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THE DALLES TRANSPORTATION SYSTEM PLAN

Final Technical Memorandum #4: Future Systems Conditions

Date:	February 23, 2016	Project #: 18495.0
To:	The Dalles TSP Project Advisory Committee and Technical Advisory Committee	
CC:	Darci Rudzinski and CJ Doxsee – Angelo Planning Group	
From:	Casey Bergh, PE; Michael Eagle, and Chris Brehmer, PE	

This memorandum summarizes transportation system needs anticipated for The Dalles over a 20-year period from 2015 through 2035. These needs include existing deficiencies identified in Technical Memorandum #3 (and supplemental feedback from citizens and residents), improvements to achieve goals identified in Technical Memorandum #2, and forecast needs associated with traffic growth through 2035. The analyses and findings contained in this memorandum will inform the identification and evaluation of future multimodal transportation system alternatives that address the needs.

Technical analyses summarized herein assume The Dalles will continue to see growth in employment and population between 2016 and 2035 within the existing Urban Growth Boundary (UGB). At the same time, the analyses assume all modal transportation systems will remain as they exist today, except where planned improvement projects are considered funded and certain to be implemented. This "do nothing" or "no-build" scenario is commonly used as a foundation that communities can compare to alternatives that include various projects, policies, pilot studies, and programs.

The remainder of this memorandum outlines the analyses and findings of the "no build" future transportation conditions. In addition, preliminary examples of improvement strategies the City and ODOT may consider to address some of the needs in the future are also highlighted.

DEVELOPMENT OF YEAR 2035 TRAFFIC FORECASTS

Estimates of future traffic demand are based on population and employment forecasts in the year 2035, existing travel patterns, and transportation infrastructure (existing system and planned/funded improvements). The following section summarizes key aspects of The Dalles 2035 traffic volume estimate.

Land Use and Population Projections

Land use plays an important role in developing a comprehensive 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

will have a direct impact on how the transportation system will be used in the future. Understanding land use is critical to taking actions to maintain or enhance the transportation system.

Travel Demand Modeling Tool

Based on a variety of data sources, ODOT's Transportation Planning Analysis Unit (TPAU) has created a travel demand model specific to The Dalles to help inform future demand and travel patterns. The travel demand model is comprised of multiple Transportation Analysis Zones (TAZs) that encompass defined geographic areas and the land uses within them. The arterial and collector roadway network is integrated with the TAZs to reflect the existing motor vehicle transportation system.

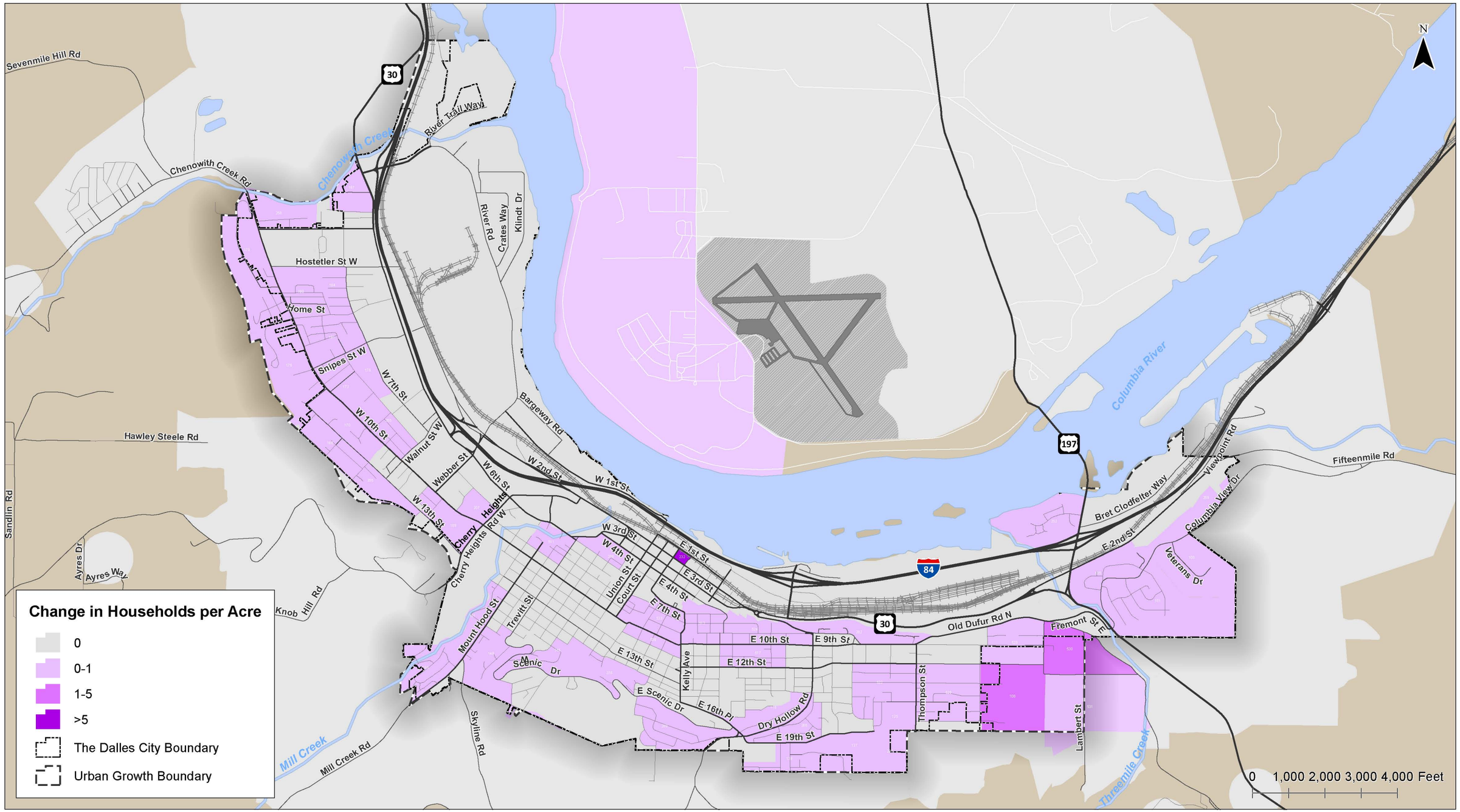
Travel patterns between land uses in each TAZ and to and from the broader region have been estimated by City staff for both existing and long-term future conditions and integrated into the TPAU modeling effort. Each TAZ has been coded with a unique set of characteristics for land use, population, employment and households in the geographic area represented by the TAZ. The travel demand model in turn uses the coded information to predict future travel patterns between TAZs and the regional roadway network. The inputs into the model and TAZs are coded to represent the existing transportation system and anticipated future changes as accurately as possible. Each TAZ area is individually coded to reflect anticipated changes in population, businesses/employment opportunities and/or households.

Growth Projections

The Dalles travel demand model is coded to assess travel patterns for base year 2010 and forecast year 2036 population, household, and employment (retail, service, and other) estimates for The Dalles by TAZ. Figures 4-1 and 4-2 illustrate the percent change in households and employment expected per acre between base year 2010 and forecast year 2036. Table 1 summarizes the collective changes in population, households, employment community-wide. As shown in Table 4-1, the change in population is projected to be 11.8 percent over the 26-year period while the corresponding percent change in households is projected to be 13.4 percent and the change in employment is projected to be 15.2 percent.

Table 4-1: The Dalles Land Use Summary

Land Use	2010	2036	Change	Percent Change
Population	18,479	20,660	2,181	11.8%
Households	7,378	8,369	991	13.4%
Employment	8,435	9,714	1,279	15.2%



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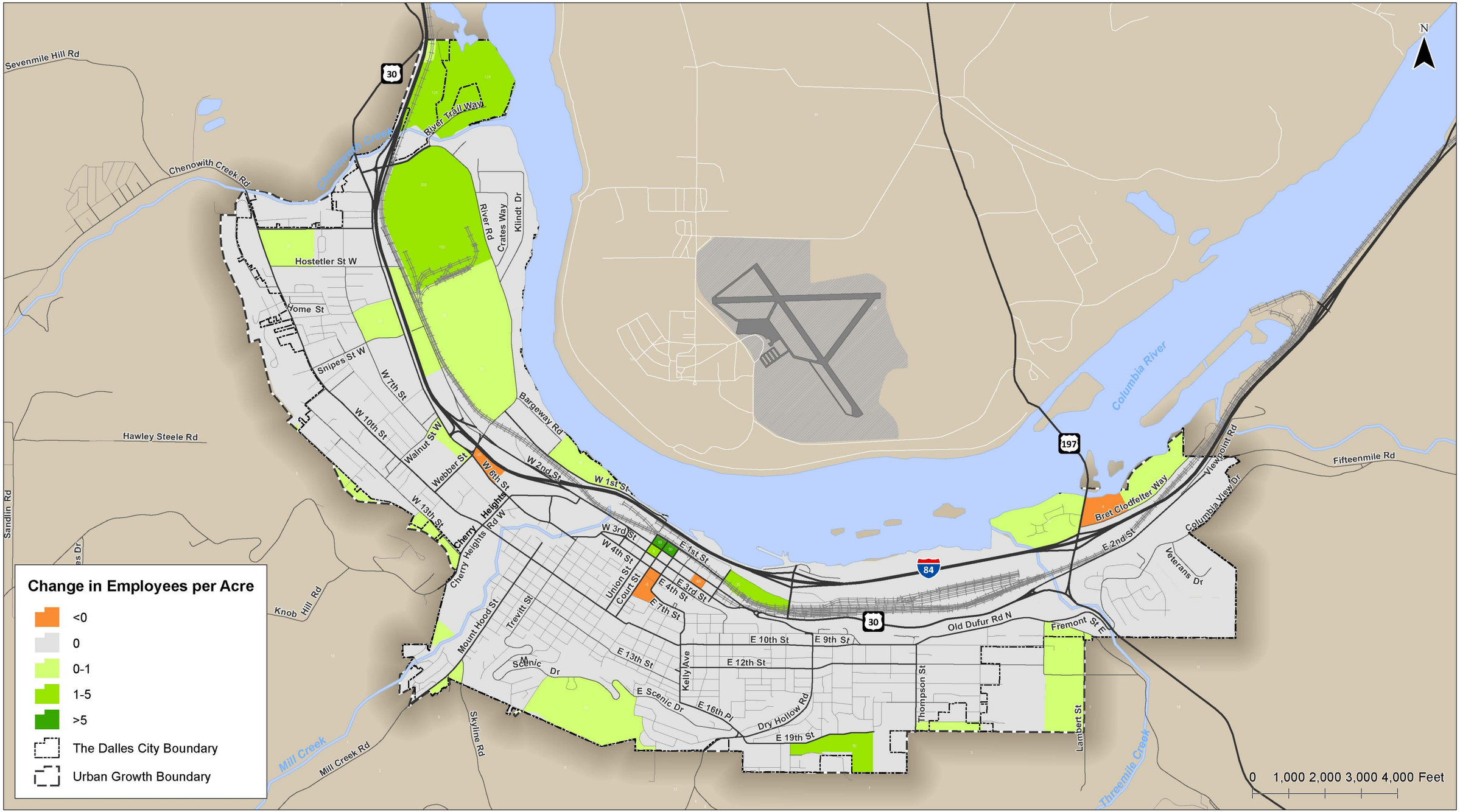
Change in Households from 2010 to 2036
The Dalles, Oregon

Figure
4-1

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County



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Change in Employment from 2010 to 2036
The Dalles, Oregon

Figure **4-2**

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County

Travel Trends and Modeling Observations

In reviewing the future traffic volume projections, several trends and relationships should be considered as follows.

- The greatest increase in housing and employees per acre (density) is projected within several blocks of The Dalles Downtown where redevelopment is anticipated.
- While the downtown TAZs have the highest increase in density of anticipated housing and employees, these areas are relatively small.
- The total increase in employment projected by the travel demand model is highest in the industrial areas.
- As land uses change in proportion to each other (i.e., a more significant increase in employment relative to population and household growth), there will be a shift in the overall operation of the transportation system.
    - By way of illustration, retail land uses typically generate a higher number of trips per acre of land than residential, industrial, or other land uses. As a result, the location and design of retail land uses in The Dalles has the potential to substantially affect localized transportation system operations (for example, at a traffic signal or driveway serving as a gateway to a retail development). Even within retail uses, the trip impact can vary between destination retail (businesses whose customers drive significant distances to reach the site – for example, a large home improvement store) vs. convenience retail (business who rely largely on traffic passing by the site to shop as a function of convenience – for example, a gas station or convenience market)
- Areas of The Dalles that are homogeneous in land use character can also affect transportation system design and operations.
    - For example, the Port area primarily has employment-based land uses and, as a result, the local transportation system must support significant trips coming to or from that area during peak commuter periods (especially if shift changes coincide among employers).
    - Similarly, residential subdivisions tend to have a relatively heavy egress travel pattern during the morning peak hour and a relatively heavy return-to-home travel pattern during the p.m. peak hour.
    - Promoting a mix of residential, commercial, and employment land uses so that some residents may work and shop locally reduces the need for residents to travel longer distances (for example, as is being developed within the Lone Pine area).
    - Parking demand is also heavily impacted by land use – mixed-use areas have the potential to make better use of shared parking arrangements (for example, office

space may use parking during the day that is shared with local residents overnight and on weekends when residential is highest and office demand lowest).

