FUTURE TRAFFIC FORECAST

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TO: Project Management Team

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SUBJECT: Newport Transportation System Plan

Future Traffic Forecast (Task 4.3; Technical Memo #6) Project #17081-007

Future forecasting is an important step in the transportation planning process and provides estimates of future travel demand. This memorandum documents the forecasting methodology and results associated with the travel demand model developed by ODOT for the Newport area. The Newport model was used to develop study intersection turn movement volumes for the 2040 TSP horizon year.

INTRODUCTION

Forecasted traffic volumes were developed using the latest Newport model for 30th highest hour volume conditions in 2040. The Newport Travel Demand Model was utilized as the primary tool to estimate future travel demand in Newport, with refined travel demand forecasts developed for the City by incorporating local circulation characteristics in the travel demand model. Future year 2040 baseline motor vehicle volumes were developed and post-processed using National Cooperative Highway Research Program (NCHRP) Report 765 guidelines. The resulting volumes will be used in the future traffic operations analysis.

A summary of the Newport Travel Demand Model is provided in the following sections, including a discussion of the roadway network and land use assumptions included in the model. In addition, the model "post-processing" is described and the future traffic volumes are presented.

NEWPORT TRAVEL DEMAND MODEL

The Oregon Department of Transportation (ODOT) has recently developed and will maintain a travel demand model that estimates daily and p.m. peak hour demand for the existing year (2018) and future year (2040) transportation system. The travel demand model includes the Newport Urban Growth Boundary (UGB) (refer to Figures later in this document).

These models include two key structures that help estimate future traffic:

- Transportation Analysis Zones (TAZs)

The model area is split into internal regional TAZs and external zones. Each internal TAZ represents a small subarea of the model with unique land use attributes that represent the number of households and the number and type of employees within the zone. These land use attributes determine the intensity and directionality of trips generated by the zone. The TAZ structure for Newport can be seen in Figures later in this document. Approximately 156 TAZ's represent the Newport area.

- Transportation Network

  The model includes a network of links that generally represents the major transportation system (typically collector roads and above) in the model area. Each link is coded with attributes (e.g., speed and capacity) that approximate the function of existing roadways (for the base year and future year) and programmed roadway improvements (committed funding identified) for the future year. Each TAZ is connected to links in the model at points representing where travelers access the roadway network.

FUTURE TRANSPORTATION NETWORK

There are no regionally significant transportation improvements included in the 2040 travel demand model in the Newport area. The purpose of this model is to create a "committed" system that represents the conditions and needs of the future system without including any unfunded improvements.

LAND USE DEVELOPMENT

Land use is a crucial factor in forecasting future transportation demand. The amount of land that is to be developed, the type and scale (housing units or number of employees) of the land uses, and how the land uses are arranged within the model area has a direct impact on the future system.

Before beginning the future forecasting process, existing year (2018) and future year (2040) summer and average weekday land use was developed from prior work[1] to support development of the travel demand models. A control total for population and a control target for employment was established for Newport in both 2018 and 2040 based on projections developed by Portland State University[2], the Economic Opportunities Analysis[3], and QCEW data provided by the State of Oregon. A household control target was estimated for both 2018 and 2040 using data provided by the Census. The control totals and targets established for the average weekday land use scenario for Newport are summarized below in Table 1.

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[1] DKS previously developed 2010 and 2040 land use for Newport as part of the initial model development effort in 2011, although the developed land use was not used to develop a full model at that time.

[2] Population Research Center Portland State University. *Coordinated Population Forecast for Lincoln County, its Urban Growth Boundaries, and Area Outside UGBs 2017-2067.* 2017.

[3] ECONorthwest. *Newport Commercial and Industrial Buildable Lands Inventory and Economic Opportunities Analysis.* 2012.

TABLE 1: NEWPORT LAND USE CONTROL TOTALS AND TARGETS (AVERAGE WEEKDAY)

NEWPORT AREA*	EXISTING (2018)	FUTURE (2040)	TOTAL GROWTH	PERCENT GROWTH
POPULATION	10,909	13,241	2,332	21%
HOUSEHOLDS	4,660	5,656	996	21%
EMPLOYEES	11,321	13,535	2,214	20%

The 2018 land use was developed from the previous 2010 land use. The total number of new households was identified using aerials and a list of recent developments compiled by the City; the total number of households was converted to a population estimate using the previously established average household size for each zone. Newport's household and population estimates are the same for both the summer and average weekday land use scenarios. The total number of employees for each zone was also grown to 2018 using an assumed 1% annual growth rate and compared to 2017 QCEW data to estimate current employment for the average weekday land use scenario. Average weekday employment was converted to summer employment using the same ratio of summer to average weekday employment as in the 2010 land use. City staff reviewed and provided feedback on this land use scenario to ensure the household, population, and employment numbers match local conditions.

The 2040 land use was developed from the previous 2040 land use. The future land use was compared with base year 2018 land use to identify zones with high employment or household growth to flag these zones for additional review. Zones with high household growth were reviewed against the residential buildable lands inventory and a list of pending residential developments provided by the City. Zones with high employment growth were also reviewed against the employment buildable lands inventory, recent developments which could spur further growth, or other large employers. The total employment was generally distributed to each employment type using the same distribution as in 2018 unless there was no previous employment in the zone or an expected significant change in employment type. City staff provided additional review of the 2040 land use scenarios to ensure the land use projections match their desired growth patterns.

Due to the importance of seasonal tourism on the Oregon Coast, the number of visiting households was also estimated as a model input. The City of Newport has previously surveyed their total number of short-term housing units in 2016 and 2019 which was assumed to represent the total number of visiting household units in 2018. Average weekday occupancy data from a 2010 survey and an assumed summer occupancy rate of 90% was used to convert the total number of units to visiting households. The average annual growth in visiting households between the 2010 and 2018 land use was used to project visiting household totals for 2040 although the total number of visiting households was capped in proportion to the total available units. Zoning information and City input was also used to identify any future hotel developments which could add to the stock of visiting household units for Newport. Both 2018 and 2040 visiting households were distributed to

each TAZ using the existing distribution of visiting households for each zone and modified based on City input.

FUTURE GROWTH AREAS

The Newport model generally uses household and employment information as a basis for estimating future transportation activity. Various types of employment are associated with different types of origin-destination intensities and patterns in the p.m. peak hour. For example, TAZs with large employment numbers may generate a heavy outbound travel movement, sending trips toward TAZs with more households. Conversely, TAZs with numerous retail employees may attract trips in the p.m. peak hour. Table 2 summarizes how households and employment are assumed to change between the 2018 base year and 2040.

As shown in Table 2, the population, number of permanent households and number of visiting households within the Newport area is projected to increase by up to 21 percent from 2018 to 2040. Overall, employment in Newport is expected to increase up to 24 percent from 2018.

