Report for

City of Camas Traffic Impact Fee Update

Prepared for

City of Camas

Prepared by

DKS

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CHAPTER 1: EXISTING AND FUTURE BASELINE CONDITIONS ANALYSIS

This chapter introduces the existing and future motor vehicle conditions that will be used to update the Camas Traffic Impact Fee (TIF). The Camas TIF was last updated in 2003. Over the past eight years, the urban growth areas for Camas and other neighboring Cities have expanded and therefore the needs for roadway and intersection improvements have changed. A key element of the TIF update is to identify the areas impacted by the projected growth and determine the associated transportation facility improvements needed to accommodate it.

Existing motor vehicle facility conditions were reviewed to identify deficiencies before the traffic volume growth associated with new development was added to the roadway network in Camas. This ensures that the updated TIF can associate costs with a nexus to development impacts. The existing motor vehicle inventory data also represents the baseline to which future growth in the City will be added, and will be used to help ensure that acceptable operations of roadways and intersections is maintained as new development increases traffic volumes. The following sections provide a summary of the study area, a description of the existing motor vehicle facilities, and an inventory of existing traffic volumes and congestion levels at key intersections in the study area.

Study Area

The study area is comprised of the Camas urban growth area (or Urban Growth Boundary), which includes the entire Camas City limits, in addition to land just outside or adjacent to the City limits that is planned for future annexation and urbanization.

Figure 1 shows the major roadways in Camas, as well as key study area intersections that were reviewed for motor vehicle intersection operations. The study intersections included:

1. 6th Avenue/Norwood Street
2. 6th Avenue/Ivy Street
3. Division Street/6th Avenue
4. Adams Street/6th Avenue
5. Dallas Street/SR-500 (3rd Avenue)
6. SR-14/SR-500 (Union Street)
7. 3rd Avenue/2nd Avenue-4th Street
8. 3rd Avenue/Crown Road
9. 6th Avenue/SR-500 (Garfield Street)
10. 14th Avenue/SR-500 (Everett Street)
11. 18th Avenue/Division Street
12. 28th Avenue/Sierra Drive
13. 18th Avenue/Cascade Street
14. McIntosh Road/Brady Road
15. 16th Avenue/Brady Road
16. Pacific Rim Boulevard/Payne Road
17. Pacific Rim Boulevard/Parker Street
18. 38th Avenue/Parker Street
19. Lake Road/Sierra Street
20. Lake Road/SR-500 (Everett Street)
21. 43rd Avenue/SR-500 (Everett Street)
22. Leadbetter Road/SR-500 (Everett Street)
23. Nourse Road-15th Street/283rd Avenue
24. Lake Road/Parker Street
25. Lake Road/218th Avenue
26. 1st Street/Friberg Street-202nd Avenue
27. 13th Street/Friberg Street
28. Goodwin Road/Camas Meadows Drive
29. Goodwin Road/Ingle Road
30. 28th Street/232nd Avenue

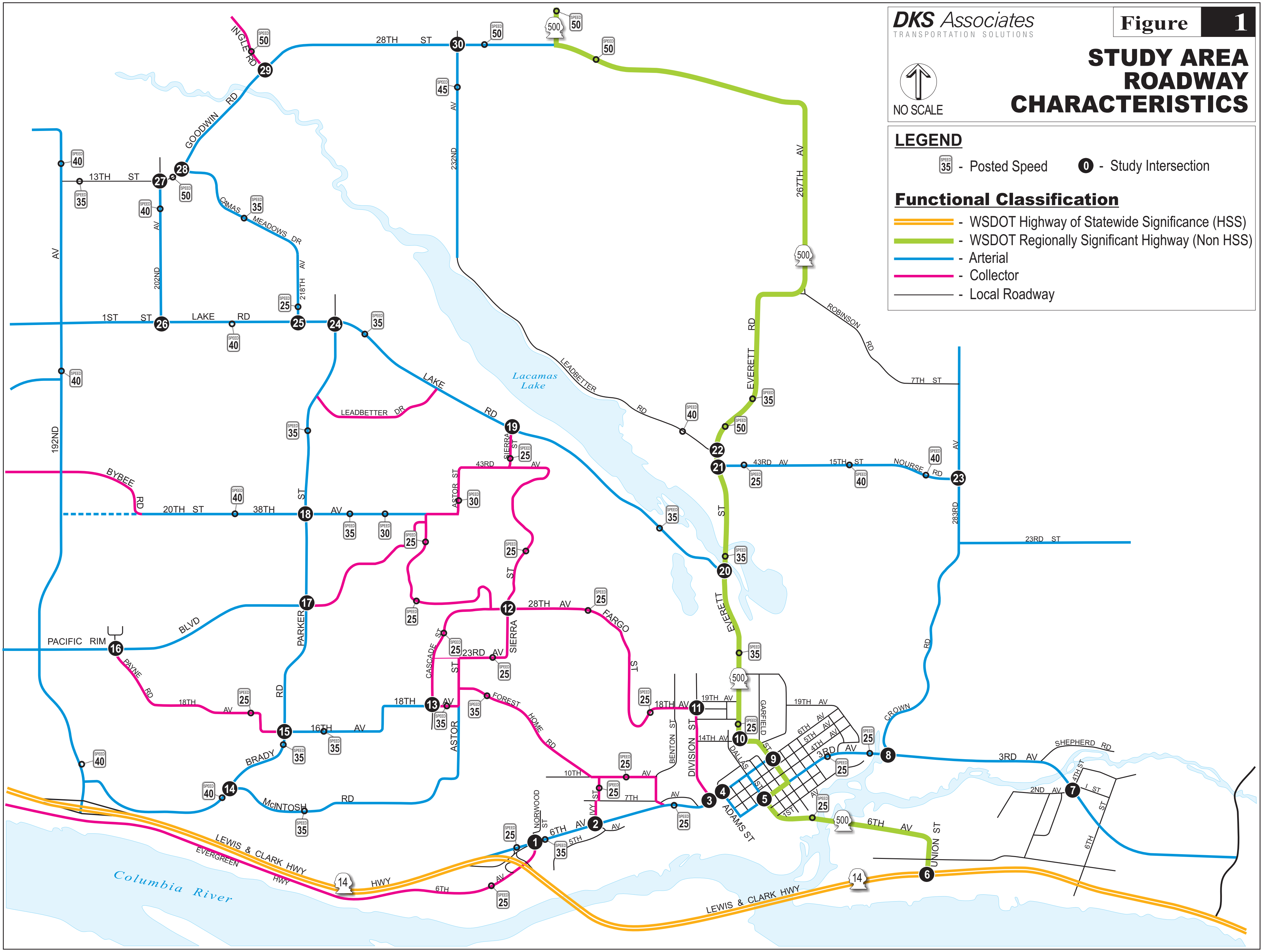

Figure 1

STUDY AREA ROADWAY CHARACTERISTICS

Motor Vehicle Facilities

Characteristics of the major roadways in the urban growth area of Camas were documented and are presented in Figure 1. Data collected included functional classification, roadway cross-section, and posted speed limits.

State Route (SR) 14 and SR 500 are the state highways in Camas. SR 14 is classified by the state as a Highway of Statewide Significance (HSS)[1], while SR 500 is classified by the state as a Regionally Significant Highway. SR 14 runs east to west and connects the City of Camas to I-205, the City of Vancouver, other nearby urban areas to the west, and the Columbia River Gorge to the east. SR 500 generally winds north to south through Camas via the alignments of several roadways, connecting SR 14 at the south to 28th Street at the north.

Major roadways under City of Camas jurisdiction include Brady Road, Parker Street, Pacific Rim Boulevard, SE 20th Street/NW 38th Avenue, NW 16th/Hood/18th, 1st Street, Lake Road, Dallas Street (between 3rd and 6th), 3rd Avenue and 6th Avenue. Each of these roadways are classified as arterials[2] and generally provide for higher volumes of motor vehicle circulation through the City.

Completed TIF Roadway Improvements

A few of the improvement projects included in the 2003 Camas TIF have been constructed. These projects mitigated forecasted roadway deficiencies that resulted from new growth in Camas. The completed projects include:

- Leadbetter Road: Constructing a new two lane roadway from Parker Street to Lake Road.
- 1st Street/Lake Road: Widening 1st Street and Lake Road to three or five lanes.

Existing Traffic Volumes

Motor vehicle activity at 30 intersections in the study area was collected during the weekday evening peak hour (4:00 p.m. to 6:00 p.m.) in the late spring and early summer of 2011. In addition, historical motor vehicle count data from recent years (2007 to 2010) for 10 intersections was obtained[3] and utilized to supplement the new count data. The count data was used to analyze existing intersection operations at the study intersections, and is included in the appendix. The existing evening peak hour traffic volumes developed for the study intersections are displayed in Figure 2.

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[1] Highways of Statewide Significance, WSDOT, http://www.wsdot.wa.gov/planning/HSS/Default.htm

[2] City of Camas Transportation Comprehensive Plan, Transportation Designations, December 2007.

[3] Historical Count Data obtained from the City of Camas.

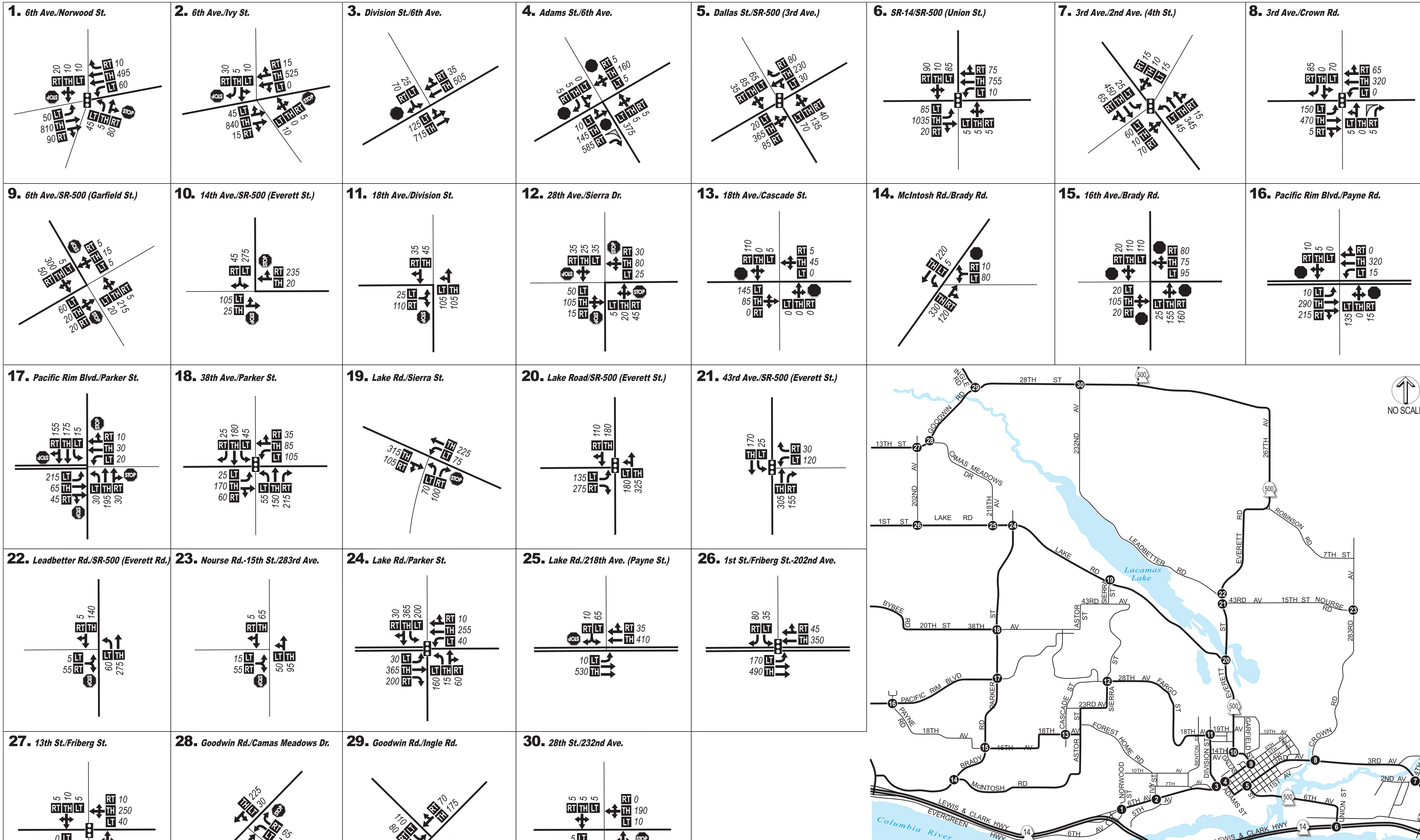

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Figure 2

2005 EXISTING PM PEAK HOUR TRAFFIC VOLUMES

Intersection Operations

This section covers the existing traffic operating conditions at the study intersections. Included is a description of the intersection performance measures, jurisdictional operational standards, and an existing traffic operational analysis.

