City of Olympia

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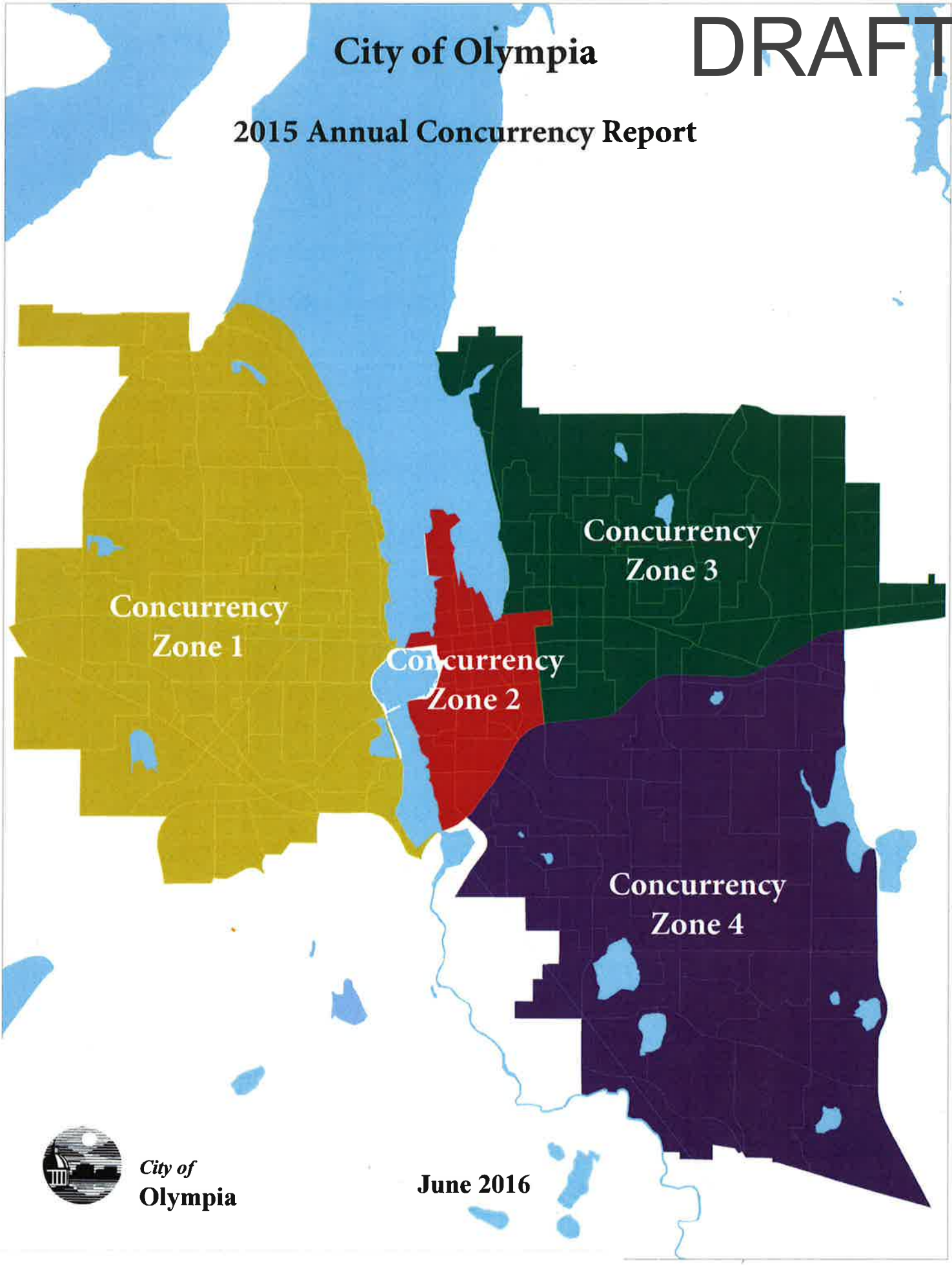
2015 Annual Concurrency Report



City of
Olympia

June 2016

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Olympia 2015 Concurrency Report

INTRODUCTION

In 1995, the City of Olympia (City), in compliance with the Growth Management Act's (GMA) internal consistency requirement, adopted the Transportation Concurrency Ordinance (No. 5540). One objective of GMA's internal consistency requirement is to maintain concurrency between a jurisdiction's infrastructure investments and growth. Following this objective, the City's Ordinance prohibits development approval if the development causes the Level of Service (LOS) on a transportation facility to decline below the standards adopted in the transportation element of the *Olympia's Comprehensive Plan* (Comp Plan). The ordinance contains two features, as follows:

- Development is not allowed unless (or until) transportation improvements or strategies to provide for the impacts of the development are in place at the time of development or within six years of the time the project comes on line.
- Annual review of the concurrency management system is required along with the annual review and update of the *Capital Facilities Plan* (CFP) and transportation element of the Comp Plan.

In developing the City's concurrency requirements, City Council desired a measurement system that would be easy to understand and administer, and be used to monitor transportation facilities on an annual basis, through a report. A concurrency management system was developed that utilizes a regionally developed travel demand model to project the number of vehicle-trips generated by forecast land use growth for a six-year period. This six-year forecast facilitates evaluating potential system deficiencies.

In 1996, the City adopted its first annual concurrency review. The 1996 *Concurrency Report* established a methodology for monitoring the four concurrency districts outlined in the ordinance and provided a framework for future concurrency reviews. Between 1996 and 2009 concurrency reports were issued annually. Between 2008 and 2014, the City saw little new growth and vehicle-trips began to decrease, the City issued annual memos documenting changes in traffic volumes rather than complete concurrency reports.

In general, the concurrency framework consists of two stages.

1. The first stage reports:

    - Actual traffic volume growth at select intersections.
    - Annual vehicle-trip growth based on population and employment data.

- Six-year forecast of vehicle-trip growth for PM Peak Hour. The City uses this information to gain an understanding of actual trends and forecast growth in vehicle volumes on the transportation network.

2. The second stage involves the LOS analysis. Using vehicle-volume outputs from the regional travel-demand model, reported as two-hour average volumes, the City performs a detailed LOS analysis at key intersections. This analysis is conducted to identify potential problem areas, and provide verification of transportation system improvement needs within the six-year horizon of Olympia's Capital Facilities Plan (CFP).

When a new development proposal is received, the City uses the average hourly vehicle traffic volume that would occur during the highest two-hour PM period to determine how the City's LOS will be affected. This measurement is used as a screening tool at all intersections and road segments to determine if there are any deficiencies.

Since deficiencies are measured using LOS, it is worth mentioning that Olympia has two LOS standards. In downtown Olympia and along urban corridors LOS E will be acceptable on arterial and major collectors. In the rest of the City and urban growth area LOS D is acceptable. Olympia's LOS standards are consistent with the standards in the *Regional Transportation Plan* (RTP), and the City works to make its projects consistent with regional standards and projects.

METHODOLOGY

The methodology used for performing 2015 annual concurrency is consistent with the methodology used in previous years; however, the base data have undergone some significant upgrades.

