

XI. Transportation Impact Analysis

CANBY BRISTOL TOWNHOMES

TRANSPORTATION IMPACT ANALYSIS

MARCH 2023

PREPARED FOR:

CITY OF CANBY

PREPARED BY DKS ASSOCIATES



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EXECUTIVE SUMMARY

A summary of key findings from the proposed Bristol Townhomes development Transportation Impact Analysis is provided below:

- **Transportation Approval Criteria and Livability Measures:**

- The proposed site adequately addresses each transportation approval criteria and livability measure with the recommended transportation conditions of approval.

- **Expected Additional Vehicle Trips:**

- Approximately 14 a.m. peak trips, 17 p.m. peak trips, and 216 average daily trips.
 - > The intersections closest to the proposed project will be expected to see the highest increase in peak trips such as OR 99E/S Ivy Street and S Ivy Street/ S Township Road, with up to 14 additional peak trips and up to 174 additional daily trips.

- **Intersection Operations:**

- Peak-hour intersection operations were evaluated for the existing and future 2025 background (without the proposed project) and project conditions (with the proposed project) scenarios.
- Existing intersection volume data was collected and adjusted to reflect future 2025 Project Conditions using a background growth rate of 0.5 percent per year and adding trips generated by all approved but unoccupied developments in the City (see Table 6) and trips generated by the proposed development.
 - > Figure 1 shows the level of congestion experienced at study intersections and along roadway segments in 2025 with the proposed project.
 - The measured conditions indicate that drivers are experiencing some congestion during peak travel times, particularly at OR 99E/ S Ivy Street intersection, although the conditions are still within the acceptable range when compared to the adopted ODOT and City mobility standards at all study intersections.

- **Proposed Site Access and Internal Site Circulation:**

- The site includes two proposed driveways to connect the proposed site to public streets, one to S Township Road and one to S Knott Street.
 - > The proposed driveways would 26-feet wide and provide full ingress/egress for vehicles and bicycles.
 - > A proposed internal drive aisle would connect both proposed driveways and provide access to the on-site parking areas.
 - > The proposed access to S Knott Street complies with the City's spacing standard, however the proposed driveway to S Township Road would be located 30 feet closer than the 100-foot collector spacing standard.
 - However, no operational or safety issues are anticipated due to the low number of vehicles using these existing driveways that serve single-family uses.
 - A deviation to the spacing standard in the Code will be required for this driveway.
- Preliminary sight distance evaluation indicates that sight distance is adequate. However, prior to occupancy, sight distance at all access points will need to be verified, documented, and stamped by a registered professional Civil or Traffic Engineer licensed in the State of Oregon.

- The site plan also shows a proposed sidewalk on the internal drive aisle along the frontage of the residential units, and a connection to S Township Road and S Knott Street.
- The proposed internal site circulation and connections to external public streets meets City requirements and can adequately accommodate all users.

- **Proposed Site Frontage Improvements:**

- The applicant will be required to design and construct improvements along the entire site frontage of S Township Road and S Knott Street to City standard.
 - > The existing paved width of S Township Road meets the City's cross-section standard for Collector streets, although the sidewalk along the frontage is substandard and the applicant should reconstruct with a 6-foot sidewalk.
 - > S Knott Street is improved and exceeds the City's cross-section standard for Local streets, with a 40-foot paved width (the current standard requires a 34-foot paved width for Local streets). However, the applicant must construct a 6-foot sidewalk along the frontage.

FIGURE 1: ESTIMATED LEVEL OF DELAY (2025 PM PEAK HOUR WITH PROPOSED PROJECT)



SECTION 1. INTRODUCTION

The purpose of this transportation impact analysis is to identify potential transportation system needs triggered by the proposed Bristol Townhomes development located on Township Road, between S Knott Street and S Locust Street in Canby, Oregon. The site is proposed to consist of 30 attached residential units.

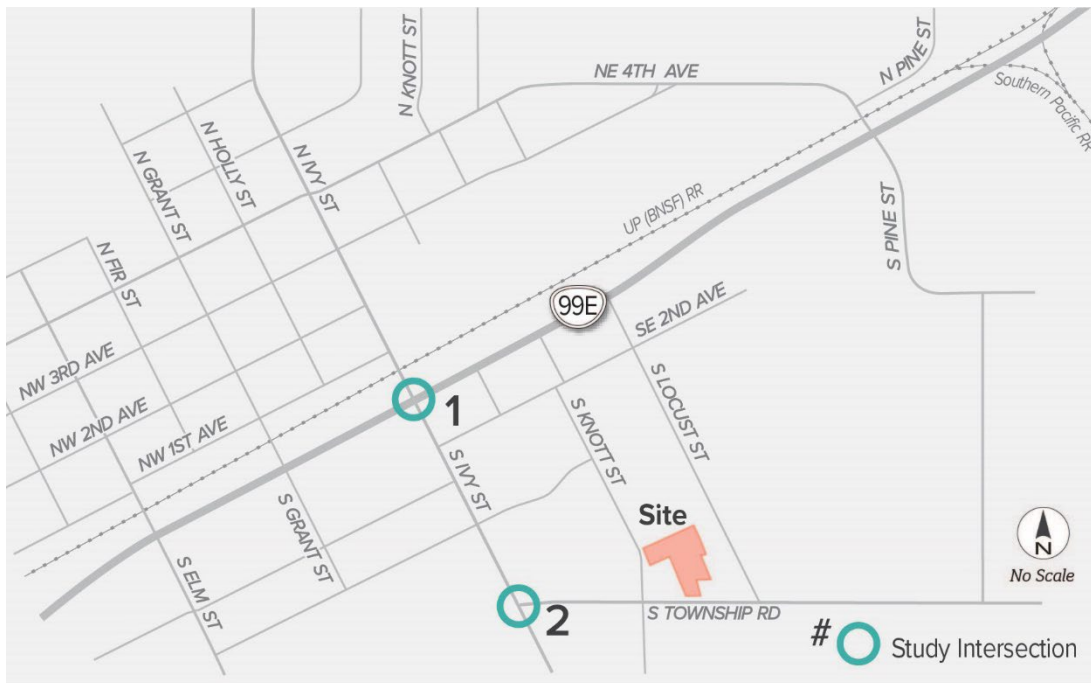
Included in the following sections is a documentation of existing transportation conditions, a summary of the assumptions and methodologies used to analyze future transportation conditions, a detail of traffic operating conditions, and a summary of recommendations related to the proposed project.

PROJECT AREA

The project site is located approximately 0.6 miles southeast of downtown Canby on Township Road, between S Knott Street and S Locust Street. The following intersections were evaluated as study intersections (see Figure 2), with their intersection control listed:

1. OR 99E/ S Ivy Street (signalized intersection)
2. S Ivy Street/ S Township Road (two-way stop)

FIGURE 2: STUDY AREA



SECTION 2. EXISTING CONDITIONS

This section provides documentation of existing transportation conditions in the project area, including an inventory of the existing transportation network, and an operational analysis and safety evaluation of the study intersections. Supporting details are provided in the Appendix.

PEDESTRIAN AND BICYCLE FACILITIES

An inventory of the existing pedestrian and bicycle facilities was collected to determine the current location of sidewalks and bicycle lanes near the proposed project site. An existing curb-tight sidewalk is available along the proposed site frontage along S Township Road, while a sidewalk gap exists along the proposed site frontage of S Knott Street. There are currently striped bike lanes on S Township Road adjacent to proposed site.

Pedestrian and bicycle count data during the morning and evening peak periods was also collected at the study intersections. The count data shows that during the peak periods, up to 20 pedestrian crossings were observed at the OR 99E / S Ivy Street intersection and up to 5 pedestrian crossings were observed at the S Ivy Street/ S Township Road intersection.

Bicycle activity at the study intersections was also counted during the peak periods. Up to 9 bicyclists traveled through the OR 99E study intersection/ S Ivy Street during the peak periods, while up to 6 were observed at the S Ivy Street/ S Township Road intersection.

TRANSIT

Canby Area Transit (CAT) provides transit service to the project area via Route 99X as well as the Canby Loop. Route 99X runs along OR 99E and connects Canby to Oregon City and Woodburn. This route also connects Canby to the Oregon City Transit Center where riders can transfer to several additional TriMet bus lines. The nearest Route 99X stop to the project area is at the Canby Transit Center, located approximately ½ mile northwest (or about a 10-minute walk) of the site at NW 1st Avenue/S Ivy Street.

The Canby Loop is a local circulator bus route around the City and runs adjacent to the project site along S Township Road, with stops at the S Ivy Street and S Locust Street intersections.

CAT also provides general public Dial-A-Ride service for anyone traveling to or from destinations within the Canby Urban Growth Boundary (UGB). Service is provided between 8 a.m. and 6 p.m., Monday through Friday.

ROADWAY NETWORK

Characteristics of the key roadways adjacent to the proposed project site are summarized in Table 1. S Township Road provides for higher capacity east and west motor vehicle movement through the study area. It maintains a two-lane cross-section (i.e., one through lane in each direction) and connects the proposed project site to S Ivy Street to the west and S Pine Street, S Redwood Street

and Sequoia Parkway to the east. S Knott Street is a local street adjacent to the proposed project site and connects S Township Road with SE 2nd Avenue and OR 99E to the north.

TABLE 1: PROJECT FRONTAGE ROADWAY CHARACTERISTICS

ROADWAY	JURISDICTION*	CLASSIFICATION*	NO. OF LANES	SIDEWALKS	BIKE LANES
S TOWNSHIP ROAD	City of Canby	Collector	2	Yes	Yes
S KNOTT STREET	City of Canby	Local Street	2	No	No

* Source: Canby Transportation System Plan. Adopted December 2010.

EXISTING TRAVEL CONDITIONS

To determine intersection operations, turn movement count data was obtained for the study intersections during the weekday morning peak period (7 to 9 a.m.) and evening peak period (4 to 6 p.m.). The raw counts were adjusted using methodology from the ODOT Analysis Procedures Manual (APM) to determine the 30th highest annual hour volume (30 HV) for the study intersections. The 30 HV is commonly used for design purposes and represents the level of congestion that is typically encountered during the peak travel month.

To determine when the 30th highest annual hour volume occurs, data is examined from Automatic Traffic Recorder (ATR) stations that record highway traffic volumes year-round. If no on-site ATR is present, one with similar characteristics can be identified using ODOT's ATR Characteristics Table. If these do not produce a similar ATR with average annual daily traffic volumes (AADT) within 10% of study area volumes, the seasonal trend method should be used. The seasonal trend method averages seasonal trend groupings from the ATR Characteristics Table. For the study area, no ATR's are located on-site, and the ATR Characteristics Table did not produce matches within 10% of the study area AADT volumes. Therefore, the seasonal trend method was utilized to develop a calculated seasonal factor of 1.16. This factor was applied to the existing count data, with the adjusted existing peak hour traffic volumes shown later in Figure 5.

