



lancaster
moble

1030 Young Street

Transportation Impact
Analysis

Woodburn, Oregon

Date:

March 15, 2023

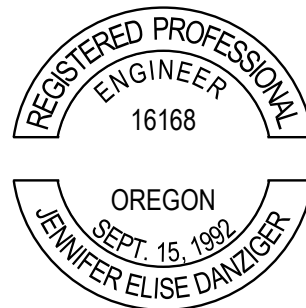
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Executive Summary

1. The proposed development will construct 94 multi-family housing units on currently undeveloped land located at 1030 Young Street in Woodburn, Oregon.
2. The trip generation calculations show that the proposed multi-family development is projected to generate 52 morning peak hour trips, 61 evening peak hour trips, and 678 weekday site trips.
3. Based on the most recent five years of crash data, one of the study intersections have crash rates that exceed the 90th percentile rates identified by ODOT for similar types of intersections and two are identified on the ODOT SPIS List. Potential intersection improvements have been identified in the Woodburn TSP at these intersections.
4. All other study intersections had no significant trends or crash patterns that were identified, and no safety mitigation is recommended per the crash data analysis.
5. Adequate sight distances are available at the proposed site access intersection to allow for safe operation along Young Street.
6. Preliminary traffic signal warrants are not projected to be met for any of the unsignalized study intersections upon full buildout of the proposed development.
7. All study intersections are currently operating acceptably per City of Woodburn and ODOT standards and are projected to continue operating acceptably through the 2025 site buildout year. No operational mitigation is necessary or recommended at these intersections.
8. In general, changes in 95th percentile queuing between the year 2025 background and buildout conditions are anticipated to be small, one or two vehicles. No queuing related mitigation is necessary or recommended.



The site will take access from Young Street. Willamette Valley Railway abuts the southern boundary of the site providing a barrier to any connection with E Cleveland Street. One site access is proposed to be aligned opposite Bryan Street.

Vicinity Streets

Four roadways near the site are anticipated to carry the majority of site trips to and from the project site. Table 1 provides a description of each of the vicinity roadways.

Table 1: Vicinity Roadway Descriptions

Street Name	Functional Classification	Travel Lanes	Speed (MPH)	Curbs & Sidewalks	On-Street Parking	Bicycle Lanes
Jurisdiction: ODOT						
OR-99E (Pacific Highway)	Regional Highway Major Arterial (City)	2-5	35	Partial	Not Permitted	None
OR-214 (Young Street East)	District Highway Major Arterial (City)	2-3	35	None	No Permitted	None
Jurisdiction: City of Woodburn						
Young Street West	Minor Arterial	3	25	Both Sides	Not Permitted	Yes
E Cleveland Street	Service Collector	2-3	25	Southern Side	Not Permitted	None
Bryan Street	Local Street	2	25	Partial	Permitted	None

Functional classification based on Woodburn Transportation System Plan (September 2019).

Study Intersections

Most of the site trips generated by the proposed multi-family development are expected to impact three existing nearby intersections of significance. The project will construct the fourth leg of the intersection of Young Street at Bryan Street.

A vicinity map displaying the project site, vicinity streets, and the study intersections with their associated lane configurations, under existing and proposed conditions, is shown in Figure 2. A summarized description of these intersections is provided in Table 2.



Table 2: Vicinity Intersection Descriptions

Intersection		Geometry	Traffic Control	Phasing/Stopped Approaches
1	OR-99E at Young Street	Four-Legged	Signalized	Protected/FYA NB/SB Left Turns, Permitted EB/WB Left Turns
2	OR-99E at E Cleveland Street	Three-Legged	Stop-Controlled	Eastbound Stop-Controlled
3	Young Street at Bryan Street	Three-Legged	Stop-Controlled	Southbound Stop-Controlled

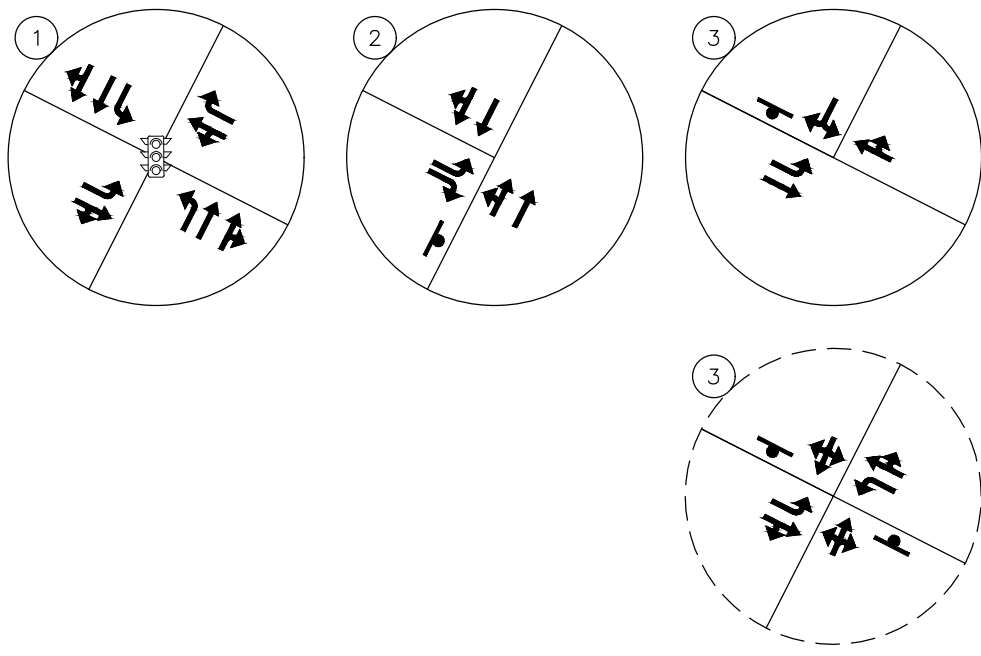
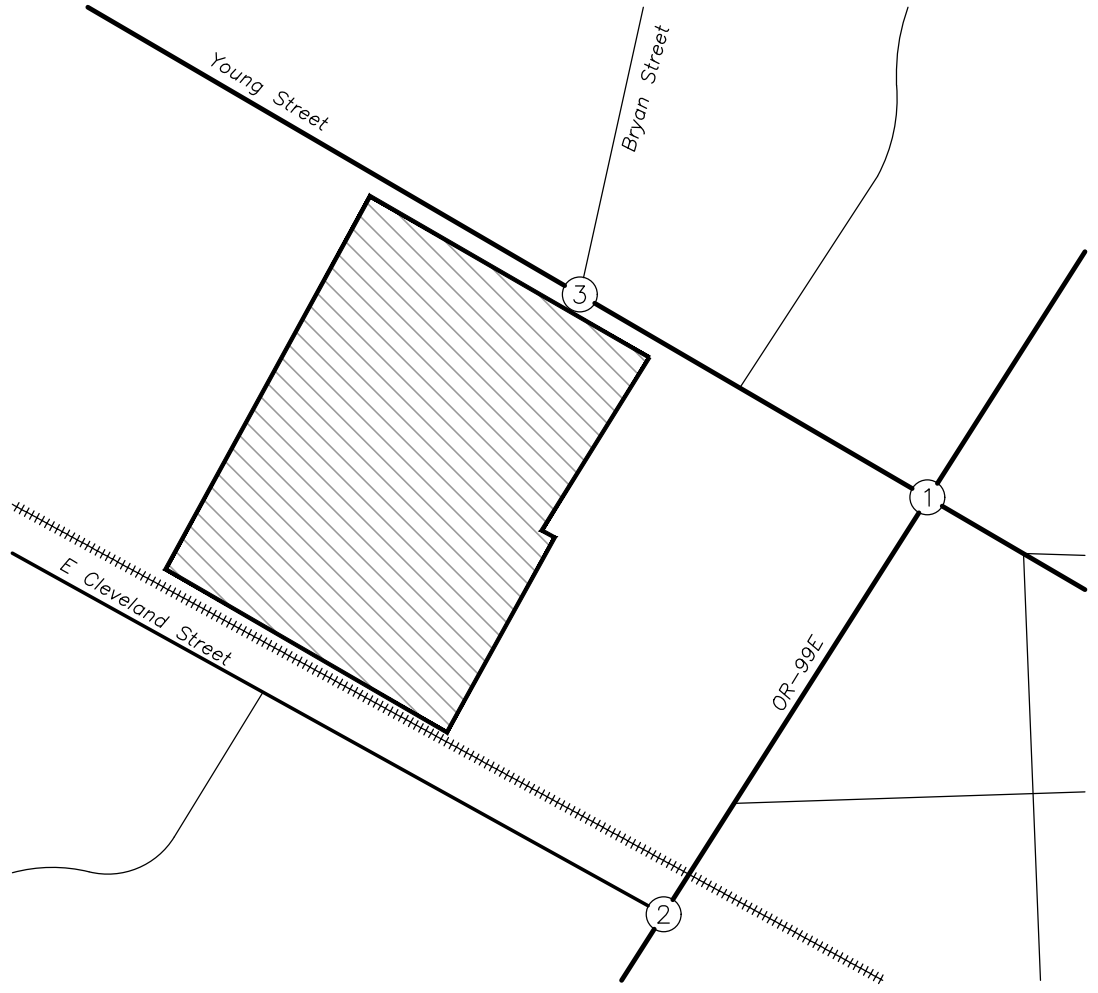
Public Transit

The Woodburn Transit System provides a single, fixed loop around Woodburn that starts and stops at the Downtown Transit Center, with notable stops at the Woodburn Premium Outlets, Walmart, Bi-Mart, Safeway, and Goodwill. The nearest bus stop to the site is located along the site frontage, near the access intersection at Bryan Street. Weekday service is scheduled from approximately 8:00 AM to 6:00 PM and has headways of approximately 60 minutes. Saturday service is scheduled from approximately 9:00 AM to 5:00 PM and has headways of approximately 60 minutes. Sunday service is scheduled from approximately 9:00 AM to 3:00 PM and has headways of approximately 60 minutes.



LEGEND

-  STUDY INTERSECTION
-  FUTURE INTERSECTION
-  STOP SIGN
-  TRAFFIC SIGNAL
-  PROJECT SITE
-  ARTERIAL ROADWAY
-  COLLECTOR ROADWAY
-  LOCAL ROADWAY
-  RAILROAD TRACKS



Site Trips

Trip Generation

The proposed development will include the construction of 94 multifamily units on currently undeveloped land. To estimate the number of trips that will be generated by the townhome development, trip equations from the *Trip Generation Manual*¹ were used. Data from land use code 220, *Multi-Family Housing (Low-Rise)*, was used to estimate the trip generation of the project based on the number of dwelling units.

The trip generation calculations show that the proposed development is projected to generate 52 morning peak hour trips, 61 evening peak hour trips, and 678 weekday site trips. The trip generation estimates are summarized in Table 3. Detailed trip generation calculations are included in Appendix A.

Table 3: Trip Generation Summary

Land Use	ITE Code	Size	Morning Peak Hour			Evening Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Multi-Family Housing (Low-Rise)	220	94 units	12	40	52	38	23	61	678

Trip Distribution

The directional distribution of site trips to and from the proposed development was estimated based on locations of likely trip destinations and locations of major transportation facilities in the site vicinity. The following trip distribution was estimated and used for analysis:

- Approximately 45 percent of site trips will travel to/from the north along OR-99E
- Approximately 25 percent of site trips will travel to/from the west along Young Street to access Interstate 5 northbound and school or other local destinations
- Approximately 30 percent of site trips will travel to/from the south along OR-99E

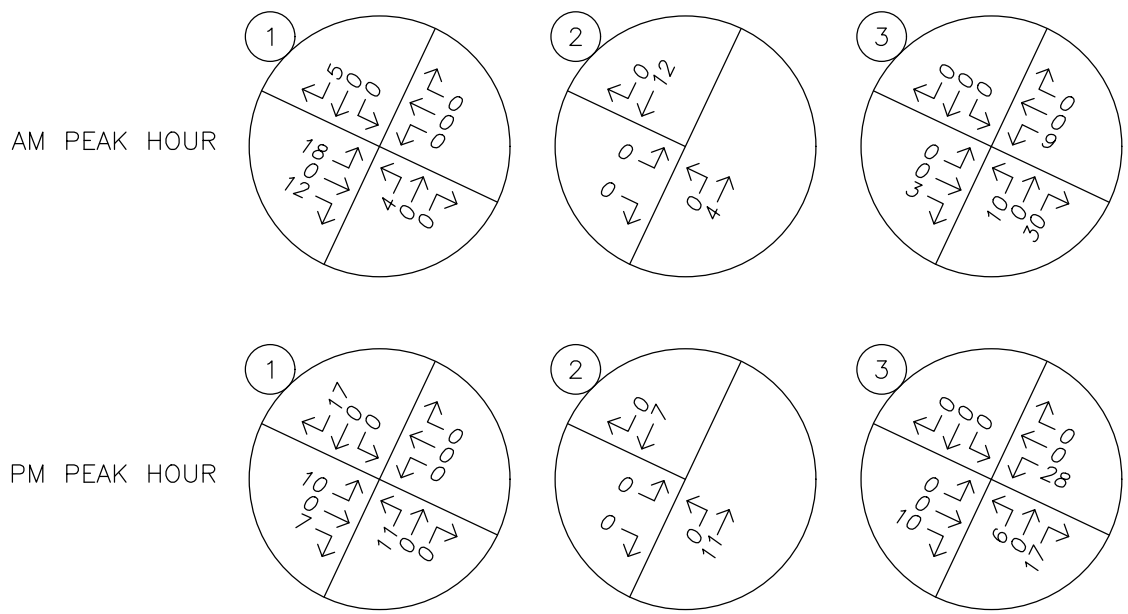
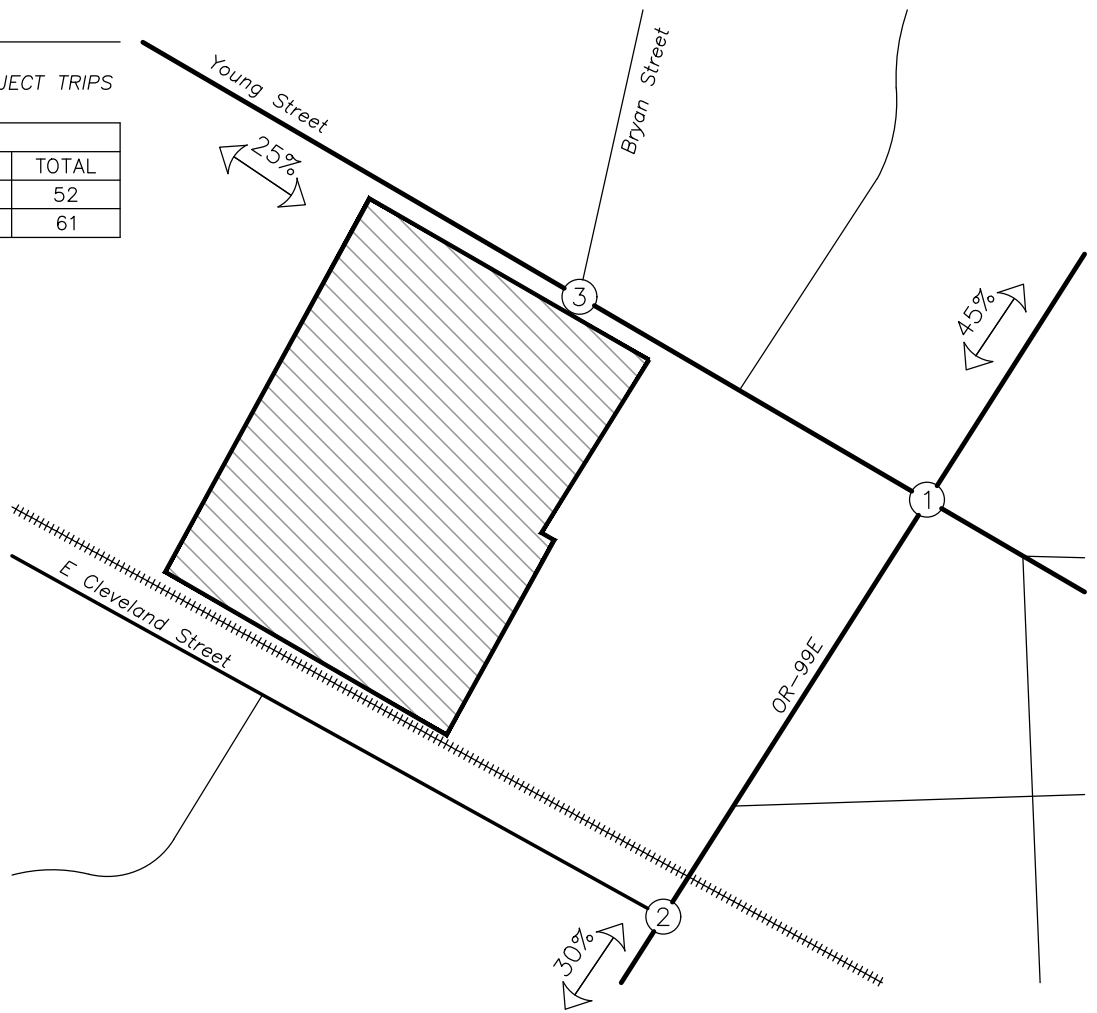
The trip distribution and assignment for the site trips generated during the morning and evening peak hours is shown in Figure 3.

¹ Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 11th Edition, 2021.

LEGEND

XX%
PERCENT OF PROJECT TRIPS

TRIP GENERATION			
	IN	OUT	TOTAL
AM	12	40	52
PM	38	23	61



Traffic Volumes

Existing Conditions

Traffic counts were collected at the study intersections along OR-99E on Tuesday, January 31, 2023, from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. For the intersection of Bryan Street at Young Street, peak hour through volumes along Young Street from the intersection of Young Street at OR-99E were used. For the existing turning movement counts to and from Bryan Street, peak hour observations were made during the morning and evening peak hours.

Since OR-99E is under the jurisdiction of ODOT, procedures described in ODOT’s *Analysis Procedures Manual* (APM)² were used to seasonally adjust existing traffic volumes to reflect the 30th highest hour volumes in a typical year. Using a map of seasonal trends, this portion of OR-99E was determined to show a commuter trend, and a seasonal adjustment factor (SAF) of 1.215 was applied to through volumes along OR-99E. Raw count data is included in Appendix B.

Figure 4 shows the existing adjusted morning and evening peak hour traffic volumes at the study intersections.

Background Conditions

To provide analysis of the impact of the proposed development on the nearby transportation facilities, an estimate of future traffic volumes is required. Future traffic volumes for ODOT highways are projected using growth rates calculated based on data from ODOT’s future volumes table. Growth rates were applied to the existing traffic volumes over a two-year period to determine year 2025 background volumes. Table 4 summarizes the growth rates used for analysis.

Table 4: Growth Rate Assumptions

Facility	Growth Rate
OR-99E	1.9% per year (linear)
OR-214	1.1% per year (linear)
City of Woodburn roadways	1% per year (compounded)

In addition to the general growth, in-process trips associated with the following previously-approved developments were added to the background volumes to represent future traffic volumes at the study intersections prior to approval of the proposed multi-family development:

- Amazon Warehouse (Project Basie)
- Woodburn East Apartments
- Woodburn Place apartments (two phases)

² ODOT, *Analysis Procedures Manual* Version 2, October 2020.



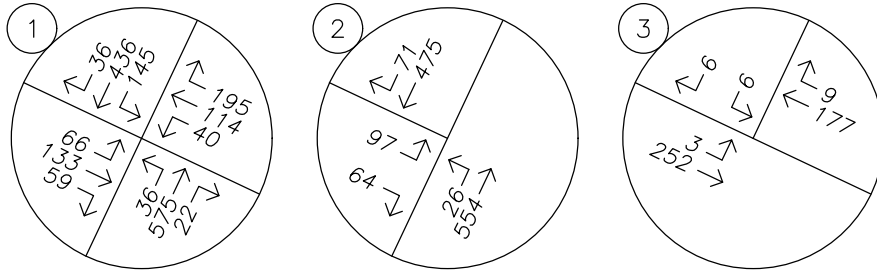
Figure 5 shows the projected year 2025 background traffic volumes at the study intersections during the morning and evening peak hours.