TABLE 2: NEWPORT MODEL LAND USE CHANGES (2018-2040)

NEWPORT AREA*		EXISTING (2018)	FUTURE (2040)	TOTAL GROWTH	PERCENT GROWTH
POPULATION	Average Weekday	11,345	13,730	2,385	21%
	Summer				
PERMANENT HOUSEHOLDS	Average Weekday	5,037	6,040	1,003	20%
	Summer				
VISITING HOUSEHOLDS	Average Weekday	1,211	1,423	212	18%
	Summer	2,605	3,098	493	19%
EMPLOYEES	Average Weekday	11,123	13,731	2,608	23%
	Summer	11,251	13,942	2,691	24%

Source: Newport Travel Demand Model

Note: * These locations are not limited to the city limits and includes 3 TAZ's outside of the Urban Growth Boundary.

The following maps summarize the change in land use in Newport between 2018 and 2040. Figures 1a to 1c show the increase in total households for each zone. High housing growth is concentrated around Newport's urban fringe including in northern Newport along US 101, Big Creek Park, Newport Middle School, in eastern Newport between US 20 and Yaquina Bay Road, and near the Oregon Coast Community College.

Figures 2a to 2c show the average weekday and Figures 3a to 3c show the summer increase in total employment for each zone within Newport. High employment growth is concentrated near Avery Street, the Lincoln County Fairgrounds, the Port of Newport, the South Beach area, Oregon Coast Community College, the Newport Airport, and the Holiday Beach area for both the summer and average weekday land use scenarios. Moderate employment growth is also expected along US 101 and in Newport's downtown area.

FIGURE 1A: HOUSEHOLD GROWTH (NORTH) (2018 – 2040)

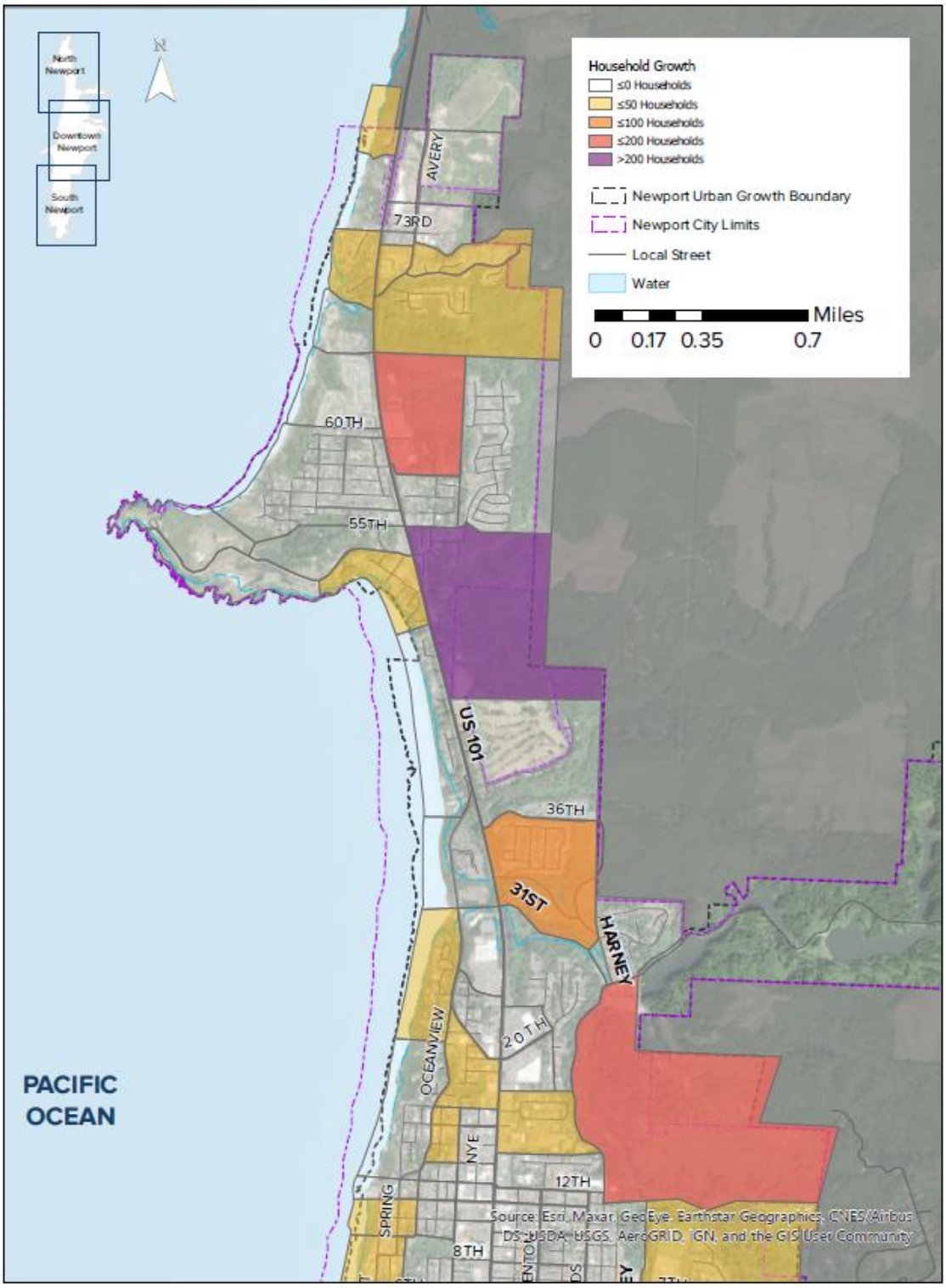


FIGURE 1B: HOUSEHOLD GROWTH (DOWNTOWN) (2018 – 2040)

