



# **BORNSTEDT VIEWS TRAFFIC IMPACT STUDY**

**SANDY, OREGON**



**PREPARED FOR:**

Mac Even

**PREPARED BY:**

Michael Ard, PE  
Ard Engineering

**DATE:**

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## EXECUTIVE SUMMARY

1. A property located east of SE Bornstedt Road, west of SE Jacoby Road and south of Jerger Street is proposed for development with a 43-lot residential subdivision. Each lot may be developed with either a single-family home or a duplex. The proposed development will take access via a new roadway intersecting SE Bornstedt Road and an extension of Averall Parkway from the north into the site.
2. Upon completion of development with 43 single-family homes, the subject property is projected to generate 32 site trips during the morning peak hour, 43 trips during the evening peak hour, and 406 daily site trips. Upon completion of development with 86 duplex dwellings, the subject property would be projected to generate up to 41 site trips during the morning peak hour, 49 trips during the evening peak hour, and 620 daily trips.
3. Based on the operational analysis, the intersections of Pioneer Boulevard at Highway 211 and Highway 211 at Bornstedt Road are projected to operate acceptably per ODOT and City of Sandy standards through 2024 either with or without the addition of site trips from the proposed development. The intersection of Highway 211 at Dubarko Road is projected to operate at level of service F during the evening peak hour under year 2024 traffic conditions either with or without the addition of site trips from the proposed development. If the intersection is converted to all-way stop control it is projected to operate with reduced delays for the highest-delay movement as compared to background (no-build) conditions.
4. The local streets in the project vicinity currently carry fewer than 1,000 vehicles per day, in accordance with the requirements of the city's development code. Following completion of the proposed development the local streets are projected to continue to carry fewer than 1,000 daily trips. Accordingly, operation of local streets is projected to meet city standards.
5. Crash data for the most recent five years shows no significant crash trends that may be indicative of design deficiencies for the intersections of Pioneer Boulevard at Highway 211 and Highway 211 at Bornstedt Road. The crash rate for the intersection of Highway 211 at Dubarko Road is in excess of the 90<sup>th</sup> percentile crash rate for similar intersections in the state of Oregon. Based on the crash data and the all-way stop control warrant analysis, it is recommended that the Dubarko Road intersection be converted to all-way stop control to improve safety in the site vicinity.
6. Based on the warrant analysis, no new traffic signals or turn lanes are recommended in conjunction with the proposed development.



## **PROJECT DESCRIPTION & LOCATION**

### ***INTRODUCTION***

A property located east of SE Bornstedt Road, west of SE Jacoby Road and south of Jerger Street is proposed for development with a 43-lot residential subdivision. Each lot can be developed with either a single-family home or a duplex. Although the development plan as originally conceived consists of site development with 43 single-family homes, recent changes to Oregon law allow development of duplex dwellings on each tax lot. Accordingly, the City of Sandy has requested that analysis be provided for up to 86 duplex dwelling units on the site. The proposed development will take access via a new roadway intersecting SE Bornstedt Road and an extension of Averbill Parkway from the north into the site.

This report addresses the impacts of the proposed development on the surrounding street system. An operational and safety analysis was conducted for the proposed site access as well as the intersections of:

- Pioneer Boulevard (US 26 Eastbound) at Highway 211;
- Highway 211 at Dubarko Road; and
- Highway 211 at SE Bornstedt Road.

In addition to the intersection analysis, daily traffic volumes were examined for the local streets in the site vicinity that will be impacted by the proposed development. These included Averbill Parkway extending north from the site, and Newton Street which provides a connection to Jacoby Road northeast of the subject property.

The purpose of this analysis is to determine whether the surrounding transportation system is capable of safely and efficiently supporting the proposed use and to identify any necessary improvements and mitigations.

### ***SITE LOCATION AND STUDY AREA DESCRIPTION***

The project site has an area of approximately 12.7 acres. It is located on the east side of SE Bornstedt Road, immediately south of Jerger Street and west of Jacoby Road in Sandy, Oregon. The site is surrounded by existing residential development to the north and west, and by low-density residential and agricultural land to the south and east.

Pioneer Boulevard is classified by the Oregon Department of Transportation as a Statewide Highway. In the vicinity of Highway 211 it is also classified as a Freight Route and Special Transportation Area. It is a one-way street which forms the eastbound side of the Highway 26 couplet within the City of Sandy's downtown street grid. It has two eastbound through travel lanes, with additional turn lanes added at major intersections. It has a posted speed limit of 25 mph. An eastbound bike lane is provided on the south side of the roadway, and sidewalks are in place along both sides of the road. On-street parking is generally available on both sides of the roadway within the study area, except where restrictions are needed to accommodate turn lanes.



Oregon Highway 211 is classified by the Oregon Department of Transportation as a District Highway; however, the segment of Highway 211 within the study area has been transferred to operate under the jurisdiction of the City of Sandy, where it is classified as a Major Arterial. It generally has one through travel lane in each direction. It has a posted speed limit of 45 mph at the intersections of Highway 211 at Bornstedt Road and Highway 211 at Dubarko Road. It has a posted speed limit of 40 mph on the south side of Pioneer Boulevard, transitioning to a 25-mph posted speed within the urban street grid on the north side of Pioneer Boulevard. Existing sidewalks are also in place on the vicinity of Pioneer Boulevard.

Dubarko Road is classified by the City of Sandy as a Minor Arterial. It generally has a two-lane cross-section with some added turn lanes at major intersections and bike lanes on each side of the roadway. Partial sidewalks are in place on each side of the roadway adjacent to developed properties. It has a posted residential speed limit of 25 mph.

Bornstedt Road is classified by the City of Sandy as a Minor Arterial. It has a two-lane cross-section, with one through lane in each direction. It has a posted speed limit of 45 mph. Partial sidewalks are in place on both sides of the roadway adjacent to developed properties, and some on-street parking is also available in these areas.

Averill Parkway is classified by the city of Sandy as a Local Street. It has a two-lane cross-section, with one through lane in each direction and no centerline striping. Existing sidewalks and on-street parking are in place on both sides of the roadway. Between Cascadia Village Drive and Newton Street, the roadway is divided into a couplet with the northbound and southbound lanes separated by a linear park space. This park space also has sidewalks in place along its length.

Newton Street is classified by the City of Sandy as a Local Street. It has a two-lane cross-section with one through lane in each direction and no centerline striping. Existing sidewalks and on-street parking are in place on both sides of the roadway.



## **EXISTING CONDITIONS**

The intersection of Pioneer Boulevard/US Highway 26 at Highway 211 is a four-way intersection controlled by a traffic signal. The eastbound approach has a shared left/through lane, an exclusive through lane and a channelized right-turn lane which operates under yield control. The northbound approach has a through lane and an exclusive right-turn lane. The southbound approach has an exclusive left-turn lane and a through lane. All four legs of the intersection have marked crosswalks in place with pedestrian signals.

The intersection of Highway 211 at Dubarko Road is a four-way intersection controlled by stop signs on the eastbound and westbound Dubarko Road approaches. The southbound, eastbound, and westbound approaches each have a shared through/left lane, a bike lane, and a dedicated right-turn lane. The northbound approach has a single, shared lane for all motorized turning movements and a bike lane.

The intersection of Highway 211 at Bornstedt Road is a T-intersection operating under stop control for the northbound Bornstedt Road approach. Through vehicles traveling along Highway 211 are free flowing. The northeast-bound Highway 211 approach has through lane and a short, channelized right-turn lane feeding onto Dubarko Road. The southwest-bound Highway 211 approach has a left-turn lane and a dedicated through lane.

A vicinity map displaying the project site, vicinity streets, and study intersection including lane configurations is provided in Figure 1 on page 9.

## ***TRAFFIC COUNT DATA***

Traffic counts were conducted at the study intersections on Wednesday June 9<sup>th</sup>, 2021 from 7:00 to 9:00 AM and from 4:00 to 6:00 PM. Data was used from the highest-volume hour during each analysis period.

The observed traffic volumes were increased to account for the impacts of the COVID-19 pandemic on traffic volumes in the site vicinity. Based on data from ODOT's Weekly COVID-19 Traffic Reports, traffic volumes along Highway 26 are currently approximately 14.6 percent below the levels that would have otherwise been projected for this corridor in 2021. Similarly, statewide traffic volumes average approximately 9.6 percent lower than would otherwise be projected absent the impacts of the pandemic. Accordingly, the projected year 2021 peak-season traffic volumes were increased by 14.6 percent on Highway 26 and by 9.6 percent for all other roadways to estimate traffic volumes absent the impacts of the continuing pandemic.

Additionally, since the count data was collected during a non-peak period of the year, the observed traffic volumes were adjusted to account for seasonal traffic variations to represent the 30<sup>th</sup>-highest hour design volumes.

US Highway 26 serves local and commuter traffic as well as trips to and from Mt. Hood and beyond. These trip types would be expected to exhibit very different seasonal variations in travel demands



over the course of the year, since local and commuter traffic volumes are relatively stable regardless of season, while travel volumes to and from Mt. Hood vary significantly based on the season.

To determine the portion of traffic attributable to each of the two primary travel types, data from ODOT's 2019 Highway Volume Tables was utilized. Specifically, the data used was collected at ODOT's Automatic Count Data station 03-006, located 0.30 miles east of Camp Creek Road in Rhododendron, Oregon. This site is located on Highway 26 approximately 21 miles east of SE Vista Loop Drive. Although the distance to the ATR station means the data cannot be used directly, the ATR data provides useful information regarding the variation in traffic volumes traveling to Mt. Hood and beyond during the time of the count data collection as well as during the peak season of the year. Accordingly, this data allows determination of the likely portion of highway traffic that falls into each of the two seasonal variation categories ("commuter" and "recreational summer/winter"), as well as providing information regarding the most appropriate seasonal adjustment factor for the recreational summer/winter traffic.

Based on the data, 8,771 vehicles per day (approximately 877 per hour during the peak hour) travel along Highway 26 to and from Mt. Hood at the Rhododendron permanent count station location during the month of June, with 55 percent westbound and 45 percent eastbound. This volume represents 32.3 percent of the COVID-adjusted eastbound through traffic volumes on Highway 26 at Oregon Highway 211. Accordingly, it is expected that no more than 32.3 percent of the trips traveling along Highway 26 in the project vicinity are traveling to and from destinations beyond the Rhododendron count station. Since the remaining 67.7 percent of through traffic volumes on Highway 26 at Highway 211 never reach Mt. Hood, it was assumed that these traffic volumes represent more typical commuter and local trips.

The ODOT data also showed that 10,810 vehicles were measured per day (approximately 1081 per hour during the peak hour) during the peak-season month of July at the ATR station near Rhododendron. This indicates that the seasonal recreational traffic volumes along the Highway 26 corridor increased by no more than 2,039 vehicles per day (10,810 vehicles per day in August - 8,771 vehicles per day in March). This equates to roughly 204 additional vehicles per hour during the peak hour of the peak recreational season. Accounting for directionality of trips, this is approximately 112 westbound vehicles and 92 eastbound vehicles.

To seasonally adjust the local and commuter traffic volumes, the eastbound through traffic volumes on Highway 26 were reduced by the amount of the assumed seasonal traffic (395 vehicles per hour during the evening peak hour), and a seasonal adjustment of 1.007 was applied to the remaining local and commuter traffic volumes. Following this adjustment, the 395 June eastbound recreational trips and the 92 eastbound recreational peak-season through trips were added to determine the total peak-season traffic volumes. These calculated through traffic volumes represent the anticipated eastbound traffic volumes on Highway 26 immediately east of Highway 211 during the 30<sup>th</sup>-highest hour in July. The morning peak hour traffic volumes along Highway 26 were then increased by the same overall percentage as the evening peak hour volumes (8.0 percent).

The observed traffic volumes on Highway 211 also had a commuter seasonal adjustment of 1.007 applied to represent peak-season traffic volumes.



In addition to the turning movement count data, daily traffic volume data was collected on Newton Street between Amherst Street and Jacoby Road, and on Averill Parkway at three locations: immediately south of Cascadia Village Drive; immediately south of Newton Street; and immediately south of Amherst Street. Again, the recorded local-street daily traffic volumes were increased by 9.6 percent to account for the impacts of the ongoing pandemic.

Figure 2 on page 10 shows the existing year 2021 traffic volumes for the morning and evening peak hours at the study intersections. The existing traffic volumes for local streets in the site vicinity that would be impacted by the proposed development are provided in Table 2 on page 12.



FIGURE 1

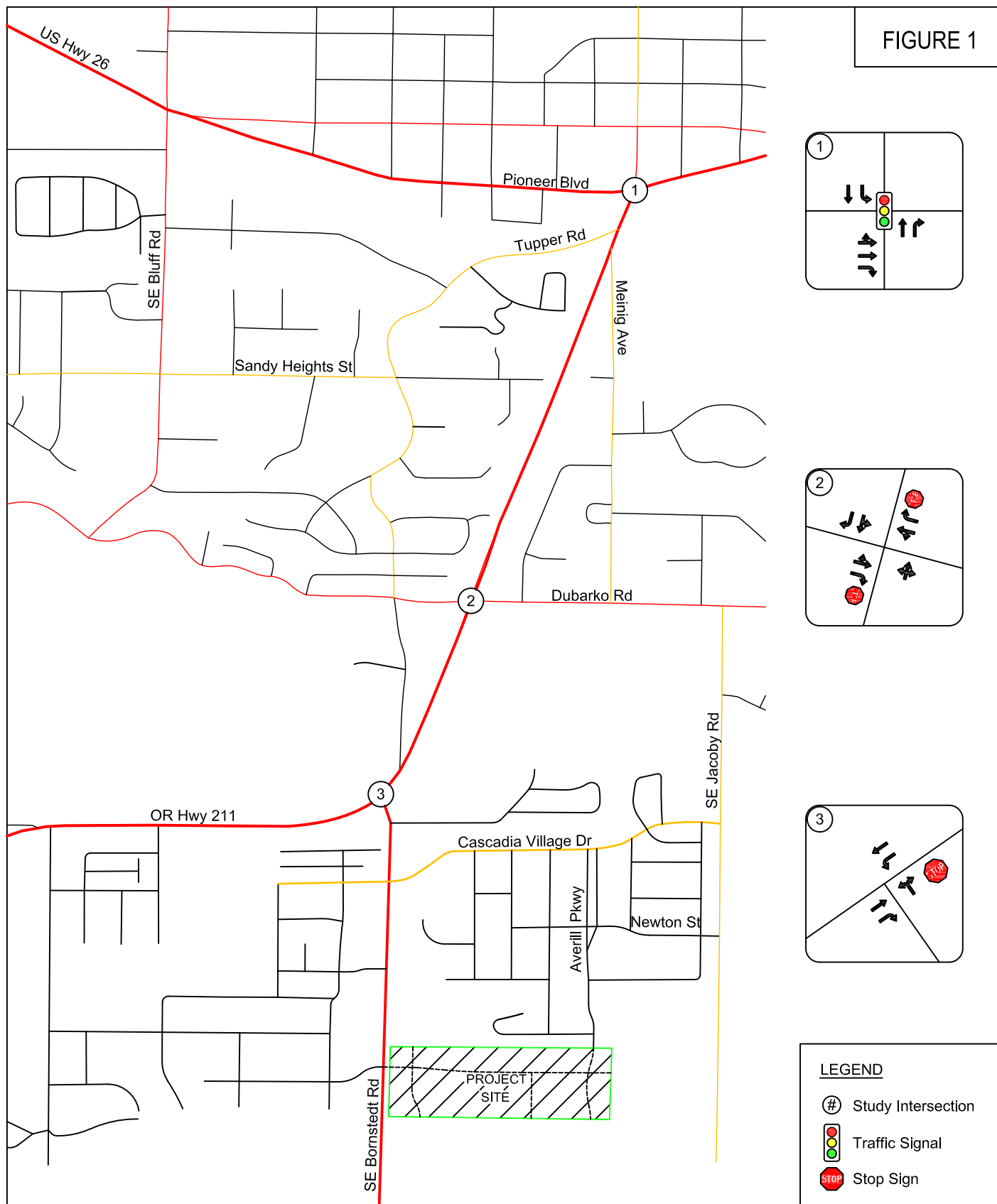
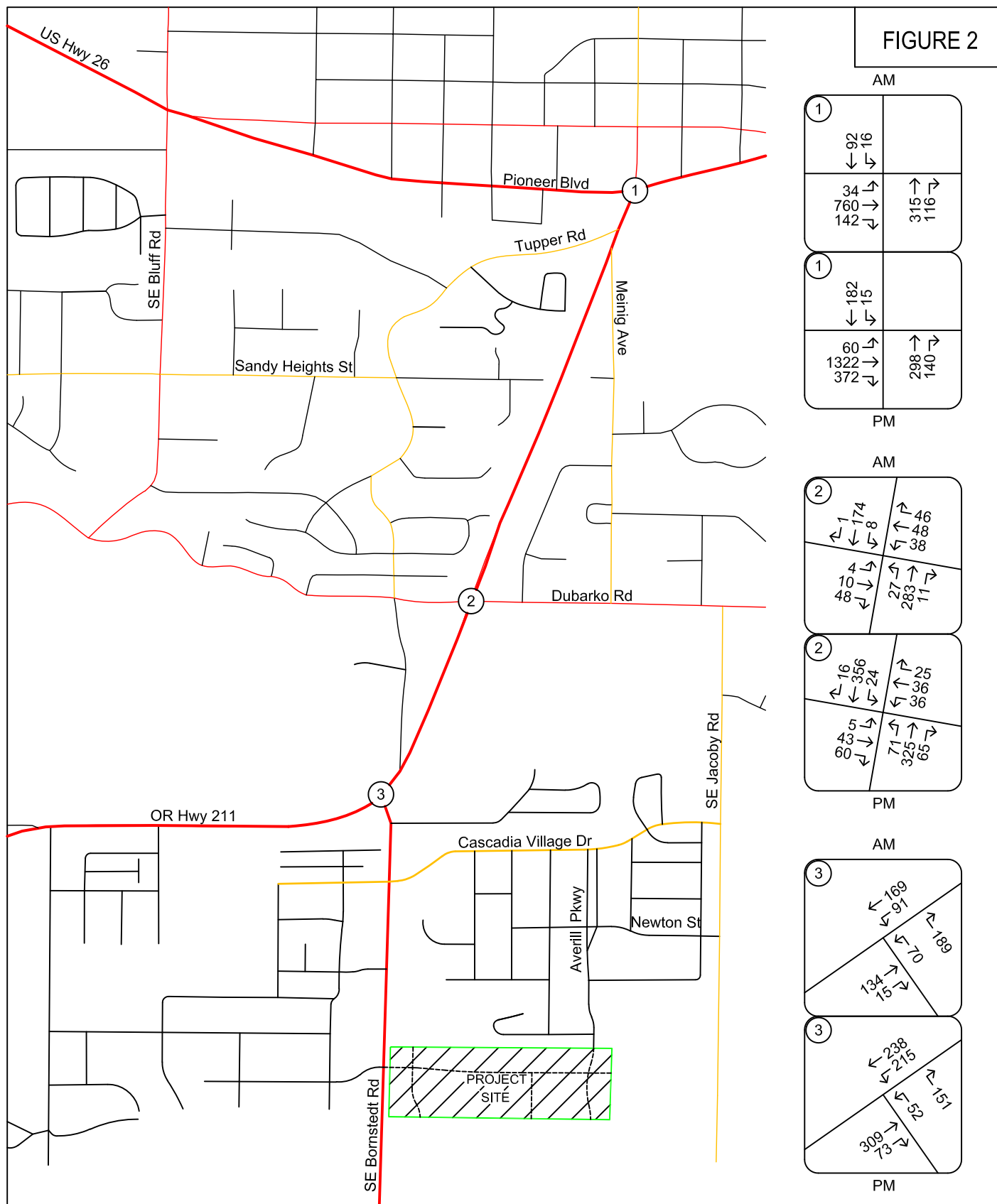


FIGURE 2





## ***OPERATIONAL ANALYSIS***

An operational analysis was conducted for the study intersections using Synchro software. The analysis was conducted for the weekday morning and evening peak hours.

The purpose of the existing conditions analysis is to establish how the study area intersections operate currently and allow for calibration of the operational analysis if required.

The results of the operational analysis are reported based on delay, Level of Service (LOS), and volume-to-capacity ratio (v/c). Delays are reported in seconds. Level of service is reported as a letter grade and can range from A to F, with level of service A representing nearly free-flow conditions and level of service F representing high delays and severe congestion. A report of level of service D generally indicates moderately high but tolerable delays, and typically occurs prior to reaching intersection capacity. For the unsignalized study intersection, the v/c represents the portion of the available intersection capacity that is being utilized on the worst intersection approach. A v/c ratio of 1.0 would indicate that the approach is operating at capacity.

The Oregon Department of Transportation requires that the signalized intersection of Highway 26 at Highway 211 operate with a v/c ratio of 0.90 or less during the peak hours.

Intersections operating under the jurisdiction of the City of Sandy are required to operate at level of service D or better. Since Oregon Highway 211 has been transferred to city jurisdiction, this operational standard applies to the intersections of Highway 211 at Dubarko Road and Highway 211 at SE Bornstedt Road.

A summary of the existing conditions operational analysis is provided in Table 1 below. For the signalized intersection of Pioneer Boulevard at Highway 211, the reported delays, levels-of-service, and v/c ratios represent the operation of the overall intersection. For the unsignalized intersections the reported delays, levels-of-service and v/c ratios represent the worst approach lane.

Based on the analysis, the intersections of Highway 26 at Highway 211 and Highway 211 at Bornstedt Road are currently operating acceptably per the respective ODOT and City of Sandy standards. The intersection of Highway 211 at Dubarko Road is currently operating at level of service E for the westbound left/through lane during the evening peak hour. Detailed capacity analysis worksheets are provided in the technical appendix.

**Table 1 - Operational Analysis Summary: 2021 Existing Conditions**

Intersection	AM Peak Hour			PM Peak Hour		
	Delay	LOS	v/c	Delay	LOS	v/c
Pioneer Boulevard at Highway 211	23.4	C	0.62	24.2	C	0.76
Highway 211 at Dubarko Road	21.9	C	0.34	35.9	E	0.39
Highway 211 at Bornstedt Road	14.8	B	0.47	20.0	C	0.47



The 24-hour count data collected on Newton Street between Amherst Street and Jacoby Road, and on Averill Parkway immediately south of Cascadia Village Drive; immediately south of Newton Street; and immediately south of Amherst Street was used to determine whether the existing local street segments are currently carrying fewer than 1,000 daily trips. This threshold is identified in the City of Sandy's Development Code, Section 17.10.30 "Street", Sub-section E "Local Streets", which reads in part:

"Average daily traffic (ADT) shall not exceed 1,000 vehicles/day. Proposed projects that result in more than 1,000 ADT on an existing or proposed local street shall be modified to not exceed the 1,000 ADT threshold on the local street or the proposal may be processed through the procedures in Chapter 17.66 of the Sandy Development Code."

The results of the data collection (including an increase of 9.6 percent to account for COVID-19 impacts on traffic) are summarized in Table 2 below.

**Table 2 - Existing Average Daily Traffic on Local Streets**

Street Segment	ADT Volume
Newton Street west of Jacoby Road	148
Averill Parkway south of Cascadia Village Drive	300
Averill Parkway south of Newton Street	209
Averill Parkway south of Amherst Street	103

Based on the measured volumes, the local streets that will be impacted by the proposed development are currently operating with average daily traffic volumes well below the limit of 1,000 daily trips.



## SITE TRIPS

The proposed subdivision will support development of either 43 single-family homes or 86 duplex dwelling units. Although the intent is to develop the site with single-family homes, due to recent changes in state law duplex units are also permitted on single-family lots. Accordingly, the City of Sandy has requested that we analyze the impacts of the maximum potential development of 86 duplex dwelling units within the site in addition to the proposed 43 single-family homes. To estimate the number of trips that will be generated by the potential residential development within the proposed subdivision, trip rates from the *TRIP GENERATION MANUAL, 10<sup>th</sup> EDITION* were used. Data from land-use codes 210, *Single-Family Detached Housing* and 215, *Single-Family Attached Housing* were used. The trip estimates are based on the number of dwelling units.

A summary of the trip generation calculations for the two development scenarios is provided in Tables 3 and 4 below. Detailed trip generation worksheets are also included in the technical appendix.

**Table 3 - Site Trip Generation Summary - Single-Family Homes**

	AM Peak Hour			PM Peak Hour			Daily Total
	In	Out	Total	In	Out	Total	
43 Single-Family Homes	8	24	32	27	16	43	406

**Table 4 - Site Trip Generation Summary - Duplex Dwelling Units**

	AM Peak Hour			PM Peak Hour			Daily Total
	In	Out	Total	In	Out	Total	
86 Duplex Dwelling Units	13	28	41	28	21	49	620

## TRIP DISTRIBUTION

The directional distribution of primary site trips to and from the project site was estimated based the existing travel patterns in the site vicinity. Overall, 65 percent of site trips are projected to travel to and from the west on Highway 26, 20 percent are projected to travel to and from the east on Highway 26, 10 percent are projected to travel to and from the south on Highway 211, and the remaining 5 percent are projected to travel to and from the west on Dubarko Road.

The trip distribution percentages and trip assignment for the primary site trips under the single-family development scenario are shown in Figure 3 on page 14. The trip distribution percentages and trip assignment for the primary site trips under the duplex development scenario are shown in Figure 4 on page 15.

FIGURE 3

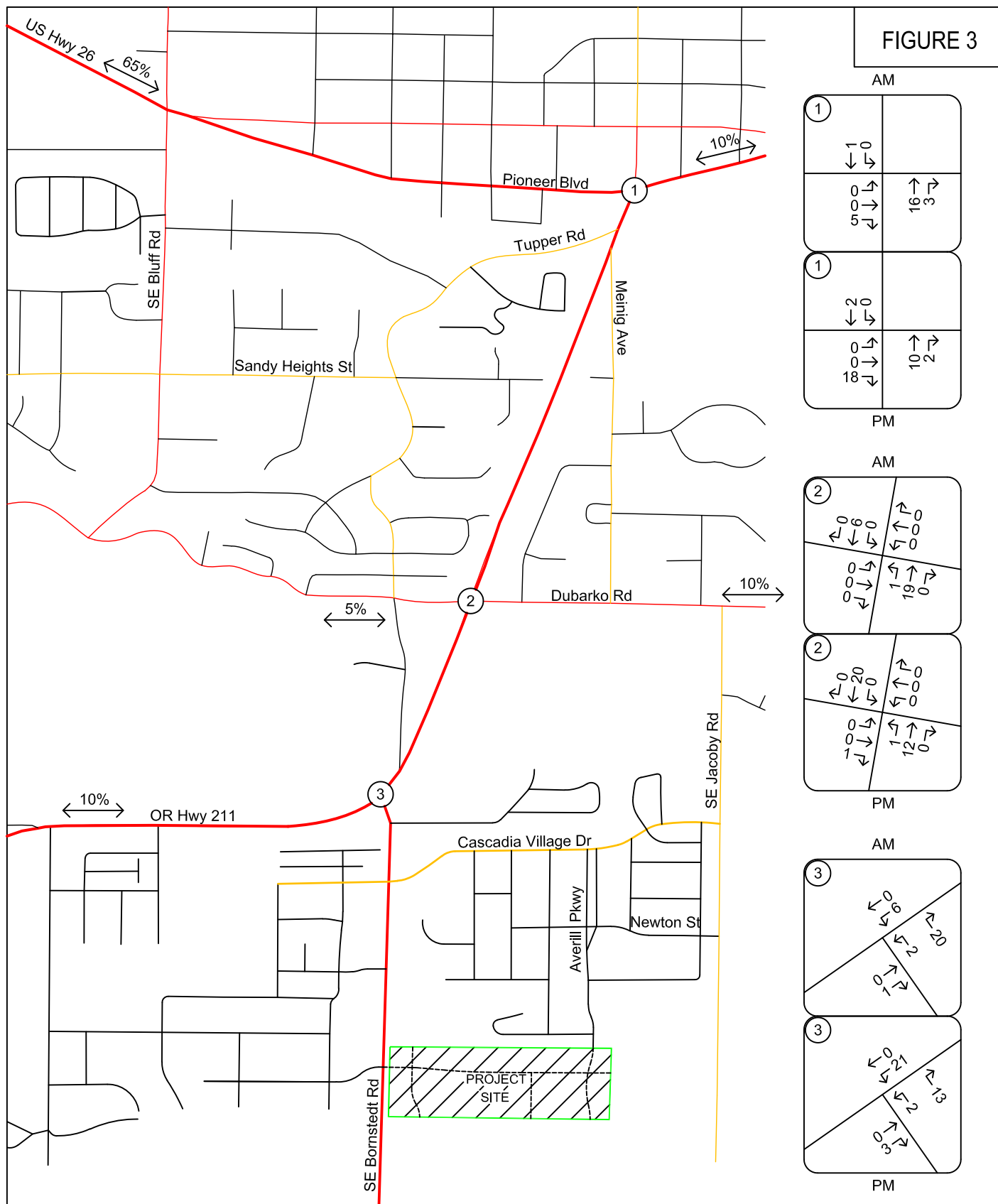
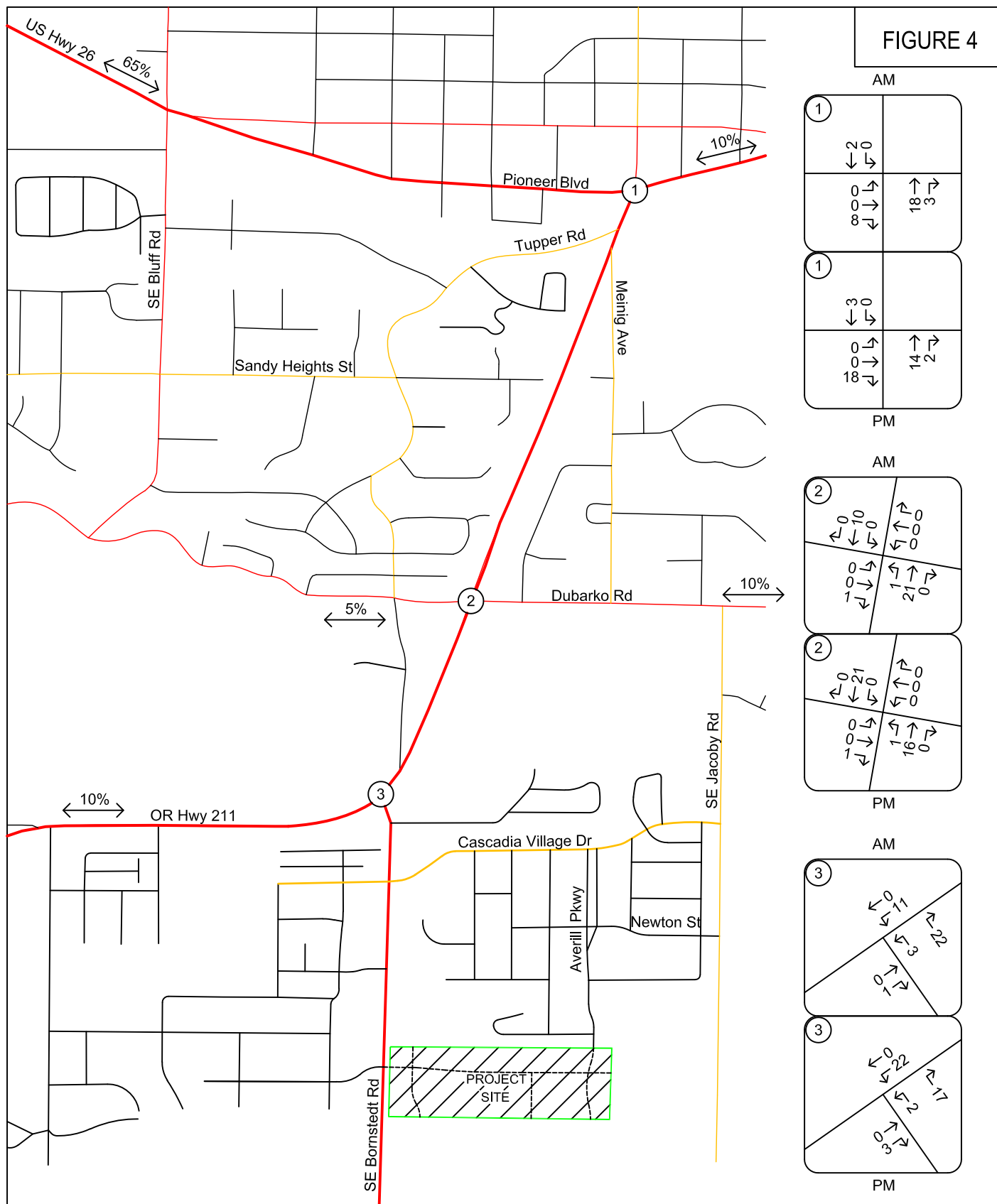


FIGURE 4



**TRAFFIC VOLUMES**  
 Proposed Development - 86 Duplex Units Site Trips  
 Morning and Evening Peak Hours



## **FUTURE CONDITIONS ANALYSIS**

### ***BACKGROUND VOLUMES***

To determine the expected impact of site trips on the study area intersections, it is necessary to compare traffic conditions both with and without the addition of the projected traffic from the proposed development. Since the proposed development cannot be constructed and occupied immediately, the comparison is made for future traffic conditions at the time of expected project completion. It is anticipated that the proposed homes can be completed and fully occupied within three years from the date of count data collection. Accordingly, the analysis was conducted for year 2024 traffic conditions.

