Appendix D Transportation Analysis

Commented [LG1]: Responds to WSDOT Request in August 2017

This appendix summarizes the transportation analysis contained in the Existing Conditions and Trends Report (March 2017, updated October 2017) and the City's non-project State Environmental Policy Act Checklist May 2017.

EXISTING TRAFFIC OPERATIONS

Traffic operations were evaluated based on the LOS methodologies of the Highway Capacity Manual. The methodology used to analyze roadway segments and signalized, unsignalized, or roundabout intersections is different for each type of facility.

Intersection levels of service were evaluated for 18 study intersections. Trafficount, a traffic data collection firm, collected evening peak period turning movement counts for the study intersections between 4:00 PM and 6:00 PM on May 19, 20 and 21, 2009. Exhibit 1 shows the existing 2017 traffic volumes for the study intersections and Exhibit 2 shows the existing level of service at each study intersection. The capacity analysis worksheets are provided in Existing Conditions and Trends Report **Appendix E-3**.

Because the traffic counts were conducted several years ago, a comparison of key locations with more recent counts was completed to evaluate the validity of the data. Newer counts did not show a significant increase in traffic in Chelan, and in some cases volumes were lower. Therefore, the 2009 counts were used for this update.

These traffic volumes were used for our base year operations analysis and as the basis for future year traffic volume projections.