Intersection Performance Measures

Level of service (LOS) and volume-to-capacity (V/C) ratios are two commonly used performance measures that provide a gauge of intersection operations. In addition, they are often incorporated into agency mobility standards. Descriptions are given below:

- **Level of service (LOS):** A "report card" rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.
- **Volume-to-capacity (V/C) ratio:** A decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used (i.e., the saturation) at a turn movement, approach leg, or intersection. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and long delays.

Jurisdictional Mobility Standards

The mobility standards for the study intersections vary according to the agency of jurisdiction for each roadway. Of the 30 study intersections, seven are under state jurisdiction (including intersections along SR 14 and SR 500), two are under county jurisdiction (Nourse Road-15th Street/283rd Avenue and 28th Street/232nd Avenue), while the remaining intersections are under the jurisdiction of the City of Camas.

The Washington State Department of Transportation (WSDOT) requires a level of service "D" or better for Highways of Statewide Significance (HSS) in urban areas[4], including SR 14. In addition, WSDOT requires a level of service "E" or better for Regionally Significant State Highways (non-HSS) in urban areas, including SR 500. Clark County requires a level of service "E" or better for unsignalized intersections, unless signal warrants are met, then a level of service "D" would be required.[5] The City of Camas operating standards require that a level of service "D" and a volume to capacity ratio of 0.90 or better to be maintained for all intersections.[6]

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[4] Level of Service Standards for Washington State Highways, WSDOT, January 1, 2010.

[5] Clark County Code, Section 40.350.020, Transportation Concurrency Management System.

[6] City of Camas Comprehensive Plan, Transportation Element, Policy TR-20, March 2004.

Existing Operating Conditions

The existing motor vehicle operating conditions at the study intersections were determined for the evening peak hour based on the *2000 Highway Capacity Manual* methodology[7] for signalized and unsignalized intersections. The conditions include the estimated average delay, level of service (LOS), and volume-to-capacity (v/c) ratio of the study intersections and are shown in Table 1.[8]

Table 1: Existing Evening Peak Hour Intersection Operations

Intersection	Mobility Standard* LOS	V/C	Delay	Level of Service	Volume/ Capacity
Signalized Intersections					
Dallas Street/SR-500 (3rd Avenue)	E		9.7	A	0.61
SR-14/SR-500 (Union Street)	D		30.2	C	0.92
3rd Avenue/2nd Avenue-4th Street	D	0.90	5.5	A	0.31
3rd Avenue/Crown Road	D	0.90	9.9	A	0.39
38th Avenue/Parker Street	D	0.90	15.1	B	0.41
Lake Road/SR-500 (Everett Street)	E		13.6	B	0.49
43rd Avenue/SR-500 (Everett Street)	E		9.5	A	0.37
Lake Road/Parker Street	D	0.90	13.7	B	0.51
1st Street/Friberg Street-202nd Avenue	D	0.90	8.4	A	0.35
13th Street/Friberg Street	D	0.90	7.5	A	0.38
All-Way Stop Intersections					
28th Avenue/Sierra Drive	D	0.90	8.6	A	0.24
16th Avenue/Brady Road	D	0.90	13.3	B	0.54
Pacific Rim Boulevard/Parker Street**	D	0.90	10.8	B	0.46
Unsignalized Intersections					
6th Avenue/Norwood Street	D	0.90	53.6	**A/F**	0.65
6th Avenue/Ivy Street	D	0.90	33.6	A/D	0.28
Division Street/6th Avenue	D	0.90	19.2	A/C	0.30
Adams Street/6th Avenue**	D	0.90	15.4	A/C	0.37
6th Avenue/SR-500 (Garfield Street)	E		16.9	A/C	0.26

7 *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.
8 Detailed intersection analysis worksheets are attached in the technical appendix.

Intersection	Mobility Standard* LOS	V/C	Delay	Level of Service	Volume/ Capacity
14th Avenue/SR-500 (Everett Street)	E		67.1	**A/F**	0.75
18th Avenue/Division Street	D	0.90	10.1	A/B	0.17
18th Avenue/Cascade Street	D	0.90	9.3	A/A	0.13
McIntosh Road/Brady Road	D	0.90	16	A/C	0.29
Pacific Rim Boulevard/Payne Road	D	0.90	15.6	A/C	0.33
Lake Road/Sierra Street	D	0.90	12.5	A/B	0.28
Leadbetter Road/SR-500 (Everett Street)	E		9.7	A/A	0.17
Nourse Road-15th Street/283rd Avenue	E		9.3	A/A	0.08
Lake Road/218th Avenue/Payne Street	D	0.90	17.8	A/C	0.22
Goodwin Road/Camas Meadows Drive	D	0.90	13.7	A/C	0.22
Goodwin Road/Ingle Road	D	0.90	17.1	A/C	0.37
28th Street/232nd Avenue	E		14.7	A/B	0.17

Note:

*Mobility Standard is for City of Camas, except for SR-14, which is WSDOT HSS, SR-500, which is WSDOT Non HSS, and Nourse Road-15th Street/283rd Avenue and 28th Street/232nd Avenue, which is for Clark County.

**Intersection configuration not allowed in HCM analysis, therefore intersection configuration was modified in Synchro to allow for capacity analysis

Bolded and Shaded indicates mobility standard is not met

Signalized or AWS intersections: All Movements
- LOS = Level of Service of Intersection
- Delay = Average Delay of Intersection
- V/C = Volume-to-Capacity Ratio of Intersection (except for AWS where V/C is for worst movement)

Unsignalized intersection: Worst Movement
- LOS = Level of Service of Major Street/Minor Street
- Delay = Approach Delay of Worst Movement
- V/C = Volume-to-Capacity Ratio of Worst Movement

During the evening peak hour, all study intersections operate within jurisdictional standards, with the exception of the 6th Avenue/Norwood Street and the 14th Avenue/SR 500-Everett Street intersections. The 6th Avenue/Norwood Street intersection operates at level of service of “F” on the minor street approach due to the high traffic volumes on 6th Avenue causing long delays for northbound traffic on Norwood Street waiting to find an acceptable gap to turn left onto 6th Avenue.

At the 14th Avenue/SR 500-Everett Street intersection, the eastbound approach operates at level of service of “F” due to high traffic volumes from the uncontrolled southbound movement (SR 500-Everett Street) preventing traffic from 14th Avenue to finding an acceptable gap to turn left onto SR 500-Everett Street.

Signal Warrants

A signal warrant analysis was performed for the unsignalized study intersections not meeting mobility standards to determine if side-street volumes are high enough to justify (i.e. warrant) the construction of a traffic signal. The only unsignalized intersections not meeting mobility standards under existing conditions were the 6th Avenue/Norwood Street and 14th Avenue/SR-500 (Everett Street) intersections. For this analysis, the MUTCD9 Warrant #3 (peak hour) was assessed using 2011 p.m. peak hour traffic volumes. Based on the peak hour warrant, neither of these intersections would meet the signal warrant criteria. The signal warrant analysis worksheets are attached in the appendix.

2005 Base Link Volumes

To help understand the traffic flows and corridor conditions throughout the entire study area, the regional travel demand model developed by the Southwest Washington Regional Transportation Council (SWWRTC) was customized for use in Camas. Roadway link data, including estimated volumes and approximate levels of congestion, can be plotted from the model for sketch-level purposes.

Figure 3 shows 2005 model link volumes with links having volume-to-capacity ratios over 0.80 colored to indicate the relative level of congestion. In addition, approximate intersection level of service is indicated as well. This figure does not represent *Highway Capacity Manual* calculations, but gives a general indication of the performance of the network.

Based on Figure 3, the worst congestion occurs along SR 14, 6th Avenue and 1st Street/Lake Road.

[9] Manual on Uniform Traffic Control Devices 2003 Ed., Federal Highway Administration, November 2004.

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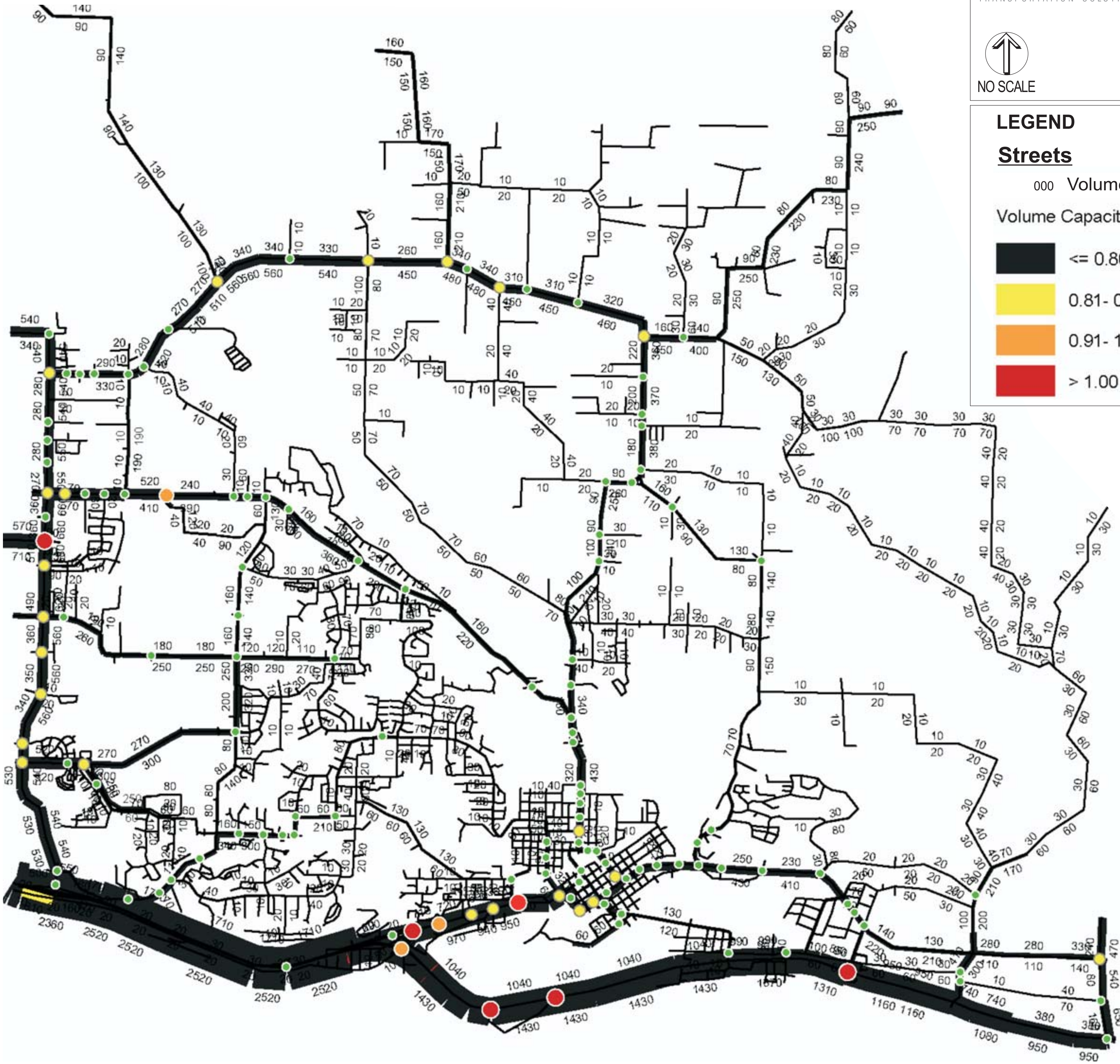
Figure 3

2005 PM PEAK HOUR LINK VOLUMES & V/C INTERSECTION LOS

NO SCALE



LEGEND

Streets

000 Volume

Volume Capacity Ratio

- <= 0.80
- 0.81- 0.90
- 0.91- 1.00
- > 1.00

Intersections

LOSReported

- B
- C
- D
- E
- F

Note: Model Volumes - Not Post-Processed

Future Base Conditions

The need for transportation improvements within Camas depends on the level of future development and the corresponding traffic volumes. The 2003 Camas Traffic Impact Fee was based on a 2023 traffic forecast. This TIF update uses a 2035 land use forecast to assess future traffic growth. A detailed mesoscopic transportation forecast model was developed for the study area from the Southwest Washington Regional Transportation Council's (RTC) regional travel demand forecast models (base year 2005 and future year 2035) to assess the growth in traffic. The projected growth in traffic was then added to existing volumes to determine traffic volumes for the forecast year 2035. This chapter provides a general description of the forecast methodology and summarizes future roadway operations resulting from the growth in traffic. More detailed information about the forecasting methodology can be found in the *Focus-Area Mesoscopic Forecasting Methodology* memorandum, in the appendix.[10]

Future Demand and Land Use

The City of Camas TIF addresses additional facilities that are required to serve future growth. The RTC urban area transportation forecast model was used to determine traffic growth and future volumes in Camas. This forecast model translates land uses into person travel, selects modes, and assigns motor vehicles to the roadway network. These traffic volume projections form the basis for identifying potential roadway deficiencies and for evaluating alternative circulation improvements. This section describes the forecasting process, including key assumptions and the land use scenario developed from the existing Comprehensive Plan designations and allowed densities.

