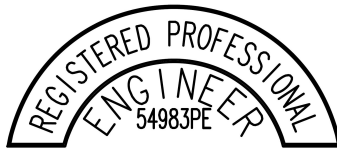


# EXHIBIT K



## JOHNSON RV TRAFFIC IMPACT STUDY

SANDY, OREGON



RENEWS: 12/31/2023

**PREPARED FOR:**

Robert Murray – Johnson RV

**PREPARED BY:**

Michael Ard, PE  
Ard Engineering

**DATE:**

November 10, 2022



## TABLE OF CONTENTS

Executive Summary .....	3
Project Description & Location .....	4
Existing Conditions .....	5
Site Trips.....	11
Future Conditions Analysis .....	13
Safety Analysis .....	17
Conclusions .....	21
Appendix .....	22



## EXECUTIVE SUMMARY

1. A property located on the east side of SE 362<sup>nd</sup> Avenue immediately south of Industrial Way in Sandy, Oregon is proposed for development with an RV refurbishing business that will be operated by Johnson RV. The site will take access via an existing driveway on SE 362<sup>nd</sup> Avenue and a proposed new site access driveway on Industrial Way at the northeast corner of the site.
2. Upon completion of the proposed improvements within the subject property, the site is projected to accommodate 18 site trips during the morning peak hour, 22 trips during the evening peak hour, and 108 daily site trips.
3. Based on the operational analysis, the study intersections are currently operating acceptably per City of Sandy and ODOT standards. Under year 2023 traffic conditions the intersections are projected to continue to operate acceptably either with or without the addition of site trips from the proposed use. No operational mitigations are necessary or recommended.
4. Based on the queueing analysis, the projected northbound queues on SE 362<sup>nd</sup> Avenue are projected to extend beyond the proposed driveway location during a portion of the peak hours. However, average queue lengths even during the peak hours will not obstruct the driveway, and the proposed driveway re-alignment will provide 50 feet of added access spacing as compared to existing conditions, and the driveway will be aligned directly opposite an existing driveway on the west side of SE 362<sup>nd</sup> Avenue.
5. Based on the crash data, the study intersections are currently operating acceptably with respect to safety. No specific safety improvements are recommended in conjunction with the proposed site use.
6. Based on the warrant analysis, no new turn lanes or traffic signals are recommended in conjunction with the proposed site use.
7. The proposed re-aligned site access on SE 362<sup>nd</sup> Avenue is projected to have adequate sight distance for safe and efficient operation. The proposed new site access on Industrial Way is projected to have adequate sight distance to the west upon clearing of vegetation within the site frontage allowing a clear line of sight to SE 362<sup>nd</sup> Avenue. Sight distance to the east is restricted by an existing concrete block which supports a fire department standpipe connection that serves the property immediately east of the Johnson RV site. Although sight lines to the east are restricted, the available intersection sight distance is sufficient for safe operation of the access, and operational impacts associated with the limited sight distance are negligible. Accordingly, the proposed site access on Industrial Way can also operate safely and efficiently.



## **PROJECT DESCRIPTION & LOCATION**

### ***INTRODUCTION***

A property located on the east side of SE 362<sup>nd</sup> Avenue immediately south of Industrial Way is currently developed with two buildings, a 20,000 square foot main building and a two-story 3,850 square foot office building. The site takes access via a driveway on SE 362<sup>nd</sup> Avenue centered 100 feet south of the west leg of Industrial Way.

Under the proposed development plan, a 7,375 square foot shed roof will be added to cover the bus wash facility within the site. Additionally, a new access driveway intersecting Industrial Way near the northeast corner of the site is proposed.

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

- Highway 26 at SE 362<sup>nd</sup> Avenue;
- SE 362<sup>nd</sup> Avenue at Industrial Way (east);
- SE 362<sup>nd</sup> Avenue at Industrial Way (west);
- SE 362<sup>nd</sup> Avenue at Johnson RV Site Access; and
- Industrial Way at the proposed new site access.

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 3.4 acres, and was previously used for trailer and equipment sales, rental, and maintenance. Johnson RV purchased the site to serve as a maintenance facility which supplements their existing sales facility located at 41777 US Highway 26 at the east end of the City of Sandy.

The property is surrounded primarily by commercial and industrial uses, including the Fred Meyer store located immediately to the northwest. There are also residential homes south of the site on the far side of a school bus barn.

US Highway 26 (Mt. Hood Highway) is classified by the Oregon Department of Transportation as a Statewide Highway and a Freight Route. It has two through lanes in each direction and added turn lanes at intersections. It has a posted speed limit of 45 in the vicinity of SE 362<sup>nd</sup> Avenue. Bike lanes are in place along both sides of the highway in the site vicinity, and sidewalks are in place along the south side of the highway in the vicinity of SE 362<sup>nd</sup> Avenue.

SE 362<sup>nd</sup> Avenue generally has one through travel lane for motor vehicles in each direction plus bike lanes and sidewalks on both sides of the roadway. North of Industrial Way it has a center two-way



left-turn lane. It has a posted speed limit of 35 mph and is classified by the City of Sandy as a Minor Arterial.

Industrial Way accommodates one travel lane in each direction with no centerline striping. It has a posted speed limit of 25 mph and has sufficient width for on-street parking (although parking is restricted in the immediate vicinity of SE 362<sup>nd</sup> Avenue). It is classified by the City of Sandy as a Local Street. Existing sidewalks are in place on both sides of the roadway west of SE 362<sup>nd</sup> Avenue. Partial sidewalks are in place along the north side of Industrial Way immediately east of SE 362<sup>nd</sup> Avenue, while none are currently provided along the south side of the roadway east of SE 362<sup>nd</sup> Avenue.

## **EXISTING CONDITIONS**

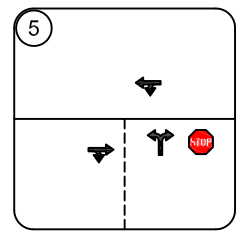
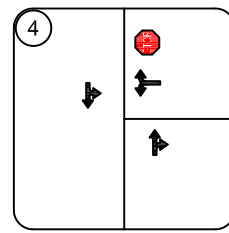
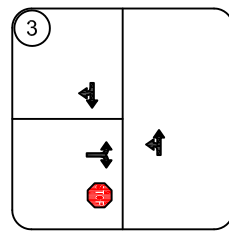
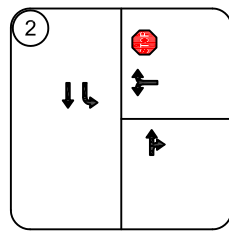
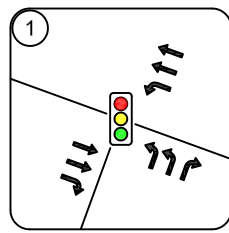
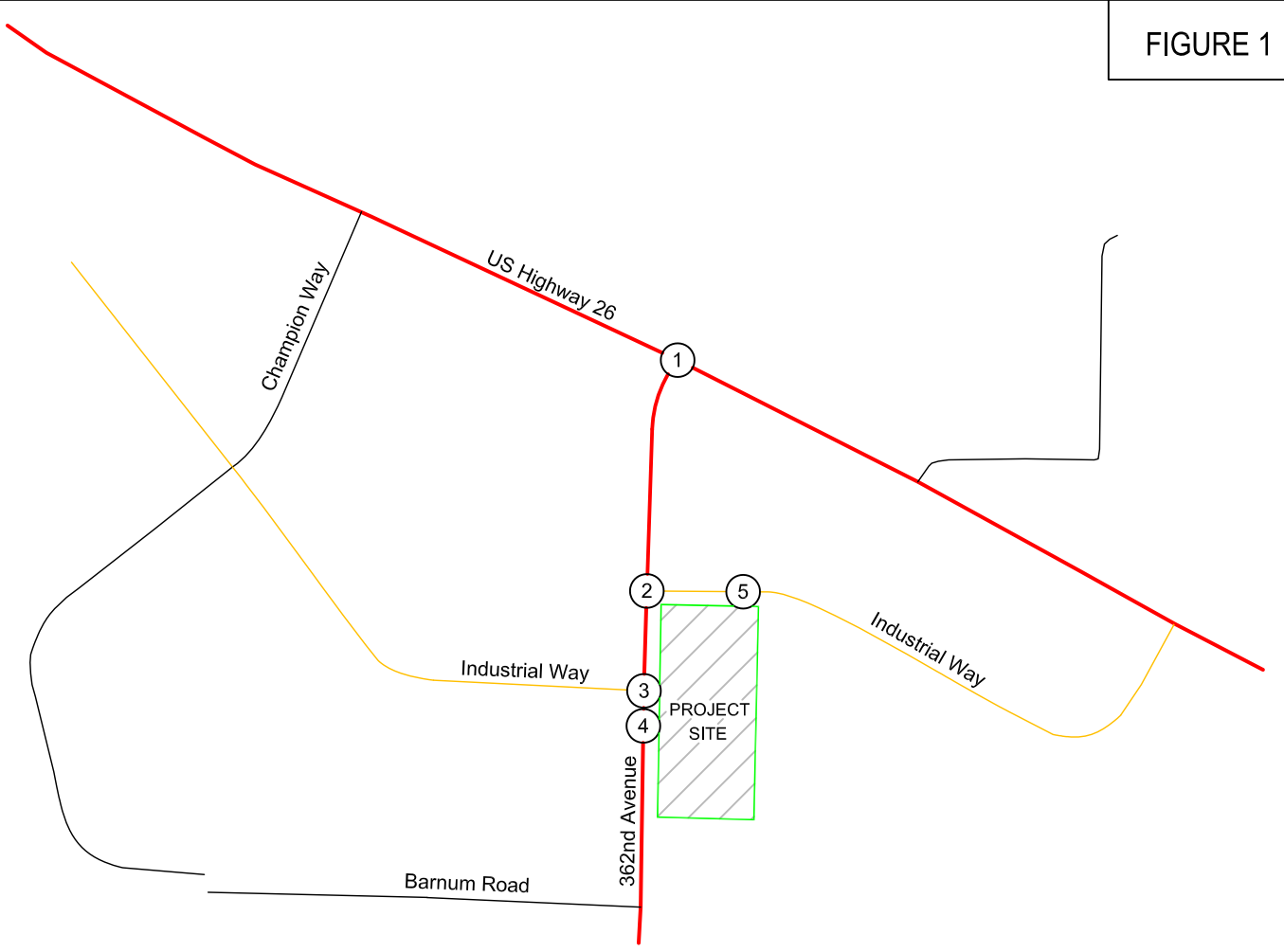
The intersection of US Highway 26 at SE 362<sup>nd</sup> Avenue is a T-intersection controlled by a traffic signal. The northbound approach has two left-turn lanes, a right-turn lane, and a bike lane to the right of the motor vehicle travel lanes. The westbound approach has a left-turn lane operating with protected signal phasing, two through lanes, and a bike lane to the right of the motor vehicle travel lanes. The eastbound approach has two through lanes, a bike lane, and a right-turn lane on the right side of the bike lane.

The intersection of SE 362<sup>nd</sup> Avenue at Industrial Way (east) is a T-intersection controlled by a stop sign on the westbound Industrial Way approach. Through traffic traveling along SE 362<sup>nd</sup> Avenue does not stop. The southbound approach has a left-turn lane and a through lane. The northbound and westbound approaches each have a single shared lane for all turning movements.

The intersection of SE 362<sup>nd</sup> Avenue at Industrial Way (west) is a T-intersection operating under all-way stop control. Each approach has a single, shared lane for all turning movements.

A vicinity map displaying the project site, vicinity streets, and the study intersections including lane configurations is provided in Figure 1 on page 6.

FIGURE 1



(Proposed)

**LEGEND**

- # Study Intersection #
- Traffic Signal
- Stop Sign





### ***TRAFFIC COUNT DATA***

Traffic counts were conducted at the study area intersections on Thursday August 11, 2022 from 7:00 to 9:00 AM and from 4:00 to 6:00 PM. Data was used from the highest-volume hour for each study intersection during each analysis period.

Since the count data was not collected during the peak month of the year, the observed traffic volumes on Highway 26 were adjusted to account for seasonal traffic variations. In accordance with the Oregon Department of Transportation's *Analysis Procedures Manual*, this allows us to analyze operations based on traffic patterns that occur during the 30<sup>th</sup>-highest hour of the year.

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 vastly 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.

In order to determine the portion of traffic attributable to each of the two primary travel types, data from ODOT's 2017-2021 ATR station trend data 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 24 miles east of SE 362<sup>nd</sup> Avenue. 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 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 five years of ATR data and excluding the highest and lowest variations (i.e., averaging the three other data points), 13,374 vehicles per day (approximately 1,337 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 August. This volume represents 50.5 percent of the through traffic volumes measured on Highway 26 east of Oregon Highway 211, since the August turning movement counts showed 2,643 vehicles on Highway 26 east of SE 362<sup>nd</sup> Avenue during the evening peak hour. Accordingly, no more than 50.5 percent of the trips traveling along Highway 26 at that location can be traveling to and from destinations beyond the Rhododendron count station. Since the remaining 49.5 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 13,969 vehicles were measured per day (approximately 1,397 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 595 vehicles per day (13,969 vehicles per day in July - 13,374 vehicles per day in August). This equates to roughly 60 additional vehicles per hour during the peak hour of the peak recreational season. Accounting for directionality of trips, this equates to approximately 33 westbound vehicles and 27 eastbound vehicles during the evening peak hour.

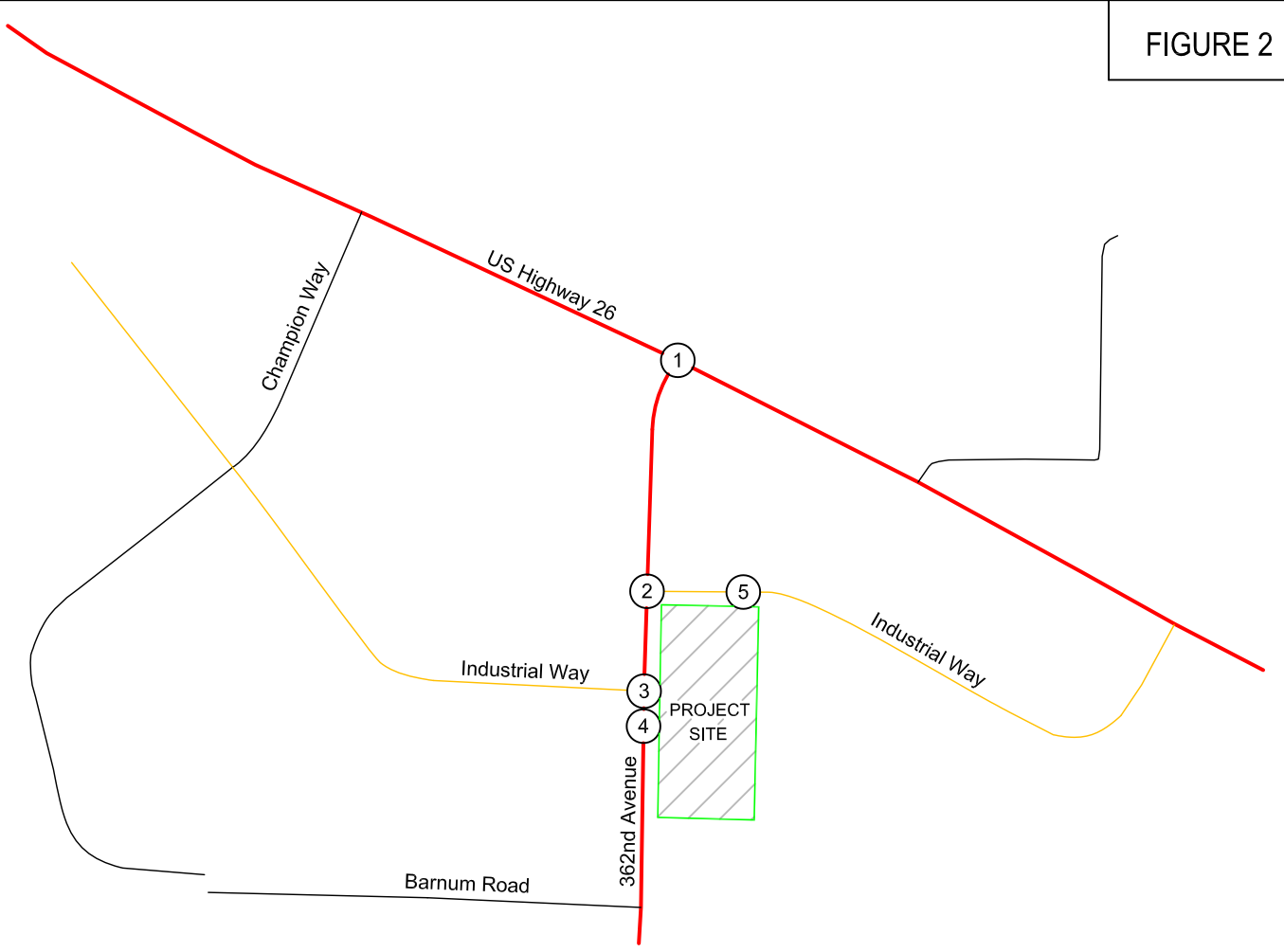


In addition to the calculated seasonal adjustment for trips to and from Mt. Hood and beyond, a commuter seasonal adjustment was applied to the traffic volumes that do not reach the ATR station in Rhododendron, Oregon. Based on data from ODOT's Seasonal Trend Table, the seasonal adjustment for commuter traffic was calculated to be 2.2 percent. This adjustment was applied to the portion of the through traffic volumes on Highway 26 that represent commuter and local trips. Accordingly, the total adjustment was calculated to be 84 additional vehicles during the PM peak hour (an increase of 4.0 percent to the through traffic volumes on the highway). This 4.0 percent seasonal adjustment was also applied to the through volumes on Highway 26 for the AM count period.

Figure 2 on page 9 shows the resulting seasonally adjusted existing year 2022 30<sup>th</sup>-highest hour traffic volumes for the morning and evening peak hours at the study intersections.



FIGURE 2



Node	AM	AM	AM	AM	AM																										
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**OPERATIONAL ANALYSIS**

An operational analysis was conducted for the study intersections using Synchro 10 software, with outputs calculated based on the *HIGHWAY CAPACITY MANUAL, 6<sup>th</sup> Edition*. 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 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 unsignalized intersections, the v/c represents the portion of the available intersection capacity that is being utilized on the worst intersection approach. For signalized intersections, it indicates the portion of the overall intersection’s capacity that is being used. A v/c ratio of 1.0 would indicate that the intersection is operating at capacity.

The Oregon Department of Transportation requires that the signalized intersection of Highway 26 at SE 362<sup>nd</sup> Avenue operate with a v/c ratio of 0.80 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. This operational standard applies to the intersections of SE 362<sup>nd</sup> Avenue at the north and south intersections with Industrial Way, as well as the site access intersections.

A summary of the existing conditions operational analysis is provided in Table 1 on the following page. For the unsignalized intersections the reported delays and levels-of-service represent the approach lane which experiences the highest delays. The reported v/c ratios represent the highest ratio for the major-street and minor-street movements. For the signalized intersection of Highway 26 at SE 362<sup>nd</sup> Avenue, the reported delays, levels-of-service and v/c ratios represent the operation of the overall intersection.

Based on the analysis, the intersections are currently operating acceptably per the respective ODOT and City of Sandy standards. Detailed capacity analysis worksheets are provided in the technical appendix.

**Table 1 - Operational Analysis Summary: Year 2022 30th-Highest Hour Conditions**

Intersection	AM Peak Hour			PM Peak Hour		
	Delay	LOS	v/c	Delay	LOS	v/c
Highway 26 at SE 362nd Ave.	13.1	B	0.48	22.6	C	0.68
SE 362nd Ave. at Industrial Way (N)	12.8	B	0.09	15.0	C	0.21
SE 362nd Ave. at Industrial Way (S)	11.5	B	0.48	23.5	C	0.76
SE 362nd Ave. at Existing Site Access	10.8	B	0.01	13.0	B	0.01



## SITE TRIPS

### *PROPOSED DEVELOPMENT*

The subject property currently contains an existing 20,000 square foot industrial main building and a two-story 3,850 square foot office building. The proposed redevelopment plan will also include constructing a new 7,375 square foot shed roof to cover the bus wash area within the site. To estimate the number of trips that will be generated at the site trip rates from the *TRIP GENERATION MANUAL, 10<sup>th</sup> EDITION* were used. Data from land-use code 180, *Specialty Trade Contractor*, were used.

Since the floor area of the existing and proposed facilities is well in excess of the largest comparable facilities within the data set, the trip estimates are based on the number of employees at the site. It is anticipated that 20 to 30 employees will work within the site. To maintain a conservative analysis, the larger estimate of 30 employees was used to assess trip generation for the site.

A summary of the trip generation calculations is provided in Table 2 below. A detailed trip generation worksheet is also included in the technical appendix.