Prior to adding the projected site trips to the study intersections, the existing traffic volumes were adjusted to account for background traffic growth over time. Background growth is expected to occur regardless of whether or not the proposed mixed-use development is constructed, and accounts for other developments outside the immediate project area.

Based on data from ODOT's 2039 Future Volume Tables, an annual growth rate of 2.13 percent per year (linear) was calculated for Highway 26 in the project vicinity. For the other turning movements in the project vicinity a growth rate of 2.0 percent per year (exponential) was used to estimate the impacts of overall population growth within the City of Sandy.

In addition to these background growth rates, site trips from approved developments which have not yet been fully completed were added to the background traffic volumes. These "in-process" developments included include the Clackamas County Health Clinic, Mt. Hood Senior Living, The Pad, The Views, Shaylee Meadows, Mt. View Ridge, Marshall Ridge, Jacoby Heights, Trimble PD, and the Deer Meadows Subdivision. The projected site trips for these developments are shown in Figure 8 in the attached technical appendix.

Figure 5 on page 17 shows the projected year 2024 background traffic volumes at the study intersections during the morning and evening peak hours.

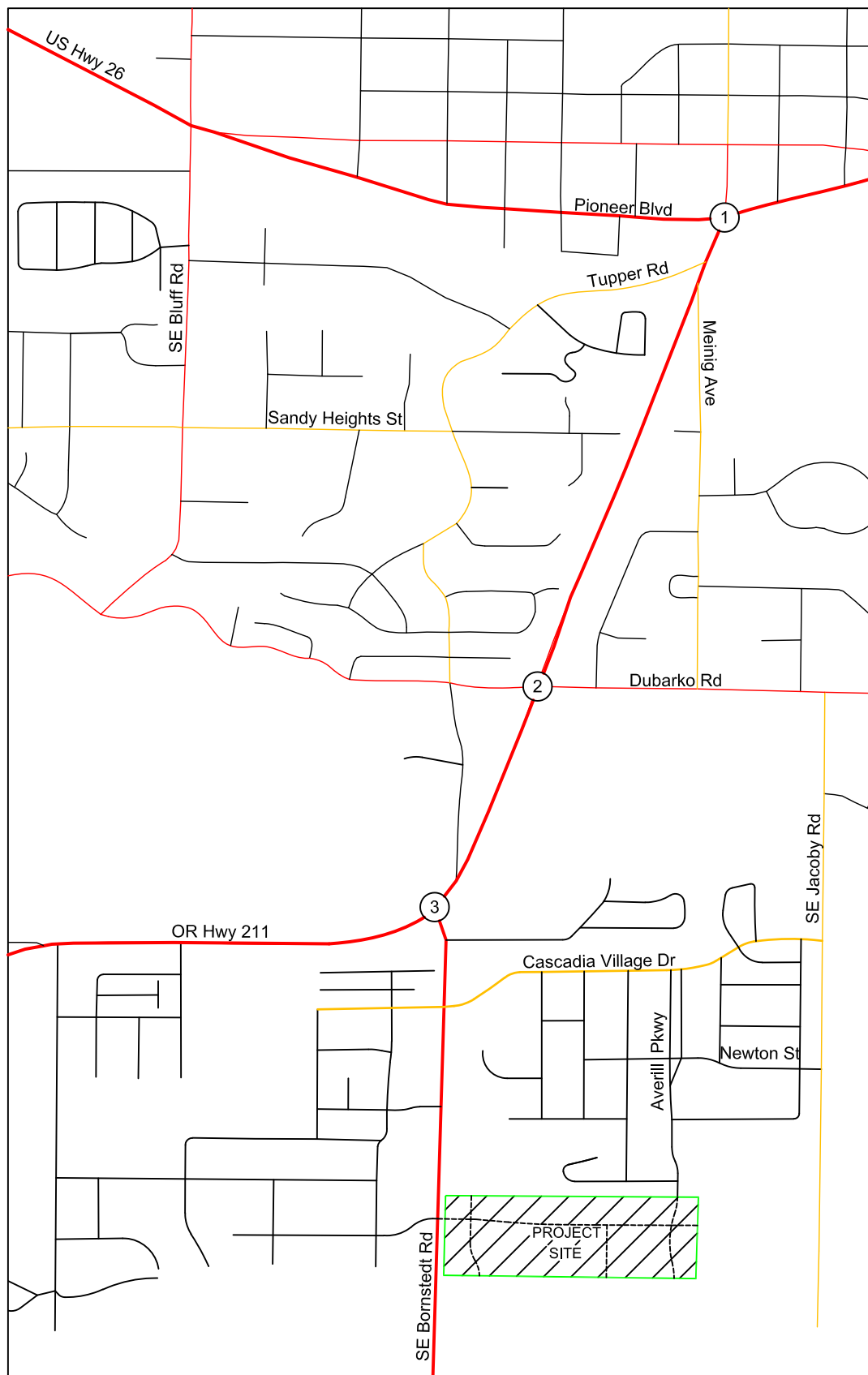
### ***BACKGROUND VOLUMES PLUS SITE TRIPS***

Peak hour trips calculated to be generated by the proposed development were added to the projected year 2024 background traffic volumes to obtain the year 2024 total traffic volumes following completion of the proposed development.

Figure 6 on page 18 shows the projected year 2024 peak hour volumes including both background growth and site trips from the proposed 43-unit single-family dwelling development during the morning and evening peak hours. Figure 7 on page 19 shows the projected year 2024 peak hour volumes including both background growth and site trips from the potential 86-unit duplex development during the morning and evening peak hours.



FIGURE 5



AM

1	<div> <div>← 110</div> <div>→ 17</div> </div>	
	<div> <div>39 →</div> <div>860 →</div> <div>157 →</div> </div>	<div> <div>362 →</div> <div>137 →</div> </div>

1	<div> <div>← 212</div> <div>→ 16</div> </div>	
	<div> <div>67 →</div> <div>1498 →</div> <div>410 →</div> </div>	<div> <div>334 →</div> <div>165 →</div> </div>

PM

AM

2	<div> <div>← 3</div> <div>← 198</div> <div>→ 13</div> </div>	<div> <div>→ 74</div> <div>← 54</div> <div>→ 46</div> </div>
	<div> <div>7 →</div> <div>12 →</div> <div>51 →</div> </div>	<div> <div>29 →</div> <div>314 →</div> <div>14 →</div> </div>

2	<div> <div>← 20</div> <div>← 397</div> <div>→ 38</div> </div>	<div> <div>→ 43</div> <div>← 41</div> <div>→ 42</div> </div>
	<div> <div>7 →</div> <div>50 →</div> <div>64 →</div> </div>	<div> <div>75 →</div> <div>362 →</div> <div>75 →</div> </div>

PM

AM

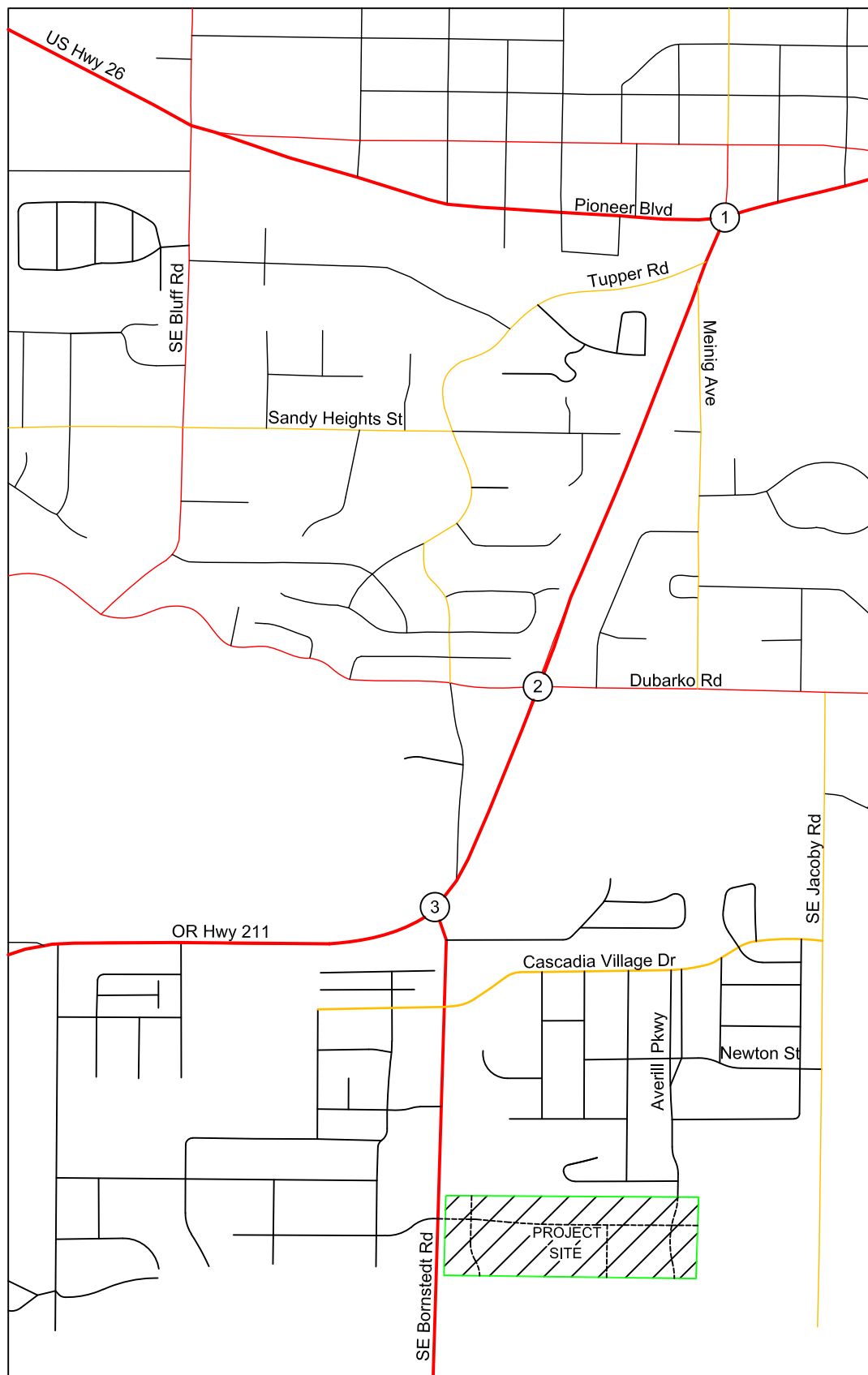
3	<div> <div>← 196</div> <div>← 99</div> <div>→ 14</div> </div>	<div> <div>→ 206</div> </div>
	<div> <div>153 →</div> <div>16 →</div> </div>	

3	<div> <div>← 270</div> <div>← 234</div> <div>→ 35</div> </div>	<div> <div>→ 104</div> </div>
	<div> <div>347 →</div> <div>77 →</div> </div>	

PM



FIGURE 6



AM

1	<div><div>111 17</div><div>↓↘</div></div>	
	<div><div>39 860 162</div><div>↗→↙</div></div>	<div><div>378 140</div><div>↗↘</div></div>
1	<div><div>214 16</div><div>↓↘</div></div>	
	<div><div>67 1498 428</div><div>↗→↙</div></div>	<div><div>344 167</div><div>↗↘</div></div>

PM

AM

2	<div> <div>3</div> <div>204</div> <div>73</div> </div> <div> <div>74</div> <div>54</div> <div>46</div> </div>
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PM

AM

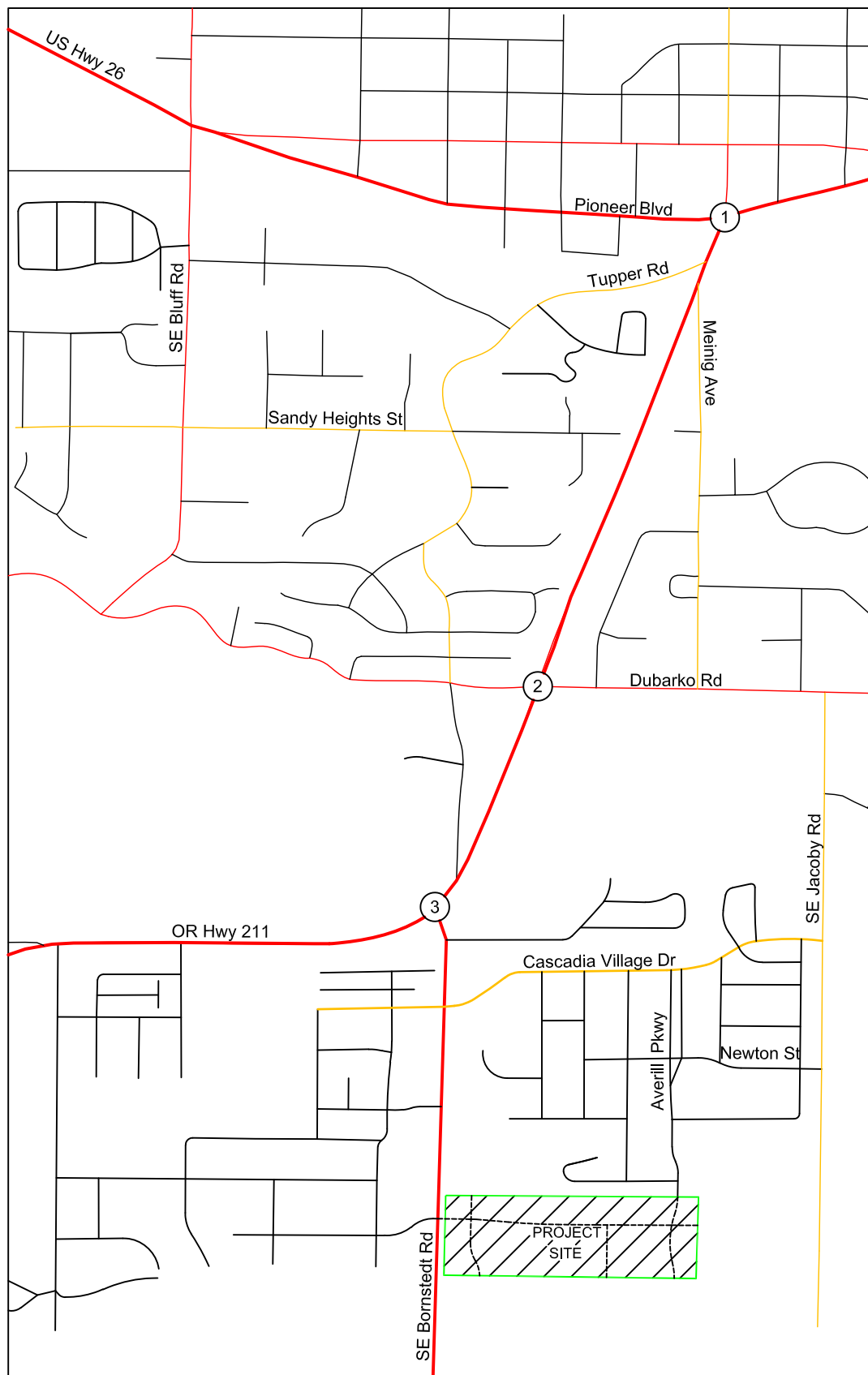
3	<div> <div>196</div> <div>105</div> </div> <div> <div>153</div> <div>17</div> </div>	<div> <div>226</div> <div>91</div> </div>
3	<div> <div>270</div> <div>255</div> </div> <div> <div>347</div> <div>80</div> </div>	<div> <div>177</div> <div>57</div> </div>

PM



TRAFFIC VOLUMES  
2024 Background Plus 43 Single-Family Homes  
Morning and Evening Peak Hours

FIGURE 7



AM

1	<div> <div>112</div> <div>17</div> </div>	
	<div>39</div> <div>860</div> <div>165</div>	<div>380</div> <div>140</div>

1	<div>215</div> <div>16</div>	
	<div>67</div> <div>1498</div> <div>428</div>	<div>348</div> <div>167</div>

PM

AM

2	<div>3</div> <div>208</div> <div>13</div>	<div>74</div> <div>54</div> <div>46</div>
	<div>7</div> <div>12</div> <div>52</div>	<div>30</div> <div>335</div> <div>14</div>

2	<div>20</div> <div>418</div> <div>38</div>	<div>43</div> <div>41</div> <div>42</div>
	<div>7</div> <div>50</div> <div>65</div>	<div>76</div> <div>378</div> <div>75</div>

PM

AM

3	<div>196</div> <div>110</div>	<div>228</div>
	<div>153</div> <div>17</div>	<div>17</div>

3	<div>270</div> <div>256</div>	<div>181</div>
	<div>347</div> <div>80</div>	<div>57</div>

PM



TRAFFIC VOLUMES  
2024 Background Plus 86 Duplex Dwelling Units  
Morning and Evening Peak Hours



## OPERATIONAL ANALYSIS

The future conditions operational analysis was again conducted using Synchro software, with outputs based on the analysis methodologies contained in the *HIGHWAY CAPACITY MANUAL*. The analysis was prepared for the intersection's morning and evening peak hours.

The results of the future conditions operational analysis are summarized in Table 5 below. Detailed analysis worksheets are included in the technical appendix.

**Table 5 - Operational Analysis Summary: Year 2024 Future Conditions**

Intersection	AM Peak Hour			PM Peak Hour		
	Delay	LOS	v/c	Delay	LOS	v/c
Pioneer Boulevard at Highway 211						
2024 Background Conditions	26.4	C	0.71	30.3	C	0.86
2024 Background plus 43 SFDs	27.3	C	0.72	31.6	C	0.86
2024 Background plus 86 Duplexes	27.5	C	0.72	32.1	C	0.87
Highway 211 at Dubarko Road						
2024 Background Conditions	29.2	D	0.47	61.3	F	0.59
2024 Background plus 43 SFDs	31.6	D	0.49	70.3	F	0.64
2024 Background plus 86 Duplexes	32.4	D	0.50	72.4	F	0.65
2024 Bkgd + SFDs (All-Way Stop)	26.7	D	0.77	46.2	E	0.91
2024 Bkgd + Duplex (All-Way Stop)	32.0	D	0.83	55.0	F	0.95
Highway 211 at Bornstedt Road						
2024 Background Conditions	17.0	C	0.54	25.3	D	0.57
2024 Background plus 43 SFDs	18.1	C	0.58	28.9	D	0.63
2024 Background plus 86 Duplexes	18.6	C	0.59	29.2	D	0.64

Based on the results of the operational analysis, the intersections of Pioneer Boulevard at Highway 211 and Highway 211 at Bornstedt Road are projected to meet the respective operational standards of the Oregon Department of Transportation and the City of Sandy.

The intersection of Highway 211 at Dubarko Road is projected to operate at level of service F for the westbound left/through lane during the evening peak hour either with or without the addition of site trips from the proposed development. If the intersection is converted to all-way stop control, operation improves to level of service E under the 43 single-family home development scenario, with average delays for the highest-delay approach lane reduced from 61.3 seconds under background conditions to 46.2 seconds with full development and conversion to all-way stop control, indicating an improvement to operation of the worst movement with all-way stop control and the proposed development in place. Similarly, for the duplex scenario the worst movement delays are reduced from 61.3 seconds under background conditions to 55 seconds with all-way stop control. This operational mitigation would also be expected to reduce the risk of angle and turning-movement collisions at the intersection, as described in the safety analysis section of this report.



### ***LOCAL STREET TRAFFIC VOLUMES***

Local street traffic volumes were also examined to determine the projected traffic levels following completion of the proposed development. Most site trips will not add to the local street traffic volumes. However, the homes on the east side of the development traveling to and from locations that are to the east on Highway 26 will add traffic to the analyzed street segments. Table 6 below summarizes the projected future traffic levels on the impacted local streets following completion of the development under the worst-case 86 duplex development scenario. Based on the analysis, all local streets in the site vicinity will continue to operate with average volumes well below 1,000 vehicles per day.

**Table 6 - Year 2024 Average Daily Traffic on Local Streets**

<b>Street Segment</b>	<b>ADT Volume</b>
Newton Street west of Jacoby Road	224
Averill Parkway south of Cascadia Village Drive	326
Averill Parkway south of Newton Street	260
Averill Parkway south of Amherst Street	205



## **SAFETY ANALYSIS**

### ***CRASH DATA ANALYSIS***

Using data obtained from the Oregon Department of Transportation, a review of the five most recent years of available crash history (from January 2015 through December 2019) was performed for the study intersections. The crash data was evaluated based on the number, type, and severity of collisions, as well as the intersection crash rate. Crash rates allow comparison of relative safety risks at intersections with different lane configurations, volumes, and traffic control devices by accounting for both the number of crashes that occur during the study period and the number of vehicles that traveled through the intersection during that period. Crash rates are calculated using the standard assumption that evening peak hour volumes are approximately 10 percent of the average daily traffic volume at an intersection. The crash rates were compared to statewide crash rates for similar intersection types to identify any locations with crash rates in excess of the 90<sup>th</sup> percentile.

The intersection of Highway 211 at Dubarko Road had 27 reported crashes during the five-year analysis period. These included 16 angle collisions, 4 turning-movement collisions, 4 rear-end collisions, 1 backing collision, 1 sideswipe-overtaking collision, and 1 pedestrian collision. The crashes resulted in one incapacitating injury and no fatalities. There were 10 “non-incapacitating” injuries reported and 19 reports of a “possible injury/complaint of pain”. The incapacitating injury occurred when a westbound driver failed to yield to a southbound vehicle and was struck in the intersection. The pedestrian collision occurred when a southbound pedestrian was struck by a westbound driver that failed to yield right-of-way to the pedestrian crossing, resulting in a report of a possible injury/complaint of pain by the pedestrian. The crash rate for the intersection was calculated to be 1.56 crashes per million entering vehicles. This is above the 90<sup>th</sup> percentile crash rate of 1.08 crashes per million entering vehicles for rural unsignalized four-way intersections in the state of Oregon.

The Oregon Department of Transportation recently undertook safety improvements at this intersection, including re-alignment of the minor-street approaches to intersect at a 90-degree angle and the addition of some striping and speed feedback signs along the major-street to increase driver awareness of speed. However, the crash data for subsequent years has shown no significant improvement in the crash frequency at this intersection. An examination of the current intersection configuration revealed no significant apparent hazards and adequate sight distance from the minor-street approaches, allowing drivers approaching the highway to select safe gaps when turning onto or crossing the highway.

As described in the Warrant Analysis section of this report below, the intersection currently meets all-way stop control warrants based on crash history. Accordingly, it is recommended that all-way stop control be installed at this intersection. No other safety mitigations are recommended at this time.

The intersections of Pioneer Boulevard at Highway 211 and Highway 211 at Bornstedt Road had no reported crashes during the five-year analysis period.



Based on the crash data, the majority of the study intersections are currently operating acceptably with respect to safety. The intersection of Highway 211 at Dubarko Road has a high historical crash rate which recent safety improvements have not significantly improved. It is recommended that consideration be given to installing all-way stop control at this intersection. No other safety improvements are recommended for the study area intersections at this time.

#### ***TRAFFIC SIGNAL AND ALL-WAY STOP CONTROL WARRANTS***

Traffic signal warrants were examined for the unsignalized study intersections of Highway 211 at Dubarko Road and Highway 211 at Bornstedt Road. Based on the projected turning movement volumes, traffic signal warrants will not be satisfied for either intersection under any of the analysis scenarios. Accordingly, no new traffic signals are recommended in conjunction with the proposed development.

All-way stop control can be installed where there are “Five or more crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.” Examination of the crash data shows that there were six angle collisions at the intersection in the most recent year for which complete data is available (2019). Accordingly, installation of all-way stop control is warranted based on crash history.

#### ***TURN LANE WARRANTS***

Major-street turn lane warrants are primarily based on safety considerations. A major-street left-turn lane provides a refuge for drivers to move out of the through travel lane while waiting for a gap in the opposing through traffic stream prior to turning left. A major-street right-turn lane allows right-turning drivers to decelerate outside the through travel lane prior to turning.

The intersection of Highway 211 at Dubarko Road currently meets ODOT warrants for a northbound left-turn lane and a northbound right-turn lane. However, the need for these turn lanes is not meaningfully related to the proposed development. Further, if all-way stop control is installed at the intersection as recommended based on the safety analysis, the turn lane warrants will no longer be applicable. The need for additional lanes will be dictated by operational considerations rather than safety warrants, since all vehicles will stop prior to entering the intersection.

The intersection of Highway 211 at Bornstedt Road already has a southwest-bound left-turn lane in place. A short, channelized right-turn radius is also provided for the northeast-bound right turn movement. The proposed development will have no significant impact on the need for turn lanes at this intersection.

#### ***INTERSECTION SIGHT DISTANCE ANALYSIS***

Intersection sight distance was measured for the proposed access location on Bornstedt Road to verify whether the proposed access can operate safely and efficiently. The posted speed limit is 45 mph, requiring a minimum sight distance of 500 feet.



The available intersection sight distances are measured from a position 15 feet behind the edge of the traveled way with a driver's eye height 3.5 feet above the driveway surface to an oncoming driver's eye height of 3.5 feet above the surface of the oncoming travel lane. Existing vegetation and an embankment on the east side of the roadway north of the proposed access currently limit sight distances to the north and south. However, upon development of the subject property and construction- of improvements along the site frontage sight distances are projected to be well in excess of 500 feet in each direction.

Based on the detailed analysis, adequate sight distance is available in each direction for safe and efficient operation of the proposed access. No sight distance mitigations beyond clearing of vegetation, leveling the roadside embankment north of the site access, and construction of typical frontage improvements are necessary or recommended.





## CONCLUSIONS

Based on the operational analysis, the intersections of Pioneer Boulevard at Highway 211 and Highway 211 at Bornstedt Road are projected to operate acceptably per ODOT and City of Sandy standards through 2024 either with or without the addition of site trips from the proposed development. The intersection of Highway 211 at Dubarko Road is projected to operate at level of service F during the evening peak hour under year 2024 traffic conditions either with or without the addition of site trips from the proposed development. If the intersection is converted to all-way stop control it is projected to operate with reduced delays for the highest-delay movement as compared to background (no-build) conditions.

The local streets in the project vicinity currently carry fewer than 1,000 vehicles per day, in accordance with the requirements of the city's development code. Following completion of the proposed development the local streets are projected to continue to carry fewer than 1,000 daily trips. Accordingly, operation of local streets is projected to meet city standards.

