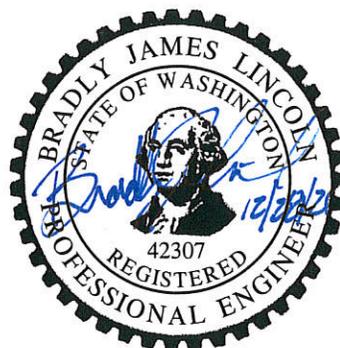


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425.339.8266

# Grandview Olympic Traffic Impact Analysis

Jurisdiction: City of Arlington

December 2021



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## 1. INTRODUCTION

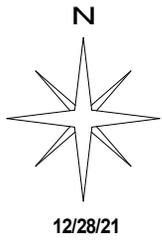
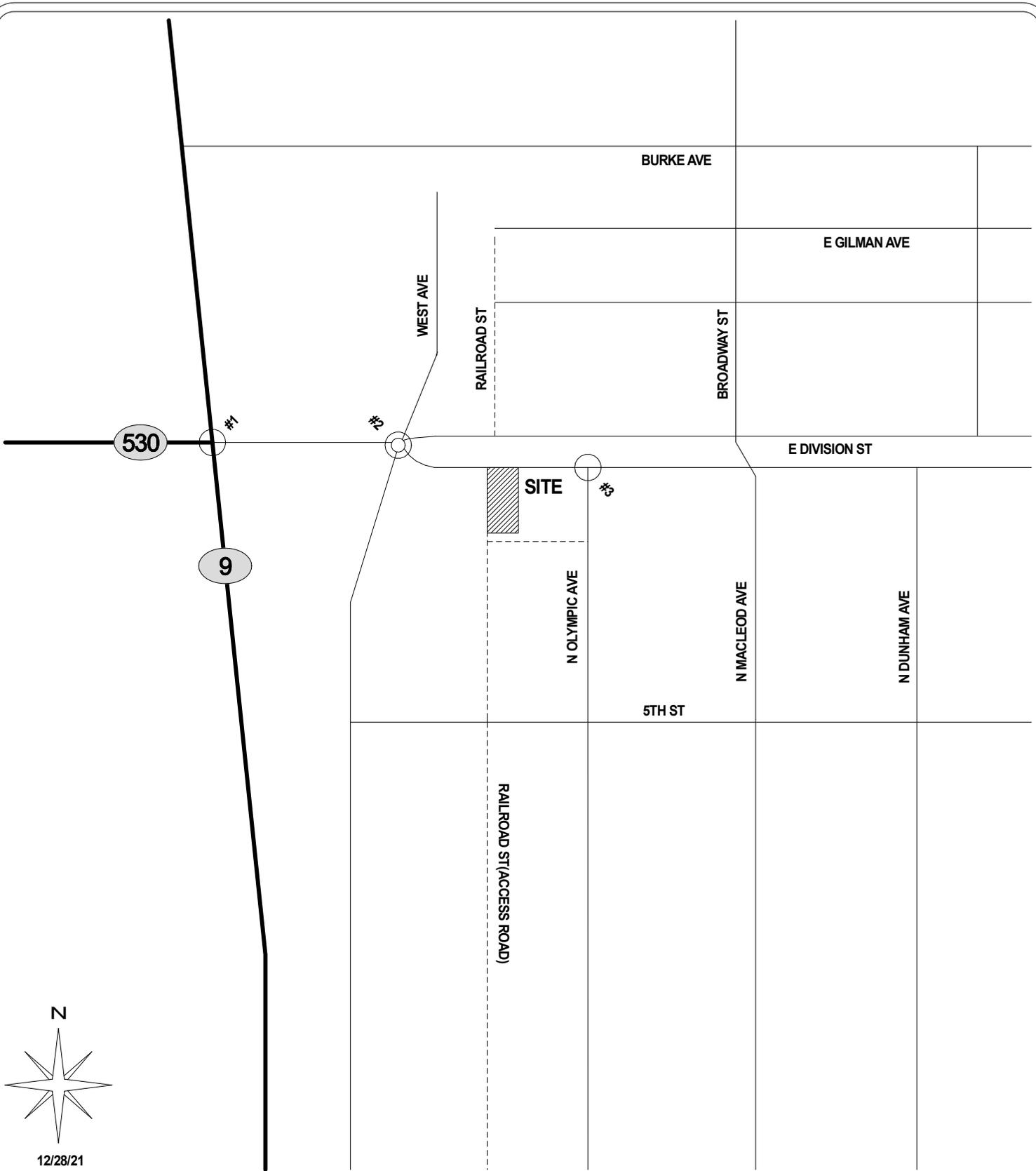
Gibson Traffic Consultants, Inc. (GTC) has been retained to analyze the traffic impacts of the proposed Grandview Olympic development. The proposed development is located along the south side of E Division Street, west of Olympic Avenue. A site vicinity map is included in Figure 1. The development is proposed to consist of 46 low-rise apartments and 4,000 square-feet (SF) of retail space.

Brad Lincoln, responsible for this report, is a licensed professional engineer (Civil) in the State of Washington and member of the Washington State section of the Institute of Transportation Engineers (ITE).

## 2. METHODOLOGY

Trip generation for the Grandview Olympic development is based on average trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition (2017)*. Level of service (LOS) at the study intersections is determined using the methodology described in the *Highway Capacity Manual, 6<sup>th</sup> Edition (HCM)*. The analysis has been performed using the *Synchro 11.1, Build 0* and *Sidra Intersection 9.0.3.9771* software packages. The intersection level of service analysis has been performed for the 2021 existing conditions, 2025 baseline conditions, and 2025 future with development conditions during the PM peak-hour. The year 2025 has been utilized for the horizon year to represent a conservative 4-year horizon period; even though the development is anticipated to be completed before 2025.

Traffic congestion on roadways is generally measured in terms of level of service at critical intersections. In accordance with the *Highway Capacity Manual, 6<sup>th</sup> Edition*, roadway facilities and intersections are rated between LOS A and LOS F, with LOS A being free flow and LOS F being forced flow or over-capacity conditions. The level of service at signalized, all-way stop-controlled, and roundabout intersections are based on the average stopped delay for all entering vehicles. The level of service at two-way stop-controlled intersections is based on stopped delay times for the critical approach. Geometric characteristics and conflicting traffic movements are taken into consideration when determining level of service values. A summary of the level of service criteria has been included in Table 1.



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GTC #21-268**

**GRANDVIEW OLYMPIC**

**CITY OF ARLINGTON**

**LEGEND**



DEVELOPMENT SITE



STUDY INTERSECTION

**FIGURE 1  
SITE VICINITY  
MAP**

**Table 1: Level of Service Criteria for Intersections**

Level of <sup>1</sup> Service	Expected Delay	Intersection Control Delay (Seconds per Vehicle)	
		Unsignalized Intersections	Signalized & Roundabout Intersections
A	Little/No Delay	≤10	≤10
B	Short Delays	>10 and ≤15	>10 and ≤20
C	Average Delays	>15 and ≤25	>20 and ≤35
D	Long Delays	>25 and ≤35	>35 and ≤55
E	Very Long Delays	>35 and ≤50	>55 and ≤80
F	Extreme Delays <sup>2</sup>	>50	>80

The City of Arlington has established an acceptable level of service of LOS D.

The City of Arlington and Snohomish County have an interlocal agreement that provides for reciprocal mitigation fees. Snohomish County mitigation fees can be calculated based on the default percentage in the interlocal agreement, which is 70%, or based on actual impacts. The City of Arlington also has an interlocal agreement with WSDOT that provides for mitigation fees to WSDOT for impacts to WSDOT improvement projects. WSDOT improvement projects and their associated fees are based on the most recent Exhibit C list, which is included in the attachments. City of Arlington developments are required to pay for any WSDOT improvement project on the Exhibit C list impacted with 3 or more directional PM peak-hour trips or based on the area wide mitigation fee.

### 3. TRIP GENERATION

Trip generation calculations for the proposed Grandview Olympic development are based on national research data for land uses contained in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition* (2017). The Grandview Olympic development is propose to replace the existing 2,184 square-foot (SF) retail building with 46 low-rise residential units and 4,000 SF of retail space. The following ITE Land Use Codes have been utilized for the trip generation calculations:

<sup>1</sup> **Source:** *Highway Capacity Manual, 6<sup>th</sup> Edition*.

LOS A: Free-flow traffic conditions, with minimal delay to stopped vehicles (no vehicle is delayed longer than one cycle at signalized intersection).

LOS B: Generally stable traffic flow conditions.

LOS C: Occasional back-ups may develop, but delay to vehicles is short term and still tolerable.

LOS D: During short periods of the peak hour, delays to approaching vehicles may be substantial but are tolerable during times of less demand (i.e. vehicles delayed one cycle or less at signal).

LOS E: Intersections operate at or near capacity, with long queues developing on all approaches and long delays.

LOS F: Jammed conditions on all approaches with excessively long delays and vehicles unable to move at times.

<sup>2</sup> When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection.

- ITE Land Use Code 221, Multifamily Housing (Low-Rise) – 46 units
- ITE Land Use Code 820, Shopping Center – 4,000 SF of retail space (new)
- ITE Land Use Code 820, Shopping Center – 1,284 SF of retail space (removed)

The average trip generation rates for the land uses have been used since that is the basis for the City of Arlington traffic mitigation fee. Additionally, the trip generation for ITE Land Use Code 820 using the regression equation produces unreasonable results, particularly for the daily and PM peak-hours. The daily trip generation using the regression equation would equate to an average of about 1 trip every 2 minutes throughout the entire day. The PM peak-hour trip generation would equate to approximately 1 trip every minute. This trip generation is not reasonable for a relatively small retail space that will be surrounded by residential units and is located in the downtown area of the City of Arlington. It is important to note that the trip generation calculations do not account for any pedestrian trip reductions or internal crossover between the residential units and the retail space.

A pass-by reduction of 34% for the retail use has been applied using ITE data. The pass-by trips account for vehicles currently on the roadway that will use the proposed use and therefore the pass-by trips are not new to the surrounding roadways. The trip generation of the Grandview Olympic development is summarized in Table 2.

**Table 2: Trip Generation Summary**

Grandview Olympic Development	Units/Size	Average Daily Trips	AM Peak-Hour Trips			PM Peak-Hour Trips		
			Inbound	Outbound	Total	Inbound	Outbound	Total
Multifamily (Low-Rise) ITE LUC 220	46 units	250	4	13	17	12	8	20
Shopping Center ITE LUC 820 (New)	4,000 SF	151	3	1	4	7	8	15
Shopping Center ITE LUC 820 (Removed)	-2,184 SF	-82	-2	0	-2	-3	-5	-8
Pass-By Trips	---	-23	0	0	0	-1	-1	-2
<b>TOTAL</b>		<b>296</b>	<b>5</b>	<b>14</b>	<b>19</b>	<b>15</b>	<b>10</b>	<b>25</b>

The Grandview Olympic development is anticipated to generate approximately 296 new average daily trips (ADT) with 19 new AM peak-hour trips and 25 new PM peak-hour trips. The trip generation calculations are included in the attachments.

#### **4. TRIP DISTRIBUTION**

The trip distribution for the Grandview Olympic development is based on previously approved distributions in the area and surrounding uses. It is anticipated that 60% of the trips generated by the development will travel to and from the south; twenty-five percent along SR-9, twenty-five percent along West Avenue, and ten percent along Olympic Avenue. Approximately 35% of the trips generated by the development will travel to and from the west along SR-530. The remaining 5% of the trips generated by the development are anticipated to travel to and from the north along SR-9. Detailed distributions for the AM and PM peak-hours are shown in Figure 2 and Figure 3, respectively.

It is important to note that trips generated by the Grandview Olympic development will utilize shared accesses, including Railroad Street (the alley along the west side of the site) and the access to Olympic Avenue. These accesses are shown with dashed lines in the figures.

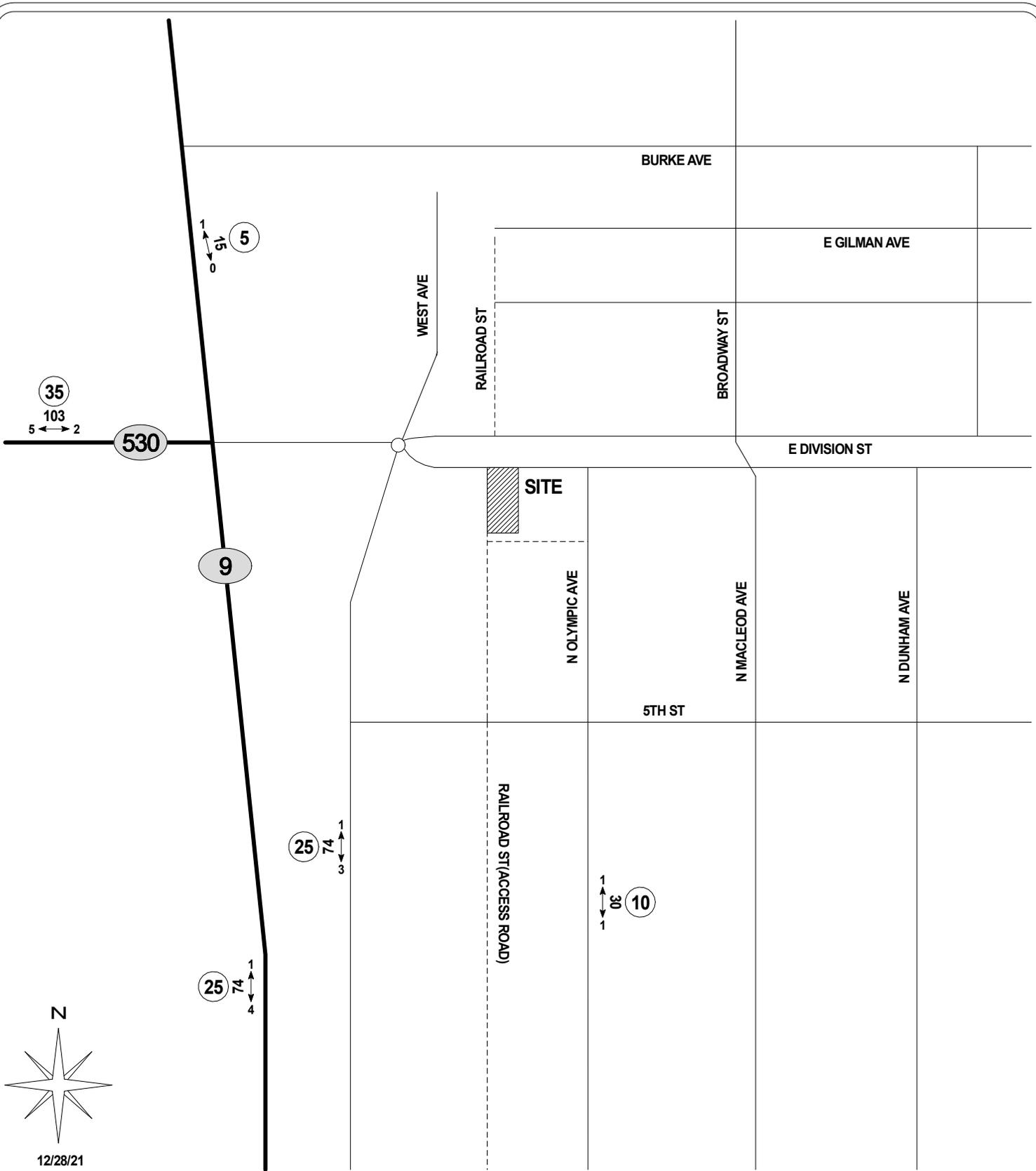
The interlocal agreement between the City of Arlington and Snohomish County requires detailed development trip turning movement data at Snohomish County key intersections impacted with three or more directional trips during the AM peak-hour and PM peak-hour. The trips generated by the development are not anticipated to impact any Snohomish County key intersections during the AM and PM peak-hours with 3 directional peak-hour trips.

