

City of Oak Park Heights and Stillwater, Minnesota

INTERSECTION ANALYSIS REPORT

For

**TH 36 and Washington Avenue/Norell Avenue N
City of Oak Park Heights and Stillwater
Washington County, Minnesota**

PREPARED BY

Stantec Consulting Services Inc.

October
2018

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



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Reg. No.

10/5/2018

Date



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I. Description of Location

A. INTRODUCTION

The purpose of this Intersection Analysis is to determine improvements that can be made at the intersection of TH 36 and Washington Avenue/Norell Avenue N and the intersections with the frontage roads of W Frontage Road and Washington Avenue, and 60th Street N and Norell Avenue N. TH 36 is the border between Stillwater and Oak Park Heights at this area with Washington Avenue on the north side and Norell Avenue N on the south side. The existing TH 36 and Washington Avenue/Norell Avenue N intersection is currently controlled by a traffic signal. Both intersections with the frontage roads are side-stopped controlled, and both are located within 150 feet of the primary intersection.

The following intersection improvement alternatives are evaluated in this report. For layouts of the alternatives please see Figures 4 through 7.:

- Alternative No. 1: Add a northbound right-turn lane on Norell Avenue N at TH 36, add a northbound left turn lane on Washington Avenue at W Frontage Road, and improve the striping and alignment of the existing lanes.
- Alternative No. 1a: Similar improvements as Alternative No. 1 with the addition of a raised median on Norell Avenue N at the intersection with 60th Street N and at Washington Avenue at the intersection of W Frontage Road. This alternative would require U-turns to take place at the ends of the raised medians.
- Alternative No. 2: Realign the east leg of 60th Street N south to the northern driveway of Walmart with a roundabout controlling the new intersection, and restricting the movements of the remaining 3 legs of the two frontage roads to right-in-right-out by extending the medians on Washington Avenue and Norell Avenue N.
- Alternative No. 3: Realign both frontage roads away from the primary intersection with roundabout control at both new intersections.

B. INTERSECTION LOCATION

The existing TH 36 and Washington Avenue/Norell Avenue N intersection is located near the northwestern border of the City of Oak Park Heights and the southwestern border of the City of Stillwater, in Washington County, MN. It is currently a heavily traveled intersection with volumes on TH 36 recently increased by the opening of the new Saint Croix River crossing to the east of the study area. The TH 36 corridor between the two cities is densely populated by commercial retail including smaller stores, restaurants, and big box stores. **Figure 1** illustrates the location of the TH 36 at Washington Avenue/Norell Avenue N intersection.

Figure 1 – Location Map



II. Existing Conditions

A. EXISTING INTERSECTIONS CHARACTERISTICS

The existing intersection of TH 36 and Washington Avenue/Norell Avenue N is currently controlled by a traffic signal. The eastbound and westbound approaches are two-lane with two storage lanes for the left-turn and one storage lane for the right-turn. The northbound approach is three-lane with a dedicated left-turn lane, a thru lane, and a shared thru-right lane. The southbound approach is four-lane with two thru lanes and dedicated lanes for each of the turn movements. Intersection lane geometry is shown graphically in **Figure 2**.

The existing intersection of W Frontage Road and Washington Avenue is currently side-stop controlled with stop signs on W Frontage Road. The eastbound and westbound approaches are single-lane with a storage lane for left-turns and a shared thru-right lane. The northbound approach is three-lane with a shared left-thru lane, a thru lane, and a shared thru-right lane. The southbound approach is two-lane with a storage lane for left-turns, a thru lane, and a shared thru-right lane.

The existing intersection of 60th Street N and Norell Avenue N is currently side-stop controlled with stop signs on 60th Street N. The eastbound and westbound approaches are single-lane with a storage lane for left-turns and a shared thru-right lane. The southbound approach is two-lane with a storage lane for left-turns, a thru lane, and a shared thru-right lane. The northbound approach is two-lane with a storage lane for left-turns, a thru lane, and a shared thru-right lane.

Washington Avenue and Norell Avenue N are both four-lane, median divided roadways in the study area. Both streets have posted speed limits of 30 mph. There is no street parking on either street.

W Frontage Road and 60th Street N are both a three-lane undivided roadway. Both streets have a speed limit of 30 mph. There is no parking on either side of the street.

B. EXISTING VOLUMES

Existing 13-hour turning movement counts were collected on October 12 and 14, 2017 by Traffic Data Inc. **Figure 3** shows the existing year 2017 p.m. and Saturday peak hour traffic volumes at the three intersections. Copies of the turning movement counts are provided in the Appendix.

C. CRASH DATA

Crash data for 5 years (2011 through 2015) was obtained from MnDOT Crash Mapping Analysis Tool (MnCMAT) at the study intersections. During this 5-year period, there were a total of 87 reported crashes at the TH 36 and Washington Avenue/Norell Avenue N intersection, 12 at the W Frontage Road and Washington Avenue intersection, and 46 at the 60th Street N and Norell Avenue N intersection (see **Table 2.1**).

Table 2.1 – Intersection Crash Data 2011 – 2015						
Intersection	Number of Crashes (2011 – 2015)					
	Fatal	Personal Injury*			Property Damage	Total Crashes
		Type A	Type B	Type C		
TH 36 and Washington Avenue/ Norell Avenue N	0	0	1	19	67	87
W Frontage Road and Washington Avenue	0	0	1	0	11	12
60 th Street N and Norell Avenue N	0	0	3	14	29	46

*Personal Injury Crashes include Type A (Incapacitating Injury), Type B (Non-Incapacitating Injury), and Type C (Possible Injury).

The intersection of TH 36 and Washington Avenue/Norell Avenue N exceeds the critical crash rate and severity rate for similar intersections. The predominant crash types were: Rear End (49.4%), Right Angle (26.4%), and Left Turn into Traffic (9.2%).

The intersection of W Frontage Road and Washington Avenue exceeds the critical crash rate, and the severity rate exceeds the statewide average for similar intersections. The predominant crash types were: Right Angle (41.7%), Left Turn into Traffic, (12.5%), and Sideswipe Passing (12.5%).

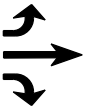
The intersection of 60th Street N and Norell Avenue N exceeds the state average for severity rate, and the critical crash rate for similar intersections. The predominant crash types were: Right Angle (41.7%), Rear End (33.3%), and Sideswipe Passing (16.7%).

The three intersections are all experiencing crashes at a higher rate than compared to similar intersections. It should be noted that the intersections were all analyzed individually. It is possible that the high frequency of crashes in all three intersections can be attributed to the roadway design and the close proximity of the intersections to each other. A summary of the crash and severity rates can be found in Table 2.2 below.

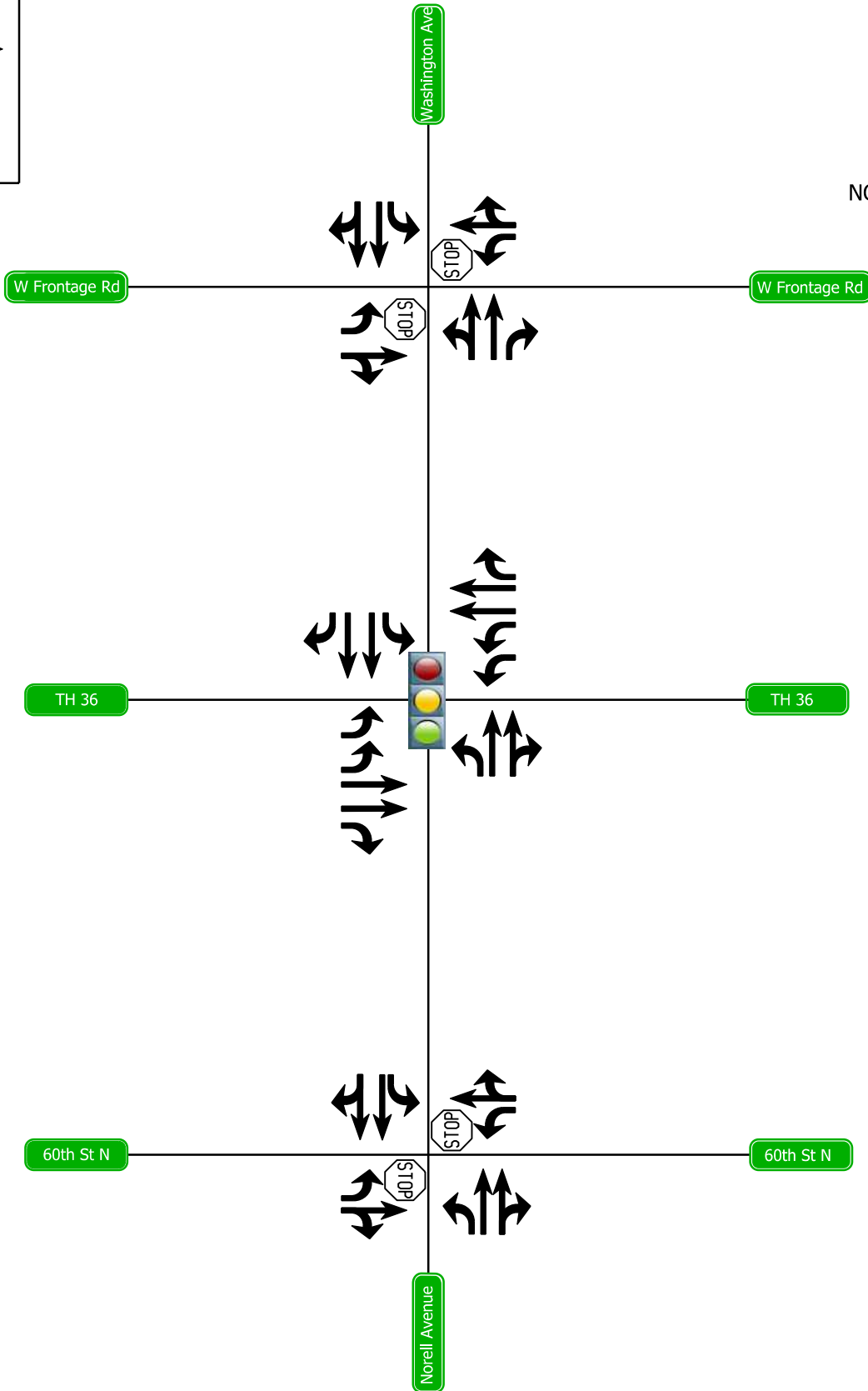
Table 2.2 – Intersection Crash and Severity Rates						
Location	Crash Rate			Severity Rate		
	Calculated	State Avg.	Critical	Calculated	State Avg.	Critical
TH 36 and Washington/Norell Avenue N	1.13	0.41	0.61	1.40	0.59	0.83
W Frontage Road and Washington Avenue	0.44	0.18	0.42	0.51	0.27	0.54
60 th Street N and Norell Avenue N	1.76	0.18	0.42	2.53	0.27	0.50

LEGEND

LANE STRIPING



NOT TO SCALE



EXISTING ROADWAY GEOMETRY

FIGURE 2

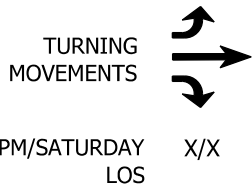
TH 36 AT WASHINGTON AVENUE/NORELL AVENUE N
- CITY OF STILLWATER, CITY OF OAK PARK HEIGHTS



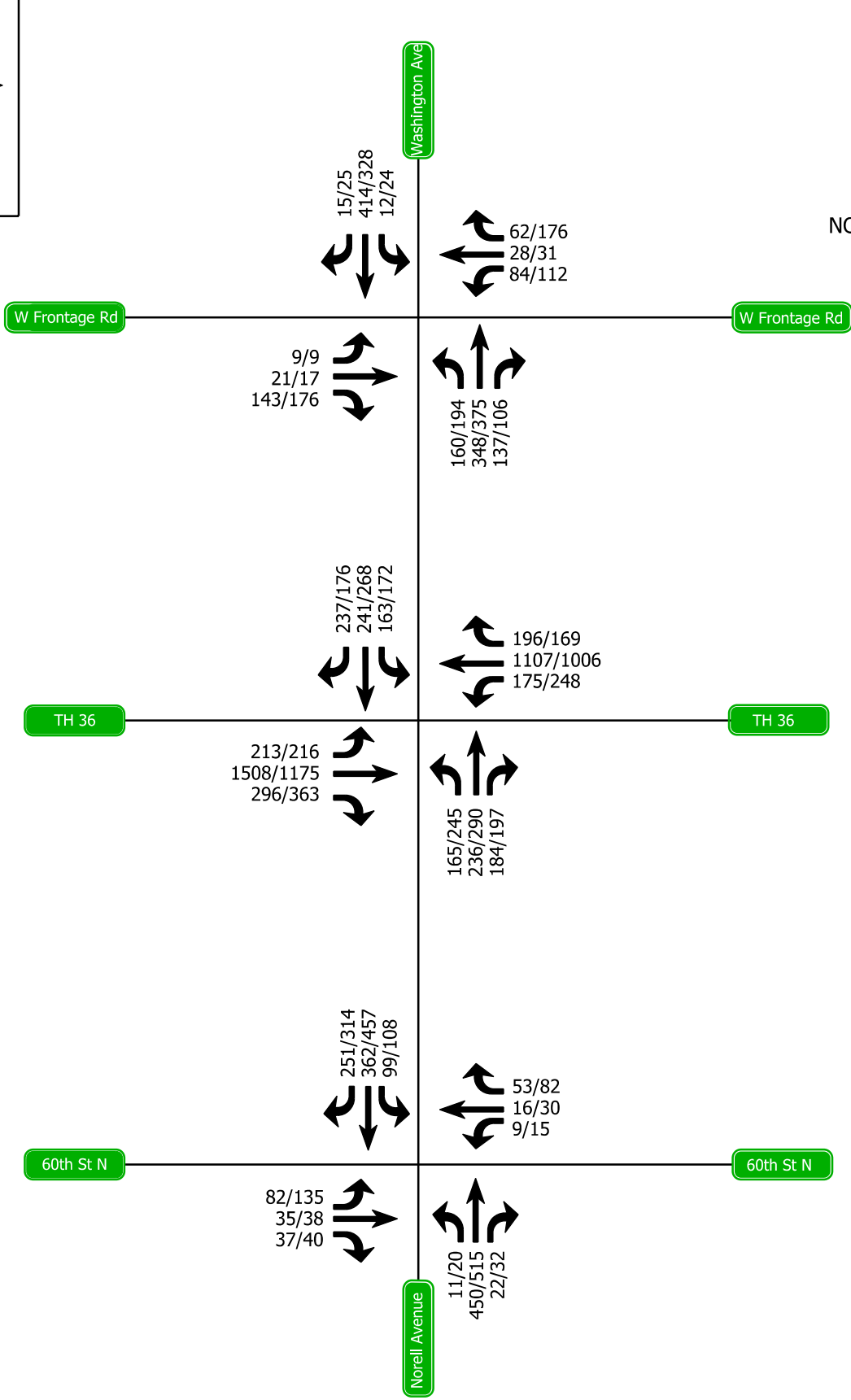
DATE: 5/20/2018

PROJECT NO: 193804019

LEGEND



NOT TO SCALE



EXISTING TRAFFIC VOLUMES

FIGURE 3

TH 36 AT WASHINGTON AVENUE/NORELL AVENUE N
- CITY OF STILLWATER, CITY OF OAK PARK HEIGHTS



DATE: 5/20/2018

PROJECT NO: 193804019

III. Analysis of Alternatives

Roadway design alternatives were analyzed at the three intersections. The analysis utilized existing and forecast year 2027 traffic volume conditions.

A. ROADWAY DESIGN ALTERNATIVES

The following intersection improvement alternatives are evaluated in this report. For layouts of the alternatives please see Figures 4 through 7.:

- Alternative No. 1: Add a northbound right-turn lane on Norell Avenue N at TH 36, add a northbound left turn lane on Washington Avenue at W Frontage Road, and improve the striping and alignment of the existing lanes.
- Alternative No. 1a: Similar improvements as Alternative No. 1 with the addition of a raised median on Norell Avenue N at the intersection with 60th Street N and at Washington Avenue at the intersection of W Frontage Road. This alternative would require U-turns to take place at the ends of the raised medians.
- Alternative No. 2: Realign the east leg of 60th Street N south to the northern driveway of Walmart with a roundabout controlling the new intersection, and restricting the movements of the remaining 3 legs of the two frontage roads to right in right out by extending the medians on Washington Avenue and Norell Avenue N.
- Alternative No. 3: Realign both frontage roads away from the primary intersection with roundabout control at both new intersections.