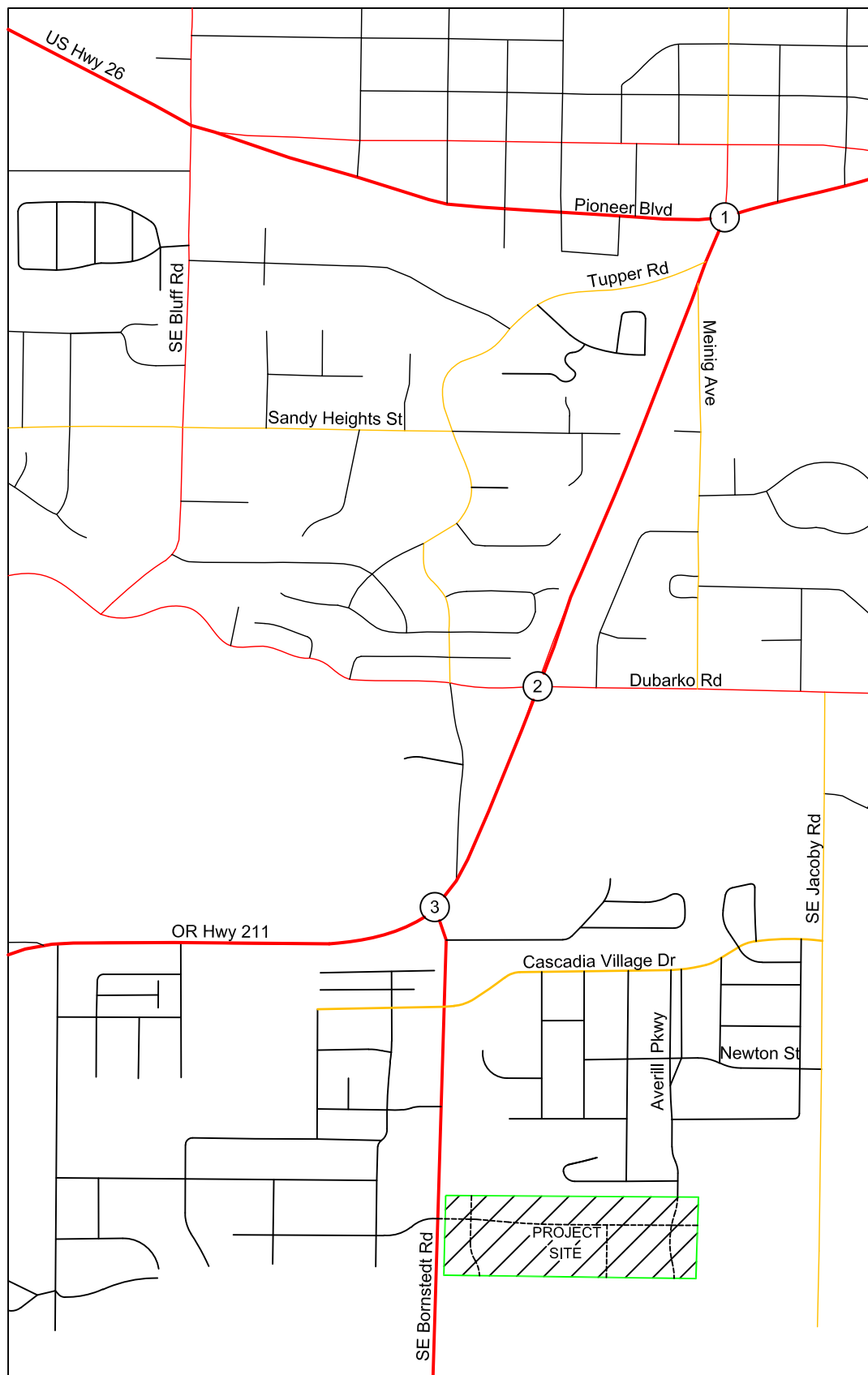
Crash data for the most recent five years shows no significant crash trends that may be indicative of design deficiencies for the intersections of Pioneer Boulevard at Highway 211 and Highway 211 at Bornstedt Road. The crash rate for the intersection of Highway 211 at Dubarko Road is in excess of the 90<sup>th</sup> percentile crash rate for similar intersections in the state of Oregon. Based on the crash data and the all-way stop control warrant analysis, it is recommended that the Dubarko Road intersection be converted to all-way stop control to improve safety in the site vicinity.

Based on the warrant analysis, no new traffic signals or turn lanes are recommended in conjunction with the proposed development.



## **APPENDIX**

FIGURE 8



AM

1	<div> <div>12</div> <div>←</div> <div>51</div> <div>→</div> <div>6</div> <div>↓</div> </div>	<div> <div>28</div> <div>→</div> <div>14</div> <div>↓</div> </div>
1	<div> <div>19</div> <div>←</div> <div>90</div> <div>→</div> <div>15</div> <div>↓</div> </div>	<div> <div>18</div> <div>→</div> <div>16</div> <div>↓</div> </div>

PM

AM

2	<div> <div>2</div> <div>←</div> <div>13</div> <div>→</div> <div>5</div> <div>↓</div> </div>	<div> <div>25</div> <div>→</div> <div>3</div> <div>↓</div> <div>6</div> <div>↓</div> </div>
2	<div> <div>3</div> <div>←</div> <div>19</div> <div>→</div> <div>13</div> <div>↓</div> </div>	<div> <div>14</div> <div>→</div> <div>2</div> <div>↓</div> </div>

PM

AM

3	<div> <div>17</div> <div>←</div> <div>2</div> <div>→</div> <div>11</div> <div>↓</div> </div>	<div> <div>5</div> <div>→</div> <div>0</div> <div>↓</div> </div>
3	<div> <div>17</div> <div>←</div> <div>6</div> <div>→</div> <div>19</div> <div>↓</div> </div>	<div> <div>4</div> <div>→</div> <div>0</div> <div>↓</div> </div>

PM



TRAFFIC VOLUMES  
In-Process Development - Site Trips  
Morning and Evening Peak Hours

PAGE  
APP1



ALL TRAFFIC DATA SERVICES

(303) 216-2439

www.alltrafficdata.net

Location: SE BORNSTEDT RD & HWY 211 AM

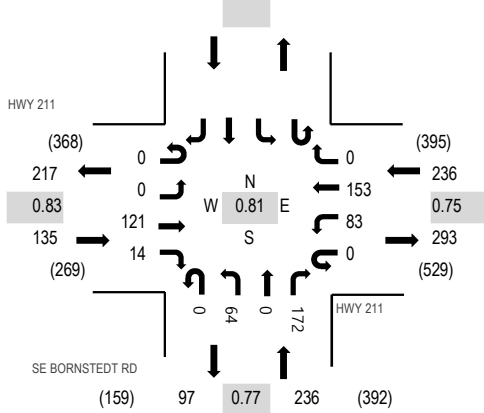
Date: Wednesday, June 9, 2021

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

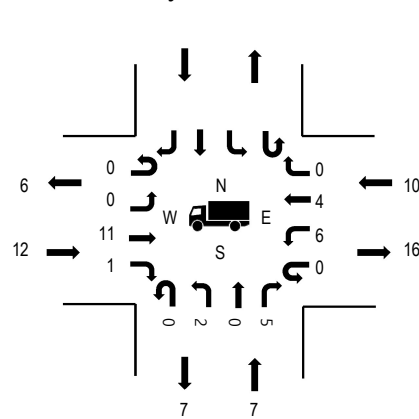
Peak 15-Minutes: 07:20 AM - 07:35 AM

## Peak Hour

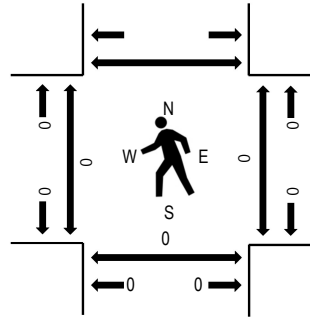
### Motorized Vehicles



### Heavy Vehicles



### Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	8.9%	0.83
WB	4.2%	0.75
NB	3.0%	0.77
SB		
All	4.8%	0.81

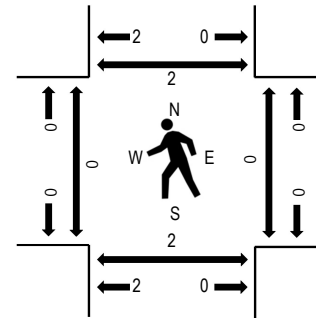
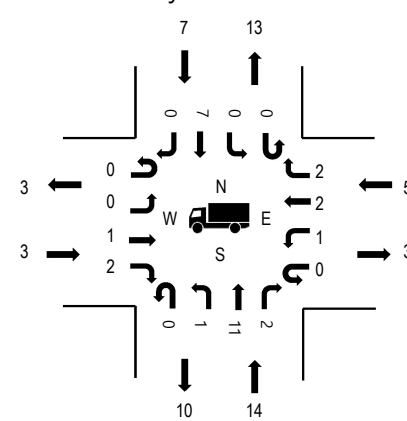
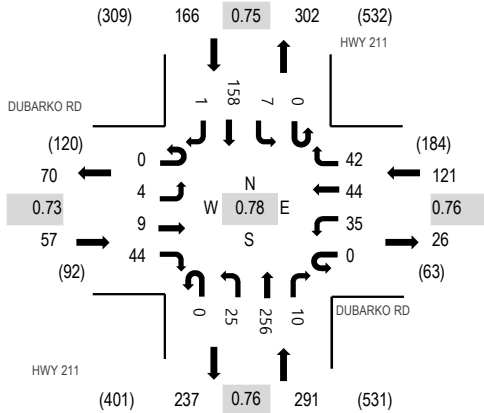
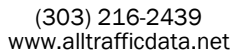
## Traffic Counts - Motorized Vehicles

Interval Start Time	HWY 211 Eastbound				HWY 211 Westbound				SE BORNSTEDT RD Northbound				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	0	7	0	0	5	16	0	0	4	0	18					50	607
7:05 AM	0	0	2	3	0	3	5	0	0	8	0	12					33	589
7:10 AM	0	0	8	1	0	3	15	0	0	2	0	15					44	586
7:15 AM	0	0	9	1	0	9	14	0	0	8	0	14					55	581
7:20 AM	0	0	14	0	0	6	16	0	0	2	0	20					58	567
7:25 AM	0	0	13	0	0	8	8	0	0	8	0	16					53	532
7:30 AM	0	0	16	0	0	12	18	0	0	8	0	23					77	515
7:35 AM	0	0	10	3	0	10	15	0	0	1	0	10					49	470
7:40 AM	0	0	12	2	0	9	15	0	0	7	0	16					61	460
7:45 AM	0	0	6	3	0	6	7	0	0	5	0	14					41	451
7:50 AM	0	0	12	0	0	5	12	0	0	7	0	7					43	453
7:55 AM	0	0	12	1	0	7	12	0	0	4	0	7					43	447
8:00 AM	0	0	7	2	0	4	4	0	0	4	0	11					32	449
8:05 AM	0	0	8	1	0	0	9	0	0	4	0	8					30	
8:10 AM	0	0	7	2	0	6	12	0	0	4	0	8					39	
8:15 AM	0	0	11	1	0	4	12	0	0	6	0	7					41	
8:20 AM	0	0	9	1	0	1	4	0	0	2	0	6					23	
8:25 AM	0	0	6	2	0	4	16	0	0	2	0	6					36	
8:30 AM	0	0	7	3	0	3	12	0	0	0	0	7					32	
8:35 AM	0	0	10	3	0	6	7	0	0	0	0	13					39	
8:40 AM	0	0	16	1	0	4	10	0	0	5	0	16					52	
8:45 AM	0	0	15	1	0	3	7	0	0	0	0	17					43	
8:50 AM	0	0	7	0	0	8	10	0	0	2	0	10					37	
8:55 AM	0	0	14	0	0	2	11	0	0	8	0	10					45	
Count Total	0	0	238	31	0	128	267	0	0	101	0	291					1,056	
Peak Hour	0	0	121	14	0	83	153	0	0	64	0	172					607	

Location: SE BORNSTEDT RD & HWY 211 AM

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	2	0	0		2	7:00 AM	0	0	0		0	7:00 AM	0	0	0		0
7:05 AM	0	1	0		1	7:05 AM	0	0	0		0	7:05 AM	0	0	0		0
7:10 AM	2	1	0		3	7:10 AM	0	0	0		0	7:10 AM	0	0	0		0
7:15 AM	0	1	4		5	7:15 AM	0	0	0		0	7:15 AM	0	0	0		0
7:20 AM	1	0	0		1	7:20 AM	0	0	0		0	7:20 AM	0	0	0		0
7:25 AM	2	2	0		4	7:25 AM	0	0	0		0	7:25 AM	0	0	0		0
7:30 AM	2	0	1		3	7:30 AM	0	0	0		0	7:30 AM	0	0	0		0
7:35 AM	0	0	1		1	7:35 AM	0	0	0		0	7:35 AM	0	0	0		0
7:40 AM	0	0	2		2	7:40 AM	0	0	0		0	7:40 AM	0	0	0		0
7:45 AM	2	2	1		5	7:45 AM	0	0	0		0	7:45 AM	0	0	0		0
7:50 AM	1	0	0		1	7:50 AM	0	0	0		0	7:50 AM	0	0	0		0
7:55 AM	0	0	1		1	7:55 AM	0	0	0		0	7:55 AM	0	0	0		0
8:00 AM	2	0	0		2	8:00 AM	0	0	0		0	8:00 AM	0	0	0		0
8:05 AM	2	0	1		3	8:05 AM	0	0	0		0	8:05 AM	0	0	0		0
8:10 AM	0	1	0		1	8:10 AM	0	0	0		0	8:10 AM	0	0	0		0
8:15 AM	1	1	1		3	8:15 AM	0	0	0		0	8:15 AM	0	0	0		0
8:20 AM	2	0	0		2	8:20 AM	0	0	0		0	8:20 AM	0	0	0		0
8:25 AM	0	1	1		2	8:25 AM	0	0	0		0	8:25 AM	0	0	0		0
8:30 AM	1	0	0		1	8:30 AM	0	0	0		0	8:30 AM	0	0	0		0
8:35 AM	1	0	1		2	8:35 AM	0	0	0		0	8:35 AM	0	0	0		0
8:40 AM	0	1	1		2	8:40 AM	0	0	0		0	8:40 AM	0	0	0		0
8:45 AM	0	4	2		6	8:45 AM	0	0	0		0	8:45 AM	0	0	0		0
8:50 AM	0	0	3		3	8:50 AM	0	0	0		0	8:50 AM	0	0	0		0
8:55 AM	0	0	0		0	8:55 AM	0	0	0		0	8:55 AM	0	0	0		0
Count Total	21	15	20		56	Count Total	0	0	0		0	Count Total	0	0	0		0
Peak Hour	12	7	10		29	Peak Hour	0	0	0		0	Peak Hour	0	0	0		0



	HV%	PHF
EB	5.3%	0.73
WB	4.1%	0.76
NB	4.8%	0.76
SB	4.2%	0.75
All	4.6%	0.78

Interval Start Time	DUBARKO RD Eastbound				DUBARKO RD Westbound				HWY 211 Northbound				HWY 211 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	1	1	0	0	2	1	2	0	2	19	1	0	0	20	0	49	635
7:05 AM	0	0	1	3	0	2	5	2	0	1	19	0	0	0	4	0	37	617
7:10 AM	0	0	0	4	0	3	4	5	0	4	16	0	0	1	8	0	45	613
7:15 AM	0	0	1	6	0	2	5	4	0	1	22	0	0	0	15	0	56	612
7:20 AM	0	0	1	4	0	6	4	2	0	1	26	0	0	0	13	0	57	596
7:25 AM	0	0	1	3	0	1	6	9	0	2	33	1	0	0	14	0	70	564
7:30 AM	0	1	1	9	0	2	2	3	0	2	22	2	0	0	15	0	59	536
7:35 AM	0	0	0	3	0	4	6	7	0	4	26	4	0	2	19	0	75	514
7:40 AM	0	0	0	2	0	6	3	3	0	1	19	2	0	1	17	1	55	483
7:45 AM	0	2	1	2	0	0	3	1	0	5	22	0	0	1	10	0	47	465
7:50 AM	0	0	0	4	0	3	2	0	0	2	13	0	0	1	9	0	34	485
7:55 AM	0	0	2	4	0	4	3	4	0	0	19	0	0	1	14	0	51	491
8:00 AM	0	2	0	1	0	2	0	3	0	1	15	1	0	0	6	0	31	481
8:05 AM	0	0	2	2	0	0	1	3	0	2	14	1	0	1	7	0	33	
8:10 AM	0	0	0	0	0	3	1	1	0	1	20	1	0	2	15	0	44	
8:15 AM	0	1	2	1	0	3	4	0	0	2	13	2	0	1	11	0	40	
8:20 AM	1	0	0	0	0	1	3	1	0	3	9	0	0	1	5	1	25	
8:25 AM	0	1	1	1	0	1	1	3	0	3	12	1	0	0	18	0	42	
8:30 AM	0	2	2	1	0	3	1	2	0	0	14	0	0	0	12	0	37	
8:35 AM	0	0	2	1	0	0	2	3	0	2	20	1	0	0	12	1	44	
8:40 AM	0	1	0	3	0	2	1	2	0	2	15	3	0	1	6	1	37	
8:45 AM	0	0	2	0	0	1	5	2	0	5	34	4	0	0	14	0	67	
8:50 AM	0	0	1	1	0	1	0	2	0	5	13	0	0	1	16	0	40	
8:55 AM	0	1	3	0	0	3	1	1	0	0	20	1	0	0	11	0	41	
Count Total	1	12	24	55	0	55	64	65	0	51	455	25	0	14	291	4	1,116	
Peak Hour	0	4	9	44	0	35	44	42	0	25	256	10	0	7	158	1	635	

Location: HWY 211 & DUBARKO RD AM

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	1	2	0	0	3	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	0	0	1	0	1	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	2	2	1	5	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	2	0	0	2	4	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	0	2	0	0	2	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	1	0	0	1	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	0	2	1	1	4	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	0	1	0	1	2	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	0	1	1	2	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	0	3	0	1	4	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	2	2
7:50 AM	0	1	0	0	1	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0	7:55 AM	0	2	0	0	2
8:00 AM	0	0	0	1	1	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	1	0	1	2	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	0	1	0	0	1	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	0	0	0	1	1	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	0	1	0	1	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	3	0	1	4	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	0	0	0	1	1	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	0	1	1	2	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	0	0	0	1	1	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	4	1	3	8	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	0	0	1	2	3	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	3	23	9	19	54	Count Total	0	0	0	0	0	Count Total	0	2	0	2	4
Peak Hour	3	14	5	7	29	Peak Hour	0	0	0	0	0	Peak Hour	0	2	0	2	4

Location: HWY 211 & PIONEER BLVD AM



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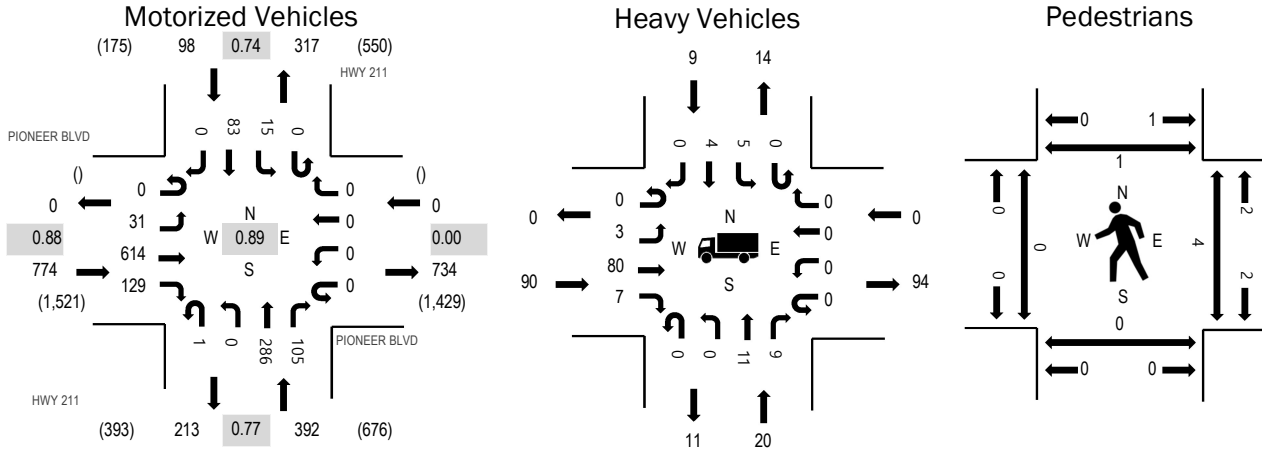
Location: HWY 211 & PIONEER BLVD AM

Date: Wednesday, June 9, 2021

Peak Hour: 07:15 AM - 08:15 AM

Peak 15-Minutes: 07:25 AM - 07:40 AM

## Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	11.6%	0.88
WB	0.0%	0.00
NB	5.1%	0.77
SB	9.2%	0.74
All	9.4%	0.89

## Traffic Counts - Motorized Vehicles

Interval Start Time	PIONEER BLVD Eastbound				PIONEER BLVD Westbound				HWY 211 Northbound				HWY 211 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	2	30	16	0	0	0	0	0	0	25	6	0	2	8	0	89	1,225
7:05 AM	0	3	29	3	0	0	0	0	0	0	18	4	0	0	1	0	58	1,215
7:10 AM	0	2	34	12	0	0	0	0	0	0	23	5	0	0	3	0	79	1,248
7:15 AM	0	1	39	10	0	0	0	0	0	0	29	12	0	1	10	0	102	1,264
7:20 AM	0	3	42	10	0	0	0	0	0	0	33	6	0	0	8	0	102	1,241
7:25 AM	0	6	55	7	0	0	0	0	1	0	37	12	0	0	8	0	126	1,231
7:30 AM	0	2	52	14	0	0	0	0	0	0	27	9	0	2	12	0	118	1,206
7:35 AM	0	2	46	17	0	0	0	0	0	0	30	6	0	2	8	0	111	1,175
7:40 AM	0	1	57	13	0	0	0	0	0	0	26	7	0	0	9	0	113	1,168
7:45 AM	0	3	57	13	0	0	0	0	0	0	25	12	0	3	4	0	117	1,169
7:50 AM	0	2	68	8	0	0	0	0	0	0	12	6	0	1	3	0	100	1,164
7:55 AM	0	2	61	12	0	0	0	0	0	0	17	10	0	4	4	0	110	1,158
8:00 AM	0	0	40	6	0	0	0	0	0	0	17	11	0	1	4	0	79	1,147
8:05 AM	0	4	52	6	0	0	0	0	0	0	18	6	0	0	5	0	91	
8:10 AM	0	5	45	13	0	0	0	0	0	0	15	8	0	1	8	0	95	
8:15 AM	0	2	41	6	0	0	0	0	0	0	17	5	0	1	7	0	79	
8:20 AM	0	3	63	7	0	0	0	0	0	0	9	8	0	0	2	0	92	
8:25 AM	0	3	57	12	0	0	0	0	0	0	10	9	0	0	10	0	101	
8:30 AM	0	3	50	8	0	0	0	0	0	0	11	9	0	1	5	0	87	
8:35 AM	0	5	55	9	0	0	0	0	0	0	22	6	0	1	6	0	104	
8:40 AM	0	1	69	8	0	0	0	0	0	0	23	8	0	0	5	0	114	
8:45 AM	0	2	65	16	0	0	0	0	0	0	12	8	0	2	7	0	112	
8:50 AM	0	6	54	8	0	0	0	0	0	0	13	6	0	1	6	0	94	
8:55 AM	0	4	51	8	0	0	0	0	0	0	14	13	0	2	7	0	99	
Count Total	0	67	1,212	242	0	0	0	0	1	0	483	192	0	25	150	0	2,372	
Peak Hour	0	31	614	129	0	0	0	0	1	0	286	105	0	15	83	0	1,264	



Location: HWY 211 & PIONEER BLVD AM

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	8	1	0	1	10	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	10	1	0	0	11	7:05 AM	0	0	0	0	0	7:05 AM	0	2	1	0	3
7:10 AM	5	2	0	0	7	7:10 AM	0	0	0	0	0	7:10 AM	0	0	2	0	2
7:15 AM	7	3	0	0	10	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	9	2	0	1	12	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	8	4	0	1	13	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	8	0	0	2	10	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	8	3	0	1	12	7:35 AM	0	0	0	0	0	7:35 AM	0	0	1	1	2
7:40 AM	8	1	0	0	9	7:40 AM	0	0	0	0	0	7:40 AM	0	0	1	0	1
7:45 AM	9	1	0	1	11	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	8	3	0	0	11	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	9	1	0	2	12	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	5	0	0	1	6	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	8	1	0	0	9	8:05 AM	0	0	0	0	0	8:05 AM	0	0	1	0	1
8:10 AM	3	1	0	0	4	8:10 AM	0	0	0	0	0	8:10 AM	0	0	1	0	1
8:15 AM	5	0	0	1	6	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	10	0	0	0	10	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	6	2	0	1	9	8:25 AM	0	0	0	0	0	8:25 AM	0	0	1	0	1
8:30 AM	10	0	0	0	10	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	10	0	0	0	10	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	11	1	0	1	13	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	8	1	0	1	10	8:45 AM	0	0	0	0	0	8:45 AM	3	3	0	0	6
8:50 AM	6	1	0	0	7	8:50 AM	0	0	0	0	0	8:50 AM	1	1	1	1	4
8:55 AM	9	0	0	0	9	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	188	29	0	14	231	Count Total	0	0	0	0	0	Count Total	4	6	9	2	21
Peak Hour	90	20	0	9	119	Peak Hour	0	0	0	0	0	Peak Hour	0	0	4	1	5



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Location: SE BORNSTEDT RD & HWY 211 PM

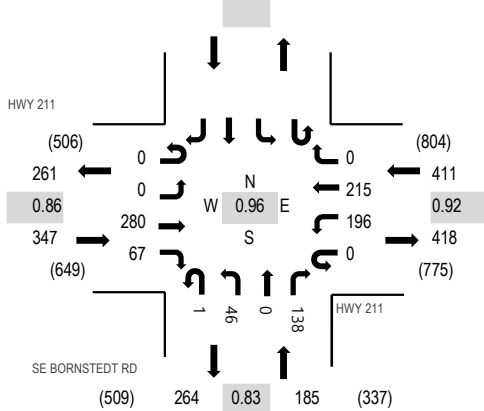
Date: Wednesday, June 9, 2021

Peak Hour: 04:20 PM - 05:20 PM

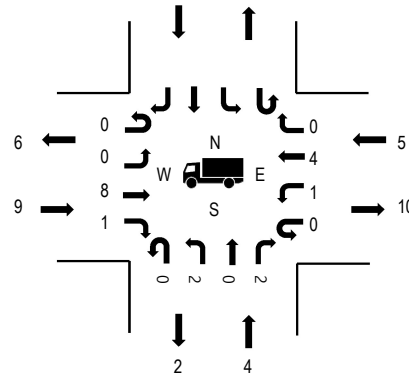
Peak 15-Minutes: 04:25 PM - 04:40 PM

## Peak Hour

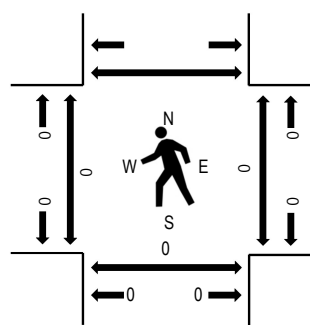
### Motorized Vehicles



### Heavy Vehicles



### Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	2.6%	0.86
WB	1.2%	0.92
NB	2.2%	0.83
SB		
All	1.9%	0.96

## Traffic Counts - Motorized Vehicles

Interval Start Time	HWY 211 Eastbound				HWY 211 Westbound				SE BORNSTEDT RD Northbound				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	0	18	3	0	8	14	0	0	1	0	9					53	896
4:05 PM	0	0	15	4	0	20	21	0	0	2	0	8					70	911
4:10 PM	0	0	15	3	0	18	35	0	0	4	0	8					83	933
4:15 PM	0	0	19	1	0	9	12	0	1	3	0	9					54	928
4:20 PM	0	0	29	4	0	20	15	0	0	3	0	13					84	943
4:25 PM	0	0	29	4	0	17	13	0	0	4	0	15					82	939
4:30 PM	0	0	20	6	0	13	23	0	0	5	0	7					74	940
4:35 PM	0	0	33	9	0	18	17	0	0	1	0	11					89	942
4:40 PM	0	0	14	3	0	16	18	0	0	1	0	13					65	915
4:45 PM	0	0	25	4	0	17	19	0	0	3	0	6					74	930
4:50 PM	0	0	23	4	0	12	23	0	0	6	0	18					86	921
4:55 PM	0	0	22	8	0	13	16	0	1	7	0	15					82	915
5:00 PM	0	0	24	5	0	15	15	0	0	3	0	6					68	894
5:05 PM	0	0	24	5	0	21	25	0	0	4	0	13					92	
5:10 PM	0	0	17	7	0	16	22	0	0	5	0	11					78	
5:15 PM	0	0	20	8	0	18	9	0	0	4	0	10					69	
5:20 PM	0	0	21	9	0	12	24	0	0	5	0	9					80	
5:25 PM	0	0	25	6	0	14	15	0	0	5	0	18					83	
5:30 PM	0	0	24	7	0	14	19	0	0	5	0	7					76	
5:35 PM	0	0	25	4	0	13	11	0	0	1	0	8					62	
5:40 PM	0	0	18	5	0	27	16	0	0	5	0	9					80	
5:45 PM	0	0	16	4	0	16	19	0	0	3	0	7					65	
5:50 PM	0	0	31	5	0	14	14	0	0	3	0	13					80	
5:55 PM	0	0	17	7	0	21	7	0	0	1	0	8					61	
Count Total	0	0	524	125	0	382	422	0	2	84	0	251					1,790	
Peak Hour	0	0	280	67	0	196	215	0	1	46	0	138					943	

