

UPDATED Transportation Impact Analysis

TUMWATER RETAIL

May 2006

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Introduction

This report summarizes the results of the transportation impact analysis (TIA) prepared for the proposed Tumwater retail development. This report has been prepared in support of the Supplemental Environmental Impact Study being completed for the proposed project. This report provides an analysis of two site plans. The proposed plan is based on Kingswood Drive in its current location. The alternative site plan reflects a realigned Kingswood Drive further south.

This report addresses the comments provided by the City after initial review of the December 2004 TIA.

The proposed project site is located in the City of Tumwater, Washington. The purpose of this report is to identify any potential traffic-related impacts the proposed project would have on the roadway network in the vicinity of the site, and to recommend measures that are necessary to mitigate those impacts. The analysis includes a description of the surrounding roadway network, an estimate of site-generated peak hour vehicle trips, and an evaluation of peak hour intersection operations. The scope of the analysis was based on direction provided by City of Tumwater staff.

Project Description

As shown on Figure 1, the proposed project site is located within the City of Tumwater on the east side of Littlerock Road and is located between the existing Home Depot and Costco stores. The proposed project consists of a 207,751 gsf discount superstore with an attached 20,822 gsf seasonal garden center. In addition to the primary building, one outlot is also proposed. This lease out-lot will likely be developed as a gas station and has been assumed as such in the trip generation estimates. As noted above, two different site plans are evaluated in this report. The Proposed site plan (Figure 2A) and the Alternate site plan (Figure 2B).

The Proposed site plan has a joint access with the retail properties to the north, one driveway accessing Littlerock Road, two driveways accessing Kingswood Drive from the north, and two driveways accessing Kingswood Drive from the south. The Alternate site plan has a connection to the shared access, north of the site, and also assumes Kingswood Drive realigned to the south. This also allows for one Littlerock Road driveway and three Kingswood Drive driveways.

An EIS was previously completed for this site¹ and included the traffic associated with this current proposal. This analysis serves to update the original EIS and provides updated information on the specific development application and updated background conditions, including the projected traffic volumes and planned/programmed improvements.

¹ Frontage Road LID Traffic Study, November 1992 and Addendum December 1992, Kittelson and Associates

Figure 1. Site Vicinity

(Figure 1)

Figure 2A. Site Plan - Proposed

(Figure 2A)

Figure 2B. Site Plan - Alternate

(Figure 2B)

Existing and Future Baseline Conditions

The following section describes existing traffic conditions in the vicinity of the proposed project. In addition, this section evaluates the future 2007 baseline (without-project) traffic conditions in the study area. Future baseline conditions will be compared to future with-project conditions in order to identify potential transportation impacts of the proposed project. The year 2007 represents a horizon year shortly after store opening and was chosen based on coordination with City staff.

Study Intersections

The transportation impact analysis study area was determined through coordination with the City of Tumwater. It was agreed that major intersections in the site vicinity and known congestion points along likely project travel routes would be evaluated as part of this study. Due to the retail nature of the project and limited trip generation of the development during the weekday AM peak hour, the weekday analysis was limited to the PM peak hour. Saturday conditions were also considered but weekday PM peak hour still represents the period with the highest overall combination of site-generated and background street traffic volumes. Traffic counts were collected during the Saturday peak hour and compared to the weekday PM peak hour. The detailed comparison is described in the *Traffic Volumes* sub-section of this section. The study intersections are listed below along with the existing traffic control noted in parenthesis.

- Capitol Boulevard / Trosper Road (Signalized)
- Capitol Boulevard / Lee Street (Signalized)
- I-5 NB Ramp / Trosper Road (Signalized)
- I-5 SB Ramp / Trosper Road (Signalized)
- Littlerock Road / Trosper Road (Signalized)
- Littlerock Road / Fred Meyer –Costco Access (Signalized)
- Littlerock Road / Costco Driveway (Unsignalized)
- Littlerock Road / Kingswood Drive (Unsignalized)
- Littlerock Road / E Israel Road (Signalized)
- Littlerock Road / Tumwater Boulevard (Unsignalized)
- I-5 NB Ramp / Tumwater Boulevard (Unsignalized)
- I-5 SB Ramp / Tumwater Boulevard (Signalized)
- Tyee Road / Kingswood Drive (Unsignalized)

Roadway Network

The existing roadway network is discussed along with any planned improvements that may be installed before the proposed project horizon year. In general, the roadway descriptions given apply to the roadways within the study area of the proposed project.

Existing Inventory

The existing roadway characteristics in the proposed project vicinity are described in detail below.

Capitol Boulevard South is a five-lane, north-south principal arterial with a posted speed limit of 35 mph within the site vicinity. Within the study area, the roadway has two through lanes in each direction, and a center, two-way, left-turn lane. The roadway provides access to Olympia from the north and to unincorporated Thurston County from the south. There is curb, gutter, and sidewalk on both sides of the roadway, and traffic signals at major intersections.

Trosper Road SW is classified as a principal arterial that connects Capitol Boulevard SW to I-5 and the western city limits. It becomes 54th Avenue SW west of its intersection with Littlerock Road SW, and transitions to a minor arterial with a posted speed limit of 25 mph. Trosper Road SW is a four- to five-lane roadway with traffic signals at major intersections.

Israel Road is classified as an urban collector that provides an east-west connection between Littlerock Road and Capitol Boulevard. In the project vicinity, Israel Road is a three-lane roadway with one travel lane in each direction. The posted speed limit is 35 mph.

Tumwater Boulevard is a major east-west arterial within the site vicinity that extends between Henderson Boulevard and west over I-5. The roadway has a two- to three-lane section west of I-5 and a four-lane section from I-5, east to Linderson Way. East of Linderson Way a three lane section is provided. There are intermittent sidewalks along Tumwater Boulevard and Class II bicycle lanes on both sides of the roadway between Capitol Boulevard and Linderson Way. The bicycle lanes are striped and signed. The posted speed limit is 35 mph, with traffic signals at the I-5 southbound ramps, Linderson Way, and Capitol Boulevard.

Littlerock Road is classified as a minor arterial that provides a north-south connection between Trosper Road and Tumwater Boulevard. The cross-section varies between two/three lanes to five lanes closer to the Trosper Road intersection. The posted speed limit is 30 mph north of Odegard Road and 35 mph south of Odegard Road. Paved shoulders are provided along the corridor. Although, where new development has occurred, curb, gutter, and sidewalks have been constructed.

Planned Improvements

Planned improvements to the Tumwater transportation system area are identified in the City of Tumwater's 2006 -2011, *Six-Year Capital Facilities Plan* (CFP). One roadway improvement was identified in the area that would impact the study area intersections and is scheduled to begin within the study area before the 2007 horizon year. This improvement was confirmed with City staff and is described below.

Littlerock Road – Trospen Road to City Limits. This fully funded improvement will extend from Trospen Road south, beyond Tumwater Boulevard. Based on information provided by City staff, north of Kingswood Drive, the ultimate roadway section will be similar to the existing conditions, and include a typical 5-lane section. South of Kingswood Drive, Littlerock Road will consist of one to two travel lanes in each direction, depending on the segment, with a median limiting access to right-in/right-out movements only. To accommodate left-turning traffic, roundabouts are proposed at several locations, including Kingswood Drive (two-lane roundabout), Odegard Road (one-lane roundabout), Israel Street (one-lane roundabout with eastbound right-turn bypass), and Tumwater Boulevard (two-lane roundabout). As part of the roadway section, sidewalks will be constructed on both the east and west sides of Littlerock Road. The City is currently in the process of securing the necessary right-of-way for the project. Construction is anticipated to be completed in 2008.

In addition, the Capitol Boulevard corridor within the study area is currently the focus of a long-range planning study. Implementation of any proposed improvements would occur beyond the 2007 horizon year so no improvements were assumed for this analysis.

Traffic Volumes

The existing roadway volumes are presented along with volume forecasts for the project's horizon year. Existing volumes are based on recent traffic counts conducted in 2004 and 2005 by Transpo. Future baseline volumes were estimated by applying a general growth rate to existing volumes and adding specific traffic increases due to other planned, un-built developments.

Existing Volumes

For weekday PM peak hour conditions, traffic counts were collected in October and November, 2004 and January and September 2005. These counts are included in Appendix A. Figure 3 illustrates the existing weekday PM peak hour traffic volumes at the 13 study area intersections. Peak hour traffic volumes were rounded to the nearest five vehicles since weekday volumes fluctuate day-to-day.

