



SPOT SPEED STUDIES & DELAY TIME SURVEY AND ANALYSIS-A CASE STUDY IN SURAMPALEM AT VARIOUS CENTRE FOR PROBLEM

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Abstract

Designing and construction of a road involves estimation of traffic volume and setting up ideal speed for the vehicles to travel in a comfortable way. Now days, due to rapid increase in volume of traffic the designed speed on high ways could not be maintained resulting a delay in reaching target point. Our project also involves survey of spot speed of vehicles near a college zone. This helps us to recommend changes to the existing system. These recommendations may involve establishment of precautionary signs like college zone, speed limit etc. Our project is to study the traffic volume and check the time to reach the target in off-peak and peak timings on stretch (say from AEC to SRMT) and coming up with both analytical and practical solution under IRC guidelines. The conclusion of the project is the solution to problems faced in ADB journey by checking personally and taking feedback of public using the highway.

Keywords: IRC, Time Survey, Spot Speed Studies, Traffic Survey

1. INTRODUCTION:

Traffic Engineering is that branch of engineering which deals with the improvement of traffic performance of road networks and terminals. This is achieved by systematic traffic studies, scientific analysis, and engineering applications. Traffic engineering deals with the application of scientific principles, tools, techniques, and findings for safe, rapid, convenient and economic movement of people and goods. The basic object of traffic engineering is to achieve efficient free and rapid flow of traffic with least number of traffic accidents. Factual studies of traffic operations provide the foundation for developing methods for improvement in general and for solving specific problems. These studies help in

deciding the geometric design feature and traffic control for safe and efficient traffic movements.

Speed is an important transportation consideration because it relates to safety, time, comfort, convenience, and economics. The actual speed of vehicles over a particular route may fluctuate widely depending on several factors such as geometric features, traffic conditions, time, place, environment, and driver.

1.1 Spot speed studies:

The profession of traffic engineering as known today has evolved with the advent of motor vehicles. During the last few decades significant advances have been made in many phases of the profession.

Advance study and training facilities have been made available at several universities and institutions. Traffic engineering has now been recognized as an essential tool in the improvement of traffic operations in metropolitan cities like Bombay, Calcutta, and Madras. Study of speed characteristics is the most essential prerequisite for any improvement of traffic facilities.

1.1.1 Spot Speed Methodology:

Speed is an important measure of the quality of travel and safety of road network. Speed by definition is the rate of movement of vehicle in distance per unit time. A typical unit of speed is kilometers per hour (KMPH) or mile per hour (MPH).

The main purpose of this study is to determine traffic parameter, especially speed. Spot speed measurements are most often taken at a point (or a short section) of road way under conditions of free flow.

The intent is to determine the speeds that drivers select, unaffected by the existence of congestion. This information is used to determine general speed trends, to help determine reasonable speed limits and to assess safety. Basically, there are two types of speed: the time-mean speed and space-mean speed.

1.1.2 Space mean speed: It is the length of a road section divided by the average travel time of several vehicles over this specific section.

1.1.3 Time mean speed: It is the average spot speed of several vehicles measured at a given spot, it is also called as spot speed. For geometric design of roads, it is necessary to have a realistic estimate of the speeds at which vehicles travel. Based on the speed studies, the design speed can be selected and other geometric elements

of design such as horizontal curvature, vertical profile, sight distances and super-elevation can be determined.

Spot speed studies are conducted to estimate the distribution of speeds of vehicles in a stream of traffic at a particular location on a highway. This is carried out by recording the speed of a sample of vehicle at a specified location. When we measure the traffic parameters over a short distance, we generally measure the spot speed. A spot speed is made by measuring the individual speeds of a sample of the vehicle passing a given spot on a street highway. Spot speed studies are used to determine the distribution of a traffic stream at a specific location. The data gathered in spot speed studies are used to determine vehicle speed percentiles, which are useful in making many speed-related decisions. Spot speed data have a number of safety applications, including the following.