DAILY MOTOR VEHICLE VOLUMES

Daily count data was also obtained along S Township Road adjacent to the proposed project site. The count data indicates that approximately 5,925 vehicles traveled along S Township Road during an average weekday. The highest number of hourly trips occurred during the a.m. peak hour, with nearly 450 vehicles counted near the proposed site.

INTERSECTION OPERATIONS

This section discusses the existing conditions for motor vehicles at the study intersections, including an analysis of traffic operations.

Intersection Performance Measures

Level of service (LOS) ratings and volume-to-capacity (v/c) ratios are two commonly used performance measures that provide a good picture of intersection operations. Agencies often incorporate these performance measures into their mobility standards. Descriptions are given below:

- **Level of service (LOS):** A “report card” rating (A through F) based on the average delay vehicles experienced at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak travel demand. LOS D and E indicate progressively worse operation conditions. LOS F represents conditions where average vehicle delay has become excessive, and demand has exceeded capacity.
- **Volume-to-capacity (v/c) ratio:** A decimal representation (typically between 0.00 and 1.00) of the proportion of capacity that used at a turn movement, approach leg, or intersection. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00 (generally above 0.70), congestion noticeably increases, and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and lengthy delays.

Jurisdictional Mobility Standards

The mobility standards for the study intersections vary according to the agency of jurisdiction for each roadway. The OR 99E / S Ivy Street intersection is under ODOT jurisdiction and requires a v/c ratio of 1.00 to be maintained during the peak hours¹. The S Ivy Street/ S Township Road is under Clackamas County jurisdiction and requires a v/c ratio of 0.95 or less be maintained².

Existing Operating Conditions

Motor vehicle conditions were evaluated during the peak hours at the study intersections (see Table 2) using the *Highway Capacity Manual, 6th Edition* (HCM)³ methodologies. As shown in Table 2, the study intersections meet the mobility standards under existing conditions. However, the OR 99E/ S Ivy Street intersection is operating above a 0.70 v/c during the peak, indicating that drivers are experiencing some congestion, although the condition is still within the acceptable range when compared to the adopted ODOT mobility standard.

¹ Oregon Highway Plan, Policy 1F, Table 6. Updated May 2015.

² Clackamas County Comprehensive Plan, Table 5-2b, Updated March 2014.

³ Highway Capacity Manual, 6th Edition, Transportation Research Board, 2016.

TABLE 2: EXISTING 2022 STUDY INTERSECTION OPERATIONS

INTERSECTION	JURISDICTION	MOBILITY STANDARD	AM PEAK			PM PEAK		
			DELAY (SEC)	LOS	V/C	DELAY (SEC)	LOS	V/C
OR 99E/ S IVY STREET*	ODOT	1.00 V/C	35	D	0.77	58	E	0.85
S IVY STREET/ S TOWNSHIP ROAD **	County	0.95 V/C	21	C	0.45	26.0	D	0.25

Notes: * Signalized intersection; ** Intersection with stop-control on the side street (S Township Road)

Values reported as the intersection average at signals and for the uncontrolled approach at stop-control intersections.

SAFETY ANALYSIS

The most recent five years of available collision data (2016 – 2020) for the study area was obtained from Oregon Department of Transportation (ODOT) and used to evaluate the collision history⁴. There were 48 crashes recorded at the study intersections over the five-year period, with the most crashes occurring at the OR 99E/ Ivy Street intersection.

Crash rates at study intersections were calculated and compared to a 90th percentile crash rate for similar intersections in Oregon⁵ to identify problem areas in need of mitigation. Intersections that had observed crash rates greater than the 90th percentile crash rate were flagged for further evaluation. As shown in Table 3, crash rates calculated at both study intersections are below the 90th percentile rate, indicating the frequency of collisions is typical for the volume of traffic served.

TABLE 3: CRASH DATA SUMMARY (2016 - 2020)

INTERSECTION	COLLISIONS BY SEVERITY (5-YEAR) ^b						5-YEAR COLLISION RATE ^a	90TH PERCENTILE COLLISION RATE
	FATAL	INJ. A	INJ. B	INJ. C	PDO	TOTAL		
OR 99E / S IVY STREET	0	0	5	20	19	44	0.806	0.860
S IVY STREET/ S TOWNSHIP ROAD	0	0	0	2	2	4	0.208	0.293

^a Rate Calculation = Collisions / (Average Daily Traffic x 365 days x Number of Years / 1 million) – [units: crashes per million entering vehicles]

^b INJ. C = possible injury, INJ. B = minor injury, INJ. A = major injury

⁴ ODOT reported collisions for January 1, 2016 through December 31, 2020.

⁵ Exhibit 4-1, Chapter 4, ODOT Analysis Procedures Manual, Updated June 2022.

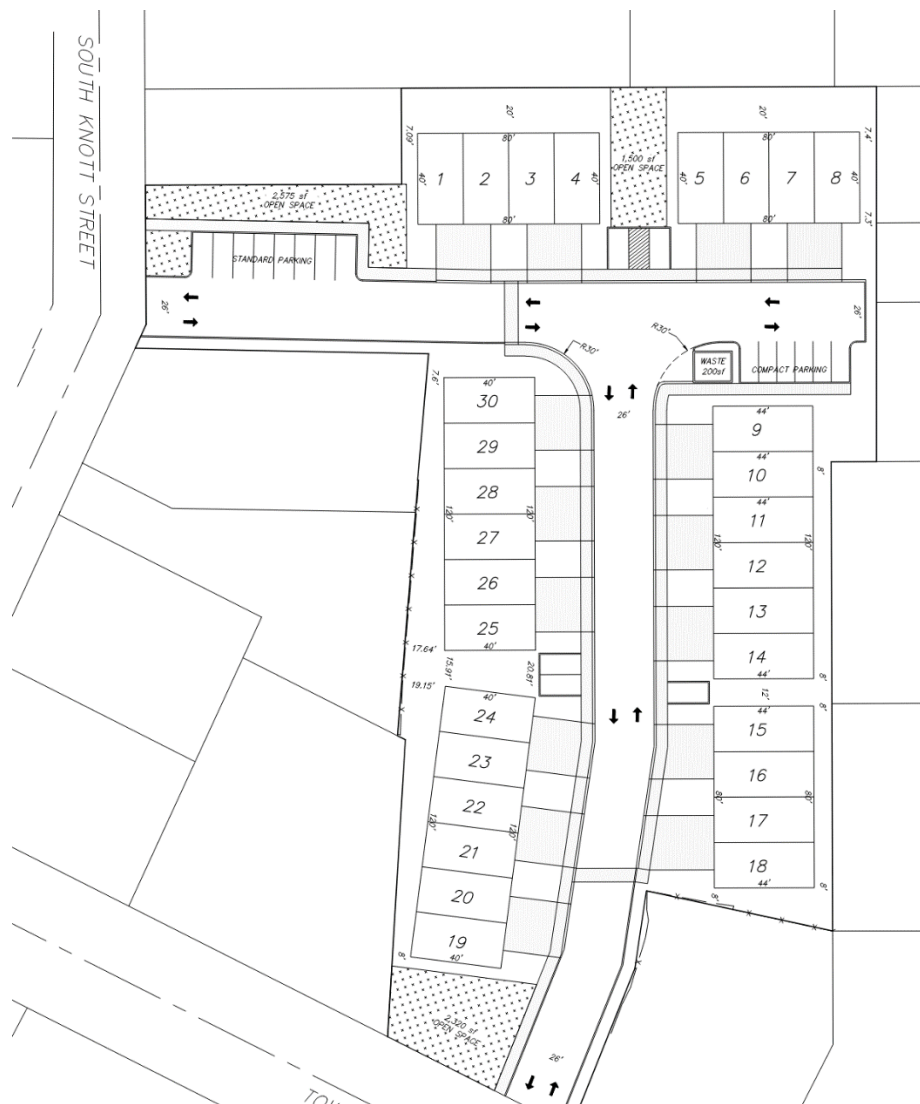
SECTION 3. ASSUMPTIONS AND METHODOLOGIES

This section outlines key assumptions and methodologies that were used to analyze future conditions and identify any potential impacts at study intersections. Areas of interest covered in this section are site access, trip generation, trip distribution and assignment, and background traffic growth.

PROPOSED PROJECT DESCRIPTION

The proposed project will consist of 30 attached residential units. The site proposes to take access from S Township Road to the south and S Knott Street to the west. The site plan can be seen in Figure 3.

FIGURE 3: SITE PLAN



PROPOSED SITE ACCESS

Access to the site is proposed via one driveway to S Township Road and one driveway to S Knott Street.

ACCESS SPACING

The City of Canby has jurisdiction over S Township Road and S Knott Street along the frontage of the proposed site and applies a functional classification of “Collector” to S Township Road and “Local” to S Knott Street.

City standards require that accesses along a Collector must be a minimum of 100 feet from roadways or other driveways along the same side of the street⁶. The two existing site driveways to S Township Road are proposed to be consolidated into a single driveway that would be located approximately 70 feet from the nearest existing driveway to the east and west, or 30 feet closer than the 100-foot Collector spacing standard allows without a deviation to the Code. Although the proposed driveway would be located about 30 feet closer than the 100-foot collector spacing standard, no operational or safety issues are anticipated due to the low number of vehicles using the existing driveways that serve single family uses. A deviation to the spacing standard in the Code will be required.

City standards require that accesses along a Local Street must be a minimum of 10 feet between driveways along the same side of the street⁷. The proposed driveway to S Knott Street would be located at least 10 feet from the nearest driveways, complying with the spacing standard.

SIGHT DISTANCE

The sight triangle at intersections should be clear of objects (large signs, landscaping, parked cars, etc.) that could potentially limit vehicle sight distance. In addition, all proposed accesses should meet AASHTO sight distance requirements as measured from 15 feet back from the edge of the traveled way⁸.

The proposed driveway to S Township Road would require a minimum of 335 feet of sight distance based on an assumed 30-mph design speed. Preliminary sight distance evaluation for the approximate location of the proposed driveway indicates that it would be expected to provide sight distance of at least 400-feet looking to the west and east, suggesting adequate sight distance.

The proposed driveway to S Knott Street would require a minimum of 280 feet of sight distance based on a 25 mile per hour design speed. Preliminary sight distance evaluation from the approximate location of the proposed driveway indicates that it would be expected to provide sight

⁶ Canby Municipal Code 16.46.030. Retrieved January 2023.

⁷ Canby Municipal Code 16.46.030. Retrieved January 2023.

⁸ AASHTO – *Geometric Design of Highways and Streets*, 7th edition, 2018.

distance to S Township Road looking to the south, and at least 300-feet looking to the north, again suggesting adequate sight distance.