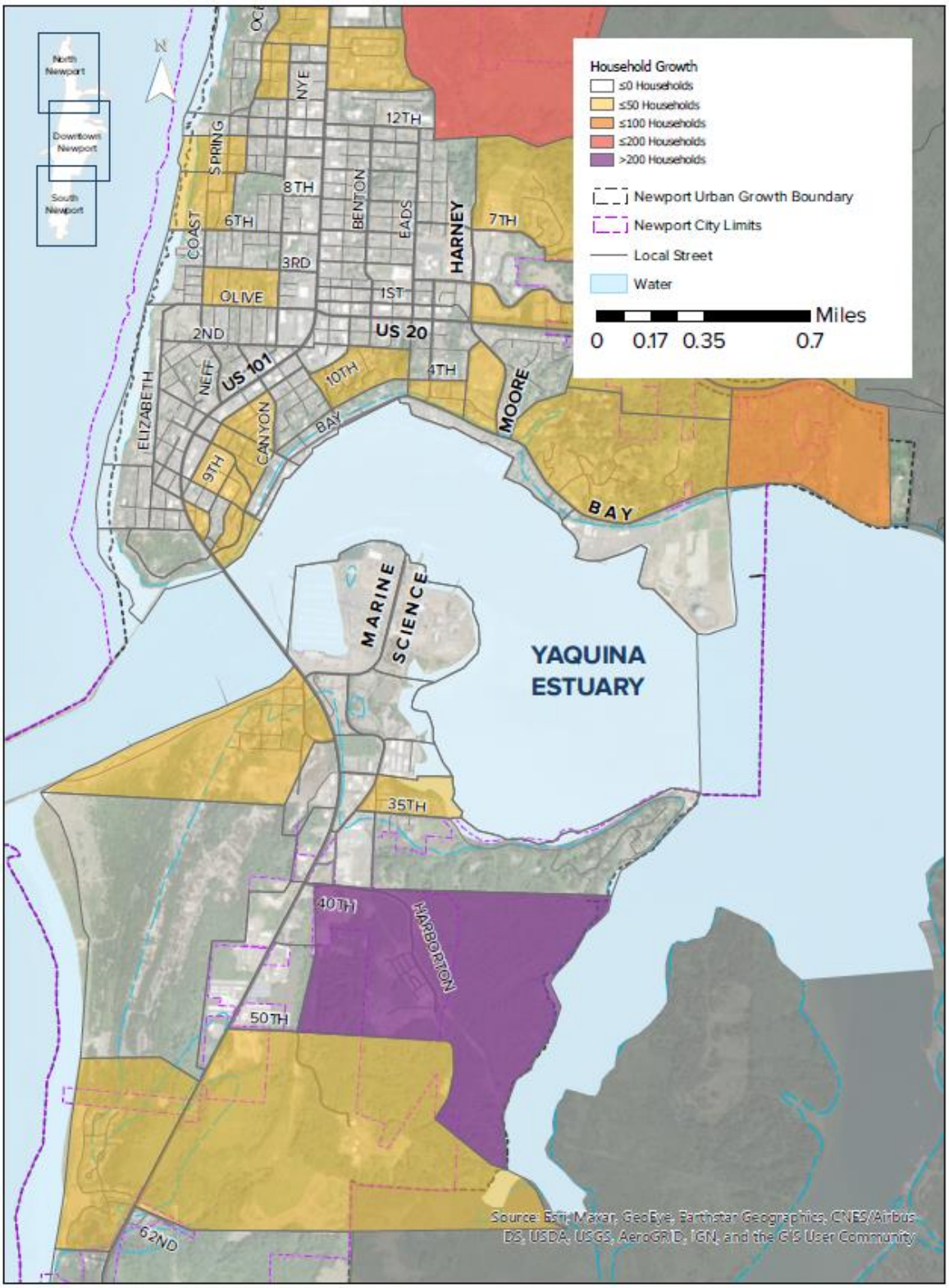


FIGURE 1C: HOUSEHOLD GROWTH (SOUTH) (2018 – 2040)

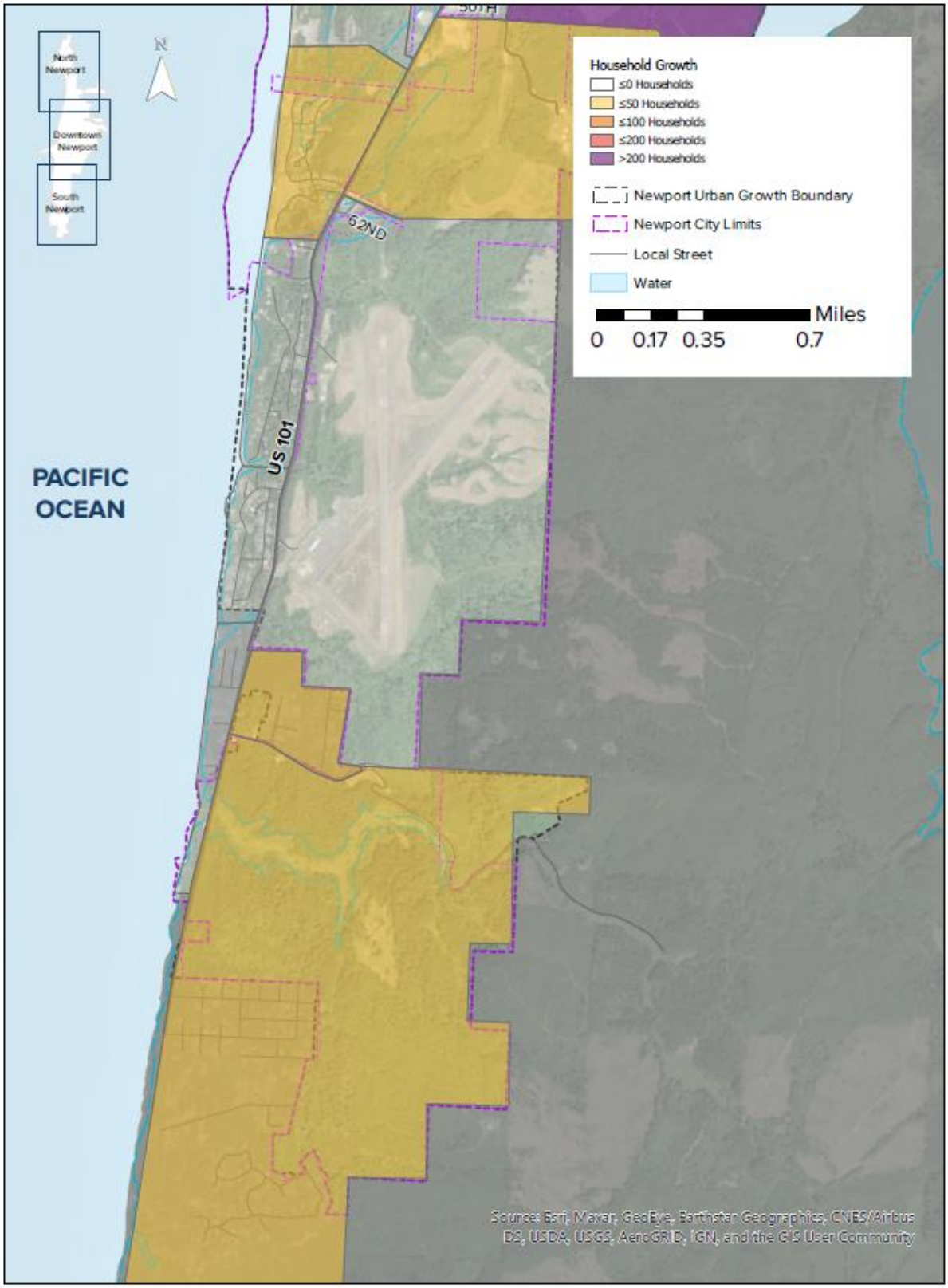


FIGURE 2A: AVERAGE WEEKDAY EMPLOYMENT GROWTH (NORTH) (2018 – 2040)