Projected Land Uses

Land use is a key factor in developing a functional transportation system. The amount of land that is planned to be developed, the type of land uses, and how the land uses are mixed together have a direct relationship to expected demands on the transportation system. Understanding the amount and type of land use is critical to taking actions to maintain or enhance transportation system operation.

For transportation forecasting, the land use data are stratified into geographical areas called transportation analysis zones (TAZs), which represent the sources of vehicle trip generation. There are approximately 60 RTC TAZs within the Camas TIF study area. As part of the previous Camas TIF update (2003), a detailed land use inventory was conducted for the Camas Urban Growth Area. Information collected from that effort was used to disaggregate RTC "parent" transportation analysis zones (TAZs) into smaller "child" TAZs (see Figure 4). The 60 RTC TAZs were subdivided into about 140 TAZs.

[10] Memorandum from DKS Associates to Mark Harrington, RTC, May 20, 2011. *Focus-Area Mesoscopic Forecasting Methodology*.

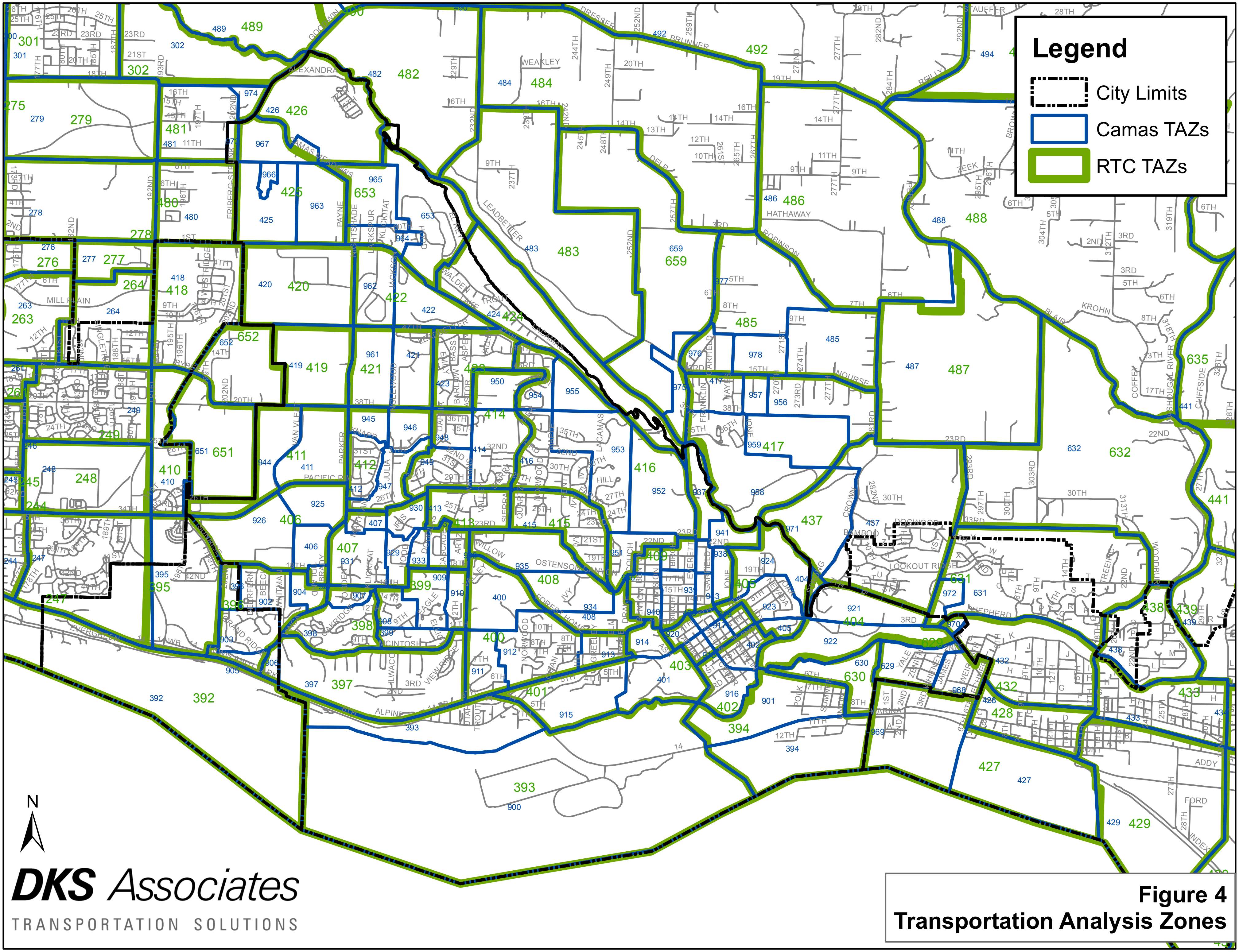


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Figure 4
Transportation Analysis Zones

The purpose of the disaggregation is to more accurately load traffic onto the street network. Overall, the land uses assumed are consistent with RTC's land use assumptions, which were recently reviewed and updated, regionally.

The disaggregated land use data was reviewed by City staff and refined to reflect local planning efforts. Table 2 summarizes the land uses for the base year model (2005) and the future scenario (2035) within the Camas study area. While these summaries only outline land use in Camas for the purposes of this study, the travel demand forecasts that have been evaluated reflect the regional land use growth throughout the Portland/Vancouver metropolitan area. Table 2 indicates that significant growth is expected in Camas in the coming decades.

Table 2: Camas Land Use Summary

Land Use	2005	2035	Increase	% Increase
Households (HH)	7,021	14,124	7,103	101%
Retail Employees (RET)	446	3,447	3,001	673%
Other Employees (OTH)	5,755	14,797	9,042	157%

The land use growth listed in Table 2 is different than the land use growth used to develop the 2003 Camas TIF. The 2023 land use used in the 2003 TIF indicated that households would increase by 66%, slightly less than the amount identified for 2035. The 2035 forecast identifies a significant increase in retail employment growth when compared to the 2023 forecast (a 673% increase in 2035 versus 32% increase in 2023). Other employment growth assumed for 2035 is generally comparable to what was assumed for 2023 (157% in 2035 versus 144% in 2023). The land use developed for the 2035 forecasts includes areas north and east of Lacamas Lake, which were not planned for in the 2023 employment forecast.

At the base year (2005) level of land development, the transportation system generally operates without significant deficiencies in the study area. As land uses are changed in proportion to each other (i.e. there is a significant increase in employment relative to household growth), there will be a shift in the overall operation of the transportation system. Retail land uses generate higher amounts of trips per acre of land than do households and other land uses. The location and design of retail land uses in a community can greatly affect transportation system operation. Additionally, if a community is homogeneous in land use character (i.e. all employment or residential), the transportation system must support significant trips coming to or from the community rather than within the community. Typically, there should be a mix of residential, commercial, and employment type land uses so that some residents may work and shop locally, reducing the need for residents to travel long distances.

RTC Area Transportation Model

A determination of future traffic system needs in Camas requires the ability to accurately forecast travel demand resulting from estimates of future population and employment for the City. The objective of the transportation planning process is to provide the information necessary for making decisions on when and where improvements should be made to the transportation system to meet travel demand as developed in an urban area travel demand model as part of the Regional Transportation Plan update process. RTC uses VISUM, a computer based program for transportation planning, to process the large amounts of data for the Clark County area. For the Camas TIF Update, the RTC model was used to forecast 2035 travel with substantially more detail added into the Camas area as described previously.

Traffic forecasting can be divided into several distinct but integrated components that represent the logical sequence of travel behavior (Figure 5). These components and their general order in the traffic forecasting process are as follows:

- Trip Generation
- Trip Distribution
- Mode Choice
- Traffic Assignment

Trip Generation

The trip generation process translates land use quantities (number of dwelling units, retail, and other employment) into vehicle trip ends (number of vehicles entering or leaving a TAZ or sub-TAZ). The RTC trip generation process is elaborate, entailing detailed trip characteristics for various types of housing, retail employment, non-retail employment, and special activities. Typically, most traffic impact studies rely on the Institute of Transportation Engineers (ITE) research for analysis.[11] The ITE trip rates are used in implementing TIF fee calculations because they provide a greater link between specific land use and vehicular traffic. The model process is tailored to variations in travel characteristics and activities in the region and is useful for establishing area-wide TIF rates.

Table 3 illustrates the estimated growth in vehicle trips generated within the Camas area during the PM peak period between 2010 and 2035. It indicates that vehicle trips in Camas would grow by approximately 137 percent between 2010 and 2035 if the land develops according to the land use forecasts, with the majority of growth occurring in the north part of the city. This growth is significantly higher than the 95% growth identified in the 2003 TIF, which is consistent with the change in land use forecasts. Assuming a 25-year horizon to the 2035 scenario, this represents an annualized growth rate of about 2.9 percent per year.

Table 3: Existing and Future Projected Vehicle Trip Generation (PM Peak Hour)

Camas UGA	2005	2035	2035-2005	Change
Trips	10,313	24,483	14,170	137%

[11] *Trip Generation: An ITE Informational Report*, 8th Edition, Institute of Transportation Engineers, 2008.

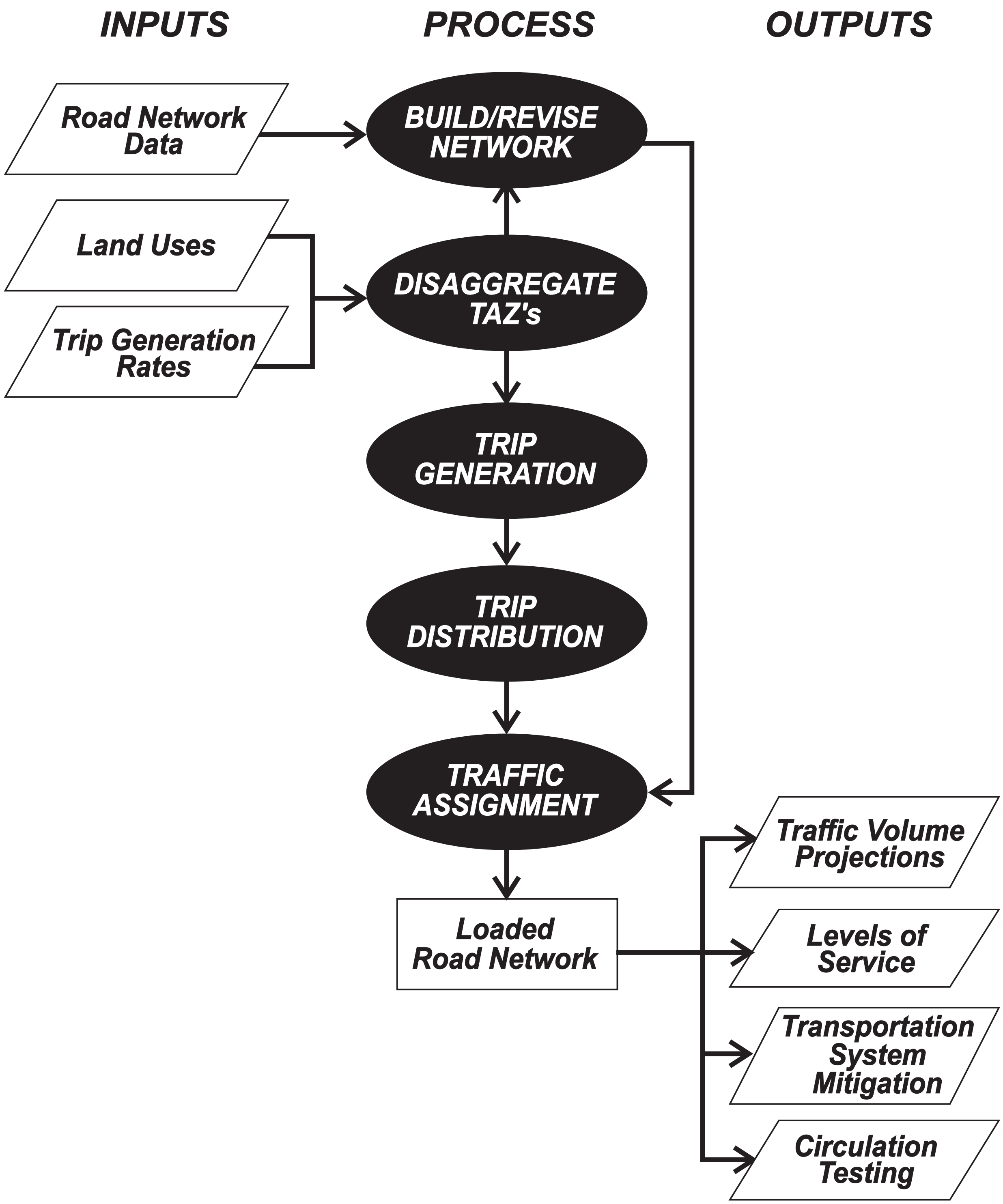

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Figure 5

TRAVEL FORECASTING PROCESS

Trip Distribution

This step estimates how many trips travel from one zone in the model to any other zone. Distribution is based on land uses, trip purpose, and on factors that relate the likelihood of travel between any two zones to the travel time between zones (including the influences of congestion). In projecting long-range future traffic volumes, it is important to consider potential changes in regional travel patterns. Although the locations and amounts of traffic generation in Camas are essentially a function of future land use in the city, the distribution of trips is influenced by regional growth, particularly in neighboring areas in Clark County, including Vancouver and Washougal. The trip distribution from RTC's regional model was incorporated into the Camas mesoscopic focus-area model to ensure regional consistency.