In 2015, the Thurston Regional Planning Council (TRPC) completed development of a new multimodal travel demand model – the Greater Thurston Region (GTR) travel demand model. The GTR model was expanded beyond Thurston County to include parts of Pierce, Grays Harbor, Lewis, and Mason Counties in order to get a better estimate of county-to-county flows. It contained updated 2014 land use data, including estimates of dwelling units and employment, and was calibrated to a 2013 Household Travel Survey, and recent traffic counts.

The GTR model also includes TRPC's updated population and employment forecast (2013), which takes into the account the effects of the economic downturn from 2008 to 2014. The forecast horizon is to the year 2040. TRPC's land use forecast is consistent with adopted local comprehensive plans. In the shorter horizons, efforts have been made to calibrate the land use forecast to development projects that are vested with local cities and Thurston County, and are fairly likely to be developed.[1]

[1] This analysis assumes that the City of Olympia will purchase two properties (known as the Trillium property and Kaiser Heights) that were previously designated for residential or mixed-use growth and develop them as parks.

Comparing the new GTR model with TRPC's previous travel demand model, the new GTR model is forecasting less vehicle-trip growth than the previous model. The main reasons are:

- The GTR model is calibrated to an updated household travel survey. The survey shows that Thurston County has had a slight change in the overall number of trips people are taking by vehicles, and a slight increase in walking, bicycling, and transit trips.
- The post-recession land use forecast (2013) is lower than the previous forecast, resulting in less growth projected for vehicle-trips.
- There is a major change in the amount of trips forecast from outside of Thurston County. In particular, the previous model contained a much higher growth forecast for trips beginning in Pierce County, compared to updated forecasts received from Puget Sound Regional Council. Due to the configuration of the previous model, most of those trips were pushed onto Interstate-5 and through Thurston County. In the updated GTR model, a great deal of detail has been added to Pierce County's network, and the trips are better distributed.

The concurrency methodology has two stages, the results of which are presented in the following sections.

A. Actual Traffic Volume Growth, Annual Vehicle-trip Growth, and Six-Year Forecast

This section of the report contains actual growth in traffic volumes, annual estimates of vehicle-trip growth based on population and employment data, and six-year forecasts of vehicle-trip growth for the afternoon peak-hour (PM Peak Hour). The City uses this information to gain an understanding of actual trends and forecast growth in vehicle volumes on the transportation network.

Actual Traffic Volume Growth at Select Intersections

Traffic volumes are collected by the City on a regular basis. Table 1 and Figure 1 show PM Peak Hour volumes for major intersections.

Table 1: Traffic Counts for Select Intersections, PM Peak Entering Hour Volumes

Location #	Intersection Name	YEAR								PERCENT CHANGE	
		2008	2009	2010	2011	2012	2013	2014	2015	2014 to 2015	2008 to 2015
001	Black Lake Blvd Jct. Cooper Pt Rd	5,283	5,316	5,154	4,776	4,754	4,815	5,064	4,832	-4.58%	-8.54%
005	Division St Jct. Harrison Ave	2,877	2,861	2,848	2,801	2,771	2,756	2,644	2,527	-4.43%	-12.17%
008	Simmons St Jct. 4th Ave	2,430	2,130	2,093	2,155	2,238	2,148	2,308	2,106	-8.75%	-13.33%
022	Lilly Rd Jct. Martin Way	3,419	3,424	3,367	3,259	3,242	3,224	3,144	3,094	-1.59%	-9.51%
024	Martin Way Jct. Sleater-Kinney Rd	3,635	3,542	3,357	3,410	3,488	3,367	3,418	3,135	-8.28%	-13.76%
025	Lilly Rd Jct. Pacific Ave	3,425	3,348	3,184	3,230	3,262	3,296	2,994	3,033	1.30%	-11.45%
026	Fones Rd Jct. Pacific Ave	3,780	3,934	3,929	3,880	3,774	3,688	3,700	3,643	-1.54%	-3.62%
030	East Bay Dr Jct. State Ave	2,382	2,569	2,430	2,277	2,165	2,147	2,404	2,273	-5.45%	-4.58%
051	Plum St Jct. Union Ave	3,634	3,651	3,510	3,581	3,604	3,531	3,487	3,537	1.43%	-2.67%
058	Jefferson St Jct. 14th Ave	2,337	2,276	2,215	2,345	2,284	2,280	2,345	2,321	-1.02%	-0.68%
063	Eskridge Blvd Jct. Henderson Blvd	1,197	1,223	1,126	1,132	1,044	1,128	1,297	1,317	1.54%	10.03%
064	Henderson Blvd Jct. North St	1,563	1,549	1,545	1,617	1,733	1,556	1,631	1,727	5.89%	10.49%
066	Simmons St Jct. 5th Ave	1,867	1,911	1,827	1,798	1,641	1,710	1,949	1,862	-4.46%	-0.27%
093	Henderson Blvd Jct. Yelm Highway	2,240	2,631	2,290	1,921	1,946	1,816	1,994	2,699	35.36%	20.49%
096	Harrison Ave Jct. Kaiser Rd	1,649	1,756	1,796	1,766	1,840	1,879	1,903	2,170	14.03%	31.59%
510	Cain Rd Jct. North St	1,114	1,046	1,097	1,065	1,041	1,035	969	1,062	9.60%	-4.67%
511	Cooper Pt Rd Jct. 14th Ave NW	1,157	1,105	1,057	1,011	943	972	955	912	-4.50%	-21.18%
520	Hoffman Rd Jct. 18th Ave SE	1,642	1,636	1,631	1,587	1,565	1,591	1,579	1,573	-0.38%	-4.20%
522	Boulevard Rd Jct. Morse-Merryman Rd	1,297	1,195	1,253	1,197	1,287	1,248	1,259	1,341	6.51%	3.39%
523	Boulevard Rd Jct. 22nd Ave SE	1,418	1,291	1,260	1,176	1,211	1,192	1,260	1,129	-10.40%	-20.38%
526	Boulevard Rd Jct. Log Cabin Rd	1,530	1,506	1,521	1,404	1,315	1,244	1,292	1,484	14.86%	-3.01%
528	Evergreen Pk Dr Jct. Lakeridge Dr	955	929	877	728	956	726	917	921	0.44%	-3.56%
531	Herman Rd Jct. Wiggins Rd	948	961	950	1,129	1,242	1,023	1,078	1,137	5.47%	19.94%
541	Harrison Ave Jct. West Bay Dr	2,542	2,660	2,632	2,316	2,361	2,449	2,320	2,544	9.66%	0.08%
543	Deschutes Pkwy Jct. Lakeridge Dr	1,228	1,091	1,027	989	974	1,040	1,120	1,217	8.66%	-0.90%
544	Evergreen Pk Dr Jct. Evergreen Pk Dr S	1,192	1,129	1,140	1,084	1,014	990	1,072	1,089	1.59%	-8.64%
548	East Bay Dr Jct. Olympia Ave	1,318	1,345	1,296	1,202	1,273	1,257	1,343	1,301	-3.13%	-1.29%
	Total	**58,059**	**58,015**	**56,412**	**54,836**	**54,968**	**54,108**	**55,446**	**55,986**	**0.97%**	**-3.57%**

Indicates Estimated Volume based on Interpolation

Source: City of Olympia, Public Works Department.