#### **5. LEVEL OF SERVICE ANALYSIS**

The following intersections have been analyzed as a part of this report:

1. E Division Street/SR-530 at SR-9 – Signalized
2. E Division Street at West Avenue – Roundabout
3. E Division Street at Olympic Avenue – All-Way Stop-Controlled

The intersections have been analyzed for the 2021 existing conditions, 2025 baseline conditions, and 2025 future conditions with the development. These are the only intersections that are anticipated to be impacted by 10 PM peak-hour trips. It is important to note that the intersection of E Division Street at Railroad Street (the alley along the west side of the site) is only anticipated to be impacted by 9 inbound PM peak-hour trips since the intersection is restricted to right-in/right-out only operations and it is anticipated that outbound trips destined to the west will use the access to Olympic Avenue.



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AWDT  
AM ↔ PEAK

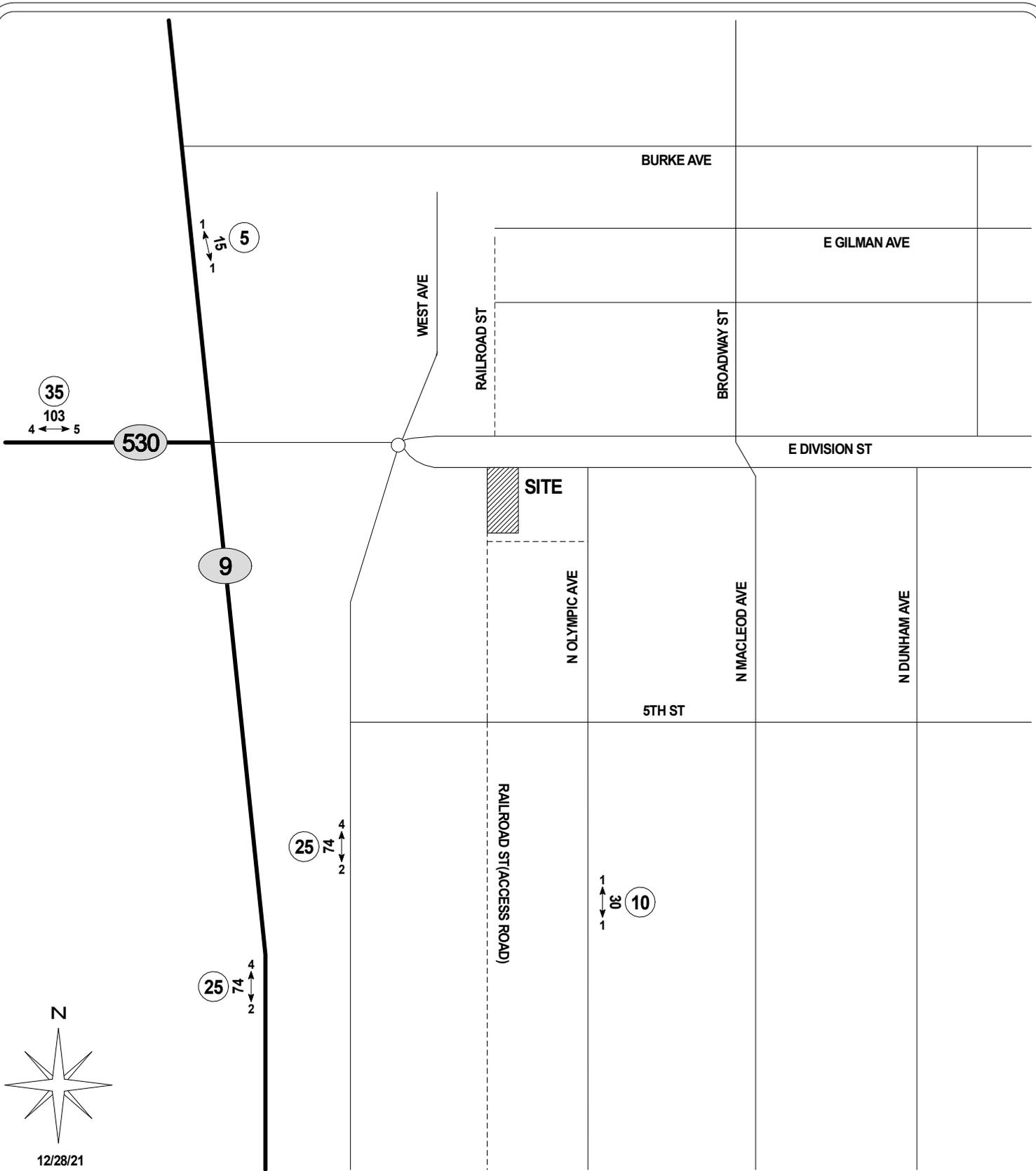
NEW DAILY TRIPS  
NEW AM PEAK-HOUR TRIPS



TRIP DISTRIBUTION %

**CITY OF ARLINGTON**

**FIGURE 2  
DEVELOPMENT  
TRIP DISTRIBUTION  
AM PEAK-HOUR**



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**TRAFFIC IMPACT STUDY**  
GTC #21-268

**GRANDVIEW OLYMPIC**

**LEGEND**

AWDT  
PM ← → PEAK

NEW DAILY TRIPS  
NEW PM PEAK-HOUR TRIPS

XX

TRIP DISTRIBUTION %

**CITY OF ARLINGTON**

**FIGURE 3**  
**DEVELOPMENT**  
**TRIP DISTRIBUTION**  
**PM PEAK-HOUR**

## 5.1 Intersection Turning Movements

The existing volumes at the study intersections are based on counts performed by the independent count firm Traffic Data Gathering (TDG) in November and December 2021. The existing turning movements at the study intersections are shown in Figure 4. The 2025 baseline turning movements at the intersections have been calculated utilizing a 2% annually compounding growth rate, which is consistent with previous analysis performed in the City of Arlington. The 2025 baseline turning movements are shown in Figure 5. The 2025 future with development turning movements were calculated by adding the trips generated by the development to the 2025 baseline tuning movements. The 2025 future with development turning movements are shown in Figure 6. The existing turning movement counts and future turning movement calculations are included in the attachments.

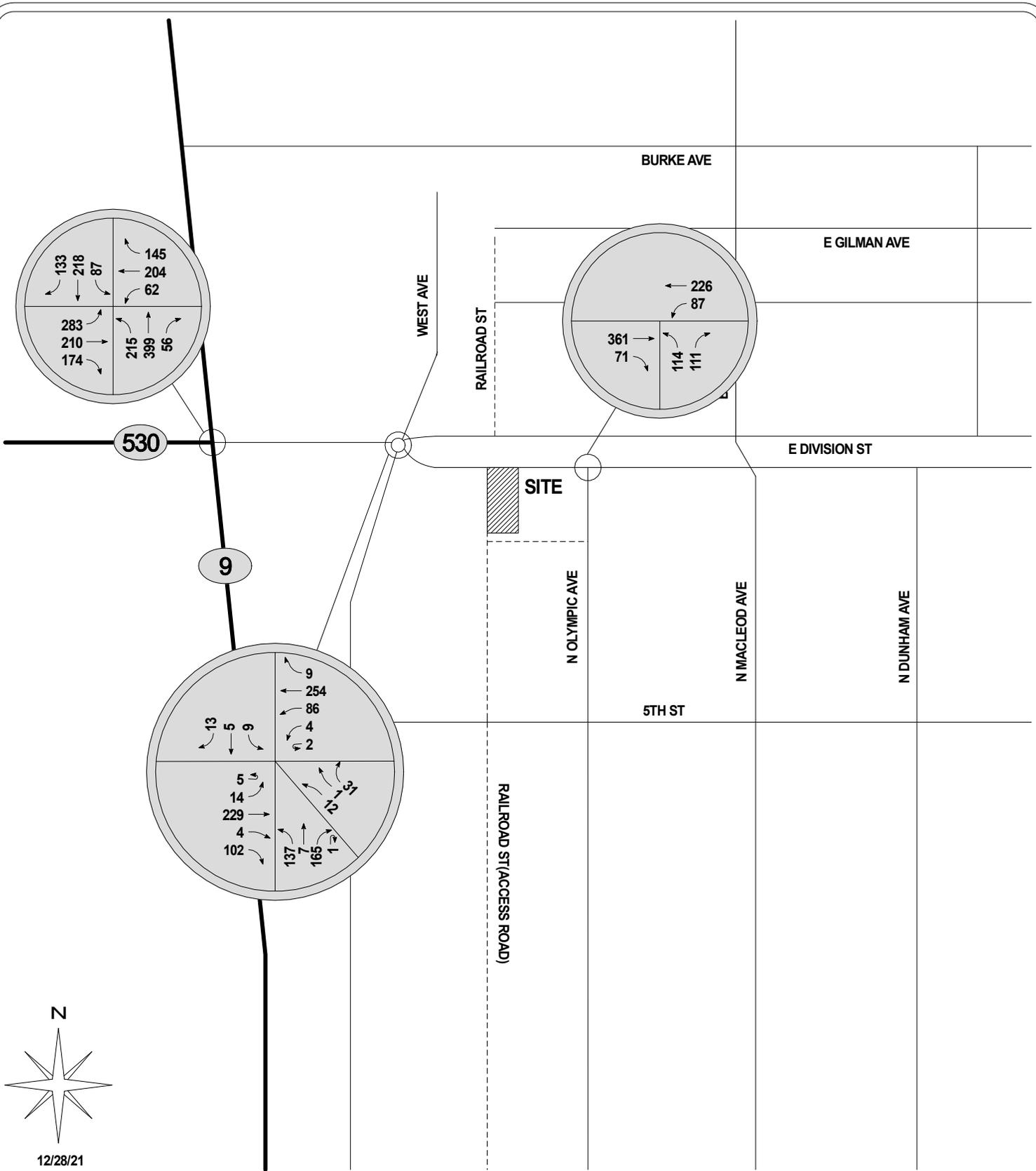
## 5.2 Level of Service Analysis

The level of service analysis has been completed with the existing channelization, intersection control, and signal timing data from WSDOT. The analysis shows that the study intersections all currently operate at LOS C or better and are anticipated to operate at LOS C or better under the 2025 baseline conditions and 2025 future conditions with the development. The intersection of E Division Street at Olympic Avenue is anticipated to change from LOS B to LOS C under the 205 baseline conditions, but will remain at LOS C under the 2025 future conditions with the development. The level of service results for the study intersections are summarized in Table 3.

**Table 3: Level of Service Summary**

Intersection	Control	2021 Existing Conditions		2025 Baseline Conditions		2025 Future Conditions with Development	
		LOS	Delay	LOS	Delay	LOS	Delay
1. E Division Street/SR-530 at SR-9	Signal	C	30.1 sec	C	32.3 sec	C	32.5 sec
2. E Division Street at West Avenue	Roundabout	A	7.1 sec	A	7.3 sec	A	7.3 sec
3. E Division Street at Olympic Avenue	All-Way Stop-Controlled	B	14.2 sec	C	16.2 sec	C	16.4 sec

The level of service calculations are included in the attachments.



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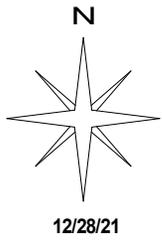
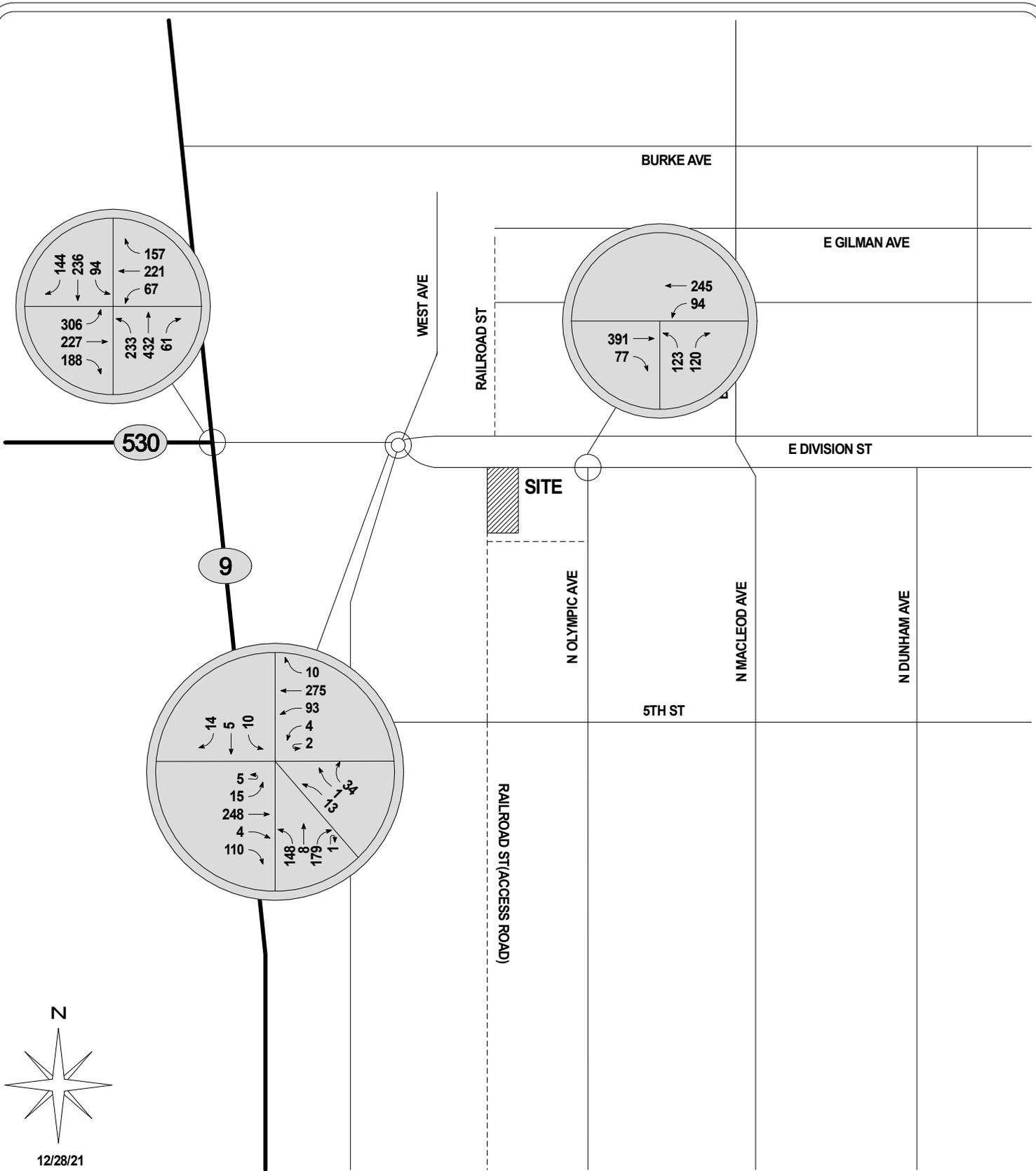
**LEGEND**