FIGURE 4
 ALTERNATIVE 1
 CITY OF OAK PARK HEIGHTS
 CITY OF STILLWATER
 MNDOT
 TH 36 AT NORELL AVE N/WASHINGTON AVE
 INTERSECTION STUDY
 DATE: 6/1/2018 PROJ. NO.: 193804019
 FILENAME: PW: 193804019\193804019_b1.dgn





80
SCALE IN FEET

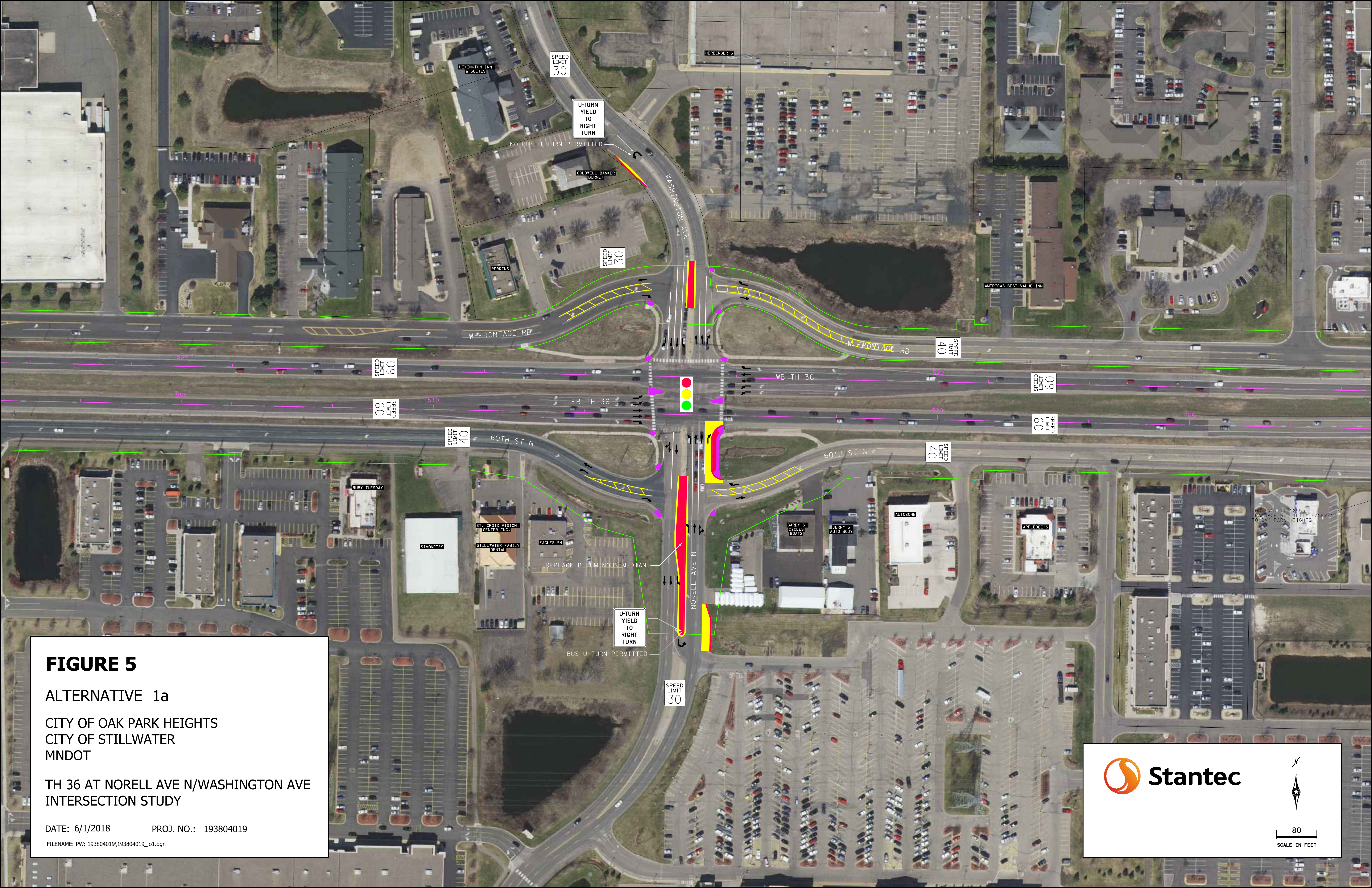


FIGURE 5
 ALTERNATIVE 1a
 CITY OF OAK PARK HEIGHTS
 CITY OF STILLWATER
 MNDOT
 TH 36 AT NORELL AVE N/WASHINGTON AVE
 INTERSECTION STUDY
 DATE: 6/1/2018 PROJ. NO.: 193804019
 FILENAME: PW: 193804019\193804019_to1.dgn





80
SCALE IN FEET

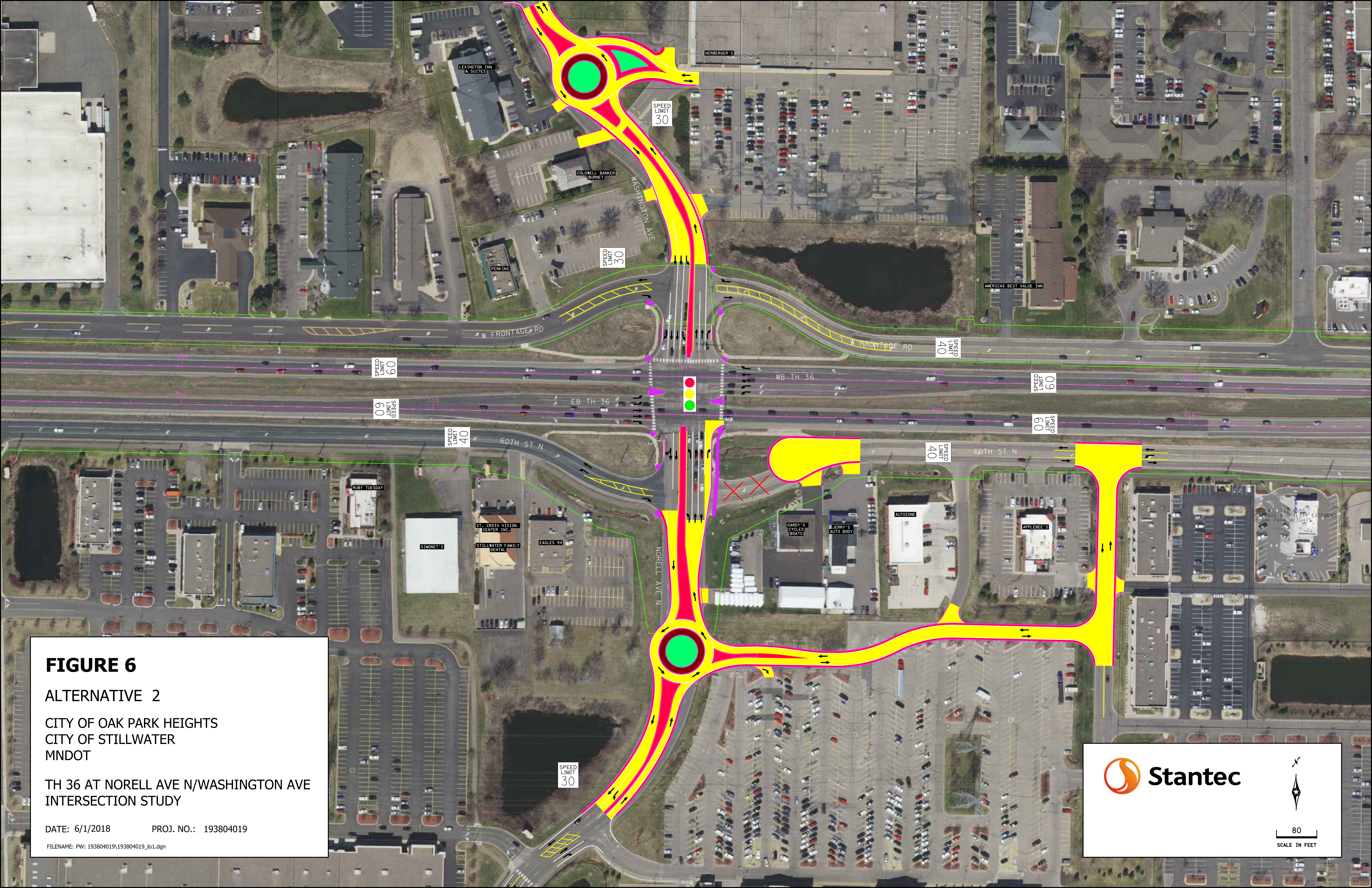


FIGURE 6
 ALTERNATIVE 2
 CITY OF OAK PARK HEIGHTS
 CITY OF STILLWATER
 MNDOT
 TH 36 AT NORELL AVE N/WASHINGTON AVE
 INTERSECTION STUDY
 DATE: 6/1/2018 PROJ. NO.: 193804019
 FILENAME: PW: 193804019\193804019_101.dgn

Stantec

80
SCALE IN FEET

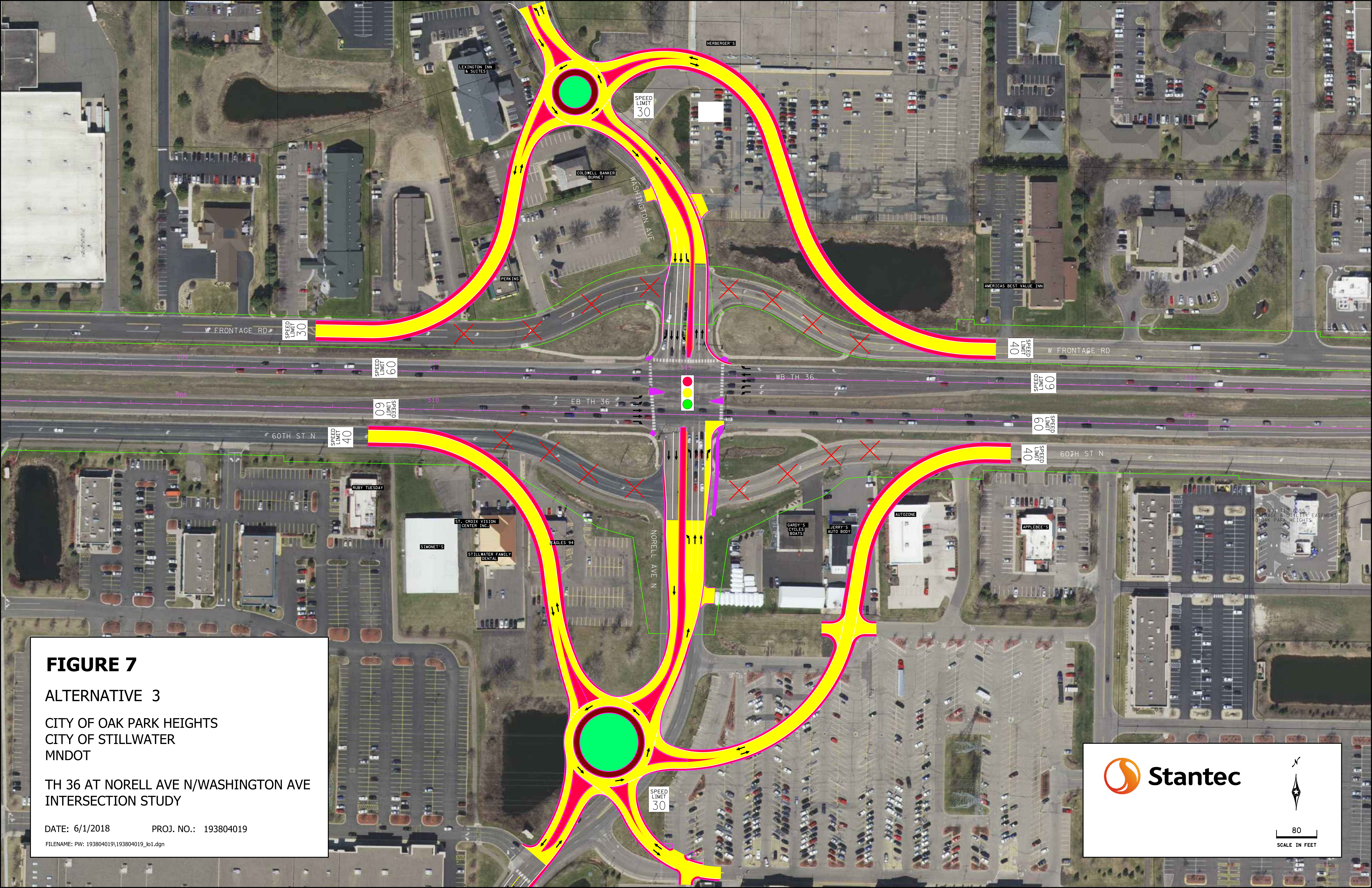



FIGURE 7
 ALTERNATIVE 3
 CITY OF OAK PARK HEIGHTS
 CITY OF STILLWATER
 MNDOT
 TH 36 AT NORELL AVE N/WASHINGTON AVE
 INTERSECTION STUDY
 DATE: 6/1/2018 PROJ. NO.: 193804019
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B. TRAFFIC OPERATIONS ANALYSIS

Highway Capacity analysis results identify a level of service (LOS), which indicates how well an intersection is operating. The LOS results at an intersection are based on average delay per vehicle. The LOS system rates the intersection using the letters A through F, with LOS A being least congested and LOS F being most congested. At LOS C, roads remain safely below, but are approaching capacity and posted speed is often maintained. LOS D is a common design goal for urban streets during future peak hours. While LOS E is a common design goal in larger urban areas where some roadway congestion is inevitable, the threshold for acceptable traffic operations for the peak hour used in this analysis was LOS D. A summary of the LOS thresholds from the Highway Capacity Manual is shown in

Table 3.1.

Table 3.1 –Highway Capacity Manual Levels of Service and Control Delay			
Signalized Intersection		Unsignalized Intersection	
Level of Service	Control Delay per Vehicle (sec)	Level of Service	Control Delay per Vehicle (sec)
A	≤ 10	A	≤ 10
B	> 10 and ≤ 20	B	> 10 and ≤ 15
C	> 20 and ≤ 35	C	> 15 and ≤ 25
D	> 35 and ≤ 55	D	> 25 and ≤ 35
E	> 55 and ≤ 80	E	> 35 and ≤ 50
F	> 80	F	> 50

This study analyzed the intersection using the Synchro/SimTraffic software. The analysis examined existing traffic conditions using the existing year and forecast year 2027 traffic volumes. A summary of the traffic operations results for the study intersection are shown in **Tables 3.2-3.8.**

In March of 2018, MnDOT updated the signal timing for the TH 36 corridor. The new signal timing for TH 36 and Washington Avenue/Norell Avenue N was used in this analysis.

Table 3.2 - LOS and Queue Lengths for TH 36 & Norell Ave N/Washington Ave Existing 2017 Conditions w/ New Timing												
Intersection	Direction	Movement	PM					Saturday				
			95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS
W Frontage Rd & Washington Ave	EB	Left	93'	13.0	B	F (213.7)	F (88.3)	87'	18.4	C	F (124.1)	F (60.4)
		Thru	567'	202.7	F			488'	152.8	F		
		Right	567'	228.3	F			42'	126.7	F		
	WB	Left	691'	869.7	F	F (492.5)		636'	454.0	F	F (283.7)	
		Thru	709'	65.5	F			569'	31.5	D		
		Right	709'	31.1	D			47'	13.1	B		
	NB	Left	115'	7.0	A	A (3.2)		111'	6.5	A	A (3.2)	
		Thru	115'	2.3	A			72'	2.3	A		
		Right	22'	1.2	A			26'	1.2	A		
	SB	Left	61'	7.0	A	D (25.4)		29'	4.4	A	B (12.5)	
		Thru	195'	26.3	D			120'	13.8	B		
		Right	208'	13.3	B			124'	8.2	A		
60th St N & Norell Ave N	EB	Left	782'	1855.0	F	F (1050.2)	F (123.6)	758'	1285.0	F	F (931.6)	F (98.7)
		Thru	857'	93.9	F			911'	164.0	F		
		Right	857'	120.0	F			42'	107.5	F		
	WB	Left	312'	56.9	F	F (731.6)		227'	21.1	C	F (366.6)	
		Thru	616'	761.1	F			595'	349.3	F		
		Right	616'	789.6	F			48'	427.3	F		
	NB	Left	71'	9.5	A	F (53.4)		42'	8.6	A	C (24.3)	
		Thru	273'	53.7	F			215'	24.8	C		
		Right	324'	70.4	F			245'	25.3	D		
	SB	Left	73'	8.9	A	A (2.4)		61'	6.1	A	A (2.0)	
		Thru	51'	1.5	A			24'	1.5	A		
		Right	14'	1.2	A			15'	1.3	A		
TH 36 & Norell Ave N/ Washington Ave	EB	Left	406'	102.1	F	D (46.9)	D (46.5)	385'	107.3	F	D (54.4)	D (45.1)
		Thru	683'	43.7	D			561'	53.3	D		
		Right	456'	23.8	C			436'	25.8	C		
	WB	Left	221'	92.9	F	D (38.3)		209'	56.5	E	C (34.2)	
		Thru	448'	33.9	C			340'	32.1	C		
		Right	332'	13.7	B			140'	11.9	B		
	NB	Left	134'	61.1	E	E (63.9)		131'	41.8	D	D (44.9)	
		Thru	133'	76.4	E			130'	50.3	D		
		Right	117'	49.9	D			122'	40.5	D		
	SB	Left	122'	58.0	E	D (49.9)		122'	46.8	D	D (43.5)	
		Thru	125'	69.4	E			127'	56.9	E		
		Right	111'	24.1	C			113'	19.8	B		
Walmart Driveway & Norell Ave N	WB	Right	115'	14.2	B	B (14.2)	A (4.8)	73'	5.1	A	A (5.1)	A (1.8)
		Thru	18'	3.8	A			29'	0.7	A		
	NB	Right	102'	4.5	A	A (3.8)		13'	0.1	A	A (0.7)	
		Left	73'	4.2	A			67'	3.7	A		
SB	Thru	0	0.4	A	A (2.2)	0	0.4	A	A (1.7)			
	Left	73'	4.2	A		67'	3.7	A				
Herberger's Driveway & Washington Ave	EB	Left	Spire traffic only, nominal amount of vehicles				A (1.3)	Spire traffic only, nominal amount of vehicles				A (1.9)
		Right										
	WB	Left	54'	3.3	A	A (5.8)		67'	2.9	A	A (6.4)	
		Right	56'	2.9	A			49'	1.8	A		
	NB	Left	27'	4.3	A	A (0.8)		30'	3.7	A	A (1.0)	
		Thru	0	0.7	A			10'	0.9	A		
	SB	Right	0	0.4	A	A (0.6)		10'	0.7	A	A (0.5)	
		Left	24'	3.0	A			30'	3.1	A		
		Thru	31'	0.5	A			0	0.2	A		
		Right	11'	0.1	A			0	0.0	A		

Table 3.3 - LOS and Queue Lengths for TH 36 & Norell Ave N/Washington Ave Alternative 1 - 2017 Conditions														
Intersection	Direction	Movement	PM					Saturday						
			95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS		
W Frontage Rd & Washington Ave	EB	Left	280'	24.3	C	F (281.7)	F (82.8)	23'	17.9	C	F (82.9)	E (35.7)		
		Thru	651'	317.5	F			352'	91.8	F				
		Right	42'	296.3	F			42'	58.0	F				
	WB	Left	612'	647.7	F	F (329.6)		468'	253.4	F	F (158.2)			
		Thru	473'	44.3	E			189'	15.5	C				
	NB	Right	49'	13.5	B	A (2.9)		47'	5.5	A	A (2.6)			
		Left	84'	8.1	A			85'	5.9	A				
		Thru	67'	1.2	A			54'	1.4	A				
	SB	Right	15'	1.0	A	D (25.5)		8'	1.0	A	B (10.8)			
		Left	38'	6.2	A			27'	5.0	A				
		Thru	202'	26.3	D			109'	11.5	B				
	60th St N & Norell Ave N	EB	Right	216'	19.5	C		F (120.9)	D (27.9)	128'	6.9		A	F (439.3)
Left			346'	215.9	F	781'	643.2			F				
Thru			59'	17.7	C	785'	51.3			F				
WB		Right	50'	4.5	A	F (94.0)	49'	42.5		E	F (63.8)			
		Left	25'	19.4	C		33'	16.4		C				
		Thru	244'	87.0	F		223'	70.4		F				
NB		Right	52'	107.4	F	D (25.5)	46'	71.1		F	B (12.2)			
		Left	70'	7.1	A		46'	6.7		A				
		Thru	249'	26.2	D		197'	12.9		B				
SB		Right	221'	20.1	C	A (2.0)	142'	4.2		A	A (2.0)			
		Left	58'	5.7	A		59'	5.7		A				
		Thru	23'	1.4	A		17'	1.6		A				
TH 36 & Norell Ave N/ Washington Ave	EB	Right	7'	1.2	A	D (53.9)	D (48.1)	17'	1.3	A	D (45.0)	D (40.3)		
		Left	442'	113.6	F			277'	82.5	F				
		Thru	802'	51.0	D			849'	45.0	D				
	WB	Right	464'	29.2	C	D (36.2)		373'	21.6	C	C (34.7)			
		Left	223'	85.8	F			188'	62.2	E				
		Thru	425'	32.2	C			331'	31.7	C				
	NB	Right	273'	11.3	B	E (55.8)		170'	10.9	B	D (37.5)			
		Left	131'	57.9	E			124'	39.8	D				
		Thru	143'	65.8	E			128'	47.2	D				
	SB	Right	109'	41.9	D	D (49.8)		115'	20.5	C	D (42.8)			
		Left	120'	55.0	D			122'	42.1	D				
		Thru	127'	70.2	E			127'	58.5	E				
Walmart Driveway & Norell Ave N	WB	Right	112'	23.6	C	A (4.2)	A (1.6)	113'	20.9	C	A (4.3)	A (1.6)		
		Thru	60'	4.1	A			63'	4.3	A				
	NB	Right	17'	0.6	A	A (0.6)		8'	0.4	A	A (0.4)			
		Left	21'	0.8	A			5'	0.1	A				
Herberger's Driveway & Washington Ave	EB	Right	61'	3.3	A	A (1.5)	A (1.2)	60'	0.5	A	A (1.6)	A (1.9)		
		Left	0	0.4	A			0'	0.5	A				
	WB	Spire traffic only, nominal amount of vehicles						A (6.5)	Spire traffic only, nominal amount of vehicles					
		Left	55'	8.7	A	69'			7.9	A	A (6.8)			
		Right	54'	3.8	A	47'			3.1	A				
		Left	29'	4.4	A	32'			2.4	A				
	NB	Thru	5'	0.4	A	A (0.6)		12'	0.8	A	A (0.9)			
		Right	5'	0.4	A			12'	0.8	A				
	SB	Left	29'	3.3	A	A (0.5)		30'	3.9	A	A (0.6)			
		Thru	14'	0.3	A			0'	0.2	A				
			Right	13'	0.1	A			0'	0.1	A			