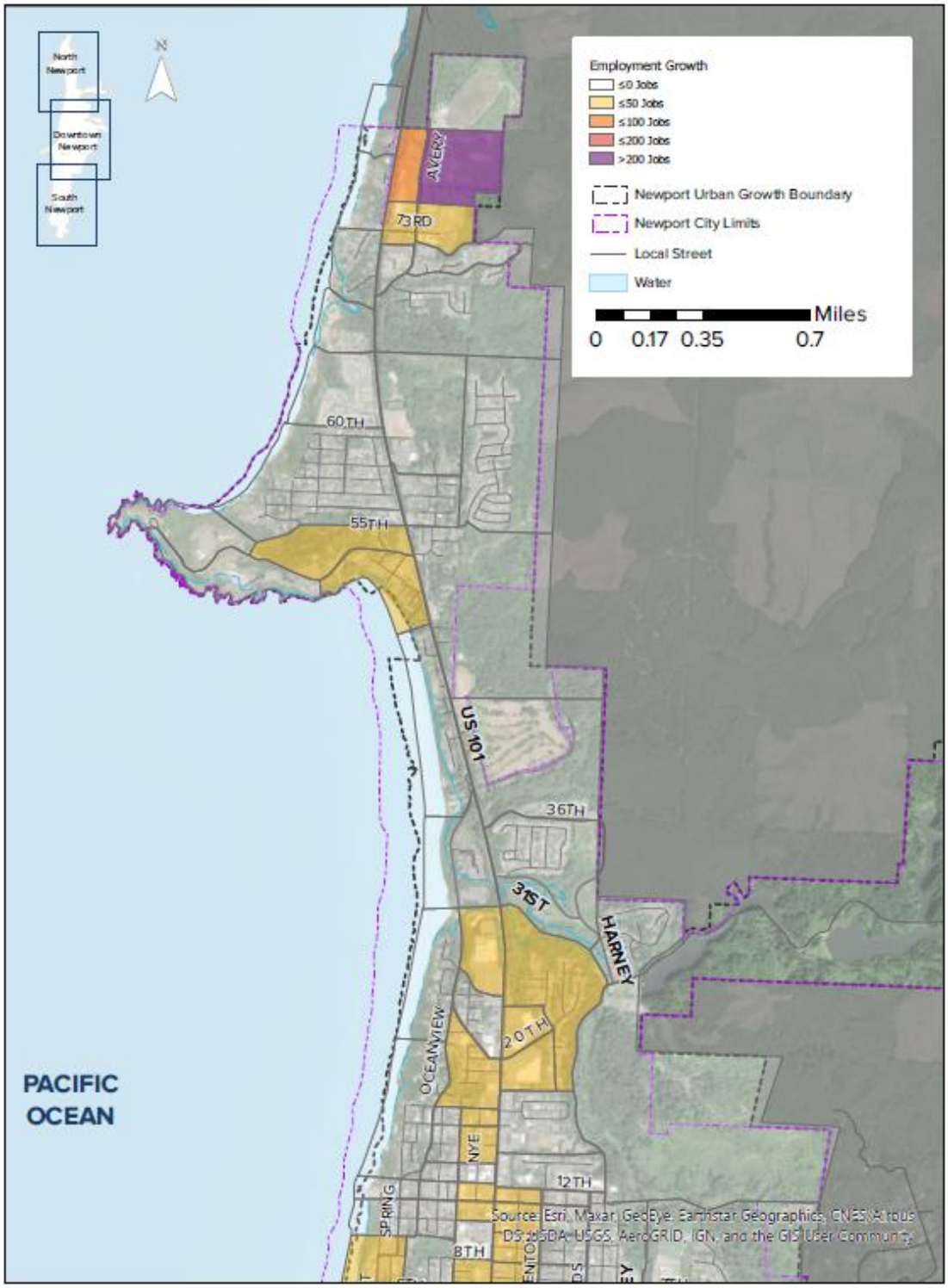


FIGURE 2B: AVERAGE WEEKDAY EMPLOYMENT GROWTH (DOWNTOWN) (2018 – 2040)

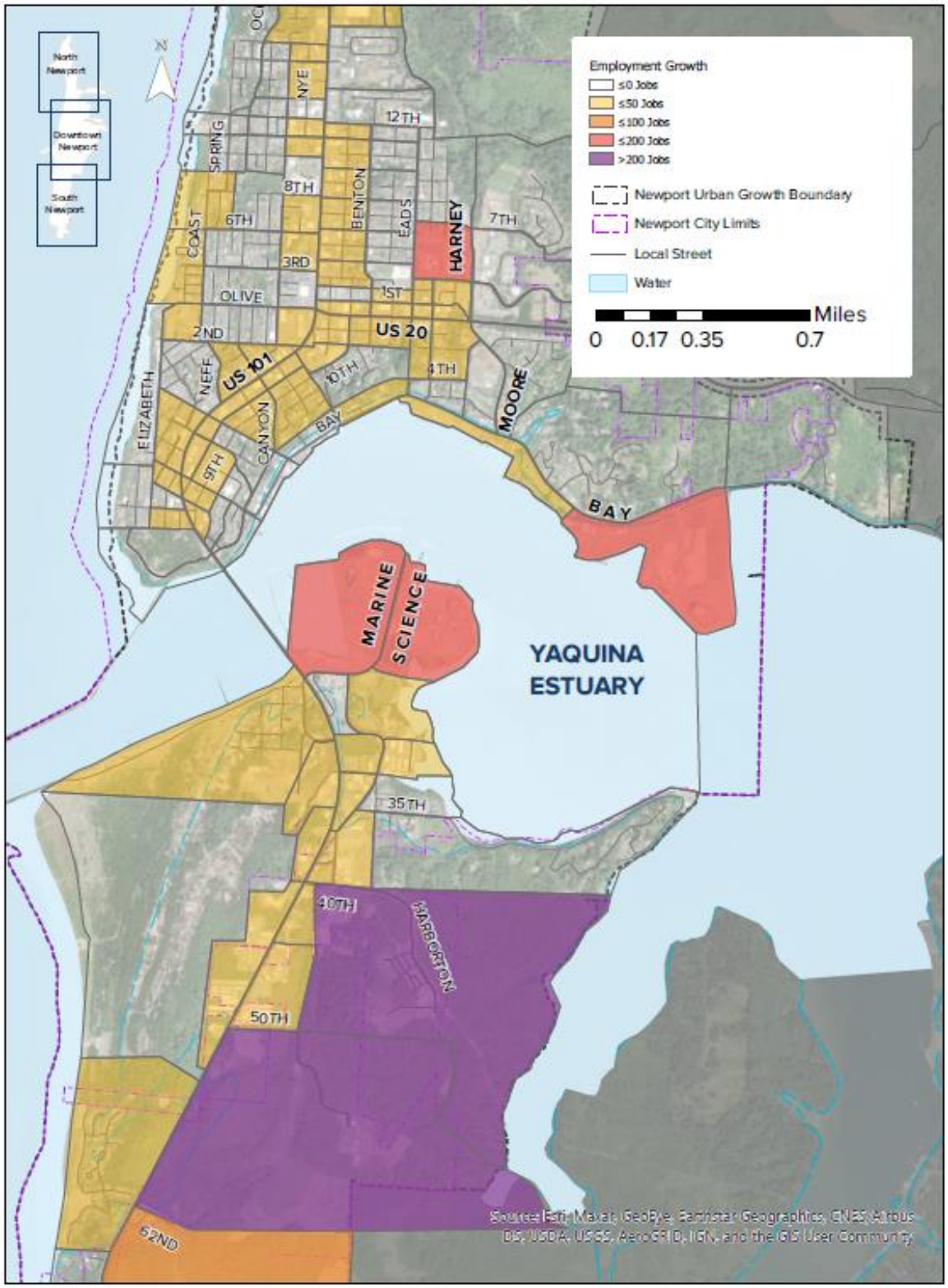


FIGURE 2C: AVERAGE WEEKDAY EMPLOYMENT GROWTH (SOUTH) (2018 – 2040)