- Speed trends,
- Traffic control planning,
- Accidental analysis,
- Geometric design,
- Research studies.

1.3 Methods of spot speed measurement:

Methods of conducting spot speed studies are divided into two main categories: Manual and Automatic. Spot speed may be estimated by manually measuring the time it takes a vehicle to travel between two defined points on the roadway a known distance apart (short distance), usually less than 90m. Distance between two points is generally depends upon the average speed of traffic stream. Following tables gives recommended study length (in meters) for various average stream speed ranges (in KMPH).

1.3.1 Methods of spot speed studies:

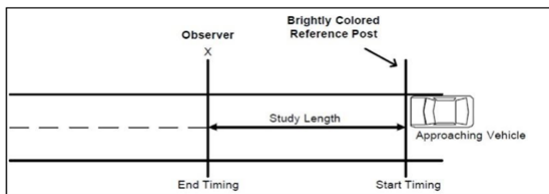
Following are some methods to measure

spot speed of vehicles in traffic stream, in which first two are manual methods and other are automatic:

1.3.2 Stop watch method:

In this method, markings of pavements are placed across the road at each end of trap. Observer starts and stops the watch as vehicle passes lines.

In this method, minimum two observers required to collect the data, of which one is standing at the starting point to start and stop the stop watch and other one is standing at endpoint to give indications to stop the watch when vehicle passes the end line. Advantages of this method is that after the initial installation on the set-up time is required, marking are easily renewed. Disadvantages of this method are that substantial error can be introduced, and magnitude of error may change for substitute studies. This method is only applicable for low traffic conditions.



Pictorial representation of stop watch method

2. LITERATURE REVIEW:

The college is directly connected ADB road. Vehicles travel at very high speed on this road which may range from 50-60 kmph. This is an example for bad indication or bad signalling there are no precautionary signs like college zone or speed limit or zebra crossing the high speed vehicle some times may not notice the road crossing public, leading to accidents. To improvise the existing system, survey need to be conducted.

The proposed system or mechanism will overcome the disadvantages of existing system. Firstly, whereas study aspects are noticed, required primary data if collected, and the collected is analysed then the experimentation is done keeping all the study aspects in mind. The experimentation results are analysed and an appropriate solution is recommended to the existing system. in this case, the recommendation maybe on traffic signalling or establishing speed limits.

Speed delay time survey

We consider a stretch of 6 km that is from Peddapuram. The features of this road are

- Single line road
- Tar bitumen road with the mix of plastic
- As it is enroute for the national highway and in this road is one of the major business are beside this road, heavy traffic is observed
- Peak hours- 08:00AM to 10: AM & 05:00PM to 08:00PM

Due to high traffic volume, a part of the stretch from Peddapuram to ramesampeta faces severe traffic jam during peak hours passengers faces long stop time due insufficient roads

The single lane road is insufficient for the traffic during peak hours near Peddapuram., surampalem, ramesampeta.

Some passengers violated the rules; this led to traffic inconvenience. At some places the road is damaged and not well maintained, this may lead to reduction in average traffic flow velocity. HMR works are going on along the stretch length; this is causing inconvenience to the travelers. Due to underground electricity wiring works, about 1.7mts of road width is been

dug and let open by the electricity department in the direction of Peddapuram to ramesampeta, this is reducing the available road with and sometimes may be dangerous during nights.

2. Pneumatic tube method:

The pressure contacts strips, either pneumatic or electric, are used to indicate the time of ending and leaving the base length. When a vehicle passes over the tube laid at the first reference point, an air impulse is sent, which activates an electromagnetically controlled stop-watch in the hands of the observer. When the vehicle passes over the second tube, the stop-watch automatically stops. Then the reading is noted by the observer or is auto saved into computer.

Advantages: The risk of human error is reduced, and parallax error can be avoided completely. This is the method over short distance. It gives quit relevant data and if it is connected through graphical recorder then it gives continuous data automatically.