Buildout Conditions

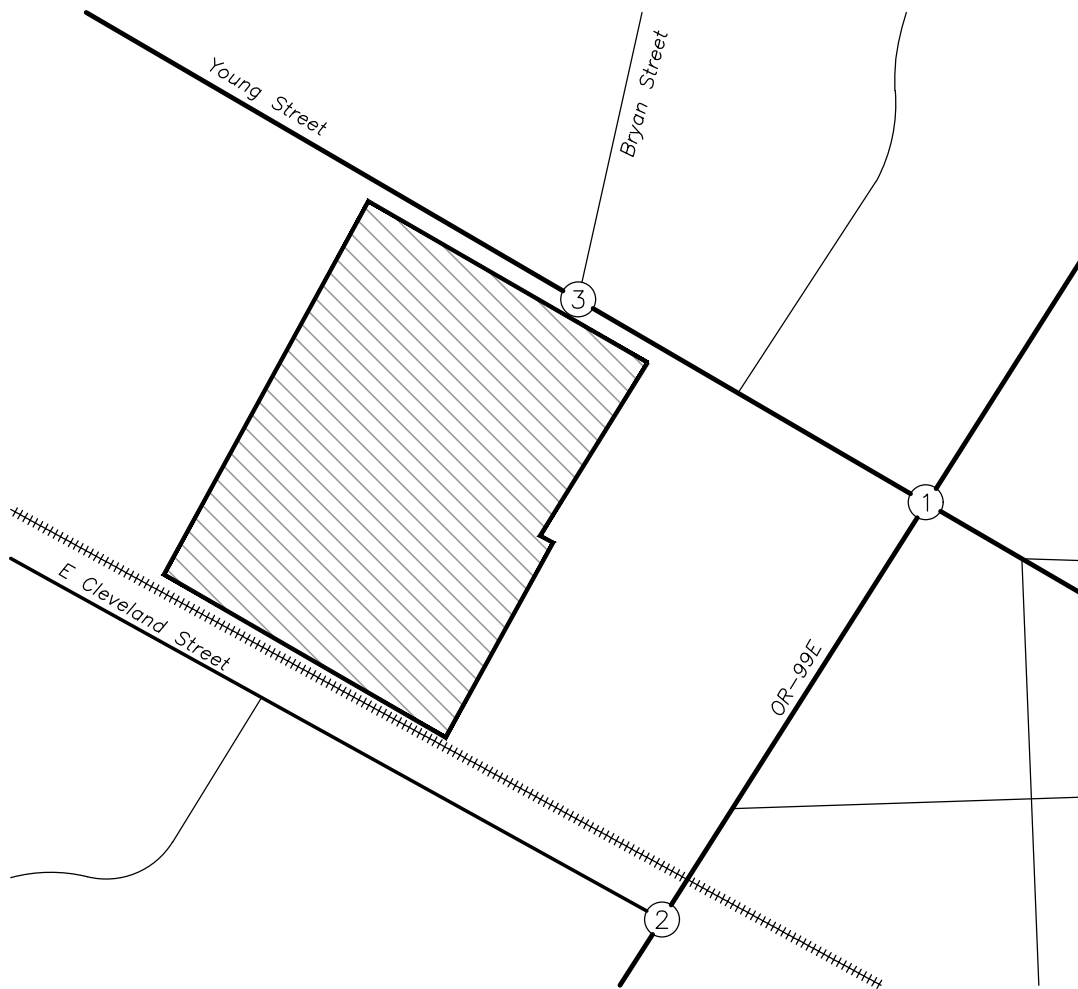
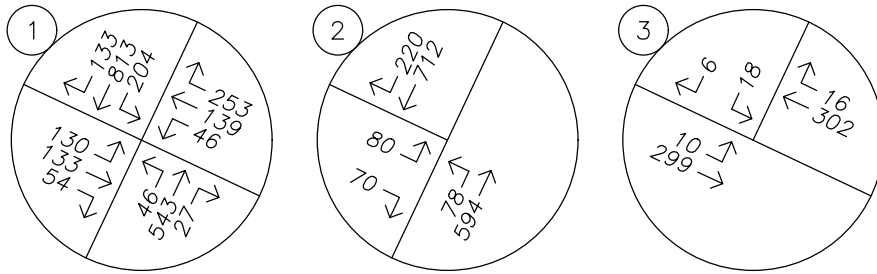
The peak hour trips projected to be generated by the proposed development, as described earlier within the *Site Trips* section, were added to the projected year 2025 background traffic volumes to obtain the expected 2025 site buildout volumes.

Figure 6 shows the projected year 2025 buildout traffic volumes at the study intersections during the morning and evening peak hours.

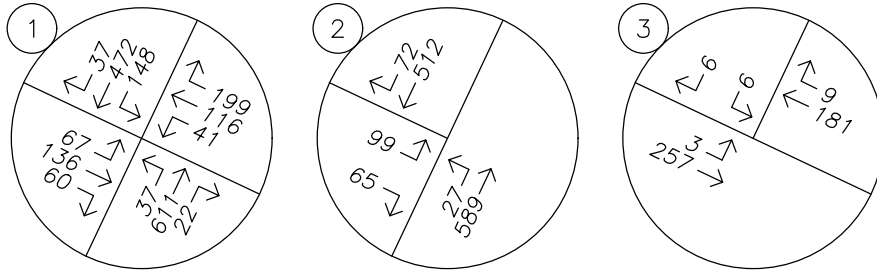
AM PEAK HOUR



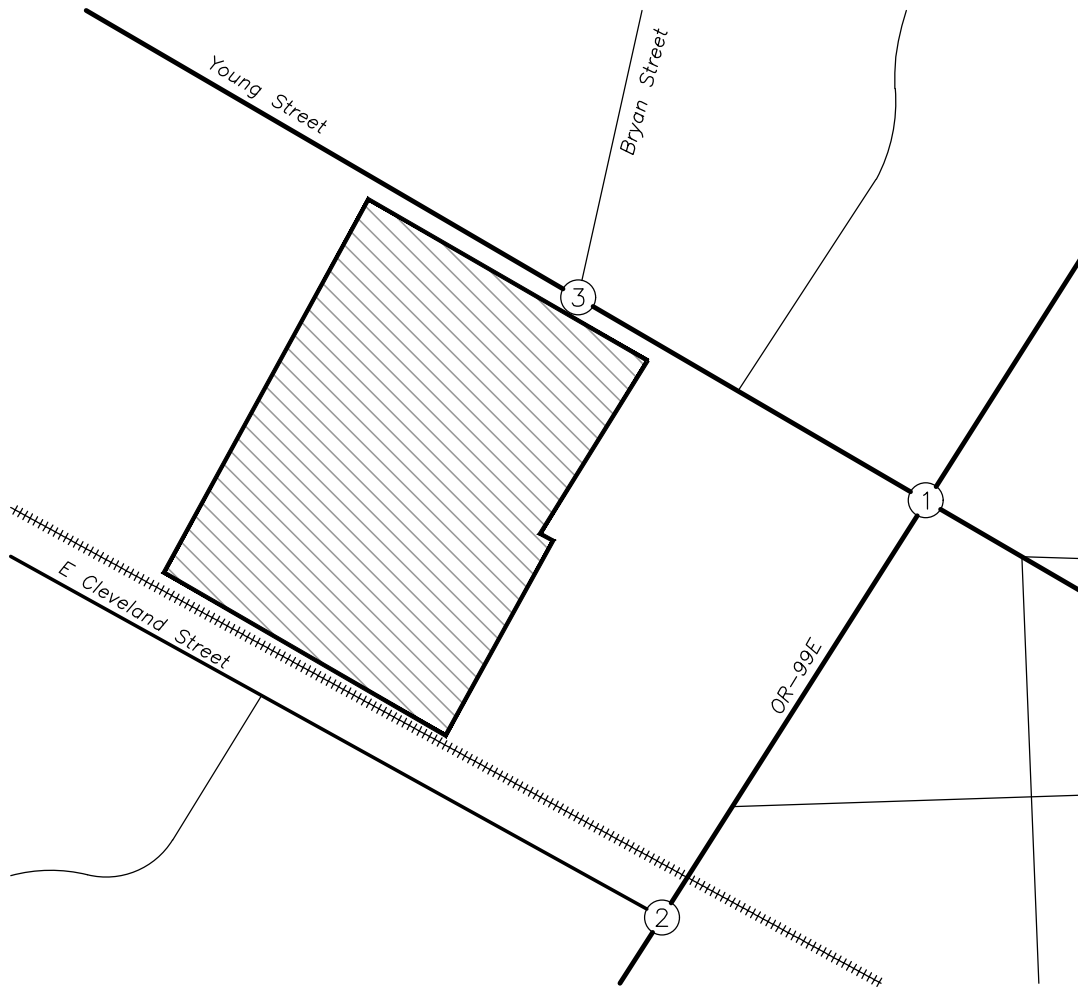
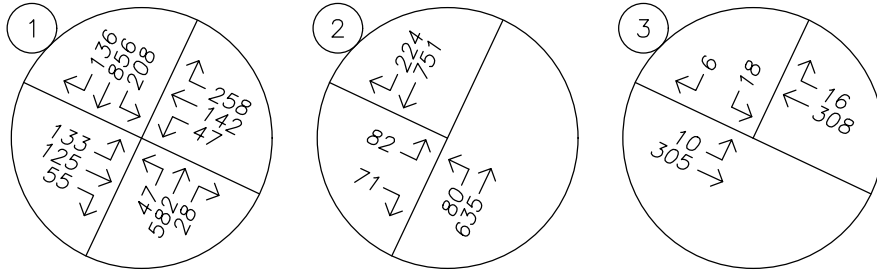
PM PEAK HOUR



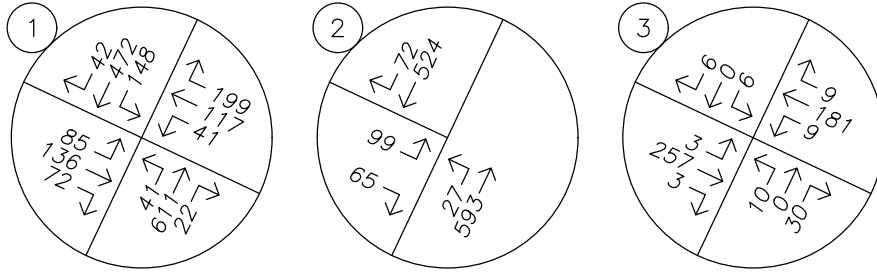
AM PEAK HOUR



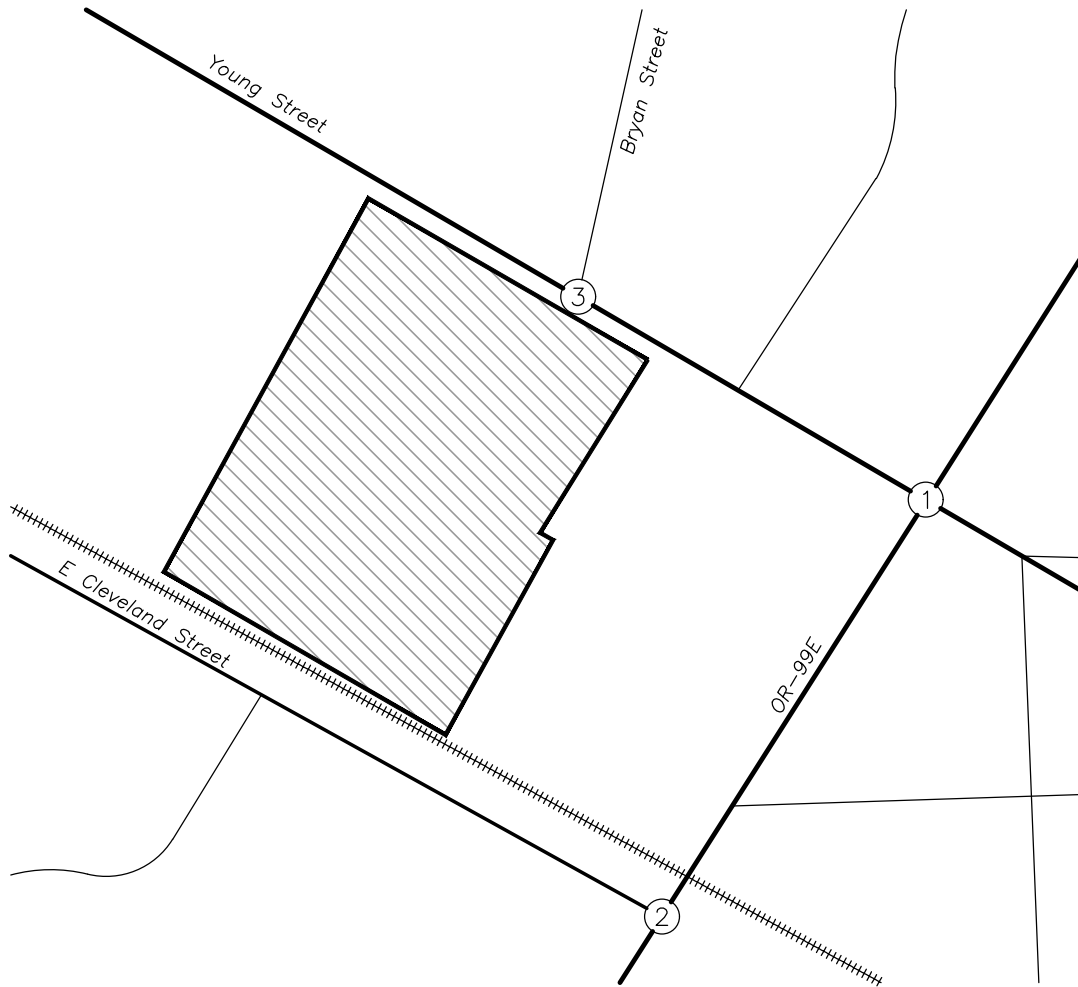
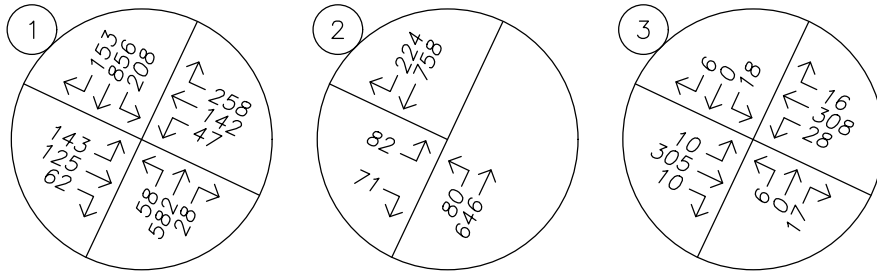
PM PEAK HOUR



AM PEAK HOUR



PM PEAK HOUR



Safety Analysis

Crash History Review

Using data obtained from the ODOT Crash Data System, a review of the most recent available five years of crash history (January 2016 to December 2020) was performed at the study intersections. The crash data were evaluated based on the number of crashes, the type of collisions, and the severity of the collisions. Crash severity is based on injuries sustained by people involved in the crash, and includes five categories:

- Property Damage Only (PDO)
- Possible Injury (Injury C)
- Non-Incapacitating Injury (Injury B)
- Incapacitating Injury (Injury A)
- Fatality or Fatal Injury

Crash rates provide the ability to compare safety risks at different intersections by accounting for both the number of crashes that have occurred during the study period and the number of vehicles that typically travel through the intersection. Crash rates were calculated using the common assumption that traffic counted during the evening peak hour represents approximately 10 percent of the annual average daily traffic (AADT) at the intersection.

Table 5 provides a summary of crash types while Table 6 summarizes crash severities and rates for each of the study intersections. Detailed crash data is included in Appendix C.

Table 5: Crash Type Summary

Intersection	Crash Type						Total Crashes
	Turn	Rear End	Angle	Side swipe	Fixed Object	Ped/ Bike	
1 OR-99E at Young Street	15	12	5	3	1	0	36
2 OR-99E at E Cleveland Street	28	20	0	1	2	1	52
3 Bryan Street at Young Street	0	1	0	0	0	1	2

Table 6: Crash Severity and Rate Summary

Intersection	Severity					Total Crashes	ADT	Crash Rate	90 th % Rate
	PDO	C	B	A	Fatal				
1 OR-99E at Young Street	17	16	3	0	0	36	25,110	0.79	0.860
2 OR-99E at E Cleveland Street	16	25	10	1	0	52	17,540	1.62	0.293
3 Bryan Street at Young Street	0	1	1	0	0	2	6,510	0.17	N/A

ODOT 90th Percentile Crash rates are from the Analysis Procedures Manual Version 2 (2019), Exhibit 4.1, p.4-3.



Crash Severity

The intersection of OR-99E at E Cleveland Street had one crash resulting in an Injury A classification. The crash occurred when a southbound passenger vehicle was following too closely to the vehicle in front of them. The driver in the striking vehicle sustained no injury. A passenger in the struck vehicle sustained injuries classified as Injury A. The driver and another passenger in the struck vehicle reported possible injuries. The collision occurred under clear, dry, daytime conditions.

Pedestrian and Bicycle Collisions

The intersection of OR-99E at E Cleveland Street had one crash involving a pedestrian. A southbound vehicle struck a pedestrian who was illegally in the roadway. The pedestrian sustained a possible injury consistent with injury classification C. The collision occurred under wet, rainy, and dimly lit conditions.

The intersection of Bryan Street at Young Street has one crash involving a bicyclist. A left-turning westbound vehicle which did not have right-of-way over the cyclist struck an eastbound cyclist. The pedestrian suffered injuries consistent with the classification Injury B. The collision occurred under wet, rainy, and dark conditions.

ODOT 90th Percentile Crash Rates

Intersection crash rates were compared to the published statewide 90th percentile crash rates within ODOT's *Analysis Procedures Manual (APM)*. According to [Exhibit 4-1: Intersection Crash Rates per MEV by Land Type and Traffic Control](#) in the APM, intersections which experience crash rates in excess of 90th percentile crash rates should be "flagged for further analysis".

One of the study intersections was calculated to have a crash rate that exceeds the 90th percentile crash rate for similar intersections:

OR-99E at E Cleveland Street

The intersection of OR-99E at E Cleveland Street had 52 crashes over the five-year analysis period. Twenty-eight (28) of these crashes were reported as turning movement collisions and 20 were reported as rear-end collisions. The primary cause was not yielding to the right-of-way of the through traffic. The intersection is currently unsignalized, with the eastbound approach under stop-control. OR-99E has four lanes of travel, with no center turn lane or refuge, which contributes to the frequency of rear-end collisions.

The Woodburn TSP identifies intersection capacity improvement but does not specify any safety improvements at the intersection. The capacity improvement is identified as a traffic signal (if warranted), turn lanes, or roundabout at this location in coordination with ODOT. Consideration should be given to railroad preemption and the proximity to the signalized intersection at OR-99E at Young Street. Installing a traffic signal to protect the turning movements could potentially reduce the frequency of these collisions, however, as shown in the Warrant Analysis section, due to low minor street volumes, the preliminary traffic signal warrant is not met for this intersection. Additionally, ODOT's region traffic engineer has noted installation of a traffic signal at this location would be problematic due to its close proximity to the fully controlled intersection of Young Street at OR-99E.

Restriping OR-99E to replace one of the northbound lanes with a center turn lane until the roadway widens to five lanes north of Silverton Avenue could potentially improve the safety of the intersection. Separating the left-

turn movement from the through movement could reduce the rate of rear-end collisions at the intersection. Allowing for a two-stage left-turn movement could potentially reduce the rate of turn collisions.

The proposed project is estimated to generate 18 evening peak hour trips at the study intersection, which is 0.97 percent of the total year 2025 buildout volume of 1,861 trips through the intersection. All site trips will be traveling through the intersection; none will be turning.

ODOT SPIS Review

The ODOT 2020 Safety Priority Index System (SPIS) list is based on reported crash data for the years 2017 through 2019. Two of the study area intersections was listed in the worst 15 percent of the SPIS list:

- OR-99E at Young Street – 90-95th percentile
- OR-99E at E Cleveland Street – 85-90th percentile

These findings coincide with other factors in the crash review, including high crash rates and locations with crashes that resulted in an Injury A classification.

The intersection of OR-99E at E Cleveland Street is discussed in the previous section. For context regarding the intersection of OR-99E at Young Street, see below.

OR-99E at Young Street

The Woodburn TSP identifies intersection capacity improvement but does not specify any safety improvements at the intersection. The capacity improvement is identified installing a third westbound lane to provide separate left, thru, and right turn lanes in coordination with ODOT, as well as implement protected/permissive left-turn phasing for the east and westbound approaches.

The proposed project is estimated to generate 45 evening peak hour trips at the study intersection, which is 1.7 percent of the total year 2025 buildout volume of 2,662 trips through the intersection.

Conclusion

Based on a review of the most recent five years of available crash data, one of the study intersections has a crash rate that exceed the 90th percentile rates identified by ODOT for similar types of intersections and both highway intersections are identified within the worst 15 percent in ODOT's SPIS database. The Woodburn TSP has projects identified at some of these locations.

All other study intersections had no significant trends or crash patterns that were identified, and no safety mitigation is recommended per the crash data analysis.

Sight Distance Evaluation

A sight distance analysis was conducted at the site access proposed on Young Street. To evaluate the sight distance available, intersection sight distance was measured and recommended in accordance with the standards established in *A Policy on Geometric Design of Highways and Streets*³. According to AASHTO, the

³ American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 7th Edition, 2018.

driver's eye is assumed to be 14.5 feet from the near edge of the nearest travel lane of the intersecting street and at a height of 3.5 feet above the approach street pavement. The vehicle driver's eye height is assumed to be 3.5 feet above the cross-street pavement.

Based on the posted speed of 25 mph along Young Street, the minimum recommended intersection sight distance (ISD) is 295 feet and the minimum required stopping sight distance (SSD) is 155 feet.

Looking east from the proposed access, the available sight distance was measured to be 380 feet (to the intersection of Young Street at OR-99E). Looking west from the proposed access, the available sight distance was measured to be in excess of 400 feet.

Conclusion

Adequate sight distances are available at the proposed site access location. No mitigation is recommended or necessary in conjunction with the proposed development.

Warrant Analysis

Preliminary traffic signal warrants were examined for the study intersections near the site where such treatments would be applicable. Detailed information on the warrant analyses is included in Appendix C.