**Table 2 - Proposed Development Trip Generation Summary**

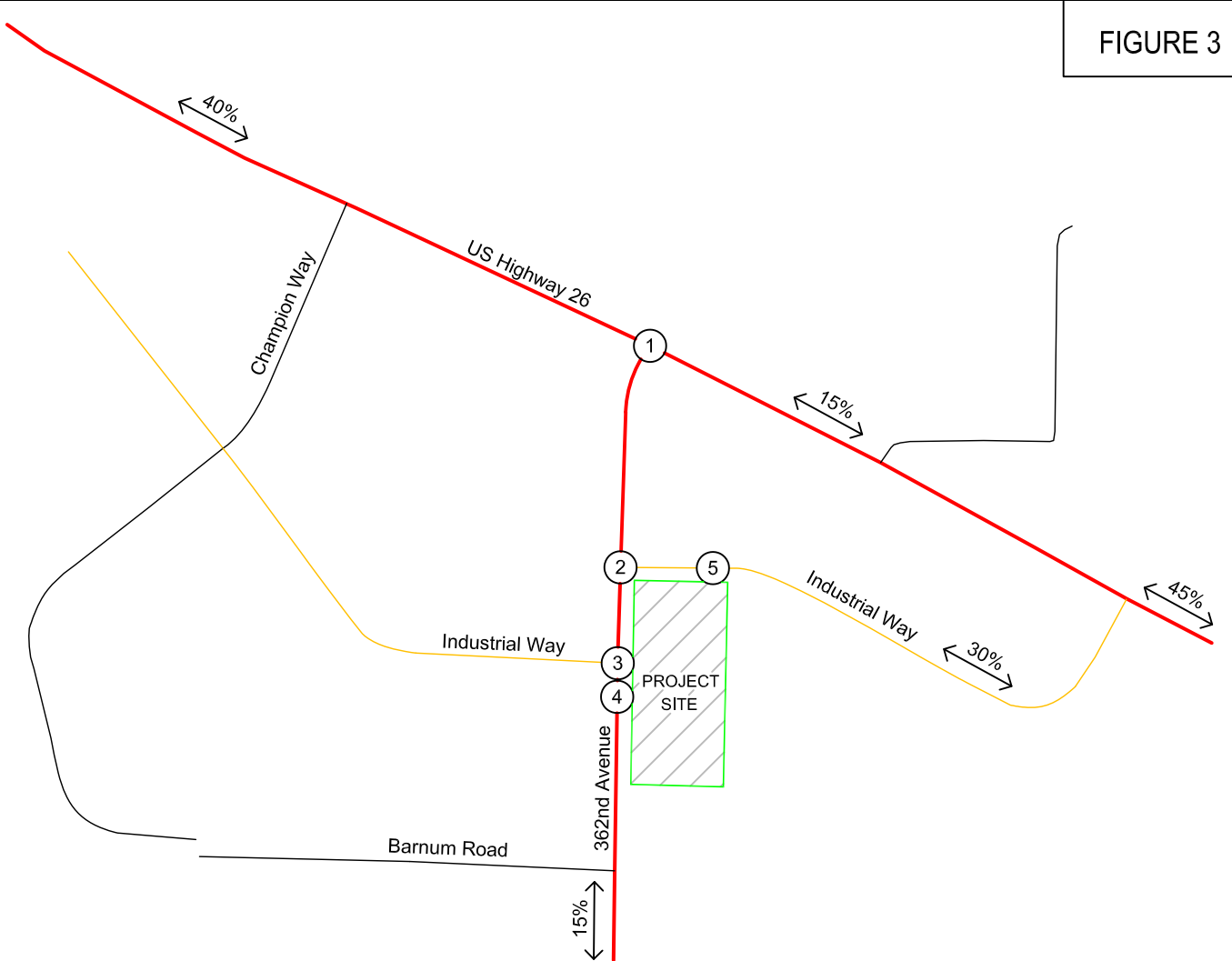
	AM Peak Hour			PM Peak Hour			Daily Total
	In	Out	Total	In	Out	Total	
30 Employee Specialty Contractor	13	5	18	7	15	22	108

### *TRIP DISTRIBUTION*

The directional distribution of site trips to and from the project site was estimated based the existing travel patterns in the site vicinity, as well as the locations of likely trip destinations and major transportation routes. Overall, 40 percent of the anticipated site trips are projected to travel to and from the northwest on Highway 26, 45 percent are projected to travel to and from the southeast on Highway 26, and the remaining 15 percent of site trips are projected to travel to and from the west on Dubarko Road.

The trip distribution percentages and trip assignment for the proposed development are shown in Figure 3 on page 12.

FIGURE 3



AM	AM	AM	AM	AM
<p>①</p>	<p>②</p>	<p>③</p>	<p>④</p>	<p>⑤</p>
<p>PM</p>	<p>PM</p>	<p>PM</p>	<p>PM</p>	<p>PM</p>





## **FUTURE CONDITIONS ANALYSIS**

### ***BACKGROUND VOLUMES***

In order 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. This comparison is made for future traffic conditions at the time of project completion. It is anticipated that the proposed use will be completed and occupied within one year. Accordingly, the analysis was conducted for year 2023 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. Based on data from ODOT's 2040 Future Volume Table, the growth rate for traffic volumes on Highway 26 in the site vicinity was calculated to be 1.92 percent per year (linear). This growth rate was applied to the through traffic volumes on Highway 26. All other turning movements had a growth factor of 2 percent per year (exponential) applied.

In addition to the background growth, future site trips associated with other anticipated developments within the City of Sandy were added to the background traffic volumes. These projects included the Mt. Hood Senior Living, The Pad, Cedar Heights Views, Shaylee Meadows, Trimble PD, Bornstedt Views, Cascade Creek Multifamily, Tickle Creek Village, Double Creek Condos, Jewelberry Ridge, Jewelberry Meadows, Sandy Plaza Apartments, FreeUp Storage, and a mixed-use development at 38015 Highway 26. The projected site trips for these residential developments are shown in Figure 6 in the attached technical appendix.

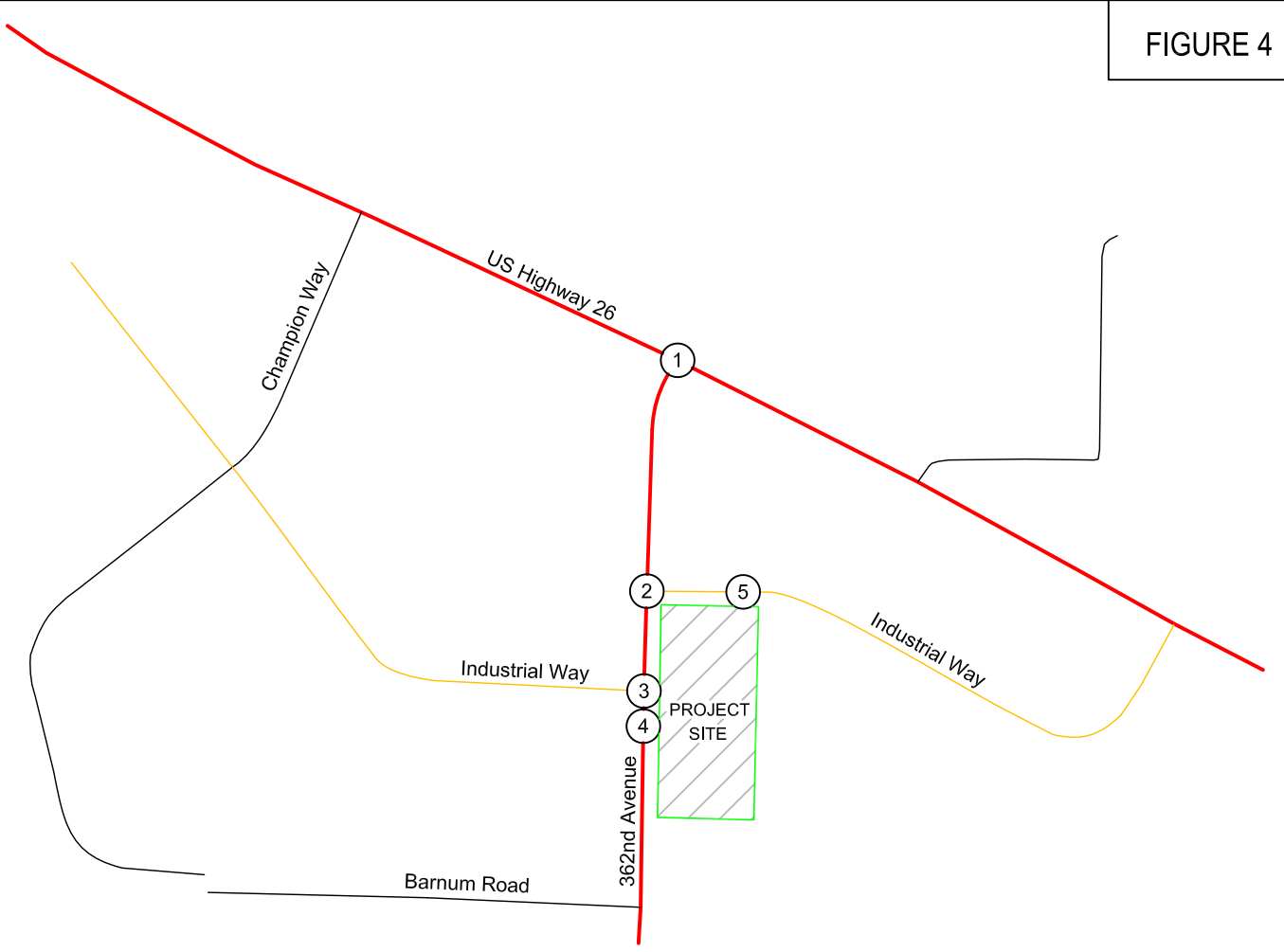
Figure 4 on page 14 shows the projected year 2023 background traffic volumes at the study intersections during the morning and evening peak hours.

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

Peak hour trips calculated to be generated by the proposed development were added to the projected year 2023 background traffic volumes to obtain the year 2023 total traffic volumes following completion of the proposed development.

Figure 5 on page 15 shows the projected year 2023 peak hour volumes including background growth, and site trips from the proposed development for the morning and evening peak hours.

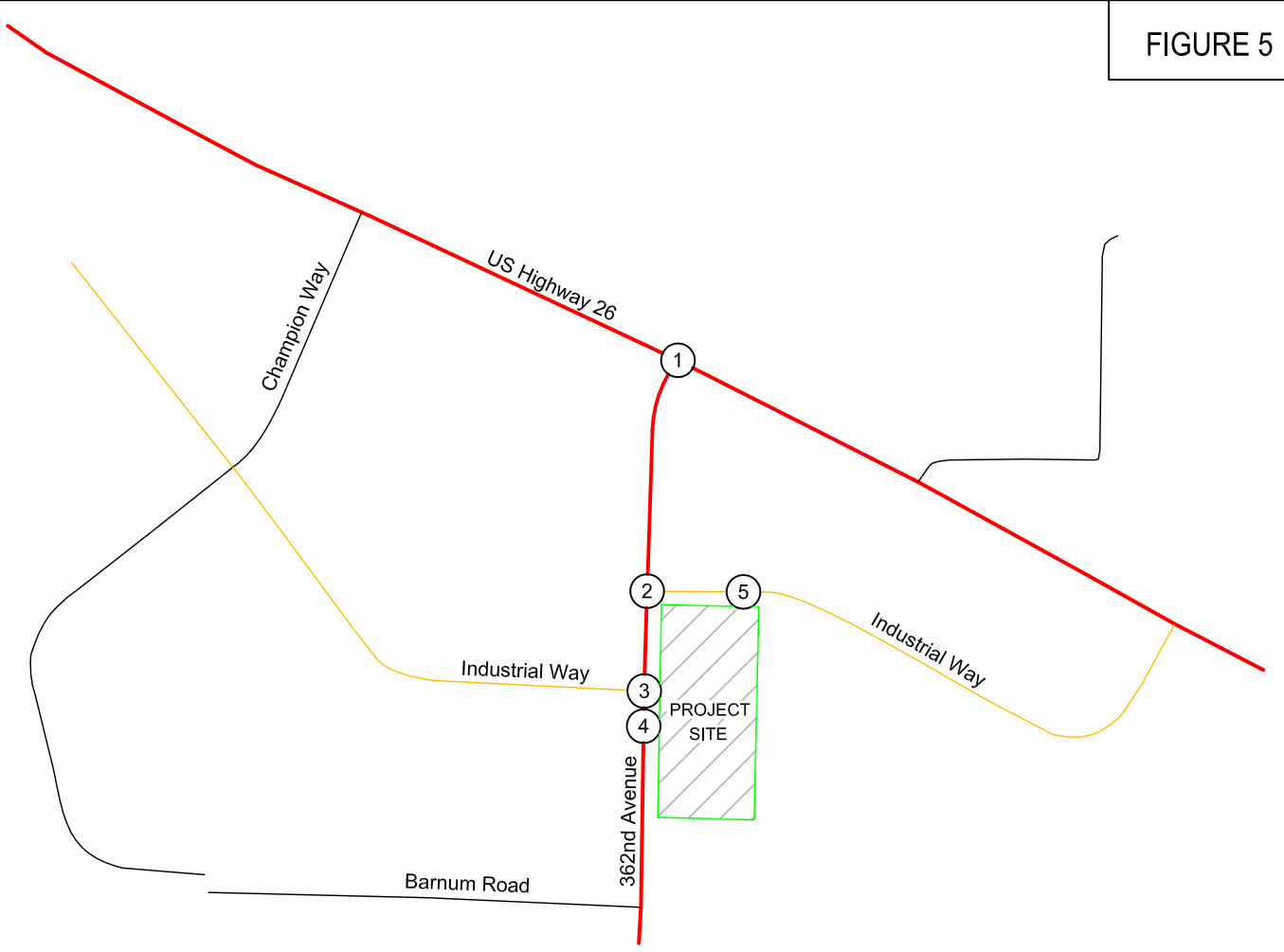
FIGURE 4



AM	AM	AM	AM	AM
<p>①</p>	<p>②</p>	<p>③</p>	<p>④</p>	<p>⑤</p>
<p>①</p>	<p>②</p>	<p>③</p>	<p>④</p>	<p>⑤</p>
PM	PM	PM	PM	PM



FIGURE 5



Node	AM	AM	AM	AM	AM																														
1	<table border="1"> <tr> <td>789</td> <td>143</td> <td>272</td> <td>98</td> <td>990</td> <td>96</td> </tr> </table>	789	143	272	98	990	96	<table border="1"> <tr> <td>135</td> <td>39</td> <td>16</td> <td>27</td> <td>309</td> <td>46</td> </tr> </table>	135	39	16	27	309	46	<table border="1"> <tr> <td>39</td> <td>103</td> <td>59</td> <td>38</td> <td>58</td> <td>309</td> </tr> </table>	39	103	59	38	58	309	<table border="1"> <tr> <td>136</td> <td>5</td> <td>2</td> <td>1</td> <td>365</td> <td>2</td> </tr> </table>	136	5	2	1	365	2	<table border="1"> <tr> <td>42</td> <td>4</td> <td>83</td> <td>2</td> <td>1</td> <td>1</td> </tr> </table>	42	4	83	2	1	1
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39	103	59	38	58	309																														
136	5	2	1	365	2																														
42	4	83	2	1	1																														
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### ***OPERATIONAL ANALYSIS***

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

The results of the operational analysis are summarized in Table 4 below. Detailed analysis worksheets are also included in the technical appendix.

**Table 4 - Operational Analysis Summary: Year 2023 Future Conditions**

Intersection	AM Peak Hour			PM Peak Hour		
	Delay	LOS	v/c	Delay	LOS	v/c
Highway 26 at SE 362nd Ave.						
2023 Background Conditions	13.3	B	0.50	23.3	C	0.72
2023 Background plus Site	13.3	B	0.50	23.4	C	0.72
SE 362nd Ave. at Industrial Way (N)						
2023 Background Conditions	13.1	B	0.10	15.6	C	0.22
2023 Background plus Site	13.2	B	0.10	15.8	C	0.23
SE 362nd Ave. at Industrial Way (S)						
2023 Background Conditions	12.0	B	0.50	27.0	D	0.81
2023 Background plus Site	12.1	B	0.51	27.7	D	0.81
SE 362nd Ave. at Existing Site Access						
2023 Background Conditions	10.9	B	0.01	13.3	B	0.01
2023 Background plus Site	11.7	B	0.01	13.4	B	0.02
Industrial Way at Proposed Site Access						
2023 Background plus Site	9.7	A	0.01	9.4	A	0.01

Upon completion of the proposed development, all study intersections are projected to operate acceptably per the appropriate jurisdictional standards.

### ***QUEUING ANALYSIS***

A queuing analysis was conducted using SimTraffic software to determine whether standing queues on the major streets will impact operation of the site access driveways. The SE 362<sup>nd</sup> Avenue northbound approach toward Industrial Way (South) has projected 95<sup>th</sup> percentile queue lengths of 103 feet and 115 feet during the morning and evening peak hours, respectively. The existing site access is planned to be moved 50 feet south of its existing alignment in conjunction with the proposed development, resulting in an access spacing of 93 feet between the northbound stop bar and the near side of the driveway. Although the proposed access location is within the 95th percentile queue lengths it is less than the average queue lengths during the peak hours (67 feet and 73 feet during the AM and PM peak hours, respectively) and will align directly opposite an existing driveway on the west side of SE 362<sup>nd</sup> Avenue. This represents an improvement in access spacing as compared to existing conditions.





## **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 2016 through December 2020) 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 26 at SE 362<sup>nd</sup> Avenue had 22 reported collisions during the five-year analysis period. These included 15 rear-end collisions, 6 turning-movement collisions, and one pedestrian collision. The pedestrian collision occurred when a pedestrian crossed Highway 26 without a walk signal in the dark and was struck by a driver making a northbound right turn from SE 362<sup>nd</sup> Avenue onto Highway 26. The crash resulted in a “possible injury/complaint of pain” from the pedestrian. The crashes resulted in no incapacitating injuries or fatalities, two non-incapacitating injuries, and 18 reports of a “possible injury/complaint of pain”. The crash rate for the intersection was calculated to be 0.362 crashes per million entering vehicles. This is well below the 90<sup>th</sup> percentile crash rate of 0.509 crashes per million entering vehicles for signalized, three-way urban intersections in Oregon.

The intersections of SE 362<sup>nd</sup> Avenue at Industrial Way had four total reported collisions during the five-year analysis period. These included three rear-end collisions and one turning-movement collision. The crashes resulted in four reports of a “possible injury/complaint of pain.” No serious injuries or fatalities were reported. Conservatively assuming that all reported crashes occurred at the same intersection, the crash rate for the intersection would be 0.203 crashes per million entering vehicles, which is still below the 90<sup>th</sup> percentile crash rate of 0.293 crashes per million entering vehicles for stop-controlled, three-way urban intersections in Oregon.

Based on the crash data, the study intersections are currently operating acceptably with respect to safety. No specific safety improvements are recommended for the study area intersections.

### ***TRAFFIC SIGNAL WARRANT ANALYSIS***

Traffic signal warrants were examined for the unsignalized study intersections. Based on the projected traffic volumes, traffic signal warrants are not projected to be met for any of the unsignalized study intersections under any of the analysis scenarios.



### ***TURN LANE WARRANT ANALYSIS***

Turn lane warrants were also examined for the major-street approaches to the unsignalized study intersections. Left-turn lane warrants are intended to evaluate whether a meaningful safety benefit may be expected if the turning vehicles are provided with a turn lane within the street, allowing left-turning drivers to move out of the through travel lane so that following vehicles may pass without conflicts. Similarly, right-turn lane warrants are intended to evaluate whether a meaningful safety benefit may be expected if a right-turn lane is provided, allowing right-turning vehicles to move out of the through travel lane while decelerating and making turns.

The intersection of SE 362<sup>nd</sup> Avenue at Industrial Way (North) already has a southbound left-turn lane in place. Right-turn lane warrants are not projected to be met at this intersection.

Turn lane warrants are not directly applicable at the intersection of SE 362<sup>nd</sup> Avenue and Industrial Way (South), since the intersection operates under all-way stop control. All vehicles must stop prior to entering the intersection and providing a separate turn lane would not allow through vehicles to traverse the intersection without slowing and stopping. The need for turn lanes at all-way stop control intersections is based on operational rather than safety benefits. In this instance, the intersection operates acceptably without the addition of left and right turn lanes. Therefore, no new turn lanes are recommended at this intersection in conjunction with the proposed development.

The intersections of SE 362<sup>nd</sup> Avenue at the site access and Industrial Way at the proposed site access are not projected to meet turn lane warrants under any analysis scenarios.

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

Intersection sight distance was examined for the proposed re-aligned site access intersections on SE 362<sup>nd</sup> Avenue and for the proposed new site access on Industrial Way.

#### **SE 362<sup>nd</sup> Avenue at Re-Aligned Site Access**

The existing site access on SE 362<sup>nd</sup> Avenue is proposed to be re-aligned to a position 50 feet south of the existing driveway alignment. The proposed new alignment increases the access spacing between the driveway and the nearby all-way stop controlled intersection at Industrial Way. It also aligns the proposed access directly opposite another existing driveway on the west side of the roadway.

