

KANE COUNTY

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To: Road Improvement Impact Fee Advisory Committee

From: KDOT Staff

Re: Explanation of Level of Service

Level of Service (LOS) definition:

“A qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience” *Highway Capacity Manual HCM2000, Transportation Research Board (TRB)*. Most design or planning efforts typically use LOS C or D, to ensure an acceptable operating service for facility users.

FOR INTERSECTIONS

For signalized intersections, both LOS and volume to capacity (V/C) ratio are indicative of an intersection's operation. For signalized intersections LOS is defined in terms of control delay per vehicle. Control Delay (CD) includes a vehicle's initial deceleration delay at a signal, queue move-up time, stopped delay, and final acceleration delay.

- **LOS A:** Very low delay, favorable progression &/or short cycle length (CDV < 10 seconds).
- **LOS B:** Low delay, good progression &/or short cycle length (CDV is 10-20 seconds).
- **LOS C:** Average delays due to fair progression &/or longer cycle lengths. Individual cycle failures begin to appear (CDV is 20-35 seconds).
- **LOS D:** Longer delays due to unfavorable progression, long cycle lengths or high volume to capacity ratios. Individual cycle failures are noticeable (CDV is 35-55 seconds).
- **LOS E:** High delay values indicating poor progression, long cycle lengths and high volume to capacity ratios. Individual cycle failures are common. This is considered to be the limit of acceptable delay (CDV is 55-80 seconds).
- **LOS F:** Delays unacceptable to most drivers due to over saturation, poor progression or very long cycle lengths (CDV is > 80 seconds).

FOR ROADWAY SEGMENTS

For roadway segments, *average delay and speed* enter into the LOS determination along with other factors. LOS measures the *quality* of traffic service, and may be determined for each roadway segment on the basis of *delay, congested speed, volume to capacity (V/C) ratio, or vehicle density by functional class*.

- **LOS A:** Primarily free flow operation at average travel speeds, usually about 90% of the free-flow speed for the arterial classification.
- **LOS B:** Reasonably unimpeded operations at average travel speeds, usually about 70% of the free-flow speed for the arterial classification.
- **LOS C:** Stable operations; however, ability to maneuver and change lanes in mid-block location may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both, may contribute to lower than average travel speeds of about 50% of the average free-flow speed for the arterial classification.
- **LOS D:** Borders on a range in which small increases in flow may cause substantial increases in delay, and hence decreases in arterial speed. Average travel speeds are about 40% of free-flow speeds. **LOS D is often used as a limiting criterion for design purposes.**
- **LOS E:** Significant delays and average travel speeds of one-third of the free-flow speed or less. LOS E is sometimes accepted as a limiting criterion for design purposes when restricted conditions make it impractical to consider a higher LOS.
- **LOS F:** Arterial flow at extremely low speeds, below one-third to one-fourth of the free-flow speed. Intersection congestion is likely at critical signalized location with high delays and extensive queuing. LOS F is *never* used as a design standard. It represents a condition that is intolerable to most motorists.

Source: Highway Capacity Manual HCM2000, Transportation Research Board (TRB), Exhibit 16-2 and Fehr & Peers Transportation Consultants