TECH MEMO #4: FUTURE SYSTEMS CONDITIONS

Date:	August 16, 2019 Project #: 22254.0
To:	Larry Lewis and Kerry Kemp, City of Waldport David Helton, Oregon Department of Transportation
From:	Susan Wright, Matt Bell, Krista Purser, Alicia Hunter, Kittelson & Associates, Inc.
Project:	Waldport Transportation System Plan (TSP) Update
Subject:	Tech Memo #4: Future Systems Conditions

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INTRODUCTION

This memorandum summarizes future (no-build) transportation system conditions in Waldport for the Waldport Transportation System Plan (TSP) update. The information provided in this memorandum is based on population and employment forecasts developed for Waldport and corresponding growth in traffic volumes throughout the City. The future deficiencies identified in this memorandum will serve as the basis for developing transportation system alternatives and improvement projects for the TSP update.

POPULATION AND EMPLOYMENT FORECASTS

This section summarizes population and employment forecasts developed for Waldport. *Attachment A contains a more detailed summary of the population and employment forecasts.*

POPULATION AND HOUSEHOLD FORECAST

Historic and projected population information for the communities of Lincoln County, including Waldport, was obtained from the Portland State University (PSU) Population Research Center (PRC). The PRC generates coordinated forecasts for Oregon counties and cities every four years. The most recent coordinated population forecast for Lincoln County was released in 2017. The 2017 report includes historic and projected population estimates for Lincoln County and Waldport, including estimates for 2017, 2035, and 2067.

Historically, Waldport has grown slower than Lincoln County as a whole; however, projected Average Annual Growth Rates (AARG) for 2017 through 2035 are higher for Waldport than for Lincoln County; 0.9% and 0.6%, respectively. The AARG are forecasted to taper off from 2035 through 2067; 0.7% and 0.4%, respectively. According to the 2017 report, Waldport is expected to capture an increasing share of Lincoln County's total population growth, while the shares for other smaller cities are expected to decline slightly. Table 1 summarizes the projected population estimates for Waldport and Lincoln County per the report.

Table 1: Projected Population

Projected Population						
	2017	2035	2067	Share of County 2017	Share of County 2035	Share of County 2040
Waldport	2,282	2,693	3,359	4.8%	5.1%	5.1%
Lincoln County	47,944	52,962	60,628	100%	100%	100%

Using the above information, the forecasted population of the end year for this analysis (2040) is 2,788.

Historic and projected household information for Lincoln County and Waldport was obtained from the 2010 US Census. The 2010 US Census estimates persons per household (PPH) in Waldport as 2.1. The assumption for Waldport is that this ratio will remain the same through the planning horizon. Dividing the population estimates by this number results in an estimated 1,087 households in 2017 and 1,328 households in 2040. The difference between the base year (2017) and end year (2040) estimates is an additional 239 households. This is the overall growth in housing units estimated for Waldport through the planning horizon.

EMPLOYMENT FORECAST

The most recent employment data by North American Industry Classification System (NAICS) sector available for Waldport is provided from the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Statistics. This data provides a general basis of comparison with the Oregon Employment Department's employment forecast analysis. As shown in Table 2, Waldport employed 400 people in the year 2015. Nearly one in four jobs (25.3 percent) were related to retail services. Nearly one in six jobs (17.3 percent) were related to lodging accommodations or food services and another one in six jobs (15.3 percent) were related to educational services.

Table 2: Waldport Jobs by NAICS Sector

Waldport Jobs by NAICS Sector		
NAICS Sector	2015	%
Agriculture, Forestry, Fishing and Hunting	0	0.0%
Mining, Quarrying, and Oil and Gas Extraction	0	0.0%
Utilities	0	0.0%
Construction	9	2.3%
Manufacturing	22	5.5%
Wholesale Trade	0	0.0%
Retail Trade	101	25.3%
Transportation and Warehousing	0	0.0%

Waldport Jobs by NAICS Sector		
NAICS Sector	2015	%
Information	8	2.0%
Finance and Insurance	7	1.8%
Real Estate and Rental and Leasing	2	0.5%
Professional, Scientific, and Technical Services	21	5.3%
Management of Companies and Enterprises	0	0.0%
Administration & Support, Waste Management and Remediation	15	3.8%
Educational Services	61	15.3%
Health Care and Social Assistance	23	5.8%
Arts, Entertainment, and Recreation	10	2.5%
Accommodation and Food Services	69	17.3%
Other Services (excluding Public Administration)	24	6.0%
Public Administration	28	7.0%
Total	**400**	**100.0%**

Source: US Census Bureau, OnTheMap Application and LEHD Origin-Destination Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2015)

The City of Waldport is assumed to grow by an additional 35 jobs through the year 2027 and an additional 200 jobs through the year 2040. With one exception, this assumes that growth in Waldport follows similar employment trends as forecasted in the State's Industry Employment Forecast. The exception accounts for ongoing City efforts to facilitate the development of a 161-acre area near the southern City limits for new industrial and office-space uses. By applying the employment space utilization to the forecasted growth in employment, Waldport is anticipated to increase its total commercial space by an additional 16,532 square feet and increase its total industrial space by an additional 57,280 square feet.

Table 3 summarizes the population and employment data for year 2017 and forecast year 2040 conditions. As shown, employment is expected to grow at a higher rate than the population over the 23-year period, primarily due to growth in the Waldport industrial area.

Table 3: Waldport Population, Household, and Employment Summary

Waldport Population, Household, and Employment Summary				
Land Use	2017	2040	Change	Percent Change
Population	2,282	2,788	515	22.1%
Households	1,087	1,328	241	22.1%
Employment	400	600	200	50.0%

The population and employment data shown in Table 3 was distributed throughout the City based on current zoning designations and an evaluation of vacant and developable lands. Based on the evaluation, there is adequate capacity within the City to accommodate the projected growth in population, households, and employment over the planning horizon without changes to current zoning designations, development patterns, and/or the UGB.

Figures 1 and 2 illustrate the changes in households and employment by Transportation Analysis Zone (TAZ). The TAZs shown in Figures 1 and 2 were developed based on the current zoning designations and the location of major roadways and intersections throughout the City. The TAZs provide a convenient way of evaluating and summarizing the population and employment data for the City.

PLANNED IMPROVEMENTS

This section summarizes planned improvements identified in the Statewide Transportation Improvement Program (STIP) and the Waldport Capital Improvement Program (CIP). One expected outcome of the Waldport TSP update is the identification of projects for inclusion in updated/amended versions of the STIP and CIP.

STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM

The Statewide Transportation Improvement Program (STIP) is the Oregon Department of Transportation's (ODOT) capital improvement program for state and federally-funded projects. The Oregon Transportation Commission (OTC) and ODOT develop the STIP in coordination with a wide range of stakeholders, including local jurisdictions, and the public. The Commission allocates funding among four categories:

- **Fix-it** programs fund projects that fix or preserve the state's transportation system, including bridges, pavement, culverts, traffic signals, and others.
- **Enhance it** programs fund projects that enhance or expand the transportation system, these are typically high-priority projects from state and local transportation plans, such as the Waldport TSP.
- **Safety** programs reduce deaths and injuries on Oregon roads. This includes the All Roads Transportation Safety (ARTS) program, which includes projects on state highways and local roads.
- **Non-highway** programs fund bicycle and pedestrian projects and public transportation
- **Local government** programs direct funding to local governments so they can fund projects

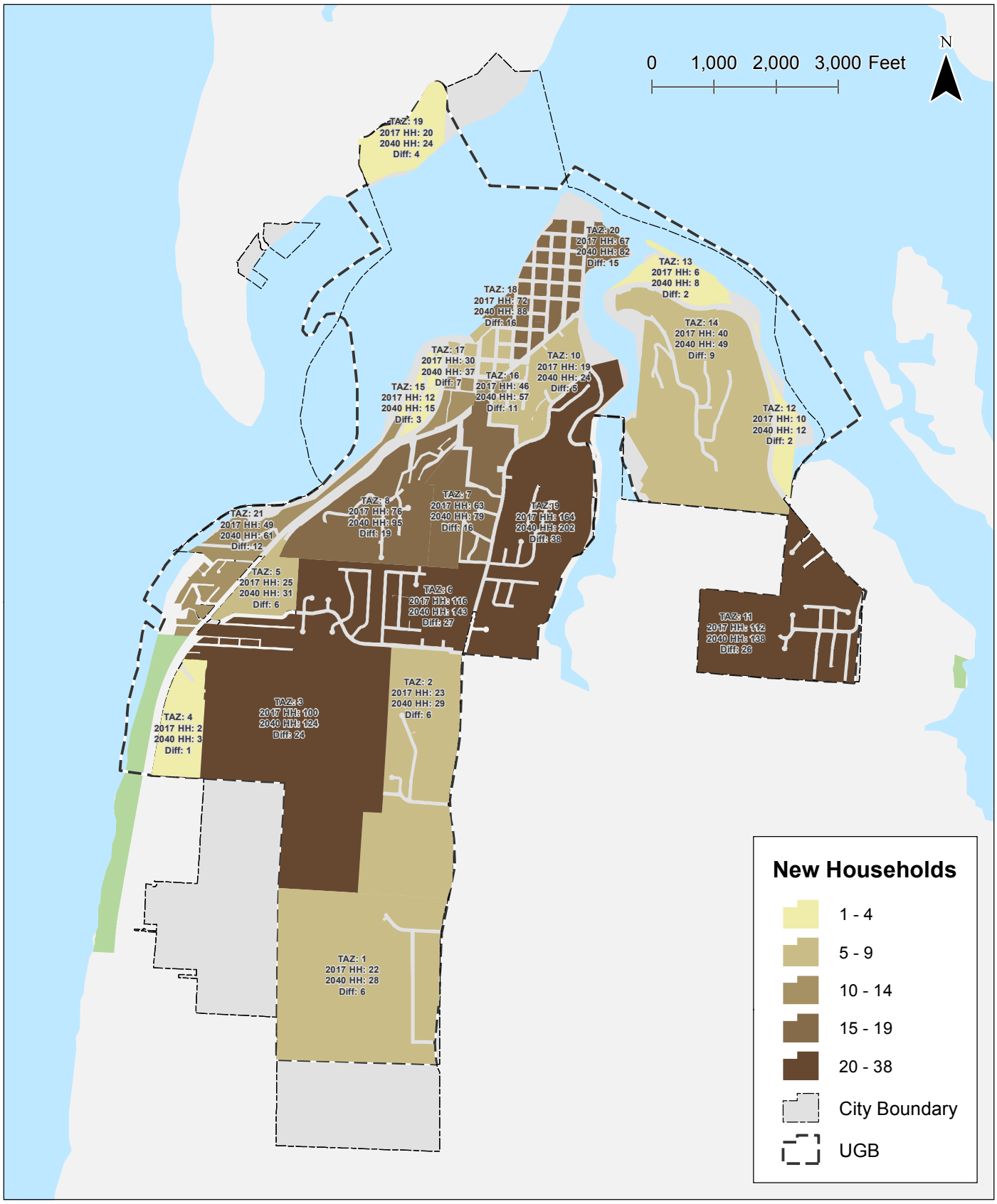
The current STIP (2018-2021) identifies two projects within Waldport that are expected to be completed within the planning horizon. Table 4 summarizes key characteristics of the projects.