For Saturday peak hour conditions, traffic counts were collected in January 2005. These Saturday counts were collected at the intersections of I-5 SB Ramps/Trospen Road and Littlerock Road/Trospen Road and are included in Appendix A. Saturday total entering peak hour volume at I-5 SB Ramps/Trospen Road was about 400 vehicles less than the PM peak hour volume, or 87 percent of the PM peak hour volume. The Saturday total entering peak hour volume at Littlerock Road/Trospen Road was 81 percent of the PM peak hour volume (460 vehicles less). Even when adding anticipated project trips² to these counts, the PM peak hour volumes are still higher: At I-5 SB Ramps/Trospen Road the PM peak hour volumes are 125 vehicles higher; And at Littlerock Road/Trospen Road the PM peak hour volumes are 280 vehicles higher. These Saturday peak hour volumes confirm that the weekday PM peak hour represents the period with the highest

² PM peak hour project trip generation discussed below. Saturday peak hour trip generation rates based on rates published in *ITE Trip Generation Manual*, 7th Edition.

overall background and anticipated project traffic volumes. To capture worst-case roadway conditions, the subsequent analysis focuses on weekday PM peak hour traffic conditions only.

Future Baseline Volumes

In order to estimate future baseline traffic volumes at the study area intersections, a 3.0-percent annual growth rate was applied to the existing year traffic volumes to account for an increase in general background traffic volumes. While historical counts at two study intersections suggest a 1.0-percent annual growth rate, the higher 3.0-percent annual growth rate was used per city staff direction. Additionally, peak hour “pipeline” project volumes were added to the forecast 2007 volumes. Pipeline projects are planned developments that have not yet been constructed and would generate traffic within the study area. Based on city staff direction, future traffic from the following pipeline projects were included in the study and are summarized in Figure 4:

- Pinehurst Apartments
- Towncenter East—Phases 1 and 2
- Airdustrial Park
- GA Project
- Kirsop Village
- The Old Towne Plaza
- Sovran
- Littlerock Retail
- 6501 Capitol

The use of both pipeline project traffic volumes and background growth rates at the study area intersections potentially provides a conservative (high) estimate of future baseline traffic volumes. The 2007 future baseline weekday PM peak hour traffic volumes are illustrated in Figure 5.

Figure 3. Existing Weekday PM Peak Hour Traffic Volumes

(Figure 3)

Figure 4. Weekday PM Peak Hour Pipeline Traffic Volumes

(Figure 4)

Figure 5. 2007 Baseline Weekday PM Peak Hour Traffic Volumes

(Figure 5)

Traffic Operations

This section presents the traffic operations analysis for existing conditions and the future baseline scenario. The methodology used in this traffic operations analysis is outlined below. Both existing and future baseline traffic operations were evaluated to disclose existing conditions and compare future baseline operations with the with-project scenario.

Individual intersection levels of service (LOS) were calculated at the study intersections for the weekday PM peak hour. The level of service (LOS) analyses methodology was based on procedures identified in the *Highway Capacity Manual* (TRB, 2000), and was evaluated using the Synchro 6 analysis software. Traffic operations for an intersection are described alphabetically with a range of levels of service (LOS A through F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. A more detailed description of LOS definition and the criteria is provided in Appendix B. The roundabouts were evaluated using AASIDRA.

At signalized intersections, LOS is measured in total control delay per vehicle and is typically reported using the intersection delay and volume-to-capacity ratio (v/c). At stop-sign-controlled intersections, LOS is measured in total control delay per vehicle and is typically reported for the intersection turning movement with the highest delay. Signal timing information was obtained from the City of Tumwater and WSDOT, and used for all LOS analysis.

Consistent with the signal timing plans obtained from the City and WSDOT, the Trospen Road corridor was analyzed as a coordinated system. Coordination parameters, such as offsets and cycle lengths, were addressed for 2004 and 2007 conditions at the following five intersections: Littlerock Road/Trospen Road; I-5 Southbound Ramps/Trospen Road; I-5 Northbound Ramps/Trospen Road; Capitol Boulevard/Trospen Road; and Capitol Boulevard/Lee Street.

At the several locations along the Trospen Road corridor, unique driver behavior necessitated specific adjustments to the analysis. In preparation for movements beyond the intersection, drivers cause an imbalanced lane utilization by preferring one of two lanes. For example, in anticipation of the I-5 ramps along Trospen Road, I-5 bound vehicles on northbound Capitol Boulevard favor the outside left-turn lane. This lane is also shared with vehicles traveling north through the intersection. This unbalanced lane utilization creates northbound queues that can extend back into the Lee Street intersection. The lane utilization factors used in this analysis were adjusted to reflect this type of condition at four locations: the northbound Capitol Boulevard approach at Trospen Road; the eastbound Trospen Road approach at Capitol Boulevard; the southbound I-5 off-ramp approach at Trospen Road; and the westbound Trospen Road approach at Littlerock Road. The modified lane utilization factors are based on a significant data collection effort undertaken in September 2005 at the request of the City. The factors are shown on the Synchro LOS worksheets provided in the appendix.

City of Tumwater LOS Standard

The City of Tumwater has adopted an intersection LOS concurrency standard of E for Capitol Boulevard/Trosper Road and the Trosper Road I-5 interchange, and a LOS standard of D for all other arterial intersections under City jurisdiction (Tumwater Municipal Code 15.48.030). While the standard does not apply to private unsignalized driveways, project site driveways such as the Littlerock Road/South Costco Driveway (which is intended to be a shared access utilized by the proposed project) were also evaluated for purposes of SEPA disclosure.

Existing Operations

An operations analysis was conducted to evaluate the current traffic characteristics of the existing roadway system within the study area. Table 1 shows the results of the weekday PM peak hour levels of service calculations. Intersection level of service worksheets for existing traffic conditions are contained in Appendix C.

Table 1. Existing and Baseline Weekday PM Peak Hour LOS Summary

Study Intersection	Type ¹	2005 Existing			2007 Baseline		
		LOS ²	Delay ³	V/C ⁴ or WM ⁵	LOS	Delay	V/C or WM
Capitol Blvd / Lee St	Signal	B	17.4	0.59	D	35.1	0.66
Capitol Blvd / Trosper Rd	Signal	D	50.8	0.82	E	67.8	0.95
I-5 NB Ramps/ Trosper Rd	Signal	A	8.8	0.41	A	6.9	0.46
I-5 SB Ramps/ Trosper Rd	Signal	D	48.3	0.79	E	56.0	0.95
Littlerock Rd/ Trosper Rd	Signal	D	44.2	0.68	D	43.6	0.72
Littlerock Rd/ North Costco Drwy	Signal	A	9.7	0.37	B	10.1	0.39
Littlerock Rd/ Israel Rd	Sig/Rd	B	13.5	0.69	B	18.8	0.97
I-5 SB Ramps/ Tumwater Blvd	Signal	B	18.5	0.83	F	97.5	1.21
Littlerock Rd/ South Costco Drwy	Stop	F	181.2	WBL	F	>999	EB
Littlerock Rd/ Kingswood Dr	Sp/Rd	D	34.0	WBL	A	4.3	0.50
Littlerock Rd/ Tumwater Blvd	Sp/Rd	E	41.3	WBL	A	6.3	0.31
I-5 NB Ramps/ Tumwater Blvd	Stop	F	823.3	NBL	F	>999	NBL
Tyee Rd/ Kingswood Dr	Stop	A	9.2	EBL	A	9.3	EBL

1. Intersection control type. "Sig/Rd" means intersection is signalized but will be converted to a roundabout by 2007. "Stp/Rd" means the intersection is stop-controlled but will be converted to a roundabout by 2007. Roundabouts are part of the Littlerock Road Improvement project.
2. Level of service, based on 2000 *Highway Capacity Manual* methodology.
3. Average delay in seconds per vehicle.
4. Volume-to-capacity ratio reported for signalized intersections.
5. Worst movement reported for unsignalized intersections.

As shown in Table 1, under 2005 existing conditions all signalized intersections currently operate within the City's LOS standards. Of the four unsignalized arterial intersections, two do not meet the City's LOS standards. The westbound left-turns at Tumwater Boulevard and Littlerock Road currently operate at LOS E. The northbound left-turn at Tumwater Boulevard and the I-5 NB ramps operates at LOS F. The westbound left-turn at Littlerock Road and the South Costco driveway also operates poorly at LOS F.