Mode Choice

This is the step where it is determined how many trips will be by various modes (single-occupant vehicle, transit, truck, carpool, pedestrian, bicycle, etc.). The 2005 mode splits are incorporated into the base model and adjustments to that mode split are projected for the future scenario, depending on any expected changes in transit or carpool use. These considerations are built into the forecasts used for 2035, consistent with the RTC regional travel demand model.

Traffic Assignment

Trip assignment involves the determination of the specific travel routes taken by all of the trips within the transportation network. This step was performed using VISUM modeling software. Model inputs included the transportation network (i.e., road and intersection locations and characteristics, as determined from maps and field inventories) and a trip distribution table (determined using methodology described previously in this memorandum). Iterated equilibrium assignment was then performed using estimated travel times along roadways and delays at intersection movements.[12] The path choice for each trip was based on minimal travel times between locations. Model outputs include traffic volumes on roadway segments and at intersections.

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[12] Roadway travel times were calculated based on distance and travel speed. Intersection movement delays were calculated using Highway Capacity Manual (HCM) methodology for signalized and unsignalized intersections. Detailed lane geometry, traffic control, roadway cross-sections, and roadway travel speed information is required for model accuracy.

Model Application to Camas

The future base network was developed through coordination with City of Camas staff. The improvements included in the base year model are those projects with secured funding. The base 2035 roadway network included the following projects:

- SR 14 Camas-Washougal Widening and Interchange Improvements:
  - Widening of SR 14 from two lanes to four lanes from the end of the West Camas Slough Bridge to Union Street (SR 500)
  - Construction of a split-diamond interchange at Union Street and 2nd Street
    - Includes four new roundabouts, north and south of SR 14 at Union Street and 2nd Street
- SE 20th Street Improvement from SE Armstrong Road to SE 192nd Avenue – widen existing portion to three lanes with bike lanes and sidewalks and extend to SE 192nd Avenue.[13]

2035 Base Traffic Volumes

Intersection turn movements were extracted from the model at key intersections for both the base year 2005 and forecast year 2035 scenarios. These intersection turn movements were not used directly, but the increment of the year 2035 turn movements over the 2005 turn movements was applied (added) to existing (actual 2010) turn movement counts in Camas, since 2010 counts were determined to be comparable to 2005 counts. A post-processing technique following NCHRP 255 methodology was used to refine model travel forecasts to the volume forecasts used for future intersection analysis. The turn movement volumes used for future year intersection analysis can be found in the technical appendix. The traffic volumes developed for the Future 2035 Base are shown in Figure 6.

[13] Loan payback remnant may be required in new TIF calculation.

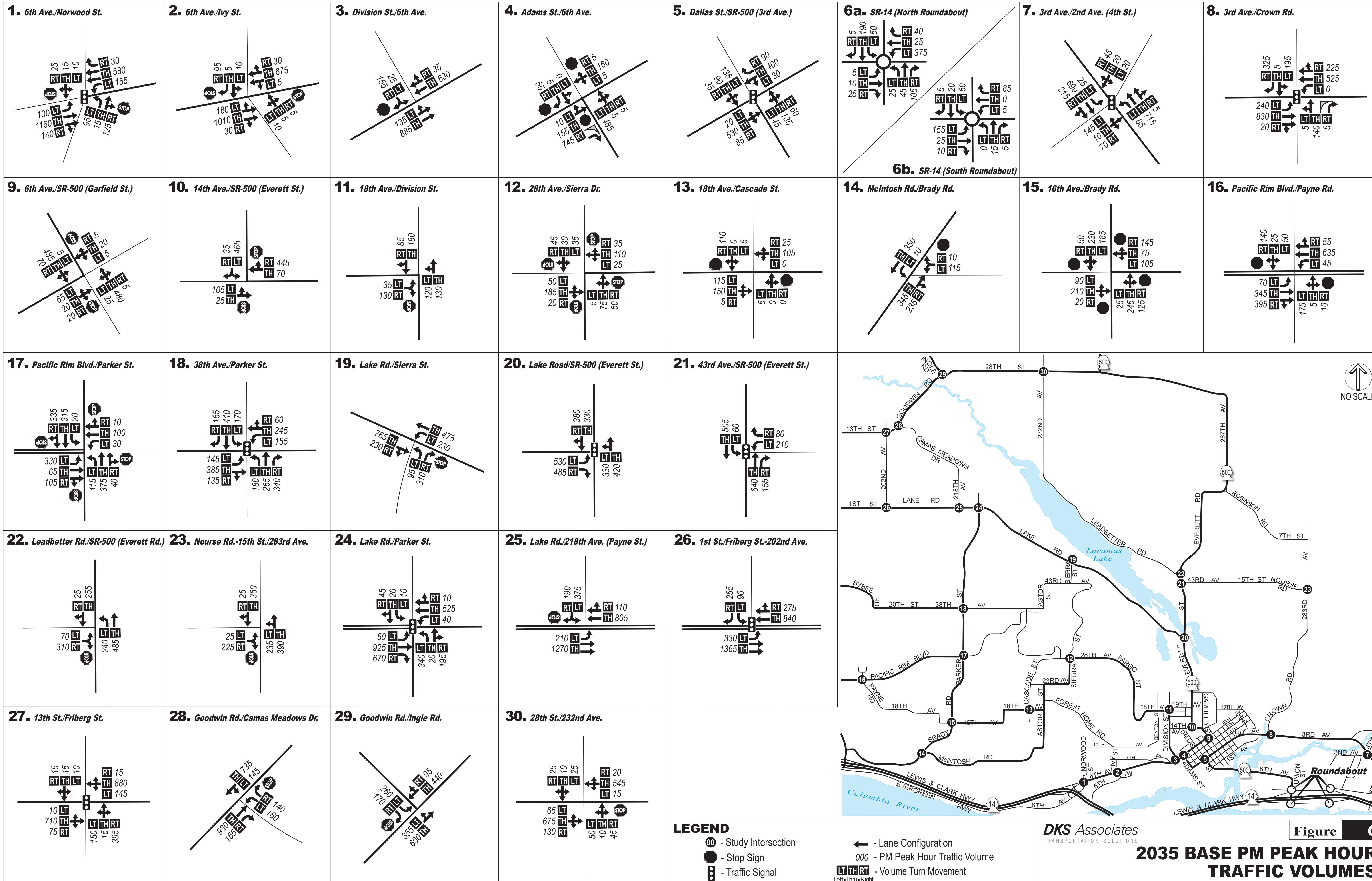

Figure 6

2035 BASE PM PEAK HOUR TRAFFIC VOLUMES

Future Base (2035) Operating Conditions

The 2035 base motor vehicle operating conditions at the study intersections were determined for the evening peak hour based on the *2000 Highway Capacity Manual* methodology[14] for signalized and unsignalized intersections. The conditions include the estimated average delay, level of service (LOS), and volume-to-capacity (v/c) ratio of the study intersections and are shown in Table 4.[15]

During the evening peak hour, all signalized study intersections operate within jurisdictional standards, with the exception Lake Road/Parker Street and 13th Street/Friberg Street. The Lake Road/Parker Street intersection, while operating at an acceptable level of service, exceeds the City's volume-to-capacity mobility standard by 0.02, a small amount. However, the intersection at 13th Street/Friberg Street would operate at level of service F and significantly exceed the City's volume-to-capacity standard.

Two of the three all-way-stop controlled intersections would exceed the City's mobility standard, although current tools do not allow correct analysis of the intersection at Pacific Rim Boulevard/Parker Street. The level of service shown, E, reflects an analysis that assumes fewer lanes than currently exist at this intersection, due to analysis limitations. It is likely that this intersection would operate slightly better than what is reported. However, the 16th Avenue/Brady Road intersection does operate poorly, level of service F, and improvements should be considered at that location.

Ten of the unsignalized study intersections deteriorate to a LOS of E or F due to the growth in motor vehicle volumes. These intersections are located on arterial roadways, including 6th Avenue, SR 500/Everett Street, Lake Road, Pacific Rim Boulevard and Goodwin Road/28th Street.

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[14] *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

[15] Detailed intersection analysis worksheets are attached in the technical appendix.

Table 4: Future Base (2035) Evening Peak Hour Intersection Operations

Intersection	Mobility Standard* LOS	Mobility Standard* V/C	Delay	Level of Service	Volume/ Capacity
Signalized Intersections					
Dallas Street/SR-500 (3rd Avenue)	E		13.7	B	0.74
3rd Avenue/2nd Avenue-4th Street	D	0.90	8.7	A	0.55
3rd Avenue/Crown Road	D	0.90	20.8	C	0.69
38th Avenue/Parker Street	D	0.90	31.1	C	0.84
Lake Road/SR-500 (Everett Street)	E		67.1	E	1.04
43rd Avenue/SR-500 (Everett Street)	E		15.0	B	0.66
Lake Road/Parker Street	D	0.90	38.7	D	**0.92**
1st Street/Friberg Street-202nd Avenue	D	0.90	15.3	B	0.71
13th Street/Friberg Street	D	0.90	96.7	**F**	**1.22**
All-Way Stop Intersections					
28th Avenue/Sierra Drive	D	0.90	9.9	A	0.37
16th Avenue/Brady Road	D	0.90	88.4	**F**	**1.24**
Pacific Rim Boulevard/Parker Street**	D	0.90	41.3	**E**	**1.07**
Unsignalized Intersections					
6th Avenue/Norwood Street	D	0.90	>200.0	**C/F**	**>2.0**
6th Avenue/Ivy Street	D	0.90	182.7	**A/F**	0.55
Division Street/6th Avenue	D	0.90	24.2	A/C	0.51
Adams Street/6th Avenue**	D	0.90	21.5	A/C	0.53
6th Avenue/SR-500 (Garfield Street)	E		46.4	A/E	0.58
14th Avenue/SR-500 (Everett Street)	E		>200.0	**A/F**	>2.0
18th Avenue/Division Street	D	0.90	12.7	A/B	0.28
18th Avenue/Cascade Street	D	0.90	16.5	A/C	0.14
McIntosh Road/Brady Road	D	0.90	24.6	A/C	0.43
Pacific Rim Boulevard/Payne Road	D	0.90	128.4	**A/F**	**1.05**
Lake Road/Sierra Street	D	0.90	93.9	**B/F**	**1.07**
Leadbetter Road/SR-500 (Everett Street)	E		88.0	**A/F**	**1.03**
Nourse Road-15th Street/283rd Avenue	D	0.90	9.3	A/A	0.08

Intersection	Mobility Standard* LOS	V/C	Delay	Level of Service	Volume/ Capacity
Lake Road/218th Avenue/Payne Street	D	0.90	>200.0	**B/F**	**>2.0**
Goodwin Road/Camas Meadows Drive	D	0.90	>200.0	**B/F**	**>2.0**
Goodwin Road/Ingle Road	D	0.90	>200.0	**A/F**	**>2.0**
28th Street/232nd Avenue	D	0.90	132.5	**A/F**	**0.93**
Roundabout Intersections					
Union/"C" Street (north)	D		7.9	A	0.45
Union/11th Street (south)	D		4.3	A	0.20

*Mobility Standard is for City of Camas, except for SR-14, which is WSDOT HSS and SR-500, which is WSDOT Non HSS

**Intersection configuration not allowed in HCM analysis, therefore intersection configuration was modified in Synchro to allow for capacity analysis

Bolded and Shaded indicates mobility standard is not met

Signalized or All Way Stop intersections: All Movements
LOS = Level of Service of Intersection
Delay = Average Delay of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
(except for AWS where V/C is for worst movement)

Unsignalized intersections: Worst Movement
LOS = Level of Service of Major Street/Minor Street
Delay = Approach Delay of Worst Movement
V/C = Volume-to-Capacity Ratio of Worst Movement

2035 Base Link Volumes

In addition to the intersection operation analysis, corridor performance was examined to determine if the growth in traffic volumes exceeded capacity on major routes (arterial and collectors) or if significant volume was added to local or neighborhood routes. Figure 7 shows model link volumes for the 2035 Base condition. Similar to Figure 3, the volume-to-capacity ratios shown do not reflect *Highway Capacity Manual* analysis, but give a general idea of areas of concern. It shows that a number of key corridors are significantly impacted by growth between 2010 and 2035. Figure 8 shows traffic volume growth between 2005 and 2035. Table 5 lists a summary of the corridor performance findings. The issues identified in Table 5 could potentially be mitigated with access control, roadway widening, parallel route improvements, or new parallel facilities to relieve congestion. Strategies and alternatives for mitigating these concerns will be addressed in Chapter 2.