Table 4: 2018-2021 Statewide Transportation Improvement Program Projects for Waldport

2018-2021 Statewide Transportation Improvement Program Projects for Waldport				
Project Name	**Description**	**Work Type**	**Status**	**Project Total**
US 101: SW Waziyata Street to SW Maple Street[1]	Reconfigure US 101 cross-section and construct adjacent multiuse path (Bridgeview trail)	Bike/Ped	Project funded through final plans	$243,800.00
OR34: McKinney Slough Bridge Replacement	Replace bridge #04167	Bridge	Project under construction	$5,145,485.99

1. This project was removed from the 2018-2021 STIP due to limited funding and lack of support.

The projects shown in Table 4 are accounted for in the future (no-build) traffic conditions analysis and alternatives analysis summarized in Tech Memo 5.



Changes in Households by Transportation Analysis Zone (2017 - 2040) - Waldport, Oregon

Figure **1**

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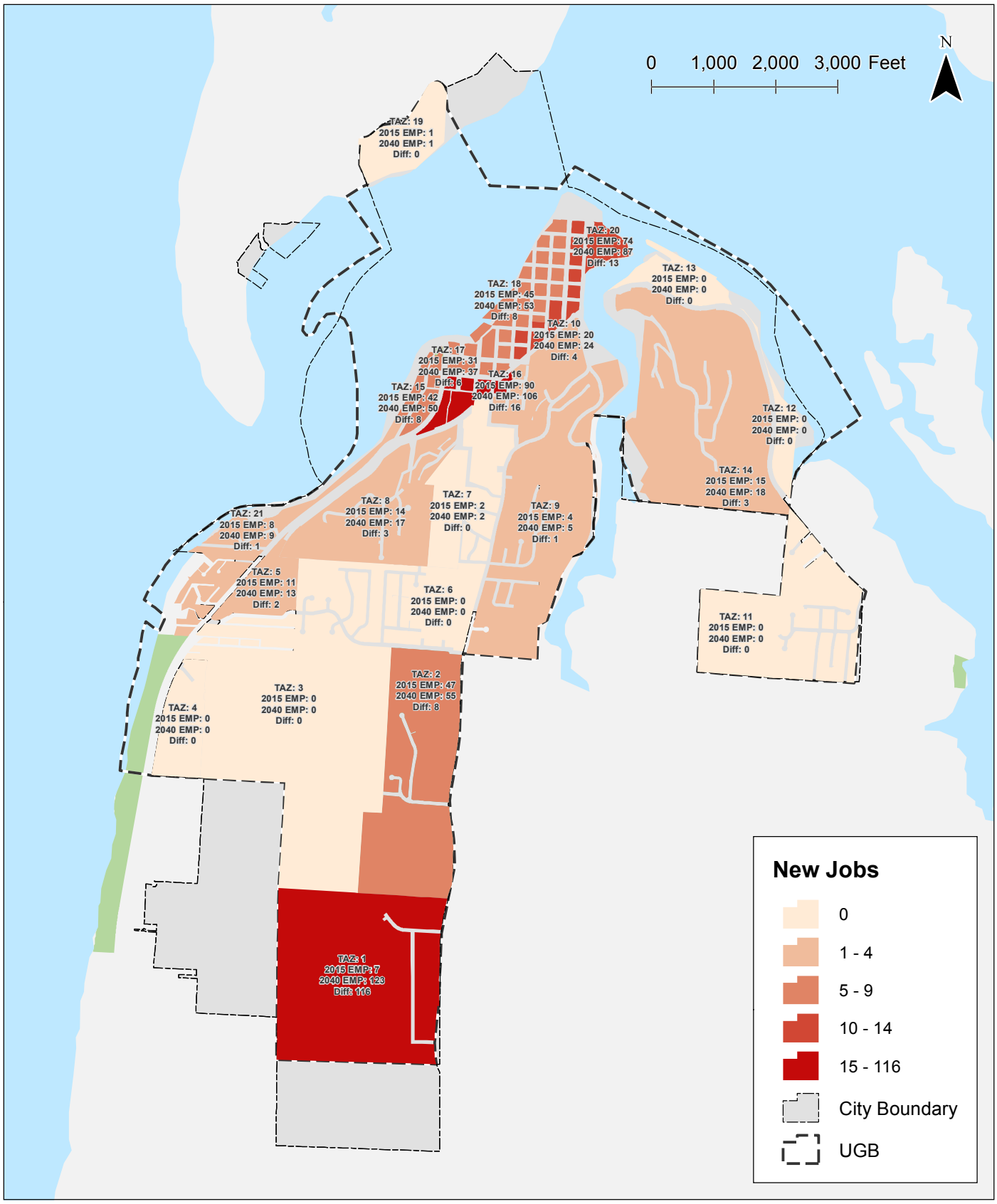
Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl



Changes in Employment by Transportation Analysis Zone (2015 - 2040) - Waldport, Oregon

Figure **2**

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KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

WALDPORT CAPITAL IMPROVEMENT PLAN

The Waldport Capital Improvement Plan (CIP) establishes, prioritizes, and ensures funding for projects to improve existing infrastructure or to pave the way for new development. Projects generally increase functionality, efficiency, and capacity of the infrastructure, or increase capacity to meet the demands of growth, or provide community livability and enhancement.

The current CIP identifies several projects for Fiscal Year (FY) 2017/2018 along with projects for FY 2018-2019 and FY 2019-2020, each of which are expected to be completed within the planning horizon. Table 5 summarizes key characteristics of relevant projects.

Table 5: Waldport Caiptal Improvement Plan

Waldport Capital Improvement Plan				
Fiscal Year	**Fund**	**Projects**	**Estimated Cost**	**Funding Source**
FY 2017-2018	Community	Lint Slough Trail	$15,596	Grant
FY 2017-2018	Community	Waziyata Beach Access	$17,972	Grant
FY 2017-2018	Urban Renewal	Downtown Wayfinding/Beach Access	$25,000	UR#1
FY 2019-2020	Urban Renewal	Crestline Sidewalk Improvements	$350,000	UR #2

The projects shown in Table 5 are accounted for in the future (no-build) traffic conditions analysis and alternatives analysis summarized in Tech Memo 5.

FUTURE TRAFFIC VOLUMES

Future traffic volumes were developed for the study intersections based on the Zonal Cumulative Analysis methodology described in the ODOT Analysis Procedures Manual (APM). This methodology is suggested when analyzing entire cities of up to 10,000 residents. This type of analysis combines growth in regional traffic volumes with growth in local traffic volumes associated with projected household and employment growth within the city. The traffic volume projection process includes the three major modeling steps (trip generation, trip distribution, and trip assignment). The process accounts for the following four categories of vehicle trips:

- External-External (through trips): vehicles with an origin and destination outside the UGB. An example of an external-external trip is someone traveling from Newport to Yachats through Waldport.
- External-Internal (inbound trips): vehicles with an origin outside the city limits and a destination inside the UGB. An example of an external-internal trip is someone who works in Newport but returns home to Waldport during the evening peak hour.
- Internal-External (outbound trips): vehicles with an origin inside the city limits and a destination outside the UGB. An example of an internal-external trip is someone who works in Waldport but returns home to Yachats during the evening peak hour.
- Internal-Internal (local trips): vehicles with an origin and destination inside the UGB. An example of an internal-internal trip is someone who travels from their home to the grocery store without leaving the city.

Using these vehicle trip types, the basic steps for a zonal cumulative analysis are:

- Develop regional growth rates for highway traffic volumes;
- Identify where household and employment growth is likely to occur in the community;
- Develop estimates of the number of vehicle trips associated with household and employment growth, and;
- Allocate those trips across the city to various growth areas.

An overview of each of these steps is presented below.

REGIONAL TRAFFIC GROWTH

ODOT's Future Volume Tables were used to develop regional growth rates for US 101 and OR 34. Based on the tables, traffic volumes along US 101 are projected to increase by approximately 8.8 percent north of the city limits and by 16.1 percent south of the city limits. Similarly, traffic volumes along OR 34 are projected to increase by approximately 4 percent east of the city limits. These growth rates were applied to existing traffic volumes along US 101 and OR 34 to represent growth in regional traffic volumes.

HOUSEHOLD AND EMPLOYMENT GROWTH

Projected household and employment growth also contributes to future growth in traffic volumes. Growth estimates were developed based on the PRC's Coordinated Population Forecast for Lincoln County, the Census Bureau's LEHD Origin-Destination Statistics, and the Oregon Employment Department's employment forecast analysis. The distribution of new households and employment within the City was determined based on an evaluation of vacant and developable lands as well as a review of existing land use, zoning designations, and development patterns. Additional information on projected household and employment growth is provided earlier in this memo and in Attachment A.

TRIP GENERATION

The projected household and employment growth can be equated to increases in local traffic volumes by calculating the trip generation of the future uses. Trip generation estimates were prepared based on information provided in the standard reference manual, Trip Generation, 10th Edition, published by the Institute of Transportation Engineers (ITE). Table B-1in Attachment B summarizes the total trips by TAZ.