Location: SE BORNSTEDT RD & HWY 211 PM

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

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	3		3	4:00 PM	0	0	0		0	4:00 PM	0	0	0		0
4:05 PM	0	1	1		2	4:05 PM	0	0	0		0	4:05 PM	0	0	0		0
4:10 PM	0	0	0		0	4:10 PM	0	0	0		0	4:10 PM	0	0	0		0
4:15 PM	0	0	1		1	4:15 PM	0	0	0		0	4:15 PM	0	0	0		0
4:20 PM	2	0	0		2	4:20 PM	0	0	0		0	4:20 PM	0	0	0		0
4:25 PM	0	0	0		0	4:25 PM	0	0	0		0	4:25 PM	0	0	0		0
4:30 PM	1	0	0		1	4:30 PM	0	0	0		0	4:30 PM	0	0	0		0
4:35 PM	0	0	0		0	4:35 PM	0	0	0		0	4:35 PM	0	0	0		0
4:40 PM	1	0	0		1	4:40 PM	0	0	0		0	4:40 PM	0	0	0		0
4:45 PM	0	0	1		1	4:45 PM	0	0	0		0	4:45 PM	0	0	0		0
4:50 PM	0	1	3		4	4:50 PM	0	0	0		0	4:50 PM	0	0	0		0
4:55 PM	0	0	0		0	4:55 PM	0	0	0		0	4:55 PM	0	0	0		0
5:00 PM	1	0	0		1	5:00 PM	0	0	0		0	5:00 PM	0	0	0		0
5:05 PM	2	1	0		3	5:05 PM	0	0	0		0	5:05 PM	0	0	0		0
5:10 PM	1	1	1		3	5:10 PM	0	0	0		0	5:10 PM	0	0	0		0
5:15 PM	1	1	0		2	5:15 PM	0	0	0		0	5:15 PM	0	0	0		0
5:20 PM	0	0	0		0	5:20 PM	0	0	0		0	5:20 PM	0	0	0		0
5:25 PM	1	1	0		2	5:25 PM	0	0	0		0	5:25 PM	0	0	0		0
5:30 PM	1	0	2		3	5:30 PM	0	0	0		0	5:30 PM	0	0	0		0
5:35 PM	1	0	0		1	5:35 PM	0	0	0		0	5:35 PM	0	0	0		0
5:40 PM	0	0	1		1	5:40 PM	0	0	0		0	5:40 PM	0	0	0		0
5:45 PM	1	0	0		1	5:45 PM	0	0	0		0	5:45 PM	0	0	0		0
5:50 PM	0	0	1		1	5:50 PM	0	0	0		0	5:50 PM	0	0	0		0
5:55 PM	0	0	1		1	5:55 PM	0	0	0		0	5:55 PM	0	0	0		0
Count Total	13	6	15		34	Count Total	0	0	0		0	Count Total	0	0	0		0
Peak Hour	9	4	5		18	Peak Hour	0	0	0		0	Peak Hour	0	0	0		0

Location: HWY 211 & DUBARKO RD PM



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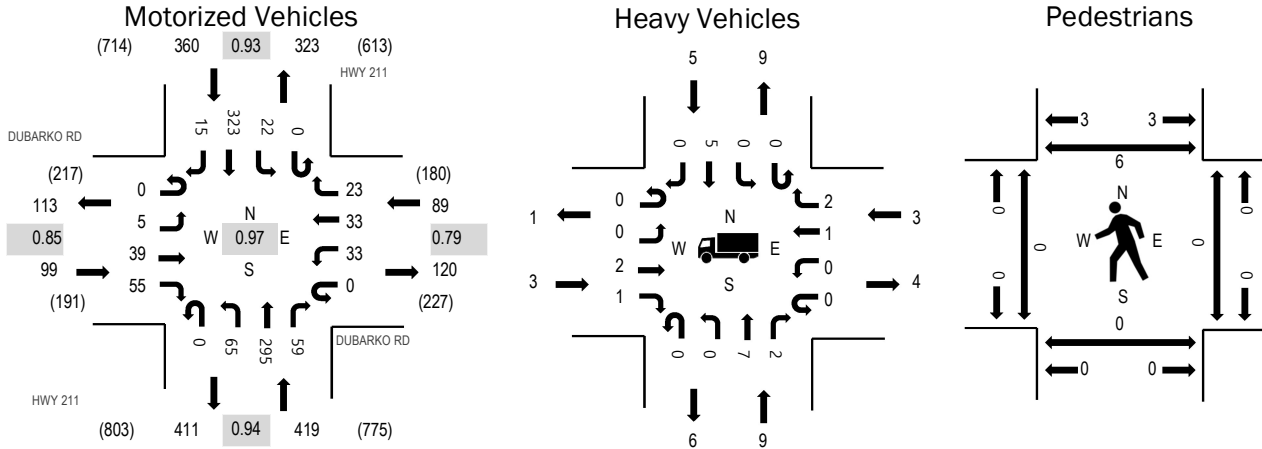
Location: HWY 211 & DUBARKO RD PM

Date: Wednesday, June 9, 2021

Peak Hour: 04:20 PM - 05:20 PM

Peak 15-Minutes: 05:05 PM - 05:20 PM

## Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	3.0%	0.85
WB	3.4%	0.79
NB	2.1%	0.94
SB	1.4%	0.93
All	2.1%	0.97

## Traffic Counts - Motorized Vehicles

Interval Start Time	DUBARKO RD Eastbound				DUBARKO RD Westbound				HWY 211 Northbound				HWY 211 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	0	2	2	0	3	1	0	0	4	22	2	0	0	16	0	52	933
4:05 PM	0	0	5	6	0	1	5	2	0	3	15	3	0	1	38	0	79	949
4:10 PM	0	0	2	6	0	2	3	0	0	3	18	3	0	2	41	2	82	965
4:15 PM	0	1	4	3	0	1	2	8	0	1	23	7	0	1	17	2	70	961
4:20 PM	0	1	4	5	0	5	4	4	0	5	31	4	0	0	23	0	86	967
4:25 PM	0	0	2	4	0	1	3	2	0	5	30	7	0	4	28	1	87	954
4:30 PM	0	1	1	4	0	3	2	1	0	6	17	6	0	1	24	1	67	947
4:35 PM	0	0	5	6	0	3	2	2	0	5	28	8	0	1	31	0	91	961
4:40 PM	0	0	4	2	0	3	7	1	0	7	20	1	0	2	29	3	79	934
4:45 PM	0	0	5	4	0	0	4	2	0	3	19	6	0	1	31	0	75	950
4:50 PM	0	0	3	5	0	4	3	2	0	4	31	4	0	0	26	1	83	937
4:55 PM	0	1	2	2	0	4	1	2	0	5	31	7	0	3	22	2	82	933
5:00 PM	0	0	2	7	0	1	1	1	0	4	21	2	0	2	25	2	68	927
5:05 PM	0	0	5	6	0	1	1	3	0	10	27	3	0	4	33	2	95	
5:10 PM	0	0	1	7	0	6	4	1	0	4	16	8	0	3	27	1	78	
5:15 PM	0	2	5	3	0	2	1	2	0	7	24	3	0	1	24	2	76	
5:20 PM	0	0	4	2	0	4	2	2	0	2	19	7	0	1	30	0	73	
5:25 PM	0	1	4	4	0	1	3	1	0	11	29	5	0	1	20	0	80	
5:30 PM	0	2	1	2	0	0	4	6	0	4	19	7	0	2	33	1	81	
5:35 PM	0	0	1	1	0	1	3	2	0	5	22	3	0	1	24	1	64	
5:40 PM	0	0	4	8	0	3	6	3	0	4	23	5	0	1	34	4	95	
5:45 PM	0	1	3	6	0	3	1	3	0	2	15	2	0	1	24	1	62	
5:50 PM	0	0	2	5	0	0	5	1	0	8	28	3	0	4	23	0	79	
5:55 PM	0	1	4	5	0	0	5	4	0	4	19	6	0	3	23	2	76	
Count Total	0	11	75	105	0	52	73	55	0	116	547	112	0	40	646	28	1,860	
Peak Hour	0	5	39	55	0	33	33	23	0	65	295	59	0	22	323	15	967	

Location: HWY 211 & DUBARKO RD PM

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

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

Location: HWY 211 & PIONEER BLVD PM



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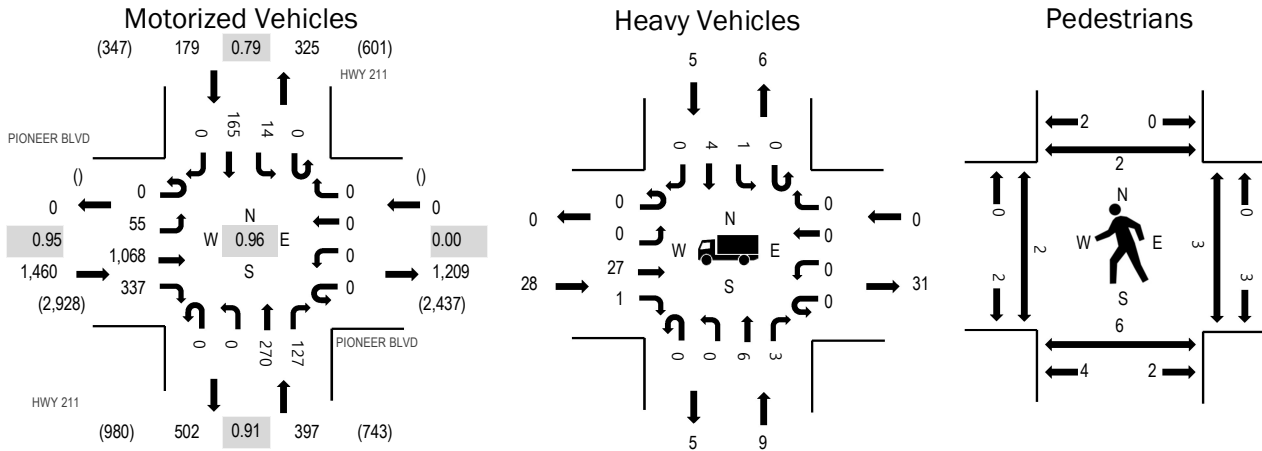
Location: HWY 211 & PIONEER BLVD PM

Date: Wednesday, June 9, 2021

Peak Hour: 04:20 PM - 05:20 PM

Peak 15-Minutes: 05:05 PM - 05:20 PM

## Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.9%	0.95
WB	0.0%	0.00
NB	2.3%	0.91
SB	2.8%	0.79
All	2.1%	0.96

## Traffic Counts - Motorized Vehicles

Interval Start Time	PIONEER BLVD Eastbound				PIONEER BLVD Westbound				HWY 211 Northbound				HWY 211 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	5	88	17	0	0	0	0	0	0	19	9	0	1	9	0	148	2,004
4:05 PM	0	7	86	31	0	0	0	0	0	0	19	6	0	1	13	0	163	2,017
4:10 PM	0	7	94	28	0	0	0	0	0	0	17	8	0	3	29	0	186	2,030
4:15 PM	0	2	103	13	0	0	0	0	0	0	12	14	0	4	14	0	162	2,023
4:20 PM	0	5	88	30	0	0	0	0	0	0	22	12	0	1	3	0	161	2,036
4:25 PM	0	7	85	27	0	0	0	0	0	0	28	15	0	1	11	0	174	2,032
4:30 PM	0	5	90	28	0	0	0	0	0	0	23	7	0	1	15	0	169	2,014
4:35 PM	0	4	93	33	0	0	0	0	0	0	19	9	0	0	8	0	166	2,032
4:40 PM	0	3	80	30	0	0	0	0	0	0	26	7	0	3	19	0	168	2,033
4:45 PM	0	5	80	27	0	0	0	0	0	0	25	7	0	0	18	0	162	2,023
4:50 PM	0	4	87	26	0	0	0	0	0	0	22	15	0	0	10	0	164	2,024
4:55 PM	0	8	98	26	0	0	0	0	0	0	23	11	0	3	12	0	181	2,016
5:00 PM	0	5	78	20	0	0	0	0	0	0	18	20	0	2	18	0	161	2,014
5:05 PM	0	4	76	29	0	0	0	0	0	0	27	10	0	2	28	0	176	
5:10 PM	0	4	111	24	0	0	0	0	0	0	16	9	0	1	14	0	179	
5:15 PM	0	1	102	37	0	0	0	0	0	0	21	5	0	0	9	0	175	
5:20 PM	0	5	82	24	0	0	0	0	0	0	16	15	0	0	15	0	157	
5:25 PM	0	3	78	25	0	0	0	0	0	0	22	15	0	0	13	0	156	
5:30 PM	0	2	109	33	0	0	0	0	0	0	18	14	0	1	10	0	187	
5:35 PM	0	5	97	25	0	0	0	0	0	0	18	12	0	1	9	0	167	
5:40 PM	0	6	77	36	0	0	0	0	0	0	21	8	0	1	9	0	158	
5:45 PM	0	4	93	30	0	0	0	0	0	0	16	8	0	1	11	0	163	
5:50 PM	0	6	91	27	0	0	0	0	0	0	13	7	0	0	12	0	156	
5:55 PM	0	5	86	38	0	0	0	0	0	0	28	11	0	4	7	0	179	
Count Total	0	112	2,152	664	0	0	0	0	0	0	489	254	0	31	316	0	4,018	
Peak Hour	0	55	1,068	337	0	0	0	0	0	0	270	127	0	14	165	0	2,036	

Location: HWY 211 & PIONEER BLVD PM

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

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	5	1	0	0	6	4:00 PM	0	0	0	0	0	4:00 PM	1	0	0	0	1
4:05 PM	5	0	0	1	6	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	4	0	0	0	4	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	4	1	0	1	6	4:15 PM	0	0	0	0	0	4:15 PM	0	0	2	0	2
4:20 PM	3	0	0	0	3	4:20 PM	0	0	0	0	0	4:20 PM	0	0	1	0	1
4:25 PM	2	3	0	0	5	4:25 PM	0	0	0	0	0	4:25 PM	0	0	1	0	1
4:30 PM	2	1	0	0	3	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	1	1
4:35 PM	2	0	0	0	2	4:35 PM	0	0	0	0	0	4:35 PM	0	1	1	0	2
4:40 PM	2	0	0	0	2	4:40 PM	0	0	0	0	0	4:40 PM	0	1	0	0	1
4:45 PM	3	2	0	0	5	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	1	0	0	2	3	4:50 PM	0	0	0	0	0	4:50 PM	1	1	1	1	4
4:55 PM	4	0	0	1	5	4:55 PM	0	0	0	0	0	4:55 PM	0	1	0	0	1
5:00 PM	1	0	0	1	2	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	1	1	0	0	2	5:05 PM	0	0	0	0	0	5:05 PM	1	1	0	0	2
5:10 PM	3	1	0	1	5	5:10 PM	0	0	0	0	0	5:10 PM	0	1	0	0	1
5:15 PM	4	1	0	0	5	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	1	1	0	1	3	5:20 PM	0	0	0	0	0	5:20 PM	1	0	0	0	1
5:25 PM	2	1	0	0	3	5:25 PM	0	0	0	0	0	5:25 PM	0	2	2	0	4
5:30 PM	4	2	0	1	7	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	1	1
5:35 PM	6	0	0	0	6	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	1	1	0	2	4	5:40 PM	0	0	0	0	0	5:40 PM	0	1	0	0	1
5:45 PM	2	0	0	0	2	5:45 PM	0	0	1	0	1	5:45 PM	0	2	3	0	5
5:50 PM	7	0	0	0	7	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	2	2
5:55 PM	1	1	0	1	3	5:55 PM	0	0	0	0	0	5:55 PM	0	0	1	0	1
Count Total	70	17	0	12	99	Count Total	0	0	1	0	1	Count Total	4	11	12	5	32
Peak Hour	28	9	0	5	42	Peak Hour	0	0	0	0	0	Peak Hour	2	6	4	2	14

**Table 1** provides traffic volumes by corridor for weekdays and weekends for the last five weeks of available data, May 31 to July 4, 2021. Corridor volumes are prepared by summing traffic volumes from ATRs across 13 corridors for years 2019, 2020 and 2021<sup>5</sup>.

*Overall statewide traffic volumes are close to pre-COVID traffic volumes. For the month of June, statewide average weekday traffic volumes ranged between 5% below and 5% above 2019 pre-COVID conditions, while weekend volumes ranged between 9% below and equal to 2019 levels. Recent forecast news from the Oregon DAS Office of Economic Analysis indicates economic recovery is expected to move faster than past recessions<sup>6</sup>*

**Table 1. Observed Year-Over-Year Difference in Traffic Volumes by Corridor 2019-2021**

Date	Corridor	2021 Volumes		2020 Volumes		2019 Volumes		2021 as % of 2020	
		Average Weekday	Average Weekend	Average Weekday	Average Weekend	Average Weekday	Average Weekend	Weekday Diff	Weekend Diff
<b>Week 23</b> May 31- June 6, 2021	I-5	558,510	483,914	466,638	356,866	588,873	519,086	20%	36%
	I-205	244,436	204,969	210,138	158,028	269,797	235,467	16%	30%
	I-405	121,681	101,902	103,291	66,692	143,769	119,357	18%	53%
	I-84	367,455	323,293	308,732	238,313	371,031	343,419	19%	36%
	US 97	158,986	135,404	146,823	118,339	168,151	143,367	8%	14%
	US197	3,578	3,120	2,959	2,583	3,325	2,777	21%	21%
	US20	28,808	24,285	23,669	19,012	25,683	24,331	22%	28%
	US26	54,746	48,449	45,634	41,742	52,260	55,722	20%	16%
	US30	13,271	11,148	10,584	9,625	11,896	11,960	25%	16%
	US395	27,000	22,600	25,703	19,130	29,165	21,212	5%	18%
	OR18	20,746	20,537	17,111	19,026	16,663	21,557	21%	8%
	OR22	31,732	25,749	28,307	20,870	31,838	27,314	12%	23%
	US101	89,221	76,993	69,722	62,523	85,138	78,636	28%	23%
<b>Statewide Average</b>		341,488	295,401	287,606	220,203	359,073	318,941	19%	34%
<b>Week 24</b> June 7-13, 2021	I-5	563,778	506,995	482,153	403,769	604,078	557,050	17%	26%
	I-205	254,111	216,643	217,082	173,873	274,976	241,338	17%	25%
	I-405	130,579	103,765	106,251	67,900	138,162	111,721	23%	53%
	I-84	373,222	336,902	317,742	265,804	371,513	350,983	17%	27%
	US 97	162,982	143,270	151,426	128,987	167,322	144,049	8%	11%
	US197	3,279	3,081	2,875	2,874	3,300	2,984	14%	7%
	US20	26,872	24,396	23,035	21,125	27,478	26,848	17%	15%
	US26	49,816	50,297	44,922	46,867	54,733	59,844	11%	7%
	US30	11,968	11,572	10,544	10,341	12,629	12,870	14%	12%
	US395	28,230	24,050	25,522	19,638	27,868	21,759	11%	22%
	OR18	17,979	20,422	15,673	20,177	18,915	25,441	15%	1%
	OR22	32,004	25,896	27,696	23,442	32,686	29,214	16%	10%
	US101	90,358	75,148	68,825	67,046	90,295	84,241	31%	12%
<b>Statewide Average</b>		346,835	308,995	296,567	246,468	365,312	335,096	17%	25%

<sup>5</sup> Statewide average values are weighted by pre-COVID traffic volumes in order to monitor relative change in traffic volumes. Without weighting, the higher volume corridors would dominate the results.

<sup>6</sup> See latest post by OEA: <https://oregoneconomicanalysis.com/2021/07/09/no-permanent-damage-expected/>



Location	US26; MP 46.38; MT. HOOD HIGHWAY NO. 26; 0.30 mile east of Camp Creek Rd (USFS 28)	Site Name	Rhododendron (03-006)
		Installed	August, 1995

HISTORICAL ANNUAL TRAFFIC DATA						
Year	Annual Average Daily Traffic (AADT)	Critical Values as percent of Annual Average Daily Traffic (AADT)				
		Max Day	Max Hour	10th Hour	20th Hour	30th Hour
2010	8714	207	21.6	19.8	18.9	18.5
2011	8330	214	24.7	20.0	18.6	18.1
2012	8480	227	24.0	21.0	20.2	19.4
2013	8527	213	23.4	21.1	20.3	19.1
2014	8652	216	23.2	21.1	20.3	19.2
2015	8861	242	21.4	20.3	19.4	18.7
2016	10071	208	22.9	19.6	18.8	17.9
2017	10223	200	19.9	19.1	18.1	17.5
2018	10291	199	20.4	19.5	19.0	18.5
2019	10218	204	20.5	19.5	19.1	18.6

2019 SEASONAL TRAFFIC DATA				
Month	Weekday		Daily	
	Average	% AADT	Average	% AADT
January	8537	84	11650	114
February	7637	75	9937	97
March	7393	72	10238	100
April	6402	63	8476	83
May	7666	75	9670	95
June	8771	86	11100	109
July	10810	106	13605	133
August	10610	104	13497	132
September	8391	82	9937	97
October	6484	63	7998	78
November	5653	55	6971	68
December	7878	77	9535	93

SEASONAL TREND TABLE (Updated: 10/14/2020 )										Seasonal Trend Peak Period Factor	
TREND	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May	1-Jun	15-Jun	1-Jul	
INTERSTATE URBANIZED	1.1160	1.0605	1.0050	0.9923	0.9796	0.9781	0.9767	0.9615	0.9463	0.9517	0.9463
INTERSTATE NONURBANIZED	1.4616	1.2645	1.0673	1.0382	1.0092	0.9798	0.9504	0.9005	0.8506	0.8322	0.8139
COMMUTER	1.1492	1.0880	1.0268	1.0014	0.9759	0.9705	0.9650	0.9503	0.9355	0.9470	0.9355
COASTAL DESTINATION	1.2289	1.1242	1.0194	1.0316	1.0437	1.0080	0.9723	0.9347	0.8972	0.8612	0.8159
COASTAL DESTINATION ROUTE	1.4968	1.2858	1.0747	1.0911	1.1076	1.0274	0.9473	0.8941	0.8409	0.7820	0.7205
AGRICULTURE	1.6700	1.4596	1.2492	1.1487	1.0482	0.9747	0.9011	0.8579	0.8146	0.8058	0.7670
RECREATIONAL SUMMER	1.9247	1.6595	1.3942	1.2973	1.2004	1.0517	0.9029	0.8256	0.7484	0.7018	0.6552
RECREATIONAL SUMMER WINTER	1.0135	1.0146	1.0158	1.1492	1.2825	1.1763	1.0700	0.9760	0.8821	0.8005	0.7190
RECREATIONAL WINTER	0.6733	0.7219	0.7704	1.0580	1.3455	1.3746	1.4038	1.2832	1.1625	0.9985	0.6389
SUMMER	1.3901	1.2520	1.1139	1.0620	1.0100	0.9718	0.9336	0.8976	0.8615	0.8457	0.8299
SUMMER < 2500	1.4448	1.2869	1.1289	1.0598	0.9906	0.9480	0.9053	0.8720	0.8387	0.8237	0.8086

\* Seasonal Trend Table factors are based on previous year ATR data. The table is updated yearly.

\* Grey shading indicates months were seasonal factor is greater than or less than 30%

\* February 2019 snow event causing lower seasonal factors

June 1 0.9503  
June 15 0.9355

Daily Adjustment 0.001057  
June 9 Value 0.941843

Commuter Adjustment =0.941843/0.9355 1.00678

# Daily Volume Count Report

Study Name

Newton Street west of Jacoby

Site Code 8667515307

45.384363067727755 / -122.25832287805528

<b>Study Date</b>	6/15/2021
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East /West

### Direction

### Direction

[illegible][illegible][illegible][illegible]

# Daily Volume Count Report

Study Name

Averill Pkwy S of Cascadia (Southbound)

**Site Code** 4955566172

45.385346503017196 / -122.2603799967819

Study Date 6/15/2021

## Roadway Orientation

South /North

**Direction** Southbound

[illegible][illegible][illegible][illegible]

# Daily Volume Count Report

Study Name

Averill S of Cascadia (Northbound)

Site Code 6855039561

45.38567367272235 / -122.26087689361204

Study Date 6/15/2021

North / South

Direction Northbound

[illegible][illegible][illegible][illegible]

# Daily Volume Count Report

Study Name

Averill S of Newton

Site Code

1617971870

Location

45.38425073389019 /-122.26118712663511

Study Date

6/16/2021

Roadway  
Orientation

South /North

Direction

Start	6-14-2021		Tues		Wed		Thurs		Fri		Sat		Sun		Week Average	
Time	South	North	South	North	South	North	South	North	South	North	South	North	South	North	South	North
12:00 AM							2	1							2	1
01:00															0	0
02:00															0	0
03:00								1							0	1
04:00								4							0	4
05:00								4							0	4
06:00							2	2							2	2
07:00							5	7							5	7
08:00							9	9							9	9
09:00							5	7							5	7
10:00							1	5							1	5
11:00							4	6							4	6
12:00 PM							6	6							6	6
01:00					6	3									6	3
02:00					7	7									7	7
03:00					10	4									10	4
04:00					9	7									9	7
05:00					13	5									13	5
06:00					6	7									6	7
07:00					4	5									4	5
08:00					4										4	0
09:00					4										4	0
10:00					1	2									1	2
11:00					1										1	0

Lane	0	0	0	0	65	40	34	52	0	0	0	0	0	0	99	92
Day	0	0	0	0	105		86		0	0	0	0	0	0	191	

AM Peak							08:00	08:00							08:00	08:00
Vol.							9	9							9	9

PM Peak					05:00	02:00	12:00 PM								05:00	02:00
Vol.					13	7	6	6							13	7

# Daily Volume Count Report

Study Name  
Location  
Roadway  
Orientation

Averill S of Amherst  
45.38348042625627 /-122.26097579816569  
South /North

Site Code  
Study Date  
Direction

8553036648  
6/16/2021

Start Time	6-14-2021		Tues		Wed		Thurs		Fri		Sat		Sun		Week Average	
	South	North	South	North	South	North	South	North	South	North	South	North	South	North	South	North
12:00 AM							1								1	0
01:00															0	0
02:00															0	0
03:00								1							0	1
04:00								2							0	2
05:00								1							0	1
06:00															1	0
07:00							1	4							2	4
08:00							2	2							2	2
09:00							2	3							2	3
10:00								2							0	2
11:00							2	4							2	4
12:00 PM							4	3							4	3
01:00						4									4	4
02:00						6	4								6	4
03:00						5	5								5	5
04:00						3	4								3	4
05:00						6	4								6	4
06:00						2	2								2	2
07:00						2	1								2	1
08:00						2									2	0
09:00						2									2	0
10:00						1									1	0
11:00						1									0	1

Lane	0	0	0	0	33	25	14	22	0	0	0	0	0	0	47	47
Day	0	0	0	0	58	36	36	0	0	0	0	0	0	0	94	94



















AM Peak							07:00	07:00							07:00	07:00
Vol.							2	4							2	4

PM Peak					02:00	03:00	12:00 PM								02:00	03:00
Vol.					6	5	4	3							6	5

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

07/13/2021



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	760	142	0	0	0	0	315	116	16	92	0
Future Volume (vph)	34	760	142	0	0	0	0	315	116	16	92	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		2962	1328					1617	1350	1525	1606	
Flt Permitted		1.00	1.00					1.00	1.00	0.34	1.00	
Satd. Flow (perm)		2962	1328					1617	1350	541	1606	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	38	854	160	0	0	0	0	354	130	18	103	0
RTOR Reduction (vph)	0	0	39	0	0	0	0	0	94	0	0	0
Lane Group Flow (vph)	0	892	121	0	0	0	0	354	36	18	103	0
Confl. Peds. (#/hr)	1								4			
Heavy Vehicles (%)	12%	12%	12%	0%	0%	0%	5%	5%	5%	9%	9%	9%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		49.4	49.4					25.0	25.0	31.6	31.6	
Effective Green, g (s)		49.4	49.4					25.0	25.0	31.6	31.6	
Actuated g/C Ratio		0.55	0.55					0.28	0.28	0.35	0.35	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1625	728					449	375	212	563	
v/s Ratio Prot								c0.22		0.00	c0.06	
v/s Ratio Perm		0.30	0.09						0.03	0.03		
v/c Ratio		0.55	0.17					0.79	0.10	0.08	0.18	
Uniform Delay, d1		13.1	10.1					30.1	24.1	27.6	20.2	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.3	0.5					8.9	0.1	0.2	0.2	
Delay (s)		14.4	10.6					39.0	24.2	27.8	20.4	
Level of Service		B	B					D	C	C	C	
Approach Delay (s)		13.9			0.0			35.0			21.5	
Approach LOS		B			A			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			20.6									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			90.0							13.5		
Intersection Capacity Utilization			49.4%									ICU Level of Service A
Analysis Period (min)			15									
c Critical Lane Group												



# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

07/13/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	760	142	0	0	0	0	315	116	16	92	0
Future Volume (veh/h)	34	760	142	0	0	0	0	315	116	16	92	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1586	1586	1586				0	1486	1486	1627	1627	0
Adj Flow Rate, veh/h	38	854	0				0	354	130	18	103	0
Peak Hour Factor	0.89	0.89	0.89				0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	12	12	12				0	5	5	9	9	0
Cap, veh/h	70	1658					0	401	337	126	553	0
Arrive On Green	0.56	0.56	0.00				0.00	0.27	0.27	0.02	0.34	0.00
Sat Flow, veh/h	126	2961	1344				0	1486	1250	1550	1627	0
Grp Volume(v), veh/h	478	414	0				0	354	130	18	103	0
Grp Sat Flow(s),veh/h/ln	1580	1507	1344				0	1486	1250	1550	1627	0
Q Serve(g_s), s	17.2	15.0	0.0				0.0	20.5	7.6	0.0	4.0	0.0
Cycle Q Clear(g_c), s	17.2	15.0	0.0				0.0	20.5	7.6	0.0	4.0	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	885	844					0	401	337	126	553	0
V/C Ratio(X)	0.54	0.49					0.00	0.88	0.39	0.14	0.19	0.00
Avail Cap(c_a), veh/h	885	844					0	537	452	181	759	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.5	12.0	0.0				0.0	31.5	26.8	42.5	20.9	0.0
Incr Delay (d2), s/veh	2.4	2.0	0.0				0.0	12.7	0.7	0.5	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	5.2	0.0				0.0	8.4	2.2	0.4	1.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	14.1	0.0				0.0	44.2	27.5	43.0	21.1	0.0
LnGrp LOS	B	B					A	D	C	D	C	A
Approach Vol, veh/h		892	A					484			121	
Approach Delay, s/veh		14.5						39.7			24.3	
Approach LOS		B						D			C	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		54.9	6.3	28.8				35.1				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		39.0	5.0	32.5				42.0				
Max Q Clear Time (g_c+I1), s		19.2	2.0	22.5				6.0				
Green Ext Time (p_c), s		6.1	0.0	1.7				0.6				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			23.4									
HCM 6th LOS			C									
<b>Notes</b>												
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