Disadvantages: pressure contact tubes are easily sensed by the drivers which may affect their behaviour.



Pneumatic Road Tube Method

2.1 Doppler- principle meter :

This radar meters are frequently used for measurement of spot speed. It measures speed directly by measuring the difference in the frequency between the emitted and reflected radar wave emitted on an oncoming vehicle. It is radar meter which is targeted to a vehicle, so the wave, the frequency between the emitted and reflected wave that the difference in used to calculate the speed. This is normally reflected as Doppler effect. Dynamo meter actually works based on the principal of Doppler effect, which justifies the difference in frequency is proportional to the speed of oncoming vehicle. Using this principle, the instrument is programmed to calculate the speed of the vehicle.

This is recent advancement in speed studies; it automatically records speed, and employs a radar transmitter-receiver unit. The apparatus transmits high frequency electromagnetic waves as a narrow beam towards the moving vehicle, the beam changes its frequency depending up on the vehicle's speed and is returned to the receiver unit. Upon calibration spot speed of the vehicle is obtained.

Through these meters are widely used by engineers, traffic polices and others these have certain practical limitations. They are
→ In some situations, there is a possibility of recording wrong inputs like when a test sample is obstructed by other vehicles, the triggered radar beam bounds back by hitting the obstacle but not the test sample.
→ Accurate measurements from radar meter are obtained only when the radar wave is reflected directly along the axis of the movement. But in some cases, it is practically difficult.



RADAR method

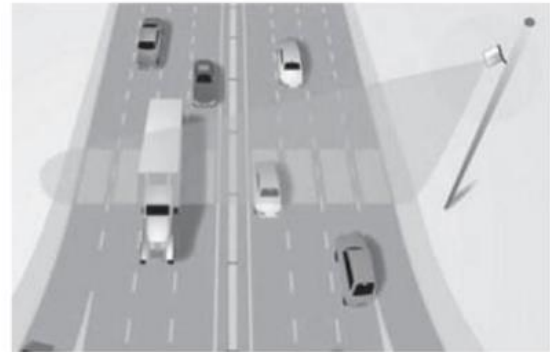
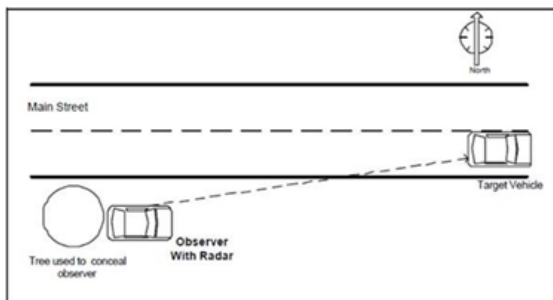


Fig. Photography method



Electronic-principle detectors (Photography)

In this method a camera records the distance moved by a vehicle in a selected short time. In this exposure of photograph should be in a constant time interval and the distance travelled by the vehicle is measured by projecting the films during the exposure interval. The main advantage of method is that, it gives a permanent record with 100% sample obtained. This method is quit expensive and generally adopted in a situation where evidence is required. Even video recording can be used which give more accurate result.

Among these available methods, we adopt stop watch method considering the advantages and adaptability of the method.

The detail experimental procedure followed will be discussed in the following section.

3. Discussions and Conclusions:

3.1 Spot Speed Study

1. Precaution sign stating “College Zone” should be established.
2. Speed limit board of 25 KMPH should be established along with college timings.
3. Zebra crossing for the students should be provided.

3.2 Speed delay time survey

Installation of Traffic Signals: As there is no traffic signals at Atchampeta junction and Samarlakotabridge, the traffic flow is heavy.

Solution : Install traffic signals at both places.

3.3 Uneven pavements at Peddapuram bypass:

The damaged roads near Peddapuram bypass are causing volunteer slowdown of vehicles and inconvenience.

Solution: New roads of high quality assuring more life time should be laid.

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