However, prior to occupancy, sight distance at all proposed driveways will need to be verified, documented, and stamped by a registered professional Civil or Traffic Engineer licensed in the State of Oregon.

PROPOSED CIRCULATION IMPROVEMENTS

SITE FRONTAGE

The proposed site has frontage along S Township Road and S Knott Street. As documented earlier, the City of Canby has jurisdiction over both streets and applies a function classification of “Collector” to S Township Road and “Local” to S Knott Street.

The existing paved width of S Township Road meets the City’s cross-section standard for Collector streets, with one travel lane in each direction and bike lanes. The frontage of the proposed site also includes on-street parking and a curb-tight sidewalk, although the sidewalk along the frontage is substandard and the applicant should reconstruct with a 6-foot sidewalk. The existing roadway, with the frontage pedestrian improvements, can adequately accommodate the additional vehicle, pedestrian, and bicycle traffic expected.

S Knott Street is improved and exceeds the City’s cross-section standard for Local streets, with a 40-foot paved width (the current standard requires a 34-foot paved width for Local streets). However, the applicant must construct a 6-foot sidewalk along the frontage. The existing roadway, with the frontage pedestrian improvements, can adequately accommodate the additional vehicle, pedestrian, and bicycle traffic expected.

INTERNAL SITE CIRCULATION

The site plan (shown earlier in Figure 3) shows two proposed driveways to connect the proposed site to public streets, one to S Township Road and one to S Knott Street. The proposed driveways would be 26-feet wide and provide full ingress/egress for vehicles and bicycles. A proposed internal drive aisle would connect both proposed driveways and provide access to the on-site parking areas.

The site plan also shows a proposed sidewalk on the internal drive aisle along the frontage of the residential units, and a connection to S Township Road and S Knott Street. The proposed internal site circulation and connections to external public streets meets City requirements and can adequately accommodate all users.

PROPOSED PROJECT GENERATED TRIPS

The amount of new vehicle trips generated by the proposed use was estimated using the trip generation estimates based on ITE Code 215 (Single-Family Attached Housing) using the latest version of the ITE Trip Generation Manual (11th Edition). Trip generation estimates for the proposed

development are provided for daily, morning, and evening peak hours, and are summarized in Table 4. The proposed site will be expected to generate 14 a.m. peak trips, 17 p.m. peak trips, and 216 daily trips.

TABLE 4: TRIP GENERATION FOR THE PROPOSED PROJECT

ITE LAND USE CODE	AM PEAK HOUR			PM PEAK HOUR			WEEKDAY TOTAL
	IN	OUT	TOTAL	IN	OUT	TOTAL	
215 (SINGLE-FAMILY ATTACHED HOUSING)	4	10	14	10	7	17	216

PROPOSED PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

The estimated site generated traffic for the proposed project was distributed and assigned to the nearby arterial and collector roadway network (see Figure 4) based on the City of Canby travel demand model⁹. It is estimated that 30 percent of the trips will start or end southwest of the OR 99E/S Ivy Street intersection, 25 percent to/from northeast of the OR 99E/S Ivy Street intersection, 15 percent to/from northwest of the OR 99E/S Ivy Street intersection, 20 percent to/from areas east of the proposed site along S Township Road and 10 percent to/from areas to the south of the S Ivy Street/ S Township Road intersection.

Table 5 and Figure 5 summarize the expected project trips added to study intersections. Overall, the intersections closest to the proposed project will be expected to see the highest increase in peak trips such as OR 99E/S Ivy Street and S Ivy Street/ S Township Road, with up to 14 additional peak trips and up to 174 additional daily trips.

TABLE 5: PROPOSED PROJECT TRIPS ADDED TO NEARBY INTERSECTIONS

INTERSECTION	A.M. PEAK TRIPS ADDED	P.M. PEAK TRIPS ADDED	DAILY TRIPS
OR 99E & IVY STREET	11	13	150
S IVY STREET/ S TOWNSHIP ROAD	11	14	174

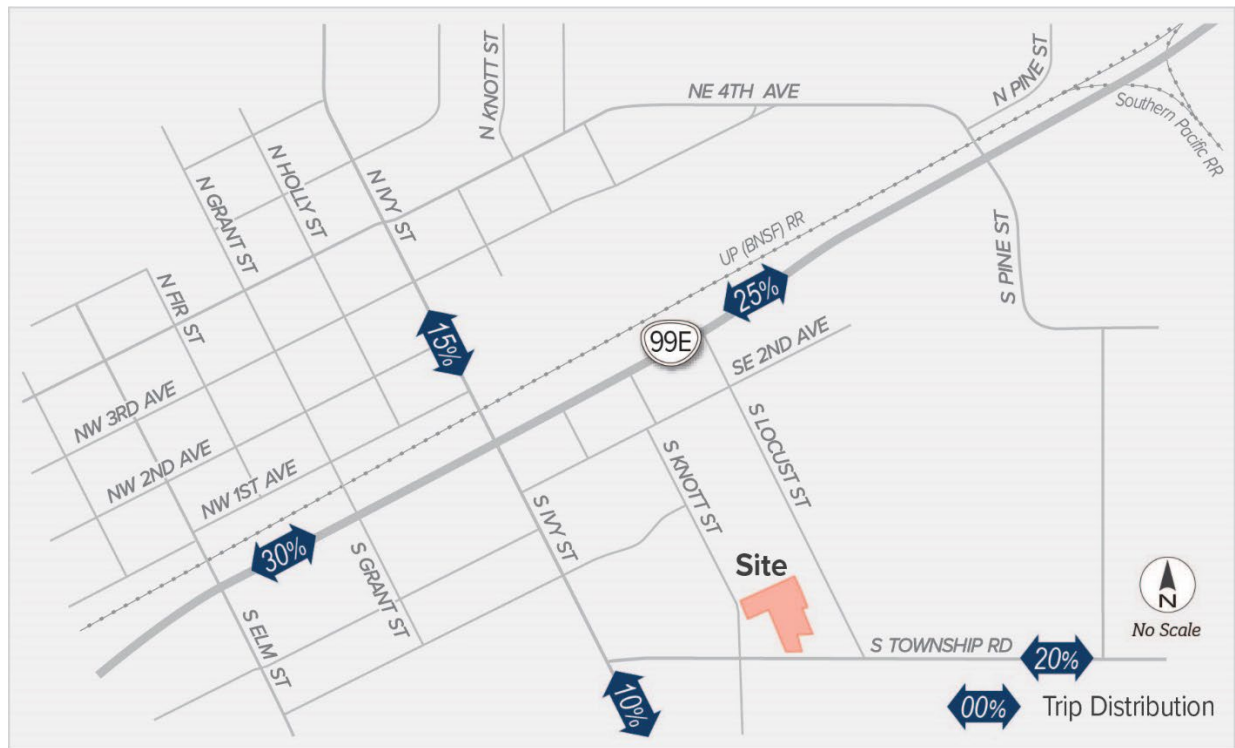
NEIGHBORHOOD TRIPS

A neighborhood trip impact is triggered when a proposed site adds 30 peak trips or 300 daily trips to a residential local street¹⁰. As shown earlier in Table 4, the proposed use is expected to generate 17 or fewer peak and 216 daily trips, well under this standard.

⁹ City of Canby Travel Forecast Tool, select zone model run.

¹⁰ Canby Municipal Code 16.08.150.H.

FIGURE 4: DISTRIBUTION OF SITE GENERATED TRIPS



IN-PROCESS DEVELOPMENTS

In addition to the trips generated from the proposed project, trips from approved but not fully occupied developments in Canby were added to study intersections for the future conditions analysis (see Table 6). These represent trips that were not counted in the original traffic count data but will be added to area roadways as the individual developments build out. These trips were distributed throughout the City based on each traffic study and added to the applicable study intersections. It should be noted that some of the in-process trips could be double counted between the separate traffic studies. This is because each individual trip has an origin and a destination, and often the residential and retail/employment trips have a connection, but the trips have no connection when the traffic studies are done separately. For example, a trip beginning in a Canby residential neighborhood and ending in an employment destination in the City would typically represent one a.m. peak trip from home to work and one p.m. peak trip from work to home. However, since the traffic studies are completed separately for each use, that trip would instead likely be reported below as two a.m. peak trips from home to work and two p.m. peak trips from work to home, or one from the residential neighborhood traffic study and one from the employer traffic study.

TABLE 6: IN-PROCESS DEVELOPMENT TRIPS

DEVELOPMENT NAME	APPROVED TRIPS REMAINING AS OF JANUARY 2023					
	AM PEAK			PM PEAK		
	IN	OUT	TOTAL	IN	OUT	TOTAL
ACTIVE WATER SPORTS	10	2	12	6	13	19
N PINE STREET SUBDIVISION	4	13	17	13	8	21
TOFTE FARMS PHASE 6	3	9	12	10	6	16
S HOPE VILLAGE EXPANSION	12	21	33	24	19	43
WEST LIGHT INDUSTRIAL	101	31	132	44	100	144
REDWOOD LANDING 2	5	16	21	18	11	29
TOFTE SOUTH SUBDIVISION	29	88	117	88	59	147
SENIOR LIVING	8	4	12	4	14	18
REDWOOD LANDING 3	8	23	31	26	16	42
BECKWOOD PLACE	8	23	31	26	16	42
CANBY SOUTH	96	22	118	48	78	126
DRAGONBERRY PRODUCE	4	1	5	1	4	5
NORTHWOODS ESTATES PHASE 4	3	8	11	9	6	15
3RD AVENUE APARTMENTS	1	5	6	4	3	7
AMERICAN WELDING	4	1	5	1	4	5
PROJECT OLD MAC	17	5	22	18	23	41
OKADA MANUFACTURING	15	5	20	6	15	21
CANBY TERRITORIAL FOURPLEXES	1	3	4	2	2	4
FOOD PROCESSING FACILITY	15	4	19	6	15	21
TRAIL CROSSING PHASE 2	6	18	24	19	12	31
CANBY CENTER	3	2	5	25	42	67
THERMA GLASS	4	1	5	1	4	5
NW 4TH 5-PLEX ¹¹	1	0	1	1	1	2
TOTAL	358	305	663	400	471	871

¹¹ Note, as of March 2023, this project has not yet been approved. However, the trip generation from the proposed project is minor and does not affect the findings in this report.

BACKGROUND TRAFFIC

In addition to the trips from approved citywide developments, a 0.5 percent annual growth rate was applied to all movements at study intersections to capture other background regional trip growth not related to citywide development. This growth rate was applied between 2022 and 2025 to represent background traffic growth for the horizon years at study intersections.

