



*Helping Communities face the challenge
and impacts of growth while maintaining
community character and a sense of place.*

City of Nashua Transportation Toolkit: Understanding Traffic Studies

March 2008

#3062-187



Nashua Regional Planning Commission

Background

- Traffic studies provide insight regarding the traffic implications associated with various development projects.
- A thorough traffic study typically includes a project description, a description of existing and future traffic conditions, traffic operations analysis and identification of key issues and recommendations.



Traffic Study Framework

Gather Information About Existing Conditions:

- Existing roadways
- Intersections
- Traffic volumes
- Peak hour traffic volumes
- Peak hour turning movements
- Accident data

Traffic Study Framework

Estimate Future Conditions:

- Planned roadway improvements
- Anticipated traffic growth
- Build/no-build traffic volumes
- Vehicle trip distribution
- Vehicle trip generation

Traffic Study Framework

Traffic Analysis:

- Existing & future intersection level of service (LOS)
- Movement-specific delay for each intersection in the study area

Traffic Study Framework

Use Information to Identify Key Issues:

- Identify and analyze key issues along the road segment, corridor or intersection, based on the data that has been gathered.
- Facilitate public input session to help identify local issues and concerns.

Traffic Study Framework

Develop Recommendations:

- Once issues have been identified, recommendations can be developed.
- An Action Plan helps to lay out a time frame for implementing recommendations.

Terminology

Average Daily Traffic (ADT)

- The average number of vehicles that travel the road segment during a 24-hour period
- Planners take the total traffic volume during a given time period and divide by the number of days in the time period.



Terminology

Capacity

- The maximum rate at which persons or vehicles can be expected to traverse a point during a given time period under typical roadway and traffic conditions
- Capacity can apply to intersections or segments of roadway.
- The capacity of a roadway or intersection is affected by the # of lanes, lane width, the presence of a median and other factors.

Terminology

Volume to Capacity

- The Volume-to-Capacity ratio (V/C) measures the level of congestion on a roadway or intersection.
- It is measured simply by dividing the volume of traffic (existing or future) by the capacity of the roadway or intersection.

Terminology

Volume to Capacity

- The V/C ratio makes it possible to estimate the relative level of congestion on a segment of roadway or intersection:
 - V/C ratio > 1 = Severe congestion
 - V/C ratio 0.75 to 1.0 = Heavy Congestion
 - V/C ratio 0.5 to 0.74 = Moderate Congestion
 - V/C ratio < 0.5 = Low or no Congestion
- The V/C ratio is one of the factors used to estimate the Level of Service of a roadway or intersection.

Terminology

Level of Service (LOS)

- LOS is used to estimate the quality of operations at specific transportation facilities such as roads, lanes, intersections and intersection approaches during the “peak hour” of traffic.
- LOS characterizes the operating conditions on the facility in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort and convenience.
- The levels of service range from LOS A (least congested) to LOS F (most congested).



Terminology

LOS Definitions

| Level of Service | General Operating Conditions |
|------------------|--|
| A | Free flow (traffic flows at or above speed limit and motorists have complete mobility between lanes) |
| B | Reasonably free flow (slightly more congested, with some impingement of maneuverability) |
| C | Stable flow (more congested than B, ability to pass or change lanes is not always assured. Experienced motorists are comfortable, roads are below but close to capacity, and posted speed is maintained) |
| D | Approaching unstable flow (speeds are somewhat reduced, motorists are hemmed in by other vehicles. Example: busy shopping corridor during middle of a weekday, or a functional urban highway during rush hour) |
| E | Unstable flow (flow becomes irregular, speed varies widely and rarely reaches speed limit. This is consistent with a road over its capacity) |
| F | Forced or breakdown flow (a constant traffic jam) |

Terminology

Intersection Delay

- Intersection LOS analysis for signalized and non-signalized intersections is closely associated with *intersection delay*.
- Transportation planners use various inputs to determine how long motorists have to wait before they can move through an intersection.
- The amount of time the motorists must wait determines the LOS for that intersection.



Terminology

Intersection Delay: Signalized Intersection

| Level of Service | Control Delay per Vehicle (sec./veh.) Amount of Time to Travel through an Intersection |
|------------------|---|
| A | ≤ 10 |
| B | > 10-20 |
| C | > 20-35 |
| D | > 35-55 |
| E | > 55-80 |
| F | > 80 |

Terminology

Intersection Delay: Non-Signalized Intersection

| Level of Service | Control Delay per Vehicle (sec./veh.) |
|------------------|---------------------------------------|
| A | 0 – 10 |
| B | 10 – 15 |
| C | 15 – 25 |
| D | 25 – 35 |
| E | 35 – 50 |
| F | > 50 |

Terminology

Trip Generation

- Trip generation is the number of vehicle trips that result from a specific site development.
- The Institute for Traffic Engineers Trip Generation Manual provides an industry standard of the anticipated number of trips for a wide range of specific land uses.

Terminology

Trip Generation

| Land Use | Vehicle Trips/Unit/Day |
|------------------------------|---------------------------|
| Single Family Housing | 10 Trips/Home/Day |
| Fast Food W/Drive Through | 496 Trips /1000 sq ft/Day |
| Home Improvement Super Store | 30 Trips/1000 sq ft/Day |
| Pharmacy W/ Drive Through | 88 Trips/1000 sq ft/Day |

Understanding Traffic Studies

- Existing Conditions
- Future Conditions
- Traffic Analysis
- Identify Key Issues
- Recommendations and Action Plan



Understanding Traffic Studies

Questions?



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City of Nashua