

## Technical Memorandum

**To:** Marc Wyzykowski, Johnson Development Associates, Inc.  
**From:** Todd E. Mobley, PE  
**Date:** December 10, 2019  
**Subject:** Monroe Apartments, Transportation Impact Study – Addendum #1



RENEWS: 12/31/2020

### Introduction

This memorandum is written to respond to comments received from City staff and to provide additional details and analysis regarding the operation of the intersection of SE 37<sup>th</sup> Avenue at SE Railroad Avenue.

### Comments from Staff

The following comments were received via email from Steve Adams, City Engineer. Each comment is quoted in italics below, with a response immediately following. It should be noted that the staff comments are from a review of the TIS dated November 19, 2019, which was submitted with the land use application. The TIS was subsequently updated in a more recent version dated November 27, 2019. Some of the staff comments below were updated in the more recent version of the TIS.

#### *Table 1*

*SE Harrison: add a note that it has on-street parking only east of 34th Avenue*

*SE Oak: I could find nothing to support LE's 20 mph speed; best I know it is 25 mph*

*SE Railroad: add a note that this is the section west of Oak Street*

*SE 37th: add a note that this is classified as a collector south of Harrison and a local north of Harrison; Speed is shows as "Basic Speed Rule / 25 mph Stat.", however page 24 assumes a design speed of 35 mph (which is fine be me; I just think some clarification needs to be added)*

**Response:** An updated version of Table 1 from the TIS is included below to reflect these changes. With respect to the speed on SE Oak and SE 37<sup>th</sup> Avenue, there are no adopted speed zones in place for these roadways, so some assumptions were made. For Oak Street, Oregon Revised Statute (ORS) 811.105(2) establishes statutory speeds when no designated speed is posted. The ORS allows for 20 mph speed in business district, which is an apt description of Oak Street in the project study area. For SE 37<sup>th</sup> Avenue, the ORS above allows for 25 mph in residential areas, which describes the roadway in the area north of SE Railroad Avenue. South of Railroad Avenue it is neither residential nor a business district, so the 55 mph Basic Rule applies. Still, drivers do not travel at 55 mph in this segment, so for the purposes of sight distance, a design speed of 35 mph was assumed.

Table 1 – Vicinity Roadway Descriptions

Roadway	Jurisdiction	Functional Classification	Cross Section	Speed	On-street Parking	Bicycle Lanes	Curbs	Sidewalks
SE Harrison Street	City of Milwaukie	Arterial	2 to 4 Lanes	25 mph Posted	Only east of 34 <sup>th</sup> Ave	Partial Both Sides	Both Sides	Both Sides
SE Monroe Street (west of railroad tracks)	City of Milwaukie	Collector	2 Lanes	25 mph Posted	Partially Permitted	None	Both Sides	Both Sides
SE Monroe Street (east of railroad tracks)	City of Milwaukie	Collector	2 Lanes	25 mph Posted	Permitted North Side	South Side	Both Sides	Both Sides
SE Oak Street	City of Milwaukie/ ODOT	Collector	3 to 6 Lanes	20 mph Statutory	Not Permitted	None	Both Sides	Both Sides
SE Washington Street	City of Milwaukie	Neighborhood Route/Local Street	2 Lanes	25 mph Statutory	Permitted Both Sides	None	Both Sides	Partial Both Sides
SE Edison Street	City of Milwaukie	Collector/ Neighborhood Route	2 Lanes	Basic Rule	Partially Permitted	None	Partial Both Sides	Partial Both Sides
SE International Way	City of Milwaukie	Collector	3 Lanes	25 mph Posted	Not Permitted	None	Both Sides	Partial Both Sides
OR-224	ODOT	Regional Route/ Statewide Hwy	5 to 6 Lanes	40/50 mph Posted	Not Permitted	None	Both Sides	Partial Both Sides
SE Railroad Avenue (west of Oak Street)	City of Milwaukie	Collector	2 Lanes	Basic Rule	Partial North Side	None	North Side	North Side
SE 32 <sup>nd</sup> Avenue	City of Milwaukie	Collector	2 to 3 Lanes	25 mph Posted	Not Permitted	None	Both Sides	Partial Both Sides
SE 37 <sup>th</sup> Avenue	City of Milwaukie	Collector S of Harrison/Local N of Harrison	2 to 3 Lanes	Basic Rule/25 mph Stat	Partially Permitted	None	Partial Both Sides	Partial Both Sides