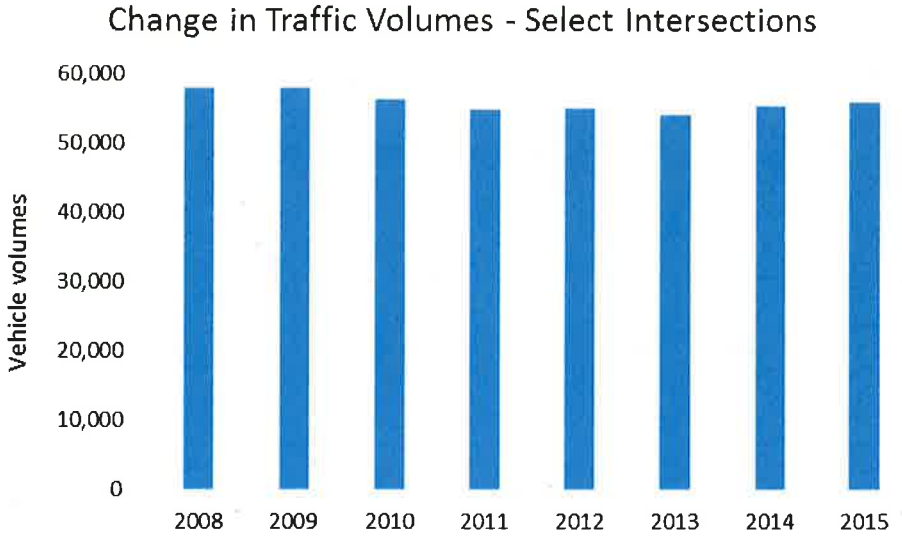

Figure 1: Change in traffic volumes for select intersections in Olympia.

Between 2008 and 2014, population growth slowed in Olympia and the surrounding regions, and employment decreased. This led to a decrease in traffic volumes on the transportation network (Figure 1). Employment began to increase beginning in 2011, and in 2014 surpassed pre-recession levels (Figure 2).

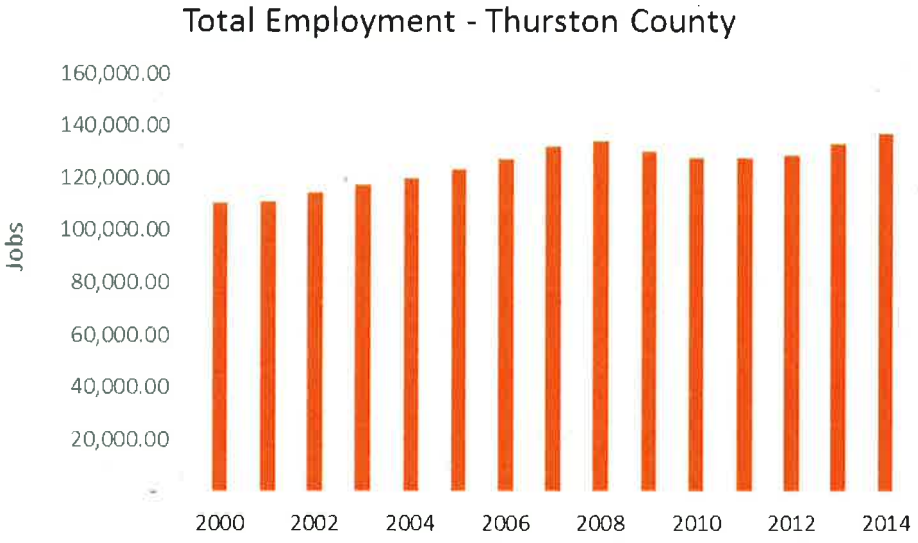

Figure 2: Change in total employment, Thurston County.

Annual Vehicle-trip Growth

Annual growth in vehicle-trips (Table 2) is obtained from the GTR model using population and employment data. Thurston Regional Planning Council obtains actual residential building permits to calculate new dwelling units and then calibrates to population estimates generated by the State Office of Financial Management. Employment growth is estimated from new commercial and industrial building square footage obtained from commercial building permits. The land use estimates are input into the GTR model, where model trip generation rates are applied to both dwelling units and employment to generate vehicle-trips. Vehicle-trips include both trip origins and trip destinations in the specified area.

Table 2: Comparison of annual PM peak hour traffic growth* in vehicle-trips.

	City				City and UGA			
Concurrency Zone	**2014**	**2015**	**Annual Growth Rate**	**Growth 2015**	**2014**	**2015**	**Annual Growth Rate**	**Growth 2015**
1	15,922	16,267	2.2%	345	16,736	17,083	2.1%	347
2	9,918	10,040	1.2%	122	9,918	10,040	1.2%	122
3	9,047	9,221	1.9%	174	9,435	9,611	1.9%	176
4	5,631	5,690	1.0%	59	7,585	7,669	1.1%	84
Total	**40,518**	**41,218**	**1.7%**	**700**	**43,674**	**44,403**	**1.7%**	**729**

*Traffic growth is based on residential and commercial permits issued.
Source: Thurston Regional Planning Council

Six-Year Forecast

TRPC's GTR model was used to develop the six-year forecast of PM trip growth within the City of Olympia and its UGA (Table 3). Estimating trip growth for the six-year period involved extrapolating from the 2040 forecast horizon. Forecasts of trip-growth were generated from countywide forecasts of both dwelling units and employment. Actual growth depends on many dynamic factors, including market forces. TRPC's post-recession population and employment forecasts are tracking well with actual growth (Figures 3 and 4).

Table 3: Comparison of six-year forecast PM peak hour traffic growth in vehicle-trips.

Concurrency Zone	City				City and UGA			
	2015	2021	Average Annual Growth	Growth 2015-2021	2015	2021	Average Annual Growth	Growth 2015-2021
1	16,267	18,598	2.3%	2,332	17,083	19,477	2.2%	2,394
2	10,040	11,232	1.9%	1,191	10,040	11,232	1.9%	1,191
3	9,221	10,442	2.1%	1,221	9,611	10,893	2.1%	1,282
4	5,690	6,736	2.9%	1,046	7,669	9,043	2.8%	1,374
Total	**41,218**	**47,008**	**2.2%**	**5,790**	**44,404**	**50,645**	**2.2%**	**6,241**

Source: Thurston Regional Planning Council.