In addition to the standard operations analysis, a detailed micro-simulation analysis was performed for the Trosper Road corridor as requested by the City to assess queuing

impacts. This analysis was requested in order to evaluate the impacts of the project on the operations of the corridor, given the proximity of the traffic signals to one another. To develop the micro-simulation model, new vehicle counts were collected by lane and by movement in addition to queue lengths. In addition, an origin-destination study was performed to link vehicle trips to/from the north along I-5 and trips to/from Capitol Boulevard south of the Trospen Road intersection. Because of these complex trip patterns, VISSIM software (version 4.10-10) was used to most effectively model the corridor. The existing conditions VISSIM model was calibrated to match conditions observed in the field during the September 2005 data collection effort.

The results of the analysis are shown in Table 2. Table 2 highlights the existing storage, the observed existing 95th percentile queue lengths and forecasted queue lengths from the micro-simulation model. Where the storage is exceeded, the estimated spillback is provided. The spacing for a vehicle in queue is considered to be 25 feet from front bumper of one car to the front bumper of the following car.

The existing maximum queues and several locations currently extend beyond the storage provided. The most significant queues are at the following locations: the northbound queues at Capitol Boulevard/Trospen Road; the northbound, southbound, and eastbound queues at I-5 Southbound Ramps/Trospen Road; and, the westbound queues at Littlerock Road/Trospen Road.

The standard *Highway Capacity Manual* (HCM) methodology does not account for queue spillback and therefore potentially underestimates associated delays at those intersections that the queue extends into. During some signal cycles for example, traffic operations at Capitol Boulevard/Lee Street may be worse than LOS B. The queuing analysis was conducted to assess the impacts of queuing on the overall operations of the corridor.

Future Baseline Operations

An operational analysis was conducted to evaluate the 2007 baseline characteristics of the study area. Intersection LOS was calculated at the study intersections to establish weekday PM peak hour conditions in 2007 without the proposed project. The 2007 horizon year represents the year of project full build-out.

By 2007 without the proposed project, two arterial intersections are forecast to operate at LOS F in the future without the proposed project. This includes the northbound and southbound I-5 ramps at Tumwater Boulevard. The City has identified a future improvement at this interchange for which they are in the process of collecting SEPA mitigation fees for those projects that add additional traffic to this interchange. At the intersection of Littlerock Road and the Costco south driveway, LOS F conditions are anticipated to continue with the addition of traffic from previously approved projects (Sovran Development and Littlerock Retail Project) on the west side of the intersection. All other study intersections would operate within the City's LOS standards.

Table 2. Existing and Baseline Queue Length Results for Trosper Road Corridor

Study Intersection	Movement	Available Storage (ft)	2005 Existing		2007 Baseline	
			Queue Length ¹	Exceeds Capacity (ft)	Queue Length ²	Exceeds Capacity (ft)
Capitol Blvd / Lee St	NBT	1000	525	No	705	No
	SBL	150	n/a ³	n/a	90	No
	SBT	650	n/a	n/a	390	No
Capitol Blvd / Trosper Rd	NBL	550	225	No	170	No
	NBTL	650	700	Yes +50	755	Yes +105
	NBTR	650	675	Yes +25	725	Yes +75
	SBT	1000	n/a	n/a	350	No
	EBL	325	230	No	280	No
	EBTL	325	250	No	300	No
	EBR	325	250	No	215	No
I-5 NB Ramps/ Trosper Rd	NBL	150	n/a	n/a	150	No
	EBT	780	n/a	n/a	180	No
	WBT	325	n/a	n/a	90	No
I-5 SB Ramps/ Trosper Rd	NBLT	150	115	No	185	Yes +35
	NBR	150	250	Yes +100	355	Yes +205
	SBL	450	275	No	225	No
	SBLT	1000	410	No	750	No
	SBR	400	430	Yes +30	910	Yes +510
	EBL	125	115	No	525	Yes +400
	EBT-in	400	200	No	540	Yes +140
	EBT-out	400	430	Yes +30	565	Yes +165
	EBR	100	20	No	20	No
	WBL	350	n/a	n/a	350	No
	WBT	780	n/a	n/a	310	No
Littlerock Rd/ Trosper Rd	NBL	300	n/a	n/a	760	Yes +460
	NBR	800	n/a	n/a	>800	Yes +>25
	EBL	150	100	No	90	No
	EBT	1000	205	No	265	No
	EBTR	300	260	No	575	Yes +275
	WBL	175	280	Yes +105	415	Yes +240
	WBTL	400	500	Yes +100	420	Yes +20
	WBTR	400	210	No	285	No

1. Observed 95th-percentile queue lengths in feet

2. Forecasted 95th-percentile queue lengths in feet from micro-simulation VISSIM model

3. n/a - field queuing observations not quantified for these movements. Key movements for model calibration purposes were determined through coordination with the City.

Like the existing operation analysis, a detailed queuing analysis was performed for the future baseline Trosper Road corridor and is also shown in Table 2. The analysis showed that the future 95th-percentile queue lengths at several intersections locations are anticipated to extend beyond the storage provided. Due to planned improvements at the Littlerock Road/Trosper Road intersection and signal timing adjustment along the Trosper Road corridor to better manage forecasted volumes, some baseline queue lengths are less than existing conditions. However, the forecasted increased in background traffic volumes made the maximum queue length generally longer than existing conditions.

Traffic Safety

The purpose of this section is to identify any existing traffic safety concerns in order to evaluate potential project impacts at these locations later in the report. Historical accident records were obtained from the City of Tumwater for the most recent period available (2001 to 2003). Table 3 summarizes the results of the safety analysis.

Table 3. Summary of Three-Year Accident Records at Study Intersections

Study Intersections	Number of Reported Accidents			Annual Average	Accidents per MEV ¹
	2001	2002	2003		
Capital Blvd/Lee St	3	10	7	6.67	0.72
Capital Blvd/Trosper Rd	12	7	3	7.33	0.62
Tyee Rd/Trosper Rd	5	6	6	5.67	0.50
Littlerock Rd/Trosper Rd	7	7	4	6.00	0.67
Littlerock Rd/Fred Meyer/Costco	1	0	1	0.67	0.12
Littlerock Rd/South Costco Drwy	No accidents reported				
Littlerock Rd/Kingswood Dr	0	1	0	0.33	0.07
Littlerock Rd/Israel Rd	2	5	7	4.67	0.74
Littlerock Rd/Tumwater Blvd	0	4	0	1.33	0.26
Tyee Rd/Kingswood Dr	No accidents reported				

1. MEV = Million entering vehicles.

In general, a signalized intersection is considered a high-accident location (HAL) if it experiences, on average, ten or more accidents per year. Similarly, an unsignalized intersection is considered a high-accident location if, on average, five or more accidents are reported on an annual basis. In addition, an intersection is generally considered a high accident location if the accident rate per million entering vehicles (MEV) is greater than 1.0. Based on these criteria, none of the intersections analyzed are considered high accident locations. Intersection accident reports were not obtained for I-5 on/off ramp intersections, however Transpo staff confirmed with WSDOT that no HALs exist at the interchanges.

As shown in Table 3, all study area intersections have accident rates less than 1.0 accidents per MEV and have annual average less than industry standards. Therefore, no significant safety issues are readily apparent.

Non-Motorized Facilities

Pedestrian facilities along Littlerock Road primarily consist of paved shoulders. Properties developed recently have included the construction of curb, gutter, and sidewalks. North of the project site, towards Trospen Road and the other retail developments, continuous sidewalks are provided on the east side of Littlerock Road. Existing non-motorized facilities along Littlerock Road will be improved as part of the Littlerock Road corridor improvements. Tyee Drive has a sidewalk on the west side of the road and Kingswood Drive has sidewalks on both sides.

Project Impacts – Proposed Site Plan

This section documents the project-generated impacts of the proposed development on the surrounding roadway network. Site-generated traffic volumes were estimated, then distributed and assigned to the surrounding roadway network. Future with-project traffic volumes were identified and traffic operations were evaluated. The site plan shown in Figure 2A is used as a basis for this analysis.

Trip Generation

Daily trip generation from the proposed project was estimated using rates identified for land use #813 (Free-Standing Discount Superstore) in the *ITE Trip Generation Manual* (7th Edition). Weekday PM peak hour trip generation estimates were developed based on data collected from similar retail stores in the northwestern U.S. and summarized in *Trip Generation Study for Free-Standing Discount Superstores* (The Transpo Group, April 2003). This regional data suggests a slightly higher trip rate than the national data (3.90 trips/1,000 gsf versus 3.87 trips/1,000 gsf). As such, and in order to provide a reasonable, yet conservative evaluation of project impacts, the higher rate obtained from local studies was used for the purposes of this analysis. In addition, information collected at various fueling stations located as outlots to larger retail properties was used as a basis for estimating the future trip generation for the fuel station. This study documenting the new and pass-by trip rates, as well as the internal capture characteristics are included in Appendix D. The final trip generation estimate is summarized in Table 4, and further described below.