Notes: Functional Classification based on *City of Milwaukie TSP* and ODOT *Oregon Highway Plan*  
 Jurisdiction based on *Milwaukie Road Jurisdiction Map* and ODOT *Oregon Highway Plan*



Figure 1

*With intersection 9 please remove the east/west through arrows*

**Response:** It is noted that there will not be east/west traffic between the site and SE Washington Street. In the November 27<sup>th</sup> TIS the eastbound through arrow was removed and while the westbound arrow was not removed, none of the trips were assigned to SE Washington Street.

*Page 11, Trip Generation*

*Revise first sentence to reflect the current design of one five-story and four three-story buildings.*

**Response:** This change was included in the November 27<sup>th</sup> TIS.

*Page 14, Parking Analysis*

*Second paragraph: with the proposed changes with the cycle track option along Monroe/37<sup>th</sup>, some of the on-street parking spaces will be removed. The 297 and 42 numbers should be revised downward.*

**Response:** Because the design of the cycletrack is still preliminary, the exact number of on-street parking spaces to be removed is not certain. Still, the loss of parking is noted and even with the parking reduction, there will still be more than enough supply to meet demand.

*Page 16, 7<sup>th</sup> bullet*

*With the Hillside Park redevelopment, it will add a total of 400 new dwelling units over the next 7-8 years, however this is currently planned to be spread over 3 phases.*

**Response:** The in-process trip information was supplied by the City. Also, the proposed Monroe Apartments will be constructed in one phase in the near future, well before buildout of the Hillside Park redevelopment.

*Page 24,*

*Update "Emergency Access at SE Monroe Street" to "Right-out at SE Monroe Street / Emergency Ingress Access"*

**Response:** The emergency access label was removed from this driveway in the November 27<sup>th</sup> TIS, but it is noted in the TIS that this access will be available for emergency vehicle ingress.

## SE 37<sup>th</sup> Avenue at SE Railroad Avenue

This intersection was shown in the TIS to be operating at level of service (LOS) E during the evening peak hour for background traffic conditions, even before site-generated trips are added. The City of Milwaukee's performance standard for stop controlled intersections is LOS D or better, so this operation does not meet the City's performance standard. In order to be sure that the calculated delay at the intersection matches actual operation, a delay study was conducted in the field. This approach was discussed with and approved by City staff. As discussed with City staff, the LOS and delay reported for this intersection describes only the westbound



left turn from SE Railroad Avenue onto SE 37<sup>th</sup> Avenue, since this movement experiences the longest delays. Accordingly, the delay study focuses on the operation of the westbound left-turn movement.

**Delay Study Methodology & Results**

The delay study was conducted via a video recording on Thursday, December 5, 2019. A new turning movement count was conducted at the same time the delay for each vehicle was measured so that the calculated intersection operation could be calibrated to exactly match what was measured in the field. This provides a direct apples-to-apples comparison between measured and calculated delay. Updated traffic count data is attached to this memorandum.

The calculation shows that the uncalibrated result was an average delay of 41 seconds per vehicle, while the measured delay was 25 seconds per vehicle. Once the calculation was calibrated, these calibration settings were then applied to the analysis scenarios in the November 27<sup>th</sup> TIS.

**Updated Capacity Analysis**

In the original November 27<sup>th</sup> TIS, the westbound left turn was calculated to operate at LOS E for background traffic conditions and it remained at LOS E with the addition of trips from the proposed apartments. Applying the calibration settings determined in the delay study, the operation improved to LOS D for all scenarios, meeting City of Milwaukie operational standards. Updated capacity analysis output showing the new results is attached to this memorandum. The table below compares the results from the November 27<sup>th</sup> TIS and the updated analysis.