XXX →

PM PEAK-HOUR  
TURNING MOVEMENT VOLUMES

**CITY OF ARLINGTON**

**FIGURE 4  
2021 EXISTING  
TURNING MOVEMENTS**



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GTC #21-268**

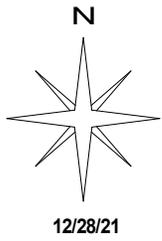
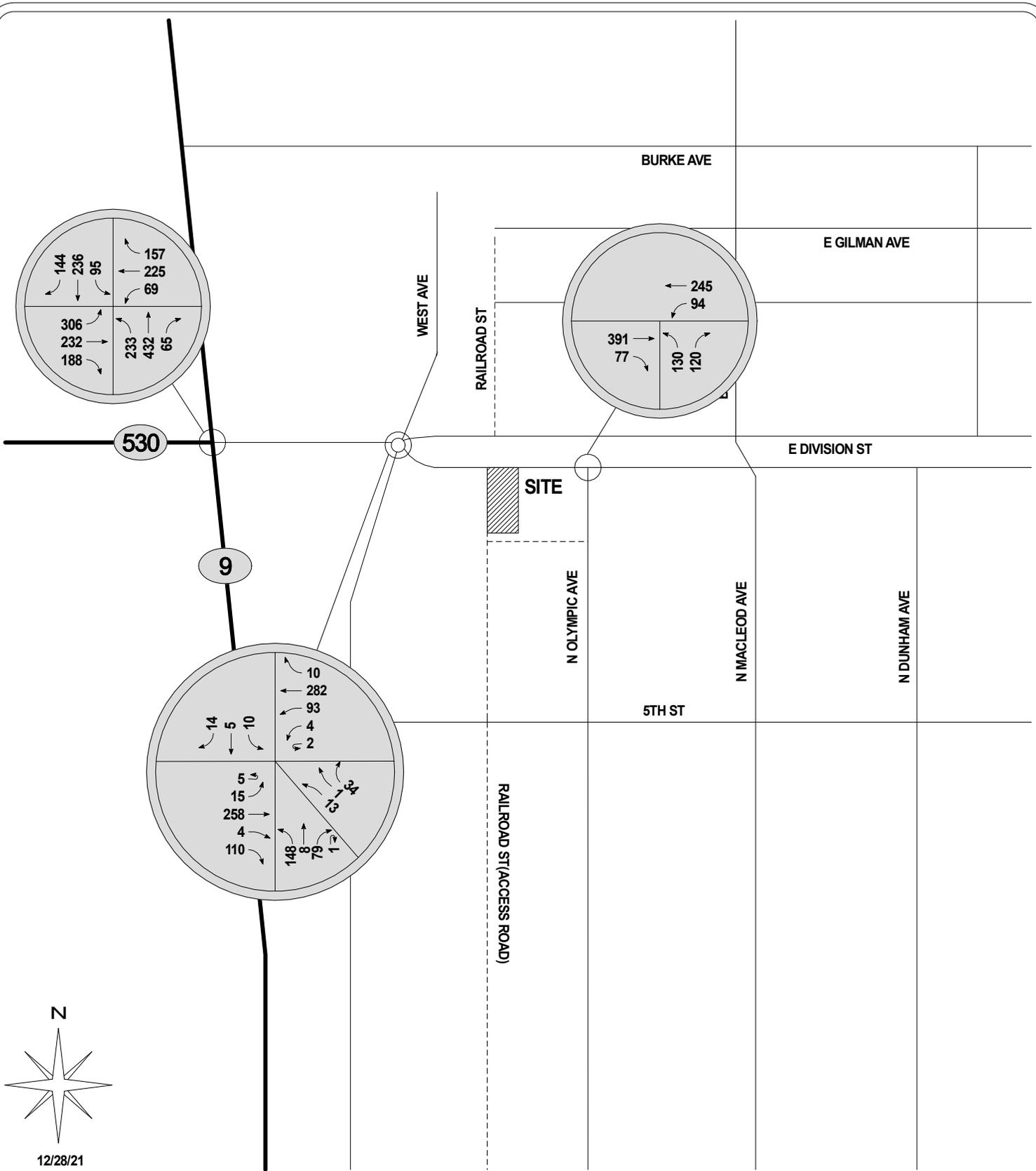
**GRANDVIEW OLYMPIC**

**LEGEND**

XXX → PM PEAK-HOUR  
TURNING MOVEMENT VOLUMES

**FIGURE 5  
2025 BASELINE  
TURNING MOVEMENTS**

**CITY OF ARLINGTON**



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GTC #21-268**

**GRANDVIEW OLYMPIC**

**LEGEND**

XXX →

PM PEAK-HOUR  
TURNING MOVEMENT VOLUMES

**CITY OF ARLINGTON**

**FIGURE 6  
2025 FUTURE  
WITH DEVELOPMENT  
TURNING MOVEMENTS**

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## 6. TRAFFIC MITIGATION FEES

The City of Arlington collects traffic mitigation fees based on the number of PM peak-hour trips generated by a development. The City of Arlington also has interlocal agreements with WSDOT and Snohomish County for traffic mitigation fees.

### 6.1 City of Arlington

The City of Arlington currently has a traffic mitigation fee of \$3,355 per PM peak-hour trip. The Grandview Olympic development is anticipated to generate 25 new PM peak-hour trips. These trips result in a City of Arlington traffic mitigation fees of \$83,875.00. The 46 residential units generate approximately 67% of the gross new trips (20 of 30) and the 4,000 SF of retail space generates approximately 33% of the gross new trips (10 of 30). The mitigation fees for each of the uses have therefore been calculated to be:

- Multifamily Housing (Low-Rise), 46 units - \$56,196.25 (\$1,221.66 per unit)
- Shopping Center, 4,000 SF - \$27,678.75 (\$6.92 per SF)

It is important to note that City of Arlington traffic mitigation fees do not vest to the time of application. It is possible that the City of Arlington mitigation fees will increase between the time of this report and when the traffic mitigation fees are required to be paid.

### 6.2 Washington State Department of Transportation

WSDOT improvement projects and their associated fees are based on the most recent Exhibit C list, which is part of the interlocal agreement between Snohomish County and WSDOT. City of Arlington developments are typically required to pay for WSDOT improvement projects on the Exhibit C list impacted with 10 or more PM peak-hour trips. The trips generated by the Grandview Olympic development will not impact any improvement projects on the WSDOT Exhibit C List. WSDOT traffic mitigation fees should therefore not be required for the Grandview Olympic development.

### 6.3 Snohomish County

The City of Arlington has an interlocal agreement with Snohomish County for reciprocal traffic mitigation fees. The fees can be calculated based on the standard rate or impacts to actual improvement projects on the Snohomish County Transportation Needs Report, Appendix D: Impact Fee Cost Basis. Snohomish County has three projects identified in Transportation Service Area A (TSA A), which includes the City of Arlington. There are not any Snohomish County projects that are anticipated to be impacted by 3 directional PM peak-hour trips generated by the Grandview Olympic development (equivalent to 20% of the PM peak-hour trips). Snohomish County Traffic mitigation fees should therefore not be required for the Grandview Olympic development.

## 7. CONCLUSIONS

The proposed Grandview Olympic development is located on the south side of E Division Street, west of Olympic Avenue. The development is proposed to consist of 46 multifamily residential units and 4,000 SF of retail space. The Grandview Olympic development is anticipated to generate 296 new daily trips with 19 new AM peak-hour trips and 25 new PM peak-hour trips.

The level of service analysis shows that the study intersections are anticipated to operate at acceptable LOS C or better under the 2025 future conditions with the development. The Grandview Olympic development will have a total traffic mitigation fee of \$83,875.00 for impacts to the City of Arlington. Traffic mitigation fees to WSDOT and Snohomish County should not be required. It is important to note that the City of Arlington traffic mitigation fees do not vest and could increase in the future.

# **Trip Generation Calculations**

**Trip Generation for: Development Peak Weekday  
(a.k.a.): Average Weekday Daily Trips (AWDT)**

LAND USES		VARIABLE	ITE LU code	NET EXTERNAL TRIPS BY TYPE																					
				Gross Trips					Internal Crossover		IN BOTH DIRECTIONS				DIRECTIONAL ASSIGNMENTS										
				Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	% of Trips In+Out (Total)	TOTAL	% of Ext. Trips	In+Out (Total)	PASS-BY	% of Ext. Trips	DIVERTED LINK	In+Out (Total)	NEW	In	Out	In	Out	In	Out		
Multifamily Housing (Low-Rise)	46 Units	221	5.44	50%	50%	250	0.0%	0	0.0%	0	0	0	0%	0	0	250	0	0	0	0	0	0	0	125	125
Shopping Center (Retail)	4,000 KSF	820	37.75	50%	50%	151	0.0%	0	0.0%	0	151	34%	51	0	0	100	26	25	0	0	0	0	0	50	50
Shopping Center (Retail)	-2,184 KSF	820	37.75	50%	50%	-82	0.0%	0	0.0%	0	-82	34%	-28	0	0	-54	-14	-14	0	0	0	0	0	-27	-27
<b>Total</b>						319		0		0	319		23	0	0	296	12	11	0	0	0	0	0	148	148

Grandview Olympic  
GTC #21-268

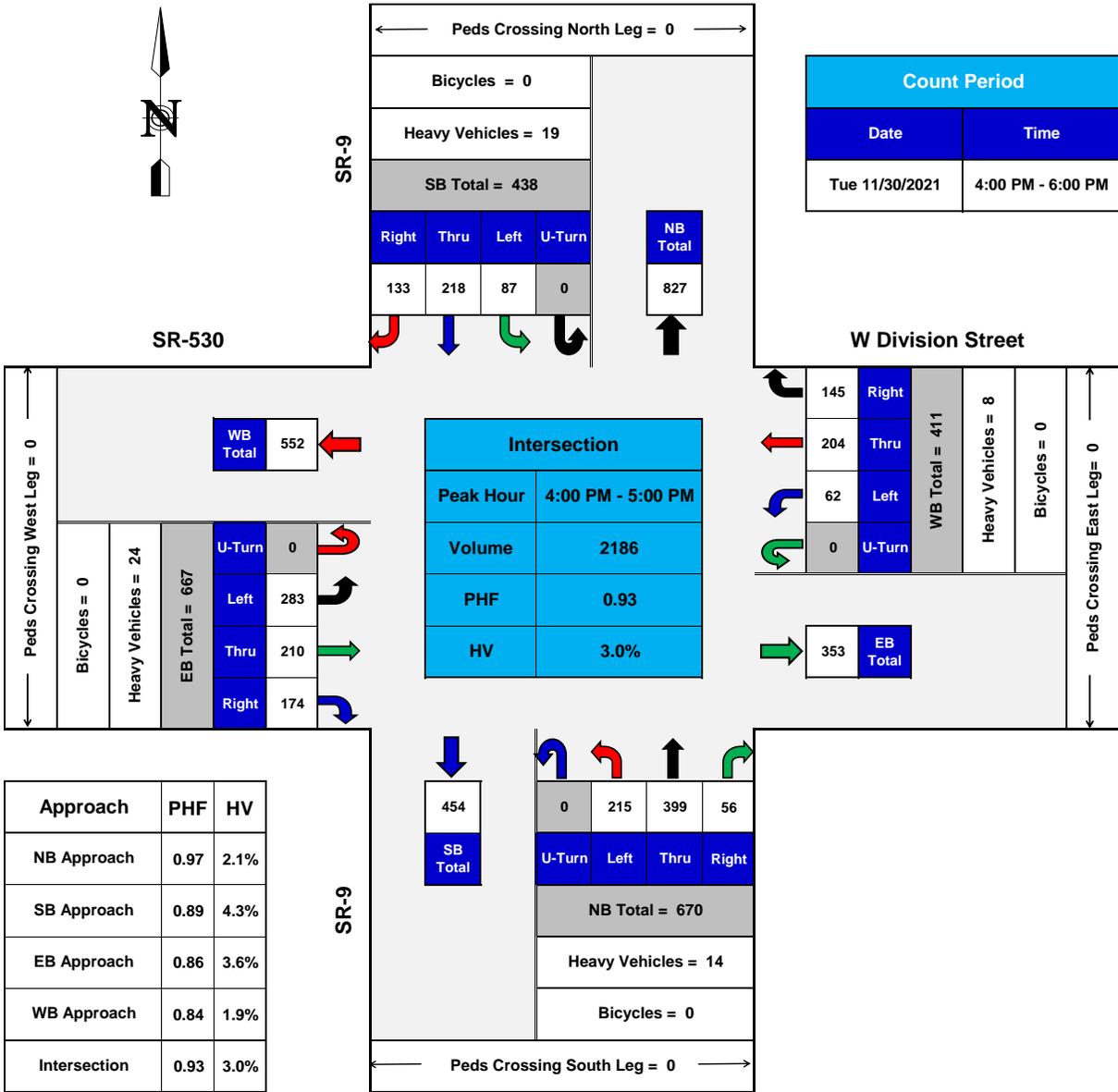
**Trip Generation for: Development Peak Weekday, Peak Hour of Adjacent Street Traffic, One Hour between 7 and 9 AM  
(a.k.a.): Weekday AM Peak Hour**