07/13/2021

Intersection												
Int Delay, s/veh	4.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰			↰	↱
Traffic Vol, veh/h	4	10	48	38	48	46	27	283	11	8	174	1
Future Vol, veh/h	4	10	48	38	48	46	27	283	11	8	174	1
Conflicting Peds, #/hr	2	0	2	2	0	2	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	4	4	4	5	5	5	4	4	4
Mvmt Flow	5	13	62	49	62	59	35	363	14	10	223	1






Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	748	694	227	725	688	374	226	0	0	379	0	0
Stage 1	245	245	-	442	442	-	-	-	-	-	-	-
Stage 2	503	449	-	283	246	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.14	6.54	6.24	4.15	-	-	4.14	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.536	4.036	3.336	2.245	-	-	2.236	-	-
Pot Cap-1 Maneuver	325	363	805	338	367	668	1325	-	-	1169	-	-
Stage 1	752	698	-	591	573	-	-	-	-	-	-	-
Stage 2	545	567	-	720	699	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	247	346	802	292	350	665	1322	-	-	1167	-	-
Mov Cap-2 Maneuver	247	346	-	292	350	-	-	-	-	-	-	-
Stage 1	725	690	-	570	552	-	-	-	-	-	-	-
Stage 2	425	547	-	645	691	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.6		18.1		0.7		0.4	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1322	-	-	310	802	322	665	1167	-	-
HCM Lane V/C Ratio	0.026	-	-	0.058	0.077	0.342	0.089	0.009	-	-
HCM Control Delay (s)	7.8	0	-	17.3	9.9	21.9	10.9	8.1	0	-
HCM Lane LOS	A	A	-	C	A	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.2	1.5	0.3	0	-	-

HCM 6th TWSC  
3: Highway 211 & Bornstedt Road

07/13/2021

Intersection						
Int Delay, s/veh	6.8					
Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	70	189	134	15	91	169
Future Vol, veh/h	70	189	134	15	91	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	9	9	4	4
Mvmt Flow	86	233	165	19	112	209

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	598	165	0
Stage 1	165	-	-
Stage 2	433	-	-
Critical Hdwy	6.43	6.23	-
Critical Hdwy Stg 1	5.43	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.527	3.327	-
Pot Cap-1 Maneuver	464	877	-
Stage 1	862	-	-
Stage 2	652	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	427	877	-
Mov Cap-2 Maneuver	427	-	-
Stage 1	862	-	-
Stage 2	600	-	-



















Approach	NB	NE	SW
HCM Control Delay, s	14.8	0	2.7
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	683	1401	-
HCM Lane V/C Ratio	-	-	0.468	0.08	-
HCM Control Delay (s)	-	-	14.8	7.8	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.3	-

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd



















07/13/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1322	372	0	0	0	0	298	140	15	182	0
Future Volume (vph)	60	1322	372	0	0	0	0	298	140	15	182	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	0.97					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3252	1408					1664	1391	1613	1699	
Flt Permitted		1.00	1.00					1.00	1.00	0.34	1.00	
Satd. Flow (perm)		3252	1408					1664	1391	584	1699	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	1377	388	0	0	0	0	310	146	16	190	0
RTOR Reduction (vph)	0	0	61	0	0	0	0	0	93	0	0	0
Lane Group Flow (vph)	0	1440	327	0	0	0	0	310	53	16	190	0
Confl. Peds. (#/hr)	2		6						3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		55.0	55.0					20.5	20.5	26.0	26.0	
Effective Green, g (s)		55.0	55.0					20.5	20.5	26.0	26.0	
Actuated g/C Ratio		0.61	0.61					0.23	0.23	0.29	0.29	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1987	860					379	316	180	490	
v/s Ratio Prot								c0.19		0.00	c0.11	
v/s Ratio Perm		0.44	0.23						0.04	0.02		
v/c Ratio		0.72	0.38					0.82	0.17	0.09	0.39	
Uniform Delay, d1		12.2	8.9					33.0	27.9	30.9	25.6	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.3	1.3					12.8	0.3	0.2	0.5	
Delay (s)		14.6	10.1					45.8	28.2	31.1	26.1	
Level of Service		B	B					D	C	C	C	
Approach Delay (s)		13.6			0.0			40.2			26.5	
Approach LOS		B			A			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.5					HCM 2000 Level of Service		B		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			90.0					Sum of lost time (s)		13.5		
Intersection Capacity Utilization			67.2%					ICU Level of Service		C		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

07/13/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1322	372	0	0	0	0	298	140	15	182	0
Future Volume (veh/h)	60	1322	372	0	0	0	0	298	140	15	182	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723				0	1527	1527	1709	1709	0
Adj Flow Rate, veh/h	62	1377	0				0	310	146	16	190	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				0	2	2	3	3	0
Cap, veh/h	83	1941					0	348	293	117	506	0
Arrive On Green	0.60	0.60	0.00				0.00	0.23	0.23	0.02	0.30	0.00
Sat Flow, veh/h	138	3214	1460				0	1527	1286	1628	1709	0
Grp Volume(v), veh/h	771	668	0				0	310	146	16	190	0
Grp Sat Flow(s),veh/h/ln	1716	1637	1460				0	1527	1286	1628	1709	0
Q Serve(g_s), s	29.1	24.6	0.0				0.0	17.7	8.9	0.0	7.9	0.0
Cycle Q Clear(g_c), s	29.1	24.6	0.0				0.0	17.7	8.9	0.0	7.9	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1036	988					0	348	293	117	506	0
V/C Ratio(X)	0.74	0.68					0.00	0.89	0.50	0.14	0.38	0.00
Avail Cap(c_a), veh/h	1036	988					0	399	336	178	627	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.8	11.9	0.0				0.0	33.7	30.3	43.2	25.1	0.0
Incr Delay (d2), s/veh	4.8	3.7	0.0				0.0	19.6	1.3	0.5	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	9.2	0.0				0.0	8.1	2.7	0.4	3.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.7	15.6	0.0				0.0	53.3	31.6	43.7	25.5	0.0
LnGrp LOS	B	B					A	D	C	D	C	A
Approach Vol, veh/h		1439	A					456			206	
Approach Delay, s/veh		16.7						46.3			27.0	
Approach LOS		B						D			C	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		58.8	6.1	25.0				31.2				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		48.0	5.0	23.5				33.0				
Max Q Clear Time (g_c+I1), s		31.1	2.0	19.7				9.9				
Green Ext Time (p_c), s		9.9	0.0	0.8				1.1				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			24.2									
HCM 6th LOS			C									
<b>Notes</b>												
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

07/13/2021

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰↱			↰	↱
Traffic Vol, veh/h	5	43	60	36	36	25	71	325	65	24	356	16
Future Vol, veh/h	5	43	60	36	36	25	71	325	65	24	356	16
Conflicting Peds, #/hr	6	0	0	0	0	6	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	1	1	1
Mvmt Flow	5	44	62	37	37	26	73	335	67	25	367	16
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	969	965	367	993	948	375	383	0	0	402	0	0
Stage 1	417	417	-	515	515	-	-	-	-	-	-	-
Stage 2	552	548	-	478	433	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.12	-	-	4.11	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.218	-	-	2.209	-	-
Pot Cap-1 Maneuver	232	254	676	223	260	669	1175	-	-	1162	-	-
Stage 1	611	590	-	541	533	-	-	-	-	-	-	-
Stage 2	516	515	-	566	580	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	179	227	676	159	232	665	1175	-	-	1162	-	-
Mov Cap-2 Maneuver	179	227	-	159	232	-	-	-	-	-	-	-
Stage 1	562	574	-	497	490	-	-	-	-	-	-	-
Stage 2	419	473	-	462	564	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	17.6		29.4		1.3		0.5					
HCM LOS	C		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1175	-	-	221	676	189	665	1162	-	-		
HCM Lane V/C Ratio	0.062	-	-	0.224	0.092	0.393	0.039	0.021	-	-		
HCM Control Delay (s)	8.3	0	-	25.9	10.9	35.9	10.6	8.2	0	-		
HCM Lane LOS	A	A	-	D	B	E	B	A	A	-		
HCM 95th %tile Q(veh)	0.2	-	-	0.8	0.3	1.7	0.1	0.1	-	-		






# HCM 6th TWSC

## 3: Highway 211 & Bornstedt Road

07/13/2021

### Intersection

Int Delay, s/veh 5.7

Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	52	151	309	73	215	238
Future Vol, veh/h	52	151	309	73	215	238
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	54	157	322	76	224	248

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1018	322	0
Stage 1	322	-	-
Stage 2	696	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	263	719	-
Stage 1	735	-	-
Stage 2	495	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	215	719	-
Mov Cap-2 Maneuver	215	-	-
Stage 1	735	-	-
Stage 2	405	-	-

Approach	NB	NE	SW
HCM Control Delay, s	20	0	4.1
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	449	1238	-
HCM Lane V/C Ratio	-	-	0.471	0.181	-
HCM Control Delay (s)	-	-	20	8.5	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.7	-

# Trip Generation Calculation Worksheet



Land Use Description: Single-Family Detached Housing

ITE Land Use Code: 210

Independent Variable: Dwelling Units

Quantity: 43 Dwelling Units

## Summary of ITE Trip Generation Data

### **AM Peak Hour of Adjacent Street Traffic**

Trip Rate: 0.74 trips per dwelling unit

Directional Distribution: 25% Entering 75% Exiting

### **PM Peak Hour of Adjacent Street Traffic**

Trip Rate: 0.99 trips per dwelling unit

Directional Distribution: 63% Entering 37% Exiting

### **Total Weekday Traffic**

Trip Rate: 9.44 trips per dwelling unit

Directional Distribution: 50% Entering 50% Exiting

## Site Trip Generation Calculations

43 Dwelling Units

	Entering	Exiting	Total
AM Peak Hour	8	24	32
PM Peak Hour	27	16	43
Weekday	203	203	406



# Trip Generation Calculation Worksheet



Land Use Description: Single-Family Attached Housing  
ITE Land Use Code: 215  
Independent Variable: Dwelling Units  
Quantity: 86 Dwelling Units  
Setting: General Urban/Suburban and Rural

## Summary of ITE Trip Generation Data

### **AM Peak Hour of Adjacent Street Traffic**

Trip Rate: 0.48 trips per dwelling unit  
Directional Distribution: 31% Entering 69% Exiting

### **PM Peak Hour of Adjacent Street Traffic**

Trip Rate: 0.57 trips per dwelling unit  
Directional Distribution: 57% Entering 43% Exiting

### **Total Weekday Traffic**

Trip Rate: 7.2 trips per dwelling unit  
Directional Distribution: 50% Entering 50% Exiting

## Site Trip Generation Calculations

86 Dwelling Units

	Entering	Exiting	Total
AM Peak Hour	13	28	41
PM Peak Hour	28	21	49
Weekday	310	310	620

Site id	HWY	MP	DIR	HS	Description	2017	2018	2019	2039	RSQ
1760	026	9.96	1		0.09 mile east of SE 174th Avenue, west city limits of Gresham		20100		20900	MODEL
26003	026	14.36	1		Gresham Automatic Traffic Recorder, Sta. 26-003, 0.18 mile southeast of SE Powell Valley Road		33400		42900	MODEL
1774	026	14.80	1		0.05 mile south of SE Palmquist Road		28500		36100	MODEL
1775	026	18.30	1		0.05 mile northwest of SE Haley Road		25600		37100	MODEL
1776	026	19.24	1		0.30 mile northwest of Clackamas-Boring Highway (OR212)		25500		36900	MODEL
22590	026	20.60	1		0.50 mile northwest of SE Kelso Road		30300		43400	MODEL
1777	026	21.40	1		0.30 mile southeast of SE Kelso Road		30300		42500	MODEL
1778	026	22.72	1		0.02 mile northwest of SE 362nd Drive, west city limits of Sandy		33700		47300	MODEL
1779	026	23.85	1		0.02 mile west of Bluff Road		33300		47100	MODEL
1780	026	23.89	1		0.02 mile east of Bluff Road		15700		22400	MODEL
1781	026	24.02	1		0.02 mile west of Beers Avenue		16200		23100	MODEL
1782	026	24.35	1		0.05 mile west of Eagle Creek-Sandy Highway (OR211)		16000		23400	MODEL
1783	026	24.42	1		0.02 mile east of Eagle Creek-Sandy Highway (OR211)		12400		17700	MODEL
1784	026	24.59	1		0.02 mile west of Ten Eyck Road		12500		17800	MODEL
1785	026	23.89	2		0.02 mile east of Bluff Road		16600		23300	MODEL
1786	026	24.04	2		0.02 mile west of Beers Avenue		18300		25600	MODEL
1787	026	24.36	2		0.05 mile west of Eagle Creek-Sandy Highway (OR211)		15900		22700	MODEL
1788	026	24.40	2		0.02 mile east of Eagle Creek-Sandy Highway (OR211)		13700		19200	MODEL
1789	026	24.61	2		0.02 mile west of Ten Eyck Road		12600		17600	MODEL
1790	026	25.10	1		0.02 mile west of Langensand Road		20700		29200	MODEL
1791	026	25.66	1		0.10 mile east of Vista Loop Drive		23500		32900	MODEL
1792	026	26.76	1		0.10 mile west of SE Firwood Road		19000		26600	MODEL
1793	026	26.93	1		0.07 mile east of SE Firwood Road		17800		25200	MODEL
1794	026	29.66	1		0.23 mile west of Wagoneer Loop Drive (East Jct.)		16500		23400	MODEL
1795	026	34.87	1		0.10 mile west of E Sleepy Hollow Drive		15000		21500	MODEL

FIGURE 7

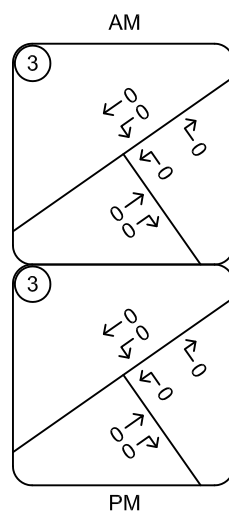
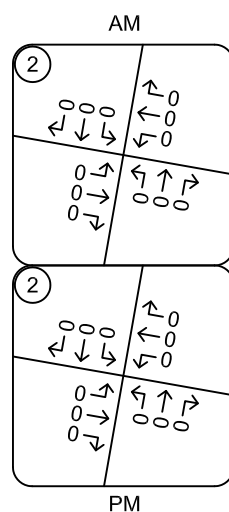
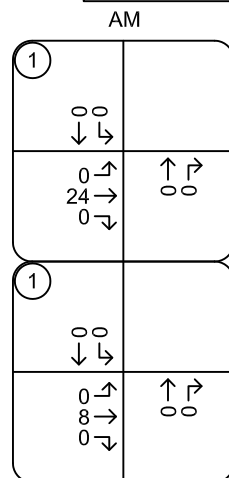
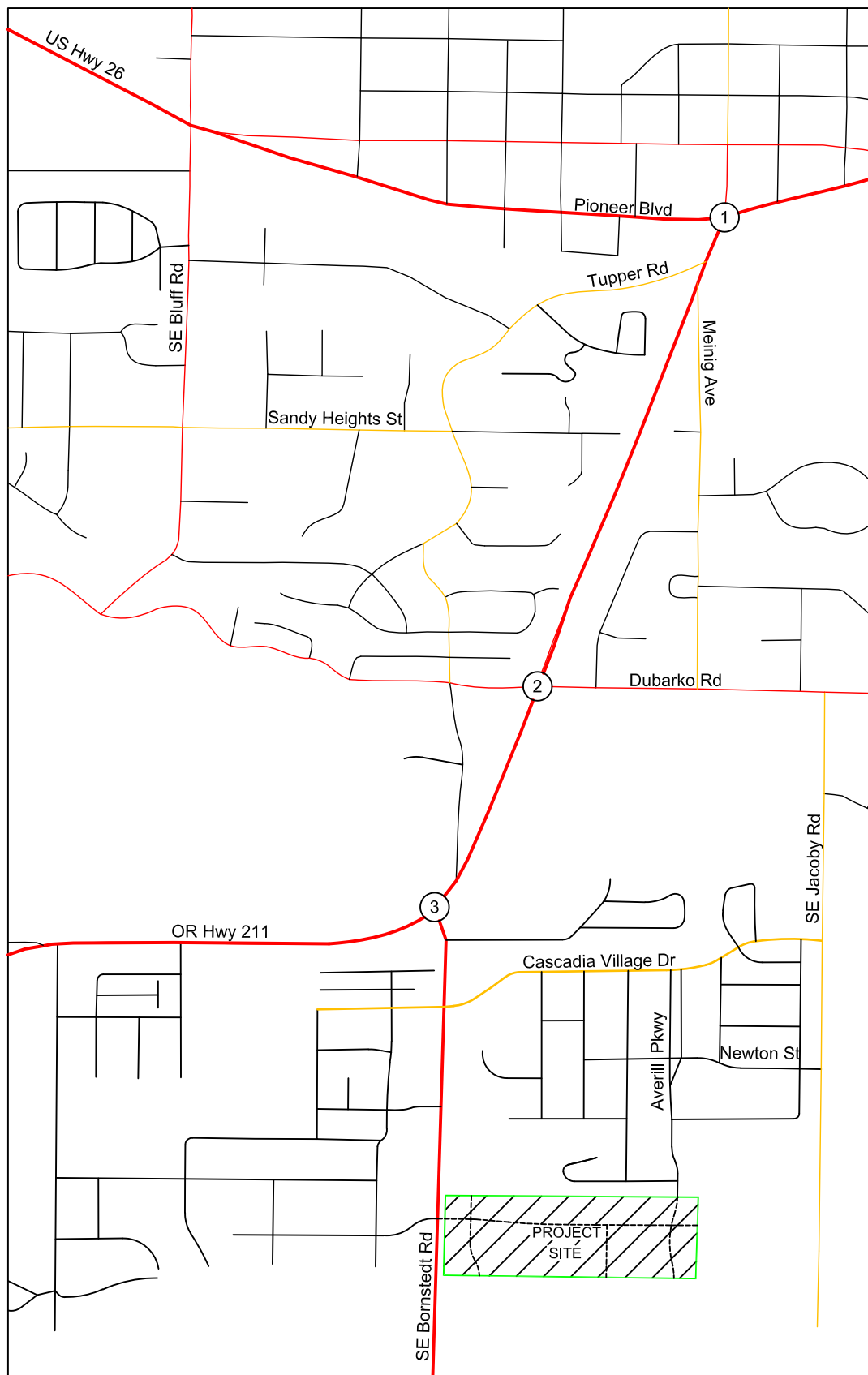
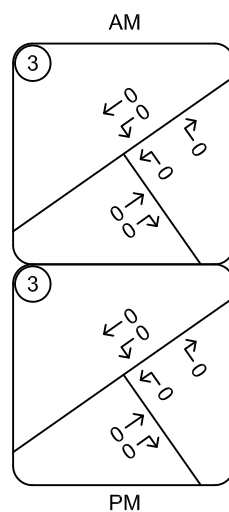
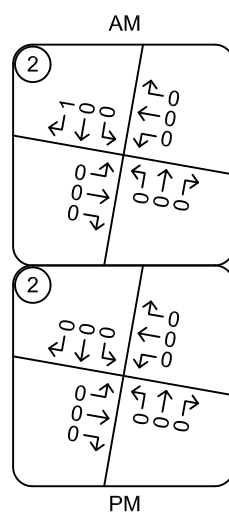
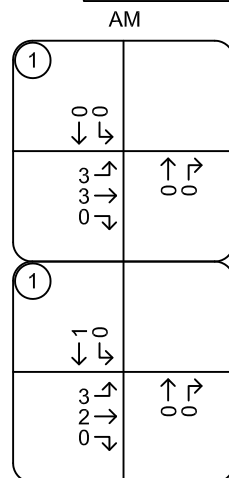
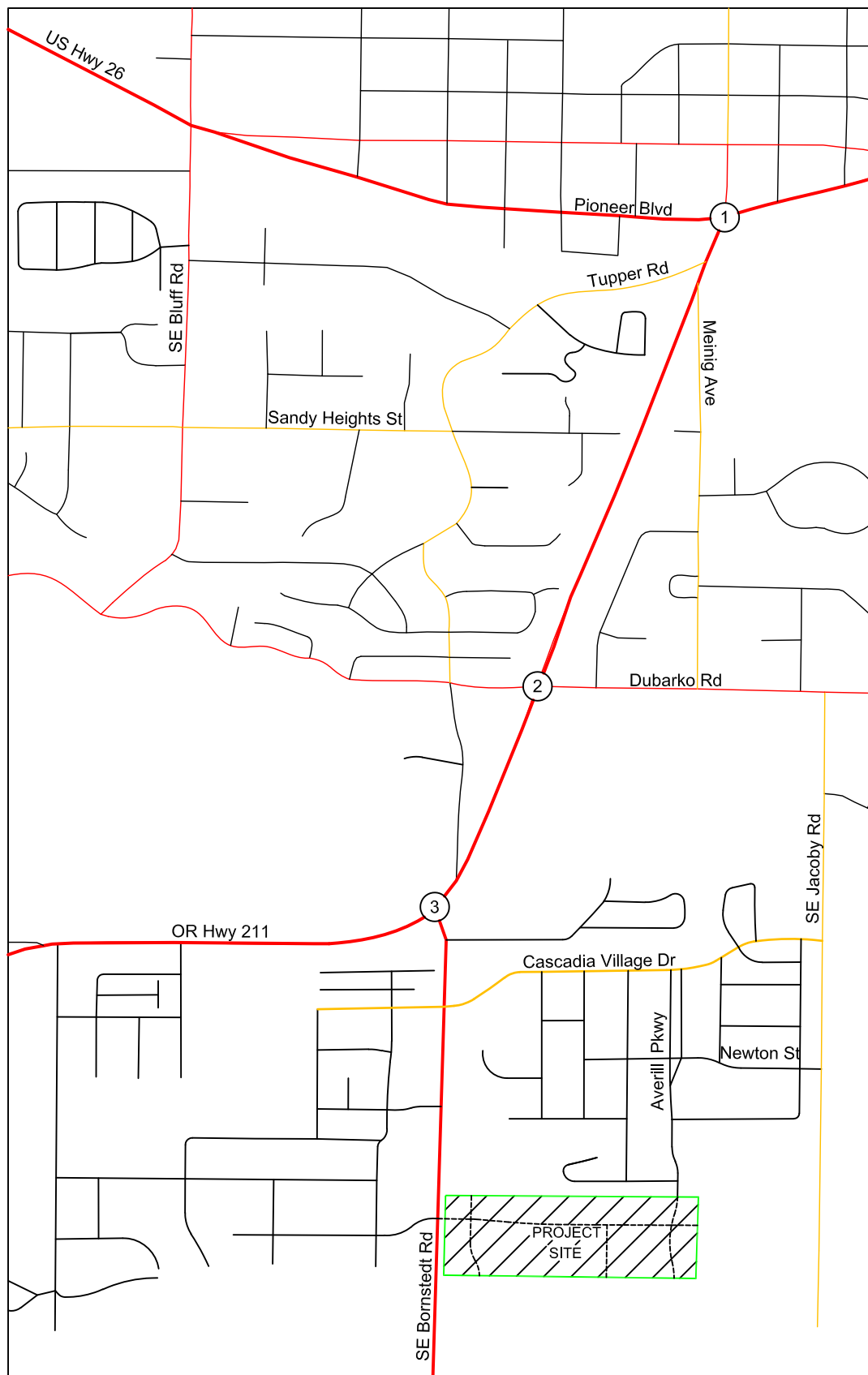
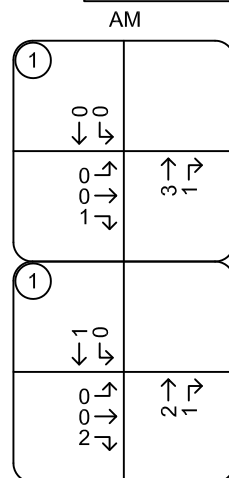
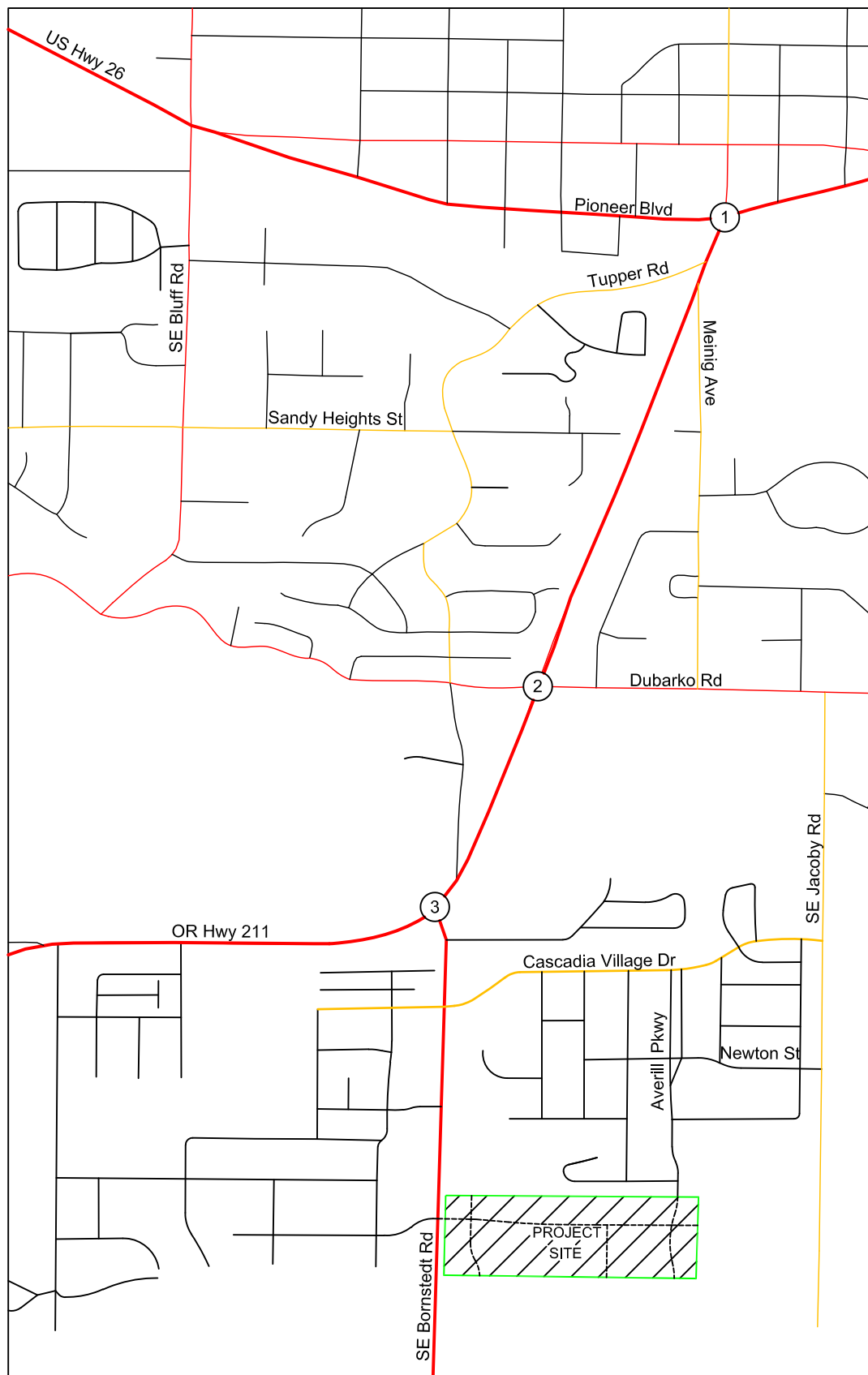


FIGURE 8

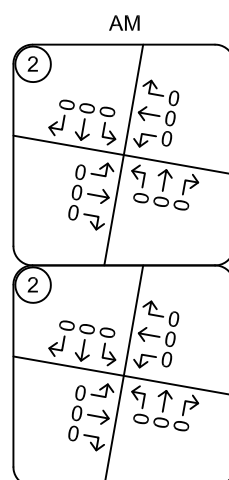


TRAFFIC VOLUMES  
Mt. Hood Senior Living Development - Site Trips  
Morning and Evening Peak Hours