Table 2 – Updated Capacity Analysis

	November 27, 2019 TIS			Updated Analysis with Delay Study Calibration		
	LOS	Delay	v/c	LOS	Delay	v/c
2022 Background Conditions	E	38	0.54	D	28	0.44
2022 Buildout Conditions	E	46	0.60	D	32	0.49

Notes: LOS = Level of service  
 Delay = Average delay per vehicle in seconds  
 v/c = Volume-to-capacity ratio

**Conclusions**

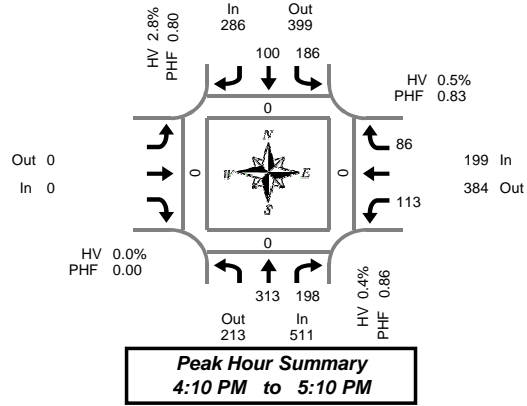
With the additional analysis regarding the operation of the intersection of SE Railroad Avenue at SE 37<sup>th</sup> Avenue, all study area intersections are shown to operate acceptably with the proposed project in place. No mitigations are recommended.



# Total Vehicle Summary



Clay Carney  
(503) 833-2740



## SE 37th Ave & SE Railroad Ave

Thursday, December 05, 2019

4:00 PM to 6:00 PM

### 5-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Interval Total	Pedestrians Crosswalk			
	T	R	Bikes	L	T	Bikes		Bikes	L	R	Bikes	North		South	East	West	
4:00 PM	20	14	0	17	9	0		0	9	7	0	76	0	0	0	0	
4:05 PM	18	20	0	13	9	0		0	9	9	0	78	0	0	0	0	
4:10 PM	36	20	1	12	7	0		0	10	12	0	97	0	0	0	0	
4:15 PM	28	21	0	9	5	0		0	8	7	0	78	0	0	0	0	
4:20 PM	27	16	1	14	7	0		0	6	13	0	83	0	0	0	0	
4:25 PM	22	4	0	24	5	0		0	11	8	0	74	0	0	0	0	
4:30 PM	25	28	0	10	11	0		0	10	6	0	90	0	0	0	0	
4:35 PM	32	19	1	17	5	0		0	7	6	0	86	0	0	0	0	
4:40 PM	25	20	0	22	9	0		0	5	4	0	85	0	0	0	0	
4:45 PM	19	19	0	14	9	0		0	10	4	0	75	0	0	0	0	
4:50 PM	24	10	0	17	11	1		0	6	6	0	74	0	0	0	0	
4:55 PM	19	10	0	16	15	0		0	11	9	0	80	0	0	0	0	
5:00 PM	31	13	0	19	11	0		0	13	5	0	92	0	0	0	0	
5:05 PM	25	18	0	12	5	0		0	16	6	0	82	0	0	0	0	
5:10 PM	25	14	0	21	7	0		0	8	12	0	87	0	0	0	0	
5:15 PM	16	11	0	13	6	0		0	9	10	0	65	0	0	0	0	
5:20 PM	19	12	0	9	3	0		0	13	5	0	61	0	0	0	0	
5:25 PM	13	9	0	9	4	0		0	5	5	0	45	0	0	0	0	
5:30 PM	13	7	0	2	9	0		0	13	9	0	53	0	0	0	0	
5:35 PM	16	10	1	4	9	0		0	9	11	0	59	0	0	0	0	
5:40 PM	13	9	1	4	12	0		0	6	6	0	50	0	0	0	0	
5:45 PM	13	8	0	7	12	1		0	2	9	1	51	0	0	0	0	
5:50 PM	16	6	0	10	10	0		0	2	9	0	53	0	0	0	0	
5:55 PM	8	7	1	10	8	0		0	3	3	0	39	0	0	0	0	
Total Survey	503	325	6	305	198	2		0	201	181	1	1,713	0	0	0	0	

