Technical Memo #6

Future Traffic Forecast Methodology and Results
September 21, 2021 – FINAL

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Introduction

This memorandum documents the increase in traffic expected to occur in the Nehalem Bay region between now and 2040 and the existing transportation system's ability to accommodate the expected growth. This memorandum outlines the following:

- Expected land use growth in the region
- Expected population growth in the cities and the county
- Expected transportation growth from planned projects and regional travel along Highway 101
- The methods used to calculate 2040 traffic volumes on Highway 101 and at the intersections of Highway 101 / Hemlock Street in Wheeler and Highway 101 / 7th Avenue in Nehalem
- Analysis results for roadway segments and intersections in 2040

Land Use Growth

In recent years, the demand for housing has increased in all three cities. This trend is expected to continue over the next 20 years with all three cities expecting housing development to continue within their respective Urban Growth Boundaries (UGB).

Manzanita

The City of Manzanita is already experiencing infill development within the City Core, which is expected to continue. The City also anticipates that approximately 300 new homes will be built on currently vacant land east of Classic Street within the next eight years, though the development has not been approved as of September 2021.

Nehalem

The City of Nehalem is also experiencing an increase in residential development. However, this development is primarily occurring in Bayside Gardens, located outside city limits but within the UGB. Further development is anticipated within Hilltop Estates, Riverview Meadows, and Nehalem Point.

The City recently received an application for a Mixed-Use-Development at the corner of 7th Street and H Street. This development would include 3,370 square feet of commercial space and eight apartment units. Due to the concern of a new traffic generator adjacent to the 7th Street/Highway 101 intersection, traffic from this development has been accounted for in the 2040 traffic forecasts and proximity of the development to the intersection will be considered in development of the project list.

Wheeler

Due to the build out in Manzanita and Nehalem, Wheeler is also experiencing an increase in demand for housing. While there are no planned housing developments at this time, there is a proposed Mixed-Use Development on the Wheeler waterfront. The Mixed-Use Development on the Wheeler waterfront that will include the construction of 28 cottages, a 30-room hotel, and a two-story commercial building (consisting of 4 employee housing units, 2,153 square feet of restaurant space, 2,124 square feet of retail space, and 2,630 square feet of storage space). While the project is projected to add 49 net new morning peak hour trips, 52 net new evening peak hour trips, and 584 net new average weekday trips to the intersection of Highway 101 and Hemlock Street in 2023, there are no recommended changes to the intersection configuration based on the Transportation Impact Analysis conducted for the project (March 2020). The trip generation estimated for the site will be included in the 2040 future year traffic analysis for the TSP.

It is expected that Rhinehart Clinic, currently located at 2nd Street/Rowe Street, will relocate to the southern end of the City on the south side of Highway 101.

Currently, there are no expected changes to the UGB for any of the three cities.

Population Growth

The Population Research Center at Portland State University publishes historical population trends and estimated future population growth for cities and counties throughout the state. The most recent estimates, published in 2017 forecast growth from 2017 to 2067.

Historically, Tillamook County's population grew an average of 0.4 percent per year between 2000-2010. However, it is predicted that the County's population will grow at a slightly faster pace through 2035 and will increase by more than 2,800 people. Manzanita, Nehalem, and Wheeler all saw higher growth from 2000-2010 than the County average and are predicted to grow at the same or at faster rate than the County through 2035, as shown in **Table 1**.

