

February 15, 2019

Project #: 22983

Mr. John Replinger, PE
City of Oregon City
625 Center Street
Oregon City, OR 97045

RE: OSU Extension Building - Transportation Impact Study

Dear John:

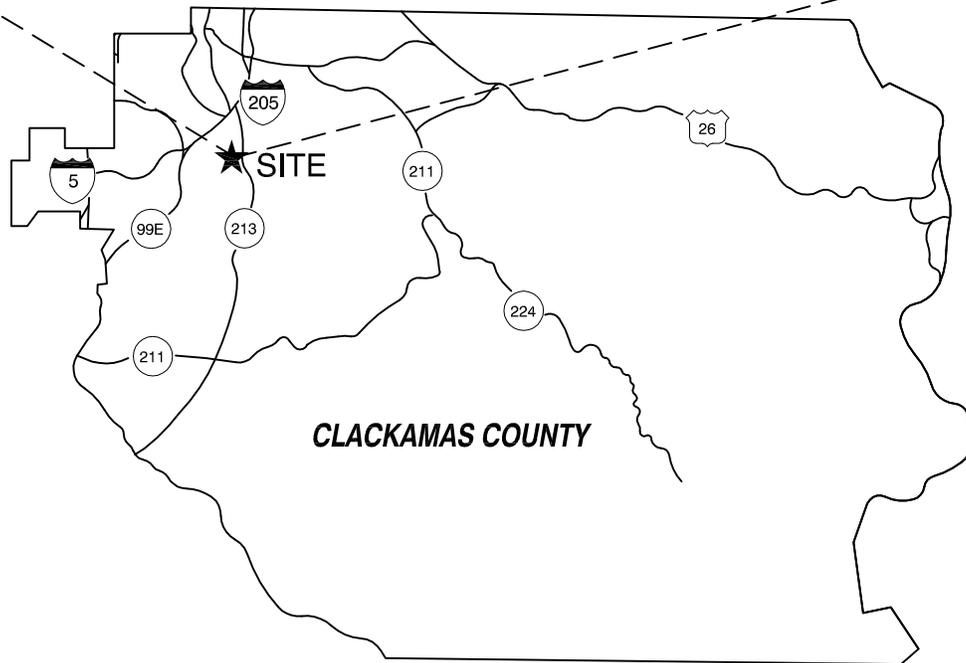
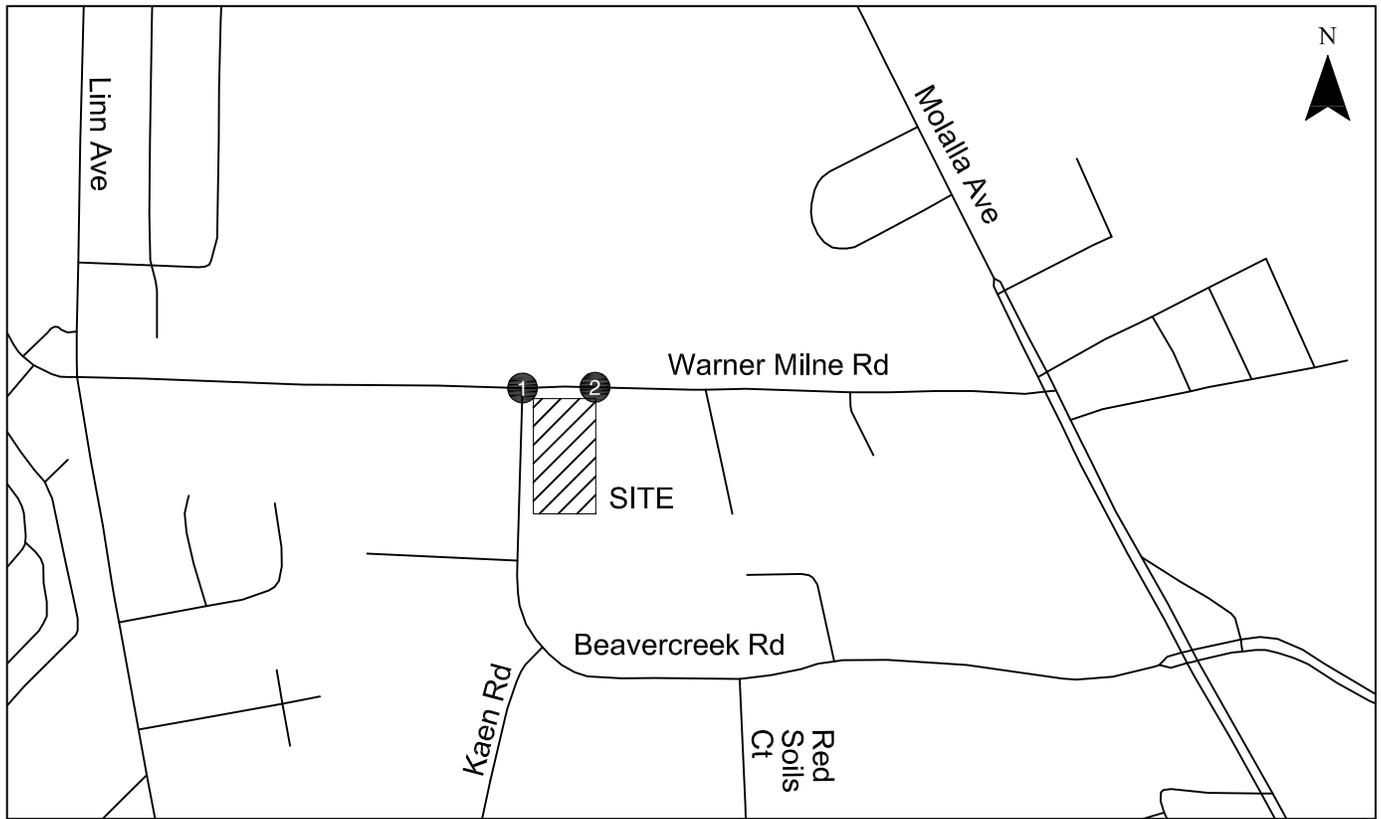
Oregon State University (OSU) proposes to construct a 22,681 square-foot extension services building on the Clackamas County Red Soils Campus in Oregon City, Oregon. This document provides a Transportation Impact Study (TIS) for the proposed extension building. The study concludes that the proposed building can be fully built out and occupied while maintaining acceptable traffic operations and safety on the surrounding roadway system. No capacity-based mitigation needs were identified at the study intersection or site driveway to support site development. Additional details of the methodology, findings, and recommendations are provided herein.

INTRODUCTION

The OSU Extension Service currently occupies a building on the Red Soils Campus on the west side of Beaver Creek Road, with frontage and driveway access on Warner Milne Road. The area currently occupied is approximately 4,200 square feet and serves approximately 24 full-time employees.

A new building is planned to be constructed on a vacant parcel of land that is east of Beaver Creek Road, with frontage and a shared driveway approach on Warner Milne Road. The existing driveway to be shared serves the Family Justice Center for Clackamas County. This existing facility provides support and safety planning to individuals or families that may be experiencing violence or abuse.

The proposed OSU Extension Services Building will provide approximately 22,681 square feet and the Service plans for approximately 26 to 28 full-time employees at full occupancy (an increase of 2 to 4 employees compared to the current building). Figure 1 displays the site vicinity, and Figure 2 displays the proposed site plan.



- Study Intersection

Site Vicinity Map
Oregon City, Oregon

Figure
1

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METHODOLOGY

This analysis is prepared in accordance with The City of Oregon City *Guidelines for Transportation Impact Analyses*, as contained on the City's website (document dated November 2, 2005), and documents the transportation-related impacts associated with the proposed OSU Extension Service Building. The study scope and intersections have been selected in consultation with City of Oregon City staff and are based on a review of the local transportation system.

Study Intersections

Operational analysis is reported at the following intersections within the site vicinity:

1. Warner Milne Road/Beavercreek Road
2. Warner Milne Road/Family Justice Center for Clackamas County Access (Future Site Access)

Figure 1 displays the location of the study intersections.

Scope of the Report

Per City of Oregon City requirements, the study addresses the following elements:

- Existing land use and transportation system conditions within the site vicinity during the weekday AM and PM peak hours;
- Planned developments and transportation improvements in the study area;
- Forecast year 2020 background traffic conditions at the study intersections during the weekday AM and PM peak hours;
- Trip generation and distribution estimates for the proposed office building;
- Forecast year 2020 total traffic conditions at the study intersections during the weekday AM and PM peak hours, assuming full build-out of the site; and
- Site access and circulation requirements.

Findings and recommendations are provided at the end of the report.

City of Oregon City Operating Standards

This analysis evaluates the peak 15-minute flow rate during the peak hour analysis periods and is consistent with the *Highway Capacity Manual (HCM) 2000* (Reference 1). The analysis reflects conditions that are only likely to occur during the peak 15 minutes of each average peak hour, and the study intersections will likely operate more efficiently during the other times of the day.

EXISTING CONDITIONS

The existing conditions analysis identifies site conditions and the current operational and geometric characteristics of roadways within the study area. The purpose of this analysis is to form a baseline for comparison to future conditions.

Kittelsohn and Associates, Inc. (KAI) staff visited the proposed site in November 2018. At that time, information was collected regarding site conditions, adjacent land uses, existing traffic operations, and transportation facilities within the study area.

Site Conditions and Adjacent Land Uses

The site is located at the southeastern corner of the Warner Milne Road/Beavercreek Road intersection and is surrounded by office uses to the east and west as well as vacant parcels to the north and south.

Table 1 provides a summary of the key features on the study area roadways. Figure 3 illustrates the existing lane configurations and traffic control devices at the study intersections.

Table 1. Existing Transportation Facilities

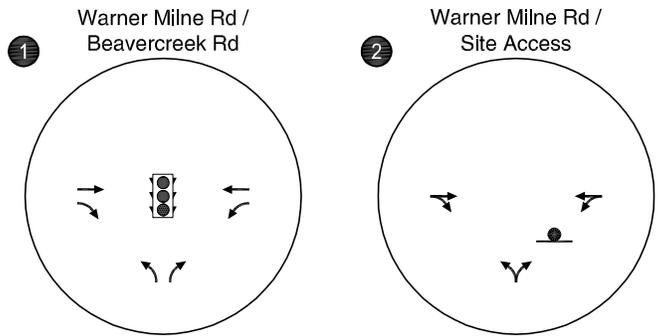
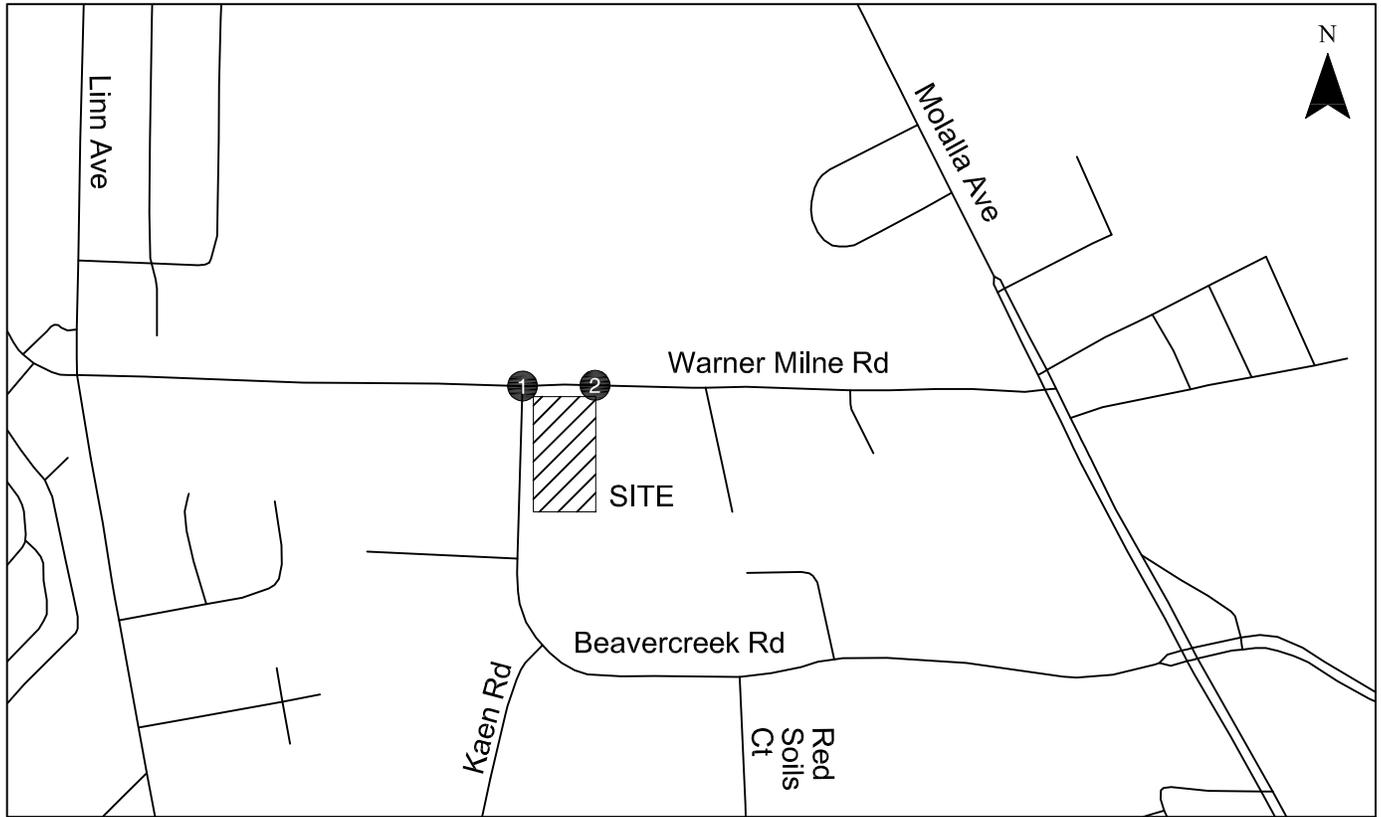
Roadway	Functional Classification ¹	Number of Lanes	Posted Speed (mph)	Sidewalks	Bicycle Lanes	On-Street Parking
Warner Milne Road	Minor Arterial	2	30	Yes	No ²	No
Beavercreek Road	Minor Arterial	2-3	35	West Side Only	Yes	No

¹ Oregon City Transportation System Plan (Reference 2)

² A bike lane in each direction on Warner Milne Road begins to develop toward the eastern end of the site frontage but is not at full width in either direction until east of the existing site driveway to the Family Justice Center for Clackamas County driveway (future shared driveway for the OSU Extension Service).

Pedestrian Facilities

The site is located in a suburban environment, with sidewalks provided on both sides of the study area roadways, with the exception of the east side of Beavercreek Road along the site frontage. Sidewalks on Warner Milne connect from Molalla Avenue to beyond Linn Avenue. Sidewalks on the west and south side of Beavercreek Road connect from Warner Milne Road to and beyond Highway 213. Sidewalks are intermittent on the east and north side of Beavercreek Road until a point between the intersection of Kaen Road and South Red Soils Court where the sidewalk becomes continuous to and beyond Highway 213.



-  - STOP SIGN
-  - TRAFFIC SIGNAL

Existing Lane Configurations
and Traffic Control Devices
Oregon City, Oregon

Figure
3

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Bicycle Facilities

Bicycle lanes are provided in both directions of Warner Milne Road from east of the proposed site driveway to the intersection with Molalla Avenue. Warner Milne Road is treated as a shared use bicycle facility along the site frontage and through its intersection with Beaver Creek Road. Bike lanes in each direction are provided along Warner Milne Road west of the Beaver Creek Road intersection and extend to and beyond Linn Avenue. Bicycle lanes are provided in both directions on Beaver Creek Road from Warner Milne Road to and beyond Highway 213.

Transit Facilities

TriMet provides the following bus services within the site vicinity (Reference 3):

- Route 32-Oatfield stops near the Warner Milne Road/Beaver Creek Road intersection and connects the study area with Clackamas Community College, Oregon City Transit Center, and Milwaukie Transit Center. Service is provided approximately 30 minutes on weekdays from 7:00 AM to 9:00 PM, with less frequent service provided on Saturdays.
- Route 33-McLoughlin/King Road stops near the Warner Milne Road/Molalla Avenue intersection, approximately 0.3 mile east of the site, and connects the study area with Clackamas Community College, Oregon City Transit Center, and Clackamas Town Center Transit Center. Service is provided every 15 to 30 minutes on weekdays from 6:00 AM to 2:00 AM, with less frequent service on Saturdays and Sundays.