- Areas with significant future development potential may substantially impact the transportation system and should be thoughtfully considered. ODOT's travel demand model specifically considered the following local high-growth potential areas:
    - Lands north of I-84, at the far west and east ends of the city, at the boundaries of the UGB;
    - Vacant industrial land located near the I-84/ Chenoweth interchange;
    - Land zoned for industrial/commercial uses at the Columbia Gorge Regional Airport; and,
    - Future mixed-use development within the Lone Pine area.

Planned and Funded Projects Assumed in the Travel Demand Model

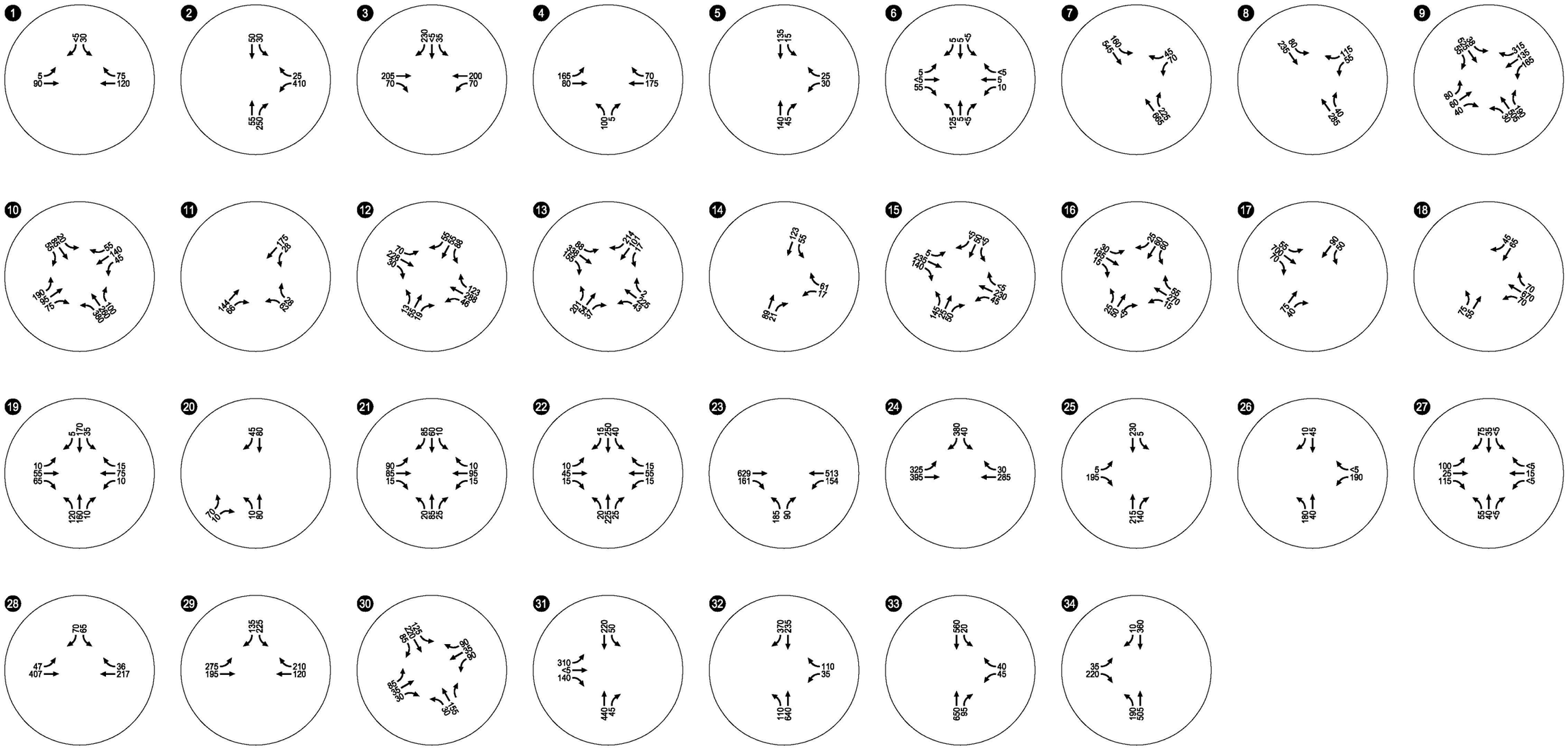
The initial year 2035 modeling presented in this memorandum assumes that only new transportation projects that are both developed and funded will be available for use in 2035. Typically, such future projects could be part of the ODOT Statewide Transportation Improvement Program (STIP), or City/County projects. While ODOT's 2015-2018 STIP includes several projects within The Dalles, such as improvements to the Riverfront Trail, sign upgrades, signalization upgrades, and safety improvements, no capacity or operational projects are planned and funded at the study intersections. Accordingly, the Year 2035 modeling presented in this report reflects operations of the existing transportation system with year 2035 traffic volumes.

FUTURE TRAFFIC CONDITIONS AND NEEDS

Year 2035 Forecast Traffic Volumes

Year 2035 forecast traffic volumes on the arterial and collector street system were projected using the travel demand model to reflect anticipated land use changes assuming continued use of the existing transportation network. Turning and through movement volumes at the study intersections were derived from the travel demand model projections using the post-processing methodology presented in the National Cooperative Highway Research Program (NCHRP) Report 255 *Highway Traffic Data for Urbanized Area Project Planning and Design*, in conjunction with engineering judgment and knowledge of the study area.

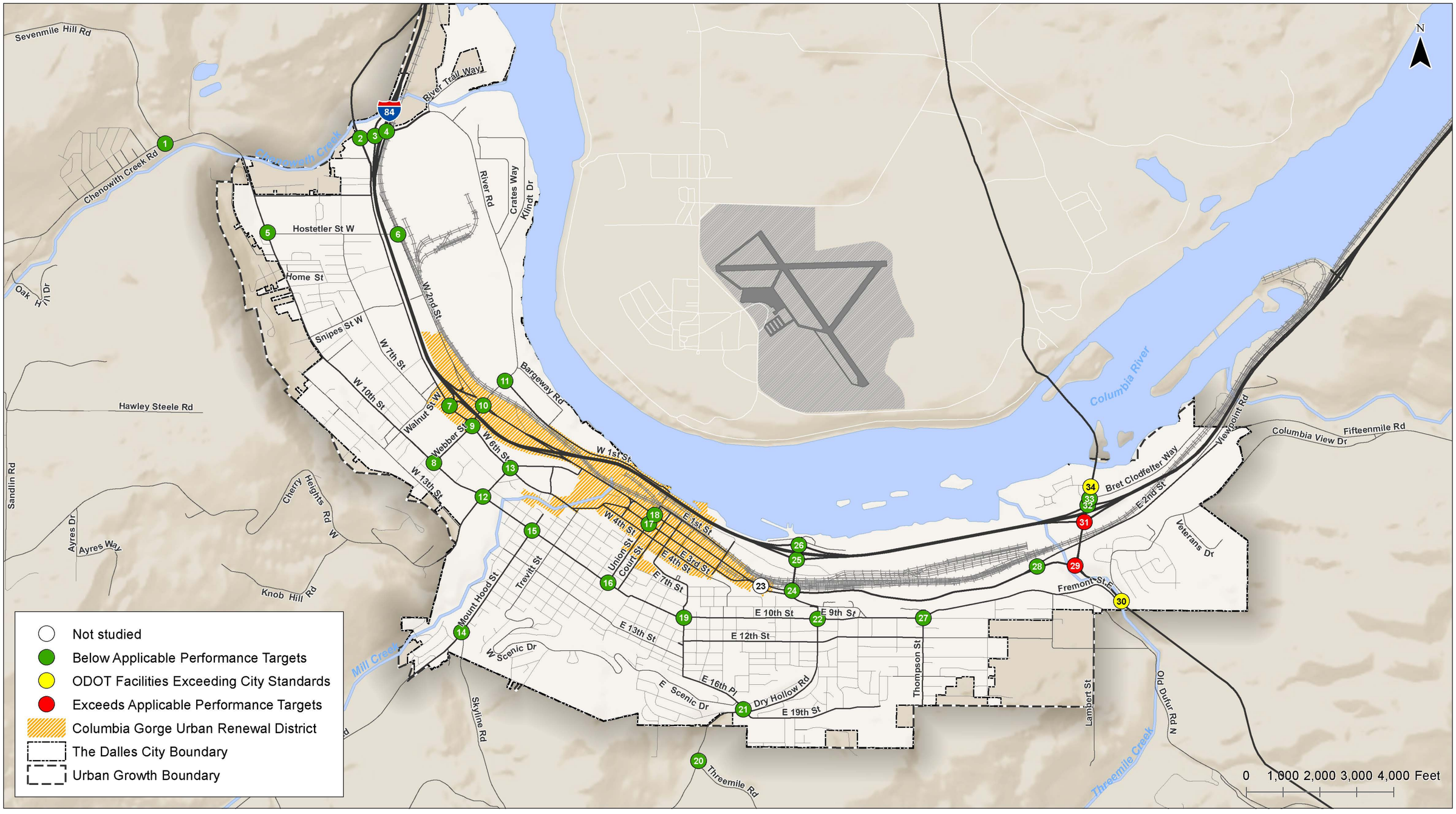
Figure 4-3 illustrates the year 2035 traffic volumes at the study intersections located within The Dalles UGB during the weekday p.m. peak hour while Figure 4-4 illustrates the corresponding intersection locations.



#- Study Intersections

Future 2035 Traffic Volumes
Weekday PM Peak Hour
The Dalles, Oregon

Figure
4-3



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Future Traffic Conditions
Weekday PM Peak Hour
The Dalles, Oregon

Figure
4-4

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County
Sources: Esri, USGS, NOAA

Year 2035 Forecast Operations

The City of The Dalles seeks to maintain LOS D or better at signalized and unsignalized intersections. ODOT operation standards for existing and no-build future scenarios were previously documented in Technical Memorandum #3 and are defined in Table 6 of the *Oregon Highway Plan*.

The traffic volumes shown in Figure 4-3 were used to analyze traffic operations at the study intersections. Figure 4-4 and Table 4-2 summarize the results of the traffic operations analysis at the study intersections for the weekday p.m. peak hour. Figure 4-4 illustrates study intersections that exceed the applicable operational standards with red circles. Those intersections shown with yellow circles satisfy ODOT performance targets, but do not meet City standards. All other intersections are shown by green circles, indicating they are operating below the applicable performance thresholds. Note that the color-coding shown in Figure 4-4 only represents delay- and capacity-based performance measures. Additional performance measures and considerations including queuing and safety are addressed later in this memorandum. *Year 2035 Future Traffic Condition operations analysis worksheets are included in Appendix A.*

Key findings from the forecast weekday p.m. peak hour operational analysis includes:

- Compared to existing conditions, the forecast traffic conditions do not indicate a substantial increase in traffic demand and congestion, except along the US 197 corridor.
- The unsignalized US 197/I-84 EB Ramp intersection (Intersection #31) has a volume-to-capacity (v/c) ratio of greater than 1.0 on the eastbound approach. This finding indicates eastbound I-84 off-ramp volumes are projected to exceed both the intersection's capacity and the intersection's 0.85 v/c target.
- The unsignalized US 197/US 30 intersection (Intersection #29) has a v/c ratio of greater than 1.0 on the southbound left-turn approach lane. This finding indicates southbound volumes turning left to continue on US 197 are projected to exceed both the intersection's capacity and the intersection's 0.85 v/c target.
- While satisfying ODOT's mobility standard, the Lone Pine Boulevard eastbound left-turn movement at US 197 (Intersection #34) is forecast to exceed the City's LOS D threshold. The projected delay impacts less than 50 vehicles during the weekday p.m. peak hour.
- The minor-street approaches to US 197 at Fremont Street/Columbia View Drive (Intersection #30) are forecast to exceed the City's LOS D threshold but satisfy ODOT's mobility standard.
- The signals at the Webber Street interchange (at 6th Street and 2nd Street) operate with permitted left-turn phasing on the north and south approaches. This signal phasing does not provide for the most efficient signal operations resulting in excess delay and queuing on the north and south approaches at both signals.