Table 1. Historical and Forecasted Population Growth in Nehalem Bay

Jurisdiction	Historical				Forecast			
	2000	2010	AAGR[1] (2000-2010)	2017	2035	2067	AAGR[1] (2017-2035)	AAGR[1] (2035-2067)
Tillamook County	24,262	25,250	0.4%	26,071	28,879	32,747	0.6%	0.4%
Manzanita UGB	712	827	1.5%	884	1,156	1,567	1.5%	1.0%
Nehalem UGB	873	1,120	2.5%	1,240	1,566	2,010	1.3%	0.8%

Wheeler UGB	391	420	0.7%	408	474	539	0.8%	0.4%

Source: U.S. Census Bureau, 2000 and 2010 Censuses; Forecast by Population Research Center, Portland State University
[1]Average Annual Growth Rate (AAGR)

Transportation Growth

Prior planning documents including the Tillamook County TSP, Manzanita Trail Master Plan, Manzanita and Nehalem Downtown Transportation Plans, Wheeler TSP, and Wheeler Waterfront Development Plan identified transportation improvements in each of the three communities that would be needed to meet the needs of the cities. At this time, there are no funds allocated to previously identified improvements in any of the cities; therefore, no transportation improvements within the cities were accounted for in the development of 2040 traffic forecasts and future needs. ODOT has two improvement projects planned for U.S. 101 through Nehalem Bay from their 2021-2024 Statewide Transportation Improvements Program (STIP). These projects are:

- Install chevrons and updated curve warning signs & advisory speed plaques at various locations to improve safety. (mp 0 – mp 167.51)
- Rehabilitate and replace culverts to ensure they are functioning properly. (mp 37.11 – mp 102.78)

Traffic Volumes

Base year (2019) Traffic Volumes

The base year AADT on Highway 101, Highway 53, 7th Avenue in Nehalem, and Laneda Avenue in Manzanita was provided by ODOT from the Highway Economic Requirements System (HERS) database. This segment level data was supplemented by PM (3:00pm-6:00pm) intersection traffic counts at Highway 101 / Hemlock Street in Wheeler (January 2020) and Highway 101 / 7th Avenue in Nehalem (March 2021). Base year traffic volumes and intersection operations can be found in *Technical Memorandum #5: Existing Conditions.* To account for seasonal variations in traffic, a seasonal factor was applied to base year traffic data and an additional factor was applied to counts collected in 2021 to account for changes in travel resulting from the COVID-19 pandemic.

Future year (2040) Traffic Volumes

To develop future 2040 traffic volumes for both segment and intersection analysis, the growth rates on Highway 101 were used to grow the existing traffic volumes. Future year (2039) AADT on Highway 101 was provided by ODOT from the Future Volume Tables (FVT). The HERS data available for each segment included:

- The K-factor, which is the ratio of the 30th highest hour volume (30HV) to the AADT
- The directional factor, which is the percentage of the two-way volume that is flowing in the peak direction
- The number of travel and turn lanes on each segment

The average annual growth rate from 2018 to 2039 was calculated from the FVT AADT. This growth rate was then used to grow the base year ADT to 2040. The 2040 AADT was multiplied by the K-factor to calculate the 30HV along each segment, and the directional factor was then used to calculate the 30HV in the peak direction. This volume was then used in the future traffic analysis to calculate future year volume to capacity ratio along Highway 101 in Nehalem Bay. Calculations for future growth are included in **Appendix A.**

As shown in **Table 2,** the volumes on Highway 101 are expected to grow between 0.1 and 1.4 percent from 2018 to 2039.

Table 2. Forecasted AADT and Growth on Highway 101 through Nehalem Bay

MP	Description	2018	2039	Total Growth	Annual Growth Rate
43.08	0.02 mile north of Manzanita Avenue	5,200	6,700	1,500	1.4%
43.20	0.02 mile south of Laneda Avenue	6,600	9,900	3,300	2.5%
43.98	0.02 mile east of Bayside Gardens Lane	7,100	7,300	200	0.1%
44.73	At west city limits of Nehalem	7,100	7,300	200	0.1%
44.96	0.02 mile west of 7th Street	6,600	6,900	300	0.2%
45.00	0.02 mile south of "H" Street	8,300	9,200	900	0.5%
45.53	At south city limits of Nehalem	6,000	6,200	200	0.2%
46.48	0.02 mile north of Necanicum Highway (OR53)	5,800	6,400	600	0.5%
46.52	0.02 mile south of Necanicum Highway (OR53)	5,500	5,700	200	0.2%
47.08	At the north city limits of Wheeler	5,300	5,500	200	0.2%
47.32	0.02 mile north of Rector Street	5,500	5,700	200	0.2%
47.36	0.02 mile south of Rector Street	5,300	5,400	100	0.1%
43.08	0.02 mile north of Manzanita Avenue	5,200	6,700	1,500	1.4%