Existing Traffic Volumes

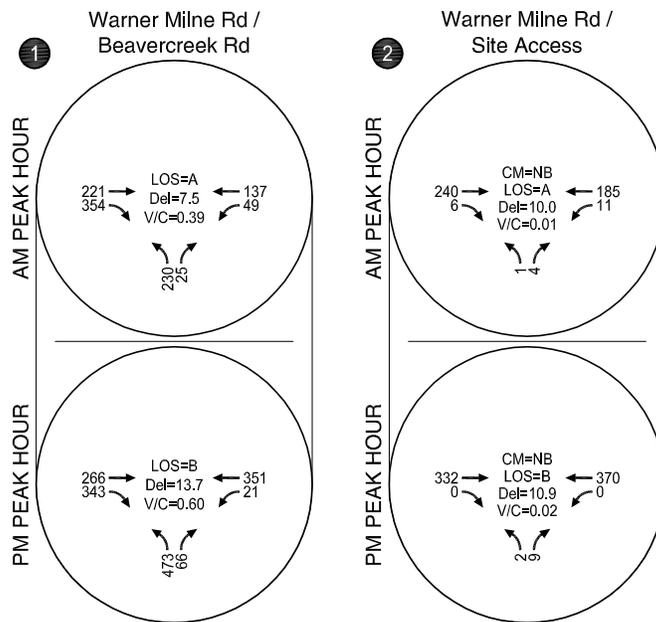
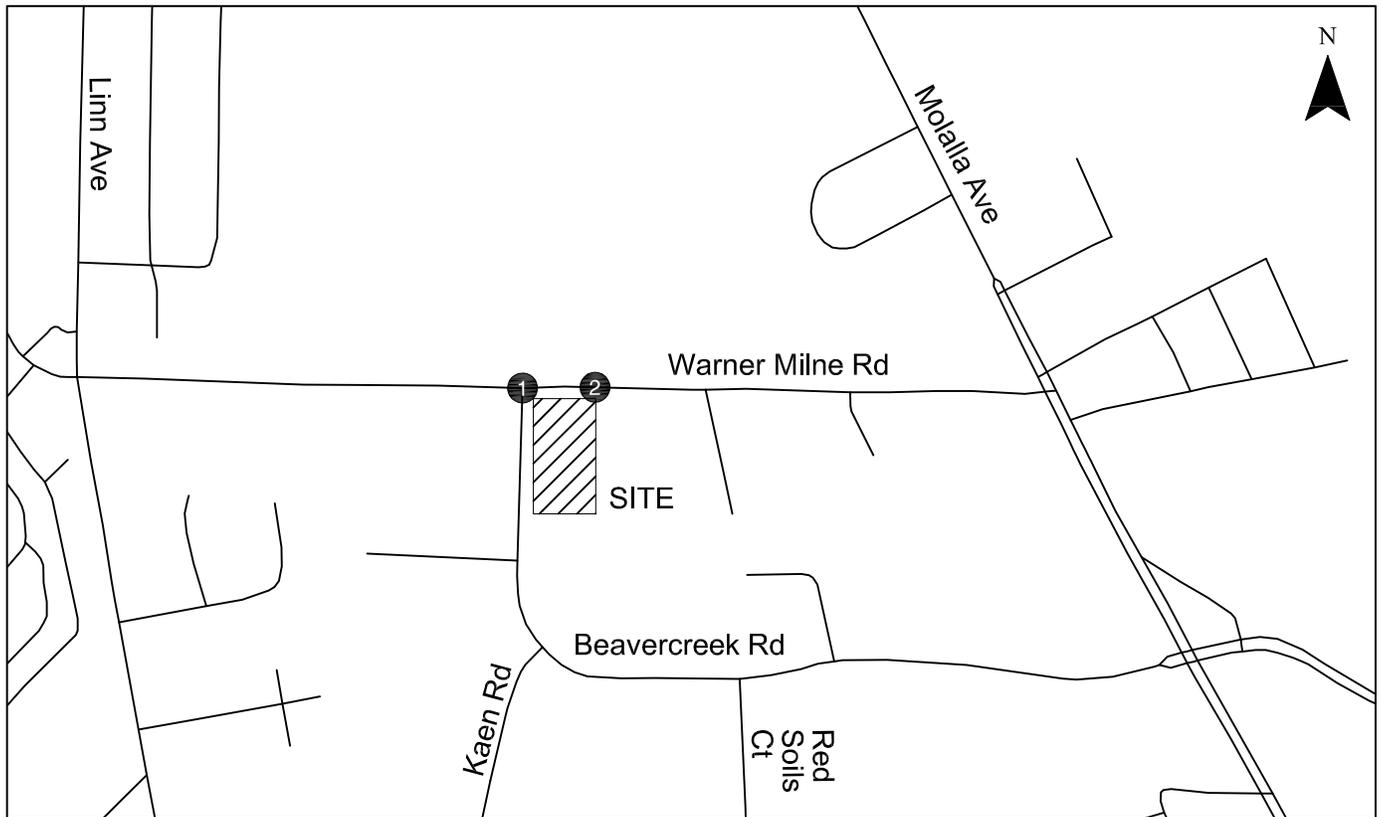
Turning movement counts were conducted at the study intersections on Tuesday, November 13, 2018, which was a typical mid-weekday when school was in session. Counts were conducted between 7:00 and 9:00 AM and between 4:00 and 6:00 PM. The peak hours were identified as 8:00 to 9:00 AM and 4:15 to 5:15 PM. Figure 4 displays the weekday AM and PM peak hour turning movement volumes. *Appendix "A" includes the traffic count data.*

Existing Traffic Operations

Figure 4 also displays the existing AM and PM peak hour traffic operations. As shown, both study intersections currently meet City of Oregon City requirements. *Appendix "B" includes the existing traffic conditions analysis worksheets.*

Crash Data Review

The crash history at the intersection of Warner Milne Road/Beaver Creek Road was reviewed in an effort to identify potential intersection safety issues. Crash data was obtained from the Oregon Department of Transportation (ODOT) for the five-year period from January 1, 2012 through December 31, 2016 and is summarized in Table 2. *Appendix "C" contains the ODOT crash data.*



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

Existing Traffic Conditions
 Weekday AM and PM Peak Hours
 Oregon City, Oregon

Figure 4

Table 2. Intersection Crash History (January 1, 2012 through December 31, 2016)

Location	Collision Type		Severity		Total Crashes
	Rear-end	Turning	PDO ¹	Injury	
Warner Milne Road/Beavercreek Road	1	4	3	2	5

¹PDO – Property damage only

Critical crash rates were calculated for the study intersection following the analysis methodology presented in ODOT’s *SPR 667 Assessment of Statewide Intersection Safety Performance* (Reference 4). SPR 667 provided average crash rates at a variety of intersection configurations in Oregon based on number of approaches and traffic control types. The average crash rate represents the approximate number of crashes that are “expected” at a study intersection. Additionally, this average crash rate was used to calculate the critical crash rate for each study intersection, based on the *Highway Safety Manual* methodology (Reference 5). The critical crash rate is calculated for each intersection based on the average crash rate for each facility and serves as a threshold for further analysis.

Table 3 summarizes the critical crash rates for the intersection and compares those values to the observed crash rate. Per ODOT, if the observed crash rate at the study location exceeds the critical rate, it is a possible indication that the location is exceeding average crash rates.

Table 3. Intersection Crash Rate Assessment

Location	Total Crashes	Critical Crash Rate by Intersection	Critical Crash Rate by Volume	Observed Crash Rate at Intersection	Observed Crash Rate > Critical Crash Rate?
Warner Milne Road/Beavercreek Road	5	0.26	0.46	0.18	No

As shown in Table 3, the observed crash rate does not exceed the critical crash rate at the study intersection. As such, no safety-based mitigations are recommended based on review of the crash data alone.

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area’s transportation system will operate upon full build-out and occupancy of the proposed OSU Extension Service building, which is expected in 2020. The impact of traffic generated by the proposed building is examined as follows:

- Planned developments and transportation improvements in the site vicinity are identified and reviewed;
- Year 2020 background traffic conditions are analyzed for the weekday AM and PM peak hours;
- Weekday AM and PM peak hour site-generated trips are estimated for full build-out of the site;

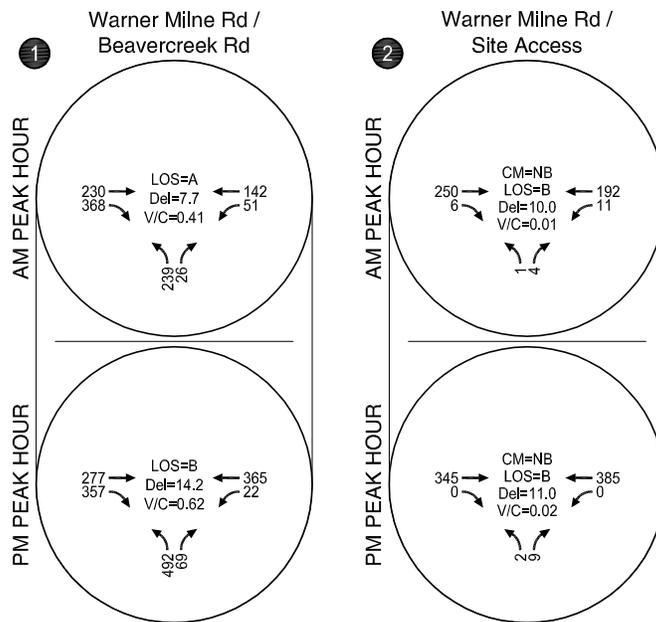
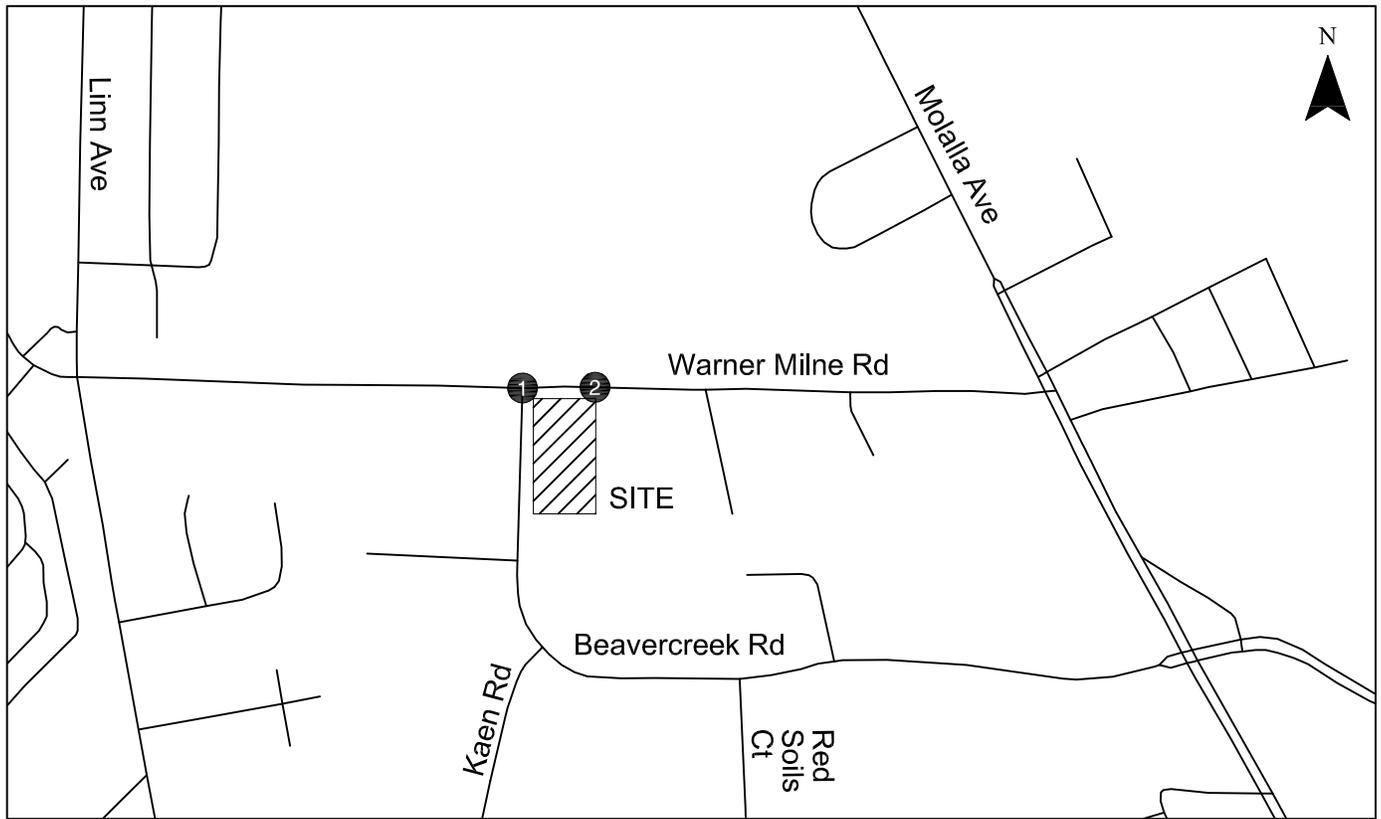
- A trip distribution pattern is derived based on existing travel patterns within the site vicinity; and
- The estimated site-generated trips are assigned to the study intersections and added to the year 2020 background traffic volumes to evaluate year 2020 total traffic conditions at the study intersections during the weekday AM and PM peak hours.

Year 2020 Background Traffic Conditions

The background traffic conditions analysis identifies how the study area's transportation system will operate in the year the site is expected to be fully built out and operational. This analysis includes traffic growth due to development within the study area and from general growth in the region but does not include traffic from the proposed OSU Extension Services Building.

A two-percent annual growth rate is applied to the existing volumes along Warner Milne Road and Beavercreek Road, consistent with direction from City of Oregon City staff. No approved in-process developments or transportation improvements are identified by staff to include with this analysis.

Figure 5 displays the year 2020 background traffic conditions at the study intersections. As shown, both study intersections are forecast to continue operating acceptably per City requirements. *Appendix "D" contains the year 2020 background traffic conditions analysis worksheets.*



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2020 Background Traffic Conditions
 Weekday AM and PM Peak Hours
 Oregon City, Oregon

Figure 5

Proposed Development Plan

The OSU Extension Service Building will provide 22,681 square feet of office space and will share driveway access with the existing Family Justice Center for Clackamas County parking lot to the east. Typical half street improvements will be provided along the site frontage on both Warner Milne Road and Beaver Creek Road in accordance with City of Oregon City requirements.

Trip Generation

Weekday daily, AM peak hour, and PM peak hour trip generation was estimated for the proposed building based on data contained in *Trip Generation, 10th Edition* (Reference 6), published by the Institute of Transportation Engineers (ITE). Table 4 displays the estimated site-generated trips.