LAND USES	VARIABLE	ITE LU code	NET EXTERNAL TRIPS BY TYPE																							
			Gross Trips					IN BOTH DIRECTIONS					DIRECTIONAL ASSIGNMENTS													
			Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Internal Crossover	TOTAL	% of Ext. Trips	In+Out (Total)	PASS-BY	% of Ext. Trips	DIVERTED LINK	In+Out (Total)	NEW	PASS-BY	DIVERTED LINK	In	Out	In	Out	In	Out		
Multifamily Housing (Low-Rise)	46 Units	221	0.36	26%	74%	17	0.0%	0	0	0	0	0	0%	0	17	0	0	0	0	0	0	0	0	0	4	13
Shopping Center (Retail)	4,000 KSF	820	0.94	62%	38%	4	0.0%	0	4	0	1	34%	0	3	3	1	0	0	0	0	0	0	0	0	2	1
Shopping Center (Retail)	-2,184 KSF	820	0.94	62%	38%	-2	0.0%	0	-2	0	-1	34%	0	-1	-1	-1	0	0	0	0	0	0	0	-1	0	
<b>Total</b>						19		0	19	0	0			19	19	0	0	0	0	0	0	0	0	0	5	14



# **Counts and Turning Movement Calculations**

**SR-9 @ SR-530**  
**Arlington, WA**



PHF = Peak Hour Factor  
 HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



LOCATION: West Avenue @ W Division Street  
Arlington, WA

DATE OF COUNT: Thu. 11/29/2018  
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: TDG  
DATE OF REDUCTION: 12/2/2021

TIME INTERVAL ENDING AT	FROM (1) West Avenue (From North)					FROM (2) W Division Street (From East)					FROM (3) Driveway (From Southeast)					FROM (4) West Street (From South)					FROM (5) W Division Street (From West)					INTERVAL TOTALS																																																																																																																																								
	Peds	Bicycles	HV	U-Turn	(3)	(4)	(5)	Peds	Bicycles	HV	U-Turn	(1)	(2)	(3)	(4)	(5)	Peds	Bicycles	HV	U-Turn	(1)	(2)	(3)	(4)	(5)																																																																																																																																									
04:15 PM	0	0	0	0	2	0	2	1	0	0	3	0	3	1	20	84	0	0	0	0	1	3	0	2	0	0	1	37	0	0	2	0	0	4	60	0	28																																																																																																																													
04:30 PM	0	0	0	0	1	0	1	6	0	0	1	1	2	3	23	62	0	0	0	0	0	8	0	4	0	0	1	36	0	26	0	1	0	2	46	1	18																																																																																																																													
04:45 PM	0	0	0	0	4	0	2	1	0	0	5	1	1	0	28	55	0	0	0	0	0	12	0	3	0	0	2	0	34	0	0	2	2	5	59	3	30																																																																																																																													
05:00 PM	0	0	1	0	2	0	0	5	0	0	3	0	3	0	15	53	0	0	0	0	0	8	0	3	0	0	1	0	40	0	0	1	3	64	0	26																																																																																																																														
05:15 PM	0	0	0	0	2	0	1	3	0	0	1	1	1	0	12	56	0	0	0	0	0	5	0	3	0	0	0	0	39	0	0	2	7	51	1	23																																																																																																																														
05:30 PM	0	0	0	0	3	0	2	2	0	0	3	1	1	0	17	51	1	0	0	1	2	0	2	0	0	0	0	0	26	0	0	2	0	3	42	2	16																																																																																																																													
05:45 PM	0	0	0	0	1	0	2	2	0	0	0	1	0	1	14	44	2	0	0	0	0	4	0	1	0	0	1	0	28	0	0	1	0	1	42	1	24																																																																																																																													
06:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	0	9	37	0	0	0	0	0	3	0	1	0	0	0	18	0	0	1	0	3	39	0	11																																																																																																																														
PEAK HOUR TOTALS	0	0	1	0	9	0	5	13	0	0	12	2	9	4	86	254	0	0	0	0	1	31	0	12	0	4	0	7	165	1	137	0	6	5	14	229	4	102																																																																																																																												
ALL MOVEMENTS	27																											355																											44																											310																											354																											1080																										
% HV	3.7%																											3.4%																											0.0%																											1.3%																											1.7%																											2.1%																										
PHF	0.84																											0.82																											0.73																											0.91																											0.89																											0.94																										

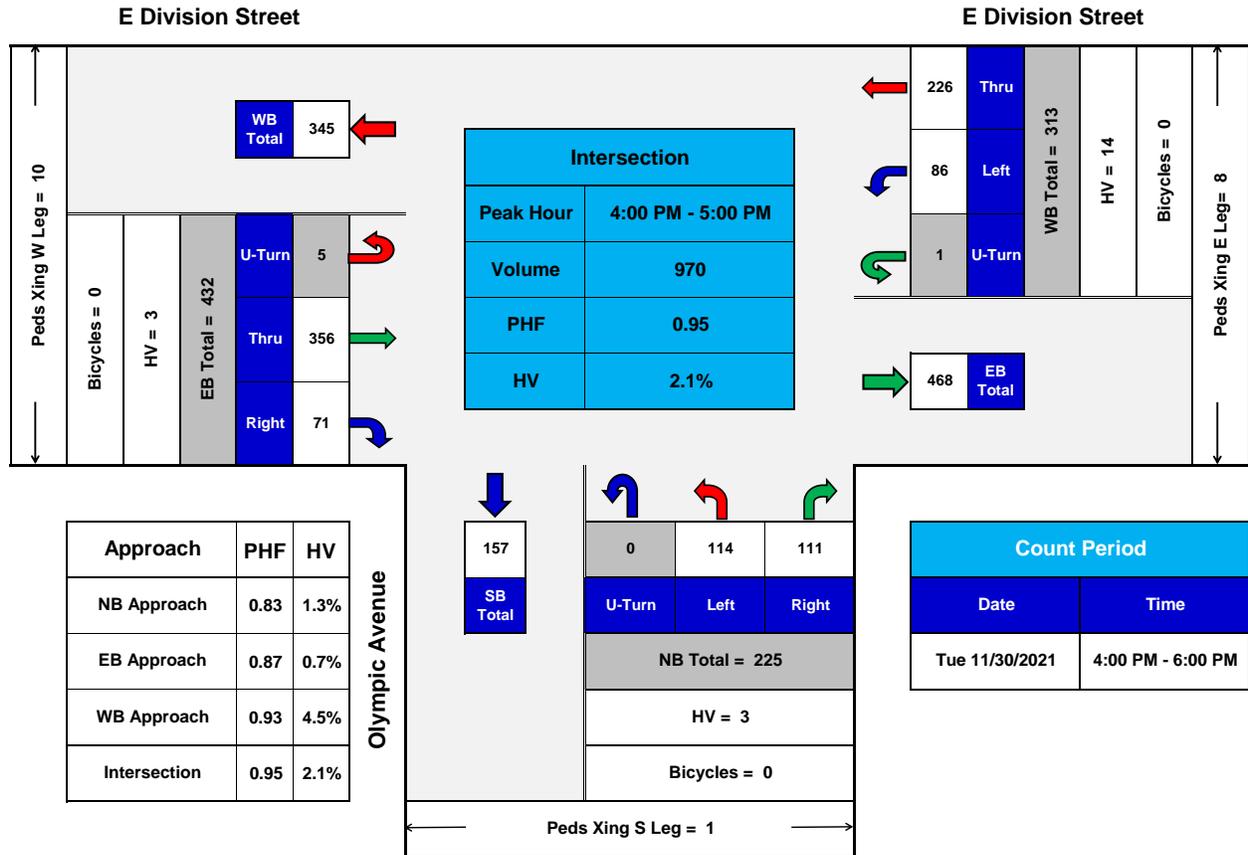
HV = Heavy Vehicles  
PHF = Peak Hour Factor  
Peds = Pedestrians

TURNING MOVEMENTS REDUCTION SHEET  
PM PEAK HOUR: FROM 4:00 TO 5:00 PM





**N Olympic Avenue @ E Division Street  
Arlington, WA**



PHF = Peak Hour Factor  
HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM  
PEAK HOUR SUMMARY**



# 1 Division St at SR-9

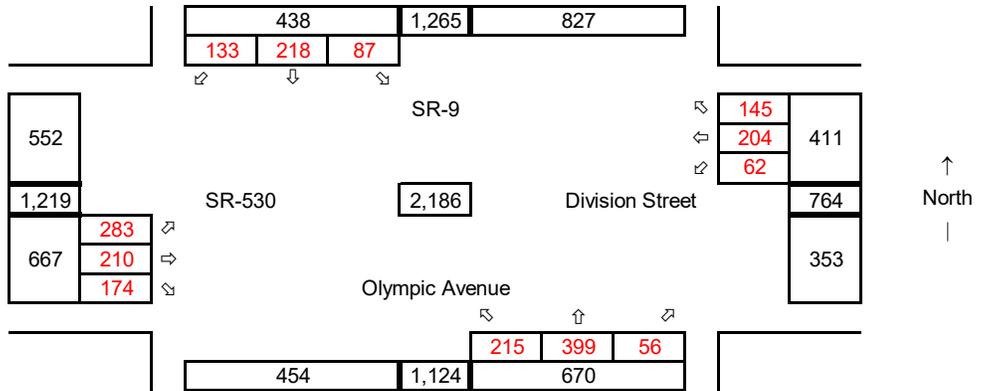
Synchro ID: 1

## Existing

Average Weekday  
PM Peak Hour

Year: 11/30/2021

Data Source: TDG



## Baseline

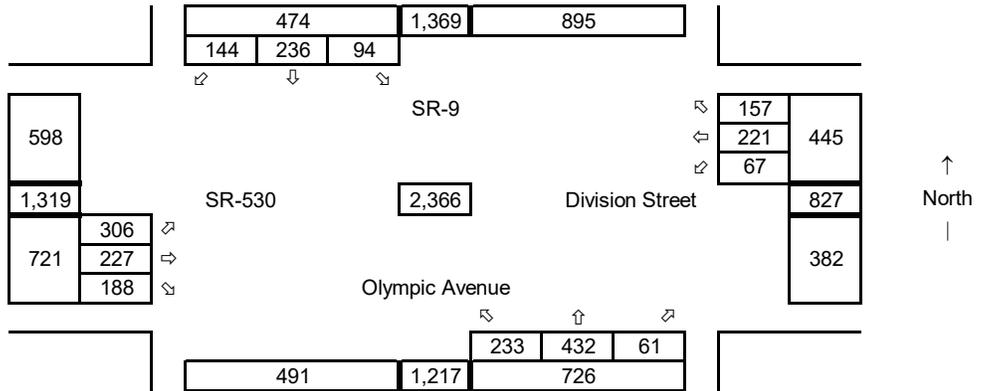
Average Weekday  
PM Peak Hour

Year: 2025

Growth Rate = 2.0%

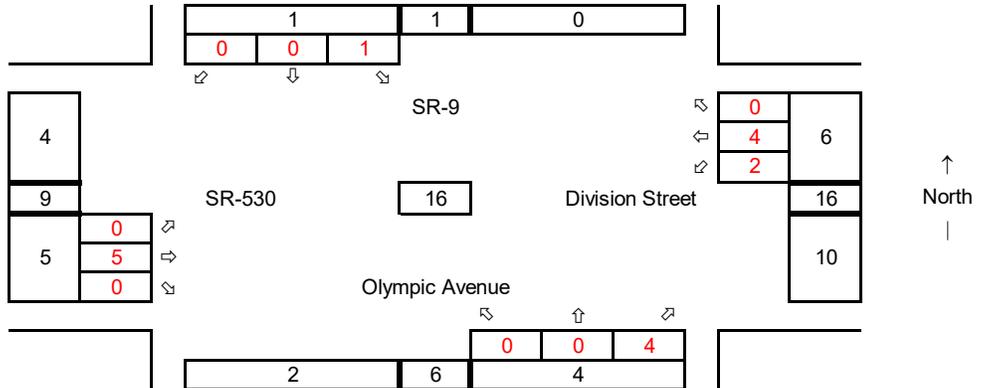
Years of Growth = 4

Total Growth = 1.0824



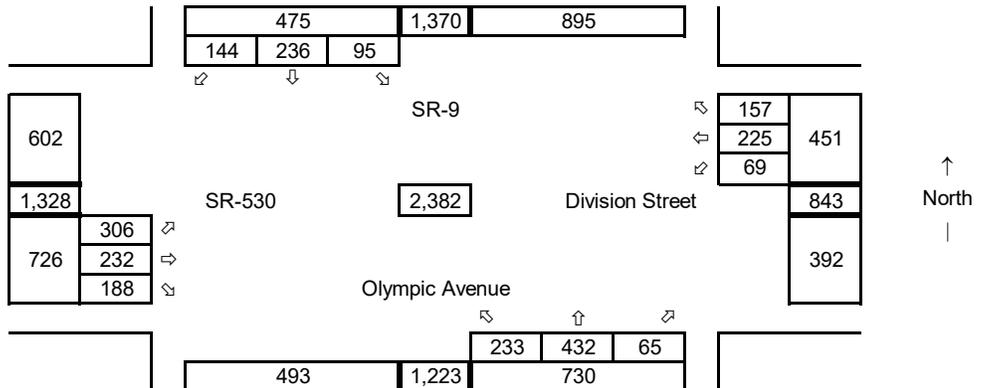
## Development Trips

Average Weekday  
PM Peak Hour



## Future with Development

Average Weekday  
PM Peak Hour



## 2 Division St at West Ave

Synchro ID: 2

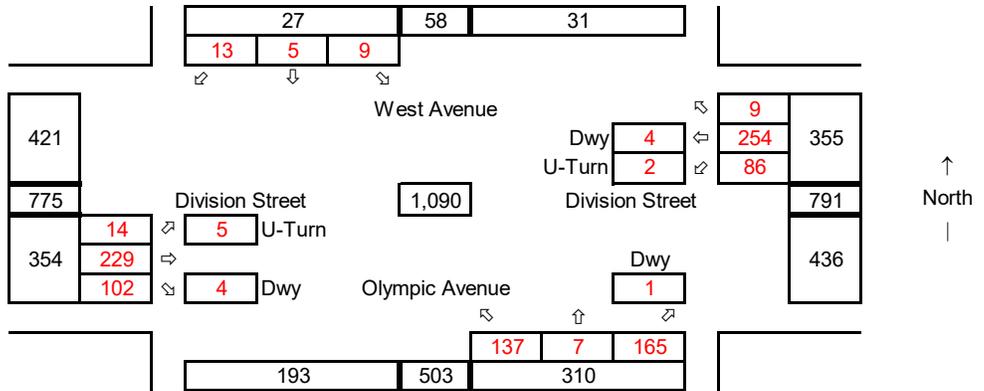
**Existing**

Average Weekday  
PM Peak Hour

Year: 12/2/2021

Data Source: TDG

Driveway Volumes  
Left to Division: 12  
Right to West: 1  
Right to Division: 31