Table 4. Project Trip Generation Summary

Land Use	Size	Total Daily Trips ¹	PM Peak Hour Trips		
			Total	In	Out
Discount Retail Superstore ²	207,751	8,432	672 ⁵	343	329
Garden Center ³	20,822	623	66 ⁵	40	26
Fueling Station	12 vfp ⁴	661	54 ⁵	28	26
Total Development (Primary Trips)		9,716	793	411	382
Total Development (Pass-by Trips - 17%)		2,570	210	105	105
Total Development (Driveway Trips)		12,286	1,003	516	487

1. Based on ITE Trip Generation Manual 7th Edition, includes primary trips only.
2. Based on Trip Generation Study for Free-Standing Discount Superstores (The Transpo Group, April 2003).
3. Trip generation estimated using rate identified for discount retail superstore as directed by City staff.
4. Vehicle Fueling Positions.
5. Includes primary trips only.

Pass-by rates were identified for the proposed project using data from the *ITE Trip Generation Handbook* for Discount Retail Store (land use #815). ITE has no specific information for land use #813, thus land use #815 (Discount Store) is the most similar land use and was used to determine the appropriate pass-by percentages to apply. A 17 percent pass-by rate was assumed in the analysis. Pass-by trips represent trips that are currently passing by the site. With the addition of the proposed development, these trips would stop at the site before continuing on their way. As such, these trips do not represent new trips to the adjacent roadway network. The resulting trip generation

estimate is summarized in Table 4. The trip generation worksheets showing the key assumptions and detailed calculations are included in Appendix E.

The proposed retail development is expected to generate a total of 9,716 new daily, and 793 net new weekday PM peak hour trips.

Trip Distribution and Assignment

Project traffic was assigned to the surrounding roadway system based on travel patterns identified in *Home Depot Traffic Impact Analysis* (The Shea Group, 2002) located immediately south of the proposed project. Figure 6 illustrates the anticipated project distribution for new trips. The assignment of trips during the weekday PM peak hour, including new and pass-by trips, is highlighted in Figure 7 and Figure 8. The site-access detail figures highlight the trip assignment and traffic volumes at all future access points.

As shown in Figure 6, approximately 70 percent of the project traffic is anticipated to travel north of the site via Littlerock Road or Tyee Drive. Of the 70 percent, 10 percent is anticipated to extend north beyond Trospen Road via 2nd Avenue, 10 percent west of Littlerock Road, 25 percent north on I-5, 5 percent south on I-5, and the remaining 20 percent split north and south on Capitol Boulevard. 30 percent of the project traffic is anticipated to travel south of the site destined for SB I-5, south on Littlerock Road, and east of I-5 via E Israel Road and Tumwater Boulevard. The distribution of pass-by trips along Littlerock Road was determined based on a review of local travel patterns.

The project trips were then added to the 2007 baseline traffic volumes to estimate the 2007 with-project traffic volumes. The 2007 with-project traffic volumes are summarized in Figure 9 and Figure 10.

Figure 6. Trip Distribution

(Figure 6)

Figure 7. Primary Project Trips - Weekday PM Peak Hour Traffic Volumes

(Figure 7)

Figure 8. PM Peak Hour Project Trips – Proposed Site Detail

(Figure 8)

Figure 9. 2007 With-Project Weekday PM Peak Hour Traffic Volumes

(Figure 9)

Figure 10. 2007 With-Project Volumes – Proposed Site Detail

(Figure 10)

Traffic Operations Impacts

Traffic operations at the study intersections were evaluated for the 2007 with-project conditions and then compared to 2007 baseline conditions to identify project-related impacts. The results of the weekday PM peak hour analyses are summarized in Table 5. The LOS worksheets are included in Appendix C.

Table 5. Baseline and With Project Peak Hour LOS Summary

PM Peak Hour	Type ¹	2007 Baseline			2007 With Project		
		LOS ²	Delay ³	V/C ⁴ or WM ⁵	LOS	Delay	V/C or WM
Capitol Blvd / Lee St	Signal	D	35.1	0.66	D	35.8	0.68
Capitol Blvd / Trosper Rd	Signal	E	67.8	0.95	E	74.6	0.98
I-5 NB Ramps/ Trosper Rd	Signal	A	6.9	0.46	A	7.3	0.53
I-5 SB Ramps/ Trosper Rd	Signal	E	56.0	0.95	F	96.9	1.13
Littlerock Rd/ Trosper Rd	Signal	D	43.6	0.72	D	48.2	0.80
Littlerock Rd/ North Costco Drwy	Signal	B	10.1	0.39	A	9.9	0.47
Littlerock Rd/ Israel Rd	Round	B	18.8	0.97	D	36.7	1.13
I-5 SB Ramps/ Tumwater Blvd	Signal	F	97.5	1.21	F	121.9	1.33
Littlerock Rd/ South Costco Drwy	Stop	F	>999	EB	F	>999	EB
Littlerock Rd/ Kingswood Dr	Round	A	4.3	0.50	A	6.2	0.65
Littlerock Rd/ Tumwater Blvd	Round	A	6.3	0.31	A	6.4	0.34
I-5 NB Ramps/ Tumwater Blvd	Stop	F	>999	NBL	F	>999	NBL
Tyee Rd/ Kingswood Dr	Stop	A	9.3	EBL	B	11.4	EBL

1. Intersection control type. "Round" means roundabout, which will be installed as part of the Littlerock Road Improvement project.
2. Level of service, based on *Highway Capacity Manual* (TRB, 2000) methodology.
3. Average delay in seconds per vehicle.
4. Volume-to-capacity ratio reported for signalized intersections.
5. Worst movement reported for unsignalized intersections.

As shown in Table 5, of the 12 study area arterial intersections, which do not include the site driveways, three are shown to operate below the City of Tumwater's LOS standard. The I-5 SB Ramps/Trosper Road intersection is anticipated to operate at LOS F by 2007 with the proposed project without mitigation compared to LOS E without the proposed project. Mitigation measures are proposed for this intersection and are discussed in a subsequent section. The intersections of I-5 SB Ramps/Tumwater Boulevard and I-5 NB Ramps/Tumwater Boulevard are forecast to operate at LOS F with or without the proposed project, without mitigation. Mitigation fees will be collected for these two intersections as part of funding for the I-5/Tumwater Boulevard interchange project. As explained in the current City's 2006-2011 CFP, the City is collecting development mitigation fees through the SEPA process for the Tumwater Boulevard & I-5 Interchange improvement project. These fees are based on a pro-rata share of the improvement costs assessed for every new project trips traveling through this interchange. This project is not expected to be completed by the 2007 horizon year.

Consistent with the 2007 baseline analysis, the forecasted 95th percentile queue lengths were estimated for the 2007 with-project conditions. The results are summarized in Table 6. The results of the baseline analysis are included for comparison purposes. A car

length is equated to 25 feet for purposes of evaluating the impacts of the forecasted queue lengths.