Table 4. Estimated Site-Generated Trips

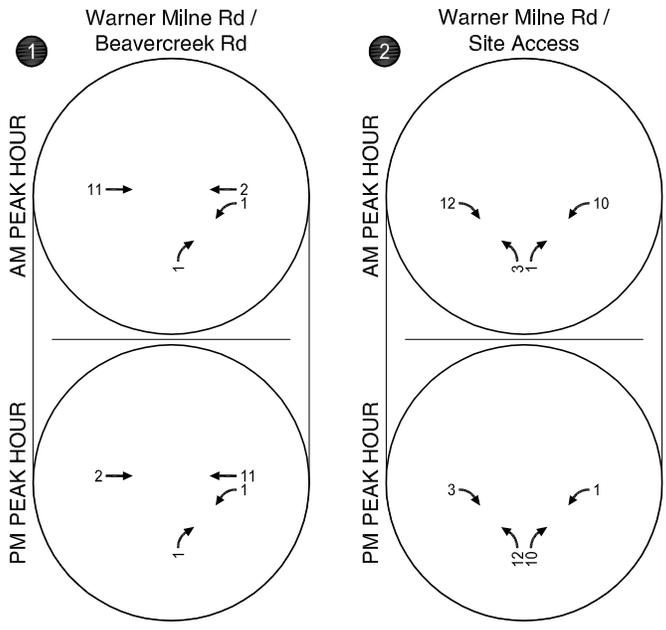
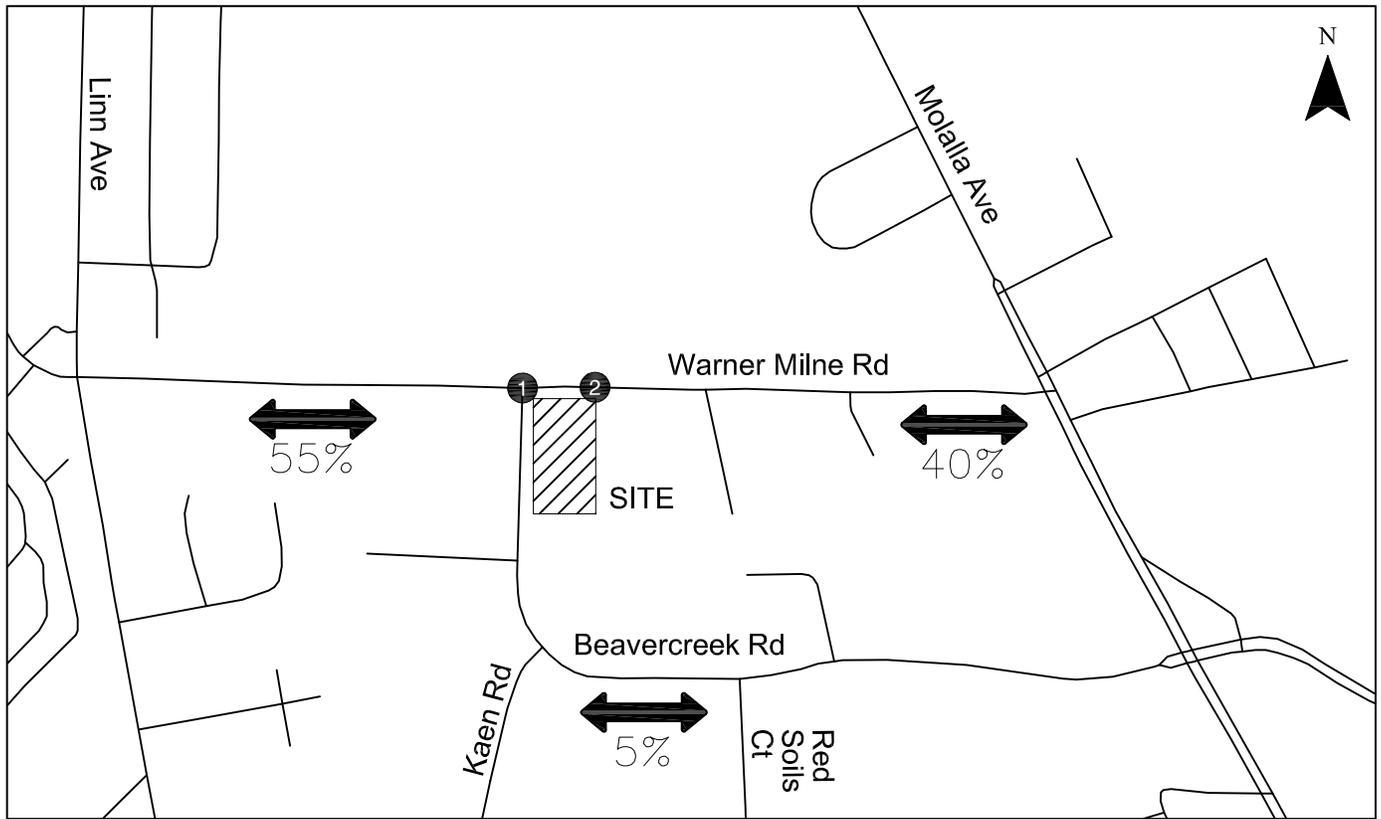
Land Use	ITE Code	Size	Weekday Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Office	710	22,681	220	26	22	4	26	4	22

As shown, the proposed building is estimated to generate approximately 220 weekday daily trips, of which 26 will occur during the AM peak hour and 26 will occur during the PM peak hour. The estimated site-generated peak hour volumes exceed a City of Oregon City procedural threshold that triggers the requirement for a Traffic Impact Study.

Trip Distribution and Assignment

The trip distribution pattern for the proposed building is estimated based on existing traffic volumes, previously prepared traffic impact analysis studies of similar uses in the same vicinity, the geographic area intended to be served by the proposed use, and knowledge of the site vicinity. Site-generated trips are assigned to and from the one driveway onto Warner Milne Road and the connecting arterial/collector street system. Figure 6 displays the weekday AM and PM peak hour trip distribution and assignment.

As previously noted, the OSU Extension Service currently operates on the Red Soils Campus with approximately 24 full-time employees in a building located to the west of the proposed building site. Consequently, the vast majority of the site-generated trip shown in Table 4 are already using the transportation system and will simply now drive to the new site. To provide a conservative analysis, no reduction in site trip generation was made for the redistribution of existing OSU Extension Service trips in this study.



Site Trip Generation, Distribution, and Assignment
 Weekday AM and PM Peak Hours
 Oregon City, Oregon

Figure
 6

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Year 2020 Total Traffic Conditions

The total traffic conditions analysis estimates how the study area’s transportation system will operate with the inclusion of traffic from the proposed building. The estimated weekday AM and PM peak hour site-generated trips shown in Figure 6 are added to the year 2020 background traffic volumes shown in Figure 5 to arrive at the year 2020 total traffic volumes, shown Figure 7. As shown, both study intersections are forecast to continue operating acceptably per City requirements. *Appendix “E” includes the year 2020 total traffic conditions analysis worksheets.*

95th-Percentile Queuing Analysis

A 95th-percentile queuing analysis was performed in Synchro at both study intersections. The 95th-percentile queue represents the queue storage length that will accommodate the peak 15-minute queue for 95 percent of the time. Table 5 summarizes the existing and future 95th-percentile queues for each movement during the weekday AM and PM peak hours. Queues are rounded to the nearest vehicle length (approximately 25 feet).

As shown, all 95th-percentile queues are projected to be accommodated within the existing turn lane storage lengths. Further, the proposed site development is not projected to measurably impact peak hour queues at the signalized Warner Milne Road/Beavercreek Road intersection relative to background traffic conditions. *95th-percentile queue information is contained in Appendix “B”, Appendix “D”, and Appendix “E”.*

Table 5. Summary of 95th-Percentile Queues

Intersection	Movement	Available Queue Storage (ft)	95 th -percentile Queue (ft)						Queue Storage Adequate?
			Existing		2020 Background		2020 Total		
			AM	PM	AM	PM	AM	PM	
Warner Milne Road/Beavercreek Road	EB T	>300	125	200	125	200	125	200	Yes
	EB R	100	<25	<25	<25	<25	<25	<25	Yes
	WB L	100 ¹	25	25	25	25	25	25	Yes
	WB T	>250 ²	50	225	50	250	50	250	Yes
	NB L	150 ³	150	325	150	350	150	350	Yes*
	NB R	-	<25	25	<25	25	<25	25	Yes
Site Access/Warner Milne Rd	NB	-	<25	<25	<25	<25	<25	<25	Yes

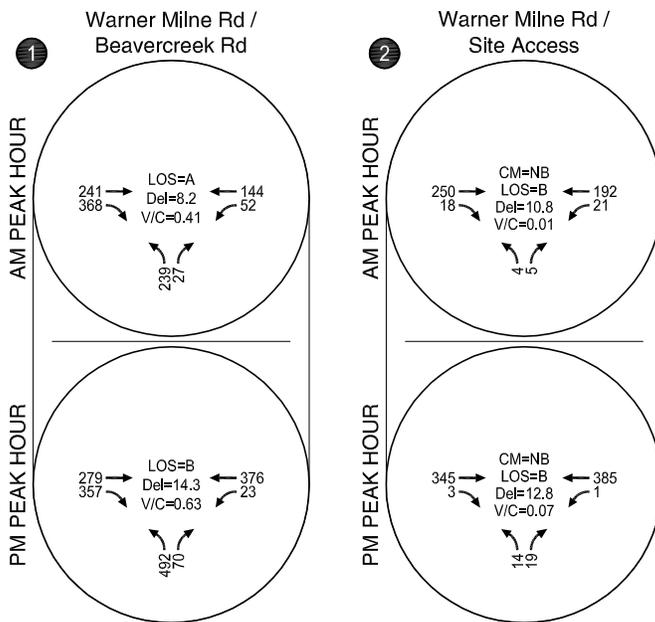
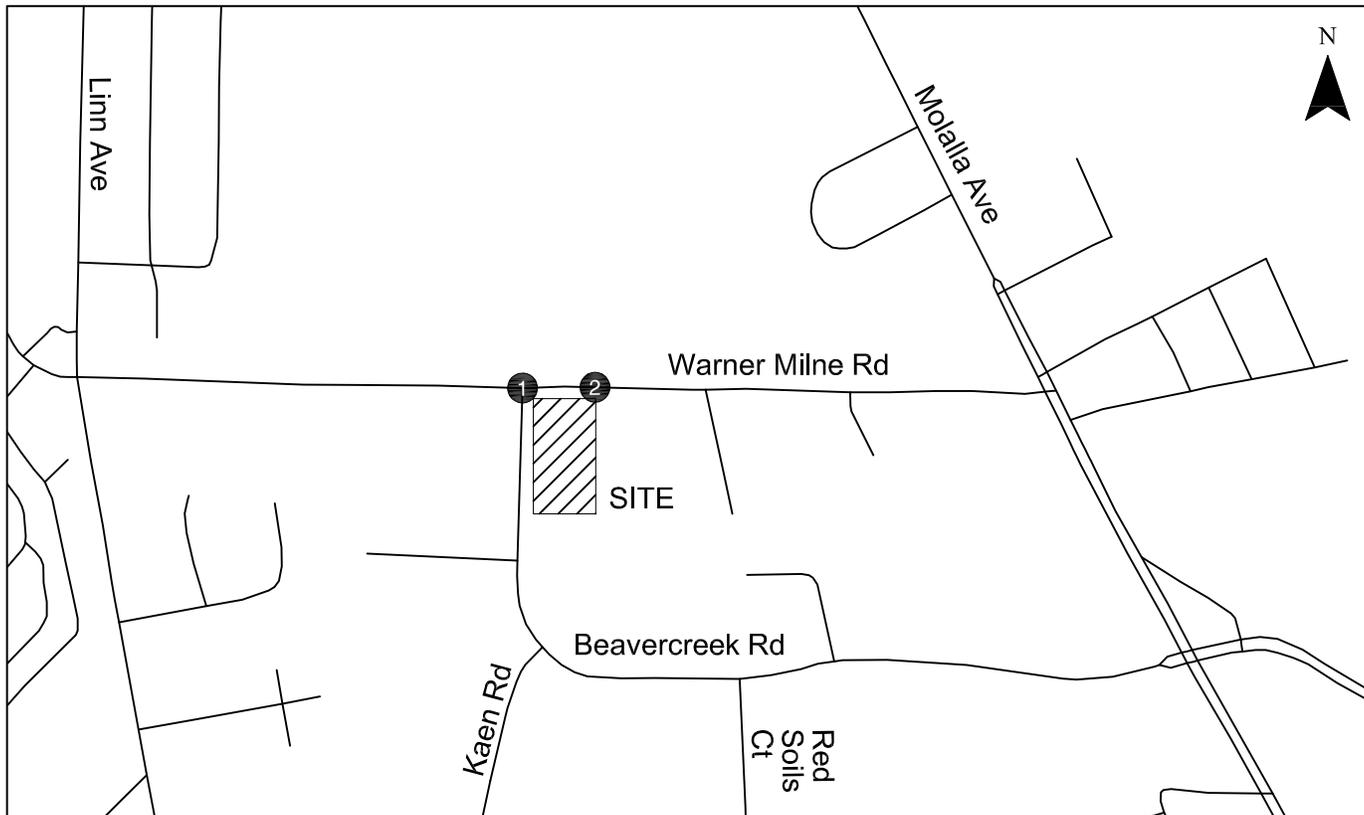
Where: EB = eastbound, WB = westbound, NB = northbound, L = left turn, T = through, R = right turn

¹The WB left-turn lane is striped for 100 feet of storage but provides 150 feet of storage without impeding westbound through movements or blocking intervening driveways.

²The WB through lane is longer than 250 feet; however, the proposed shared site driveway is located approximately 265 feet east of the signalized intersection.

³The NB left-turn lane is striped for 150 feet of storage but provides 275 feet of storage without impeding an intervening driveway and more than 475 feet of total storage without impeding northbound through movements.

*While the painted left turn storage length on northbound Beavercreek Road is 150 feet, sufficient median width is available to store a 350-foot queue in the available median without impeding northbound through volumes and potentially blocking one driveway.



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2020 Total Traffic Conditions
 Weekday AM and PM Peak Hours
 Oregon City, Oregon

Figure
 7

Site Access Review

The existing site driveway to the Family Justice Center for Clackamas County is proposed as a shared-use driveway for the site. The driveway takes access to Warner Milne Road approximately 265 feet east of the north/south crosswalk on the east side of the Warner Milne Road/Beavercreek Road intersection.

Driveway Width

Section 12.04.025 of the Oregon City Municipal Code requires that all non-residential driveways be a minimum of 15 feet and maximum of 40 feet in width. The existing driveway (to be shared with the proposed OSU Extension Services Building) is approximately 25 feet wide and complies with City width requirements.

Access Spacing

The City of Oregon City classifies Warner Milne Road as a Minor Arterial (per Figure 8 “Multi-modal Street System” from the *City of Oregon City Transportation System Plan* Volume 1 dated June 2013) which carries a minimum driveway spacing requirement of 175 feet¹. The existing site driveway satisfies the minimum 175-foot standard with respect to existing driveways to the east and Beavercreek Road to the west along the south side of Warner Milne Road. There is an existing driveway to a paved area (no building) located approximately 65 feet west of the shared access along the north side of Warner Milne Road. There is no apparent reoccurring use of the northern driveway today given the lack of development on the site (historic aerial photography suggests that a building once was located on the property circa the year 2000 but was removed by 2001 – other single family homes appear to have also been on the property to the north and east at one time). Given these considerations, we conclude that the proposed shared access driveway’s existing location complies with the City’s minimum spacing requirements and no revisions to the location are recommended.

Sight Distance

Currently available intersection sight distance and stopping sight distance was observed at the existing shared driveway location. Based on the posted 30 mile per hour speed limit on Warner Milne Road, *A Policy on Geometric Design of Highways and Streets, 6th Edition* (published by the American Association of State Highway and Transportation Officials, AASHTO) identifies a desired 335 feet of intersection

¹ Table 1 of the June 2013 *City of Oregon City Transportation System Plan* Volume 1, Spacing Standards, identifies a minimum driveway spacing standard (street to driveway and driveway to driveway) of 175 feet for minor arterial facilities in mixed-use or residential areas.

sight distance and 200 feet of stopping sight distance². Field observations determined that a driver leaving the proposed site driveway location in an automobile should have in excess of 350 feet of intersection sight distance facing to the east (right) and west (left). Stopping sight distance approaching the driveway along Warner Milne Road exceeds 300 feet. Final sight distance available should be verified during the final design process.

Landscaping, signage, and above-ground utilities along the site frontage and near the site driveway should be located and maintained to provide adequate sight distance per City of Oregon City standards.

Other Considerations

Street lighting is provided along Warner Milne Road in the form of overhead, cobra-head style luminaires. One such luminaire is positioned directly above the existing driveway.

FINDINGS AND RECOMMENDATIONS

Based on the results of this transportation impact study, the proposed OSU Extension Service Building can be developed while maintaining acceptable levels of service at the study intersections. The primary findings and recommendations of this study are summarized below.

Findings

- Both study intersections currently operate acceptably during the weekday AM and PM peak hours and are projected to continue to do so in the year 2020 before and after the proposed site development.
- A review of the latest five years of crash data reported by ODOT did not reveal any crash trends or deficiencies at the two study intersections.
- The proposed building is expected to generate approximately 220 weekday daily trips, of which 26 will occur during the AM peak hour and 26 will occur during the PM peak hour.
- Use of the existing site driveway under the proposed shared access arrangement complies with the City's access spacing and driveway sight distance minimum requirements.

² Per AASHTO requirements, intersection sight lines were measured from a vertex point located 14.5 feet from the Warner Milne eastbound travel lane along the center of the approaching travel lane. The assumed driver eye height was 3.5 feet above the driveway and the object height was 3.5 feet above Warner Milne Road, providing enough space on the approaching vehicle to recognize it. For stopping sight distance purposes, the assumed driver eye height was 3.5 feet above Warner Milne Road and the object height was 2.0 feet above the driveway.