Table 4-2: Forecast 2035 Intersection Operations – Weekday PM Peak Hour

Map ID	Intersection	Level of Service (LOS)	Delay (Sec)	Volume/ Capacity (V/C)	Unsignalized Critical Movement	ODOT V/C Target*	Meets Applicable Performance Thresholds?
1	Seven Mile Hill Rd/ Chenoweth Rd	B	10.5	0.05	SB	N/A	Yes
2	US 30/River Rd	C	16.5	0.61	WB	0.90	Yes
3	I-84 EB Ramps/River Rd	C	16.6	0.13	SB	0.85	Yes
4	I-84 WB Ramps/River Rd	D	25.2	0.43	NB	0.85	Yes
5	W 10th St/Hostetler Rd	B	10.8	0.09	WB	N/A	Yes
6	W 2nd St/Hostetler Rd	B	11.9	0.03	WB	N/A	Yes
7	I-84 EB Ramps/W 6th St	D	33.2	0.49	WB	0.85	Yes
8	Webber St/W 10th St	C	17.1	0.17	WB	N/A	Yes
9	Webber St/W 6th St	C	20.4	0.76	Signalized	N/A	Yes
10	Webber St/W 2nd St	C	22.2	0.87	Signalized	N/A	Yes
11	Webber St/W 1st St	B	11.7	0.15	WB	N/A	Yes
12	Cherry Heights Rd/W 10th St	C	19.8	N/A	AWSC	N/A	Yes
13	Cherry Heights Rd/W 6th St	C	25.5	0.65	Signalized	N/A	Yes
14	Mt Hood St/Skyline Rd	B	11.1	0.03	WB	N/A	Yes
15	Mt Hood St/Skyline Rd	C	23.4	N/A	AWSC	N/A	Yes
16	Union St/10th	B	11	N/A	AWSC	N/A	Yes
17	Union St/W 3rd St	C	31.8	0.46	Signalized	N/A	Yes
18	Union St/W 2nd St	B	13.5	0.4	Signalized	N/A	Yes
19	Kelly Ave/E 10th St	C	18.9	0.29	WB	N/A	Yes
20	Dry Hollow Rd/3 Mile Rd	B	10	0.1	EB	N/A	Yes
21	Dry Hollow Rd/16th Pl/19th St	A	8.7	N/A	AWSC	N/A	Yes
22	Dry Hollow Rd/E 10th St	C	16.7	0.22	WB	N/A	Yes
24	Brewery Overpass Rd/US 30	B	11.8	0.30	EB	0.90	Yes
25	Brewery Overpass Rd/ I-84 EB Ramps	C	15.9	0.40	WB	0.85	Yes
26	Brewery Overpass Rd/ I-84 WB Ramps	C	16.2	0.25	NB	0.85	Yes
27	Thompson St/E 10th St/ Old Dufur Rd	B	10.4	0.10	SB	N/A	Yes
28	E 2nd St/US 30	B	10.4	0.10	SBL	0.90	Yes
29	US 197/US 30	**F**	**>50**	**1.13**	SBL	0.85	**No**
30	US 197/Fremont St/Columbia View Dr	**F**	**50.3**	0.71	EB	0.90	**City No, ODOT Yes**
31	US 197/I-84 EB Ramps	**F**	**>50**	**1.08**	EB	0.85	**No**
32	US 197/I-84 WB Ramps	A	9.6	0.14	WB	0.85	Yes
33	US 197/Bret Clodfelter Wy	C	22.8	0.31	WB	0.90	Yes
34	US 197/Lone Pine Blvd	**E**	**40.4**	0.26	EB	0.90	**City No, ODOT Yes**

AWSC = All-way stop control, N/A = Not applicable, EB=Eastbound, WB=Westbound, SB=Southbound, NB=Northbound

* For critical movement at unsignalized intersections

As shown in Table 4-2, there is a need to increase capacity at two intersections that exceed their applicable v/c targets. At two other intersections on ODOT facilities, the delay exceeds City thresholds, but not ODOT's v/c target.

Congestion has been reported at several other intersections within The Dalles, although the forecast conditions do not indicate the delay and capacity will exceed applicable performance thresholds. Pedestrian and bicycle facilities and safety projects may be identified at these locations, as described below.

Intersection Queues

A queuing analysis was conducted at the five signalized study intersections using Synchro 8 software. Table 4-3 summarizes the 95th percentile queues for movements with exclusive lanes during the weekday p.m. peak hour, rounded to the nearest 25 feet (approximately 1 vehicle length). The available storage lengths reflect the striped storage for each movement at the intersections.

Table 4-3: Forecast 2035 Signalized 95th Percentile Queues – Weekday PM Peak Hour

Map ID	Intersection	Movement	Weekday PM Queue (feet)	Available Storage (feet)	Adequate?
9	Webber St/W 6th St	EBL	25	250	Yes
		EBT/R	<400	705	Yes
		WBL	25	150	Yes
		WBT	300	> 500	Yes
		WBR	50	175	Yes
		NBL/T	100	495	Yes
		NBR	5	175	Yes
		SBL/T	250	585	Yes
		SBR	125	50	**No**
10	Webber St/W 2nd St	EBL	25	125	Yes
		EBT	100	430	Yes
		WBL	275	425	Yes
		WBT	200	635	Yes
		WBR	50	425	Yes
		NBL/T	275	585	Yes
		NBR	50	25	No
		SBL/T	150	810	Yes
13	Cherry Heights Rd/W 6th St	EBL	100	100	Yes
		EBT	375	> 500	Yes
		EBR	50	> 500	Yes
		WBL	50	965	Yes
		WBT	250	965	Yes
		WBR	0	75	Yes
		NBL	150	100	**No**
		NBT/R	75	360	Yes
		SBL	25	200	Yes
		SBT/R	300	200	**No**
17	Union St/W 3rd St	EBT	350	365	Yes
		NBT	100	> 500	Yes
		SBL	75	75	Yes
		SBT	50	205	Yes
18	Union St/W 2nd St	WBL	50	50	Yes
		WBT	175	390	Yes
		NBT	100	205	Yes
		SBT	50	385	Yes

EB=Eastbound, WB=Westbound, SB=Southbound, NB=Northbound, L=Left-turn Lane, T=Through Lane, R=Right-turn Lane, L/T=Shared Left-Through Lane, T/R= Shared Through-Right Lane L/R=Shared Left and Right-turn Lane

As shown in Table 4-3, all of the signalized study intersections are forecasted to have one or more movements where the 95th percentile queues exceed the available storage for that movement. *The worksheets used to evaluate future queuing at the signalized study intersections are included in Appendix G.*

Based on the forecast queuing analysis, the following signalized intersection improvement needs were identified:

- *Webber Street Interchange (Intersections #9 and #10)* - Queue storage to accommodate forecast demand queues at the Webber/6th Street and Webber/2nd Street intersections would require extending the right-turn lane beyond the queue in the shared through/left lanes. Due to restrictions in width under the I-84 overpass, extending these turn lanes beyond 100 feet is not feasible within the constraints of the existing structure.
- *Cherry Heights Road/W 6th Street (Intersection #13)* – The southbound queue extends beyond the left-turn lane storage length, reducing the approach capacity. Review of approach volumes indicates an imbalance in lane utilization between the left lane (20 vehicles/hour) and shared through/right lanes (346 vehicles/hour). The northbound left-turn lane needs to be extended to 150 feet by reallocating existing pavement width.

Unsignalized Intersection Queues

The operational analysis of unsignalized intersections estimates queuing at unsignalized intersections. Based on review of the analysis results, we did not identify any unsignalized queues that exceed available storage. Additional consideration of storage lengths and turn lane needs at unsignalized intersections are identified as safety needs.

Roadway Connectivity

Within most of the City, the existing grid network generally provides users with a variety of travel options and serves as emergency access routes during incidents. A review of the existing street connectivity needs and constraints revealed the following:

- There is an established grid system within and adjacent to the downtown core. Outside of the downtown area, connectivity is limited by topography, the I-84 corridor, the US 197 corridor, and the Union Pacific Railroad corridor and undeveloped properties. Specific constraints include:
    - Access to/from residential areas off of Columbia View Drive is limited to a single unsignalized intersection at US 197.
    - Access to the mixed-use development off of Lone Pine Boulevard is limited to a single point of access on US 197.
    - Connections from The Dalles to The Dalles Municipal Airport and the surrounding industrial areas are limited to US 197.

  - Railroad crossings and I-84 concentrate north-south travel to/from The Port industrial area to River Road (Chenoweth Interchange) and Webber Street.
- Despite the grid system in the downtown area and to the south, there are limited east-west connections from the west side of the City to the east side, with the exception of I-84.
- Significant grade changes limit connections across the southern UGB boundary, although current connections provide adequate capacity.
- The Mid-Columbia Medical Center (MCMC) has limited collector or arterial connection options to the east to Thompson Street (refer to Figure 4-5). Completing a connection to Thompson Street could improve emergency response time by providing alternative routes to the hospital and could alleviate other north/south routes currently in use. Examples of connections that could be considered for completion are:
  - Extend E 19th Street from MCMC to Thompson Street
  - Extend E 16th Street from Oakwood Drive to Quinton Street
  - Extend Oakwood Drive from E 16th Street to E 14th Street
  - Complete E 16th Street from Golden Way to Thompson Street
- The downtown core of The Dalles includes a one-way couplet (East 2nd Street and East 3rd Street). There have been requests to evaluate the impacts to the downtown area if the one-way couplet was converted into two-way streets. Consideration will need to be given to the roundabout at East 2nd Street and Brewery Grade as the west leg of the roundabout currently accommodates the one-way couplet configuration. Consideration will also need to be given to the costs of upgrading the signalized intersections along both streets to allow for two-way travel. The evaluation of this concept will be provided in Technical Memorandum #5.
  - Traffic volume
  - Roundabout
  - Signal modifications
  - Loading/unloading, freight.

Roadway Safety Needs & Considerations

Several study intersections were identified in Technical Memorandum #3 as exceeding the critical crash rate, the 90th percentile crash rate, or having more than 50-percent left-turn or angle crash type proportion. These include:

- US 197/Fremont Street/Columbia View Drive (Intersection #30)
  - Exceeds Critical Crash Rate during the study period. The posted speed on the uncontrolled US 197 approaches is 45 miles per hour (MPH). Fourteen of the 15 reported crashes (93 percent) were left-turn crashes. Safety improvement needs may include changes to traffic control or speed reduction on US 197.
- US 197/US 30 (Intersection #29)
  - Exceeds Critical Crash Rate during the study period. The posted speed on the uncontrolled US 197 approaches is 45 miles per hour (MPH). Speed and weather factors

have been indicated in the 12 reported crashes at this intersection. Safety improvement needs may include changes to traffic control or speed reduction measures.

- I-84 EB Ramps/River Road (Intersection #3)
  - This intersection exceeded the 90th percentile crash rates for similar intersections throughout the state. Two of the four crashes at this location were injury B and C. Two of the four crashes were turning movement related; indicating that sight distance may need to be evaluated.
- Kelly Avenue/East 10th Street (Intersection #19)
  - This intersection exceeded the 90th percentile crash rates for similar intersections throughout the state. Four of the six reported crashes resulted in injury B or C. Four crashes were angle collisions with reports that the driver failed to obey the stop sign. Advanced stop-ahead warning signage or larger stop signs may be needed to reduce potential for running the stop sign.
- Dry Hollow Road/East 10th Street (Intersection #22)
  - This intersection exceeded the 90th percentile crash rates for similar intersections throughout the state with a total of six crashes. Four crashes were angle collisions and two crashes resulted in injuries. Advanced stop-ahead warning signage may be needed to reduce potential for running the stop sign.
- US 197/I-84 Eastbound Ramps (Intersection #31)
  - Six of the nine reported crashes were either angle or turning movement related. The majority of these involved an eastbound vehicle making a left-turn from the ramp. Turn lanes or changes in traffic control may be needed to address the reported crash types.
- US 197/I-84 Westbound Ramps (Intersection #32)
  - Three of the six reported crashes were angle or turning movement related. No exclusive left-turn or right-turn lanes are provided along any approach to the intersection. Turn lanes or changes in traffic control may be needed to address the reported crash types.
- Webber St/W 2nd Street (Intersection #10)
  - 14 crashes were reported at the intersection over the 5-year period, including 10 crashes caused by angle or turning movement. A majority of these crashes involve a northbound left-turn vehicle. Converting the northbound left-turn phase to protected only phasing may be needed to address reported crash types.
- US 197/Bret Clodfelter Way (Intersection #33)
  - 5 crashes were reported at this intersection over the study period, all of them including angle or turning movement collisions where the driver was cited as not yielding right-of-way. Turn lanes or changes in traffic control may be needed to address the reported crash types.

