2.2 SPEED STUDIES:

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.

SPOT SPEED

Spot speed is the **instantaneous speed of a vehicle** at a specified location.

Uses:

Spot speed study may be useful in any of the following aspects of traffic.

1. 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.**

2. **Accident analysis**, road maintenance, and congestion are the modern fields of traffic engineer, which uses spot speed data as the basic input.

3. To use in planning **traffic control** and in **traffic regulations**.

Spot speed can be measured using an **enoscope,** pressure contact tubes or direct timing procedure or radar speedometer or by time-lapse photographic methods.

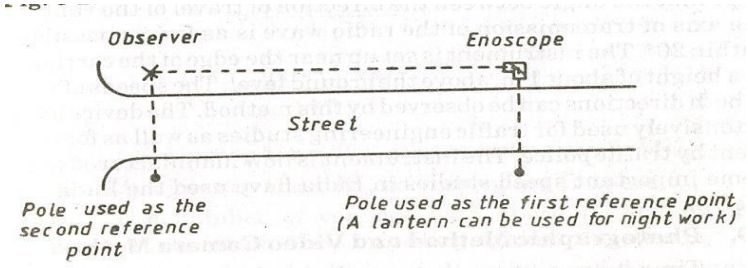
Spot speed by enoscope method:

It is one of the simplest methods of finding spot speed is by using enoscope which is by using enoscope which is **just a mirror box supported on a tripod stand.**

In its simplest principle, the observer is stationed on one side of the road

and starts a stopwatch when a vehicle crosses that section an enoscope is placed at a convenient distance of say 30m in such a way that the image of the vehicle is seen by the observer when the vehicle crosses the section where the enoscope is fixed and at this instant the stop watch is stopped.

The main advantage of this method is that it is a simple and cheap equipment and is easy to use. The greatest disadvantage is that the progress is so flow as it is difficult to spot out typical vehicles and the number of samples observed willbe les. There is also a possibility of human error.



Spot Speed by Enoscope

Other equipment used:

Graphic recorder

Photo electric meter

Speed meter

Photographic method

radar

Running speed:

Running speed is the average speed maintained over a particular course while the vehicle is moving and is found by dividing the length of the course by the time duration the vehicle was in motion.(EXCLUIDING DELAY)

Journey speed:

Journey speed is the effective speed of the vehicle on a journey between two points and is the distance between the two points divided by the total time taken forthe vehicle to complete the journey including any stopped time.(INCLUDING DELAY)

Time mean speed:

Time mean speed is defined as the average speed of all the vehicles passing a point on a highway over some specified time period.

Space mean speed:

Space mean speed is defined as the average speed of all the vehicles occupyinga given section of a highway over some specified time period.

The space mean speed is slightly **lower than** time mean speed under typical conditions on rural highways.

Average speed:

It is the average of the spot speeds of all vehicles passing a given point on the highway.

2.2.1 CAPACITY AND LEVEL OF SERVICE

Overview

Capacity and Level of service are two related terms. Capacity analysis tries to give a clear understanding of how much flow much traffic a given transportation facility can accommodate. Level of service tries to answer how much flow good is the present traffic situation on a given facility. Thus it gives a qualitative measure of traffic, whereas capacity analysis gives a quantitative measure of a facility. Capacity and level of service varies with the type of facility, prevailing traffic and road conditions etc. These concepts are discussed in this chapter.

CAPACITY

Capacity is defined as the maximum number of vehicles, passengers, or the like, per unit time, which can be accommodated under given conditions with a reasonable expectation of occurrence.

Highway capacity

Highway capacity is defined by the Highway Capacity Manual as the maximum hourly rate at which persons or vehicles can be reasonably expected to traverse a point or a uniform segment of a lane or roadway during a given time period
under prevailing roadway, traffic and control conditions. The highway capacity depends on
certain conditions as listed below;

1. **Traffic conditions:** It refers to the traffic composition in the road such as the mix of cars, trucks, buses etc in the stream. It also include peaking characteristics, proportions of turning movements at intersections etc.
2. **Road way characteristics:** This points out to the geometric characteristics of the road. These include lane width, shoulder width, lane configuration, horizontal alignment and vertical alignment.
3. **Control conditions:** This primarily applies to surface facilities and often refer tothe signals at intersections etc.

Level of service

A term closely related to capacity and often confused with it is service volume. When capacity gives a quantitative measure of traffic, level of service or LOS tries to

give a qualitative measure. A service volume is the maximum number of vehicles, passengers, or the like, which can be accommodated by a given facility or system under given conditions at a given level of service.

For a given road or facility, capacity could be constant. But actual flow will be different for different days and different times in a day itself. The intention of LOS is to relate the traffic service quality to a given flow rate of traffic. It is a term that designates a range of operating conditions on a particular type of facility.

Highway capacity manual (HCM) developed by the transportation research board of USA provides some procedure to determine level of service. It divides the quality of traffic into six levels ranging form level A to level F. Level A represents the best quality of traffic where the driver has the freedom to drive with free flow speed and level F represents the worst quality of traffic. Level of service is defined based on the measure of effectiveness or (MOE).

Typically three parameters are used under this and they are speed and travel time, density, and delay. One of the important measures of service quality is the amount of time spent in travel. Therefore, speed and travel time are considered to be more effective in defining LOS of a facility. Density gives the proximity of other vehicles in the stream.

Since it affects the ability of the driver to maneuver in the traffic stream, it is also used to describe LOS. Delay is a term that describes excess or unexpected time spent in travel. Many specific delay measures are defined and used as MOE's in the highway capacity manual.

Factors affecting level of service

Level of service was introduced in Highway capacity manual(HCM) to denote the level of service one can derive from a road under different operating characteristics and traffic volumes.

The factors affecting level of service (LOS) can be listed as follows

1. Speed and travel time
2. Traffic interruptions/restrictions

3. Freedom to travel with desired speed
4. Driver comfort and convenience
5. Operating cost