SE 362<sup>nd</sup> Avenue has a posted speed limit of 35 mph, typically requiring a minimum of 390 feet of intersection sight distance in each direction. However, the actual 85<sup>th</sup> percentile approach speeds were used in lieu of the posted speed limit to evaluate sight distance in both directions.

For southbound traffic approaching the proposed re-aligned site access on SE 362<sup>nd</sup> Avenue, all approaching vehicles must stop prior to entering the intersection. Intersection sight distance was measured to be continuous beyond the stop-controlled intersection at Industrial Way. The effective



approach speed from the intersection is thus zero miles per hour, and adequate intersection sight distance for safe and efficient operation is available.

Intersection sight distance was measured to be 324 feet to the south from the proposed re-aligned site access. For northbound traffic approaching the proposed re-aligned site access on SE 362<sup>nd</sup> Avenue, the measured 85<sup>th</sup> percentile speed at the limits of sight distance was 37 mph. For this design speed, a minimum of 410 feet of intersection sight distance would typically be desired. However, this intersection sight distance requirement is predicated on the idea of allowing sufficient sight lines such that through traffic will not need to slow to avoid conflicts at the studied intersection. In this instance, all northbound traffic must slow when approaching the site access since it is in close proximity to the northbound stop bar at Industrial Way, so the assumptions underlying the typical intersection sight distance requirements are not directly applicable.

The required stopping sight distance for an approach speed of 37 mph was calculated to be 270 feet. Since the available intersection sight distance to the south is in excess of 270 feet, northbound vehicles approaching the site access have sufficient sight lines to see vehicles entering the roadway at the proposed site access location and slow or stop to avoid collisions. As such, the site access can operate safely. Since all northbound vehicles must slow (and stop) prior to reaching Industrial Way, the potential induced delays to northbound through traffic are not projected to materially impact operation of SE 362<sup>nd</sup> Avenue either at the proposed re-aligned site access location or at Industrial Way.

Based on the detailed analysis, sight lines at the proposed re-aligned site access location are sufficient to allow for safe and efficient operation of the site access. Since the proposed re-alignment also results in increased access spacing and direct alignment opposite an existing driveway, the proposed re-aligned access will operate better than the existing site access and is expected to represent the optimal location for the driveway within the site frontage.

#### Industrial Way at Proposed Site Access

The proposed new site access is centered approximately 40 feet west of the site's east property line on Industrial Way. Industrial Way has a posted speed limit of 25 mph. The desired intersection sight distance for this approach speed is 280 feet in each direction.

Intersection sight distance to the west from the proposed access location on Industrial Way is currently obstructed by vegetation within the site frontage. However, with clearing of the vegetation continuous sight lines to SE 362<sup>nd</sup> Avenue can be provided to the west. The proposed access will be located 230 feet east of the traveled way on SE 362<sup>nd</sup> Avenue, indicating that a minimum of 230 feet of intersection sight distance will be provided in this direction. Vehicles approaching from beyond the intersection at SE 362<sup>nd</sup> Avenue will need to make a 90-degree turn onto Industrial Way. Typical turning speeds are in the range of 9 to 19 mph, while the available intersection sight distance to the west will be sufficient for turning speeds of up to 20 mph. The available intersection sight distance to the west is also projected to provide adequate stopping sight distance for approach speeds up to 33 mph. Based on the analysis, adequate sight lines for safe and efficient operation can be attained to the west of the proposed access location upon clearing of vegetation within the site frontage.



Intersection sight distance to the east from the proposed access location on Industrial Way was measured to be 248 feet, as limited by a large concrete block which provides a fire department standpipe connection that serves the property immediately east of the Johnson RV site.

For westbound traffic approaching the proposed site access on Industrial Way, the measured 85<sup>th</sup> percentile speed at the limits of sight distance was 33 mph. This design speed requires a minimum of 230 feet of stopping sight distance for safety. Since the available intersection sight distance is in excess of 230 feet, the intersection has adequate sight lines for through vehicles to anticipate and avoid collisions at the site access. However, interruptions to the flow of through traffic along Industrial Way may be expected when vehicles pull out from the proposed access driveway.

In order to assess the anticipated delays which would be induced by operation of the proposed driveway on Industrial Way, a detailed delay analysis was conducted.

For vehicles traveling at speeds of up to 33 mph, the available intersection sight distance of 248 feet accommodates approximately 5.1 seconds of travel time. Typically, intersections are designed to accommodate 7.5 seconds of travel time at the design speed in order to avoid undue delays to through traffic. Accordingly, vehicles entering Industrial Way from the proposed site access have the potential to add as much as 2.4 seconds of additional delay to through traffic per vehicle exiting from the proposed driveway. Assuming random arrivals, the average added delay per affected vehicle would be 1.2 seconds (half the maximum value).

A conservative estimate of the likelihood of conflicts resulting in any induced delay can be calculated based on the volume of westbound traffic traveling on Industrial Way during the highest-volume hour. In this instance, the highest westbound volumes occur during the evening peak hour when 91 westbound through vehicles are projected at the site access. Conservatively assuming that each approaching vehicle has a 2.4-second window during which a vehicle exiting the site would require the westbound driver to slow, each vehicle making a left turn from the site access onto Industrial Way would have a 6 percent chance of experiencing a conflict with westbound through traffic which induces a delay. Since approximately 10 vehicles per day are projected to make this turning movement, the average induced delay was calculated to be 0.72 seconds per day (10 vehicles per day \* 6% chance of conflict \* 1.2 seconds average delay per conflict). This equates to approximately 4.4 minutes of induced delay per year. The economic impact of these cumulative delays would be \$2.19 per year assuming a time value of \$30 per hour. Based on the minimal economic impact, any meaningful mitigation would result in costs well in excess of the actual impacts of the proposed site access.

Based on the analysis, adequate intersection sight distance is available in each direction for safe operation of the proposed site access on Industrial Way. Since sight lines are limited to the east by a large concrete block which provides a fire department standpipe connection that serves the property immediately east of the Johnson RV site, some induced delays are expected since westbound through vehicles may need to slow or stop to avoid collisions at the site access. The overall impact of these delays is negligible, however. Accordingly, operation of the proposed site access is not projected to result in any significant operational or safety concerns.



## CONCLUSIONS

Based on the operational analysis, the study intersections are currently operating acceptably per City of Sandy and ODOT standards. Under year 2023 traffic conditions the intersections are projected to continue to operate acceptably either with or without the addition of site trips from the proposed use. No operational mitigations are necessary or recommended.

Based on the queuing analysis, the projected northbound queues on SE 362<sup>nd</sup> Avenue are projected to extend beyond the proposed driveway location during a portion of the peak hours. However, average queue lengths even during the peak hours will not obstruct the driveway, and the proposed driveway re-alignment will provide 50 feet of added access spacing as compared to existing conditions, and the driveway will be aligned directly opposite an existing driveway on the west side of SE 362<sup>nd</sup> Avenue.

Based on the crash data, the study intersections are currently operating acceptably with respect to safety. No specific safety improvements are recommended in conjunction with the proposed site use.

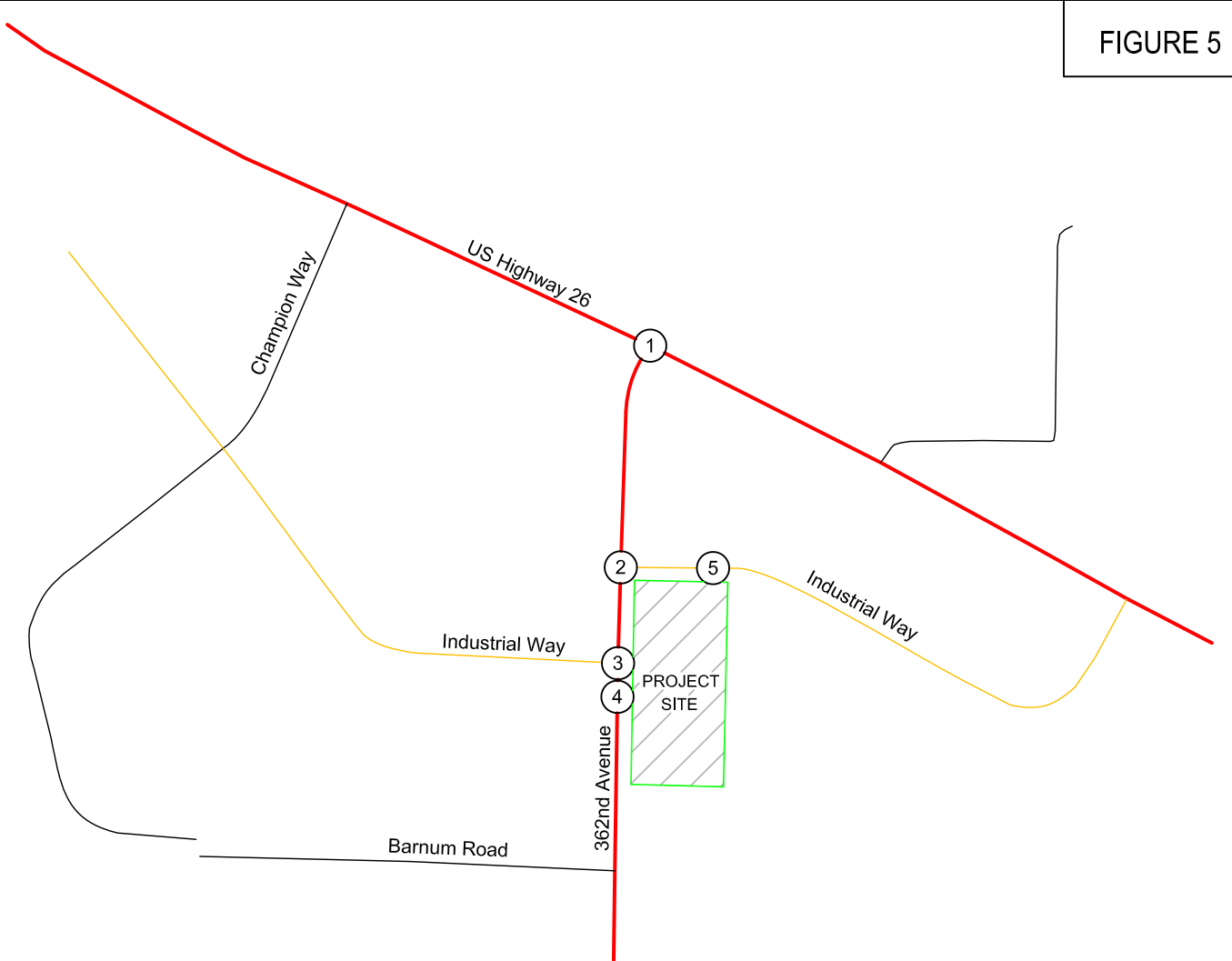
Based on the warrant analysis, no new turn lanes or traffic signals are recommended in conjunction with the proposed site use.

The proposed re-aligned site access on SE 362<sup>nd</sup> Avenue is projected to have adequate sight distance for safe and efficient operation. The proposed new site access on Industrial Way is projected to have adequate sight distance to the west upon clearing of vegetation within the site frontage allowing a clear line of sight to SE 362<sup>nd</sup> Avenue. Sight distance to the east is restricted by an existing concrete block which supports a fire department standpipe connection that serves the property immediately east of the Johnson RV site. Although sight lines to the east are restricted, the available intersection sight distance is sufficient for safe operation of the access, and operational impacts associated with the limited sight distance are negligible. Accordingly, the proposed site access on Industrial Way can also operate safely and efficiently.



## APPENDIX

FIGURE 5



AM	AM	AM	AM	AM
<p>①</p>	<p>②</p>	<p>③</p>	<p>④</p>	<p>⑤</p>
<p>①</p>	<p>②</p>	<p>③</p>	<p>④</p>	<p>⑤</p>
PM	PM	PM	PM	PM





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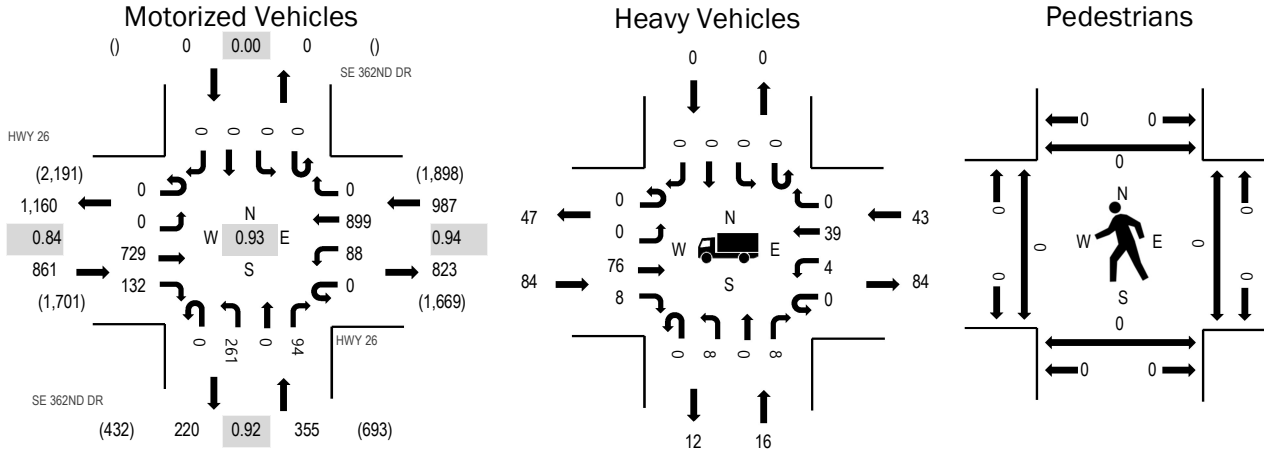
Location: 1 SE 362ND DR & HWY 26 AM

Date: Thursday, August 11, 2022

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

Peak 15-Minutes: 07:50 AM - 08:05 AM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	9.8%	0.84
WB	4.4%	0.94
NB	4.5%	0.92
SB	0.0%	0.00
All	6.5%	0.93

Traffic Counts - Motorized Vehicles

Interval Start Time	HWY 26 Eastbound				HWY 26 Westbound				SE 362ND DR Northbound				SE 362ND DR 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	60	7	0	4	69	0	0	21	0	1	0	0	0	0	162	2,185
7:05 AM	0	0	37	9	0	8	82	0	0	22	0	5	0	0	0	0	163	2,202
7:10 AM	0	0	40	8	0	7	68	0	0	26	0	3	0	0	0	0	152	2,181
7:15 AM	0	0	50	6	0	3	89	0	0	30	0	3	0	0	0	0	181	2,203
7:20 AM	0	0	45	8	0	3	90	0	0	22	0	7	0	0	0	0	175	2,192
7:25 AM	0	0	78	16	0	4	76	0	0	21	0	4	0	0	0	0	199	2,184
7:30 AM	0	0	65	16	0	7	71	0	0	26	0	8	0	0	0	0	193	2,148
7:35 AM	0	0	52	6	0	8	80	0	0	26	0	7	0	0	0	0	179	2,109
7:40 AM	0	0	71	9	0	11	71	0	0	22	0	9	0	0	0	0	193	2,143
7:45 AM	0	0	49	11	0	7	73	0	0	19	0	13	0	0	0	0	172	2,139
7:50 AM	0	0	85	13	0	11	67	0	0	21	0	5	0	0	0	0	202	2,147
7:55 AM	0	0	71	21	0	9	78	0	0	23	0	12	0	0	0	0	214	2,133
8:00 AM	0	0	71	8	0	7	67	0	0	18	0	8	0	0	0	0	179	2,107
8:05 AM	0	0	41	9	0	8	60	0	0	17	0	7	0	0	0	0	142	
8:10 AM	0	0	51	9	0	10	77	0	0	16	0	11	0	0	0	0	174	
8:15 AM	0	0	71	17	0	4	58	0	0	10	0	10	0	0	0	0	170	
8:20 AM	0	0	52	8	0	10	57	0	0	26	0	14	0	0	0	0	167	
8:25 AM	0	0	59	7	0	7	68	0	0	12	0	10	0	0	0	0	163	
8:30 AM	0	0	57	5	0	7	52	0	0	19	0	14	0	0	0	0	154	
8:35 AM	0	0	58	5	0	12	101	0	0	25	0	12	0	0	0	0	213	
8:40 AM	0	0	68	10	0	9	69	0	0	19	0	14	0	0	0	0	189	
8:45 AM	0	0	77	8	0	10	55	0	0	18	0	12	0	0	0	0	180	
8:50 AM	0	0	76	9	0	11	65	0	0	18	0	9	0	0	0	0	188	
8:55 AM	0	0	78	14	0	16	62	0	0	9	0	9	0	0	0	0	188	
Count Total	0	0	1,462	239	0	193	1,705	0	0	486	0	207	0	0	0	0	4,292	
Peak Hour	0	0	729	132	0	88	899	0	0	261	0	94	0	0	0	0	2,203	



### 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	12	0	4	0	16	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	7	0	6	0	13	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	3	2	1	0	6	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	11	2	1	0	14	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	6	0	1	0	7	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	9	0	1	0	10	7:25 AM	0	0	1	0	1	7:25 AM	0	0	0	0	0
7:30 AM	10	2	3	0	15	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	3	1	2	0	6	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	6	0	5	0	11	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	5	1	5	0	11	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	11	1	5	0	17	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	10	4	6	0	20	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	2	1	5	0	8	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	4	0	5	0	9	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	7	4	4	0	15	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	16	1	3	0	20	8:15 AM	0	0	0	0	0	8:15 AM	0	0	1	1	2
8:20 AM	3	3	2	0	8	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	8	2	7	0	17	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	6	1	9	0	16	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	7	2	6	0	15	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	7	1	7	0	15	8:40 AM	0	0	0	0	0	8:40 AM	0	1	0	0	1
8:45 AM	12	2	4	0	18	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	11	1	9	0	21	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	5	1	5	0	11	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	181	32	106	0	319	Count Total	0	0	1	0	1	Count Total	0	1	1	1	3
Peak Hour	84	16	43	0	143	Peak Hour	0	0	1	0	1	Peak Hour	0	0	0	0	0



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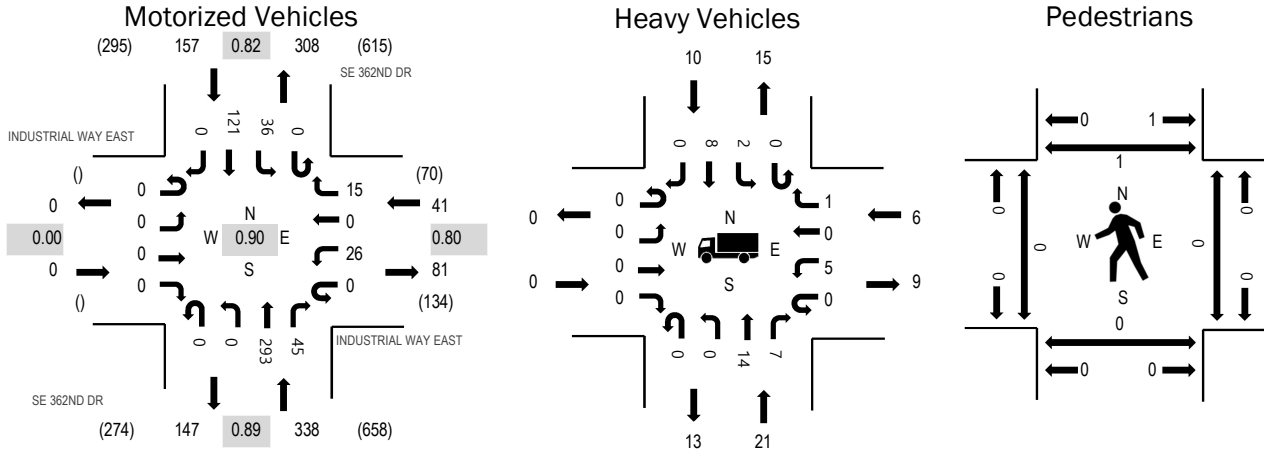
Location: 2 SE 362ND DR & INDUSTRIAL WAY EAST AM

Date: Thursday, August 11, 2022

Peak Hour: 07:20 AM - 08:20 AM

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

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.00
WB	14.6%	0.80
NB	6.2%	0.89
SB	6.4%	0.82
All	6.9%	0.90