Preliminary Traffic Signal Warrants

Preliminary traffic signal warrants were examined for all unsignalized study intersections in order to determine whether the installation of a new traffic signal will be warranted at the intersections by the 2025 site buildout year. Methodologies were based on the *Manual on Uniform Traffic Control Devices*⁴ (MUTCD). Warrant 1, Eight-Hour Vehicular Volumes, was evaluated based on the common assumption that traffic counted during the evening peak hour represents 10 percent of the average daily traffic (ADT) and that the 8th highest hour is 5.65 percent of the daily volume.

Preliminary traffic signal warrants are not projected to be met for any of the unsignalized study intersections upon full buildout of the project.

Assessment of Pedestrian, Bicycle, and Transit Modes

Pedestrian Facilities

Omitting the subject site, contiguous sidewalks are provided along Young Street. Continuous sidewalks are provided along OR-99E and intermittent sidewalks are provided along Bryan Street. E Cleveland Street has sidewalks on the south side but not along the north side where the railroad line is present.

The development of the site will fill the current sidewalk gap along the southern side of the roadway, consistent with planned improvements in the TSP. Additionally, the project will construct a ped/bike path along the southern property line which connects to Young Street via paths through the center and along the western boundary of the site.

⁴ Federal Highway Administration, Manual on Uniform Traffic Control Devices, 2009

Pedestrians have continuous sidewalks that allow access to numerous destinations. Sidewalks along Young Street and Gatch Street provide access to Washington Elementary School. Sidewalks along Front Street and Parr Road to the Settlemier Park, Heritage Elementary School, Valor Middle School, and Centennial Park. Sidewalks along Front Street and S Settlemier Avenue provide pedestrian access into the neighborhoods, downtown Woodburn, and other schools and parks.

Bicycle Facilities

Bicycle lanes are provided along both sides of Young Street but other higher classification roadways currently have no bike lanes. However, neighborhood streets not listed as bicycle routes in the immediate site vicinity are typically low-stress roadways that provide alternative routes to other nearby bicycle paths. There are 104 bicycle parking spaces which will be provided on-site.

Transit Facilities

The nearest bus stop to the site is located along the site frontage, near the existing intersection of Bryan Street at Young Street.

Planned Improvements

There are two planned pedestrian and bicycle projects listed in the Woodburn TSP which will provide connections between the proposed development and existing infrastructure and enhance safety for vulnerable roadway users. These projects are listed in Table 8.

Table 7: Active Transportation Projects in Woodburn TSP

Project Number	Location	Description
P11	Young Street	Fill in gaps
B3	OR-99E from Lincoln Street to southern City boundary	Widen roadway and install bike lanes in coordination with ODOT



Operational Analysis

A capacity and delay analysis was conducted for each of the study intersections per the signalized and unsignalized intersection analysis methodologies in the *Highway Capacity Manual*⁵ (HCM). Intersections are generally evaluated based on the average control delay experienced by vehicles and are assigned a grade according to their operation. The level of service (LOS) of an intersection can range from LOS A, which indicates very little or no delay experienced by vehicles, to LOS F, which indicates a high degree of congestion and delay. The volume-to-capacity (v/c) ratio is a measure that compares the traffic volumes (demand) against the available capacity of an intersection.

The analysis was performed using the Synchro (version 11) software. The overall signalized v/c ratios were calculated following the methodologies in Chapter 16 of the ODOT APM for the critical intersection v/c ratio. This methodology was performed for all signalized intersections.

Performance Standards

All study intersections must comply with adopted operating standards, and intersection performance measures used for operating standards vary by roadway jurisdiction. The following agency mobility standards are applicable in the study area:

- The **City of Woodburn** has the following mobility standards per the Woodburn Development Ordinance⁶:
 - For an unsignalized intersection, the minimum v/c ratio shall be 0.95 or lower for the major movement through the intersection, or if pre-development already operating at higher v/c, then at no higher v/c.
- **ODOT** has the following mobility targets in the study area per the Oregon Highway Plan⁷:
 - OR-99E is a regional highway inside the urban growth boundary, with a posted speed of 35 mph. For non-MPOs outside of STAs, the target v/c ratio is 0.90.

Delay & Capacity Analysis

The v/c, delay, and LOS results of the capacity analysis are shown in Table 9 for the morning and evening peak hours. Detailed calculations as well as tables showing the relationship between delay and LOS are included in Appendix D.

⁵ Transportation Research Board, *Highway Capacity Manual*, 6th Edition, 2016.

⁶ City of Woodburn, *Woodburn Development Ordinance*, Amended by Ordinance 2603, effective June 30, 2022 (LA 21-02)

⁷ Oregon Department of Transportation, *Oregon Highway Plan*, Table 6: Volume to Capacity Ratio Targets for Peak Hour Operating Conditions, 1999 Including amendments November 1999 through May 2015

Table 8: Capacity Analysis Summary

Intersection & Condition	Mobility Standard	AM Peak Hour			PM Peak Hour		
		V/C	LOS	Delay (s)	V/C	LOS	Delay (s)
1. OR-99E at Young Street¹							
2023 Existing Conditions	0.90	0.60	B	14	0.61	B	16
2025 Background Conditions		0.63	B	14	0.63	B	16
2025 Buildout Conditions		0.65	B	15	0.64	B	17
2. OR-99E at E Cleveland Street							
2023 Existing Conditions	0.90	0.40	D	27	0.80	F	111
2025 Background Conditions ²		0.45	D	32	0.81	F	116
2025 Buildout Conditions ²		0.46	D	43	0.84	F	124
3. Young Street at Site Access/Bryan Street							
2023 Existing Conditions	0.95	0.02	A	10	0.04	B	11
2025 Background Conditions		0.02	A	10	0.04	B	11
2025 Buildout Conditions		0.06	B	10	0.05	B	12

Table Notes:

1. The overall signalized v/c ratio for this intersection was calculated following the methodologies in Chapter 16 of the ODOT APM for the critical intersection v/c ratio.
2. The peak hour factor for this intersection was increased to a minimum of 0.95 due to the substantial increase in background traffic.

All study intersections are currently operating acceptably per City of Woodburn and ODOT standards and are projected to continue operating acceptably through the 2025 site buildout year. No operational mitigation is necessary or recommended at these intersections.

Queuing Analysis

An analysis of projected queuing was conducted for the study intersections. The 95th percentile queue lengths were estimated based on the same Synchro/SimTraffic simulations used for the delay calculations. The 95th percentile queue is a statistical measurement which indicates there is a 5 percent chance that the queue may exceed this length during the analysis period; however, given this is a probability, the 95th percentile queue length may theoretically never be met or observed in the field.

The 95th percentile queue lengths reported in the simulation are presented in Table 9 for the morning and evening peak hours. All queues more than 5 feet longer than a multiple of 25 were rounded up to the nearest 25 feet, equivalent to an average vehicle length. Those that were 5 feet or less than a multiple of 25 were rounded down since 5 feet is equivalent to the space between queued vehicles. Detailed queuing analysis reports are included in Appendix D.



Table 9: 95th Percentile Queuing Analysis Summary

Intersection/Movement	Available Storage (ft)	2025 Background Queue (ft)		2025 Buildout Queue (ft)	
		Morning	Evening	Morning	Evening
1. OR-99E at Young Street					
EB Left	95	125	150	125	150
WB Right	100	150	150	150	150
NB Left	110	100	125	100	125
SB Left	145	150	175	150	175
2. OR-99E at E Cleveland Street					
EB Left	165	100	225	100	225
NB Left-Through	N/A	75	225	75	250
SB Through-Right	N/A	25	25	25	25
3. Young Street at Bryan Street/Site Access					
EB Left-Through-Right	N/A	-	25	25	50
WB Left-Through-Right	N/A	-	-	25	50
NB Left-Through-Right	N/A	-	-	50	50
SB Left-Through-Right	N/A	50	50	50	50

BOLDED values indicate 95th percentile queue lengths that exceed available storage.

In general, changes in 95th percentile queuing between the year 2025 background and buildout conditions are anticipated to be small, one or two vehicles.

Based on the queuing evaluation, no queuing related mitigation is necessary or recommended.



Conclusions

The impacts of the proposed multi-family development were analyzed. Key findings include:

- Based on the most recent five years of crash data, one of the study intersections have crash rates that exceed the 90th percentile rates identified by ODOT for similar types of intersections and two are identified on the ODOT SPIS List. Potential intersection improvements have been identified in the Woodburn TSP at these intersections.
- All other study intersections had no significant trends or crash patterns that were identified, and no safety mitigation is recommended per the crash data analysis.
- Adequate sight distances are available at the proposed site access intersection to allow for safe operation along Young Street.
- Preliminary traffic signal warrants are not projected to be met for any of the unsignalized study intersections upon full buildout of the proposed development.
- All study intersections are currently operating acceptably per City of Woodburn and ODOT standards and are projected to continue operating acceptably through the 2025 site buildout year. No operational mitigation is necessary or recommended at these intersections.
- In general, changes in 95th percentile queuing between the year 2025 background and buildout conditions are anticipated to be small, one or two vehicles. No queuing related mitigation is necessary or recommended.



Appendix A – Site Information

Site Plan

Trip Generation Calculations





SITE PLAN GENERAL NOTES:

- REFER TO LANDSCAPE PLANS FOR ADDITIONAL PEDESTRIAN WALKS AND PLANTING INFORMATION.
- ANY GRADING AND UTILITIES (BOTH EXISTING AND NEW) ARE SHOWN FOR REFERENCE ONLY - REFER TO CIVIL DRAWINGS.
- SITE PAVEMENT MATERIAL AND DESIGN PER CIVIL. MAX. SPACE BETWEEN JOINTS TO BE 10'-0".
- REFER TO PLUMBING DRAWINGS FOR HOSE BIB LOCATIONS.
- LIGHTING TO BE INSTALLED AT PATHS ALONG THE REQUIRED EXIT WAYS - REFER TO ELECTRICAL SITE PLAN.
- ALL GROUND MOUNTED UTILITY EQUIPMENT SHALL BE SCREENED FROM THE STREET AND THE BUILDING WITH LANDSCAPE - VERIFY LOCATION WITH EACH UTILITY PROVIDER AND COORDINATE WITH LANDSCAPING AS NEEDED.
- ANY WALL PACK LIGHTING PROVIDED TO BE SHIELDED.
- THE RUNNING SLOPE OF WALKING SURFACES SHALL NOT BE STEEPER THAN 1:20. THE CROSS SLOPE OF A WALKING SURFACE SHALL NOT BE STEEPER THAN 1:48.
- PARKING SPACES AND ACCESS AISLES SHALL HAVE A SURFACE SLOPES NOT STEEPER THAN 1:50 (2%) PER IBC.
- ANY RETAINING WALLS, BERMS, SWALES, ETC. SHOWN FOR REFERENCE ONLY - REFER TO CIVIL DRAWINGS.
- ANY WALL MOUNTED UTILITIES AND ASSOCIATED EQUIPMENT SHALL BE PAINTED TO MATCH ADJACENT BUILDING COLOR.

SITE PLAN LEGEND

(NOTE: SEE A0 SHEETS FOR ADDITIONAL GENERAL LEGEND INFORMATION)

OBJECT/PATTERN	DESCRIPTION(S)
---	- PROPERTY LINE
---	- SETBACK LINES
---	- ROOF OUTLINE
x x x	- FENCE LINE
---	- ACCESSIBLE PATH FROM BUILDING TO PUBLIC WAY
[Orange Box]	- BUILDING FOOTPRINT
[Green Box]	- AMENITY SPACE
[Hatched Box]	- GRASSCRETE FIRE ACCESS DRIVE
•	- PROPERTY DATUM POINT
•	- REMOVABLE BOLLARDS
EV	- ELECTRIC VEHICLE CHARGING STATION AT PARKING LOCATION

SITE INFORMATION

LOT AREA	138,679 SF
ZONE	MUV - MIXED USE VILLAGE
USES	MULTI-FAMILY HOUSING
# UNITS	94
MAX. LOT WIDTH	446'-2 1/4"
MAX. LOT DEPTH	323'-6 1/2"

UNITS

TYPE	AREA (SF)	COUNT
1-BEDROOM	788	48
2-BEDROOM	984	46

BUILDING COVERAGE

DESCRIPTION	AREA (SF)	% OF SITE
BUILDING FOOTPRINT	35,996	26 %
PAVING	64,439	46 %
SIDEWALKS	13,420	10 %
LANDSCAPE AREA	24,824	18 %
COMMON AREA	39,538	29 %
IMPROVED COMMON AREA 450 DOG PARK, 140 PATIO INTERIOR IMPROVED*	1,294	- %
TOTAL SITE AREA	138,679	

* BASED 12 SF / DWELLING UNIT

PARKING SCHEDULE

DESCRIPTION	# REQUIRED	# PROVIDED
STANDARD STALLS	-	152
COMPACT STALLS**	-	38
COVERED STALLS***	94	97
EV CHARGING STALLS	9	10
TOTAL ON-SITE PARKING	188*	190

* BASED ON PARKING RATIO OF 2 / DWELLING UNIT

** BASED ON 20% ALLOWED TO BE COMPACT STALLS

*** BASED ON 1/2 OF PARKING STALLS REQUIRED TO BE COVERED

BICYCLE SCHEDULE

DESCRIPTION	# REQUIRED	# PROVIDED
STANDARD STALLS	52	52
COVERED STALLS	52	52
TOTAL ON-SITE PARKING	104	104

SITE PLAN

SCALE: 1" = 20'-0"



CLIENT:



PROJECT/ LOCATION:

WEST COAST HOME SOLUTIONS

WOODBURN, OREGON

TITLE:

SITE PLAN

LU 1.0

DATE:

03/02/23

Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

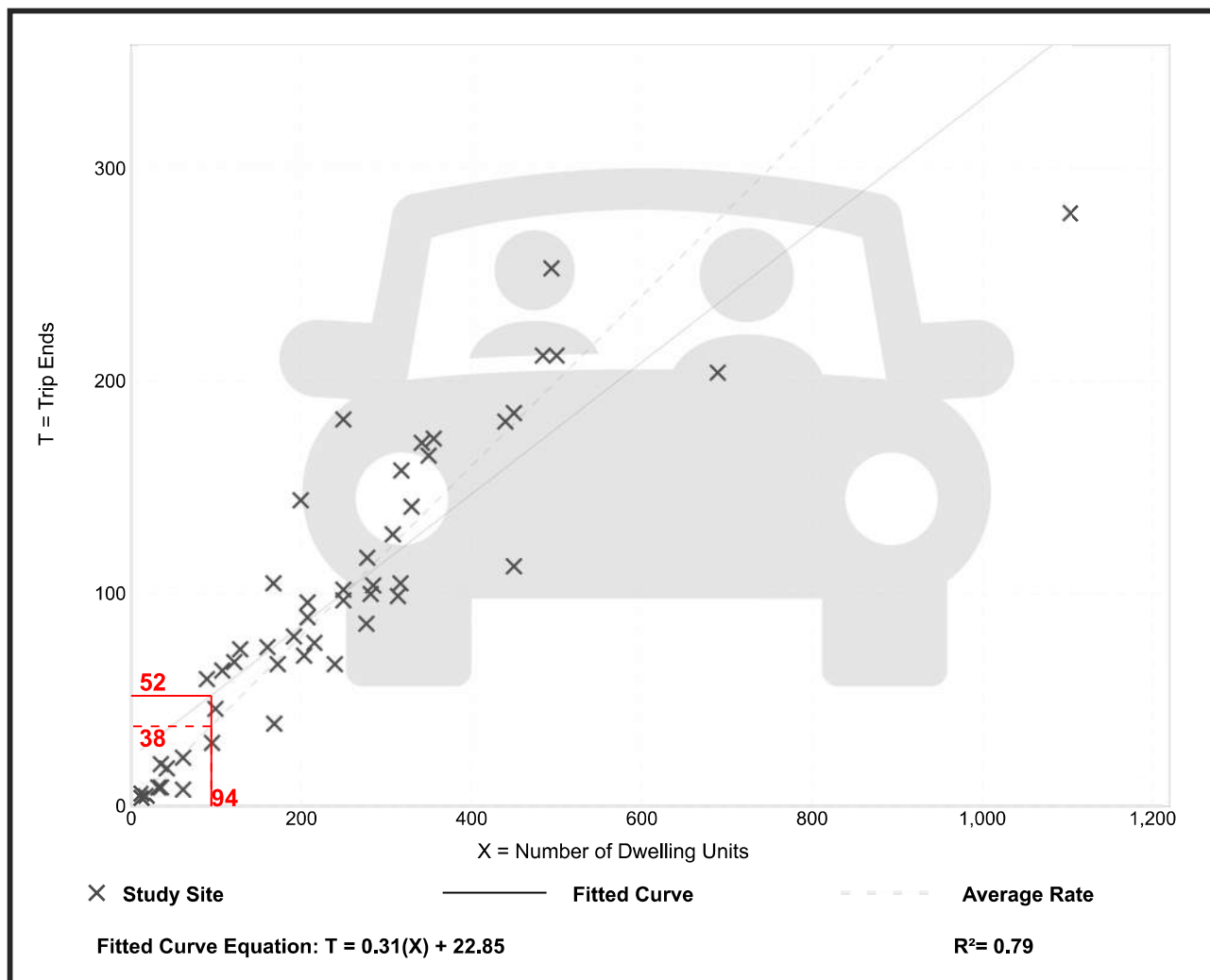
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban
 Number of Studies: 49
 Avg. Num. of Dwelling Units: 249
 Directional Distribution: 24% entering, 76% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.40	0.13 - 0.73	0.12

Data Plot and Equation



Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

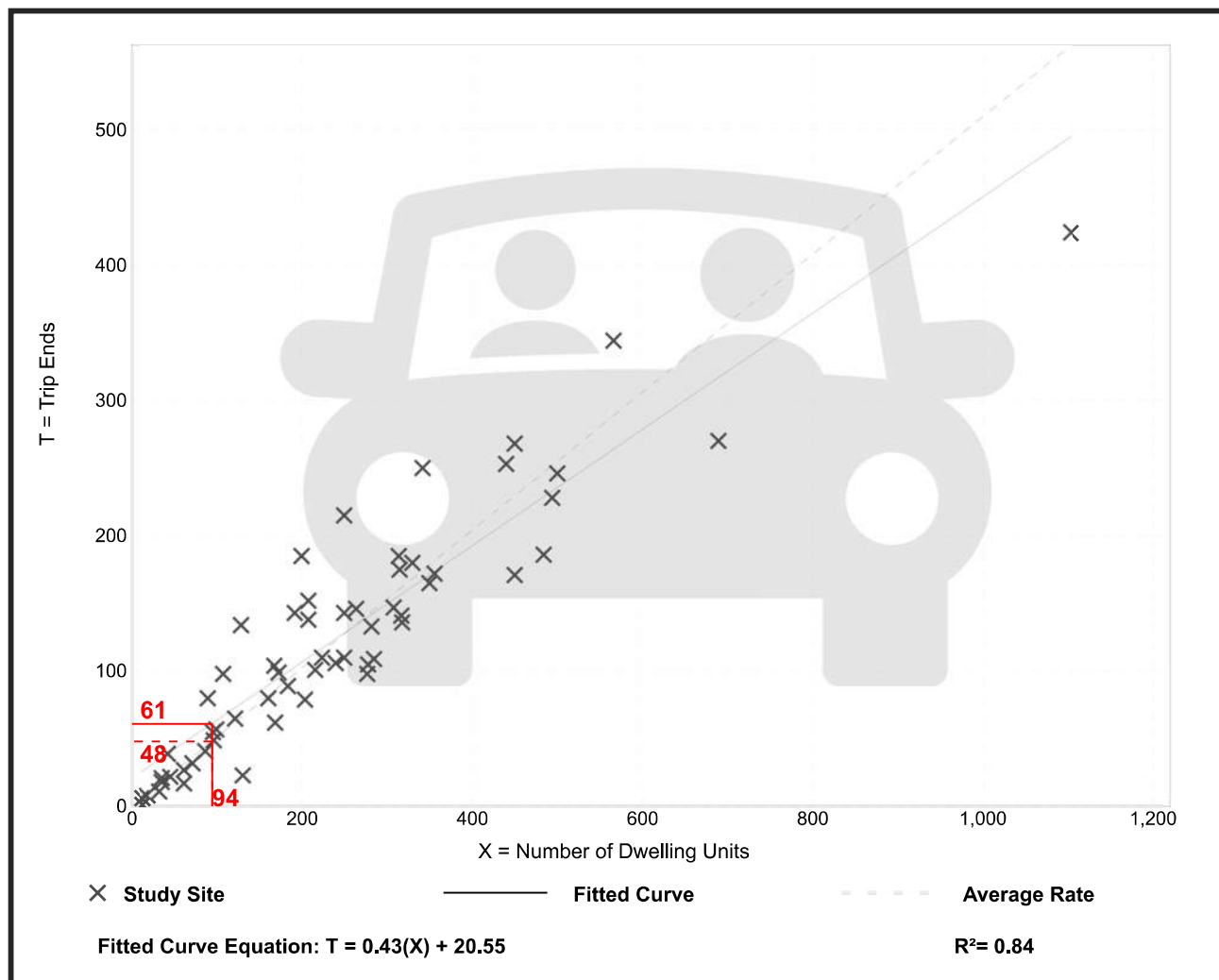
Setting/Location: General Urban/Suburban

Number of Studies: 59
 Avg. Num. of Dwelling Units: 241
 Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.51	0.08 - 1.04	0.15