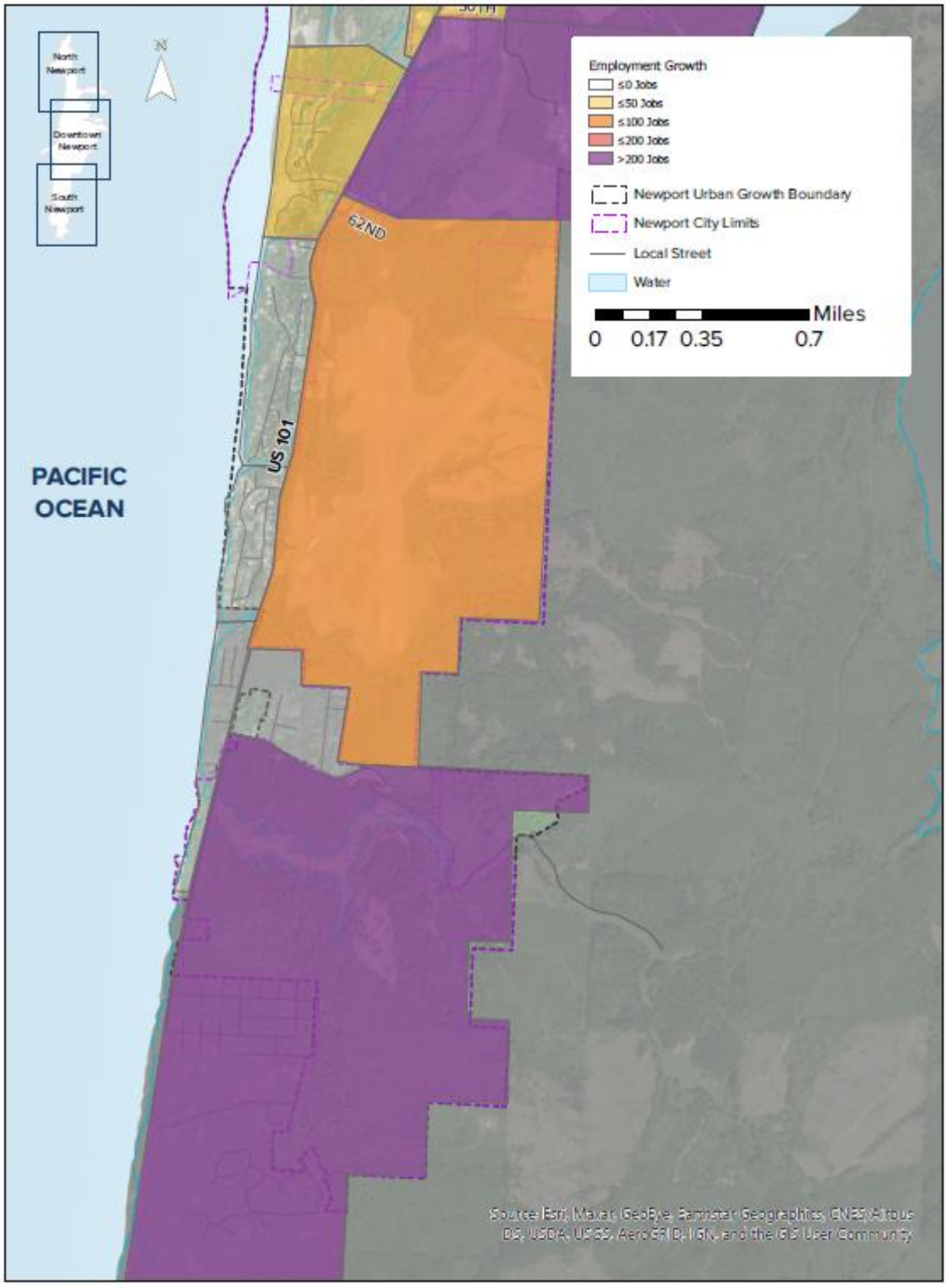


FIGURE 3A: SUMMER EMPLOYMENT GROWTH (NORTH) (2018 – 2040)