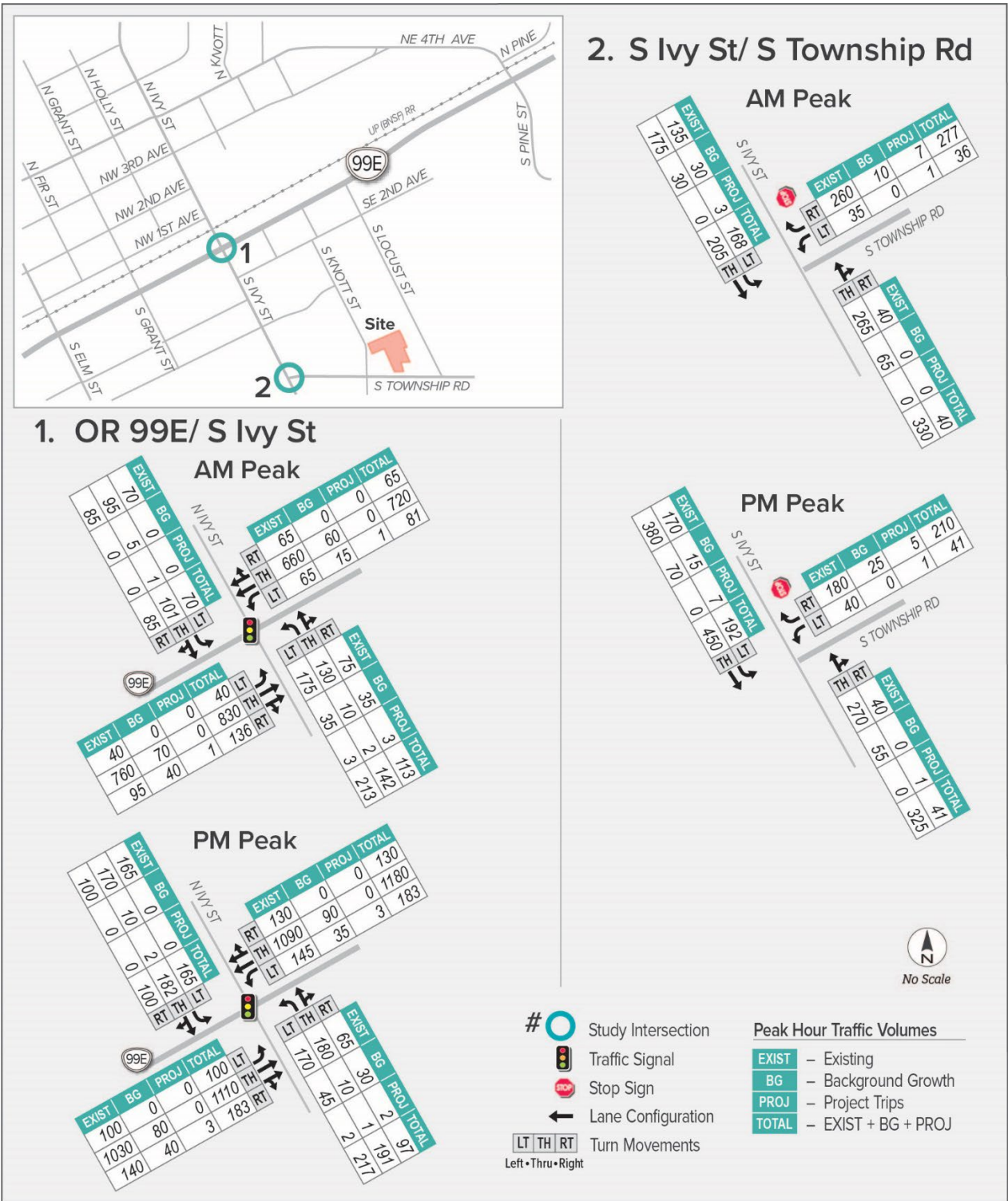
PLANNING HORIZON AND SCENARIOS

The planning horizon year selected for analysis is 2025, which represents the expected year of build out and occupancy for the proposed project. Two main scenarios were evaluated within the horizon year using the following assumptions:

- **2025 Background Conditions (No Build)**– Existing traffic volumes plus in-process trips and background traffic growth.
- **2025 Project Conditions (Build)** – Existing traffic volumes plus in-process trips and background traffic growth, with the added traffic associated with the proposed project.

Figure 5 summarizes the existing, background, project, and build traffic volumes for the a.m. and p.m. peak hours at study area intersections.

FIGURE 5: PEAK HOUR VOLUMES



SECTION 4. FUTURE CONDITIONS

The following section summarizes the peak hour transportation operating conditions for the planning horizon year. Future traffic operating conditions were analyzed at the study intersections to determine if the transportation network can serve the trips generated by the proposed project.

FUTURE 2025 BACKGROUND CONDITIONS INTERSECTION OPERATIONS (NO BUILD)

Table 7 shows the future 2025 intersection operations at study intersections, without the proposed project. As shown, all the intersections are projected to experience increased delay with added background traffic, though they will continue to meet their respective mobility standards for the a.m. and p.m. peak hours. The OR 99E/Ivy Street intersection is expected to operate at a v/c ratio of 0.87 during the a.m. peak hour and 0.96 during the p.m. peak hour, indicating that the intersecting will be operating near its capacity. The S Ivy Street/S Township Road intersection is projected to continue to operate well below its mobility standard. Detailed intersection operations calculation worksheets are included in the Appendix.

TABLE 7. 2025 BACKGROUND CONDITION INTERSECTION OPERATIONS

INTERSECTION	MOBILITY STANDARD	AM PEAK			PM PEAK		
		DELAY (SEC)	LOS	V/C	DELAY (SEC)	LOS	V/C
OR 99E & IVY STREET *	1.00 V/C	46	D	0.87	81	F	0.96
S IVY STREET/ S TOWNSHIP ROAD **	0.95 V/C	28	D	0.52	34	D	0.31

Notes: * Signalized intersection; ** Intersection with stop-control on the side street (S Township Road)

Values reported as the intersection average at signals and for the uncontrolled approach at stop-control intersections.

FUTURE 2025 PROJECT CONDITIONS INTERSECTION OPERATIONS (BUILD)

The 2025 peak hour operations at study intersections with the completed project are shown in Table 8. No intersections fail to meet the mobility standards, as is the case for the 2025 background conditions. The OR 99E/S Ivy Street intersection is expected to approach, but not exceed, the v/c ratio standard during the p.m. peak under background and project conditions. On the other hand, the S Ivy Street/S Township Road intersection is projected to remain well below mobility standards under both conditions, meaning drivers would be expected to experience minimal delay on average during the peak hour. Project-generated trips are expected to create only negligible impacts on intersection operations. The Appendix includes detailed intersection operations calculation worksheets.

TABLE 8: 2025 PROJECT CONDITION INTERSECTION OPERATIONS

INTERSECTION	MOBILITY STANDARD	AM PEAK			PM PEAK		
		DELAY (SEC)	LOS	V/C	DELAY (SEC)	LOS	V/C
OR 99E & IVY STREET *	1.00 V/C	46	D	0.88	82	F	0.97
S IVY STREET/ S TOWNSHIP ROAD **	0.95 V/C	28	D	0.53	35	D	0.32

Notes: * Signalized intersection; ** Intersection with stop-control on the side street (S Township Road)

Values reported as the intersection average at signals and for the uncontrolled approach at stop-control intersections

SECTION 5. APPROVAL CRITERIA AND LIVABILITY MEASURES

The following sections summarize how the proposed project addresses the transportation approval criteria and the livability measures for neighborhood traffic and pedestrian and bicycle circulation.

TRANSPORTATION APPROVAL CRITERIA

The Canby Municipal Code 16.08.160 includes transportation approval criteria that each proposed development must satisfy. This includes criteria B, D, E, and F, as summarized below. While Criteria A, C and E.3 are not transportation-related criteria, they are still applicable for approval. See the respective documents or plans for more details on how this proposed development meets Criteria A, C and E.3.

A. ADEQUATE STREET DRAINAGE, AS DETERMINED BY THE CITY.

Non-transportation related criteria. See respective project documents/plans for information.

B. SAFE ACCESS AND CLEAR VISION AT INTERSECTIONS, AS DETERMINED BY THE CITY.

Access to the site is proposed via one driveway to S Township Road and one driveway to S Knott Street. The two existing site driveways to S Township Road are proposed to be consolidated into a single driveway that would be located approximately 70 feet from the nearest existing driveway to the east and west, or 30 feet closer than the 100-foot Collector spacing standard allows without a deviation to the Code. Although the proposed driveway would be located about closer than the 100-foot collector spacing standard, no operational or safety issues are anticipated due to the low number of vehicles using the existing driveways that serve single family uses. A deviation to the spacing standard in the Code will be required.

The proposed driveway to S Knott Street would be located at least 10 feet from the nearest driveways, complying with the spacing standard.

Prior to occupancy, sight distance at all proposed accesses will need to be verified, documented, and stamped by a registered professional Civil or Traffic Engineer licensed in the State of Oregon. Preliminary sight distance evaluation from the approximate location of the proposed driveways indicates that they would be expected to provide adequate sight distance.

C. ADEQUATE PUBLIC UTILITIES, AS DETERMINED BY THE CITY.

Non-transportation related criteria. See respective project documents/plans for information.

D. ACCESS ONTO A PUBLIC STREET WITH THE MINIMUM PAVED WIDTHS.

The site includes two proposed driveways to connect the proposed site to public streets, one to S Township Road and one to S Knott Street. The proposed driveways would 26-feet wide and provide

full ingress/egress for vehicles and bicycles. A proposed internal drive aisle would connect both proposed driveways and provide access to the on-site parking areas.

The site plan also shows a proposed sidewalk on the internal drive aisle along the frontage of the residential units, and a connection to S Township Road and S Knott Street. The proposed internal site circulation and connections to external public streets meets City requirements and can adequately accommodate all users.

E. ADEQUATE FRONTAGE IMPROVEMENTS

1. For local streets and neighborhood connectors, a minimum paved width of 16 feet along the site's frontage.

The proposed site has frontage along S Knott Street. S Knott Street is improved and exceeds the City's cross-section standard for Local streets, with a 40-foot paved width (the current standard requires a 34-foot paved width for Local streets). However, the applicant must construct a 6-foot sidewalk along the frontage.

2. For collector and arterial streets, a minimum paved width of 20 feet along the site's frontage.

The proposed site has frontage along S Township Road. The existing paved width of S Township Road meets the City's cross-section standard for Collector streets, with one travel lane in each direction and bike lanes. The frontage of the proposed site also includes on-street parking and a curb-tight sidewalk, although the sidewalk along the frontage is substandard and the applicant should reconstruct with a 6-foot sidewalk.

3. For all streets, a minimum horizontal right-of-way clearance of 20 feet along the site's frontage.

The proposed site has frontage along S Township Road and S Knott Street, and both have an existing horizontal right-of-way clearance of at least 20 feet.