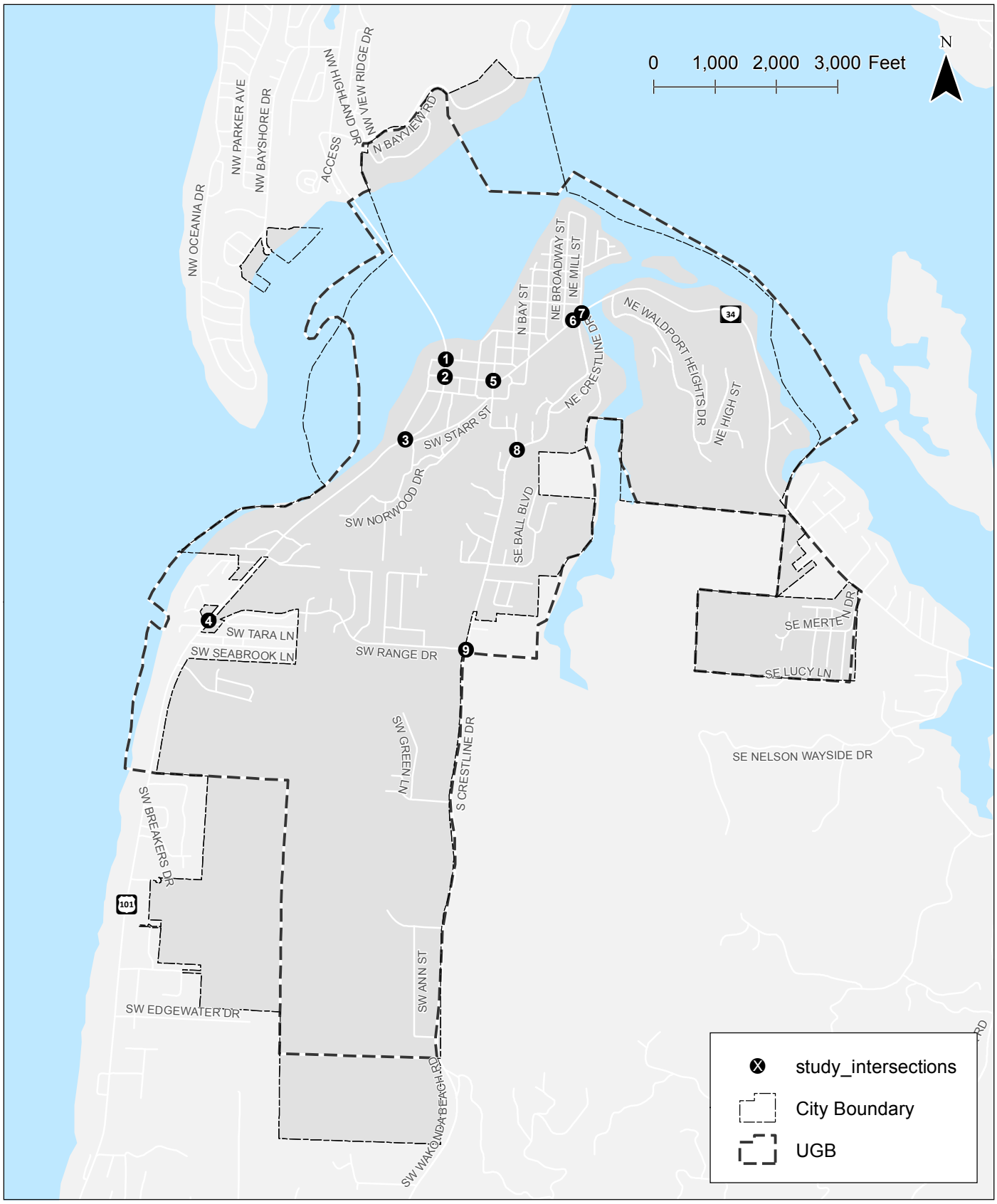
TRAFFIC ANALYSIS ZONES

The trips associated with the projected household and employment growth were distributed throughout the city based on the type of trips (i.e. external-external, external-internal, internal-external, internal-internal) and the location of the TAZs developed for the project. Additional information on the TAZs is provided earlier in this memo and in Attachment A.

INTERSECTION OPERATIONS ANALYSIS

The *Analysis Methodology and Assumptions Memo* identifies the intersection operational standards for City and ODOT facilities, the analysis model parameters, and the traffic analysis software and input assumptions. The intersection operations analysis was conducted in accordance with the memo.

Figure 3 illustrates the location of the study intersections. Figure 4 and Table 6 summarize the results of the intersection operations analysis. As shown, all study intersections are projected to operate acceptably during the Year 2040 weekday PM peak hour. *Attachment C includes the intersection operations analysis worksheets.*



Study Intersections
Waldport, Oregon

Figure
3

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

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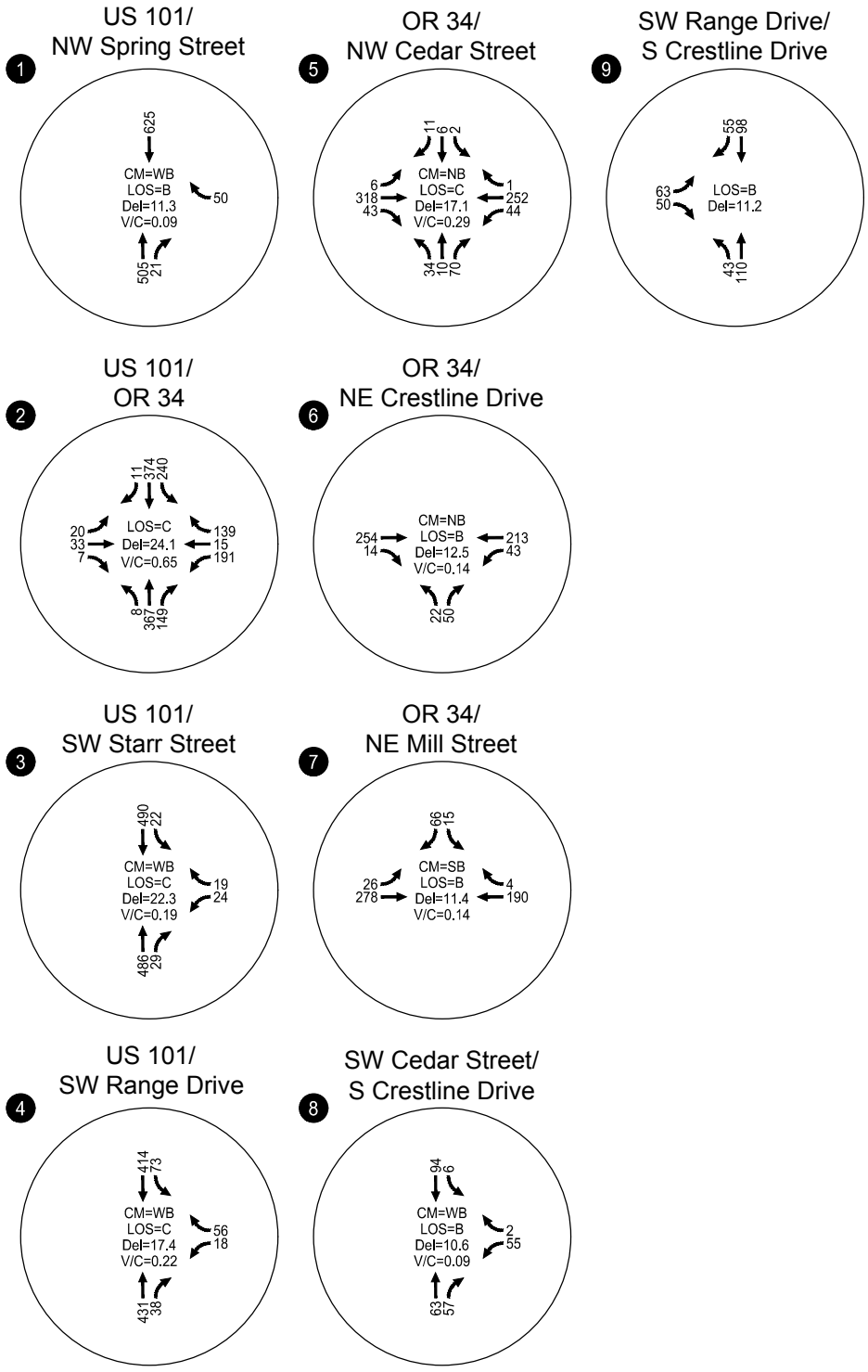

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = LEVEL OF SERVICE: INTERSECTION AVERAGE LOS (SIGNALIZED)/
CRITICAL MOVEMENT LOS (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/
CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2040 Future Weekday PM Peak Hour Operations
Waldport, Oregon

Figure
4

Table 6: Intersection Operations Analysis Results – Year 2040 Weekday PM Peak Hour

Intersection Operations Analysis Results – Year 2040 Weekday PM Peak Hour							
Map ID	Intersection	Level of Service (LOS)	Delay (Sec)	Volume/ Capacity (V/C)	Measure of Effectiveness		MOE Met?
					Agency	Maximum (major/minor)[1]	
1	US 101/NE Spring Street	B	11.3	0.09	ODOT	v/c 0.90/0.95	Yes
2	US 101/OR 34	C	24.1	0.65[2]	ODOT	v/c 0.95/0.95	Yes
3	US 101/SW Starr Street	C	22.3	0.18	ODOT	v/c 0.95/1.0	Yes
4	US 101 SW Range Drive	C	17.4	0.22	ODOT	v/c 0.80/0.90	Yes
5	OR 34/NW Cedar Street	C	17.1	0.29	ODOT	v/c 1.0/1.0	Yes
6	OR 34/NE Crestline Drive	B	12.5	0.14	ODOT	v/c 0.95/0.95	Yes
7	OR 34/NE Mill Street	B	11.4	0.14	ODOT	v/c 0.95/0.95	Yes
8	SW Cedar St/S Crestline Dr	B	10.6	0.09	City	LOS E	Yes
9	SW Range Dr/S Crestline Dr	B	11.2	-[3]	City	LOS E	Yes

1. For ODOT intersections, represents OHP Mobility Targets as identified in the Analysis Methodology and Assumptions Memo.
2. Synchro does not provide v/c ratio for this intersection with HCM 6th Edition. V/c ratio shown is HCM 2000 result.
3. HCM methodologies do not produce a v/c ratio for all-way stop-controlled intersections.

Notes: LOS = Intersection Level of Service (Signal), Critical Movement Level of Service (TWSC).
Delay = Intersection Average vehicle delay (Signal), critical movement vehicle delay (TWSC).
V/C = Intersection V/C (Signal) critical movement V/C (TWSC).
MOE = Measure of Effectiveness

QUEUEING

A queuing analysis was conducted at the study intersection using Synchro 10. Table 7 summarizes the projected 95th percentile queues during the weekday PM peak hour under year 2040 traffic conditions. The vehicle queue and storage lengths were rounded to the nearest 25-feet. The storage lengths reflect the striped storage for each movement at the intersections.