### 15-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Interval Total	Pedestrians Crosswalk			
	T	R	Bikes	L	T	Bikes		Bikes	L	R	Bikes	North		South	East	West	
4:00 PM	74	54	1	42	25	0		0	28	28	0	251	0	0	0	0	
4:15 PM	77	41	1	47	17	0		0	25	28	0	235	0	0	0	0	
4:30 PM	82	67	1	49	25	0		0	22	16	0	261	0	0	0	0	
4:45 PM	62	39	0	47	35	1		0	27	19	0	229	0	0	0	0	
5:00 PM	81	45	0	52	23	0		0	37	23	0	261	0	0	0	0	
5:15 PM	48	32	0	31	13	0		0	27	20	0	171	0	0	0	0	
5:30 PM	42	26	2	10	30	0		0	28	26	0	162	0	0	0	0	
5:45 PM	37	21	1	27	30	1		0	7	21	1	143	0	0	0	0	
Total Survey	503	325	6	305	198	2		0	201	181	1	1,713	0	0	0	0	

### Peak Hour Summary

4:10 PM to 5:10 PM

By Approach	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Total	Pedestrians Crosswalk			
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total		North	South	East	West
Volume	511	213	724	3	286	399	685	1	0	0	0	0	199	384	583	0	996
%HV	0.4%			2.8%			0.0%			0.5%			1.1%				
PHF	0.86			0.80			0.00			0.83			0.95				

By Movement	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Total
	T	R	Total	L	T	Total		Total	L	R	Total		
Volume	313	198	511	186	100	286		0	113	86	199	996	
%HV	NA	0.3%	0.5%	0.4%	3.8%	1.0%	NA	2.8%	NA	NA	NA	1.1%	
PHF	0.86	0.74	0.86	0.88	0.68	0.80		0.00	0.71	0.67	0.83	0.95	

### Rolling Hour Summary

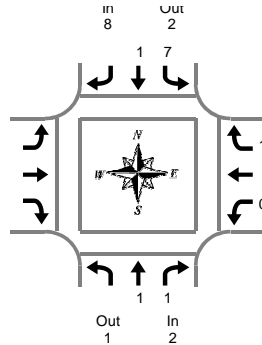
4:00 PM to 6:00 PM

Interval Start Time	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Interval Total	Pedestrians Crosswalk			
	T	R	Bikes	L	T	Bikes		Bikes	L	R	Bikes	North		South	East	West	
4:00 PM	295	201	3	185	102	1		0	102	91	0	976	0	0	0	0	
4:15 PM	302	192	2	195	100	1		0	111	86	0	986	0	0	0	0	
4:30 PM	273	183	1	179	96	1		0	113	78	0	922	0	0	0	0	
4:45 PM	233	142	2	140	101	1		0	119	88	0	823	0	0	0	0	
5:00 PM	208	124	3	120	96	1		0	99	90	1	737	0	0	0	0	

# Heavy Vehicle Summary



Clay Carney  
(503) 833-2740



**Peak Hour Summary**  
4:10 PM to 5:10 PM

## SE 37th Ave & SE Railroad Ave

Thursday, December 05, 2019

4:00 PM to 6:00 PM

### Heavy Vehicle 5-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Interval Total
	T	R	Total	L	T	Total			Total	L	R	Total	
4:00 PM	0	0	0	0	0	0			0	0	0	0	0
4:05 PM	0	0	0	0	0	0			0	1	0	1	1
4:10 PM	0	0	0	0	0	0			0	0	0	0	0
4:15 PM	0	0	0	1	0	1			0	0	0	0	1
4:20 PM	0	0	0	1	0	1			0	0	0	0	1
4:25 PM	0	0	0	1	0	1			0	0	0	0	1
4:30 PM	0	0	0	1	0	1			0	0	0	0	1
4:35 PM	0	0	0	0	0	0			0	0	0	0	0
4:40 PM	0	0	0	1	0	1			0	0	0	0	1
4:45 PM	0	0	0	0	0	0			0	0	0	0	0
4:50 PM	1	0	1	0	0	0			0	0	1	1	2
4:55 PM	0	0	0	1	1	2			0	0	0	0	2
5:00 PM	0	0	0	1	0	1			0	0	0	0	1
5:05 PM	0	1	1	0	0	0			0	0	0	0	1
5:10 PM	0	0	0	0	0	0			0	0	0	0	0
5:15 PM	0	0	0	0	0	0			0	0	0	0	0
5:20 PM	1	0	1	0	0	0			0	0	0	0	1
5:25 PM	0	0	0	0	0	0			0	0	0	0	0
5:30 PM	0	0	0	0	1	1			0	0	1	1	2
5:35 PM	0	0	0	0	0	0			0	0	0	0	0
5:40 PM	0	0	0	0	0	0			0	0	0	0	0
5:45 PM	0	0	0	0	0	0			0	0	0	0	0
5:50 PM	0	0	0	0	0	0			0	0	0	0	0
5:55 PM	0	0	0	0	0	0			0	0	0	0	0
Total Survey	2	1	3	7	2	9			0	1	2	3	15

