



## **ANALYSIS OF SPEED CHARACTERISTICS ON VIDYA PATH CHANDIGARH- A CASE STUDY**

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**Abstract-** Speed is considered as a quality measurement of travel as the drivers and passengers will be concerned more about the speed of the journey than the design aspects of the traffic. It is an important parameter in transportation as it relates to safety, time, comfort, convenience, and economics. Spot speed studies are done to estimate the distribution of speeds of vehicles in a stream of traffic at a particular location. The data collected from the spot speed is to be used for assessing general speed trends and for setting speed limits. This paper presents the analysis of spot speed of the vehicles travelling on the Vidya Path, Chandigarh.

**Index terms:** spot speed, speed percentiles

### I. INTRODUCTION

Speed defines the distance travelled by user in a given time, and this is a vibrant in every traffic movement. The actual speed of traffic flow over a given route may fluctuated widely, as because at each time the volume of traffic varies. A typical unit of speed is kilometers per hour (Kmph). Speed is considered as a quality measurement of travel as the drivers and passengers will be concerned more about the speed of the journey than the design aspects of the traffic. . It is defined as the rate of motion in distance per unit of time. Mathematically speed or velocity  $v$  is given by,  $v = d/t$  where,  $v$  is the

speed of the vehicle in m/s,  $d$  is distance traveled in m in time  $t$  seconds. Speed of different vehicles will vary with respect to time and space.

Spot speed is the instantaneous speed of a vehicle at a specified location. Spot speed can be used to design the geometry of road like horizontal and vertical curves, super elevation etc. Location and size of signs, design of signals, safe speed, and speed zone determination, require the spot speed data. Accident analysis, road maintenance, and congestion are the modern fields of traffic engineer, which uses spot speed data as the basic input. Spot speed can be measured using an endoscope, pressure contact tubes or direct timing procedure or radar speedometer or by time-lapse photographic methods. **(Source: Evaluation of Traffic Characteristics: A Case Study by Arash Moahadkhani Roshandeh)**

#### A. Study area

Area of study is taken along the Vidya Path in Chandigarh as shown in Fig. 1. The condition of the road is average and there are many potholes and cracks which are clearly visible along the length of the road due to which there is wide fluctuation in the speed adopted by the different vehicles.



**Fig. 1**

## B. Objective of the study

The objective of the study is to analyse the speed characteristics along the study stretch and to determine the speed percentiles, which are useful in designing and regulating the traffic.

## II. DATA COLLETION

Various methods of data collection for spot speed are: (1) stopwatch method, (2) radar meter method, or (3) pneumatic road tube method. 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 applications which are as:

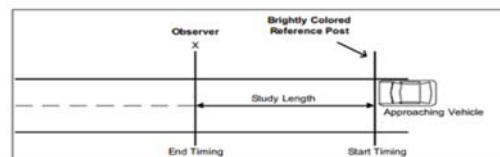
- i. Determining existing traffic operations and evaluation of traffic control devices
  - a) Evaluating and determining proper speed limits
  - b) Determining the 50th and 85th speed percentiles
  - c) Evaluating and determining proper advisory speeds
  - d) Establishing the limits of no-passing zones
  - e) Determining the proper placements of traffic control signs and markings
  - f) Setting appropriate traffic signal timing
- ii. Establishing roadway design elements
  - a) Evaluating and determining proper intersection sight distance

- b) Evaluating and determining proper passing sight distance
  - c) Evaluating and determining proper stopping sight distance
- iii. Assessing roadway safety questions
    - a) Evaluating and verifying speeding problems
    - b) Assessing speed as a contributor to vehicle crashes
    - c) Investigating input from the public or other officials
  - iv. Monitoring traffic speed trends by systematic ongoing speed studies
  - v. Measuring effectiveness of traffic control devices or traffic programs, including signs and
  - vi. Markings, traffic operational changes, and speed enforcement programs.

**Data was collected manually on the study stretch for 2- wheelers and 4-wheelers using stopwatch method as shown in Table 1 and Table 2. 100 m stretch was taken on the Vidya Path.**

### **Calculation of spot speed by stopwatch method**

The stopwatch method can be used to successfully complete a spot speed study using a small sample size taken over a relatively short period of time. The stopwatch method is a quick and inexpensive method for collecting speed data.



A stopwatch spot speed study includes five key steps:

- a) Obtain appropriate study length.
- b) Select proper location and layout.

- c) Record observations on stopwatch spot speed study data form.
- d) Calculate vehicle speeds.
- e) Generate frequency distribution table and determine speed percentiles.

### III. DATA ANALYSIS

The analysis of the study is very important to achieve the key objectives. After Data Collection, analysis is done. Collected data was compiled in tabular form and the following steps have been taken to analyse the data. Analysis is done in order to find the key parameters which may include Mean speed, 85th Percentile Speed, 98th Percentile Speed, 50th Percentile Speed, Median, Mode, Speed Variance etc. Some values are directly obtained from the data and some can be drawn from the graphs. 50th percentile speed represents the average speed of the traffic stream. The 85th percentile is the speed at which 85% of the observed vehicles are travelling at or below the particular speed. This percentile is used in evaluating/recommending posted speed limits based on the assumption that 85% of the drivers are travelling at a speed they perceive to be safe. The 98th percentile speed is the speed at which 98% of observed vehicles are travelling at or below that particular speed. The 98th percentile is the design speed.

