

# Traffic Analysis: Some Key Elements

## Overall Approach

Computer models are used to provide information such as traffic volumes, queue length, delays, and levels of service (collectively called Measures of Effectiveness or MOE), for two conditions:

1. **No-Build Scenario:** The situation in the project build-out year, without the project. This is derived by adding three items: 1) Existing Situation data, 2) average traffic growth rate, based on historical data, and 3) projected additional traffic from known off-site developments in the planning or construction phases.
2. **Build Scenario:** The situation in the project build-out year adding the project impacts to the No-Build Scenario.

First, data collection is used to establish the existing volumes and observations are used to determine existing trip distribution, queue lengths, and delays to calibrate the model. Then, additional volumes for off-site developments and the project are added, using trip generation rates for other similar projects, normally taken from nationwide surveys summarized in the Institute of Transportation Engineers (ITE) Manual. Generally, calculations are made and data is calculated at intersections or driveways; sometimes, they are made for roadways between intersections.

## Definitions

- **Volume:** The number of vehicles on a lane or road, typically measured per hour, day, week, or year. Intersection volume is the total number of all vehicles entering the intersection.
- **Capacity:** Capacity is the maximum number of vehicles per unit time (usually an hour or a day), which can be accommodated under given conditions with a reasonable expectation of occurrence. Can apply to a single lane, a road, an intersection, etc.
- **Queue Length:** The average length of the line of vehicles stopped or moving slowly (less than 3 miles per hour) approaching an intersection, road narrowing, or other blockage, usually measured in feet or car lengths (multiples of 20'). The rate of arriving vehicles exceeds the rate of departures because of the limited capacity at the bottleneck. The queue length can be calculated by adding or subtracting the hourly differences between the demand volume and capacity.
- **Travel Time:** The amount of time required to travel from one point to another on a given route.
- **Free-Flow Speed:** The speed without other vehicles or bottlenecks present, normally the posted speed limit.
- **Delay (Del):** The travel time (for all vehicles entering and attempting to enter the system during the analysis period) minus the theoretical travel time at the free-flow speed, usually measured in seconds. For example, if traffic is slowed along a stretch of road and/or there is a queue before an intersection, the delay is the total time lost because of the slowing as well as moving through the backed-up line.
- **Level of Service (LOS):** A measure of user satisfaction. For an intersection or driveway, it is linked to average delay. For roads between intersections, it is linked to the ratio of volume to capacity (V/C).

Levels of Service			
Level of Service	Unsignalized Intersections Delay (seconds per vehicle)	Roadway Volume/Capacity	Description
A	0 to 10	0.00 to 0.60	Free flow
B	10 to 15	0.61 to 0.70	Stable flow with slight delays
C	15 to 25	0.71 to 0.80	Stable flow with acceptable delays
D	25 to 35	0.81 to 0.90	Approaching unstable operations. Small increases in volume produce substantial increases in delay.
E	35 to 50	0.91 to 1.00	Unstable. Significant delays. Low average speeds.
F	More than 50	Greater than 1.00	Forced flow (jammed). Extremely low speeds. Intersection congestion. High delay.