Table 3.4 - LOS and Queue Lengths for TH 36 & Norell Ave N/Washington Ave Alternative 1 - Forecast 2027 Conditions												
Intersection	Direction	Movement	PM					Saturday				
			95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS
W Frontage Rd & Washington Ave	EB	Left	393'	25.4	D	F (386.2)	F (107.1)	247'	29.5	D	F (249.4)	F (93.1)
		Thru	750'	337.3	F			683'	259.0	F		
		Right	43'	415.9	F			42'	258.7	F		
	WB	Left	667'	1191.1	F	F (622.2)		670'	792.9	F	F (520.3)	
		Thru	737'	64.7	F			743'	64.0	F		
		Right	46'	49.3	E			46'	50.3	F		
	NB	Left	88'	9.5	A	A (3.3)		90'	7.9	A	A (3.2)	
		Thru	104'	1.3	A			79'	1.3	A		
		Right	12'	1.0	A			12'	1.0	A		
	SB	Left	58'	9.8	A	D (28.1)		73'	6.2	A	C (18.1)	
		Thru	236'	29.0	D			173'	19.4	C		
		Right	228'	20.8	C			173'	14.5	B		
60th St N & Norell Ave N	EB	Left	677'	601.0	F	F (329.7)	F (59.9)	718'	1021.3	F	F (705.9)	F (76.5)
		Thru	559'	39.1	E			914'	122.1	F		
		Right	51'	12.5	B			47'	97.5	F		
	WB	Left	26'	17.3	C	F (168.4)		97'	22.6	C	F (140.6)	
		Thru	334'	161.5	F			407'	159.7	F		
		Right	51'	195.8	F			46'	155.1	F		
	NB	Left	44'	8.7	A	E (36.6)		66'	9.9	A	C (15.3)	
		Thru	291'	38.1	E			225'	16.2	C		
		Right	251'	16.4	C			177'	5.4	A		
	SB	Left	70'	7.3	A	A (2.2)		66'	6.3	A	A (2.1)	
		Thru	43'	1.4	A			43'	1.5	A		
		Right	14'	1.2	A			15'	1.4	A		
TH 36 & Norell Ave N/ Washington Ave	EB	Left	555'	149.3	F	F (94.1)	E (67.2)	453'	149.8	F	E (64.8)	D (49.3)
		Thru	1584'	91.0	F			872'	64.2	E		
		Right	472'	70.6	E			458'	36.4	D		
	WB	Left	297'	88.5	F	D (39.7)		198'	62.6	E	D (36.9)	
		Thru	513'	36.2	D			369'	34.0	C		
		Right	340'	13.9	B			212'	13.0	B		
	NB	Left	124'	62.4	E	E (57.6)		124'	41.8	D	D (38.4)	
		Thru	130'	65.0	E			134'	47.3	D		
		Right	108'	43.1	D			115'	20.6	C		
	SB	Left	122'	56.8	E	D (51.2)		123'	45.6	D	D (45.2)	
		Thru	130'	71.4	E			124'	60.2	E		
		Right	117'	26.3	C			115'	21.7	C		
Walmart Driveway & Norell Ave N	WB	Right	78'	5.2	A	A (5.2)	A (2.4)	64'	4.8	A	A (4.8)	A (1.8)
		Thru	52'	1.7	A			11'	0.5	A		
	NB	Right	14'	0.6	A	A (1.6)		11'	0.4	A	A (0.5)	
		Left	84'	4.6	A			70'	4.0	A		
SB	Thru	0	0.5	A	A (2.0)	0'	0.5	A	A (1.8)			
	Left	84'	4.6	A		70'	4.0	A				
Herberger's Driveway & Washington Ave	EB	Left	Spire traffic only, nominal amount of vehicles				A (1.4)	Spire traffic only, nominal amount of vehicles				
		Right										
	WB	Left	56'	9.9	A	A (7.5)		69'	7.9	A	A (6.8)	
		Right	52'	3.7	A			48'	3.3	A		
	NB	Left	33'	3.1	A	A (0.6)		28'	2.2	A	A (0.9)	
		Thru	4'	0.5	A			13'	0.8	A		
		Right	4'	0.3	A			13'	0.8	A		
	SB	Left	33'	3.5	A	A (0.7)		27'	3.2	A	A (0.5)	
		Thru	21'	0.5	A			4'	0.3	A		
		Right	10'	0.1	A			4'	0.0	A		

Table 3.5 - LOS and Queue Lengths for TH 36 & Norell Ave N/Washington Ave Alternative 2 - 2017 Conditions												
Intersection	Direction	Movement	PM					Saturday				
			95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS
W Frontage Rd & Washington Ave	EB	Right	467'	135.0	F	F (135.0)	D (28.2)	772'	384.6	F	F (384.6)	E (48.8)
	WB	Right	105'	12.4	B	B (12.4)		163'	15.1	C	C (15.1)	
	NB	Thru	101'	2.7	A	A (2.4)		79'	2.8	A	A (2.5)	
		Right	24'	1.2	A			32'	1.4	A		
	SB	Thru	357'	32.3	D	D (32.1)		332'	30.4	D	D (29.8)	
		Right	366'	31.7	D			366'	28.7	D		
60th St N & Norell Ave N	EB	Right	54'	4.2	A	A (4.2)	A (4.1)	71'	5.1	A	A (5.1)	A (9.0)
	NB	Thru	149'	7.6	A	A (7.6)		297'	19.1	C	C (19.2)	
		Right	19'	1.3	A	A (1.3)		5'	1.2	A	A (1.2)	
	SB	Thru	12'	1.2	A			5'	1.2	A		
TH 36 & Norell Ave N/ Washington Ave	EB	Left	508'	135.9	F	E (67.2)	E (56.5)	335'	153.2	F	D (53.9)	D (45.4)
		Thru	1143'	62.8	E			636'	44.2	D		
		Right	444'	39.7	D			328'	22.8	C		
	WB	Left	269'	81.1	F	D (38.4)		237'	65.7	E	D (36.6)	
		Thru	748'	36.2	D			344'	33.6	C		
		Right	286'	11.9	B			124'	11.4	B		
	NB	Left	201'	65.8	E	E (63.7)		126'	37.6	D	D (37.5)	
		Thru	207'	80.5	F			160'	47.4	D		
		Right	176'	37.9	D			122'	20.8	C		
	SB	Left	167'	64.9	E	E (57.1)		131'	49.9	D	D (52.0)	
		Thru	183'	79.0	E			135'	74.8	E		
		Right	130'	27.3	D			129'	22.7	C		
Walmart Driveway & Norell Ave N (Roundabout)	WB	Left	64'	4.2	A	A (3.8)	A (4.4)	116'	7.1	A	A (6.3)	A (8.2)
		Right	64'	3.8	A			116'	6.3	A		
	NB	Thru	96'	6.2	A	A (5.8)		212'	14.6	B	B (14.7)	
		Right	96'	5.4	A			212'	15.6	C		
	SB	Left	18'	3.7	A	A (3.8)		149'	6.0	A	A (5.4)	
		Thru	18'	4.0	A			77'	4.2	A		
Herberger's Driveway & Washington Ave (Roundabout)	EB	Left	Spire traffic only, nominal amount of vehicles					Spire traffic only, nominal amount of vehicles				
		Right										
	WB	Left	72'	6.1	A	A (7.0)	109'	13.1	B	B (12.6)		
		Right	72'	8.0	A		109'	10.8	B			
	NB	Left	299'	15.7	C	B (11.5)	280'	18.9	C	B (12.3)		
		Thru	299'	12.0	B		280'	13.0	B			
		Right	112'	3.5	A		138'	5.0	A			
	SB	Left	263'	16.8	C	C (22.5)	219'	28.5	D	D (28.6)		
		Thru	263'	22.9	C		219'	28.9	D			
		Right	263'	18.2	C		219'	21.6	C			

Table 3.6 - LOS and Queue Lengths for TH 36 & Norell Ave N/Washington Ave Alternative 2 - 2027 Conditions													
Intersection	Direction	Movement	PM					Saturday					
			95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	
W Frontage Rd & Washington Ave	EB	Right	732'	299.3	F	F (299.3)	F (52.2)	727'	467.7	F	F (467.7)	F (52.2)	
	WB	Right	158'	23.1	C	C (23.2)		108'	9.3	A	A (9.3)		
	NB	Thru	176'	4.2	A	A (3.5)		54'	1.8	A	A (1.7)		
		Right	41'	1.3	A			11'	1.1	A			
	SB	Thru	411'	45.6	E	E (44.9)		316'	24.5	C	C (22.0)		
		Right	304'	43.0	E			289'	17.3	C			
60th St N & Norell Ave N	EB	Right	58'	4.4	A	A (4.4)	A (8.3)	109'	9.9	A	A (9.9)	C (16.2)	
	NB	Thru	234'	17.4	C	C (17.4)		415'	35.0	D	D (35.0)		
		Thru	8'	1.2	A	A (1.3)		46'	2.0	A	A (1.8)		
	SB	Right	15'	1.4	A			36'	1.4	A			
TH 36 & Norell Ave N/ Washington Ave	EB	Left	585'	213.7	F	F (104.0)	E (73.7)	558'	280.0	F	F (96.2)	E (62.7)	
		Thru	1778'	93.7	F			1393'	73.4	E			
		Right	479'	69.8	E			453'	47.1	D			
	WB	Left	284'	83.2	F	B (17.4)		221'	68.5	E	D (38.6)		
		Thru	521'	37.7	D			392'	35.5	D			
		Right	322'	14.8	B			243'	13.2	B			
	NB	Left	200'	72.8	E	A (1.3)		122'	41.1	D	D (36.8)		
		Thru	205'	92.3	F			160'	42.6	D			
		Right	196'	46.2	D			128'	21.3	C			
	SB	Left	173'	66.4	E	E (55.4)		120'	54.9	D	D (53.9)		
		Thru	170'	73.7	E			132'	72.8	E			
		Right	161'	25.8	C			124'	25.2	C			
Walmart Driveway & Norell Ave N (Roundabout)	WB	Left	85'	3.9	A	A (5.2)	A (5.9)	161'	9.7	A	B (10.6)	C (22.9)	
		Right	85'	5.2	A			161'	10.7	B			
	NB	Thru	151'	9.2	A	A (8.6)		408'	50.1	F	F (50.3)		
		Right	151'	8.0	A			408'	51.3	F			
	SB	Left	110'	4.4	A	A (4.6)		256'	16.4	C	B (13.6)		
		Thru	110'	4.8	A			220'	9.3	A			
Herberger's Driveway & Washington Ave (Roundabout)	EB	Left	Spire traffic only, nominal amount of vehicles					D (27.2)	Spire traffic only, nominal amount of vehicles				
		Right											
	WB	Left	91'	11.7	B	B (12.9)	77'		5.6	A	A (5.6)		
		Right	91'	14.6	B		77'		5.6	A			
	NB	Left	390'	16.0	C	C (19.1)	249'		10.3	B	A (8.6)		
		Thru	390'	20.0	C		249'		9.8	A			
		Right	173'	4.8	A		102'		3.4	A			
	SB	Left	345'	45.7	E	E (45.5)	151'		11.1	B	B (11.8)		
		Thru	345'	45.6	E		151'		11.8	B			
		Right	345'	40.5	E		151'		9.7	A			

Table 3.7 - LOS and Queue Lengths for TH 36 & Norell Ave N/Washington Ave Alternative 3 - 2017 Conditions												
Intersection	Direction	Movement	PM					Saturday				
			95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS
W Frontage Rd & Washington Ave (Roundabout)	EB	Left	50'	3.5	A	A (3.6)	A (7.1)	61'	3.8	A	A (4.0)	A (8.1)
		Thru	50'	4.3	A			61'	5.2	A		
		Right	50'	3.6	A			61'	4.0	A		
	WB	Left	61'	3.7	A	A (3.8)		83'	5.1	A	A (5.1)	
		Thru	61'	4.4	A			83'	5.9	A		
		Right	61'	3.7	A			83'	5.1	A		
	NB	Left	256'	11.4	B	B (10.2)		238'	14.0	B	B (12.0)	
		Thru	256'	12.3	B			238'	14.8	B		
		Right	256'	5.0	A			238'	7.6	A		
	SB	Left	85'	5.4	A	A (5.6)		74'	4.9	A	A (5.2)	
		Thru	85'	5.7	A			74'	5.4	A		
		Right	85'	3.6	A			74'	4.5	A		
60th St N & Norell Ave N (Roundabout)	EB	Left	52'	3.5	A	A (3.8)	A (6.1)	62'	4.3	A	A (4.5)	
		Thru	52'	4.5	A			62'	5.3	A		
		Right	52'	3.7	A			62'	4.5	A		
	WB	Left	65'	3.9	A	A (3.9)		73'	4.3	A	A (4.4)	
		Thru	65'	4.8	A			73'	5.4	A		
		Right	65'	3.8	A			73'	4.3	A		
	NB	Left	77'	4.8	A	A (5.4)		100'	5.4	A	A (6.4)	
		Thru	77'	5.4	A			100'	6.5	A		
		Right	77'	4.7	A			100'	6.0	A		
	SB	Left	187'	8.6	A	A (7.6)		250'	12.8	B	B (10.9)	
		Thru	187'	8.7	A			250'	13.9	B		
		Right	187'	5.8	A			250'	6.7	A		
TH 36 & Norell Ave N/ Washington Ave	EB	Left	466'	115.2	F	D (53.7)	D (49.5)	367'	95.6	F	D (53.6)	
		Thru	805'	49.7	D			666'	53.9	D		
		Right	456'	28.0	C			431'	25.4	C		
	WB	Left	259'	89.4	F	D (37.2)		184'	57.1	E	C (33.6)	
		Thru	450'	34.0	C			359'	31.7	C		
		Right	320'	10.8	B			170'	9.9	A		
	NB	Left	278'	69.5	E	E (61.6)		274'	51.1	D	D (41.8)	
		Thru	262'	75.5	E			212'	48.4	D		
		Right	179'	36.3	D			133'	18.8	B		
	SB	Left	240'	60.0	E	D (53.6)		195'	45.6	D	D (49.7)	
		Thru	246'	73.5	E			234'	70.9	E		
		Right	202'	30.1	C			168'	20.6	C		

Table 3.8 - LOS and Queue Lengths for TH 36 & Norell Ave N/Washington Ave Alternative 3 - Forecast 2027 Conditions												
Intersection	Direction	Movement	PM					Saturday				
			95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS	95 % Queue	Delay/ Vehicle	MVMT LOS	LOS	LOS
W Frontage Rd & Washington Ave (Roundabout)	EB	Left	30'	10.8	B	B (14.8)	A (7.4)	35'	13.9	B	B (14.2)	B (10.6)
		Thru	131'	26.5	D			133'	25.6	D		
		Right	131'	13.4	B			133'	13.3	B		
	WB	Left	149'	30.2	D	C (21.7)		244'	39.7	E	C (29.1)	
		Thru	58'	13.1	B			58'	12.7	B		
		Right	58'	5.1	A			58'	4.9	A		
	NB	Left	88'	6.1	A	A (3.8)		88'	5.7	A	A (3.5)	
		Thru	13'	2.8	A			4'	1.8	A		
		Right	22'	3.1	A			39'	3.1	A		
	SB	Left	21'	6.3	A	A (0.8)		49'	6.7	A	A (1.7)	
		Thru	3'	0.7	A			17'	0.9	A		
		Right	11'	0.4	A			17'	0.4	A		
60th St N & Norell Ave N (Roundabout)	EB	Left	84'	20.0	C	C (15.3)	A (5.7)	292'	88.0	F	F (62.1)	C (24.4)
		Thru	66'	16.0	C			86'	19.5	C		
		Right	66'	5.0	A			86'	7.8	A		
	WB	Left	30'	9.9	A	B (12.2)		457'	25.9	D	F (87.1)	
		Thru	139'	25.9	D			541'	110.4	F		
		Right	139'	11.0	B			541'	87.7	F		
	NB	Left	23'	4.4	A	A (1.0)		38'	5.9	A	A (1.3)	
		Thru	10'	0.9	A			11'	1.0	A		
		Right	19'	0.5	A			27'	0.8	A		
	SB	Left	112'	6.4	A	A (4.0)		115'	6.8	A	A (4.2)	
		Thru	38'	2.7	A			26'	2.9	A		
		Right	15'	2.8	A			26'	2.8	A		
TH 36 & Norell Ave N/ Washington Ave (signalized)	EB	Left	515'	129.2	F	E (73.4)	E (59.8)	487'	108.1	F	E (63.5)	D (48.6)
		Thru	1264'	69.9	E			721'	63.5	E		
		Right	482'	49.3	E			471'	35.4	D		
	WB	Left	354'	90.7	F	D (41.4)		199'	58.1	E	F (87.1)	
		Thru	535'	37.7	D			350'	33.3	C		
		Right	403'	16.0	B			200'	12.1	B		
	NB	Left	300'	73.8	E	E (66.3)		312'	51.7	D	A (1.3)	
		Thru	270'	78.1	E			225'	48.5	D		
		Right	226'	43.9	D			164'	22.5	C		
	SB	Left	246'	56.5	E	D (54.3)		232'	51.7	D	A (4.2)	
		Thru	256'	73.1	E			200'	53.7	D		
		Right	227'	34.6	C			165'	20.6	C		

Based on the results shown in **Tables 3.2-3.8**, the following summarizes the results of the traffic operations analysis at the TH 36 at Washington Avenue/Norell Avenue N intersection:

- **Alternative No. 1** is expected to provide only minor relief on the system. The added turn lanes provide some additional space for queueing, but not enough to provide significant improvement. Conditions will continue to deteriorate under forecast conditions.
- **Alternative No. 1a** is not a viable option. By requiring traffic to make U-turns on Washington Avenue and Norell Avenue N at the ends of the medians, the traffic operations at the U-turn locations breaks down due to the length of the queues that develop from the W Frontage Road and 60th Street N intersections. This scenario also creates extremely long queues on W Frontage Road and 60th St. N.
- **Alternative No. 2** is expected to operate successfully under existing conditions for most of the system. The analysis shows considerable improvement on the Norell Avenue N portion of the corridor. However, conditions on the Washington Avenue side, while showing improvement, still remain poor for some movements. In particular, movements from the west leg of W Frontage Road onto Washington Avenue southbound are still hampered by queues from the vehicles queued at the TH 36 intersection.
- The forecast conditions for **Alternative No. 2** show worsening conditions on Washington Avenue. Queues from the TH 36 intersection continue to inhibit movements causing excessive delays. The analysis shows conditions on Norell Avenue N continue to operate at acceptable levels, but some movements begin to experience considerable delays.
- **Alternative No. 3** is expected to operate successfully under existing and forecast conditions. Both side street intersections are expected to operate at LOS C or better. It should be noted, that while some movements in the SimTraffic analysis were shown to be failing, the Rodel analysis showed all movements operating successfully.