Recommendations

- Landscaping, signage, and above-ground utilities along the site frontage and near the site driveway should be located and maintained to provide adequate sight distance per City of Oregon City standards.

We trust this document adequately addresses the transportation-related impacts of the proposed OSU Extension Service Building. If you have any questions, please call us at 503-535-7418.

Sincerely,
KITTELSON & ASSOCIATES, INC.

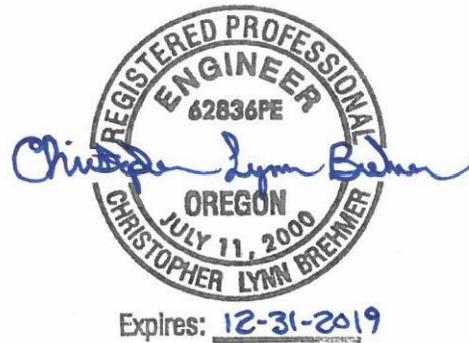


Zachary Bugg
Senior Engineer



Phill Worth
Principal Planner

cc: Becky Epstein & Chris Meigel, SERA Architects



REFERENCES

1. Transportation Research Board. *Highway Capacity Manual 2000*. 2000.
2. City of Oregon City, Oregon. *2013 Transportation System Plan*. 2013.
3. TriMet. "Maps & Schedules." 2018. <<http://www.trimet.org>>.
4. Oregon Department of Transportation (ODOT) Research Section. *SPR 667 Assessment of Statewide Intersection Safety Performance*. June 2011.
5. American Association of State Highway and Transportation Officials. *Highway Safety Manual*. 2010.
6. Institute of Transportation Engineers. *Trip Generation, 10th Edition*. 2017.

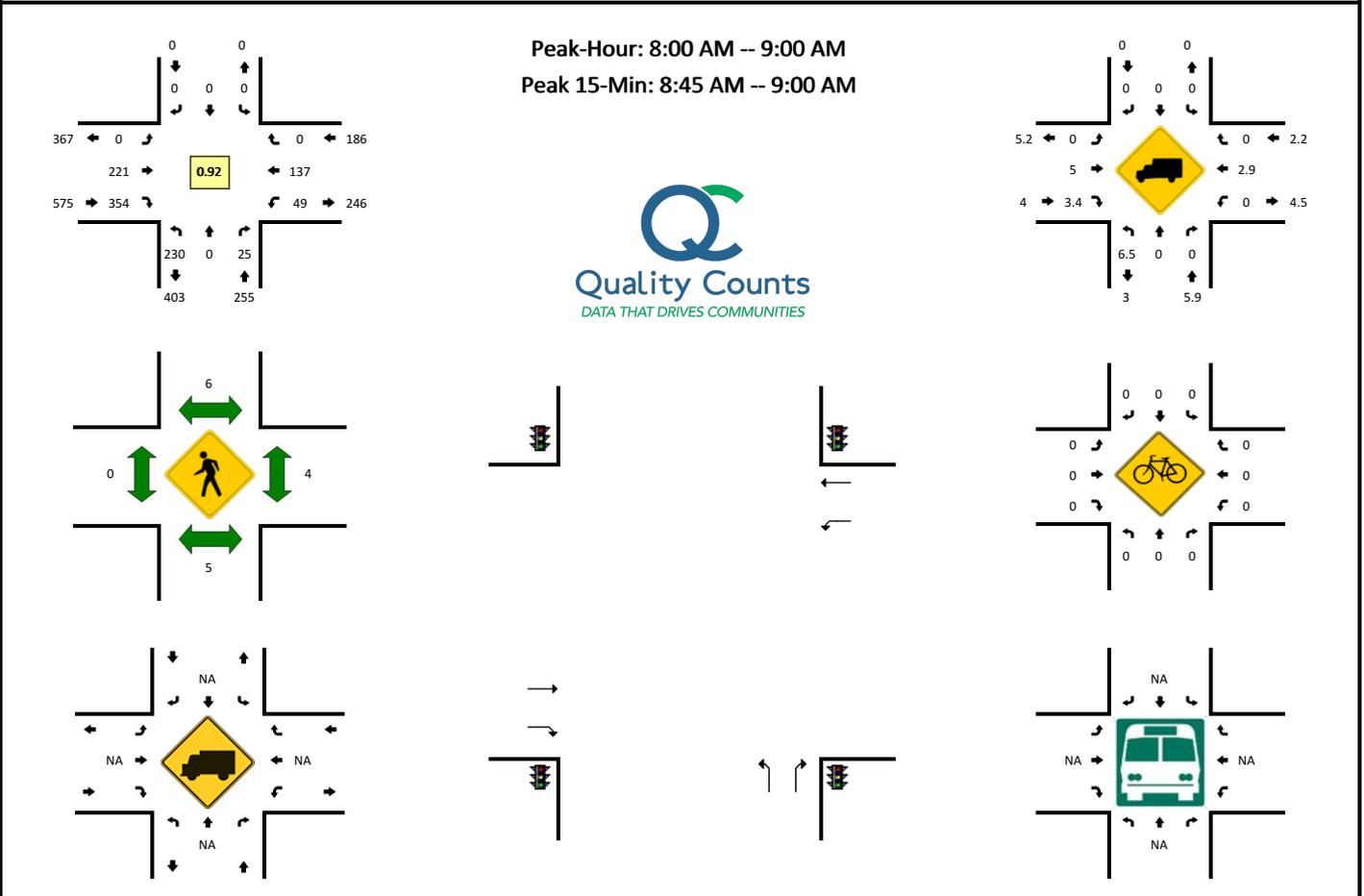
APPENDICES

- A. Turning Movement Counts
- B. Existing Conditions Traffic Analysis Worksheets
- C. ODOT Crash Data
- D. 2020 Background Conditions Traffic Analysis Worksheets
- E. 2020 Total Conditions Traffic Analysis Worksheets

Appendix A Turning Movement Counts

LOCATION: Beaver Creek Rd -- Warner Parrott Rd (WM 4)
CITY/STATE: Clackamas, OR

QC JOB #: 14841119
DATE: Tue, Nov 13 2018

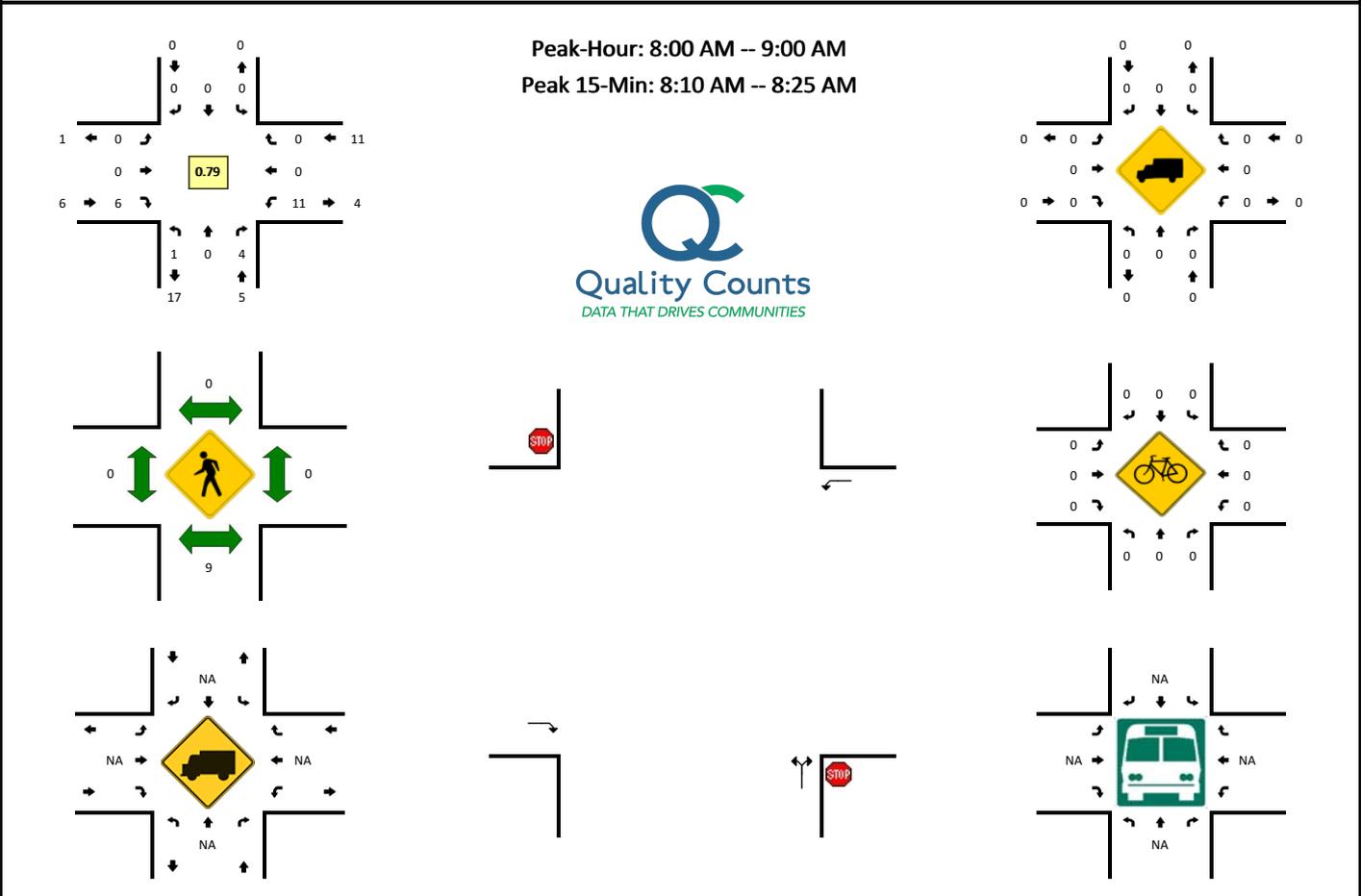


5-Min Count Period Beginning At	Beaver Creek Rd (Northbound)				Beaver Creek Rd (Southbound)				Warner Parrott Rd (WM 4) (Eastbound)				Warner Parrott Rd (WM 4) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	7	0	1	0	0	0	0	0	0	9	37	0	3	9	0	0	66	
7:05 AM	10	0	0	0	0	0	0	0	0	15	36	0	2	5	0	0	68	
7:10 AM	13	0	1	0	0	0	0	0	0	19	36	0	3	11	0	0	83	
7:15 AM	15	0	2	0	0	0	0	0	0	13	34	0	4	10	0	0	78	
7:20 AM	9	0	0	0	0	0	0	0	0	12	44	0	2	6	0	0	73	
7:25 AM	8	0	1	0	0	0	0	0	0	8	39	0	3	11	0	0	70	
7:30 AM	9	0	1	0	0	0	0	0	0	14	37	0	2	15	0	0	78	
7:35 AM	14	0	2	0	0	0	0	0	0	13	42	0	6	3	0	0	80	
7:40 AM	21	0	0	0	0	0	0	0	0	20	35	0	4	8	0	0	88	
7:45 AM	13	0	2	0	0	0	0	0	0	27	31	0	6	12	0	0	91	
7:50 AM	16	0	1	0	0	0	0	0	0	16	39	0	3	9	0	0	84	
7:55 AM	18	0	2	0	0	0	0	0	0	17	33	0	4	11	0	0	85	944
8:00 AM	16	0	1	0	0	0	0	0	0	20	29	0	2	13	0	0	81	959
8:05 AM	17	0	2	0	0	0	0	0	0	20	36	0	2	8	0	0	85	976
8:10 AM	20	0	1	0	0	0	0	0	0	17	30	0	1	14	0	0	83	976
8:15 AM	21	0	0	0	0	0	0	0	0	10	25	0	3	13	0	0	72	970
8:20 AM	16	0	2	0	0	0	0	0	0	24	35	0	7	12	0	0	96	993
8:25 AM	14	0	3	0	0	0	0	0	0	16	23	0	6	14	0	0	76	999
8:30 AM	14	0	5	0	0	0	0	0	0	14	33	0	7	7	0	0	80	1001
8:35 AM	22	0	3	0	0	0	0	0	0	16	28	0	8	8	0	0	85	1006
8:40 AM	24	0	2	0	0	0	0	0	0	16	29	0	3	9	0	0	83	1001
8:45 AM	26	0	1	0	0	0	0	0	0	26	28	0	3	13	0	0	97	1007
8:50 AM	19	0	4	0	0	0	0	0	0	26	26	0	2	16	0	0	93	1016
8:55 AM	21	0	1	0	0	0	0	0	0	16	32	0	5	10	0	0	85	1016
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	264	0	24	0	0	0	0	0	0	272	344	0	40	156	0	0	1100	
Heavy Trucks	24	0	0		0	0	0		0	12	12		0	0	0		48	
Pedestrians		8				0				0				0			8	
Bicycles	0	0	0		0	0	0		0	0	1		0	0	0		1	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Clackamas Women's Services Dwy -- Warner Parrott Rd (WM DWY 5)
CITY/STATE: Clackamas, OR

QC JOB #: 14841145
DATE: Tue, Nov 13 2018

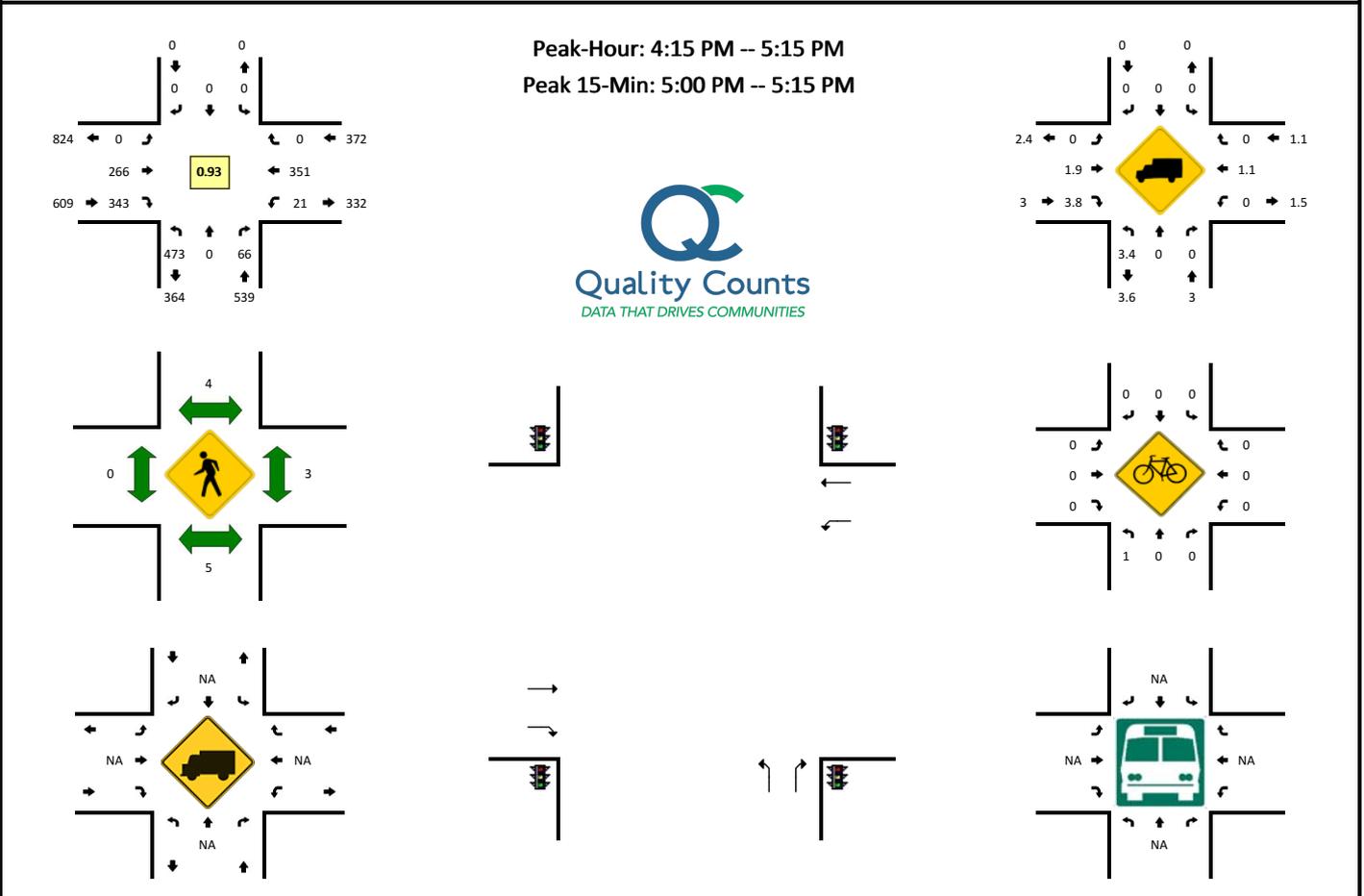


5-Min Count Period Beginning At	Clackamas Women's Services Dwy (Northbound)				Clackamas Women's Services Dwy (Southbound)				Warner Parrott Rd (WM DWY 5) (Eastbound)				Warner Parrott Rd (WM DWY 5) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:05 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	
7:10 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:20 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:25 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:35 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:40 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:50 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:55 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	6
8:05 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
8:10 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	6
8:15 AM	0	0	1	0	0	0	0	0	0	0	1	0	2	0	0	0	4	10
8:20 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	12
8:25 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	13
8:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	15
8:35 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
8:40 AM	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	3	17
8:45 AM	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	19
8:50 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	21
8:55 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	22
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	8	0	0	0	0	0	0	0	4	0	16	0	0	0	28	
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Beaver Creek Rd -- Warner Parrott Rd (WM 4)
CITY/STATE: Clackamas, OR