F. COMPLIANCE WITH MOBILITY STANDARDS IDENTIFIED IN THE TSP.

If a mobility deficiency already exists, the development shall not create further deficiencies.

Peak-hour intersection operations were evaluated for the existing and future 2025 background (without the proposed project) and project conditions (with the proposed project) scenarios. The evaluation found that the study intersections are expected to continue to meet mobility targets, although the Ivy Street study intersection along OR 99E is expected to operate with v/c ratios above 0.70 during the peak hours, indicating that drivers at these intersections will experience increasing congestion during peak travel times.

This proposed project will contribute its proportional share towards the System Development Charge improvement projects.

LIVABILITY CRITERIA

Each project in Canby must comply with livability measures for neighborhood traffic and pedestrian and bicycle circulation. A summary is provided below for the proposed project.

NEIGHBORHOOD TRAFFIC

The proposed use is expected to generate fewer peak and daily trips when compared to the neighborhood trip impact standard. The adjacent local street (i.e., S Knott Street) is proposed to provide a secondary access to the site and connect it to S Township Road and maintain a level of traffic volume that is consistent with the local street classifications (i.e., under 1,200 daily trips).

PEDESTRIAN AND BICYCLE CIRCULATION

The proposed site has frontage along S Township Road and S Knott Street. S Township Road has a sidewalk and bike lanes, although the sidewalk along the frontage must be widened to 6-feet to comply with the City's design standard. S Knott Street does not have a sidewalk along the proposed site frontage, so the applicant must construct a 6-foot sidewalk. Bicyclists share the roadway with motor vehicles on S Knott Street, consistent with the City cross-section standard for Local streets. The existing roadways, with the frontage pedestrian improvements, can adequately accommodate the additional vehicle, pedestrian, and bicycle traffic expected.

SECTION 6. TRANSPORTATION CONDITIONS OF APPROVAL

The following is a summary of the transportation conditions of approval:

1. The development shall pay Transportation System Development Charges to address citywide impacts.
2. The development shall design and reconstruct the existing sidewalk along the S Township Road frontage with a 6-foot sidewalk.
3. The development shall design and construct a 6-foot sidewalk along the S Knott Street frontage.
4. The development shall request a deviation to the spacing standard in the Code for the proposed driveway to S Township Road to be constructed 30 feet closer to an existing driveway than the 100-foot collector spacing standard allows.
5. Minimum sight distance requirements shall be met at all site accesses. Sight distances should be verified in the final engineering/construction stages of development.

APPENDIX



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APPENDIX A: COUNT DATA

Interval Start Time	S Ivy St Eastbound				S Ivy St Westbound				Hwy 99 Northbound				Hwy 99 Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
3:30 PM	0	5	5	8	0	11	4	8	0	8	92	6	0	8	67	7	229	2,823
3:35 PM	0	21	15	7	0	17	11	3	0	8	66	6	0	6	54	5	219	2,828
3:40 PM	0	12	15	5	0	17	17	3	0	11	73	14	0	8	74	5	254	2,872
3:45 PM	0	8	8	6	0	21	12	5	0	12	66	8	0	2	76	12	236	2,870
3:50 PM	0	15	13	3	0	11	8	6	0	6	72	5	0	0	83	14	236	2,877
3:55 PM	0	9	16	8	0	17	14	6	0	16	62	10	0	3	63	12	236	2,893
4:00 PM	0	10	14	9	0	8	12	4	0	12	64	9	0	12	74	14	242	2,907
4:05 PM	0	10	9	2	0	9	7	6	0	9	84	6	0	10	74	9	235	2,904
4:10 PM	0	11	12	8	0	13	12	6	0	4	58	8	0	8	60	11	211	2,914
4:15 PM	0	12	13	7	0	18	14	7	0	11	76	15	0	8	58	4	243	2,941
4:20 PM	0	9	10	11	0	7	9	2	0	4	67	18	0	10	90	8	245	2,948
4:25 PM	0	12	9	2	0	15	16	4	0	4	75	12	0	7	68	13	237	2,908
4:30 PM	0	17	10	11	0	16	22	2	0	4	62	7	0	14	65	4	234	2,896
4:35 PM	0	14	13	9	0	15	14	8	0	7	84	12	0	8	75	4	263	
4:40 PM	0	12	9	5	0	13	9	8	0	10	73	10	0	9	83	11	252	
4:45 PM	0	11	19	6	0	14	13	3	0	7	64	6	0	8	80	12	243	
4:50 PM	0	21	17	14	0	15	13	7	0	13	73	8	0	11	53	7	252	
4:55 PM	0	5	6	8	0	8	17	4	0	9	86	14	0	11	77	5	250	
5:00 PM	0	9	8	1	0	16	9	4	0	4	83	5	0	10	80	10	239	
5:05 PM	0	10	16	7	0	12	7	3	0	6	68	13	0	11	87	5	245	
5:10 PM	0	14	13	7	0	13	16	5	0	10	71	7	0	8	65	9	238	
5:15 PM	0	7	15	6	0	4	9	4	0	8	80	7	0	7	91	12	250	
5:20 PM	0	9	11	8	0	15	6	3	0	5	55	6	0	3	78	6	205	
5:25 PM	0	6	8	9	0	18	14	4	0	9	59	5	0	9	74	10	225	
Count Total	0	269	284	167	0	323	285	115	0	197	1,713	217	0	191	1,749	209	5,719	
Peak Hour	0	141	145	87	0	148	154	54	0	86	886	119	0	114	914	100	2,948	

Location: 7 Hwy 99 & S Ivy St PM

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
3:30 PM	1	9	1	3	14	3:30 PM	1	0	0	0	1	3:30 PM	0	1	0	0	1
3:35 PM	2	2	0	2	6	3:35 PM	0	0	0	0	0	3:35 PM	0	1	1	0	2
3:40 PM	0	2	1	0	3	3:40 PM	0	0	0	0	0	3:40 PM	0	0	1	0	1
3:45 PM	0	3	1	2	6	3:45 PM	0	0	0	0	0	3:45 PM	0	1	0	0	1
3:50 PM	4	7	1	4	16	3:50 PM	1	0	0	0	1	3:50 PM	0	0	0	1	1
3:55 PM	0	2	1	2	5	3:55 PM	0	0	0	0	0	3:55 PM	0	0	0	1	1
4:00 PM	2	9	0	0	11	4:00 PM	0	0	0	0	0	4:00 PM	0	1	1	0	2
4:05 PM	0	6	0	0	6	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	3	3
4:10 PM	1	4	1	8	14	4:10 PM	0	0	0	0	0	4:10 PM	0	0	3	0	3
4:15 PM	0	2	0	0	2	4:15 PM	0	0	0	0	0	4:15 PM	0	1	0	3	4
4:20 PM	1	0	1	0	2	4:20 PM	0	0	0	0	0	4:20 PM	0	0	1	2	3
4:25 PM	0	2	0	0	2	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	1	1
4:30 PM	2	0	0	0	2	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	4	4
4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	1	1
4:40 PM	0	1	0	2	3	4:40 PM	0	0	0	0	0	4:40 PM	0	1	0	0	1
4:45 PM	0	4	1	2	7	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	0	2	1	2	5	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	2	2
4:55 PM	2	3	0	1	6	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	3	3
5:00 PM	3	7	0	0	10	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	2	2
5:05 PM	0	1	0	3	4	5:05 PM	0	0	0	0	0	5:05 PM	0	0	1	1	2
5:10 PM	0	2	1	2	5	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0
5:15 PM	0	3	0	0	3	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	1	1
5:20 PM	1	1	1	1	4	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	1	0	0	1	5:25 PM	0	0	0	0	0	5:25 PM	0	0	3	0	3
Count Total	19	73	11	34	137	Count Total	2	0	0	0	2	Count Total	0	6	11	25	42
Peak Hour	8	25	4	12	49	Peak Hour	0	0	0	0	0	Peak Hour	0	1	2	17	20