Detailed Synchro/SimTraffic outputs are included in the Appendix.

C. PROJECT COST DISCUSSION

The estimated project cost of each alternative is provided below. These estimates are planning level estimates and are subject to change upon further investigation and refinement of the design alternatives.

Alternative No. 1: \$201,650

Alternative No 1a: Not a viable option

Alternative No. 2: \$2,479,000

Alternative No. 3: \$3,782,500

FIGURE 8



DRAFT COST ESTIMATE ALTERNATIVE 1

TH 36 AT NORELL AVENUE INTERSECTION STUDY
 CITY OF OAK PARK HEIGHTS
 STANTEC PROJECT # 193804019

PREPARED BY: SMV
 DATE: 6/1/2018

NO.	MATERIAL NUMBER	ITEM	NOTE	UNIT	UNIT PRICE	TOTAL PROJECT	
						QUANTITY	COST
1	2021.501	MOBILIZATION	1	LUMP SUM	\$ 5,656.00	1	\$ 5,656.00
2	2104.503	SAWING BIT PAVEMENT (FULL DEPTH)		LIN FT	\$ 3.00	680	\$ 2,040.00
3	2104.503	REMOVE CURB & GUTTER		LIN FT	\$ 6.00	580	\$ 3,480.00
4	2104.504	REMOVE CONCRETE WALK		SQ YD	\$ 5.00	146	\$ 730.00
5	2104.504	REMOVE BITUMINOUS PAVEMENT		SQ YD	\$ 5.00	425	\$ 2,125.00
6	2231.604	BITUMINOUS PATCH SPECIAL		SQ YD	\$ 55.00	425	\$ 23,375.00
7	2433.618	RECONSTRUCT SIDEWALK (ADA)		SQ FT	\$ 45.00	961	\$ 43,245.00
8	2433.618	RECONSTRUCT APPROACH MEDIAN		SQ FT	\$ 30.00	540	\$ 16,200.00
9	2521.518	4" CONCRETE WALK		SQ FT	\$ 7.00	1,310	\$ 9,170.00
10	2531.503	CONCRETE CURB & GUTTER DESIGN B624		LIN FT	\$ 22.00	580	\$ 12,760.00
11	2563.601	TRAFFIC CONTROL	2	LUMP SUM	\$ 4,525.00	1	\$ 4,525.00
12	2564.601	SIGNING & PAVEMENT MARKING	3	LUMP SUM	\$ 1,131.00	1	\$ 1,131.00
13	2573.601	TEMPORARY EROSION CONTROL	4	LUMP SUM	\$ 2,263.00	1	\$ 2,263.00
14	2575.501	TURF ESTABLISHMENT	5	LUMP SUM	\$ 3,394.00	1	\$ 3,394.00
SUBTOTAL							\$ 130,094.00
30% CONTINGENCY							\$ 39,028.20
25% ENGINEERING & ADMINISTRATION							\$ 32,523.50
TOTAL CONSTRUCTION ESTIMATE							\$ 201,645.70

GENERAL NOTE:
 COST ESTIMATE DOES NOT INLCUDE ANY SIGNAL IMPROVEMENTS

- SPECIFIC NOTES:
- 1 5% PROJECT TOTAL
 - 2 4% PROJECT TOTAL
 - 3 1% PROJECT TOTAL
 - 4 2% PROJECT TOTAL
 - 5 3% PROJECT TOTAL

FIGURE 9



DRAFT COST ESTIMATE ALTERNATIVE 2

TH 36 AT NORELL AVENUE INTERSECTION STUDY
 CITY OF OAK PARK HEIGHTS
 STANTEC PROJECT # 193804019

PREPARED BY: SMV
 DATE: 6/1/2018

NO.	MATERIAL NUMBER	ITEM	NOTE	UNIT	UNIT PRICE	TOTAL PROJECT	
						QUANTITY	COST
1	2021.501	MOBILIZATION	1	LUMP SUM	\$ 65,012.00	1	\$ 65,012.00
2	2104.503	SAWING BIT PAVEMENT (FULL DEPTH)		LIN FT	\$ 3.00	2,100	\$ 6,300.00
3	2104.503	REMOVE CURB & GUTTER		LIN FT	\$ 6.00	6,500	\$ 39,000.00
4	2104.504	REMOVE CONCRETE WALK		SQ YD	\$ 5.00	1,334	\$ 6,670.00
5	2104.504	REMOVE BITUMINOUS PAVEMENT		SQ YD	\$ 5.00	23,352	\$ 116,760.00
6	2106.507	EXCAVATION - COMMON		CU YD	\$ 8.00	26,106	\$ 208,848.00
7	2106.507	SELECT GRANULAR EMBANKMENT (CV)		CU YD	\$ 18.00	6,133	\$ 110,394.00
8	2211.507	AGGREGATE BASE (CV) CLASS 5		CU YD	\$ 30.00	5,159	\$ 154,770.00
9	2301.504	CONCRETE PAVEMENT 7.0"		SQ YD	\$ 66.00	2,112	\$ 139,392.00
10	2360.509	TYPE SP 12.5 WEARING COURSE MIX (3,B)		TON	\$ 55.00	1,899	\$ 104,445.00
11	2506.601	DRAINAGE	2	LUMP SUM	\$ 52,010.00	1	\$ 52,010.00
12	2521.518	4" CONCRETE WALK		SQ FT	\$ 7.00	22,450	\$ 157,150.00
13	2531.503	CONCRETE CURB & GUTTER DESIGN SPECIAL		LIN FT	\$ 22.00	960	\$ 21,120.00
14	2531.503	CONCRETE CURB & GUTTER DESIGN B424		LIN FT	\$ 22.00	3,350	\$ 73,700.00
15	2531.503	CONCRETE CURB & GUTTER DESIGN B624		LIN FT	\$ 22.00	7,350	\$ 161,700.00
16	2545.501	LIGHTING SYSTEM	2	LUMP SUM	\$ 52,010.00	1	\$ 52,010.00
17	2563.601	TRAFFIC CONTROL	2	LUMP SUM	\$ 52,010.00	1	\$ 52,010.00
18	2564.601	SIGNING & PAVEMENT MARKING	3	LUMP SUM	\$ 13,002.00	1	\$ 13,002.00
19	2573.601	TEMPORARY EROSION CONTROL	4	LUMP SUM	\$ 26,005.00	1	\$ 26,005.00
20	2575.501	TURF ESTABLISHMENT	5	LUMP SUM	\$ 39,007.00	1	\$ 39,007.00
SUBTOTAL							\$ 1,599,305.00
30% CONTINGENCY							\$ 479,791.50
25% ENGINEERING & ADMINISTRATION							\$ 399,826.25
TOTAL CONSTRUCTION ESTIMATE							\$ 2,478,922.75

GENERAL NOTE:
 COST ESTIMATE DOES NOT INCLUDE ANY SIGNAL IMPROVEMENTS

- SPECIFIC NOTES:
- 1 5% PROJECT TOTAL
 - 2 4% PROJECT TOTAL
 - 3 1% PROJECT TOTAL
 - 4 2% PROJECT TOTAL
 - 5 3% PROJECT TOTAL

FIGURE 10



DRAFT COST ESTIMATE ALTERNATIVE 3

TH 36 AT NORELL AVENUE INTERSECTION STUDY
 CITY OF OAK PARK HEIGHTS
 STANTEC PROJECT # 193804019

PREPARED BY: SMV
 DATE: 6/1/2018

NO.	MATERIAL NUMBER	ITEM	NOTE	UNIT	UNIT PRICE	TOTAL PROJECT	
						QUANTITY	COST
1	2021.501	MOBILIZATION	1	LUMP SUM	\$ 99,199.00	1	\$ 99,199.00
2	2104.503	SAWING BIT PAVEMENT (FULL DEPTH)		LIN FT	\$ 3.00	2,600	\$ 7,800.00
3	2104.503	REMOVE CURB & GUTTER		LIN FT	\$ 6.00	10,250	\$ 61,500.00
4	2104.504	REMOVE CONCRETE WALK		SQ YD	\$ 5.00	1,334	\$ 6,670.00
5	2104.504	REMOVE BITUMINOUS PAVEMENT		SQ YD	\$ 5.00	47,334	\$ 236,670.00
6	2106.507	EXCAVATION - COMMON		CU YD	\$ 8.00	47,125	\$ 377,000.00
7	2106.507	SELECT GRANULAR EMBANKMENT (CV)		CU YD	\$ 18.00	9,281	\$ 167,058.00
8	2211.507	AGGREGATE BASE (CV) CLASS 5		CU YD	\$ 30.00	7,639	\$ 229,170.00
9	2301.504	CONCRETE PAVEMENT 7.0"		SQ YD	\$ 66.00	2,800	\$ 184,800.00
10	2360.509	TYPE SP 12.5 WEARING COURSE MIX (3,B)		TON	\$ 55.00	3,004	\$ 165,220.00
11	2506.601	DRAINAGE	2	LUMP SUM	\$ 79,360.00	1	\$ 79,360.00
12	2521.518	4" CONCRETE WALK		SQ FT	\$ 7.00	25,500	\$ 178,500.00
13	2531.503	CONCRETE CURB & GUTTER DESIGN SPECIAL		LIN FT	\$ 22.00	1,300	\$ 28,600.00
14	2531.503	CONCRETE CURB & GUTTER DESIGN B424		LIN FT	\$ 22.00	4,000	\$ 88,000.00
15	2531.503	CONCRETE CURB & GUTTER DESIGN B624		LIN FT	\$ 22.00	11,500	\$ 253,000.00
16	2545.501	LIGHTING SYSTEM	2	LUMP SUM	\$ 79,360.00	1	\$ 79,360.00
17	2563.601	TRAFFIC CONTROL	2	LUMP SUM	\$ 79,360.00	1	\$ 79,360.00
18	2564.601	SIGNING & PAVEMENT MARKING	3	LUMP SUM	\$ 19,840.00	1	\$ 19,840.00
19	2573.601	TEMPORARY EROSION CONTROL	4	LUMP SUM	\$ 39,680.00	1	\$ 39,680.00
20	2575.501	TURF ESTABLISHMENT	5	LUMP SUM	\$ 59,520.00	1	\$ 59,520.00
SUBTOTAL							\$ 2,440,307.00
30% CONTINGENCY							\$ 732,092.10
25% ENGINEERING & ADMINISTRATION							\$ 610,076.75
TOTAL CONSTRUCTION ESTIMATE							\$ 3,782,475.85

GENERAL NOTE:

COST ESTIMATE DOES NOT INCLUDE ANY SIGNAL IMPROVEMENTS, R/W ACQUISITION, OR WETLAND MITIGATION.

SPECIFIC NOTES:

- 1 5% PROJECT TOTAL
- 2 4% PROJECT TOTAL
- 3 1% PROJECT TOTAL
- 4 2% PROJECT TOTAL
- 5 3% PROJECT TOTAL

IV. Findings and Recommendations

Based on the results of this analysis, it is recommended that the alternatives be considered for implementation in succession for the following reasons:

- Alternative No. 1 can be completed immediately, and it will provide some relief to the queue lengths on Norell Avenue N northbound and have some operational benefits for the TH 36 and Washington Avenue/Norell Avenue N intersection. The added dedicated right turn lane will allow more vehicles to complete their movements per cycle. There may also be some crash reduction on Washington Avenue northbound at W Frontage Road with the added storage space for northbound left-turning vehicles reducing potential conflicts. However, the problems that currently exist will persist. The queues on Washington Avenue and Norell Avenue N will continue to inhibit the movements from W Frontage Road and 60th Street N, respectively. These improvements are also not expected to have a significant impact on crash reduction at the Norell Avenue N and 60th Street intersection or TH 36 and Washington Avenue/Norell Avenue N intersection.
- Alternative No. 2 is seen as an intermediate step. By limiting the movements from the approaches on both frontage roads there is a reduction in the number of conflict points. It is expected that this will have a significant impact on reducing crashes at both frontage road intersections, and some crash reduction at the primary intersection as well. Also, realigning the east leg of 60th Street N will reduce the delays of vehicles from that approach. Delays will continue to be a problem for the west leg of W Frontage Road at Washington Avenue. Furthermore, the forecast analysis showed that queue lengths on Washington Avenue southbound begin to reach back to the roundabout in the forecast analysis. In this scenario the model assumes that vehicles traveling southbound on Washington Avenue do not utilize the intersection space at W Frontage Road for queueing. If queueing on Washington Avenue or Norell Avenue N begin to extend into the roundabout, the cities may need to provide an alternative connection to the local road system to provide a route that does not go through the TH 36 at Washington Avenue/Norell Avenue N intersection.
- Alternative No. 3 is seen as the long-term improvement. By moving the frontage road intersections away from the primary intersection, movements are not expected to be inhibited by large queue lengths extending back from the TH 36 intersection. By moving all legs of the frontage roads away from the primary intersection it is expected to reduce driver confusion and unease. This in turn should improve the driver behavior of the system and lead to a reduction in crashes.

It is recommended that the cities each explore options to acquire the right of way necessary to complete the realignments of the frontage roads as opportunities present themselves.

Appendix

Traffic Volumes

Synchro Analysis Output

Rodel Output



File Name : 1 - Washington Ave & W Frontage Rd, 10-12-17, 6am-7pm

Site Code : 1

Start Date : 10/12/2017

Page No : 1

Washington Ave & W Frontage Rd
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						W Frontage Rd Westbound						Washington Ave Northbound						W Frontage Rd Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	1	17	0	0	18	0	5	0	1	0	6	0	5	10	12	0	27	0	0	0	3	0	3	54
06:15 AM	0	0	22	1	0	23	0	6	0	1	0	7	0	7	19	6	0	32	0	0	1	7	0	8	70
06:30 AM	0	0	21	1	0	22	0	7	1	0	0	8	0	7	25	21	0	53	0	0	1	3	0	4	87
06:45 AM	0	0	40	0	0	40	0	7	0	3	0	10	0	14	42	25	0	81	0	0	1	6	0	7	138
Total	0	1	100	2	0	103	0	25	1	5	0	31	0	33	96	64	0	193	0	0	3	19	0	22	349
07:00 AM	0	0	36	0	0	36	0	6	3	2	0	11	0	16	40	18	0	74	0	0	1	10	0	11	132
07:15 AM	1	0	58	1	0	60	0	5	1	3	0	9	0	10	52	23	0	85	0	1	3	14	0	18	172
07:30 AM	0	1	39	2	0	42	0	5	4	1	0	10	0	18	74	19	0	111	0	0	2	11	0	13	176
07:45 AM	0	3	27	2	0	32	0	2	2	2	0	6	0	21	69	29	0	119	0	0	2	9	0	11	168
Total	1	4	160	5	0	170	0	18	10	8	0	36	0	65	235	89	0	389	0	1	8	44	0	53	648
08:00 AM	0	1	42	3	0	46	0	5	0	3	0	8	0	17	48	25	0	90	0	2	5	15	0	22	166
08:15 AM	0	4	41	2	0	47	0	9	3	2	0	14	0	17	63	26	0	106	0	2	0	18	1	21	188
08:30 AM	0	5	58	2	0	65	0	8	2	3	0	13	0	17	49	29	0	95	0	1	4	15	0	20	193
08:45 AM	0	1	36	1	0	38	0	8	4	7	0	19	0	26	40	26	0	92	0	0	0	8	0	8	157
Total	0	11	177	8	0	196	0	30	9	15	0	54	0	77	200	106	0	383	0	5	9	56	1	71	704
09:00 AM	0	3	46	0	0	49	0	16	2	4	0	22	0	15	52	34	1	102	0	1	6	17	0	24	197
09:15 AM	2	4	47	5	0	58	0	12	6	3	0	21	0	37	51	28	0	116	0	0	3	28	0	31	226
09:30 AM	0	4	48	3	0	55	0	23	6	5	0	34	0	25	58	28	0	111	0	0	3	33	0	36	236
09:45 AM	0	1	67	7	0	75	0	21	3	4	0	28	0	35	77	25	0	137	0	0	8	22	0	30	270
Total	2	12	208	15	0	237	0	72	17	16	0	105	0	112	238	115	1	466	0	1	20	100	0	121	929
10:00 AM	2	1	54	5	0	62	0	11	8	5	0	24	0	35	71	18	0	124	0	5	3	37	0	45	255
10:15 AM	1	6	70	3	0	80	0	12	8	3	0	23	0	32	66	19	0	117	0	4	2	35	0	41	261
10:30 AM	1	5	83	3	0	92	0	16	8	9	0	33	0	27	75	33	0	135	0	2	2	21	0	25	285
10:45 AM	0	1	69	4	0	74	0	17	4	3	0	24	1	33	71	22	0	127	0	2	5	37	0	44	269
Total	4	13	276	15	0	308	0	56	28	20	0	104	1	127	283	92	0	503	0	13	12	130	0	155	1070
11:00 AM	0	5	98	7	0	110	0	17	9	9	0	35	0	33	77	24	0	134	0	0	4	36	0	40	319
11:15 AM	0	4	86	3	0	93	0	21	6	9	1	37	0	18	69	38	0	125	0	1	2	33	0	36	291
11:30 AM	0	7	83	7	0	97	0	15	7	7	0	29	1	39	75	35	0	150	0	2	1	47	0	50	326
11:45 AM	2	7	100	5	0	114	0	18	8	12	0	38	0	35	85	30	0	150	0	1	3	37	0	41	343
Total	2	23	367	22	0	414	0	71	30	37	1	139	1	125	306	127	0	559	0	4	10	153	0	167	1279
12:00 PM	0	5	110	6	0	121	0	30	10	7	0	47	0	29	99	43	0	171	0	5	3	42	0	50	389
12:15 PM	2	1	88	6	0	97	0	22	4	8	0	34	0	39	79	36	0	154	0	5	1	37	0	43	328
12:30 PM	0	2	102	5	0	109	0	29	7	7	1	44	0	34	88	24	0	146	0	5	2	33	0	40	339
12:45 PM	0	7	79	12	0	98	0	17	7	14	0	38	0	40	113	40	1	194	0	3	6	35	0	44	374
Total	2	15	379	29	0	425	0	98	28	36	1	163	0	142	379	143	1	665	0	18	12	147	0	177	1430
01:00 PM	0	8	84	7	0	99	0	15	7	9	0	31	0	44	80	33	0	157	0	2	3	51	1	57	344
01:15 PM	0	7	89	7	0	103	0	28	6	10	0	44	0	30	81	32	0	143	0	3	1	26	0	30	320
01:30 PM	1	8	81	2	0	92	0	24	6	13	0	43	0	43	101	23	0	167	0	2	8	43	0	53	355
01:45 PM	0	4	84	10	0	98	0	16	4	12	0	32	0	26	83	38	0	147	0	0	8	42	0	50	327
Total	1	27	338	26	0	392	0	83	23	44	0	150	0	143	345	126	0	614	0	7	20	162	1	190	1346
02:00 PM	0	5	77	4	0	86	0	18	8	7	0	33	2	32	68	27	0	129	0	2	3	34	0	39	287
02:15 PM	0	0	74	2	0	76	0	23	5	8	0	36	1	31	72	30	0	134	0	1	2	25	0	28	274