Data Plot and Equation



Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

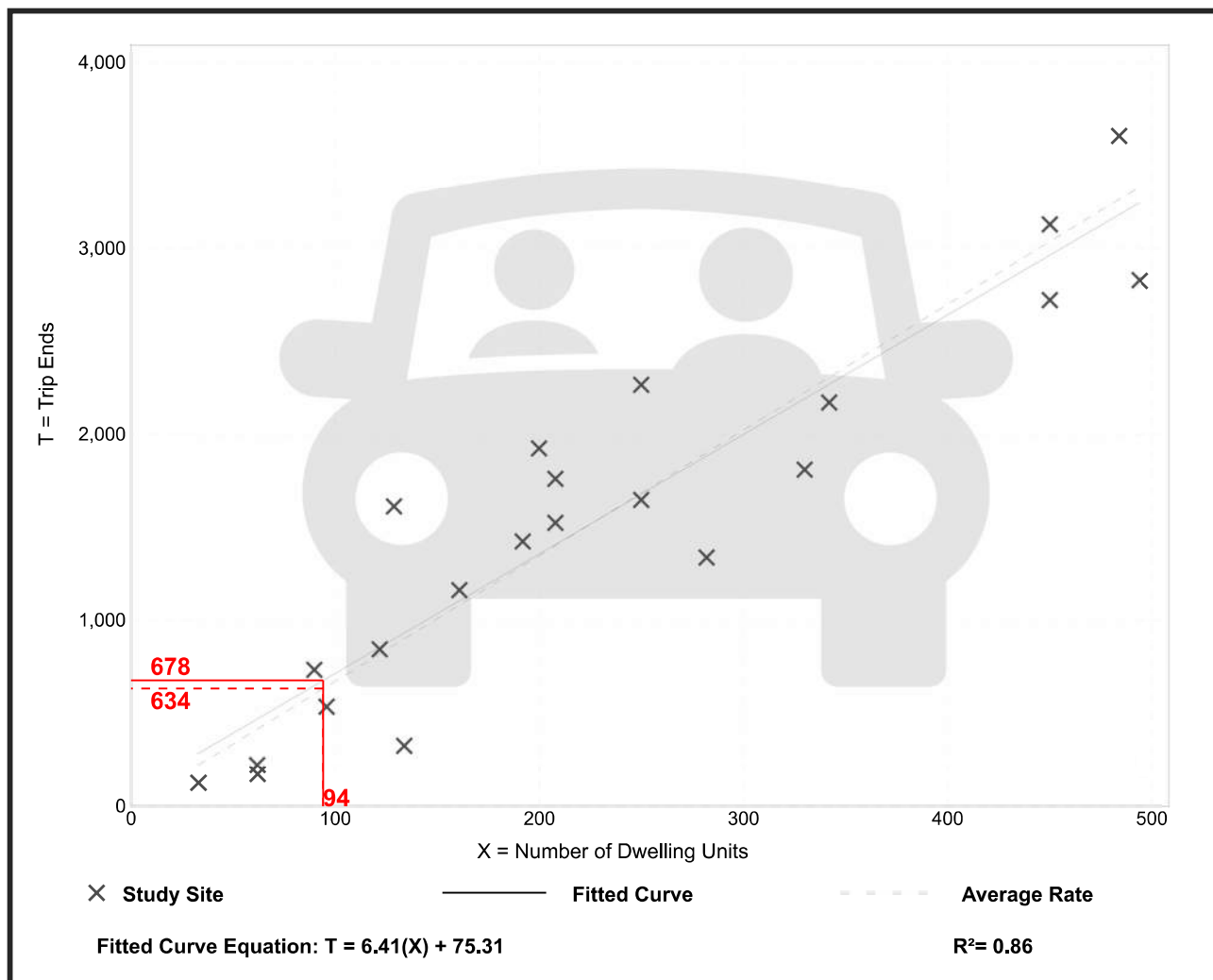
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 22
Avg. Num. of Dwelling Units: 229
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
6.74	2.46 - 12.50	1.79

Data Plot and Equation



Appendix B – Volumes

Traffic Counts

In-Process Trips





(303) 216-2439
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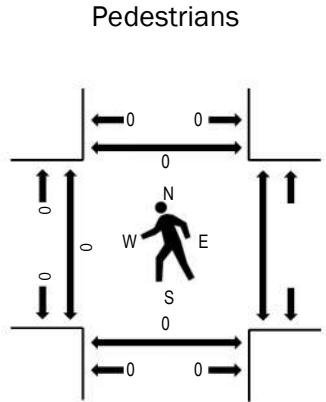
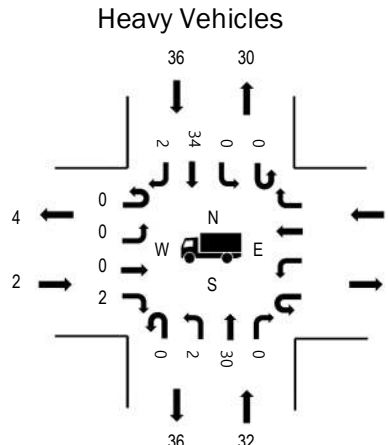
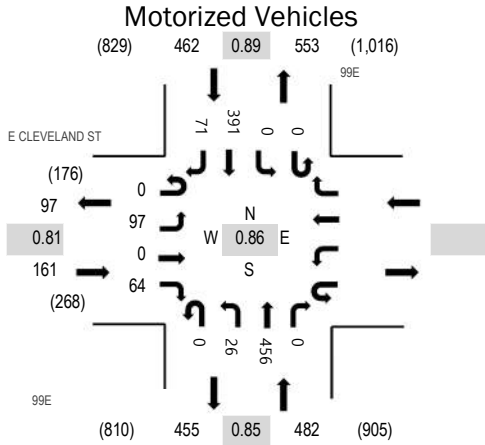
Location: 1 99E & E CLEVELAND ST AM

Date: Tuesday, January 31, 2023

Peak Hour: 07:00 AM - 08:00 AM

Peak 15-Minutes: 07:35 AM - 07:50 AM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.2%	0.81
WB		
NB	6.6%	0.85
SB	7.8%	0.89
All	6.3%	0.86

Traffic Counts - Motorized Vehicles

Interval Start Time	E CLEVELAND ST				99E				99E				Total	Rolling Hour				
	Eastbound				Westbound				Northbound						Southbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	10	0	10					0	2	37	0	0	0	33	5	97	1,105
7:05 AM	0	9	0	5					0	1	29	0	0	0	34	2	80	1,097
7:10 AM	0	9	0	4					0	1	36	0	0	0	23	4	77	1,103
7:15 AM	0	5	0	4					0	4	45	0	0	0	29	10	97	1,092
7:20 AM	0	9	0	5					0	4	32	0	0	0	35	7	92	1,056
7:25 AM	0	7	0	5					0	2	40	0	0	0	26	1	81	1,042
7:30 AM	0	11	0	3					0	2	28	0	0	0	39	4	87	1,042
7:35 AM	0	8	0	6					0	2	32	0	0	0	34	4	86	1,030
7:40 AM	0	8	0	7					0	1	44	0	0	0	40	7	107	1,009
7:45 AM	0	11	0	10					0	1	60	0	0	0	34	11	127	976
7:50 AM	0	7	0	2					0	3	37	0	0	0	31	6	86	925
7:55 AM	0	3	0	3					0	3	36	0	0	0	33	10	88	903
8:00 AM	0	5	0	5					0	2	42	0	0	0	29	6	89	897
8:05 AM	0	6	0	6					0	3	36	0	0	0	30	5	86	
8:10 AM	0	4	0	1					0	0	29	0	0	0	28	4	66	
8:15 AM	0	5	0	1					0	1	32	0	0	0	20	2	61	
8:20 AM	0	6	0	3					0	3	37	0	0	0	27	2	78	
8:25 AM	0	5	0	4					0	2	43	0	0	0	22	5	81	
8:30 AM	0	6	0	4					0	1	31	0	0	0	29	4	75	
8:35 AM	0	4	0	2					0	1	27	0	0	0	22	9	65	
8:40 AM	0	8	0	4					0	2	26	0	0	0	29	5	74	
8:45 AM	0	10	0	2					0	2	27	0	0	0	32	3	76	
8:50 AM	0	1	0	3					0	5	36	0	0	0	13	6	64	
8:55 AM	0	5	0	7					0	3	32	0	0	0	32	3	82	
Count Total	0	162	0	106					0	51	854	0	0	0	704	125	2,002	
Peak Hour	0	97	0	64					0	26	456	0	0	0	391	71	1,105	

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

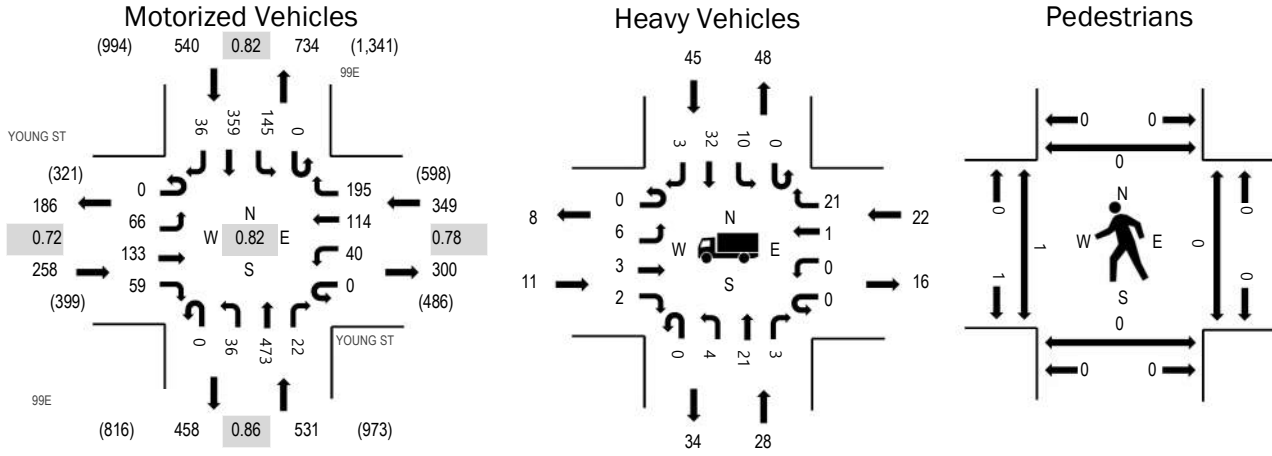
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	2		3	5	7:00 AM	0	0		0	0	7:00 AM	0	0		0	0
7:05 AM	1	1		4	6	7:05 AM	0	0		0	0	7:05 AM	0	0		0	0
7:10 AM	0	5		2	7	7:10 AM	0	0		0	0	7:10 AM	0	0		0	0
7:15 AM	0	2		2	4	7:15 AM	0	0		0	0	7:15 AM	0	0		0	0
7:20 AM	0	4		1	5	7:20 AM	0	0		0	0	7:20 AM	0	0		0	0
7:25 AM	0	3		2	5	7:25 AM	0	0		0	0	7:25 AM	0	0		0	0
7:30 AM	0	1		4	5	7:30 AM	0	0		0	0	7:30 AM	0	0		0	0
7:35 AM	0	1		2	3	7:35 AM	0	0		0	0	7:35 AM	0	0		0	0
7:40 AM	0	7		5	12	7:40 AM	0	0		0	0	7:40 AM	0	0		0	0
7:45 AM	1	0		5	6	7:45 AM	0	0		0	0	7:45 AM	0	0		0	0
7:50 AM	0	4		0	4	7:50 AM	0	0		0	0	7:50 AM	0	0		0	0
7:55 AM	0	2		6	8	7:55 AM	0	0		0	0	7:55 AM	0	0		0	0
8:00 AM	0	5		5	10	8:00 AM	0	0		0	0	8:00 AM	0	0		0	0
8:05 AM	0	3		6	9	8:05 AM	0	0		0	0	8:05 AM	0	0		0	0
8:10 AM	0	1		1	2	8:10 AM	0	0		0	0	8:10 AM	0	0		0	0
8:15 AM	0	4		2	6	8:15 AM	0	0		0	0	8:15 AM	0	0		0	0
8:20 AM	0	5		2	7	8:20 AM	0	0		0	0	8:20 AM	0	0		0	0
8:25 AM	0	7		3	10	8:25 AM	0	0		0	0	8:25 AM	0	0		0	0
8:30 AM	0	5		5	10	8:30 AM	1	0		0	1	8:30 AM	0	0		0	0
8:35 AM	0	2		3	5	8:35 AM	0	0		0	0	8:35 AM	0	0		0	0
8:40 AM	0	5		6	11	8:40 AM	0	0		0	0	8:40 AM	0	0		0	0
8:45 AM	0	0		4	4	8:45 AM	0	0		0	0	8:45 AM	0	0		0	0
8:50 AM	1	6		0	7	8:50 AM	0	0		0	0	8:50 AM	0	0		0	0
8:55 AM	1	7		5	13	8:55 AM	0	0		0	0	8:55 AM	0	0		0	0
Count Total	4	82		78	164	Count Total	1	0		0	1	Count Total	0	0		0	0
Peak Hour	2	32		36	70	Peak Hour	0	0		0	0	Peak Hour	0	0		0	0



(303) 216-2439
www.alltrafficdata.net

Location: 2 99E & YOUNG ST AM
Date: Tuesday, January 31, 2023
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:40 AM - 07:55 AM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	4.3%	0.72
WB	6.3%	0.78
NB	5.3%	0.86
SB	8.3%	0.82
All	6.3%	0.82

Traffic Counts - Motorized Vehicles

Interval Start Time	YOUNG ST Eastbound				YOUNG ST Westbound				99E Northbound				99E Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	3	7	6	0	1	12	12	0	5	48	0	0	7	31	2	134	1,678
7:05 AM	0	2	11	7	0	3	12	18	0	1	31	1	0	10	27	2	125	1,666
7:10 AM	0	5	10	3	0	3	4	10	0	1	39	3	0	9	20	3	110	1,660
7:15 AM	0	5	12	2	0	4	2	14	0	4	41	1	0	12	29	3	129	1,643
7:20 AM	0	3	4	7	0	4	5	6	0	3	44	1	0	11	30	0	118	1,618
7:25 AM	0	5	9	4	0	5	12	21	0	3	39	2	0	13	24	5	142	1,599
7:30 AM	0	5	8	4	0	2	12	13	0	4	24	1	0	18	33	1	125	1,563
7:35 AM	0	7	11	10	0	5	8	11	0	1	36	4	0	13	25	1	132	1,549
7:40 AM	0	7	17	5	0	3	13	36	0	5	38	1	0	11	32	4	172	1,521
7:45 AM	0	9	20	4	0	3	12	19	0	5	60	3	0	18	33	5	191	1,456
7:50 AM	0	8	11	5	0	2	14	11	0	2	38	2	0	12	38	6	149	1,379
7:55 AM	0	7	13	2	0	5	8	24	0	2	35	3	0	11	37	4	151	1,322
8:00 AM	0	6	7	2	0	3	9	17	0	3	44	2	0	4	24	1	122	1,286
8:05 AM	0	2	7	6	0	2	8	10	0	1	35	0	0	13	32	3	119	
8:10 AM	0	3	3	2	0	4	10	15	0	1	28	1	0	6	20	0	93	
8:15 AM	0	0	3	1	0	1	2	18	0	3	35	3	0	13	19	6	104	
8:20 AM	0	5	6	1	0	1	5	9	0	4	31	0	0	9	28	0	99	
8:25 AM	0	2	5	3	0	0	4	15	0	4	41	1	0	5	24	2	106	
8:30 AM	0	9	7	1	0	5	3	7	0	1	34	1	0	13	27	3	111	
8:35 AM	0	4	6	3	0	1	5	15	0	2	28	0	0	10	27	3	104	
8:40 AM	0	4	5	3	0	2	5	15	0	1	27	0	0	9	33	3	107	
8:45 AM	0	3	4	0	0	1	6	12	0	0	39	1	0	12	32	4	114	
8:50 AM	0	11	6	1	0	3	8	9	0	1	30	2	0	3	14	4	92	
8:55 AM	0	4	5	1	0	0	8	11	0	7	29	2	0	12	31	5	115	
Count Total	0	119	197	83	0	63	187	348	0	64	874	35	0	254	670	70	2,964	
Peak Hour	0	66	133	59	0	40	114	195	0	36	473	22	0	145	359	36	1,678	

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
7:00 AM	0	1	1	5	7	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	1	1	3	5	10	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	5	1	2	8	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	2	2	2	6	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	0	4	2	2	8	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	3	4	4	11	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	3	1	0	3	7	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	1	1	0	4	6	7:35 AM	0	0	0	0	0	7:35 AM	1	0	0	0	1
7:40 AM	0	4	5	6	15	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	2	1	0	0	3	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	4	3	2	6	15	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	2	2	6	10	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	0	5	3	7	15	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	1	2	1	6	10	8:05 AM	0	0	0	0	0	8:05 AM	1	0	0	0	1
8:10 AM	0	1	1	2	4	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	1	4	1	3	9	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	1	1
8:20 AM	2	4	2	4	12	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	8	3	5	16	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	1	4	3	7	15	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	2	1	3	6	8:35 AM	0	0	0	0	0	8:35 AM	0	0	1	0	1
8:40 AM	0	4	2	5	11	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	1	1
8:45 AM	1	1	4	7	13	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	0	3	2	0	5	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	2	6	0	7	15	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	19	72	45	101	237	Count Total	0	0	0	0	0	Count Total	2	0	1	2	5
Peak Hour	11	28	22	45	106	Peak Hour	0	0	0	0	0	Peak Hour	1	0	0	0	1

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
4:00 PM	1	3		5	9	4:00 PM	0	0		0	0	4:00 PM	0	0		0	0
4:05 PM	0	3		3	6	4:05 PM	0	0		0	0	4:05 PM	0	0		0	0
4:10 PM	0	3		1	4	4:10 PM	0	0		0	0	4:10 PM	0	0		0	0
4:15 PM	0	1		3	4	4:15 PM	0	0		0	0	4:15 PM	0	0		0	0
4:20 PM	0	1		0	1	4:20 PM	0	0		0	0	4:20 PM	0	0		0	0
4:25 PM	0	2		1	3	4:25 PM	0	0		0	0	4:25 PM	0	0		0	0
4:30 PM	0	1		3	4	4:30 PM	0	0		0	0	4:30 PM	0	0		0	0
4:35 PM	0	1		2	3	4:35 PM	0	0		0	0	4:35 PM	0	0		0	0
4:40 PM	0	1		1	2	4:40 PM	0	0		0	0	4:40 PM	0	0		0	0
4:45 PM	0	0		4	4	4:45 PM	0	0		0	0	4:45 PM	0	0		0	0
4:50 PM	0	0		0	0	4:50 PM	0	0		0	0	4:50 PM	0	0		0	0
4:55 PM	0	0		4	4	4:55 PM	0	0		0	0	4:55 PM	0	0		0	0
5:00 PM	0	1		2	3	5:00 PM	0	0		0	0	5:00 PM	0	0		0	0
5:05 PM	0	1		1	2	5:05 PM	0	0		0	0	5:05 PM	0	0		0	0
5:10 PM	0	0		2	2	5:10 PM	0	0		0	0	5:10 PM	0	0		0	0
5:15 PM	0	1		0	1	5:15 PM	0	0		0	0	5:15 PM	0	0		0	0
5:20 PM	0	0		2	2	5:20 PM	0	0		0	0	5:20 PM	0	0		0	0
5:25 PM	0	2		1	3	5:25 PM	0	0		0	0	5:25 PM	0	0		0	0
5:30 PM	0	1		0	1	5:30 PM	0	0		0	0	5:30 PM	0	0		0	0
5:35 PM	0	1		3	4	5:35 PM	0	0		0	0	5:35 PM	0	0		0	0
5:40 PM	0	0		3	3	5:40 PM	0	0		0	0	5:40 PM	1	0		0	1
5:45 PM	1	4		3	8	5:45 PM	0	0		0	0	5:45 PM	0	0		0	0
5:50 PM	0	2		0	2	5:50 PM	0	0		0	0	5:50 PM	0	0		0	0
5:55 PM	1	3		1	5	5:55 PM	0	0		0	0	5:55 PM	0	0		0	0
Count Total	3	32		45	80	Count Total	0	0		0	0	Count Total	1	0		0	1
Peak Hour	0	14		24	38	Peak Hour	0	0		0	0	Peak Hour	0	0		0	0



(303) 216-2439

www.alltrafficdata.net

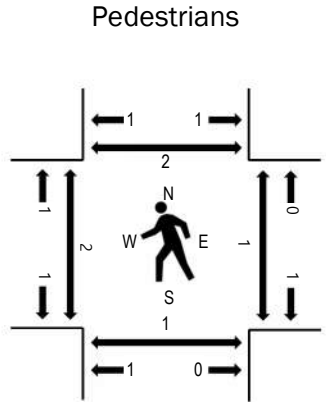
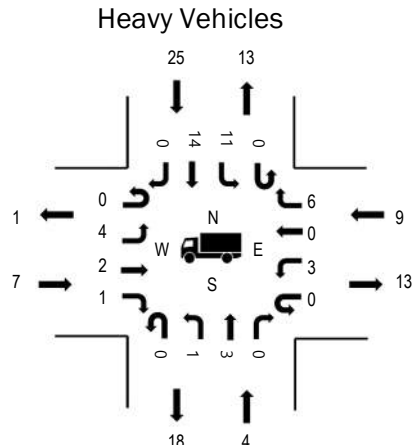
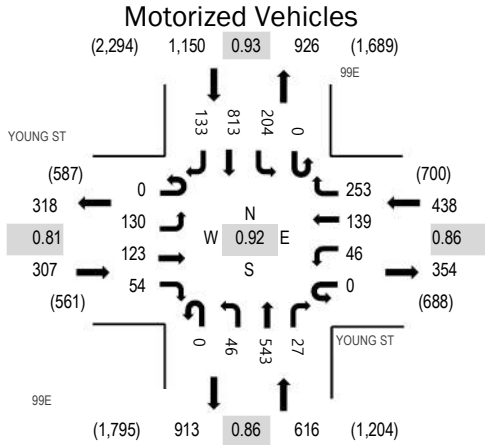
Location: 2 99E & YOUNG ST PM