APPENDIX B: CRASH DATA

000 Crash Id	015 Street Name	016 Intersecting Street Name	028 Crash	029 Collision Type	031 Weather	032 Road	033 Light	034 Traffic Control	036 Crash	114 Road	117 Severity	118 Intersect	126 Bike / Ped	Week of 000	002 Year	007 County	008 Jurisdiction	119 State	005 Region	011 Hwy Number	013 Lat	014 Long	019 Mp No
1776933	S IVY ST	PACIFIC HY 99E	ANGL-OTH	TURN	CLR	DRY	DAY	UNKNOWN	NO-YIELD	No	Minor Injury (B)	No	Neither	4-Feb-18	2018	Clackamas	Canby	No	1		45.26208	-122.692	
1884307	S IVY ST	PACIFIC HY 99E	S-1STOP	REAR	UNKN	UNKN	DAY	TRF SIGNAL	F AVOID	No	Possible Injury (C)	Yes	Neither	22-Mar-20	2020	Clackamas	Canby	No	1		45.26226	-122.692	
1784264	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	RAIN	WET	DAY	TRF SIGNAL	NO-YIELD	No	Possible Injury (C)	Yes	Neither	3-Jun-18	2018	Clackamas	Canby	Yes	1	81	45.26227	-122.692	21.14
1894648	S IVY ST	PACIFIC HY 99E	ANGL-OTH	TURN	CLR	DRY	DAY	TRF SIGNAL	DIS SIG	No	Possible Injury (C)	Yes	Neither	18-Oct-20	2020	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1878422	S IVY ST	PACIFIC HY 99E	S-1STOP	REAR	RAIN	WET	DLIT	TRF SIGNAL	INATTENT	No	Possible Injury (C)	Yes	Neither	12-Jan-20	2020	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1787154	PACIFIC HY 99E	S IVY ST	ANGL-OTH	TURN	CLR	DRY	DAY	UNKNOWN	NO-YIELD	No	Possible Injury (C)	No	Neither	15-Jul-18	2018	Clackamas	Canby	Yes	1	81	45.26249	-122.691	21.09
1748006	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	CLD	DRY	DAY	TRF SIGNAL	DIS SIG	No	Possible Injury (C)	Yes	Neither	17-Dec-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1891111	S IVY ST	PACIFIC HY 99E	ANGL-OTH	ANGL	CLR	DRY	DAY	TRF SIGNAL	INATTENT	No	Possible Injury (C)	Yes	Neither	9-Aug-20	2020	Clackamas	Canby	Yes	1	81	45.26227	-122.692	21.14
1747443	S IVY ST	PACIFIC HY 99E	ANGL-OTH	ANGL	CLD	WET	DAY	TRF SIGNAL	DIS SIG	No	Possible Injury (C)	Yes	Neither	26-Nov-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1731829	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	UNKN	WET	DAY	TRF SIGNAL	NO-YIELD	No	Possible Injury (C)	Yes	Neither	26-Mar-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1831482	PACIFIC HY 99E	S IVY ST	ANGL-OTH	TURN	CLR	DRY	DAY	L-TURN REF	NO-YIELD	No	Minor Injury (B)	No	Neither	6-Jan-19	2019	Clackamas	Canby	Yes	1	81	45.26249	-122.691	21.09
1877506	PACIFIC HY 99E	S IVY ST	ANGL-OTH	TURN	CLR	DRY	DAY	NONE	NO-YIELD	No	Possible Injury (C)	No	Neither	29-Dec-19	2020	Clackamas	Canby	Yes	1	81	45.26197	-122.693	21.18
1779019	PACIFIC HY 99E	S IVY ST	O-1 L-TURN	TURN	CLR	DRY	DAY	NONE	NO-YIELD	No	Minor Injury (B)	No	Neither	25-Mar-18	2018	Clackamas	Canby	Yes	1	81	45.26249	-122.691	21.09
1859765	S IVY ST	PACIFIC HY 99E	S-1STOP	REAR	CLR	DRY	DAY	TRF SIGNAL	F AVOID	No	PDO	Yes	Neither	21-Apr-19	2019	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1907894	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	RAIN	WET	DAY	TRF SIGNAL	NO-YIELD	No	PDO	Yes	Neither	1-Nov-20	2020	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1896847	S IVY ST	PACIFIC HY 99E	S-1STOP	SS-O	RAIN	WET	DLIT	TRF SIGNAL	IMP-TURN	No	PDO	Yes	Neither	12-Jan-20	2020	Clackamas	Canby	Yes	1	81	45.26225	-122.692	21.14
1735463	S IVY ST	PACIFIC HY 99E	FIX OBJ	FIX	CLR	DRY	DAY	TRF SIGNAL	IMP-TURN	No	Possible Injury (C)	Yes	Neither	21-May-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1684482	PACIFIC HY 99E	S IVY ST	ANGL-OTH	TURN	CLR	DRY	DAY	L-TURN REF	NO-YIELD	No	Possible Injury (C)	No	Neither	24-Jul-16	2016	Clackamas	Canby	Yes	1	81	45.26249	-122.691	21.09
1859796	S IVY ST	PACIFIC HY 99E	ANGL-OTH	TURN	CLR	DRY	DAY	NONE	NO-YIELD	No	PDO	No	Neither	21-Apr-19	2019	Clackamas	Canby	No	1		45.26207	-122.692	
1678191	S IVY ST	PACIFIC HY 99E	O-1STOP	BACK	CLR	DRY	DAY	UNKNOWN	OTHR-IMP	No	Possible Injury (C)	No	Neither	7-Aug-16	2016	Clackamas	Canby	No	1		45.26208	-122.692	
1689277	PACIFIC HY 99E	S IVY ST	S-1STOP	REAR	CLR	DRY	DAY	UNKNOWN	F AVOID	No	PDO	No	Neither	24-Jan-16	2016	Clackamas	Canby	Yes	1	81	45.26197	-122.693	21.18
1761494	PACIFIC HY 99E	S IVY ST	S-1STOP	REAR	CLR	DRY	DAY	UNKNOWN	F AVOID	No	PDO	No	Neither	10-Sep-17	2017	Clackamas	Canby	Yes	1	81	45.26219	-122.692	21.15
1809267	PACIFIC HY 99E	S IVY ST	ANGL-OTH	TURN	CLR	DRY	DAY	L-TURN REF	NO-YIELD	No	PDO	No	Neither	17-Jun-18	2018	Clackamas	Canby	Yes	1	81	45.26249	-122.691	21.09
1863310	PACIFIC HY 99E	S IVY ST	S-STRGHT	SS-O	CLR	DRY	DAY	NONE	IMP LN C	No	PDO	No	Neither	2-Jun-19	2019	Clackamas	Canby	Yes	1	81	45.26249	-122.691	21.09
1869793	PACIFIC HY 99E	S IVY ST	S-STRGHT	SS-O	CLR	DRY	DUSK	L-TURN REF	IMP LN C	No	PDO	No	Neither	27-Oct-19	2019	Clackamas	Canby	Yes	1	81	45.26212	-122.693	21.16
1904803	PACIFIC HY 99E	S IVY ST	ANGL-OTH	TURN	CLR	DRY	DAY	L-TURN REF	NO-YIELD	No	PDO	No	Neither	2-Aug-20	2020	Clackamas	Canby	Yes	1	81	45.26197	-122.693	21.18
1907211	PACIFIC HY 99E	S IVY ST	ANGL-OTH	TURN	CLR	DRY	DAY	NONE	NO-YIELD	No	PDO	No	Neither	18-Oct-20	2020	Clackamas	Canby	Yes	1	81	45.26249	-122.691	21.09
1813022	PACIFIC HY 99E	S IVY ST	S-1STOP	REAR	CLR	DRY	DAY	NONE	INATTENT	No	PDO	No	Neither	23-Sep-18	2018	Clackamas	Canby	Yes	1	81	45.2624	-122.692	21.11
1737429	S IVY ST	PACIFIC HY 99E	S-1STOP	REAR	CLR	DRY	DAY	TRF SIGNAL	INATTENT	No	Possible Injury (C)	Yes	Neither	18-Jun-17	2017	Clackamas	Canby	No	1		45.26226	-122.692	
1853013	S IVY ST	PACIFIC HY 99E	ANGL-OTH	ANGL	UNKN	UNKN	DUSK	TRF SIGNAL	NO-YIELD	No	Possible Injury (C)	Yes	Neither	20-Oct-19	2019	Clackamas	Canby	Yes	1	81	45.26227	-122.692	21.14
1745336	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	CLR	DRY	DAY	TRF SIGNAL	NO-YIELD	No	Minor Injury (B)	Yes	Neither	24-Sep-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1707077	S IVY ST	PACIFIC HY 99E	ANGL-OTH	ANGL	CLR	DRY	DLIT	TRF SIGNAL	DIS SIG	No	PDO	Yes	Neither	28-Aug-16	2016	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1759957	S IVY ST	PACIFIC HY 99E	S-1STOP	REAR	CLR	DRY	DAY	TRF SIGNAL	F AVOID	No	PDO	Yes	Neither	6-Aug-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1749819	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	RAIN	WET	DAY	TRF SIGNAL	NO-YIELD	No	PDO	Yes	Neither	29-Jan-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1707234	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	CLR	DRY	DAY	TRF SIGNAL	IMP-TURN	No	PDO	Yes	Neither	28-Aug-16	2016	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1714260	S IVY ST	PACIFIC HY 99E	ANGL-OTH	ANGL	CLR	DRY	DAY	TRF SIGNAL	DIS SIG	No	PDO	Yes	Neither	4-Dec-16	2016	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1862932	S IVY ST	PACIFIC HY 99E	S-1STOP	REAR	CLR	DRY	DAY	TRF SIGNAL	F AVOID	No	PDO	Yes	Neither	16-Jun-19	2019	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1747786	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	CLR	DRY	DAY	TRF SIGNAL	NO-YIELD	No	Minor Injury (B)	Yes	Neither	10-Dec-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1729991	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	CLD	DRY	DAY	TRF SIGNAL	CARELESS	No	Possible Injury (C)	Yes	Neither	2-Apr-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1713127	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	RAIN	WET	DLIT	TRF SIGNAL	DIS SIG	No	PDO	Yes	Neither	20-Nov-16	2016	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1672424	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	RAIN	WET	DAY	TRF SIGNAL	NO-YIELD	No	Possible Injury (C)	Yes	Neither	12-Jun-16	2016	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1853680	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	RAIN	WET	DAY	TRF SIGNAL	NO-YIELD	No	Possible Injury (C)	Yes	Neither	22-Sep-19	2019	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1660613	S IVY ST	PACIFIC HY 99E	ANGL-OTH	ANGL	RAIN	WET	DAY	TRF SIGNAL	DIS SIG	No	Possible Injury (C)	Yes	Neither	7-Feb-16	2016	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14
1726691	S IVY ST	PACIFIC HY 99E	O-1 L-TURN	TURN	SNOW	SNO	DLIT	TRF SIGNAL	NO-YIELD	No	Possible Injury (C)	Yes	Neither	1-Jan-17	2017	Clackamas	Canby	Yes	1	81	45.26226	-122.692	21.14






















000 Crash	015 Street	016 Inters	028 Crash	029 Collision Type	031 Weath	032 Road	033 Lightin	034 Traffic	036 Crash	114 Road	117 Severity	118 Inters	126 Bike /	Week of 001 CRASH Date	002 Year	007 Count	008 Jurisd	119 State	005 Region	011 Hwy N	013 Lat	014 Long	019 Mp No
1713475	S IVY ST	SE TOWNS	S-STRGHT	REAR	UNK	UNK	DAY	STOP SIGN	FAVOID	No	PDO	Yes	Neither	18-Dec-16	2016	Clackamas	Canby	No	1		45.25936	-122.69	
1832306	S IVY ST	SE TOWNS	S-1STOP	REAR	CLR	DRY	DAY	STOP SIGN	TOO-CLOS	No	Possible Injury (C)	Yes	Neither	6-Jan-19	2019	Clackamas	Canby	No	1		45.25935	-122.69	
1859094	S IVY ST	SE TOWNS	ANGL-OTH	TURN	CLR	DRY	DAY	STOP SIGN	NO-YIELD	No	PDO	Yes	Neither	31-Mar-19	2019	Clackamas	Canby	No	1		45.25935	-122.69	
1886165	S IVY ST	SE TOWNS	S-STRGHT	REAR	CLR	DRY	DAY	NONE	TOO-CLOS	No	Possible Injury (C)	No	Neither	24-May-20	2020	Clackamas	Canby	No	1		45.25959	-122.69	

APPENDIX C: PEAK HOUR HCM REPORTS (EXISTING)

