Appendix B: Level of Service Standards

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Level of Service Concept

Level of service (LOS) is a concept that is used to assess roadway system performance. It measures traffic flow *quality* as experienced by motor vehicle drivers and passengers. Typically, six levels of service are defined and each is assigned a letter designation from A to F, with LOS A representing the least congested conditions and LOS F the most congested.

For the purpose of identifying capacity deficiencies in *TransPlan*, a roadway's LOS is based on the ratio of its peak-hour traffic volume to the maximum hourly volume the roadway can accommodate. This is referred to as the roadway's *volume-to-capacity ratio* (V/C).

Roadway Congestion Impacts

When the volume of traffic using a roadway nears the roadway's capacity, the resulting congestion has several types of undesirable impacts:

- Travel speeds fall, which lengthens travel times and significantly increases the overall cost of transportation.
- Congestion on main routes causes traffic to spillover onto local routes through neighborhoods.
- Slowdowns and backups on high-speed freeway facilities can produce more frequent and severe vehicle collisions.
- Vehicle idling time caused by severe traffic congestion is a primary source of excessive auto emissions that degrade air quality.

Responses to Roadway Congestion

A key *TransPlan* strategy for meeting the region's mobility needs using available resources is to extract maximum value from the existing roadway system. Transportation System Improvements (TSI) System-Wide policies and implementation actions set a high priority on managing and protecting existing and future transportation infrastructure. When combined with policies and implementation actions for land use, transportation demand management and transit, TSI System-Wide polices provide direction for a wide range of actions that reduce the need to construct new roadway capacity improvements. Examples of such actions include the following:

- Reconfigure roadway accesses to minimize traffic conflicts at intersections;
- Limit parking near signalized intersections to increase intersection capacity;
- Coordinate and operate traffic signals to improve traffic progression;
- Relocate driveways and improve local street connections to direct traffic away from overburdened intersections and intersections where side-street capacity is limited in order to optimize traffic progression on arterials and collectors;
- Improve turning-radii at intersections that are heavily used by trucks to avoid lane blockages;
- Install raised medians to reduce traffic conflicts; and
- Improve accesses so that traffic can enter or exit the highway with minimal disruptions of flow.

Even with the above actions, significant components of the roadway system are forecast to fall below acceptable LOS standards. Where management actions have failed to produce acceptable LOS, construction projects to add roadway capacity must be considered.

LOS Standards – Application

TSI Roadway Policy #2: Motor Vehicle Level of Service guided *TransPlan's* transportation system needs analysis and is intended to guide the transportation aspects of future land use decisions. OAR 660-12-0060 (1) "Transportation Planning Rule" states that,

> "Amendments to functional plans, acknowledged comprehensive plans, and land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards (e.g., level of service, volume to capacity ratio, etc.) of the facility."

Capacity Analysis Methodologies

The most current Highway Capacity Manual (HCM), *Special Report 209, Transportation Research Board* is the standard reference for roadway capacity analysis methodology. The basic concepts of *capacity* and *LOS* are described in Chapter 1 of the HCM.

In general terms, the HCM defines roadway capacity as the maximum hourly rate at which vehicles can reasonably be expected to traverse a uniform section of roadway during a given time period under prevailing roadway, traffic, and control conditions. Capacity is often stated in terms of Passenger Cars Per Lane Per Hour (pcplph).

The Highway Capacity Software (HCS) package is a tool that implements the HCM analysis methods. The HCM/HCS package has been developed over time as an integrated, comprehensive package of analysis methods that are widely understood and accepted.

The Oregon Department of Transportation (ODOT) has developed special analysis tools for use in analyzing capacity issues for certain types of facilities on the state highway system. In particular, the SIGCAP2 and UNSIG10 software packages are used for signalized and unsignalized intersection capacity/LOS analysis, respectively. Other more specialized analysis methods are also used, depending on the nature of issues being analyzed.

Roadway System Needs Analysis

Transportation system needs analysis for the Eugene-Springfield area's collector and arterial roadway network was conducted using a computer model (EMME/2). Output from this model was used as a primary source of information about locations on the roadway network where roadway volumes are forecast to exceed capacity.

The traffic volume forecasted to occur on each network link was compared to the link's assumed capacity to produce a V/C ratio. The following thresholds were established to relate these V/C ratios to the roadway LOS performance standards:

Facility Type	LOS D	LOS E
Freeways, 55 MPH	V/C #0.78	V/C #1.0
Non-freeways, 55 MPH	V/C #0.87	V/C #1.0
Other Arterials and Collectors	V/C #0.87	V/C = 0.88 - .97

Through the *Oregon Highway Plan* (OHP), ODOT establishes performance standards for the state highway system, including all state facilities considered in *TransPlan*. The adopted OHP sets V/C standards based on various combinations of highway and land use categories. Due to the prominent role that state facilities play in the local transportation system, these standards are reproduced here for reference.

Maximum Volume-to-Capacity Ratios for Peak Hour Operating Conditions Through a Planning Horizon for State Highway Sections Located Outside the Portland Metropolitan Area Urban Growth Boundary

Highway Category	Land Use Type/Speed Limits					
	Inside Urban Growth Boundary				Outside Urban Growth Boundary	
	STA[1]	MPO[2] outside of STAs	Non-MPO outside of STAs where non-freeway speed limit < 45 mph	Non-MPO where non-freeway speed limit $ 45 mph	Unincorporated Communities	Rural Lands
Interstate	N/A	0.80	0.70	0.70	0.70	0.70
State-wide[3]:						
• Freight route	0.85	0.80	0.75	0.70	0.70	0.70
• Non-Freight Route State-Wide	0.90	0.85	0.80	0.75	0.75	0.70
Regional	0.95	0.85	0.80	0.75	0.75	0.70
District/Local Interest Roads	0.95	0.90	0.85	0.80	0.80	0.75

[1] Special Transportation Area
[2] Metropolitan Planning Organization
[3] National Highway System