Table 7: Year 2040 Weekday PM Peak Hour Queuing

Year 2040 Weekday PM Peak Hour Queuing				
Intersection	Movement	95th Percentile Queue (feet)	Storage Length (feet)	Adequate?
US 101/NE Spring Street	WBR	25	-	Yes
US 101/OR 34	EBL	50	125	Yes
	WBL	250	125	**No**
	NBL	25	75	Yes
	SBL	200	200	Yes
US 101/SW Starr Street	WB	25	-	Yes
US 101 SW Range Drive	SBL	25	350	Yes
	WB	25	-	Yes

Year 2040 Weekday PM Peak Hour Queuing				
Intersection	Movement	95th Percentile Queue (feet)	Storage Length (feet)	Adequate?
OR 34/NW Cedar Street	EBL	0	200	Yes
	WBL	25	250	Yes
	NB	50	-	Yes
	SB	25	-	Yes
OR 34/NE Crestline Drive	WBL	25	100	Yes
	NB	25	-	Yes
OR 34/NE Mill Street	SB	25	-	Yes
SW Cedar Street/S Crestline Drive	WB	25	-	Yes
SW Range Drive/S Crestline Drive	EB	25	-	Yes
	NB	50	-	Yes
	SB	50	-	Yes

Where WB = Westbound, SB = Southbound, EB = Eastbound, NB = Northbound, L = Left, R = Right
#: 95th percentile volume exceeds capacity, queue may be longer.
m: Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 7, the striped storage for the study intersection movements are projected to be adequate for the 95th percentile queues with the exception of the westbound left-turn at US 101/OR 34. The westbound left-turn lane is restricted by the adjacent intersection of OR 34/NW Verbena Street and additional storage is available to the east of NW Verbena Street.

NON-AUTOMOBILE TRANSPORTATION ANALYSIS

This section summarizes the results of a non-automobile transportation analysis, including bicycle level of traffic stress, pedestrian level of traffic stress, and a qualitative multimodal assessment of transit facilities ad services.

BICYCLE LEVEL OF TRAFFIC STRESS

Bicycle Level of Traffic Stress (BLTS) is determined based on travel speed, the number of travel lanes per direction, the presence and width of an on-street bicycle lane and/or adjacent parking lane, and several other factors. Traffic volumes do not impact BLTS. Therefore, the forecast traffic volumes are not expected result in an increase in BLTS along state or city facilities. However, planned improvements identified in the STIP and CIP are expected to result in a decrease in BLTS as indicated below.

- STIP: US 101: SW Waziyata Street to SW Maple Street – While no longer included in the 2018-2021 STIP due to limited funding and lack of support, this improvement would significantly decrease BLTS along US 101.
- STIP: OR34: McKinney Slough Bridge Replacement – This project will decrease BLTS across the McKinney Slough Bridge.
- CIP: Downtown Wayfinding/Beach Access – This project will not decrease BLTS, but it will improve bicycle access and circulation within the downtown area.

PEDESTRIAN LEVEL OF TRAFFIC STRESS

Pedestrian Level of Traffic Stress (PLTS) is determined based on sidewalk condition, physical buffer type, total buffering width, and general land use. Similar to BLTS, traffic volumes do not impact PLTS. Therefore, the forecast traffic volumes are not expected result in an increase in PLTS along state or city facilities. However, planned improvements identified in the STIP and CIP are expected to result in a decrease in PLTS as indicated below.

- STIP: US 101: SW Waziyata Street to SW Maple Street – While not funded through to construction, this planned improvement will significantly decrease PLTS along US 101
- STIP: OR34: McKinney Slough Bridge Replacement – This project will decrease PLTS across the McKinney Slough Bridge.
- CIP: Crestline Sidewalk Improvements – This project will decrease PLTS along Crestline Drive within the project area.
- CIP: Downtown Wayfinding/Beach Access – This project will not decrease PLTS, but it will improve pedestrian access and circulation within the downtown area.

TRANSIT QUALITATIVE MULTIMODAL ASSESSMENT

The transit level of service (LOS) score is based on transit speed, transit frequency, passenger load factor, and pedestrian LOS score. Similar to BLTS and PLTS, traffic volumes do not impact either the transit LOS or pedestrian LOS scores. Therefore, the forecast traffic volumes are not expected result in a change in the overall transit LOS. However, some of the planned improvements identified above could improve the pedestrian LOS score and thereby reduce the overall transit LOS score.

CRASH ANALYSIS

As indicated in *Tech Memo #3B: Existing Conditions Analysis*, the observed crash rates for all study intersections are below the critical crash rates and the observed crash rates for all roadway segments are below the statewide crash rates for similar facilities.

ACCESS MANAGEMENT

As indicated in Tech Memo #3B: Existing Conditions Analysis, there are multiple access points along US 101, OR 34, Crestline Drive, Range Drive, and Cedar Street that do not meet spacing standards. However, no new access points are planned along state of city facilities that will not meet or move in the direction of state and city access spacing standards.

FUTURE DEFICIENCIES

This section summarizes the future transportation system deficiencies as identified by the future intersection operations analysis, non-automobile transportation analysis, crash analysis, and access management analysis describe above.

INTERSECTION OPERATIONS ANALYSIS

- The intersection operations analysis indicates that all study intersections are projected to operate acceptably per their respective mobility standards.
- The queuing analysis indicates that the projected 95th percentile queues can be accommodated by the striped storage available at all study intersections except the westbound left-turn queue at the US 101/OR 34 intersection. The westbound left-turn queue is projected to extend through the OR 34/NW Verbena Street intersection; additional storage is available east of NW Verbena Street.

NON-AUTOMOBILE TRANSPORTATION ANALYSIS

- BLTS is not impacted by potential changes in traffic volumes; therefore, BLTS is not expected to increase in the future; however, planned improvements along US 101 and OR 34 are expected to decrease BLTS.
- PLTS is not impacted by potential changes in traffic volumes; therefore, PLTS is not expected to increase in the future; however, planned improvements along US 101, OR 34, and Crestline Drive are expected to decrease PLTS.
- Transit LOS is not impacted by potential changes in traffic volumes; therefore, the transit LOS is not expected to decrease in the future; however, improvements in the pedestrian LOS score could results in improvements in the overall transit LOS score.

It is important to note that ODOT identifies *targets* for BLTS and PLTS, not *standards*. Therefore, there are no deficiencies related to BLTS and PLTS. The only pedestrian and bicycle deficiencies identified by the non-automobile transportation analysis are the gaps and deficiencies identified in the current transportation system inventory and current transportation system conditions analysis.

CRASH ANALYSIS

- The observed crash rates for all study intersections are expected to continue to be below the critical crash rates and the observed crash rates for all roadway segments are expected to continue to be below the statewide crash rates for similar facilities.

ACCESS MANAGEMENT

- No new access points are planned along state of city facilities that will not meet or move in the direction of state and city access spacing standards.

REFERENCES

1. Oregon Department of Transportation. *Analysis Procedures Manual*, 2018.

ATTACHMENTS

A. Population and Employment Growth Projections
B. Trip Generation Estimate
C. Year 2040 Intersection Operations Worksheets

ATTACHMENT A: POPULATION AND EMPLOYMENT FORECAST METHODOLOGY

POPULATION AND EMPLOYMENT FORECAST METHODOLOGY

Date:	May 14, 2019
To:	Larry Lewis, Kerry Kemp, City of Waldport David Helton, Oregon Department of Transportation
From:	Darci Rudzinski & Clinton "CJ" Doxsee, Angelo Planning Group
Project:	Waldport Transportation System Plan Update
Subject:	Population and Employment Forecast Methodology

Project #: 22254.0

INTRODUCTION

This memorandum documents the methodology and results of the population and employment forecasts conducted as part of the City of Waldport Transportation System Plan (TSP) Update. This forecast ultimately provides the following:

- Number of single-family dwelling, double-family dwelling, and multi-family dwellings in each Transportation Analysis Zone (TAZ), current year (2017) and end year (2040).
- Square footage of employment uses in each TAZ, current year and end year.

HISTORIC AND PROJECTED POPULATION GROWTH PATTERNS

Historic and projected population information for the communities of Lincoln County, including Waldport, has been developed by the Portland State University (PSU) Population Research Center (PRC).[1] By estimating future population based on historic and current trends, forecasts provide necessary information to help plan for the impacts of population growth in local areas. The PRC generates coordinated forecasts with a 50-year forecast horizon for Oregon counties and cities no less than once every four years. The most recent coordinated population forecast for Lincoln County was released in 2017.[2]

Table 1 shows the 2000, 2010, and 2017 populations as well as the latest population projections, shown for 2035-2067, that were prepared in 2017 for Lincoln County. The table illustrates the City of Waldport population and the total Lincoln County population. In 2017 Waldport represented approximately 4.9% of the County's total population. In 2040, Waldport is projected to represent approximately 5.2% of the County's total population.

[1] https://www.pdx.edu/prc/home
[2] https://www.pdx.edu/prc/sites/www.pdx.edu.prc/files/Lincoln_Report_2017_Final.pdf

Table 1. Historic and Projected Population

Historic and Projected Population			
Year	Waldport Population	Lincoln County Population	Percent of Population
2000	2,200	44,479	4.9%
2010	2,244	46,034	4.9%
2017	2,282	47,944	4.8%
2040	2,788	54,004	5.2%
2067	3,359	60,628	5.5%

Historic Population

As shown in Table 1, the population in Waldport grew by approximately 82 people between 2000 and 2017—approximately 3.7% growth over that time, an average annual increase of 0.2%. As shown in Table 2, Waldport's population increased from 1,274 in 1980 to 2,050 in 2000—a 61% increase over 20 years with an average annual increase of 1.9%, or approximately 39 people per year.

Table 2: U.S. Census Historic Population

U.S. Census Historic Population	
Year	Waldport Population
1980	1,274
1990	1,595
2000	2,050

Projected Population

Projected population is one of the primary tools for developing planning policies as well as determining future urban growth boundary expansions. PRC develops projected population forecasts based on historic and current trends, as well as assuming the likelihood of future events.