Traffic Counts - Motorized Vehicles

Interval Start Time	INDUSTRIAL WAY EAST Eastbound				INDUSTRIAL WAY EAST Westbound				SE 362ND DR Northbound				SE 362ND DR 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	0	0	0	0	0	0	0	0	21	3	0	3	4	0	31	520
7:05 AM	0	0	0	0	0	1	0	0	0	0	25	1	0	2	8	0	37	528
7:10 AM	0	0	0	0	0	0	0	0	0	0	29	5	0	5	6	0	45	529
7:15 AM	0	0	0	0	0	0	0	0	0	0	25	2	0	2	6	0	35	521
7:20 AM	0	0	0	0	0	4	0	1	0	0	28	4	0	1	9	0	47	536
7:25 AM	0	0	0	0	0	2	0	1	0	0	24	2	0	5	8	0	42	529
7:30 AM	0	0	0	0	0	0	0	2	0	0	36	5	0	7	10	0	60	523
7:35 AM	0	0	0	0	0	1	0	2	0	0	21	3	0	1	7	0	35	515
7:40 AM	0	0	0	0	0	2	0	2	0	0	26	1	0	2	10	0	43	525
7:45 AM	0	0	0	0	0	1	0	0	0	0	26	3	0	3	18	0	51	527
7:50 AM	0	0	0	0	0	2	0	1	0	0	25	7	0	3	7	0	45	517
7:55 AM	0	0	0	0	0	2	0	1	0	0	24	4	0	3	15	0	49	506
8:00 AM	0	0	0	0	0	5	0	0	0	0	20	7	0	4	3	0	39	503
8:05 AM	0	0	0	0	0	2	0	1	0	0	22	3	0	1	9	0	38	
8:10 AM	0	0	0	0	0	0	0	2	0	0	19	3	0	3	10	0	37	
8:15 AM	0	0	0	0	0	5	0	2	0	0	22	3	0	3	15	0	50	
8:20 AM	0	0	0	0	0	1	0	2	0	0	24	3	0	2	8	0	40	
8:25 AM	0	0	0	0	0	1	0	3	0	0	18	0	0	2	12	0	36	
8:30 AM	0	0	0	0	0	0	0	2	0	0	28	4	0	1	17	0	52	
8:35 AM	0	0	0	0	0	1	0	3	0	0	30	3	0	0	8	0	45	
8:40 AM	0	0	0	0	0	3	0	1	0	0	27	1	0	2	11	0	45	
8:45 AM	0	0	0	0	0	1	0	0	0	0	27	3	0	1	9	0	41	
8:50 AM	0	0	0	0	0	1	0	3	0	0	15	3	0	1	11	0	34	
8:55 AM	0	0	0	0	0	2	0	4	0	0	20	3	0	1	16	0	46	
Count Total	0	0	0	0	0	37	0	33	0	0	582	76	0	58	237	0	1,023	
Peak Hour	0	0	0	0	0	26	0	15	0	0	293	45	0	36	121	0	536	

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

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	1	0	2	3	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	0	2	1	3	6	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	2	0	1	3	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	0	0	0	1	1	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	1	0	1	2	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	0	1	0	0	1	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	0	2	0	0	2	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	2	0	0	2	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	0	1	0	2	3	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	0	3	0	1	4	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	1	0	2	3	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	0	1	3	0	4	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	3	1	0	4	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	0	4	0	1	5	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	1	1
8:15 AM	0	2	2	2	6	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	2	0	1	3	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	1	0	3	4	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	3	0	0	3	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	0	0	1	3	4	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	1	0	2	3	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	0	1	0	2	3	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	0	1	1	0	2	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	0	35	9	27	71	Count Total	0	0	0	0	0	Count Total	0	0	0	1	1
Peak Hour	0	21	6	10	37	Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	1	1



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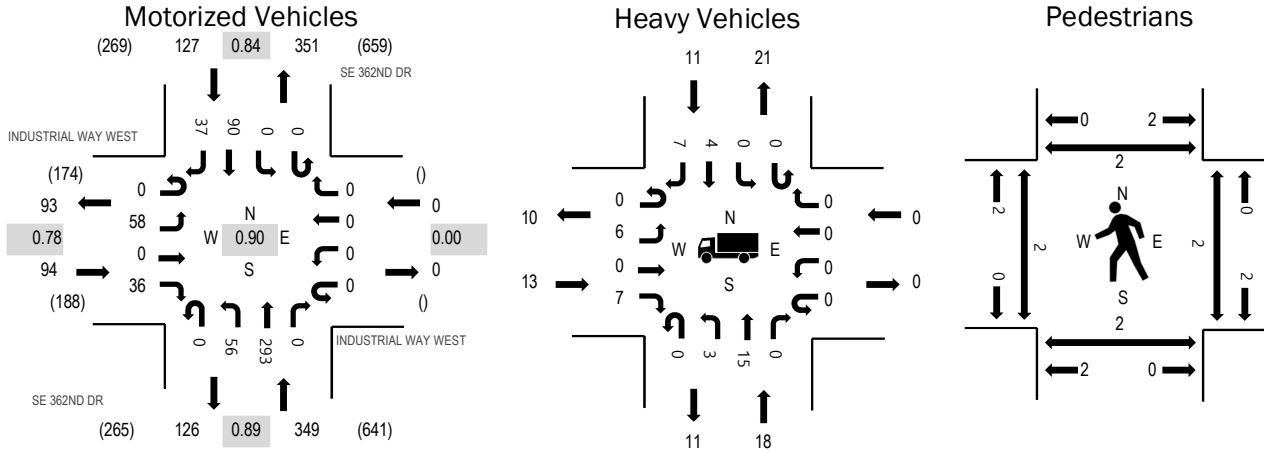
Location: 3 SE 362ND DR & INDUSTRIAL WAY WEST AM

Date: Thursday, August 11, 2022

Peak Hour: 07:10 AM - 08:10 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	13.8%	0.78
WB	0.0%	0.00
NB	5.2%	0.89
SB	8.7%	0.84
All	7.4%	0.90

Traffic Counts - Motorized Vehicles

Interval Start Time	INDUSTRIAL WAY WEST Eastbound				INDUSTRIAL WAY WEST Westbound				SE 362ND DR Northbound				SE 362ND DR 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	5	0	0	0	0	0	0	0	5	21	0	0	0	4	2	37	561
7:05 AM	0	7	0	0	0	0	0	0	0	4	18	0	0	0	4	2	35	565
7:10 AM	0	3	0	4	0	0	0	0	0	2	29	0	0	0	4	3	45	570
7:15 AM	0	3	0	1	0	0	0	0	0	12	26	0	0	0	4	2	48	568
7:20 AM	0	4	0	4	0	0	0	0	0	4	25	0	0	0	5	4	46	558
7:25 AM	0	9	0	3	0	0	0	0	0	5	22	0	0	0	7	4	50	568
7:30 AM	0	6	0	3	0	0	0	0	0	6	23	0	0	0	10	0	48	553
7:35 AM	0	2	0	4	0	0	0	0	0	2	34	0	0	0	8	3	53	558
7:40 AM	0	1	0	3	0	0	0	0	0	5	23	0	0	0	4	4	40	551
7:45 AM	0	4	0	2	0	0	0	0	0	7	21	0	0	0	11	4	49	560
7:50 AM	0	5	0	6	0	0	0	0	0	2	32	0	0	0	10	4	59	564
7:55 AM	0	10	0	3	0	0	0	0	0	1	20	0	0	0	13	4	51	548
8:00 AM	0	8	0	0	0	0	0	0	0	5	16	0	0	0	10	2	41	537
8:05 AM	0	3	0	3	0	0	0	0	0	5	22	0	0	0	4	3	40	
8:10 AM	0	5	0	2	0	0	0	0	0	2	22	0	0	0	8	4	43	
8:15 AM	0	0	0	1	0	0	0	0	0	4	20	0	0	0	11	2	38	
8:20 AM	0	3	0	4	0	0	0	0	0	5	28	0	0	0	9	7	56	
8:25 AM	0	5	0	6	0	0	0	0	0	4	9	0	0	0	9	2	35	
8:30 AM	0	8	0	4	0	0	0	0	0	2	23	0	0	0	12	4	53	
8:35 AM	0	7	0	3	0	0	0	0	0	1	22	0	0	0	10	3	46	
8:40 AM	0	6	0	5	0	0	0	0	0	6	23	0	0	0	8	1	49	
8:45 AM	0	3	0	2	0	0	0	0	0	4	33	0	0	0	7	4	53	
8:50 AM	0	6	0	3	0	0	0	0	0	6	15	0	0	0	12	1	43	
8:55 AM	0	6	0	3	0	0	0	0	0	2	13	0	0	0	12	4	40	
Count Total	0	119	0	69	0	0	0	0	0	101	540	0	0	0	196	73	1,098	
Peak Hour	0	58	0	36	0	0	0	0	0	56	293	0	0	0	90	37	570	

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

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	2	2	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	1	1	0	3	5	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	1	0	1	2	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	1	2	0	0	3	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	3	0	0	1	4	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	1	1	0	2	4	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	1	2	0	0	3	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	2	2	0	0	4	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	2	0	0	2	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	0	2	0	1	3	7:45 AM	0	0	0	0	0	7:45 AM	2	2	0	0	4
7:50 AM	2	2	0	2	6	7:50 AM	0	0	0	0	0	7:50 AM	0	0	1	1	2
7:55 AM	2	1	0	1	4	7:55 AM	0	0	0	0	0	7:55 AM	0	0	1	1	2
8:00 AM	0	2	0	3	5	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	1	1	0	0	2	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	4	3	0	2	9	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	1	4	0	3	8	8:15 AM	0	0	0	0	0	8:15 AM	0	0	1	0	1
8:20 AM	1	3	0	2	6	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	1	1	0	1	3	8:25 AM	0	0	0	0	0	8:25 AM	0	0	2	2	4
8:30 AM	1	1	0	2	4	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	1	0	0	0	1	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	1	3	0	2	6	8:40 AM	0	0	0	0	0	8:40 AM	0	0	1	1	2
8:45 AM	1	0	0	2	3	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	0	1	0	3	4	8:50 AM	0	0	0	0	0	8:50 AM	1	1	0	0	2
8:55 AM	0	2	0	1	3	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	25	37	0	34	96	Count Total	0	0	0	0	0	Count Total	3	3	6	5	17
Peak Hour	13	18	0	11	42	Peak Hour	0	0	0	0	0	Peak Hour	2	2	2	2	8



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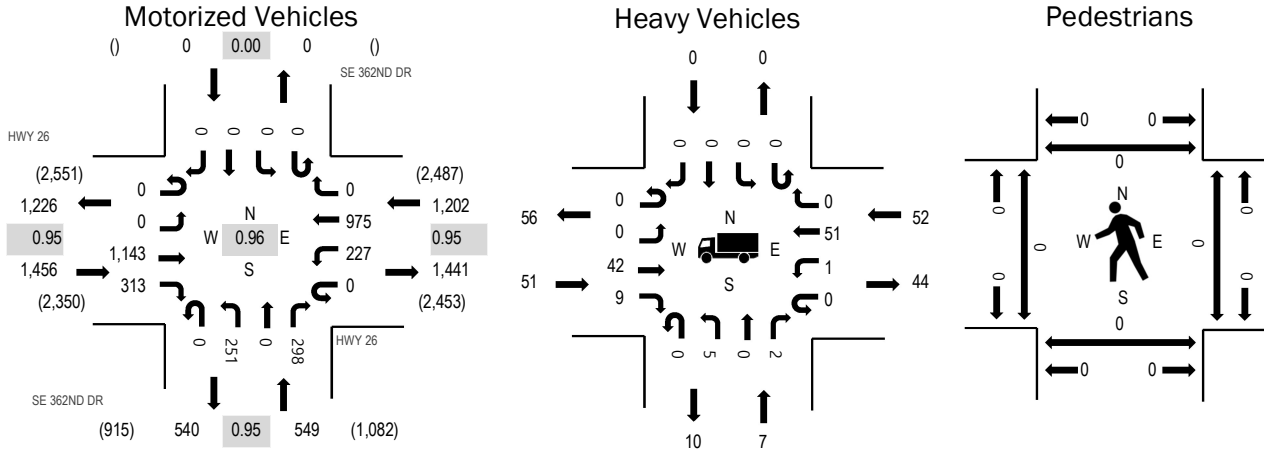
Location: 1 SE 362ND DR & HWY 26 PM

Date: Thursday, August 11, 2022

Peak Hour: 04:50 PM - 05:50 PM

Peak 15-Minutes: 04:55 PM - 05:10 PM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	3.5%	0.95
WB	4.3%	0.95
NB	1.3%	0.95
SB	0.0%	0.00
All	3.4%	0.96

Traffic Counts - Motorized Vehicles

Interval Start Time	HWY 26 Eastbound				HWY 26 Westbound				SE 362ND DR Northbound				SE 362ND DR 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	60	6	0	22	84	0	0	20	0	15	0	0	0	0	207	2,742
4:05 PM	0	0	40	9	0	21	75	0	0	44	0	19	0	0	0	0	208	2,828
4:10 PM	0	0	41	8	0	24	89	0	0	13	0	17	0	0	0	0	192	2,888
4:15 PM	0	0	49	6	0	16	115	0	0	22	0	25	0	0	0	0	233	2,961
4:20 PM	0	0	44	8	0	19	84	0	0	28	0	30	0	0	0	0	213	3,016
4:25 PM	0	0	76	15	0	28	94	0	0	27	0	13	0	0	0	0	253	3,079
4:30 PM	0	0	67	16	0	19	92	0	0	30	0	20	0	0	0	0	244	3,090
4:35 PM	0	0	52	6	0	24	101	0	0	30	0	20	0	0	0	0	233	3,113
4:40 PM	0	0	70	9	0	28	98	0	0	14	0	23	0	0	0	0	242	3,148
4:45 PM	0	0	53	11	0	10	80	0	0	22	0	20	0	0	0	0	196	3,158
4:50 PM	0	0	84	12	0	15	91	0	0	20	0	26	0	0	0	0	248	3,207
4:55 PM	0	0	73	22	0	29	97	0	0	22	0	30	0	0	0	0	273	3,196
5:00 PM	0	0	105	28	0	21	98	0	0	21	0	20	0	0	0	0	293	3,177
5:05 PM	0	0	94	30	0	18	83	0	0	22	0	21	0	0	0	0	268	
5:10 PM	0	0	71	29	0	17	81	0	0	33	0	34	0	0	0	0	265	
5:15 PM	0	0	104	22	0	23	101	0	0	15	0	23	0	0	0	0	288	
5:20 PM	0	0	113	37	0	13	71	0	0	18	0	24	0	0	0	0	276	
5:25 PM	0	0	99	25	0	19	75	0	0	21	0	25	0	0	0	0	264	
5:30 PM	0	0	92	33	0	14	83	0	0	23	0	22	0	0	0	0	267	
5:35 PM	0	0	109	25	0	24	74	0	0	11	0	25	0	0	0	0	268	
5:40 PM	0	0	103	26	0	12	56	0	0	25	0	30	0	0	0	0	252	
5:45 PM	0	0	96	24	0	22	65	0	0	20	0	18	0	0	0	0	245	
5:50 PM	0	0	102	20	0	18	60	0	0	18	0	19	0	0	0	0	237	
5:55 PM	1	0	107	18	0	14	70	0	0	14	0	30	0	0	0	0	254	
Count Total	1	0	1,904	445	0	470	2,017	0	0	533	0	549	0	0	0	0	5,919	
Peak Hour	0	0	1,143	313	0	227	975	0	0	251	0	298	0	0	0	0	3,207	

### 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	11	2	8	0	21	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	7	2	6	0	15	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	4	0	4	0	8	4:10 PM	0	0	0	0	0	4:10 PM	0	0	1	0	1
4:15 PM	10	1	6	0	17	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	6	0	5	0	11	4:20 PM	0	0	0	0	0	4:20 PM	0	0	1	0	1
4:25 PM	9	1	3	0	13	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	10	0	2	0	12	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	3	2	4	0	9	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	8	0	4	0	12	4:40 PM	0	0	1	0	1	4:40 PM	0	0	0	0	0
4:45 PM	7	0	5	0	12	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	10	0	3	0	13	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	7	0	5	0	12	4:55 PM	0	0	1	0	1	4:55 PM	0	0	0	0	0
5:00 PM	5	1	5	0	11	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	3	1	3	0	7	5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0
5:10 PM	4	0	5	0	9	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0
5:15 PM	5	0	9	0	14	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	2	1	4	0	7	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	4	1	4	0	9	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	4	1	9	0	14	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	2	0	1	0	3	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	2	1	0	0	3	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	3	1	4	0	8	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	7	1	3	0	11	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	1	0	1	0	2	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	134	16	103	0	253	Count Total	0	0	2	0	2	Count Total	0	0	2	0	2
Peak Hour	51	7	52	0	110	Peak Hour	0	0	1	0	1	Peak Hour	0	0	0	0	0



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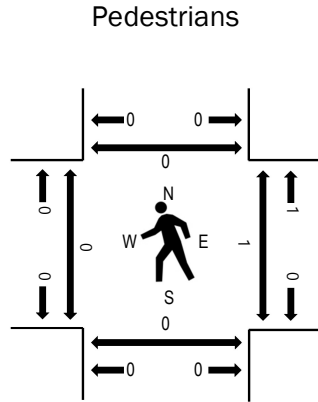
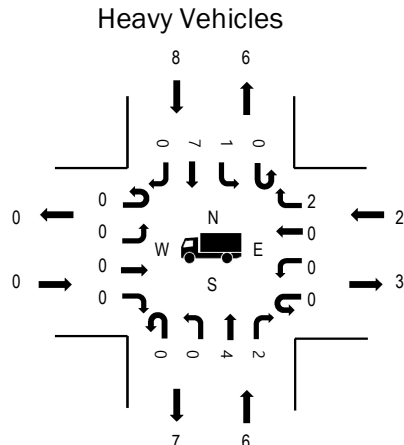
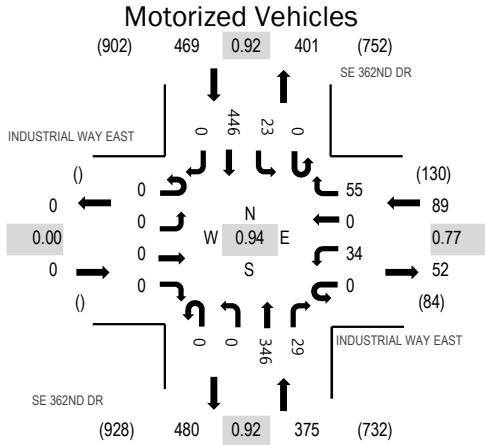
Location: 2 SE 362ND DR & INDUSTRIAL WAY EAST PM

Date: Thursday, August 11, 2022

Peak Hour: 04:00 PM - 05:00 PM

Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.00
WB	2.2%	0.77
NB	1.6%	0.92
SB	1.7%	0.92
All	1.7%	0.94

Traffic Counts - Motorized Vehicles

Interval Start Time	INDUSTRIAL WAY EAST Eastbound				INDUSTRIAL WAY EAST Westbound				SE 362ND DR Northbound				SE 362ND DR 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	0	0	0	3	0	7	0	0	42	2	0	1	38	0	93	933
4:05 PM	0	0	0	0	0	2	0	5	0	0	30	2	0	5	30	0	74	929
4:10 PM	0	0	0	0	0	3	0	5	0	0	21	1	0	1	38	0	69	933
4:15 PM	0	0	0	0	0	5	0	5	0	0	35	3	0	2	43	0	93	929
4:20 PM	0	0	0	0	0	0	0	1	0	0	26	4	0	0	41	0	72	898
4:25 PM	0	0	0	0	0	2	0	4	0	0	19	2	0	1	26	0	54	896
4:30 PM	0	0	0	0	0	5	0	11	0	0	34	1	0	2	44	0	97	902
4:35 PM	0	0	0	0	0	2	0	5	0	0	21	6	0	2	45	0	81	876
4:40 PM	0	0	0	0	0	2	0	4	0	0	31	2	0	1	30	0	70	862
4:45 PM	0	0	0	0	0	4	0	5	0	0	34	3	0	5	29	0	80	863
4:50 PM	0	0	0	0	0	5	0	2	0	0	25	0	0	1	36	0	69	854
4:55 PM	0	0	0	0	0	1	0	1	0	0	28	3	0	2	46	0	81	847
5:00 PM	0	0	0	0	0	1	0	4	0	0	44	2	0	0	38	0	89	831
5:05 PM	0	0	0	0	0	1	0	3	0	0	27	3	0	0	44	0	78	
5:10 PM	0	0	0	0	0	1	0	3	0	0	22	1	0	2	36	0	65	
5:15 PM	0	0	0	0	0	1	0	2	0	0	28	2	0	1	28	0	62	
5:20 PM	0	0	0	0	0	2	0	1	0	0	25	1	0	1	40	0	70	
5:25 PM	0	0	0	0	0	2	0	1	0	0	17	1	0	0	39	0	60	
5:30 PM	0	0	0	0	0	2	0	2	0	0	33	1	0	0	33	0	71	
5:35 PM	0	0	0	0	0	5	0	0	0	0	29	2	0	1	30	0	67	
5:40 PM	0	0	0	0	0	3	0	1	0	0	24	2	0	1	40	0	71	
5:45 PM	0	0	0	0	0	3	0	1	0	0	27	2	0	1	37	0	71	
5:50 PM	0	0	0	0	0	0	0	1	0	0	30	3	0	0	28	0	62	
5:55 PM	0	0	0	0	0	1	0	0	0	0	26	5	0	0	33	0	65	
Count Total	0	0	0	0	0	56	0	74	0	0	678	54	0	30	872	0	1,764	
Peak Hour	0	0	0	0	0	34	0	55	0	0	346	29	0	23	446	0	933	