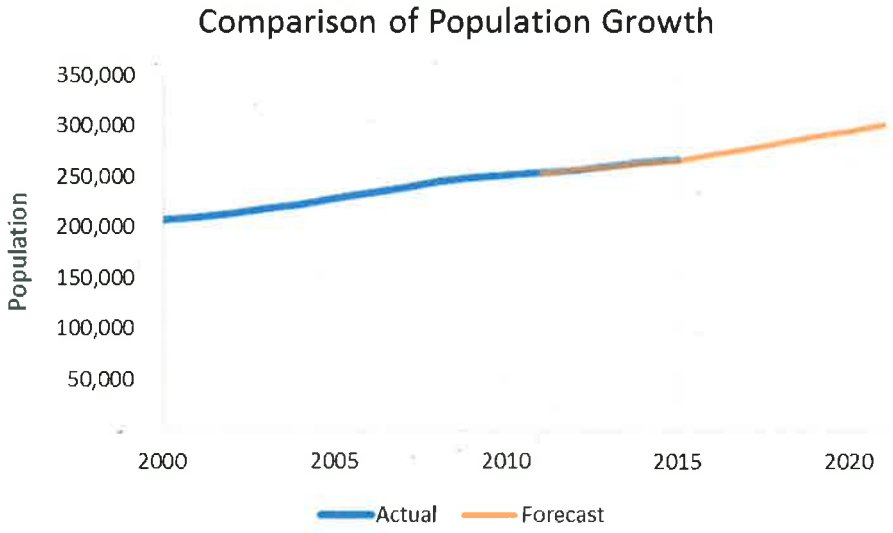

Figure 2: Comparison of actual versus forecast population growth, Thurston County.

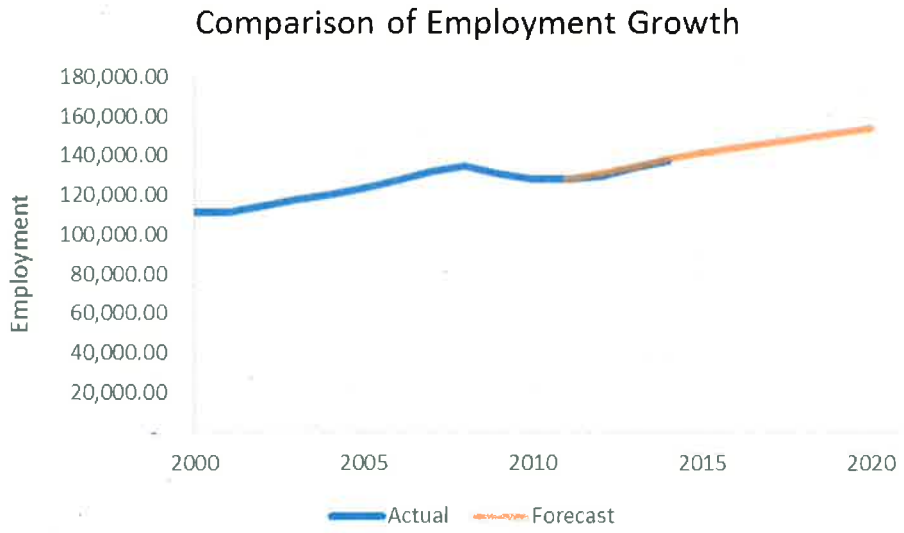

Figure 3: Comparison of actual versus forecast employment growth, Thurston County.

Traffic growth and new developments depend on many dynamic factors, including market forces. This concurrency report identifies locations that will need improvement when growth occurs and allows the City to prepare transportation improvements or strategies to accommodate growth as required by the GMA. The GTR model estimates trips from the new permits and allows performing roadway level LOS analysis throughout Thurston County. The demand model provides planning level volume estimates for areas in the City that may have LOS problems. Once these areas are identified through the model, a more detailed analysis of LOS standards described below is necessary to confirm the need for traffic improvements.

B. Level of Service Analysis

LOS indicators for roadways are defined by the *Comp Plan*. Adopted link and intersection LOS (classes A thru F) are based on standards set by the *Highway Capacity Manual*. The *Comp Plan* designates LOS D as the standard for the average of the two highest consecutive peak-hours or two-hour LOS. The standard allows traffic congestion to occur over a longer period of time than a single peak-hour. Those roadways falling below LOS D are generally considered deficient. There are, however, important exceptions. In high-density residential areas and the core area (e.g., downtown core area), LOS E will be acceptable. The six intersections listed in the City's Concurrency Ordinance that will be allowed to fall to LOS F within 20 years are as follows:

1. Jefferson Street and 14th Avenue
2. Plum Street and Union Avenue
3. Water Street and 5th Avenue
4. Capitol Way and 14th Avenue
5. Sleater-Kinney Road and Martin Way
6. Lilly Road and Martin Way
7. Black Lake Boulevard and Cooper Point Road

The Roadway LOS Analysis (Appendix D) provides a list of roadways and their estimated link, or section of roadway, 2015 through 2021. The 2021 forecast link LOS is another check for the six-year time frame of concurrency. Typically, if a link LOS is failing or near failing, the LOS at the intersection adjacent to that link needs closer examination. A more detailed analysis of intersection LOS, using traffic signal and unsignalized analysis software – *Synchro8,* was conducted to examine potential problems and provide more verification of transportation system improvement needs. This analysis includes signalized and unsignalized intersections.

Intersection LOS is based on average delay per vehicle, as shown in the following table:

Table 4
Level of Service for Intersections

Intersection LOS	For Signalized Intersections Average Stopped Delay Per Vehicle (in seconds)	For Unsignalized Intersections Average Stopped Delay Per Vehicle (in seconds)
A	less than 10.0 seconds	less than 10.0 seconds
B	10.0 to 20 seconds	10.0 to 15 seconds
C	20 to 35 seconds	15 to 25 seconds
D	35 to 55 seconds	25 to 35 seconds
E	55 to 80 seconds	35 to 50 seconds
F	greater than 80 seconds	Greater than 50 seconds

In addition to a detailed LOS analysis of signalized intersections, a warrant analysis of unsignalized intersections was conducted to determine if signals are needed. Three widely accepted standards set forth by the Manual on Uniform Traffic Control Devices (MUTCD), referred to as Warrant #1a, #1b, and #3, are considered in the warrant analysis. Warrant #1a considers traffic volume at the specified intersection. This warrant is satisfied when specific traffic volumes are met or exceeded. Warrant #1b considers the interruption of continuous traffic. This warrant is satisfied when specific traffic volumes are met or exceeded and installation of a traffic signal will not disrupt progressive traffic flow. Warrant #3 considers peak-hour volume. This warrant is satisfied when traffic on the minor street suffers undue traffic delay when entering or crossing a major street during peak hour.

The results of the warrant analysis of unsignalized intersections are listed in Appendix C, 2015-2021 Unsignalized Intersection Warrant Analysis.

The LOS analysis conducted for this report (shown in Appendix B, Intersection Level of Service Analysis vs. Project Needs) shows that the LOS standards set forth in the Comp Plan can be met at all locations in the next six years, if projects identified in Appendix B are funded and completed.

CONCLUSIONS

A. Conformance with Adopted LOS Standards

The LOS analysis provides a check for the six-year timeframe of concurrency. The roadway and intersection analysis identify areas with failing LOS standards. Proposed roadway, intersection, or system improvements are tested to see if a feasible project can achieve compliance with the LOS

standards. The analysis focuses on projects in the current CFP to confirm the need for these projects. The analysis also determines other locations that merit further monitoring due to recent traffic growth. **This concurrency review confirmed that no new intersection capacity projects are is needed in the development of the 2017 CFP.** Although the US101-West Olympia access at Yauger Way and Kaiser Road will be added for design and environmental permitting.