HCM 6th Signalized Intersection Summary

2: OR 99E & Ivy St

03/14/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	95	85	175	130	75	40	760	95	65	660	65
Future Volume (veh/h)	70	95	85	175	130	75	40	760	95	65	660	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
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	1668	1627	1654	1736	1682	1682	1627	1641	1723	1682	1695	1682
Adj Flow Rate, veh/h	83	113	101	208	155	89	48	905	113	77	786	77
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	6	9	7	1	5	5	9	8	2	5	4	5
Cap, veh/h	208	135	120	238	184	106	428	1298	162	222	842	82
Arrive On Green	0.13	0.17	0.17	0.14	0.18	0.18	0.45	0.93	0.92	0.05	0.28	0.28
Sat Flow, veh/h	1589	787	704	1654	1000	574	1550	2788	348	1602	2963	290
Grp Volume(v), veh/h	83	0	214	208	0	244	48	506	512	77	427	436
Grp Sat Flow(s),veh/h/ln	1589	0	1491	1654	0	1574	1550	1559	1578	1602	1611	1643
Q Serve(g_s), s	4.6	0.0	13.2	11.7	0.0	14.2	0.0	6.1	6.2	3.6	24.5	24.6
Cycle Q Clear(g_c), s	4.6	0.0	13.2	11.7	0.0	14.2	0.0	6.1	6.2	3.6	24.5	24.6
Prop In Lane	1.00		0.47	1.00		0.36	1.00		0.22	1.00		0.18
Lane Grp Cap(c), veh/h	208	0	255	238	0	290	428	726	734	222	458	467
V/C Ratio(X)	0.40	0.00	0.84	0.87	0.00	0.84	0.11	0.70	0.70	0.35	0.93	0.93
Avail Cap(c_a), veh/h	208	0	361	296	0	480	428	726	734	309	458	467
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.81	0.81	0.81	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	0.0	38.1	39.8	0.0	37.4	20.1	2.0	2.0	27.9	33.1	33.2
Incr Delay (d2), s/veh	0.5	0.0	8.3	18.0	0.0	3.0	0.0	4.5	4.4	0.3	28.3	28.0
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	1.8	0.0	5.3	5.9	0.0	5.6	0.6	1.7	1.7	1.3	12.8	13.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.3	0.0	46.4	57.8	0.0	40.4	20.1	6.4	6.5	28.2	61.4	61.2
LnGrp LOS	D	A	D	E	A	D	C	A	A	C	E	E
Approach Vol, veh/h	297				452				1066			
Approach Delay, s/veh	44.1				48.4				7.1			
Approach LOS	D				D				A			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.1	31.0	16.4	21.5	8.8	48.2	17.7	20.3				
Change Period (Y+Rc), s	4.5	* 4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	12.0	* 27	11.0	29.0	10.0	28.5	17.0	23.0				
Max Q Clear Time (g_c+I1), s	2.0	26.6	6.6	16.2	5.6	8.2	13.7	15.2				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	4.5	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	35.4
HCM 6th LOS	D

Notes






* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
22: S Ivy St & S Township Rd

03/14/2023

Intersection

Int Delay, s/veh 6.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	260	265	40	135	175
Future Vol, veh/h	35	260	265	40	135	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	313	319	48	163	211

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	880	343	0
Stage 1	343	-	-
Stage 2	537	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	318	700	-
Stage 1	719	-	-
Stage 2	586	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	274	700	-
Mov Cap-2 Maneuver	274	-	-
Stage 1	719	-	-
Stage 2	506	-	-





















Approach	WB	NB	SB
HCM Control Delay, s	14.9	0	3.7
HCM LOS	B		






Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 274 700 1192	-	-
HCM Lane V/C Ratio	-	- 0.154 0.448 0.136	-	-
HCM Control Delay (s)	-	- 20.5 14.2 8.5	-	-
HCM Lane LOS	-	- C B A	-	-
HCM 95th %tile Q(veh)	-	- 0.5 2.3 0.5	-	-

HCM 6th Signalized Intersection Summary

2: OR 99E & Ivy St

03/14/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	170	100	170	180	65	100	1030	140	145	1090	130
Future Volume (veh/h)	165	170	100	170	180	65	100	1030	140	145	1090	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		1.00	1.00		1.00
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	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	170	175	103	175	186	67	103	1062	144	149	1124	134
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	221	206	122	202	233	84	381	1309	177	238	1006	120
Arrive On Green	0.13	0.20	0.20	0.12	0.19	0.19	0.38	0.89	0.88	0.08	0.34	0.33
Sat Flow, veh/h	1667	1015	597	1667	1218	439	1667	2941	398	1667	2991	356
Grp Volume(v), veh/h	170	0	278	175	0	253	103	600	606	149	624	634
Grp Sat Flow(s),veh/h/ln	1667	0	1612	1667	0	1657	1667	1663	1677	1667	1663	1685
Q Serve(g_s), s	10.8	0.0	18.3	11.3	0.0	16.0	0.0	15.6	16.0	7.4	37.0	37.0
Cycle Q Clear(g_c), s	10.8	0.0	18.3	11.3	0.0	16.0	0.0	15.6	16.0	7.4	37.0	37.0
Prop In Lane	1.00		0.37	1.00		0.26	1.00		0.24	1.00		0.21
Lane Grp Cap(c), veh/h	221	0	328	202	0	318	381	740	747	238	559	567
V/C Ratio(X)	0.77	0.00	0.85	0.87	0.00	0.80	0.27	0.81	0.81	0.63	1.12	1.12
Avail Cap(c_a), veh/h	288	0	366	288	0	377	381	740	747	278	559	567
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.65	0.65	0.65	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.1	0.0	42.2	47.5	0.0	42.4	27.7	4.2	4.3	30.6	36.5	36.6
Incr Delay (d2), s/veh	6.2	0.0	14.1	13.3	0.0	8.1	0.1	6.3	6.3	1.8	73.9	75.0
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	4.9	0.0	8.5	5.4	0.0	7.2	1.7	3.1	3.1	3.0	25.9	26.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.3	0.0	56.3	60.8	0.0	50.5	27.8	10.5	10.6	32.4	110.4	111.5
LnGrp LOS	D	A	E	E	A	D	C	B	B	C	F	F
Approach Vol, veh/h	448				428				1309			
Approach Delay, s/veh	54.8				54.7				11.9			
Approach LOS	D				D				B			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	25.3	41.0	18.6	25.1	13.3	53.0	17.3	26.4				
Change Period (Y+Rc), s	4.5	* 4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	13.0	* 37	19.0	25.0	12.0	37.5	19.0	25.0				
Max Q Clear Time (g_c+I1), s	2.0	39.0	12.8	18.0	9.4	18.0	13.3	20.3				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3	0.0	5.5	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	57.9											
HCM 6th LOS	E											
Notes												






















Intersection						
Int Delay, s/veh	4.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	40	180	270	40	170	380
Future Vol, veh/h	40	180	270	40	170	380
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	200	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	188	281	42	177	396
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1052	302	0	0	323	0
Stage 1	302	-	-	-	-	-
Stage 2	750	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	251	738	-	-	1237	-
Stage 1	750	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	215	738	-	-	1237	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	750	-	-	-	-	-
Stage 2	400	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	14.1	0	2.6			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 215 738 1237	-			
HCM Lane V/C Ratio	-	- 0.194 0.254 0.143	-			
HCM Control Delay (s)	-	- 25.7 11.5 8.4	-			
HCM Lane LOS	-	- D B A	-			
HCM 95th %tile Q(veh)	-	- 0.7 1 0.5	-			

APPENDIX D: PEAK HOUR HCM REPORTS (NO BUILD)

HCM 6th Signalized Intersection Summary






2: OR 99E & Ivy St

03/14/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	100	85	210	140	110	40	830	135	80	720	65
Future Volume (veh/h)	70	100	85	210	140	110	40	830	135	80	720	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
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	1668	1627	1654	1736	1682	1682	1627	1641	1723	1682	1695	1682
Adj Flow Rate, veh/h	83	119	101	250	167	131	48	988	161	95	857	77
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	6	9	7	1	5	5	9	8	2	5	4	5
Cap, veh/h	200	141	120	279	189	148	384	1143	186	176	849	76
Arrive On Green	0.13	0.17	0.17	0.17	0.22	0.22	0.40	0.85	0.84	0.06	0.28	0.28
Sat Flow, veh/h	1589	808	686	1654	871	683	1550	2683	437	1602	2989	269
Grp Volume(v), veh/h	83	0	220	250	0	298	48	574	575	95	462	472
Grp Sat Flow(s),veh/h/ln	1589	0	1494	1654	0	1554	1550	1559	1562	1602	1611	1646
Q Serve(g_s), s	4.6	0.0	13.5	14.1	0.0	17.6	0.0	19.6	20.0	4.4	27.0	27.0
Cycle Q Clear(g_c), s	4.6	0.0	13.5	14.1	0.0	17.6	0.0	19.6	20.0	4.4	27.0	27.0
Prop In Lane	1.00		0.46	1.00		0.44	1.00		0.28	1.00		0.16
Lane Grp Cap(c), veh/h	200	0	261	279	0	338	384	664	665	176	458	468
V/C Ratio(X)	0.41	0.00	0.84	0.89	0.00	0.88	0.13	0.86	0.87	0.54	1.01	1.01
Avail Cap(c_a), veh/h	200	0	362	296	0	474	384	664	665	244	458	468
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.81	0.81	0.81	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.3	0.0	38.0	38.6	0.0	36.0	22.9	5.5	5.6	29.6	34.0	34.0
Incr Delay (d2), s/veh	0.5	0.0	9.2	25.4	0.0	10.6	0.0	11.7	11.8	1.0	44.3	43.9
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	1.8	0.0	5.5	7.6	0.0	7.5	0.7	4.1	4.2	1.7	15.7	16.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.8	0.0	47.2	64.1	0.0	46.6	23.0	17.2	17.5	30.6	78.3	77.9
LnGrp LOS	D	A	D	E	A	D	C	B	B	C	F	F
Approach Vol, veh/h	303		548				1197		1029			
Approach Delay, s/veh	44.9		54.6				17.6		73.7			
Approach LOS	D		D				B		E			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.4	31.0	16.0	24.6	9.9	44.4	20.1	20.6				
Change Period (Y+Rc), s	4.5	* 4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	12.0	* 27	11.0	29.0	10.0	28.5	17.0	23.0				
Max Q Clear Time (g_c+I1), s	2.0	29.0	6.6	19.6	6.4	22.0	16.1	15.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.5	0.0	3.0	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay			45.6									
HCM 6th LOS			D									
Notes												

Intersection

Int Delay, s/veh 6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	270	330	40	165	205
Future Vol, veh/h	35	270	330	40	165	205
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	200	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	325	398	48	199	247

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1067	422	0
Stage 1	422	-	-
Stage 2	645	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	246	632	-
Stage 1	662	-	-
Stage 2	522	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	202	632	-
Mov Cap-2 Maneuver	202	-	-
Stage 1	662	-	-
Stage 2	429	-	-






















Approach	WB	NB	SB
HCM Control Delay, s	17.9	0	4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 202 632 1114	-	-
HCM Lane V/C Ratio	-	- 0.209 0.515 0.178	-	-
HCM Control Delay (s)	-	- 27.5 16.6 8.9	-	-
HCM Lane LOS	-	- D C A	-	-
HCM 95th %tile Q(veh)	-	- 0.8 3 0.6	-	-