File Name : 1 - Washington Ave & W Frontage Rd, 10-12-17, 6am-7pm

Site Code : 1

Start Date : 10/12/2017

Page No : 2

Washington Ave & W Frontage Rd
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						W Frontage Rd Westbound						Washington Ave Northbound						W Frontage Rd Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:30 PM	0	8	83	3	0	94	0	18	7	8	0	33	0	38	106	35	0	179	0	2	6	20	0	28	334
02:45 PM	1	4	93	6	1	105	0	29	8	10	0	47	0	40	82	32	0	154	0	1	7	37	0	45	351
Total	1	17	327	15	1	361	0	88	28	33	0	149	3	141	328	124	0	596	0	6	18	116	0	140	1246
03:00 PM	0	4	104	2	0	110	0	24	12	12	0	48	0	37	71	34	0	142	0	2	3	30	0	35	335
03:15 PM	0	9	95	5	0	109	0	23	5	15	0	43	0	28	91	34	0	153	0	2	4	35	0	41	346
03:30 PM	1	6	112	5	0	124	0	23	11	13	0	47	0	33	105	36	0	174	0	0	6	24	0	30	375
03:45 PM	2	7	86	4	0	99	0	22	4	10	0	36	0	37	95	31	0	163	0	3	3	24	1	31	329
Total	3	26	397	16	0	442	0	92	32	50	0	174	0	135	362	135	0	632	0	7	16	113	1	137	1385
04:00 PM	0	3	103	5	0	111	0	17	9	17	0	43	0	36	75	34	0	145	0	0	5	35	1	41	340
04:15 PM	0	4	110	3	0	117	0	17	3	18	0	38	0	46	92	42	0	180	0	2	6	38	0	46	381
04:30 PM	0	2	103	3	0	108	0	24	7	17	0	48	0	49	94	32	0	175	0	5	4	35	1	45	376
04:45 PM	1	3	98	4	0	106	0	26	9	10	0	45	0	29	94	29	0	152	0	2	6	35	0	43	346
Total	1	12	414	15	0	442	0	84	28	62	0	174	0	160	355	137	0	652	0	9	21	143	2	175	1443
05:00 PM	0	4	104	4	2	114	0	13	8	11	0	32	1	32	72	26	0	131	0	0	7	31	0	38	315
05:15 PM	0	8	116	3	0	127	0	22	8	14	0	44	0	42	100	43	0	185	0	1	11	32	0	44	400
05:30 PM	0	4	102	4	0	110	0	25	9	6	1	41	0	28	86	42	0	156	0	1	4	25	0	30	337
05:45 PM	0	4	56	4	0	64	0	30	10	8	1	49	0	35	73	34	0	142	0	3	8	32	0	43	298
Total	0	20	378	15	2	415	0	90	35	39	2	166	1	137	331	145	0	614	0	5	30	120	0	155	1350
06:00 PM	0	6	72	5	0	83	0	23	5	6	0	34	1	27	67	30	0	125	0	0	8	35	0	43	285
06:15 PM	0	4	75	1	1	81	0	23	4	15	0	42	0	29	79	21	0	129	0	2	6	33	0	41	293
06:30 PM	0	3	61	1	0	65	0	30	3	4	0	37	0	22	70	21	0	113	0	1	3	31	0	35	250
06:45 PM	0	5	55	1	0	61	0	16	4	7	0	27	0	26	60	24	0	110	0	2	4	33	0	39	237
Total	0	18	263	8	1	290	0	92	16	32	0	140	1	104	276	96	0	477	0	5	21	132	0	158	1065
Grand Total	17	199	3784	191	4	4195	0	899	285	397	4	1585	7	1501	3734	1499	2	6743	0	81	200	1435	5	1721	14244
Apprch %	0.4	4.7	90.2	4.6	0.1		0	56.7	18	25	0.3		0.1	22.3	55.4	22.2	0		0	4.7	11.6	83.4	0.3		
Total %	0.1	1.4	26.6	1.3	0	29.5	0	6.3	2	2.8	0	11.1	0	10.5	26.2	10.5	0	47.3	0	0.6	1.4	10.1	0	12.1	
Cars +	17	196	3705	190	3	4111	0	877	281	391	4	1553	7	1480	3677	1466	0	6630	0	79	197	1420	2	1698	13992
% Cars +	100	98.5	97.9	99.5	75	98	0	97.6	98.6	98.5	100	98	100	98.6	98.5	97.8	0	98.3	0	97.5	98.5	99	40	98.7	98.2
Trucks	0	3	79	1	1	84	0	22	4	6	0	32	0	21	57	33	2	113	0	2	3	15	3	23	252
% Trucks	0	1.5	2.1	0.5	25	2	0	2.4	1.4	1.5	0	2	0	1.4	1.5	2.2	100	1.7	0	2.5	1.5	1	60	1.3	1.8



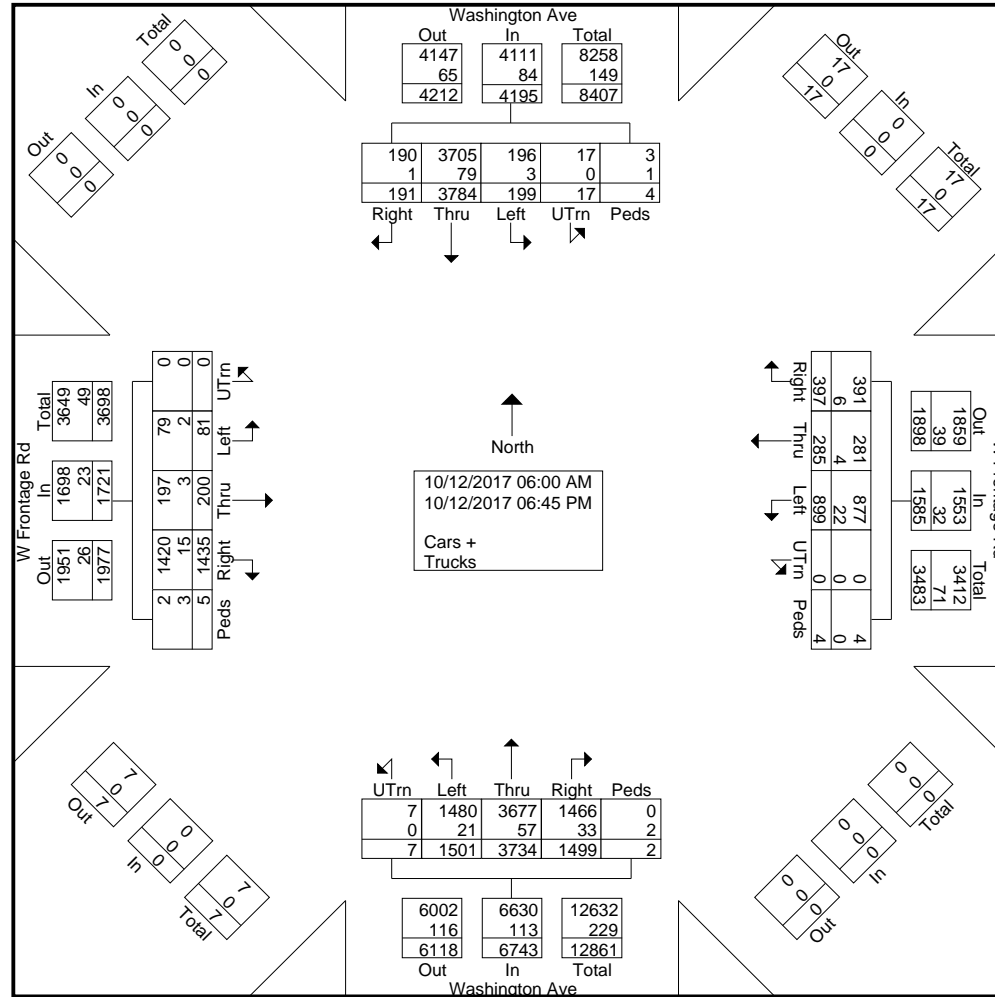
File Name : 1 - Washington Ave & W Frontage Rd, 10-12-17, 6am-7pm

Site Code : 1

Start Date : 10/12/2017

Page No : 3

Washington Ave & W Frontage Rd
Oak Park Heights, MN





File Name : 1 - Washington Ave & W Frontage Rd, 10-12-17, 6am-7pm

Site Code : 1

Start Date : 10/12/2017

Page No : 4

Washington Ave & W Frontage Rd
Oak Park Heights, MN

Start Time	Washington Ave Southbound						W Frontage Rd Westbound						Washington Ave Northbound						W Frontage Rd Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:00 AM																									
09:00 AM	0	3	46	0	0	49	0	16	2	4	0	22	0	15	52	34	1	102	0	1	6	17	0	24	197
09:15 AM	2	4	47	5	0	58	0	12	6	3	0	21	0	37	51	28	0	116	0	0	3	28	0	31	226
09:30 AM	0	4	48	3	0	55	0	23	6	5	0	34	0	25	58	28	0	111	0	0	3	33	0	36	236
09:45 AM	0	1	67	7	0	75	0	21	3	4	0	28	0	35	77	25	0	137	0	0	8	22	0	30	270
Total Volume	2	12	208	15	0	237	0	72	17	16	0	105	0	112	238	115	1	466	0	1	20	100	0	121	929
% App. Total	0.8	5.1	87.8	6.3	0		0	68.6	16.2	15.2	0		0	24	51.1	24.7	0.2		0	0.8	16.5	82.6	0		
PHF	.250	.750	.776	.536	.000	.790	.000	.783	.708	.800	.000	.772	.000	.757	.773	.846	.250	.850	.000	.250	.625	.758	.000	.840	.860

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:00 PM																									
12:00 PM	0	5	110	6	0	121	0	30	10	7	0	47	0	29	99	43	0	171	0	5	3	42	0	50	389
12:15 PM	2	1	88	6	0	97	0	22	4	8	0	34	0	39	79	36	0	154	0	5	1	37	0	43	328
12:30 PM	0	2	102	5	0	109	0	29	7	7	1	44	0	34	88	24	0	146	0	5	2	33	0	40	339
12:45 PM	0	7	79	12	0	98	0	17	7	14	0	38	0	40	113	40	1	194	0	3	6	35	0	44	374
Total Volume	2	15	379	29	0	425	0	98	28	36	1	163	0	142	379	143	1	665	0	18	12	147	0	177	1430
% App. Total	0.5	3.5	89.2	6.8	0		0	60.1	17.2	22.1	0.6		0	21.4	57	21.5	0.2		0	10.2	6.8	83.1	0		
PHF	.250	.536	.861	.604	.000	.878	.000	.817	.700	.643	.250	.867	.000	.888	.838	.831	.250	.857	.000	.900	.500	.875	.000	.885	.919

Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:00 PM																									
04:00 PM	0	3	103	5	0	111	0	17	9	17	0	43	0	36	75	34	0	145	0	0	5	35	1	41	340
04:15 PM	0	4	110	3	0	117	0	17	3	18	0	38	0	46	92	42	0	180	0	2	6	38	0	46	381
04:30 PM	0	2	103	3	0	108	0	24	7	17	0	48	0	49	94	32	0	175	0	5	4	35	1	45	376
04:45 PM	1	3	98	4	0	106	0	26	9	10	0	45	0	29	94	29	0	152	0	2	6	35	0	43	346
Total Volume	1	12	414	15	0	442	0	84	28	62	0	174	0	160	355	137	0	652	0	9	21	143	2	175	1443
% App. Total	0.2	2.7	93.7	3.4	0		0	48.3	16.1	35.6	0		0	24.5	54.4	21	0		0	5.1	12	81.7	1.1		
PHF	.250	.750	.941	.750	.000	.944	.000	.808	.778	.861	.000	.906	.000	.816	.944	.815	.000	.906	.000	.450	.875	.941	.500	.951	.947



File Name : 2 - TH 36 & Norell-Washington Ave, 10-12-17, 6am-7pm
 Site Code : 2
 Start Date : 10/12/2017
 Page No : 1

TH 36 & Norell-Washington Ave
 Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						TH 36 Westbound						Norell Ave Northbound						TH 36 Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	6	8	15	0	29	0	15	276	7	0	298	0	12	6	8	0	26	0	18	101	13	0	132	485
06:15 AM	0	5	10	17	0	32	0	11	393	9	0	413	0	8	4	8	0	20	0	12	131	16	0	159	624
06:30 AM	0	5	8	18	0	31	0	12	311	15	0	338	0	14	6	5	0	25	0	33	166	13	0	212	606
06:45 AM	0	10	14	27	0	51	0	26	330	24	0	380	0	13	8	10	0	31	0	50	197	24	0	271	733
Total	0	26	40	77	0	143	0	64	1310	55	0	1429	0	47	24	31	0	102	0	113	595	66	0	774	2448
07:00 AM	0	15	18	22	0	55	0	22	366	20	0	408	0	19	5	18	0	42	1	45	194	29	0	269	774
07:15 AM	0	19	42	20	0	81	0	29	383	13	0	425	0	16	23	11	0	50	0	45	191	49	0	285	841
07:30 AM	0	12	25	15	0	52	0	24	344	22	0	390	0	18	23	14	0	55	0	58	244	27	0	329	826
07:45 AM	0	10	15	12	0	37	0	34	324	31	0	389	0	15	21	17	0	53	0	58	272	42	0	372	851
Total	0	56	100	69	0	225	0	109	1417	86	0	1612	0	68	72	60	0	200	1	206	901	147	0	1255	3292
08:00 AM	0	10	19	27	0	56	0	25	266	14	0	305	0	20	17	18	0	55	0	53	205	32	0	290	706
08:15 AM	0	10	31	31	0	72	0	29	257	27	0	313	1	16	25	14	0	56	1	42	240	35	1	319	760
08:30 AM	0	22	33	32	0	87	0	26	226	23	0	275	0	19	18	19	0	56	0	45	219	46	0	310	728
08:45 AM	0	16	36	22	0	74	0	33	247	19	0	299	0	16	29	21	0	66	0	40	203	47	0	290	729
Total	0	58	119	112	0	289	0	113	996	83	0	1192	1	71	89	72	0	233	1	180	867	160	1	1209	2923
09:00 AM	0	20	29	25	0	74	0	35	229	18	0	282	0	30	27	21	0	78	0	42	205	34	0	281	715
09:15 AM	0	19	31	31	0	81	0	39	230	21	0	290	0	22	29	23	0	74	1	47	181	40	0	269	714
09:30 AM	0	21	34	40	0	95	0	49	197	18	0	264	0	22	39	19	0	80	0	42	169	42	0	253	692
09:45 AM	0	18	57	36	0	111	0	48	164	20	0	232	0	19	52	28	0	99	0	44	191	44	0	279	721
Total	0	78	151	132	0	361	0	171	820	77	0	1068	0	93	147	91	0	331	1	175	746	160	0	1082	2842
10:00 AM	0	16	51	35	0	102	0	43	146	22	0	211	0	25	48	31	0	104	0	33	188	44	0	265	682
10:15 AM	0	26	54	32	0	112	0	38	194	22	0	254	0	36	42	19	0	97	0	46	172	56	0	274	737
10:30 AM	0	28	48	39	0	115	0	44	191	29	0	264	0	30	53	27	0	110	0	41	173	33	1	248	737
10:45 AM	0	20	57	51	0	128	0	41	206	16	0	263	0	33	50	32	0	115	0	38	169	53	0	260	766
Total	0	90	210	157	0	457	0	166	737	89	0	992	0	124	193	109	0	426	0	158	702	186	1	1047	2922
11:00 AM	0	21	58	59	0	138	0	63	180	29	0	272	0	39	57	39	0	135	0	29	168	55	0	252	797
11:15 AM	0	26	77	48	0	151	0	54	187	19	0	260	0	43	55	46	0	144	0	32	211	52	0	295	850
11:30 AM	0	31	87	30	1	149	0	46	163	41	0	250	0	35	54	45	0	134	0	48	193	83	0	324	857
11:45 AM	0	35	73	45	0	153	0	66	184	41	1	292	0	44	50	59	0	153	0	39	201	71	3	314	912
Total	0	113	295	182	1	591	0	229	714	130	1	1074	0	161	216	189	0	566	0	148	773	261	3	1185	3416
12:00 PM	0	42	91	47	0	180	0	54	181	39	0	274	0	42	65	50	0	157	0	48	228	75	0	351	962
12:15 PM	0	41	72	33	1	147	0	42	203	35	1	281	0	47	74	46	0	167	0	37	214	57	2	310	905
12:30 PM	0	45	84	35	0	164	0	67	193	29	1	290	0	43	68	48	0	159	0	33	212	75	0	320	933
12:45 PM	0	31	61	29	0	121	0	57	192	44	0	293	1	53	98	52	0	204	0	45	265	72	0	382	1000
Total	0	159	308	144	1	612	0	220	769	147	2	1138	1	185	305	196	0	687	0	163	919	279	2	1363	3800
01:00 PM	0	41	65	44	0	150	0	63	157	37	0	257	0	38	66	51	0	155	1	53	212	70	0	336	898
01:15 PM	0	33	56	51	0	140	0	41	201	34	0	276	0	45	59	47	0	151	0	39	196	73	2	310	877
01:30 PM	0	39	75	36	0	150	0	41	209	37	0	287	1	46	70	54	0	171	0	49	238	67	0	354	962
01:45 PM	0	42	62	30	0	134	0	39	232	32	1	304	0	40	58	50	1	149	0	61	221	84	0	366	953
Total	0	155	258	161	0	574	0	184	799	140	1	1124	1	169	253	202	1	626	1	202	867	294	2	1366	3690
02:00 PM	0	25	63	37	0	125	0	73	231	25	0	329	0	48	47	66	0	161	0	36	243	71	0	350	965
02:15 PM	0	27	56	53	0	136	0	51	225	22	0	298	0	61	68	65	0	194	0	35	256	72	0	363	991