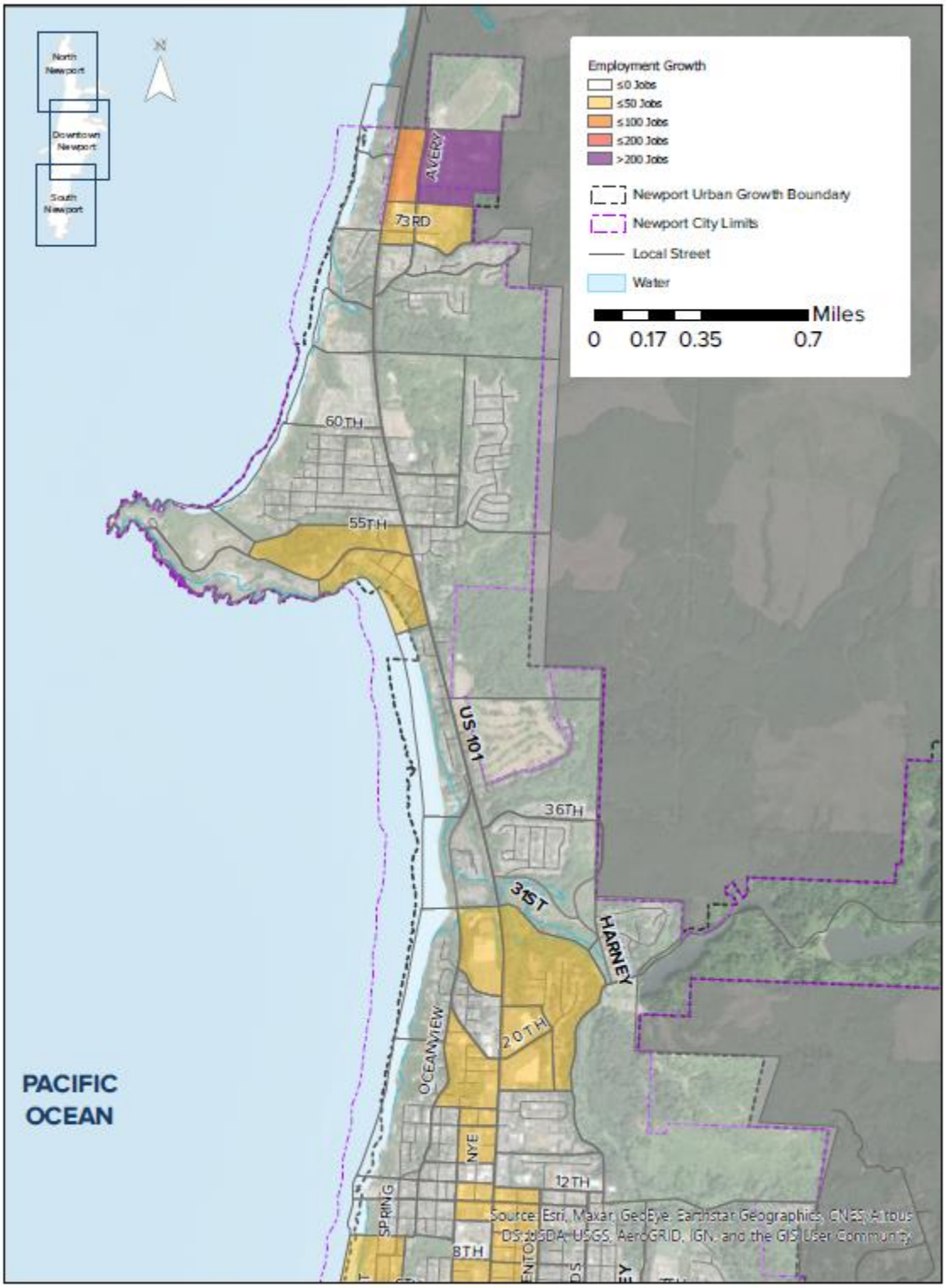


FIGURE 3B: SUMMER EMPLOYMENT GROWTH (DOWNTOWN) (2018 – 2040)

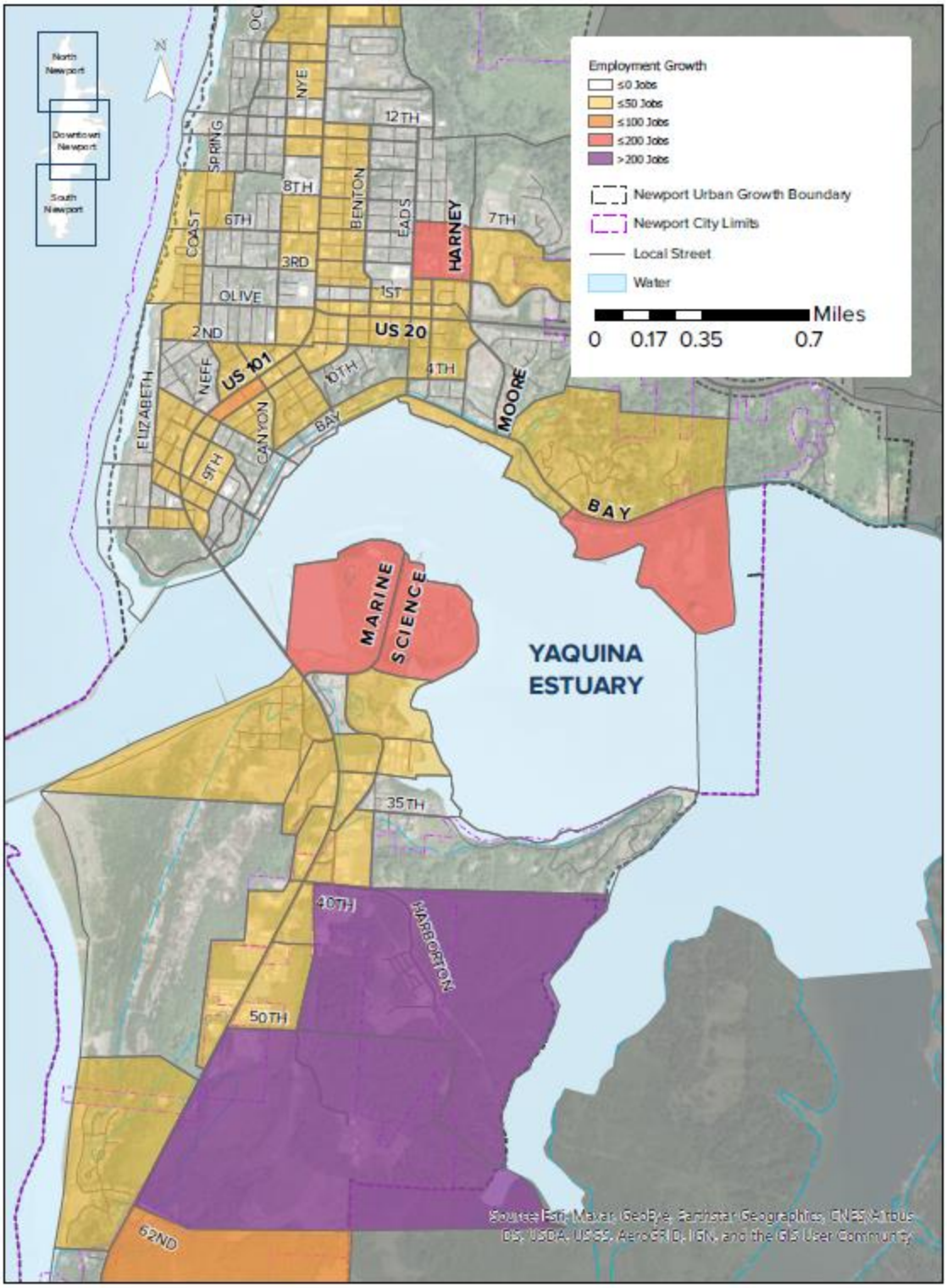
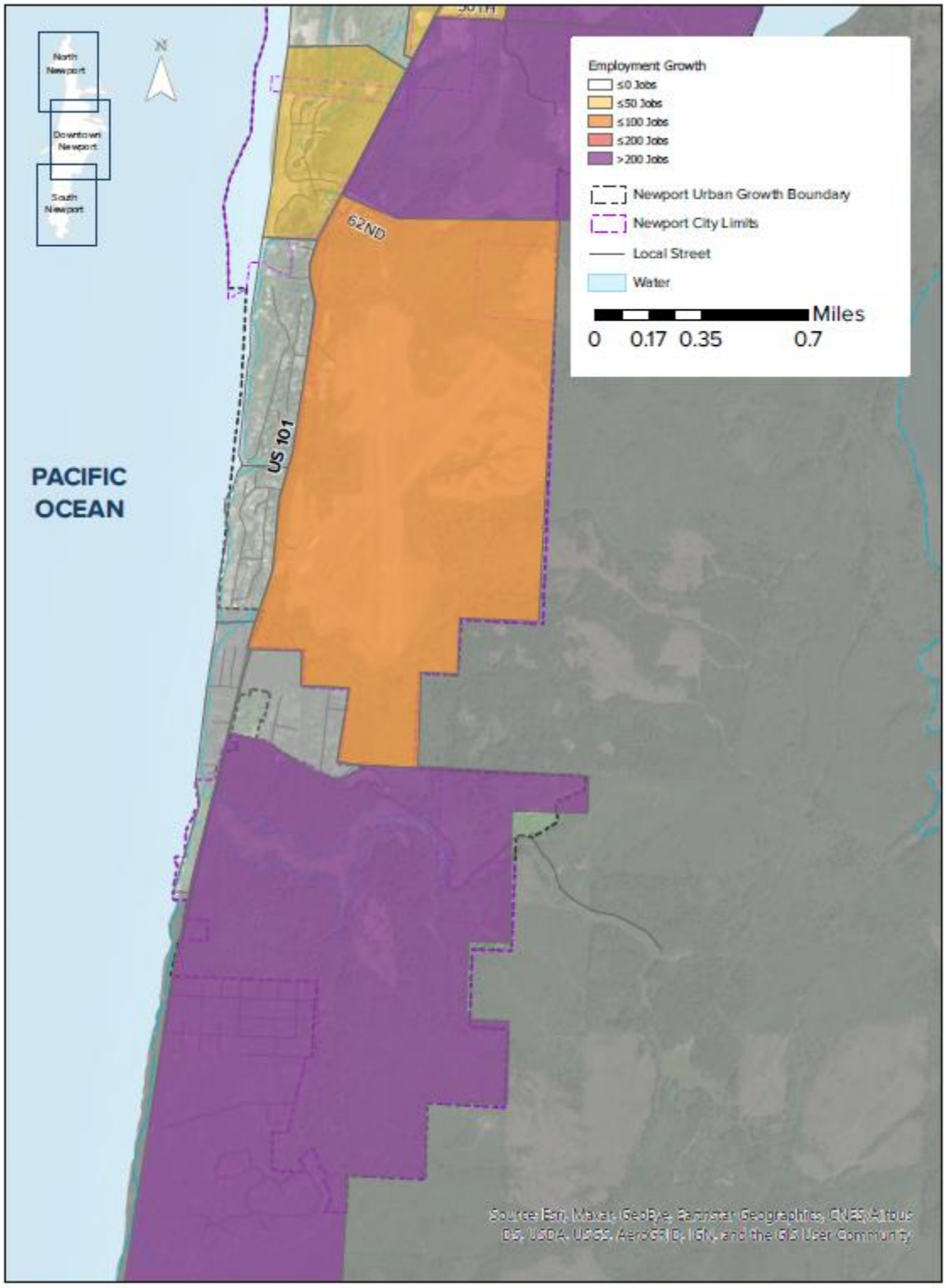


