut, with a population of 17.2 lakhs, is a fast-urbanizing metropolis. The rising population has resulted in a massive increase in vehicle ownership, resulting in high rates of motorization. Traffic congestion, traffic delays, accidents, the environment, noise pollution, air pollution, and other issues have come from the increase in vehicular population, congestion, and hazardous traffic conditions. The number of cars in the research region is counted in traffic volume studies. The information gathered is valuable in determining the amount of heavy vehicular traffic and the number of vehicles moving. Survey data will be utilized to analyze traffic volume, passenger car unit (PCU), congestion, Peak hour factor, and Directional

distribution, volume capacity ratio.

2. Objectives

This study is done with following purposes,

- To determine traffic volumes and other traffic parameters (e.g., flow composition, flow fluctuations etc.).
- Calculate hourly volume in passenger car equivalents (PCE) To determine the composition of vehicles in a traffic stream.
- To compare the results with standard design service volumes and identify remedies.

3. Related Previous Work

Assessment of traffic congestion in Pabna Town by Md. Tufajjal Hossain, Md. Kamrul Hasan

The town's traffic congestion investigation revealed that auto-rickshaws, cycle rickshaws, bicycles, and motor cycles are the most common modes of transportation, and traffic flow is most heavy in the morning, noon, and evening. The beginning and conclusion of office hours for employment and working time for various professionals, schooling hours, shopping hours, festivals and seasonal variations, and so on all have an impact on the town's traffic flow. One way traffic flow is one of the possible solutions.

Analysis of Congestion using Advanced Traffic Instruments – A Case Study of Chandigarh (India) by Ankit Bansal, Tripta Goyal, Har Amrit Singh Sandhu

The current study was carried out to analyse the traffic characteristics of Chandigarh's V-2 roads, using automated and advanced instruments such as MetroCount for traffic volume analysis and Radar Gun for traffic speed analysis. Various speed percentiles for different vehicle compositions have been examined, and the average 85th percentile speed (speed limit) for all classes of vehicles has been determined to be 55.5 km/h for Madhya Marg, 59.8 km/h for Purv Marg, 61.4 km/h for Dakshin Marg, 53.5 km/h for Himalaya Marg, 60.7 km/h for Jan Marg, and 53.5 km/h for Udyog Path, indicating that there is a considerable

Analysis of traffic growth on a rural highway: A case study from India

The goal of this study was to create traffic forecasting models for individual and combination vehicle types, such as CJV,

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LCV, MULTI AXLE, and BUS/TRUCK, in order to anticipate Average Daily Traffic in the nth year.

Traffic Volume Time-Series Analysis According to the Type of Road Use by Satish Sharma

In this study, time series analysis was used to estimate the following day's traffic volume using the past 13 daily traffic volumes for distinct road groupings. To simplify the research, PTC sites with comparable traffic characteristics were grouped together. Different route groupings were created using hierarchical grouping approaches. A thorough time-series study of various types of roadways may give important insights and ideas for future research.

Visualization and Analysis of Traffic Flow and Congestion in India, Tsotomu Tsuboi

This is the first real traffic congestion analysis in India, and it introduces novel traffic flow analysis techniques such as: (1) collecting over a month of recent traffic data in a major Indian city, (2) defining traffic congestion from occupancy parameters based on traffic flow theory and observation data, and (3) identifying traffic congestion location using geographical special analysis (GIS). With the help of these three combination analyses, one may determine the most crowded location in the city and quantify the congestion situation.

Traffic volume Analysis of Newly Developing semi-urban Road, S. Venkatcharyulu, V. Mallikarjunareddy

The preceding study was carried out and evaluated for traffic from Miyapur to Nizampet (Hyderabad, India). When examining steam composition flow, it is discovered that the percentage of volume of 2-wheelers is roughly 62-65 percent of overall vehicle volume. Local folks in this area are the primary supplier of 2-wheelers. It is also noticed that the amount of private automobiles on this route is insufficient when compared to the volume of public vehicles. The average peak hour factor (PHF) for traffic flow towards Nizampet in the morning peak hours is roughly 0.943, while the maximum PHF for the same over the entire week is 0.970. Similarly, the average PHF for traffic flow towards Miyapur in the morning is 0.963, with the maximum PHF for the whole week being 0.981. In the evenings, the average PHFs for traffic flow towards Nizampet and Miyapur are 0.964 and 0.947, respectively. For the whole week, the greatest PHFs are 0.971 and 0.974 for traffic flow towards Miyapur and Nizampet, respectively.