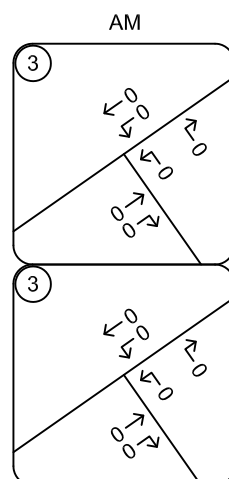
FIGURE 9



PM



PM

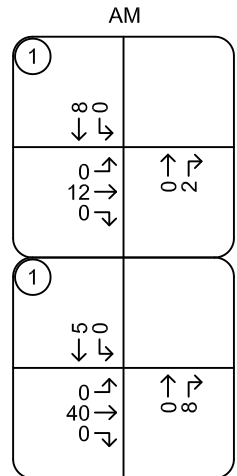
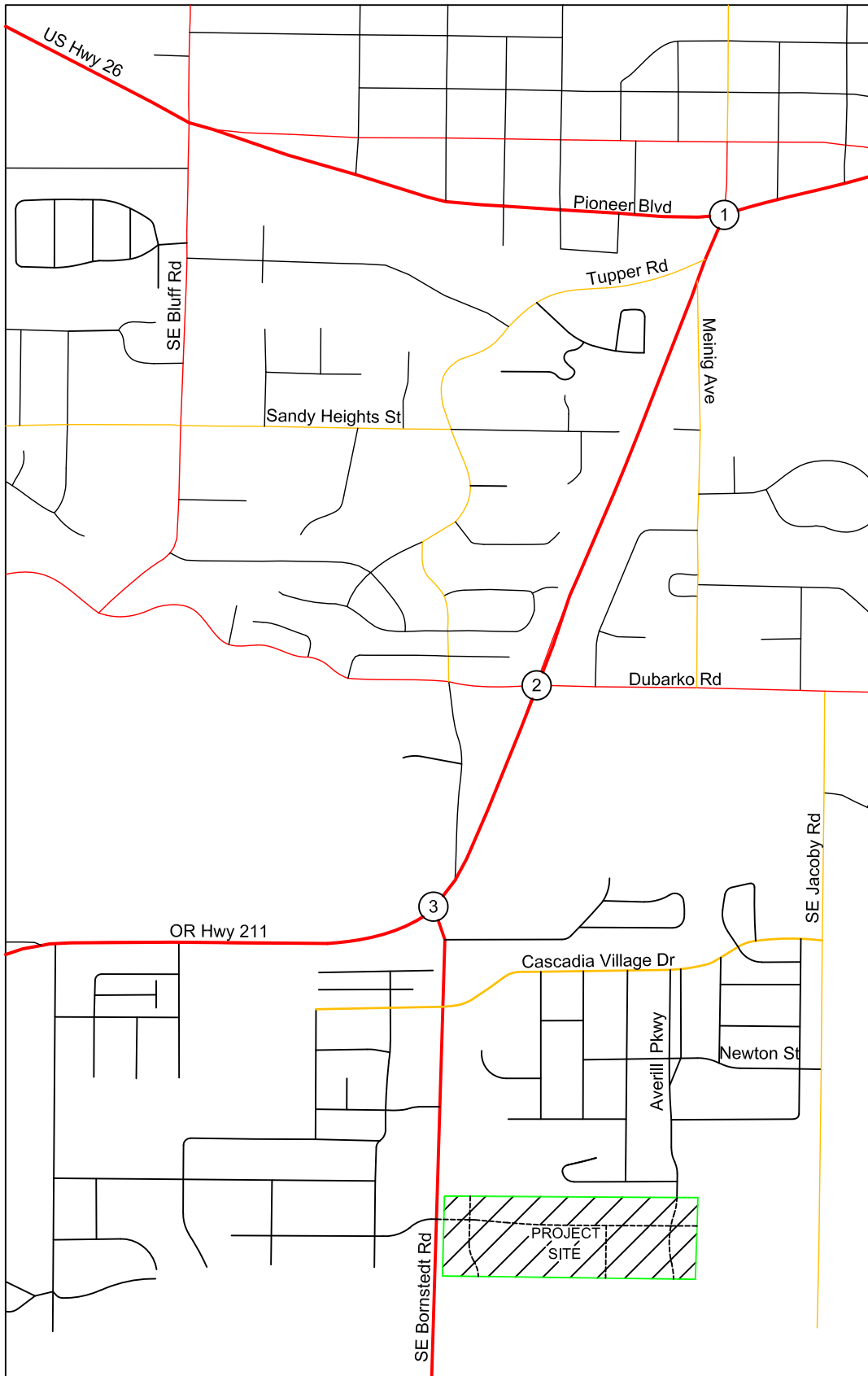


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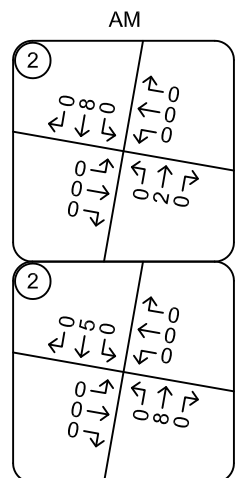


**TRAFFIC VOLUMES**  
The Pad Development - Site Trips  
Morning and Evening Peak Hours

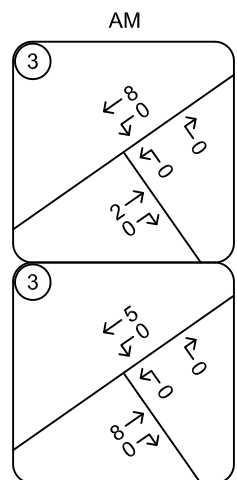
FIGURE 10



PM



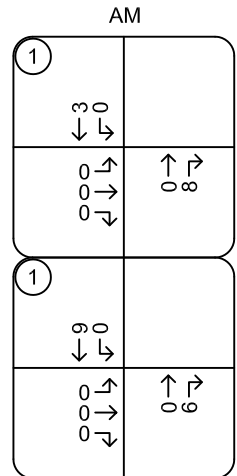
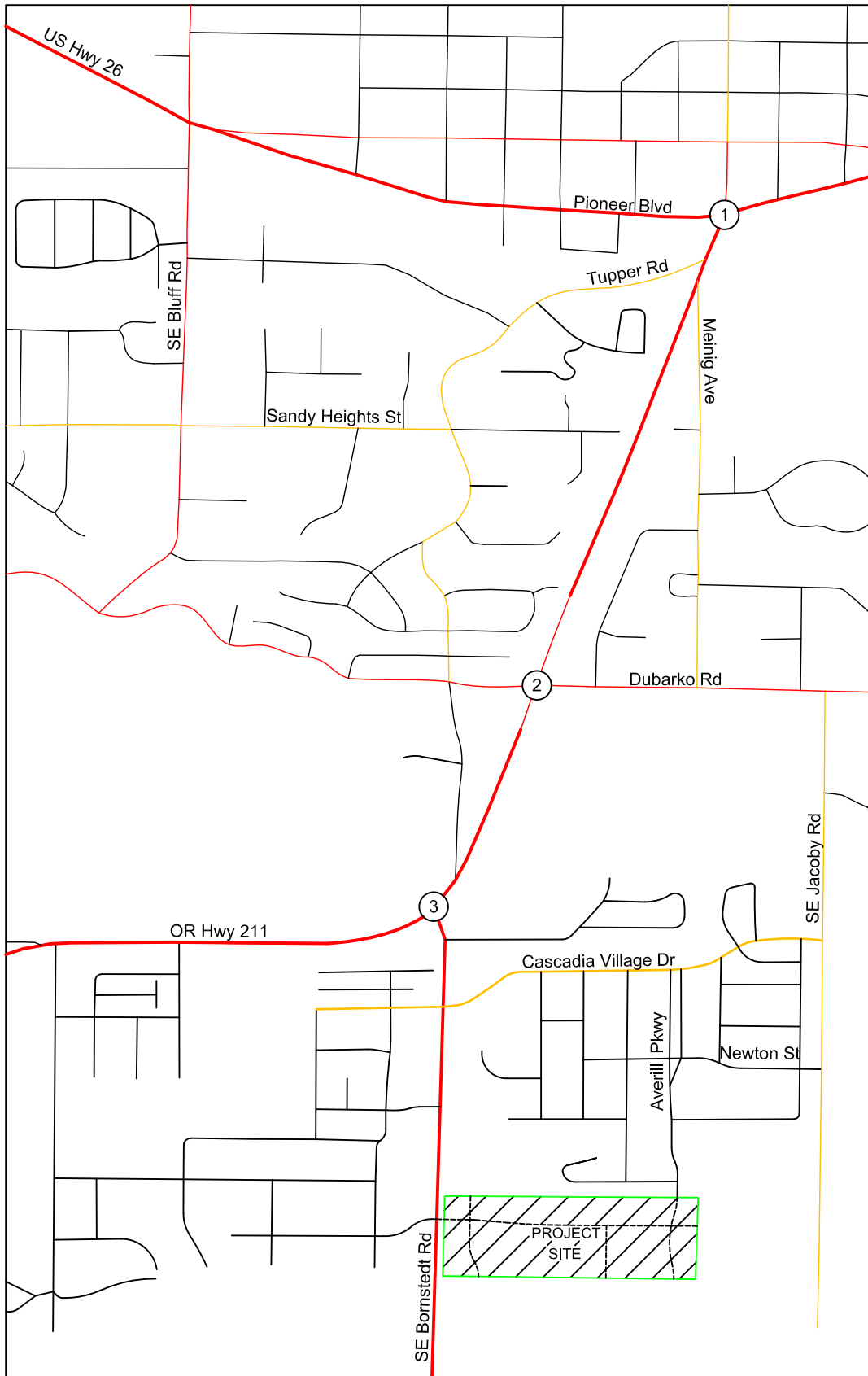
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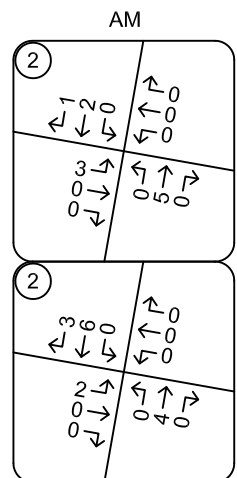
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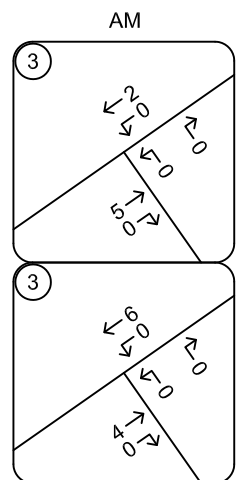
FIGURE 11



PM



PM

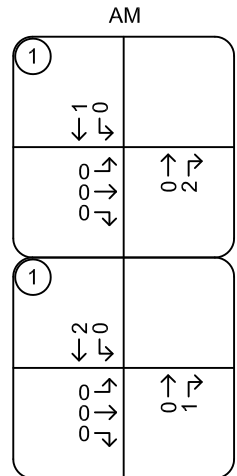
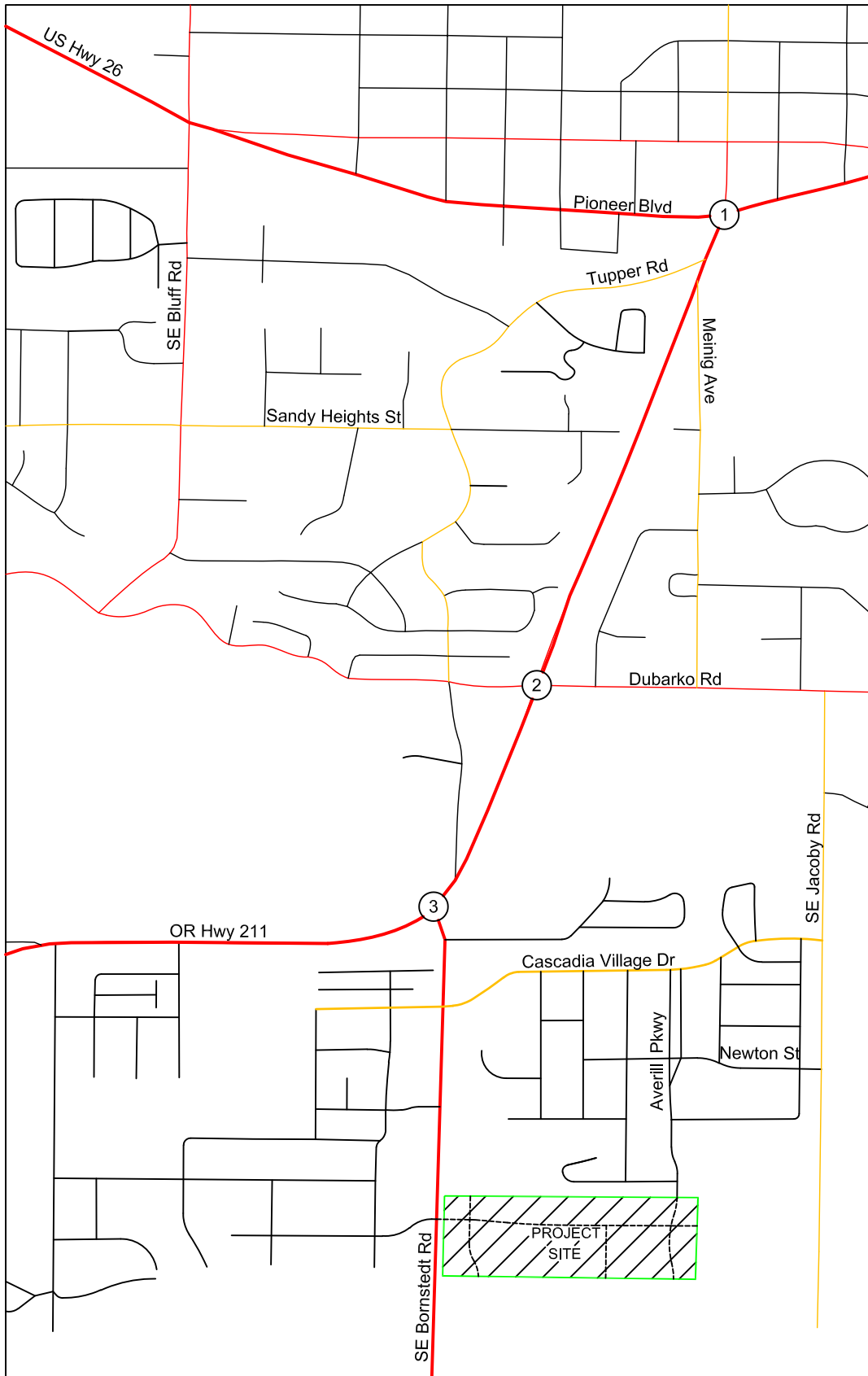


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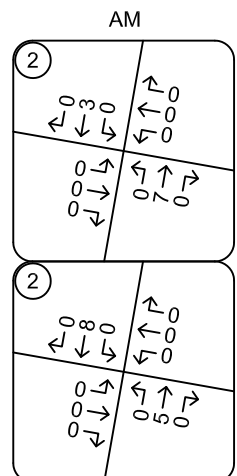


**TRAFFIC VOLUMES**  
 Shaylee Meadows - Site Trips  
 Morning and Evening Peak Hours

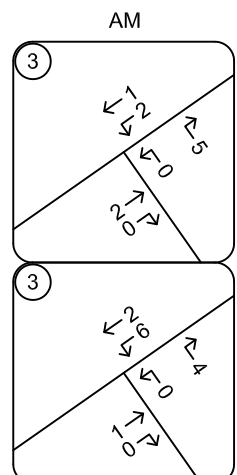
FIGURE 12



PM



PM



PM



TRAFFIC VOLUMES  
Mt. View Ridge / Marshall Ridge - Site Trips  
Morning and Evening Peak Hours



FIGURE 13

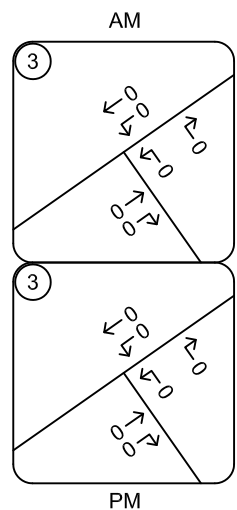
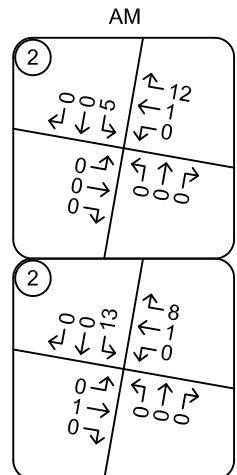
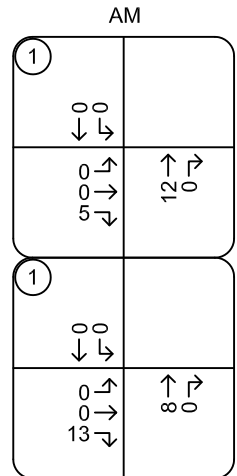
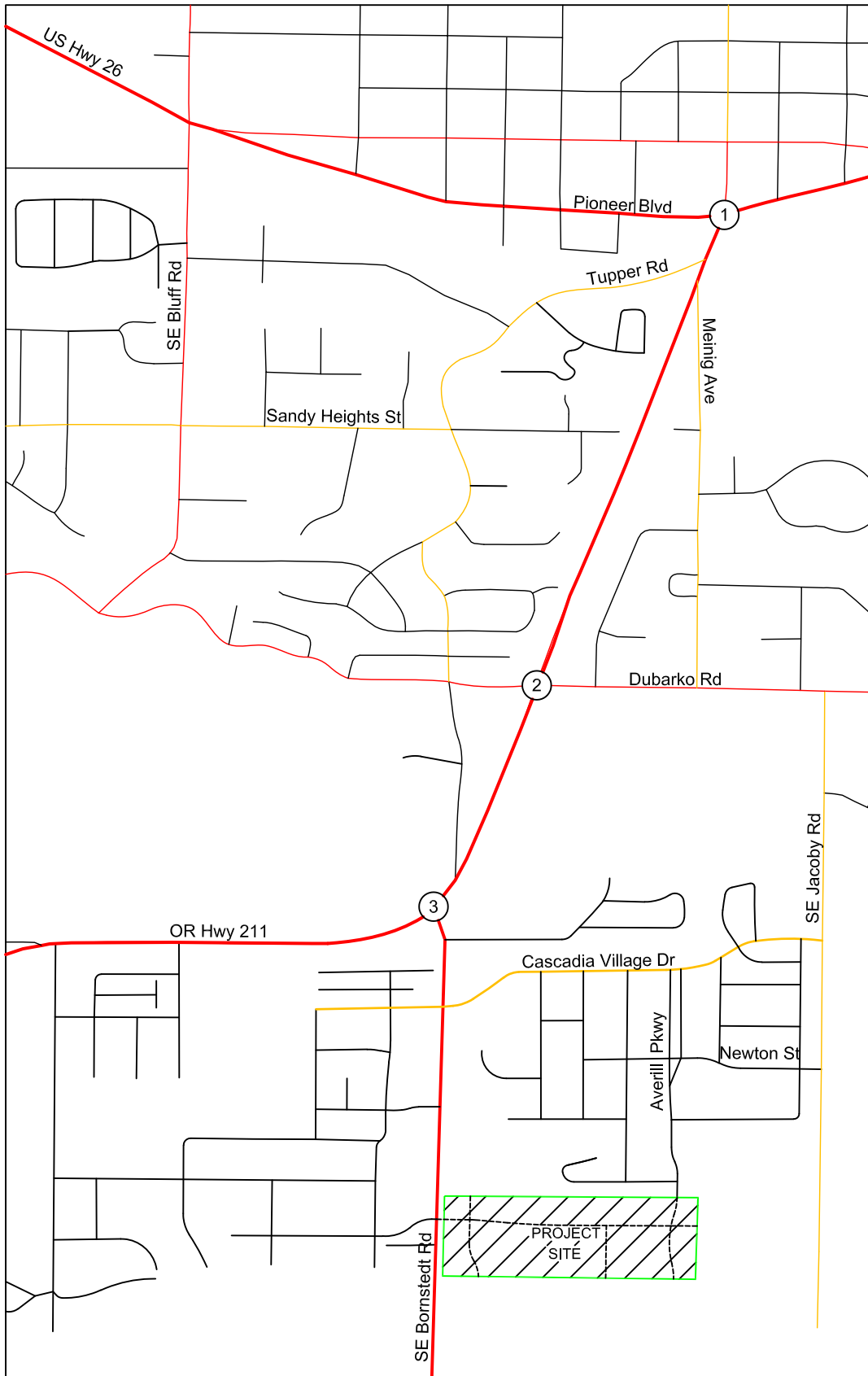


FIGURE 14

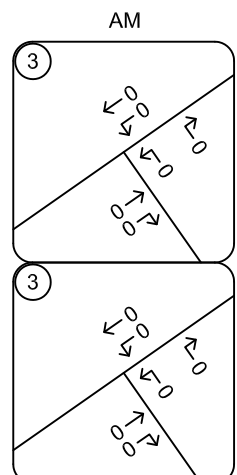
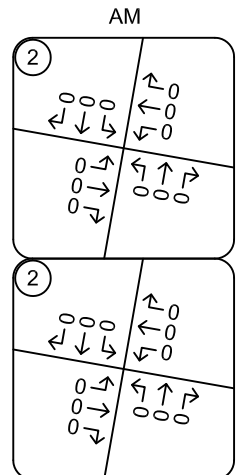
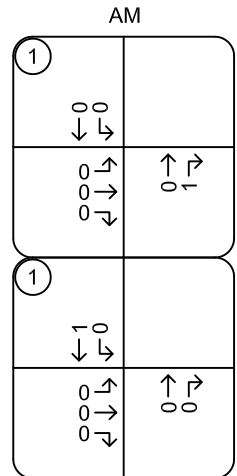
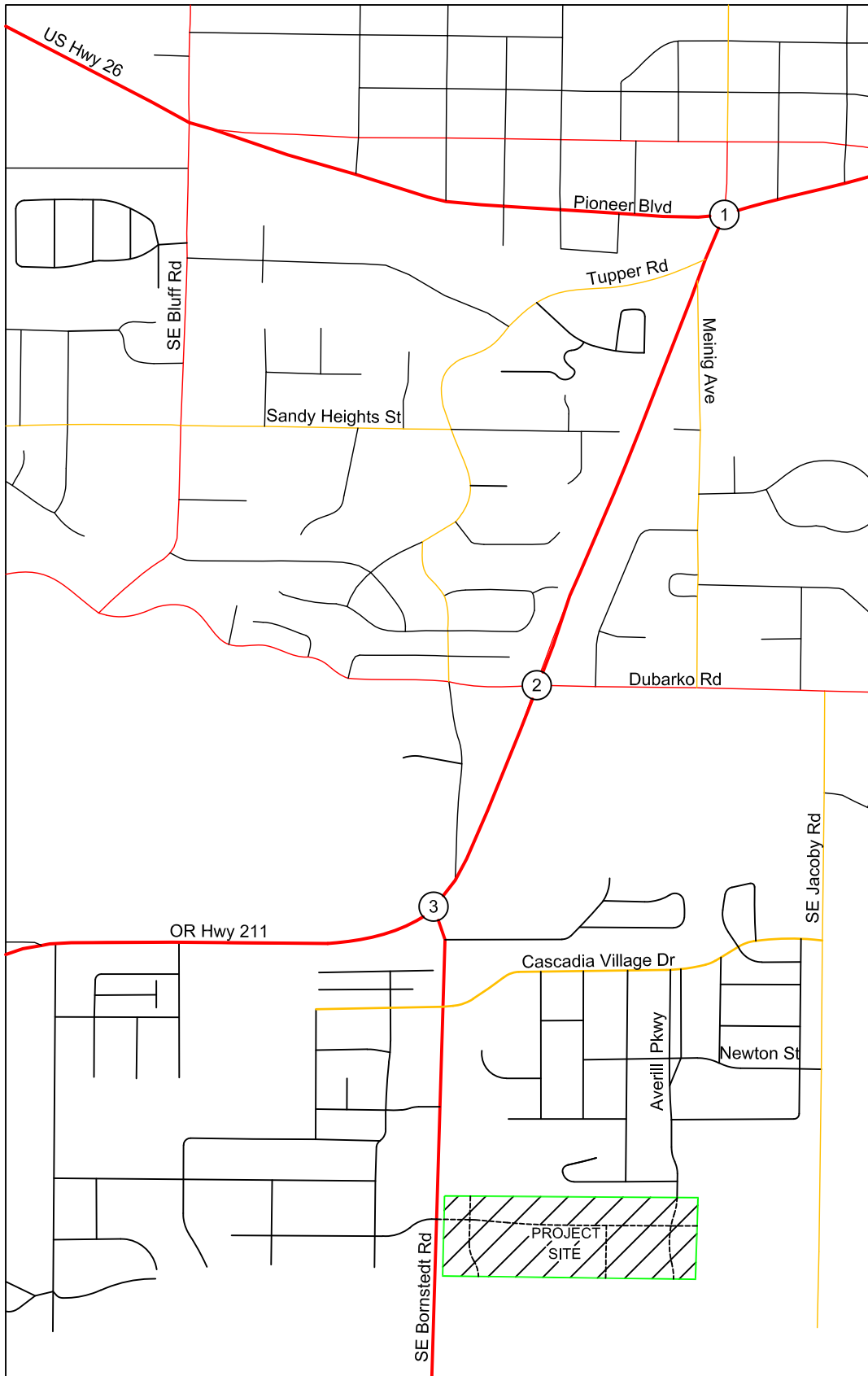
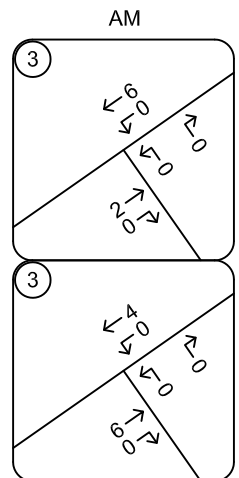
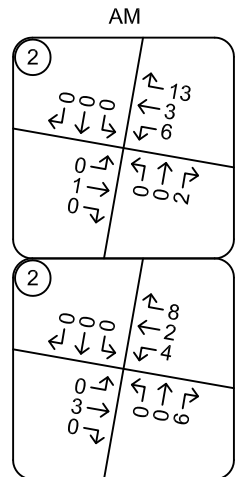
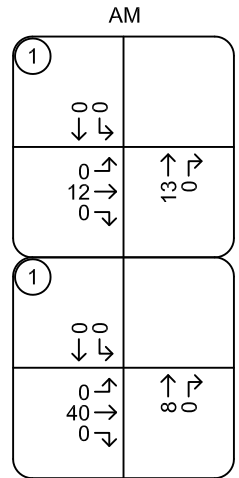
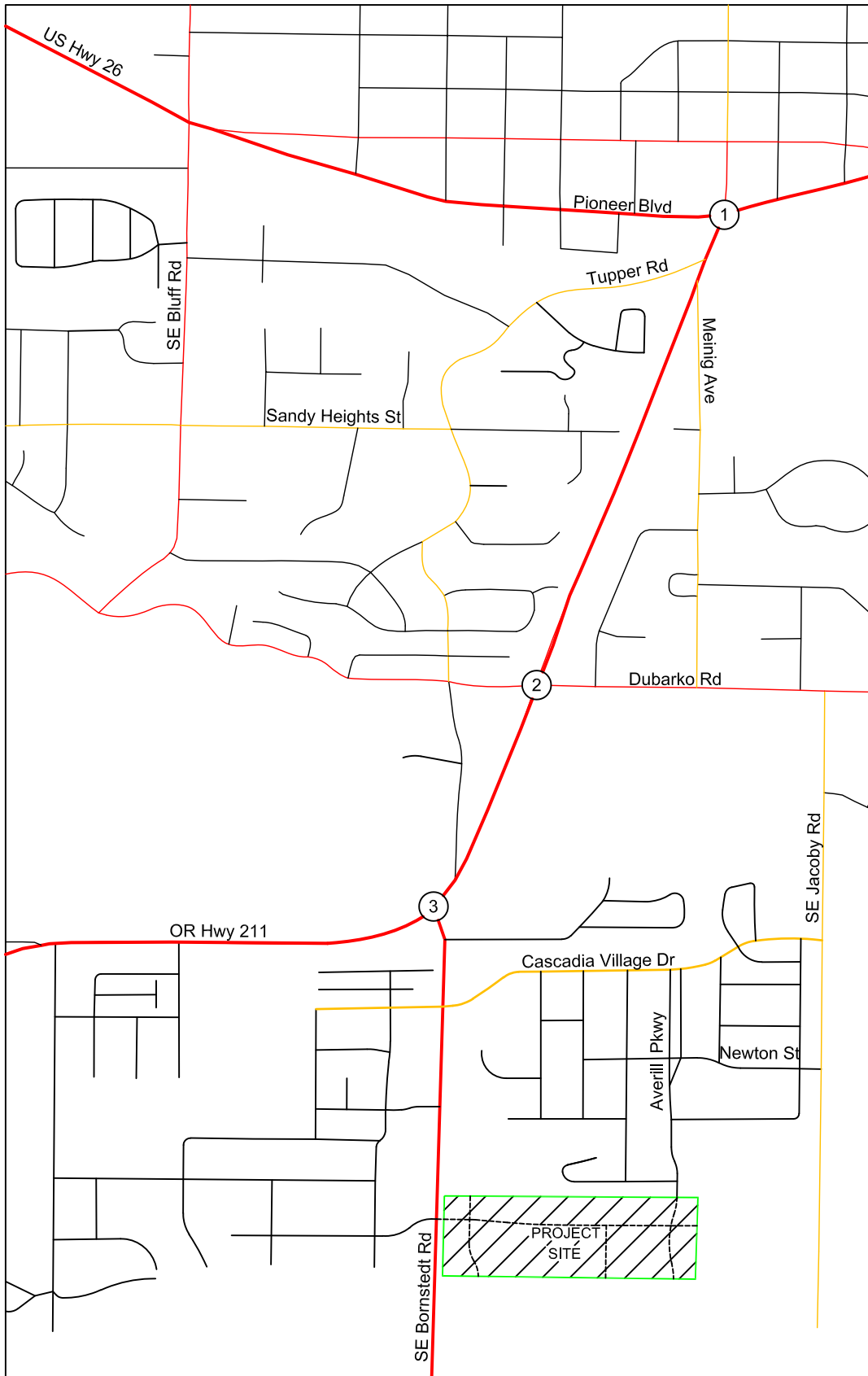




















FIGURE 15



# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd



















04/28/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	860	157	0	0	0	0	362	137	17	110	0
Future Volume (vph)	39	860	157	0	0	0	0	362	137	17	110	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		2962	1328					1617	1350	1525	1606	
Flt Permitted		1.00	1.00					1.00	1.00	0.22	1.00	
Satd. Flow (perm)		2962	1328					1617	1350	349	1606	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	44	966	176	0	0	0	0	407	154	19	124	0
RTOR Reduction (vph)	0	0	41	0	0	0	0	0	98	0	0	0
Lane Group Flow (vph)	0	1010	135	0	0	0	0	407	56	19	124	0
Confl. Peds. (#/hr)	1								4			
Heavy Vehicles (%)	12%	12%	12%	0%	0%	0%	5%	5%	5%	9%	9%	9%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		47.5	47.5					27.0	27.0	33.5	33.5	
Effective Green, g (s)		47.5	47.5					27.0	27.0	33.5	33.5	
Actuated g/C Ratio		0.53	0.53					0.30	0.30	0.37	0.37	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1563	700					485	405	156	597	
v/s Ratio Prot								c0.25		0.00	c0.08	
v/s Ratio Perm		0.34	0.10						0.04	0.04		
v/c Ratio		0.65	0.19					0.84	0.14	0.12	0.21	
Uniform Delay, d1		15.2	11.2					29.5	23.0	19.9	19.2	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.1	0.6					12.1	0.2	0.4	0.2	
Delay (s)		17.3	11.8					41.6	23.2	20.2	19.4	
Level of Service		B	B					D	C	C	B	
Approach Delay (s)		16.5			0.0			36.5			19.5	
Approach LOS		B			A			D			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		22.7										
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		90.0										
Intersection Capacity Utilization		55.2%										
Analysis Period (min)		15										
c Critical Lane Group												

# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

04/28/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	860	157	0	0	0	0	362	137	17	110	0
Future Volume (veh/h)	39	860	157	0	0	0	0	362	137	17	110	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No					No			No		
Adj Sat Flow, veh/h/ln	1586	1586	1586				0	1486	1486	1627	1627	0
Adj Flow Rate, veh/h	44	966	0				0	407	154	19	124	0
Peak Hour Factor	0.89	0.89	0.89				0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	12	12	12				0	5	5	9	9	0
Cap, veh/h	68	1560					0	449	378	141	607	0
Arrive On Green	0.53	0.53	0.00				0.00	0.30	0.30	0.02	0.37	0.00
Sat Flow, veh/h	129	2958	1344				0	1486	1251	1550	1627	0
Grp Volume(v), veh/h	541	469	0				0	407	154	19	124	0
Grp Sat Flow(s),veh/h/ln	1580	1507	1344				0	1486	1251	1550	1627	0
Q Serve(g_s), s	22.1	19.2	0.0				0.0	23.7	8.8	0.7	4.7	0.0
Cycle Q Clear(g_c), s	22.1	19.2	0.0				0.0	23.7	8.8	0.7	4.7	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	833	794					0	449	378	141	607	0
V/C Ratio(X)	0.65	0.59					0.00	0.91	0.41	0.13	0.20	0.00
Avail Cap(c_a), veh/h	833	794					0	520	438	195	741	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	15.3	14.6	0.0				0.0	30.2	25.0	23.3	19.2	0.0
Incr Delay (d2), s/veh	3.9	3.2	0.0				0.0	18.1	0.7	0.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	7.0	0.0				0.0	10.2	2.6	0.3	1.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.2	17.8	0.0				0.0	48.3	25.7	23.7	19.3	0.0
LnGrp LOS	B	B					A	D	C	C	B	A
Approach Vol, veh/h		1010	A					561			143	
Approach Delay, s/veh		18.6						42.1			19.9	
Approach LOS		B						D			B	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		52.0	6.4	31.7				38.0				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		40.0	5.0	31.5				41.0				
Max Q Clear Time (g_c+I1), s		24.1	2.7	25.7				6.7				
Green Ext Time (p_c), s		6.4	0.0	1.5				0.7				
Intersection Summary												
HCM 6th Ctrl Delay			26.4									
HCM 6th LOS			C									
Notes												
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

04/28/2022

Intersection												
Int Delay, s/veh	6.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	↔
Traffic Vol, veh/h	7	12	51	46	54	74	29	314	14	13	198	3
Future Vol, veh/h	7	12	51	46	54	74	29	314	14	13	198	3
Conflicting Peds, #/hr	2	0	2	2	0	2	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	4	4	4	5	5	5	4	4	4
Mvmt Flow	9	15	65	59	69	95	37	403	18	17	254	4

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	860	787	258	820	782	416	260	0	0	423	0	0
Stage 1	290	290	-	488	488	-	-	-	-	-	-	-
Stage 2	570	497	-	332	294	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.14	6.54	6.24	4.15	-	-	4.14	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.536	4.036	3.336	2.245	-	-	2.236	-	-
Pot Cap-1 Maneuver	273	320	773	292	324	632	1287	-	-	1126	-	-
Stage 1	711	667	-	558	547	-	-	-	-	-	-	-
Stage 2	501	540	-	677	666	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	183	301	770	245	305	630	1285	-	-	1124	-	-
Mov Cap-2 Maneuver	183	301	-	245	305	-	-	-	-	-	-	-
Stage 1	683	654	-	536	525	-	-	-	-	-	-	-
Stage 2	355	518	-	593	653	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	13.2		21.8		0.6		0.5	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1285	-	-	243	770	274	630	1124	-	-
HCM Lane V/C Ratio	0.029	-	-	0.1	0.085	0.468	0.151	0.015	-	-
HCM Control Delay (s)	7.9	0	-	21.5	10.1	29.2	11.7	8.3	0	-
HCM Lane LOS	A	A	-	C	B	D	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.3	2.3	0.5	0	-	-






# HCM 6th TWSC

## 3: Highway 211 & Bornstedt Road

04/28/2022

### Intersection

Int Delay, s/veh 7.4

Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	74	206	153	16	99	196
Future Vol, veh/h	74	206	153	16	99	196
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	9	9	4	4
Mvmt Flow	91	254	189	20	122	242

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	675	189	0
Stage 1	189	-	-
Stage 2	486	-	-
Critical Hdwy	6.43	6.23	-
Critical Hdwy Stg 1	5.43	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.527	3.327	-
Pot Cap-1 Maneuver	418	850	-
Stage 1	841	-	-
Stage 2	616	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	381	850	-
Mov Cap-2 Maneuver	381	-	-
Stage 1	841	-	-
Stage 2	561	-	-



















Approach	NB	NE	SW
HCM Control Delay, s	17	0	2.6
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	641	1373	-
HCM Lane V/C Ratio	-	-	0.539	0.089	-
HCM Control Delay (s)	-	-	17	7.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	3.2	0.3	-

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

04/28/2022

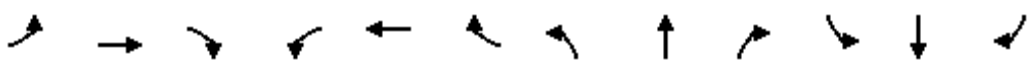
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	1498	410	0	0	0	0	334	165	16	212	0
Future Volume (vph)	67	1498	410	0	0	0	0	334	165	16	212	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	0.97					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3252	1408					1664	1391	1614	1699	
Flt Permitted		1.00	1.00					1.00	1.00	0.21	1.00	
Satd. Flow (perm)		3252	1408					1664	1391	352	1699	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	70	1560	427	0	0	0	0	348	172	17	221	0
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	79	0	0	0
Lane Group Flow (vph)	0	1630	360	0	0	0	0	348	93	17	221	0
Confl. Peds. (#/hr)	2		6						3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		52.8	52.8					21.7	21.7	28.2	28.2	
Effective Green, g (s)		52.8	52.8					21.7	21.7	28.2	28.2	
Actuated g/C Ratio		0.59	0.59					0.24	0.24	0.31	0.31	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1907	826					401	335	138	532	
v/s Ratio Prot								c0.21		0.00	c0.13	
v/s Ratio Perm		0.50	0.26						0.07	0.04		
v/c Ratio		0.85	0.44					0.87	0.28	0.12	0.42	
Uniform Delay, d1		15.4	10.3					32.8	27.8	23.0	24.4	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.1	1.7					17.6	0.5	0.4	0.5	
Delay (s)		20.6	12.0					50.4	28.2	23.4	24.9	
Level of Service		C	B					D	C	C	C	
Approach Delay (s)		18.8			0.0			43.1			24.8	
Approach LOS		B			A			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.8									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			90.0							13.5		
Intersection Capacity Utilization			74.2%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												



# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

04/28/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔					↔	↔	↔	↔	
Traffic Volume (veh/h)	67	1498	410	0	0	0	0	334	165	16	212	0
Future Volume (veh/h)	67	1498	410	0	0	0	0	334	165	16	212	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723				0	1527	1527	1709	1709	0
Adj Flow Rate, veh/h	70	1560	0				0	348	172	17	221	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				0	2	2	3	3	0
Cap, veh/h	81	1903					0	365	307	123	527	0
Arrive On Green	0.59	0.59	0.00				0.00	0.24	0.24	0.02	0.31	0.00
Sat Flow, veh/h	138	3215	1460				0	1527	1286	1628	1709	0
Grp Volume(v), veh/h	873	757	0				0	348	172	17	221	0
Grp Sat Flow(s),veh/h/ln	1716	1637	1460				0	1527	1286	1628	1709	0
Q Serve(g_s), s	38.1	31.6	0.0				0.0	20.2	10.6	0.7	9.2	0.0
Cycle Q Clear(g_c), s	38.1	31.6	0.0				0.0	20.2	10.6	0.7	9.2	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1016	969					0	365	307	123	527	0
V/C Ratio(X)	0.86	0.78					0.00	0.95	0.56	0.14	0.42	0.00
Avail Cap(c_a), veh/h	1016	969					0	365	307	182	589	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	15.3	13.9	0.0				0.0	33.8	30.1	26.4	24.7	0.0
Incr Delay (d2), s/veh	9.5	6.2	0.0				0.0	35.1	2.3	0.5	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.1	12.3	0.0				0.0	10.6	3.3	0.3	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.7	20.2	0.0				0.0	68.9	32.4	26.9	25.3	0.0
LnGrp LOS	C	C					A	E	C	C	C	A
Approach Vol, veh/h		1630	A					520			238	
Approach Delay, s/veh		22.6						56.8			25.4	
Approach LOS		C						E			C	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		57.8	6.2	26.0				32.2				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		50.0	5.0	21.5				31.0				
Max Q Clear Time (g_c+I1), s		40.1	2.7	22.2				11.2				
Green Ext Time (p_c), s		7.4	0.0	0.0				1.2				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			30.3									
HCM 6th LOS			C									
<b>Notes</b>												
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

04/28/2022

Intersection												
Int Delay, s/veh	7.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰	↱		↰	↱
Traffic Vol, veh/h	7	50	64	42	41	43	75	362	75	38	397	20
Future Vol, veh/h	7	50	64	42	41	43	75	362	75	38	397	20
Conflicting Peds, #/hr	6	0	0	0	0	6	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	1	1	1
Mvmt Flow	7	52	66	43	42	44	77	373	77	39	409	21

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1102	1091	409	1123	1074	418	430	0	0	450	0	0
Stage 1	487	487	-	566	566	-	-	-	-	-	-	-
Stage 2	615	604	-	557	508	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.12	-	-	4.11	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.218	-	-	2.209	-	-
Pot Cap-1 Maneuver	188	214	640	182	219	633	1129	-	-	1116	-	-
Stage 1	560	549	-	507	506	-	-	-	-	-	-	-
Stage 2	477	486	-	513	537	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	130	185	640	116	190	629	1129	-	-	1116	-	-
Mov Cap-2 Maneuver	130	185	-	116	190	-	-	-	-	-	-	-
Stage 1	508	524	-	460	459	-	-	-	-	-	-	-
Stage 2	363	441	-	396	512	-	-	-	-	-	-	-






Approach	EB		WB		NB		SB	
HCM Control Delay, s	22.7		44.2		1.2		0.7	
HCM LOS	C		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1129	-	-	176	640	144	629	1116	-	-
HCM Lane V/C Ratio	0.068	-	-	0.334	0.103	0.594	0.07	0.035	-	-
HCM Control Delay (s)	8.4	0	-	35.4	11.3	61.3	11.2	8.3	0	-
HCM Lane LOS	A	A	-	E	B	F	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.4	0.3	3.1	0.2	0.1	-	-

# HCM 6th TWSC

## 3: Highway 211 & Bornstedt Road



















04/28/2022

Intersection						
Int Delay, s/veh	6.6					
Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	55	164	347	77	234	270
Future Vol, veh/h	55	164	347	77	234	270
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	57	171	361	80	244	281
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1130	361	0	0	361	0
Stage 1	361	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	225	684	-	-	1198	-
Stage 1	705	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	179	684	-	-	1198	-
Mov Cap-2 Maneuver	179	-	-	-	-	-
Stage 1	705	-	-	-	-	-
Stage 2	364	-	-	-	-	-
Approach	NB	NE	SW			
HCM Control Delay, s	25.3	0	4.1			
HCM LOS	D					
Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT	
Capacity (veh/h)	-	-	400	1198	-	
HCM Lane V/C Ratio	-	-	0.57	0.203	-	
HCM Control Delay (s)	-	-	25.3	8.8	-	
HCM Lane LOS	-	-	D	A	-	
HCM 95th %tile Q(veh)	-	-	3.4	0.8	-	

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd



















04/28/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	860	162	0	0	0	0	378	140	17	111	0
Future Volume (vph)	39	860	162	0	0	0	0	378	140	17	111	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		2962	1328					1617	1350	1525	1606	
Flt Permitted		1.00	1.00					1.00	1.00	0.21	1.00	
Satd. Flow (perm)		2962	1328					1617	1350	332	1606	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	44	966	182	0	0	0	0	425	157	19	125	0
RTOR Reduction (vph)	0	0	43	0	0	0	0	0	94	0	0	0
Lane Group Flow (vph)	0	1010	139	0	0	0	0	425	63	19	125	0
Confl. Peds. (#/hr)	1								4			
Heavy Vehicles (%)	12%	12%	12%	0%	0%	0%	5%	5%	5%	9%	9%	9%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		46.8	46.8					27.7	27.7	34.2	34.2	
Effective Green, g (s)		46.8	46.8					27.7	27.7	34.2	34.2	
Actuated g/C Ratio		0.52	0.52					0.31	0.31	0.38	0.38	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1540	690					497	415	152	610	
v/s Ratio Prot								c0.26		0.00	c0.08	
v/s Ratio Perm		0.34	0.10						0.05	0.04		
v/c Ratio		0.66	0.20					0.86	0.15	0.12	0.20	
Uniform Delay, d1		15.7	11.6					29.3	22.6	19.6	18.8	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.2	0.7					13.5	0.2	0.4	0.2	
Delay (s)		17.9	12.2					42.7	22.8	20.0	18.9	
Level of Service		B	B					D	C	B	B	
Approach Delay (s)		17.1			0.0			37.4			19.1	
Approach LOS		B			A			D			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.4									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			90.0								13.5	
Intersection Capacity Utilization			56.1%									ICU Level of Service B
Analysis Period (min)			15									
c Critical Lane Group												

# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

04/28/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	860	162	0	0	0	0	378	140	17	111	0
Future Volume (veh/h)	39	860	162	0	0	0	0	378	140	17	111	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1586	1586	1586				0	1486	1486	1627	1627	0
Adj Flow Rate, veh/h	44	966	0				0	425	157	19	125	0
Peak Hour Factor	0.89	0.89	0.89				0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	12	12	12				0	5	5	9	9	0
Cap, veh/h	66	1529					0	464	391	139	624	0
Arrive On Green	0.52	0.52	0.00				0.00	0.31	0.31	0.02	0.38	0.00
Sat Flow, veh/h	129	2958	1344				0	1486	1252	1550	1627	0
Grp Volume(v), veh/h	541	469	0				0	425	157	19	125	0
Grp Sat Flow(s),veh/h/ln	1580	1507	1344				0	1486	1252	1550	1627	0
Q Serve(g_s), s	22.6	19.7	0.0				0.0	24.8	8.9	0.7	4.6	0.0
Cycle Q Clear(g_c), s	22.6	19.7	0.0				0.0	24.8	8.9	0.7	4.6	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	816	779					0	464	391	139	624	0
V/C Ratio(X)	0.66	0.60					0.00	0.92	0.40	0.14	0.20	0.00
Avail Cap(c_a), veh/h	816	779					0	520	438	193	741	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	16.0	15.3	0.0				0.0	29.8	24.3	23.0	18.5	0.0
Incr Delay (d2), s/veh	4.2	3.4	0.0				0.0	19.8	0.7	0.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	7.2	0.0				0.0	10.8	2.6	0.3	1.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.2	18.7	0.0				0.0	49.6	25.0	23.5	18.7	0.0
LnGrp LOS	C	B					A	D	C	C	B	A
Approach Vol, veh/h		1010	A					582			144	
Approach Delay, s/veh		19.5						43.0			19.3	
Approach LOS		B						D			B	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		51.0	6.4	32.6				39.0				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		40.0	5.0	31.5				41.0				
Max Q Clear Time (g_c+I1), s		24.6	2.7	26.8				6.6				
Green Ext Time (p_c), s		6.3	0.0	1.3				0.7				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			27.3									
HCM 6th LOS			C									

### Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

04/28/2022

Intersection												
Int Delay, s/veh	6.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱	↱		↱	↱		↱			↱	↱
Traffic Vol, veh/h	7	12	51	46	54	74	30	333	14	13	204	3
Future Vol, veh/h	7	12	51	46	54	74	30	333	14	13	204	3
Conflicting Peds, #/hr	2	0	2	2	0	2	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	4	4	4	5	5	5	4	4	4
Mvmt Flow	9	15	65	59	69	95	38	427	18	17	262	4

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	894	821	266	854	816	440	268	0	0	447	0	0
Stage 1	298	298	-	514	514	-	-	-	-	-	-	-
Stage 2	596	523	-	340	302	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.14	6.54	6.24	4.15	-	-	4.14	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.536	4.036	3.336	2.245	-	-	2.236	-	-
Pot Cap-1 Maneuver	259	306	765	276	309	613	1278	-	-	1103	-	-
Stage 1	704	662	-	540	532	-	-	-	-	-	-	-
Stage 2	485	526	-	671	661	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	170	287	762	231	290	611	1276	-	-	1101	-	-
Mov Cap-2 Maneuver	170	287	-	231	290	-	-	-	-	-	-	-
Stage 1	674	649	-	517	510	-	-	-	-	-	-	-
Stage 2	339	504	-	587	648	-	-	-	-	-	-	-






Approach	EB		WB		NB		SB	
HCM Control Delay, s	13.6		23.3		0.6		0.5	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1276	-	-	229	762	260	611	1101	-	-
HCM Lane V/C Ratio	0.03	-	-	0.106	0.086	0.493	0.155	0.015	-	-
HCM Control Delay (s)	7.9	0	-	22.6	10.2	31.6	12	8.3	0	-
HCM Lane LOS	A	A	-	C	B	D	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.3	2.5	0.5	0	-	-

# HCM 6th TWSC

## 3: Highway 211 & Bornstedt Road



















04/28/2022

Intersection						
Int Delay, s/veh	8.2					
Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	76	226	153	17	105	196
Future Vol, veh/h	76	226	153	17	105	196
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	9	9	4	4
Mvmt Flow	94	279	189	21	130	242
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	691	189	0	0	189	0
Stage 1	189	-	-	-	-	-
Stage 2	502	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.14	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.236	-
Pot Cap-1 Maneuver	409	850	-	-	1373	-
Stage 1	841	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	370	850	-	-	1373	-
Mov Cap-2 Maneuver	370	-	-	-	-	-
Stage 1	841	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Approach	NB	NE	SW			
HCM Control Delay, s	18.1	0	2.8			
HCM LOS	C					
Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT	
Capacity (veh/h)	-	-	641	1373	-	
HCM Lane V/C Ratio	-	-	0.582	0.094	-	
HCM Control Delay (s)	-	-	18.1	7.9	-	
HCM Lane LOS	-	-	C	A	-	
HCM 95th %tile Q(veh)	-	-	3.8	0.3	-	

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

04/28/2022



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	1498	428	0	0	0	0	344	167	16	214	0
Future Volume (vph)	67	1498	428	0	0	0	0	344	167	16	214	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	0.97					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3252	1408					1664	1391	1614	1699	
Flt Permitted		1.00	1.00					1.00	1.00	0.21	1.00	
Satd. Flow (perm)		3252	1408					1664	1391	353	1699	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	70	1560	446	0	0	0	0	358	174	17	223	0
RTOR Reduction (vph)	0	0	71	0	0	0	0	0	78	0	0	0
Lane Group Flow (vph)	0	1630	375	0	0	0	0	358	96	17	223	0
Confl. Peds. (#/hr)	2		6						3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		52.0	52.0					22.5	22.5	29.0	29.0	
Effective Green, g (s)		52.0	52.0					22.5	22.5	29.0	29.0	
Actuated g/C Ratio		0.58	0.58					0.25	0.25	0.32	0.32	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1878	813					416	347	141	547	
v/s Ratio Prot								c0.22		0.00	c0.13	
v/s Ratio Perm		0.50	0.27						0.07	0.04		
v/c Ratio		0.87	0.46					0.86	0.28	0.12	0.41	
Uniform Delay, d1		16.1	10.9					32.3	27.2	22.5	23.8	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.7	1.9					16.4	0.4	0.4	0.5	
Delay (s)		21.8	12.8					48.7	27.6	22.9	24.3	
Level of Service		C	B					D	C	C	C	
Approach Delay (s)		19.9			0.0			41.8			24.2	
Approach LOS		B			A			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			24.4									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			90.0							13.5		
Intersection Capacity Utilization			74.4%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												



# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

04/28/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	1498	428	0	0	0	0	344	167	16	214	0
Future Volume (veh/h)	67	1498	428	0	0	0	0	344	167	16	214	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723				0	1527	1527	1709	1709	0
Adj Flow Rate, veh/h	70	1560	0				0	358	174	17	223	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				0	2	2	3	3	0
Cap, veh/h	81	1903					0	365	307	116	527	0
Arrive On Green	0.59	0.59	0.00				0.00	0.24	0.24	0.02	0.31	0.00
Sat Flow, veh/h	138	3215	1460				0	1527	1286	1628	1709	0
Grp Volume(v), veh/h	873	757	0				0	358	174	17	223	0
Grp Sat Flow(s),veh/h/ln	1716	1637	1460				0	1527	1286	1628	1709	0
Q Serve(g_s), s	38.1	31.6	0.0				0.0	21.0	10.7	0.7	9.3	0.0
Cycle Q Clear(g_c), s	38.1	31.6	0.0				0.0	21.0	10.7	0.7	9.3	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1016	969					0	365	307	116	527	0
V/C Ratio(X)	0.86	0.78					0.00	0.98	0.57	0.15	0.42	0.00
Avail Cap(c_a), veh/h	1016	969					0	365	307	175	589	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	15.3	13.9	0.0				0.0	34.0	30.1	26.5	24.8	0.0
Incr Delay (d2), s/veh	9.5	6.2	0.0				0.0	41.9	2.4	0.6	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.1	12.3	0.0				0.0	11.6	3.4	0.3	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.7	20.2	0.0				0.0	76.0	32.6	27.1	25.3	0.0
LnGrp LOS	C	C					A	E	C	C	C	A
Approach Vol, veh/h		1630	A					532			240	
Approach Delay, s/veh		22.6						61.8			25.4	
Approach LOS		C						E			C	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		57.8	6.2	26.0				32.2				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		50.0	5.0	21.5				31.0				
Max Q Clear Time (g_c+I1), s		40.1	2.7	23.0				11.3				
Green Ext Time (p_c), s		7.4	0.0	0.0				1.2				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			31.6									
HCM 6th LOS			C									

### Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

04/28/2022

Intersection												
Int Delay, s/veh	8.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	↔
Traffic Vol, veh/h	7	50	65	42	41	43	76	374	75	38	417	20
Future Vol, veh/h	7	50	65	42	41	43	76	374	75	38	417	20
Conflicting Peds, #/hr	6	0	0	0	0	6	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	1	1	1
Mvmt Flow	7	52	67	43	42	44	78	386	77	39	430	21

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1138	1127	430	1159	1110	431	451	0	0	463	0	0
Stage 1	508	508	-	581	581	-	-	-	-	-	-	-
Stage 2	630	619	-	578	529	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.12	-	-	4.11	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.218	-	-	2.209	-	-
Pot Cap-1 Maneuver	178	204	623	172	208	622	1109	-	-	1104	-	-
Stage 1	546	537	-	498	498	-	-	-	-	-	-	-
Stage 2	468	479	-	500	526	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	121	176	623	107	179	618	1109	-	-	1104	-	-
Mov Cap-2 Maneuver	121	176	-	107	179	-	-	-	-	-	-	-
Stage 1	494	512	-	450	450	-	-	-	-	-	-	-
Stage 2	354	433	-	382	501	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	23.8		50.2		1.2		0.7	
HCM LOS	C		F					






Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1109	-	-	167	623	134	618	1104	-	-
HCM Lane V/C Ratio	0.071	-	-	0.352	0.108	0.639	0.072	0.035	-	-
HCM Control Delay (s)	8.5	0	-	37.8	11.5	70.3	11.3	8.4	0	-
HCM Lane LOS	A	A	-	E	B	F	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.5	0.4	3.4	0.2	0.1	-	-

HCM 6th TWSC  
3: Highway 211 & Bornstedt Road

04/28/2022

Intersection

Int Delay, s/veh 7.6

Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	57	177	347	80	255	270
Future Vol, veh/h	57	177	347	80	255	270
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	59	184	361	83	266	281

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1174	361	0
Stage 1	361	-	-
Stage 2	813	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	212	684	-
Stage 1	705	-	-
Stage 2	436	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	165	684	-
Mov Cap-2 Maneuver	165	-	-
Stage 1	705	-	-
Stage 2	339	-	-



















Approach	NB	NE	SW
HCM Control Delay, s	28.9	0	4.3
HCM LOS	D		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	387	1198	-
HCM Lane V/C Ratio	-	-	0.63	0.222	-
HCM Control Delay (s)	-	-	28.9	8.9	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	4.1	0.8	-

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd



















05/20/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	860	165	0	0	0	0	380	140	17	112	0
Future Volume (vph)	39	860	165	0	0	0	0	380	140	17	112	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		2962	1328					1617	1350	1525	1606	
Flt Permitted		1.00	1.00					1.00	1.00	0.20	1.00	
Satd. Flow (perm)		2962	1328					1617	1350	328	1606	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	44	966	185	0	0	0	0	427	157	19	126	0
RTOR Reduction (vph)	0	0	43	0	0	0	0	0	94	0	0	0
Lane Group Flow (vph)	0	1010	142	0	0	0	0	427	63	19	126	0
Confl. Peds. (#/hr)	1								4			
Heavy Vehicles (%)	12%	12%	12%	0%	0%	0%	5%	5%	5%	9%	9%	9%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		46.8	46.8					27.7	27.7	34.2	34.2	
Effective Green, g (s)		46.8	46.8					27.7	27.7	34.2	34.2	
Actuated g/C Ratio		0.52	0.52					0.31	0.31	0.38	0.38	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1540	690					497	415	151	610	
v/s Ratio Prot								c0.26		0.00	c0.08	
v/s Ratio Perm		0.34	0.11						0.05	0.04		
v/c Ratio		0.66	0.21					0.86	0.15	0.13	0.21	
Uniform Delay, d1		15.7	11.6					29.3	22.6	19.7	18.8	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.2	0.7					13.8	0.2	0.4	0.2	
Delay (s)		17.9	12.3					43.1	22.8	20.0	18.9	
Level of Service		B	B					D	C	C	B	
Approach Delay (s)		17.1			0.0			37.6			19.1	
Approach LOS		B			A			D			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.5									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			90.0								13.5	
Intersection Capacity Utilization			56.3%									ICU Level of Service B
Analysis Period (min)			15									
c Critical Lane Group												

# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

05/20/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	860	165	0	0	0	0	380	140	17	112	0
Future Volume (veh/h)	39	860	165	0	0	0	0	380	140	17	112	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1586	1586	1586				0	1486	1486	1627	1627	0
Adj Flow Rate, veh/h	44	966	0				0	427	157	19	126	0
Peak Hour Factor	0.89	0.89	0.89				0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	12	12	12				0	5	5	9	9	0
Cap, veh/h	66	1525					0	466	392	139	625	0
Arrive On Green	0.52	0.52	0.00				0.00	0.31	0.31	0.02	0.38	0.00
Sat Flow, veh/h	129	2958	1344				0	1486	1252	1550	1627	0
Grp Volume(v), veh/h	541	469	0				0	427	157	19	126	0
Grp Sat Flow(s),veh/h/ln	1580	1507	1344				0	1486	1252	1550	1627	0
Q Serve(g_s), s	22.7	19.7	0.0				0.0	24.9	8.9	0.7	4.7	0.0
Cycle Q Clear(g_c), s	22.7	19.7	0.0				0.0	24.9	8.9	0.7	4.7	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	815	777					0	466	392	139	625	0
V/C Ratio(X)	0.66	0.60					0.00	0.92	0.40	0.14	0.20	0.00
Avail Cap(c_a), veh/h	815	777					0	520	438	193	741	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	16.0	15.3	0.0				0.0	29.8	24.3	23.0	18.5	0.0
Incr Delay (d2), s/veh	4.2	3.5	0.0				0.0	20.0	0.7	0.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	7.2	0.0				0.0	10.9	2.6	0.3	1.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.3	18.8	0.0				0.0	49.7	24.9	23.4	18.6	0.0
LnGrp LOS	C	B					A	D	C	C	B	A
Approach Vol, veh/h		1010	A					584			145	
Approach Delay, s/veh		19.6						43.1			19.3	
Approach LOS		B						D			B	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		50.9	6.4	32.7				39.1				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		40.0	5.0	31.5				41.0				
Max Q Clear Time (g_c+I1), s		24.7	2.7	26.9				6.7				
Green Ext Time (p_c), s		6.3	0.0	1.3				0.8				
Intersection Summary												
HCM 6th Ctrl Delay			27.5									
HCM 6th LOS			C									
Notes												
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

05/20/2022

Intersection												
Int Delay, s/veh	6.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	↔
Traffic Vol, veh/h	7	12	52	46	54	74	30	335	14	13	208	3
Future Vol, veh/h	7	12	52	46	54	74	30	335	14	13	208	3
Conflicting Peds, #/hr	2	0	2	2	0	2	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	4	4	4	5	5	5	4	4	4
Mvmt Flow	9	15	67	59	69	95	38	429	18	17	267	4

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	901	828	271	862	823	442	273	0	0	449	0	0
Stage 1	303	303	-	516	516	-	-	-	-	-	-	-
Stage 2	598	525	-	346	307	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.14	6.54	6.24	4.15	-	-	4.14	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.536	4.036	3.336	2.245	-	-	2.236	-	-
Pot Cap-1 Maneuver	256	303	761	273	306	611	1273	-	-	1101	-	-
Stage 1	700	658	-	538	531	-	-	-	-	-	-	-
Stage 2	484	524	-	666	657	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	168	285	758	227	287	609	1271	-	-	1099	-	-
Mov Cap-2 Maneuver	168	285	-	227	287	-	-	-	-	-	-	-
Stage 1	671	645	-	515	509	-	-	-	-	-	-	-
Stage 2	338	502	-	581	644	-	-	-	-	-	-	-






Approach	EB		WB		NB		SB	
HCM Control Delay, s	13.6		23.7		0.6		0.5	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1271	-	-	227	758	256	609	1099	-	-
HCM Lane V/C Ratio	0.03	-	-	0.107	0.088	0.501	0.156	0.015	-	-
HCM Control Delay (s)	7.9	0	-	22.8	10.2	32.4	12	8.3	0	-
HCM Lane LOS	A	A	-	C	B	D	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.3	2.6	0.5	0	-	-