Increases in congestion associated with the forecast employment and population growth could affect crash patterns observed at the aforementioned intersections and throughout the City. Based on input from the Technical and Public Advisory Committee members, additional safety improvement needs identified for mitigation include:

- W 6th Street from River Road to Chenoweth Loop Road and from Hostetler Street to Snipes Street
    - A two-way left-turn lane is provided on W 6th Street from Snipes to Webber Street, but is not provided along this segment of W 6th Street. A TWLTL is expected to reduce left-turn and rear-end crashes related to traffic turning at public and private accesses.

    - As shown in Figure 4-5, there were 27 crashes along the segments of W 6th Street where no TWLTL or left-turn lane exists today. Of these 27 crashes, the majority were rear-end crashes (14) or angle/left-turn crashes (12). Of the 14 rear-end crashes, 10 occurred in the northbound direction.

- 1st Street/Union Street
    - At this rail crossing, southbound traffic turning left onto 1st Street has the potential to create a queue across the railroad tracks during peak periods of vehicular traffic. (See Exhibit 4-1)

- 1st Street/Madison Street
    - 1st Street parallels the railroad and intersects with Madison Street at the railroad crossing. Because the existing traffic gate blocks the northbound lane along Madison Street, the geometry of the intersection allows vehicles attempting an eastbound left-turn movement from 1st Street to avoid the traffic gate when a train is present. (See Exhibit 4-2)

Exhibit 4-1 UPRR Railroad Crossing at Union Street

Exhibit 4-2 UPRR Railroad Crossing at Madison Street

Figure 4-5 – Reported Crashes on W 6th Street

- E 10th Street/Thompson Street
    - While projected to satisfy the City and ODOT's intersection capacity standard, stakeholder comments indicate the Old Dufur Road skewed approach and the undefined nature of the intersection contribute to driver confusion and influence the perceived safety of pedestrians and bicyclists (see Exhibit 4-3). The existing configuration includes stop sign control on the northbound Thompson Street and westbound East 10th Street approaches.
- E 2nd Street/US 30
    - The intersection has eastbound and westbound free-flow through movements; however, the eastbound left-turn, westbound right-turn, and southbound movements are all stop-controlled. Westbound vehicles along US 30 are shifted to the north to allow for an easier eastbound left-turn movement onto East 2nd Street. Exhibit 4-4 illustrates the existing intersection configuration.
    - The current intersection has drainage and lack of storm inlets.

Exhibit 4-3 Existing Alignment at E 10th Street/Old Dufur Road/Thompson Street Source: Google Maps

Exhibit 4-4 Existing Alignment of US 30/State Road (E 2nd Street) Source: Google Maps

ODOT ARTS Program

In addition to the projects listed above, the ODOT All Roads Transportation Safety (ARTS) program has programmed systemic sign upgrades and illumination along US 197 and West 6th Street.

Access Management

Spacing requirements for public roadways and private driveways can have a profound impact on transportation system operations as well as land development. As the City continues to grow, its street system will become more heavily traveled. Consequently, it will become increasingly important to manage access on the arterial and collector street system as new development occurs in order to preserve those streets' function for carrying through traffic.

Future access management on highways and City collector and arterial facilities could benefit both safety and operations; however, access management strategies and implementation require careful consideration to balance the needs for access to developed land with the need to ensure movement of traffic in a safe and efficient manner. Future streetscape projects, redevelopment, or changes in land use may provide opportunities for shared access, creation of easements for future shared access, reduction in the number of driveways, or alternative connectivity to lower-order facilities. These topics will be addressed later in the TSP update process.

As part of the I-84 Chenoweth Road IAMP, future access locations and public street connections were evaluated for properties and streets located in the IAMP Access Study Area. Access locations were evaluated based on ODOT's Division 51 Access Management standards, the City of The Dalles access spacing standards, and an assessment of traffic operations and safety as described in Action 3C.3 of the 1999 Oregon Highway Plan.

Under ODOT's current access management policy, the 1999 Oregon Highway Plan stipulates that the desired distance between an interchange ramp terminal and the first major approach (public or private) on the crossroad should be 1,320 feet (¼ mile). Currently there are four private accesses and two public street connections within 1,320 feet of the interchange ramp terminals. Public street connections are located on River Road at West 6th Street, and West 6th Street at Division Street. Existing private accesses are located on West 6th Street and US 30.

Bicycle Needs

Bicycle needs were evaluated at a qualitative level in the context of future system needs.[1] The Dalles Bicycle Advisory Committee provided extensive feedback and guidance related to bicycle system needs. The Advisory Committee feedback was reviewed along with those bicycle facilities identified in Technical Memorandum #3 as having a bicycle level of traffic stress (LTS) rating of 3 or 4[2].

Downtown Bicycle Considerations

Bicycle corridor needs through the downtown area were noted in light of the lack of existing facilities on the East 2nd Street and East 3rd Street corridors. Given current right-of-way and building constraints in the downtown area, opportunities to widen East 2nd Street or East 3rd Street to provide dedicated bicycle facilities are limited. While many cyclists share the roadway with motor vehicles, there is a need to accommodate bicycle travel for a wider range of users through downtown.

[1] Future forecast volumes are not expected to increase to a great enough degree on a typical weekday to warrant a future conditions evaluation of bicycle level of traffic stress.

[2] Bicycle needs aim to reduce the LTS to a rating of 2, which is considered appealing to a majority of the bike-riding population and therefore, is the desired target on most arterials and collectors.

East-West Bicycle Connectivity Considerations

The existing conditions analysis documented that there are limited east-west bicycle connections through The Dalles. The northwest side of the City has several schools, a new transit center (under construction on West 7th Street), a new aquatic center, and may be home to the Gorge Youth Center in the future. A high priority has been placed on providing safe and efficient bicycle facilities between these locations and to residential areas.

Input from The Dalles Ad-Hoc Bicycle Advisory Committee identified several specific needs, including new bicycle routes and right-of-way for multi-use paths based on their discussion during a November 18, 2015 meeting. The needs are generally illustrated in Figure 4-6. The type of treatments (bicycle lanes, shared roadway, bicycle boulevard, etc.), an evaluation of need for pavement widening, and cost estimates for each project will be described in Technical Memorandum #5.

Pedestrian Needs

Within The Dalles, sidewalks are provided on one or both sides of some of the arterials and collectors, as summarized in Technical Memorandum #3. Generally, sidewalks are provided on both sides of the street throughout The Dalles Historic Downtown and on at least one side of residential streets south of downtown. Ideally, future plans for improvements to the pedestrian system should focus on strategic improvements to improve east-west connectivity throughout The Dalles and connectivity between residential areas and schools as identified in the Safe Routes to School (SRTS) Action Plans, and trail improvements to complete The Dalles Riverfront Trail.

Pedestrian needs identified to date include:

- Areas to the west of Webber Street (and south of I-84) and areas east of Thompson Street generally have the fewest pedestrian facilities. The areas to the west of Webber Street in need of pedestrian facilities have some key attractors and generators (school, transit center, and planned youth center).
- Given it is one of a few east-west arterials in The Dalles, pedestrian improvements to 10th Street and/or 7th Street (West of Cherry Heights Rd) may be prioritized to provide an east-west pedestrian route and align with future bicycle route needs.
- Improvements to the shared-use paths within The Dalles could also be considered.
    - The majority of The Dalles Riverfront Trail is completed, but a workgroup is tasked with identifying options to complete two short missing segments.
    - Additional shared-use paths along Chenowith Creek and Mill Creek, were identified in the 2006 TSP, but have not been completed. Constructing new accesses to the trail should also be considered in the future.
- Needs previously identified through SRTS plans include:

- Sidewalk and sidewalk connections around Chenoweth Elementary on W 10th Street, W 7th Street, Hostetler Street, and Chenowith Loop Road
- Sidewalk and sidewalk connections around Dry Hollow Elementary on E 16th Place and E 19th Street – add sidewalk on side with gravel up Dry Hollow
- Intersection signage and pavement markings, including crossing warning signs and markings at:
    - West 10th Street/Hostetler Street (Chenowith Elementary)
    - East 16th Place/East 19th Street/Dry Hollow Road (Dry Hollow Elementary)
    - West 14th Street/Bridge Street (Colonel Wright Elementary)
    - West 14th Street/Trevitt Street (Colonel Wright Elementary)
    - West 16th Street/Bridge Street (Colonel Wright Elementary)
    - West 16th Street/Trevitt Street (Colonel Wright Elementary)

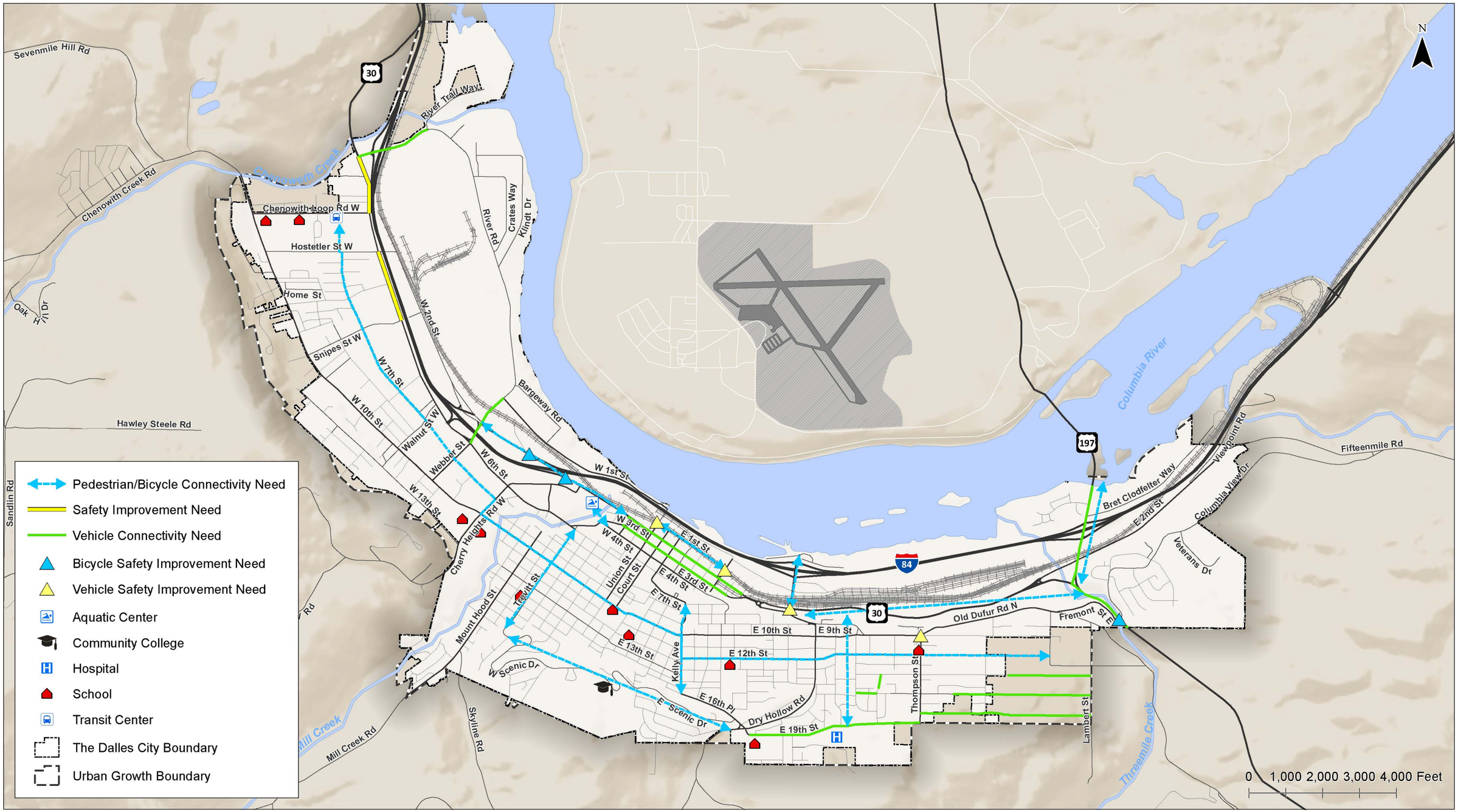
Transit

A new transit center is currently under construction in the southwest corner of the West 7th Street/ Chenoweth Loop Road intersection. West 7th Street has been widened and extended to Chenowith Loop Road. The transit center is expected to be completed in 2016, with park-and-ride space and bus service provided by Columbia Area Transit, Mid-Columbia Council of Government (MCCOG) Link, and possibly Greyhound. There is a high priority to provide pedestrian and bicycle connectivity between the new transit center's location on the west side of the City to the Downtown area. As noted in the previous Pedestrian and Bicycle Needs sections, a priority on improving pedestrian and bicycle facilities on West 7th Street will provide east-west connectivity between the transit center, proposed youth center, schools, and the Downtown area.