Source: Highway Future Volume Table, 2019

To forecast future traffic volumes at the intersections of Highway 101 / Hemlock Street in Wheeler and Highway 101 / 7th Avenue in Nehalem, the base year turning movement volumes were multiplied by the annual Highway 101 growth percentages for the applicable segment of

Highway 101 location shown in **Table 2**. This annual growth rate was multiplied by the 20 years of expected growth. Lastly, growth expected from the developments documented above in Nehalem and Wheeler were added to the 2040 forecasts. The 2040 intersection forecasts were then analyzed using SIDRA and Synchro to evaluate the existing network's ability to accommodate expected growth. The analysis results are documented below and will be used to identify future transportation needs, which will be documented in *Technical Memorandum #7: Future Transportation Conditions and Needs.*

Traffic Analysis Assumptions and Results

Technical analysis for the future year followed ODOT's guidance as outlined in the APM for evaluating roadway segment delay and analyzing intersection operations using Highway Capacity Software Version 7 (HCS 7), Synchro 11,and SIDRA traffic analysis software. Volume-to-capacity (v/c) ratio is reported for both roadway segments and intersections as described below.

Roadway Segment Operations

For the study roadway segments the v/c ratio during the 2040 30th HV was calculated using HCS 7 for a two-lane highway. Inputs for this analysis will include:

- Lane width
- Shoulder Width
- Heavy Vehicle Percentage
- Access Density
- Speed
- Peak Direction Volume

The v/c ratio for the peak direction will be reported as part of this analysis for future conditions.

Roadway Segment Results

As shown in **Table 3,** all segments will continue to have a v/c ratio significantly below the targets defined in the Oregon Highway Plan (OHP). Detailed calculations are provided in **Appendix B**.

Table 3: Roadway Segment 30th HV V/C in 2040

ID	Segment	v/c target[1]	v/c[2]
1	US 101 north of Laneda Avenue	0.80	0.37
2	US 101 at west city limits of Nehalem	0.80	0.40
3	US 101 west of 7th Street	0.85	0.38
4	US 101 north of Tohls Street	0.85	0.51
5	US 101 north of Necanicum Highway	0.70	0.35
6	US 101 north of Hemlock Street	0.80	0.30
7	US 101 north of Rector Street	0.85	0.32

[1] v/c targets taken from the Oregon Highway Plan Table 6 based on highway category and posted speed.
[2] v/c calculated using HCS for a two-lane highway and reported for the peak direction.

Intersection Operations

Synchro 11 traffic analysis software was used to analyze queueing at the intersection of Highway 101 and Hemlock Street in Wheeler. To analyze the Highway 101/ 7th Street intersection in Nehalem, SIDRA was used. SIDRA was selected for the 7th Street intersection through coordination with ODOT due to the non-standard intersection control at the intersection. The intersection is an all-way stop controlled (AWSC) intersection with free movements for all northbound vehicles and vehicles making the eastbound right-turn. The calibration parameters available in SIDRA allow for a more accurate analysis that reflects additional delay created by the high percentage of drivers that are visitors to the area and therefore unfamiliar with the unique intersection control.

Synchro and SIDRA use intersection geometry, traffic control, and multimodal volumes to estimate how an intersection is operating. The analysis for this study used the default Synchro/SIDRA settings outlined in Appendix 12/13A of the APM and ODOT's published Synchro templates. Roadway geometry, including lane configurations, turn pocket lengths, and lane widths, will be determined through the most recent aerial imagery.