Exhibit 1. Existing 2017 Traffic Volumes

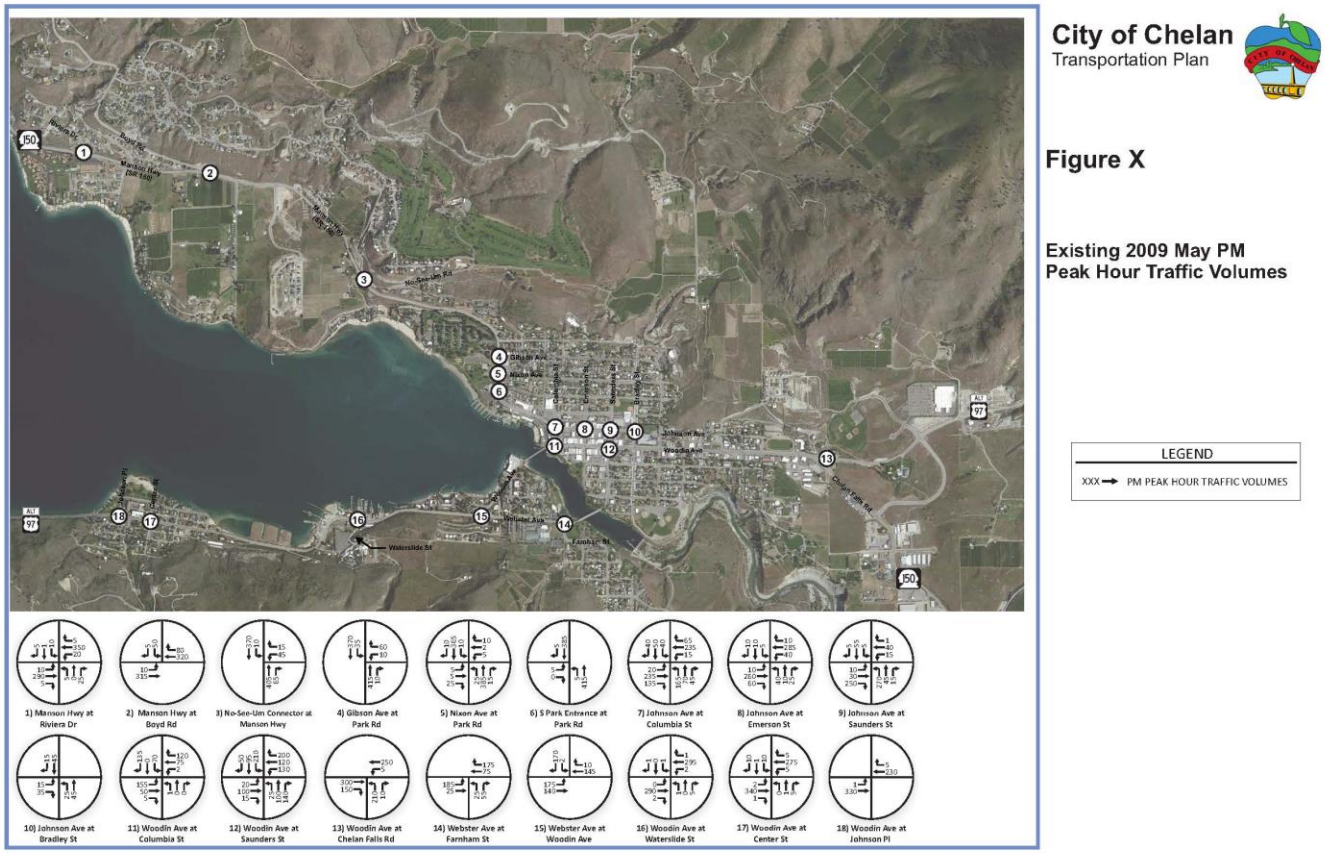


Exhibit 2. Existing Level of Service Summary

Intersection	2017 Base Year	
	LOS (Delay)	Worst V/C
Riviera Drive/ (SR 150)	B (14.7)	0.06
Boyd Road/ (SR 150)	B (12.8)	0.11
No-See-Um Road/ (SR 150)	C (17.8)	0.19
W Gibson Avenue/Park Road (SR 150)	B (12.5)	0.14
W Nixon Avenue/Park Road (SR 150)	C (20.0)	0.05
Lakeshore Park Entrance/Park Road (SR 150)	B (13.3)	0.01
Columbia Street/E Johnson Avenue (SR 150)	B (12.3)	0.53
Emerson Street/E Johnson Avenue (SR 150)	C (22.2)	0.29
Sanders Street/E Johnson Avenue	B (12.7)	0.53
Bradley Street/E Johnson Avenue	A (9.1)	0.06
Columbia Street/E Woodin Avenue (SR 97A)	C (17.7)	0.21
Sanders Street/Woodin Avenue (SR 97A)	B (17.1)	0.49
Chelan Falls Road (SR 150)/Woodin Avenue (SR 97A)	C (18.4)	0.46
Farnham Street/Webster Avenue (SR 97A)	B (12.0)	0.07
W Woodin Avenue/Webster Avenue (SR 97A)	B (10.2)	0.21
Waterslide Drive/Webster Avenue (SR 97A)	B (14.2)	0.01
Center Street/Webster Avenue (SR 97A)	B (12.8)	0.05
Johnson Place/Webster Avenue (SR 97A)	A (7.7)	0.01

Summary of Existing Operations

All intersections evaluated currently operate above the City of Chelan's adopted level of service, and no intersections on SR 97A or SR 140 operate below the State of Washington's LOS D standard for Highways of Statewide Significance.

PLANNED IMPROVEMENTS

Changes in land use or expected growth patterns have an effect on the future transportation system and transportation planning must evaluate conditions as they evolve. Some planned improvements may no longer be needed or specific improvements that were not included in future planning may now be needed. Planned improvements to the City of Chelan transportation system include short term needs identified in the Six-Year TIP, as well as long-term needs based on conditions expected to develop over the next 20 years.

Six-Year Transportation Program

The City of Chelan's Six-Year TIP (2017-2023) provides information on project locations, funding and schedule. The City is required to update its TIP annually, and it is adopted as part of the Transportation Element of the Transportation Plan. A copy of the current 6-Year TIP, which is available from the Public Works Department, identifies the following projects:

- Woodin Avenue Bridge Rehabilitation and Related Improvement Projects
- SR 97A and Farnham St Intersection
- No-See-Um Road Intersection
- Sanders Street Crosswalks
- South Chelan Access Study
- Columbia Street, Johnson Ave to Gibson Ave and Woodin Avenue to Gibson
- Downtown Alleys, Columbia St to Sanders St
- Lakeside Trail
- Union Valley Road Study
- SR 97A/East Woodin Avenue Corridor Study
- Boyd Road Widening, SR 150 to City Limits

Chelan-Douglas Transportation Council Regional Transportation Improvements Program

The CDTC Regional Transportation Improvement Program (2017-2020) project list is prepared in cooperation with local jurisdictions, transit operators, and WSDOT. The plan is linked to local agency Six-Year Transportation Improvement Plans, Link Transit's Transit Development Plan, and the WSDOT North Central Region's Six-Year Plan of Capital Projects. The Regional TIP is 'fiscally constrained', meaning that only the CDTC can only approve and submit projects for inclusion in the Statewide Transportation Improvement Program (STIP) if adequate funding is reasonably expected to be available. The current project list includes the following projects within the City of Chelan:

- Woodin Avenue Bridge Renovation and Repair
- SR 150 and No See Um Road Intersection Improvements

Washington State Department of Transportation Highway Improvement Program

WSDOT's Six-Year TIP includes the preliminary design and construction of the Woodin Avenue Bridge which is planned to begin in 2017. There are no other major WSDOT projects planned in the Chelan area.

FUTURE 2037 TRAFFIC CONDITIONS ANALYSIS

The GMA requires that traffic operations be evaluated on a long-range planning horizon, considering the planned transportation projects and planned growth, to determine how the transportation network can accommodate future demand.