QC JOB #: 14841120
DATE: Tue, Nov 13 2018

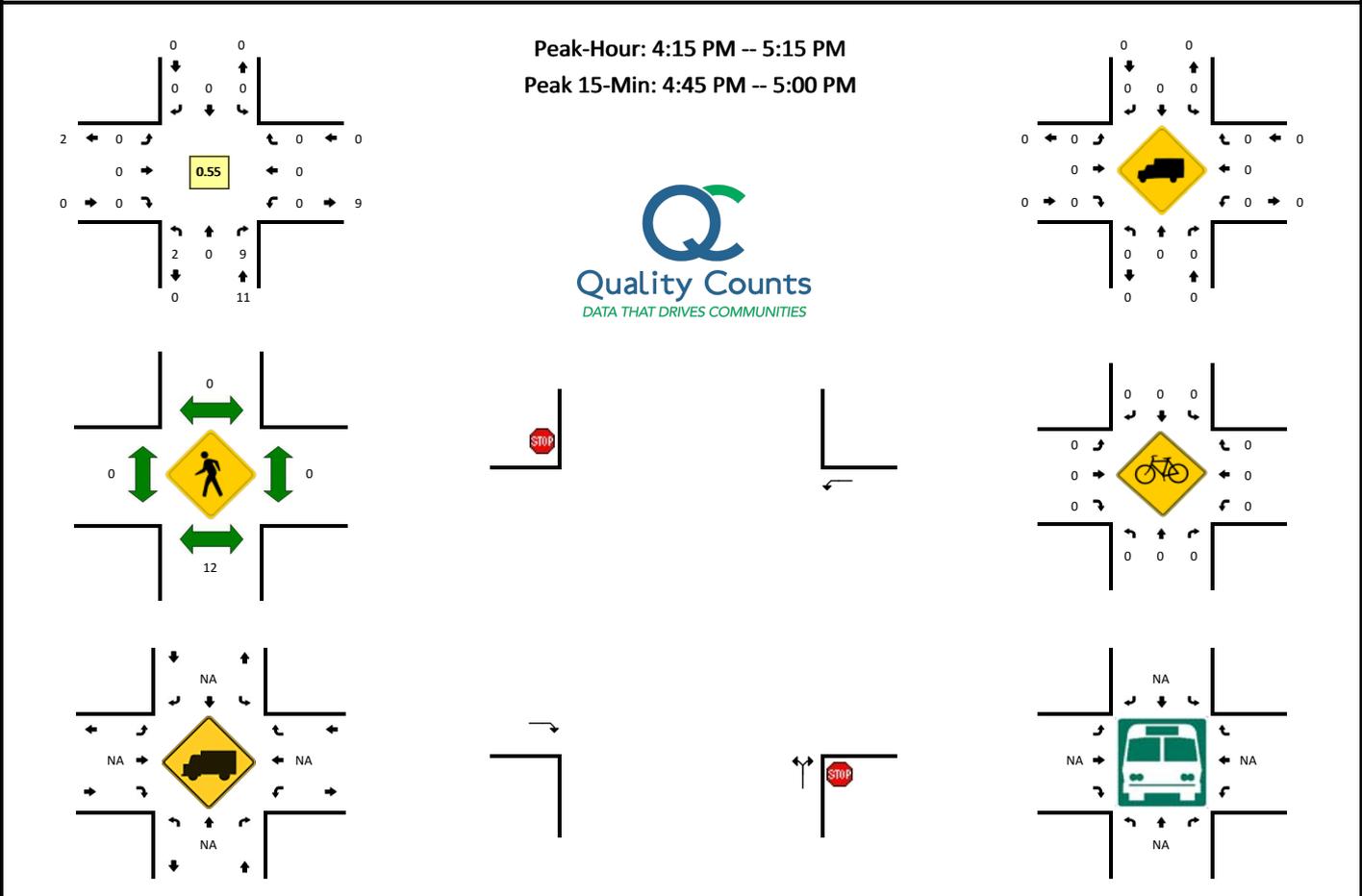


5-Min Count Period Beginning At	Beaver Creek Rd (Northbound)				Beaver Creek Rd (Southbound)				Warner Parrott Rd (WM 4) (Eastbound)				Warner Parrott Rd (WM 4) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	47	0	4	0	0	0	0	0	0	18	28	0	1	27	0	0	125	
4:05 PM	34	0	6	0	0	0	0	0	0	31	36	0	4	25	0	0	136	
4:10 PM	44	0	6	0	0	0	0	0	0	18	34	0	4	24	0	0	130	
4:15 PM	26	0	7	0	0	0	0	0	0	37	36	0	1	26	0	0	133	
4:20 PM	41	0	6	0	0	0	0	0	0	23	33	0	6	32	0	0	141	
4:25 PM	37	0	7	0	0	0	0	0	0	21	29	0	0	31	0	0	125	
4:30 PM	35	0	6	0	0	0	0	0	0	21	28	0	1	35	0	0	126	
4:35 PM	40	0	5	0	0	0	0	0	0	16	29	0	3	33	0	0	126	
4:40 PM	39	0	3	0	0	0	0	0	0	17	22	0	1	32	0	0	114	
4:45 PM	38	0	4	0	0	0	0	0	0	31	28	0	0	13	0	0	114	
4:50 PM	28	0	8	0	0	0	0	0	0	20	35	0	3	29	0	0	123	
4:55 PM	32	0	2	0	0	0	0	0	0	21	23	0	3	27	0	0	108	1501
5:00 PM	56	0	5	0	0	0	0	0	0	13	25	0	0	36	0	0	135	1511
5:05 PM	57	0	8	0	0	0	0	0	0	32	24	0	1	23	0	0	145	1520
5:10 PM	44	0	5	0	0	0	0	0	0	14	31	0	2	34	0	0	130	1520
5:15 PM	45	0	3	0	0	0	0	0	0	20	23	0	3	35	0	0	129	1516
5:20 PM	33	0	2	0	0	0	0	0	0	24	40	0	1	29	0	0	129	1504
5:25 PM	34	0	4	0	0	0	0	0	0	18	15	0	4	34	0	0	109	1488
5:30 PM	45	0	5	0	0	0	0	0	0	21	28	0	1	31	0	0	131	1493
5:35 PM	41	0	1	0	0	0	0	0	0	21	28	0	0	40	0	0	131	1498
5:40 PM	41	0	4	0	0	0	0	0	0	20	29	0	1	29	0	0	124	1508
5:45 PM	36	0	0	0	0	0	0	0	0	14	29	0	1	22	0	0	102	1496
5:50 PM	38	0	4	0	0	0	0	0	0	16	22	0	1	20	0	0	101	1474
5:55 PM	31	0	0	0	0	0	0	0	0	17	27	0	0	24	0	0	99	1465
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	628	0	72	0	0	0	0	0	0	236	320	0	12	372	0	0	1640	
Heavy Trucks	20	0	0		0	0	0		0	8	12		0	4	0		44	
Pedestrians		0				4				0				4			8	
Bicycles	1	0	0		0	0	0		0	0	0		0	0	0		1	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Clackamas Women's Services Dwy -- Warner Parrott Rd (WM DWY 5)
CITY/STATE: Clackamas, OR

QC JOB #: 14841146
DATE: Tue, Nov 13 2018



5-Min Count Period Beginning At	Clackamas Women's Services Dwy (Northbound)				Clackamas Women's Services Dwy (Southbound)				Warner Parrott Rd (WM DWY 5) (Eastbound)				Warner Parrott Rd (WM DWY 5) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:25 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
4:30 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:55 PM	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8
5:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8
5:05 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9
5:10 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	11
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
5:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
5:25 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	12
5:30 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	12
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	13
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
5:45 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	13
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	15
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	4	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	20	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pedestrians			12				0				0				0		12	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		
Stopped Buses																		

Comments:

Appendix B Existing Conditions Traffic
Analysis Worksheets

Queues

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	240	385	53	149	250	27
v/c Ratio	0.32	0.27	0.08	0.15	0.51	0.03
Control Delay	12.9	0.7	6.2	6.4	19.8	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	0.7	6.2	6.4	19.8	4.0
Queue Length 50th (ft)	46	0	6	16	57	0
Queue Length 95th (ft)	115	12	22	50	142	11
Internal Link Dist (ft)	390			230	412	
Turn Bay Length (ft)		100	100		220	
Base Capacity (vph)	1647	1591	1138	1845	1420	1455
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.24	0.05	0.08	0.18	0.02

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	221	354	49	137	230	25
Future Volume (vph)	221	354	49	137	230	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-3%			0%	0%	
Total Lost time (s)	4.0	3.5	4.0	4.0	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Fr t	1.00	0.85	1.00	1.00	1.00	0.85
Fl t Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1837	1591	1801	1845	1687	1615
Fl t Permitted	1.00	1.00	0.60	1.00	0.95	1.00
Satd. Flow (perm)	1837	1591	1133	1845	1687	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	240	385	53	149	250	27
RTOR Reduction (vph)	0	86	0	0	0	15
Lane Group Flow (vph)	240	299	53	149	250	12
Confl. Peds. (#/hr)		5	5			4
Heavy Vehicles (%)	5%	3%	0%	3%	7%	0%
Turn Type	NA	pt+ov	D.P+P	NA	Prot	pt+ov
Protected Phases	2	2 8	1	6	8	1 8
Permitted Phases			2			
Actuated Green, G (s)	18.8	36.1	21.9	25.9	13.3	20.4
Effective Green, g (s)	18.8	36.6	21.9	25.9	13.3	20.9
Actuated g/C Ratio	0.40	0.78	0.46	0.55	0.28	0.44
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	5.0		2.3	5.0	2.5	
Lane Grp Cap (vph)	731	1233	569	1012	475	715
v/s Ratio Prot	c0.13	0.19	0.01	c0.08	c0.15	0.01
v/s Ratio Perm			0.04			
v/c Ratio	0.33	0.24	0.09	0.15	0.53	0.02
Uniform Delay, d1	9.8	1.5	7.0	5.2	14.3	7.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2	0.0	0.1	0.8	0.0
Delay (s)	10.4	1.7	7.0	5.4	15.1	7.4
Level of Service	B	A	A	A	B	A
Approach Delay (s)	5.0			5.8	14.3	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			7.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			47.2		Sum of lost time (s)	12.0
Intersection Capacity Utilization			39.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Site Access & Warner Milne Rd

12/20/2018



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
Traffic Volume (veh/h)	240	6	11	185	1	4
Future Volume (Veh/h)	240	6	11	185	1	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	261	7	12	201	1	4
Pedestrians						9
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						1
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	310					
pX, platoon unblocked			0.92		0.92	0.92
vC, conflicting volume			277		498	274
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			176		416	172
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	100
cM capacity (veh/h)			1294		542	803
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	268	213	5			
Volume Left	0	12	1			
Volume Right	7	0	4			
cSH	1700	1294	732			
Volume to Capacity	0.16	0.01	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.5	10.0			
Lane LOS			A	A		
Approach Delay (s)	0.0	0.5	10.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			28.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	286	369	23	377	509	71
v/c Ratio	0.43	0.26	0.05	0.51	0.71	0.08
Control Delay	21.1	0.6	11.9	19.0	23.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.1	0.6	11.9	19.0	23.9	2.6
Queue Length 50th (ft)	89	0	5	109	167	0
Queue Length 95th (ft)	192	9	20	231	334	18
Internal Link Dist (ft)	390			230	412	
Turn Bay Length (ft)		100	100		220	
Base Capacity (vph)	1346	1521	809	1765	1124	1398
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.24	0.03	0.21	0.45	0.05

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	266	343	21	351	473	66
Future Volume (vph)	266	343	21	351	473	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-3%			0%	0%	
Total Lost time (s)	4.0	3.5	4.0	8.5	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Fr t	1.00	0.85	1.00	1.00	1.00	0.85
Fl t Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1891	1576	1801	1881	1752	1615
Fl t Permitted	1.00	1.00	0.48	1.00	0.95	1.00
Satd. Flow (perm)	1891	1576	913	1881	1752	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	286	369	23	377	509	71
RTOR Reduction (vph)	0	65	0	0	0	33
Lane Group Flow (vph)	286	304	23	377	509	38
Confl. Peds. (#/hr)		5	5			3
Heavy Vehicles (%)	2%	4%	0%	1%	3%	0%
Turn Type	NA	pt+ov	D.P+P	NA	Prot	pt+ov
Protected Phases	2	2 8	1	6	8	1 8
Permitted Phases			2			
Actuated Green, G (s)	23.6	54.6	27.8	27.3	27.0	35.2
Effective Green, g (s)	23.6	55.1	27.8	27.3	27.0	35.7
Actuated g/C Ratio	0.35	0.82	0.42	0.41	0.40	0.53
Clearance Time (s)	4.0		4.0	8.5	4.0	
Vehicle Extension (s)	5.0		2.3	5.0	2.5	
Lane Grp Cap (vph)	668	1299	435	768	708	863
v/s Ratio Prot	0.15	0.19	0.00	c0.20	c0.29	0.02
v/s Ratio Perm			0.02			
v/c Ratio	0.43	0.23	0.05	0.49	0.72	0.04
Uniform Delay, d1	16.5	1.3	11.7	14.6	16.7	7.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.2	0.0	1.0	3.3	0.0
Delay (s)	17.4	1.5	11.7	15.6	20.0	7.4
Level of Service	B	A	B	B	B	A
Approach Delay (s)	8.4			15.4	18.4	
Approach LOS	A			B	B	
Intersection Summary						
HCM 2000 Control Delay			13.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			66.8		Sum of lost time (s)	12.5
Intersection Capacity Utilization			55.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Site Access & Warner Milne Rd

12/20/2018



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	332	0	0	370	2	9
Future Volume (Veh/h)	332	0	0	370	2	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	357	0	0	398	2	10
Pedestrians						12
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						1
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	310					
pX, platoon unblocked			0.88		0.88	0.88
vC, conflicting volume			369		767	369
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			221		671	221
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1189		371	720
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	357	398	12			
Volume Left	0	0	2			
Volume Right	0	0	10			
cSH	1700	1189	622			
Volume to Capacity	0.21	0.00	0.02			
Queue Length 95th (ft)	0	0	1			
Control Delay (s)	0.0	0.0	10.9			
Lane LOS				B		
Approach Delay (s)	0.0	0.0	10.9			
Approach LOS				B		
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			29.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Appendix C ODOT Crash Data