MCCOG's Link service provides dial-a-ride service (door-to-door, on request). The City could consider investing in a fixed-route service to provide regular services to key destinations (e.g., MCMC, Columbia Gorge Community College, downtown, Aquatic Center, etc.). A fixed route system could help reduce single-occupant motor vehicle trips and provide accessibility and connectivity, consistent with TSP Goal #2C.

SUMMARY AND NEXT STEPS

The needs identified in this memorandum are generally reflected in Figure 4-6. They include needs identified in the existing analysis and inventory, needs based on feedback from various stakeholders, and capacity analyses prepared based on modeling of projected future traffic volumes.



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Future Needs
The Dalles, Oregon

Figure
4-6

Oregon Department of Transportation

Kittelson & Associates, Inc.
Transportation Engineering/Planning

APG

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County
Sources: Esri, USGS, NOAA

The preliminary needs identified include improvements to pedestrian and bicycle facilities to enhance east-west connectivity throughout the City and between key attractors and destinations. The needs also consider intersection capacity improvements, vehicular connectivity, and safety improvements. The needs included as part of this memorandum were reviewed by the Project Advisory Committee (PAC) and Technical Advisory Committee (TAC) members as well as at the February 10 Public Workshop. Alternatives to address the identified needs are provided in Technical Memorandum #5, with additional information to facilitate evaluation of the alternatives.

APPENDICES

Appendix A Year 2035 Future Traffic Conditions Worksheets

Appendix B 2035 Future Queuing Worksheets

Appendix A Year 2035 Future Traffic Condition Worksheet

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	525	51	27	503	192	75	63	40	165	133	313
Future Volume (vph)	38	525	51	27	503	192	75	63	40	165	133	313
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		4.0	4.0		5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00		0.97	1.00
Satd. Flow (prot)	1662	1711		1662	1733	1458		1647	1488		1686	1403
Flt Permitted	0.30	1.00		0.27	1.00	1.00		0.65	1.00		0.75	1.00
Satd. Flow (perm)	533	1711		464	1733	1458		1095	1488		1301	1403
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	39	541	53	28	519	198	77	65	41	170	137	323
RTOR Reduction (vph)	0	4	0	0	0	110	0	0	29	0	0	155
Lane Group Flow (vph)	39	590	0	28	519	88	0	142	12	0	307	168
Heavy Vehicles (%)	0%	1%	0%	0%	1%	2%	3%	4%	0%	1%	1%	6%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	33.4	30.3		31.6	29.4	29.4		19.5	19.5		18.5	18.5
Effective Green, g (s)	33.4	30.3		31.6	29.4	29.4		19.5	19.5		18.5	18.5
Actuated g/C Ratio	0.51	0.46		0.48	0.45	0.45		0.30	0.30		0.28	0.28
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		4.0	4.0		5.0	5.0
Vehicle Extension (s)	2.0	4.5		2.5	4.5	4.5		2.5	2.5		2.0	2.0
Lane Grp Cap (vph)	322	785		262	771	649		323	439		364	393
v/s Ratio Prot	c0.01	c0.34		0.00	0.30							
v/s Ratio Perm	0.06			0.05		0.06		0.13	0.01		c0.24	0.12
v/c Ratio	0.12	0.75		0.11	0.67	0.14		0.44	0.03		0.84	0.43
Uniform Delay, d1	9.2	14.7		10.2	14.5	10.8		18.8	16.5		22.4	19.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	4.6		0.1	2.8	0.2		0.7	0.0		15.5	0.3
Delay (s)	9.2	19.3		10.3	17.3	11.0		19.5	16.5		37.9	19.7
Level of Service	A	B		B	B	B		B	B		D	B
Approach Delay (s)		18.7			15.3			18.9			28.6	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	84	54	378	260	97	190	95	76	45	137	55
Future Volume (vph)	18	84	54	378	260	97	190	95	76	45	137	55
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		4.0	4.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	0.94		1.00	1.00	0.85		1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00		0.99	
Satd. Flow (prot)	1662	1594		1498	1683	1430		1650	1458		1632	
Flt Permitted	0.58	1.00		0.49	1.00	1.00		0.62	1.00		0.89	
Satd. Flow (perm)	1014	1594		769	1683	1430		1052	1458		1460	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	20	95	61	430	295	110	216	108	86	51	156	62
RTOR Reduction (vph)	0	30	0	0	0	66	0	0	46	0	10	0
Lane Group Flow (vph)	20	126	0	430	295	44	0	324	40	0	260	0
Heavy Vehicles (%)	0%	1%	7%	11%	4%	4%	2%	4%	2%	6%	3%	0%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6		6	8		8	4		
Actuated Green, G (s)	17.7	16.6		36.3	30.2	30.2		30.2	30.2		29.2	
Effective Green, g (s)	17.7	16.6		36.3	30.2	30.2		30.2	30.2		29.2	
Actuated g/C Ratio	0.23	0.22		0.48	0.40	0.40		0.40	0.40		0.39	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		4.0	4.0		5.0	
Vehicle Extension (s)	2.0	4.5		2.5	4.5	4.5		2.5	2.5		2.0	
Lane Grp Cap (vph)	247	350		511	673	572		420	583		564	
v/s Ratio Prot	0.00	0.08		c0.16	0.18							
v/s Ratio Perm	0.02			c0.24		0.03		c0.31	0.03		0.18	
v/c Ratio	0.08	0.36		0.84	0.44	0.08		0.77	0.07		0.46	
Uniform Delay, d1	22.4	24.9		15.0	16.5	14.0		19.7	14.0		17.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.1		11.8	0.8	0.1		8.2	0.0		0.2	
Delay (s)	22.4	26.0		26.7	17.3	14.1		27.9	14.0		17.5	
Level of Service	C	C		C	B	B		C	B		B	
Approach Delay (s)		25.6			21.7			25.0			17.5	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	75.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	338	155	43	225	2	201	54	37	18	101	214
Future Volume (vph)	88	338	155	43	225	2	201	54	37	18	101	214
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1614	1716	1473	1662	1750	1488	1630	1623		1662	1547	
Flt Permitted	0.43	1.00	1.00	0.39	1.00	1.00	0.26	1.00		0.69	1.00	
Satd. Flow (perm)	739	1716	1473	682	1750	1488	451	1623		1212	1547	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	97	371	170	47	247	2	221	59	41	20	111	235
RTOR Reduction (vph)	0	0	114	0	0	1	0	18	0	0	61	0
Lane Group Flow (vph)	97	371	56	47	247	1	221	82	0	20	285	0
Heavy Vehicles (%)	3%	2%	1%	0%	0%	0%	2%	2%	0%	0%	5%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	37.1	30.1	30.1	30.5	26.8	26.8	42.1	35.2		26.8	24.9	
Effective Green, g (s)	37.1	30.1	30.1	30.5	26.8	26.8	42.1	35.2		26.8	24.9	
Actuated g/C Ratio	0.41	0.33	0.33	0.34	0.29	0.29	0.46	0.39		0.29	0.27	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	368	568	487	268	515	438	367	628		366	423	
v/s Ratio Prot	c0.02	c0.22		0.01	0.14		c0.08	0.05		0.00	c0.18	
v/s Ratio Perm	0.09		0.04	0.05		0.00	0.20			0.01		
v/c Ratio	0.26	0.65	0.12	0.18	0.48	0.00	0.60	0.13		0.05	0.67	
Uniform Delay, d1	17.4	25.9	21.1	21.0	26.3	22.6	16.9	18.0		22.9	29.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.7	0.1	0.1	0.7	0.0	1.9	0.0		0.0	3.3	
Delay (s)	17.5	28.6	21.2	21.1	27.0	22.6	18.8	18.0		22.9	32.7	
Level of Service	B	C	C	C	C	C	B	B		C	C	
Approach Delay (s)		25.0			26.1			18.6			32.2	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↱		↰	↑	
Traffic Volume (vph)	54	701	67	0	0	0	0	76	37	47	88	0
Future Volume (vph)	54	701	67	0	0	0	0	76	37	47	88	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5						4.5		4.0	4.5	
Lane Util. Factor		0.95						1.00		1.00	1.00	
Frt		0.99						0.96		1.00	1.00	
Flt Protected		1.00						1.00		0.95	1.00	
Satd. Flow (prot)		3215						1568		1630	1733	
Flt Permitted		1.00						1.00		0.95	1.00	
Satd. Flow (perm)		3215						1568		1630	1733	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	61	797	76	0	0	0	0	86	42	53	100	0
RTOR Reduction (vph)	0	7	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	927	0	0	0	0	0	108	0	53	100	0
Heavy Vehicles (%)	2%	2%	0%	0%	0%	0%	0%	7%	6%	2%	1%	0%
Turn Type	Perm	NA						NA		Prot	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2											
Actuated Green, G (s)		30.0						30.0		15.5	49.5	
Effective Green, g (s)		30.0						30.0		15.5	49.5	
Actuated g/C Ratio		0.34						0.34		0.18	0.56	
Clearance Time (s)		4.5						4.5		4.0	4.5	
Lane Grp Cap (vph)		1089						531		285	969	
v/s Ratio Prot								c0.07		c0.03	0.06	
v/s Ratio Perm		0.29										
v/c Ratio		0.85						0.20		0.19	0.10	
Uniform Delay, d1		27.2						20.8		31.1	9.1	
Progression Factor		1.00						1.00		1.00	1.00	
Incremental Delay, d2		8.4						0.9		1.4	0.2	
Delay (s)		35.6						21.6		32.6	9.3	
Level of Service		D						C		C	A	
Approach Delay (s)		35.6			0.0			21.6			17.4	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	70	677	69	74	56	0	0	65	43
Future Volume (vph)	0	0	0	70	677	69	74	56	0	0	65	43
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	12	12	12	12	12	12	12	16	12	12	12	12
Total Lost time (s)				4.5	4.5			4.5			4.5	
Lane Util. Factor				1.00	0.95			1.00			1.00	
Frt				1.00	0.99			1.00			0.95	
Flt Protected				0.95	1.00			0.97			1.00	
Satd. Flow (prot)				1662	3152			1847			1643	
Flt Permitted				0.95	1.00			0.80			1.00	
Satd. Flow (perm)				1662	3152			1512			1643	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	77	744	76	81	62	0	0	71	47
RTOR Reduction (vph)	0	0	0	0	11	0	0	0	0	0	29	0
Lane Group Flow (vph)	0	0	0	77	809	0	0	143	0	0	89	0
Heavy Vehicles (%)	0%	0%	0%	0%	3%	14%	4%	5%	0%	0%	0%	2%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					6			8			4	
Permitted Phases				6			8					
Actuated Green, G (s)				33.0	33.0			26.0			26.0	
Effective Green, g (s)				33.0	33.0			26.0			26.0	
Actuated g/C Ratio				0.49	0.49			0.38			0.38	
Clearance Time (s)				4.5	4.5			4.5			4.5	
Lane Grp Cap (vph)				806	1529			578			628	
v/s Ratio Prot					c0.26						0.05	
v/s Ratio Perm				0.05				c0.09				
v/c Ratio				0.10	0.53			0.25			0.14	
Uniform Delay, d1				9.4	12.1			14.3			13.7	
Progression Factor				1.00	1.00			1.00			1.00	
Incremental Delay, d2				0.2	1.3			1.0			0.5	
Delay (s)				9.7	13.4			15.3			14.2	
Level of Service				A	B			B			B	
Approach Delay (s)		0.0			13.1			15.3			14.2	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	4	91	118	76	30	2
Future Vol, veh/h	4	91	118	76	30	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	1	0	7	50	0	3
Mvmt Flow	5	108	140	90	36	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	231	0	-	0	304	186
Stage 1	-	-	-	-	186	-
Stage 2	-	-	-	-	118	-
Critical Hdwy	4.11	-	-	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.327
Pot Cap-1 Maneuver	1343	-	-	-	692	854
Stage 1	-	-	-	-	851	-
Stage 2	-	-	-	-	912	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1343	-	-	-	689	854
Mov Cap-2 Maneuver	-	-	-	-	689	-
Stage 1	-	-	-	-	851	-
Stage 2	-	-	-	-	908	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1343	-	-	-	697
HCM Lane V/C Ratio	0.004	-	-	-	0.055
HCM Control Delay (s)	7.7	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	8.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	409	23	57	249	29	51
Future Vol, veh/h	409	23	57	249	29	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Yield	-	None
Storage Length	150	0	-	-	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	4	0	2	6	7	0
Mvmt Flow	470	26	66	286	33	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	191	66	0	0	66	0
Stage 1	66	-	-	-	-	-
Stage 2	125	-	-	-	-	-
Critical Hdwy	6.44	6.2	-	-	4.17	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.3	-	-	2.263	-
Pot Cap-1 Maneuver	793	1003	-	-	1505	-
Stage 1	952	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	776	1003	-	-	1505	-
Mov Cap-2 Maneuver	776	-	-	-	-	-
Stage 1	952	-	-	-	-	-
Stage 2	876	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.1	0	2.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	776	1003	1505	-
HCM Lane V/C Ratio	-	-	0.606	0.026	0.022	-
HCM Control Delay (s)	-	-	16.5	8.7	7.4	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	4.2	0.1	0.1	-