The LOS analysis conducted for this concurrency review indicates that all current 2016 CFP projects still merit inclusion in the 2017 CFP.

Existing CFP Capacity Projects with Reconfirmed Need

1. Fones Road Widening (roundabout at south Home Depot driveway)
2. US 101 – West Olympia Access (design, environmental permitting and mitigation and right-of-way)
3. Henderson Boulevard and Eskridge Boulevard (new traffic signal)
4. Cain Road and North Street (compact roundabout)
5. Wiggins Road and Herman Road (new traffic signal)
6. Log Cabin Road Extension (right-of-way and design)

In December 2008, the project team received formal concurrence and documentation approval that there is a need for modified access to US 101. This concurrence included evaluation of both the Black Lake Interchange and Evergreen Interchange scenarios, with conceptual layout, design and probably construction cost estimates for both scenarios. The City worked with the Washington State Department of Transportation (WSDOT) and Federal Highways Administration (FHWA) staff on the US 101 West Olympia Access Project Interchange Justification Report. The IJR was approved in July 2016.

B. Marginal Projects

Several potential projects were identified for monitoring, which may be on the verge of failure within the next six to ten years. These marginal projects were discovered, due to the following factors:

- Inclusion of an additional year of growth
- Improved land-use data used in the travel demand model
- General improvements in the traffic analysis tools

The LOS Analysis underlying Appendix B and C indicates a need for further study and monitoring of the following potential project locations:

Project needs consistent with the 2009 Concurrency Report (6 years):

1. Plum Street at State Avenue, exception area
2. 14th Avenue at Jefferson Street, exception area
3. Pacific Avenue at Fones Road, monitor between I-5 and Lilly Road
4. Pacific Avenue at Phoenix Street, signalize

5. Lilly Road at Martin Way, monitor
6. Division Street at Harrison Avenue, add turn-lane on Division Street
7. East Bay Drive at State Avenue, general monitoring
8. Pacific Avenue and Lilly Road, enhance connections in this area (12th Avenue Extension)
9. South Evergreen Park Drive at Evergreen Park Drive, general monitoring
10. Cooper Point Road at 14th Avenue, monitor for potential signal
11. Martin Way at Pattison Street, signalize
12. Henderson Boulevard at Carlyon Avenue, monitor for potential signal

Project needs consistent with 2035 planning horizon (10 years):

13. Black Lake Boulevard and Cooper Point Road, turn lane
14. Sleater-Kinney Road and Martin Way, turn lane
15. East Bay Drive and Olympia Avenue, traffic signal
16. Harrison Avenue/Mud Bay Road, Phase 4 Widening
17. Log Cabin Road Extension, Hoffman to East City Limits, widening and median

Several of the projects listed for further monitoring are borderline needs, based on projected population growth. However, if growth slows, all projects in the current CFP will need to be reassessed to determine if any can be delayed without causing LOS standards to be violated.

C. Level of Service on State Facilities

State law requires LOS policy at freeway interchanges, including ramps and overpasses, to be determined by a joint effort of Washington State Department of Transportation and TRPC. Since these locations include City streets approaching interchanges, the City should be closely involved in any policy changes affecting local freeway interchanges. Any change in LOS policy at these locations may affect the City's ability to maintain concurrency.

SUMMARY

A. Traffic forecasts and LOS Analysis show that Olympia is on track in maintaining concurrency for the next six years, if projects identified in Appendix B (Intersection Level of Service Analysis vs. Project Needs) are funded and completed.

B. No locations show a need for emergency consideration, as defined in the Concurrency Ordinance.

C. Several locations and issues require careful annual monitoring. Locations to be monitored are listed within this report (See Conclusions). Issues to be monitored include the following:

- Adequacy of revenue stream for transportation improvements;
- Location of actual growth versus planned growth; and
- The impact of growth outside Olympia to the City's streets.

APPENDIX A

MAPS OF TRAFFIC GROWTH IN THE FOUR CONCURRENCY ANALYSIS ZONES

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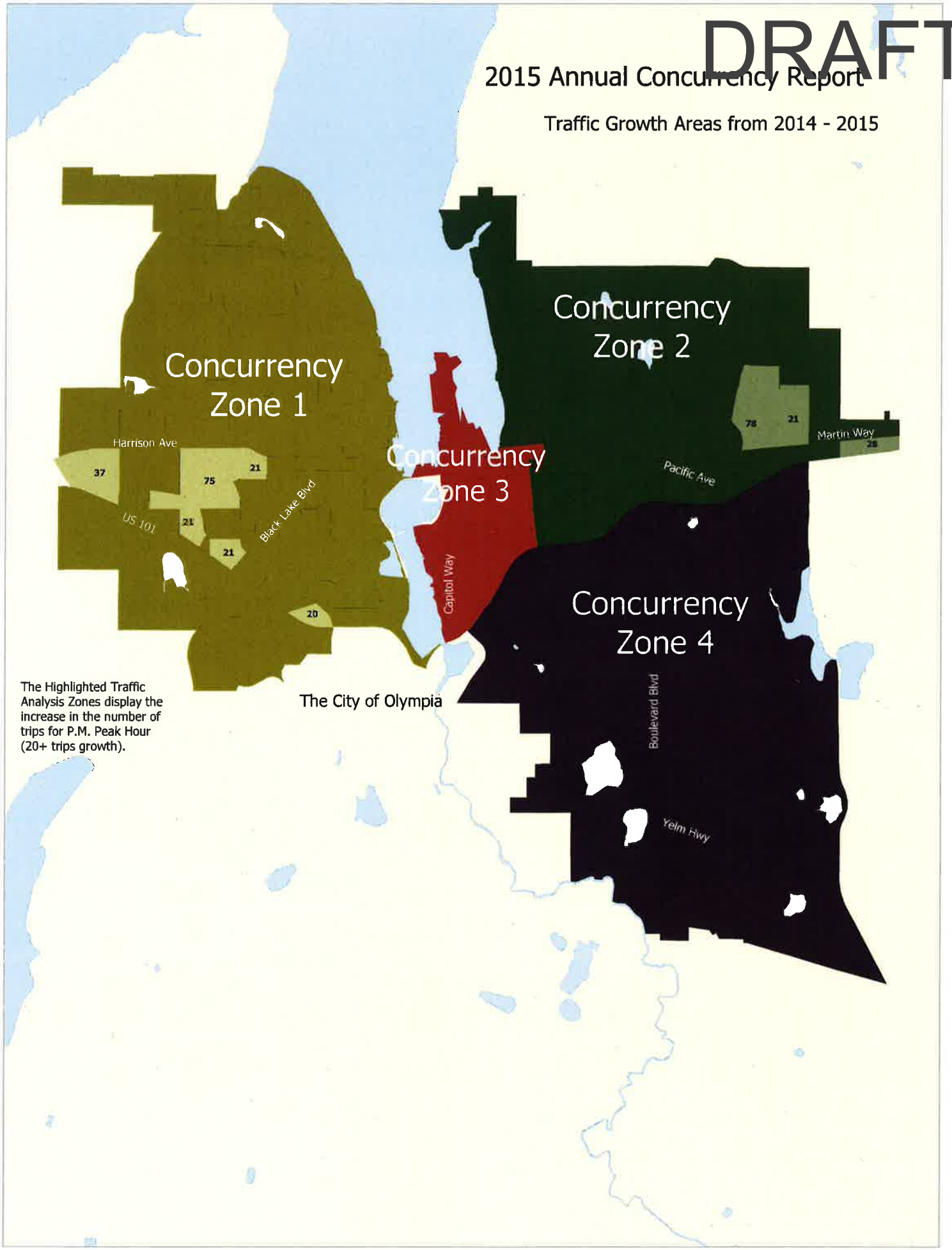
Traffic Growth Areas from 2014 - 2015



The Highlighted Traffic Analysis Zones display the increase in the number of trips for P.M. Peak Hour (20+ trips growth).

