



Woodland Public Schools
Attn: Michael Green
800 3rd Street
Woodland WA 98674

Memo: Traffic Analysis Vic New High School

This memo addresses the anticipated operation of several key intersections in the vicinity of the proposed new High School on Dike Rd. This study will discuss the meaning of "Level of Service", the current state of approved development and associated street improvements, estimate the expected trip generation from the High School and then examine the operation of key intersections in terms of "Level of Service".

This analysis will examine the following intersections:

- Dike Road and Robinson Rd
- Dike Rd and Schurman Way
- Dike Rd and I-5 Southbound Ramps
- Dike Rd and I-5 Northbound Ramps

The study will examine traffic with the High School plus approved developments in the vicinity of the school for both the High School Peak Hour and for the general 4:00 to 6:00 PM peak hour. The study will also look at 2025 projected traffic volumes from the Cowlitz- Wakiakum Council of Governments (CWCOG)

Level of Service

Level of Service is a concept defined in the "Highway Capacity Manual" by the Transportation Research Board as follows:

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of Service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions and comfort and convenience" Highway Capacity Manual 2000 pg 2-2,2-3

For intersection LOS the quantitative measurement is the average number of seconds of delay experienced by vehicles passing through the intersection. The standards vary depending on the type of control at the intersection. For signalized and unsignalized intersections the standards are as follows:

Table 1 LOS Standards

LOS	Signalized Intersection	Unsignalized Intersection
A	≤10 sec	≤10 sec
B	10-20 sec	10-15 sec
C	20-35 sec	15-25 sec
D	35-55 sec	25-35 sec
E	55-80 sec	35-50 sec
F	≥80 sec	≥50 sec

Roundabouts are not currently evaluated based on delay for vehicles passing through the intersection. Roundabout LOS is determined by the amount of unused capacity in the intersections.

In most cases as the volume of vehicles using an intersection goes up, the delay is increased and the unused capacity of the intersection decreases. LOS "F" is generally considered to be the threshold where more vehicles are trying to use the intersection than can be accommodated.

Approved Development and Roadway Improvements

The City of Woodland has approved a shopping center with a Walmart and additional pads for development. Also, an "Old Apostolic Lutheran" Church is under construction just north of the intersection of Dike Rd and Burke Rd. Trips from these developments were included in this analysis.

The Walmart Development is under construction and is building roundabouts at the I-5 interchange with Dike Rd. Steve Branz with the City of Woodland was contacted and roundabouts are planned at the intersections of Dike Road with both Schurman Way and Robinson Rd. These roundabouts are not funded for construction.

High School Trip Generation

The ITE Trip Generation Manual, eighth edition was used to estimate the trip generation for this High School. The High School is planned to accommodate 1200 students. The results are shown in Table 2.

Table 2 High School Trip Generation

Land Use	ITE Code	Independent Variable	Size	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour			Adjacent St PM		
					In	Out	Total	In	Out	Total	In	Out	Total
High School	530	Students	1,200	2052	343	161	504	115	233	348	73	83	156

The AM Peak for the High School is expected to occur during the weekday AM peak for the adjacent street. Thus no separate data for the AM peak of the adjacent street is included.

LOS Analysis

This analysis examines several different scenarios. Two different time periods are analyzed. One near term assuming the High School is built in the next few years with all the trips from the approved in-process development. The second time frame examines the 2025 traffic conditions based on traffic projections received from CWCOC. For both of these scenarios the study periods include an examination of the PM Peak hour condition associated with the release of the High school and another peak hour associated with the peak hour for traffic on Dike Road.

Near term Analysis with Approved In-process Development

This analysis assumed that the roundabouts at the I-5 interchange are completed as part of the Walmart Project.

The intersections of Dike Road with Robinson Rd and Schurman Way are expected to remain in their current configuration for this analysis. The results are shown in Table 3.