Forecasting Methodology

In order to assess the future transportation needs of the city and the ability of the existing roadway network to accommodate planned growth, traffic volumes were estimated for the 2037 horizon year. The traffic volume projections were prepared using the current Chelan transportation model. The transportation model was created using a computerized transportation network model program.

The Chelan study area was modeled using the Emme/4 software package. Existing land use and demographic information was provided by the City of Chelan, Chelan County and the Washington State Office of Financial Management (OFM). The model was developed beginning in 2008 and was completed in its present form in early 2010. Updates to growth rates and land use were made in February, 2017.

The modeling process developed for this study involved four major steps:

- Construction of a computerized street network system of the Chelan transportation system;
- Developing a computerized land use zone system and database inventory of households and employment;
- Preparing base year model traffic volumes using trip generation factors and land use types to calibrate the model to current conditions;
- Developing future traffic volumes using projected land use and changes.

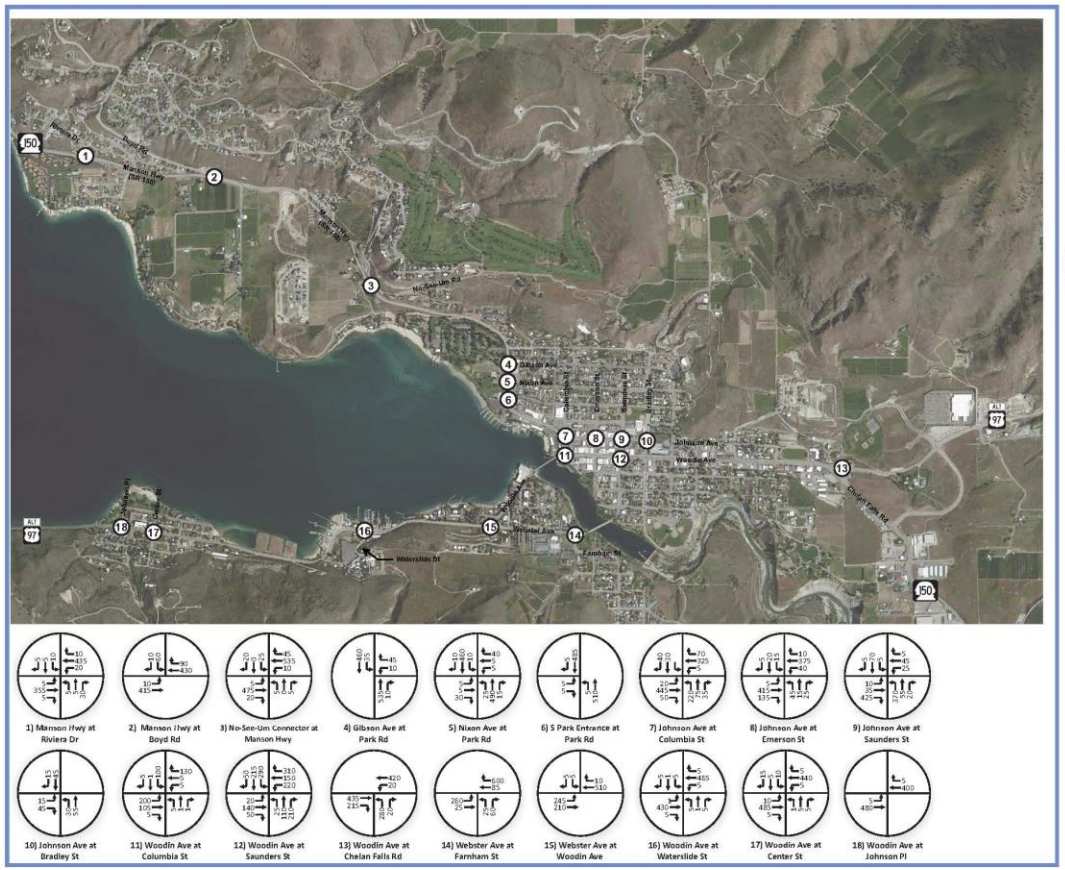
In addition to being used for preparing this transportation plan, the transportation model will continue to be a valuable tool for the City in assessing future roadway needs. The model will also be used to assess the traffic potential of larger developments that may have significant impacts to City roadways. The transportation model will continue to be refined and updated as necessary to accurately reflect existing transportation characteristics and to remain consistent with long-range land use planning efforts.

Model Post-Process Calibration

The transportation model has been calibrated to a high degree of accuracy for the system-wide roadway network. However, the accuracy of model volumes for particular roadway segments may vary based on a variety of factors. To account for the occurrence of local variation, a "post-process" calibration was applied to the model-generated traffic volumes.

