Spack SOLUTIONS

Engineering Guide

Level of Service (LOS)

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Level of Service (LOS) is a qualitative description, similar to typical school grades, that traffic engineers use to communicate how good or bad traffic operations are on a corridor, intersection, or interchange.

Common Factors

Traffic can be a hard thing to quantify as everyone has a different tolerance for congestion. What seems excessively long to one person may seem good enough for another. These differences are readily apparent when comparing small towns or rural areas, where five cars an hour can be the norm, to big cities or downtowns, where less than hundred cars an hour, even in the middle of night, is rare.

To combat this issue and provide a consistent measuring tool for traffic studies, a "Level of Service" rating was developed. Level of Service ratings are based on the roadway or intersection characteristics and the amount of traffic. Just like grade school, LOS A represents the best traffic operations, where traffic flows freely. LOS F, on the other hand, represents failing operations, where the road or intersection is congested and running beyond maximum capacity. LOS E is typically considered "at capacity" which means the amount of traffic is right at the level the roadway or intersection can adequately accommodate.

COMMON FACTORS IMPACTING LEVEL OF SERVICE

- Number of Lanes.
- Traffic Volumes.
- Intersection Control (stop sign, signal, roundabout, interchange.)
- Amount of access on a corridor.
- Percentage of turning traffic.
- Traffic signal cycle length (green time devoted to each approach) and phasing (one green for all approach movements or separate green arrows.)
- Percentage of heavy trucks.
- Roadway grades.
- Distribution of traffic within a peak hour as well as over the course of a day.
- Pedestrian activity.
- Bicycle activity.

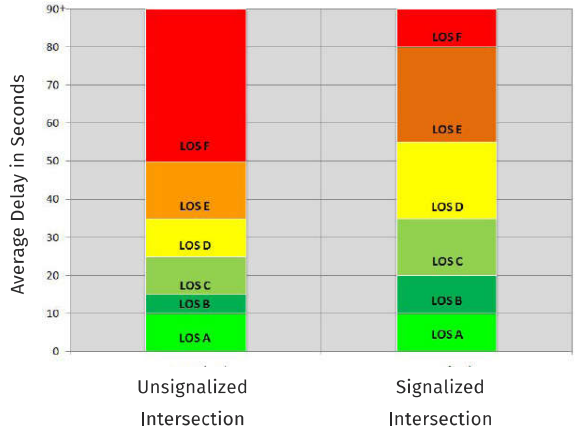
Using Level of Service letter grades provides an easy way to convey road operations to the general public and has been adopted across the United States.

Level of Service criteria have been developed for multiple types of traffic operations including:

- Transit Service
- Bicycle Operations
- Pedestrian Operations
- Intersections
- Urban Corridors
- Freeways

The most common LOS criteria used is for car operations at intersections; both signalized and unsignalized. For an intersection Level of Service analysis, average delay for cars travelling through the intersection is used to determine the appropriate grade. A high delay results in a poor LOS rating and equates to poor operations. Similarly, low delay results in a good LOS rating and equates to good or great operations.

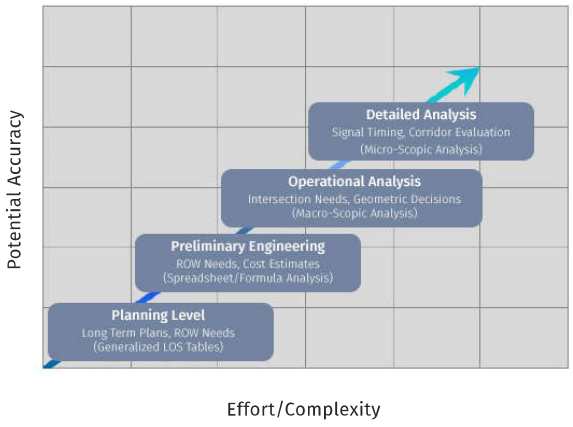
LOS can be determined for the intersection as a whole, or for individual movements. It is common during peak periods in major population areas for an intersection to have an acceptable overall LOS rating, but fail to achieve a good grade for individual movements.



Although a Level of Service rating of A represents the best traffic operations, it is not always the most desirable. Providing LOS A for all corridors and all operations at all times would require a significant amount of land to be devoted to the road infrastructure, which makes it extremely costly to build and maintain. During non-peak times, like overnight, much of that infrastructure would sit unused.

On the opposite side of the spectrum, a Level of Service rating of E and F represent traffic operations close to breaking down, or that already have. These ratings mean high delays, long queues, and slow speeds, not to mention driver frustration.

Instead of trying to achieve one or the other, government agencies try to strike a balance between providing acceptable operations, neither failing nor flowing too freely. Because of this, **LOS D is typically considered the lowest LOS acceptable by government agencies** and is reflective of a balanced approach between cost and benefit.



LOS A

LOS C

LOS D = Acceptable

LOS F = **Unacceptable**

There are many tools and guidelines used to determine a road's Level of Service rating. Simple tools like generalized roadway capacities allow for planning-level efforts. While inexpensive and quick to complete, they are not as accurate as other options. More complicated tools, such as micro-simulations, provide more accurate results, but cost more and take more time. It is important to understand the trade-offs between the analysis types as well as the purpose of the study.

Resources

- Highway Capacity Manual, fifth edition
- National Cooperative Highway Research Program Report 616; Multimodal Level of Service Analysis for Urban Streets
- Florida Department of Transportation Quality/Level of Service Handbook