# HCM 6th TWSC

## 3: Highway 211 & Bornstedt Road


05/20/2022

Intersection						
Int Delay, s/veh	8.4					
Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	77	228	153	17	110	196
Future Vol, veh/h	77	228	153	17	110	196
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	9	9	4	4
Mvmt Flow	95	281	189	21	136	242
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	703	189	0	0	189	0
Stage 1	189	-	-	-	-	-
Stage 2	514	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.14	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.236	-
Pot Cap-1 Maneuver	402	850	-	-	1373	-
Stage 1	841	-	-	-	-	-
Stage 2	598	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	362	850	-	-	1373	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	841	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Approach	NB	NE	SW			
HCM Control Delay, s	18.6	0	2.8			
HCM LOS	C					
Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT	
Capacity (veh/h)	-	-	634	1373	-	
HCM Lane V/C Ratio	-	-	0.594	0.099	-	
HCM Control Delay (s)	-	-	18.6	7.9	-	
HCM Lane LOS	-	-	C	A	-	
HCM 95th %tile Q(veh)	-	-	3.9	0.3	-	

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

05/20/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗					↕	↗	↗	↕	
Traffic Volume (vph)	67	1498	428	0	0	0	0	348	167	16	215	0
Future Volume (vph)	67	1498	428	0	0	0	0	348	167	16	215	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		0%			0%			6%			0%	
Total Lost time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	0.97					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3252	1408					1664	1391	1614	1699	
Flt Permitted		1.00	1.00					1.00	1.00	0.21	1.00	
Satd. Flow (perm)		3252	1408					1664	1391	350	1699	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	70	1560	446	0	0	0	0	362	174	17	224	0
RTOR Reduction (vph)	0	0	71	0	0	0	0	0	78	0	0	0
Lane Group Flow (vph)	0	1630	375	0	0	0	0	363	96	17	224	0
Confl. Peds. (#/hr)	2		6						3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						4		3	8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)		51.7	51.7					22.8	22.8	29.3	29.3	
Effective Green, g (s)		51.7	51.7					22.8	22.8	29.3	29.3	
Actuated g/C Ratio		0.57	0.57					0.25	0.25	0.33	0.33	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1868	808					421	352	142	553	
v/s Ratio Prot								c0.22		0.00	c0.13	
v/s Ratio Perm		0.50	0.27						0.07	0.04		
v/c Ratio		0.87	0.46					0.86	0.27	0.12	0.41	
Uniform Delay, d1		16.3	11.1					32.1	27.0	22.3	23.6	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		6.0	1.9					16.4	0.4	0.4	0.5	
Delay (s)		22.3	13.0					48.5	27.4	22.7	24.1	
Level of Service		C	B					D	C	C	C	
Approach Delay (s)		20.3			0.0			41.7			24.0	
Approach LOS		C			A			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			24.6									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			90.0							13.5		
Intersection Capacity Utilization			74.5%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												



# HCM 6th Signalized Intersection Summary

## 1: Highway 211/Meinig Avenue & Pioneer Blvd

05/20/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔					↔	↔	↔	↔	
Traffic Volume (veh/h)	67	1498	428	0	0	0	0	348	167	16	215	0
Future Volume (veh/h)	67	1498	428	0	0	0	0	348	167	16	215	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.99	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723				0	1527	1527	1709	1709	0
Adj Flow Rate, veh/h	70	1560	0				0	362	174	17	224	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				0	2	2	3	3	0
Cap, veh/h	81	1903					0	365	307	113	527	0
Arrive On Green	0.59	0.59	0.00				0.00	0.24	0.24	0.02	0.31	0.00
Sat Flow, veh/h	138	3215	1460				0	1527	1286	1628	1709	0
Grp Volume(v), veh/h	873	757	0				0	362	174	17	224	0
Grp Sat Flow(s),veh/h/ln	1716	1637	1460				0	1527	1286	1628	1709	0
Q Serve(g_s), s	38.1	31.6	0.0				0.0	21.3	10.7	0.7	9.4	0.0
Cycle Q Clear(g_c), s	38.1	31.6	0.0				0.0	21.3	10.7	0.7	9.4	0.0
Prop In Lane	0.08		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1016	969					0	365	307	113	527	0
V/C Ratio(X)	0.86	0.78					0.00	0.99	0.57	0.15	0.43	0.00
Avail Cap(c_a), veh/h	1016	969					0	365	307	172	589	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	15.3	13.9	0.0				0.0	34.2	30.1	26.6	24.8	0.0
Incr Delay (d2), s/veh	9.5	6.2	0.0				0.0	44.9	2.4	0.6	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.1	12.3	0.0				0.0	12.0	3.4	0.3	3.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.7	20.2	0.0				0.0	79.1	32.6	27.2	25.3	0.0
LnGrp LOS	C	C					A	E	C	C	C	A
Approach Vol, veh/h		1630	A					536			241	
Approach Delay, s/veh		22.6						64.0			25.5	
Approach LOS		C						E			C	
Timer - Assigned Phs		2	3	4				8				
Phs Duration (G+Y+Rc), s		57.8	6.2	26.0				32.2				
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5				
Max Green Setting (Gmax), s		50.0	5.0	21.5				31.0				
Max Q Clear Time (g_c+I1), s		40.1	2.7	23.3				11.4				
Green Ext Time (p_c), s		7.4	0.0	0.0				1.2				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			32.1									
HCM 6th LOS			C									

### Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC  
2: Highway 211 & Dubarko Road

05/20/2022

Intersection												
Int Delay, s/veh	8.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰	↱		↰	↱
Traffic Vol, veh/h	7	50	65	42	41	43	76	378	75	38	418	20
Future Vol, veh/h	7	50	65	42	41	43	76	378	75	38	418	20
Conflicting Peds, #/hr	6	0	0	0	0	6	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	105	-	-	130	-	-	-	-	-	340
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	1	1	1
Mvmt Flow	7	52	67	43	42	44	78	390	77	39	431	21

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1143	1132	431	1164	1115	435	452	0	0	467	0	0
Stage 1	509	509	-	585	585	-	-	-	-	-	-	-
Stage 2	634	623	-	579	530	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.12	-	-	4.11	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.218	-	-	2.209	-	-
Pot Cap-1 Maneuver	176	202	622	171	207	619	1109	-	-	1100	-	-
Stage 1	545	536	-	495	496	-	-	-	-	-	-	-
Stage 2	466	477	-	499	525	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	119	174	622	106	178	615	1109	-	-	1100	-	-
Mov Cap-2 Maneuver	119	174	-	106	178	-	-	-	-	-	-	-
Stage 1	493	511	-	447	448	-	-	-	-	-	-	-
Stage 2	352	431	-	382	500	-	-	-	-	-	-	-






Approach	EB		WB		NB		SB	
HCM Control Delay, s	24.1		51.5		1.2		0.7	
HCM LOS	C		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1109	-	-	165	622	132	615	1100	-	-
HCM Lane V/C Ratio	0.071	-	-	0.356	0.108	0.648	0.072	0.036	-	-
HCM Control Delay (s)	8.5	0	-	38.4	11.5	72.4	11.3	8.4	0	-
HCM Lane LOS	A	A	-	E	B	F	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.5	0.4	3.5	0.2	0.1	-	-

# HCM 6th TWSC

## 3: Highway 211 & Bornstedt Road

05/20/2022

Intersection						
Int Delay, s/veh	7.7					
Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	57	181	347	80	256	270
Future Vol, veh/h	57	181	347	80	256	270
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	-	30	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	59	189	361	83	267	281
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1176	361	0	0	361	0
Stage 1	361	-	-	-	-	-
Stage 2	815	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	211	684	-	-	1198	-
Stage 1	705	-	-	-	-	-
Stage 2	435	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	164	684	-	-	1198	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	705	-	-	-	-	-
Stage 2	338	-	-	-	-	-
Approach	NB	NE	SW			
HCM Control Delay, s	29.2	0	4.3			
HCM LOS	D					
Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT	
Capacity (veh/h)	-	-	389	1198	-	
HCM Lane V/C Ratio	-	-	0.637	0.223	-	
HCM Control Delay (s)	-	-	29.2	8.9	-	
HCM Lane LOS	-	-	D	A	-	
HCM 95th %tile Q(veh)	-	-	4.2	0.9	-	

# HCM 6th AWSC

## 2: Highway 211 & Dubarko Road

04/28/2022

Intersection	
Intersection Delay, s/veh	18.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰↱			↰↱	↱
Traffic Vol, veh/h	7	12	51	46	54	74	29	314	14	13	198	3
Future Vol, veh/h	7	12	51	46	54	74	29	314	14	13	198	3
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles, %	5	5	5	4	4	4	5	5	5	4	4	4
Mvmt Flow	9	15	65	59	69	95	37	403	18	17	254	4
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	10.4	11.5	26.7	14.5
HCM LOS	B	B	D	B








Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	8%	37%	0%	46%	0%	6%	0%
Vol Thru, %	88%	63%	0%	54%	0%	94%	0%
Vol Right, %	4%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	357	19	51	100	74	211	3
LT Vol	29	7	0	46	0	13	0
Through Vol	314	12	0	54	0	198	0
RT Vol	14	0	51	0	74	0	3
Lane Flow Rate	458	24	65	128	95	271	4
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.771	0.051	0.119	0.256	0.164	0.473	0.006
Departure Headway (Hd)	6.068	7.472	6.564	7.178	6.226	6.292	5.549
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	595	476	541	497	572	571	641
Service Time	4.127	5.268	4.359	4.958	4.005	4.06	3.316
HCM Lane V/C Ratio	0.77	0.05	0.12	0.258	0.166	0.475	0.006
HCM Control Delay	26.7	10.7	10.3	12.4	10.2	14.6	8.3
HCM Lane LOS	D	B	B	B	B	B	A
HCM 95th-tile Q	7.1	0.2	0.4	1	0.6	2.5	0

# HCM 6th AWSC

## 2: Highway 211 & Dubarko Road

04/28/2022

Intersection	
Intersection Delay, s/veh	32.4
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	50	64	42	41	43	75	362	75	38	397	20
Future Vol, veh/h	7	50	64	42	41	43	75	362	75	38	397	20
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	1	1	1
Mvmt Flow	7	52	66	43	42	44	77	373	77	39	409	21
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	11.4	12	46.2	28.2
HCM LOS	B	B	E	D








Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	15%	12%	0%	51%	0%	9%	0%
Vol Thru, %	71%	88%	0%	49%	0%	91%	0%
Vol Right, %	15%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	512	57	64	83	43	435	20
LT Vol	75	7	0	42	0	38	0
Through Vol	362	50	0	41	0	397	0
RT Vol	75	0	64	0	43	0	20
Lane Flow Rate	528	59	66	86	44	448	21
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.924	0.13	0.132	0.193	0.088	0.792	0.032
Departure Headway (Hd)	6.299	7.968	7.18	8.129	7.144	6.359	5.601
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	581	450	499	442	501	570	641
Service Time	4.313	5.724	4.935	5.885	4.898	4.073	3.316
HCM Lane V/C Ratio	0.909	0.131	0.132	0.195	0.088	0.786	0.033
HCM Control Delay	46.2	11.9	11	12.8	10.6	29.1	8.5
HCM Lane LOS	E	B	B	B	B	D	A
HCM 95th-tile Q	11.6	0.4	0.5	0.7	0.3	7.5	0.1

# HCM 6th AWSC

## 2: Highway 211 & Dubarko Road

05/20/2022

Intersection	
Intersection Delay, s/veh	21.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	12	52	46	54	74	30	335	14	13	208	3
Future Vol, veh/h	7	12	52	46	54	74	30	335	14	13	208	3
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles, %	5	5	5	4	4	4	5	5	5	4	4	4
Mvmt Flow	9	15	67	59	69	95	38	429	18	17	267	4
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	10.6	11.8	32	15.3
HCM LOS	B	B	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	8%	37%	0%	46%	0%	6%	0%
Vol Thru, %	88%	63%	0%	54%	0%	94%	0%
Vol Right, %	4%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	379	19	52	100	74	221	3
LT Vol	30	7	0	46	0	13	0
Through Vol	335	12	0	54	0	208	0
RT Vol	14	0	52	0	74	0	3
Lane Flow Rate	486	24	67	128	95	283	4
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.826	0.052	0.126	0.261	0.168	0.501	0.006
Departure Headway (Hd)	6.12	7.735	6.824	7.317	6.364	6.363	5.621
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	588	466	529	487	559	564	631
Service Time	4.19	5.435	4.524	5.112	4.157	4.146	3.403
HCM Lane V/C Ratio	0.827	0.052	0.127	0.263	0.17	0.502	0.006
HCM Control Delay	32	10.9	10.5	12.7	10.5	15.4	8.4
HCM Lane LOS	D	B	B	B	B	C	A
HCM 95th-tile Q	8.5	0.2	0.4	1	0.6	2.8	0

HCM 6th AWSC  
2: Highway 211 & Dubarko Road

05/20/2022

Intersection	
Intersection Delay, s/veh	38.1
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰↱			↰	↱
Traffic Vol, veh/h	7	50	65	42	41	43	76	378	75	38	418	20
Future Vol, veh/h	7	50	65	42	41	43	76	378	75	38	418	20
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	1	1	1
Mvmt Flow	7	52	67	43	42	44	78	390	77	39	431	21
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	11.6	12.3	55	32.9
HCM LOS	B	B	F	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	14%	12%	0%	51%	0%	8%	0%
Vol Thru, %	71%	88%	0%	49%	0%	92%	0%
Vol Right, %	14%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	529	57	65	83	43	456	20
LT Vol	76	7	0	42	0	38	0
Through Vol	378	50	0	41	0	418	0
RT Vol	75	0	65	0	43	0	20
Lane Flow Rate	545	59	67	86	44	470	21
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.966	0.132	0.136	0.197	0.09	0.838	0.032
Departure Headway (Hd)	6.374	8.111	7.321	8.274	7.287	6.42	5.664
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	573	441	489	433	491	564	634
Service Time	4.39	5.873	5.084	6.033	5.045	4.137	3.381
HCM Lane V/C Ratio	0.951	0.134	0.137	0.199	0.09	0.833	0.033
HCM Control Delay	55	12.1	11.2	13.1	10.8	34	8.6
HCM Lane LOS	F	B	B	B	B	D	A
HCM 95th-tile Q	13.1	0.5	0.5	0.7	0.3	8.8	0.1





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

CDS380  
07/03/2021

CITY OF SANDY, CLACKAMAS COUNTY

**EAGLE CRK-SANDY HY at DUBARKO RD, City of Sandy, Clackamas County, 01/01/2015 to 12/31/2019**  
5 - 8 of 27 Crash records shown.

SER#	P R J S W DATE	CLASS	CITY STREET	RD CHAR	INT-TYPE		INT-REL		OFFRD		WTHR		CRASH		SPCL USE		MOVE		PRIC		A S		PED		CAUSE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
					LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-		INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-	INT-REL	LEG	TRAP-

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CDS380  
07/03/2021

OREGON . . DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION  
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING

CITY OF SANDY, CLACKAMAS COUNTY

EAGLE CRK-SANDY HY at DUBARKO RD, City of Sandy, Clackamas County, 01/01/2015 to 12/31/2019

13 - 17 of 27 Crash records shown.

SER#	P R J S W DATE	CLASS	CITY STREET	INT-TYPE (MEDIAN)	RD CHAR	INT-REL	OFFRD	WTHR	CRASH	SPCL USE	MOVE	FROM	PRTC	INJ	G E LICNS	PED	CAUSE
RD DPT	E L G N H R TIME	FROM	SECOND STREET	LEGS	TRAF-	CONTL	DRVMY	LIGHT	SVRTY	VH TYPE	TO	P# TYPE	SVRTY	E X RES	LOC	ERROR	ACT EVENT
UNLOC?	D C S V L K LAT	LONG	LRS	(#LANES)													
										02 NONE	9	01 DRVR	NONE	00	Unk UNK	000	00
										N/A	N -S				UNK	000	00
										PSNGR CAR							
02031	N N N N 05/06/2016	16	DUBARKO RD	CROSS	N	N	N	CLR	ANGL-OTH	01 NONE	9	01 DRVR	NONE	00	Unk UNK	000	02
CITY	FR		EAGLE CRK-SANDY HY	STOP SIGN	N	N	N	DRY	ANGL	N/A	N -S						00
N	4P			0			N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	Unk UNK	000	00
N	45 23 22.76 -122 15 48 .39		017200100500							02 NONE	9				UNK		
										N/A	STRGHT						00
										PSNGR CAR	E -W						00
										01 DRVR	NONE	00	Unk UNK	000	000	000	00
00805	N N N N 03/01/2017	16	DUBARKO RD	CROSS	N	N	N	CLD	ANGL-OTH	01 NONE	0	01 DRVR	NONE	00	Unk UNK	000	02
CITY	WE		EAGLE CRK-SANDY HY	STOP SIGN	N	N	N	DRY	ANGL	PRVTE	W -E						015
N	3P			0			N	DAY	INJ	PSNGR CAR		01 DRVR	INJC	17	F	OR-Y	028
N	45 23 22.76 -122 15 48 .39		017200100500							02 NONE	0				OR<25		000
										PRVTE	STRGHT						000
										PSNGR CAR	S -N						000
										03 NONE	0				OR<25		022
										PRVTE	STOP						000
										PSNGR CAR	E -W						000
										01 DRVR	INJC	27	F	OR-Y	OR<25	000	00
00846	N N N N 03/04/2017	16	DUBARKO RD	CROSS	N	N	N	RAIN	ANGL-OTH	01 NONE	0	01 DRVR	NONE	21	M	OR-Y	028
CITY	SA		EAGLE CRK-SANDY HY	STOP SIGN	N	N	N	WET	ANGL	PRVTE	W -E						015
N	6P			0			N	DLIT	INJ	PSNGR CAR		01 DRVR	NONE	21	M	OR-Y	000
N	45 23 22.76 -122 15 48 .39		017200100500							02 NONE	0				OR<25		000
										PRVTE	STRGHT						000
										PSNGR CAR	N -S						000
										01 DRVR	INJC	21	F	OR-Y	OR<25	000	00
02225	N N N N 06/07/2017	16	DUBARKO RD	CROSS	N	N	N	CLR	ANGL-OTH	01 NONE	0	01 DRVR	NONE	40	M	OR-Y	000
CITY	WE		EAGLE CRK-SANDY HY	STOP SIGN	N	N	N	DRY	ANGL	PRVTE	S -N						000
N	4P			0			N	DAY	INJ	PSNGR CAR		01 DRVR	INJC	40	M	OR-Y	000
N	45 23 22.76 -122 15 48 .39		017200100500							02 NONE	0				OR<25		015
										PRVTE	STRGHT						000
										PSNGR CAR	W -E						000
										01 DRVR	INJC	38	M	OR-Y	OR<25	028	02

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 requirement, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

OREGON.. DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION  
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING

EAGLE CRK-SANDY HY at DUBARKO RD, City of Sandy, Clackamas County, 01/01/2015 to 12/31/2019

18 - 21 of 27 Crash records shown.

[illegible]

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## CITY OF SANDY, CLACKAMAS COUNTY

URBAN NON-SYSTEM CRASH LISTING

EAGLE CRK-SANDY HY at DUBARKO RD, City of Sandy, Clackamas County, 01/01/2015 to 12/31/2019

22 - 24	of 27	Crash records shown.
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[illegible]

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OREGON . . DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION  
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING  
**EAGLE CRK-SANDY HY at DUBARKO RD, City of Sandy, Clackamas County, 01/01/2015 to 12/31/2019**  
25 - 27 of 27 Crash records shown.

CITY OF SANDY, CLACKAMAS COUNTY

SER#	P R J S W DATE	CLASS	CITY STREET	INT-TYPE		RD CHAR	DIRECT	LOCN	LRS	FROM	DIST	INVEST	E A U I C O DAY	RD DFT	E L G N H R TIME	D C S V L K LAT	LONG	UNLOC?	OFFRD	WTHR	CRASH	TRLR QTY	SPCL USE	MOVE	FROM	PRTC	INJ	A S	PED	CAUSE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
				INT-REL	INT-REL																										VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE	VEH TYPE

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 requirement, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

OREGON.. DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION  
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING

PIONEER BLVD at EAGLE CRK-SANDY HY, City of Sandy, Clackamas County, 01/01/2015 to 12/31/2019

CDS380  
07/03/2021

CITY OF SANDY, CLACKAMAS COUNTY

S D M		P R J S W D A T E		CITY STREET		CLASS		INT- TYPE		SPCL USE		A S						
SER#	INVEST	E A U I C O DAY	DIST	RD CHAR	RD CHAR	INT-REL	OFFRD	WTHR	CRASH	TRLR QTY	MOVE	PH TYPE	SVRTY	E X RES	LOC	ACT	EVENT	CAUSE
RD DPT	E L G N H R TIME	FROM	LONG	DIRECT	DIRECT	LEGS	RNDET	SURF	COLL	OWNER	FROM	PRTC	INJ	G E LICNS	PED			
UNLOC?	D C S V L K LAT			LOCIN	LOCIN	(#LANES)	CONTL	DRVMY	LIGHT	SVRTY	VH TYPE	TO						

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 requirement, 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 Name: Bornstedt Views

Intersection: Highway 211 at Dubarko Road

Scenario: 2024 Background Plus Duplex Site Trips (30th-Highest Hour)

Number of Major Street Lanes: 1 PM Peak Hour Volume 1005 (sum of both approaches)

Number of Minor Street Lanes 1 PM Peak Hour Volume 83 (highest-volume approach)<sup>a</sup>

Posted or 85th percentile speed > 40 mph: Yes

Isolated Population Less than 10,000: No

## Warrant 1, Eight-Hour Vehicular Volume

### Condition A - Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on minor street (total of both approaches)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

### Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on minor street (total of both approaches)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

## Warrant Analysis Calculations

<u>Warrant Anaylsis Calculations</u>	8th Highest Hour <sup>b</sup>	Minimum Volume	Warrant Satisfied?
Condition A - Minimum Vehicular Volume			
Major Street Volume	568	350	No
Minor Street Volume	47	105	
Condition B - Interruption of Continuous Traffic			
Major Street Volume	568	525	No
Minor Street Volume	47	53	
Combination Warrant <sup>c</sup>			
Major Street Volume	568	420	No
Minor Street Volume	47	84	

<sup>a</sup> Minor-Street right turn volumes are reduced to account for the impact of right-turns on red.

<sup>b</sup> Eighth-highest hour volumes are calculated as 5.65 percent of the expected daily traffic volume.

<sup>c</sup> This warrant should be used only after adequate trial of other alternatives has failed to solve traffic problems.



# Preliminary Traffic Signal Warrant Analysis



Project Name: Bornstedt Views

Intersection: Highway 211 at Bornstedt Road

Scenario: 2023 Background Plus Site Trips (30th-Highest Hour)

Number of Major Street Lanes: 1 PM Peak Hour Volume 953 (sum of both approaches)  
 Number of Minor Street Lanes 1 PM Peak Hour Volume 57 (highest-volume approach)<sup>a</sup>  
 Posted or 85th percentile speed > 40 mph: Yes  
 Isolated Population Less than 10,000: No

## Warrant 1, Eight-Hour Vehicular Volume

### Condition A - Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on minor street (total of both approaches)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

### Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on minor street (total of both approaches)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

## Warrant Analysis Calculations

	8th Highest Hour <sup>b</sup>	Minimum Volume	Warrant Satisfied?
Condition A - Minimum Vehicular Volume			
Major Street Volume	538	350	
Minor Street Volume	32	105	No
Condition B - Interruption of Continuous Traffic			
Major Street Volume	538	525	
Minor Street Volume	32	53	No
Combination Warrant <sup>c</sup>			
Major Street Volume	538	420	
Minor Street Volume	32	84	No

<sup>a</sup> Minor-Street right turn volumes are reduced to account for the impact of right-turns on red.

<sup>b</sup> Eighth-highest hour volumes are calculated as 5.65 percent of the expected daily traffic volume.

<sup>c</sup> This warrant should be used only after adequate trial of other alternatives has failed to solve traffic problems.

## Left-Turn Lane Warrant Analysis (ODOT Methodology)



Project Name: Bornstedt Subdivision

Approach: Highway 211 NB at Dubarko Road

Scenario: 2021 Existing Conditions

Number of Advancing Lanes: 1

Number of Opposing Lanes: 1

Major-Street Design Speed: 45 mph

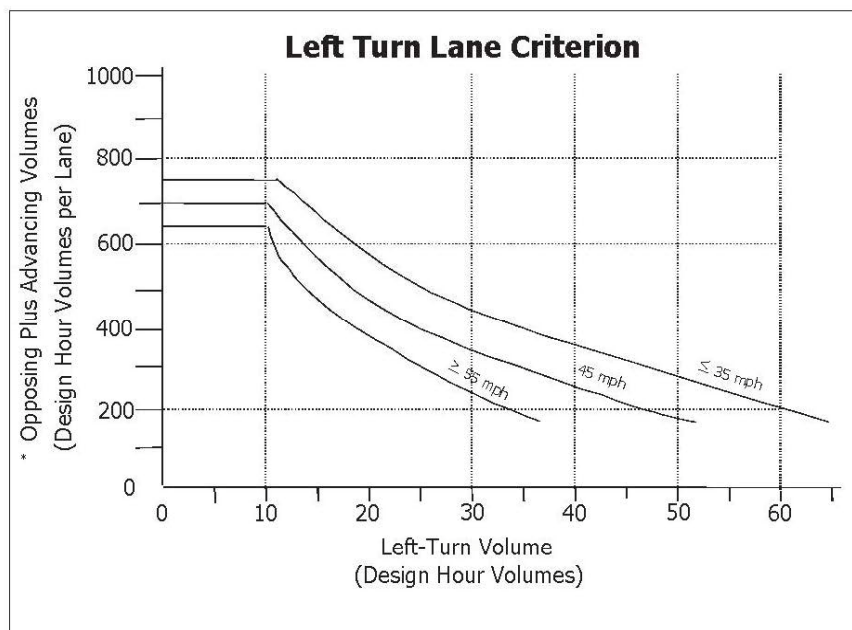
	AM Volume	PM Volume
Advancing Volume for Design Hour:	321	461
Opposing Volume for Design Hour:	183	396

Design Hour Volume Per Lane: 504 857

Number of Left Turns per Hour: 27 71

Left-turn lane warrants satisfied? **YES** **YES**

### Exhibit 7-1 Left Turn Lane Criterion (TTI)



\*(Advancing Volume/Number of Advancing Through Lanes) + (Opposing Volume/Number of Opposing Through Lanes)

## Right-Turn Lane Warrant Analysis (ODOT Methodology)



Project Name: Bornstedt Views Subdivision

Approach: Highway 211 Northbound at Dubarko Road

Scenario: 2021 Existing Conditions

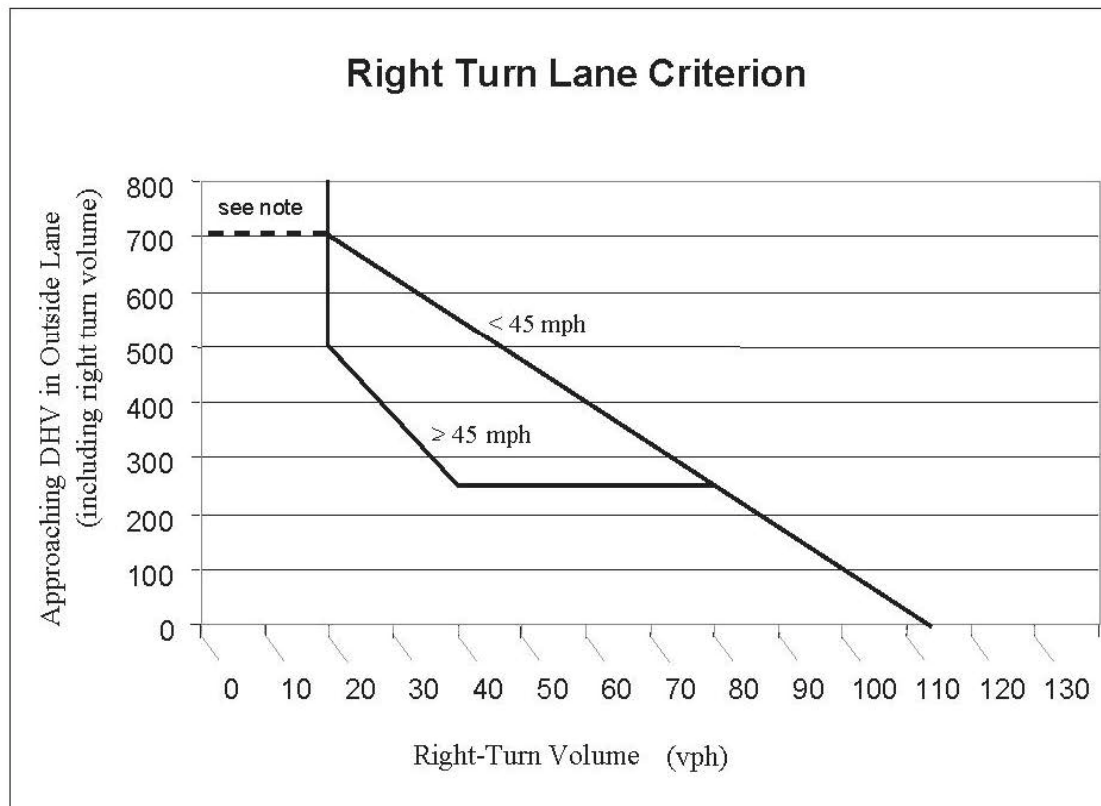
Major-Street Design Speed: 45 mph

	AM Volume	PM Volume
Number of Right Turns per Hour:	11	65
Approaching DVH in Outside Lane:	321	461
Calculated Turn Volume Threshold:	34	23
Right Turn Volume Exceeds Threshold?	<b>NO</b>	<b>YES</b>

### Criterion 1: Vehicular Volume

The vehicular volume criterion is intended for application where the volume of intersecting traffic is the principal reason for considering installation of a right turn lane. The vehicular volume criteria are determined using the curve in Exhibit 7-2.

### **Exhibit 7-2 Right Turn Lane Criterion**



Note: If there is no right turn lane, a shoulder needs to be provided. If this intersection is in a rural area and is a connection to a public street, a right turn lane is needed.