**Table 1: Spot speed study for 2-wheelers on Vidya Path Chandigarh**

WEATHER:GOOD		DATE: 12-NOV-2014		
ROAD SURFACE:AVERAGE		TIME: 3.00-4.00pm		
SPEED CLASS LIMITS (K.P.H)	MID POINT SPEED (K.P.H)	NO. OF VEHICLES	FREQUENCY %	CUMULATIVE FREQUENCY %
18-23	20.5	3	7.5	7.5
23-28	25.5	4	10	17.5
28-33	30.5	8	20	37.5
33-38	35.5	11	27.5	65
38-43	40.5	0	0	65
43-48	45.5	9	22.5	87.5
48-53	50.5	0	0	87.5
53-58	55.5	0	0	87.5
58-63	60.5	5	12.5	100

**Table 2: Spot speed study for 4-wheelers on Vidya Path Chandigarh**

WEATHER:GOOD		DATE: 12-NOV-2014		
ROAD SURFACE:AVERAGE		TIME: 3.00-4.00pm		
SPEED CLASS LIMITS (K.P.H)	MID POINT SPEED (K.P.H)	NO. OF VEHICLES	FREQUENCY %	CUMULATIVE FREQUENCY %
18-23	20.5	10	25	25
23-28	25.5	5	12.5	37.5
28-33	30.5	9	22.5	60
33-38	35.5	9	22.5	82.5
38-43	40.5	0	0	82.5
43-48	45.5	4	10	92.5
48-53	50.5	0	0	92.5
53-58	55.5	0	0	92.5
58-63	60.5	3	7.5	100

## A. Graphical analysis

The Cumulative percentages calculated for 2-wheelers and 4-wheelers in Table-1 and Table-2 respectively is plotted against the upper limit of the various speed groups as shown in Fig. 2 and Fig. 3. A smooth S-shape curve is obtained which is called the cumulative speed curve.

The vertical axis of the curve indicates the percentage of the number of vehicles travelling at or below the indicated speed.

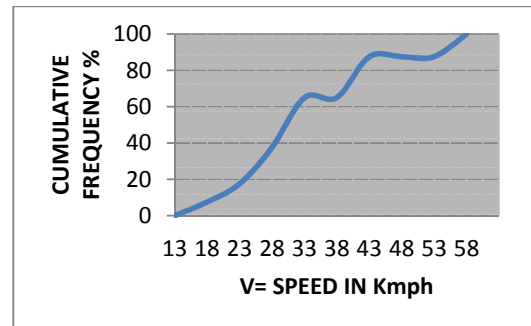
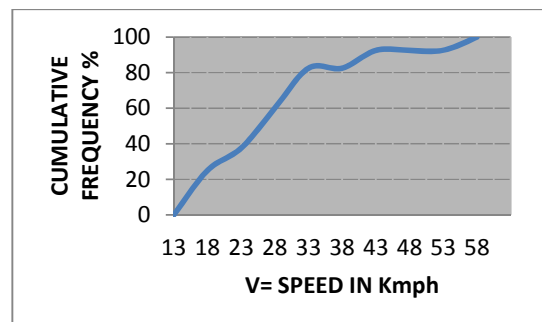


Fig.

**2 Cumulative Speed Distribution for 2-wheelers**

From graphical analysis, the following results have been obtained for 2-wheelers:

- 15th percentile speed- 22 Kmph
- 50th percentile speed- 31 Kmph
- 85th percentile speed-42 Kmph
- 98th percentile speed-58 Kmph

**Fig. 3 Cumulative Speed Distribution for 4-wheelers**

From above graph, the following results were obtained for 4-wheelers:

- 15th percentile speed- 16 Kmph

- **50th percentile speed- 26 Kmph**
- **85th percentile speed- 40 Kmph**
- **98th percentile speed- 58 Kmph**

#### IV. CONCLUSIONS

The following conclusions have been drawn from the study:

- 1) The maximum speed limit on the road is equal to 58 Kmph for 2-wheelers as well as for 4-wheelers.
- 2) All the 2-wheelers and 4-wheelers plying on the road moved with a speed ranging between 13-58 Kmph.
- 3) Maximum 2-wheelers moved with the average speed of 31 Kmph and maximum number of 4-wheelers moved with an average speed of 26 Kmph.
- 4) The 85th percentile speed i.e. the critical speed for 2-wheelers is 42 Kmph and for 4-wheelers is 40 Kmph.
- 5) The 15th percentile speed i.e. the minimum speed for 2 wheelers is 22 kmph and for 4- wheelers is 16 Kmph.

#### REFERENCES

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