### 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	3	0	2	5	4:00 PM	0	0	0	0	0	4:00 PM	0	0	1	0	1
4:05 PM	0	1	0	0	1	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	1	0	0	1	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	0	1	0	1	2	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	1	1	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	0	0	0	0
4:30 PM	0	0	1	1	2	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	2	2	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	0	0	0	1	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	2	0	0	2	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	1	1	5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0
5:10 PM	0	0	0	2	2	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	1	0	1	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	0	0
5:30 PM	0	0	0	1	1	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	2	0	0	2	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	0	1	0	1	2	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	0	12	3	14	29	Count Total	0	0	0	0	0	Count Total	0	0	1	0	1
Peak Hour	0	6	2	8	16	Peak Hour	0	0	0	0	0	Peak Hour	0	0	1	0	1



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

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	3	0	2	5	4:00 PM	0	0	0	0	0	4:00 PM	0	0	2	0	2
4:05 PM	1	0	0	3	4	4:05 PM	0	0	0	0	0	4:05 PM	0	0	2	1	3
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	2	0	0	2	4:15 PM	0	1	0	0	1	4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	2	2	4:20 PM	0	0	0	0	0	4:20 PM	0	0	5	0	5
4:25 PM	0	0	0	3	3	4:25 PM	0	0	0	0	0	4:25 PM	0	0	2	0	2
4:30 PM	0	0	0	1	1	4:30 PM	1	0	0	0	1	4:30 PM	0	0	0	0	0
4:35 PM	1	1	0	1	3	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	1	0	0	1	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	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	0	1	0	0	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0	4:55 PM	0	0	1	0	1
5:00 PM	0	1	0	1	2	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	1	0	1	2	5:05 PM	0	0	0	0	0	5:05 PM	0	0	1	0	1
5:10 PM	0	0	0	2	2	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	1	0	1
5:20 PM	1	0	0	0	1	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
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	1	0	0	0	1	5:35 PM	1	0	0	0	1	5:35 PM	0	0	0	0	0
5:40 PM	0	1	0	2	3	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	1	0	0	1	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	0	1	0	1	2	5:50 PM	0	0	0	0	0	5:50 PM	0	0	2	0	2
5:55 PM	1	0	0	2	3	5:55 PM	0	0	0	0	0	5:55 PM	0	0	2	0	2
Count Total	6	15	0	25	46	Count Total	2	1	0	0	3	Count Total	0	0	18	1	19
Peak Hour	2	6	0	13	21	Peak Hour	1	1	0	0	2	Peak Hour	0	0	9	0	9

**ODOT ADT Volumes at Permanent Count Station 03-006 (Rhododendron)**

<b>Year</b>	<b>August</b>	<b>July</b>	<b>Adjust</b>	<b>High/Low</b>
2021	12988	14387	1.107715	High
2020	13411	14166	1.056297	
2019	13497	13605	1.008002	Low
2018	13089	13868	1.059516	
2017	13623	13874	1.018425	
Sum of 3	40123	41908	<b>1.044488</b>	
Average of 3	13374.33	13969.33		

**Calculated Adjustment** 595 vehicles per day

SEASONAL TREND TABLE (Updated: 7/20/2021) <sup>1</sup>														Seasonal Trend			
TREND	1-Jan	15-Jan	1-Jun	15-Jun	1-Jul	15-Jul	1-Aug	15-Aug	1-Sep	15-Sep	1-Oct	15-Oct	1-Nov	15-Nov	1-Dec	15-Dec	Peak Period Factor
INTERSTATE URBANIZED	1.0672	1.0684	0.9615	0.9463	0.9517	0.9571	0.9551	0.9531	0.9674	0.9816	0.9850	0.9884	1.0045	1.0206	1.0322	1.0438	0.9463
INTERSTATE NONURBANIZED	1.2426	1.2883	0.9005	0.8506	0.8322	0.8139	0.8221	0.8302	0.8719	0.9135	0.9441	0.9747	1.0178	1.0608	1.1123	1.1638	0.8139
COMMUTER	1.0650	1.0875	0.9503	0.9355	0.9470	0.9585	0.9509	0.9433	0.9528	0.9623	0.9614	0.9604	0.9938	1.0272	1.0474	1.0676	0.9355
COASTAL DESTINATION	1.1885	1.1712	0.9347	0.8972	0.8612	0.8252	0.8205	0.8159	0.8686	0.9214	0.9689	1.0164	1.0660	1.1156	1.1580	1.2005	0.8159
COASTAL DESTINATION ROUTE	1.3445	1.3248	0.8941	0.8409	0.7820	0.7231	0.7218	0.7205	0.8016	0.8827	0.9669	1.0511	1.1133	1.1754	1.2480	1.3206	0.7205
AGRICULTURE	1.4583	1.4827	0.8579	0.8146	0.8058	0.7970	0.7922	0.7873	0.7772	0.7670	0.8288	0.8905	0.9347	1.0989	1.2462	1.3934	0.7670
RECREATIONAL SUMMER	1.5848	1.6474	0.8256	0.7484	0.7018	0.6552	0.6708	0.6864	0.7393	0.7922	0.8898	0.9874	1.1242	1.2610	1.3965	1.5320	0.6552
RECREATIONAL SUMMER WINTER	0.8736	0.8525	0.9760	0.8821	0.8005	0.7190	0.7305	0.7420	0.8897	1.0374	1.2010	1.3645	1.5212	1.6778	1.3812	1.0847	0.7190
RECREATIONAL WINTER	0.6997	0.6389	1.2832	1.1625	0.9985	0.8344	0.8600	0.8857	1.0560	1.2262	1.4100	1.5937	1.8758	2.1580	1.5328	0.9076	0.6389
SUMMER	1.2151	1.2357	0.8976	0.8615	0.8457	0.8299	0.8354	0.8410	0.8743	0.9077	0.9357	0.9638	1.0273	1.0908	1.1322	1.1737	0.8299
SUMMER < 2500	1.3035	1.3186	0.8720	0.8387	0.8237	0.8086	0.8229	0.8373	0.8616	0.8859	0.9233	0.9607	1.0428	1.1249	1.2016	1.2783	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

<sup>1</sup>Seasonal Trend Table: The 2020 table is based on 2019 values due to the irregularity caused by the Covid epidemic shutdown during the 2020 count year.

June 15 = 0.9355

Aug 1 = 0.9509

Aug 15 = 0.9433

Aug 11 = 0.956329

-0.00543 (Change per day)

Adjustment 1.022265 = August 11 value / June 15 peak value

HCM Signalized Intersection Capacity Analysis  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↓
Traffic Volume (vph)	758	132	88	935	261	94
Future Volume (vph)	758	132	88	935	261	94
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3023	1352	1599	3197	3072	1417
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3023	1352	1599	3197	3072	1417
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	815	142	95	1005	281	101
RTOR Reduction (vph)	0	54	0	0	0	71
Lane Group Flow (vph)	815	88	95	1005	281	30
Heavy Vehicles (%)	10%	10%	4%	4%	5%	5%
Turn Type	NA	Perm	Prot	NA	Prot	pt+ov
Protected Phases	2		1	6	4	4 1
Permitted Phases		2				
Actuated Green, G (s)	60.5	60.5	11.2	75.7	14.4	30.1
Effective Green, g (s)	61.9	61.9	11.2	77.1	14.9	30.1
Actuated g/C Ratio	0.62	0.62	0.11	0.77	0.15	0.30
Clearance Time (s)	5.4	5.4	4.0	5.4	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1871	836	179	2464	457	426
v/s Ratio Prot	c0.27		c0.06	0.31	c0.09	0.02
v/s Ratio Perm		0.07				
v/c Ratio	0.44	0.11	0.53	0.41	0.61	0.07
Uniform Delay, d1	9.9	7.8	41.9	3.8	39.9	25.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3	3.0	0.5	2.5	0.1
Delay (s)	10.7	8.0	44.9	4.3	42.3	25.0
Level of Service	B	A	D	A	D	C
Approach Delay (s)	10.3			7.8	37.7	
Approach LOS	B			A	D	

Intersection Summary

HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵↵	↵
Traffic Volume (veh/h)	758	132	88	935	261	94
Future Volume (veh/h)	758	132	88	935	261	94
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	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	1614	1614	1695	1695	1682	1682
Adj Flow Rate, veh/h	815	142	95	1005	281	101
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	4	4	5	5
Cap, veh/h	2097	935	119	2568	381	272
Arrive On Green	0.68	0.68	0.07	0.80	0.12	0.12
Sat Flow, veh/h	3146	1367	1615	3306	3107	1425
Grp Volume(v), veh/h	815	142	95	1005	281	101
Grp Sat Flow(s),veh/h/ln	1533	1367	1615	1611	1554	1425
Q Serve(g_s), s	11.4	3.7	5.8	9.2	8.7	6.2
Cycle Q Clear(g_c), s	11.4	3.7	5.8	9.2	8.7	6.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2097	935	119	2568	381	272
V/C Ratio(X)	0.39	0.15	0.80	0.39	0.74	0.37
Avail Cap(c_a), veh/h	2097	935	274	2568	715	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.8	5.6	45.6	3.0	42.3	35.2
Incr Delay (d2), s/veh	0.5	0.3	11.7	0.4	2.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.9	2.6	1.7	3.4	5.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	7.4	5.9	57.3	3.4	45.1	36.0
LnGrp LOS	A	A	E	A	D	D
Approach Vol, veh/h	957			1100	382	
Approach Delay, s/veh	7.1			8.1	42.7	
Approach LOS	A			A	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	11.3	72.4		16.3		83.7
Change Period (Y+Rc), s	4.0	* 5.4		4.5		* 5.4
Max Green Setting (Gmax), s	17.0	* 47		22.5		* 68
Max Q Clear Time (g_c+I1), s	7.8	13.4		10.7		11.2
Green Ext Time (p_c), s	0.1	6.5		1.0		8.2

Intersection Summary

HCM 6th Ctrl Delay	13.1
HCM 6th LOS	B

Notes

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

HCM 6th TWSC  
2: 362nd Avenue & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	15	293	45	36	121
Future Vol, veh/h	26	15	293	45	36	121
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	15	15	6	6	6	6
Mvmt Flow	29	17	326	50	40	134

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	565	351	0	0	376
Stage 1	351	-	-	-	-
Stage 2	214	-	-	-	-
Critical Hdwy	6.55	6.35	-	-	4.16
Critical Hdwy Stg 1	5.55	-	-	-	-
Critical Hdwy Stg 2	5.55	-	-	-	-
Follow-up Hdwy	3.635	3.435	-	-	2.254
Pot Cap-1 Maneuver	465	664	-	-	1161
Stage 1	685	-	-	-	-
Stage 2	792	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	449	664	-	-	1161
Mov Cap-2 Maneuver	449	-	-	-	-
Stage 1	685	-	-	-	-
Stage 2	765	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	1.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	509	1161
HCM Lane V/C Ratio	-	-	0.09	0.034
HCM Control Delay (s)	-	-	12.8	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1



Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑	↑	
Traffic Vol, veh/h	58	36	56	293	90	37
Future Vol, veh/h	58	36	56	293	90	37
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	14	14	5	5	9	9
Mvmt Flow	64	40	62	326	100	41
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.2	11.5	8.6
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	16%	62%	0%
Vol Thru, %	84%	0%	71%
Vol Right, %	0%	38%	29%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	349	94	127
LT Vol	56	58	0
Through Vol	293	0	90
RT Vol	0	36	37
Lane Flow Rate	388	104	141
Geometry Grp	1	1	1
Degree of Util (X)	0.48	0.151	0.179
Departure Headway (Hd)	4.452	5.219	4.575
Convergence, Y/N	Yes	Yes	Yes
Cap	810	686	783
Service Time	2.476	3.261	2.606
HCM Lane V/C Ratio	0.479	0.152	0.18
HCM Control Delay	11.5	9.2	8.6
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.6	0.5	0.6

HCM 6th TWSC  
4: 362nd Avenue & Site Access

11/08/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	0	1	348	0	3	123
Future Vol, veh/h	0	1	348	0	3	123
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	5	5	9	9
Mvmt Flow	0	1	387	0	3	137

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	530	387	0	0	387	0
Stage 1	387	-	-	-	-	-
Stage 2	143	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.19	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.281	-
Pot Cap-1 Maneuver	480	623	-	-	1134	-
Stage 1	649	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	479	623	-	-	1134	-
Mov Cap-2 Maneuver	479	-	-	-	-	-
Stage 1	649	-	-	-	-	-
Stage 2	839	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	623	1134
HCM Lane V/C Ratio	-	-	0.002	0.003
HCM Control Delay (s)	-	-	10.8	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM Signalized Intersection Capacity Analysis  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵↵	↵
Traffic Volume (vph)	1188	313	227	1014	251	298
Future Volume (vph)	1188	313	227	1014	251	298
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3197	1430	1599	3197	3162	1458
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3197	1430	1599	3197	3162	1458
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1238	326	236	1056	261	310
RTOR Reduction (vph)	0	134	0	0	0	28
Lane Group Flow (vph)	1238	192	236	1056	261	282
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%
Turn Type	NA	Perm	Prot	NA	Prot	pt+ov
Protected Phases	2		1	6	4	4 1
Permitted Phases		2				
Actuated Green, G (s)	73.5	73.5	24.1	101.6	18.5	47.1
Effective Green, g (s)	74.9	74.9	24.1	103.0	19.0	47.1
Actuated g/C Ratio	0.58	0.58	0.19	0.79	0.15	0.36
Clearance Time (s)	5.4	5.4	4.0	5.4	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1841	823	296	2533	462	528
v/s Ratio Prot	c0.39		c0.15	0.33	0.08	c0.19
v/s Ratio Perm		0.13				
v/c Ratio	0.67	0.23	0.80	0.42	0.56	0.53
Uniform Delay, d1	19.1	13.5	50.6	4.2	51.7	32.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.7	13.8	0.5	1.6	1.0
Delay (s)	21.0	14.1	64.4	4.7	53.2	33.8
Level of Service	C	B	E	A	D	C
Approach Delay (s)	19.6			15.6	42.7	
Approach LOS	B			B	D	

Intersection Summary

HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Signalized Intersection Summary  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵↵	↵
Traffic Volume (veh/h)	1188	313	227	1014	251	298
Future Volume (veh/h)	1188	313	227	1014	251	298
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	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	1695	1695	1695	1695	1723	1723
Adj Flow Rate, veh/h	1238	326	236	1056	261	310
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	4	4	4	2	2
Cap, veh/h	1918	855	262	2540	477	450
Arrive On Green	0.60	0.60	0.16	0.79	0.15	0.15
Sat Flow, veh/h	3306	1437	1615	3306	3183	1460
Grp Volume(v), veh/h	1238	326	236	1056	261	310
Grp Sat Flow(s),veh/h/ln	1611	1437	1615	1611	1591	1460
Q Serve(g_s), s	32.8	15.4	18.6	13.4	9.9	19.0
Cycle Q Clear(g_c), s	32.8	15.4	18.6	13.4	9.9	19.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1918	855	262	2540	477	450
V/C Ratio(X)	0.65	0.38	0.90	0.42	0.55	0.69
Avail Cap(c_a), veh/h	1918	855	385	2540	477	450
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	13.8	53.4	4.3	51.2	39.5
Incr Delay (d2), s/veh	1.7	1.3	17.6	0.5	1.3	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.6	5.0	8.7	3.4	4.0	19.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.0	15.1	71.0	4.8	52.5	43.8
LnGrp LOS	B	B	E	A	D	D
Approach Vol, veh/h	1564			1292	571	
Approach Delay, s/veh	18.2			16.9	47.8	
Approach LOS	B			B	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	25.1	81.4		23.5		106.5
Change Period (Y+Rc), s	4.0	* 5.4		4.5		* 5.4
Max Green Setting (Gmax), s	31.0	* 66		19.0		* 1E2
Max Q Clear Time (g_c+I1), s	20.6	34.8		21.0		15.4
Green Ext Time (p_c), s	0.5	11.9		0.0		8.9

Intersection Summary

HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Notes

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

HCM 6th TWSC  
2: 362nd Avenue & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	34	55	346	29	23	446
Future Vol, veh/h	34	55	346	29	23	446
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	59	368	31	24	474

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	906	384	0	0	399
Stage 1	384	-	-	-	-
Stage 2	522	-	-	-	-
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	307	664	-	-	1160
Stage 1	688	-	-	-	-
Stage 2	595	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	301	664	-	-	1160
Mov Cap-2 Maneuver	301	-	-	-	-
Stage 1	688	-	-	-	-
Stage 2	583	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	455	1160
HCM Lane V/C Ratio	-	-	0.208	0.021
HCM Control Delay (s)	-	-	15	8.2
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.8	0.1

Intersection

Intersection Delay, s/veh	18.6
Intersection LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑	↑	
Traffic Vol, veh/h	92	129	54	290	455	33
Future Vol, veh/h	92	129	54	290	455	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	3	3
Mvmt Flow	100	140	59	315	495	36
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	12.8	15.5	23.5
HCM LOS	B	C	C

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	16%	42%	0%
Vol Thru, %	84%	0%	93%
Vol Right, %	0%	58%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	344	221	488
LT Vol	54	92	0
Through Vol	290	0	455
RT Vol	0	129	33
Lane Flow Rate	374	240	530
Geometry Grp	1	1	1
Degree of Util (X)	0.568	0.395	0.769
Departure Headway (Hd)	5.467	5.919	5.216
Convergence, Y/N	Yes	Yes	Yes
Cap	658	605	695
Service Time	3.515	3.975	3.258
HCM Lane V/C Ratio	0.568	0.397	0.763
HCM Control Delay	15.5	12.8	23.5
HCM Lane LOS	C	B	C
HCM 95th-tile Q	3.6	1.9	7.3

HCM 6th TWSC  
4: 362nd Avenue & Site Access

11/08/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	R	T	R	L	T
Traffic Vol, veh/h	1	3	341	0	2	582
Future Vol, veh/h	1	3	341	0	2	582
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	2	20	20	3
Mvmt Flow	1	3	371	0	2	633

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1008	371	0	0	371
Stage 1	371	-	-	-	-
Stage 2	637	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3
Critical Hdwy Stg 1	5.6	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38
Pot Cap-1 Maneuver	247	637	-	-	1095
Stage 1	660	-	-	-	-
Stage 2	494	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	246	637	-	-	1095
Mov Cap-2 Maneuver	246	-	-	-	-
Stage 1	660	-	-	-	-
Stage 2	493	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	456	1095
HCM Lane V/C Ratio	-	-	0.01	0.002
HCM Control Delay (s)	-	-	13	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

# Trip Generation Calculation Worksheet



Land Use Description: Specialty Trade Contractor  
ITE Land Use Code: 180  
Independent Variable: Gross Floor Area  
Quantity: 30 Employees

## Summary of ITE Trip Generation Data

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

Trip Rate: 0.61 trips per ksf  
Directional Distribution: 74% Entering 26% Exiting

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

Trip Rate: 0.72 trips per ksf  
Directional Distribution: 32% Entering 68% Exiting

### **Total Weekday Traffic**

Trip Rate: 3.63 trips per ksf  
Directional Distribution: 50% Entering 50% Exiting

## Site Trip Generation Calculations

30 Employee Specialty Trade Contractor

	Entering	Exiting	Total
AM Peak Hour	13	5	18
PM Peak Hour	7	15	22
Weekday	54	54	108



\*\* Future Volume calculated based on 2017-2019 counts due to covid.