Date: Tuesday, January 31, 2023

Peak Hour: 04:30 PM - 05:30 PM

Peak 15-Minutes: 04:40 PM - 04:55 PM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	2.3%	0.81
WB	2.1%	0.86
NB	0.6%	0.86
SB	2.2%	0.93
All	1.8%	0.92

Traffic Counts - Motorized Vehicles

Interval Start Time	YOUNG ST Eastbound				YOUNG ST Westbound				99E Northbound			99E Southbound				Total	Rolling Hour	
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru			Right
4:00 PM	0	9	10	4	0	3	9	16	0	2	41	1	0	19	72	4	190	2,476
4:05 PM	0	8	8	4	0	4	7	22	0	3	40	0	0	18	71	7	192	2,484
4:10 PM	0	11	16	6	0	5	7	14	0	9	56	1	0	15	84	7	231	2,484
4:15 PM	0	3	10	3	0	4	9	13	0	6	69	0	0	13	74	9	213	2,502
4:20 PM	0	10	3	2	0	3	5	17	0	5	48	2	0	22	76	8	201	2,483
4:25 PM	0	9	8	4	0	3	5	11	0	5	39	2	0	13	52	11	162	2,471
4:30 PM	0	8	13	7	0	7	12	15	0	1	44	2	0	21	68	9	207	2,511
4:35 PM	0	11	3	4	0	4	7	29	0	7	45	4	0	11	64	10	199	2,484
4:40 PM	0	7	11	5	0	1	13	33	0	6	49	5	0	16	62	14	222	2,492
4:45 PM	0	11	12	3	0	3	13	25	0	3	63	2	0	16	86	19	256	2,451
4:50 PM	0	5	4	2	0	3	12	25	0	5	49	3	0	17	67	12	204	2,345
4:55 PM	0	11	8	7	0	5	10	20	0	5	50	1	0	12	58	12	199	2,319
5:00 PM	0	11	9	5	0	7	11	23	0	3	34	1	0	16	66	12	198	2,283
5:05 PM	0	18	11	5	0	8	10	20	0	5	42	1	0	14	50	8	192	
5:10 PM	0	18	16	5	0	6	17	21	0	2	43	3	0	23	84	11	249	
5:15 PM	0	7	11	5	0	0	15	17	0	4	36	4	0	23	64	8	194	
5:20 PM	0	9	12	4	0	0	5	7	0	3	44	1	0	19	76	9	189	
5:25 PM	0	14	13	2	0	2	14	18	0	2	44	0	0	16	68	9	202	
5:30 PM	0	11	8	2	0	0	6	11	0	2	50	0	0	22	58	10	180	
5:35 PM	0	13	9	12	0	3	12	12	0	7	20	4	0	26	71	18	207	
5:40 PM	0	9	8	4	0	1	4	7	0	3	40	4	0	19	64	18	181	
5:45 PM	0	8	6	6	0	2	5	6	0	1	38	1	0	12	52	13	150	
5:50 PM	0	10	6	2	0	2	12	9	0	5	35	3	0	22	61	11	178	
5:55 PM	0	6	4	2	0	2	7	4	0	8	38	0	0	19	64	9	163	
Count Total	0	237	219	105	0	78	227	395	0	102	1,057	45	0	424	1,612	258	4,759	
Peak Hour	0	130	123	54	0	46	139	253	0	46	543	27	0	204	813	133	2,511	

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
4:00 PM	0	2	2	8	12	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	3	1	2	3	9	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	4	3	2	9	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	0	2	0	2	4	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	1	1	0	2	4:20 PM	0	0	0	0	0	4:20 PM	1	0	0	0	1
4:25 PM	1	2	0	3	6	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	1	1	1	3	6	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	1	1
4:35 PM	0	1	1	1	3	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	0	0	1	2	3	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	1	1
4:45 PM	1	0	1	3	5	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	0	0	0	2	2	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	1	0	0	3	4	4:55 PM	0	0	1	0	1	4:55 PM	0	0	0	0	0
5:00 PM	1	1	1	4	7	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	1	1
5:05 PM	1	0	1	2	4	5:05 PM	0	0	0	0	0	5:05 PM	0	1	1	0	2
5:10 PM	1	0	1	2	4	5:10 PM	0	0	0	0	0	5:10 PM	2	0	0	1	3
5:15 PM	0	0	0	0	0	5:15 PM	0	0	1	0	1	5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	1	1	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	1	1	2	2	6	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	1	1	0	1	3	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	1	0	4	5	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	1	1
5:40 PM	1	0	0	2	3	5:40 PM	0	0	0	0	0	5:40 PM	1	0	0	0	1
5:45 PM	1	2	0	4	7	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	2	2	0	1	5	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	1	2	0	3	6	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	17	24	17	58	116	Count Total	0	0	2	0	2	Count Total	4	1	1	5	11
Peak Hour	7	4	9	25	45	Peak Hour	0	0	2	0	2	Peak Hour	2	1	1	4	8

Trip Generation Estimate

Trip generation estimates are typically based on data derived from *Trip Generation, 10th Edition*, published by the Institute of Transportation Engineers (ITE). Project Basie will be used for storage and consolidation of products prior to their larger regional and local distribution and would be considered a “sortable” facility. The ITE land use that most closely matches this function is “High-Cube Fulfillment Center Warehouse” (Land Use 155). Table 9 provides the estimated trip generation using ITE data.

Table 9 - Estimated Trip Generation (ITE) – High Cube Fulfillment Center (Sortable)

Land Use	ITE Code	Size	Weekday Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
High-Cube Fulfillment Center Warehouse	155	3,849,000 sq. ft.	23,640	1,705	853	852	3,959	1,980	1,979

In reviewing Table 9, it is important to note that these ITE rates are based on one or two study sites (depending on the analysis period) with a facility square footage that is significantly smaller than the proposed 3.849 million square foot Project Basie facility. In consultation with the Project Basie tenant, it was determined that the application of the Land Use 155 rates would significantly overestimate the daily and peak hour trip profile of the site.

Instead, the Project Basie tenant supplied a detailed employee and truck arrival/departure profile that was developed specifically for the proposed site, taking into consideration the size of the building, its geographic location and relation to other in-network distribution facilities, the finite processing capabilities of the facility, internal automation technology, anticipated employee levels, and site-specific work schedules. These variables are based on operational experience at other facilities with similar functions nationwide. A detailed summary of this profile is included in *Appendix G* along with additional trip generation information requested by City of Woodburn staff. As shown, the proposed site is anticipated to be a 24-hour facility with multiple shift change patterns. In particular, there are two key shift change periods that are anticipated to occur near the typical weekday AM and PM peak periods:

- 6:30-7:30 AM which accounts for the peak arrival period for the dayshift.
- 5:30-6:30 PM which accounts for peak dayshift departure period and the peak nightshift arrival period.

These shift change periods represent what ITE defines as “the Peak Hour of the Generator”. The resulting trip profile is summarized in Table 10 below.

Table 10 - Project Basie - Peak Hour of the Generator Trip Generation Estimate

Land Use	Size	Trip Type	Weekday Daily Trips	Weekday AM Peak Hour of Generator Trips (6:30-7:30 AM)			Weekday PM Peak Hour of Generator Trips (5:30-6:30 PM)		
				Total	In	Out	Total	In	Out
Project Basie	937 employees per shift	Employees	3,558	676	648	28	1,156	573	583
		Trucks	612	26	13	13	20	10	10
		Total	4,170	702	661	41	1,176	583	593

Source: Tenet supplied employee and freight arrival/departure schedule. See Appendix G.

Note: The trip generation profile in Table 10 is consistent with the proposed 3.849 million square foot facility. The square footage identified in the 4/16/21 Scoping Memo was incorrectly stated.

In addition to the Peak Hour of the Generator, the traffic counts along the OR 219 study corridor revealed that Woodburn’s street system has different peak time periods than reflected in Table 10. In particular, the weekday AM peak hour in Woodburn has been found to occur from 7:00-8:00 AM while the weekday PM system peak hour has been found to occur from 4:30-5:30 PM. The resulting trip profile for the proposed building during these times is shown in Table 11.

Table 11 - Project Basie - Peak Hour of the System Trip Generation Estimate

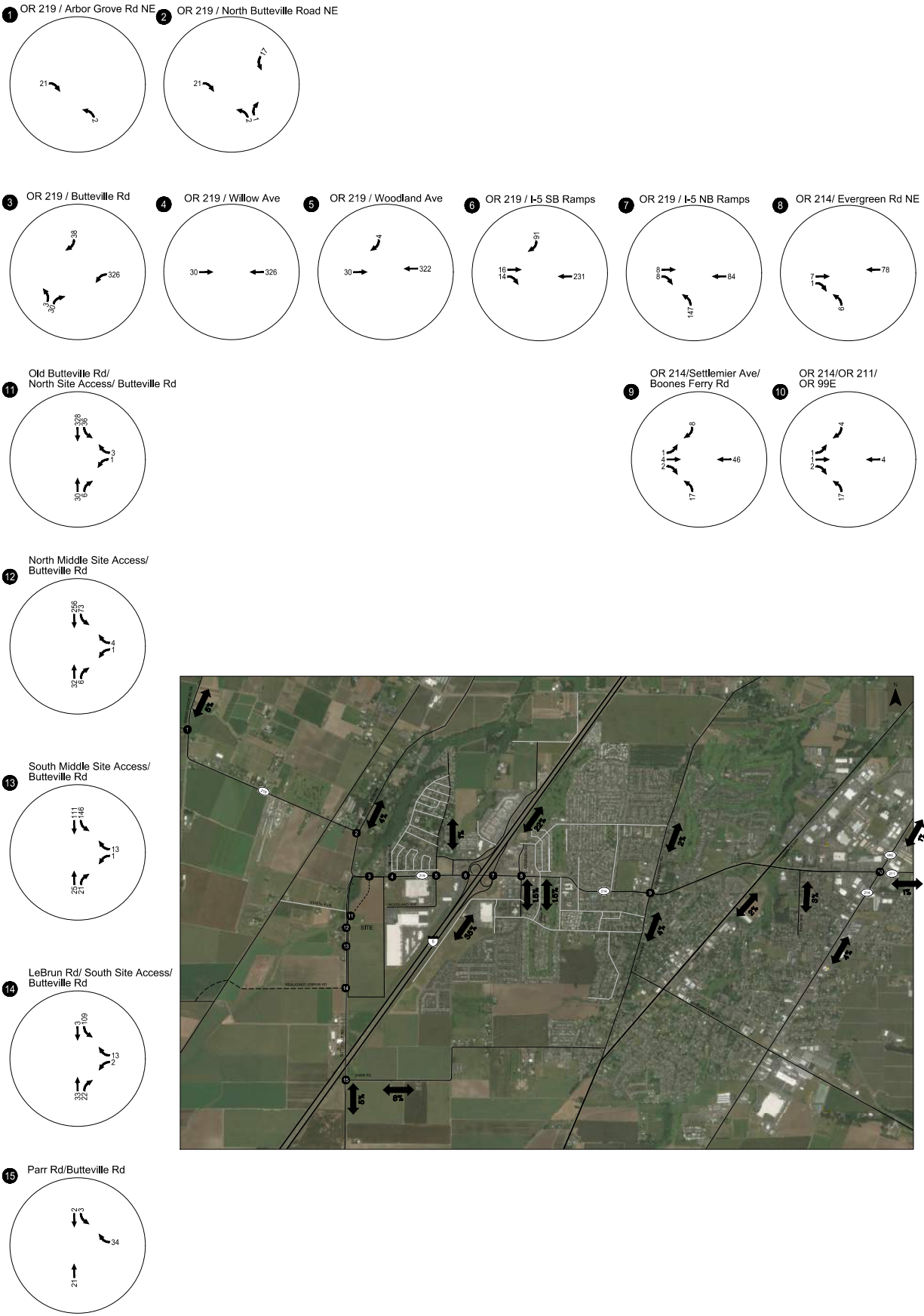
Land Use	Size	Trip Type	Weekday Daily Trips	Weekday AM Peak Hour of the System Trips (7:00-8:00 AM)			Weekday PM Peak Hour of the System Trips (4:30-5:30 PM)		
				Total	In	Out	Total	In	Out
Project Basie	937 employees per shift	Employees	3,558	427	404	23	154	93	61
		Trucks	612	30	15	15	22	11	11
		Total	4,170	457	419	38	176	104	72

Source: Tenet supplied employee and freight arrival/departure schedule. See Appendix G.

Note: The trip generation profile in Table 11 is consistent with the proposed 3.849 million square foot facility. The square footage identified in the 4/16/21 Scoping Memo was incorrectly stated.

Site Trip Distribution/Trip Assignment

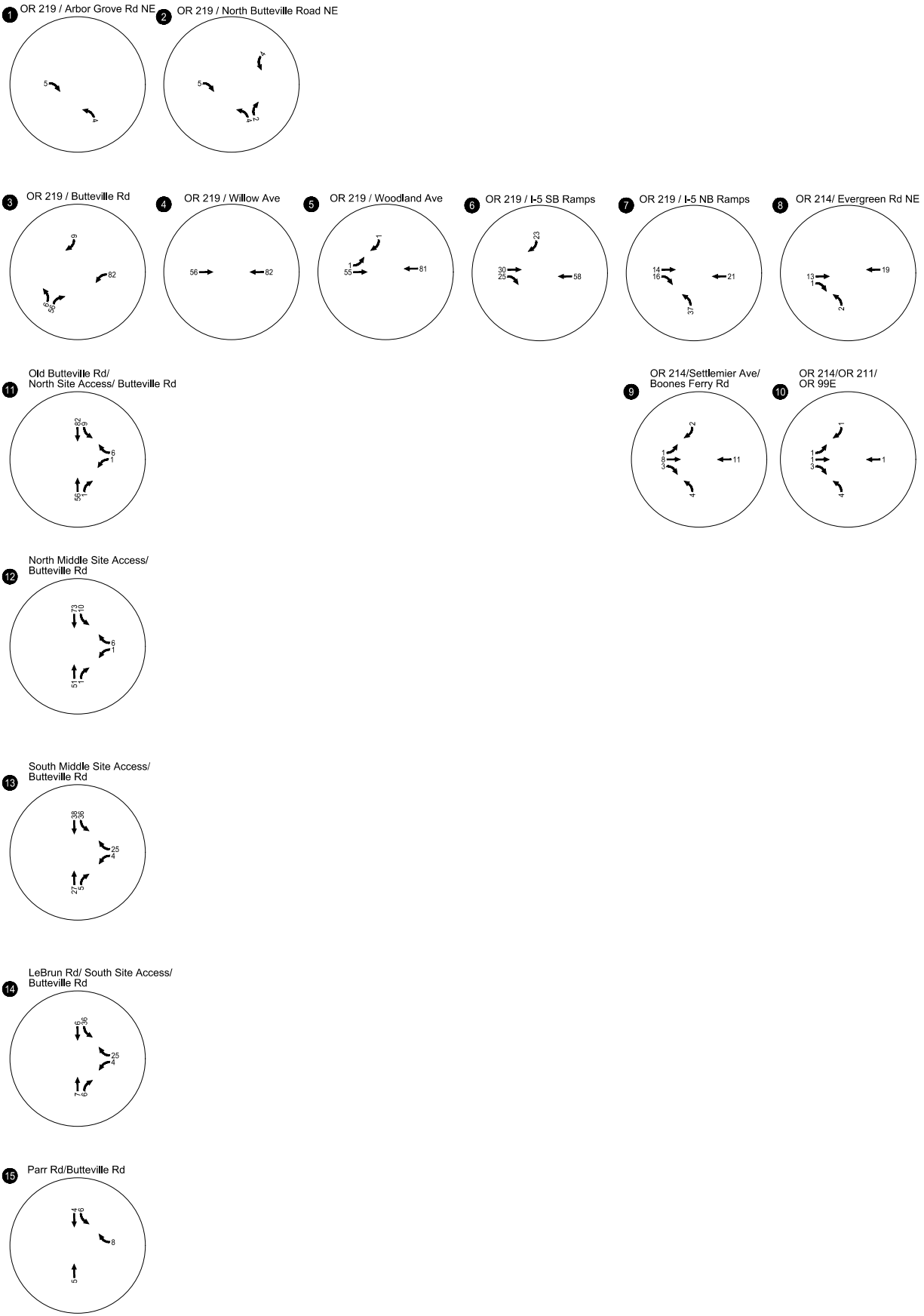
A trip distribution pattern was identified for the proposed fulfillment center, taking into consideration the number of anticipated jobs that will be provided by the development, the site’s location with respect to both the city and other population centers in the Willamette Valley. In addition to these factors, US Census OnTheMap (<https://onthemap.ces.census.gov/>) data was consulted which identifies statistics about the origins of workers who are employed in the Woodburn area (see Appendix H for a more detailed summary of the census employee origin data for Woodburn). Using a combination of these factors and based on preliminary scoping feedback from City, County, and ODOT staff, a refined trip distribution pattern was developed for the site. The trip distribution pattern and resulting assignment of weekday AM and PM peak period site-generated trips to the study intersections and site driveways is illustrated in Figures 13-16.



Site-Generated Trips
System Peak Hour (7:00 AM to 8:00 AM)
Woodburn, OR

Figure
13

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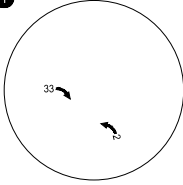


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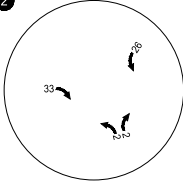
Site-Generated Trips
System Peak Hour (4:30 PM to 5:30 PM)
Woodburn, OR

Figure
14

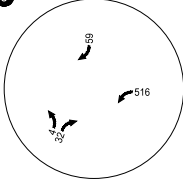
1 OR 219 / Arbor Grove Rd NE



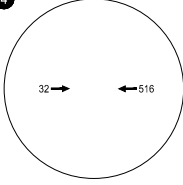
2 OR 219 / North Butteville Road NE



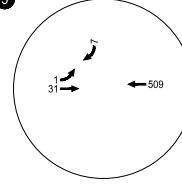
3 OR 219 / Butteville Rd



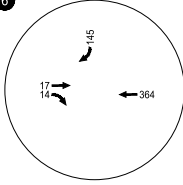
4 OR 219 / Willow Ave



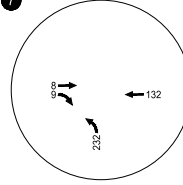
5 OR 219 / Woodland Ave



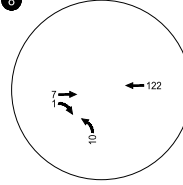
6 OR 219 / I-5 SB Ramps



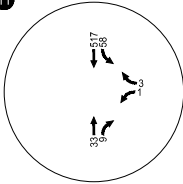
7 OR 219 / I-5 NB Ramps



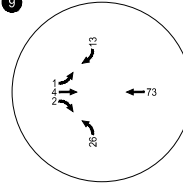
8 OR 214/ Evergreen Rd NE



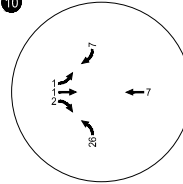
11 Old Butteville Rd/ North Site Access/ Butteville Rd



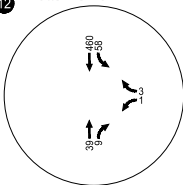
9 OR 214/Settemier Ave/ Boones Ferry Rd



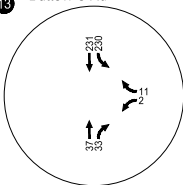
10 OR 214/OR 211/ OR 98E



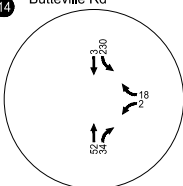
12 North Middle Site Access/ Butteville Rd



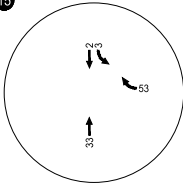
13 South Middle Site Access/ Butteville Rd