Table 6. Baseline and With-Project Queue Length Results (Trosper Road Corridor)

Study Intersection	Movement	Available Storage (ft)	2007 Baseline		2007 With Project	
			Queue Length ¹	Exceeds Capacity (ft)	Queue Length ¹	Exceeds Capacity (ft)
Capitol Blvd / Lee St	NBT	1000	705	No	720	No
	SBL	150	90	No	90	No
	SBT	650	390	No	390	No
Capitol Blvd / Trosper Rd	NBL	550	170	No	220	No
	NBTL	650	755	Yes +105	750	Yes +100
	NBTR	650	725	Yes +75	710	Yes +60
	SBT	1000	350	No	355	No
	EBL	325	280	No	305	No
	EBTL	325	300	No	300	No
	EBR	325	215	No	160	No
I-5 NB Ramps/ Trosper Rd	NBL	150	150	No	180	Yes +30
	EBT	780	180	No	190	No
	WBT	325	90	No	170	No
I-5 SB Ramps/ Trosper Rd	NBLT	150	185	Yes +35	300	Yes +150
	NBR	150	355	Yes +205	405	Yes +255
	SBL	450	225	No	240	No
	SBLT	1000	750	No	>1000	Yes +>25 ²
	SBR	400	910	Yes +510	>1000	Yes +>600 ²
	EBL ³	125	125	-	125	-
	EBT-in	400	540	Yes +140	540	Yes +140
	EBT-out	400	565	Yes +165	545	Yes +145
	EBR	100	20	No	20	No
	WBL	350	350	No	670	Yes +320
Littlerock Rd/ Trosper Rd	NBL	300	760	Yes +460	>800	Yes +>500 ²
	NBR	800	>800	Yes +>25	>800	Yes +>25 ²
	EBL	150	90	No	98	No
	EBT	1000	265	No	370	No
	EBTR ⁴	500	575	Yes +75	>800	Yes +>300 ²
	WBL	175	415	Yes +240	410	Yes +235
	WBTL	400	420	Yes +20	440	Yes +40
	WBTR	400	285	No	300	No

1. Forecasted 95th percentile queue lengths in feet from micro-simulation VISSIM model.
2. Queues are forecast to exceed capacity under with-project (without-mitigation) conditions, estimation not possible.
3. Movement forecasted to operate at an adequate LOS. Vehicle queuing for this movement influenced by the through queue and therefore not calculated in this table.
4. Future storage lengths revised from existing conditions due to planned improvements by the City.

As shown in Table 6, the projected 95th percentile queue lengths are forecast to increase along the Trosper Road corridor as a result of the proposed project. The greatest increase is anticipated at the I-5 SB Ramps/Trosper Road intersection. The LOS analysis

described previously has identified the need for mitigation at this intersection. The proposed mitigation measures are discussed in a subsequent section.

Outside the influence of the I-5 SB Ramps/Trosper Road intersection, the increases in queue lengths are forecasted to be 50 feet or less, which represents two car lengths. For example, queue lengths at the Capitol Boulevard/Trosper Road intersection are forecast to increase by one to two vehicles during the weekday PM peak hour; however, this level of increase does not by itself trigger the need for additional improvements as no new queue spillback is expected to be triggered. At the I-5 NB Ramps/Trosper Road intersection, the northbound left-turn is shown to increase beyond the designated storage by only one vehicle. Based on the current width of pavement on that approach, there is adequate width for vehicles destined for the right-turn movement to bypass this peak condition queue.

Site Access/Circulation Analysis

Under the proposed site plan, the parking lot is bisected such that parking for the site is located both on the north and south sides of Kingswood Drive. With the split parking field, there will be frequent pedestrian crossings of Kingswood Drive.

Intersection levels of service were calculated for the site access driveways proposed along Kingswood Drive and Littlerock Road. Under the proposed site plan and the proposed driveway locations, only the shared access with Costco is anticipated to operate at LOS F. The remaining driveways operate at LOS C or better.

Table 7. Baseline and With Project Peak Hour LOS Summary

PM Peak Hour	Type ¹	2007 Baseline			2007 With Project		
		LOS ²	Delay ³	V/C ⁴ or WM ⁵	LOS	Delay	V/C or WM
Littlerock Rd/ South Costco Drwy (#7)	Stop	F	>999	EB	F	>999	EB
Littlerock Rd/ Kingswood Dr (#8)	Round	A	4.3	0.50	A	6.2	0.65
Kingswood Dr / Southwest Drwy (#14)	Stop	-	-	-	A	9.1	NB
Kingswood Dr / South Center Drwy (#15)	Stop	-	-	-	B	13.6	NB
Kingswood Dr / Southeast Drwy (#16)	Stop	-	-	-	B	11.3	SB
Littlerock Rd / West Drwy (#17)	Stop	-	-	-	C	18.0	WB

1. Intersection control type. "Round" means roundabout, which will be installed as part of the Littlerock Road Improvement project.

2. Level of service, based on *Highway Capacity Manual* (TRB, 2000) methodology.

3. Average delay in seconds per vehicle.

4. Volume-to-capacity ratio reported for signalized intersections.

5. Worst movement reported for unsignalized intersections.

As noted, key movements at one of the five access points are anticipated to operate at LOS F under with-project conditions. Mitigation is proposed and identified for the shared access with Costco. This is described in more detail in a subsequent section, but includes the installation of a traffic signal.

Traffic Safety Impacts

Generally, as traffic volumes increase through the area, the potential for traffic accidents will also increase. However, the Littlerock Road improvement project will significantly improve operations and traffic safety as it relates to turning conflicts. North of the site along Trosper Road, the operations analysis showed only minor increases in intersection delay anticipated as a result of this project. Thus, no significant increase in the number of accidents is anticipated. Mitigation is proposed at the South Costco shared access which will improve safety and operations for the minor street movements. However, due to the bisected parking lot and the frequency of pedestrians crossing Kingswood Drive, there exists the potential for an increase in pedestrian/vehicle related accidents at the designated crossing. This marked crossing will be identified and designed to match City and *Manual on Uniform Traffic Control Devices* (MUTCD) guidelines for advance warning measures.

Tumwater Middle School Impacts

As noted during the public scoping process, a request was made to evaluate the impacts of the proposed development on the access to the middle school. Currently three driveways serve the Middle School. Two driveways provide access to the front bus loading area of the school, while a third, located to the north of the school provides access to the schools parking area. These two parking areas are not connected and are served independently by the access points previously described. The northernmost driveway is located approximately 780 feet from Kingswood Drive. The City's planned corridor project includes the construction of a roundabout at the Littlerock Road/Kingswood Drive intersection. As a result of this improvement all driveways will be restricted such that they are limited to right-in/right-out only. Access to the school from the south will be accommodated through u-turns at the Kingswood Drive intersection. Due to the turn restrictions and the access management planned by the City, the proposed retail project would have little impact on the safety and operations of the school access. Furthermore, traffic exiting the site from Kingswood Drive will be forced to yield to u-turn traffic from south destined for the school, and the peak periods of the school would occur during the non-peak commute hours and thus do not overlap with the peak hours of the proposed retail project. Due to proximity of the school access points to the future roundabout at Kingswood Drive, travel speeds are anticipated to be within the design speeds of the roadway due to the traffic calming effect caused by the roundabout.

As part of the Littlerock Road improvements, full non-motorized improvements including sidewalks and marked crossings at the roundabout will be constructed. These improvements will provide safe and effective means for students to walk to school without being impacted by any additional traffic to be generated by the project.

Pedestrian Impacts

The proposed project would include typical pedestrian facilities to promote use of alternate modes of transportation. Typically non-motorized trips are not a major component of the overall traffic patterns associated with this type of development.

Although the site is not likely to generate a high number of pedestrian trips, the current proposal identifies frontage improvements along Littlerock Road that include curb, gutter, and sidewalks. The sidewalks on the east side of Littlerock road will connect to the sidewalks constructed as part of the Littlerock Road project and provide a linkage to areas north of the site.

Truck Access

As part of the review of the December 2004 TIA, City staff requested additional analysis of the truck routes through the site to verify that the truck turning radius could be accommodated. The autoturn templates prepared by PACLAND are shown in Figure 11. The design vehicle used in this analysis is a WB-67.

Based on data collected at other supercenters, it is anticipated that on the average, the store would receive 3 General Merchandise trailers and 5 Grocery Trailers per day. Depending on seasonal and sales variations, these numbers could be higher or lower. The majority of the deliveries are anticipated to occur outside the weekday PM peak hour. Those deliveries that would occur during the peak hour are reflected in the forecasted trip generation as they would have been counted in the multiple site surveys used to generate the trip generation data.

Parking

Based on the site plan evaluated within this TIA, a total of 822 stalls, including ADA stalls, are provided north of Kingswood Drive. With the proposed 207,751 gsf of retail space, this translates to a parking rate of 4.0 stalls per 1,000 gsf of retail space. Per Chapter 18.50 of the City of Tumwater Municipal code the maximum parking ratio allowed for this retail use is 4.0 stalls per 1,000 gsf of retail space. Including the additional 316 stalls south of Kingswood Drive, the total site parking ratio is 5.5 stalls per 1,000 gsf. Per chapter 18.50, an administrative modification is being sought to allow the proposed parking supply.

The analysis presented in the section outlines the projected parking demand for the proposed site plan. Calculations are derived from ITE Parking Generation Manual (3rd Edition, 2004) for Land Use #815, Discount Store. Following is the Manual's description for "Free-Standing Discount Store:

"The discount stores in this category are free-standing stores. These stores offer a variety of customer services, centralized cashiering and a wide range of products. They typically maintain long store hours seven days a week. The stores included in this land use are often the only ones on the site, but they can also be found in mutual operation with a related or unrelated garden center and/or service station..."