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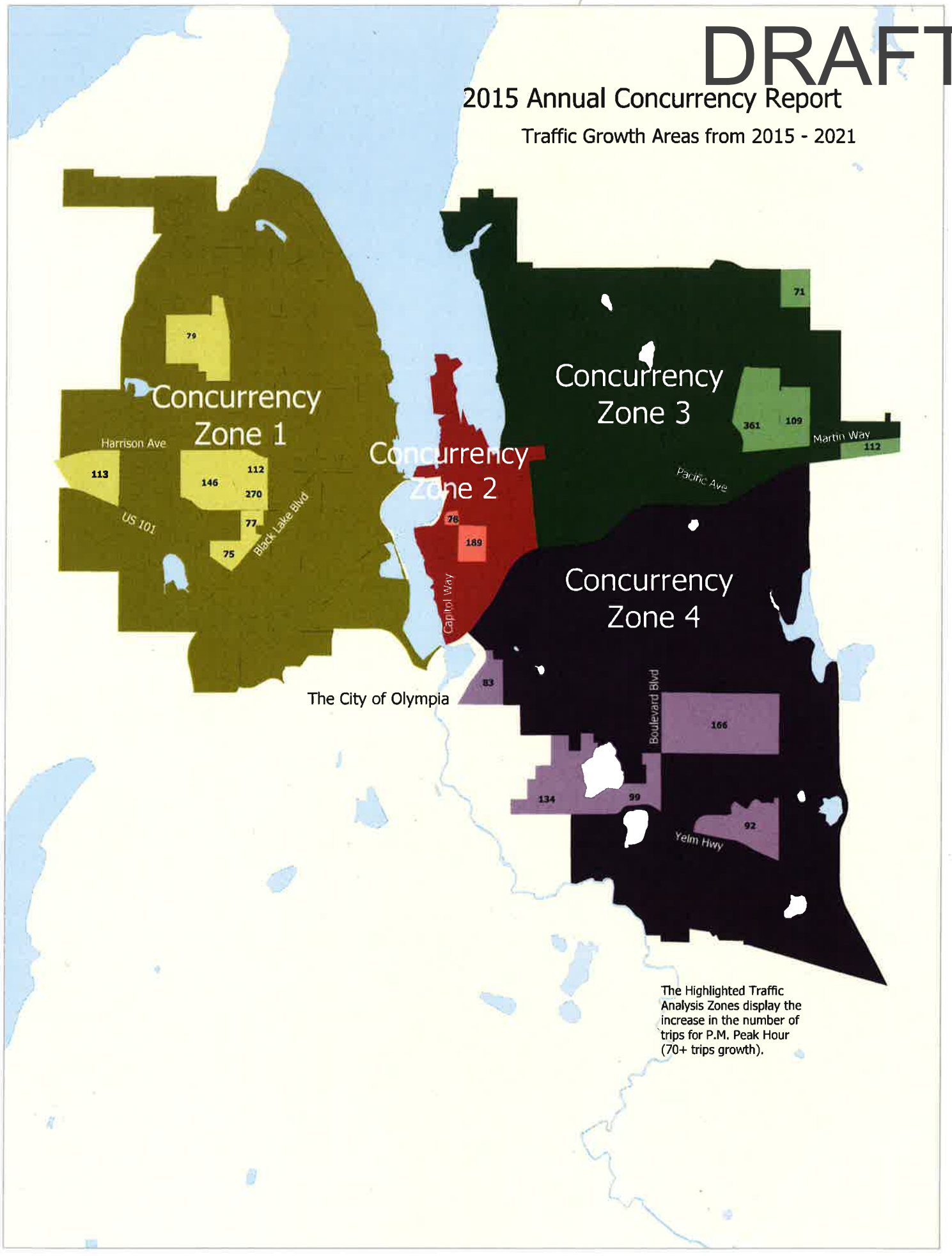
Traffic Growth Areas from 2015 - 2021



The Highlighted Traffic Analysis Zones display the increase in the number of trips for P.M. Peak Hour (70+ trips growth).

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APPENDIX B

INTERSECTION LEVEL OF SERVICE ANALYSIS
VS.
PROJECT NEEDS

Appendix B: Intersection Level of Service Analysis and Project Needs DRAFT

LOCATION	RECENT LOS (2014 – 2015)	FORECAST LOS (2021)	LOS STANDARD	PROJECT NEEDED	NOTES
1. UNSIGNALIZED CAPACITY PROJECTS					
WIGGINS ROAD AT 37TH AVENUE SE Last Year: 2009	A A	C F	D	Yes	Traffic signal warranted.
BOULEVARD ROAD AT 22ND AVENUE SE					Install roundabout. Project completed in 2015.
BOULEVARD ROAD AT MORSE-MERRYMAN ROAD SE Last Year: 2009	A B	C F	D	Yes	Traffic signal warranted. Install roundabout, consistent with Boulevard Road Corridor Study completed in 2006.
BOULEVARD ROAD AT LOG CABIN ROAD, SE					Install roundabout. Project completed in 2012.
NORTH STREET AT CAIN ROAD/LOG CABIN ROAD SE Last Year: 2009	C C	C F	D	Yes	Signal warranted. Install compact roundabout.
COOPER POINT ROAD AT 14TH AVENUE Last Year: 2009	A A	A B	D	No	Development driven, SEPA funded. Project complete 2003/2004 to do left-turn channelization (warranted), monitor need for traffic signal.
HARRISON AVENUE AT KAISER ROAD					Install traffic signal. Project completed in 2012.
HENDERSON BOULEVARD AT ESKRIDGE BOULEVARD Last Year: 2009	A A	C F	D	Yes	Traffic signal warranted.