Site id	HWY	MP	DIR	HS	Description	2017	2018	2019	2020	2040**	RSQ
26003	026	14.36	1		Southeast of Powell Valley Rd [0.18 mile] {Gresham ATR, Sta. 26-003}		33400			43300	MODEL
1774	026	14.80	1		mile]		28500			36500	MODEL
1775	026	18.30	1		Northwest of S.E. Haley Road [0.05 mile]		25600			37600	MODEL
1776	026	19.24	1		Northwest of Clackamas Boring Highway (OR212) [0.30 mile]		25500			37400	MODEL
22590	026	20.60	1		Northwest of S.E. Kelso Road [0.50 mile]		30300			44000	MODEL
1777	026	21.40	1		Southeast of Southeast Kelso Road [0.30 mile]		30300			43000	MODEL
1778	026	22.72	1		Northwest of S.E. 362nd Drive, west city limits Sandy [0.02 mile]		33700			47900	MODEL
1779	026	23.85	1		West of Bluff Road [0.02 mile]		33300			47700	MODEL
1780	026	23.89	1		East of Bluff Road [0.02 mile]		15700			22700	MODEL
1781	026	24.02	1		West of Beers Avenue [0.02 mile]		16200			23500	MODEL
1782	026	24.35	1		West of Meining Ave (OR211) [0.05 mile]		16000			23700	MODEL
1783	026	24.42	1		East of Meining Ave (OR211) [0.02 mile]		12400			17900	MODEL
1784	026	24.59	1		West of Ten Eyck Road [0.02 mile]		12500			18100	MODEL
1785	026	23.89	2		East of Bluff Road [0.02 mile]		16600			23600	MODEL
1786	026	24.04	2		West of Beers Avenue [0.02 mile]		18300			26000	MODEL
1787	026	24.36	2		West of Meining Ave (OR211) [0.02 mile]		15900			23000	MODEL
1788	026	24.40	2		East of Meining Ave (OR211) [0.02 mile]		13700			19400	MODEL
1789	026	24.61	2		West of Ten Eyck Road [0.02 mile]		12600			17900	MODEL
1790	026	25.10	1		West of Langensand Road [0.02 mile]		20700			29600	MODEL
1791	026	25.66	1		East of Vista Loop Drive [0.10 mile]		23500			33300	MODEL
1792	026	26.76	1		West of S.E. Firwood Road [0.10 mile]		19000			26900	MODEL
1793	026	26.93	1		East of S.E. Firwood Road [0.07 mile]		17800			25600	MODEL
1794	026	29.66	1		West of Wagoneer Loop Drive (East Jct.) [0.23 mile]		16500			23700	MODEL
1795	026	34.87	1		West of E. Sleepy Hollow Drive [0.10 mile]		15000			21800	MODEL

HCM Signalized Intersection Capacity Analysis  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵↵	↵
Traffic Volume (vph)	789	138	94	990	270	97
Future Volume (vph)	789	138	94	990	270	97
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3023	1352	1599	3197	3072	1417
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3023	1352	1599	3197	3072	1417
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	848	148	101	1065	290	104
RTOR Reduction (vph)	0	57	0	0	0	72
Lane Group Flow (vph)	848	91	101	1065	290	32
Heavy Vehicles (%)	10%	10%	4%	4%	5%	5%
Turn Type	NA	Perm	Prot	NA	Prot	pt+ov
Protected Phases	2		1	6	4	4 1
Permitted Phases		2				
Actuated Green, G (s)	59.8	59.8	11.6	75.4	14.7	30.8
Effective Green, g (s)	61.2	61.2	11.6	76.8	15.2	30.8
Actuated g/C Ratio	0.61	0.61	0.12	0.77	0.15	0.31
Clearance Time (s)	5.4	5.4	4.0	5.4	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1850	827	185	2455	466	436
v/s Ratio Prot	c0.28		c0.06	0.33	c0.09	0.02
v/s Ratio Perm		0.07				
v/c Ratio	0.46	0.11	0.55	0.43	0.62	0.07
Uniform Delay, d1	10.5	8.1	41.7	4.0	39.7	24.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.3	3.3	0.6	2.6	0.1
Delay (s)	11.3	8.3	45.0	4.6	42.3	24.6
Level of Service	B	A	D	A	D	C
Approach Delay (s)	10.8			8.1	37.6	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Signalized Intersection Summary  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↖	↑↑	↖	↗
Traffic Volume (veh/h)	789	138	94	990	270	97
Future Volume (veh/h)	789	138	94	990	270	97
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	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	1614	1614	1695	1695	1682	1682
Adj Flow Rate, veh/h	848	148	101	1065	290	104
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	4	4	5	5
Cap, veh/h	2075	926	126	2560	389	282
Arrive On Green	0.68	0.68	0.08	0.79	0.13	0.12
Sat Flow, veh/h	3146	1367	1615	3306	3107	1425
Grp Volume(v), veh/h	848	148	101	1065	290	104
Grp Sat Flow(s),veh/h/ln	1533	1367	1615	1611	1554	1425
Q Serve(g_s), s	12.4	3.9	6.2	10.1	9.0	6.3
Cycle Q Clear(g_c), s	12.4	3.9	6.2	10.1	9.0	6.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2075	926	126	2560	389	282
V/C Ratio(X)	0.41	0.16	0.80	0.42	0.74	0.37
Avail Cap(c_a), veh/h	2075	926	274	2560	684	417
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.2	5.9	45.4	3.1	42.2	34.7
Incr Delay (d2), s/veh	0.6	0.4	11.3	0.5	2.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.0	2.8	1.9	3.5	5.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	7.8	6.2	56.6	3.6	45.0	35.5
LnGrp LOS	A	A	E	A	D	D
Approach Vol, veh/h	996			1166	394	
Approach Delay, s/veh	7.6			8.2	42.5	
Approach LOS	A			A	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	11.8	71.7		16.5		83.5
Change Period (Y+Rc), s	4.0	* 5.4		4.5		* 5.4
Max Green Setting (Gmax), s	17.0	* 48		21.5		* 69
Max Q Clear Time (g_c+I1), s	8.2	14.4		11.0		12.1
Green Ext Time (p_c), s	0.1	6.8		1.0		8.9

Intersection Summary

HCM 6th Ctrl Delay	13.3
HCM 6th LOS	B

Notes

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

HCM 6th TWSC  
2: 362nd Avenue & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P		Y	↑
Traffic Vol, veh/h	27	15	307	46	37	130
Future Vol, veh/h	27	15	307	46	37	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	15	15	6	6	6	6
Mvmt Flow	30	17	341	51	41	144

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	593	367	0	0	392
Stage 1	367	-	-	-	-
Stage 2	226	-	-	-	-
Critical Hdwy	6.55	6.35	-	-	4.16
Critical Hdwy Stg 1	5.55	-	-	-	-
Critical Hdwy Stg 2	5.55	-	-	-	-
Follow-up Hdwy	3.635	3.435	-	-	2.254
Pot Cap-1 Maneuver	447	650	-	-	1145
Stage 1	673	-	-	-	-
Stage 2	782	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	431	650	-	-	1145
Mov Cap-2 Maneuver	431	-	-	-	-
Stage 1	673	-	-	-	-
Stage 2	754	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	1.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	490	1145
HCM Lane V/C Ratio	-	-	0.095	0.036
HCM Control Delay (s)	-	-	13.1	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑	↑	
Traffic Vol, veh/h	59	38	58	307	98	39
Future Vol, veh/h	59	38	58	307	98	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	14	14	5	5	9	9
Mvmt Flow	66	42	64	341	109	43
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.3	12	8.8
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	16%	61%	0%
Vol Thru, %	84%	0%	72%
Vol Right, %	0%	39%	28%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	365	97	137
LT Vol	58	59	0
Through Vol	307	0	98
RT Vol	0	38	39
Lane Flow Rate	406	108	152
Geometry Grp	1	1	1
Degree of Util (X)	0.504	0.158	0.195
Departure Headway (Hd)	4.475	5.277	4.61
Convergence, Y/N	Yes	Yes	Yes
Cap	807	678	776
Service Time	2.504	3.324	2.647
HCM Lane V/C Ratio	0.503	0.159	0.196
HCM Control Delay	12	9.3	8.8
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.9	0.6	0.7

HCM 6th TWSC  
4: 362nd Avenue & Site Access

11/08/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	0	1	364	0	3	133
Future Vol, veh/h	0	1	364	0	3	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	5	5	9	9
Mvmt Flow	0	1	404	0	3	148

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	558	404	0	0	404	0
Stage 1	404	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.19	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.281	-
Pot Cap-1 Maneuver	461	609	-	-	1118	-
Stage 1	637	-	-	-	-	-
Stage 2	832	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	460	609	-	-	1118	-
Mov Cap-2 Maneuver	460	-	-	-	-	-
Stage 1	637	-	-	-	-	-
Stage 2	830	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	609	1118
HCM Lane V/C Ratio	-	-	0.002	0.003
HCM Control Delay (s)	-	-	10.9	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM Signalized Intersection Capacity Analysis  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↓
Traffic Volume (vph)	1250	323	235	1060	259	308
Future Volume (vph)	1250	323	235	1060	259	308
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3197	1430	1599	3197	3162	1458
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3197	1430	1599	3197	3162	1458
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1302	336	245	1104	270	321
RTOR Reduction (vph)	0	135	0	0	0	25
Lane Group Flow (vph)	1302	201	245	1104	270	296
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%
Turn Type	NA	Perm	Prot	NA	Prot	pt+ov
Protected Phases	2		1	6	4	4 1
Permitted Phases		2				
Actuated Green, G (s)	73.4	73.4	24.4	101.8	18.3	47.2
Effective Green, g (s)	74.8	74.8	24.4	103.2	18.8	47.2
Actuated g/C Ratio	0.58	0.58	0.19	0.79	0.14	0.36
Clearance Time (s)	5.4	5.4	4.0	5.4	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1839	822	300	2537	457	529
v/s Ratio Prot	c0.41		c0.15	0.35	0.09	c0.20
v/s Ratio Perm		0.14				
v/c Ratio	0.71	0.24	0.82	0.44	0.59	0.56
Uniform Delay, d1	19.8	13.6	50.7	4.2	52.0	33.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.7	15.6	0.5	2.0	1.3
Delay (s)	22.1	14.3	66.3	4.8	54.0	34.4
Level of Service	C	B	E	A	D	C
Approach Delay (s)	20.5			15.9	43.4	
Approach LOS	C			B	D	

Intersection Summary

HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Signalized Intersection Summary  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↖	↑↑	↖	↗
Traffic Volume (veh/h)	1250	323	235	1060	259	308
Future Volume (veh/h)	1250	323	235	1060	259	308
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	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	1695	1695	1695	1695	1723	1723
Adj Flow Rate, veh/h	1302	336	245	1104	270	321
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	4	4	4	2	2
Cap, veh/h	1913	853	271	2552	465	452
Arrive On Green	0.59	0.59	0.17	0.79	0.15	0.14
Sat Flow, veh/h	3306	1437	1615	3306	3183	1460
Grp Volume(v), veh/h	1302	336	245	1104	270	321
Grp Sat Flow(s),veh/h/ln	1611	1437	1615	1611	1591	1460
Q Serve(g_s), s	35.8	16.1	19.4	14.1	10.3	18.5
Cycle Q Clear(g_c), s	35.8	16.1	19.4	14.1	10.3	18.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1913	853	271	2552	465	452
V/C Ratio(X)	0.68	0.39	0.91	0.43	0.58	0.71
Avail Cap(c_a), veh/h	1913	853	373	2552	465	452
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.0	14.0	53.1	4.3	51.8	39.7
Incr Delay (d2), s/veh	2.0	1.4	20.0	0.5	1.8	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.7	5.2	9.2	3.5	4.2	20.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.0	15.4	73.1	4.8	53.6	44.8
LnGrp LOS	B	B	E	A	D	D
Approach Vol, veh/h	1638			1349	591	
Approach Delay, s/veh	19.0			17.2	48.8	
Approach LOS	B			B	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	25.8	81.2		23.0		107.0
Change Period (Y+Rc), s	4.0	* 5.4		4.5		* 5.4
Max Green Setting (Gmax), s	30.0	* 68		18.5		* 1E2
Max Q Clear Time (g_c+I1), s	21.4	37.8		20.5		16.1
Green Ext Time (p_c), s	0.4	12.5		0.0		9.6

Intersection Summary

HCM 6th Ctrl Delay	23.3
HCM 6th LOS	C

Notes

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



HCM 6th TWSC  
2: 362nd Avenue & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	56	359	30	23	465
Future Vol, veh/h	35	56	359	30	23	465
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	60	382	32	24	495

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	941	398	0	0	414
Stage 1	398	-	-	-	-
Stage 2	543	-	-	-	-
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	292	652	-	-	1145
Stage 1	678	-	-	-	-
Stage 2	582	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	286	652	-	-	1145
Mov Cap-2 Maneuver	286	-	-	-	-
Stage 1	678	-	-	-	-
Stage 2	570	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.6	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	437	1145
HCM Lane V/C Ratio	-	-	0.222	0.021
HCM Control Delay (s)	-	-	15.6	8.2
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.8	0.1

Intersection	
Intersection Delay, s/veh	20.8
Intersection LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	94	133	57	302	473	35
Future Vol, veh/h	94	133	57	302	473	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	3	3
Mvmt Flow	102	145	62	328	514	38
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	13.3	16.7	27
HCM LOS	B	C	D

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	16%	41%	0%
Vol Thru, %	84%	0%	93%
Vol Right, %	0%	59%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	359	227	508
LT Vol	57	94	0
Through Vol	302	0	473
RT Vol	0	133	35
Lane Flow Rate	390	247	552
Geometry Grp	1	1	1
Degree of Util (X)	0.601	0.413	0.81
Departure Headway (Hd)	5.542	6.019	5.28
Convergence, Y/N	Yes	Yes	Yes
Cap	648	595	685
Service Time	3.598	4.083	3.331
HCM Lane V/C Ratio	0.602	0.415	0.806
HCM Control Delay	16.7	13.3	27
HCM Lane LOS	C	B	D
HCM 95th-tile Q	4	2	8.4

HCM 6th TWSC  
4: 362nd Avenue & Site Access

11/08/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	3	356	0	2	604
Future Vol, veh/h	1	3	356	0	2	604
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	2	20	20	3
Mvmt Flow	1	3	387	0	2	657

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1048	387	0	0	387
Stage 1	387	-	-	-	-
Stage 2	661	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3
Critical Hdwy Stg 1	5.6	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38
Pot Cap-1 Maneuver	233	623	-	-	1080
Stage 1	649	-	-	-	-
Stage 2	481	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	232	623	-	-	1080
Mov Cap-2 Maneuver	232	-	-	-	-
Stage 1	649	-	-	-	-
Stage 2	480	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	438	1080
HCM Lane V/C Ratio	-	-	0.01	0.002
HCM Control Delay (s)	-	-	13.3	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM Signalized Intersection Capacity Analysis  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (vph)	789	143	96	990	272	98
Future Volume (vph)	789	143	96	990	272	98
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3023	1352	1599	3197	3072	1417
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3023	1352	1599	3197	3072	1417
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	848	154	103	1065	292	105
RTOR Reduction (vph)	0	60	0	0	0	73
Lane Group Flow (vph)	848	94	103	1065	292	32
Heavy Vehicles (%)	10%	10%	4%	4%	5%	5%
Turn Type	NA	Perm	Prot	NA	Prot	pt+ov
Protected Phases	2		1	6	4	4 1
Permitted Phases		2				
Actuated Green, G (s)	59.7	59.7	11.7	75.4	14.7	30.9
Effective Green, g (s)	61.1	61.1	11.7	76.8	15.2	30.9
Actuated g/C Ratio	0.61	0.61	0.12	0.77	0.15	0.31
Clearance Time (s)	5.4	5.4	4.0	5.4	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1847	826	187	2455	466	437
v/s Ratio Prot	c0.28		c0.06	0.33	c0.10	0.02
v/s Ratio Perm		0.07				
v/c Ratio	0.46	0.11	0.55	0.43	0.63	0.07
Uniform Delay, d1	10.5	8.1	41.7	4.0	39.7	24.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.3	3.5	0.6	2.6	0.1
Delay (s)	11.3	8.4	45.2	4.6	42.4	24.5
Level of Service	B	A	D	A	D	C
Approach Delay (s)	10.9			8.2	37.6	
Approach LOS	B			A	D	

Intersection Summary

HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↖	↑↑	↖↗	↗
Traffic Volume (veh/h)	789	143	96	990	272	98
Future Volume (veh/h)	789	143	96	990	272	98
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	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	1614	1614	1695	1695	1682	1682
Adj Flow Rate, veh/h	848	154	103	1065	292	105
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	4	4	5	5
Cap, veh/h	2069	923	128	2558	391	285
Arrive On Green	0.67	0.67	0.08	0.79	0.13	0.12
Sat Flow, veh/h	3146	1367	1615	3306	3107	1425
Grp Volume(v), veh/h	848	154	103	1065	292	105
Grp Sat Flow(s),veh/h/ln	1533	1367	1615	1611	1554	1425
Q Serve(g_s), s	12.4	4.1	6.3	10.2	9.1	6.4
Cycle Q Clear(g_c), s	12.4	4.1	6.3	10.2	9.1	6.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2069	923	128	2558	391	285
V/C Ratio(X)	0.41	0.17	0.81	0.42	0.75	0.37
Avail Cap(c_a), veh/h	2069	923	274	2558	684	419
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.3	6.0	45.3	3.2	42.2	34.5
Incr Delay (d2), s/veh	0.6	0.4	11.1	0.5	2.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.0	2.8	1.9	3.6	5.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	7.9	6.3	56.4	3.7	45.0	35.3
LnGrp LOS	A	A	E	A	D	D
Approach Vol, veh/h	1002			1168	397	
Approach Delay, s/veh	7.7			8.3	42.4	
Approach LOS	A			A	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	11.9	71.5		16.6		83.4
Change Period (Y+Rc), s	4.0	* 5.4		4.5		* 5.4
Max Green Setting (Gmax), s	17.0	* 48		21.5		* 69
Max Q Clear Time (g_c+I1), s	8.3	14.4		11.1		12.2
Green Ext Time (p_c), s	0.1	6.8		1.0		8.9

Intersection Summary

HCM 6th Ctrl Delay	13.3
HCM 6th LOS	B

Notes

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

HCM 6th TWSC  
2: 362nd Avenue & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	27	16	309	46	39	135
Future Vol, veh/h	27	16	309	46	39	135
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	15	15	6	6	6	6
Mvmt Flow	30	18	343	51	43	150

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	605	369	0	0	394
Stage 1	369	-	-	-	-
Stage 2	236	-	-	-	-
Critical Hdwy	6.55	6.35	-	-	4.16
Critical Hdwy Stg 1	5.55	-	-	-	-
Critical Hdwy Stg 2	5.55	-	-	-	-
Follow-up Hdwy	3.635	3.435	-	-	2.254
Pot Cap-1 Maneuver	440	649	-	-	1143
Stage 1	672	-	-	-	-
Stage 2	774	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	423	649	-	-	1143
Mov Cap-2 Maneuver	423	-	-	-	-
Stage 1	672	-	-	-	-
Stage 2	745	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	1.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	486	1143
HCM Lane V/C Ratio	-	-	0.098	0.038
HCM Control Delay (s)	-	-	13.2	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

**Intersection**

Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑	↑	
Traffic Vol, veh/h	59	38	58	309	103	39
Future Vol, veh/h	59	38	58	309	103	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	14	14	5	5	9	9
Mvmt Flow	66	42	64	343	114	43
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.4	12.1	8.8
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	16%	61%	0%
Vol Thru, %	84%	0%	73%
Vol Right, %	0%	39%	27%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	367	97	142
LT Vol	58	59	0
Through Vol	309	0	103
RT Vol	0	38	39
Lane Flow Rate	408	108	158
Geometry Grp	1	1	1
Degree of Util (X)	0.508	0.159	0.203
Departure Headway (Hd)	4.484	5.295	4.621
Convergence, Y/N	Yes	Yes	Yes
Cap	803	676	775
Service Time	2.514	3.344	2.659
HCM Lane V/C Ratio	0.508	0.16	0.204
HCM Control Delay	12.1	9.4	8.8
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.9	0.6	0.8

HCM 6th TWSC  
4: 362nd Avenue & Site Access

11/08/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	R	T	R	L	T
Traffic Vol, veh/h	1	2	365	2	5	136
Future Vol, veh/h	1	2	365	2	5	136
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	5	5	9	9
Mvmt Flow	1	2	406	2	6	151

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	570	407	0	0	408
Stage 1	407	-	-	-	-
Stage 2	163	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.19
Critical Hdwy Stg 1	5.6	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.281
Pot Cap-1 Maneuver	454	607	-	-	1114
Stage 1	635	-	-	-	-
Stage 2	824	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	451	607	-	-	1114
Mov Cap-2 Maneuver	451	-	-	-	-
Stage 1	635	-	-	-	-
Stage 2	819	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	544	1114
HCM Lane V/C Ratio	-	-	0.006	0.005
HCM Control Delay (s)	-	-	11.7	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0



HCM 6th TWSC  
 5: Proposed Access & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	83	2	4	42	1	1
Future Vol, veh/h	83	2	4	42	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	6	6	15	15	50	50
Mvmt Flow	104	3	5	53	1	1

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	0	0	107	0
Stage 1	-	-	-	106
Stage 2	-	-	-	63
Critical Hdwy	-	-	4.25	-
Critical Hdwy Stg 1	-	-	-	5.9
Critical Hdwy Stg 2	-	-	-	5.9
Follow-up Hdwy	-	-	2.335	-
Pot Cap-1 Maneuver	-	-	1406	-
Stage 1	-	-	-	811
Stage 2	-	-	-	851
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	1406	-
Mov Cap-2 Maneuver	-	-	-	719
Stage 1	-	-	-	811
Stage 2	-	-	-	848

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	771	-	-	1406	-
HCM Lane V/C Ratio	0.003	-	-	0.004	-
HCM Control Delay (s)	9.7	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