FIGURE 3C: SUMMER EMPLOYMENT GROWTH (SOUTH) (2018 – 2040)



TRAVEL DEMAND

The model's trip generation process calculates the total number of trips per TAZ. This was done for each TAZ based on the existing and projected land uses described previously in the Future Growth Areas section of this memorandum. The trips are separated into different types (home-to-work, home-to-shopping, etc.).

The increase in the number of households and employees in the model area increases the overall number of trips generated. Table 3 summarizes the total p.m. peak hour motor vehicle trip ends for the Newport area for year 2018 and year 2040. The number of vehicle trips is expected to grow by approximately 27 percent between 2018 and 2040 if the land develops according to the modeled land use assumptions. This is generally consistent with the projected population and land use increases.

TABLE 3: VEHICLE TRIP GENERATION (PM PEAK HOUR)

PERIOD*	2018 TRIP ENDS	2040 TRIP ENDS	TRIP END GROWTH	PERCENT GROWTH
AVERAGE WEEKDAY	5,713	7,248	1,535	27%
SUMMER	6,640	8,438	1,798	27%

Source: Newport Travel Demand Model

Note: * These locations are not limited to the city limits and include surrounding unincorporated areas to provide location context.

TRIP DISTRIBUTION

The trip distribution step estimates trips between origins and destinations. The model uses various factors to decide on the destination for each trip produced (started) in the TAZ. For example, home-based shopping trips produced near a downtown shopping area will choose the downtown shopping area destination over a similar shopping area in a different town due to shorter travel times.

Travel demand projections estimate the number of three distinct types of trips:

- **External-External (E-E) Trips** do not have an origin or destination in Newport and do not stop while passing through the Newport UGB. These are through traffic trips that enter or exit the city via one of the major gateways, including US 20 to the east or US 101 to the north or south.
- **Internal-External (I-E) Trips** originate in Newport and travel to a location outside of the Newport UGB, and **External-Internal (E-I) Trips** originate outside of the Newport UGB and travel to a location within Newport.
- **Internal-Internal (I-I) Trips** travel from one location within the Newport UGB to another location within the UGB.

Table 4 shows the destination for trips entering Newport at the three major gateways during the 2040 p.m. peak hour, including US 20 to the east and US 101 to the north or south. Most of the traffic entering the city ends within the city (external-internal trips), with at least 59 percent of trips from each gateway. For trips entering via US 20, about 29 percent are external-external trips and travel through the city and exit via US 101 to the north (14 percent) or south (15 percent). For trips entering via US 101 at the north end of the city, about 40 percent are external-external trips and travel through the city and exit via US 101 to the south (26 percent) or US 20 to the east (14 percent). For trips entering via US 101 at the south end of the city, about 41 percent are external-external trips and travel through the city and exit via US 101 to the north (24 percent) or US 20 to the east (17 percent).

TABLE 4: TRIP DESTINATION SUMMARY BY GATEWAYS IN NEWPORT (2040 PM PEAK HOUR)

TRIP BEGINNING	TOTAL ENTERING TRIPS	TRIP ENDING (BY % OF TRIPS ENTERING AT GATEWAY)			
		WITHIN NEWPORT	US 20- EAST GATEWAY	US 101- NORTH GATEWAY	US 101- SOUTH GATEWAY
US 20- EAST GATEWAY	878	71%	-	14%	15%
US 101- NORTH GATEWAY	571	60%	14%	-	26%
US 101- SOUTH GATEWAY	563	59%	17%	24%	-

Source: Newport Travel Demand Model

Table 5 shows the origination of trips exiting Newport at the three major gateways during the 2040 p.m. peak hour, including US 20 to the east and US 101 to the north or south. Most of the traffic exiting the city begins within the city (internal-external trips), representing at least 60 percent of trips exiting at each gateway. For trips exiting via US 20, about 28 percent are external-external trips and travel through the city and enter via US 101 to the north (13 percent) or south (15 percent). For trips exiting via US 101 at the north end of the city, about 40 percent are external-external trips and travel through the city and enter via US 101 to the south (21 percent) or US 20 to the east (19 percent). For trips exiting via US 101 at the south end of the city, about 40 percent are external-external trips and travel through the city and enter via US 101 to the north (21 percent) or US 20 to the east (19 percent).