Historically, Waldport has grown slower than Lincoln County as a whole; however, projected Average Annual Growth Rates (AARG) for 2017 through 2035 are higher than those projected for Lincoln County; 0.9% and 0.6%, respectively. The AARG are forecasted to taper off from 2035 through 2067 at 0.7% and 0.4%, respectively. According to the report, Waldport is expected to capture an increasing share of Lincoln County's total population growth, while the shares for other smaller cities are expected to decline slightly.

Table 3: Projected Population

Projected Population						
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Lincoln County	47,944	52,962	60,628	100%	100%	100%

Using the above information, the forecasted population of the end year for this analysis (2040) is 2,788.

Table 4 shows the persons per household for Waldport, which experienced a reduction of 0.2 person per household (PPH) between the 2000 and 2010 census. The assumption for 2040 is that this ratio will remain the same throughout the planning horizon at 2.1 PPH. Dividing the population by this number results in an estimated 1,087 households in 2017 and 1,328 households in the year 2040. The difference between the Base Year and End Year is an additional 239 households. This is the overall growth in housing units estimated for Waldport during the planning period.

Table 4: Persons per Household (PPH)

Persons per Household (PPH)			
	2000	2010	Change 2000-2010
Waldport	2.2	2.1	-0.2
Lincoln County	2.3	2.2	-0.1

An inventory of vacant land was produced as part of Technical Memorandum #3A: Existing Conditions Inventory. The vacant land inventory is used as the basis for determining future residential capacity in Waldport.[3] There is a combination of zoning from the City of Waldport and Lincoln County within the City's urban growth boundary (UGB). This analysis takes into account the zoned residential capacity for both jurisdictions.

Minimum and maximum residential density is provided in the Waldport Development Code, Title 16 and the Lincoln County Code (LCC) for individual residential zones. Residential densities for all types of dwellings are primarily regulated by minimum lot size as a function of the availability of public water and sewer facilities. In other words, the maximum residential density is limited when these facilities are not available. This analysis assumes that these facilities are currently provided or will be provided at the time of development, thus allowing for higher overall residential densities. A summary of the minimum and maximum allowed densities for residential zones is provided in Table 5.

Table 5: Residential Density Standards

Residential Density Standards			
	Single-family Dwelling	Double Family Dwelling	Multi-family Dwelling
City of Waldport Zones			
R-1 Residential	No minimum Max: 7.26 DU/acre	-	-
R-2 Residential	No minimum Max: 8.71 DU/acre	No minimum Max: 17.42 DU/acre	-
R-3 Residential	No minimum Max: 8.71 DU/acre	No minimum Max: 17.42 DU/acre	Min: 26 DU/acre Max: 30.85 DU/acre
R-4 Residential	No minimum Max: 8.71 DU/acre	No minimum Max: 17.42 DU/acre	Min: 26 DU/acre Max: 30.85 DU/acre
D-D Downtown District	-	-	No maximum*

[3] A Residential Buildable Lands Inventory (BLI) is not available at the time of this memorandum.

Lincoln County Zones			
R-1	No minimum Max: 7.26 DU/acre	-	-

Table 6 provides a summary of residential zones (City and County) within the Waldport UGB. The table also lists the assumptions for the types of residential housing that is used in this forecast. Overall, the forecast assumes that most new development will be single-family residential. This assumption is supported by inspection of the diversity of residential development using Google Street View for various locations throughout the City.

Table 6: Zoning Summary

Zoning Summary		
Zone	**Description**	**Assumption**
City of Waldport Zones		
R-1 Residential	This zone was established to promote public health and safety in numerous ways, including protection of living conditions, better light for homes, improvement of the atmosphere, prevention of accumulation of trash and play areas for children. Allows for single-family dwellings with a minimum lot size of 6,000 square feet; business and multiple-dwelling structures are not allowed.	Assume 7 DU/acre at 100% single-family dwelling. This is a conservative (high) estimate to test the performance of the transportation system assuming maximum development, which tends to generate the most trips per unit compared to other housing types.
R-2 Residential	Created to allow single-family dwellings, duplexes, and multi-wide mobile homes with a minimum lot size of 5,000 square feet. Intended for residential use at a moderate density and to utilize existing subdivided lots with affordable housing.	Assume 8 DU/acre at 90% single-family dwelling and 17 DU/acre at 10% double-family dwelling. This estimate assumes that most development will utilize single-family residential housing types due to the availability of developable land.
R-3 Residential	Intended for residential use as a high-density residential district allowing for some conditional uses such as public/institutional uses, bed and breakfast inns, mobile home parks, and neighborhood services such as clinics or professional offices. Requires a minimum lot size of 5,000 square feet for one- or two-family dwellings; lot size for multifamily dwellings must be greater than 5,000 square feet and are allowed one additional unit per 1,250 additional square feet.	Assume 8 DU/acre at 80% single-family dwelling, 17 DU/acre at 10% double-family dwelling, and 30.85 DU/acre at 10% multi-family. This estimate assumes that most development will utilize single-family residential housing types due to the availability of developable land.

Zoning Summary		
Zone	**Description**	**Assumption**
R-4 Residential	Created for residential use but permits mixed-use development under conditional use procedures such as a hotel, motel or resort together with accessory commercial uses. Allows for single-family, duplex, or multifamily development with a minimum lot size of 5,000 square feet for one- or two-family dwellings; lot size for multifamily dwellings must be greater than 5,000 square feet and are allowed one additional unit per 1,250 additional square feet.	Assume 8 DU/acre at 90% single-family dwelling, 17 DU/acre at 10% double-family dwelling, and 30.85 DU/acre at 10% multi-family. This estimate assumes that most development will utilize single-family residential housing types due to the availability of developable land.
D-D Downtown District	Created to support the goals of Commercial Zone C-1 through regulating design standards and guidelines that maintain and enhance the character and pedestrian-friendliness of Waldport. Encourages the efficient use of land and urban services and the provision of employment and housing options, opportunities for community gathering, enhanced storefront character, visitor and tourism accommodations and amenities, and a strong connection between Downtown Waldport and neighboring areas.	Assumes 30.85 DU/acre at 100% multi-family. There is no maximum allowed density in this zone, as such, this assumes the maximum allowed development similar to the highest allowed residential density in other zones. This estimate factors development code restrictions that limit dwelling types to mixed-use development (either vertical or horizontal).
Lincoln County Zones		
R-1	*No description is provided in Lincoln County's Comprehensive Plan or County Code.*	Assume 7 DU/acre at 100% single-family dwelling. This is a conservative estimate to test the performance of the transportation system assuming maximum development, which tends to generate the most trips per unit compared to other housing types.

For the purposes of calculating capacity, the gross acreage was reduced by 25% to allow for dedications and improvements. Site-specific environmental constraints (i.e. wetland or topography) were not factored into the capacity analysis. Multiplying these assumed densities by the remaining buildable acres identified in the vacant inventory map provides the expected capacity of households remaining within the UGB.

Table 7: Residential Capacity Summary

Residential Capacity Summary				
	Net Buildable Acres	Assumed Density	Unit Capacity	Unit Split
City of Waldport Zones				
R-1 Residential	63.76	7 DU/acre	446	100% single-family
R-2 Residential	16.12	8 - 30.85 DU/acre	143	90% single-family 10% double-family
R-3 Residential	8.23	8 - 30.85 DU/acre	73	80% single-family 10% double-family 10% multi-family
R-4 Residential	9.33	8 - 30.85 DU/acre	83	80% single-family 10% double-family 10% multi-family
D-D Downtown Residential	3.50	30.85 DU/acre	107	100% multi-family
Lincoln County Zones				
R-1	17.04	7 DU/acre	119	100% single-family
TOTAL	**117.98**		**971**	

Given these (fairly aggressive) assumptions, the UGB has more than adequate capacity to accommodate all of the projected growth in new households over the planning horizon. As noted above, Waldport is expected to add an additional 239 households between 2017 and 2040; a fraction of the residential capacity within the UGB.

Locating Households and Housing Types

Considering that available residentially zoned land is not a constraint on future development, the AARG growth forecast was applied to the total population within individual Census Blocks. In other words, this analysis used the distribution of population in Waldport as indicated in 2010 Census Data, then assumed all Census Blocks would grow proportionally to accommodate the difference between 2010 and 2040 growth. This assumption is supported by the availability of vacant land, which is distributed throughout the UGB.

As shown on Figure 1, population growth is anticipated to occur in the central and southern areas of the City limits. Growth is expected to occur south and east of SW Norwood Drive. This expectation is generally consistent with the availability of vacant land inventory generated for Technical Memorandum #3A. Similarly, the Figure shows growth is expected to occur south of SW Range Drive. However, this growth must be qualified due to the large geographic size of the Census Block. In comparison to the vacant land inventory, this growth is more likely to occur within the westernmost extent of the Census Block, closest to Highway 101.

Population was assigned to Transportation Analysis Zones (TAZs) based on share of total land area, which was then converted into households and unit types using the information in Table 7. These results are shown in Table 8.