### Heavy Vehicle 15-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Interval Total
	T	R	Total	L	T	Total			Total	L	R	Total	
4:00 PM	0	0	0	0	0	0			0	1	0	1	1
4:15 PM	0	0	0	3	0	3			0	0	0	0	3
4:30 PM	0	0	0	2	0	2			0	0	0	0	2
4:45 PM	1	0	1	1	1	2			0	0	1	1	4
5:00 PM	0	1	1	1	0	1			0	0	0	0	2
5:15 PM	1	0	1	0	0	0			0	0	0	0	1
5:30 PM	0	0	0	0	1	1			0	0	1	1	2
5:45 PM	0	0	0	0	0	0			0	0	0	0	0
Total Survey	2	1	3	7	2	9			0	1	2	3	15

### Heavy Vehicle Peak Hour Summary

4:10 PM to 5:10 PM

By Approach	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	2	1	3	8	2	10	0	0	0	1	8	9	11
PHF	0.50			0.67			0.00			0.25			0.55

By Movement	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Total
	T	R	Total	L	T	Total			Total	L	R	Total	
Volume	1	1	2	7	1	8			0	0	1	1	11
PHF	0.25	0.25	0.50	0.58	0.25	0.67			0.00	0.00	0.25	0.25	0.55

### Heavy Vehicle Rolling Hour Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound SE 37th Ave			Southbound SE 37th Ave			Eastbound SE Railroad Ave			Westbound SE Railroad Ave			Interval Total
	T	R	Total	L	T	Total			Total	L	R	Total	
4:00 PM	1	0	1	6	1	7			0	1	1	2	10
4:15 PM	1	1	2	7	1	8			0	0	1	1	11
4:30 PM	2	1	3	4	1	5			0	0	1	1	9
4:45 PM	2	1	3	2	2	4			0	0	2	2	9
5:00 PM	1	1	2	1	1	2			0	0	1	1	5

