



# Traffic - Level of Service (LOS)

## How do you evaluate if a street or intersection is functioning?

As a driver, you have a sense of when you feel a street is working or not. Ask 10 drivers and you will get 12 answers from “busy” to “insanely busy” or even “totally failing”. Traffic engineers are a little more methodical.

Engineers evaluate roads using what they call “Levels of Service” or LOS, using engineering methodologies laid out in the Highway Capacity Manual (HCM) published by the Transportation Research Board. This manual is a nationally recognized and locally accepted method for measuring traffic flow and congestion.

Like being in school, LOS is graded from A to F. An “A” describes conditions which are “free flowing” while an “F” indicates there is “extreme congestion with significant delays”.

In simple terms, an engineer looks at how long the average vehicle is delayed at an intersection and grades that intersection based on that delay.

| Level of Service   | Average Delay/Vehicle (sec.) |                     | Description  |
|--------------------|------------------------------|---------------------|--|
|                    | Signalized                   | Unsignalized        |  |
| A (Desirable)      | <10 seconds                  | ≤10 seconds         | Very low delay, most vehicles do not stop.   |
| B (Desirable)      | >10 and ≤20 seconds          | >10 and <15 seconds | Low delay resulting from good progression, short cycle lengths, or both.   |
| C (Desirable)      | >20 and ≤35 seconds          | >15 and <25 seconds | Higher delays with fair progression, longer cycle lengths, or both.  |
| D (Acceptable)     | >35 and ≤55 seconds          | >25 and <35 seconds | Noticeable congestion with many vehicles stopping. Individual cycle failures occur.  |
| E (Unsatisfactory) | >55 and ≤80 seconds          | >35 and <50 seconds | High delay with poor progression, long cycle lengths, high v/c ratios, and frequent cycle failures.                            |
| F (Unsatisfactory) | >80 seconds                  | >50 seconds         | Very long delays, considered unacceptable by most drivers. Often results from over-saturated conditions or poor signal timing. |

Source: 6<sup>th</sup> Edition Highway Capacity Manual, Transportation Research Board, 2016.

\*This snapshot is of Table 4, taken from the Woodland Industrial Site Study produced for the city by SCJ Alliance and we thank them for its use.

## What does that mean?

Signalized – A signalized intersection is one that has a street light or a roundabout.

Unsignalized – An intersection with 1 or more stop signs.

In Woodland, we don’t have a lot of signalized intersections. We have three roundabouts at Exit 22 and one on SR-503. We also have three lights, all at Exit 21. However, we have a huge number of unsignalized intersections.

If you look closely, you will note that unsignalized intersections actually have shorter delay standards than signalized intersections.

In practical terms, this means that in general, you can expect to spend less time at a stop sign than you might at a signalized intersection. (Duh...anyone who has stopped for a red light at an empty intersection, or been stuck waiting for a green arrow, knows that.) But you also have to recognize that at a traffic light or roundabout, at least you know your turn is coming. (Anyone who has tried to make a left turn on SR-503 knows how frustrating that wait can be.)

### **Don't they know it's rush hour?**

Bear in mind that streets are open 24-hours a day, 7-days a week, 365 days a year. The vast majority of that time, most intersections in the city are at LOS A or LOS B. You can cruise on up and through the intersection without delay.

Knowing that, traffic engineers focus on the busiest times of the day. What you and I know as "Rush Hour". Engineers call it the "AM Peak Hour" in the morning and "PM Peak Hour" in the evening. They do this to recognize that some intersections are busiest in the morning while others are busiest in the evening. But generally, the "evening rush hour", or PM Peak Hour (PMPH) is the busiest.

Traffic models also recognize that traffic patterns are different at each intersection. They also recognize that some are busy from 6:30 AM to 8:00 AM, while others are busiest 4:00 PM to 6:00 PM. All intersections are different and the model takes that into account.

For example, intersections near schools may be busiest from 7:30 AM till 8:15 AM because student drop-off is at the same time that commuters are trying to get to work. But schools might get out at 3:00 PM. So those same intersections may be half-empty at 5:30 PM when the commuters are coming home.

Advanced computer modeling takes all of this information into account and any development project that contributes significant trips to our road system, must provide a traffic report that looks at the LOS before the project and that models the effects of the project. That is often reflected as a Volume-to-Capacity (V/C) ratio or the Critical Movement Control Delay.

| Intersection                               | Traffic Control | LOS Target <sup>4</sup> | Worst Movement | PM Peak Hour     |                    |                  |
|--|-----------------|-------------------------|----------------|------------------|--------------------|------------------|
|  |                 |                         |                | V/C <sup>3</sup> | Delay <sup>2</sup> | LOS <sup>1</sup> |
| 1 – Dike Access Road at I-5 NB on/off-ramp | RBT             | D                       | Overall        | 0.56             | 7.9                | A                |
| 2 – Dike Access Road at I-5 SB on/off-ramp | RBT             | D                       | Overall        | 0.80             | 8.5                | A                |
| 3 – Dike Access Road at Schurman Way       | RBT             | D                       | Overall        | 0.48             | 7.2                | A                |

### **When is an intersection considered failing?**

A grade of LOS E is considered failing. For signalized intersections, E occurs when the average car has to be waiting (aka delayed) for 55-seconds or more. (That's average car...for the busiest hour of the entire day.) Above, you see average delays from 7.2 to 8.5 seconds.

So, if you are the first car and you have to waited three minutes, and three cars roll up just as the light turns green, the "average" wait time is 45 seconds (3-minutes, 0-Minutes, 0-minutes and 0-minutes = 45 seconds average). Bummer. An engineer is going to look at you and be happy with a Level of Service D.

I'm sorry to say, the moral of the story is that while you may feel a road is "insanely busy", it may be that the intersection you're stuck at, is working as designed.

*Did you know? - All intersections in the City of Woodland are performing at an LOS of D or better except for one. If you are on Buckeye St. trying to turn left on Goerig St. that turn has a LOS of F.*