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Figure 7

2035 PM PEAK HOUR LINK VOLUMES & V/C INTERSECTION LOS

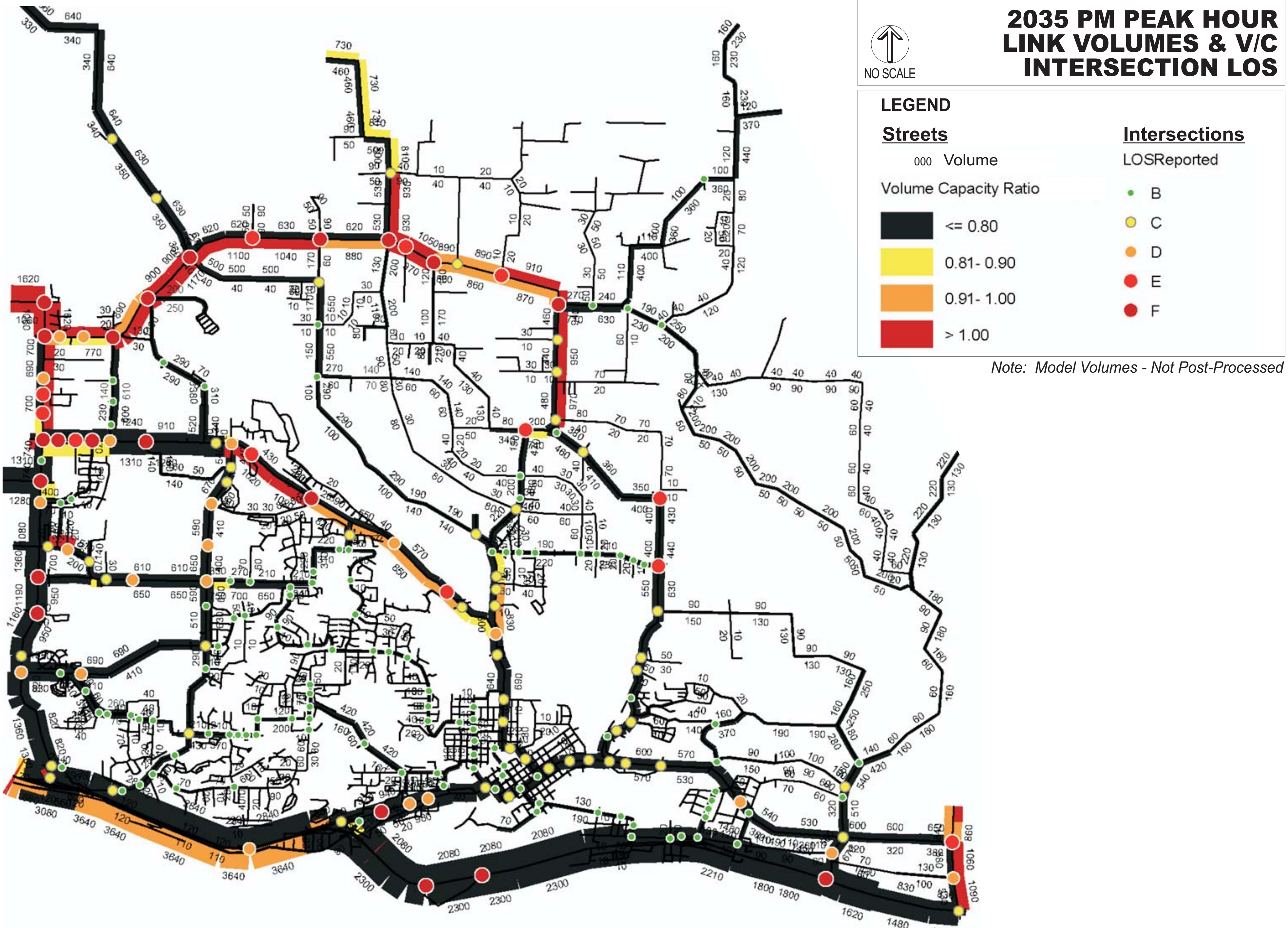

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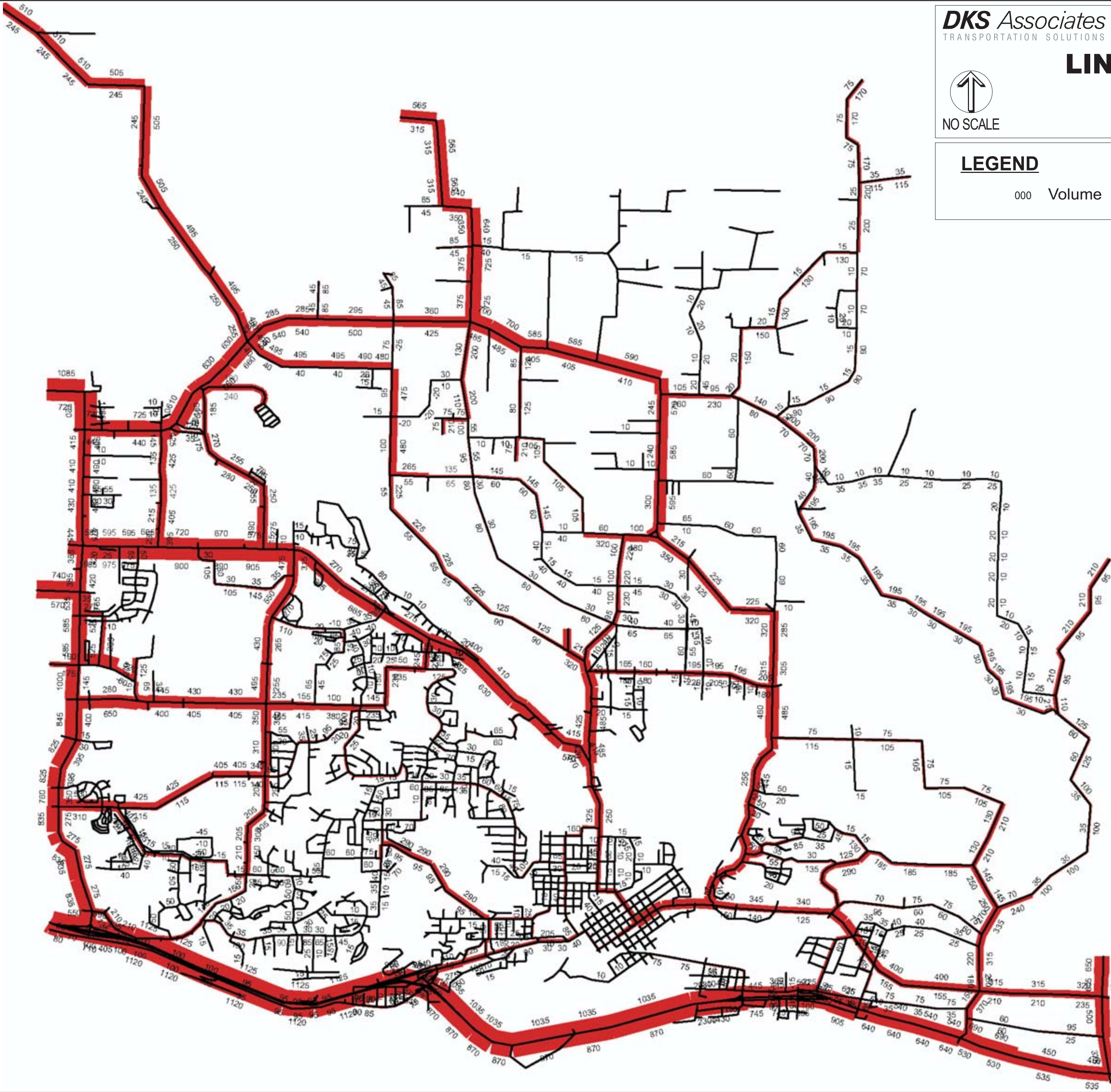
Figure **8**

LINK VOLUME GROWTH (2035-2005)

NO SCALE



LEGEND

000 Volume

Table 5: Summary of 2035 Link Volume Capacity Analysis

Roadway	Limits	Issues
SR-14	192nd to 6th Avenue	• Growth of approximately 2,200 vehicles in the PM peak hour • PM peak volumes approaching capacity in eastbound direction
Lake Road	Parker Street to Everett Street/SR 500	• Growth of approximately 1,000 vehicles in the PM peak hour • PM peak volumes approach or exceed capacity in eastbound direction
13th Street/ Goodwin Road/ 28th Street	192nd to 242nd	• Growth of 800 to 1,200 vehicles in the PM peak hour • PM peak volumes approach or exceed capacity of the existing roadway
SR 500	Everett to 242nd	• Growth of 900 to 1,200 vehicles in the PM peak hour • PM peak volumes exceed capacity of existing roadway
SR 500/ Everett Street	Lake Road to Leadbetter Road	• Growth of 800 to 900 vehicles in the PM peak hour • PM peak volumes approach capacity of existing roadway
242nd Avenue	North of 28th Street	• Growth of approximately 900 to 1,100 vehicles in the PM peak hour • PM peak volumes exceed capacity of existing roadway northbound
1st Street/ Lake Road	192nd Avenue to Parker Street	• Growth of about 1,500 vehicles in the PM peak hour • PM peak volumes approach capacity of existing roadway

CHAPTER 2: IMPROVEMENTS ALTERNATIVES ANALYSIS

Between 2005 and 2035, the traffic volume within Camas' Urban Growth Area (UGA) is forecast to grow by 137 percent. Future deficiencies were identified using WSDOT's and the local jurisdiction's thresholds for mobility standards. Improvements to the Camas street system, including intersection improvements, roadway improvements, or new roadways, were considered and a package of recommended improvements was determined. This chapter discusses the recommended roadway improvements, including benefits, costs and related policies.

Major Roadway Improvements

Several roadway improvements were identified to address the intersection capacity and roadway capacity issues identified in the Existing and Future Baseline Conditions section, previously. Several of the roadway improvements that were tested and recommended were projects originally recommended in the 2003 TIF Update. Other projects include new facilities to serve the North UGA Expansion area, or other improvements determined to meet the latest future forecast demands. Table 6 lists the recommended major roadway improvements and describes their benefits.

Figure 9 shows the volume-to-capacity ratios with the proposed improvements in place.

Table 6: 2035 PM Peak Hour Mitigated Intersection Level of Service

Roadway	Limits	Description	Benefits
Goodwin Road	192nd Avenue to Friberg Street	An improvement is needed to provide additional capacity between Vancouver and Camas. No specific project has been identified, but could include: • widening of 13th Street • constructing an 18th Street connection • or a combination of the two	• Modeling shows there will be a high travel demand in the future between Vancouver and northern Camas. Either two three-lane corridors or one five-lane corridor will be needed to connect 192nd and Goodwin/28th.
Goodwin Road	Friberg Street to Ingle Road	High travel demand along this corridor will require a five-lane section to provide capacity between Vancouver and northeastern Camas.	• Capacity improvement for key corridor • Safety improvement for key corridor
Goodwin Road	Ingle Road to 242nd Avenue	Traffic forecasts indicate a three-lane section, in combination with the proposed 242nd Extension/East-West Arterial Roadway will provide sufficient capacity in this corridor	• Lower cost than originally anticipated (3-lane vs. 5-lane section • Improved capacity and safety
Camas Meadows Drive	Payne to Lake Road	Extend Camas Meadows Drive from Payne Street to Lake Road along Larkspur alignment as a three-lane collector	• Improved capacity and safety • Improves operation of Lake/Parker intersection • Eliminates the need to widen 1st/Lake to accommodate eastbound through traffic
Ingle Street Extension (New East-West Connector)	Extend Ingle Street south and east between Goodwin/28th and 232nd Street	Provides an alternative route into north portion of Camas, eliminating the need for a five-lane section on Goodwin between Ingle and 242nd Avenue	• Provides additional capacity • Provides access to new development area

Roadway	Limits	Description	Benefits
232nd Street Improvement	Widen and improve 232nd Street between 28th Street and 9th Street	In conjunction with the Ingle Street Extension, eliminates the need for a five-lane section on Goodwin between Ingle and 242nd Avenue	• Provides additional capacity • Provides access to new development area
9th Street Improvement	Widen and improve 9th Street between 232nd Avenue and 242nd Avenue Extension	In conjunction with the Ingle Street Extension and the 232nd Street Improvement, eliminates the need for a five-lane section on Goodwin between Ingle and 242nd Avenue	• Provides additional capacity • Provides access to new development area
242nd Avenue Extension	28th Street to 14th Street	Construct new high-speed (45 mph) 3-lane roadway	• Provide a high mobility roadway connection as an alternative to SR 500 (which would otherwise have high demands in the future) • Provide access to new development
New East-West Arterial	14th Street to SR 500 (Everett Street)	Construct new high-speed 3 lane roadway	• Provide a high-speed, high-capacity roadway connection as an alternative to SR 500 • Provide access to new development
NE Everett Street	35th Avenue to New East-West Arterial	Widen to 3 lanes	• Provide turn lane capacity for adjacent development and growth in through traffic
23rd Street Extension	43rd Avenue to 283rd Avenue	New 2 lane, minimum access roadway	• Provide access to new development • Provide additional connectivity in the area