HCM 6th Signalized Intersection Summary






2: OR 99E & Ivy St

03/14/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	180	100	215	190	95	100	1110	180	180	1180	130
Future Volume (veh/h)	165	180	100	215	190	95	100	1110	180	180	1180	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.98	1.00		1.00	1.00		1.00
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	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	170	186	103	222	196	98	103	1144	186	186	1216	134
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	247	216	119	248	227	113	328	1129	183	239	1016	112
Arrive On Green	0.15	0.21	0.21	0.15	0.21	0.21	0.31	0.79	0.78	0.10	0.34	0.33
Sat Flow, veh/h	1667	1041	576	1667	1090	545	1667	2864	464	1667	3020	332
Grp Volume(v), veh/h	170	0	289	222	0	294	103	662	668	186	668	682
Grp Sat Flow(s),veh/h/ln	1667	0	1617	1667	0	1636	1667	1663	1665	1667	1663	1689
Q Serve(g_s), s	10.6	0.0	19.0	14.4	0.0	19.1	0.4	43.4	43.4	9.5	37.0	37.0
Cycle Q Clear(g_c), s	10.6	0.0	19.0	14.4	0.0	19.1	0.4	43.4	43.4	9.5	37.0	37.0
Prop In Lane	1.00		0.36	1.00		0.33	1.00		0.28	1.00		0.20
Lane Grp Cap(c), veh/h	247	0	335	248	0	340	328	655	656	239	559	568
V/C Ratio(X)	0.69	0.00	0.86	0.89	0.00	0.86	0.31	1.01	1.02	0.78	1.19	1.20
Avail Cap(c_a), veh/h	288	0	368	288	0	372	328	655	656	247	559	568
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.65	0.65	0.65	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.4	0.0	42.1	45.9	0.0	42.1	31.8	11.6	11.8	31.6	36.5	36.5
Incr Delay (d2), s/veh	3.8	0.0	16.2	23.6	0.0	16.4	0.1	31.0	32.7	12.8	104.1	106.4
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	4.6	0.0	9.0	7.6	0.0	9.2	1.9	9.7	10.1	4.6	30.6	31.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.2	0.0	58.3	69.5	0.0	58.5	31.9	42.6	44.5	44.3	140.6	142.9
LnGrp LOS	D	A	E	E	A	E	C	F	F	D	F	F
Approach Vol, veh/h	459				516				1433			
Approach Delay, s/veh	54.6				63.3				42.7			
Approach LOS	D				E				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.8	41.0	20.3	26.9	15.5	47.4	20.4	26.8				
Change Period (Y+Rc), s	4.5	* 4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	13.0	* 37	19.0	25.0	12.0	37.5	19.0	25.0				
Max Q Clear Time (g_c+I1), s	2.4	39.0	12.6	21.1	11.5	45.4	16.4	21.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	80.8											
HCM 6th LOS	F											
Notes												

Intersection

Int Delay, s/veh 4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	40	205	325	40	185	450
Future Vol, veh/h	40	205	325	40	185	450
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	200	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	214	339	42	193	469

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1215	360	0
Stage 1	360	-	-
Stage 2	855	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	200	684	-
Stage 1	706	-	-
Stage 2	417	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	167	684	-
Mov Cap-2 Maneuver	167	-	-
Stage 1	706	-	-
Stage 2	349	-	-






















Approach	WB	NB	SB
HCM Control Delay, s	16	0	2.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 167 684 1177	-	-
HCM Lane V/C Ratio	-	- 0.25 0.312 0.164	-	-
HCM Control Delay (s)	-	- 33.6 12.6 8.7	-	-
HCM Lane LOS	-	- D B A	-	-
HCM 95th %tile Q(veh)	-	- 0.9 1.3 0.6	-	-

APPENDIX E: PEAK HOUR HCM REPORTS (BUILD)

HCM 6th Signalized Intersection Summary2: OR 99E & Ivy St

03/14/2023






												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	101	85	213	142	113	40	830	136	81	720	65
Future Volume (veh/h)	70	101	85	213	142	113	40	830	136	81	720	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
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	1668	1627	1654	1736	1682	1682	1627	1641	1723	1682	1695	1682
Adj Flow Rate, veh/h	83	120	101	254	169	135	48	988	162	96	857	77
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	6	9	7	1	5	5	9	8	2	5	4	5
Cap, veh/h	199	142	120	283	191	152	379	1132	185	177	849	76
Arrive On Green	0.13	0.17	0.17	0.17	0.22	0.22	0.39	0.84	0.83	0.06	0.28	0.28
Sat Flow, veh/h	1589	812	683	1654	863	690	1550	2681	439	1602	2989	269
Grp Volume(v), veh/h	83	0	221	254	0	304	48	574	576	96	462	472
Grp Sat Flow(s),veh/h/ln	1589	0	1495	1654	0	1553	1550	1559	1561	1602	1611	1646
Q Serve(g_s), s	4.6	0.0	13.6	14.3	0.0	18.0	0.0	20.7	21.0	4.5	27.0	27.0
Cycle Q Clear(g_c), s	4.6	0.0	13.6	14.3	0.0	18.0	0.0	20.7	21.0	4.5	27.0	27.0
Prop In Lane	1.00		0.46	1.00		0.44	1.00		0.28	1.00		0.16
Lane Grp Cap(c), veh/h	199	0	262	283	0	343	379	658	659	177	458	468
V/C Ratio(X)	0.42	0.00	0.85	0.90	0.00	0.89	0.13	0.87	0.87	0.54	1.01	1.01
Avail Cap(c_a), veh/h	199	0	362	296	0	474	379	658	659	244	458	468
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.81	0.81	0.81	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.3	0.0	37.9	38.5	0.0	35.9	23.2	5.9	6.0	29.6	34.0	34.0
Incr Delay (d2), s/veh	0.5	0.0	9.4	26.1	0.0	11.4	0.0	12.4	12.5	1.0	44.3	43.9
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	1.8	0.0	5.6	7.8	0.0	7.8	0.7	4.4	4.4	1.7	15.7	16.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.8	0.0	47.3	64.6	0.0	47.3	23.3	18.3	18.5	30.6	78.3	77.9
LnGrp LOS	D	A	D	E	A	D	C	B	B	C	F	F
Approach Vol, veh/h	304			558			1198			1030		
Approach Delay, s/veh	45.0			55.1			18.6			73.7		
Approach LOS	D			E			B			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.1	31.0	15.9	25.0	10.0	44.1	20.3	20.6				
Change Period (Y+Rc), s	4.5	* 4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	12.0	* 27	11.0	29.0	10.0	28.5	17.0	23.0				
Max Q Clear Time (g_c+I1), s	2.0	29.0	6.6	20.0	6.5	23.0	16.3	15.6				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.5	0.0	2.6	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	46.2
HCM 6th LOS	D

Notes






















* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection						
Int Delay, s/veh	6.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	277	330	40	168	205
Future Vol, veh/h	36	277	330	40	168	205
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	200	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	334	398	48	202	247
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1073	422	0	0	446	0
Stage 1	422	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	244	632	-	-	1114	-
Stage 1	662	-	-	-	-	-
Stage 2	519	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	200	632	-	-	1114	-
Mov Cap-2 Maneuver	200	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	425	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	18.2	0	4			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 200 632 1114	-	-		
HCM Lane V/C Ratio	-	- 0.217 0.528 0.182	-	-		
HCM Control Delay (s)	-	- 27.9 16.9 8.9	-	-		
HCM Lane LOS	-	- D C A	-	-		
HCM 95th %tile Q(veh)	-	- 0.8 3.1 0.7	-	-		

HCM 6th Signalized Intersection Summary






2: OR 99E & Ivy St

03/14/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	182	100	217	191	97	100	1110	183	183	1180	130
Future Volume (veh/h)	165	182	100	217	191	97	100	1110	183	183	1180	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.98	1.00		1.00	1.00		1.00
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	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	170	188	103	224	197	100	103	1144	189	189	1216	134
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	249	217	119	250	227	115	325	1116	184	242	1016	112
Arrive On Green	0.15	0.21	0.21	0.15	0.21	0.21	0.31	0.78	0.77	0.11	0.34	0.33
Sat Flow, veh/h	1667	1045	573	1667	1084	550	1667	2856	470	1667	3020	332
Grp Volume(v), veh/h	170	0	291	224	0	297	103	664	669	189	668	682
Grp Sat Flow(s),veh/h/ln	1667	0	1618	1667	0	1635	1667	1663	1664	1667	1663	1689
Q Serve(g_s), s	10.6	0.0	19.1	14.5	0.0	19.3	0.4	43.0	43.0	9.7	37.0	37.0
Cycle Q Clear(g_c), s	10.6	0.0	19.1	14.5	0.0	19.3	0.4	43.0	43.0	9.7	37.0	37.0
Prop In Lane	1.00		0.35	1.00		0.34	1.00		0.28	1.00		0.20
Lane Grp Cap(c), veh/h	249	0	336	250	0	342	325	650	650	242	559	568
V/C Ratio(X)	0.68	0.00	0.87	0.89	0.00	0.87	0.32	1.02	1.03	0.78	1.19	1.20
Avail Cap(c_a), veh/h	288	0	368	288	0	372	325	650	650	247	559	568
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.65	0.65	0.65	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.3	0.0	42.1	45.9	0.0	42.1	32.0	12.0	12.2	31.6	36.5	36.5
Incr Delay (d2), s/veh	3.8	0.0	16.6	24.0	0.0	17.1	0.1	34.2	36.1	13.3	104.1	106.4
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	4.6	0.0	9.1	7.6	0.0	9.4	1.9	10.4	10.8	4.7	30.6	31.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.1	0.0	58.7	69.9	0.0	59.2	32.1	46.2	48.3	45.0	140.6	142.9
LnGrp LOS	D	A	E	E	A	E	C	F	F	D	F	F
Approach Vol, veh/h		461			521			1436			1539	
Approach Delay, s/veh		54.8			63.8			46.1			129.9	
Approach LOS		D			E			D			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.6	41.0	20.4	27.0	15.6	47.0	20.5	26.9				
Change Period (Y+Rc), s	4.5	* 4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	13.0	* 37	19.0	25.0	12.0	37.5	19.0	25.0				
Max Q Clear Time (g_c+I1), s	2.4	39.0	12.6	21.3	11.7	45.0	16.5	21.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay			82.0									
HCM 6th LOS			F									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

Intersection

Int Delay, s/veh 4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	41	210	325	41	192	450
Future Vol, veh/h	41	210	325	41	192	450
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	200	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	219	339	43	200	469

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1230	361	0
Stage 1	361	-	-
Stage 2	869	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	196	684	-
Stage 1	705	-	-
Stage 2	410	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	163	684	-
Mov Cap-2 Maneuver	163	-	-
Stage 1	705	-	-
Stage 2	340	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.3	0	2.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 163 684 1176	-	-
HCM Lane V/C Ratio	-	- 0.262 0.32 0.17	-	-
HCM Control Delay (s)	-	- 34.8 12.7 8.7	-	-
HCM Lane LOS	-	- D B A	-	-
HCM 95th %tile Q(veh)	-	- 1 1.4 0.6	-	-