The Manual provides peak parking Demand rates for three scenarios. These are summarized in Table 8.

Table 8. Peak Parking Demand

Scenario	Peak Parking Demand Rate		
	Range of Observed Demand Rates	85th Percentile Rate ¹	Retail Practical Capacity ² (85% to 90%)
Saturday (non-December)	2.19 - 3.55	3.21	3.53 - 4.06
Saturday (December)	2.08 - 5.71	5.54	6.09 - 7.01
Weekday (December)	3.37 - 4.19	4.09	4.50 - 5.17

1. Peak parking rate in which 85 percent of field studies were at or below.
 2. Retail practical capacity represents 85th-percentile rate plus 10 to 15 percent.

While a rate for non-December weekdays is not provided it is assumed that it is the same or less than the ratio for non-December Saturday, as customer activity is typically higher on weekends than weekdays for these types of retail operations.

Note that Table 8 also provides a rate considering an 85% to 90% “practical capacity.” As a general rule, the number of parking spaces provided should be greater than the demand since it is not practical to assume that every space can be filled. This prevents cars circling the lot looking for a vacant space or waiting in aisles for spaces to vacate. As a general rule, a cushion of about 10% to 15% should be provided. In industry terms, this practice is termed “practical capacity.” A practical capacity of 85% to 90% means that the parking could be considered “fully utilized” when occupancy reaches 85% to 90%. Thus the 10% to 15% cushion is provided for.

The parking supply rate in the current proposal for the stalls north of Kingswood Drive is within 3.53 – 4.06 range that represents a practical capacity for peak parking demand for the non-December Saturday scenario. The proposed supply is not designed to meet the practical capacity of peak annual conditions on-site. A facility designed to serve the busiest shopping season would be an unrealistic design standard. It would result in excessive paved area for the vast majority of the year. As with most retail uses, during peak retail season, such as around the Christmas holiday in December, measures such as off-site employee parking, are instituted if parking reaches full capacity.

Mitigation Analysis

This section highlights the proposed mitigation and provides additional support for the proposed improvements. As noted above, mitigation is recommended at the following locations:

- I-5 SB ramps/Trosper Road
- Littlerock Road/Trosper Road
- Littlerock Road/Costco shared access
- I-5/Tumwater Boulevard Interchange

In addition to the four locations noted above, improvements were requested along Capitol Boulevard as a part of the project mitigation plan. The improvements at the intersection of Trosper Road/Capitol Boulevard include of the elimination of the westbound signal phase at this intersection. The existing east leg of this intersection would be converted to a left-in/right-in/right-out movement. A u-turn location will be

developed north of the Burger King access at a location yet to be determined by the City. Although the project impacts noted in this report do not trigger the need for this improvement, the existing and future baseline conditions warrant this improvement and have been previously identified in the City's sub-area plan prepared for this area.

I-5 SB Ramp/Trosper Road

As noted in the traffic operations section, without the project this intersection is forecast to operate at LOS E with a delay of 56.0 seconds and v/c ratio of 0.95. Per City of Tumwater standards, the LOS standard for this intersection is LOS E in 2007 during the weekday PM peak hour. With the traffic from the proposed project, the intersection is anticipated to degrade to LOS F with a delay of 96.9 seconds. Several potential improvements were reviewed based on available right-of-way. This included signal timing, optimization, phase modifications, and construction of additional lanes. The results of the analysis indicated that the project impacts on the intersection performance could be mitigated through addition of exclusive through lanes to the northbound and southbound approaches. In addition, a northbound right-turn overlap phase will be implemented, which permits the northbound right-turns to operate with a green arrow while the westbound left-turns have a green arrow and are being served. These modifications allow for more efficient signal phasing and timing operations. With the implementation of these improvements, the intersection improves to LOS D, with a delay of 43.5 seconds and a v/c ratio of 0.85. This satisfies the City's LOS E criteria. Table 9 outlines the revised queuing analysis based on the proposed mitigation plan.

Table 9. Baseline and Mitigated Queue Length Results (Trosper Road Corridor)

Study Intersection	Movement	Available Storage (ft)	2007 Baseline		2007 With Mitigation	
			Queue Length ¹	Exceeds Capacity (ft)	Queue Length ¹	Exceeds Capacity (ft)
I-5 SB Ramps/ Trosper Rd	NBL	100			25	No
	NBLT	150 ²	185	Yes +35	275	Yes +125
	NBR	150 ²	355	Yes +205	390	Yes +240
	SBL	450	225	No	300	No
	SBLT	1000	750	No		
	SBT	400			350	No
	SBR	400	910	Yes +510	610	Yes +210
	EBL	125	125 ³	- ³	125	-
	EBT-in	400	540	Yes +140	520	Yes +120
	EBT-out	400	565	Yes +165	540	Yes +140
	WBL	350	350	No	260	No
	WBT	780	310	No	175	No

1. Forecasted 95th percentile queue lengths in feet from micro-simulation VISSIM model.

2. Storage defined based on proximity to Fred Meyer's driveway, actual storage available is greater than 1,000 feet.

3. Movement forecasted to operate at an adequate LOS. Vehicle queuing for this movement influenced by the through queue and therefore not calculated in this table.

As shown in Table 9, all but one approach have 95th-percentile queue lengths less than baseline conditions. The northbound 95th-percentile queues will continue to extend beyond the Fred Meyer driveway (150 feet south of the Trosper intersection), which will continue to degrade operations for that driveway during the peak hour. Table 9 shows

the eastbound left-turn to meet the current storage. A review of the model performance and calculations shows that the original values reported in the model were representative of the through queue as well as the left-turn volume. Based on the project traffic volumes for this movement and the LOS performance for this movement, vehicle queuing for this movement is not anticipated to impact corridor performance.

Littlerock Road/Trosper Road

Two improvement alternatives were reviewed for this intersection. The results of the analysis indicate that either improvement could be implemented and would result in a mitigation of project impacts at this location. Both improvements would also complement the mitigation measures being proposed at the southbound ramp terminal. The two improvement alternatives include:

- Reconfigure the northbound approach to include a second northbound right-turn lane. As a result of this improvement, the center northbound through lane would be modified to become a shared through and right-turn lane. In addition, signal phasing would be modified by removing the northbound overlap phase and adjusting the phase order. These changes would better stage vehicles that are preparing to travel eastbound through the I-5 SB Ramp/Trosper Road intersection.
- Reconfigure the east leg of the intersection to convert the westbound approach to include two left-turn lanes, and a through right lane. As a result of the improvement the center shared left-through lane would become a left-turn only lane. Westbound through lanes would reduce from two to one. In addition, signal phasing for the east and west approaches would be adjusted to provide protected left-turn phasing instead of the existing split signal phasing.

Changes at this intersection are being proposed by the applicant to complement the changes at the I-5 SB Ramp/Trosper Road intersection. These changes would better stage vehicles that are traveling eastbound and westbound through the I-5 SB Ramp/Trosper Road intersection. Table 10 highlights the LOS for both improvement options while Table 11 and Table 12 shows the results of the queuing analysis conducted for both improvement options.

Table 10. Mitigation LOS Summary for Littlerock Rd/Trosper Blvd

PM Peak Hour	2007 Baseline			2007 With Project		
	LOS ¹	Delay ²	V/C ³	LOS	Delay	V/C
Littlerock Rd/ Trosper Rd	D	43.6	0.72	D	48.2	0.80
with double northbound right-turn lanes (opt A)	-	-	-	D	52.2	0.75
with exclusive westbound left-turn lanes (opt B)	-	-	-	D	45.4	0.74
with both Option A and Option B	-	-	-	D	45.8	0.73

1. Level of service, based on 2000 *Highway Capacity Manual* methodology.
 2. Average delay in seconds per vehicle.
 3. Volume-to-capacity ratio reported for signalized intersections.

As shown in Table 10, under both the baseline and with-project scenarios, the Littlerock Road/Trosper Road intersection is forecast to operate at LOS D. The mitigation

measures are proposed to better manage the queues along Trospers Road and improve system performance.

Table 11. Baseline Queue Length Results for Trospers Rd/Littlerock Blvd

Movement	Available Storage (ft)	2007 Baseline Conditions	
		Queue Length ¹	Exceeds Capacity (ft)
NBL	300	760	Yes +460
NBR	800	>800	Yes +>25
EBL	150	90	No
EBT	1000	265	No
EBTR	500 ²	575	Yes +75
WBL	175	415	Yes +240
WBTL	400	420	Yes +20
WBTR	400	285	No

1. Forecasted 95th percentile queue lengths in feet from micro-simulation VISSIM model.
2. Future storage lengths revised from existing conditions due to planned improvements by the City.