**Baseline**

Average Weekday  
PM Peak Hour

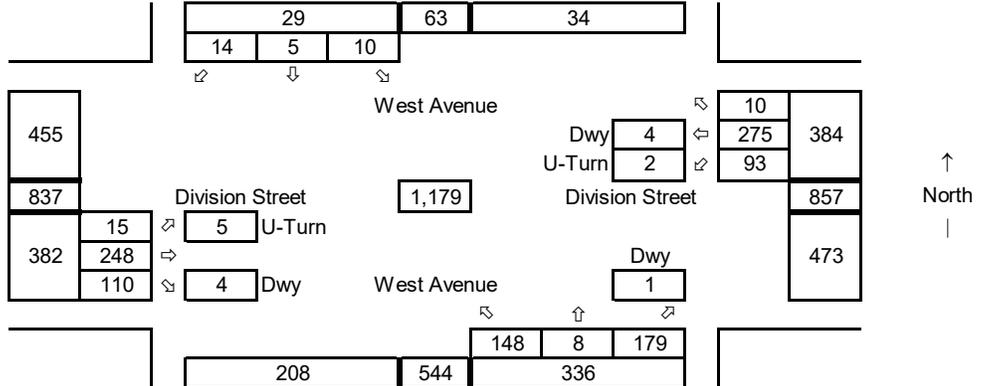
Year: 2025

Growth Rate = 2.0%

Years of Growth = 4

Total Growth = 1.0824

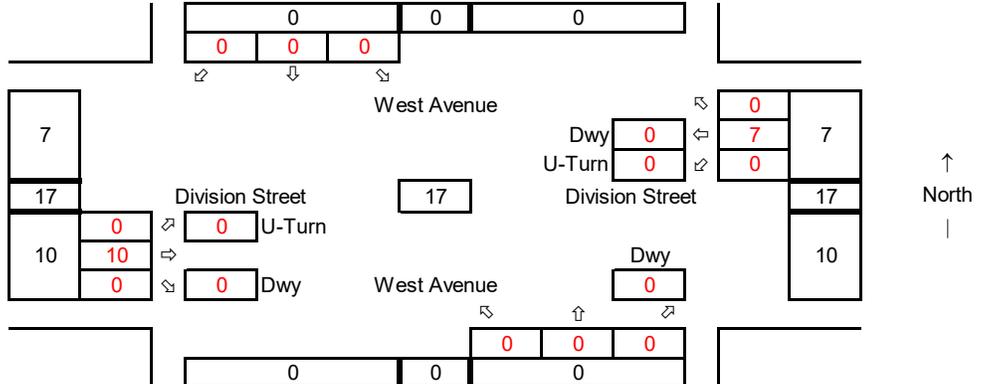
Driveway Volumes  
Left to Division: 13  
Right to West: 1  
Right to Division: 34



**Development Trips**

Average Weekday  
PM Peak Hour

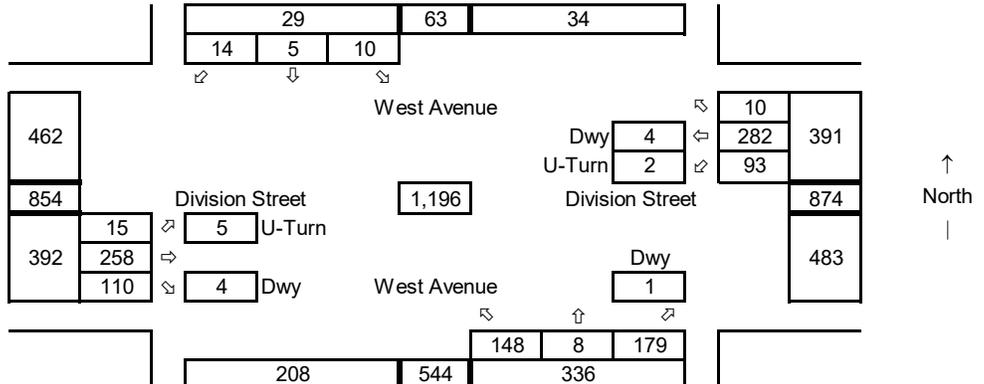
Driveway Volumes  
Left to Division: 0  
Right to West: 0  
Right to Division: 0



**Future with Development**

Average Weekday  
PM Peak Hour

Driveway Volumes  
Left to Division: 13  
Right to West: 1  
Right to Division: 34



### 3 Division St at Olympic Ave

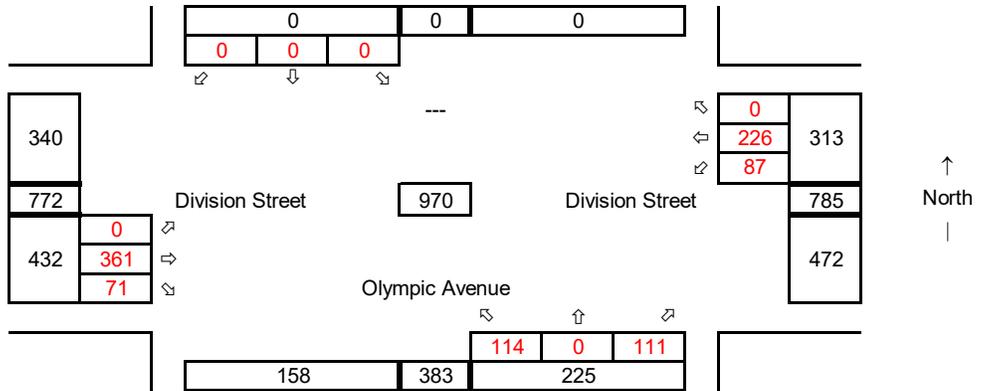
Synchro ID: 3

**Existing**

Average Weekday  
PM Peak Hour

Year: 11/30/2021

Data Source: TDG



**Baseline**

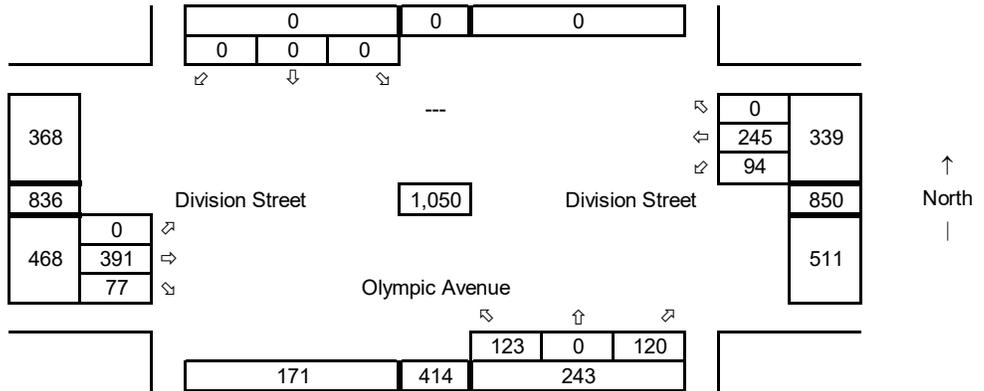
Average Weekday  
PM Peak Hour

Year: 2025

Growth Rate = 2.0%

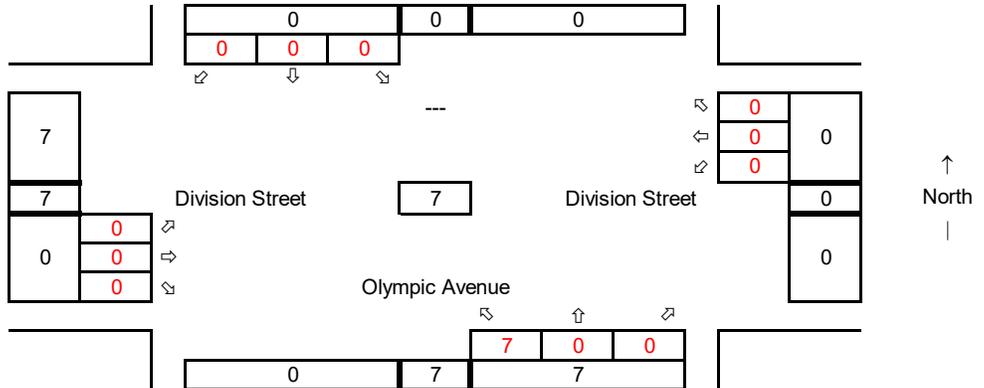
Years of Growth = 4

Total Growth = 1.0824



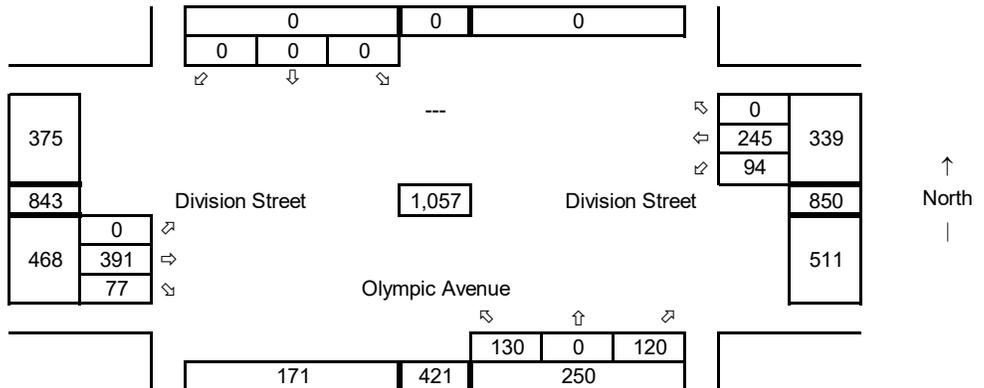
**Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



# **Level of Service Calculations**

Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)	360			326			883			479		
Turn Bay Length (ft)	350			75			100			175		50
Base Capacity (vph)	506	965	867	576	965	875	560	934	837	480	934	837
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.23	0.22	0.12	0.23	0.18	0.41	0.46	0.07	0.20	0.25	0.17

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 98.8

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.80

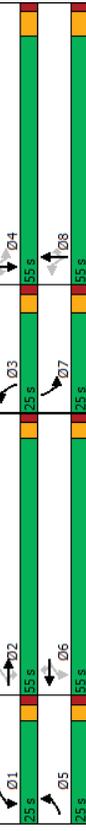
Intersection Signal Delay: 30.1

Intersection Capacity Utilization: 70.9%

Analysis Period (min): 15

Intersection LOS: C

ICU Level of Service: C



Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Traffic Volume (vph)	283	210	174	62	204	145	215	399	56	87	218	133
Future Volume (vph)	283	210	174	62	204	145	215	399	56	87	218	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350			50	75	100	175	150	150	150	50	50
Storage Lanes	1			1	1	1	1	1	1	1	1	1
Taper Length (ft)	25			25			25			25		25
Lane Util. Factor	1.00	1.00	1.00	0.850	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.950			0.950			0.950			0.950		0.850
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Flt Permitted	0.344			0.617			0.432			0.275		0.275
Satd. Flow (perm)	635	1845	1568	1138	1845	1568	797	1845	1568	507	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			98			116			87			87
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		440			406			963			559	
Travel Time (s)		10.0			9.2			14.6			8.5	
Peak Hour Factor		0.93			0.93			0.93			0.93	
Heavy Vehicles (%)		3%			3%			3%			3%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	304	226	187	67	219	156	231	429	60	94	234	143
Turn Type	pm+pt	IMA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	IMA	Perm
Protected Phases	5	2		1	6		3	8		7	4	4
Permitted Phases	2		2	6		6	8		8	7	4	4
Detector Phase	5	2		1	6		3		8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.1	42.1	42.1	10.1	33.1	33.1	10.5	34.7	34.7	10.5	40.7	40.7
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0
Total Split (%)	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%
Yellow Time (s)	3.1	3.1	3.1	3.1	3.1	3.1	3.5	4.7	4.7	3.5	4.7	4.7
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	5.1	5.1	5.1	5.1	5.5	6.7	6.7	5.5	6.7	6.7
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Recall Mode	None											
Act Effct Green (s)	42.5	32.0	32.0	26.5	18.3	18.3	43.4	28.6	28.6	35.6	24.6	24.6
Actuated g/C Ratio	0.43	0.32	0.32	0.27	0.19	0.19	0.44	0.29	0.29	0.36	0.25	0.25
v/c Ratio	0.62	0.38	0.33	0.19	0.64	0.41	0.80	0.12	0.31	0.51	0.31	0.31
Control Delay	27.5	31.8	16.7	21.6	48.5	15.9	20.7	45.8	2.9	19.4	37.4	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.5	31.8	16.7	21.6	48.5	15.9	20.7	45.8	2.9	19.4	37.4	16.0
LOS	C	C	B	C	D	B	C	D	A	B	D	B
Approach Delay		26.0						34.2			27.3	
Approach LOS		C						C			C	
Queue Length 50th (ft)	125	111	41	24	128	21	88	249	0	33	126	27
Queue Length 95th (ft)	252	227	121	63	243	88	161	419	15	70	233	88

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-268]

PM Peak-Hour

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-268]

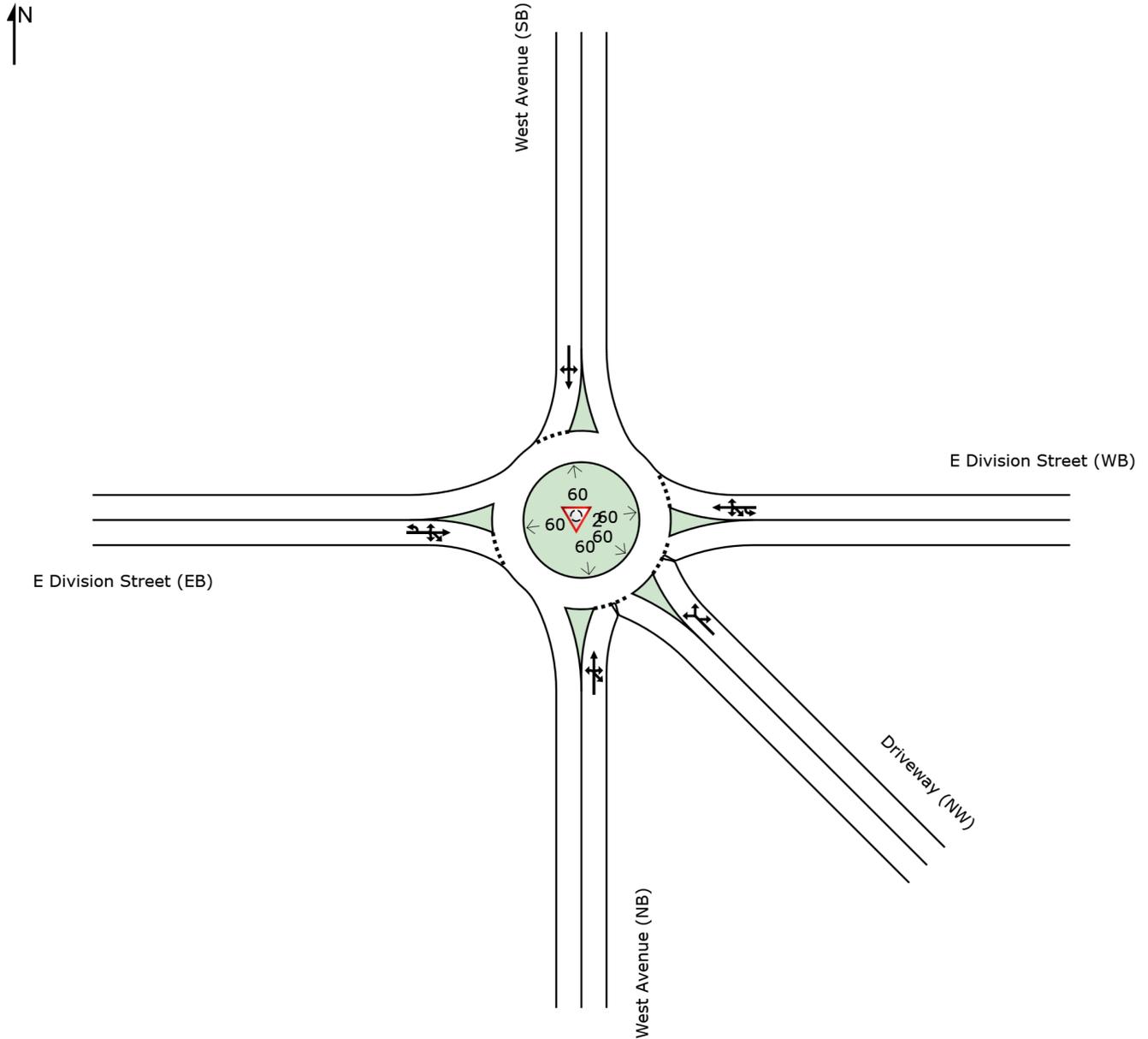
PM Peak-Hour

# SITE LAYOUT

 **Site: 2 [2021 Existing (Site Folder: 21-268)]**

E Division Street at West Avenue  
Site Category: PM Peak-Hour  
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Organisation: GIBSON TRAFFIC CONSULTANTS | Licence: PLUS / 1PC | Created: Thursday, December 23, 2021 8:10:44 AM  
Project: H:\2021\21-268\Sidra#2 - Division St at West Ave.sip9

# MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

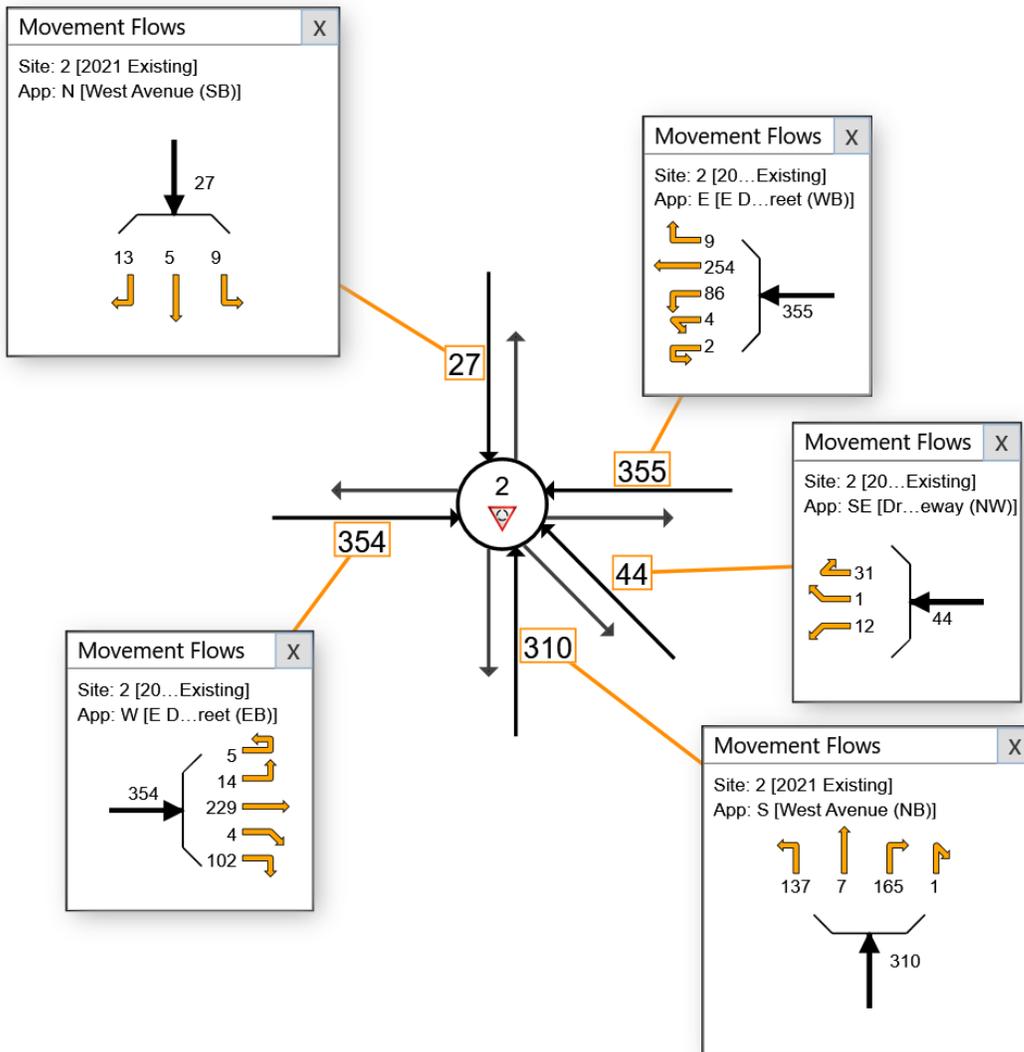
## All Movement Classes

**Site: 2 [2021 Existing (Site Folder: 21-268)]**

E Division Street at West Avenue  
 Site Category: PM Peak-Hour  
 Roundabout

Use the button below to open or close all popup boxes. Click value labels to open selected ones. Click and drag popup boxes to move to preferred positions.

Close All Popups



# MOVEMENT SUMMARY

Site: 2 [2021 Existing (Site Folder: 21-268)]

E Division Street at West Avenue  
 Site Category: PM Peak-Hour  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: West Avenue (NB)														
3	L2	137	3.0	146	3.0	0.326	11.0	LOS B	2.1	52.6	0.55	0.68	0.55	34.4
8	T1	7	3.0	7	3.0	0.326	6.6	LOS A	2.1	52.6	0.55	0.68	0.55	34.6
18	R2	165	3.0	176	3.0	0.326	6.3	LOS A	2.1	52.6	0.55	0.68	0.55	33.8
18b	R3	1	3.0	1	3.0	0.326	6.6	LOS A	2.1	52.6	0.55	0.68	0.55	33.6
Approach		310	3.0	330	3.0	0.326	8.4	LOS A	2.1	52.6	0.55	0.68	0.55	34.1
SouthEast: Driveway (NW)														
3ax	L1	12	3.0	13	3.0	0.061	11.7	LOS B	0.3	8.5	0.64	0.70	0.64	33.8
18ax	R1	1	3.0	1	3.0	0.061	7.8	LOS A	0.3	8.5	0.64	0.70	0.64	34.0
18bx	R3	31	3.0	33	3.0	0.061	8.3	LOS A	0.3	8.5	0.64	0.70	0.64	33.2
Approach		44	3.0	47	3.0	0.061	9.2	LOS A	0.3	8.5	0.64	0.70	0.64	33.4
East: E Division Street (WB)														
1u	U	2	2.0	2	2.0	0.342	12.5	LOS B	2.3	57.8	0.48	0.59	0.48	35.3
1b	L3	4	2.0	4	2.0	0.342	11.4	LOS B	2.3	57.8	0.48	0.59	0.48	35.0
1	L2	86	2.0	91	2.0	0.342	10.4	LOS B	2.3	57.8	0.48	0.59	0.48	34.8
6	T1	254	2.0	270	2.0	0.342	5.9	LOS A	2.3	57.8	0.48	0.59	0.48	34.9
16	R2	9	2.0	10	2.0	0.342	5.7	LOS A	2.3	57.8	0.48	0.59	0.48	34.1
Approach		355	2.0	378	2.0	0.342	7.1	LOS A	2.3	57.8	0.48	0.59	0.48	34.9
North: West Avenue (SB)														
7	L2	9	3.0	10	3.0	0.035	12.0	LOS B	0.2	4.8	0.60	0.65	0.60	34.2
4	T1	5	3.0	5	3.0	0.035	7.6	LOS A	0.2	4.8	0.60	0.65	0.60	34.4
14	R2	13	3.0	14	3.0	0.035	7.3	LOS A	0.2	4.8	0.60	0.65	0.60	33.6
Approach		27	3.0	29	3.0	0.035	8.9	LOS A	0.2	4.8	0.60	0.65	0.60	33.9
West: E Division Street (EB)														
5u	U	5	2.0	5	2.0	0.318	11.9	LOS B	2.1	53.3	0.36	0.51	0.36	36.1
5	L2	14	2.0	15	2.0	0.318	9.9	LOS A	2.1	53.3	0.36	0.51	0.36	35.5
2	T1	229	2.0	244	2.0	0.318	5.4	LOS A	2.1	53.3	0.36	0.51	0.36	35.7
12a	R1	4	2.0	4	2.0	0.318	5.0	LOS A	2.1	53.3	0.36	0.51	0.36	35.5
12	R2	102	2.0	109	2.0	0.318	5.1	LOS A	2.1	53.3	0.36	0.51	0.36	34.9
Approach		354	2.0	377	2.0	0.318	5.6	LOS A	2.1	53.3	0.36	0.51	0.36	35.4
All Vehicles		1090	2.3	1160	2.3	0.342	7.1	LOS A	2.3	57.8	0.47	0.60	0.47	34.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

HCM 6th AWSC  
 3: Olympic Avenue & E Division Street

Grandview Olympic Development

Intersection

Intersection Delay, s/veh	14.2
Intersection LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	↻
Traffic Vol, veh/h	361	71	87	226	114	111
Future Vol, veh/h	361	71	87	226	114	111
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	380	75	92	238	120	117
Number of Lanes	1	0	0	1	1	1

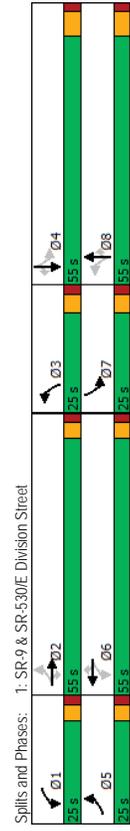
Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	16.5	13.4	10.9
HCM LOS	C	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	100%	0%	0%	28%
Vol Thru, %	0%	0%	84%	72%
Vol Right, %	0%	100%	16%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	114	111	432	313
LT Vol	114	0	0	87
Through Vol	0	0	361	226
RT Vol	0	111	71	0
Lane Flow Rate	120	117	455	329
Geometry Grp	7	7	2	2
Degree of Util (X)	0.233	0.188	0.636	0.488
Departure Headway (Hd)	7	5.78	5.032	5.333
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	514	620	718	675
Service Time	4.737	3.516	3.059	3.364
HCM Lane V/C Ratio	0.233	0.189	0.634	0.487
HCM Control Delay	11.9	9.9	16.5	13.4
HCM Lane LOS	B	A	C	B
HCM 95th-tile Q	0.9	0.7	4.6	2.7

Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)	350	360	50	75	326	100	175	883	175	150	479	50
Turn Bay Length (ft)	473	896	812	552	896	821	544	867	783	451	867	783
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.27	0.25	0.13	0.27	0.21	0.46	0.54	0.08	0.22	0.29	0.20

Intersection Summary  
Area Type: Other  
Cycle Length: 160  
Actuated Cycle Length: 106.1  
Natural Cycle: 105  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.81  
Intersection Signal Delay: 32.3  
Intersection LOS: C  
ICU Level of Service D  
Analysis Period (min) 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	306	227	188	67	221	157	233	432	61	94	236	144
Traffic Volume (vph)	306	227	188	67	221	157	233	432	61	94	236	144
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	350	50	75	175	175	150	150	150	150	150	150	150
Storage Length (ft)	1	1	1	1	1	1	1	1	1	1	1	1
Storage Lanes	25	25	25	25	25	25	25	25	25	25	25	25
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.950	0.850	0.850	0.950	0.950	0.850	0.950	0.850	0.950	0.850	0.950	0.850
Flt Protected	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Satd. Flow (prot)	0.313	0.607	0.607	0.407	0.407	0.243	0.407	0.243	0.407	0.243	0.407	0.243
Flt Permitted	577	1845	1568	1120	1845	1568	751	1845	1568	448	1845	1568
Satd. Flow (perm)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Right Turn on Red	30	440	98	30	406	116	45	963	45	559	85	559
Link Speed (mph)	10.0	14.6	9.2	14.6	9.2	8.5	14.6	9.2	14.6	8.5	14.6	9.2
Link Distance (ft)	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Travel Time (s)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Peak Hour Factor	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)	329	244	202	72	238	169	251	465	66	101	254	155
Lane Group Flow (vph)	pm+pt	IMA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	IMA	Perm
Turn Type	5	2	2	6	6	6	8	8	8	7	4	4
Protected Phases	2	2	2	6	6	6	8	8	8	7	4	4
Permitted Phases	5	2	2	1	6	6	3	8	8	7	4	4
Detector Phase	Switch Phase	Minimum Initial (s)	10.1	42.1	10.1	33.1	10.5	34.7	34.7	10.5	40.7	40.7
Minimum Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0
Total Split (%)	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%
Yellow Time (s)	3.1	3.1	3.1	3.1	3.1	3.1	3.5	4.7	4.7	3.5	4.7	4.7
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	5.1	5.1	5.1	5.1	5.5	6.7	6.7	5.5	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	45.1	34.3	34.3	28.8	20.2	20.2	48.7	32.9	32.9	39.8	28.4	28.4
Actuated g/C Ratio	0.43	0.32	0.32	0.27	0.19	0.19	0.46	0.31	0.31	0.38	0.27	0.27
v/c Ratio	0.71	0.41	0.35	0.20	0.68	0.43	0.52	0.81	0.12	0.34	0.51	0.32
Control Delay	33.5	34.5	18.9	23.6	52.1	18.2	21.8	46.7	3.6	20.3	38.0	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.5	34.5	18.9	23.6	52.1	18.2	21.8	46.7	3.6	20.3	38.0	17.0
LOS	C	C	B	C	D	B	C	D	A	C	D	B
Approach Delay	30.0	35.9	35.9	30.0	35.9	35.9	35.1	35.1	35.1	35.1	35.1	35.1
Approach LOS	C	C	C	D	D	D	D	D	D	D	D	C
Queue Length 50th (ft)	151	132	52	28	149	30	101	288	0	37	146	35
Queue Length 95th (ft)	#324	259	143	71	277	105	178	471	20	76	257	99

2025 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-268]

PM Peak-Hour

2025 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-268]

