

E. LEVEL OF SERVICE (LOS)

Level of Service¹

A multilane highway is characterized by three performance measures:

- Density, in terms of passenger cars per mile per lane;
- Speed, in terms of mean passenger car speed; and
- Volume to capacity ratio.

Each of these measures indicates how well the highway accommodates traffic flow.

Density is the assigned primary performance measure for estimating LOS. The three measures of speed, density, and flow or volume are interrelated. If the values of two of these measures are known, the remaining measure can be computed.

LOS A describes completely free-flow conditions. The operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the geometric features of the highway and by driver preferences. Maneuverability within the traffic stream is good. Minor disruptions to flow are easily absorbed without a change in travel speed.

LOS B also indicates free flow, although the presence of other vehicles becomes noticeable. Average travel speeds are the same as in LOS A, but drivers have slightly less freedom to maneuver. Minor disruptions are still easily absorbed, although local deterioration in LOS will be more obvious.

In LOS C, the influence of traffic density on operations becomes marked. The ability to maneuver within the traffic stream is clearly affected by other vehicles. On multilane highways with an FFS above 50 mi/h, the travel speeds reduce somewhat.

Minor disruptions can cause serious local deterioration in service, and queues will form behind any significant traffic disruption.

¹ Quoted from the *Highway Capacity Manual 2000, Chapter 12 – Highway Concepts, Multilane Highways, Pages 12-7 and 12-8.*

At LOS D, the ability to maneuver is severely restricted due to traffic congestion.

Travel speed is reduced by the increasing volume. Only minor disruptions can be absorbed without extensive queues forming and the service deteriorating.

LOS E represents operations at or near capacity, an unstable level. The densities vary, depending on the FFS. Vehicles are operating with the minimum spacing for maintaining uniform flow. Disruptions cannot be dissipated readily, often causing queues to form and service to deteriorate to LOS F. For the majority of multilane highways with FFS between 45 and 60 mi/h, passenger-car mean speeds at capacity range from 42 to 55 mi/h but are highly variable and unpredictable.

LOS F represents forced or breakdown flow. It occurs either when vehicles arrive at a rate greater than the rate at which they are discharged or when the forecast demand exceeds the computed capacity of a planned facility. Although operations at these points and on sections immediately downstream appear to be at capacity, queues form behind these breakdowns. Operations within queues are highly unstable, with vehicles experiencing brief periods of movement followed by stoppages. Travel speeds within queues are generally less than 30 mi/h. Note that the term LOS F may be used to characterize both the point of the breakdown and the operating condition within the queue.

Although the point of breakdown causes the queue to form, operations within the queue generally are not related to deficiencies along the highway portion.

Exhibit A-1: Level of Service Photographs

From the U. S. Department of Transportation Freeway Management Handbook, August 1997

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FREEWAYS



Illustration 3-5. LOS A.

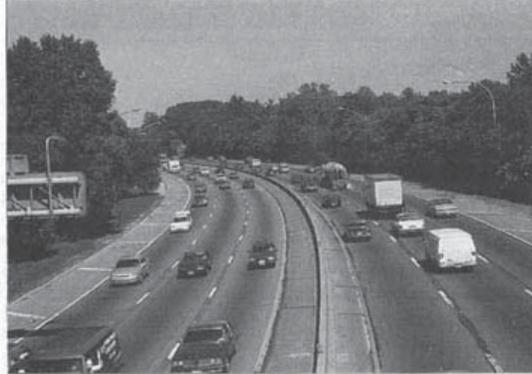


Illustration 3-8. LOS D.



Illustration 3-6. LOS B.



Illustration 3-9. LOS E.



Illustration 3-7. LOS C.

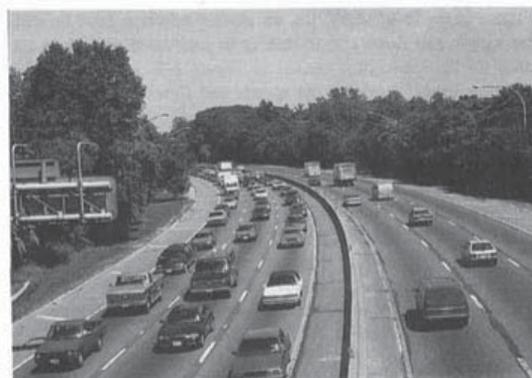


Illustration 3-10. LOS F.

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