Table 12. Mitigation Queue Length Results for Trospers Rd/Littlerock Blvd

Movement	Available Storage (ft)	2007 With Mitigation 2 nd NBRT lane		2007 With Mitigation 2 nd WBLT lane		2007 With Mitigation "with Both"	
		Queue Length ¹	Exceeds Capacity (ft)	Queue Length ¹	Exceeds Capacity (ft)	Queue Length ¹	Exceeds Capacity (ft)
NBL	300	300	No	365	Yes +65	275	No
NBR	800	550	No	675	No	455	No
EBL	150	90	No	95	No	95	No
EBT	1000	210	No	210	No	210	No
EBTR	500 ²	490	No	430	No	440	No
WBL	175	405	Yes +230	410	Yes +235	395	Yes +220
WBTL	400	395	No	215	No	215	No
WBTR	400	390	No	395	No	375	No

1. Forecasted 95th percentile queue lengths in feet from micro-simulation VISSIM model.
2. Future storage lengths revised from existing conditions due to planned improvements by the City.

Littlerock Road/Costco Shared Access

As noted in the project impacts section of this report, the westbound left-turns from the Costco shared access are currently operating at LOS F and are projected to continue to do so with the proposed project. Per the site plan shown in Figure 2A, a traffic signal is proposed at this location. Based on a review of the traffic signal warrants outlined in the MUTCD, the projected traffic volumes would satisfy the 8-hour and 4-hour warrants. The signal warrant worksheets are provided in Appendix F. With a traffic signal installed at this location, with the proposed site plan, the intersection would operate at LOS A with a delay of 9.4 seconds and v/c ratio of 0.64. A conceptual layout showing the signalization of the intersection and the channelization along the shared access roadway is included in Figure 12. In addition to the signalization of the intersection with Littlerock Road, traffic control at the internal intersection with Costco and the proposed retail project is also proposed. This traffic control is shown in Figure 13. An eastbound

right-turn lane from the shared access drive into the retail parking lot is also proposed and will improve the efficiency of the internal intersection.

I-5/Tumwater Boulevard Interchange

As noted in the baseline analysis, improvements have been identified for the I-5 interchange at Tumwater Boulevard. The proposed project would be required to pay a mitigation fee towards these improvements at approximately \$3,100 per weekday PM peak hour trip that impacts the interchange. Based on the number of project trips projected to travel through the interchange, the total cost of the mitigation would be \$366,000. The City of Tumwater's current Capitol Facilities Plan includes the Tumwater Boulevard project as a funded program through the collection of the SEPA mitigation fees.

Capitol Boulevard/Trosper Road

A detailed LOS and queuing analysis was conducted for this intersection assuming the improvements noted above. Due to the close proximity of Lee Street, this intersection was also included in the queuing summary. The LOS for Trosper/Capitol for the "Capitol Option" is LOS D, 43.2 seconds delay, v/c of 0.86. LOS for Lee/Capitol for the "Capitol Option" is LOS C, 27.5 seconds delay, v/c of 0.68. The queuing summary is noted in Table 13.

Table 13. WP Queue Length Results (Proposed vs. "Capitol Option")

Study Intersection	Movement	Available Storage (ft)	2007 With Project		2007 WP "Capitol Opt"	
			Queue Length ¹	Exceeds Capacity (ft)	Queue Length ¹	Exceeds Capacity (ft)
Capitol Blvd / Lee St	NBT	1000	720	No	490	No
	SBL	150	90	No	75	No
	SBT	650	390	No	440	No
Capitol Blvd / Trosper Rd	NBL	550	220	No	125	No
	NBTL	650	750	Yes +100	670	Yes +20
	NBTR	650	710	Yes +60	315	No
	SBT	1000	355	No	440	No
	EBL	325	305	No	335	Yes +10
	EBTL	325	300	No	320	No
	EBR	325	160	No	180	No

1. Forecasted 95th percentile queue lengths in feet from micro-simulation VISSIM model.

2. Queues are forecast to exceed capacity under with-project (without-mitigation) conditions, estimation not possible.

Proposed Mitigation Measures

The lead agency for this proposed project has determined that it would have probable significant adverse impacts on transportation operations. The probable significant adverse impacts identified would be capable of being mitigated to a level of nonsignificance if the transportation improvement measures identified below are implemented by the applicant. The DSEIS assumes that the applicant would comply with all City ordinances and standards governing the type of development proposed.

The traffic that would be generated by the Wal-Mart project, as quantified and described in this Transportation Impact Analysis, would have significant adverse environmental impacts by reduction of existing peak-hour capacity on the Trosper Road/I-5 Interchange, and the intersection of Trosper Road/Capitol Boulevard, and the intersection of Trosper Road/Littlerock Road, and the intersection of Littlerock Road/Costco shared access, and the Tumwater Boulevard/I-5 interchange.

The identified impacts would require planning, design and construction of additional, improved transportation facilities; or the replacement of transportation facilities, as set forth below.

Mitigation of the above-stated impacts may be in the form of elimination, minimization, reduction of, or alternatively, compensation for transportation impacts.

- Elimination of impacts may occur by delaying the project until additional transportation capacity is provided by other development applicants, the City, another governmental agency, or by not building the proposed project.
- Minimization of impacts could occur by modifying the proposed project in order to reduce the project impacts at the above described locations to a degree where mitigation would not be required.
- Reduction of impacts may occur in a variety of ways such, as those described for minimizing the impacts or through operational measures which reduce the timing and volume of traffic impacts at the identified locations.
- Compensation of impacts may take one of two forms: actual construction of transportation capacity improvements, or voluntary payment of proportionate share mitigation fees. The applicant can construct transportation capacity improvements that have been identified in order for the applicant to meet adopted level of service standards necessary to provide the required capacity — including the capacity that would be consumed by the proposed project. Alternatively, compensation for impacts to the Tumwater Boulevard/I 5 Interchange may be in the form of a voluntary payment by the applicant of mitigation fees pursuant to RCW 82.02.020, which equal an identified proportionate share of the cost of constructing the improvements.

The City's six-year street program, the Thurston Regional Transportation Plan, the land division provisions of the municipal code (TMC, Title 17), all as referenced in the City's SEPA policies at TMC 16.04.150, provide authority for requiring new development projects to make adequate provision for transportation facilities needed to serve the proposed project.

The applicant has proposed to implement the following transportation improvements as necessary mitigation for project impacts:

- **Trosper Road/I-5 SB Ramp Intersection (Tyee Drive):** The addition of exclusive through-lanes for the north and southbound approaches, the

implementation of a northbound right-turn overlap phase, and signal timing optimization and phase modifications.

- **Trosper Road/Littlerock Road:** Reconfigure the northbound approach to include a right-turn lane, a right-through lane, and a left-turn lane. Reconfigure the westbound approach to include two exclusive left-turn lanes and a single through-right. Modify the signal phasing accordingly.
- **Littlerock Road/Costco Shared Access:** Installation of a traffic signal including channelization. Traffic control would be provided at the internal intersection with Costco. Stop signs would be installed on both the north and south leg of this intersection. In addition, an eastbound right-turn lane from the shared access drive into the Wal-Mart parking lot would be constructed to improve internal circulation.

In addition, the applicant has volunteered to take the following actions to improve non-project related transportation deficiencies:

- **Trosper Road/Capitol Boulevard:** Eliminate the signal phasing for the east leg of the intersection and construct a northbound u-turn, north of M Street.

The applicant would endeavor to construct the Trosper Road/Capitol Boulevard improvements described above, but if necessary right-of-way is not available or construction is prevented by circumstances outside the applicant's control, the City would accept a letter of credit for the cost of these improvements. Completion of these improvements would not be a precondition to issuance of the certificate of occupancy for the project.

Finally, the applicant would voluntarily pay a mitigation fee under RCW 82.02.020 for impacts to the Tumwater Boulevard/I-5 Interchange as described below:

- **Tumwater Boulevard/I-5 Interchange:** The City's planned transportation improvements at the Tumwater Boulevard/I-5 interchange include widening of the existing overpass, adding a second lane to the northbound on-ramp, signalization of the northbound ramp terminal, addition of new interchange on-ramps for both eastbound to northbound and westbound to southbound traffic. The proportionate share of constructing the improvements is derived by dividing the total costs of improvements by the total amount of capacity (in trips) provided by those improvements. In this case, that proportionate share amounts to a mitigation fee of \$3,103 for each of the 118 trips that would be generated by the project that are distributed to the Tumwater Boulevard/I-5 Interchange; for a total of \$366,154.