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
000	NONE	NO ACTION OR NON-WARRANTED
001	SKIDDED	SKIDDED
002	ON/OFF V	GETTING ON OR OFF STOPPED OR PARKED VEHICLE
003	LOAD OVR	OVERHANGING LOAD STRUCK ANOTHER VEHICLE, ETC.
006	SLOW DN	SLOWED DOWN
007	AVOIDING	AVOIDING MANEUVER
008	PAR PARK	PARALLEL PARKING
009	ANG PARK	ANGLE PARKING
010	INTERFERE	PASSENGER INTERFERING WITH DRIVER
011	STOPPED	STOPPED IN TRAFFIC NOT WAITING TO MAKE A LEFT TURN
012	STP/L TRN	STOPPED BECAUSE OF LEFT TURN SIGNAL OR WAITING, ETC.
013	STP TURN	STOPPED WHILE EXECUTING A TURN
014	EMR V PKD	EMERGENCY VEHICLE LEGALLY PARKED IN THE ROADWAY
015	GO A/STOP	PROCEED AFTER STOPPING FOR A STOP SIGN/FLASHING RED.
016	TRN A/RED	TURNED ON RED AFTER STOPPING
017	LOSTCTRL	LOST CONTROL OF VEHICLE
018	EXIT DWY	ENTERING STREET OR HIGHWAY FROM ALLEY OR DRIVEWAY
019	ENTR DWY	ENTERING ALLEY OR DRIVEWAY FROM STREET OR HIGHWAY
020	STR ENTR	BEFORE ENTERING ROADWAY, STRUCK PEDESTRIAN, ETC. ON SIDEWALK OR SHOULDER
021	NO DRVR	CAR RAN AWAY - NO DRIVER
022	PREV COL	STRUCK, OR WAS STRUCK BY, VEHICLE OR PEDESTRIAN IN PRIOR COLLISION BEFORE ACC. STABILIZED
023	STALLED	VEHICLE STALLED OR DISABLED
024	DRVR DEAD	DEAD BY UNASSOCIATED CAUSE
025	FATIGUE	FATIGUED, SLEEPY, ASLEEP
026	SUN	DRIVER BLINDED BY SUN
027	HDLGHTS	DRIVER BLINDED BY HEADLIGHTS
028	ILLNESS	PHYSICALLY ILL
029	THRU MED	VEHICLE CROSSED, PLUNGED OVER, OR THROUGH MEDIAN BARRIER
030	PURSUIT	PURSuing OR ATTEMPTING TO STOP A VEHICLE
031	PASSING	PASSING SITUATION
032	PRKOFFRD	VEHICLE PARKED BEYOND CURB OR SHOULDER
033	CROS MED	VEHICLE CROSSED EARTH OR GRASS MEDIAN
034	X N/SGNL	CROSSING AT INTERSECTION - NO TRAFFIC SIGNAL PRESENT
035	X W/ SGNL	CROSSING AT INTERSECTION - TRAFFIC SIGNAL PRESENT
036	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
037	BTWN INT	CROSSING BETWEEN INTERSECTIONS
038	DISTRACT	DRIVER'S ATTENTION DISTRACTED
039	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
040	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
041	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
042	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
043	PLAYINRD	PLAYING IN STREET OR ROAD
044	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
045	WORK ON	WORKING IN ROADWAY OR ALONG SHOULDER
046	W/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. WITH TRAFFIC
047	A/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. FACING TRAFFIC
050	LAY ON RD	STANDING OR LYING IN ROADWAY
051	ENT OFFRD	ENTERING / STARTING IN TRAFFIC LANE FROM OFF ROAD
052	MERGING	MERGING

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
055	SPRAY	BLINDED BY WATER SPRAY
088	OTHER	OTHER ACTION
099	UNK	UNKNOWN ACTION

CAUSE CODE TRANSLATION LIST

CAUSE CODE	SHORT DESCRIPTION	LONG DESCRIPTION
00	NO CODE	NO CAUSE ASSOCIATED AT THIS LEVEL
01	TOO-FAST	TOO FAST FOR CONDITIONS (NOT EXCEED POSTED SPEED
02	NO-YIELD	DID NOT YIELD RIGHT-OF-WAY
03	PAS-STOP	PASSED STOP SIGN OR RED FLASHER
04	DIS SIG	DISREGARDED TRAFFIC SIGNAL
05	LEFT-CTR	DROVE LEFT OF CENTER ON TWO-WAY ROAD; STRADDLING
06	IMP-OVER	IMPROPER OVERTAKING
07	TOO-CLOS	FOLLOWED TOO CLOSELY
08	IMP-TURN	MADE IMPROPER TURN
09	DRINKING	ALCOHOL OR DRUG INVOLVED
10	OTHR-IMP	OTHER IMPROPER DRIVING
11	MECH-DEF	MECHANICAL DEFECT
12	OTHER	OTHER (NOT IMPROPER DRIVING)
13	IMP LN C	IMPROPER CHANGE OF TRAFFIC LANES
14	DIS TCD	DISREGARDED OTHER TRAFFIC CONTROL DEVICE
15	WRNG WAY	WRONG WAY ON ONE-WAY ROAD; WRONG SIDE DIVIDED RO
16	FATIGUE	DRIVER DROWSY/FATIGUED/SLEEPY
17	ILLNESS	PHYSICAL ILLNESS
18	IN RDWY	NON-MOTORIST ILLEGALLY IN ROADWAY
19	NT VISBL	NON-MOTORIST NOT VISIBLE; NON-REFLECTIVE CLOTHIN
20	IMP PKNG	VEHICLE IMPROPERLY PARKED
21	DEF STER	DEFECTIVE STEERING MECHANISM
22	DEF BRKE	INADEQUATE OR NO BRAKES
24	LOADSHFT	VEHICLE LOST LOAD OR LOAD SHIFTED
25	TIREFAIL	TIRE FAILURE
26	PHANTOM	PHANTOM / NON-CONTACT VEHICLE
27	INATTENT	INATTENTION
28	NM INATT	NON-MOTORIST INATTENTION
29	F AVOID	FAILED TO AVOID VEHICLE AHEAD
30	SPEED	DRIVING IN EXCESS OF POSTED SPEED
31	RACING	SPEED RACING (PER PAR)
32	CARELESS	CARELESS DRIVING (PER PAR)
33	RECKLESS	RECKLESS DRIVING (PER PAR)
34	AGGRESV	AGGRESSIVE DRIVING (PER PAR)
35	RD RAGE	ROAD RAGE (PER PAR)
40	VIEW OBS	VIEW OBSCURED
50	USED MDN	IMPROPER USE OF MEDIAN OR SHOULDER
51	FAIL LN	FAILED TO MAINTAIN LANE
52	OFF RD	RAN OFF ROAD

COLLISION TYPE CODE TRANSLATION LIST

COLL CODE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OTH	MISCELLANEOUS
-	BACK	BACKING
0	PED	PEDESTRIAN
1	ANGL	ANGLE
2	HEAD	HEAD-ON
3	REAR	REAR-END
4	SS-M	SIDESWIPE - MEETING
5	SS-O	SIDESWIPE - OVERTAKING
6	TURN	TURNING MOVEMENT
7	PARK	PARKING MANEUVER
8	NCOL	NON-COLLISION
9	FIX	FIXED OBJECT OR OTHER OBJECT

CRASH TYPE CODE TRANSLATION LIST

CRASH TYPE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OVERTURN	OVERTURNED
0	NON-COLL	OTHER NON-COLLISION
1	OTH RDWY	MOTOR VEHICLE ON OTHER ROADWAY
2	PRKD MV	PARKED MOTOR VEHICLE
3	PED	PEDESTRIAN
4	TRAIN	RAILWAY TRAIN
6	BIKE	PEDALCYCLIST
7	ANIMAL	ANIMAL
8	FIX OBJ	FIXED OBJECT
9	OTH OBJ	OTHER OBJECT
A	ANGL-STP	ENTERING AT ANGLE - ONE VEHICLE STOPPED
B	ANGL-OTH	ENTERING AT ANGLE - ALL OTHERS
C	S-STRGHT	FROM SAME DIRECTION - BOTH GOING STRAIGHT
D	S-1TURN	FROM SAME DIRECTION - ONE TURN, ONE STRAIGHT
E	S-1STOP	FROM SAME DIRECTION - ONE STOPPED
F	S-OTHER	FROM SAME DIRECTION-ALL OTHERS, INCLUDING PARKING
G	O-STRGHT	FROM OPPOSITE DIRECTION - BOTH GOING STRAIGHT
H	O-1 L-TURN	FROM OPPOSITE DIRECTION-ONE LEFT TURN, ONE STRAIGHT
I	O-1STOP	FROM OPPOSITE DIRECTION - ONE STOPPED
J	O-OTHER	FROM OPPOSITE DIRECTION-ALL OTHERS INCL. PARKING

DRIVER LICENSE CODE TRANSLATION LIST

LIC CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NOT LICENSED (HAD NEVER BEEN LICENSED)
1	OR-Y	VALID OREGON LICENSE
2	OTH-Y	VALID LICENSE, OTHER STATE OR COUNTRY
3	SUSP	SUSPENDED/REVOKED
4	EXP	EXPIRED
8	N-VAL	OTHER NON-VALID LICENSE
9	UNK	UNKNOWN IF DRIVER WAS LICENSED AT TIME OF CRASH

DRIVER RESIDENCE CODE TRANSLATION LIST

RES CODE	SHORT DESC	LONG DESCRIPTION
1	OR<25	OREGON RESIDENT WITHIN 25 MILE OF HOME
2	OR>25	OREGON RESIDENT 25 OR MORE MILES FROM HOME
3	OR-?	OREGON RESIDENT - UNKNOWN DISTANCE FROM HOME
4	N-RES	NON-RESIDENT
9	UNK	UNKNOWN IF OREGON RESIDENT

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
000	NONE	NO ERROR
001	WIDE TRN	WIDE TURN
002	CUT CORN	CUT CORNER ON TURN
003	FAIL TRN	FAILED TO OBEY MANDATORY TRAFFIC TURN SIGNAL, SIGN OR LANE MARKINGS
004	L IN TRF	LEFT TURN IN FRONT OF ONCOMING TRAFFIC
005	L PROHIB	LEFT TURN WHERE PROHIBITED
006	FRM WRNG	TURNEED FROM WRONG LANE
007	TO WRONG	TURNEED INTO WRONG LANE
008	ILLEG U	U-TURNEED ILLEGALLY
009	IMP STOP	IMPROPERLY STOPPED IN TRAFFIC LANE
010	IMP SIG	IMPROPER SIGNAL OR FAILURE TO SIGNAL
011	IMP BACK	BACKING IMPROPERLY (NOT PARKING)
012	IMP PARK	IMPROPERLY PARKED
013	UNPARK	IMPROPER START LEAVING PARKED POSITION
014	IMP STRT	IMPROPER START FROM STOPPED POSITION
015	IMP LGHT	IMPROPER OR NO LIGHTS (VEHICLE IN TRAFFIC)
016	INATTENT	INATTENTION (FAILURE TO DIM LIGHTS PRIOR TO 4/1/97)
017	UNSF VEH	DRIVING UNSAFE VEHICLE (NO OTHER ERROR APPARENT)
018	OTH PARK	ENTERING/EXITING PARKED POSITION W/ INSUFFICIENT CLEARANCE; OTHER IMPROPER PARKING MANEUVER
019	DIS DRIV	DISREGARDED OTHER DRIVER'S SIGNAL
020	DIS SGNL	DISREGARDED TRAFFIC SIGNAL
021	RAN STOP	DISREGARDED STOP SIGN OR FLASHING RED
022	DIS SIGN	DISREGARDED WARNING SIGN, FLARES OR FLASHING AMBER
023	DIS OFCR	DISREGARDED POLICE OFFICER OR FLAGMAN
024	DIS EMER	DISREGARDED SIREN OR WARNING OF EMERGENCY VEHICLE
025	DIS RR	DISREGARDED RR SIGNAL, RR SIGN, OR RR FLAGMAN
026	REAR-END	FAILED TO AVOID STOPPED OR PARKED VEHICLE AHEAD OTHER THAN SCHOOL BUS
027	BIKE ROW	DID NOT HAVE RIGHT-OF-WAY OVER PEDALCYCLIST
028	NO ROW	DID NOT HAVE RIGHT-OF-WAY
029	PED ROW	FAILED TO YIELD RIGHT-OF-WAY TO PEDESTRIAN
030	PAS CURV	PASSING ON A CURVE
031	PAS WRNG	PASSING ON THE WRONG SIDE
032	PAS TANG	PASSING ON STRAIGHT ROAD UNDER UNSAFE CONDITIONS
033	PAS X-WK	PASSED VEHICLE STOPPED AT CROSSWALK FOR PEDESTRIAN
034	PAS INTR	PASSING AT INTERSECTION
035	PAS HILL	PASSING ON CREST OF HILL
036	N/PAS ZN	PASSING IN "NO PASSING" ZONE
037	PAS TRAF	PASSING IN FRONT OF ONCOMING TRAFFIC
038	CUT-IN	CUTTING IN (TWO LANES - TWO WAY ONLY)
039	WRNGSIDE	DRIVING ON WRONG SIDE OF THE ROAD (2-WAY UNDIVIDED ROADWAYS)

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
040	THRU MED	DRIVING THROUGH SAFETY ZONE OR OVER ISLAND
041	F/ST BUS	FAILED TO STOP FOR SCHOOL BUS
042	F/SLO MV	FAILED TO DECREASE SPEED FOR SLOWER MOVING VEHICLE
043	TOO CLOSE	FOLLOWING TOO CLOSELY (MUST BE ON OFFICER'S REPORT)
044	STRDL LN	STRADDLING OR DRIVING ON WRONG LANES
045	IMP CHG	IMPROPER CHANGE OF TRAFFIC LANES
046	WRNG WAY	WRONG WAY ON ONE-WAY ROADWAY; WRONG SIDE DIVIDED ROAD
047	BASCRULE	DRIVING TOO FAST FOR CONDITIONS (NOT EXCEEDING POSTED SPEED)
048	OPN DOOR	OPENED DOOR INTO ADJACENT TRAFFIC LANE
049	IMPEDING	IMPEDING TRAFFIC
050	SPEED	DRIVING IN EXCESS OF POSTED SPEED
051	RECKLESS	RECKLESS DRIVING (PER PAR)
052	CARELESS	CARELESS DRIVING (PER PAR)
053	RACING	SPEED RACING (PER PAR)
054	X N/SGNL	CROSSING AT INTERSECTION, NO TRAFFIC SIGNAL PRESENT
055	X W/SGNL	CROSSING AT INTERSECTION, TRAFFIC SIGNAL PRESENT
056	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
057	BTWN INT	CROSSING BETWEEN INTERSECTIONS
059	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
060	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
061	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
062	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
063	PLAYINRD	PLAYING IN STREET OR ROAD
064	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
065	WORK IN RD	WORKING IN ROADWAY OR ALONG SHOULDER
070	LAY ON RD	STANDING OR LYING IN ROADWAY
071	NM IMP USE	IMPROPER USE OF TRAFFIC LANE BY NON-MOTORIST
073	ELUDING	ELUDING / ATTEMPT TO ELUDE
079	F NEG CURV	FAILED TO NEGOTIATE A CURVE
080	FAIL LN	FAILED TO MAINTAIN LANE
081	OFF RD	RAN OFF ROAD
082	NO CLEAR	DRIVER MISJUDGED CLEARANCE
083	OVRSTEER	OVER-CORRECTING
084	NOT USED	CODE NOT IN USE
085	OVRLOAD	OVERLOADING OR IMPROPER LOADING OF VEHICLE WITH CARGO OR PASSENGERS
097	UNA DIS TC	UNABLE TO DETERMINE WHICH DRIVER DISREGARDED TRAFFIC CONTROL DEVICE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
001	FEL/JUMP	OCCUPANT FELL, JUMPED OR WAS EJECTED FROM MOVING VEHICLE
002	INTERFER	PASSENGER INTERFERED WITH DRIVER
003	BUG INTF	ANIMAL OR INSECT IN VEHICLE INTERFERED WITH DRIVER
004	INDRCT PED	PEDESTRIAN INDIRECTLY INVOLVED (NOT STRUCK)
005	SUB-PED	"SUB-PED": PEDESTRIAN INJURED SUBSEQUENT TO COLLISION, ETC.
006	INDRCT BIK	PEDALCYCLIST INDIRECTLY INVOLVED (NOT STRUCK)
007	HITCHIKR	HITCHHIKER (SOLICITING A RIDE)
008	PSNGR TOW	PASSENGER OR NON-MOTORIST BEING TOWED OR PUSHED ON CONVEYANCE
009	ON/OFF V	GETTING ON/OFF STOPPED/PARKED VEHICLE (OCCUPANTS ONLY; MUST HAVE PHYSICAL CONTACT W/ VEHICLE)
010	SUB OTRN	OVERTURNED AFTER FIRST HARMFUL EVENT
011	MV PUSHD	VEHICLE BEING PUSHED
012	MV TOWED	VEHICLE TOWED OR HAD BEEN TOWING ANOTHER VEHICLE
013	FORCED	VEHICLE FORCED BY IMPACT INTO ANOTHER VEHICLE, PEDALCYCLIST OR PEDESTRIAN
014	SET MOTN	VEHICLE SET IN MOTION BY NON-DRIVER (CHILD RELEASED BRAKES, ETC.)
015	RR ROW	AT OR ON RAILROAD RIGHT-OF-WAY (NOT LIGHT RAIL)
016	LT RL ROW	AT OR ON LIGHT-RAIL RIGHT-OF-WAY
017	RR HIT V	TRAIN STRUCK VEHICLE
018	V HIT RR	VEHICLE STRUCK TRAIN
019	HIT RR CAR	VEHICLE STRUCK RAILROAD CAR ON ROADWAY
020	JACKKNIFE	JACKKNIFE; TRAILER OR TOWED VEHICLE STRUCK TOWING VEHICLE
021	TRL OTRN	TRAILER OR TOWED VEHICLE OVERTURNED
022	CN BROKE	TRAILER CONNECTION BROKE
023	DETACH TRL	DETACHED TRAILING OBJECT STRUCK OTHER VEHICLE, NON-MOTORIST, OR OBJECT
024	V DOOR OPN	VEHICLE DOOR OPENED INTO ADJACENT TRAFFIC LANE
025	WHEELOFF	WHEEL CAME OFF
026	HOOD UP	HOOD FLEW UP
028	LOAD SHIFT	LOST LOAD, LOAD MOVED OR SHIFTED
029	TIREFAIL	TIRE FAILURE
030	PET	PET: CAT, DOG AND SIMILAR
031	LVSTOCK	STOCK: COW, CALF, BULL, STEER, SHEEP, ETC.
032	HORSE	HORSE, MULE, OR DONKEY
033	HRSE&RID	HORSE AND RIDER
034	GAME	WILD ANIMAL, GAME (INCLUDES BIRDS; NOT DEER OR ELK)
035	DEER ELK	DEER OR ELK, WAPITI
036	ANML VEH	ANIMAL-DRAWN VEHICLE
037	CULVERT	CULVERT, OPEN LOW OR HIGH MANHOLE
038	ATENUATN	IMPACT ATTENUATOR
039	PK METER	PARKING METER
040	CURB	CURB (ALSO NARROW SIDEWALKS ON BRIDGES)
041	JIGGLE	JIGGLE BAR OR TRAFFIC SNAKE FOR CHANNELIZATION
042	GDRL END	LEADING EDGE OF GUARDRAIL
043	GARDRAIL	GUARD RAIL (NOT METAL MEDIAN BARRIER)
044	BARRIER	MEDIAN BARRIER (RAISED OR METAL)
045	WALL	RETAINING WALL OR TUNNEL WALL
046	BR RAIL	BRIDGE RAILING OR PARAPET (ON BRIDGE OR APPROACH)
047	BR ABUTMNT	BRIDGE ABUTMENT (INCLUDED "APPROACH END" THRU 2013)
048	BR COLMN	BRIDGE PILLAR OR COLUMN
049	BR GIRDR	BRIDGE GIRDER (HORIZONTAL BRIDGE STRUCTURE OVERHEAD)
050	ISLAND	TRAFFIC RAISED ISLAND
051	GORE	GORE
052	POLE UNK	POLE - TYPE UNKNOWN
053	POLE UTL	POLE - POWER OR TELEPHONE
054	ST LIGHT	POLE - STREET LIGHT ONLY
055	TRF SGNL	POLE - TRAFFIC SIGNAL AND PED SIGNAL ONLY
056	SGN BRDG	POLE - SIGN BRIDGE
057	STOPSIGN	STOP OR YIELD SIGN