14 LeBrun Rd/ South Site Access/ Butteville Rd



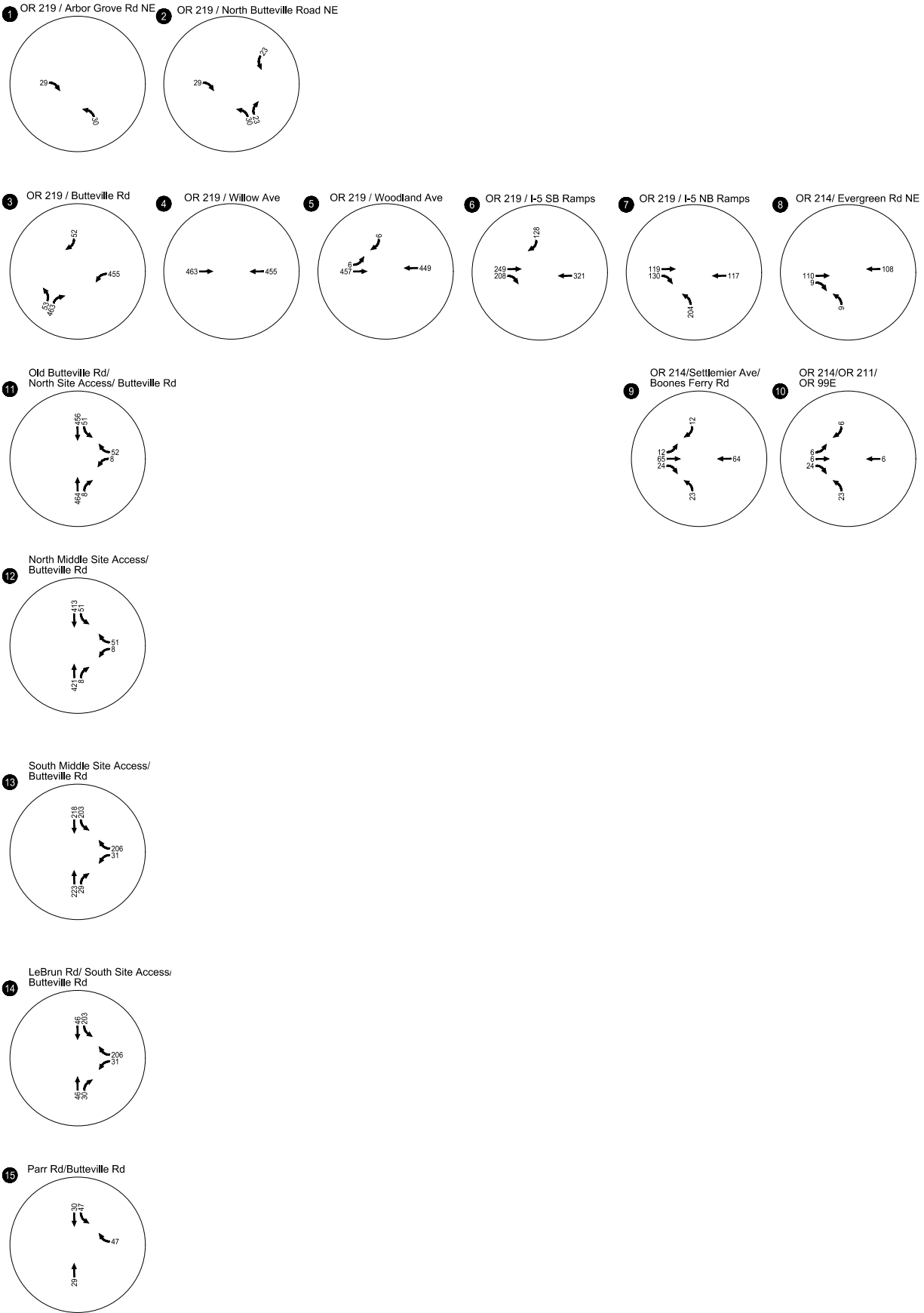
15 Parr Rd/Butteville Rd



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Site-Generated Trips
Peak Hour of Generator (6:30 AM to 7:30 AM)
Woodburn, OR

Figure
15



**Site-Generated Trips
Peak Hour of Generator (5:30 PM to 6:30 PM)
Woodburn, OR**

**Figure
16**

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CHAPTER 4: PROJECT IMPACTS

This chapter reviews impacts the proposed development may have on the study area transportation system. The focus of the impact analysis is on the following study intersections:

- 1 N Pacific Hwy (99E)/ Molalla Rd (OR 211)
- 2 Molalla Rd (OR 211)/ Safeway Driveway
- 3 Molalla Rd (OR 211)/ June Way/ Woodburn Place Apartments Phase 2 Site Access
- 4 Molalla Rd (OR 211)/ Woodburn Place Apartments Phase 1 Site Access
- 5 Molalla Rd (OR 211)/ Cooley Road

Trip Generation

Trip generation is used to estimate the number of vehicle trips added to the roadway network by a development during a specified period. In this case, the AM and PM peak hour periods are studied. Trip generation estimates are established using data and methodology provided by the Institute of Transportation Engineers (ITE).³

Trip generation values for the proposed development are estimated using the ITE Trip Generation Manual, 11th Edition, and the Land Use Code 221: Multifamily Housing (Mid-Rise) Not Close to Rail Transit. Trip generation values are provided in **Table 8**.

Table 9: Trip Generation Summary

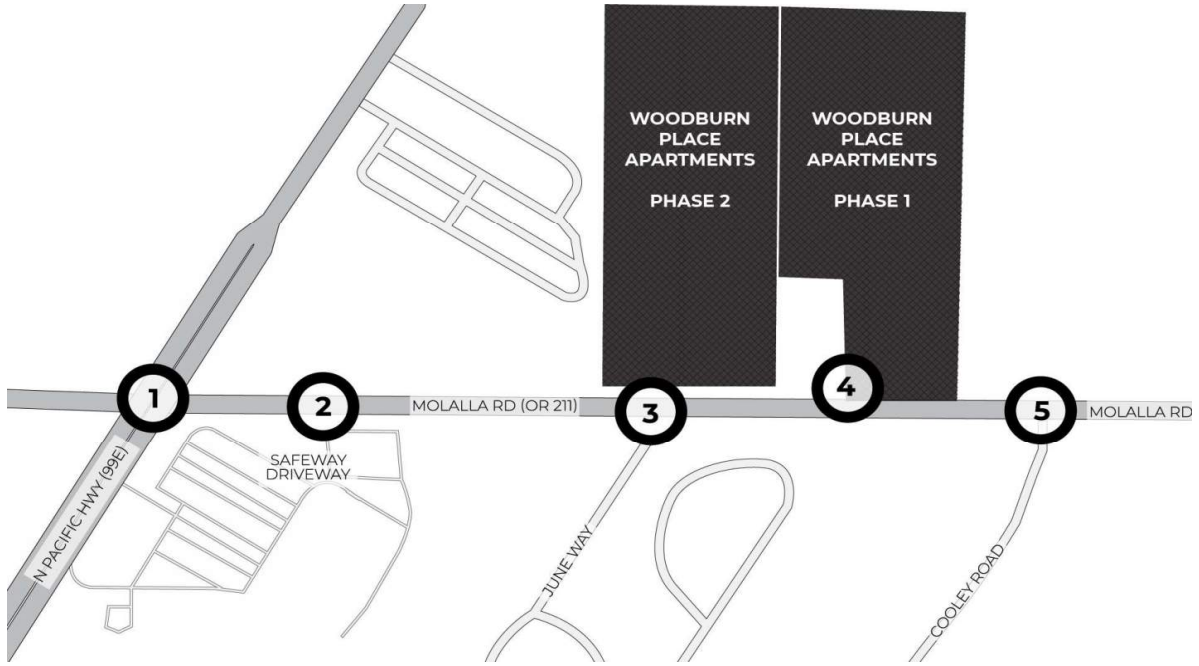
Land Use (ITE Codes)	Dwelling Units	Time Period	Trip Generation Rate	Peak Hour Trips		
				In	Out	Total
Multi-Family Mid-Rise Not Close to Rail Transit (LUC 221)	258	AM Peak	Equation	23	79	102
TOTAL AM PEAK HOUR				23	79	102
Multi-Family Mid-Rise Not Close to Rail Transit (LUC 221)	258	PM Peak	Equation	62	39	101
TOTAL PM PEAK HOUR				62	39	101

Trip Distribution

Trip distribution provides an estimation of where trips from the development originate and end on the study area network. This is represented as percentages where large portions of the trips generated enter and exit the project study area. The trip distribution percentages are included in **Appendix D**. **Figures 6 and 7** show the trips generated by the study distributed on the network.

³ *Trip Generation, 11th Edition*, Institute of Transportation Engineers, 2021.
Enloe Consulting, LLC

Figure 6: Site Generated Volumes AM Peak Hour



1 | 99E / Molalla Rd

0	0	6	20
↓	↓	↘	↖
			↖
0	8	0	0
↘	↘	↘	↖
			↖
0	0	6	0
↖	↖	↖	↖

2 | Molalla Rd / Safeway Driveway

20	0	68	0
↘	↘	↖	↖
		STOP	
0	0	0	0
↖	↖	↖	↖

3 | Molalla Rd / June Way

68	2	9	2
↖	↖	↖	↖
			STOP
20	0	0	0
↖	↖	↖	↖
			STOP
0	1	0	0
↖	↖	↖	↖

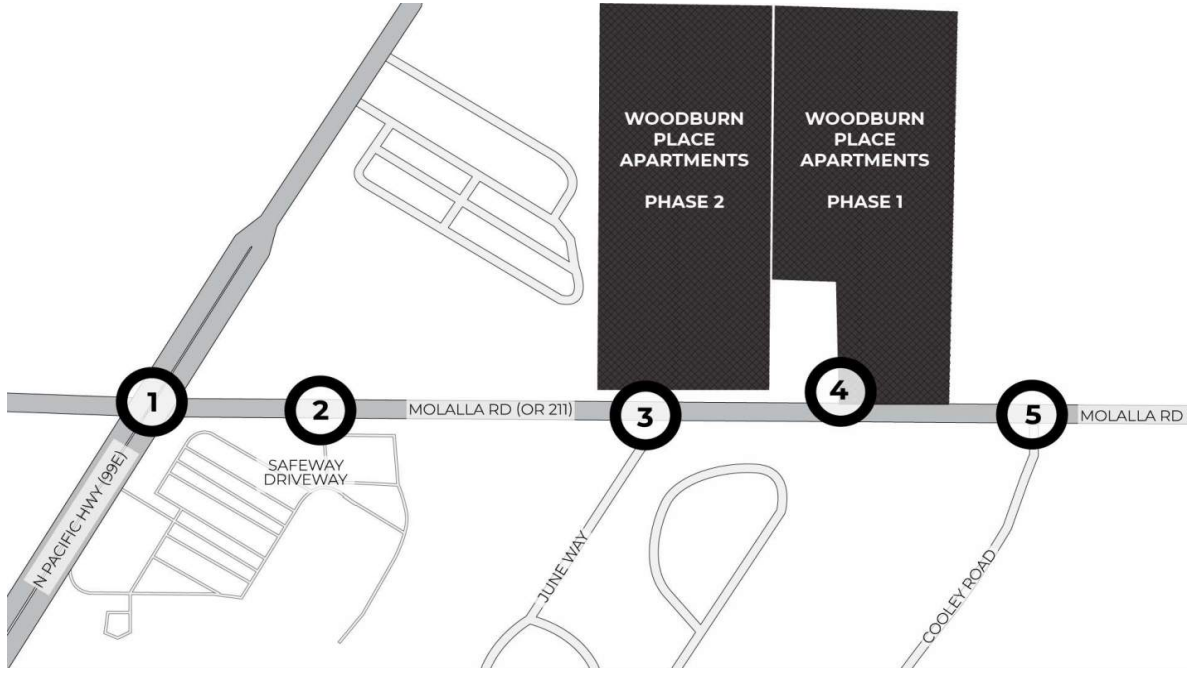
4 | Molalla Rd / Phase 1 Apt Access

0	0	0	2
↖	↖	↖	↖
		STOP	
0	9	0	0
↖	↖	↖	↖

5 | Molalla Rd / Cooley Rd

0	0	0	0
↖	↖	↖	↖
			STOP
0	5	4	1
↖	↖	↖	↖
			STOP
1	0	0	0
↖	↖	↖	↖

Figure 7: Site Generated Volumes PM Peak Hour



1 99E / Molalla Rd

0	0	15			10
↓	↓	↘	↑	↙	14
↙	↘	↗	↖	↗	10
↑			↑		
0	↘	↗	↖	↗	16
22	↘	↗	↖	↗	
0	↘	↗	↖	↗	

2 Molalla Rd / Safeway Driveway

			↑	↘	34
			↙	↗	0
53	↘	↗	↖	↗	STOP
0	↘	↗	↖	↗	
			0	0	

3 Molalla Rd / June Way

34	1	4	↑	↘	7
↙	↘	↗	↖	↗	0
↙	↘	↗	↖	↗	0
53	↘	↗	↖	↗	STOP
0	↘	↗	↖	↗	
0	↘	↗	↖	↗	
			0	2	0

4 Molalla Rd / Phase 1 Apt Access

0	0		↑	↘	0
↙	↘	↗	↖	↗	7
↙	↘	↗	↖	↗	
0	↘	↗	↖	↗	
4	↘	↗	↖	↗	

5 Molalla Rd / Cooley Rd

0	0	0	↑	↘	0
↙	↘	↗	↖	↗	4
↙	↘	↗	↖	↗	0
0	↘	↗	↖	↗	STOP
2	↘	↗	↖	↗	
2	↘	↗	↖	↗	
			3	0	0

Figure 8: Trip Distribution

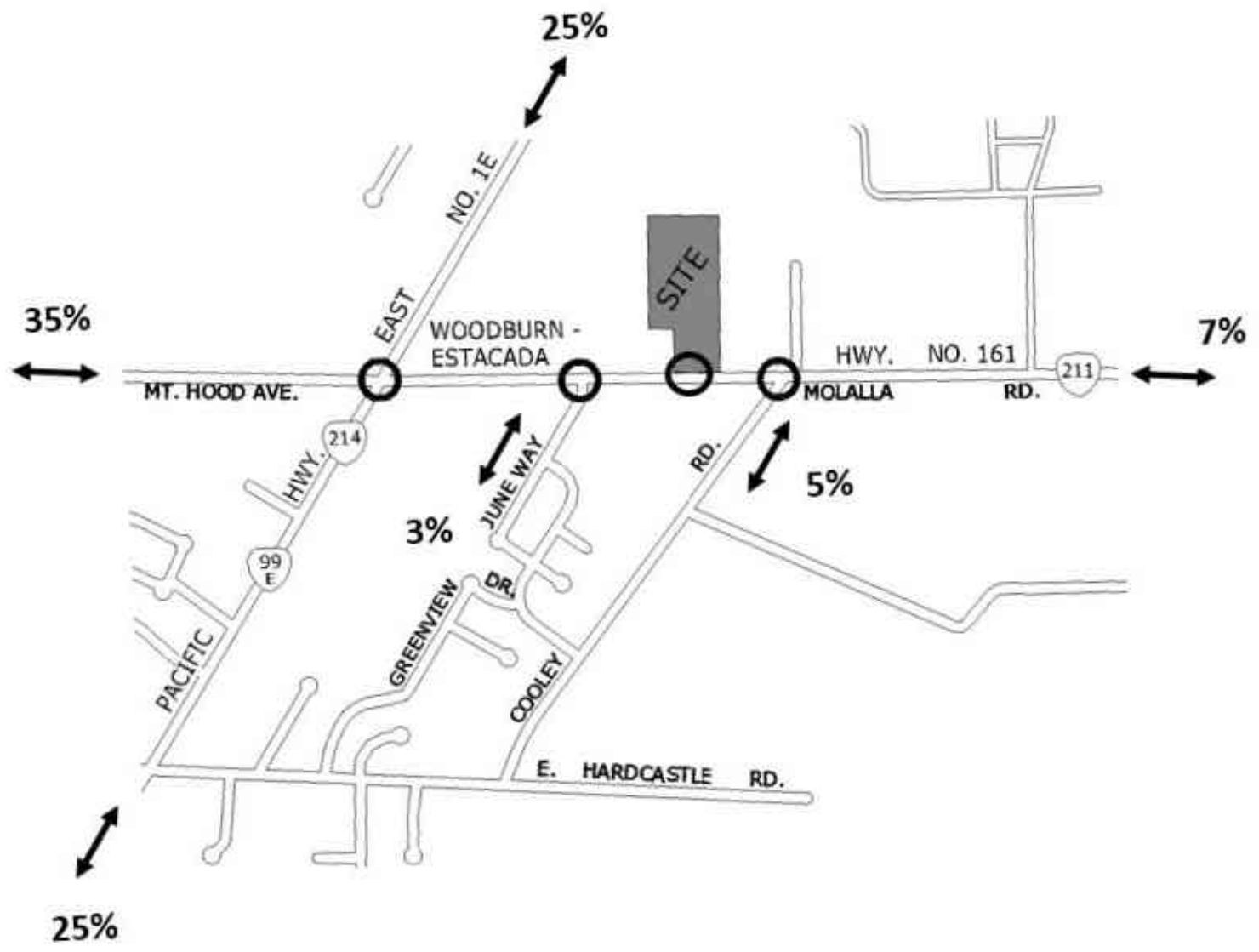
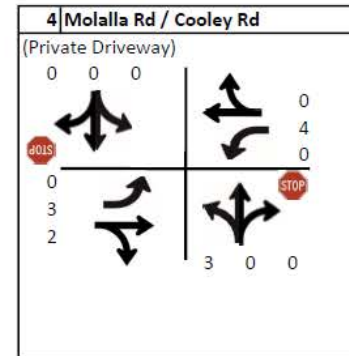
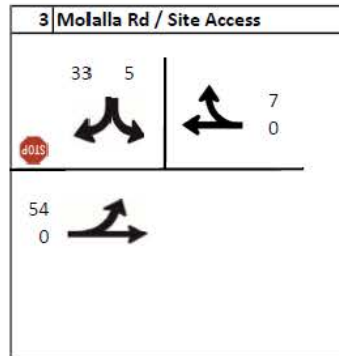
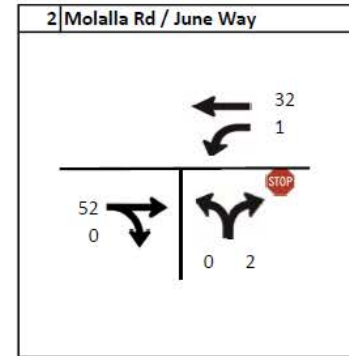
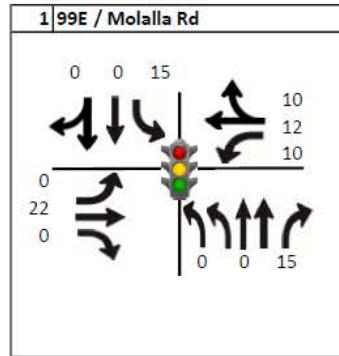
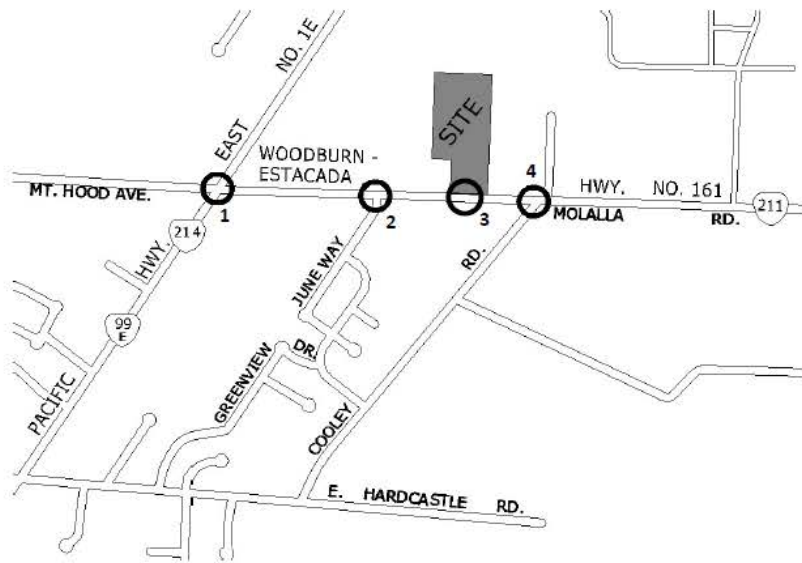


Figure 10: PM Peak Hour Site Generated Volumes



Appendix C - Safety

Crash History Data

Preliminary Signal Warrant Analysis



OREGON.. DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
URBAN NON-SYSTEM CRASH LISTING
PACIFIC HY 99E and YOUNG ST, City of Woodburn, Marion County, 01/01/2016 to 12/31/2020
1 - 2 of 36 Crash records shown.

CITY OF WOODBURN, MARION COUNTY

SER#	P	R	J	S	W	DATE	CLASS	CITY STREET	INT-TYPE	SPCL USE	ACT	EVENT	CAUSE																		
INVEST	E	A	U	I	C	O	DAY	DIST	FIRST STREET	RD CHAR	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR	QTY	MOVE	A	S											
RD DPT	E	L	G	N	H	R	TIME	FROM	SECOND STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC	INJ	G	E	LICNS	PED								
UNLOC?	D	C	S	V	L	K	LAT	LONG	LRs	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE		
04396	N	N	N	N	#	10/17/2017	14	PACIFIC HY 99E	INTER	CROSS	N	N	CLR	S-STRGHT	01	NONE	0	STRGHT												29	
NO RPT						TU		YOUNG ST	NE			TRF SIGNAL	N	DRY	REAR		PRVTE		NE-SW									000		00	
N						6P			06		0		N	DAY	INJ		PSNGR CAR			01	DRVR	NONE	30	M	OR-Y		042		000		29
N						45 8 13.29	-122 50	008100100S00																							
							38.07																								

OREGON.. DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
URBAN NON-SYSTEM CRASH LISTING

CITY OF WOODBURN, MARION COUNTY

PACIFIC HY 99E and YOUNG ST, City of Woodburn, Marion County, 01/01/2016 to 12/31/2020

3 - 4 of 36 Crash records shown.

