Section 4 Current Intersection Operations

4 CURRENT INTERSECTION OPERATIONS

This section of the existing conditions assessment documents the current performance of the 15 study intersections selected for the TSP update. Additional information related to current intersection operations, including details of the operations analyses performed at the study intersections is included in Technical Memorandum 2: Existing Conditions, which is provided in the Volume 2 Technical Appendix.

Performance Standards

All operational analyses were performed in accordance with the procedures stated in the *2000 Highway Capacity Manual* (Reference 9). In addition, all intersection operational evaluations were conducted based on the peak 15-minute flow rate observed during the weekday p.m. peak hour. The operational analysis results were compared with mobility standards used by the local agencies to assess performance and potential areas for improvement.

CITY INTERSECTIONS

Traffic operations at City intersections are generally described using a measure known as "level of service" (LOS). Level of service represents ranges in the average amount of delay that motorists experience when passing through the intersection. LOS is measured on an "A" (best) to "F" (worst) scale. At signalized and all-way stop-controlled intersections, LOS is based on the average delay experienced by all vehicles entering the intersection. At two-way stop-controlled intersections, LOS is based on the average delay experienced by the critical movement at the intersection, typically a left-turn from a stop-controlled street.

The City of St. Helens has not adopted level-of-service (LOS) or volume-to-capacity (V/C) ratio standards for signalized or unsignalized intersections. Therefore, the following minimum operating standards were applied to City intersections:

- LOS "D" is considered acceptable at signalized and all-way stop controlled intersections if the V/C ratio is not higher than 1.0 for the sum of critical movements.
- LOS "E" is considered acceptable for the poorest operating approach at two-way stop intersections. LOS "F" is allowed in situations where a traffic signal is not warranted.

A summary of the recommended performance standards at each of the study intersections under City jurisdiction is included in Table 4-1. These standards are recommended for incorporation into the City Ordinances, as described in Section 9.

Intersection	Posted Speed Traffic Control ¹ Limit (mph)		Performance Standard	
Columbia Boulevard/ NS. 6 th Street	TWSC	25	LOS "E"	
Columbia Boulevard/ NS. 12 th Street	TWSC	25	LOS "E"	
Columbia Boulevard/ NS. Vernonia Road	AWSC	25	LOS "D"	
Columbia Boulevard/ Sykes Road	AWSC	25	25 LOS "D"	
Columbia Boulevard/ Gable Road	TWSC	25	LOS "E"	
Deer Island Road/ West Street	TWSC	25	LOS "E"	
West Street/ N. 6 th Street	AWSC	25	LOS "D"	

TABLE 4-1:	RECOMMENDED PERFORMANCE STANDARDS FOR CITY INTERSECTIONS

¹TWSC: Two-way stop-controlled (unsignalized); AWSC = All-way stop-controlled

ODOT INTERSECTIONS

ODOT uses volume-to-capacity ratio standards to assess intersections operations. Table 6 of the Oregon Highway Plan (OHP) provides maximum volume-to-capacity ratios for all signalized and unsignalized intersections outside the Portland Metro area. The ODOT controlled intersections within the UGB are located along US 30, which is a designated freight route on a Statewide Highway, and inside the urban growth boundary of a non-metropolitan planning organization (MPO). The minimum required performance standards are shown in Table 4-2 and reflect the posted speed limit and traffic control at the intersection.

In reviewing Table 4-2, it should be noted that two-way stop-controlled (TWSC) intersections operated and maintained by ODOT are evaluated using two performance standards: one for the major street highway approaches and one for the minor street approaches. Given that operations at one of the minor street approaches represent the critical V/C ratio for the intersection, only the mobility standards for the minor street approaches were shown in Table 4-2.

Intersection	Traffic Control ¹	Posted Speed Limit (mph)	OHP Mobility Standard	ODOT HDM Mobility Standard ²
US 30/Deer Island Road	Signal	50	V/C ≤ 0.70	V/C ≤ 0.70
US 30/Pittsburg Road	TWSC	40	$V/C \le 0.85^3$	V/C ≤ 0.70
US 30/Wyeth Street	TWSC	40	$V/C \le 0.85^3$	V/C ≤ 0.70
US 30/St. Helens Street	Signal	35	V/C ≤ 0.80	V/C ≤ 0.70
US 30/Columbia Boulevard	Signal	35	V/C ≤ 0.80	V/C ≤ 0.70
US 30/South Vernonia Road	TWSC	35	$V/C \le 0.90^3$	V/C ≤ 0.70
US 30/Gable Road	Signal	35	V/C ≤ 0.80	V/C ≤ 0.70
US 30/Millard Road	TWSC	45	$V/C \le 0.80^3$	V/C ≤ 0.70

TABLE 4-2: SUMMARY OF ODOT INTERSECTION PERFORMANCE STANDARDS

¹TWSC: Two-way stop-controlled (unsignalized)

² HDM:ODOT Highway Design Manual

³ V/C ratio reflects minor street approach

Figure 4-1 illustrates the existing lane configurations and traffic control devices at each of the study intersections.