Figure 1: Population Growth by Census Block, 2010-2035[4]

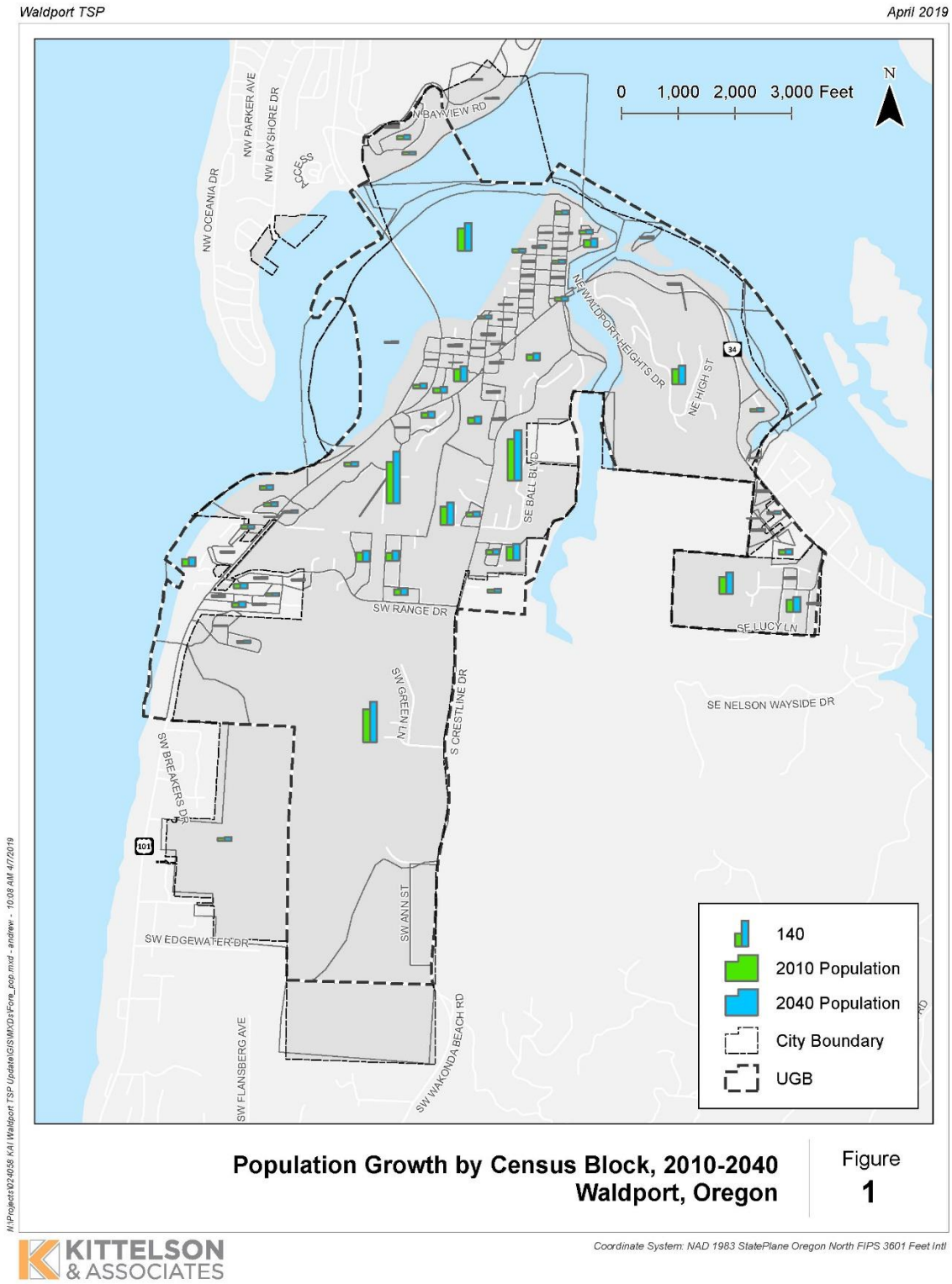


Table 8: TAZ Population, Households, and Housing Type

Residential Capacity Summary					
	2017 Population	2040 Population	2017 Households	2040 Households	Unit Split
1	47	58	22	28	100% single-family
2	49	60	23	29	100% single-family
3	209	260	100	124	100% single-family
4	5	6	2	3	100% single-family
5	53	65	25	31	100% single-family
6	243	300	116	143	100% single-family
7	133	165	63	79	90% single-family 10% double-family
8	160	200	76	95	100% single-family
9	345	425	164	202	100% single-family
10	39	50	19	24	100% single-family
11	235	290	112	138	80% single-family 10% double-family 10% multi-family
12	20	25	10	12	90% single-family 10% double-family
13	13	17	6	8	100% single-family
14	84	103	40	49	100% single-family
15	26	31	12	15	100% single-family
16	97	119	46	57	100% multi-family
17	64	78	30	37	100% multi-family
18	152	185	72	88	80% single-family 10% double-family 10% multi-family
19	42	51	20	24	100% single-family
20	140	172	67	82	100% single-family
21	103	128	49	61	100% single-family
TOTAL	**2,260**	**2,788**	**1,076**	**1,328**	

HISTORIC AND PROJECTED EMPLOYMENT GROWTH PATTERNS

This analysis evaluated historic and projected employment patterns in the Waldport area to understand current and future transportation needs.

Historic Employment Trends

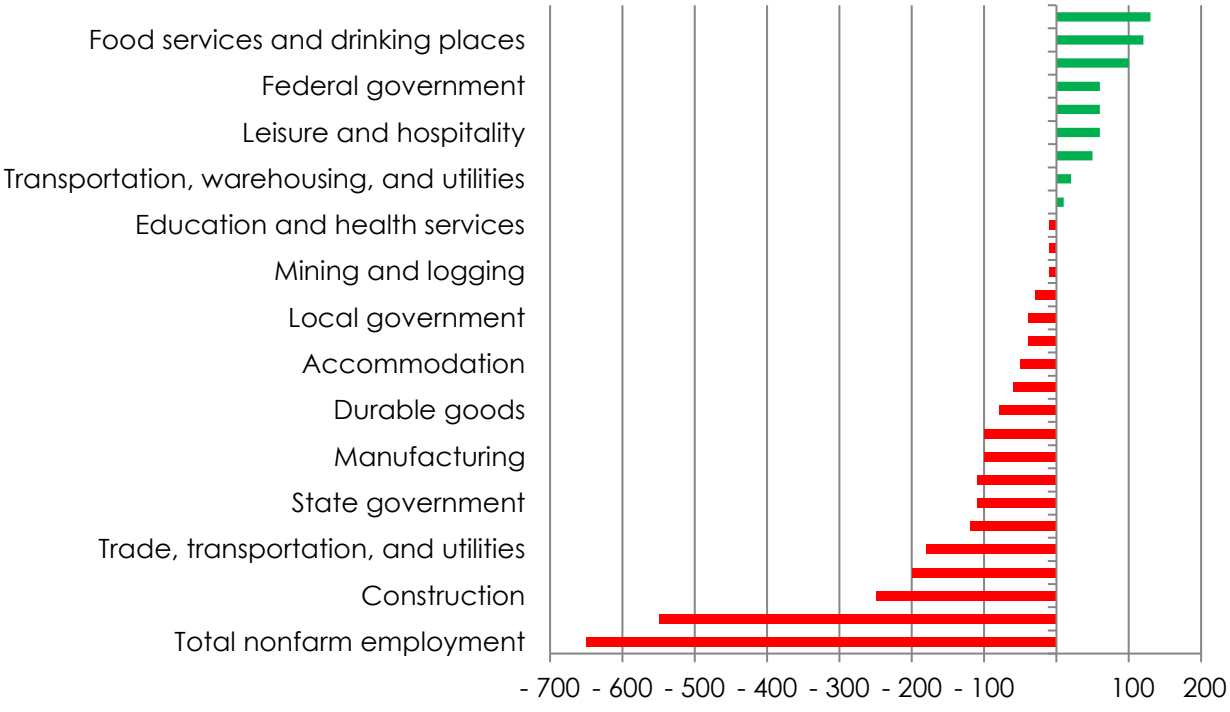
The Oregon Employment Department publishes current employment trends specific to Lincoln County. While jobs have returned to the county after the recession of 2008-2009, they are still below pre-recession employment levels. If

[4] Note, bar graphs displayed in the river is an analysis technicality that is the result of Census Block boundaries extending beyond geographic extent of land.

Lincoln County employment levels continue to increase, transportation needs within Waldport may change. Employment totals and net changes by industry are shown in Figures 2 and 3, respectively.

Figure 2: Lincoln County Seasonally Adjusted Non-farm Employment 2008-2017

Figure 3: Lincoln County Employment Changes by Industry 2008-2016



Projected Employment

The Oregon Employment Department Workforce and Economic Research Division publishes employment forecasts by industry. These ten-year forecasts are defined by regions (as opposed to counties or cities) and organize employment forecasts by primary industry. The region that includes Lincoln County also includes Benton, Clatsop, Columbia, and Tillamook counties.

It is expected that the largest employment increases will occur in the construction (1.9 percent), wholesale trade (1.7 percent), food manufacturing (1.7 percent), food services (1.5 percent), professional business services industries (1.4 percent), and natural resources and mining (1.3 percent) sectors. All industry forecasts are shown in Table 9.

Table 9: 2017-2027 Industry Employment Forecast (Benton, Clatsop, Columbia, Lincoln, Tillamook)

Industry	2017	2027	Change	% Change
Total, All	**108,980**	**116,970**	**7,990**	**7%**
Total payroll employment	103,230	110,620	7,390	7%
Total private	77,600	83,980	6,380	8%
Natural resources and mining	3,600	3,780	180	5%
Mining and logging	990	980	-10	-1%
Construction	3,810	4,300	490	13%
Manufacturing	8,650	9,040	390	5%
Durable goods	4,700	4,820	120	3%
Wood product manufacturing	1,160	1,110	-50	-4%
Nondurable goods	3,950	4,230	280	7%
Food manufacturing	1,810	2,050	240	13%
Paper manufacturing	1,270	1,140	-130	-10%
Trade, transportation, and utilities	14,920	15,540	620	4%
Wholesale trade	990	1,000	10	1%
Retail trade	12,000	12,440	440	4%
Transportation, warehousing, and utilities	1,930	2,100	170	9%
Information	980	1,000	20	2%
Financial activities	3,870	4,060	190	5%
Professional and business services	7,840	9,020	1,180	15%
Professional and technical services	3,220	3,640	420	13%
Private educational and health services	13,730	15,190	1,460	11%
Hospitals	4,490	4,900	410	9%
Leisure and hospitality	16,090	17,770	1,680	10%
Accommodation and food services	15,040	16,630	1,590	11%
Accommodation	3,970	4,330	360	9%
Food services and drinking places	11,070	12,300	1,230	11%
Other services and private households	4,110	4,280	170	4%
Government	25,630	26,640	1,010	4%
Self-employment	1,200	1,190	-10	-1%

Source: Northwest Oregon Industry Employment Forecast 2017-2027 (Benton, Clatsop, Columbia, Lincoln, Tillamook)

The most recent employment data by NAICS sector available for the City of Waldport is provided from the Census Bureau's LEHD Origin-Destination Statistics. This provides a general basis of comparison with the Oregon Employment Department's employment forecast analysis. As summarized in Table 10, Waldport employed 400 people in the year 2015. Nearly one in four jobs (25.3 percent) were related to retail services. Nearly one in six jobs (17.3 percent) were related to lodging accommodations or food services and another one in six jobs (15.3 percent) were related to educational services.