Roadway	Limits	Description	Benefits
23rd Street Realignment	283rd Avenue to 23rd Street	Construct connection between 23rd Street Extension terminus on 283rd Avenue south of 23rd Street to 23rd Street	• Provide a direct connection between the new 23rd Street Extension (at 283rd Avenue) and the existing 23rd Street, providing access east toward Washougal
Friberg Street	1st Street to 13th Street	Widen to 3 lanes	• Provide turn lane capacity for adjacent development and growth in through traffic
38th Avenue Extension	192nd to Bybee	Construct new 3 lane roadway	• Provide a direct connection to 192nd with adequate capacity rather than a residentially fronted two lane street
38th Avenue (West)	Bybee to Parker	Widen to 3 lanes	• Provide turn lane capacity for adjacent development and growth in through traffic
38th Avenue (East)	Parker to 650 feet west of Dahlia	Widen to 3 lanes	• Provide turn lanes and increased capacity for development
Bybee Realignment	199th Avenue to 20th Street	Realign to meet new signalized intersection	• Current alignment of Bybee would not be access spacing standards between the new signal planned west of 202nd Avenue

Notes:

- 13th Street/18th Street Corridor: It is recognized that additional capacity (five lanes total) is needed between NE 192nd Avenue (in Vancouver) and NE Goodwin Road (in Camas). The area between these two points is located within Clark County and, while there are multiple alignment options, there are issues related to each. The most desirable option, in terms of vehicular demand and connectivity, would be a new route along the 18th Street alignment. However, there are known environmental issues with this alignment which would make development of a project very difficult. Another alternative would be to widen NE 13th Street between 192nd Avenue and Goodwin Road, however, this alignment goes through a neighborhood, and would require acquisition of residential property to build a five-lane section. A third alternative would provide two three-lane roadways, however, both environmental and neighborhood issues would need to be addressed. This analysis assumes that some sort of connection is provided (to be determined at a later date), that would provide capacity for the equivalent of a five lane roadway.

- Previous analysis has indicated that a five-lane section would be required along the Goodwin/28th corridor. Current analysis indicates that with the planned improvements in the North UGA area, including a parallel collector route, a three-lane section will work between Ingle and 242nd Avenue. Right-of-way should be reserved for a five-lane section, as ultimately, it may be required.

- In the 2007 Framework Plan, it was recommended that Camas Meadows Drive be realigned to intersect with 1st Street/Lake Road at Larkspur/Parker Street. A key purpose of this realignment was to consolidate access and the need for additional traffic signals along 1st Street/Lake Road. Alternatives to this realignment were considered, such as improving the existing Payne Street alignment. However, the Larkspur alignment significantly improves operations at the Lake Road/1st Street/Parker intersection and preserves pedestrian access on all intersection approaches. Pedestrian access may have been at risk on the west approach to the intersection due to the high number of eastbound right turns/northbound left turns that can be reduced by extending Parker north to align with Camas Meadows Drive. Camas Meadows Drive will be improved between Payne Street and Lake Road as a three-lane collector.

- The previous TIF Update recommended improvements to Crown Road. However, current analysis reflects changing development patterns with an increased traffic shed to the north. Current modeling indicates that the current capacity of Crown Road should be adequate to accommodate future growth in Camas.

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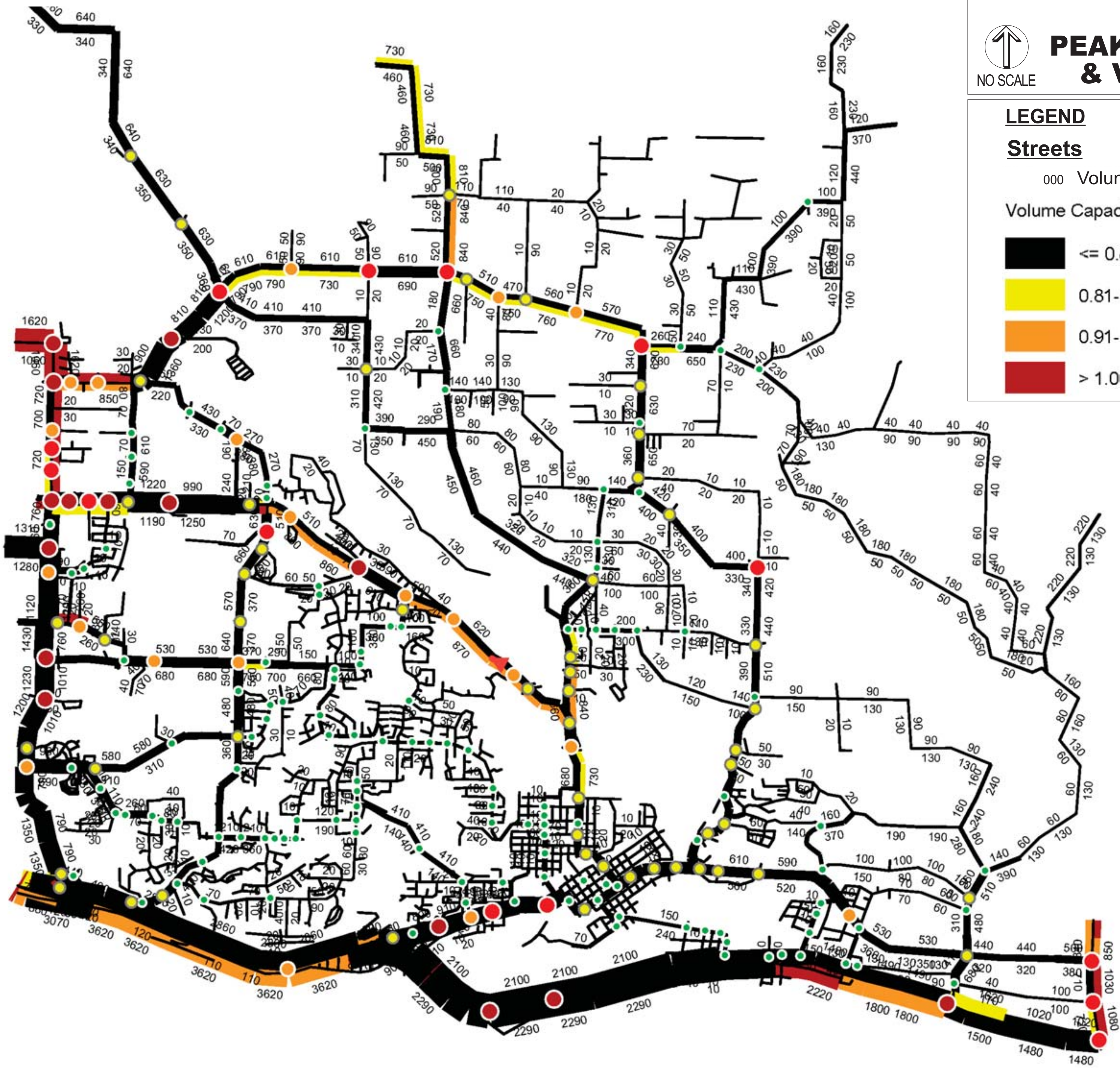
Figure 9

2035 PM IMPROVED PEAK HOUR LINK VOLUMES & V/C INTERSECTION LOS

NO SCALE



LEGEND

Streets

000 Volume

Volume Capacity Ratio

- <= 0.80
- 0.81- 0.90
- 0.91- 1.00
- > 1.00

Intersections

LOSReported

- B
- C
- D
- E
- F

Note: Model Volumes - Not Post-Processed

Intersection Improvements

Intersection capacity deficiencies not solved with the major roadway projects were addressed by adding turn lanes, providing signalization or a roundabout where warranted. Eight unsignalized intersections met peak hour signal warrants for the forecast year 2035, as listed in Table 7. Volumes used to determine whether signal warrants were met can be found in the appendix.

Table 7: Future 2035 Signal Warrant Summary at Unsignalized Intersections

Intersection	Existing Peak Hour Warrant	2035 Peak Hour Warrant
6th Avenue/Norwood Street	No	**Yes**
6th Avenue/Ivy Street	No	No
SR 500/14th Avenue	No	No
Pacific Rim Boulevard/Payne Rd	No	**Yes**
Lake Road/Sierra Street	No	**Yes**
Leadbetter/SR 500 (Everett)	No	**Yes**
Nourse Road – 15th Street/283rd	No	No
242nd/28th Street	No	**Yes***
Lake Road/218th/Payne	No	No
Goodwin Road/Camas Meadows	No	**Yes**
Goodwin/Ingle	No	**Yes**
28th/232nd Avenue	No	No
Brady/16th	No	**Yes**
Parker/Pacific Rim	No	**Yes**

* No existing count available, future volume estimated based on model volumes

None of these locations met signal warrants under existing conditions. Traffic pattern changes are planned at one of the intersections (Leadbetter/SR 500) that would mitigate the need for a traffic signal at this location. Two additional locations were identified as potential roundabout locations (Everett Street/SR 500/Lake Road and 6th Avenue/Norwood Street), and are addressed below. The recommended TIF signal improvements are at the following nine locations:

- 6th Avenue/Norwood Street
- Pacific Rim Boulevard/SE Payne Road
- Lake Road/Sierra Street
- Goodwin Road/Camas Meadows Drive
- Goodwin Road/Ingle Street
- Brady Road/16th Street
- Parker Street/Pacific Rim Boulevard
- 242nd/28th Street

Roundabouts

Roundabouts are being considered as alternatives to improvements at Everett Street/SR 500/Lake Road and 6th Avenue/Norwood Street for different reasons. Each is discussed below:

- Everett Street/SR 500/Lake Road: This intersection is currently signalized and will not meet operational standards in 2035 with its existing configuration. Due to a bridge immediately north of the intersection, the addition of an additional southbound lane (which would address the capacity deficiency) would be extremely costly, potentially more than $5 million. There is some undeveloped land, however, to the east of the intersection that may be suitable for reconfiguration with roundabout control. Coincidentally, the land is owned by the City's Parks Department. Due to the relatively balanced traffic volumes approaching the intersection, the availability of land nearby and the constraint of the bridge to the north, the potential for a roundabout at this location was evaluated. Based on the projected 2035 volumes, a partial multi-lane roundabout at this location would operate at level of service B, well within the acceptable standards for both the City of Camas and the Washington State Department of Transportation. Since this intersection is located along SR 500, input and cooperation from WSDOT will be essential.

  Recommendation: A roundabout would function well at this location. Both turn lane and roundabout improvement options should be considered as design options. Include the lower cost of the two options for TIF funding.

- 6th Avenue/Norwood Street: This intersection is currently unsignalized. The level of service for side street traffic is poor (LOS F) today and is projected to decline even further in the future. While traffic signal warrants would be met at this location in the future, a traffic signal at this location may be disruptive to the large volume of traffic traveling east and west through the intersection. A roundabout would allow continuous flow for these heavy movements, while allowing side street traffic a much improved level of service. An additional benefit of a roundabout at this location is its potential to slow traffic coming off of SR 14 an entering the City of Camas. It could be a natural transition from the high speeds on the state highway to slower speeds in town. This roundabout would incorporate ramps to and from SR 14, so input and cooperation from WSDOT is essential. The cost of a roundabout at this location would be substantial, however, due to grade issues, potentially in the multi-million dollar range. A traffic signal would cost substantially less, so a signal will be recommended at this location as part of this TIF Update.

  Recommendation: Install a Traffic Signal rather than a Roundabout at this location due to cost.

2035 Improved Operational Analysis

Intersection capacity analysis was conducted at each of the study intersections, including the recommended major roadway improvements and intersection projects. Table 8 lists the results of the analysis. Each of the study intersections operates at a LOS of D and v/c ratio of 0.90 or better, with the exception of 6th/Ivy, 6th/Garfield, Lake/Payne and 28th/232nd. Each of these intersections operate at a LOS E or F for the minor street left turn. Signal warrants are not met at any of these locations and volume-to-capacity ratios for affected movements are relatively low (less than 0.90), therefore no further improvements are recommended. These locations should be monitored to determine if signalization does become warranted at some time in the future with local development.