SER#	P	R	J	S	W	DATE	CLASS	CITY STREET	INT-TYPE	SPCL USE	ACT	EVENT	CAUSE																									
INVEST	E	A	U	I	C	O	DAY	DIST	FIRST STREET	RD CHAR	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR	QTY	MOVE	A	S																		
RD DPT	E	L	G	N	H	R	TIME	FROM	SECOND STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC	INJ	G	E	LICNS	PED															
UNLOC?	D	C	S	V	L	K	LAT	LONG	LSR	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE									
05701	N	N	N	N	#	08/06/2017	14	PACIFIC HY 99E	INTER	CROSS	N	N	N	UNK	O-OTHER	01	NONE	9	TURN-R											08								
					E																																	
					R																																	
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03/10/2023

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

PACIFIC HY 99E and YOUNG ST, City of Woodburn, Marion County, 01/01/2016 to 12/31/2020

COLLISION TYPE	FATAL	MAJOR	MODERATE	MINOR	PROP	TOTAL	PEOPLE	MAJOR	MODERATE	MINOR
	CRASHES	INJURY CRASHES	INJURY CRASHES	INJURY CRASHES	DAMAGE ONLY		KILLED	INJURIES	INJURIES	INJURIES
YEAR: 2020										
ANGLE	0	0	0	1	0	1	0	0	0	2
REAR-END	0	0	0	1	2	3	0	0	0	1
SIDESWIPE - OVERTAKING	0	0	0	0	1	1	0	0	0	0
TURNING MOVEMENTS	0	0	0	1	2	3	0	0	0	2
2020 TOTAL	0	0	0	3	5	8	0	0	0	5
YEAR: 2019										
ANGLE	0	0	0	1	0	1	0	0	0	3
REAR-END	0	0	1	0	1	2	0	0	1	0
TURNING MOVEMENTS	0	0	0	0	2	2	0	0	0	0
2019 TOTAL	0	0	1	1	3	5	0	0	1	3
YEAR: 2018										
REAR-END	0	0	0	1	1	2	0	0	0	1
TURNING MOVEMENTS	0	0	1	1	0	2	0	0	2	1
2018 TOTAL	0	0	1	2	1	4	0	0	2	2
YEAR: 2017										
ANGLE	0	0	1	2	0	3	0	0	1	5
REAR-END	0	0	0	1	4	5	0	0	0	1
SIDESWIPE - OVERTAKING	0	0	0	1	1	2	0	0	0	1
TURNING MOVEMENTS	0	0	0	3	2	5	0	0	0	4
2017 TOTAL	0	0	1	7	7	15	0	0	1	11
YEAR: 2016										
FIXED / OTHER OBJECT	0	0	0	1	0	1	0	0	0	1
TURNING MOVEMENTS	0	0	0	2	1	3	0	0	0	3
2016 TOTAL	0	0	0	3	1	4	0	0	0	4
FINAL TOTAL	0	0	3	16	17	36	0	0	4	25

Disclaimer: The information contained in this report is compiled from individual driver and police crash reports submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submittal of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

03/10/2023

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

PACIFIC HY 99E and CLEVELAND ST, City of Woodburn, Marion County, 01/01/2016 to 12/31/2020

COLLISION TYPE	FATAL	MAJOR	MODERATE	MINOR	PROP	TOTAL	PEOPLE	MAJOR	MODERATE	MINOR
	CRASHES	INJURY CRASHES	INJURY CRASHES	INJURY CRASHES	DAMAGE ONLY		KILLED	INJURIES	INJURIES	INJURIES
YEAR: 2020										
FIXED / OTHER OBJECT	0	0	0	0	1	1	0	0	0	0
PEDESTRIAN	0	0	0	1	0	1	0	0	0	1
TURNING MOVEMENTS	0	0	2	3	0	5	0	0	3	7
2020 TOTAL	0	0	2	4	1	7	0	0	3	8
YEAR: 2019										
REAR-END	0	0	1	6	1	8	0	0	1	10
TURNING MOVEMENTS	0	0	1	2	1	4	0	0	1	3
2019 TOTAL	0	0	2	8	2	12	0	0	2	13
YEAR: 2018										
FIXED / OTHER OBJECT	0	0	0	1	0	1	0	0	0	1
REAR-END	0	0	0	1	1	2	0	0	0	1
TURNING MOVEMENTS	0	0	0	2	4	6	0	0	0	2
2018 TOTAL	0	0	0	4	5	9	0	0	0	4
YEAR: 2017										
REAR-END	0	0	1	2	2	5	0	0	2	2
TURNING MOVEMENTS	0	0	2	3	2	7	0	0	3	6
2017 TOTAL	0	0	3	5	4	12	0	0	5	8
YEAR: 2016										
REAR-END	0	1	2	2	1	6	0	1	2	7
TURNING MOVEMENTS	0	0	1	2	3	6	0	0	1	4
2016 TOTAL	0	1	3	4	4	12	0	1	3	11
FINAL TOTAL	0	1	10	25	16	52	0	1	13	44

Disclaimer: The information contained in this report is compiled from individual driver and police crash reports submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submittal of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.



Preliminary Traffic Signal Warrant Analysis

Project: Young Street
 Date: 3/16/2023
 Scenario: 2025 Buildout PM Peak Hour

Major Street:	Young Street	Minor Street:	Bryan Street	
Number of Lanes:	1	Number of Lanes:	1	
PM Peak Hour Volumes:	669	PM Peak Hour Volumes:	18	Total Rights RT Discount
			13	
			0%	

Warrant Used:

 X 100 percent of standard warrants used
 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
<u>Major St.</u>	<u>Minor St.</u>	<u>Warrants</u>	<u>Warrants</u>	<u>Warrants</u>	<u>Warrants</u>
<u>WARRANT 1, CONDITION A</u>					
		100%	70%	100%	70%
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
<u>WARRANT 1, CONDITION B</u>					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
<i>Warrant 1</i>			
<i>Condition A: Minimum Vehicular Volume</i>			
Major Street	6,690	8,850	
Minor Street*	180	2,650	No
<i>Condition B: Interruption of Continuous Traffic</i>			
Major Street	6,690	13,300	
Minor Street*	180	1,350	No
<i>Combination Warrant</i>			
Major Street	6,690	10,640	
Minor Street*	180	2,120	No

* Minor street right-turning traffic volumes reduced by 00%.



Preliminary Traffic Signal Warrant Analysis

Project: Young Street TIS
 Date: 3/16/2023
 Scenario: 2025 Buildout PM Peak Hour

Major Street:	OR-99E	Minor Street:	Cleveland Street	
Number of Lanes:	2	Number of Lanes:	1	
AM Peak Hour Volumes:	1700	AM Peak Hour Volumes:	153 71	Total Rights RT Discount
			100%	

Warrant Used:

 X 100 percent of standard warrants used
 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
<u>Major St.</u>	<u>Minor St.</u>	<u>Warrants</u>	<u>Warrants</u>	<u>Warrants</u>	<u>Warrants</u>
<u>WARRANT 1, CONDITION A</u>					
		100%	70%	100%	70%
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
<u>WARRANT 1, CONDITION B</u>					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
<i>Warrant 1</i>			
<i>Condition A: Minimum Vehicular Volume</i>			
Major Street	17,000	10,600	
Minor Street*	820	2,650	No
<i>Condition B: Interruption of Continuous Traffic</i>			
Major Street	17,000	15,900	
Minor Street*	820	1,350	No
<i>Combination Warrant</i>			
Major Street	17,000	12,720	
Minor Street*	820	2,120	No

* Minor street right-turning traffic volumes reduced by 100%.

Appendix D - Operations

Synchro Reports























SimTraffic Reports



HCM 6th Signalized Intersection Summary

1: OR 99E & Young Street

03/13/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	133	59	40	114	195	36	575	22	145	436	36
Future Volume (veh/h)	66	133	59	40	114	195	36	575	22	145	436	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1841	1841	1841	1811	1811	1811	1682	1682	1682	1641	1641	1641
Adj Flow Rate, veh/h	80	162	72	49	139	238	44	701	27	177	532	44
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	4	4	4	6	6	6	5	5	5	8	8	8
Cap, veh/h	311	329	146	163	367	418	420	1023	39	411	1135	94
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.05	0.33	0.33	0.11	0.39	0.39
Sat Flow, veh/h	990	1207	537	237	1348	1535	1602	3137	121	1563	2916	241
Grp Volume(v), veh/h	80	0	234	188	0	238	44	357	371	177	284	292
Grp Sat Flow(s),veh/h/ln	990	0	1744	1585	0	1535	1602	1598	1660	1563	1559	1597
Q Serve(g_s), s	3.4	0.0	5.2	0.1	0.0	6.2	0.8	9.0	9.0	3.3	6.3	6.3
Cycle Q Clear(g_c), s	8.8	0.0	5.2	5.3	0.0	6.2	0.8	9.0	9.0	3.3	6.3	6.3
Prop In Lane	1.00		0.31	0.26		1.00	1.00		0.07	1.00		0.15
Lane Grp Cap(c), veh/h	311	0	475	530	0	418	420	521	541	411	607	622
V/C Ratio(X)	0.26	0.00	0.49	0.35	0.00	0.57	0.10	0.69	0.69	0.43	0.47	0.47
Avail Cap(c_a), veh/h	758	0	1262	1232	0	1111	570	1777	1847	966	2239	2295
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.9	0.0	14.1	13.7	0.0	14.5	9.5	13.5	13.5	9.4	10.6	10.6
Incr Delay (d2), s/veh	0.4	0.0	0.8	0.4	0.0	1.2	0.1	1.6	1.5	0.7	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	1.9	1.5	0.0	2.0	0.2	2.4	2.5	0.7	1.4	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.3	0.0	14.9	14.1	0.0	15.7	9.6	15.1	15.1	10.1	11.1	11.1
LnGrp LOS	B	A	B	B	A	B	A	B	B	B	B	B
Approach Vol, veh/h		314			426			772			753	
Approach Delay, s/veh		15.8			15.0			14.8			10.9	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.6	19.6		17.1	6.7	22.5		17.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	21.5	51.5		33.5	6.5	66.5		33.5				
Max Q Clear Time (g_c+I1), s	5.3	11.0		10.8	2.8	8.3		8.2				
Green Ext Time (p_c), s	0.4	4.1		1.9	0.0	3.2		2.1				
Intersection Summary												
HCM 6th Ctrl Delay				13.7								
HCM 6th LOS				B								

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	97	64	26	554	475	71
Future Vol, veh/h	97	64	26	554	475	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	105	70	28	602	516	77

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	912	297	593	0	-	0
Stage 1	555	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.14	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.22	-	-	-
Pot Cap-1 Maneuver	277	705	979	-	-	-
Stage 1	544	-	-	-	-	-
Stage 2	685	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	265	705	979	-	-	-
Mov Cap-2 Maneuver	265	-	-	-	-	-
Stage 1	521	-	-	-	-	-
Stage 2	685	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.7	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	979	-	265	705	-	-
HCM Lane V/C Ratio	0.029	-	0.398	0.099	-	-
HCM Control Delay (s)	8.8	0.2	27.3	10.7	-	-
HCM Lane LOS	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	0.3	-	-

HCM 6th TWSC
 3: Young Street & Bryan Street

03/13/2023

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	1		2	
Traffic Vol, veh/h	3	252	177	9	6	6
Future Vol, veh/h	3	252	177	9	6	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	2	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	274	192	10	7	7























Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	202	0	-	0	477 197
Stage 1	-	-	-	-	197 -
Stage 2	-	-	-	-	280 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1370	-	-	-	547 844
Stage 1	-	-	-	-	836 -
Stage 2	-	-	-	-	767 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1370	-	-	-	545 844
Mov Cap-2 Maneuver	-	-	-	-	675 -
Stage 1	-	-	-	-	833 -
Stage 2	-	-	-	-	767 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1370	-	-	-	750
HCM Lane V/C Ratio	0.002	-	-	-	0.017
HCM Control Delay (s)	7.6	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary
 1: OR 99E & Young Street

03/13/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	133	54	46	139	253	46	543	27	204	813	133
Future Volume (veh/h)	130	133	54	46	139	253	46	543	27	204	813	133
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1870	1870	1870	1870	1870	1870	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	141	145	59	50	151	275	50	590	29	222	884	145
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	327	370	150	159	421	464	285	1108	54	472	1183	194
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.05	0.35	0.35	0.12	0.42	0.42
Sat Flow, veh/h	961	1264	514	271	1439	1585	1641	3175	156	1641	2815	462
Grp Volume(v), veh/h	141	0	204	201	0	275	50	304	315	222	514	515
Grp Sat Flow(s),veh/h/ln	961	0	1778	1711	0	1585	1641	1637	1695	1641	1637	1640
Q Serve(g_s), s	7.7	0.0	5.2	0.0	0.0	8.4	1.1	8.4	8.4	4.5	15.0	15.0
Cycle Q Clear(g_c), s	12.5	0.0	5.2	4.8	0.0	8.4	1.1	8.4	8.4	4.5	15.0	15.0
Prop In Lane	1.00		0.29	0.25		1.00	1.00		0.09	1.00		0.28
Lane Grp Cap(c), veh/h	327	0	520	580	0	464	285	571	591	472	688	689
V/C Ratio(X)	0.43	0.00	0.39	0.35	0.00	0.59	0.18	0.53	0.53	0.47	0.75	0.75
Avail Cap(c_a), veh/h	684	0	1181	1187	0	1053	424	1348	1396	930	1783	1786
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.8	0.0	16.0	15.8	0.0	17.1	11.8	14.7	14.7	9.6	13.8	13.8
Incr Delay (d2), s/veh	0.9	0.0	0.5	0.4	0.0	1.2	0.3	0.8	0.7	0.7	1.6	1.6
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	1.7	0.0	2.0	2.0	0.0	3.0	0.3	2.4	2.5	1.1	4.1	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.7	0.0	16.4	16.2	0.0	18.3	12.1	15.5	15.4	10.3	15.5	15.5
LnGrp LOS	C	A	B	B	A	B	B	B	B	B	B	B
Approach Vol, veh/h		345			476			669			1251	
Approach Delay, s/veh		18.6			17.4			15.2			14.6	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.2	24.2		21.0	7.2	28.2		21.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	22.5	46.5		37.5	7.5	61.5		37.5				
Max Q Clear Time (g_c+I1), s	6.5	10.4		14.5	3.1	17.0		10.4				
Green Ext Time (p_c), s	0.5	3.3		2.0	0.0	6.7		2.3				
Intersection Summary												
HCM 6th Ctrl Delay				15.7								
HCM 6th LOS				B								

Intersection						
Int Delay, s/veh	6.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	80	70	78	594	712	220
Future Vol, veh/h	80	70	78	594	712	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	87	76	85	646	774	239

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1387	507	1013	0	-	0
Stage 1	894	-	-	-	-	-
Stage 2	493	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.14	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.22	-	-	-
Pot Cap-1 Maneuver	136	516	680	-	-	-
Stage 1	365	-	-	-	-	-
Stage 2	585	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	109	516	680	-	-	-
Mov Cap-2 Maneuver	109	-	-	-	-	-
Stage 1	294	-	-	-	-	-
Stage 2	585	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	65.1	2.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	680	-	109	516	-	-
HCM Lane V/C Ratio	0.125	-	0.798	0.147	-	-
HCM Control Delay (s)	11	0.9	110.5	13.2	-	-
HCM Lane LOS	B	A	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	4.5	0.5	-	-

HCM 6th TWSC
3: Young Street & Bryan Street

03/13/2023

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	1		W	
Traffic Vol, veh/h	10	299	302	16	18	6
Future Vol, veh/h	10	299	302	16	18	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	2	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	325	328	17	20	7























Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	345	0	-	0	684 337
Stage 1	-	-	-	-	337 -
Stage 2	-	-	-	-	347 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1214	-	-	-	414 705
Stage 1	-	-	-	-	723 -
Stage 2	-	-	-	-	716 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1214	-	-	-	409 705
Mov Cap-2 Maneuver	-	-	-	-	582 -
Stage 1	-	-	-	-	715 -
Stage 2	-	-	-	-	716 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1214	-	-	-	609
HCM Lane V/C Ratio	0.009	-	-	-	0.043
HCM Control Delay (s)	8	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary
 1: OR 99E & Young Street

03/13/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	136	60	41	116	199	37	611	22	148	472	37
Future Volume (veh/h)	67	136	60	41	116	199	37	611	22	148	472	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1841	1841	1841	1811	1811	1811	1682	1682	1682	1641	1641	1641
Adj Flow Rate, veh/h	82	166	73	50	141	243	45	745	27	180	576	45
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	4	4	4	6	6	6	5	5	5	8	8	8
Cap, veh/h	303	333	146	158	364	422	406	1063	39	400	1173	91
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.05	0.34	0.34	0.11	0.40	0.40
Sat Flow, veh/h	983	1212	533	236	1325	1535	1602	3145	114	1563	2930	229
Grp Volume(v), veh/h	82	0	239	191	0	243	45	378	394	180	306	315
Grp Sat Flow(s),veh/h/ln	983	0	1745	1560	0	1535	1602	1598	1661	1563	1559	1600
Q Serve(g_s), s	3.7	0.0	5.6	0.1	0.0	6.6	0.9	10.0	10.0	3.4	7.1	7.1
Cycle Q Clear(g_c), s	9.5	0.0	5.6	5.7	0.0	6.6	0.9	10.0	10.0	3.4	7.1	7.1
Prop In Lane	1.00		0.31	0.26		1.00	1.00		0.07	1.00		0.14
Lane Grp Cap(c), veh/h	303	0	480	522	0	422	406	540	561	400	624	640
V/C Ratio(X)	0.27	0.00	0.50	0.37	0.00	0.58	0.11	0.70	0.70	0.45	0.49	0.49
Avail Cap(c_a), veh/h	711	0	1204	1167	0	1059	546	1695	1763	922	2136	2192
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.8	0.0	14.8	14.3	0.0	15.2	9.6	13.9	13.9	9.7	10.9	10.9
Incr Delay (d2), s/veh	0.5	0.0	0.8	0.4	0.0	1.2	0.1	1.7	1.6	0.8	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	2.1	1.6	0.0	0.1	0.2	2.7	2.8	0.8	1.7	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.3	0.0	15.6	14.7	0.0	16.4	9.8	15.6	15.6	10.5	11.5	11.5
LnGrp LOS	B	A	B	B	A	B	A	B	B	B	B	B
Approach Vol, veh/h		321			434			817			801	
Approach Delay, s/veh		16.5			15.7			15.3			11.2	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.8	20.9		17.8	6.8	23.9		17.8				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	21.5	51.5		33.5	6.5	66.5		33.5				
Max Q Clear Time (g_c+I1), s	5.4	12.0		11.5	2.9	9.1		8.6				
Green Ext Time (p_c), s	0.4	4.4		1.9	0.0	3.5		2.1				
Intersection Summary												
HCM 6th Ctrl Delay				14.1								
HCM 6th LOS				B								

Intersection						
Int Delay, s/veh	3.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	99	65	27	589	512	72
Future Vol, veh/h	99	65	27	589	512	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	108	71	29	640	557	78

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	974	318	635	0	-	0
Stage 1	596	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.14	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.22	-	-	-
Pot Cap-1 Maneuver	253	684	944	-	-	-
Stage 1	519	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	241	684	944	-	-	-
Mov Cap-2 Maneuver	241	-	-	-	-	-
Stage 1	494	-	-	-	-	-
Stage 2	669	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.3	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	944	-	241	684	-	-
HCM Lane V/C Ratio	0.031	-	0.447	0.103	-	-
HCM Control Delay (s)	8.9	0.2	31.5	10.9	-	-
HCM Lane LOS	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	2.1	0.3	-	-

HCM 6th TWSC
3: Young Street & Bryan Street

03/13/2023

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	1		4	
Traffic Vol, veh/h	3	257	181	9	6	6
Future Vol, veh/h	3	257	181	9	6	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	2	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	279	197	10	7	7

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	207	0	-	0	487 202
Stage 1	-	-	-	-	202 -
Stage 2	-	-	-	-	285 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1364	-	-	-	540 839
Stage 1	-	-	-	-	832 -
Stage 2	-	-	-	-	763 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1364	-	-	-	538 839
Mov Cap-2 Maneuver	-	-	-	-	671 -
Stage 1	-	-	-	-	830 -
Stage 2	-	-	-	-	763 -























Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1364	-	-	-	746
HCM Lane V/C Ratio	0.002	-	-	-	0.017
HCM Control Delay (s)	7.6	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary

1: OR 99E & Young Street

03/13/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	133	125	55	47	142	258	47	582	28	208	856	136
Future Volume (veh/h)	133	125	55	47	142	258	47	582	28	208	856	136
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1870	1870	1870	1870	1870	1870	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	145	136	60	51	154	280	51	633	30	226	930	148
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	319	363	160	157	422	467	273	1152	55	458	1222	194
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.05	0.36	0.36	0.12	0.43	0.43
Sat Flow, veh/h	954	1230	543	279	1431	1585	1641	3181	151	1641	2828	450
Grp Volume(v), veh/h	145	0	196	205	0	280	51	325	338	226	538	540
Grp Sat Flow(s),veh/h/ln	954	0	1773	1710	0	1585	1641	1637	1696	1641	1637	1642
Q Serve(g_s), s	8.5	0.0	5.2	0.0	0.0	9.1	1.1	9.5	9.5	4.7	16.7	16.7
Cycle Q Clear(g_c), s	13.7	0.0	5.2	5.2	0.0	9.1	1.1	9.5	9.5	4.7	16.7	16.7
Prop In Lane	1.00		0.31	0.25		1.00	1.00		0.09	1.00		0.27
Lane Grp Cap(c), veh/h	319	0	523	579	0	467	273	593	614	458	707	709
V/C Ratio(X)	0.45	0.00	0.38	0.35	0.00	0.60	0.19	0.55	0.55	0.49	0.76	0.76
Avail Cap(c_a), veh/h	635	0	1110	1121	0	993	400	1271	1317	882	1681	1686
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.1	0.0	16.7	16.7	0.0	18.1	12.2	15.2	15.2	9.9	14.4	14.4
Incr Delay (d2), s/veh	1.0	0.0	0.4	0.4	0.0	1.2	0.3	0.8	0.8	0.8	1.7	1.7
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	1.9	0.0	2.1	2.1	0.0	3.2	0.3	2.8	2.9	1.2	4.7	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.2	0.0	17.2	17.1	0.0	19.3	12.5	16.0	16.0	10.8	16.1	16.1
LnGrp LOS	C	A	B	B	A	B	B	B	B	B	B	B
Approach Vol, veh/h		341			485			714			1304	
Approach Delay, s/veh		19.7			18.4			15.7			15.2	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.5	26.2		22.1	7.4	30.4		22.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	22.5	46.5		37.5	7.5	61.5		37.5				
Max Q Clear Time (g_c+I1), s	6.7	11.5		15.7	3.1	18.7		11.1				
Green Ext Time (p_c), s	0.5	3.6		2.0	0.0	7.2		2.4				
Intersection Summary												
HCM 6th Ctrl Delay				16.4								
HCM 6th LOS				B								

Intersection						
Int Delay, s/veh	6.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	82	71	80	635	751	224
Future Vol, veh/h	82	71	80	635	751	224
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	86	75	84	668	791	236

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1411	514	1027	0	-	0
Stage 1	909	-	-	-	-	-
Stage 2	502	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.14	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.22	-	-	-
Pot Cap-1 Maneuver	132	511	672	-	-	-
Stage 1	358	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	106	511	672	-	-	-
Mov Cap-2 Maneuver	106	-	-	-	-	-
Stage 1	287	-	-	-	-	-
Stage 2	579	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	68.5	2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	672	-	106	511	-	-
HCM Lane V/C Ratio	0.125	-	0.814	0.146	-	-
HCM Control Delay (s)	11.1	0.9	116.3	13.2	-	-
HCM Lane LOS	B	A	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	4.6	0.5	-	-

HCM 6th TWSC
 3: Young Street & Bryan Street

03/13/2023

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	1		W	
Traffic Vol, veh/h	10	305	308	16	18	6
Future Vol, veh/h	10	305	308	16	18	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	2	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	332	335	17	20	7

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	352	0	-	0	698
Stage 1	-	-	-	-	344
Stage 2	-	-	-	-	354
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1207	-	-	-	407
Stage 1	-	-	-	-	718
Stage 2	-	-	-	-	710
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1207	-	-	-	403
Mov Cap-2 Maneuver	-	-	-	-	577
Stage 1	-	-	-	-	710
Stage 2	-	-	-	-	710























Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1207	-	-	-	603
HCM Lane V/C Ratio	0.009	-	-	-	0.043
HCM Control Delay (s)	8	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary

1: OR 99E & Young Street

03/14/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	136	72	41	117	199	41	611	22	148	472	42
Future Volume (veh/h)	85	136	72	41	117	199	41	611	22	148	472	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1841	1841	1841	1811	1811	1811	1682	1682	1682	1641	1641	1641
Adj Flow Rate, veh/h	104	166	88	50	143	243	50	745	27	180	576	51
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	4	4	4	6	6	6	5	5	5	8	8	8
Cap, veh/h	311	339	180	159	385	460	390	1042	38	384	1131	100
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.05	0.33	0.33	0.11	0.39	0.39
Sat Flow, veh/h	982	1132	600	239	1286	1535	1602	3145	114	1563	2897	256
Grp Volume(v), veh/h	104	0	254	193	0	243	50	378	394	180	309	318
Grp Sat Flow(s),veh/h/ln	982	0	1733	1525	0	1535	1602	1598	1661	1563	1559	1595
Q Serve(g_s), s	5.1	0.0	6.2	0.2	0.0	6.8	1.0	10.8	10.8	3.7	7.8	7.9
Cycle Q Clear(g_c), s	11.5	0.0	6.2	6.4	0.0	6.8	1.0	10.8	10.8	3.7	7.8	7.9
Prop In Lane	1.00		0.35	0.26		1.00	1.00		0.07	1.00		0.16
Lane Grp Cap(c), veh/h	311	0	519	545	0	460	390	529	550	384	609	623
V/C Ratio(X)	0.33	0.00	0.49	0.35	0.00	0.53	0.13	0.71	0.72	0.47	0.51	0.51
Avail Cap(c_a), veh/h	651	0	1120	1080	0	992	511	1587	1650	863	1999	2045
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.7	0.0	14.9	14.2	0.0	15.1	10.5	15.2	15.2	10.6	12.0	12.0
Incr Delay (d2), s/veh	0.6	0.0	0.7	0.4	0.0	0.9	0.1	1.8	1.8	0.9	0.7	0.6
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	1.1	0.0	2.3	1.7	0.0	2.3	0.3	3.0	3.2	0.9	2.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.3	0.0	15.6	14.6	0.0	16.0	10.6	17.0	16.9	11.5	12.7	12.7
LnGrp LOS	C	A	B	B	A	B	B	B	B	B	B	B
Approach Vol, veh/h		358			436			822			807	
Approach Delay, s/veh		17.0			15.4			16.6			12.4	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.1	21.7		20.1	7.1	24.8		20.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	21.5	51.5		33.5	6.5	66.5		33.5				
Max Q Clear Time (g_c+I1), s	5.7	12.8		13.5	3.0	9.9		8.8				
Green Ext Time (p_c), s	0.4	4.4		2.1	0.0	3.5		2.1				
Intersection Summary												
HCM 6th Ctrl Delay				15.0								
HCM 6th LOS				B								

Intersection						
Int Delay, s/veh	3.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	99	65	27	593	524	72
Future Vol, veh/h	99	65	27	593	524	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	108	71	29	645	570	78

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	990	324	648	0	-	0
Stage 1	609	-	-	-	-	-
Stage 2	381	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.14	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.22	-	-	-
Pot Cap-1 Maneuver	247	678	934	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	666	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	235	678	934	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	486	-	-	-	-	-
Stage 2	666	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	934	-	235	678	-	-
HCM Lane V/C Ratio	0.031	-	0.458	0.104	-	-
HCM Control Delay (s)	9	0.2	32.6	10.9	-	-
HCM Lane LOS	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	2.2	0.3	-	-

HCM 6th TWSC
 3: Site Access/Bryan Street & Young Street

03/14/2023

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	257	3	9	181	9	10	0	30	6	0	6
Future Vol, veh/h	3	257	3	9	181	9	10	0	30	6	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	279	3	10	197	10	11	0	33	7	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	207	0	0	282	0	0	513	514	281	525	510	202
Stage 1	-	-	-	-	-	-	287	287	-	222	222	-
Stage 2	-	-	-	-	-	-	226	227	-	303	288	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1364	-	-	1280	-	-	472	464	758	463	467	839
Stage 1	-	-	-	-	-	-	720	674	-	780	720	-
Stage 2	-	-	-	-	-	-	777	716	-	706	674	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1364	-	-	1280	-	-	464	458	758	439	461	839
Mov Cap-2 Maneuver	-	-	-	-	-	-	613	580	-	585	579	-
Stage 1	-	-	-	-	-	-	718	672	-	778	714	-
Stage 2	-	-	-	-	-	-	764	710	-	674	672	-























Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.4			10.4			10.3		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	716	1364	-	-	1280	-	-	689
HCM Lane V/C Ratio	0.061	0.002	-	-	0.008	-	-	0.019
HCM Control Delay (s)	10.4	7.6	0	-	7.8	0	-	10.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.1

HCM 6th Signalized Intersection Summary

1: OR 99E & Young Street

03/14/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	143	125	62	47	142	258	58	582	28	208	856	153
Future Volume (veh/h)	143	125	62	47	142	258	58	582	28	208	856	153
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1870	1870	1870	1870	1870	1870	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	155	136	67	51	154	280	63	633	30	226	930	166
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	317	361	178	157	429	484	267	1175	56	452	1199	214
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.05	0.37	0.37	0.12	0.43	0.43
Sat Flow, veh/h	954	1183	583	286	1404	1585	1641	3181	151	1641	2775	495
Grp Volume(v), veh/h	155	0	203	205	0	280	63	325	338	226	548	548
Grp Sat Flow(s),veh/h/ln	954	0	1765	1690	0	1585	1641	1637	1696	1641	1637	1634
Q Serve(g_s), s	9.8	0.0	5.8	0.0	0.0	9.6	1.5	10.1	10.1	5.0	18.4	18.4
Cycle Q Clear(g_c), s	15.6	0.0	5.8	5.8	0.0	9.6	1.5	10.1	10.1	5.0	18.4	18.4
Prop In Lane	1.00		0.33	0.25		1.00	1.00		0.09	1.00		0.30
Lane Grp Cap(c), veh/h	317	0	539	586	0	484	267	604	626	452	707	706
V/C Ratio(X)	0.49	0.00	0.38	0.35	0.00	0.58	0.24	0.54	0.54	0.50	0.78	0.78
Avail Cap(c_a), veh/h	582	0	1030	1040	0	925	373	1184	1227	838	1566	1564
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.7	0.0	17.5	17.4	0.0	18.8	13.0	16.0	16.0	10.5	15.6	15.6
Incr Delay (d2), s/veh	1.2	0.0	0.4	0.4	0.0	1.1	0.4	0.7	0.7	0.9	1.9	1.9
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	2.2	0.0	2.3	2.3	0.0	3.5	0.4	3.1	3.2	1.4	5.4	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.8	0.0	18.0	17.8	0.0	19.9	13.5	16.7	16.7	11.4	17.4	17.5
LnGrp LOS	C	A	B	B	A	B	B	B	B	B	B	B
Approach Vol, veh/h		358			485			726			1322	
Approach Delay, s/veh		20.9			19.0			16.4			16.4	
Approach LOS		C			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.9	28.2		24.1	7.9	32.3		24.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	22.5	46.5		37.5	7.5	61.5		37.5				
Max Q Clear Time (g_c+I1), s	7.0	12.1		17.6	3.5	20.4		11.6				
Green Ext Time (p_c), s	0.5	3.6		2.0	0.0	7.4		2.4				
Intersection Summary												
HCM 6th Ctrl Delay				17.4								
HCM 6th LOS				B								

Intersection						
Int Delay, s/veh	6.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	82	71	80	646	758	224
Future Vol, veh/h	82	71	80	646	758	224
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	86	75	84	680	798	236

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1424	517	1034	0	-	0
Stage 1	916	-	-	-	-	-
Stage 2	508	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.14	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.22	-	-	-
Pot Cap-1 Maneuver	129	509	668	-	-	-
Stage 1	355	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	103	509	668	-	-	-
Mov Cap-2 Maneuver	103	-	-	-	-	-
Stage 1	283	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	72.6	2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	668	-	103	509	-	-
HCM Lane V/C Ratio	0.126	-	0.838	0.147	-	-
HCM Control Delay (s)	11.2	0.9	124	13.3	-	-
HCM Lane LOS	B	A	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	4.7	0.5	-	-

HCM 6th TWSC
 3: Site Access/Bryan Street & Young Street

03/14/2023

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	305	10	28	308	16	6	0	17	18	0	6
Future Vol, veh/h	10	305	10	28	308	16	6	0	17	18	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	332	11	30	335	17	7	0	18	20	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	352	0	0	343	0	0	767	772	338	773	769	344
Stage 1	-	-	-	-	-	-	360	360	-	404	404	-
Stage 2	-	-	-	-	-	-	407	412	-	369	365	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1207	-	-	1216	-	-	319	330	704	316	332	699
Stage 1	-	-	-	-	-	-	658	626	-	623	599	-
Stage 2	-	-	-	-	-	-	621	594	-	651	623	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1207	-	-	1216	-	-	306	316	704	298	318	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	485	472	-	478	469	-
Stage 1	-	-	-	-	-	-	651	619	-	616	580	-
Stage 2	-	-	-	-	-	-	596	576	-	627	616	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.6			11			12.3		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	630	1207	-	-	1216	-	-	519
HCM Lane V/C Ratio	0.04	0.009	-	-	0.025	-	-	0.05
HCM Control Delay (s)	11	8	0	-	8	0	-	12.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0.2

Signalized Intersection V/C Calculation Summary

MORNING PEAK HOUR

Intersection 1: OR-99E at Young Street

Year 2023

	Protected/Permitted Left-Turn Phasing						Permitted Left-Turn Phasing									
Critical Movement:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Sum of Critical Flow Ratios:	0.54	Critical Intersection V/C:	0.60
Adjusted Flow Rate:	44	701	27	177	532	44	80	162	72	49	139	238	Cycle Length (seconds):	120		
Saturated Flow:	1602	3137	121	1563	2916	241	990	1207	537	237	1348	1535	Lost Time per phase (seconds):	4		
Flow Ratio:	0.03	0.22	0.22	0.11	0.18		0.08	0.13		0.21	0.10		Number of Phases:	3		
	0.34						0.21									

Year 2025 Background

	Protected/Permitted Left-Turn Phasing						Permitted Left-Turn Phasing									
Critical Movement:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Sum of Critical Flow Ratios:	0.56	Critical Intersection V/C:	0.63
Adjusted Flow Rate:	45	745	27	180	576	45	82	166	73	50	141	243	Cycle Length (seconds):	120		
Saturated Flow:	1602	3145	114	1563	2930	229	983	1212	533	236	1325	1535	Lost Time per phase (seconds):	4		
Flow Ratio:	0.03	0.24	0.24	0.12	0.20		0.08	0.14		0.21	0.11		Number of Phases:	3		
	0.35						0.21									

Year 2025 Buildout

	Protected/Permitted Left-Turn Phasing						Permitted Left-Turn Phasing									
Critical Movement:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Sum of Critical Flow Ratios:	0.56	Critical Intersection V/C:	0.65
Adjusted Flow Rate:	50	745	27	180	576	51	104	166	88	50	143	243	Cycle Length (seconds):	120		
Saturated Flow:	1602	3145	114	1563	2897	256	982	1132	600	239	1286	1535	Lost Time per phase (seconds):	4		
Flow Ratio:	0.03	0.24	0.24	0.12	0.20	0.20	0.11	0.15	0.15	0.21	0.11	0.16	Number of Phases:	4		
	0.35						0.21									

EVENING PEAK HOUR

Intersection 1: OR-99E at Young Street

Year 2023

	Protected/Permitted Left-Turn Phasing						Permitted Left-Turn Phasing									
Critical Movement:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Sum of Critical Flow Ratios:	0.53	Critical Intersection V/C:	0.61
Adjusted Flow Rate:	50	590	29	222	884	145	141	145	59	50	151	275	Cycle Length (seconds):	120		
Saturated Flow:	1641	3175	156	1641	2815	462	961	1264	514	271	1439	1585	Lost Time per phase (seconds):	4		
Flow Ratio:	0.03	0.19	0.19	0.14	0.31		0.15	0.11		0.18	0.10		Number of Phases:	4		
	0.34						0.18									

Year 2025 Background

	Protected/Permitted Left-Turn Phasing						Permitted Left-Turn Phasing									
Critical Movement:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Sum of Critical Flow Ratios:	0.54	Critical Intersection V/C:	0.63
Adjusted Flow Rate:	51	633	30	226	930	148	145	136	60	51	154	280	Cycle Length (seconds):	120		
Saturated Flow:	1641	3181	151	1641	2828	450	954	1230	543	279	1431	1585	Lost Time per phase (seconds):	4		
Flow Ratio:	0.03	0.20	0.20	0.14	0.33		0.15	0.11		0.18	0.11		Number of Phases:	4		
	0.36						0.18									

Year 2025 Buildout

	Protected/Permitted Left-Turn Phasing						Permitted Left-Turn Phasing									
Critical Movement:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Sum of Critical Flow Ratios:	0.55	Critical Intersection V/C:	0.64
Adjusted Flow Rate:	63	633	30	226	930	166	155	136	67	51	154	280	Cycle Length (seconds):	120		
Saturated Flow:	1641	3181	151	1641	2775	495	954	1183	583	286	1404	1585	Lost Time per phase (seconds):	4		
Flow Ratio:	0.04	0.20	0.20	0.14	0.34	0.34	0.16	0.11	0.11	0.18	0.11	0.18	Number of Phases:	4		
	0.37						0.18									

Notes:

Since NB and SB left-turn phases are protected, critical ring is either EBL+WBT or WBL+EBT - HCM6 does not show reductions for permitted left turns
 Since EB and WB left-turn phases are permitted, critical ring is maximum of any lane group.

Intersection: 1: OR 99E & Young Street

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	120	246	336	125	134	287	260	163	222	199
Average Queue (ft)	51	116	119	89	35	161	131	73	89	71
95th Queue (ft)	106	209	247	143	94	249	225	134	177	151
Link Distance (ft)		567	489			491	491		448	448
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	95			100	110			145		
Storage Blk Time (%)	1	13	11	3	0	19		1	2	
Queuing Penalty (veh)	2	11	26	7	0	9		2	3	

Intersection: 2: OR 99E & E Cleveland Street

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	LT	T	T	TR
Maximum Queue (ft)	106	61	104	20	20	7
Average Queue (ft)	52	31	19	1	1	0
95th Queue (ft)	89	53	70	16	10	4
Link Distance (ft)		879	561	561	491	491
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	165					
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Young Street & Bryan Street

Movement	SB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	11
95th Queue (ft)	35
Link Distance (ft)	241
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 59

Intersection: 1: OR 99E & Young Street

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	120	249	301	125	134	265	224	170	326	393
Average Queue (ft)	81	113	120	94	47	138	122	87	139	169
95th Queue (ft)	130	213	231	149	117	228	203	158	260	308
Link Distance (ft)		567	489			491	491		448	448
Upstream Blk Time (%)										0
Queuing Penalty (veh)										0
Storage Bay Dist (ft)	95			100	110			145		
Storage Blk Time (%)	8	11	12	4	0	12		0	4	
Queuing Penalty (veh)	15	15	32	8	1	6		2	9	

Intersection: 2: OR 99E & E Cleveland Street

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	LT	T	T	TR
Maximum Queue (ft)	189	420	264	225	6	48
Average Queue (ft)	121	135	105	32	0	6
95th Queue (ft)	219	480	228	144	5	26
Link Distance (ft)		879	561	561	491	491
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	165					
Storage Blk Time (%)	30					
Queuing Penalty (veh)	22					

Intersection: 3: Young Street & Bryan Street

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	53	49
Average Queue (ft)	5	20
95th Queue (ft)	27	46
Link Distance (ft)	184	241
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 110

Intersection: 1: OR 99E & Young Street

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	119	206	286	125	134	295	257	161	245	188
Average Queue (ft)	60	95	101	78	39	149	125	71	88	62
95th Queue (ft)	114	179	203	135	104	251	216	129	179	138
Link Distance (ft)		572	489			491	491		448	448
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	95			100	110			145		
Storage Blk Time (%)	2	8	8	2	0	16		0	1	
Queuing Penalty (veh)	5	8	18	4	0	8		1	2	

Intersection: 2: OR 99E & E Cleveland Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	LT	T	TR
Maximum Queue (ft)	146	65	104	32	20
Average Queue (ft)	52	32	22	1	1
95th Queue (ft)	105	54	73	25	9
Link Distance (ft)		879	561	561	491
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	165				
Storage Blk Time (%)	1				
Queuing Penalty (veh)	0				

Intersection: 3: Site Access/Bryan Street & Young Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	14	37	57	39
Average Queue (ft)	1	3	26	13
95th Queue (ft)	11	20	51	38
Link Distance (ft)	179	572	320	242
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 47

Intersection: 1: OR 99E & Young Street

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	120	278	318	125	134	261	237	170	332	402
Average Queue (ft)	86	106	131	94	55	136	118	98	161	187
95th Queue (ft)	133	207	258	147	128	224	201	176	287	331
Link Distance (ft)		572	489			491	491		448	448
Upstream Blk Time (%)									0	0
Queuing Penalty (veh)									0	0
Storage Bay Dist (ft)	95			100	110			145		
Storage Blk Time (%)	12	11	13	4	0	11		1	6	
Queuing Penalty (veh)	23	16	35	7	0	7		5	13	

Intersection: 2: OR 99E & E Cleveland Street

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	LT	T	T	TR
Maximum Queue (ft)	189	532	313	253	7	41
Average Queue (ft)	122	143	113	46	0	3
95th Queue (ft)	215	537	249	175	5	20
Link Distance (ft)		879	561	561	491	491
Upstream Blk Time (%)		4				
Queuing Penalty (veh)		0				
Storage Bay Dist (ft)	165					
Storage Blk Time (%)	27					
Queuing Penalty (veh)	20					

Intersection: 3: Site Access/Bryan Street & Young Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	58	68	39	50
Average Queue (ft)	5	12	20	19
95th Queue (ft)	31	47	45	45
Link Distance (ft)	179	572	320	242
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 126