Table 10: Waldport Jobs by NAICS Sector

Waldport Jobs by NAICS Sector	2015	%
Total, All	**400**	**100%**
Agriculture, Forestry, Fishing and Hunting	0	0.0%
Mining, Quarrying, and Oil and Gas Extraction	0	0.0%
Utilities	0	0.0%
Construction	9	2.3%
Manufacturing	22	5.5%
Wholesale Trade	0	0.0%
Retail Trade	101	25.3%
Transportation and Warehousing	0	0.0%
Information	8	2.0%
Finance and Insurance	7	1.8%
Real Estate and Rental and Leasing	2	0.5%
Professional, Scientific, and Technical Services	21	5.3%
Management of Companies and Enterprises	0	0.0%
Administration & Support, Waste Management and Remediation	15	3.8%
Educational Services	61	15.3%
Health Care and Social Assistance	23	5.8%
Arts, Entertainment, and Recreation	10	2.5%
Accommodation and Food Services	69	17.3%
Other Services (excluding Public Administration)	24	6.0%
Public Administration	28	7.0%

Source: US Census Bureau, OnTheMap Application and LEHD Origin-Destination Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2015)

The following tables apply the State's growth forecast to employment and translates those employment figures to the amount of commercial and industrial building space needed using standard ratios of square feet per employee from the Urban Land Institute.

Table 11: Employment Space Utilization

Employment Space Utilization							
Industry	Commercial		Industrial				
	Commercial Office Share	Avg. Space per Job	Industrial Share	Avg. Space per Job			
				Warehouse	General	Tech/ Flex	Weighted Avg.
Construction	2%	**366**	30%	0	400	117	**517**
Manufacturing	5%	**366**	95%	0	400	117	**517**
Wholesale Trade	5%	**366**	95%	1350	0	47	**1,397**
Retail Trade	5%	**366**	0%	0	0	0	**0**
Transp. Warehouse. Util	30%	**366**	70%	2000	0	0	**2,000**
Information	90%	**366**	10%	0	0	467	**467**
Financial Activities	90%	**366**	0%	0	0	0	**0**
Professional & Business Services	90%	**366**	10%	0	0	467	**467**
Education & Health Services	40%	**366**	0%	0	0	0	**0**
Leisure & Hosp	25%	**366**	0%	0	0	0	**0**
Other Services	40%	**366**	60%	0	400	117	**517**
Government	85%	**366**	15%	675	0	234	**909**

The City of Waldport is assumed to grow by an additional 35 jobs through the year 2027 and an additional 200 jobs through the year 2040. With one exception, this assumes that growth in Waldport follows similar employment trends as forecasted in the State's Industry Employment Forecast. The exception accounts for ongoing City efforts to facilitate the development of a 161-acre area near the southern City limits for new industrial and office-space uses. By applying the employment space utilization to the forecasted growth in employment, Waldport is anticipated to increase its total commercial space by an additional 16,532 square feet and increase its total industrial space by an additional 57,280 square feet.

Table 12: Jobs and Employment Square Footage by NAICS Industry, Base Year and Future Year

Waldport Jobs by NAICS Sector	2015 Jobs	2015 Commercial SF	2015 Industrial SF	2040 Jobs	2040 Commercial SF	2040 Industrial SF
Total, All	**400**	**51,251**	**26,957**	**600**	**67,783**	**84,237**
Agriculture, Forestry, Fishing and Hunting	0	0	0	0	0	0

Waldport Jobs by NAICS Sector	2015 Jobs	2015 Commercial SF	2015 Industrial SF	2040 Jobs	2040 Commercial SF	2040 Industrial SF
Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	0	0
Utilities	0	0	0	0	0	0
Construction	9	66	1,396	12	87	1,845
Manufacturing	22	403	10,805	138	2,524	67,742
Wholesale Trade	0	0	0	0	0	0
Retail Trade	101	1,848	0	110	2,018	0
Transportation and Warehousing	0	0	0	0	0	0
Information	8	2,635	374	8	2,771	435
Finance and Insurance	7	2,306	0	8	2,590	0
Professional and Business Services	2	659	93	15	5,059	794
Professional, Scientific, and Technical Services	21	6,917	981	28	9,176	1,440
Management of Companies and Enterprises	0	0	0	0	0	0
Administration & Support, Waste Management and Remediation	15	4,667	2,045	18	5,524	1,377
Educational Services	61	8,930	0	77	11,308	0
Health Care and Social Assistance	23	3,367	0	28	4,137	0
Arts, Entertainment, and Recreation	10	915	0	13	1,154	0
Accommodation and Food Services	69	6,314	0	87	7,985	0
Other Services (excluding Public Administration)	24	3,514	7,445	26	3,878	8,217
Public Administration	28	8,711	3,818	31	9,572	2,386

Locating Employment

LEHD Origin-Destination Employment Statistics provides the total number of jobs within each Census block for the year 2015. This analysis assigned the total number of jobs within each Census block to the TAZs.[5] The 2040 forecasted employment assumes employment growth would occur proportionally within each TAZ based on the growth assumptions from Table 12. The share of employment sectors within each TAZ is assumed to have a similar distribution as the overall share of employment sectors within the City. Table 13 applies the share of employment sectors in the TAZs defined for the TSP update, and translates those employment figures to the amount of commercial and industrial building space needed using standard ratios of square feet per employee from the Urban Land Institute.

[5] Note, the total number of jobs for the year 2015 in Table 13 is higher than the total number of jobs in Table 10 due to the mismatch between Census block geographic boundaries and City and UGB jurisdictional boundaries.

Table 13: Employment Summary

Employment Summary				
	2015 Employment	2040 Employment	2015 Square Footage	2040 Square Footage
1	7	123	1,327	31,164
2	47	55	8,911	13,935
3	0	0	0	0
4	0	0	0	0
5	11	13	2,085	3,294
6	0	0	0	0
7	2	2	379	507
8	14	17	2,654	4,307
9	4	5	758	1,267
10	20	24	3,792	6,081
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	15	18	2,844	4,561
15	42	50	7,963	12,668
16	90	106	17,063	26,857
17	31	37	5,877	9,375
18	45	53	8,531	13,428
19	1	1	190	253
20	74	87	14,029	22,043
21	8	9	1,517	2,280
TOTAL	**411**	**600**	**77,920**	**152,020**

As shown in Table 13, total employment is expected to increase from 411 to 600 over the planning horizon while total square-footage of employment space is expected to increase from 77,920 to 152,020.

ATTACHMENT B: TRIP GENERATION ESTIMATES

TRIP GENERATION ESTIMATES

Trip generation estimates were prepared based on information provided in the standard reference manual, Trip Generation, 10th Edition, published by the Institute of Transportation Engineers (ITE). Table B-1 summarizes the total trips by Transportation Analysis Zone (TAZ).

Table B1: Trip Generation Estimate, Weekday PM Peak Hour

Trip Generation Estimate, Weekday PM Peak Hour									
TAZ	Housing			Employment			Total		
	Total	In	Out	Total	In	Out	Total	In	Out
1	5	3	2	76	30	46	81	33	48
2	5	3	2	7	3	4	12	6	6
3	24	15	9	24	15	9	48	30	18
4	0	0	0	0	0	0	0	0	0
5	6	4	2	7	4	3	13	8	5
6	27	17	10	27	17	10	54	34	20
7	14	9	5	14	9	5	28	18	10
8	19	12	7	20	12	8	39	24	15
9	38	24	14	38	24	14	76	48	28
10	5	3	2	6	3	3	11	6	5
11	24	15	9	24	15	9	48	30	18
12	2	1	1	2	1	1	4	2	2
13	2	1	1	2	1	1	4	2	2
14	9	6	3	10	6	4	19	12	7
15	2	1	1	5	2	3	7	3	4
16	6	4	2	11	4	7	17	8	9
17	3	2	1	6	3	3	9	5	4
18	14	9	5	17	9	8	31	18	13
19	5	3	2	4	3	1	9	6	3
20	16	10	6	18	9	9	34	19	15
21	12	8	4	12	7	5	24	15	9
Total	**238**	**150**	**88**	**330**	**177**	**153**	**568**	**327**	**241**

ATTACHMENT C: YEAR 2040 INTERSECTION OPERATIONS WORKSHEETS

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	50	505	21	0	625
Future Vol, veh/h	0	50	505	21	0	625
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	30	26	25	0	21
Mvmt Flow	0	56	567	24	0	702