This software employs Highway Capacity Manual (HCM) methodologies to calculate and report a number of measures of effectiveness (MOEs) for intersection operations, among them level of service, delay, queuing, and volume to capacity ratio. For this analysis, HCM 6th Edition reports will be used to report v/c, LOS, delay, and 95th percentile queues.

Level of Service and Delay

Level of service (LOS) is a standard method for characterizing delay at an intersection. For signalized and all-way stop controlled (AWSC) intersections, the LOS is based on the average

delay for all approaches. For two-way stop controlled (TWSC) intersections, the approach with the highest delay is used.

Volume to Capacity Ratio

The v/c ratio is the total vehicle volume travelling through a roadway segment during a defined period divided by the capacity of the roadway segment. This is a common measure for the level of congestion on a roadway, with a v/c ratio of 0 indicating no congestion, and a v/c ratio of 1 indicating maximum congestion.

Queuing

Queuing is an estimate of the physical length of the waiting line of vehicles from the stop line of the intersection. 95th percentile queue will be reported for the study intersections meaning that over the course of the peak hour, there is only a five percent probability that this queue length would be exceeded.

Intersection Operations Results

As shown in **Table 4,** both intersections are forecast to operate at LOS C in 2040 and the v/c ratios will remain below the mobility targets in the OHP. Queueing was also evaluated as part of the intersection analysis. No movements were found to exceed available storage or have queues that would impact traffic flow. It is important to note that, during peak seasonal travel, driver unfamiliarity with the configuration at the U.S. 101/7th Street intersection has been reported to cause an increase in congestion, specifically for eastbound vehicles turning right. This is expected to continue, and delay associated with unfamiliar drivers is likely to increase as regional traffic on Highway 101 increases in the future.

Detailed LOS calculations are provided in **Appendix A**.

Table 4: Intersection Operations in 2040

ID	Intersection	Intersection Delay (seconds) /LOS	Approach	V/C	Critical Movement
1	Highway 101 /7th Street (Nehalem)	18/C	Northbound	0.31	0.24 (EBR)
			Eastbound	0.43	
			Southbound	0.41	
			Westbound	0.11	
2	Highway 101/Hemlock Street (Wheeler)	22/C	Northbound	0.23	0.23 (NBT)
			Eastbound	0.15	
			Southbound	0.21	
			Westbound	0.10	

Multi-Modal Analysis

Bicycle Level of Traffic Stress (BLTS)

ODOT has recently conducted a BLTS analysis for roadway segments, and as a part of the recent update to the Statewide Active Transportation Needs Inventory, bicycle gaps and deficiencies were identified across the entire state. These findings were discussed in the existing conditions memo and any future projects that may change the bicycle facilities or gaps described in existing conditions will be noted in the future analysis.

Pedestrian Analysis

As a part of the recent update to the Statewide Active Transportation Needs Inventory, pedestrian gaps and deficiencies were identified across the entire state. These findings were discussed in the existing conditions memo and any future projects that may change the pedestrian facilities or gaps described in existing conditions will be noted in the future analysis.

Appendix A: 2040 Volume Calculations

Appendix B: LOS Calculations

HCS7 Two-Lane Highway Report

Project Information

Analyst	Fehr & Peers	Date	June 2021
Agency	ODOT	Analysis Year	2021
Jurisdiction	Region 2	Time Period Analyzed	30th Hour
Project Description	Nehalem Bay TSP Existing Conditions	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	1840
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	40	Access Point Density, pts/mi	0.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	632	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.95	Total Trucks, %	15.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.37

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	45.1
Speed Slope Coefficient	2.96246	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.46414	PF Power Coefficient	0.70569
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	1840	-	-	42.8

