Traffic Flow Theory

<u>Fundamental Parameters</u>

Volume (q)

The number of vehicles passing a point on a road (veh./h).

Travel Speed

The total distance travelled divided by the total elapsed time, including all delays, ie. the average speed, (km/h).

Travel Time

The total elapsed travel time which includes stops and delays, necessary for a vehicle to travel from one point to another, (min.).

Spot Speed

The instantaneous speed of a vehicle at a specific point in time, (km/h).

Average Travel Speed (v)

The average of the travel speeds for vehicles traversing a road segment (space mean speed).

Running Time

The total time that a vehicle is in motion (min.).

Headway (h)

The time interval (or gap) between vehicle arrivals at a point, measured from the same point on vehicles, eg. front of vehicle, (sec/veh).

Spacing/Distance Gap (s)

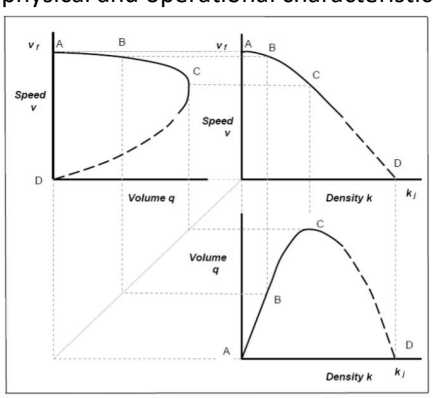
The distance between the same point on two successive vehicles in a traffic lane, (m/veh).

Density/Concentration (k)

The number of vehicles per unit length of roadway at a given instant, (veh/km).

Capacity (c)

The maximum hourly (flow) rate at which vehicles can reasonably be expected to traverse a point during a given time period (eg. 15 minutes) under the prevailing roadway, traffic & control conditions. It is a measure of a highways ability to accommodate traffic and is a function of the physical and operational characteristics of the road and traffic.



Speed, Volume & Density AUSTRO

$$q = 1/h$$

$$k = 1/s$$

$$q = v \times k$$

Levels of service are *qualitative* measures describing the operational conditions *experienced* by motorists. A-F. Traffic speed, density and % delay time are used to measure LOS.

Service Flow, the maximum flow of vehicles that can pass over a given section during a certain time period that can maintain a desired LOS.

Capacity estimate. Assume base capacity then adjust for factors.

$$C = 1800 * F_W * F_{hv}$$

$$F_w - Factor\ for\ lane\ width\ and\ lateral\ clearance\ (Table)$$

$$F_{hv} - adjustment\ for\ heavy\ vehicles = 1 / [1 + P_{hv}(E_{hv} - 1)]$$

$$P_{hv} - Proportion\ of\ heavy\ vehicles, E_{hv} - average\ passenger\ car\ equivalents$$

Traffic Control Devices (TCD's)

Placement of signs. Parameters, legibility distance, reading distance, reaction distance, braking distance. Reading distance -> size of lettering, vision cone.

Distance from sign when most drivers can read it

Letter Series	Median Legibility Distance (per 10mm of letter height)
C	5m
D	6m
E	7m
Lower Case	7.5m*

Vision Cone, horizontal vision arc (10o each side of direct line of sight), vertical vision arc (5o from direct line of sight), allows minimum legibility distance (dminl) to be estimated.

When is the sign readable? dl = dmedianl - dminl

Reading distance = velocity x readint time. 0.3s /word (short, simple & familiar), 0.7s /word (unfamiliar & direction signs), 0.75s (simple symbols).

Legibility distance must be greater than reading distance.

Reaction Distance = velocity x reaction time (1.5 for simple, 4 for unfamiliar)

Braking distance = v^2/2a. A = acceleration.

Sign location = dread+dreact+dbrack-dmedianl.

Sustainability

2 Principles of Sustainable Transport

1. For an urban transport system to be *sustainable* it must be one in which the carbon emissions from its operation, and embodied in new infrastructure construction, are reduced to a level compatible with global temperature rise from pre-industrial level s of no more than 2 degrees Celsius.
2. For a sustainable urban transport system also to be fair it must be one whose per capita carbon emissions are approximately the same in all cities worldwide