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	296	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.5	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.6	-	-	-	-
Pot Cap-1 Maneuver	0	624	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	624	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	624	-
HCM Lane V/C Ratio	-	-	0.09	-
HCM Control Delay (s)	-	-	11.3	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.3	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	44	208	167	9	561	261	419
v/c Ratio	0.25	0.40	0.73	0.46	0.03	0.74	0.57	0.25
Control Delay	60.9	59.2	56.4	12.7	15.2	39.0	17.6	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.9	59.2	56.4	12.7	15.2	39.0	17.6	13.4
Queue Length 50th (ft)	14	25	134	9	2	170	84	67
Queue Length 95th (ft)	48	74	245	72	12	286	179	149
Internal Link Dist (ft)		512		727		1208		194
Turn Bay Length (ft)	125		125		75		200	
Base Capacity (vph)	115	139	669	654	317	1060	549	1949
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	0.19	0.32	0.31	0.26	0.03	0.53	0.48	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (veh/h)	20	33	7	191	15	139	8	367	149	240	374	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.86	1.00		0.98	0.99		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1190	1600	1600	1395	1436	1436	1559	1422	1422	1381	1532	1532
Adj Flow Rate, veh/h	22	36	8	208	16	151	9	399	162	261	407	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	41	11	11	26	23	23	14	24	24	27	16	16
Cap, veh/h	69	74	17	307	27	252	363	594	238	378	1331	39
Arrive On Green	0.06	0.06	0.06	0.23	0.23	0.23	0.01	0.32	0.32	0.16	0.46	0.46
Sat Flow, veh/h	1134	1226	272	1329	116	1093	1485	1877	752	1316	2886	85
Grp Volume(v), veh/h	22	0	44	208	0	167	9	286	275	261	205	214
Grp Sat Flow(s),veh/h/ln	1134	0	1498	1329	0	1208	1485	1351	1278	1316	1455	1516
Q Serve(g_s), s	1.5	0.0	2.2	11.2	0.0	9.7	0.3	14.4	14.7	9.7	6.9	7.0
Cycle Q Clear(g_c), s	1.5	0.0	2.2	11.2	0.0	9.7	0.3	14.4	14.7	9.7	6.9	7.0
Prop In Lane	1.00		0.18	1.00		0.90	1.00		0.59	1.00		0.06
Lane Grp Cap(c), veh/h	69	0	91	307	0	279	363	428	405	378	671	699
V/C Ratio(X)	0.32	0.00	0.48	0.68	0.00	0.60	0.02	0.67	0.68	0.69	0.31	0.31
Avail Cap(c_a), veh/h	130	0	172	787	0	716	450	654	619	701	1187	1236
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.3	0.0	35.7	27.5	0.0	26.9	17.8	23.2	23.4	15.3	13.2	13.3
Incr Delay (d2), s/veh	2.0	0.0	3.0	2.0	0.0	1.5	0.0	6.4	7.1	1.7	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.9	3.6	0.0	2.8	0.1	5.1	5.0	2.8	2.3	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.3	0.0	38.6	29.5	0.0	28.5	17.9	29.6	30.5	17.0	14.2	14.1
LnGrp LOS	D	A	D	C	A	C	B	C	C	B	B	B
Approach Vol, veh/h		66			375			570			680	
Approach Delay, s/veh		38.2			29.0			29.8			15.3	
Approach LOS		D			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	41.2		22.6	16.8	29.8		9.3				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	5.5	64.0		46.5	31.5	38.0		9.0				
Max Q Clear Time (g_c+I1), s	2.3	9.0		13.2	11.7	16.7		4.2				
Green Ext Time (p_c), s	0.0	7.6		1.4	0.6	7.9		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		24.1
HCM 6th LOS		C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.86		1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1179	1364		1319	1144		1451	2498		1308	2862	
Flt Permitted	0.95	1.00		0.95	1.00		0.51	1.00		0.29	1.00	
Satd. Flow (perm)	1179	1364		1319	1144		774	2498		395	2862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	36	8	208	16	151	9	399	162	261	407	12
RTOR Reduction (vph)	0	6	0	0	120	0	0	28	0	0	1	0
Lane Group Flow (vph)	22	38	0	208	47	0	9	533	0	261	418	0
Confl. Peds. (#/hr)	5		18	18		5	6		4	4		6
Heavy Vehicles (%)	41%	11%	80%	26%	23%	31%	14%	24%	32%	27%	16%	0%
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases							6			2		
Actuated Green, G (s)	5.8	5.8		21.6	21.6		34.6	33.8		63.2	57.9	
Effective Green, g (s)	5.8	5.8		21.6	21.6		34.6	33.8		63.2	57.9	
Actuated g/C Ratio	0.06	0.06		0.21	0.21		0.33	0.32		0.60	0.55	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	6.0		2.5	6.0	
Lane Grp Cap (vph)	65	75		272	236		261	807		456	1584	
v/s Ratio Prot	0.02	c0.03		c0.16	0.04		0.00	c0.21		c0.14	0.15	
v/s Ratio Perm							0.01			0.21		
v/c Ratio	0.34	0.51		0.76	0.20		0.03	0.66		0.57	0.26	
Uniform Delay, d1	47.6	48.0		39.1	34.3		23.6	30.5		11.7	12.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.2	4.3		11.6	0.3		0.0	3.1		1.4	0.3	
Delay (s)	49.8	52.4		50.7	34.7		23.6	33.6		13.2	12.5	
Level of Service	D	D		D	C		C	C		B	B	
Approach Delay (s)		51.5			43.5			33.4			12.7	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	104.6	Sum of lost time (s)	18.5
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	19	486	29	22	490
Future Vol, veh/h	24	19	486	29	22	490
Conflicting Peds, #/hr	1	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	90	90	90	90	90	90
Heavy Vehicles, %	30	25	27	12	21	18
Mvmt Flow	27	21	540	32	24	544

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1149	556	0	0	572	0
Stage 1	556	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Critical Hdwy	6.7	6.45	-	-	4.31	-
Critical Hdwy Stg 1	5.7	-	-	-	-	-
Critical Hdwy Stg 2	5.7	-	-	-	-	-
Follow-up Hdwy	3.77	3.525	-	-	2.389	-
Pot Cap-1 Maneuver	193	489	-	-	913	-
Stage 1	522	-	-	-	-	-
Stage 2	501	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	185	489	-	-	913	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	522	-	-	-	-	-
Stage 2	481	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.3	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	255	913	-
HCM Lane V/C Ratio	-	-	0.187	0.027	-
HCM Control Delay (s)	-	-	22.3	9.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	56	431	38	73	414
Future Vol, veh/h	18	56	431	38	73	414
Conflicting Peds, #/hr	2	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	350	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	29	29	28	29	19	17
Mvmt Flow	20	61	468	41	79	450

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1099	489	0	0	509	0
Stage 1	489	-	-	-	-	-
Stage 2	610	-	-	-	-	-
Critical Hdwy	6.69	6.49	-	-	4.29	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.561	-	-	2.371	-
Pot Cap-1 Maneuver	209	528	-	-	974	-
Stage 1	564	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	192	528	-	-	974	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.4	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	370	974	-
HCM Lane V/C Ratio	-	-	0.217	0.081	-
HCM Control Delay (s)	-	-	17.4	9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.3	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	318	43	44	252	1	34	10	70	2	6	11
Future Vol, veh/h	6	318	43	44	252	1	34	10	70	2	6	11
Conflicting Peds, #/hr	17	0	8	8	0	17	14	0	0	0	0	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	60	28	26	16	34	100	10	14	19	0	0	18
Mvmt Flow	7	346	47	48	274	1	37	11	76	2	7	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	292	0	0	401	0	0	786	780	378	815	803	306
Stage 1	-	-	-	-	-	-	392	392	-	388	388	-
Stage 2	-	-	-	-	-	-	394	388	-	427	415	-
Critical Hdwy	4.7	-	-	4.26	-	-	7.2	6.64	6.39	7.1	6.5	6.38
Critical Hdwy Stg 1	-	-	-	-	-	-	6.2	5.64	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.2	5.64	-	6.1	5.5	-
Follow-up Hdwy	2.74	-	-	2.344	-	-	3.59	4.126	3.471	3.5	4	3.462
Pot Cap-1 Maneuver	1001	-	-	1086	-	-	300	313	633	298	319	698
Stage 1	-	-	-	-	-	-	617	586	-	640	612	-
Stage 2	-	-	-	-	-	-	615	589	-	610	596	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	985	-	-	1078	-	-	273	290	628	240	295	678
Mov Cap-2 Maneuver	-	-	-	-	-	-	273	290	-	240	295	-
Stage 1	-	-	-	-	-	-	608	577	-	625	575	-
Stage 2	-	-	-	-	-	-	563	554	-	522	587	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	17.1	13.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	421	985	-	-	1078	-	-	423
HCM Lane V/C Ratio	0.294	0.007	-	-	0.044	-	-	0.049
HCM Control Delay (s)	17.1	8.7	-	-	8.5	-	-	13.9
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1.2	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	254	14	43	213	22	50
Future Vol, veh/h	254	14	43	213	22	50
Conflicting Peds, #/hr	0	2	2	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	27	21	35	33	27	33
Mvmt Flow	279	15	47	234	24	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	296	0	617	291
Stage 1	-	-	-	-	289	-
Stage 2	-	-	-	-	328	-
Critical Hdwy	-	-	4.45	-	6.67	6.53
Critical Hdwy Stg 1	-	-	-	-	5.67	-
Critical Hdwy Stg 2	-	-	-	-	5.67	-
Follow-up Hdwy	-	-	2.515	-	3.743	3.597
Pot Cap-1 Maneuver	-	-	1099	-	415	680
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	677	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1097	-	396	677
Mov Cap-2 Maneuver	-	-	-	-	396	-
Stage 1	-	-	-	-	705	-
Stage 2	-	-	-	-	648	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	556	-	-	1097	-
HCM Lane V/C Ratio	0.142	-	-	0.043	-
HCM Control Delay (s)	12.5	-	-	8.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	26	278	190	4	15	66
Future Vol, veh/h	26	278	190	4	15	66
Conflicting Peds, #/hr	1	0	0	1	2	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	91	91	91	91	91	91
Heavy Vehicles, %	17	30	34	0	42	36
Mvmt Flow	29	305	209	4	16	73

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	214	0	-	0	577	212
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	365	-
Critical Hdwy	4.27	-	-	-	6.82	6.56
Critical Hdwy Stg 1	-	-	-	-	5.82	-
Critical Hdwy Stg 2	-	-	-	-	5.82	-
Follow-up Hdwy	2.353	-	-	-	3.878	3.624
Pot Cap-1 Maneuver	1272	-	-	-	418	750
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	622	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1271	-	-	-	406	749
Mov Cap-2 Maneuver	-	-	-	-	406	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	621	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1271	-	-	-	648
HCM Lane V/C Ratio	0.022	-	-	-	0.137
HCM Control Delay (s)	7.9	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	2	63	57	6	94
Future Vol, veh/h	55	2	63	57	6	94
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	87	87	87	87	87	87
Heavy Vehicles, %	29	0	12	29	50	22
Mvmt Flow	63	2	72	66	7	108

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	227	105	0	0	138	0
Stage 1	105	-	-	-	-	-
Stage 2	122	-	-	-	-	-
Critical Hdwy	6.69	6.2	-	-	4.6	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.3	-	-	2.65	-
Pot Cap-1 Maneuver	705	955	-	-	1198	-
Stage 1	856	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	701	955	-	-	1198	-
Mov Cap-2 Maneuver	701	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	836	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	708	1198	-
HCM Lane V/C Ratio	-	-	0.093	0.006	-
HCM Control Delay (s)	-	-	10.6	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	63	50	43	110	98	55
Future Vol, veh/h	63	50	43	110	98	55
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles, %	58	59	59	55	54	59
Mvmt Flow	86	68	59	151	134	75
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.9	11.6	10.9
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	28%	56%	0%
Vol Thru, %	72%	0%	64%
Vol Right, %	0%	44%	36%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	153	113	153
LT Vol	43	63	0
Through Vol	110	0	98
RT Vol	0	50	55
Lane Flow Rate	210	155	210
Geometry Grp	1	1	1
Degree of Util (X)	0.332	0.252	0.312
Departure Headway (Hd)	5.703	5.866	5.363
Convergence, Y/N	Yes	Yes	Yes
Cap	629	610	669
Service Time	3.758	3.927	3.417
HCM Lane V/C Ratio	0.334	0.254	0.314
HCM Control Delay	11.6	10.9	10.9
HCM Lane LOS	B	B	B
HCM 95th-tile Q	1.5	1	1.3