The post-process calibration involved calculating the difference between the model-generated volumes for the 2017 base year and for the 2037 horizon year. This difference is considered the model volume growth increment. The model volume growth increment was then added to the actual traffic volume counts for each roadway segment. The post process calculation used to generate future year traffic volume estimates for this study is shown in **Appendix E-4**. The 2037 traffic volume projections are shown on Exhibit 3.

Exhibit 3. Projected 2037 Traffic Volumes



2037 Assumed Network Improvements

The list of improvements included in the Chelan 2037 baseline is shown in Exhibit 4.

Exhibit 4. 2037 Assumed Network Improvements

Facility	Improvements
Woodin Avenue Bridge	Convert bridge to one-way into downtown to allow for non-motorized uses.
SR 150/No-See-Um intersection	Re-align SR 150, No-See-Um Road and Golf Course Road intersection and construct roundabout.

Future Traffic Operations

Intersection levels of service were evaluated for 18 study intersections for 2037 operational analysis based upon the network described above. The LOS results are shown on Exhibit 5.

Exhibit 5. 2037 Conditions (with Assumed Improvements)

Intersection	Projected 2037 LOS (Delay)	Projected 2037 Worst v/c
Riviera Drive/ (SR 150)	C (18.7)	0.09
Boyd Road/SR 150	B (14.7)	0.17
No-See-Um Road/SR 150	A (7.6)	0.49
W Gibson Avenue/Park Road (SR 150)	B (14.0)	0.13
W Nixon Avenue/Park Road (SR 150)	D (27.2)	0.14
Lakeshore Park Entrance/Park Road (SR 150)	B (13.3)	0.03
Columbia Street/E Johnson Avenue (SR 150)	B (14.6)	0.77
Emerson Street/E Johnson Avenue (SR 150)	**E (47.9)**	**0.55**
Sanders Street/E Johnson Avenue	D (27.3)	0.83
Bradley Street/E Johnson Avenue	A (9.2)	0.07
Columbia Street/E Woodin Avenue (SR 97A)	C (21.7)	0.34
Sanders Street/Woodin Avenue (SR 97A)	C (20.8)	0.72
Chelan Falls Road (SR 150)/Woodin Avenue (SR 97A)	**F (96.3)**	**1.03**
Farnham Street/Webster Avenue (SR 97A)	C (17.3)	0.09
W Woodin Avenue/Webster Avenue (SR 97A)	C (15.9)	0.26
Waterslide Drive/Webster Avenue (SR 97A)	C (21.2)	0.04
Center Street/Webster Avenue (SR 97A)	C (17.6)	0.10
Johnson Place/Webster Avenue (SR 97A)	A (8.2)	0.01

Summary of Future Operations

The results of the operational analysis show that with the identified improvements in the current TIP, only two intersections fall below the City's adopted LOS standards. Below is a description of each location:

- Emerson Street/E Johnson Avenue (SR 150): The level of service for this intersection is driven by the NB and SB left-turn movements. By implementing turn restrictions at Emerson Street/E Johnson Avenue (SR 150) for the NB and SB approaches, the intersection would improve to within City LOS standards. The City may elect to implement turn restrictions for safety reasons if observed conditions warrant the change.
- The Chelan Falls Road (SR 150)/Woodin Avenue (SR 97A) intersection is predicted to reach LOS F by 2037. It is recommended that this intersection be monitored as growth occurs. Due to the atypical nature of this intersection, the analysis software has a more difficult time assessing the operations and this intersection may perform better than currently predicted. Since this is the intersection of two state highways, WSDOT has primary responsibility for improvements at this location.

ALTERNATIVE MODELING

The 2009 traffic model included higher permanent growth in the City above the planning level assumptions described in the Land Use Element. It should be noted the model also tested a full range of employment and institutional uses, and seasonal resident and tourist uses. The 2017 model assumes less development than the 2009 model, accommodating year-round population similar to the trend. See Exhibit 6.

Exhibit 6. Transportation and Population

Growth Rate Scenario	AAGR	Year-Round Population 2037*	Share of 2037 County Pop
County Target 2017-2037	0.445%	4,880	5.5%
Trend: Observed-1990-2015	1.245%	5,719	6.5%
2009 Trans Model (Permitted Lots)	2.27%	6,995	7.9%

Note: average annual growth rate (AAGR)

*=Applied to County's 2017 population estimate of 4,465

The 2017 growth model also assumed less growth on the southshore and more in Downtown and East Chelan. However, comparing 2009 and 2017 transportation results, results would not significantly differ at the affected intersections according to SCJ Alliance transportation experts who prepared both the 2009 and 2017 elements. Based on this, the 2009 and 2017 models provide a bookended traffic analysis, sufficient for the studied range of growth in the Chelan Planning Area. (SEPA Checklist, May 2017)