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	207	71	71	200	0	0	0	0	36	2	232
Future Vol, veh/h	0	207	71	71	200	0	0	0	0	36	2	232
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	115	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	6	6	0	3	0	0	0	0	31	0	6
Mvmt Flow	0	252	87	87	244	0	0	0	0	44	2	283

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	244	0	-	252	0	0	669	669	244
Stage 1	-	-	-	-	-	-	417	417	-
Stage 2	-	-	-	-	-	-	252	252	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.71	6.5	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	5.71	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.71	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.779	4	3.354
Pot Cap-1 Maneuver	1334	-	0	1325	-	-	381	381	785
Stage 1	-	-	0	-	-	-	607	595	-
Stage 2	-	-	0	-	-	-	727	702	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1334	-	-	1325	-	-	356	0	785
Mov Cap-2 Maneuver	-	-	-	-	-	-	356	0	-
Stage 1	-	-	-	-	-	-	567	0	-
Stage 2	-	-	-	-	-	-	727	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	2.1	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1334	-	1325	-	-	356	785
HCM Lane V/C Ratio	-	-	0.065	-	-	0.13	0.36
HCM Control Delay (s)	0	-	7.9	-	-	16.6	12.1
HCM Lane LOS	A	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	0.2	-	-	0.4	1.6

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	167	78	0	0	173	69	100	0	6	0	0	0
Future Vol, veh/h	167	78	0	0	173	69	100	0	6	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	5	18	0	0	0	7	3	0	67	0	0	0
Mvmt Flow	211	99	0	0	219	87	127	0	8	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	306	0	0	99	0	0	785	828	99
Stage 1	-	-	-	-	-	-	522	522	-
Stage 2	-	-	-	-	-	-	263	306	-
Critical Hdwy	4.15	-	-	4.1	-	-	6.43	6.5	6.87
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.5	-
Follow-up Hdwy	2.245	-	-	2.2	-	-	3.527	4	3.903
Pot Cap-1 Maneuver	1238	-	-	1507	-	-	360	309	805
Stage 1	-	-	-	-	-	-	593	534	-
Stage 2	-	-	-	-	-	-	779	665	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1238	-	-	1507	-	-	299	0	805
Mov Cap-2 Maneuver	-	-	-	-	-	-	299	0	-
Stage 1	-	-	-	-	-	-	492	0	-
Stage 2	-	-	-	-	-	-	779	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.8	0	25.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR
Capacity (veh/h)	310	1238	-	-	1507	-	-
HCM Lane V/C Ratio	0.433	0.171	-	-	-	-	-
HCM Control Delay (s)	25.2	8.5	-	-	0	-	-
HCM Lane LOS	D	A	-	-	A	-	-
HCM 95th %tile Q(veh)	2.1	0.6	-	-	0	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	31	20	138	43	14	133
Future Vol, veh/h	31	20	138	43	14	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	38	24	168	52	17	162

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	391	195	0	0	221	0
Stage 1	195	-	-	-	-	-
Stage 2	196	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	617	851	-	-	1360	-
Stage 1	843	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	608	851	-	-	1360	-
Mov Cap-2 Maneuver	608	-	-	-	-	-
Stage 1	843	-	-	-	-	-
Stage 2	830	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	685	1360	-
HCM Lane V/C Ratio	-	-	0.091	0.013	-
HCM Control Delay (s)	-	-	10.8	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	2	57	8	4	0	127	3	2	0	5	5
Future Vol, veh/h	5	2	57	8	4	0	127	3	2	0	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	75	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	50	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	6	2	68	10	5	0	151	4	2	0	6	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	317	315	9	350	318	4	12	0	0	4	0	0
Stage 1	9	9	-	306	306	-	-	-	-	-	-	-
Stage 2	308	306	-	44	12	-	-	-	-	-	-	-
Critical Hdwy	7.1	7	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	6	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	6	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.45	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	640	529	1079	608	602	1085	1620	-	-	1631	-	-
Stage 1	1017	801	-	708	665	-	-	-	-	-	-	-
Stage 2	706	583	-	975	890	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	590	479	1079	527	545	1085	1620	-	-	1631	-	-
Mov Cap-2 Maneuver	590	479	-	527	545	-	-	-	-	-	-	-
Stage 1	921	801	-	641	602	-	-	-	-	-	-	-
Stage 2	635	528	-	911	890	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9	11.9	7.2	0
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1620	-	-	977	533	1631	-	-
HCM Lane V/C Ratio	0.093	-	-	0.078	0.027	-	-	-
HCM Control Delay (s)	7.5	0	-	9	11.9	0	-	-
HCM Lane LOS	A	A	-	A	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.3	0.1	0	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	69	45	664	222	159	545
Future Vol, veh/h	69	45	664	222	159	545
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	125	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	3	2	2	1	0
Mvmt Flow	73	47	699	234	167	574

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1724	816	0	0	933	0
Stage 1	816	-	-	-	-	-
Stage 2	908	-	-	-	-	-
Critical Hdwy	6.4	6.23	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	-	-	2.209	-
Pot Cap-1 Maneuver	99	375	-	-	738	-
Stage 1	438	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	77	375	-	-	738	-
Mov Cap-2 Maneuver	199	-	-	-	-	-
Stage 1	438	-	-	-	-	-
Stage 2	307	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.2	0	2.6
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	244	738	-
HCM Lane V/C Ratio	-	-	0.492	0.227	-
HCM Control Delay (s)	-	-	33.2	11.3	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	2.5	0.9	-

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	56	115	283	37	78	235
Future Vol, veh/h	56	115	283	37	78	235
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	175	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	2	2	0	0	2
Mvmt Flow	60	122	301	39	83	250

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	737	321	0	0	340	0
Stage 1	321	-	-	-	-	-
Stage 2	416	-	-	-	-	-
Critical Hdwy	6.41	6.22	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.318	-	-	2.2	-
Pot Cap-1 Maneuver	387	720	-	-	1230	-
Stage 1	738	-	-	-	-	-
Stage 2	668	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	357	720	-	-	1230	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	357	720	1230	-
HCM Lane V/C Ratio	-	-	0.167	0.17	0.067	-
HCM Control Delay (s)	-	-	17.1	11	8.1	0
HCM Lane LOS	-	-	C	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.6	0.2	-

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	62	28	144	66	28	175
Future Vol, veh/h	62	28	144	66	28	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	5	16	3	10	8	1
Mvmt Flow	64	29	148	68	29	180

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	420	182	0	0	216	0
Stage 1	182	-	-	-	-	-
Stage 2	238	-	-	-	-	-
Critical Hdwy	6.45	6.36	-	-	4.18	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.444	-	-	2.272	-
Pot Cap-1 Maneuver	584	826	-	-	1319	-
Stage 1	842	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	570	826	-	-	1319	-
Mov Cap-2 Maneuver	570	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	776	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	631	1319	-
HCM Lane V/C Ratio	-	-	0.147	0.022	-
HCM Control Delay (s)	-	-	11.7	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Intersection Delay, s/veh	19.8
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	70	228	30	0	46	288	123	0	13	55	19
Future Vol, veh/h	0	70	228	30	0	46	288	123	0	13	55	19
Peak Hour Factor	0.92	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.92	0.84	0.84	0.84
Heavy Vehicles, %	2	1	4	0	2	8	2	1	2	9	3	15
Mvmt Flow	0	83	271	36	0	55	343	146	0	15	65	23
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	21.3	21.9	12.4
HCM LOS	C	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	15%	23%	0%	14%	0%	42%
Vol Thru, %	63%	77%	0%	86%	0%	33%
Vol Right, %	22%	0%	100%	0%	100%	25%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	298	30	334	123	208
LT Vol	13	70	0	46	0	88
Through Vol	55	228	0	288	0	68
RT Vol	19	0	30	0	123	52
Lane Flow Rate	104	355	36	398	146	248
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.212	0.672	0.06	0.74	0.236	0.467
Departure Headway (Hd)	7.36	6.818	6.034	6.696	5.806	6.785
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	487	529	593	541	618	530
Service Time	5.424	4.565	3.781	4.441	3.551	4.834
HCM Lane V/C Ratio	0.214	0.671	0.061	0.736	0.236	0.468
HCM Control Delay	12.4	22.5	9.2	26.2	10.3	15.7
HCM Lane LOS	B	C	A	D	B	C
HCM 95th-tile Q	0.8	5	0.2	6.3	0.9	2.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	88	68	52
Future Vol, veh/h	0	88	68	52
Peak Hour Factor	0.92	0.84	0.84	0.84
Heavy Vehicles, %	2	3	2	0
Mvmt Flow	0	105	81	62
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	15.7
HCM LOS	C

Lane

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	17	61	89	21	55	123
Future Vol, veh/h	17	61	89	21	55	123
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	75	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	7	12	4	11	2	4
Mvmt Flow	18	64	94	22	58	129

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	350	105	0	0	116	0
Stage 1	105	-	-	-	-	-
Stage 2	245	-	-	-	-	-
Critical Hdwy	6.47	6.32	-	-	4.12	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.408	-	-	2.218	-
Pot Cap-1 Maneuver	637	923	-	-	1473	-
Stage 1	907	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	610	923	-	-	1473	-
Mov Cap-2 Maneuver	610	-	-	-	-	-
Stage 1	907	-	-	-	-	-
Stage 2	751	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	610	923	1473	-
HCM Lane V/C Ratio	-	-	0.029	0.07	0.039	-
HCM Control Delay (s)	-	-	11.1	9.2	7.5	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0.1	-

Intersection	
Intersection Delay, s/veh	23.4
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	5	236	142	0	44	230	2	0	143	26	52
Future Vol, veh/h	0	5	236	142	0	44	230	2	0	143	26	52
Peak Hour Factor	0.92	0.77	0.77	0.77	0.92	0.77	0.77	0.77	0.92	0.77	0.77	0.77
Heavy Vehicles, %	2	4	2	0	2	50	2	3	2	2	4	5
Mvmt Flow	0	6	306	184	0	57	299	3	0	186	34	68
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	27.8	24.3	17.1
HCM LOS	D	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	1%	16%	4%
Vol Thru, %	12%	62%	83%	96%
Vol Right, %	24%	37%	1%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	221	383	276	49
LT Vol	143	5	44	2
Through Vol	26	236	230	47
RT Vol	52	142	2	0
Lane Flow Rate	287	497	358	64
Geometry Grp	1	1	1	1
Degree of Util (X)	0.532	0.798	0.692	0.132
Departure Headway (Hd)	6.676	5.776	6.948	7.442
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	540	627	520	480
Service Time	4.728	3.822	4.999	5.518
HCM Lane V/C Ratio	0.531	0.793	0.688	0.133
HCM Control Delay	17.1	27.8	24.3	11.7
HCM Lane LOS	C	D	C	B
HCM 95th-tile Q	3.1	7.9	5.3	0.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	2	47	0
Future Vol, veh/h	0	2	47	0
Peak Hour Factor	0.92	0.77	0.77	0.77
Heavy Vehicles, %	2	0	9	0
Mvmt Flow	0	3	61	0
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	11.7
HCM LOS	B