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
058	OTH SIGN	OTHER SIGN, INCLUDING STREET SIGNS
059	HYDRANT	HYDRANT
060	MARKER	DELINEATOR OR MARKER (REFLECTOR POSTS)
061	MAILBOX	MAILBOX
062	TREE	TREE, STUMP OR SHRUBS
063	VEG OHED	TREE BRANCH OR OTHER VEGETATION OVERHEAD, ETC.
064	WIRE/CBL	WIRE OR CABLE ACROSS OR OVER THE ROAD
065	TEMP SGN	TEMPORARY SIGN OR BARRICADE IN ROAD, ETC.
066	PERM SGN	PERMANENT SIGN OR BARRICADE IN/OFF ROAD
067	SLIDE	SLIDES, FALLEN OR FALLING ROCKS
068	FRGN OBJ	FOREIGN OBSTRUCTION/DEBRIS IN ROAD (NOT GRAVEL)
069	EQP WORK	EQUIPMENT WORKING IN/OFF ROAD
070	OTH EQP	OTHER EQUIPMENT IN OR OFF ROAD (INCLUDES PARKED TRAILER, BOAT)
071	MAIN EQP	WRECKER, STREET SWEEPER, SNOW PLOW OR SANDING EQUIPMENT
072	OTHER WALL	ROCK, BRICK OR OTHER SOLID WALL
073	IRRGL PVMT	OTHER BUMP (NOT SPEED BUMP), POTHOLE OR PAVEMENT IRREGULARITY (PER PAR)
074	OVERHD OBJ	OTHER OVERHEAD OBJECT (HIGHWAY SIGN, SIGNAL HEAD, ETC.); NOT BRIDGE
075	CAVE IN	BRIDGE OR ROAD CAVE IN
076	HI WATER	HIGH WATER
077	SNO BANK	SNOW BANK
078	LO-HI EDGE	LOW OR HIGH SHOULDER AT PAVEMENT EDGE
079	DITCH	CUT SLOPE OR DITCH EMBANKMENT
080	OBJ FRM MV	STRUCK BY ROCK OR OTHER OBJECT SET IN MOTION BY OTHER VEHICLE (INCL. LOST LOADS)
081	FLY-OBJ	STRUCK BY ROCK OR OTHER MOVING OR FLYING OBJECT (NOT SET IN MOTION BY VEHICLE)
082	VEH HID	VEHICLE OBSCURED VIEW
083	VEG HID	VEGETATION OBSCURED VIEW
084	BLDG HID	VIEW OBSCURED BY FENCE, SIGN, PHONE BOOTH, ETC.
085	WIND GUST	WIND GUST
086	IMMERSED	VEHICLE IMMERSED IN BODY OF WATER
087	FIRE/EXP	FIRE OR EXPLOSION
088	FENC/BLD	FENCE OR BUILDING, ETC.
089	OTHR CRASH	CRASH RELATED TO ANOTHER SEPARATE CRASH
090	TO 1 SIDE	TWO-WAY TRAFFIC ON DIVIDED ROADWAY ALL ROUTED TO ONE SIDE
091	BUILDING	BUILDING OR OTHER STRUCTURE
092	PHANTOM	OTHER (PHANTOM) NON-CONTACT VEHICLE
093	CELL PHONE	CELL PHONE (ON PAR OR DRIVER IN USE)
094	VIOL GDL	TEENAGE DRIVER IN VIOLATION OF GRADUATED LICENSE PGM
095	GUY WIRE	GUY WIRE
096	BERM	BERM (EARTHEN OR GRAVEL MOUND)
097	GRAVEL	GRAVEL IN ROADWAY
098	ABR EDGE	ABRUPT EDGE
099	CELL WTNSD	CELL PHONE USE WITNESSED BY OTHER PARTICIPANT
100	UNK FIXD	FIXED OBJECT, UNKNOWN TYPE.
101	OTHER OBJ	NON-FIXED OBJECT, OTHER OR UNKNOWN TYPE
102	TEXTING	TEXTING
103	WZ WORKER	WORK ZONE WORKER
104	ON VEHICLE	PASSENGER RIDING ON VEHICLE EXTERIOR
105	PEDAL PSGR	PASSENGER RIDING ON PEDALCYCLE
106	MAN WHLCHR	PEDESTRIAN IN NON-MOTORIZED WHEELCHAIR
107	MTR WHLCHR	PEDESTRIAN IN MOTORIZED WHEELCHAIR
108	OFFICER	LAW ENFORCEMENT / POLICE OFFICER
109	SUB-BIKE	"SUB-BIKE": PEDALCYCLIST INJURED SUBSEQUENT TO COLLISION, ETC.
110	N-MTR	NON-MOTORIST STRUCK VEHICLE
111	S CAR VS V	STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM) STRUCK VEHICLE
112	V VS S CAR	VEHICLE STRUCK STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM)
113	S CAR ROW	AT OR ON STREET CAR OR TROLLEY RIGHT-OF-WAY

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
114	RR EQUIP	VEHICLE STRUCK RAILROAD EQUIPMENT (NOT TRAIN) ON TRACKS
115	DSTRCT GPS	DISTRACTED BY NAVIGATION SYSTEM OR GPS DEVICE
116	DSTRCT OTH	DISTRACTED BY OTHER ELECTRONIC DEVICE
117	RR GATE	RAIL CROSSING DROP-ARM GATE
118	EXPNSN JNT	EXPANSION JOINT
119	JERSEY BAR	JERSEY BARRIER
120	WIRE BAR	WIRE OR CABLE MEDIAN BARRIER
121	FENCE	FENCE
123	OBJ IN VEH	LOOSE OBJECT IN VEHICLE STRUCK OCCUPANT
124	SLIPPERY	SLIDING OR SWERVING DUE TO WET, ICY, SLIPPERY OR LOOSE SURFACE (NOT GRAVEL)
125	SHLDR	SHOULDER GAVE WAY
126	BOULDER	ROCK(S), BOULDER (NOT GRAVEL; NOT ROCK SLIDE)
127	LAND SLIDE	ROCK SLIDE OR LAND SLIDE
128	CURVE INV	CURVE PRESENT AT CRASH LOCATION
129	HILL INV	VERTICAL GRADE / HILL PRESENT AT CRASH LOCATION
130	CURVE HID	VIEW OBSCURED BY CURVE
131	HILL HID	VIEW OBSCURED BY VERTICAL GRADE / HILL
132	WINDOW HID	VIEW OBSCURED BY VEHICLE WINDOW CONDITIONS
133	SPRAY HID	VIEW OBSCURED BY WATER SPRAY
134	TORRENTIAL	TORRENTIAL RAIN (EXCEPTIONALLY HEAVY RAIN)

FUNCTIONAL CLASSIFICATION TRANSLATION LIST

FUNC CLASS	DESCRIPTION
01	RURAL PRINCIPAL ARTERIAL - INTERSTATE
02	RURAL PRINCIPAL ARTERIAL - OTHER
06	RURAL MINOR ARTERIAL
07	RURAL MAJOR COLLECTOR
08	RURAL MINOR COLLECTOR
09	RURAL LOCAL
11	URBAN PRINCIPAL ARTERIAL - INTERSTATE
12	URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXP
14	URBAN PRINCIPAL ARTERIAL - OTHER
16	URBAN MINOR ARTERIAL
17	URBAN MAJOR COLLECTOR
18	URBAN MINOR COLLECTOR
19	URBAN LOCAL
78	UNKNOWN RURAL SYSTEM
79	UNKNOWN RURAL NON-SYSTEM
98	UNKNOWN URBAN SYSTEM
99	UNKNOWN URBAN NON-SYSTEM

HIGHWAY COMPONENT TRANSLATION LIST

CODE	DESCRIPTION
0	MAINLINE STATE HIGHWAY
1	COUplet
3	FRONTAGE ROAD
6	CONNECTION
8	HIGHWAY - OTHER

INJURY SEVERITY CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
1	KILL	FATAL INJURY
2	INJA	INCAPACITATING INJURY - BLEEDING, BROKEN BONES
3	INJB	NON-INCAPACITATING INJURY
4	INJC	POSSIBLE INJURY - COMPLAINT OF PAIN
5	PRI	DIED PRIOR TO CRASH
7	NO<5	NO INJURY - 0 TO 4 YEARS OF AGE
9	NONE	PARTICIPANT UNINJURED, OVER THE AGE OF 4

LIGHT CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	DAY	DAYLIGHT
2	DLIT	DARKNESS - WITH STREET LIGHTS
3	DARK	DARKNESS - NO STREET LIGHTS
4	DAWN	DAWN (TWILIGHT)
5	DUSK	DUSK (TWILIGHT)

MEDIAN TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NO MEDIAN
1	RSDMD	SOLID MEDIAN BARRIER
2	DIVMD	EARTH, GRASS OR PAVED MEDIAN

MILEAGE TYPE CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
0	REGULAR MILEAGE
T	TEMPORARY
Y	SPUR
Z	OVERLAPPING

MOVEMENT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	STRGHT	STRAIGHT AHEAD
2	TURN-R	TURNING RIGHT
3	TURN-L	TURNING LEFT
4	U-TURN	MAKING A U-TURN
5	BACK	BACKING
6	STOP	STOPPED IN TRAFFIC
7	PRKD-P	PARKED - PROPERLY
8	PRKD-I	PARKED - IMPROPERLY
9	PARKNG	PARKING MANEUVER

NON-MOTORIST LOCATION CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
00	AT INTERSECTION - NOT IN ROADWAY
01	AT INTERSECTION - INSIDE CROSSWALK
02	AT INTERSECTION - IN ROADWAY, OUTSIDE CROSSWALK
03	AT INTERSECTION - IN ROADWAY, XWALK AVAIL UNKNWN
04	NOT AT INTERSECTION - IN ROADWAY
05	NOT AT INTERSECTION - ON SHOULDER
06	NOT AT INTERSECTION - ON MEDIAN
07	NOT AT INTERSECTION - WITHIN TRAFFIC RIGHT-OF-WAY
08	NOT AT INTERSECTION - IN BIKE PATH OR PARKING LANE
09	NOT-AT INTERSECTION - ON SIDEWALK
10	OUTSIDE TRAFFICWAY BOUNDARIES
13	AT INTERSECTION - IN BIKE LANE
14	NOT AT INTERSECTION - IN BIKE LANE
15	NOT AT INTERSECTION - INSIDE MID-BLOCK CROSSWALK
16	NOT AT INTERSECTION - IN PARKING LANE
18	OTHER, NOT IN ROADWAY
99	UNKNOWN LOCATION

ROAD CHARACTER CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	INTER	INTERSECTION
2	ALLEY	DRIVEWAY OR ALLEY
3	STRGHT	STRAIGHT ROADWAY
4	TRANS	TRANSITION
5	CURVE	CURVE (HORIZONTAL CURVE)
6	OPENAC	OPEN ACCESS OR TURNOUT
7	GRADE	GRADE (VERTICAL CURVE)
8	BRIDGE	BRIDGE STRUCTURE
9	TUNNEL	TUNNEL

PARTICIPANT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	OCC	UNKNOWN OCCUPANT TYPE
1	DRVR	DRIVER
2	PSNG	PASSENGER
3	PED	PEDESTRIAN
4	CONV	PEDESTRIAN USING A PEDESTRIAN CONVEYER
5	PTOW	PEDESTRIAN TOWING OR TRAILERING AN OB
6	BIKE	PEDALCYCLIST
7	BTOW	PEDALCYCLIST TOWING OR TRAILERING AN O
8	PRKD	OCCUPANT OF A PARKED MOTOR VEHICLE
9	UNK	UNKNOWN TYPE OF NON-MOTORIST

TRAFFIC CONTROL DEVICE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
000	NONE	NO CONTROL
001	TRF SIGNAL	TRAFFIC SIGNALS
002	FLASHBCN-R	FLASHING BEACON - RED (STOP)
003	FLASHBCN-A	FLASHING BEACON - AMBER (SLOW)
004	STOP SIGN	STOP SIGN
005	SLOW SIGN	SLOW SIGN
006	REG-SIGN	REGULATORY SIGN
007	YIELD	YIELD SIGN
008	WARNING	WARNING SIGN
009	CURVE	CURVE SIGN
010	SCHL X-ING	SCHOOL CROSSING SIGN OR SPECIAL SIGNAL
011	OFGR/FLAG	POLICE OFFICER, FLAGMAN - SCHOOL PATROL
012	BRDG-GATE	BRIDGE GATE - BARRIER
013	TEMP-BARR	TEMPORARY BARRIER
014	NO-PASS-ZN	NO PASSING ZONE
015	ONE-WAY	ONE-WAY STREET
016	CHANNEL	CHANNELIZATION
017	MEDIAN BAR	MEDIAN BARRIER
018	PILOT CAR	PILOT CAR
019	SP PED SIG	SPECIAL PEDESTRIAN SIGNAL
020	X-BUCK	CROSSBUCK
021	THR-GN-SIG	THROUGH GREEN ARROW OR SIGNAL
022	L-GRN-SIG	LEFT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
023	R-GRN-SIG	RIGHT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
024	WIGWAG	WIGWAG OR FLASHING LIGHTS W/O DROP-ARM GATE
025	X-BUCK WRN	CROSSBUCK AND ADVANCE WARNING
026	WW W/ GATE	FLASHING LIGHTS WITH DROP-ARM GATES
027	OVRHD SGNL	SUPPLEMENTAL OVERHEAD SIGNAL (RR XING ONLY)
028	SP RR STOP	SPECIAL RR STOP SIGN
029	ILUM GRD X	ILLUMINATED GRADE CROSSING
037	RAMP METER	METERED RAMPS
038	RUMBLE STR	RUMBLE STRIP
090	L-TURN REF	LEFT TURN REFUGE (WHEN REFUGE IS INVOLVED)
091	R-TURN ALL	RIGHT TURN AT ALL TIMES SIGN, ETC.
092	EMR SGN/FL	EMERGENCY SIGNS OR FLARES
093	ACCEL LANE	ACCELERATION OR DECELERATION LANES
094	R-TURN PRO	RIGHT TURN PROHIBITED ON RED AFTER STOPPING
095	BUS STPSGN	BUS STOP SIGN AND RED LIGHTS
099	UNKNOWN	UNKNOWN OR NOT DEFINITE