File Name : 2 - TH 36 & Norell-Washington Ave, 10-12-17, 6am-7pm

Site Code : 2

Start Date : 10/12/2017

Page No : 2

TH 36 & Norell-Washington Ave
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						TH 36 Westbound						Norell Ave Northbound						TH 36 Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:30 PM	0	34	42	37	0	113	0	51	272	44	0	367	0	43	71	60	0	174	0	53	242	73	1	369	1023
02:45 PM	0	45	64	52	0	161	0	40	263	41	1	345	0	59	49	45	0	153	0	55	305	80	0	440	1099
Total	0	131	225	179	0	535	0	215	991	132	1	1339	0	211	235	236	0	682	0	179	1046	296	1	1522	4078
03:00 PM	0	43	45	60	0	148	1	33	277	32	0	343	0	48	51	49	0	148	1	49	305	62	2	419	1058
03:15 PM	0	34	66	58	0	158	0	42	228	37	2	309	0	50	62	41	0	153	0	42	272	60	0	374	994
03:30 PM	0	45	53	65	0	163	0	42	275	36	0	353	0	54	72	41	0	167	1	57	374	75	0	507	1190
03:45 PM	0	25	52	53	0	130	0	48	241	45	0	334	0	39	53	50	0	142	1	69	390	66	1	527	1133
Total	0	147	216	236	0	599	1	165	1021	150	2	1339	0	191	238	181	0	610	3	217	1341	263	3	1827	4375
04:00 PM	0	43	52	53	0	148	0	35	235	34	0	304	0	45	58	42	0	145	0	50	400	77	0	527	1124
04:15 PM	0	47	62	60	0	169	0	43	283	56	0	382	0	53	60	37	0	150	0	49	344	85	0	478	1179
04:30 PM	0	31	56	66	0	153	0	51	298	59	0	408	0	36	60	53	0	149	0	66	369	67	0	502	1212
04:45 PM	0	42	54	58	0	154	0	46	291	47	0	384	0	31	55	52	0	138	0	48	395	67	0	510	1186
Total	0	163	224	237	0	624	0	175	1107	196	0	1478	0	165	233	184	0	582	0	213	1508	296	0	2017	4701
05:00 PM	0	41	50	64	0	155	0	54	231	34	0	319	0	65	49	48	0	162	0	40	368	68	1	477	1113
05:15 PM	0	43	67	63	0	173	0	50	255	54	0	359	0	37	62	46	0	145	0	61	370	63	0	494	1171
05:30 PM	0	30	56	54	0	140	1	49	211	36	0	297	0	40	41	51	0	132	0	83	389	73	0	545	1114
05:45 PM	0	41	36	41	0	118	0	47	206	42	0	295	0	31	54	51	0	136	0	45	322	90	2	459	1008
Total	0	155	209	222	0	586	1	200	903	166	0	1270	0	173	206	196	0	575	0	229	1449	294	3	1975	4406
06:00 PM	0	41	43	51	0	135	0	39	174	27	0	240	0	39	64	45	0	148	0	30	279	67	0	376	899
06:15 PM	0	42	57	30	0	129	0	38	182	38	0	258	0	42	46	42	0	130	0	48	298	57	0	403	920
06:30 PM	0	43	42	37	0	122	0	39	161	31	0	231	0	38	46	42	0	126	0	33	223	62	0	318	797
06:45 PM	0	30	35	37	0	102	0	40	124	26	0	190	0	36	53	36	0	125	0	26	207	54	0	287	704
Total	0	156	177	155	0	488	0	156	641	122	0	919	0	155	209	165	0	529	0	137	1007	240	0	1384	3320
Grand Total	0	1487	2532	2063	2	6084	2	2167	12225											12721					
Cars +	0	1468	2503	2000	2	5973	2	2134	11522	1551	7	15216	3	1765	2395	1893	1	6057	7	2260	12071	2895	16	17249	44495
% Cars +	0	98.7	98.9	96.9	100	98.2	100	98.5	94.2	98.6	100	95.3	100	97.4	99	99	100	98.5	100	97.4	94.9	98.4	100	95.8	96.3
Trucks	0	19	29	63	0	111	0	33	703	22	0	758	0	48	25	19	0	92	0	60	650	47	0	757	1718
% Trucks	0	1.3	1.1	3.1	0	1.8	0	1.5	5.8	1.4	0	4.7	0	2.6	1	1	0	1.5	0	2.6	5.1	1.6	0	4.2	3.7



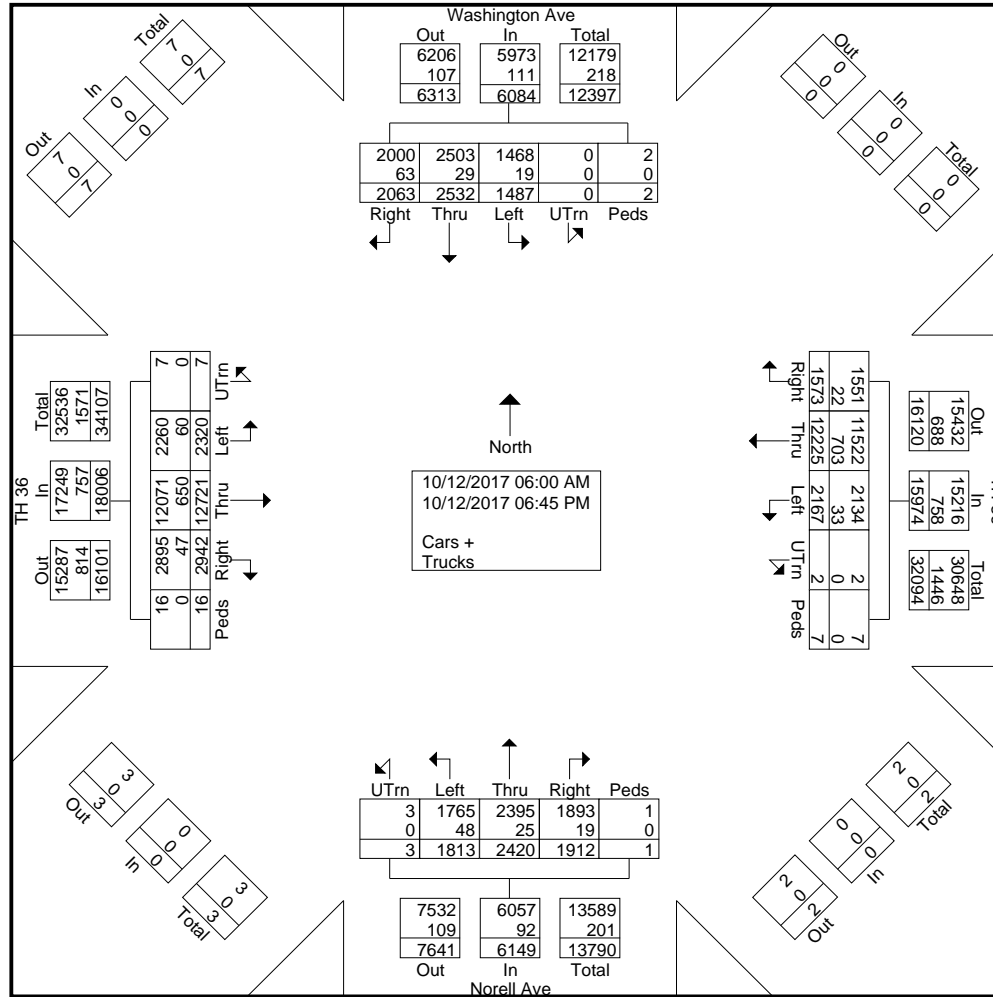
File Name : 2 - TH 36 & Norell-Washington Ave, 10-12-17, 6am-7pm

Site Code : 2

Start Date : 10/12/2017

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TH 36 & Norell-Washington Ave
Oak Park Heights, MN





File Name : 2 - TH 36 & Norell-Washington Ave, 10-12-17, 6am-7pm

Site Code : 2

Start Date : 10/12/2017

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TH 36 & Norell-Washington Ave
Oak Park Heights, MN

Start Time	Washington Ave Southbound					TH 36 Westbound					Norell Ave Northbound					TH 36 Eastbound					Int. Total				
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left		Thru	Right	Peds	App. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:00 AM																									
07:00 AM	0	15	18	22	0	55	0	22	366	20	0	408	0	19	5	18	0	42	1	45	194	29	0	269	774
07:15 AM	0	19	42	20	0	81	0	29	383	13	0	425	0	16	23	11	0	50	0	45	191	49	0	285	841
07:30 AM	0	12	25	15	0	52	0	24	344	22	0	390	0	18	23	14	0	55	0	58	244	27	0	329	826
07:45 AM	0	10	15	12	0	37	0	34	324	31	0	389	0	15	21	17	0	53	0	58	272	42	0	372	851
Total Volume	0	56	100	69	0	225	0	109	1417	86	0	1612	0	68	72	60	0	200	1	206	901	147	0	1255	3292
% App. Total	0	24.9	44.4	30.7	0		0	6.8	87.9	5.3	0		0	34	36	30	0		0.1	16.4	71.8	11.7	0		
PHF	.000	.737	.595	.784	.000	.694	.000	.801	.925	.694	.000	.948	.000	.895	.783	.833	.000	.909	.250	.888	.828	.750	.000	.843	.967
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:00 PM																									
12:00 PM	0	42	91	47	0	180	0	54	181	39	0	274	0	42	65	50	0	157	0	48	228	75	0	351	962
12:15 PM	0	41	72	33	1	147	0	42	203	35	1	281	0	47	74	46	0	167	0	37	214	57	2	310	905
12:30 PM	0	45	84	35	0	164	0	67	193	29	1	290	0	43	68	48	0	159	0	33	212	75	0	320	933
12:45 PM	0	31	61	29	0	121	0	57	192	44	0	293	1	53	98	52	0	204	0	45	265	72	0	382	1000
Total Volume	0	159	308	144	1	612	0	220	769	147	2	1138	1	185	305	196	0	687	0	163	919	279	2	1363	3800
% App. Total	0	26	50.3	23.5	0.2		0	19.3	67.6	12.9	0.2		0.1	26.9	44.4	28.5	0		0	12	67.4	20.5	0.1		
PHF	.000	.883	.846	.766	.250	.850	.000	.821	.947	.835	.500	.971	.250	.873	.778	.942	.000	.842	.000	.849	.867	.930	.250	.892	.950
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:00 PM																									
04:00 PM	0	43	52	53	0	148	0	35	235	34	0	304	0	45	58	42	0	145	0	50	400	77	0	527	1124
04:15 PM	0	47	62	60	0	169	0	43	283	56	0	382	0	53	60	37	0	150	0	49	344	85	0	478	1179
04:30 PM	0	31	56	66	0	153	0	51	298	59	0	408	0	36	60	53	0	149	0	66	369	67	0	502	1212
04:45 PM	0	42	54	58	0	154	0	46	291	47	0	384	0	31	55	52	0	138	0	48	395	67	0	510	1186
Total Volume	0	163	224	237	0	624	0	175	1107	196	0	1478	0	165	233	184	0	582	0	213	1508	296	0	2017	4701
% App. Total	0	26.1	35.9	38	0		0	11.8	74.9	13.3	0		0	28.4	40	31.6	0		0	10.6	74.8	14.7	0		
PHF	.000	.867	.903	.898	.000	.923	.000	.858	.929	.831	.000	.906	.000	.778	.971	.868	.000	.970	.000	.807	.943	.871	.000	.957	.970



File Name : 3 - Norell Ave & 60th St N, 10-12-17
 Site Code : 3
 Start Date : 10/12/2017
 Page No : 1

Norell Ave & 60th St N
 Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Norell Ave Southbound						60th St N Westbound						Norell Ave Northbound						60th St N Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	4	19	12	0	35	0	0	1	1	0	2	0	0	20	0	0	20	0	5	3	0	0	8	65
06:15 AM	0	1	16	19	0	36	0	0	1	1	0	2	0	1	14	0	0	15	0	7	1	2	0	10	63
06:30 AM	0	5	18	14	0	37	0	0	0	3	0	3	0	0	19	0	0	19	0	4	0	0	0	4	63
06:45 AM	0	8	30	29	0	67	0	1	1	2	0	4	0	0	24	0	0	24	0	9	2	2	0	13	108
Total	0	18	83	74	0	175	0	1	3	7	0	11	0	1	77	0	0	78	0	25	6	4	0	35	299
07:00 AM	0	6	30	31	0	67	0	1	0	3	0	4	0	0	24	0	0	24	0	11	3	0	0	14	109
07:15 AM	0	7	52	62	0	121	0	0	2	7	0	9	0	0	36	0	0	36	0	13	1	1	0	15	181
07:30 AM	1	6	28	41	0	76	0	0	1	6	0	7	0	1	43	1	1	46	0	9	1	0	0	10	139
07:45 AM	0	18	36	35	0	89	0	1	1	7	0	9	1	2	28	1	0	32	0	13	0	2	0	15	145
Total	1	37	146	169	0	353	0	2	4	23	0	29	1	3	131	2	1	138	0	46	5	3	0	54	574
08:00 AM	0	13	33	31	0	77	0	1	2	4	0	7	0	3	31	6	0	40	0	19	0	2	0	21	145
08:15 AM	0	8	45	41	0	94	0	0	4	5	0	9	0	0	34	0	0	34	0	15	1	1	1	18	155
08:30 AM	0	13	42	50	0	105	0	3	1	10	0	14	0	0	40	1	0	41	0	9	2	3	0	14	174
08:45 AM	0	18	54	44	0	116	0	2	0	12	0	14	0	4	36	1	0	41	0	21	3	2	0	26	197
Total	0	52	174	166	0	392	0	6	7	31	0	44	0	7	141	8	0	156	0	64	6	8	1	79	671
09:00 AM	0	12	48	41	0	101	0	1	7	9	0	17	0	2	49	2	0	53	0	20	4	5	0	29	200
09:15 AM	0	11	45	55	0	111	0	1	3	8	0	12	0	1	51	2	0	54	0	17	6	2	0	25	202
09:30 AM	0	17	66	47	0	130	0	2	2	11	0	15	0	4	52	2	0	58	0	19	3	2	0	24	227
09:45 AM	0	20	67	67	0	154	0	3	4	11	0	18	0	3	62	8	0	73	0	22	0	6	0	28	273
Total	0	60	226	210	0	496	0	7	16	39	0	62	0	10	214	14	0	238	0	78	13	15	0	106	902
10:00 AM	0	17	71	42	0	130	0	1	4	11	0	16	0	1	63	2	0	66	0	23	3	7	0	33	245
10:15 AM	0	14	75	59	0	148	0	1	4	22	0	27	0	2	66	4	0	72	0	12	3	4	0	19	266
10:30 AM	0	9	69	51	0	129	0	2	5	12	0	19	0	2	82	3	0	87	0	23	8	5	0	36	271
10:45 AM	0	19	76	55	0	150	0	5	5	16	0	26	0	4	78	10	0	92	0	31	9	9	0	49	317
Total	0	59	291	207	0	557	0	9	18	61	0	88	0	9	289	19	0	317	0	89	23	25	0	137	1099
11:00 AM	0	12	85	84	0	181	0	5	6	11	0	22	0	4	91	2	0	97	0	31	3	3	0	37	337
11:15 AM	0	21	76	93	0	190	0	2	9	15	0	26	0	2	90	6	0	98	0	29	8	8	0	45	359
11:30 AM	0	25	94	95	0	214	0	3	8	12	0	23	0	4	92	12	0	108	0	35	11	9	0	55	400
11:45 AM	0	27	97	94	0	218	0	1	8	14	0	23	0	2	101	9	0	112	0	37	7	6	3	53	406
Total	0	85	352	366	0	803	0	11	31	52	0	94	0	12	374	29	0	415	0	132	29	26	3	190	1502
12:00 PM	0	23	92	103	0	218	0	5	7	23	0	35	0	4	103	8	0	115	0	36	16	7	0	59	427
12:15 PM	0	11	70	90	0	171	0	7	4	23	0	34	0	2	107	7	0	116	0	40	8	8	0	56	377
12:30 PM	0	24	100	106	0	230	0	6	5	12	1	24	1	8	122	9	0	140	0	35	7	19	0	61	455
12:45 PM	0	19	83	87	0	189	0	6	5	21	0	32	0	6	145	2	0	153	0	34	13	7	0	54	428
Total	0	77	345	386	0	808	0	24	21	79	1	125	1	20	477	26	0	524	0	145	44	41	0	230	1687
01:00 PM	0	31	93	77	0	201	0	3	11	24	0	38	0	4	100	9	0	113	0	33	5	15	0	53	405
01:15 PM	0	25	83	65	0	173	0	4	9	15	0	28	0	3	104	8	0	115	0	40	6	14	0	60	376
01:30 PM	0	16	92	74	0	182	0	7	7	12	0	26	0	4	118	4	0	126	0	35	4	11	0	50	384
01:45 PM	0	26	97	79	0	202	0	2	6	15	0	23	0	5	104	3	0	112	0	29	7	6	0	42	379
Total	0	98	365	295	0	758	0	16	33	66	0	115	0	16	426	24	0	466	0	137	22	46	0	205	1544
02:00 PM	0	24	96	81	0	201	0	4	2	10	0	16	0	7	117	4	0	128	0	36	11	5	0	52	397
02:15 PM	0	18	94	64	0	176	0	3	6	22	0	31	0	3	130	8	0	141	0	39	8	3	0	50	398

