TRAFFIC ENGINEERING

Civil Engineering Department

Lecturer Sady Abd Tayh
Lecturer Rana Amir Yousif

Third Class

2018-2019

Travel Time and Delay Study

Purpose

1. Evaluate the quality of traffic movement along a route, and determine the locations, types, and extent of traffic delays by using a moving test vehicle.

2. Compare operational conditions before and after roadway or intersection improvements have been made.

3. Monitor level of service for the roadway.

4. Develop recommendations for improvements such as traffic signal retiming, safety improvements, turn lane additions, and channelization enhancements.

Definitions:

- Travel time: is the time taken by a vehicle to traverse a given section of a highway.
- Running time: is the time a vehicle is actually in motion.
- Delay: is the time lost by a vehicle due to causes beyond the control of the driver.

- Operational delay : is that part of the delay caused by the impedance of other traffic. This impedance can occur either as side friction, where the stream flow is interfered with by other traffic (for, example, parking or unparking vehicles) or as internal friction, where the interference is within the traffic stream (for example, reduction in capacity of the highway).

- Stopped-time delay : is that part of the delay during which the vehicle is at rest. (standing still).

- Fixed delay : is that part of the delay caused by control devices such as traffic signals.

- Travel-time delay : is the difference between the actual travel time and the travel time that will be obtained by assuming that a vehicle traverse the study section at an average speed equal to that for uncongested traffic flow on the section being studied.

Example: Procedure for Intersection Delay
(5 minutes of data for one approach)

Time (min.) Starting at	Total No. of vehicles stopped in approach at time				Approach Vol.	
	+0 sec.	+15 sec.	+30 sec.	+45 sec.	No. Stopping	No. Not Stopping
5:00	0	2	7	9	11	6
5:01	4	0	0	3	6	14
5:02	9	16	14	6	18	0
5:03	1	4	9	13	17	0
5:04	5	0	0	2	4	17
subtotal	19	22	30	33	56	37
total	104				93	

Solution:

- Total delay = total number observed * observation interval
  = 104 * 15 = 1560 vehicle-seconds of delay.

- Average delay per stopped vehicle = $\frac{\text{total delay}}{\text{number of stopping vehicles}}$
  = $\frac{1560}{56}$ = 27.8 sec./veh.

- Average delay per approach vehicle = $\frac{\text{total delay}}{\text{approach volume}}$
  = $\frac{1560}{93}$ = 16.8 sec./veh.

Percent of vehicles stopped = $\frac{\text{number of stopping vehicles}}{\text{approach volume}}$

$= \frac{56}{93} = 60.2$ percent.

Example: Sampling procedure for Intersection Travel Time (5 minutes of data for one approach).

Time (min.) min. starting at:	Instantaneous density counts (for time interval in the approach at time.			
	+ 0 sec.	+ 15 sec.	+ 30 sec.	+ 45 sec.
5:00	0	4	5	7
5:01	3	8	4	2
5:02	5	0	6	1
5:03	5	3	6	6
5:04	6	7	4	7
subtotal	19	22	25	23
Total (N) density	89			

Total volume leaving intersection approach = V = 70 (during a time of 5 minutes)

Solution:

Average travel time $\Rightarrow T = \frac{Nt}{V} = \frac{89 \times 15}{70} = 19.1$ sec.

Total time = $N * t = 89 * 15 = (\quad)$ veh. sec.