Table 3 LOS Analysis with High School and Approved In-process

	Dike Rd and Robinson Rd	Dike Rd and Schurman Way	Dike Rd and I-5 Ramp South bound	Dike Rd and I-5 Ramp Northbound
PM Peak of Adjacent St	E	E	A	A
PM Peak of High School	E	B	A	A

Los "D" is generally considered to be threshold for acceptable Level of Service at an intersection. Thus this analysis indicates that intersection improvements would likely be needed at both Dike Rd / Robinson Rd and at Dike Rd / Schurman Rd. The City has plans for roundabouts at both of these intersections and so the school would likely be required to construct or participate in the cost of these improvements.

To truly reflect traffic conditions surrounding a high school during the time period associated with the end of the school day, some agencies require that the trip generation be doubled. This is done to reflect a majority of the school traffic leaving during a 15-20 minute time period and not over the course of an hour. If the analysis considers the peak 15 or 20 minutes of the high school release, then the anticipated LOS would be as shown in Table 4.

Table 4 LOS Analysis with High School Trips Doubled and Approved In-process

	Dike Rd and Robinson Rd	Dike Rd and Schurman Way	Dike Rd and I-5 Ramp South bound	Dike Rd and I-5 Ramp Northbound
PM Peak of High School	F	C	A	A

Another scenario might involve building a roundabout at only the intersection of Dike Road and Schurman. Currently this intersection does not provided full access to the Walmart site. With the roundabout, full access is provided to Walmart reducing the trips through the intersection of Dike Road and Robinson Rd. Table 5 shows the LOS situation with the addition of a single lane roundabout at the intersections of Dike Rd/ Schurman Way.

**Table 5
LOS Analysis with High School and Approved In-process and a Roundabout added at Schurman Way**

	Dike Rd and Robinson Rd	Dike Rd and Schurman Way	Dike Rd and I-5 Ramp South bound	Dike Rd and I-5 Ramp Northbound
PM Peak of Adjacent St	E	A	A	A
PM Peak of High School	E	B	A	A

Unfortunately a roundabout at Dike Road and Schurman Way does not seem to divert enough trips to solve the capacity problem at Dike Road and Robinson Rd. Thus it is likely that the City will require mitigation at both intersections if they have not already been improved.

2025 Analysis

The 2025 Analysis assumes that all of the study area intersections are operating as roundabouts in accordance with the City's long range plan. The traffic volumes from CWCOG were used to estimate the LOS in this future condition. Table 6 shows the results of this analysis.

Table 6 2025 LOS Analysis

	Dike Rd and Robinson Rd	Dike Rd and Schurman Way	Dike Rd and I-5 Ramp South bound	Dike Rd and I-5 Ramp Northbound
PM Peak of Adjacent St	A	A	C	A
PM Peak of High School	A	A	A	A

The CWCOG volumes are assumed to include the High School, and all other development in accordance with the current zoning that may occur between now and 2025.

Conclusions

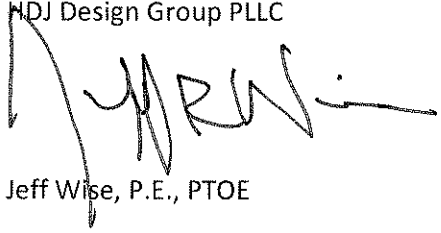
The new High School will likely be required to construct or participate in the cost of intersection improvements at the Intersection of Dike Road and Robinson Rd and at intersection of Dike Rd and Schurman Way.

The City already has plans for a roundabout at the intersection of Dike Road and Schurman way and would like to build this roundabout during the summer. At this point the City does not have funding for the project so it could be delayed. If this project is funded before the High School receives its conditions of approval then it would not have to participate in the cost of this improvement.

No design work has been done for a roundabout at the intersection of Dike Rd and Robinson Rd. We have been involved with the planning of a roundabout at the main access to Camas High School and have constructed at round about near the entrance to the High School in Sherwood Oregon. Based on our experience we would not expect any significant operational issues associated with a roundabout at the entrance to the High School.

After these improvements are made the studied intersections in the vicinity of the High School are expected to operate at an acceptable LOS well through 2025. If you have any questions regarding this analysis please contact us a 360-695-3488.

Respectfully,
HDJ Design Group PLLC



Jeff Wise, P.E., PTOE