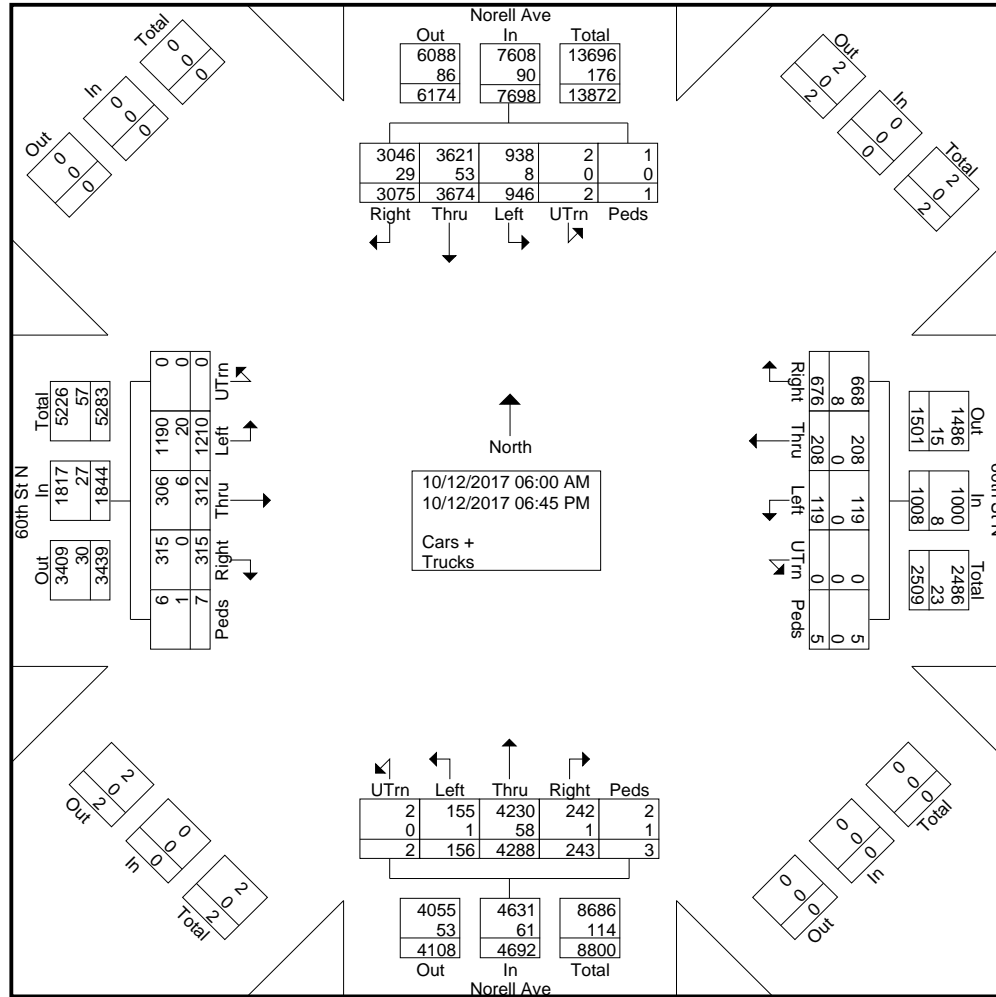


Norell Ave & 60th St N
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Norell Ave Southbound						60th St N Westbound						Norell Ave Northbound						60th St N Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:30 PM	0	17	96	52	0	165	0	3	7	18	0	28	0	1	120	2	0	123	0	32	5	4	0	41	357
02:45 PM	0	26	90	70	0	186	0	3	4	19	1	27	0	7	103	3	0	113	0	26	9	8	0	43	369
Total	0	85	376	267	0	728	0	13	19	69	1	102	0	18	470	17	0	505	0	133	33	20	0	186	1521
03:00 PM	0	12	80	52	0	144	0	4	2	16	0	22	0	2	109	4	0	115	0	23	14	16	0	53	334
03:15 PM	0	22	93	53	0	168	0	3	6	17	1	27	0	1	114	8	0	123	0	21	7	6	0	34	352
03:30 PM	0	21	89	59	1	170	0	4	5	13	1	23	0	3	133	4	1	141	0	17	4	9	0	30	364
03:45 PM	0	22	92	53	0	167	0	1	1	22	1	25	0	1	104	6	0	111	0	21	4	5	0	30	333
Total	0	77	354	217	1	649	0	12	14	68	3	97	0	7	460	22	1	490	0	82	29	36	0	147	1383
04:00 PM	0	19	94	66	0	179	0	2	3	14	0	19	0	2	122	4	0	128	0	15	13	9	0	37	363
04:15 PM	0	32	76	77	0	185	0	2	3	16	0	21	0	1	116	6	0	123	0	19	9	11	1	40	369
04:30 PM	0	20	87	61	0	168	0	2	6	14	0	22	0	4	104	7	0	115	0	23	5	11	0	39	344
04:45 PM	0	28	97	47	0	172	0	3	4	9	0	16	0	4	108	5	0	117	0	25	8	6	0	39	344
Total	0	99	354	251	0	704	0	9	16	53	0	78	0	11	450	22	0	483	0	82	35	37	1	155	1420
05:00 PM	0	22	93	60	0	175	0	3	6	14	0	23	0	6	128	7	0	141	0	16	5	11	0	32	371
05:15 PM	1	20	88	65	0	174	0	1	5	10	0	16	0	4	96	9	1	110	0	27	8	10	0	45	345
05:30 PM	0	20	78	78	0	176	0	1	2	19	0	22	0	2	102	13	0	117	0	23	10	12	0	45	360
05:45 PM	0	29	87	56	0	172	0	1	3	11	0	15	0	4	98	6	0	108	0	32	8	9	2	51	346
Total	1	91	346	259	0	697	0	6	16	54	0	76	0	16	424	35	1	476	0	98	31	42	2	173	1422
06:00 PM	0	29	64	55	0	148	0	1	3	22	0	26	0	8	104	9	0	121	0	17	11	4	0	32	327
06:15 PM	0	22	71	59	0	152	0	1	2	21	0	24	0	8	84	4	0	96	0	27	9	4	0	40	312
06:30 PM	0	27	58	60	0	145	0	1	3	15	0	19	0	4	86	5	0	95	0	29	9	2	0	40	299
06:45 PM	0	30	69	34	0	133	0	0	2	16	0	18	0	6	81	7	0	94	0	26	7	2	0	35	280
Total	0	108	262	208	0	578	0	3	10	74	0	87	0	26	355	25	0	406	0	99	36	12	0	147	1218
Grand Total	2	946	3674	3075	1	7698	0	119	208	676	5	1008	2	156	4288	243	3	4692	0	1210	312	315	7	1844	15242
Apprch %	0	12.3	47.7	39.9	0		0	11.8	20.6	67.1	0.5		0	3.3	91.4	5.2	0.1		0	65.6	16.9	17.1	0.4		
Total %	0	6.2	24.1	20.2	0	50.5	0	0.8	1.4	4.4	0	6.6	0	1	28.1	1.6	0	30.8	0	7.9	2	2.1	0	12.1	
Cars +	2	938	3621	3046	1	7608	0	119	208	668	5	1000	2	155	4230	242	2	4631	0	1190	306	315	6	1817	15056
% Cars +	100	99.2	98.6	99.1	100	98.8	0	100	100	98.8	100	99.2	100	99.4	98.6	99.6	66.7	98.7	0	98.3	98.1	100	85.7	98.5	98.8
Trucks	0	8	53	29	0	90	0	0	0	8	0	8	0	1	58	1	1	61	0	20	6	0	1	27	186
% Trucks	0	0.8	1.4	0.9	0	1.2	0	0	0	1.2	0	0.8	0	0.6	1.4	0.4	33.3	1.3	0	1.7	1.9	0	14.3	1.5	1.2

Norell Ave & 60th St N
 Oak Park Heights, MN





File Name : 3 - Norell Ave & 60th St N, 10-12-17
 Site Code : 3
 Start Date : 10/12/2017
 Page No : 4

Norell Ave & 60th St N
 Oak Park Heights, MN

Start Time	Norell Ave Southbound					60th St N Westbound					Norell Ave Northbound					60th St N Eastbound					Int. Total				
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left		Thru	Right	Peds	App. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:00 AM																									
09:00 AM	0	12	48	41	0	101	0	1	7	9	0	17	0	2	49	2	0	53	0	20	4	5	0	29	200
09:15 AM	0	11	45	55	0	111	0	1	3	8	0	12	0	1	51	2	0	54	0	17	6	2	0	25	202
09:30 AM	0	17	66	47	0	130	0	2	2	11	0	15	0	4	52	2	0	58	0	19	3	2	0	24	227
09:45 AM	0	20	67	67	0	154	0	3	4	11	0	18	0	3	62	8	0	73	0	22	0	6	0	28	273
Total Volume	0	60	226	210	0	496	0	7	16	39	0	62	0	10	214	14	0	238	0	78	13	15	0	106	902
% App. Total	0	12.1	45.6	42.3	0		0	11.3	25.8	62.9	0		0	4.2	89.9	5.9	0		0	73.6	12.3	14.2	0		
PHF	.000	.750	.843	.784	.000	.805	.000	.583	.571	.886	.000	.861	.000	.625	.863	.438	.000	.815	.000	.886	.542	.625	.000	.914	.826

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:00 PM																									
12:00 PM	0	23	92	103	0	218	0	5	7	23	0	35	0	4	103	8	0	115	0	36	16	7	0	59	427
12:15 PM	0	11	70	90	0	171	0	7	4	23	0	34	0	2	107	7	0	116	0	40	8	8	0	56	377
12:30 PM	0	24	100	106	0	230	0	6	5	12	1	24	1	8	122	9	0	140	0	35	7	19	0	61	455
12:45 PM	0	19	83	87	0	189	0	6	5	21	0	32	0	6	145	2	0	153	0	34	13	7	0	54	428
Total Volume	0	77	345	386	0	808	0	24	21	79	1	125	1	20	477	26	0	524	0	145	44	41	0	230	1687
% App. Total	0	9.5	42.7	47.8	0		0	19.2	16.8	63.2	0.8		0.2	3.8	91	5	0		0	63	19.1	17.8	0		
PHF	.000	.802	.863	.910	.000	.878	.000	.857	.750	.859	.250	.893	.250	.625	.822	.722	.000	.856	.000	.906	.688	.539	.000	.943	.927

Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 02:00 PM																									
02:00 PM	0	24	96	81	0	201	0	4	2	10	0	16	0	7	117	4	0	128	0	36	11	5	0	52	397
02:15 PM	0	18	94	64	0	176	0	3	6	22	0	31	0	3	130	8	0	141	0	39	8	3	0	50	398
02:30 PM	0	17	96	52	0	165	0	3	7	18	0	28	0	1	120	2	0	123	0	32	5	4	0	41	357
02:45 PM	0	26	90	70	0	186	0	3	4	19	1	27	0	7	103	3	0	113	0	26	9	8	0	43	369
Total Volume	0	85	376	267	0	728	0	13	19	69	1	102	0	18	470	17	0	505	0	133	33	20	0	186	1521
% App. Total	0	11.7	51.6	36.7	0		0	12.7	18.6	67.6	1		0	3.6	93.1	3.4	0		0	71.5	17.7	10.8	0		
PHF	.000	.817	.979	.824	.000	.905	.000	.813	.679	.784	.250	.823	.000	.643	.904	.531	.000	.895	.000	.853	.750	.625	.000	.894	.955



File Name : 1 - Washington Ave & W Frontage Rd, 10-14-17, 6am-7pm

Site Code : 1

Start Date : 10/14/2017

Page No : 1

Washington Ave & W Frontage Rd
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						W Frontage Rd Westbound						Washington Ave Northbound						W Frontage Rd Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	0	3	0	0	3	0	0	1	0	0	1	0	2	0	1	0	3	0	0	0	7	0	7	14
06:15 AM	0	0	5	0	0	5	0	2	0	0	0	2	0	6	3	2	0	11	0	0	0	1	0	1	19
06:30 AM	0	0	3	0	0	3	0	1	0	1	0	2	0	5	3	1	0	9	0	0	0	0	0	0	14
06:45 AM	0	2	10	2	0	14	0	3	1	0	0	4	0	4	15	2	0	21	0	0	0	1	0	1	40
Total	0	2	21	2	0	25	0	6	2	1	0	9	0	17	21	6	0	44	0	0	0	9	0	9	87
07:00 AM	0	1	16	1	0	18	0	2	0	0	0	2	0	11	15	3	0	29	0	1	1	4	0	6	55
07:15 AM	0	1	9	0	0	10	0	2	1	0	0	3	0	11	16	2	0	29	0	0	0	4	0	4	46
07:30 AM	0	0	13	0	0	13	0	4	4	1	0	9	0	19	15	7	0	41	0	1	0	9	0	10	73
07:45 AM	0	0	21	3	0	24	0	6	5	0	0	11	0	19	20	14	0	53	0	0	1	8	0	9	97
Total	0	2	59	4	0	65	0	14	10	1	0	25	0	60	66	26	0	152	0	2	2	25	0	29	271
08:00 AM	0	1	16	0	0	17	0	5	1	2	0	8	0	11	23	6	0	40	0	2	0	9	0	11	76
08:15 AM	1	0	18	2	0	21	0	7	0	1	0	8	1	16	30	11	0	58	0	1	2	20	3	26	113
08:30 AM	0	4	49	3	0	56	0	10	7	3	0	20	0	15	44	18	0	77	0	1	4	12	0	17	170
08:45 AM	2	1	31	3	0	37	0	8	2	4	0	14	0	34	36	21	0	91	0	3	6	19	0	28	170
Total	3	6	114	8	0	131	0	30	10	10	0	50	1	76	133	56	0	266	0	7	12	60	3	82	529
09:00 AM	0	2	39	1	0	42	0	8	6	4	0	18	0	31	36	16	0	83	0	1	7	24	0	32	175
09:15 AM	0	6	49	3	0	58	0	15	6	5	0	26	0	26	45	15	0	86	0	2	5	23	0	30	200
09:30 AM	0	1	45	6	0	52	0	18	6	5	0	29	0	43	58	15	0	116	0	3	3	30	0	36	233
09:45 AM	0	5	62	3	0	70	0	27	3	10	0	40	0	43	60	23	0	126	0	1	3	43	0	47	283
Total	0	14	195	13	0	222	0	68	21	24	0	113	0	143	199	69	0	411	0	7	18	120	0	145	891
10:00 AM	1	8	61	4	0	74	0	23	11	9	0	43	0	48	48	26	0	122	0	2	3	49	0	54	293
10:15 AM	1	2	54	5	0	62	0	19	7	10	0	36	0	36	74	28	0	138	0	7	8	36	0	51	287
10:30 AM	0	5	51	10	0	66	0	22	8	16	1	47	0	43	80	32	0	155	0	2	5	35	0	42	310
10:45 AM	0	3	78	4	0	85	0	26	6	14	0	46	0	42	85	27	0	154	0	2	4	42	0	48	333
Total	2	18	244	23	0	287	0	90	32	49	1	172	0	169	287	113	0	569	0	13	20	162	0	195	1223
11:00 AM	1	0	105	7	0	113	0	29	12	18	0	59	0	36	69	24	0	129	0	4	5	48	0	57	358
11:15 AM	0	7	74	7	0	88	0	28	7	9	0	44	0	39	81	23	0	143	0	2	5	46	0	53	328
11:30 AM	0	7	89	5	0	101	0	13	6	10	0	29	0	46	93	22	0	161	0	2	7	57	1	67	358
11:45 AM	0	8	79	5	0	92	0	21	9	19	0	49	0	37	88	30	0	155	0	2	2	49	0	53	349
Total	1	22	347	24	0	394	0	91	34	56	0	181	0	158	331	99	0	588	0	10	19	200	1	230	1393
12:00 PM	0	6	82	6	1	95	0	29	6	8	0	43	0	47	89	23	0	159	0	3	6	46	1	56	353
12:15 PM	1	7	95	9	0	112	0	33	6	14	0	53	1	52	75	34	0	162	0	2	5	39	0	46	373
12:30 PM	0	3	85	6	1	95	0	17	11	17	0	45	0	47	73	29	0	149	0	3	7	49	0	59	348
12:45 PM	0	0	93	6	0	99	0	21	4	9	0	34	0	45	89	35	0	169	0	3	2	42	0	47	349
Total	1	16	355	27	2	401	0	100	27	48	0	175	1	191	326	121	0	639	0	11	20	176	1	208	1423
01:00 PM	1	6	85	8	0	100	0	31	7	14	0	52	0	51	78	45	0	174	1	3	6	47	0	57	383
01:15 PM	1	2	70	8	0	81	0	33	2	9	0	44	0	48	80	19	0	147	0	5	5	48	0	58	330
01:30 PM	1	7	74	7	0	89	0	36	5	4	0	45	0	50	107	21	0	178	0	2	5	40	0	47	359
01:45 PM	0	6	78	4	0	88	0	21	10	10	0	41	0	54	104	35	0	193	0	4	5	42	0	51	373
Total	3	21	307	27	0	358	0	121	24	37	0	182	0	203	369	120	0	692	1	14	21	177	0	213	1445
02:00 PM	1	5	83	6	0	95	0	28	6	16	0	50	0	42	81	27	0	150	0	2	4	48	0	54	349
02:15 PM	1	6	93	8	0	108	0	27	10	12	0	49	1	53	92	26	0	172	0	1	3	46	0	50	379



File Name : 1 - Washington Ave & W Frontage Rd, 10-14-17, 6am-7pm

Site Code : 1

Start Date : 10/14/2017

Page No : 2

Washington Ave & W Frontage Rd
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						W Frontage Rd Westbound						Washington Ave Northbound						W Frontage Rd Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:30 PM	0	2	85	3	0	90	0	22	8	5	0	35	0	43	96	22	0	161	0	3	1	44	1	49	335
02:45 PM	0	1	92	7	0	100	0	22	11	6	0	39	1	34	93	17	0	145	0	1	3	51	0	55	339
Total	2	14	353	24	0	393	0	99	35	39	0	173	2	172	362	92	0	628	0	7	11	189	1	208	1402
03:00 PM	0	2	74	11	0	87	0	18	8	6	0	32	0	35	92	21	0	148	0	3	6	52	0	61	328
03:15 PM	0	3	62	7	0	72	0	20	5	13	0	38	0	48	79	24	0	151	0	2	6	50	0	58	319
03:30 PM	1	8	73	8	0	90	0	15	6	8	0	29	0	39	83	23	0	145	0	0	7	46	0	53	317
03:45 PM	0	7	76	7	0	90	1	17	4	10	0	32	0	45	88	14	0	147	0	3	8	34	0	45	314
Total	1	20	285	33	0	339	1	70	23	37	0	131	0	167	342	82	0	591	0	8	27	182	0	217	1278
04:00 PM	1	0	76	4	0	81	0	11	4	10	0	25	0	41	73	21	0	135	0	1	5	48	0	54	295
04:15 PM	0	2	74	4	0	80	0	19	6	6	0	31	1	40	79	20	0	140	0	3	6	54	0	63	314
04:30 PM	0	1	64	5	0	70	0	19	5	9	0	33	0	60	97	13	0	170	0	5	5	43	0	53	326
04:45 PM	0	1	72	0	0	73	0	14	7	2	0	23	0	24	83	12	0	119	0	1	2	52	0	55	270
Total	1	4	286	13	0	304	0	63	22	27	0	112	1	165	332	66	0	564	0	10	18	197	0	225	1205
05:00 PM	0	3	78	5	0	86	0	18	2	5	0	25	0	29	53	17	0	99	0	3	4	43	0	50	260
05:15 PM	0	2	50	2	0	54	0	10	3	4	0	17	0	33	52	31	0	116	0	1	1	30	0	32	219
05:30 PM	0	5	40	1	0	46	0	17	5	3	0	25	0	24	49	29	0	102	0	1	2	38	0	41	214
05:45 PM	0	3	49	1	0	53	0	13	5	7	0	25	0	26	56	27	0	109	0	1	3	28	0	32	219
Total	0	13	217	9	0	239	0	58	15	19	0	92	0	112	210	104	0	426	0	6	10	139	0	155	912
06:00 PM	0	4	42	5	0	51	0	15	4	4	0	23	0	31	48	20	0	99	0	2	3	32	0	37	210
06:15 PM	0	2	59	2	0	63	0	16	6	6	0	28	0	24	50	23	0	97	0	4	1	36	0	41	229
06:30 PM	0	5	42	2	0	49	0	18	4	4	0	26	0	25	39	16	0	80	0	1	4	32	0	37	192
06:45 PM	0	3	46	3	0	52	0	18	6	2	0	26	0	20	44	17	0	81	0	3	2	33	0	38	197
Total	0	14	189	12	0	215	0	67	20	16	0	103	0	100	181	76	0	357	0	10	10	133	0	153	828
Grand Total	14	166	2972	219	2	3373	1	877	275	364	1	1518	5	1733	3159	1030	0	5927	1	105	188	1769	6	2069	12887
Apprch %	0.4	4.9	88.1	6.5	0.1		0.1	57.8	18.1	24	0.1		0.1	29.2	53.3	17.4	0		0	5.1	9.1	85.5	0.3		
Total %	0.1	1.3	23.1	1.7	0	26.2	0	6.8	2.1	2.8	0	11.8	0	13.4	24.5	8	0	46	0	0.8	1.5	13.7	0	16.1	
Cars +	14	166	2959	217	2	3358	1	874	275	364	1	1515	5	1727	3151	1029	0	5912	1	104	188	1764	5	2062	12847
% Cars +	100	100	99.6	99.1	100	99.6	100	99.7	100	100	100	99.8	100	99.7	99.7	99.9	0	99.7	100	99	100	99.7	83.3	99.7	99.7
Trucks	0	0	13	2	0	15	0	3	0	0	0	3	0	6	8	1	0	15	0	1	0	5	1	7	40
% Trucks	0	0	0.4	0.9	0	0.4	0	0.3	0	0	0	0.2	0	0.3	0.3	0.1	0	0.3	0	1	0	0.3	16.7	0.3	0.3