Vehicle Results

Average Speed, mi/h	42.8	Percent Followers, %	65.3
Segment Travel Time, minutes	0.49	Followers Density, followers/mi/ln	9.6
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	632	Bicycle Effective Width, ft	24
Bicycle LOS Score	7.04	Bicycle Effective Speed Factor	4.17
Bicycle LOS	F		

Segment 2

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	7300
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	40	Access Point Density, pts/mi	0.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	684	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.95	Total Trucks, %	15.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.40

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	45.1
Speed Slope Coefficient	3.02271	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.37932	PF Power Coefficient	0.71194
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	10.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	42.7

Vehicle Results

Average Speed, mi/h	42.7	Percent Followers, %	65.1
Segment Travel Time, minutes	1.94	Followers Density, followers/mi/ln	10.4
Vehicle LOS	D		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	684	Bicycle Effective Width, ft	24
Bicycle LOS Score	7.08	Bicycle Effective Speed Factor	4.17
Bicycle LOS	F		

Segment 3

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	1420
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	30	Access Point Density, pts/mi	0.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	653	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.95	Total Trucks, %	15.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.38

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	33.7
Speed Slope Coefficient	2.33720	Speed Power Coefficient	0.41674

PF Slope Coefficient	-1.48321	PF Power Coefficient	0.65177
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	31.9

Vehicle Results

Average Speed, mi/h	31.9	Percent Followers, %	67.5
Segment Travel Time, minutes	0.51	Followers Density, followers/mi/ln	13.8
Vehicle LOS	D		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	653	Bicycle Effective Width, ft	24
Bicycle LOS Score	6.04	Bicycle Effective Speed Factor	3.39
Bicycle LOS	F		

Segment 4

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	355
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	30	Access Point Density, pts/mi	0.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	863	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.95	Total Trucks, %	15.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.51

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	33.7
Speed Slope Coefficient	2.33529	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.48979	PF Power Coefficient	0.65001
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	20.3
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	31.6

Vehicle Results

Average Speed, mi/h	31.6	Percent Followers, %	74.2
Segment Travel Time, minutes	0.13	Followers Density, followers/mi/ln	20.3
Vehicle LOS	E		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	863	Bicycle Effective Width, ft	24
Bicycle LOS Score	6.18	Bicycle Effective Speed Factor	3.39
Bicycle LOS	F		

Segment 5

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	6860
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	55	Access Point Density, pts/mi	0.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	600	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.95	Total Trucks, %	15.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.35

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	62.2
Speed Slope Coefficient	3.94583	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.27082	PF Power Coefficient	0.76401
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	5.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	59.2

Vehicle Results

Average Speed, mi/h	59.2	Percent Followers, %	57.7
Segment Travel Time, minutes	1.32	Followers Density, followers/mi/ln	5.8
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	600	Bicycle Effective Width, ft	24
Bicycle LOS Score	7.83	Bicycle Effective Speed Factor	4.79
Bicycle LOS	F		

Segment 6

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	3480
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	45	Access Point Density, pts/mi	0.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	516	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.95	Total Trucks, %	15.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.30

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	50.8
Speed Slope Coefficient	3.29420	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.38534	PF Power Coefficient	0.73565
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	6.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	48.5

Vehicle Results

Average Speed, mi/h	48.5	Percent Followers, %	57.3
Segment Travel Time, minutes	0.82	Followers Density, followers/mi/ln	6.1
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	516	Bicycle Effective Width, ft	24
Bicycle LOS Score	7.27	Bicycle Effective Speed Factor	4.42
Bicycle LOS	F		

Segment 7

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	1360
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	25	Access Point Density, pts/mi	0.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	537	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.95	Total Trucks, %	15.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.32

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	28.0
Speed Slope Coefficient	2.02712	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.44792	PF Power Coefficient	0.61940
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	12.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	1360	-	-	26.6