LOCATION	RECENT LOS (2014 – 2015)	FORECAST LOS (2021)	LOS STANDARD	PROJECT NEEDED	NOTES
HOFFMAN ROAD AT 18th AVENUE SE					Install roundabout. Project complete in 2011.
DESCHUTES PARKWAY AT LAKERIDGE DRIVE SW Last Year: 2009	A A	B B	D	No	
EVERGREEN PARK DRIVE AT EVERGREEN PARK DRIVE S Last Year: 2009	A A	A C	D	No	
EVERGREEN PARK DRIVE AT LAKERIDGE DRIVE Last Year: 2009	A A	A A	D	No	
EAST BAY DRIVE AT OLYMPIA AVENUE Last Year: 2009	A B	A D	E	Monitor	As development at the Port of Olympia occurs, monitor for a potential new traffic signal. Preliminary study indicates need.
YAUGER WAY AT CAPITOL MALL DRIVE	A	A	D	No	
HENDERSON BOULEVARD AT CARLYON AVENUE	A	A	D	No	Monitor.
2. SIGNALIZED INTERSECTION AYALYSIS					
COOPER POINT ROAD TURN LANE AT EVERGREEN PARK DRIVE					Add turn lane. Project complete in 2000.
SLEATER-KINNEY ROAD AT MARTIN WAY Last Year: 2009	D E	D F	Exception Area		Add turn lane. Project complete in 2002.

LOCATION	RECENT LOS (2014 – 2015)	FORECAST LOS (2021)	LOS STANDARD	PROJECT NEEDED	NOTES
LILLY ROAD AT MARTIN WAY Last Year: 2009	C D	C/D E	Exception Area	Monitor	LOS exception area. Monitor need for turn lanes.
COOPER POINT ROAD AT BLACK LAKE BOULEVARD Last Year: 2009	D E	E F	F	No	LOS exception area. The US 101 West Olympia Access Interchange Justification Report shows the need for a new SR 101 interchange access at Yauger Way and Kaiser Road/Evergreen Parkway. Right-turn completed in 2000.
PLUM STREET AT UNION AVENUE SE Last Year: 2009	C D	C E	Exception Area	Monitor	Project complete in 1997.
PACIFIC AVENUE AT FONES ROAD SE Last Year: 2009	C C	C D	E	Monitor	Need to monitor traffic on Fones Road between Pacific Avenue and Home Depot and back up to I-5 ramps.
14TH AVENUE AT JEFFERSON STREET					Install roundabout. Project complete 2008.
DIVISION STREET AT HARRISON AVENUE Last Year: 2009	D D	D C	E	Monitor	Install northbound additional turn lane. Improvements depend on development and access. Need to monitor.
PLUM STREET/EAST BAY DRIVE AT STATE AVENUE Last Year: 2009	B C	B C	E	See note	Monitor traffic on Plum Street; possibility of traffic back up into 4th Avenue.
YELM HIGHWAY AT HENDERSON BOULEVARD					East of Henderson Boulevard. Widen Yelm Highway as part of Thurston County widening project. Project complete 2012.
HENDERSON BOULEVARD AT NORTH STREET Last Year: 2009	A B	B C	D	Monitor	

LOCATION	RECENT LOS (2014 – 2015)	FORECAST LOS (2021)	LOS STANDARD	PROJECT NEEDED	NOTES
3. ROADWAY WIDENING LOCATIONS					
FONES ROAD WIDENING Last Year: 2009	E (1412) E (1428)	F (1508) C with project F (1584)	D	Yes	Volume taken south of railroad track. LOS D and E thresholds are 1350 and 1500, respectively.
4th / 5th AVENUE CORRIDOR IMPROVEMENTS (Westbound at Simmons – Total of 4th and 5th) Last Year: 2009 TMC	C (1805) C (1834)	C (2087) D (2577)	E	Monitor	LOS thresholds; WB 4th and 5th 3000 – E 2700 – D 2400 – C
OLYMPIC WAY BETWEEN 4TH AVENUE AND HARRISON Last Year: 2009	C (2404) C (2421)	C (2760) C (3063)	E	Monitor	LOS thresholds; between roundabouts 3500 – E 3150 – D 2800 – C
LOG CABIN CONNECTION Last Year: 2009	No Count	A (649) B with project C (1136)	D	See Note	Needed to serve new development, to offset growth of other arterials.
HARRISON/MUD BAY ROAD PHASE II YAUGER WAY TO KAISER ROAD Last Year: 2009					Widened to 5-Lanes. Project complete in 2010.
YAUGER WAY EXTENSION	The existing SR101/Cooper Point Road Interchange project assumed additional access to the Westside of Olympia.			Yes	City of Olympia will complete US101 West Olympia Access Interchange Justification Report in 2016.
18TH AVENUE FROM HOFFMAN TO FONES ROAD SE					Install Roundabouts installed at Fones Road and Hoffman Road. Project complete in 2010.
YELM HIGHWAY AT HENDERSON BOULEVARD, EAST APPROACH Last Year: 2009					Widened to 5-lanes. Project complete in 2010.
HARRISON/MUD BAY ROAD PHASE III KAISER ROAD TO OVERHULSE ROAD Last Year: 2009	C (1768) C (1553)	D (1944) C (1553)	D	No	LOS Threshold: Existing 4-lane E – 2400 D – 2160 C – 1920

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APPENDIX C

UNSIGNALIZED INTERSECTION WARRANT ANALYSIS

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2015 - 2021 UNSIGNALIZED INTERSECTION WARRANT ANALYSIS
GENERAL SUMMARY WORKSHEET
Appendix C

LOCATION	WARRANT (2015)	WARRANT (2021)	WARRANT STANDARD	PROJECT NEEDED	NOTES
Boulevard Road/Morse-Merryman Road	No warrants	2 warrants	2 warrants	Yes	
8th Avenue/Jefferson Street SE	No warrants	No warrants	2 warrants	Monitor	Safety issue concerns. Monitor volumes.
Deschutes Parkway/Lakeridge Drive SW	No warrants	1 warrant	3 warrants	No	
North Street/Cain Road SE	No warrants	2 warrants	2 warrants	Yes	
Legion Way/Adams Street SE	No warrants	No warrants	Safety	Monitor	Safety issues (for signal installation).
Cooper Point Road/14th Avenue NW	No warrants	No warrants	2 warrants	See note	Monitor. Development driven project.
Henderson Blvd/Eskridge Blvd SE	No warrants	2 warrants	2 warrants	Yes	
Wiggins Road/Herman Road SE	No warrants	2 warrants	2 warrants	Yes	
Pacific Avenue/ Phoenix Avenue SE	No warrants	No warrants	2 warrants	See note	Monitor.
Martin Way/Pattison Street SE	No warrants	No warrants	2 warrants	No	
Caton Way/Cooper Point Road SW	No warrants	No warrants	2 warrants	No	Monitor.
East Bay Drive/Olympia Avenue	No warrants	No warrants	2 warrants	No	Monitor. Development driven project.
Henderson Boulevard/Carlyon Avenue	No warrants	No warrants	2 warrants	No	Monitor.