HCM Signalized Intersection Capacity Analysis  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (vph)	1250	326	236	1060	265	310
Future Volume (vph)	1250	326	236	1060	265	310
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3197	1430	1599	3197	3162	1458
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3197	1430	1599	3197	3162	1458
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1302	340	246	1104	276	323
RTOR Reduction (vph)	0	137	0	0	0	25
Lane Group Flow (vph)	1302	203	246	1104	276	298
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%
Turn Type	NA	Perm	Prot	NA	Prot	pt+ov
Protected Phases	2		1	6	4	4 1
Permitted Phases		2				
Actuated Green, G (s)	73.4	73.4	24.4	101.8	18.3	47.2
Effective Green, g (s)	74.8	74.8	24.4	103.2	18.8	47.2
Actuated g/C Ratio	0.58	0.58	0.19	0.79	0.14	0.36
Clearance Time (s)	5.4	5.4	4.0	5.4	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1839	822	300	2537	457	529
v/s Ratio Prot	c0.41		c0.15	0.35	0.09	c0.20
v/s Ratio Perm		0.14				
v/c Ratio	0.71	0.25	0.82	0.44	0.60	0.56
Uniform Delay, d1	19.8	13.7	50.7	4.2	52.1	33.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.7	15.9	0.5	2.3	1.4
Delay (s)	22.1	14.4	66.6	4.8	54.4	34.5
Level of Service	C	B	E	A	D	C
Approach Delay (s)	20.5			16.0	43.7	
Approach LOS	C			B	D	

Intersection Summary

HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Signalized Intersection Summary  
 1: 362nd Avenue & US Hwy 26

11/08/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↖	↑↑	↖	↗
Traffic Volume (veh/h)	1250	326	236	1060	265	310
Future Volume (veh/h)	1250	326	236	1060	265	310
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	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	1695	1695	1695	1695	1723	1723
Adj Flow Rate, veh/h	1302	340	246	1104	276	323
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	4	4	4	2	2
Cap, veh/h	1911	852	272	2552	465	453
Arrive On Green	0.59	0.59	0.17	0.79	0.15	0.14
Sat Flow, veh/h	3306	1437	1615	3306	3183	1460
Grp Volume(v), veh/h	1302	340	246	1104	276	323
Grp Sat Flow(s),veh/h/ln	1611	1437	1615	1611	1591	1460
Q Serve(g_s), s	35.9	16.4	19.4	14.1	10.5	18.5
Cycle Q Clear(g_c), s	35.9	16.4	19.4	14.1	10.5	18.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1911	852	272	2552	465	453
V/C Ratio(X)	0.68	0.40	0.91	0.43	0.59	0.71
Avail Cap(c_a), veh/h	1911	852	373	2552	465	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.0	14.1	53.1	4.3	51.9	39.7
Incr Delay (d2), s/veh	2.0	1.4	20.2	0.5	2.0	5.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.7	5.3	9.2	3.5	4.4	20.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.0	15.5	73.2	4.8	53.9	44.9
LnGrp LOS	C	B	E	A	D	D
Approach Vol, veh/h	1642			1350	599	
Approach Delay, s/veh	19.1			17.3	49.0	
Approach LOS	B			B	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	25.9	81.1		23.0		107.0
Change Period (Y+Rc), s	4.0	* 5.4		4.5		* 5.4
Max Green Setting (Gmax), s	30.0	* 68		18.5		* 1E2
Max Q Clear Time (g_c+I1), s	21.4	37.9		20.5		16.1
Green Ext Time (p_c), s	0.4	12.5		0.0		9.6

Intersection Summary

HCM 6th Ctrl Delay	23.4
HCM 6th LOS	C

Notes

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

HCM 6th TWSC  
2: 362nd Avenue & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		Y	T
Traffic Vol, veh/h	35	58	365	30	24	468
Future Vol, veh/h	35	58	365	30	24	468
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	62	388	32	26	498

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	954	404	0	0	420
Stage 1	404	-	-	-	-
Stage 2	550	-	-	-	-
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	287	647	-	-	1139
Stage 1	674	-	-	-	-
Stage 2	578	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	280	647	-	-	1139
Mov Cap-2 Maneuver	280	-	-	-	-
Stage 1	674	-	-	-	-
Stage 2	565	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.8	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	433	1139
HCM Lane V/C Ratio	-	-	0.228	0.022
HCM Control Delay (s)	-	-	15.8	8.2
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.9	0.1

Intersection	
Intersection Delay, s/veh	21.2
Intersection LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	94	133	57	308	476	35
Future Vol, veh/h	94	133	57	308	476	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	3	3
Mvmt Flow	102	145	62	335	517	38
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	13.4	17	27.7
HCM LOS	B	C	D

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	16%	41%	0%
Vol Thru, %	84%	0%	93%
Vol Right, %	0%	59%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	365	227	511
LT Vol	57	94	0
Through Vol	308	0	476
RT Vol	0	133	35
Lane Flow Rate	397	247	555
Geometry Grp	1	1	1
Degree of Util (X)	0.612	0.414	0.817
Departure Headway (Hd)	5.553	6.046	5.296
Convergence, Y/N	Yes	Yes	Yes
Cap	647	592	683
Service Time	3.607	4.109	3.344
HCM Lane V/C Ratio	0.614	0.417	0.813
HCM Control Delay	17	13.4	27.7
HCM Lane LOS	C	B	D
HCM 95th-tile Q	4.2	2	8.6

HCM 6th TWSC  
4: 362nd Avenue & Site Access

11/08/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	6	359	1	3	606
Future Vol, veh/h	2	6	359	1	3	606
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	2	20	20	3
Mvmt Flow	2	7	390	1	3	659

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1056	391	0	0	391	0
Stage 1	391	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	231	620	-	-	1076	-
Stage 1	646	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	230	620	-	-	1076	-
Mov Cap-2 Maneuver	230	-	-	-	-	-
Stage 1	646	-	-	-	-	-
Stage 2	477	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	435	1076
HCM Lane V/C Ratio	-	-	0.02	0.003
HCM Control Delay (s)	-	-	13.4	8.4
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 6th TWSC  
5: Proposed Access & Industrial Way

11/08/2022

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	53	1	2	91	2	5
Future Vol, veh/h	53	1	2	91	2	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	50	50
Mvmt Flow	66	1	3	114	3	6

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	67	0	187
Stage 1	-	-	-	-	67
Stage 2	-	-	-	-	120
Critical Hdwy	-	-	4.12	-	6.9
Critical Hdwy Stg 1	-	-	-	-	5.9
Critical Hdwy Stg 2	-	-	-	-	5.9
Follow-up Hdwy	-	-	2.218	-	3.95
Pot Cap-1 Maneuver	-	-	1535	-	704
Stage 1	-	-	-	-	847
Stage 2	-	-	-	-	799
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1535	-	703
Mov Cap-2 Maneuver	-	-	-	-	703
Stage 1	-	-	-	-	847
Stage 2	-	-	-	-	797

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	819	-	-	1535	-
HCM Lane V/C Ratio	0.011	-	-	0.002	-
HCM Control Delay (s)	9.4	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Queuing and Blocking Report  
 2023 Bkgd plus Site AM Peak Hour

11/08/2022

Intersection: 1: 362nd Avenue & US Hwy 26

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	T	T	L	L	R
Maximum Queue (ft)	262	246	85	157	174	174	140	274	140
Average Queue (ft)	148	96	31	78	88	70	78	118	66
95th Queue (ft)	248	199	65	146	154	138	141	215	137
Link Distance (ft)	890	890			1768	1768		648	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250	500			115		115
Storage Blk Time (%)		0					1	7	1
Queuing Penalty (veh)		0					3	16	3

Intersection: 2: 362nd Avenue & Industrial Way

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	80	5	57
Average Queue (ft)	30	0	15
95th Queue (ft)	62	4	45
Link Distance (ft)	373	164	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: 362nd Avenue & Industrial Way

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	89	120	89
Average Queue (ft)	44	67	44
95th Queue (ft)	71	103	71
Link Distance (ft)	443	551	164
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			



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Intersection: 4: 362nd Avenue & Site Access

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Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	35	20
Average Queue (ft)	3	1
95th Queue (ft)	19	10
Link Distance (ft)	365	551
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Intersection: 5: Proposed Access & Industrial Way

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Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	23	67
Average Queue (ft)	1	4
95th Queue (ft)	10	30
Link Distance (ft)	306	173
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Network Summary

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Network wide Queuing Penalty: 22

Intersection: 1: 362nd Avenue & US Hwy 26

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	T	T	L	L	R
Maximum Queue (ft)	513	502	275	323	180	184	140	556	140
Average Queue (ft)	330	288	133	196	95	79	108	343	134
95th Queue (ft)	474	452	280	310	161	151	162	573	161
Link Distance (ft)	890	890			1768	1768		648	
Upstream Blk Time (%)								0	
Queuing Penalty (veh)								1	
Storage Bay Dist (ft)			250	500			115		115
Storage Blk Time (%)		6	0				6	29	22
Queuing Penalty (veh)		19	3				27	127	59

Intersection: 2: 362nd Avenue & Industrial Way

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	180	26	63	189
Average Queue (ft)	58	1	9	27
95th Queue (ft)	128	20	41	106
Link Distance (ft)	373	164		648
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				1
Queuing Penalty (veh)				0

Intersection: 3: 362nd Avenue & Industrial Way

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	121	129	176
Average Queue (ft)	61	73	126
95th Queue (ft)	99	115	186
Link Distance (ft)	443	551	164
Upstream Blk Time (%)			2
Queuing Penalty (veh)			9
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Intersection: 4: 362nd Avenue & Site Access

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Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	57	20
Average Queue (ft)	9	1
95th Queue (ft)	36	12
Link Distance (ft)	365	551
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Intersection: 5: Proposed Access & Industrial Way

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Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	7	71
Average Queue (ft)	0	10
95th Queue (ft)	5	46
Link Distance (ft)	306	173
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Network Summary

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Network wide Queuing Penalty: 245

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

**362ND DR at MT HOOD HY, City of Sandy, Clackamas County, 01/01/2016 to 12/31/2020**  
 22 - 22 of 22 Crash records shown.

CITY OF SANDY, CLACKAMAS COUNTY

SER#	INVEST	RD DPT	UNLOC?	D C S V L K LAT	DATE	CLASS	CITY STREET	RD CHAR	INT-TYPE	INT-REL	OFFERD	WTHR	CRASH	TRLR QTY	SPL USE	MOVE	FROM	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE		
00488	N	N	N	N	02/05/2017	14	MT HOOD HY	INTER	3-LEG	N	N	RAIN	S-OTHER	01	NONE	9	TURN-L													08	
NONE					SU		362ND DR	CN	TRF SIGNAL	N	N	WET	TURN	N/A		S -NW				01	DRVR	NONE	00	Unk	UNK		000	000		00	
N					9A			01	0		N	DAY	PDO	FSNGR CAR																00	
N					45 24 17.19	-122.17	002600100500								02	NONE	9	TURN-L													00
					26.69									N/A		S -NW				01	DRVR	NONE	00	Unk	UNK		000	000		00	
														FSNGR CAR																00	

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

**362ND DR at INDUSTRIAL WAY, City of Sandy, Clackamas County, 01/01/2016 to 12/31/2020**  
1 - 4 of 4 Crash records shown.

CITY OF SANDY, CLACKAMAS COUNTY

SER#	P E R M I T	D A T E	C L A S S	C I T Y	S T R E E T	R D	C H A R	I N T - T Y P E	(M E D I A N)	I N T - R E L	O F F E R D	W T H R	C R A S H	S P C L	U S E	M O V E	A S	P R T C	I N J	G E	L I C N S	P E D	C A U S E	
01016	N N N	03/02/2016	16	INDUSTRIAL WAY	INTER	3-LEG	N	RAIN	S-STRGHT	01	NONE	9	STRGHT										29	
NONE	WE	0		362ND DR	S			WET	REAR	N/A			S-N					01	DRVR	NONE	00	Unk	UNK	00
N	6P				06	0		DLIT	PDO				PSNGR	CAR									00	
N	45 24 7.79	-122.17	27.78										02	NONE	9	STRGHT							00	
													N/A					01	DRVR	NONE	00	Unk	UNK	00
													PSNGR	CAR									00	
																							00	
02898	N N N	N N 08/19/2018	16	INDUSTRIAL WAY	INTER	3-LEG	N	CLR	S-1STOP	01	NONE	0	STRGHT										27,03,07	
CITY	SU	0		362ND DR	S			DRY	REAR				S-N										00	
N	5P				06	0		DAY	INJ				PSNGR	CAR				01	DRVR	NONE	20	M	OR-Y	00
N	45 24 7.8	-122.17	27.79										02	NONE	0	STOP							00	
													PRVTE					01	DRVR	INJC	37	M	OR-Y	00
													PSNGR	CAR									00	
													02	NONE	0	STOP			02	PSNG	INJC	37	F	00
													PRVTE										00	
													PSNGR	CAR									00	
01438	N N N	06/07/2020	16	INDUSTRIAL WAY	INTER	3-LEG	N	RAIN	S-1STOP	01	NONE	0	STRGHT										29	
NONE	SU	0		362ND DR	S			WET	REAR				S-N										00	
N	5P				06	0		DAY	INJ				PSNGR	CAR				01	DRVR	NONE	27	F	OR-Y	00
N	45 24 7.78	-122.17	27.81										02	NONE	0	STOP							00	
													PRVTE										00	
													PSNGR	CAR				01	DRVR	INJC	37	F	OR-Y	00
													02	NONE	0	STOP							00	
													PRVTE										00	
													PSNGR	CAR									00	
04077	N N N	N N 11/07/2018	16	INDUSTRIAL WAY	INTER	3-LEG	N	CLR	ANGL-OTH	01	NONE	0	STRGHT										02	
CITY	WE	0		362ND DR	CN			DRY	TURN				N-S										00	
N	4P				01	0		DUSK	INJ				PSNGR	CAR				01	DRVR	NONE	35	M	OR-Y	00
N	45 24 10	-122.17	27.77										02	NONE	0	TURN-L							00	
													PRVTE										00	
													PSNGR	CAR				01	DRVR	INJC	61	F	OR-Y	00
																							02	
																							00	
																							00	

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: Johnson RV

Intersection: 362nd at Industrial (North)

Scenario: 2023 Background plus Site Trips

Number of Major Street Lanes: 1

PM Peak Hour Volume 887 (sum of both approaches)

Number of Minor Street Lanes 1

PM Peak Hour Volume 35 (highest-volume approach)<sup>a</sup>

Posted or 85th percentile speed > 40 mph: No

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?
<b>Condition A - Minimum Vehicular Volume</b>			
Major Street Volume	501	500	
Minor Street Volume	20	150	<b>No</b>
<b>Condition B - Interruption of Continuous Traffic</b>			
Major Street Volume	501	750	
Minor Street Volume	20	75	<b>No</b>
<b>Combination Warrant<sup>c</sup></b>			
Major Street Volume	501	600	
Minor Street Volume	20	120	<b>No</b>

<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: Johnson RV

Intersection: 362nd at Industrial (South)

Scenario: 2023 Background plus Site Trips

Number of Major Street Lanes: 1

PM Peak Hour Volume 876 (sum of both approaches)

Number of Minor Street Lanes 1

PM Peak Hour Volume 94 (highest-volume approach)<sup>a</sup>

Posted or 85th percentile speed > 40 mph: No

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?
<b>Condition A - Minimum Vehicular Volume</b>			
Major Street Volume	495	500	
Minor Street Volume	53	150	<b>No</b>
<b>Condition B - Interruption of Continuous Traffic</b>			
Major Street Volume	495	750	
Minor Street Volume	53	75	<b>No</b>
<b>Combination Warrant<sup>c</sup></b>			
Major Street Volume	495	600	
Minor Street Volume	53	120	<b>No</b>

<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: Johnson RV

Intersection: 362nd at Site Access

Scenario: 2023 Background plus Site Trips

Number of Major Street Lanes: 1 PM Peak Hour Volume 969 (sum of both approaches)

Number of Minor Street Lanes 1 PM Peak Hour Volume 2 (highest-volume approach)<sup>a</sup>

Posted or 85th percentile speed > 40 mph: No

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?
<b>Condition A - Minimum Vehicular Volume</b>			
Major Street Volume	547	500	
Minor Street Volume	1	150	<b>No</b>
<b>Condition B - Interruption of Continuous Traffic</b>			
Major Street Volume	547	750	
Minor Street Volume	1	75	<b>No</b>
<b>Combination Warrant<sup>c</sup></b>			
Major Street Volume	547	600	
Minor Street Volume	1	120	<b>No</b>

<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: Johnson RV

Intersection: Industrial at Proposed Site Access

Scenario: 2023 Background plus Site Trips

Number of Major Street Lanes: 1 PM Peak Hour Volume 147 (sum of both approaches)

Number of Minor Street Lanes 1 PM Peak Hour Volume 2 (highest-volume approach)<sup>a</sup>

Posted or 85th percentile speed > 40 mph: No

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?
<b>Condition A - Minimum Vehicular Volume</b>			
Major Street Volume	83	500	
Minor Street Volume	1	150	<b>No</b>
<b>Condition B - Interruption of Continuous Traffic</b>			
Major Street Volume	83	750	
Minor Street Volume	1	75	<b>No</b>
<b>Combination Warrant<sup>c</sup></b>			
Major Street Volume	83	600	
Minor Street Volume	1	120	<b>No</b>

<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)

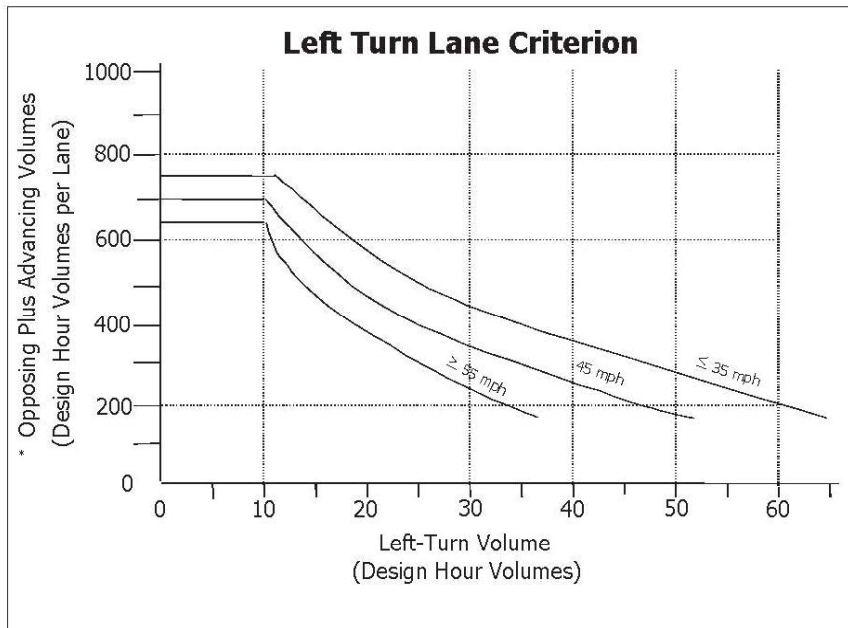


Project Name: Johnson RV  
 Approach: Northbound 362nd Avenue at Industrial (South)  
 Scenario: 2022 Existing Conditions

Number of Advancing Lanes: 1  
 Number of Opposing Lanes: 1  
 Major-Street Design Speed: 35 mph

	AM Volume	PM Volume
Advancing Volume for Design Hour:	349	344
Opposing Volume for Design Hour:	127	488
Design Hour Volume Per Lane:	476	832
Number of Left Turns per Hour:	56	54
Left-turn lane warrants satisfied?	<b>YES</b>	<b>YES</b>

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



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

# Left-Turn Lane Warrant Analysis (ODOT Methodology)

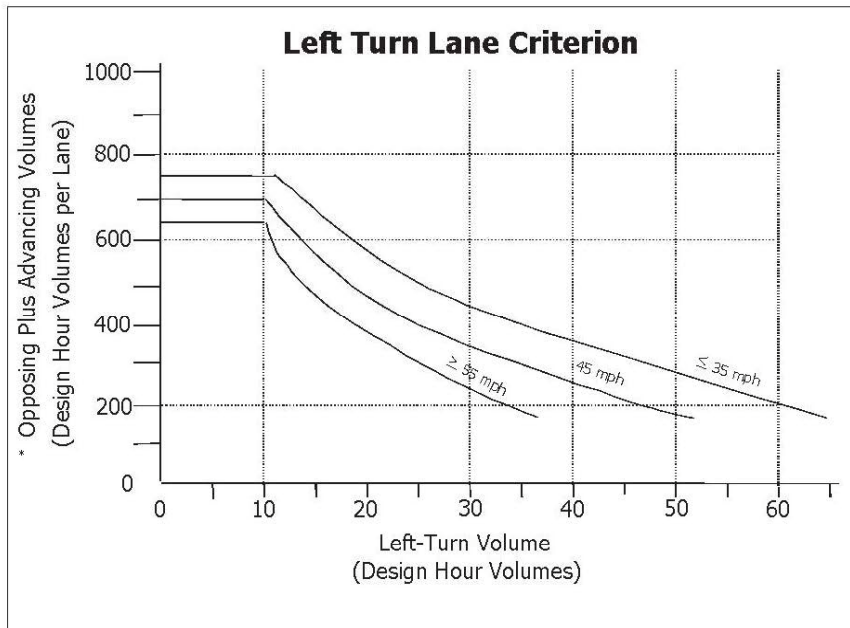


Project Name: Johnson RV  
 Approach: Southbound 362nd Avenue at Site Access  
 Scenario: 2023 Background plus Site Trips