4. Survey Method

We have collected data from manual counting method. In this method, vehicles are counted manually. There are two methods of manual counting:

- i. Direct Method
- ii. Indirect Method.

i) *Direct Method:* In this data is collected by visiting the site
 Advantages – Data can be used immediately and there are less chances of error

Disadvantages – It requires more work force and this method is time taking. This method is not practicable for high traffic flow.

ii) *Indirect Method:* In this data is collected by video camera of local sources.

Advantages—Data can be crosschecked and this method is also applicable when traffic is high.

Disadvantages—Quality of video is dependent on intensity of light. this method is not suitable for long hours data collection.

5. Study Points

For the purpose of understanding traffic flow, composition and fluctuation we have chosen two study points. These are Baghpat bypass road and Lal Kurti road.

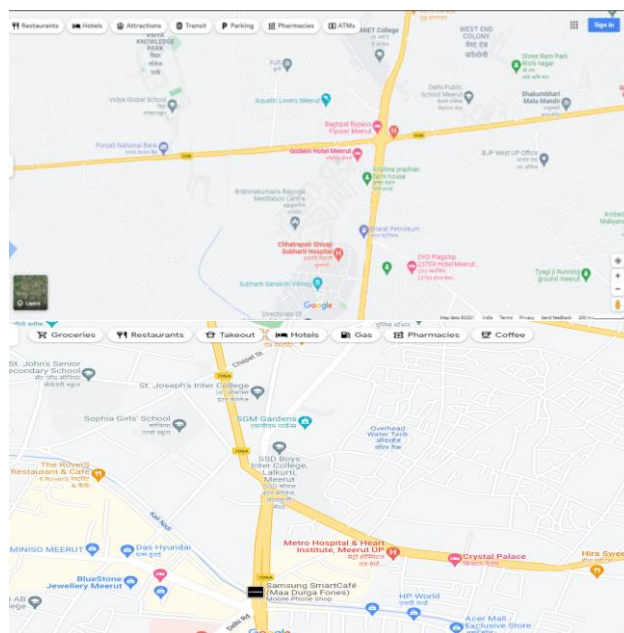


Fig. 1. Study points

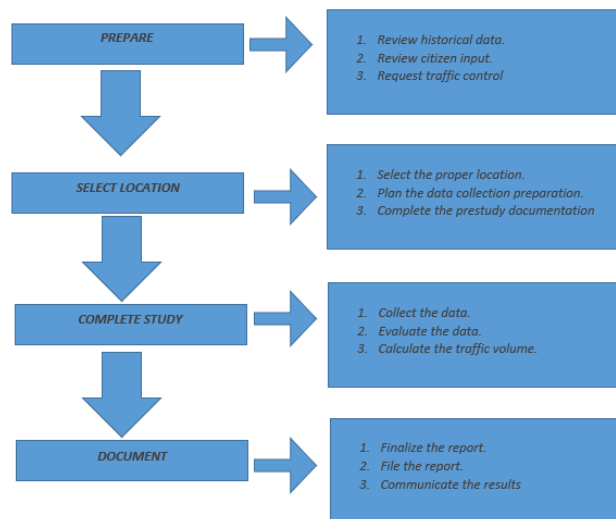


Fig. 2. Working methodology

Definitions:

Volume/flow: The total number of vehicles that pass over a given point or section of a lane or roadway during a given time interval is called volume. It is the actual number of vehicles observed or predicted to passing a point during a given interval.

Traffic Density: The average number of vehicles that occupy one mile or one kilometer of road space, expressed in vehicles per miles or per kilometer.

Passenger Car Unit: It is a vehicle unit used for expressing highway capacity. One car is considered as a single unit, cycle, motorcycle is considered as half car unit. Bus, truck causes a lot of inconvenience because of its large size and is considered equivalent to 3 cars or 3 PCU.

Type of Vehicle PCU

Car, taxi, pick up 1.0

Cycle, motor cycle 0.5

Bus, truck, 3.0 (4.0 in some cases)

Horse drawn cart 4.0

Bullock cart 6.0

Bullock cart (Large) 8.0

Rate of flow: The equivalent hourly rate at which vehicles pass over a given point or section of a lane or roadway during a time interval less than 1hr. usually 15 min.

Traffic Composition: Traffic composition is defined as the percentage of heavy vehicles with respect to the total number of vehicles.