Table 8: 2035 PM Peak Hour Mitigated Intersection Operations

Intersection	**Mobility Standard*** **LOS**	**V/C**	**Delay**	**Level of Service**	**Volume/ Capacity**
Signalized Intersections					
Dallas Street/SR-500 (3rd Avenue)	E		13.9	B	0.74
3rd Avenue/2nd Avenue-4th Street	D	0.90	8.7	A	0.54
3rd Avenue/Crown Road	D	0.90	20.8	C	0.69
38th Avenue/Parker Street	D	0.90	33.8	C	0.85
43rd Avenue/SR-500 (Everett Street)	E		13.5	B	0.60
Lake Road/Parker Street	D	0.90	53.1	D	0.90
1st Street/Friberg Street-202nd Avenue	D	0.90	21.3	C	0.77
13th Street/Friberg Street	D	0.90	26.4	C	0.84
New Signals					
6th Avenue/Norwood Street	D	0.90	25.8	C	0.63
16th Avenue/Brady Road	D	0.90	15.7	B	0.76
Pacific Rim Boulevard/Parker Street	D	0.90	20.1	C	0.48
Pacific Rim Boulevard/Payne Road	D	0.90	14.5	B	0.59
Lake Road/Sierra Street	D	0.90	25.9	C	0.77
Goodwin Road/Camas Meadows Drive	D	0.90	29.6	C	0.90
Goodwin Road/Ingle Road	D	0.90	31.7	C	0.73
All-Way Stop Intersections					
28th Avenue/Sierra Drive	D	0.90	11.4	B	0.43

Intersection	Mobility Standard* LOS	V/C	Delay	Level of Service	Volume/ Capacity
Unsignalized Intersections					
6th Avenue/Ivy Street	D	0.90	84.1	**A/F**	0.32
Division Street/6th Avenue	D	0.90	28.4	A/D	0.66
Adams Street/6th Avenue**	D	0.90	19.3	A/C	0.45
6th Avenue/SR-500 (Garfield Street)	E		47.8	A/E	0.58
14th Avenue/SR-500 (Everett Street)	E	Not an intersection, as proposed			
18th Avenue/Division Street	D	0.90	14.5	A/B	0.32
18th Avenue/Cascade Street	D	0.90	16.4	A/C	0.02
McIntosh Road/Brady Road	D	0.90	33.7	A/D	0.53
Leadbetter Road/SR-500 (Everett Street)	E	Right-in/Right-out only, as proposed			
Nourse Road-15th Street/283rd Avenue	D	0.90	14.5	A/B	0.28
Lake/Payne	D	0.90	52.6	**B/F**	0.81
28th Street/232nd Avenue	D	0.90	62.4	**A/F**	0.56
Roundabout Intersections					
Lake Road/SR-500 (Everett Street)	E		22.0	C	0.92
Union/"C" Street (north)	E		16.1	B	0.59
Union/11th Street (south)	E		13.0	B	0.16

*Mobility Standard is for City of Camas, except for SR-14, which is WSDOT HSS and SR-500, which is WSDOT Non HSS

Bolded and Shaded indicates mobility standard is not met

Signalized or All Way Stop intersections: All Movements
- LOS = Level of Service of Intersection
- Delay = Average Delay of Intersection
- V/C = Volume-to-Capacity Ratio of Intersection (except for AWS where V/C is for worst movement)

Unsignalized intersections: Worst Movement
- LOS = Level of Service of Major Street/Minor St
- Delay = Approach Delay of Worst Movement
- V/C = Volume-to-Capacity Ratio of Worst Movement

Roundabout intersections: Worst Movement

Recommended TIF Improvements

The improvements identified to mitigate future growth impacts to the transportation system are listed in Table 9 and shown in Figure 10. Cost estimates were completed for each project, which include all project related costs, with potential right-of-way costs shown separately. The projects are not listed in order of priority. Prioritization should occur in coordination with the CIP process. All TIF improvements include sidewalks for pedestrians, bike lanes for bicyclists, and transit facilities for buses and park-and-riders. This improvement program meets the TIF requirement to establish a nexus between capacity needs and future land use.

The updated TIF project listing, while extensive, is not intended to represent the comprehensive listing of all transportation improvement in Camas. Other transportation improvements (turn lanes, street modernization, traffic calming, bicycle, pedestrian, and transit improvements beyond those programmed) may be built as part of fronting development improvements, SEPA required mitigation, or other processes.

Cost Estimates

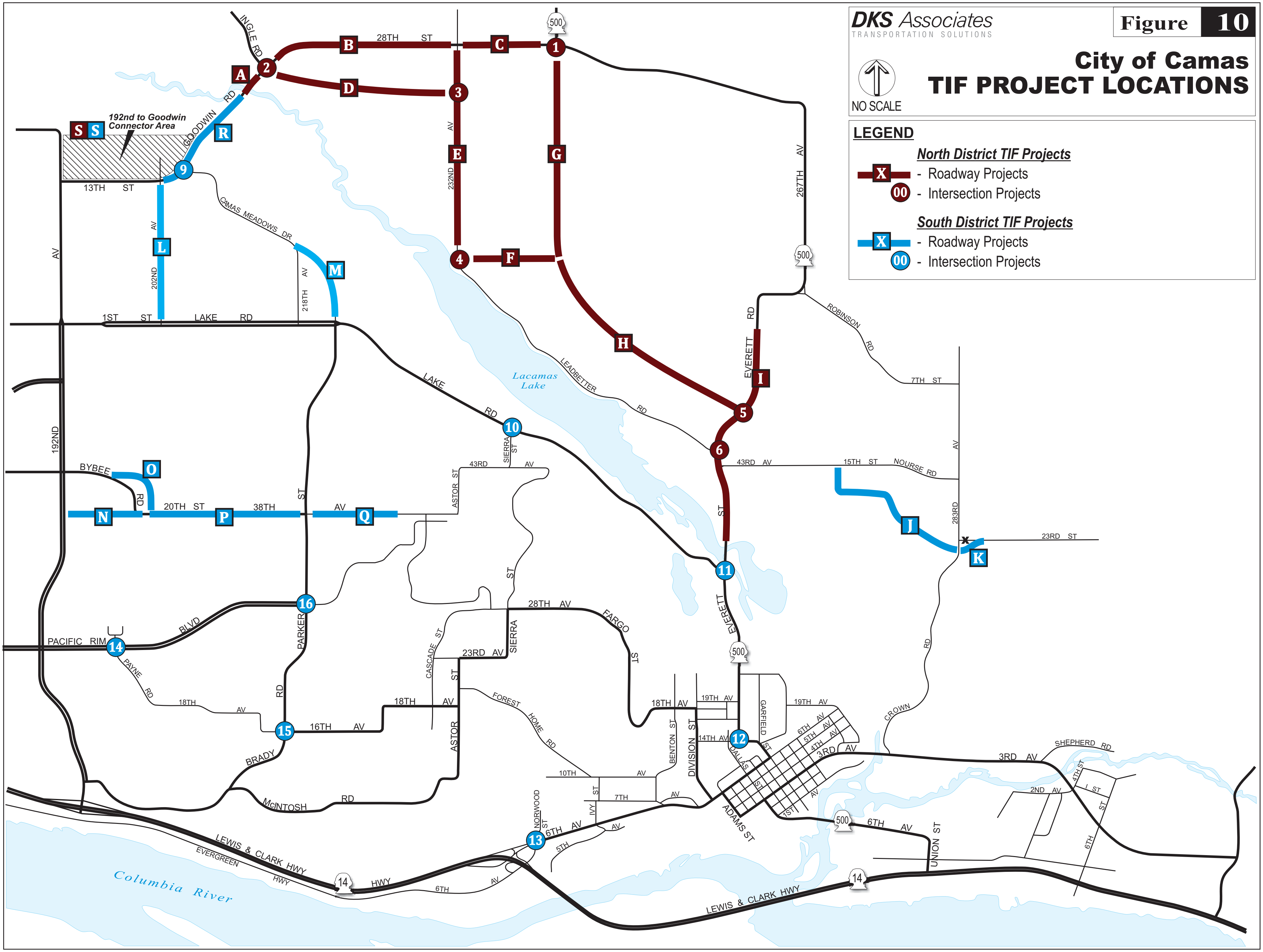
Cost estimates were developed for each improvement based upon 2011 dollars. Past construction information in the region was utilized as a basis for updates to the unit costs from the previous TIF Update study (2003). Each roadway project was estimated, including the total project cost of the roadway improvement including engineering, construction, and landscaping. In addition, the TIF eligible portion is listed as well. The TIF eligible portion is described later, but generally consists of curb-to-curb plus storm sewer costs. Where projects go outside of the Camas UGA, TIF eligible project costs include only the expected Camas share, based on growth. Potential right-of-way costs are shown separately.

Table 9: Camas UGA TIF Improvements

Element	Improvement Project	Improvement	Total Construction Project Cost (millions)	TIF Eligible Cost (millions)
A	Goodwin Road (Lacamas Creek to Ingle Road)	Widen from 2 to5 lanes between Friberg Street and Ingle Road	$4.9	$4.5
B	Goodwin Road (Ingle Road to 232nd Avenue	Widen from 2 lanes to 3 lanes between Ingle Road and 232nd Avenue	$6.4	$4.5
C	Goodwin Road (232nd Avenue to 242nd Avenue	Widen from 2 lanes to 3 lanes between 232nd Avenue and 242nd Avenue	$3.2	$0.8
D	New East-West Collector (extend Ingle Road to 232nd Avenue)	Extend Ingle Road south of Goodwin/28th as a 3 lane road to 232nd Avenue	$7.4	$5.1
E	Improve 232nd Avenue	Improve 232nd Avenue to 3 lane Collector from NE 28th Street to 9th Street. Includes 2 new roundabouts at intersection with new East-West Collector and at 9th Street	$7.8	$4.7
F	Improve/Extend 9th Street	Improve 9th Street to 3 lane collector from 232nd Avenue to existing terminus and extend to new 242nd Avenue Extension	$3.7	$2.9
G	Extend 242nd Avenue south to 9th Street	Extend and widen to 3 lanes between 28th to 9th Street	$9.5	$4.5
H	New East-West Arterial	New 3 lane roadway between 9th Street and SR 500/Everett Street	$11.5	$9.0
I	Widen NE Everett Street	Widen from 2 lanes to 3 lanes between 35th Avenue and the new East-West Arterial	$4.7	$3.6
S	192nd-Goodwin Connector	Camas share (39%) of potential connection between 192nd and Goodwin. Specific project and alignment to be determined. (North proportionate cost only)	$2.8	$0.9
North Roadway Projects			**$61.9**	**$40.5**

Element	Improvement Project	Improvement	Total Construction Project Cost (millions)	TIF Eligible Cost (millions)
J	Woodburn Drive (Greg Reservoir area)	New 2 lane roadway between 15th Street and 283rd Avenue.	$5.3	$3.8
K	23rd Street Realignment	Realign 23rd Street east of 283rd Avenue to intersect with new East-West Collector	$0.6	$0.5
L	Friberg (1st Street to 13th Street)	Widen from 2 lanes to 3 lanes between 1st Street and 13th Street	$5.0	$3.9
M	Extend Camas Meadows Drive	Extend Camas Meadows Drive from Payne Street to Lake Road as a three lane collector, includes signal modification at Lake/1st/Parker	$3.8	$2.9
N	38th Avenue Extension	New 3 lane roadway between 650 feet east of Bybee and 500 feet east of 192nd	$2.7	$2.0
O	Bybee Realignment	Realign Bybee between NW 199th and SE 20th	$1.2	$1.0
P	Widen 38th Avenue (West) (650 feet east of Bybee to Parker)	Widen from 2 lanes to 3 lanes between 650 feet east of Bybee and Parker Street	$4.7	$3.7
Q	Widen 38th Avenue (East) (Parker Street to 800 feet west of Dahlia)	Widen from 2 lanes to 3 lanes between Parker Street and Astor Street	$2.9	$2.2
R	Goodwin Road (Friberg Road to Lacamas Creek)	Widen from 2 to5 lanes between Friberg Street and Ingle Road and Lacamas Creek	$5.9	$4.8
S	192nd-Goodwin Connector	Camas share (39%) of potential connection between 192nd and Goodwin. Specific project and alignment to be determined. (South proportionate cost only)	$4.0	$1.3
South Roadway Projects			**$36.1**	**$26.1**
Total Roadway Projects (North + South)			**$98.0**	**$66.6**