Lane

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	31	186	15	0	13	270	53	0	24	51	4	0	59	62	25
Future Vol, veh/h	0	31	186	15	0	13	270	53	0	24	51	4	0	59	62	25
Peak Hour Factor	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95
Heavy Vehicles, %	2	0	5	0	2	0	3	0	2	4	4	0	2	0	2	0
Mvmt Flow	0	33	196	16	0	14	284	56	0	25	54	4	0	62	65	26
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.6	12	9.7	10.2
HCM LOS	B	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	30%	13%	4%	40%
Vol Thru, %	65%	80%	80%	42%
Vol Right, %	5%	6%	16%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	79	232	336	146
LT Vol	24	31	13	59
Through Vol	51	186	270	62
RT Vol	4	15	53	25
Lane Flow Rate	83	244	354	154
Geometry Grp	1	1	1	1
Degree of Util (X)	0.133	0.336	0.467	0.236
Departure Headway (Hd)	5.772	5.067	4.858	5.517
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	624	713	746	655
Service Time	3.78	3.067	2.858	3.521
HCM Lane V/C Ratio	0.133	0.342	0.475	0.235
HCM Control Delay	9.7	10.6	12	10.2
HCM Lane LOS	A	B	B	B
HCM 95th-tile Q	0.5	1.5	2.5	0.9

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	8	57	67	11	74	17	119	162	9	34	169	5
Future Vol, veh/h	8	57	67	11	74	17	119	162	9	34	169	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	2	3	0	1	0	3	0	13	0	0	17
Mvmt Flow	8	58	68	11	76	17	121	165	9	35	172	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	703	661	175	721	660	170	178	0	0	174	0	0
Stage 1	244	244	-	413	413	-	-	-	-	-	-	-
Stage 2	459	417	-	308	247	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.52	6.23	7.1	6.51	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.52	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.52	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.018	3.327	3.5	4.009	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	355	383	866	345	384	879	1392	-	-	1415	-	-
Stage 1	764	704	-	620	595	-	-	-	-	-	-	-
Stage 2	586	591	-	706	704	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	263	337	866	251	338	879	1392	-	-	1415	-	-
Mov Cap-2 Maneuver	263	337	-	251	338	-	-	-	-	-	-	-
Stage 1	691	685	-	560	538	-	-	-	-	-	-	-
Stage 2	446	534	-	579	685	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	18.9	3.2	1.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1392	-	-	477	362	1415	-	-
HCM Lane V/C Ratio	0.087	-	-	0.282	0.288	0.025	-	-
HCM Control Delay (s)	7.8	0	-	15.5	18.9	7.6	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	1.1	1.2	0.1	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	69	7	11	78	77	45
Future Vol, veh/h	69	7	11	78	77	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	5	11	0
Mvmt Flow	72	7	11	81	80	47

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	208	104	127	0	-	0
Stage 1	104	-	-	-	-	-
Stage 2	104	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	785	956	1472	-	-	-
Stage 1	925	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	779	956	1472	-	-	-
Mov Cap-2 Maneuver	779	-	-	-	-	-
Stage 1	925	-	-	-	-	-
Stage 2	918	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1472	-	793	-	-
HCM Lane V/C Ratio	0.008	-	0.1	-	-
HCM Control Delay (s)	7.5	0	10	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	0	82	13	0	16	93	11	0	18	83	25
Future Vol, veh/h	0	0	82	13	0	16	93	11	0	18	83	25
Peak Hour Factor	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81
Heavy Vehicles, %	2	3	12	0	2	7	1	0	2	0	1	4
Mvmt Flow	0	0	101	16	0	20	115	14	0	22	102	31
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.7	8.9	8.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	14%	0%	13%	12%
Vol Thru, %	66%	86%	78%	88%
Vol Right, %	20%	14%	9%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	126	95	120	69
LT Vol	18	0	16	8
Through Vol	83	82	93	61
RT Vol	25	13	11	0
Lane Flow Rate	156	117	148	85
Geometry Grp	1	1	1	1
Degree of Util (X)	0.197	0.155	0.193	0.112
Departure Headway (Hd)	4.55	4.766	4.699	4.745
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	787	751	763	754
Service Time	2.584	2.804	2.735	2.784
HCM Lane V/C Ratio	0.198	0.156	0.194	0.113
HCM Control Delay	8.7	8.7	8.9	8.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.5	0.7	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	8	61	0
Future Vol, veh/h	0	8	61	0
Peak Hour Factor	0.92	0.81	0.81	0.81
Heavy Vehicles, %	2	0	4	6
Mvmt Flow	0	10	75	0
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.4
HCM LOS	A

Lane

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBL	NBR	SEL	SER
Traffic Vol, veh/h	0	94	86	0	69	84
Future Vol, veh/h	0	94	86	0	69	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	102	93	0	75	91

Major/Minor	Major2		Minor1		Major1	
Conflicting Flow All	91	-	0	0	0	0
Stage 1	-	-	0	-	-	-
Stage 2	-	-	0	-	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-				-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SE
HCM Control Delay, s	0		
HCM LOS		-	

Minor Lane/Major Mvmt	NBLn1	WBL	WBR	SEL	SER
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	0	-	-	-
HCM Lane LOS	-	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	86	95	111	0	0	84
Future Volume (Veh/h)	86	95	111	0	0	84
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	93	103	121	0	0	91
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	121				410	121
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	121				410	121
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				100	90
cM capacity (veh/h)	1467				560	930

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	196	121	91
Volume Left	93	0	0
Volume Right	0	0	91
cSH	1467	1700	930
Volume to Capacity	0.06	0.07	0.10
Queue Length 95th (ft)	5	0	8
Control Delay (s)	3.9	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	3.9	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	12	44	17	16	54	13	19	225	24	39	252	15
Future Vol, veh/h	12	44	17	16	54	13	19	225	24	39	252	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	13	46	18	17	56	14	20	234	25	41	263	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	673	651	270	669	645	247	278	0	0	259	0	0
Stage 1	352	352	-	286	286	-	-	-	-	-	-	-
Stage 2	321	299	-	383	359	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	372	390	774	374	393	797	1296	-	-	1317	-	-
Stage 1	669	635	-	726	679	-	-	-	-	-	-	-
Stage 2	695	670	-	644	631	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	312	372	774	320	375	797	1296	-	-	1317	-	-
Mov Cap-2 Maneuver	312	372	-	320	375	-	-	-	-	-	-	-
Stage 1	659	615	-	715	669	-	-	-	-	-	-	-
Stage 2	616	660	-	564	611	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.8	16.7	0.6	1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1296	-	-	408	395	1317	-	-
HCM Lane V/C Ratio	0.015	-	-	0.186	0.219	0.031	-	-
HCM Control Delay (s)	7.8	-	-	15.8	16.7	7.8	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.8	0.1	-	-

Intersection	
Int Delay, s/veh	9.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	324	395	285	32	40	382
Future Vol, veh/h	324	395	285	32	40	382
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	381	465	335	38	47	449

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	373	0	-	0	1581	354
Stage 1	-	-	-	-	354	-
Stage 2	-	-	-	-	1227	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1197	-	-	-	121	694
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	280	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1197	-	-	-	82	694
Mov Cap-2 Maneuver	-	-	-	-	82	-
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	191	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	26.5
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1197	-	-	-	647
HCM Lane V/C Ratio	0.318	-	-	-	0.767
HCM Control Delay (s)	9.4	-	-	-	26.5
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	1.4	-	-	-	7.2

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	4	0	197	2	0	0	2	214	141	3	230	0
Future Vol, veh/h	4	0	197	2	0	0	2	214	141	3	230	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	8	0	0	0	0	1	1	0	1	0
Mvmt Flow	5	0	224	2	0	0	2	243	160	3	261	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	596	676	261	261	0	0	403	0	0
Stage 1	268	268	-	-	-	-	-	-	-
Stage 2	328	408	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.28	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.372	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	470	378	763	1315	-	-	1167	-	-
Stage 1	782	691	-	-	-	-	-	-	-
Stage 2	734	600	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	468	0	763	1315	-	-	1167	-	-
Mov Cap-2 Maneuver	468	0	-	-	-	-	-	-	-
Stage 1	780	0	-	-	-	-	-	-	-
Stage 2	733	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1315	-	-	754	1167	-	-
HCM Lane V/C Ratio	0.002	-	-	0.303	0.003	-	-
HCM Control Delay (s)	7.7	0	-	11.8	8.1	0	-
HCM Lane LOS	A	A	-	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	0	-	-

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	0	0	188	0	3	178	40	0	0	45	10
Future Vol, veh/h	0	0	0	188	0	3	178	40	0	0	45	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	3	0	0	1	0	0	0	0	0
Mvmt Flow	0	0	0	214	0	3	202	45	0	0	51	11

Major/Minor	Minor1			Major1			Minor2		
Conflicting Flow All	481	450	45	0	0	0	452	450	0
Stage 1	450	450	-	-	-	-	0	0	-
Stage 2	31	0	-	-	-	-	452	450	-
Critical Hdwy	6.43	6.5	6.2	-	-	-	6.4	6.5	-
Critical Hdwy Stg 1	5.43	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	3.527	4	3.3	-	-	-	3.5	4	-
Pot Cap-1 Maneuver	542	508	1031	-	-	-	569	508	-
Stage 1	640	575	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	645	575	-
Platoon blocked, %					-	-			
Mov Cap-1 Maneuver	542	0	1031	-	-	-	569	0	-
Mov Cap-2 Maneuver	542	0	-	-	-	-	569	0	-
Stage 1	640	0	-	-	-	-	-	0	-
Stage 2	-	0	-	-	-	-	645	0	-

Approach	WB	NB	SB
HCM Control Delay, s	15.9		
HCM LOS	C		-

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	-	546	-
HCM Lane V/C Ratio	-	-	-	0.398	-
HCM Control Delay (s)	-	-	-	15.9	-
HCM Lane LOS	-	-	-	C	-
HCM 95th %tile Q(veh)	-	-	-	1.9	-

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	100	23	114	75	0	36	54	39	1	16	0	1
Future Vol, veh/h	100	23	114	75	0	36	54	39	1	16	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	5	0	0	0	0	0	0	5
Mvmt Flow	111	26	127	83	0	40	60	43	1	18	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	40	0	0	152	0	0	498	518	89	520	561	20
Stage 1	-	-	-	-	-	-	311	311	-	187	187	-
Stage 2	-	-	-	-	-	-	187	207	-	333	374	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.345
Pot Cap-1 Maneuver	1583	-	-	1441	-	-	486	465	975	470	439	1049
Stage 1	-	-	-	-	-	-	704	662	-	819	749	-
Stage 2	-	-	-	-	-	-	819	734	-	685	621	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1583	-	-	1441	-	-	436	403	975	388	381	1049
Mov Cap-2 Maneuver	-	-	-	-	-	-	436	403	-	388	381	-
Stage 1	-	-	-	-	-	-	649	610	-	755	705	-
Stage 2	-	-	-	-	-	-	770	691	-	586	573	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.1	5.2	16.2	14.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	424	1583	-	-	1441	-	-	403
HCM Lane V/C Ratio	0.246	0.07	-	-	0.058	-	-	0.047
HCM Control Delay (s)	16.2	7.4	0	-	7.7	0	-	14.4
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1	0.2	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Traffic Vol, veh/h	0	0	0	0	217	0	0	47	0	0	0	0
Future Vol, veh/h	0	0	0	0	217	0	0	47	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	92	92	92	92	92	92
Heavy Vehicles, %	0	1	0	0	1	0	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	252	0	0	51	0	0	0	0

Major/Minor	Major2			Minor1		
Conflicting Flow All	0	0	0	252	252	0
Stage 1	-	-	-	0	0	-
Stage 2	-	-	-	252	252	-
Critical Hdwy	-	-	-	7.12	6.52	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	3.518	4.018	-
Pot Cap-1 Maneuver	-	-	-	701	651	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	752	698	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	701	0	-
Mov Cap-2 Maneuver	-	-	-	701	0	-
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	752	0	-

Approach	WB	NE
HCM Control Delay, s	0	
HCM LOS		-

Minor Lane/Major Mvmt	NELn1	WBL	WBT	WBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	0	-	-
HCM Lane LOS	-	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR	NEL	NER
Traffic Vol, veh/h	0	0	0	70	0	36	0	47
Future Vol, veh/h	0	0	0	70	0	36	0	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	-	-	None	-	None	-	-
Storage Length	-	-	10	-	-	0	-	0
Veh in Median Storage, #	0	-	-	0	0	-	0	-
Grade, %	0	-	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	76	0	39	0	51