Traffic Volumes

Manual turning-movement counts were obtained at most of the study intersections in May 2010⁶. The peak hour of intersections along the US 30 corridor was found to occur between 4:20 and 5:20 p.m., while the individual peak hours of the remaining study intersections were found to occur at different times throughout the p.m. peak period. Figure 4-2 provides a summary of the seasonally adjusted year 2010 turning movement counts, which are rounded to the nearest five vehicles per hour for the weekday p.m. peak hour. Figure 4-2 also reflects the existing operations at the intersections. As shown all study intersections currently meet the applicable mobility and level-of-service standards during the weekday p.m. peak hour.

⁶ Traffic counts and analysis prepared for the *Lower Columbia River Rail Corridor Study* were used to represent the existing conditions analysis at the intersections of: US 30/Millard Road, US 30/Gable Road, US 30/Columbia Boulevard, US 30/St. Helens Street, and US 30/Deer Island Road. The 2008 data was judged to remain reflective of current peak seasonal conditions to the economic downturn that has occurred since 2008.









TURN LANE NEEDS

All of the study intersections along US 30 currently have separate left- and right-turn lanes provided where northbound and southbound turn movements are allowed. Review of unsignalized and signalized intersection queuing analyses found that 95th percentile queues at the US 30/Gable Road intersection extend beyond the available storage and into the adjacent travel lanes in the east and westbound directions.

Safety Analysis

Intersection and roadway segment safety were assessed based on the ODOT Safety Priority Index System and review of crash data provided by ODOT. The Statewide Priority Index System (SPIS) is a method developed by ODOT for identifying hazardous locations on state highways through consideration of crash frequency, crash rate, and crash severity. Within St. Helens, the US 30/Sykes Road and US 30/Gable Road intersections were listed in the top ten percent of ODOT's SPIS ranking program for 2008⁷. A description of the crash experience and potential mitigation measures identified by the SPIS program is presented below.

US 30/SYKES ROAD

Sykes Road is a signalized T-intersection at a location where US 30 has a posted speed limit of 35 miles per hour (mph) and a number of nearby accesses. Eleven crashes were reported at the intersection during the four-year period, of which 64 percent resulted in an injury and 36 percent resulted in property damage only. Further, 64 percent were rear-end crashes, 27 percent were turning crashes and 9 percent were sideswipe crashes. The SPIS program identifies a potential safety improvement involving installation of a traffic separator, median islands, and implementation of access management measures that would cost on the order of \$1,250,000.

US 30/GABLE ROAD

Gable Road intersects US 30 as a four-way intersection at a location where the posted speed limit is 35 mph on the highway. It is the first signalized intersection drivers reach traveling north on US 30 as they enter the city of St. Helens. Separate northbound and southbound right-turn lanes are provided at the intersection. A total of 24 crashes were reported at the intersection during the four-year period, of which 40 percent resulted in an injury and 60 percent resulted in property damage only. Fifty percent

⁷ It is important to note that the SPIS data reported for 2008 is based on 2005-2007 crash data whereas all other crash data analysis presented reflects the reporting period from January 2006 to December 2008.

of the crashes were rear-end and 25 percent were turning movement-related. The SPIS program identified a potential safety improvement that includes the provision of a dual left-turn lane from US 30 onto Gable Road in conjunction with installation of raised median and lane realignment treatments. The estimated cost of the improvements is \$5,400,000.

CRASH DATA ANALYSIS

ODOT provided detailed crash data covering all crashes that occurred in the city of St. Helens for the three-year period from January 1, 2006 to December 31, 2008. These data were analyzed to determine crash rates for the study intersections and roadway segments.

Review of the crash data found that the segment of US 30 between Gable Road and St. Helens Street exceeds the statewide average for similar facilities. Close inspection of the crash data revealed that a majority of the crashes occurred at intersections, which is to be expected given the frequent and relatively closely spaced access points and street intersections along US 30.

The highest incidence of crashes occurred at the US 30/Gable Road intersection, with 19 reported crashes in the three-year period. At the time the TSP Update was prepared, ODOT was in the process of conducting a safety study of US 30 between Scappoose and St. Helens. Part of the review will include a Road Safety Audit (RSA) that will extend from Berg Road in Scappoose to Millard Road. The RSA is expected to offer specific findings and recommendations that will supersede the crash data review in the TSP update for this segment of roadway.