In sum, the applicant would construct the improvements identified for Trosper Road/I-5 Interchange, Trosper Road/Littlerock Road, and Littlerock Road/Costco shared access. If necessary right-of-way is not available or construction is prevented by circumstances outside the applicant's control, the City would accept a letter of credit for the cost of the improvements identified for Trosper Road/Capitol Boulevard. In

addition, the applicant would accept the impact mitigation fee for impacts to the Tumwater Boulevard/I-5 Interchange and execute the necessary voluntary agreement.

The applicant also proposes to implement the following mitigation measure:

- Measures would be instituted during the peak retail season if parking onsite reaches full capacity. These measures could include requiring employees to park offsite in designated areas.

Figure 11. Truck Access Turning Templates – Proposed Site Plan

(Figure 11)

Figure 12. Conceptual Channelization - Littlerock Road/Costco Shared Access

(Figure 12)

Figure 13. Costco/Retail Internal Access Traffic Control

(Figure 13)

Project Impacts –Alternate Site Plan

This section documents the project-generated impacts of the proposed development on the surrounding roadway network assuming the alternative site plan. The alternate site plan is shown in Figure 2B. As described previously, the alternate site plan assumes the relocation of Kingswood Drive. Site-generated traffic volumes were estimated, then distributed and assigned to the surrounding roadway network. Future with-project traffic volumes were identified and traffic operations were evaluated.

Trip Generation

Trip generation characteristics will be the same as described previously in the *Project Impacts - Proposed Site Plan* section.

Trip Distribution and Assignment

Trip distribution and assignment characteristics will be the same as described previously in the *Project Impacts - Proposed Site Plan* section. However, project trip assignment near the project site is shifted to reflect the Alternate Site plan, as shown in Figure 13. Total 2007 with-project traffic volumes assuming the alternate site plan are shown in Figure 14.

Traffic Operations Impacts

Traffic operations at the study intersections were evaluated for the 2007 with-project conditions and then compared to 2007 baseline conditions to identify project-related impacts. When compared to the Proposed Site Plan all off-site intersections are anticipated to operate at the same LOS. The site access points will operate differently and are discussed in more detail in the site access section of this report.

Site Access/Circulation Analysis

As described previously, the alternative site plan includes the realignment of Kingswood Drive. This realignment of Kingswood Drive results in a contiguous site plan, not bisected as shown in the proposed plan. The realignment of the Kingswood Drive and the alternate site plan have several improvements over the proposed plan, including:

- Contiguous parking field
- Reduced level of vehicle/pedestrian conflicts on Kingswood Drive due to the non-bisected site plan
- More efficient access and better layout of the parking field due to the non-bisected site plan
- Improved access operations

Figure 14. PM Peak Project Trips -Alternate Site Detail

(Figure 14)

Figure 15. 2007 With-Project Volumes - Alternate Site Detail

(Figure 15)

With the improved access and the contiguous parking field, all but one site driveway will operate well at LOS C or better (as shown in Table 14). The shared access with Costco will continue to operate poorly without a traffic signal. As discussed previously, the project proposes to signalize this intersection as mitigation. As a signalized intersection, the shared Costco driveway will operate at LOS A.

Table 14. Baseline and With Project Peak Hour LOS Summary

PM Peak Hour	Type ¹	2007 Baseline (No Action)			2007 With Project		
		LOS ²	Delay ³	V/C ⁴ or WM ⁵	LOS	Delay	V/C or WM
Littlerock Rd/ South Costco Drwy (#7)	Stop	F	>999	EB	F	>999	EB
Littlerock Rd/ Kingswood Dr (#8)	Round	A	4.3	0.50	A	6.0	0.60
Kingswood Dr / Southwest Drwy (#14)	Stop	-	-	-	A	9.6	SB
Kingswood Dr / South Center Drwy(#15)	Stop	-	-	-	B	13.1	SB
Kingswood Dr / Southeast Drwy (#16)	Stop	-	-	-	B	10.5	SB
Littlerock Rd/ West Dwy (#17)	Stop	-	-	-	C	17.5	WBR

1. Intersection control type. "Round" means roundabout, which will be installed as part of the Littlerock Road Improvement project.
2. Level of service, based on 2000 *Highway Capacity Manual* methodology.
3. Average delay in seconds per vehicle.
4. Volume-to-capacity ratio reported for signalized intersections.
5. Worst movement reported for unsignalized intersections.

Traffic Safety Impacts

Traffic safety impacts will be less than what was described previously in the *Project Impacts - Proposed Site Plan* section. Because the site is not bisected by a city street, there will be much less potential for pedestrian/vehicle conflicts along Kingswood Drive.

Tumwater Middle School Impacts

Under the alternative site plan, the realigned Kingswood Drive is relocated approximately 450 feet to the south. The precise location is shown on the Figure 2B site plan. With the relocation of Kingswood Drive further to the south, one design alternative could shift north the school's primary access to become a new west leg of the Kingswood Drive/Littlerock Road roundabout. Under this scenario, vehicle access to the school general parking lot is provided directly off of the roundabout. This option would improve ingress/egress options for parent and staff of the school. Buses would still utilize the roundabout to maneuver through the area, as their separate access from Littlerock Road will be maintained. This access scheme represents an improvement for general access and circulation for parents and staff of the elementary school, when compared to the previous proposal and analysis.

The school district has provided written comments with respect to the location of the roundabout and the intersection of Kingswood Drive/Littlerock Boulevard. The school district's traffic engineer formed the opinion that the Kingswood Drive relocation south of its existing location "enhances safety and improves access for Tumwater Middle School." The letter received from the school district is included in Appendix G. The school district has requested four considerations associated with the relocation of the

roundabout. These considerations include comments related to the final design and consideration of the school access and parking lot configuration.

A second design alternative would leave the school access as the City currently has planned. Under either access alternative, the impacts to the school as a result of the proposed project would be minimal.

Pedestrian Impacts

Pedestrian impacts will be less than what was described previously in the *Project Impacts - Proposed Site Plan* section. Because the site is not bisected by a city street, there will be much less potential for pedestrian/vehicle conflicts along Kingswood Drive.

Truck Access

As part of the review of the December 2004 TIA, City staff requested additional analysis of the truck routes through the site to verify that the truck turning radius could be accommodated. The autoturn templates prepared by PACLAND are shown in Figure 16. The design vehicle used in this analysis is a WB-67.

Parking

Based on the site plan evaluated within this TIA, a total of 972 stalls, including ADA stalls, are provided. This translates to a parking rate of 4.7 stalls per 1,000 gsf of retail spaces. Per Chapter 18.50 of the City of Tumwater Municipal code the maximum parking ratio allowed for this retail use is 4.0 stalls per 1,000 gsf of retail space. Per chapter 18.50 an administrative modification is being sought to allow the proposed parking supply.

As described for the proposed alternative, demand will range from 3.21 to 5.54, seasonally. The proposed supply of 4.7 spaces per 1,000 gsf will provide for parking within the recommended supply range.

Mitigation Summary

Proposed mitigation will be the same as described previously in the *Project Impacts - Proposed Site Plan* section.

Figure 16. Truck Access Turning Templates - Alternative Site Plan

(Figure 16)

Findings and Recommendations

This traffic impact analysis summarized the projected traffic impacts of the proposed Tumwater Retail development. The following outlines the general findings of the study.

- The proposed project would consist of approximately 208,000 gsf of general retail space, approximately 21,000 gsf of garden center space, and a gas station with 12 vehicle fueling positions.
- Access to the site is proposed from Littlerock Road, Kingswood Drive, and the shared access with Costco. The report included an evaluation of two site plans.
- The proposed project is expected to generate approximately 793 new weekday PM peak hour trips.
- With the mitigation measures and pro-rata contributions proposed by the applicant, all intersections are anticipated to meet City of Tumwater standards with the proposed project. For a complete list of proposed measures, refer to the *Proposed Mitigation Measures* sub-section within the *Project Impacts – Proposed Site Plan* section.
- No safety, non-motorized, or transit impacts are anticipated due to the project.

The results of this study suggest the study area would accommodate project and background traffic volumes with the proposed mitigation, assuming the planned improvements along Littlerock Road.