VEHICLE TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
00	PDO	NOT COLLECTED FOR PDO CRASHES
01	PSNGR CAR	PASSENGER CAR, PICKUP, LIGHT DELIVERY, ETC.
02	BOBTAIL	TRUCK TRACTOR WITH NO TRAILERS (BOBTAIL)
03	FARM TRCTR	FARM TRACTOR OR SELF-PROPELLED FARM EQUIPMENT
04	SEMI TOW	TRUCK TRACTOR WITH TRAILER/MOBILE HOME IN TOW
05	TRUCK	TRUCK WITH NON-DETACHABLE BED, PANEL, ETC.
06	MOPED	MOPED, MINIBIKE, SEATED MOTOR SCOOTER, MOTOR BIKE
07	SCHL BUS	SCHOOL BUS (INCLUDES VAN)
08	OTH BUS	OTHER BUS
09	MTRCYCLE	MOTORCYCLE, DIRT BIKE
10	OTHER	OTHER: FORKLIFT, BACKHOE, ETC.
11	MOTRHOME	MOTORHOME
12	TROLLEY	MOTORIZED STREET CAR/TROLLEY (NO RAILS/WIRES)
13	ATV	ATV
14	MTRSCTR	MOTORIZED SCOOTER (STANDING)
15	SNOWMOBILE	SNOWMOBILE
99	UNKNOWN	UNKNOWN VEHICLE TYPE

WEATHER CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	CLR	CLEAR
2	CLD	CLOUDY
3	RAIN	RAIN
4	SLT	SLEET
5	FOG	FOG
6	SNOW	SNOW
7	DUST	DUST
8	SMOK	SMOKE
9	ASH	ASH

Appendix D 2020 Background Conditions
Traffic Analysis Worksheets

Queues

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	250	400	55	154	260	28
v/c Ratio	0.33	0.28	0.09	0.16	0.53	0.03
Control Delay	12.9	0.8	6.2	6.5	20.6	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	0.8	6.2	6.5	20.6	4.1
Queue Length 50th (ft)	50	0	6	18	63	0
Queue Length 95th (ft)	119	12	22	51	153	11
Internal Link Dist (ft)	390			230	412	
Turn Bay Length (ft)		100	100		220	
Base Capacity (vph)	1618	1591	1136	1845	1396	1438
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.25	0.05	0.08	0.19	0.02

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	230	368	51	142	239	26
Future Volume (vph)	230	368	51	142	239	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-3%			0%	0%	
Total Lost time (s)	4.0	3.5	4.0	4.0	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	1.00	0.85	1.00	1.00	1.00	0.85
Fl _t Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1837	1591	1801	1845	1687	1615
Fl _t Permitted	1.00	1.00	0.58	1.00	0.95	1.00
Satd. Flow (perm)	1837	1591	1107	1845	1687	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	250	400	55	154	260	28
RTOR Reduction (vph)	0	88	0	0	0	16
Lane Group Flow (vph)	250	312	55	154	260	12
Confl. Peds. (#/hr)		5	5			4
Heavy Vehicles (%)	5%	3%	0%	3%	7%	0%
Turn Type	NA	pt+ov	D.P+P	NA	Prot	pt+ov
Protected Phases	2	2 8	1	6	8	1 8
Permitted Phases			2			
Actuated Green, G (s)	19.4	37.1	22.5	26.5	13.7	20.8
Effective Green, g (s)	19.4	37.6	22.5	26.5	13.7	21.3
Actuated g/C Ratio	0.40	0.78	0.47	0.55	0.28	0.44
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	5.0		2.3	5.0	2.5	
Lane Grp Cap (vph)	739	1241	561	1014	479	713
v/s Ratio Prot	c0.14	0.20	0.01	c0.08	c0.15	0.01
v/s Ratio Perm			0.04			
v/c Ratio	0.34	0.25	0.10	0.15	0.54	0.02
Uniform Delay, d ₁	10.0	1.4	7.1	5.3	14.6	7.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d ₂	0.6	0.2	0.0	0.1	1.0	0.0
Delay (s)	10.5	1.7	7.1	5.5	15.6	7.6
Level of Service	B	A	A	A	B	A
Approach Delay (s)	5.1			5.9	14.8	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			7.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.41			
Actuated Cycle Length (s)			48.2		Sum of lost time (s)	12.0
Intersection Capacity Utilization			40.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Site Access & Warner Milne Rd

12/20/2018



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	250	6	11	192	1	4
Future Volume (Veh/h)	250	6	11	192	1	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	272	7	12	209	1	4
Pedestrians						9
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						1
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	310					
pX, platoon unblocked			0.92		0.92	0.92
vC, conflicting volume			288		518	284
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		430	176
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1281		528	794

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	279	221	5
Volume Left	0	12	1
Volume Right	7	0	4
cSH	1700	1281	721
Volume to Capacity	0.16	0.01	0.01
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	0.5	10.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.5	10.0
Approach LOS			B

Intersection Summary			
Average Delay			0.3
Intersection Capacity Utilization	29.1%		ICU Level of Service
Analysis Period (min)	15		A

Queues

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	298	384	24	392	529	74
v/c Ratio	0.45	0.27	0.06	0.54	0.72	0.08
Control Delay	22.1	0.6	12.4	20.2	24.0	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	0.6	12.4	20.2	24.0	2.6
Queue Length 50th (ft)	100	0	5	124	179	0
Queue Length 95th (ft)	202	9	21	243	349	18
Internal Link Dist (ft)	390			230	412	
Turn Bay Length (ft)		100	100		220	
Base Capacity (vph)	1302	1509	776	1750	1072	1402
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.25	0.03	0.22	0.49	0.05

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Beaver Creek Rd & Warner Milne Rd

12/20/2018

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	277	357	22	365	492	69
Future Volume (vph)	277	357	22	365	492	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-3%			0%	0%	
Total Lost time (s)	4.0	3.5	4.0	8.5	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Fr t	1.00	0.85	1.00	1.00	1.00	0.85
Fl t Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1891	1576	1801	1881	1752	1615
Fl t Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	1891	1576	872	1881	1752	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	298	384	24	392	529	74
RTOR Reduction (vph)	0	65	0	0	0	34
Lane Group Flow (vph)	298	319	24	392	529	40
Confl. Peds. (#/hr)		5	5			3
Heavy Vehicles (%)	2%	4%	0%	1%	3%	0%
Turn Type	NA	pt+ov	D.P+P	NA	Prot	pt+ov
Protected Phases	2	2 8	1	6	8	1 8
Permitted Phases			2			
Actuated Green, G (s)	24.3	57.3	28.5	28.0	29.0	37.2
Effective Green, g (s)	24.3	57.8	28.5	28.0	29.0	37.7
Actuated g/C Ratio	0.35	0.83	0.41	0.40	0.42	0.54
Clearance Time (s)	4.0		4.0	8.5	4.0	
Vehicle Extension (s)	5.0		2.3	5.0	2.5	
Lane Grp Cap (vph)	661	1310	413	757	731	876
v/s Ratio Prot	0.16	0.20	0.00	c0.21	c0.30	0.02
v/s Ratio Perm			0.02			
v/c Ratio	0.45	0.24	0.06	0.52	0.72	0.05
Uniform Delay, d1	17.4	1.2	12.4	15.7	16.9	7.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.2	0.0	1.2	3.3	0.0
Delay (s)	18.5	1.4	12.5	16.9	20.2	7.5
Level of Service	B	A	B	B	C	A
Approach Delay (s)	8.9			16.6	18.7	
Approach LOS	A			B	B	
Intersection Summary						
HCM 2000 Control Delay			14.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			69.5		Sum of lost time (s)	12.5
Intersection Capacity Utilization			56.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Site Access & Warner Milne Rd

12/20/2018



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
Traffic Volume (veh/h)	345	0	0	385	2	9
Future Volume (Veh/h)	345	0	0	385	2	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	371	0	0	414	2	10
Pedestrians						12
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						1
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	310					
pX, platoon unblocked			0.88		0.88	0.88
vC, conflicting volume			383		797	383
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			227		699	227
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1174		355	709
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	371	414	12			
Volume Left	0	0	2			
Volume Right	0	0	10			
cSH	1700	1174	608			
Volume to Capacity	0.22	0.00	0.02			
Queue Length 95th (ft)	0	0	2			
Control Delay (s)	0.0	0.0	11.0			
Lane LOS				B		
Approach Delay (s)	0.0	0.0	11.0			
Approach LOS				B		
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			30.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Appendix E 2020 Total Conditions Traffic
Analysis Worksheets

Queues

1: Beaver Creek Rd & Warner Milne Rd

02/05/2019



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	262	400	57	157	260	29
v/c Ratio	0.36	0.30	0.09	0.15	0.56	0.04
Control Delay	13.7	0.8	6.1	6.3	22.4	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	0.8	6.1	6.3	22.4	4.1
Queue Length 50th (ft)	53	0	6	18	64	0
Queue Length 95th (ft)	125	12	23	52	155	12
Internal Link Dist (ft)	390			230	412	
Turn Bay Length (ft)		100	100		220	
Base Capacity (vph)	1608	1591	1065	1845	1360	1409
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.25	0.05	0.09	0.19	0.02

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Beaver Creek Rd & Warner Milne Rd

02/05/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	241	368	52	144	239	27
Future Volume (vph)	241	368	52	144	239	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-3%			0%	0%	
Total Lost time (s)	4.0	3.5	4.0	4.0	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	1.00	0.85	1.00	1.00	1.00	0.85
Fl _t Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1837	1591	1801	1845	1687	1615
Fl _t Permitted	1.00	1.00	0.56	1.00	0.95	1.00
Satd. Flow (perm)	1837	1591	1068	1845	1687	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	262	400	57	157	260	29
RTOR Reduction (vph)	0	96	0	0	0	16
Lane Group Flow (vph)	262	304	57	157	260	13
Confl. Peds. (#/hr)		5	5			4
Heavy Vehicles (%)	5%	3%	0%	3%	7%	0%
Turn Type	NA	pt+ov	D.P+P	NA	Prot	pt+ov
Protected Phases	2	2 8	1	6	8	1 8
Permitted Phases			2			
Actuated Green, G (s)	19.8	37.4	24.3	28.3	13.6	22.1
Effective Green, g (s)	19.8	37.9	24.3	28.3	13.6	22.6
Actuated g/C Ratio	0.40	0.76	0.49	0.57	0.27	0.45
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	5.0		2.3	5.0	2.5	
Lane Grp Cap (vph)	728	1208	586	1046	459	731
v/s Ratio Prot	c0.14	0.19	0.01	c0.09	c0.15	0.01
v/s Ratio Perm			0.04			
v/c Ratio	0.36	0.25	0.10	0.15	0.57	0.02
Uniform Delay, d ₁	10.6	1.8	6.8	5.1	15.6	7.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d ₂	0.6	0.2	0.0	0.1	1.3	0.0
Delay (s)	11.2	2.0	6.8	5.2	16.9	7.5
Level of Service	B	A	A	A	B	A
Approach Delay (s)	5.7			5.7	16.0	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			8.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.41			
Actuated Cycle Length (s)			49.9		Sum of lost time (s)	12.0
Intersection Capacity Utilization			40.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Site Access & Warner Milne Rd

02/05/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷		↶
Traffic Volume (veh/h)	250	18	21	192	4	5
Future Volume (Veh/h)	250	18	21	192	4	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	272	20	23	209	4	5
Pedestrians						9
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						1
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	310					
pX, platoon unblocked			0.91		0.91	0.91
vC, conflicting volume			301		546	291
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			181		451	170
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	99
cM capacity (veh/h)			1268		505	792
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	292	232	9			
Volume Left	0	23	4			
Volume Right	20	0	5			
cSH	1700	1268	632			
Volume to Capacity	0.17	0.02	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.9	10.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.9	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			37.6%	ICU Level of Service	A	
Analysis Period (min)	15					

Queues

1: Beaver Creek Rd & Warner Milne Rd

02/05/2019



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	300	384	25	404	529	75
v/c Ratio	0.45	0.27	0.06	0.56	0.71	0.08
Control Delay	22.4	0.6	12.6	20.8	23.6	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	0.6	12.6	20.8	23.6	2.4
Queue Length 50th (ft)	101	0	6	129	179	0
Queue Length 95th (ft)	205	9	21	254	338	17
Internal Link Dist (ft)	390			230	412	
Turn Bay Length (ft)		100	100		220	
Base Capacity (vph)	1300	1506	772	1753	1070	1407
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.25	0.03	0.23	0.49	0.05

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Beaver Creek Rd & Warner Milne Rd

02/05/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	279	357	23	376	492	70
Future Volume (vph)	279	357	23	376	492	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-3%			0%	0%	
Total Lost time (s)	4.0	3.5	4.0	8.5	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Fr t	1.00	0.85	1.00	1.00	1.00	0.85
Fl t Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1891	1576	1801	1881	1752	1615
Fl t Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	1891	1576	864	1881	1752	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	300	384	25	404	529	75
RTOR Reduction (vph)	0	65	0	0	0	34
Lane Group Flow (vph)	300	319	25	404	529	41
Confl. Peds. (#/hr)		5	5			3
Heavy Vehicles (%)	2%	4%	0%	1%	3%	0%
Turn Type	NA	pt+ov	D.P+P	NA	Prot	pt+ov
Protected Phases	2	2 8	1	6	8	1 8
Permitted Phases			2			
Actuated Green, G (s)	24.1	57.2	28.3	27.8	29.1	37.3
Effective Green, g (s)	24.1	57.7	28.3	27.8	29.1	37.8
Actuated g/C Ratio	0.35	0.83	0.41	0.40	0.42	0.54
Clearance Time (s)	4.0		4.0	8.5	4.0	
Vehicle Extension (s)	5.0		2.3	5.0	2.5	
Lane Grp Cap (vph)	656	1310	409	753	734	879
v/s Ratio Prot	0.16	0.20	0.00	c0.21	c0.30	0.03
v/s Ratio Perm			0.02			
v/c Ratio	0.46	0.24	0.06	0.54	0.72	0.05
Uniform Delay, d1	17.6	1.2	12.5	15.9	16.8	7.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.2	0.0	1.3	3.3	0.0
Delay (s)	18.6	1.4	12.6	17.2	20.0	7.4
Level of Service	B	A	B	B	C	A
Approach Delay (s)	9.0			17.0	18.5	
Approach LOS	A			B	B	
Intersection Summary						
HCM 2000 Control Delay			14.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			69.4		Sum of lost time (s)	12.5
Intersection Capacity Utilization			57.5%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Site Access & Warner Milne Rd

02/05/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
Traffic Volume (veh/h)	345	3	1	385	14	19
Future Volume (Veh/h)	345	3	1	385	14	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	371	3	1	414	15	20
Pedestrians						12
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						1
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	310					
pX, platoon unblocked			0.88		0.88	0.88
vC, conflicting volume			386		800	384
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			228		702	227
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	97
cM capacity (veh/h)			1171		353	708
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	374	415	35			
Volume Left	0	1	15			
Volume Right	3	0	20			
cSH	1700	1171	495			
Volume to Capacity	0.22	0.00	0.07			
Queue Length 95th (ft)	0	0	6			
Control Delay (s)	0.0	0.0	12.8			
Lane LOS			A			B
Approach Delay (s)	0.0	0.0	12.8			
Approach LOS			B			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			31.1%	ICU Level of Service	A	
Analysis Period (min)	15					