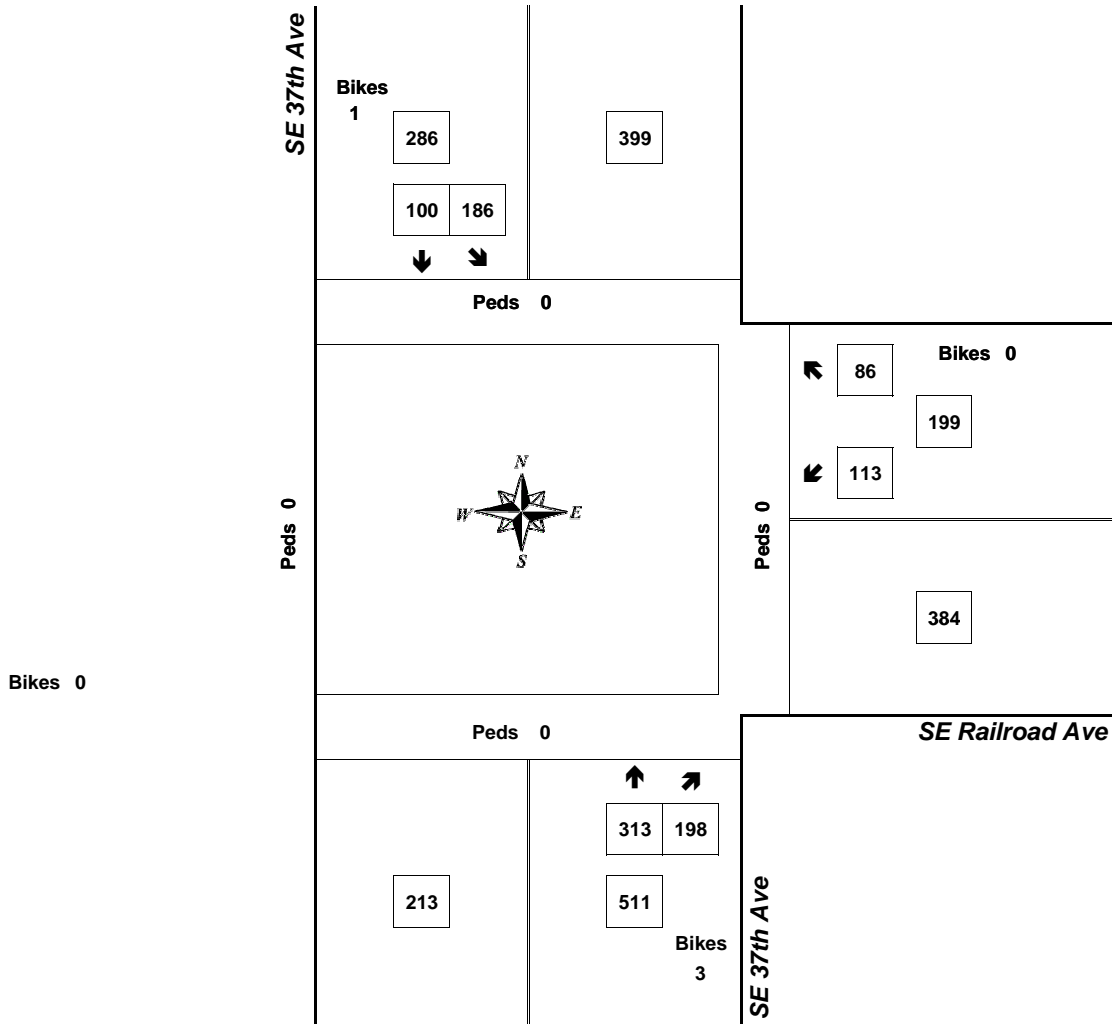
# Peak Hour Summary



Clay Carney  
(503) 833-2740

## SE 37th Ave & SE Railroad Ave

4:10 PM to 5:10 PM  
Thursday, December 05, 2019



Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.83	0.5%	199
NB	0.86	0.4%	511
SB	0.80	2.8%	286
<b>Intersection</b>	<b>0.95</b>	<b>1.1%</b>	<b>996</b>

Count Period: 4:00 PM to 6:00 PM

HCM Unsignalized Intersection Capacity Analysis  
 11: SE 37th Avenue & SE Railroad Avenue

12/11/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	110	99	296	192	164	121
Future Volume (Veh/h)	110	99	296	192	164	121
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	125	113	336	218	186	138
Pedestrians						2
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						0
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	955	447			554	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	955	447			554	
tC, single (s)	*6.1	6.2			4.1	
tC, 2 stage (s)						
tF (s)	*3.0	3.3			2.2	
p0 queue free %	56	82			82	
cM capacity (veh/h)	282	612			1016	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	125	113	554	324
Volume Left	125	0	0	186
Volume Right	0	113	218	0
cSH	282	612	1700	1016
Volume to Capacity	0.44	0.18	0.33	0.18
Queue Length 95th (ft)	54	17	0	17
Control Delay (s)	27.6	12.2	0.0	6.2
Lane LOS	D	B		A
Approach Delay (s)	20.3		0.0	6.2
Approach LOS	C			

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

\* User Entered Value



HCM Unsignalized Intersection Capacity Analysis  
 11: SE 37th Avenue & SE Railroad Avenue

12/11/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	110	102	330	192	166	142
Future Volume (Veh/h)	110	102	330	192	166	142
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	125	116	375	218	189	161
Pedestrians						2
Lane Width (ft)						12.0
Walking Speed (ft/s)						3.5
Percent Blockage						0
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1023	486			593	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1023	486			593	
tC, single (s)	*6.1	6.2			4.1	
tC, 2 stage (s)						
tF (s)	*3.0	3.3			2.2	
p0 queue free %	51	80			81	
cM capacity (veh/h)	254	582			983	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	125	116	593	350
Volume Left	125	0	0	189
Volume Right	0	116	218	0
cSH	254	582	1700	983
Volume to Capacity	0.49	0.20	0.35	0.19
Queue Length 95th (ft)	63	18	0	18
Control Delay (s)	32.1	12.7	0.0	6.1
Lane LOS	D	B		A
Approach Delay (s)	22.8		0.0	6.1
Approach LOS	C			

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

\* User Entered Value