Appendix B

Level of Service Concept

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Level of Service (LOS) is a qualitative measurement of intersection operation. LOS for both unsignalized and signalized intersections is based on control delay. Control delay is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. In general, control delay is the difference between the travel time actually experienced to the travel time experienced under ideal conditions in the absence of traffic control, geometric delay, incidents, and other vehicles.

Signalized Intersection LOS

Level of service, based on average control delay, is defined for the intersection as a whole at signalized intersections. Control delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the deceleration and acceleration delay, the stopped delay, and the volume to capacity ratio for the lane group or approach in question.

EXHIBIT B-1
Intersection Level of Service Criteria

Level of Service	Average Delay (seconds per vehicle)	Traffic Flow Characteristics
Signalized Intersections		
A	≤ 10	Most vehicles arrive during the green phase and do not stop at all.
B	> 10 - ≤ 20	More vehicles stop, causing higher delay.
C	> 20 - ≤ 35	Vehicle stopping is significant, but many still pass through the intersection without stopping.
D	> 35 - ≤ 55	Many vehicles stop, and the influence of congestion becomes more noticeable.
E	> 55 - ≤ 80	Very few vehicles pass through without stopping.
F	> 80	Considered unacceptable to most drivers. Intersection is not necessarily over capacity, even though arrivals exceed capacity of lane groups.
Unsignalized Intersections		
A	≤ 10	Free flow
B	> 10 - ≤ 15	Stable flow (slight delays)
C	> 15 - ≤ 25	Stable flow (acceptable delays)
D	> 25 - ≤ 35	Approaching unstable flow (tolerable delays)
E	> 35 - ≤ 50	Unstable flow (intolerable delays)
F	> 50	Queuing on minor approaches and not enough gaps of suitable size to allow safe crossing of major streets. Signalization should be investigated at this point, but warrants must be satisfied before implementation.

Source: Highway Capacity Manual (2000)

Unsignalized Intersection LOS

Level of service for all-way stop-controlled (AWSC) intersections is defined as average control delay for the whole intersection. Control delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. Two-way stop-controlled (TWSC) intersections apply the same methodology, but only provide delay for the minor stop-controlled approaches. Level of service for TWSC intersections is not defined for the intersection as a whole.