TABLE 5: TRIP ORIGINATION SUMMARY BY GATEWAYS IN NEWPORT (2040 PM PEAK HOUR)

TRIP ENDING	TOTAL EXITING TRIPS	TRIP BEGINNING (BY % OF TRIPS EXITING AT GATEWAY)			
		WITHIN NEWPORT	US 20- EAST GATEWAY	US 101- NORTH GATEWAY	US 101- SOUTH GATEWAY
US 20- EAST GATEWAY	652	72%	-	13%	15%
US 101- NORTH GATEWAY	624	60%	19%	-	21%
US 101- SOUTH GATEWAY	688	60%	19%	21%	-

Source: Newport Travel Demand Model

MOTOR VEHICLE TRAFFIC ASSIGNMENT

In this modeling process, motor vehicle trips from one zone to another are assigned to specific travel routes in the network. The resulting trip volumes are accumulated on links of the network until all trips are assigned. The route on which a trip is assigned generally depends on whether it offers the shortest travel time among all possible routes, given all the other trips on the network. Figures 4a and 4b shows the p.m. peak hour growth in trips along regional corridors between 2018 and 2040 for both the average weekday and the summer (thicker lines correlate to higher p.m. peak hour trip growth). The most significant increases are along the primary regional state facilities: US 20 and US 101. Other routes with notable growth include Bay Boulevard, Yaquina Bay Road, and various roadways that parallel US 20 or US 101.

FIGURE 4A: AVERAGE WEEKDAY PM PEAK HOUR TRIP GROWTH (2018 – 2040)

FIGURE 4B: SUMMER PM PEAK HOUR TRIP GROWTH (2018 – 2040)

POST PROCESSING AND MODEL APPLICATION TO NEWPORT

The year 2018 and year 2040 model and assignments were prepared and provided by ODOT. Limited additional minor network refinements were applied during the forecasting process to add detail to account for local connectivity and circulation patterns, particularly in the vicinity of study intersections. Adding the new network detail helps refine local circulation within the Newport area without affecting routing in the model. Modifications include:

- Closed Big Creek Road to northbound motor vehicle traffic (Fogarty Street to Harney Street)
- Increased speed on Moore Drive to 30 mph (US 20 to Bay Boulevard)

PM peak hour model volumes were extracted from the model for both the base year (2018) and forecast year (2040) scenarios. A "post processing" technique following NCHRP 765 Methodology was utilized to refine model travel forecasts to the volume forecasts presented in Table 6 and Table 7. Post processing is the application of manual adjustments to existing count data and model projections to minimize potential model error and bias.

TABLE 6: 2040 TRAFFIC VOLUMES (AVERAGE WEEKDAY)

			Northbound			Southbound			Eastbound			Westbound		
N/S	**E/W**	**#**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**
Study Intersections														
US 101	NE 73rd St	1	2	735	50	20	570	2	1	0	5	90	0	15
US 101	NE 52nd St	2	45	915	130	30	720	25	30	5	75	85	0	15
US 101	NW Oceanview Dr	3	20	1015	0	0	835	45	85	0	30	0	0	0
US 101	NE 36th St	4	0	1000	35	10	840	0	0	0	0	20	0	15
US 101	NE 31st St	5	0	1025	85	15	845	0	0	0	0	30	0	10
US 101	NE 20th St	6	50	1145	95	65	910	15	35	45	70	265	25	75
US 101	NE 11th St	7	10	1290	15	15	1215	20	65	15	20	25	10	45
US 101	NE 6th St	8	30	1255	20	20	1190	25	75	30	25	75	15	35
US 101	US 20	9	60	825	205	330	870	70	170	170	25	220	140	250
US 101	SW Angle St	10	10	950	10	45	1015	45	10	15	15	10	10	105
US 101	SW Hurbert St	11	20	845	10	40	965	20	35	20	30	60	35	40
US 101	Bayley St	12	25	1015	10	5	1080	15	10	0	50	10	0	25
US 20	SE Benton St	13	15	2	150	5	5	35	10	655	45	110	550	5
US 20	SE Moore Dr	14	90	60	65	135	55	35	45	725	115	60	500	135
NW Oceanview Dr	NW 25th St	15	0	85	70	15	75	0	0	0	0	35	0	35
NW Nye St	NW 11th St	16	15	70	45	10	45	5	2	25	2	10	20	5
NE Harney St	NE 7th St	17	105	0	30	0	1	0	1	45	115	20	35	0
SW 9th St	SW Hurbert St	18	15	180	15	15	80	60	10	45	10	2	60	20
SW 9th St	SW Abbey St	19	15	70	10	30	40	15	20	30	10	1	55	35
SE Moore Dr	SE Bay Blvd	20	95	95	0	0	120	40	50	0	85	0	0	0

TABLE 7: 2040 TRAFFIC VOLUMES (DHV)

			Northbound			Southbound			Eastbound			Westbound		
N/S	**E/W**	**#**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**
Study Intersections														
US 101	NE 73rd St	1	5	885	60	20	690	2	1	0	5	95	0	15
US 101	NE 52nd St	2	55	1080	120	30	850	30	35	5	90	95	0	15
US 101	NW Oceanview Dr	3	20	1150	0	0	970	55	130	0	60	0	0	0
US 101	NE 36th St	4	0	1085	40	10	995	0	0	0	0	25	0	15
US 101	NE 31st St	5	0	1115	90	20	995	0	0	0	0	35	0	10
US 101	NE 20th St	6	60	1325	115	80	1075	20	40	55	80	325	30	90
US 101	NE 11th St	7	10	1500	15	15	1445	25	75	15	25	30	10	50
US 101	NE 6th St	8	35	1445	25	25	1400	30	90	35	30	75	20	35
US 101	US 20	9	75	900	215	335	975	80	205	195	35	255	165	280
US 101	SW Angle St	10	10	1080	15	60	1135	55	15	20	20	10	10	120
US 101	SW Hurbert St	11	20	965	10	45	1080	20	40	25	35	70	40	45
US 101	Bayley St	12	25	1110	10	10	1195	20	15	0	60	10	0	30
US 20	SE Benton St	13	20	5	210	5	10	40	15	695	45	120	625	5
US 20	SE Moore Dr	14	125	80	75	175	65	40	60	835	135	75	570	195
NW Oceanview Dr	NW 25th St	15	0	110	100	20	90	0	0	0	0	80	0	70
NW Nye St	NW 11th St	16	15	100	55	15	60	5	5	30	5	15	25	10
NE Harney St	NE 7th St	17	125	0	35	0	1	0	1	40	135	25	30	0
SW 9th St	SW Hurbert St	18	20	215	15	20	100	70	10	55	10	5	70	20
SW 9th St	SW Abbey St	19	20	80	10	40	45	15	25	35	15	1	75	45
SE Moore Dr	SE Bay Blvd	20	145	160	0	0	155	110	65	0	100	0	0	0