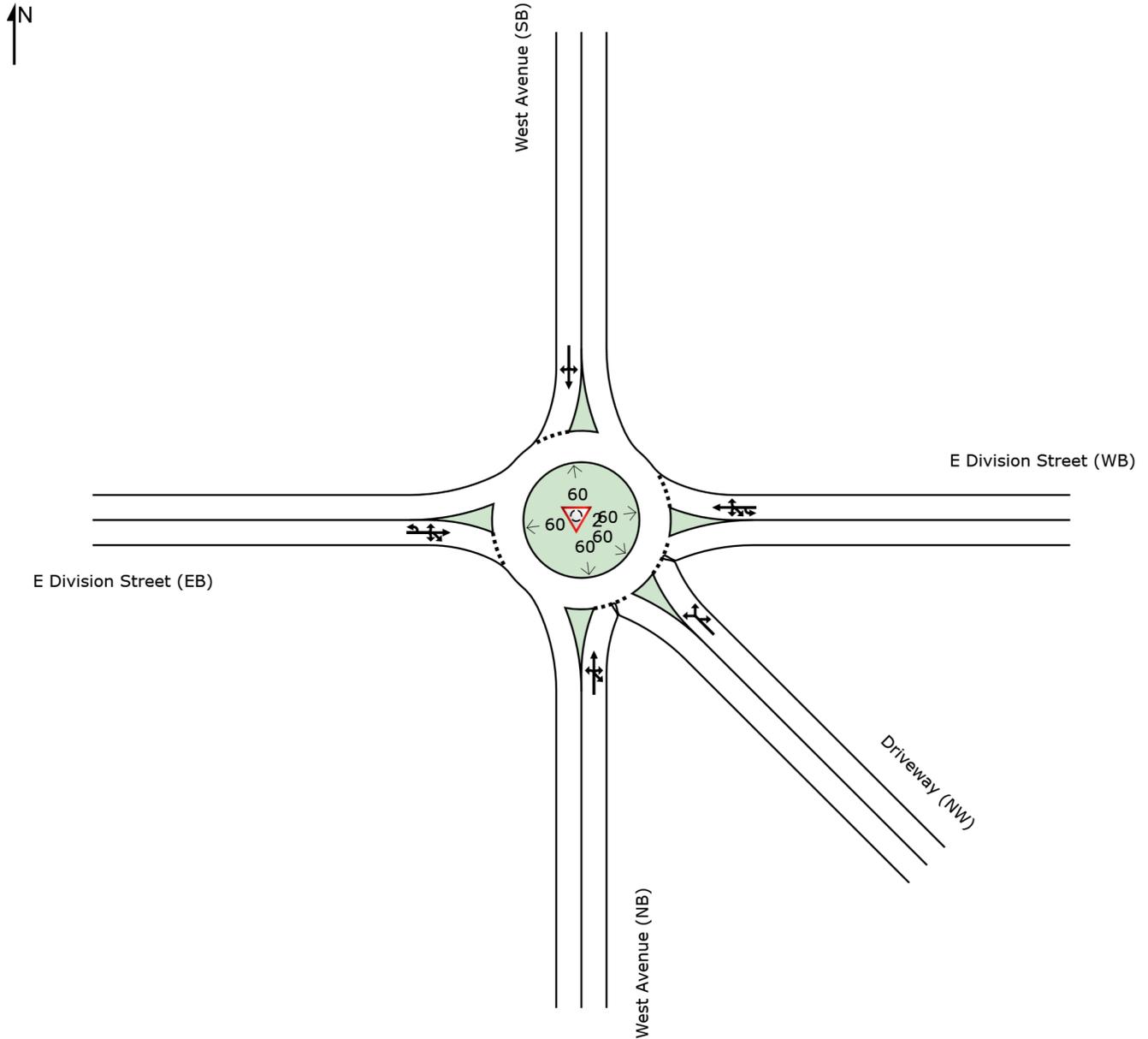
PM Peak-Hour

# SITE LAYOUT

 Site: 2 [2025 Baseline (Site Folder: 21-268)]

E Division Street at West Avenue  
Site Category: PM Peak-Hour  
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: H:\2021\21-268\Sidra#2 - Division St at West Ave.sip9

# MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

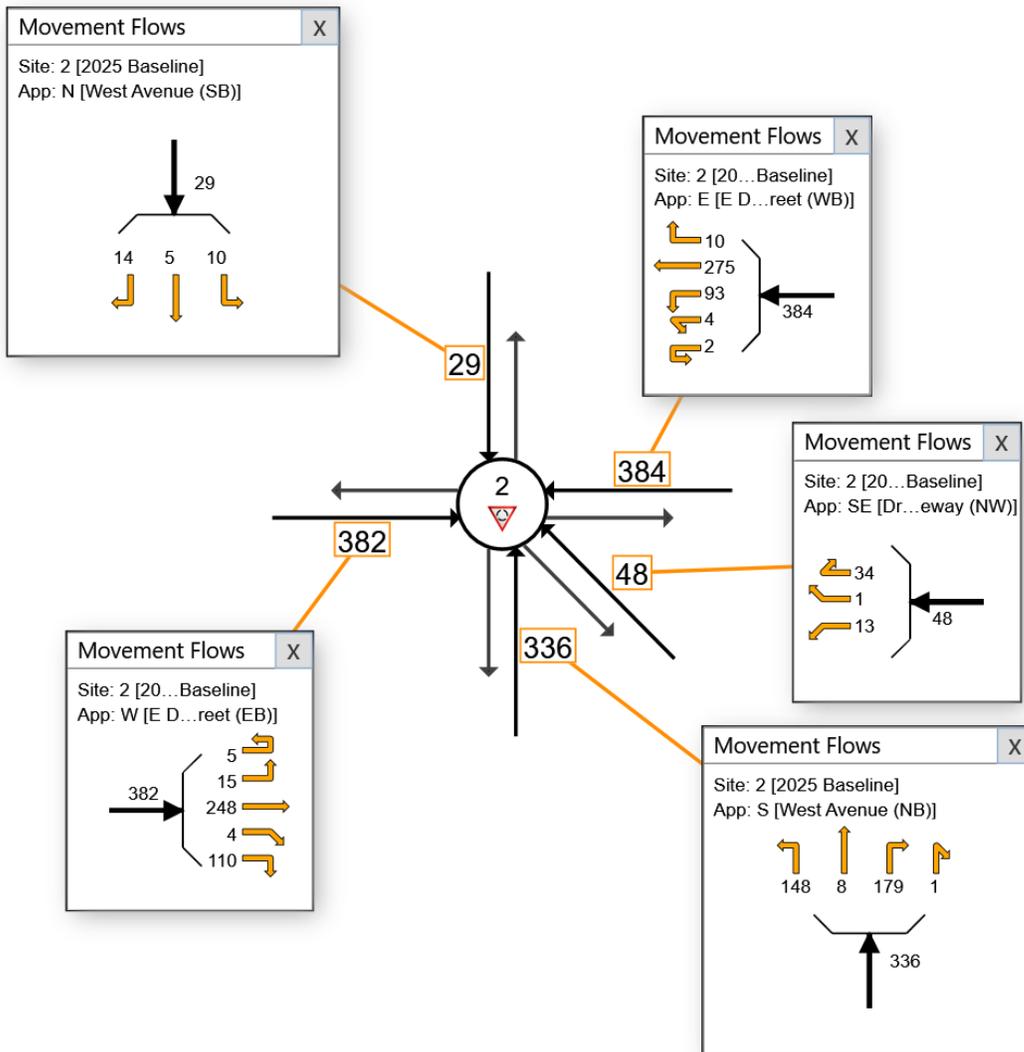
## All Movement Classes

**Site: 2 [2025 Baseline (Site Folder: 21-268)]**

E Division Street at West Avenue  
 Site Category: PM Peak-Hour  
 Roundabout

Use the button below to open or close all popup boxes. Click value labels to open selected ones.  
 Click and drag popup boxes to move to preferred positions.

Close All Popups



# MOVEMENT SUMMARY

Site: 2 [2025 Baseline (Site Folder: 21-268)]

E Division Street at West Avenue  
 Site Category: PM Peak-Hour  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: West Avenue (NB)														
3	L2	148	3.0	157	3.0	0.361	11.3	LOS B	2.3	60.1	0.58	0.70	0.58	34.4
8	T1	8	3.0	9	3.0	0.361	6.8	LOS A	2.3	60.1	0.58	0.70	0.58	34.5
18	R2	179	3.0	190	3.0	0.361	6.6	LOS A	2.3	60.1	0.58	0.70	0.58	33.7
18b	R3	1	3.0	1	3.0	0.361	6.9	LOS A	2.3	60.1	0.58	0.70	0.58	33.5
Approach		336	3.0	357	3.0	0.361	8.6	LOS A	2.3	60.1	0.58	0.70	0.58	34.0
SouthEast: Driveway (NW)														
3ax	L1	13	3.0	14	3.0	0.069	12.1	LOS B	0.4	10.0	0.67	0.72	0.67	33.6
18ax	R1	1	3.0	1	3.0	0.069	8.3	LOS A	0.4	10.0	0.67	0.72	0.67	33.8
18bx	R3	34	3.0	36	3.0	0.069	8.7	LOS A	0.4	10.0	0.67	0.72	0.67	33.0
Approach		48	3.0	51	3.0	0.069	9.6	LOS A	0.4	10.0	0.67	0.72	0.67	33.2
East: E Division Street (WB)														
1u	U	2	2.0	2	2.0	0.375	12.6	LOS B	2.6	65.7	0.51	0.61	0.51	35.2
1b	L3	4	2.0	4	2.0	0.375	11.6	LOS B	2.6	65.7	0.51	0.61	0.51	34.9
1	L2	93	2.0	99	2.0	0.375	10.6	LOS B	2.6	65.7	0.51	0.61	0.51	34.7
6	T1	275	2.0	293	2.0	0.375	6.1	LOS A	2.6	65.7	0.51	0.61	0.51	34.8
16	R2	10	2.0	11	2.0	0.375	5.8	LOS A	2.6	65.7	0.51	0.61	0.51	34.0
Approach		384	2.0	409	2.0	0.375	7.3	LOS A	2.6	65.7	0.51	0.61	0.51	34.8
North: West Avenue (SB)														
7	L2	10	3.0	11	3.0	0.039	12.4	LOS B	0.2	5.5	0.63	0.67	0.63	34.0
4	T1	5	3.0	5	3.0	0.039	7.9	LOS A	0.2	5.5	0.63	0.67	0.63	34.2
14	R2	14	3.0	15	3.0	0.039	7.6	LOS A	0.2	5.5	0.63	0.67	0.63	33.4
Approach		29	3.0	31	3.0	0.039	9.3	LOS A	0.2	5.5	0.63	0.67	0.63	33.8
West: E Division Street (EB)														
5u	U	5	2.0	5	2.0	0.346	12.0	LOS B	2.4	60.0	0.39	0.52	0.39	36.0
5	L2	15	2.0	16	2.0	0.346	9.9	LOS A	2.4	60.0	0.39	0.52	0.39	35.5
2	T1	248	2.0	264	2.0	0.346	5.5	LOS A	2.4	60.0	0.39	0.52	0.39	35.6
12a	R1	4	2.0	4	2.0	0.346	5.1	LOS A	2.4	60.0	0.39	0.52	0.39	35.4
12	R2	110	2.0	117	2.0	0.346	5.2	LOS A	2.4	60.0	0.39	0.52	0.39	34.8
Approach		382	2.0	406	2.0	0.346	5.7	LOS A	2.4	60.0	0.39	0.52	0.39	35.4
All Vehicles		1179	2.4	1254	2.4	0.375	7.3	LOS A	2.6	65.7	0.50	0.61	0.50	34.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

HCM 6th AWSC  
 3: Olympic Avenue & E Division Street

Grandview Olympic Development

Intersection

Intersection Delay, s/veh	16.2
Intersection LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	↻
Traffic Vol, veh/h	391	77	94	245	123	120
Future Vol, veh/h	391	77	94	245	123	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	412	81	99	258	129	126
Number of Lanes	1	0	0	1	1	1

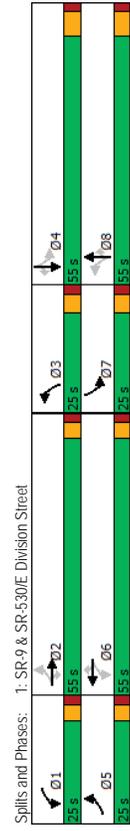
Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	19.7	14.9	11.4
HCM LOS	C	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	100%	0%	0%	28%
Vol Thru, %	0%	0%	84%	72%
Vol Right, %	0%	100%	16%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	123	120	468	339
LT Vol	123	0	0	94
Through Vol	0	0	391	245
RT Vol	0	120	77	0
Lane Flow Rate	129	126	493	357
Geometry Grp	7	7	2	2
Degree of Util (X)	0.258	0.209	0.706	0.543
Departure Headway (Hd)	7.185	5.962	5.158	5.477
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	500	601	700	657
Service Time	4.933	3.71	3.193	3.515
HCM Lane V/C Ratio	0.258	0.21	0.704	0.543
HCM Control Delay	12.4	10.3	19.7	14.9
HCM Lane LOS	B	B	C	B
HCM 95th-tile Q	1	0.8	5.9	3.3

Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)	360			326			883			479		
Turn Bay Length (ft)	350			75			175			150		50
Base Capacity (vph)	471	892	809	552	892	817	542	864	780	449	864	780
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.28	0.25	0.13	0.27	0.21	0.46	0.54	0.09	0.23	0.29	0.20