Major/Minor	Major2		Minor1		Major1	
Conflicting Flow All	51	0	51	51	0	0
Stage 1	-	-	51	-	-	-
Stage 2	-	-	0	-	-	-
Critical Hdwy	4.12	-	6.42	6.22	-	-
Critical Hdwy Stg 1	-	-	5.42	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	3.518	3.318	-	-
Pot Cap-1 Maneuver	1555	-	958	1017	-	-
Stage 1	-	-	971	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-				-
Mov Cap-1 Maneuver	1555	-	914	1017	-	-
Mov Cap-2 Maneuver	-	-	914	-	-	-
Stage 1	-	-	971	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	NE
HCM Control Delay, s	3.6	8.7	0
HCM LOS		A	

Minor Lane/Major Mvmt	NEL	NER	NER2	NBLn1	WBL2	WBL	WBT
Capacity (veh/h)	-	-	-	1017	1555	-	-
HCM Lane V/C Ratio	-	-	-	0.038	0.045	-	-
HCM Control Delay (s)	0	-	-	8.7	7.4	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	-	-	-	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	SBL	SBR	NEL	NET	SWT	SWR
Traffic Vol, veh/h	0	0	65	0	0	407	0	217
Future Vol, veh/h	0	0	65	0	0	407	0	217
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	-	-	None	-	-
Storage Length	-	-	0	-	-	-	-	0
Veh in Median Storage, #	0	-	0	-	-	0	0	-
Grade, %	0	-	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	71	0	0	442	0	236

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	255	255	275	0	0	0
Stage 1	255	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	734	784	1288	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	734	784	1288	-	-	-
Mov Cap-2 Maneuver	734	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	10.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL2	NEL	NET	SBLn1	SWT	SWR	SWR2
Capacity (veh/h)	1288	-	-	734	-	-	-
HCM Lane V/C Ratio	-	-	-	0.096	-	-	-
HCM Control Delay (s)	0	-	-	10.4	0	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	-	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Traffic Vol, veh/h	0	0	217	0	0	70
Future Vol, veh/h	0	0	217	0	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	236	0	0	76

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	236	236
Stage 1	-	-	236	-
Stage 2	-	-	0	-
Critical Hdwy	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	718	803
Stage 1	-	-	767	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	718	803
Mov Cap-2 Maneuver	-	-	718	-
Stage 1	-	-	767	-
Stage 2	-	-	-	-

Approach	WB	SW
HCM Control Delay, s	0	10
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SWLn1
Capacity (veh/h)	-	-	803
HCM Lane V/C Ratio	-	-	0.095
HCM Control Delay (s)	-	-	10
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.3

Intersection	
Int Delay, s/veh	38

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	275	197	120	0	226	133
Future Vol, veh/h	275	197	120	0	226	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	3	6	3	1
Mvmt Flow	306	219	133	0	251	148

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	133	0	-	0	963	133
Stage 1	-	-	-	-	133	-
Stage 2	-	-	-	-	830	-
Critical Hdwy	4.11	-	-	-	6.43	6.21
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.209	-	-	-	3.527	3.309
Pot Cap-1 Maneuver	1458	-	-	-	282	919
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	426	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1458	-	-	-	~ 223	919
Mov Cap-2 Maneuver	-	-	-	-	~ 223	-
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	337	-

Approach	EB	WB	SB
HCM Control Delay, s	4.7	0	94.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1458	-	-	-	223	919
HCM Lane V/C Ratio	0.21	-	-	-	1.126	0.161
HCM Control Delay (s)	8.1	-	-	-	144.3	9.7
HCM Lane LOS	A	-	-	-	F	A
HCM 95th %tile Q(veh)	0.8	-	-	-	11.6	0.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	18.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	85	33	28	89	37	91	30	155	0	123	219	86
Future Vol, veh/h	85	33	28	89	37	91	30	155	0	123	219	86
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	175	-	-	260	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	5	2	1	0	0	0	8	6	0	3	1
Mvmt Flow	97	38	32	101	42	103	34	176	0	140	249	98

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	894	821	298	856	870	176	347	0	0	176	0	0
Stage 1	577	577	-	244	244	-	-	-	-	-	-	-
Stage 2	317	244	-	612	626	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.22	7.11	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.11	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.11	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.318	3.509	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	264	306	741	279	292	872	1223	-	-	1412	-	-
Stage 1	506	497	-	762	708	-	-	-	-	-	-	-
Stage 2	698	699	-	482	480	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	185	268	741	216	256	872	1223	-	-	1412	-	-
Mov Cap-2 Maneuver	185	268	-	216	256	-	-	-	-	-	-	-
Stage 1	492	448	-	741	688	-	-	-	-	-	-	-
Stage 2	562	680	-	381	432	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	50.3	42.8	1.3	2.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1223	-	-	235	328	1412	-	-
HCM Lane V/C Ratio	0.028	-	-	0.706	0.752	0.099	-	-
HCM Control Delay (s)	8	-	-	50.3	42.8	7.8	-	-
HCM Lane LOS	A	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.7	5.8	0.3	-	-

Intersection	
Int Delay, s/veh	30.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	311	0	141	0	0	0	0	439	47	51	218	0
Future Vol, veh/h	311	0	141	0	0	0	0	439	47	51	218	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	5	0	1	0	0	0	0	2	3	13	2	0
Mvmt Flow	334	0	152	0	0	0	0	472	51	55	234	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	841	867	234	234	0	0	523	0	0
Stage 1	344	344	-	-	-	-	-	-	-
Stage 2	497	523	-	-	-	-	-	-	-
Critical Hdwy	6.45	6.5	6.21	4.1	-	-	4.23	-	-
Critical Hdwy Stg 1	5.45	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.45	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4	3.309	2.2	-	-	2.317	-	-
Pot Cap-1 Maneuver	~ 331	293	808	1345	-	-	990	-	-
Stage 1	711	640	-	-	-	-	-	-	-
Stage 2	605	534	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	~ 310	0	808	1345	-	-	990	-	-
Mov Cap-2 Maneuver	~ 310	0	-	-	-	-	-	-	-
Stage 1	665	0	-	-	-	-	-	-	-
Stage 2	605	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	80	0	1.7
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	SBL	SBT	SBR
Capacity (veh/h)	1345	-	-	310	808	990	-	-
HCM Lane V/C Ratio	-	-	-	1.079	0.188	0.055	-	-
HCM Control Delay (s)	0	-	-	111.5	10.5	8.8	0	-
HCM Lane LOS	A	-	-	F	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	12.8	0.7	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	0	0	35	0	107	112	638	0	0	234	372
Future Vol, veh/h	0	0	0	35	0	107	112	638	0	0	234	372
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	4	7	3	0	0	5	6
Mvmt Flow	0	0	0	38	0	118	123	701	0	0	257	409

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1409	1613	701	666	0	0	701	0	0
Stage 1	947	947	-	-	-	-	-	-	-
Stage 2	462	666	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.24	4.17	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.336	2.263	-	-	2.2	-	-
Pot Cap-1 Maneuver	154	105	435	900	-	-	905	-	-
Stage 1	380	342	-	-	-	-	-	-	-
Stage 2	638	460	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	120	0	435	900	-	-	905	-	-
Mov Cap-2 Maneuver	120	0	-	-	-	-	-	-	-
Stage 1	295	0	-	-	-	-	-	-	-
Stage 2	638	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.5	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	900	-	-	577	905	-	-
HCM Lane V/C Ratio	0.137	-	-	0.27	-	-	-
HCM Control Delay (s)	9.6	0	-	13.5	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	1.1	0	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	44	40	652	93	20	562
Future Vol, veh/h	44	40	652	93	20	562
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	5	3	0	0	5
Mvmt Flow	47	43	701	100	22	604

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1398	751	0	0	801	0
Stage 1	751	-	-	-	-	-
Stage 2	647	-	-	-	-	-
Critical Hdwy	6.4	6.25	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.345	-	-	2.2	-
Pot Cap-1 Maneuver	157	406	-	-	831	-
Stage 1	470	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	153	406	-	-	831	-
Mov Cap-2 Maneuver	153	-	-	-	-	-
Stage 1	470	-	-	-	-	-
Stage 2	511	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.8	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	292	831	-
HCM Lane V/C Ratio	-	-	0.309	0.026	-
HCM Control Delay (s)	-	-	22.8	9.4	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1.3	0.1	-

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	33	220	188	504	362	12
Future Vol, veh/h	33	220	188	504	362	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	1	1	4	9	0
Mvmt Flow	36	239	204	548	393	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1357	400	407	0	-	0
Stage 1	400	-	-	-	-	-
Stage 2	957	-	-	-	-	-
Critical Hdwy	6.4	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	166	652	1157	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	376	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	137	652	1157	-	-	-
Mov Cap-2 Maneuver	137	-	-	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	310	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.2	2.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1157	-	137	652	-	-
HCM Lane V/C Ratio	0.177	-	0.262	0.367	-	-
HCM Control Delay (s)	8.8	-	40.4	13.7	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.6	-	1	1.7	-	-

Appendix B Year 2035 Future Queuing Worksheet

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	39	594	28	519	198	142	41	307	323
v/c Ratio	0.10	0.72	0.08	0.66	0.26	0.42	0.08	0.81	0.57
Control Delay	7.5	21.4	7.4	20.5	3.3	23.8	0.9	41.1	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	21.4	7.4	20.5	3.3	23.8	0.9	41.1	12.2
Queue Length 50th (ft)	7	150	5	177	0	46	0	116	34
Queue Length 95th (ft)	18	#406	15	297	35	101	4	#259	113
Internal Link Dist (ft)		703		1481		491		582	
Turn Bay Length (ft)	250		150		175		175		60
Base Capacity (vph)	470	878	544	987	916	445	659	508	679
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.68	0.05	0.53	0.22	0.32	0.06	0.60	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	20	156	430	295	110	324	86	270
v/c Ratio	0.07	0.50	0.87	0.41	0.16	0.73	0.13	0.45
Control Delay	12.6	25.7	35.8	17.7	4.4	30.1	5.2	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.6	25.7	35.8	17.7	4.4	30.1	5.2	17.9
Queue Length 50th (ft)	5	47	138	82	0	114	2	77
Queue Length 95th (ft)	15	97	#279	180	30	#255	27	150
Internal Link Dist (ft)		430		634		582		810
Turn Bay Length (ft)	125		425		425		25	
Base Capacity (vph)	526	909	499	943	849	457	676	622
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.17	0.86	0.31	0.13	0.71	0.13	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	371	170	47	247	2	221	100	20	346
v/c Ratio	0.25	0.62	0.27	0.15	0.47	0.00	0.60	0.15	0.05	0.78
Control Delay	19.4	32.9	5.9	18.9	32.7	0.0	23.1	15.4	15.9	37.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	32.9	5.9	18.9	32.7	0.0	23.1	15.4	15.9	37.4
Queue Length 50th (ft)	30	174	0	14	110	0	72	21	6	130
Queue Length 95th (ft)	82	370	51	46	247	0	149	70	21	287
Internal Link Dist (ft)		1481			965			356		1149
Turn Bay Length (ft)	100					75	100			
Base Capacity (vph)	478	778	761	470	793	729	500	941	595	821
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.48	0.22	0.10	0.31	0.00	0.44	0.11	0.03	0.42

Intersection Summary

Lane Group	EBT	NBT	SBL	SBT
Lane Group Flow (vph)	934	128	53	100
v/c Ratio	0.85	0.23	0.19	0.10
Control Delay	36.0	17.3	33.1	9.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	36.0	17.3	33.1	9.5
Queue Length 50th (ft)	249	38	26	24
Queue Length 95th (ft)	#322	78	57	46
Internal Link Dist (ft)	364	557		202
Turn Bay Length (ft)			45	
Base Capacity (vph)	1097	551	285	969
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.85	0.23	0.19	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	77	820	143	118
v/c Ratio	0.10	0.53	0.25	0.18
Control Delay	9.9	13.4	15.8	9.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.9	13.4	15.8	9.8
Queue Length 50th (ft)	16	113	40	19
Queue Length 95th (ft)	37	162	78	49
Internal Link Dist (ft)		390	202	385
Turn Bay Length (ft)	40			
Base Capacity (vph)	806	1540	578	656
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.10	0.53	0.25	0.18

Intersection Summary