Number of Advancing Lanes: 1  
 Number of Opposing Lanes: 1  
 Major-Street Design Speed: 35 mph

	AM Volume	PM Volume
Advancing Volume for Design Hour:	141	609
Opposing Volume for Design Hour:	367	360
Design Hour Volume Per Lane:	508	969
Number of Left Turns per Hour:	5	3
Left-turn lane warrants satisfied?	<b>NO</b>	<b>NO</b>

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



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



# Left-Turn Lane Warrant Analysis (ODOT Methodology)

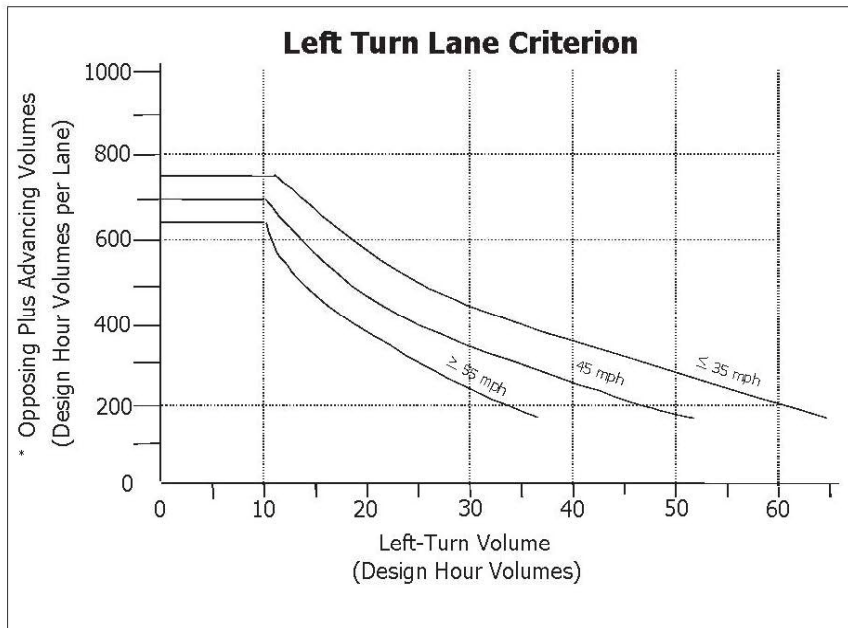


Project Name: Johnson RV  
 Approach: Westbound Industrial at Proposed Site Access  
 Scenario: 2023 Background plus Site Trips

Number of Advancing Lanes: 1  
 Number of Opposing Lanes: 1  
 Major-Street Design Speed: 25 mph

	AM Volume	PM Volume
Advancing Volume for Design Hour:	44	93
Opposing Volume for Design Hour:	85	54
Design Hour Volume Per Lane:	129	147
Number of Left Turns per Hour:	4	2
Left-turn lane warrants satisfied?	<b>NO</b>	<b>NO</b>

**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: Johnson RV  
 Approach: Northbound 362nd at Industrial (North)  
 Scenario: 2023 Background plus Site Trips

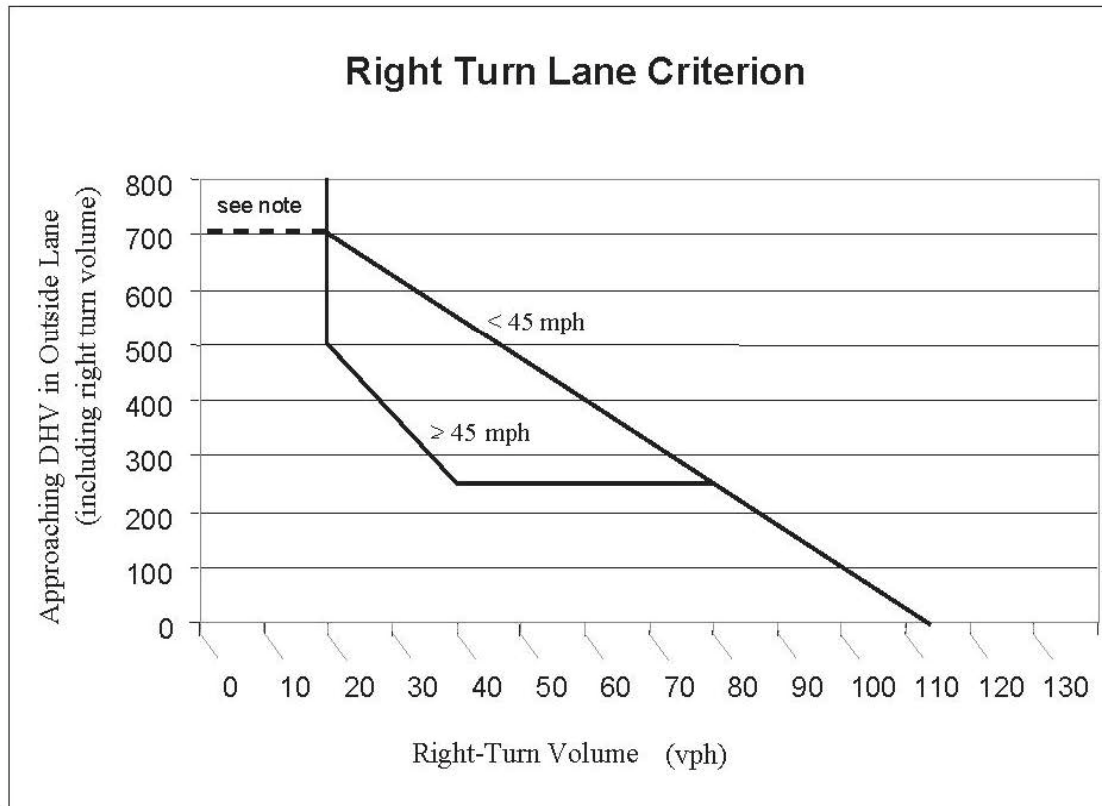
Major-Street Design Speed: 35 mph

	AM Volume	PM Volume
Number of Right Turns per Hour:	46	30
Approaching DVH in Outside Lane:	355	395
Calculated Turn Volume Threshold:	66	61
Right Turn Volume Exceeds Threshold?	<b>NO</b>	<b>NO</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.

# Right-Turn Lane Warrant Analysis (ODOT Methodology)



Project Name: Johnson RV  
 Approach: Southbound 362nd at Industrial (South)  
 Scenario: 2023 Background plus Site Trips

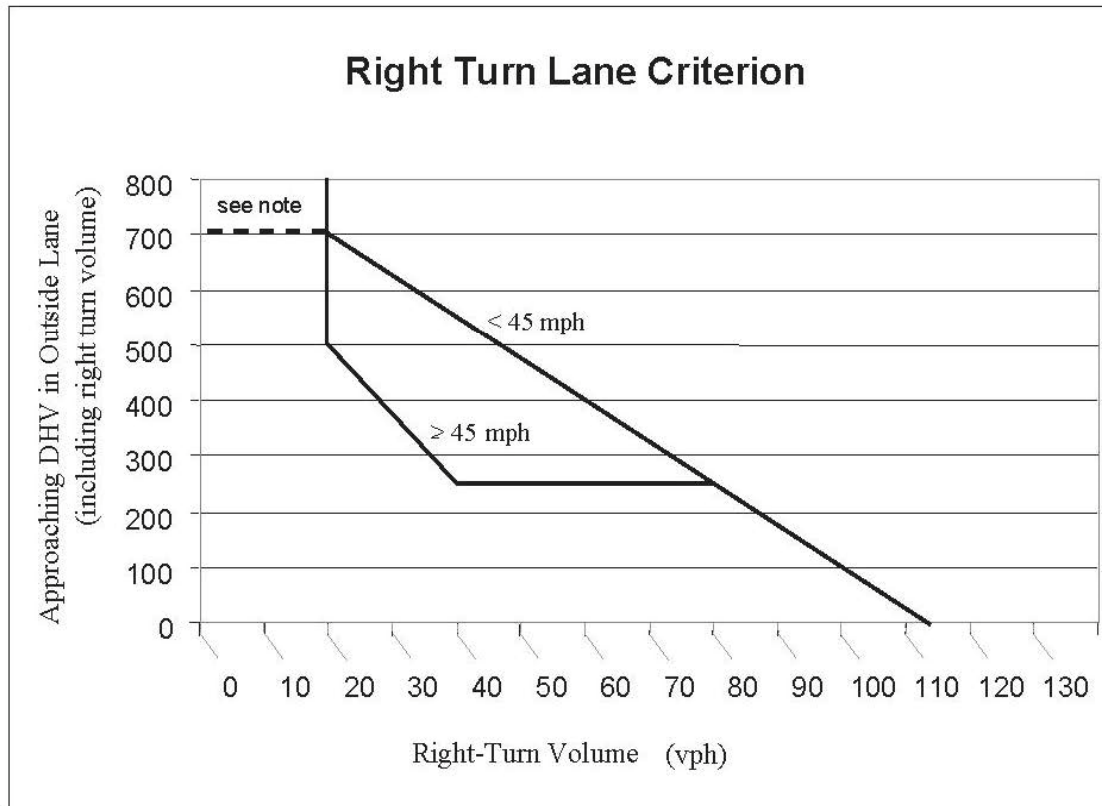
Major-Street Design Speed: 35 mph

	AM Volume	PM Volume
Number of Right Turns per Hour:	39	35
Approaching DVH in Outside Lane:	142	511
Calculated Turn Volume Threshold:	94	45
Right Turn Volume Exceeds Threshold?	<b>NO</b>	<b>NO</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.

# Right-Turn Lane Warrant Analysis (ODOT Methodology)



Project Name: Johnson RV  
 Approach: Northbound 362nd at Site Access  
 Scenario: 2023 Background plus Site Trips

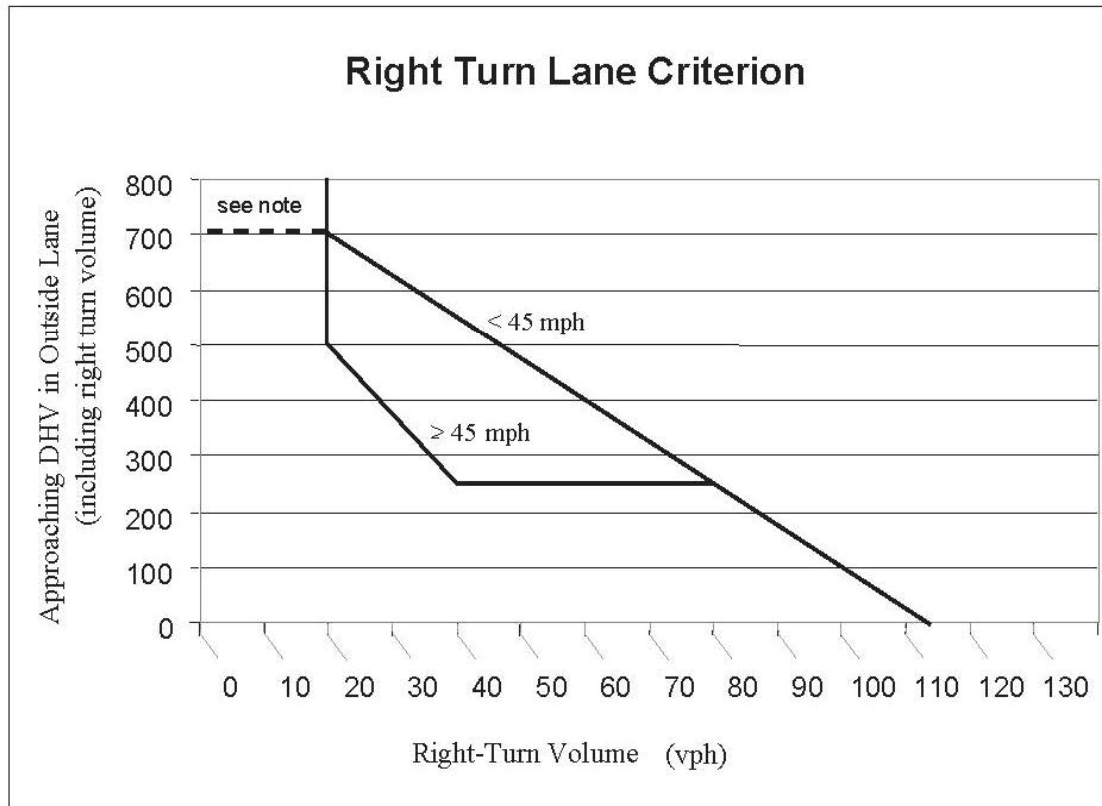
Major-Street Design Speed: 35 mph

	AM Volume	PM Volume
Number of Right Turns per Hour:	2	1
Approaching DVH in Outside Lane:	367	360
Calculated Turn Volume Threshold:	64	65
Right Turn Volume Exceeds Threshold?	<b>NO</b>	<b>NO</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.

# Right-Turn Lane Warrant Analysis (ODOT Methodology)



Project Name: Johnson RV  
 Approach: Eastbound Industrial at Proposed Site Access  
 Scenario: 2023 Background plus Site Trips

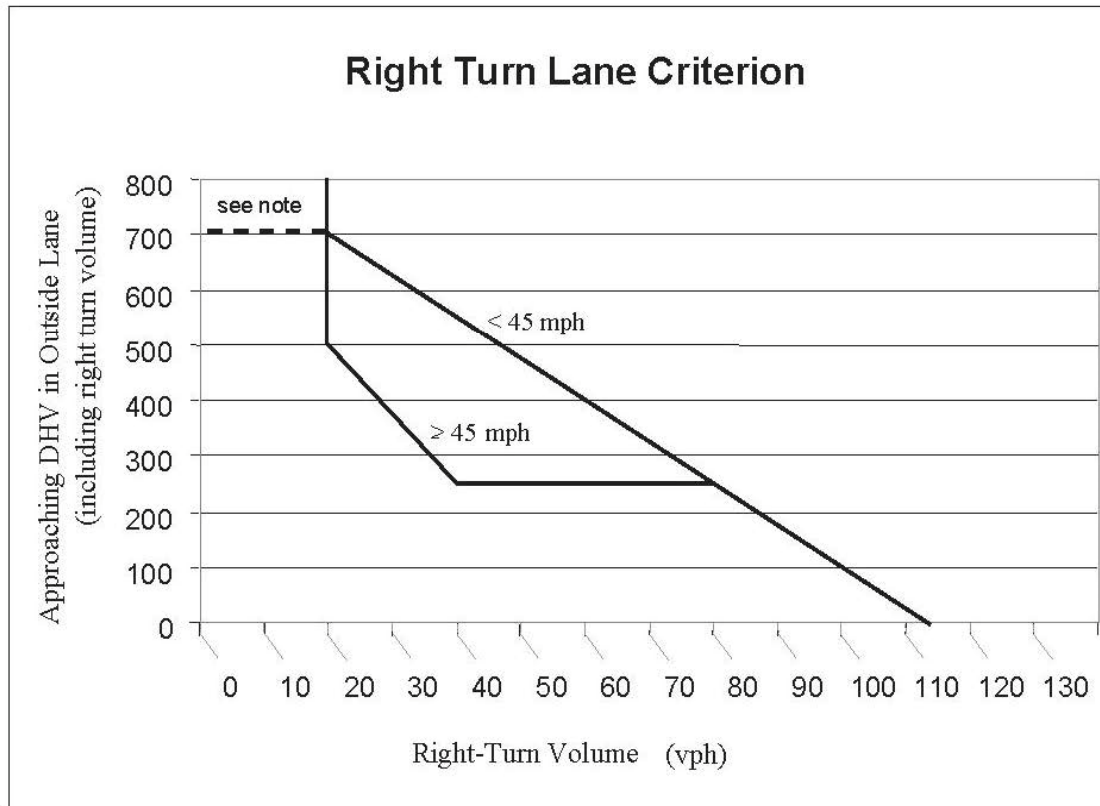
Major-Street Design Speed: 35 mph

	AM Volume	PM Volume
Number of Right Turns per Hour:	2	1
Approaching DVH in Outside Lane:	85	54
Calculated Turn Volume Threshold:	102	106
Right Turn Volume Exceeds Threshold?	<b>NO</b>	<b>NO</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.

## Speed Study Summary - Radar Data



Location: SE 362nd Avenue

Direction: Northbound

Date: August 31, 2022

Time: 3:00 PM

Weather: Clear/Dry

Notes: Occasional queues back up and impact through travel speeds. Data collection was stopped during these incidents to capture free-flow speeds.

**85th Percentile Speed**                      **37 mph**

Average Speed:                                33 mph

### Recorded Speeds:\*

1 mph ----- 0	26 mph ----- 2	51 mph ----- 0
2 mph ----- 0	27 mph ----- 3	52 mph ----- 0
3 mph ----- 0	28 mph ----- 4	53 mph ----- 0
4 mph ----- 0	29 mph ----- 3	54 mph ----- 0
5 mph ----- 0	30 mph ----- 5	55 mph ----- 0
6 mph ----- 0	31 mph ----- 14	56 mph ----- 0
7 mph ----- 0	32 mph ----- 13	57 mph ----- 0
8 mph ----- 0	33 mph ----- 8	58 mph ----- 0
9 mph ----- 0	34 mph ----- 12	59 mph ----- 0
10 mph ----- 0	35 mph ----- 7	60 mph ----- 0
11 mph ----- 0	36 mph ----- 10	61 mph ----- 0
12 mph ----- 0	37 mph ----- 5	62 mph ----- 0
13 mph ----- 0	38 mph ----- 4	63 mph ----- 0
14 mph ----- 0	39 mph ----- 2	64 mph ----- 0
15 mph ----- 0	40 mph ----- 1	65 mph ----- 0
16 mph ----- 0	41 mph ----- 0	66 mph ----- 0
17 mph ----- 0	42 mph ----- 2	67 mph ----- 0
18 mph ----- 0	43 mph ----- 0	68 mph ----- 0
19 mph ----- 0	44 mph ----- 1	69 mph ----- 0
20 mph ----- 0	45 mph ----- 0	70 mph ----- 0
21 mph ----- 0	46 mph ----- 0	71 mph ----- 0
22 mph ----- 0	47 mph ----- 0	72 mph ----- 0
23 mph ----- 1	48 mph ----- 0	73 mph ----- 0
24 mph ----- 1	49 mph ----- 1	74 mph ----- 0
25 mph ----- 1	50 mph ----- 0	75+ mph ----- 0

\* Speed data observations include free-flowing traffic only (i.e. no following vehicles)

## Speed Study Summary - Radar Data



Location: Industrial Way (North)  
Direction: Westbound  
Date: 11/7/2022  
Time: 2:00 PM  
Weather: Overcast, showers  
Notes: None

**85th Percentile Speed: 33 mph**  
Average Speed: 29 mph

### Recorded Speeds:\*

1 mph ----- 0	26 mph ----- 6	51 mph ----- 0
2 mph ----- 0	27 mph ----- 9	52 mph ----- 0
3 mph ----- 0	28 mph ----- 10	53 mph ----- 0
4 mph ----- 0	29 mph ----- 10	54 mph ----- 0
5 mph ----- 0	30 mph ----- 4	55 mph ----- 0
6 mph ----- 0	31 mph ----- 8	56 mph ----- 0
7 mph ----- 0	32 mph ----- 7	57 mph ----- 0
8 mph ----- 0	33 mph ----- 10	58 mph ----- 0
9 mph ----- 0	34 mph ----- 2	59 mph ----- 0
10 mph ----- 0	35 mph ----- 2	60 mph ----- 0
11 mph ----- 0	36 mph ----- 0	61 mph ----- 0
12 mph ----- 0	37 mph ----- 3	62 mph ----- 0
13 mph ----- 0	38 mph ----- 1	63 mph ----- 0
14 mph ----- 0	39 mph ----- 0	64 mph ----- 0
15 mph ----- 0	40 mph ----- 1	65 mph ----- 0
16 mph ----- 0	41 mph ----- 1	66 mph ----- 0
17 mph ----- 1	42 mph ----- 0	67 mph ----- 0
18 mph ----- 1	43 mph ----- 0	68 mph ----- 0
19 mph ----- 0	44 mph ----- 1	69 mph ----- 0
20 mph ----- 2	45 mph ----- 0	70 mph ----- 0
21 mph ----- 3	46 mph ----- 0	71 mph ----- 0
22 mph ----- 4	47 mph ----- 0	72 mph ----- 0
23 mph ----- 1	48 mph ----- 0	73 mph ----- 0
24 mph ----- 7	49 mph ----- 0	74 mph ----- 0
25 mph ----- 6	50 mph ----- 0	75+ mph ----- 0

\* Speed data observations include free-flowing traffic only (i.e. no following vehicles)