NOTES:

1) New signals warrant analysis based on 2+ signal warrants or safety issues

2) Further Engineering analysis should be performed prior to signal installation

2015 - 2021 UNSIGNALIZED INTERSECTION WARRANT ANALYSIS

CITY OF OLYMPIA CFP PROJECT

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INTERSECTION			VOLUMES (Major Street/Minor Street)					WARRANT (2014-2015/2021)		
NAME		TYPE	PEAK HOUR	2014-2015 ACTUAL COUNT	2021 FORECAST	2014-2015 ADJUSTED RIGHT-TURN VOLUME (1)	2021 ADJUSTED RIGHT-TURN VOLUME (1)	#1 (a)	#1 (b)	#3 (b)
Boulevard Road/Morse-Merryman with left-turn lane (Minor leg)	Current Year	1 X 2	PM AM	1159/182 816/278	1361/228 958/348	1159/151 816/230	1361/189 958/288	No/No No/No	No/Yes No/No	No/Yes No/No
	Last Year: 2009		PM AM	1062/137 790/229	1349/254 1002/429	1062/104 790/168	1349/193 1002/315	No/No No/No	No/Yes No/No	No/Yes No/No
8th Avenue/Jefferson Street	Current Year	2 X 1	PM AM	524/169 321/110	524/177 321/115	524/169 321/110	524/177 321/115	No/No No/No	No/No No/No	No/No No/No
	Last Year: 2009		PM AM	490/131 318/110	571/201 376/169	490/131 318/110	571/201 376/169	No/No No/No	No/No No/No	No/No No/No
North Street/Cain Road	Current Year	1 X 1	PM	787/275	884/301	787/275	884/301	No/Yes	No/No	No/Yes
	Last Year: 2009		PM	726/247	1105/351	726/247	1105/351	No/Yes	No/No	No/Yes
Legion Way/Adams Street	Current Year	1 X 1	PM	422/205	465/205	422/205	465/205	No/No	No/No	No/No
	Last Year: 2009		PM	512/229	756/263	512/229	756/263	No/No	No/No	No/No
Cooper Point/14th Avenue, NW	Current Year	1 X 2	PM	812/36	887/39	812/36	887/39	No/No	No/No	No/No
	Last Year: 2009		PM	993/78	1073/92	993/78	1073/92	No/No	No/No	No/No
Henderson Boulevard/Eskridge	Current Year	1 X 1	PM AM	1105/142 824/240	1158/179 864/303	1105/142 824/240	1158/179 864/303	No/No No/Yes	No/No No/No	No/Yes No/Yes
	Last Year: 2009		PM AM	1010/146 750/278	1185/364 863/693	1010/146 750/278	1185/364 863/693	No/Yes No/No	No/No No/No	No/Yes No/Yes
Wiggins Road/Herman Road	Current Year	1 X 1	PM AM	929/206 534/297	1041/243 598/350	929/206 534/297	1041/243 598/350	No/Yes No/No	No/No No/No	No/Yes No/Yes
	Last Year: 2009		PM AM	801/136 458/178	1053/284 690/366	801/136 458/178	1053/284 690/366	No/Yes No/No	No/No No/No	No/Yes No/Yes
Pacific Avenue/Phoenix Street (2)	Current Year	2 X 1	PM	969/90	1043/114	969/90	1043/114	No/No	No/No	No/No
	Last Year: 2009		PM	713/102	944/224	713/102	944/224	No/No	No/No	No/No
Martin Way/Pattison Avenue	Current Year	2 X 1	PM	1315/148	1646/152	1315/148	1646/152	No/No	No/No	No/No
	Last Year: 2009		PM	1404/95	2274/110	1404/95	2274/110	No/No	No/No	No/No
Caton Way/Cooper Point Road (2)	Current Year	2 X 2	PM	1021/210	1122/225	1021/175	1122/187	No/No	No/No	No/No
	Last Year: 2009		PM	1052/165	1290/302	1052/144	1290/265	No/No	No/No	No/Yes
Deschutes Parkway/Lakeridge Drive	Current Year	1 X 2	PM	669/548	784/612	669/405	784/453	No/No	No/No	No/Yes
	Last Year: 2009		PM	513/563	672/685	513/397	672/476	No/No	No/No	No/Yes
East Bay Drive/Olympia Avenue	Current Year	2 X 2	PM	1059/208	1107/249	1059/208	1107/249	No/No	No/No	No/No
Henderson Boulevard/Carlyon Ave	Current year	2 X 1	AM	845/206	896/211	845/170	896/174	No/No	No/No	No/No

FOOTNOTES:

(1) On "T" intersection with two lanes on minor leg, right-turn volumes are reduced by 50 percent.

(2) For three- or five-lane cross-section with center-turn lane, use nearside approach volume only.

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APPENDIX D

ROADWAY LEVEL OF SERVICE ANALYSIS

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City of Olympia Concurrency Analysis
Preliminary Link Level of Service Analysis
Appendix D

Roadway	From	To	Total No. of Lanes	2014 - 2015 Counts	2015 - 2021 Est. Growth	Adjusted 2021	2015 LOS	2021 LOS	LOS Standard	Improvement needed
Intersection problems referred to intersection analysis analyzed using Synchro 8.										
Black Lake Boulevard	N of SR-101 Interchange	Cooper Pt. Road	5	2928	229	3157	E	F	E	See intersection analysis
Plum Street	8th Avenue	Union Avenue	5	1736	99	1835	C	C	E	See intersection analysis
Pacific Avenue	NB I-5 On Ramp	Fones Road	5	2764	219	2983	E	E	E	See intersection analysis
Pacific Avenue	Lilly Road	Weir Street	5	2435	236	2671	D	D	E	See intersection analysis
Lilly Road	Pacific Avenue	I-5 Overpass	5	1543	251	1794	C	C	E	See intersection analysis
Fones Road	Pacific Avenue	18th Avenue	3	1412	96	1508	E	F	D	See intersection analysis
East Bay Drive	Olympia Avenue	State Street	4	1016	79	1095	C	C	D	See intersection analysis
Pacific Avenue	Fones Road	Lilly Road	5	2364	212	2576	C	D	E	See intersection analysis
Harrison Avenue	Kaiser Road	Overhulse Road	4	1768	176	1944	C	D	D	See intersection analysis
Boulevard Road	Log Cabin Road	Yelm Highway	2	1034	67	1101	D	D	D	See intersection analysis
Mid-blocks need to be improved or further engineering studies performed.										
Henderson Blvd.	I-5 Exit 105	Plum Street	4	1697	106	1803	C	C	D	No improvements needed
4th Avenue Corridor	Jefferson Street	Plum Street	2	1169	114	1283	C	C	E	No improvements needed
Pacific Avenue	Lansdale Road	I-5 SB Ramp	5	2229	213	2442	C	D	E	Mid-block and ramp improvements needed

Level of Service Criteria for Signalized Locations		
Level of Service (LOS)	**Average Delay per Vehicle (Seconds)**	
A	Less than 10.0	This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	10.1 to 20.0	This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for a LOS A, causing higher levels of average delay.
C	20.1 to 35.0	These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	35.1 to 55.0	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are frequent occurrences.
E	55.1 to 80.0	This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Greater than 80.0	This is considered to be unacceptable to most drivers. This condition often occurs with over saturation. It may also occur at high volume/capacity ratios below 1.00, with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such high delay levels.

Intersection LOS	**For Unsignalized Intersections Average Stopped Delay Per Vehicle (in seconds)**
A	less than 10.0 seconds
B	10.0 to 15 seconds
C	15 to 25 seconds
D	25 to 35 seconds
E	35 to 50 seconds
F	Greater than 50 seconds