Intersection Summary  
Area Type: Other  
Cycle Length: 160  
Actuated Cycle Length: 106.6  
Natural Cycle: 105  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.81  
Intersection Signal Delay: 32.5  
Intersection Capacity Utilization: 75.5%  
Analysis Period (min): 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	306	232	188	69	225	157	233	432	65	95	236	144
Traffic Volume (vph)	306	232	188	69	225	157	233	432	65	95	236	144
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	350	50	75	1	1	1	175	150	150	150	1	1
Storage Length (ft)	25	1	1	25	1	1	25	1	1	25	1	1
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.950	0.850		0.950			0.850			0.950		0.850
Flt Protected	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Satd. Flow (prot)	0.310			0.605			0.406			0.241		
Flt Permitted	572	1845	1568	1116	1845	1568	749	1845	1568	445	1845	1568
Satd. Flow (perm)		Yes	Yes		Yes							
Right Turn on Red		30	440		30	406		45	87	45	559	87
Link Speed (mph)	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Satd. Flow (RTOR)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Heavy Vehicles (%)												
Shared Lane Traffic (%)												
Lane Group Flow (vph)	329	249	202	74	242	169	251	465	70	102	254	155
Turn Type	pm+pt	MA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	MA	Perm
Protected Phases	5	2	2	6	6	6	8	8	8	7	4	4
Permitted Phases	2	2	2	1	1	1	3	3	3	4	4	4
Detector Phase	5	2	2	6	6	6	8	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.1	42.1	42.1	10.1	33.1	33.1	10.5	34.7	34.7	10.5	40.7	40.7
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0
Total Split (%)	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%
Yellow Time (s)	3.1	3.1	3.1	3.1	3.1	3.1	3.5	4.7	4.7	3.5	4.7	4.7
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	5.1	5.1	5.1	5.1	5.5	6.7	6.7	5.5	6.7	6.7
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Recall Mode	None											
Act Effct Green (s)	45.5	34.6	34.6	29.2	20.5	20.5	48.9	33.0	33.0	40.0	28.5	28.5
Actuated g/C Ratio	0.43	0.32	0.32	0.27	0.19	0.19	0.46	0.31	0.31	0.38	0.27	0.27
v/c Ratio	0.71	0.42	0.42	0.68	0.43	0.43	0.52	0.81	0.13	0.35	0.52	0.32
Control Delay	33.6	34.7	18.9	23.6	52.3	18.6	21.9	47.0	4.4	20.5	38.2	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	34.7	18.9	23.6	52.3	18.6	21.9	47.0	4.4	20.5	38.2	17.1
LOS	C	C	B	C	D	B	C	D	A	C	D	B
Approach Delay	30.1			36.2				35.2			28.3	
Approach LOS	C			D				D			C	
Queue Length 50th (ft)	152	135	52	29	153	31	102	289	0	38	146	35
Queue Length 95th (ft)	#326	265	143	73	282	107	179	474	23	78	258	100

2025 Future Conditions with Development  
Gibson Traffic Consultants, Inc. |BJL #21-268|

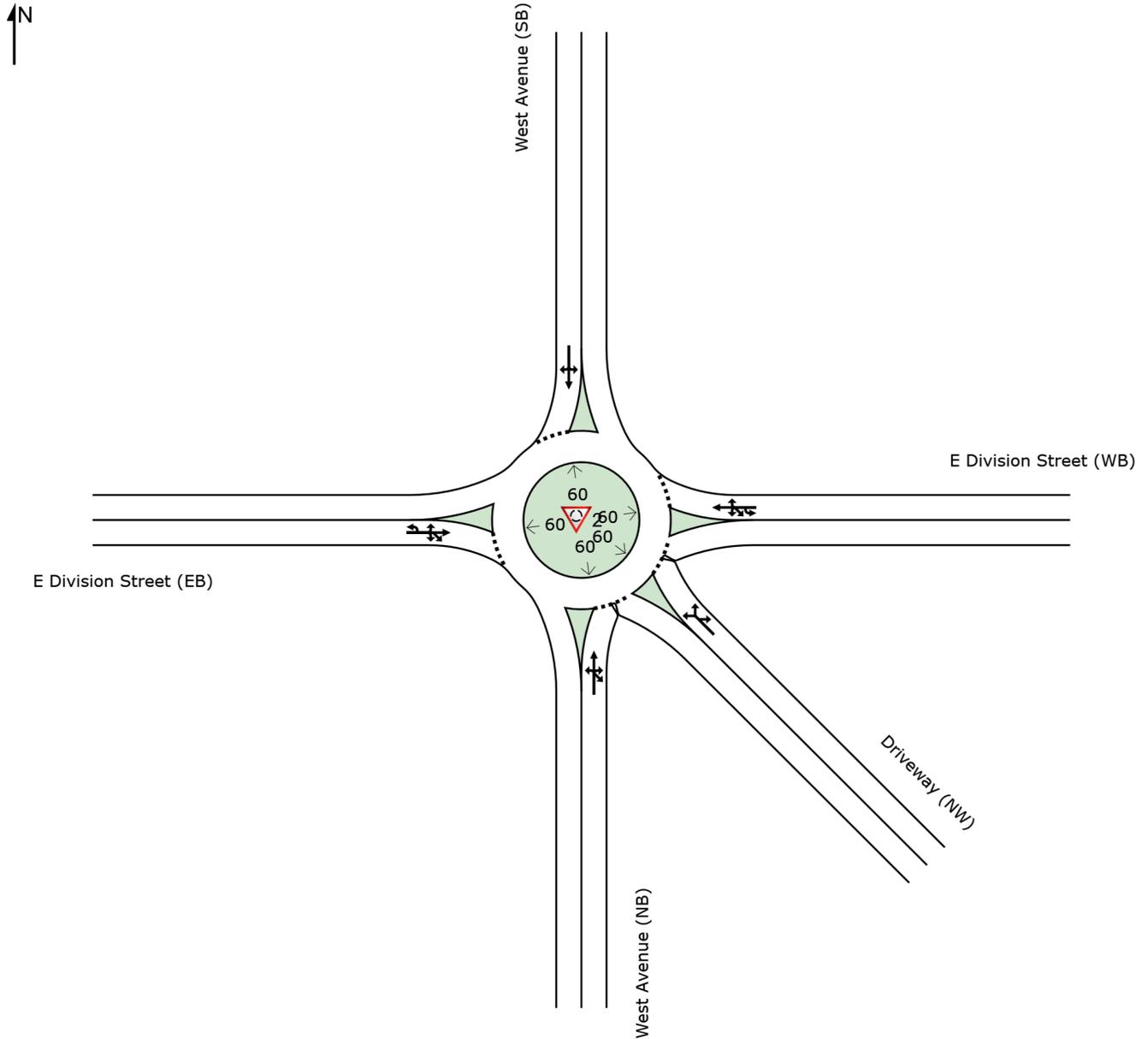
2025 Future Conditions with Development  
Gibson Traffic Consultants, Inc. |BJL #21-268|

# SITE LAYOUT

 Site: 2 [2025 Future (Site Folder: 21-268)]

E Division Street at West Avenue  
Site Category: PM Peak-Hour  
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: H:\2021\21-268\46 Unit Analysis\Sidra\#2 - Division St at West Ave.sip9

# MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

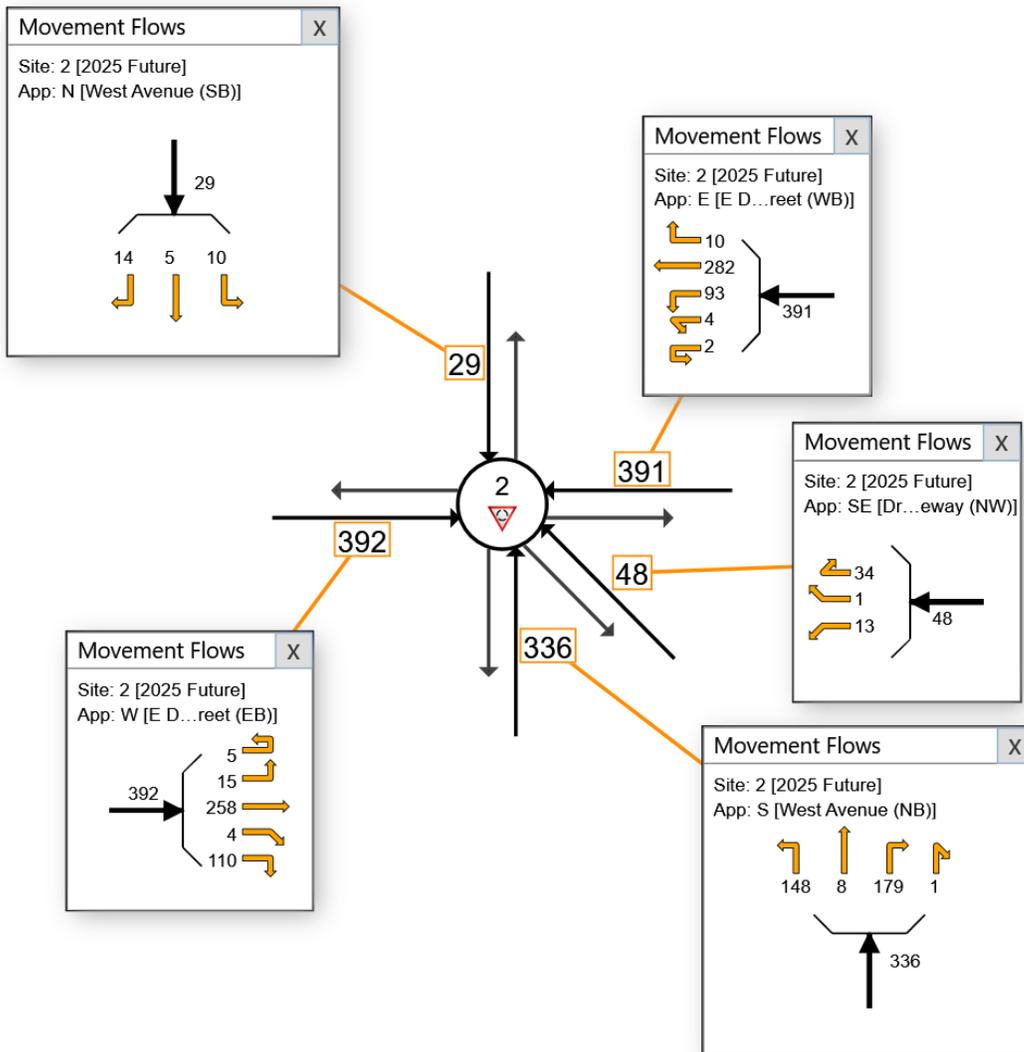
## All Movement Classes

**Site: 2 [2025 Future (Site Folder: 21-268)]**

E Division Street at West Avenue  
 Site Category: PM Peak-Hour  
 Roundabout

Use the button below to open or close all popup boxes. Click value labels to open selected ones.  
 Click and drag popup boxes to move to preferred positions.

Close All Popups



# MOVEMENT SUMMARY

Site: 2 [2025 Future (Site Folder: 21-268)]

E Division Street at West Avenue  
 Site Category: PM Peak-Hour  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] ft				
South: West Avenue (NB)														
3	L2	148	3.0	157	3.0	0.364	11.4	LOS B	2.4	60.9	0.59	0.71	0.59	34.3
8	T1	8	3.0	9	3.0	0.364	6.9	LOS A	2.4	60.9	0.59	0.71	0.59	34.5
18	R2	179	3.0	190	3.0	0.364	6.6	LOS A	2.4	60.9	0.59	0.71	0.59	33.7
18b	R3	1	3.0	1	3.0	0.364	6.9	LOS A	2.4	60.9	0.59	0.71	0.59	33.5
Approach		336	3.0	357	3.0	0.364	8.7	LOS A	2.4	60.9	0.59	0.71	0.59	34.0
SouthEast: Driveway (NW)														
3ax	L1	13	3.0	14	3.0	0.070	12.2	LOS B	0.4	10.2	0.68	0.72	0.68	33.5
18ax	R1	1	3.0	1	3.0	0.070	8.4	LOS A	0.4	10.2	0.68	0.72	0.68	33.7
18bx	R3	34	3.0	36	3.0	0.070	8.8	LOS A	0.4	10.2	0.68	0.72	0.68	33.0
Approach		48	3.0	51	3.0	0.070	9.7	LOS A	0.4	10.2	0.68	0.72	0.68	33.1
East: E Division Street (WB)														
1u	U	2	2.0	2	2.0	0.382	12.6	LOS B	2.7	67.5	0.51	0.61	0.51	35.2
1b	L3	4	2.0	4	2.0	0.382	11.6	LOS B	2.7	67.5	0.51	0.61	0.51	34.9
1	L2	93	2.0	99	2.0	0.382	10.6	LOS B	2.7	67.5	0.51	0.61	0.51	34.7
6	T1	282	2.0	300	2.0	0.382	6.1	LOS A	2.7	67.5	0.51	0.61	0.51	34.8
16	R2	10	2.0	11	2.0	0.382	5.9	LOS A	2.7	67.5	0.51	0.61	0.51	34.0
Approach		391	2.0	416	2.0	0.382	7.3	LOS A	2.7	67.5	0.51	0.61	0.51	34.8
North: West Avenue (SB)														
7	L2	10	3.0	11	3.0	0.039	12.4	LOS B	0.2	5.5	0.63	0.67	0.63	34.0
4	T1	5	3.0	5	3.0	0.039	7.9	LOS A	0.2	5.5	0.63	0.67	0.63	34.2
14	R2	14	3.0	15	3.0	0.039	7.7	LOS A	0.2	5.5	0.63	0.67	0.63	33.4
Approach		29	3.0	31	3.0	0.039	9.4	LOS A	0.2	5.5	0.63	0.67	0.63	33.7
West: E Division Street (EB)														
5u	U	5	2.0	5	2.0	0.355	12.0	LOS B	2.5	62.3	0.39	0.52	0.39	36.0
5	L2	15	2.0	16	2.0	0.355	10.0	LOS A	2.5	62.3	0.39	0.52	0.39	35.4
2	T1	258	2.0	274	2.0	0.355	5.5	LOS A	2.5	62.3	0.39	0.52	0.39	35.6
12a	R1	4	2.0	4	2.0	0.355	5.1	LOS A	2.5	62.3	0.39	0.52	0.39	35.4
12	R2	110	2.0	117	2.0	0.355	5.2	LOS A	2.5	62.3	0.39	0.52	0.39	34.8
Approach		392	2.0	417	2.0	0.355	5.7	LOS A	2.5	62.3	0.39	0.52	0.39	35.4
All Vehicles		1196	2.3	1272	2.3	0.382	7.3	LOS A	2.7	67.5	0.51	0.61	0.51	34.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

HCM 6th AWSC  
 3: Olympic Avenue & E Division Street

Grandview Olympic Development

Intersection

Intersection Delay, s/veh	16.4
Intersection LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	↻
Traffic Vol, veh/h	391	77	94	245	130	120
Future Vol, veh/h	391	77	94	245	130	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	412	81	99	258	137	126
Number of Lanes	1	0	0	1	1	1
Approach	EB		WB		NB	
Opposing Approach	WB		EB			
Opposing Lanes	1		1		0	
Conflicting Approach Left			NB		EB	
Conflicting Lanes Left	0		2		1	
Conflicting Approach Right	NB				WB	
Conflicting Lanes Right	2		0		1	
HCM Control Delay	20		15		11.5	
HCM LOS	C		B		B	

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	100%	0%	0%	28%
Vol Thru, %	0%	0%	84%	72%
Vol Right, %	0%	100%	16%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	130	120	468	339
LT Vol	130	0	0	94
Through Vol	0	0	391	245
RT Vol	0	120	77	0
Lane Flow Rate	137	126	493	357
Geometry Grp	7	7	2	2
Degree of Util (X)	0.274	0.21	0.71	0.546
Departure Headway (Hd)	7.196	5.973	5.186	5.507
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	499	600	695	653
Service Time	4.944	3.721	3.225	3.55
HCM Lane V/C Ratio	0.275	0.21	0.709	0.547
HCM Control Delay	12.7	10.3	20	15
HCM Lane LOS	B	B	C	B
HCM 95th-tile Q	1.1	0.8	5.9	3.3