Traffic Congestion: Traffic congestion is the condition that is characterized by slower speeds, longer trip time, and increased vehicular queuing

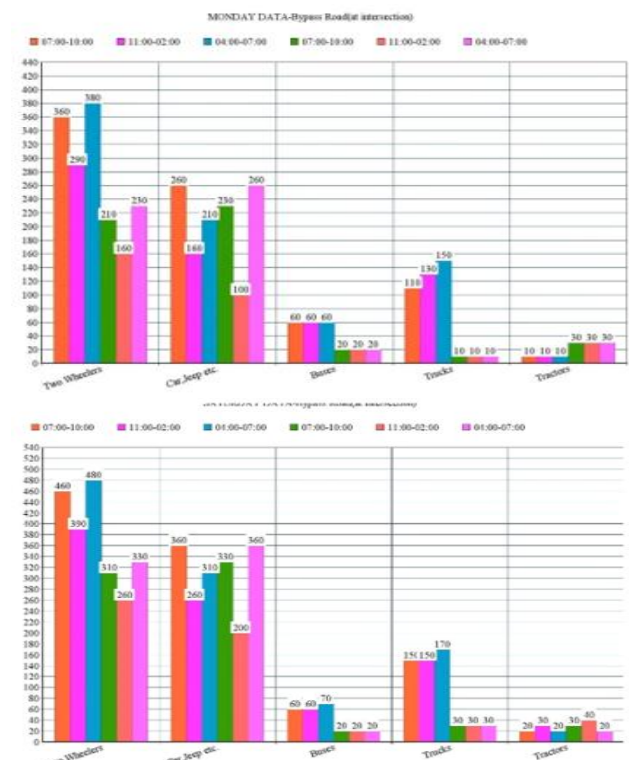


Fig. 4. Comparison between weekday and weekend data (Bypass Road)



Fig. 3. Comparison between weekday and weekend data (Lal Kurti)

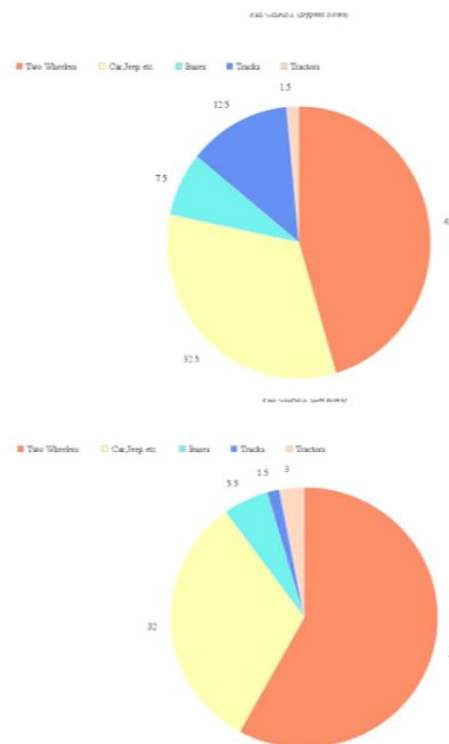


Fig. 5. Vehicle composition comparison

6. Observation and Conclusion

From the data collected following study is done.

Discussion on directional distribution:

53% percent of traffic flow was towards flyover which indicates maximum flow towards Delhi. It was morning rush hour and mostly due to working class group. So flow was higher

towards the Delhi. Only 47% percent of traffic was flowing towards Meerut city in morning hours. Opposite scenario was seen in Lal Kurti in evening rush hours

Flow composition:

Vehicle composition shows that most of the vehicles in the traffic were light vehicles i.e., two wheelers in Lal Kurti. The reason of high proportion of light vehicles in Lal Kurti is because Lal Kurti is located near residential area and a densely populated market is there in Lal Kurti. The vehicle composition on baghpat bypass is mostly evenly distributed. Buses and trucks were also in good amount because of nearing proximity to N-H 58 Highway

Analysis of accident cases:

One of the reasons of most accident cases is non availability of traffic lights. If everyone follows the rule road will be a safer place to be.

Limitations:

- We have collected data only for two study points. It should be done through whole Meerut city so that better scenario can be represented.
- For precise collection of data number of personnel's involved should be more.
- The major limitation in this survey is that data collected is approximate and survey is conducted only for some time, it should be minimum done for 12 hours

Recommendation for future work for Lal Kurti:

1. Lack of proper parking space has been seen. So proper parking space should be provided.
2. Public transport should be promoted.
3. Bicycle should have specific lanes of their own which typically is placed beside the footpath/shoulder. But there was not any specific lane in the road.
4. Illegal vendors should be removed from roadside. Proper space should be allotted to them.
5. Road side parking should be removed.

6. A proper traffic management system should be provided. Traffic lights should be installed.
7. Public toilets should be installed on the road side.
8. Proper waste management system should be there.

Recommendation for future work for Baghpat Bypass:

1. A proper traffic management system should be provided. Traffic lights should be installed.
2. Zebra crossing should be provided.
3. Road side parking should not be allowed.
4. Auto stand and Bus stand should be provided.
5. Overloading on trucks, tractors should not be allowed.

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