Vehicle Results

Average Speed, mi/h	26.6	Percent Followers, %	62.7
Segment Travel Time, minutes	0.58	Followers Density, followers/mi/ln	12.7
Vehicle LOS	D		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	537	Bicycle Effective Width, ft	24
Bicycle LOS Score	4.92	Bicycle Effective Speed Factor	2.61
Bicycle LOS	E		

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	2	20	10	2	10	30	340	10	20	320	20
Future Vol, veh/h	20	2	20	10	2	10	30	340	10	20	320	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	100	0	0	0	8	0	29	10	0
Mvmt Flow	24	2	24	12	2	12	35	400	12	24	376	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	919	918	388	925	924	406	400	0	0	412	0	0
Stage 1	436	436	-	476	476	-	-	-	-	-	-	-
Stage 2	483	482	-	449	448	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	8.1	6.5	6.2	4.1	-	-	4.39	-	-
Critical Hdwy Stg 1	6.1	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	4.4	4	3.3	2.2	-	-	2.461	-	-
Pot Cap-1 Maneuver	254	274	665	170	271	649	1170	-	-	1016	-	-
Stage 1	603	583	-	422	560	-	-	-	-	-	-	-
Stage 2	569	557	-	439	576	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	235	255	665	154	253	649	1170	-	-	1016	-	-
Mov Cap-2 Maneuver	235	255	-	154	253	-	-	-	-	-	-	-
Stage 1	579	566	-	406	538	-	-	-	-	-	-	-
Stage 2	535	535	-	409	559	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.3	21.1	0.6	0.5
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1170	-	-	341	249	1016	-	-
HCM Lane V/C Ratio	0.03	-	-	0.145	0.104	0.023	-	-
HCM Control Delay (s)	8.2	0	-	17.3	21.1	8.6	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0.3	0.1	-	-

MOVEMENT SUMMARY

Site: 1 [7th_101 (Site Folder: General)]

New Site
Site Category: (None)
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: U.S. 101														
3	L2	410	4.0	441	4.0	0.307	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	28.0
8	T1	40	0.0	43	0.0	0.307	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	28.0
18	R2	10	5.0	11	5.0	0.307	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	28.0
Approach		460	3.7	495	3.7	0.307	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	28.0
East: H Street														
1	L2	10	3.0	11	3.0	0.114	17.3	LOS C	0.4	10.0	0.94	1.26	2.07	22.7
6	T1	10	3.0	11	3.0	0.114	17.3	LOS C	0.4	10.0	0.94	1.26	2.07	22.8
16	R2	10	3.0	11	3.0	0.114	17.3	LOS C	0.4	10.0	0.94	1.26	2.07	22.9
Approach		30	3.0	32	3.0	0.114	17.3	LOS C	0.4	10.0	0.94	1.26	2.07	22.8
North: 7th Street														
7	L2	10	0.0	11	0.0	0.408	18.2	LOS C	1.8	49.4	0.94	1.43	2.59	22.5
4	T1	40	25.0	43	25.0	0.408	18.2	LOS C	1.8	49.4	0.94	1.43	2.59	22.5
14	R2	100	12.0	108	12.0	0.408	18.2	LOS C	1.8	49.4	0.94	1.43	2.59	22.6
Approach		150	14.7	161	14.7	0.408	18.2	LOS C	1.8	49.4	0.94	1.43	2.59	22.5
West: U.S. 101														
5	L2	100	10.0	108	10.0	0.431	14.7	LOS B	1.9	52.0	1.00	1.49	2.69	23.3
2	T1	10	0.0	11	0.0	0.431	14.7	LOS B	1.9	52.0	1.00	1.49	2.69	23.4
12	R2	410	3.0	441	3.0	0.306	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	28.0
Approach		520	4.3	559	4.3	0.431	3.2	LOS A	1.9	52.0	0.21	0.31	0.57	26.9
All Vehicles		1160	5.4	1247	5.4	0.431	4.3	LOS A	1.9	52.0	0.24	0.36	0.64	26.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.