Element	Improvement Project	Improvement	Total Construction Project Cost (millions)	TIF Eligible Cost (millions)
1	242nd Avenue/Goodwin/28th	Install a traffic signal. Add SB left turn lane.	$0.5	$0.14
2	Ingle Road/28th Street	Install a traffic signal.	$0.25	$0.25
3	232nd Avenue/22nd Street	Install roundabout	$0.5	$0.27
4	232nd Avenue/9th Street	Install roundabout	$0.5	$0.50
5	SR 500/New Road (242nd Avenue Extension)	Install traffic signal	$0.25	$0.25
6	SR 500/Leadbetter	Install median, converting intersection to right-in/right-out only access	$0.05	$0.05
North Intersection Projects			**$2.05**	**$1.45**
9	Camas Meadows Drive/Goodwin Road	Install traffic signal.	$0.25	$0.25
10	Lake Road/Sierra Street	Install traffic signal.	$0.25	$0.25
11	Lake Road/Everett Street/ SR 500	Install roundabout with two approach lanes on west, east and south legs, and one approach lane on north leg due to bridge limitations to north.	$2.0	$2.0
12	14th/Everett/SR 500	Install barrier restricting access to intersection from south and west approaches.	$0.05	$0.05
13	6th Avenue/Norwood Street	Install traffic signal	$0.25	$0.25
14	Payne Road/ Pacific Rim Boulevard	Install Traffic Signal	$0.25	$0.25
15	Brady Road/16th Avenue	Install Traffic Signal	$0.25	$0.25
16	Parker Street/ Pacific Rim Boulevard	Install Traffic Signal	$0.25	$0.25
South Intersection Projects			**$3.55**	**$3.55**
		Total Cost of Intersection Improvement Projects	**$5.6**	**$5.0**
		Right-of-Way Costs	**$32.3**	**$8.0**
		Total TIF Improvement Cost (Roadway + Intersection)	**$135.9**	**$79.6**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TRANSPORTATION SOLUTIONS
Figure 10
City of Camas
TIF PROJECT LOCATIONS
NO SCALE
LEGEND
North District TIF Projects
X - Roadway Projects
00 - Intersection Projects
South District TIF Projects
X - Roadway Projects
00 - Intersection Projects
192nd to Goodwin Connector Area
S S
A B C D E F G H I J K L M N O P Q R
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
INGLE RD
28TH ST
GOODWIN RD
13TH ST
202ND AV
CAMAS MEADOWS DR
218TH AV
232ND AV
267TH AV
1ST ST
LAKE RD
192ND AV
LEADBETTER RD
Lacamas Lake
EVERETT RD
ROBINSON RD
7TH ST
43RD AV
15TH ST
NOURSE RD
283RD AV
23RD ST
BYBEE RD
20TH ST
38TH AV
PARKER ST
SIERRA ST
ASTOR ST
EVERETT ST
PACIFIC RIM BLVD
PAYNE RD
18TH AV
BRADY RD
16TH AV
28TH AV
FARGO ST
CASCADE ST
23RD AV
FOREST HOME RD
McINTOSH RD
10TH AV
7TH AV
NORWOOD ST
IVY ST
6TH AV
5TH AV
BENTON ST
DIVISION ST
19TH AV
14TH AV
GARFIELD ST
DALLAS ST
ADAMS ST
3RD AV
4TH AV
5TH AV
6TH AV
1ST
CROWN RD
SHEPHERD RD
2ND AV
4TH ST
6TH ST
UNION ST
LEWIS & CLARK HWY
EVERGREEN HWY
Columbia River
500
14

TIF Cost Comparison

The cost of transportation improvements in the current TIF Update is expected to be about $100 million in today's dollars, not including right-of-way costs. This reflects anticipated growth related needs through 2035. Previous project improvement costs were developed as part of three different projects:

- Camas TIF Update (2003): about $27 million in 2003 (plus right-of-way costs)
- North UGA Transportation Improvement Framework Plan: about $119 million in 2007 (plus right-of-way costs)
- Greg Reservoir Improvements: about $3.94million in 2005 (includes only TIF eligible costs, right-of-way costs would be additional)

The current TIF Update would reflect a combination of the three as well as any new improvements identified. While construction costs increased since 2003, they have also come down, particularly after 2008. Cost estimates across all time periods listed above would be relatively comparable. While the current TIF update costs appear to be lower than the three plans previously developed, it should be considered that some projects previously identified have already been constructed or are underway (previous cost estimate shown):

- 1st Street/Lake Road – constructed (~$3.0 million)
- Leadbetter Road – constructed (~$3.8 million)
- SR 14 – project underway (~1.8 million contribution)

Other projects are not included, for a variety of reasons:

- 18th Street Corridor – 192nd to Goodwin: It is recognized that some sort of improvement is necessary to provide additional capacity between 192nd and Goodwin. This area is outside of the Camas UGA and there are multiple options for providing the needed capacity. It could be a new corridor along the 18th Street alignment, widening of 13th Street, or some combination of the two. (~$7.8 million)
- 6th Avenue restriping/Road Diet: ($.71 million)
- 38th Avenue Extension (Astor to Sierra): ($2.5 million)
- Extend Camas Meadows Drive: (~$1.8 million)
- Widen and realign Camas Meadows Drive to 1st/Lake/Parker: (~$4.5 million)
- Widen Crown Road: (~$14.2 million)

Other projects were modified:

- NE 28th Street between 232nd and 242nd (reduced from 5-lane section to 3-lane section) (~$5.9 million before vs. ~$3.7 million for the current project)
- 38th Avenue Widening (Parker to Astor): ($3.1 million) – the scope of this project was reduced to include the area between Parker and approximately 800 feet west of Dahlia Street, reducing the overall cost slightly.

CHAPTER 3: TIF STRUCTURE

The current traffic impact fee calculation methodology has been utilized since 2003. The basis of the calculation is the assessment of PM peak hour vehicle trips from the Institute of Transportation Engineer's *Trip Generation: An ITE Informational Report* and a cost rate applied to each trip-end on a citywide basis. Chapter 5 of the previous TIF study provides background into the basis of the TIF. The following sections summarize the key components of the staff's recommended proposed TIF update:

- TIF will be collected based on PM peak hour trip generation rates
- Two TIF districts will be formed (see Figure 11) with project costs allocated either to the North district or the South district, with the exception of the 192nd/Goodwin connector project, which would be allocated between the districts proportionate to their use of the connector, based on growth.
- TIF will fund curb-to-curb plus storm sewer costs
- TIF will fund right-of-way outside the UGA proportionate to the expected Camas share of each project
- TIF will fund 20% of right-of-way inside the UGA
- TIF costs will be indexed at 3.9% per year, with new rates taking effect the first of each year

Table 10 summarizes staff's recommendation and the anticipated TIF fee associated with this recommendation, along with adjustments that would be made based upon a 60% reduction factor (as described previously).

Table 10: Staff Recommended TIF Fee

TIF Fee Summary	North	South
Curb-to-Curb+Storm+ROW*	$10,619	$4,042
60% reduction Factor	-$4,248	-$1,617
2011 Net Rate	**$6,371**	**$2,425**
2012 Net Rate	$6,620	$2,520
2013Net Rate	$6,878	$2,618
2014 Net Rate	$7,146	$2,720
2015 Net Rate	$7,425	$2,826
2016 Net Rate	$7,715	$2,936
2017 Net Rate	$8,015	$3,051
2018 Net Rate	$8,328	$3,170
2019 Net Rate	$8,653	$3,294

* Includes ROW outside the UGA + 20% of ROW inside UGA

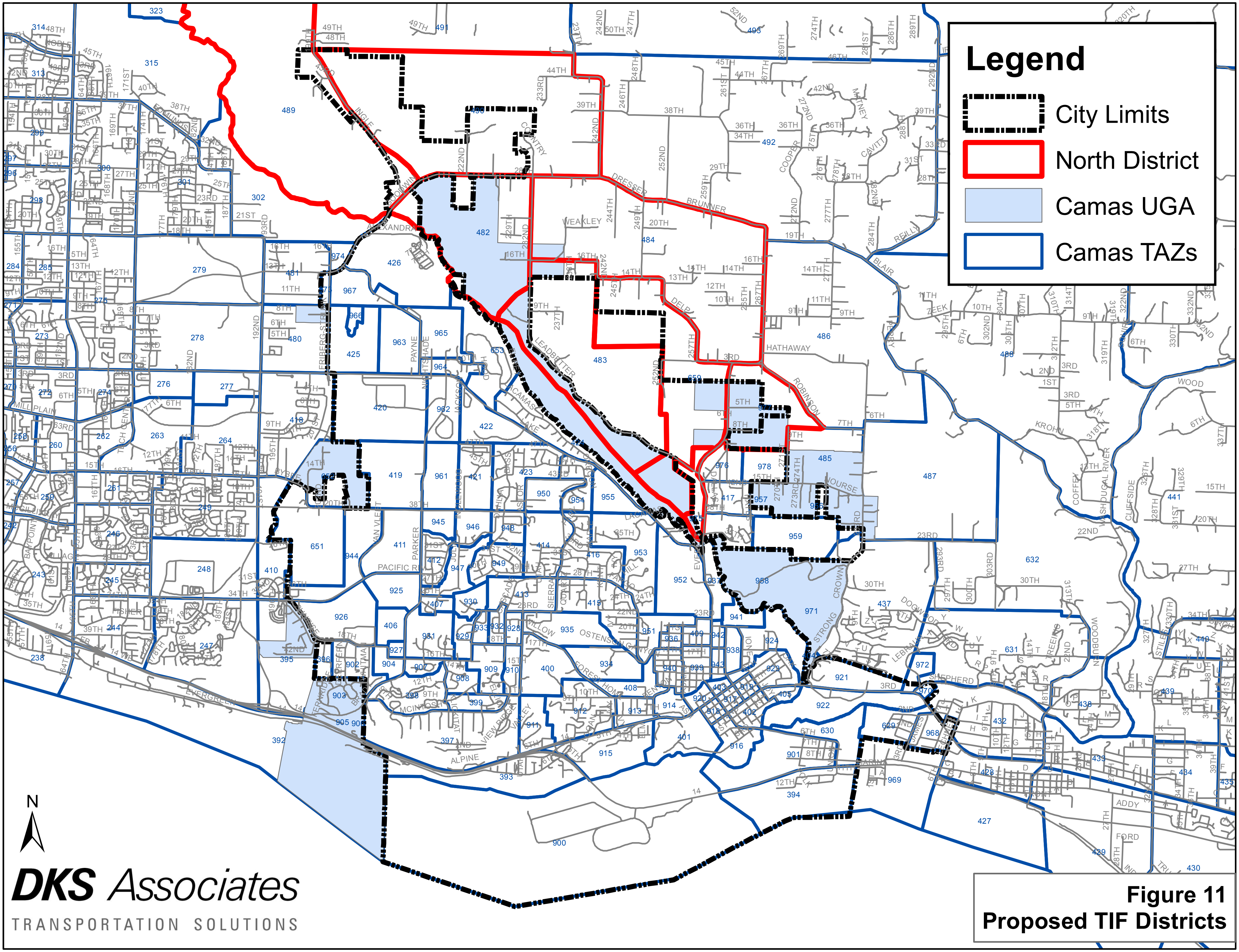

Figure 11
Proposed TIF Districts

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Recommended TIF Structure Summary

Table 11 summarizes the recommended TIF structure.

Table 11: TIF Structure Summary

TIF Element	***Basis***
Land Use Categories	Latest Edition of ITE *Trip Generation: An ITE Informational Report*
Trip Generation	Based upon highest one hour trip rate in the 4 PM to 6 PM time period from ITE *Trip Generation: An ITE Informational Report*
Pass-by and Diverted Linked Trip Adjustment	Reductions allowed for pass-by and diverted linked trips for land use codes as documented in the *Trip Generation Handbook*, or with data approved by the City Engineer
Trip Length	Not Included
Area of Coverage	2 Districts (North District and South District) per Figure 11
Point of TIF Collection	Building Permit issuance or as otherwise provided by code
TIF Project Priorities	Set by the City of Camas Adopted CFP, 6-year street plan, and annual budget.
Inflation	Use Washington State Department of Transportation Construction Cost Indices to index TIF as noted in the *TIF Rates Alternatives Analysis Memo* (see appendix).
Changes in Trip Rates	Where a use is not addressed in the ITE *Trip Generation: An ITE Report*, the applicant may be requested to provide research counts of comparable sites, per ITE recommended practice
Credits	Only for construction projects listed in the TIF. Credits not issued unless work is completed. Credits will be issued based on the cost estimate of the TIF project, the reduction factor, and the TIF rate multiplier. When projects are partially completed, a prorated credit based on percentage of the TIF cost estimate will be applied.
Exemptions	Per Camas Municipal Code.
Appeals	Approved or denied by the Board of Adjustment.

Supporting Policy Recommendations

Reimbursement Costs

Washington state law allows for the collection of some reimbursement costs within the TIF. A bond has been taken out against the TIF to build the previously completed Parker Street and Lake Road projects. The current balance of the bond debt is $3,077,193.67.

Since the bond was taken out with the intent of paying it back using TIF funds, this amount is included in the updated TIF.

Late Comer's Agreements

Where projects are undertaken and the timing of development does not match with the need for the improvement, the City may undertake the full street improvement and assess late comers agreements with fronting property owners that, at the time, do not participate in funding their share of the fronting improvements costs. At the time this fronting land eventually develops, the City would collect the equivalent balance of roadway improvement costs through the late comer's agreement. This would assure that the TIF is financially solvent and that the fair cost of the street improvements is allocated appropriately to fronting properties – even though at the time of improvement some of the properties are not ready to develop.

APPENDICES

APPENDIX A
TRAFFIC COUNTS

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APPENDIX B
EXISTING INTERSECTION LEVEL OF SERVICE ANALYSIS

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APPENDIX C
EXISTING SIGNAL WARRANTS

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APPENDIX D

FOCUS-AREA MESOSCOPIC FORECASTING METHODOLOGY MEMO

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APPENDIX E

LAND USE ASSUMPTIONS BY TAZ (TRANSPORTATION ANALYSIS ZONE)

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APPENDIX F

FUTURE (2035)

INTERSECTION LEVEL OF SERVICE ANALYSIS

APPENDIX G

FUTURE (2035) SIGNAL WARRANTS

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APPENDIX H

TIF RATE ALTERNATIVES ANALYSIS MEMO

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APPENDIX I
FUTURE (2035) IMPROVED
INTERSECTION LEVEL OF SERVICE ANALYSIS

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APPENDIX J
COST ESTIMATES