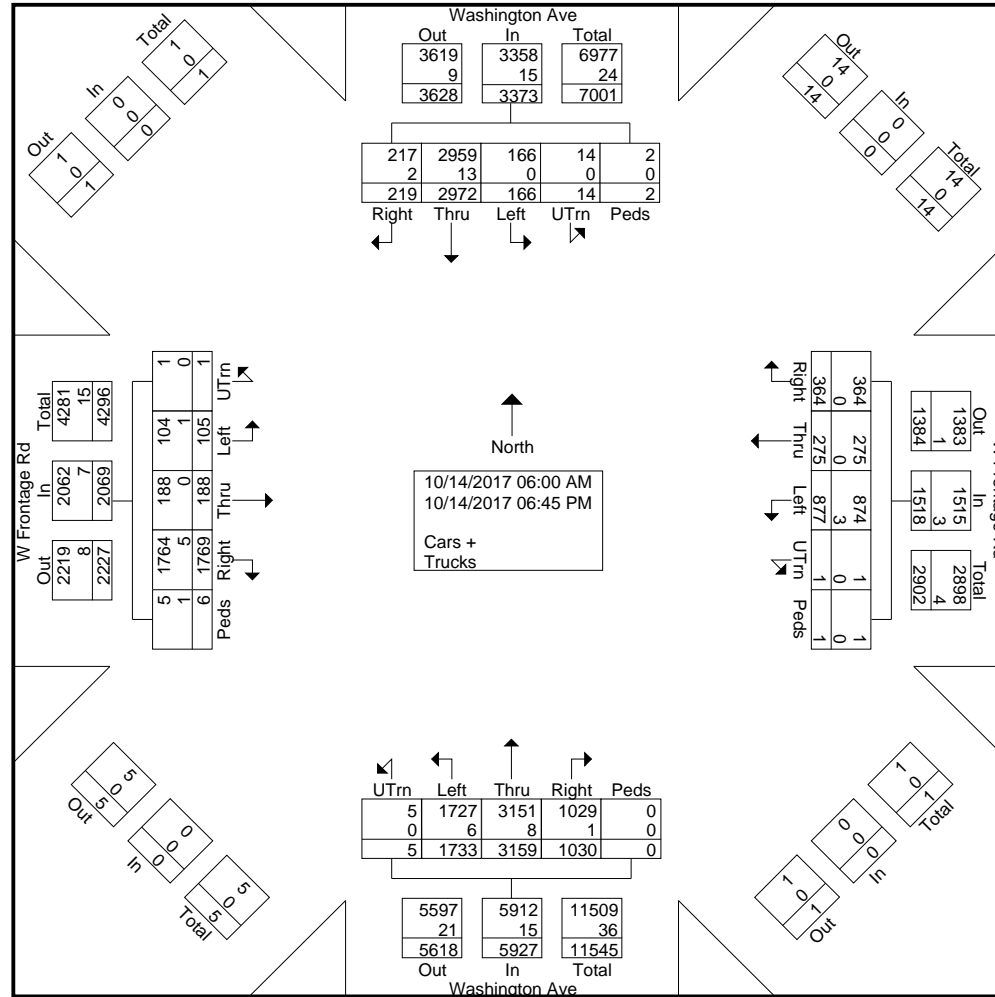
File Name : 1 - Washington Ave & W Frontage Rd, 10-14-17, 6am-7pm

Site Code : 1

Start Date : 10/14/2017

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Washington Ave & W Frontage Rd
Oak Park Heights, MN





File Name : 1 - Washington Ave & W Frontage Rd, 10-14-17, 6am-7pm

Site Code : 1

Start Date : 10/14/2017

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Washington Ave & W Frontage Rd
Oak Park Heights, MN

Start Time	Washington Ave Southbound					W Frontage Rd Westbound					Washington Ave Northbound					W Frontage Rd Eastbound					Int. Total				
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left		Thru	Right	Peds	App. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:00 AM																									
09:00 AM	0	2	39	1	0	42	0	8	6	4	0	18	0	31	36	16	0	83	0	1	7	24	0	32	175
09:15 AM	0	6	49	3	0	58	0	15	6	5	0	26	0	26	45	15	0	86	0	2	5	23	0	30	200
09:30 AM	0	1	45	6	0	52	0	18	6	5	0	29	0	43	58	15	0	116	0	3	3	30	0	36	233
09:45 AM	0	5	62	3	0	70	0	27	3	10	0	40	0	43	60	23	0	126	0	1	3	43	0	47	283
Total Volume	0	14	195	13	0	222	0	68	21	24	0	113	0	143	199	69	0	411	0	7	18	120	0	145	891
% App. Total	0	6.3	87.8	5.9	0		0	60.2	18.6	21.2	0		0	34.8	48.4	16.8	0		0	4.8	12.4	82.8	0		
PHF	.000	.583	.786	.542	.000	.793	.000	.630	.875	.600	.000	.706	.000	.831	.829	.750	.000	.815	.000	.583	.643	.698	.000	.771	.787

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:15 PM																									
12:15 PM	1	7	95	9	0	112	0	33	6	14	0	53	1	52	75	34	0	162	0	2	5	39	0	46	373
12:30 PM	0	3	85	6	1	95	0	17	11	17	0	45	0	47	73	29	0	149	0	3	7	49	0	59	348
12:45 PM	0	0	93	6	0	99	0	21	4	9	0	34	0	45	89	35	0	169	0	3	2	42	0	47	349
01:00 PM	1	6	85	8	0	100	0	31	7	14	0	52	0	51	78	45	0	174	1	3	6	47	0	57	383
Total Volume	2	16	358	29	1	406	0	102	28	54	0	184	1	195	315	143	0	654	1	11	20	177	0	209	1453
% App. Total	0.5	3.9	88.2	7.1	0.2		0	55.4	15.2	29.3	0		0.2	29.8	48.2	21.9	0		0.5	5.3	9.6	84.7	0		
PHF	.500	.571	.942	.806	.250	.906	.000	.773	.636	.794	.000	.868	.250	.938	.885	.794	.000	.940	.250	.917	.714	.903	.000	.886	.948

Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 02:00 PM																									
02:00 PM	1	5	83	6	0	95	0	28	6	16	0	50	0	42	81	27	0	150	0	2	4	48	0	54	349
02:15 PM	1	6	93	8	0	108	0	27	10	12	0	49	1	53	92	26	0	172	0	1	3	46	0	50	379
02:30 PM	0	2	85	3	0	90	0	22	8	5	0	35	0	43	96	22	0	161	0	3	1	44	1	49	335
02:45 PM	0	1	92	7	0	100	0	22	11	6	0	39	1	34	93	17	0	145	0	1	3	51	0	55	339
Total Volume	2	14	353	24	0	393	0	99	35	39	0	173	2	172	362	92	0	628	0	7	11	189	1	208	1402
% App. Total	0.5	3.6	89.8	6.1	0		0	57.2	20.2	22.5	0		0.3	27.4	57.6	14.6	0		0	3.4	5.3	90.9	0.5		
PHF	.500	.583	.949	.750	.000	.910	.000	.884	.795	.609	.000	.865	.500	.811	.943	.852	.000	.913	.000	.583	.688	.926	.250	.945	.925



File Name : 2 - TH 36 & Norell-Washington Ave, 10-14-17, 6am-7pm
 Site Code : 2
 Start Date : 10/14/2017
 Page No : 1

TH 36 & Norell-Washington Ave
 Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						TH 36 Westbound						Norell Ave Northbound						TH 36 Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	5	1	4	0	10	0	2	61	2	0	65	0	3	1	2	0	6	0	0	33	6	0	39	120
06:15 AM	0	4	2	1	0	7	0	9	62	4	0	75	0	6	5	5	0	16	0	3	41	12	0	56	154
06:30 AM	0	1	1	3	0	5	0	6	49	5	0	60	0	4	3	2	0	9	0	1	67	10	0	78	152
06:45 AM	0	3	7	4	0	14	0	6	65	6	0	77	0	6	4	4	0	14	0	11	68	26	0	105	210
Total	0	13	11	12	0	36	0	23	237	17	0	277	0	19	13	13	0	45	0	15	209	54	0	278	636
07:00 AM	0	6	10	5	0	21	0	14	70	11	0	95	0	8	7	10	0	25	0	10	81	16	0	107	248
07:15 AM	0	5	6	5	0	16	0	13	82	11	0	106	0	12	8	12	0	32	0	16	82	12	0	110	264
07:30 AM	0	8	9	8	0	25	0	14	103	10	0	127	0	5	15	6	0	26	0	16	96	15	0	127	305
07:45 AM	0	9	18	8	0	35	0	19	77	15	0	111	0	7	8	3	0	18	0	28	122	22	0	172	336
Total	0	28	43	26	0	97	0	60	332	47	0	439	0	32	38	31	0	101	0	70	381	65	0	516	1153
08:00 AM	0	10	18	4	0	32	0	29	107	15	0	151	0	12	9	12	0	33	0	16	115	26	0	157	373
08:15 AM	0	14	24	7	0	45	0	26	125	18	0	169	0	17	17	16	0	50	0	20	146	22	0	188	452
08:30 AM	0	11	34	23	0	68	0	29	135	30	0	194	0	15	21	17	0	53	0	23	166	26	0	215	530
08:45 AM	0	10	31	17	2	60	0	36	127	24	0	187	0	11	24	17	0	52	1	44	182	42	0	269	568
Total	0	45	107	51	2	205	0	120	494	87	0	701	0	55	71	62	0	188	1	103	609	116	0	829	1923
09:00 AM	0	21	29	22	0	72	0	26	122	29	0	177	0	21	28	24	0	73	0	28	163	46	0	237	559
09:15 AM	0	23	39	24	0	86	0	34	145	24	0	203	0	12	26	26	0	64	3	34	208	54	0	299	652
09:30 AM	0	22	38	24	0	84	0	44	190	33	0	267	0	21	43	32	0	96	0	30	217	38	0	285	732
09:45 AM	0	32	58	35	0	125	0	54	173	43	0	270	1	21	43	35	0	100	0	38	235	44	0	317	812
Total	0	98	164	105	0	367	0	158	630	129	0	917	1	75	140	117	0	333	3	130	823	182	0	1138	2755
10:00 AM	0	35	62	38	0	135	0	41	192	38	0	271	0	35	30	39	0	104	1	37	256	56	1	351	861
10:15 AM	0	24	41	25	0	90	0	34	148	50	0	232	0	28	37	27	0	92	1	45	231	50	0	327	741
10:30 AM	0	23	37	24	0	84	0	46	193	54	0	293	0	23	51	46	0	120	2	48	277	58	2	387	884
10:45 AM	0	33	58	35	0	126	0	51	173	48	0	272	0	38	48	39	0	125	2	52	289	84	0	427	950
Total	0	115	198	122	0	435	0	172	706	190	0	1068	0	124	166	151	0	441	6	182	1053	248	3	1492	3436
11:00 AM	0	33	62	37	0	132	0	41	192	35	1	269	0	43	52	47	0	142	0	37	234	66	0	337	880
11:15 AM	0	33	45	34	0	112	0	50	181	45	0	276	0	44	58	39	0	141	0	39	267	85	2	393	922
11:30 AM	0	35	51	22	3	111	0	45	174	48	2	269	0	47	63	43	0	153	1	46	287	94	0	428	961
11:45 AM	0	34	80	35	0	149	0	60	205	49	1	315	0	42	51	41	0	134	0	48	265	97	0	410	1008
Total	0	135	238	128	3	504	0	196	752	177	4	1129	0	176	224	170	0	570	1	170	1053	342	2	1568	3771
12:00 PM	0	54	77	45	0	176	0	50	196	41	0	287	0	45	75	48	0	168	0	44	269	80	0	393	1024
12:15 PM	0	44	67	35	0	146	0	51	197	48	0	296	0	51	75	56	0	182	0	33	274	66	5	378	1002
12:30 PM	0	48	76	35	0	159	0	52	212	47	0	311	0	55	66	59	0	180	0	39	303	84	1	427	1077
12:45 PM	0	33	78	49	0	160	0	75	122	48	4	249	0	61	57	43	0	161	1	43	295	89	0	428	998
Total	0	179	298	164	0	641	0	228	727	184	4	1143	0	212	273	206	0	691	1	159	1141	319	6	1626	4101
01:00 PM	0	35	80	34	0	149	0	80	248	52	0	380	0	35	63	60	0	158	0	65	302	68	0	435	1122
01:15 PM	0	34	81	56	0	171	0	80	242	52	0	374	0	67	54	59	0	180	1	47	293	80	0	421	1146
01:30 PM	0	43	61	40	0	144	0	62	228	41	1	332	0	62	78	58	0	198	1	55	319	88	0	463	1137
01:45 PM	0	44	72	32	0	148	0	76	238	44	0	358	0	66	73	44	0	183	0	70	302	96	0	468	1157
Total	0	156	294	162	0	612	0	298	956	189	1	1444	0	230	268	221	0	719	2	237	1216	332	0	1787	4562
02:00 PM	0	45	68	48	0	161	0	59	258	35	0	352	0	62	63	51	0	176	0	48	286	93	0	427	1116
02:15 PM	0	40	67	56	0	163	0	51	282	49	0	382	0	61	76	49	0	186	1	43	268	86	0	398	1129



File Name : 2 - TH 36 & Norell-Washington Ave, 10-14-17, 6am-7pm

Site Code : 2

Start Date : 10/14/2017

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TH 36 & Norell-Washington Ave
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Washington Ave Southbound						TH 36 Westbound						Norell Ave Northbound						TH 36 Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:30 PM	0	41	63	47	0	151	0	39	287	37	0	363	0	57	73	53	0	183	0	49	264	79	0	392	1089
02:45 PM	0	44	65	46	0	155	0	63	280	43	0	386	0	65	60	49	0	174	0	35	280	82	0	397	1112
Total	0	170	263	197	0	630	0	212	1107	164	0	1483	0	245	272	202	0	719	1	175	1098	340	0	1614	4446
03:00 PM	0	46	62	54	0	162	0	58	308	36	0	402	1	44	66	50	0	161	3	27	283	65	0	378	1103
03:15 PM	0	39	51	42	0	132	0	43	291	39	0	373	0	43	59	59	0	161	3	37	241	73	0	354	1020
03:30 PM	0	37	54	37	0	128	0	58	256	42	0	356	0	51	66	62	0	179	0	34	250	96	0	380	1043
03:45 PM	0	35	48	34	0	117	0	54	234	36	0	324	0	43	68	54	0	165	0	35	282	81	0	398	1004
Total	0	157	215	167	0	539	0	213	1089	153	0	1455	1	181	259	225	0	666	6	133	1056	315	0	1510	4170
04:00 PM	0	46	46	32	0	124	0	50	246	36	0	332	0	44	57	64	0	165	0	40	248	66	0	354	975
04:15 PM	0	45	55	39	0	139	0	43	263	44	0	350	0	36	49	61	0	146	0	45	271	70	0	386	1021
04:30 PM	0	55	38	35	0	128	0	47	281	43	0	371	0	49	66	56	0	171	1	52	250	57	0	360	1030
04:45 PM	0	54	47	45	0	146	0	40	279	32	0	351	1	55	52	49	0	157	0	27	217	51	0	295	949
Total	0	200	186	151	0	537	0	180	1069	155	0	1404	1	184	224	230	0	639	1	164	986	244	0	1395	3975
05:00 PM	0	45	42	55	0	142	0	30	271	29	0	330	0	60	41	35	0	136	0	21	221	69	0	311	919
05:15 PM	0	31	37	21	0	89	0	41	247	34	0	322	0	59	38	41	0	138	0	34	219	56	0	309	858
05:30 PM	0	31	39	27	0	97	0	44	252	30	0	326	0	49	37	64	0	150	0	33	180	57	0	270	843
05:45 PM	0	25	34	30	0	89	0	40	193	28	0	261	0	40	42	44	0	126	0	38	178	54	0	270	746
Total	0	132	152	133	0	417	0	155	963	121	0	1239	0	208	158	184	0	550	0	126	798	236	0	1160	3366
06:00 PM	0	32	28	27	0	87	0	44	203	37	0	284	0	47	34	48	0	129	0	27	172	53	0	252	752
06:15 PM	0	30	45	27	0	102	0	39	230	37	0	306	0	44	33	35	0	112	0	21	157	54	0	232	752
06:30 PM	0	20	49	22	0	91	0	45	190	22	0	257	0	41	36	43	0	120	0	23	136	39	0	198	666
06:45 PM	0	27	36	30	0	93	0	30	120	24	0	174	0	33	31	38	0	102	0	23	135	44	0	202	571
Total	0	109	158	106	0	373	0	158	743	120	0	1021	0	165	134	164	0	463	0	94	600	190	0	884	2741
Grand Total	0	1537	2327	1524	5	5393	0	2173	9805	1733	9	13720	3	1906	2240	1976	0	6125	22	1758	11023				
Cars +	0	1534	2315	1516	5	5370	0	2162	9654	1727	8	13551	3	1890	2233	1965	0	6091	22	1749	10869	2965	10	15615	40627
% Cars +	0	99.8	99.5	99.5	100	99.6	0	99.5	98.5	99.7	88.9	98.8	100	99.2	99.7	99.4	0	99.4	100	99.5	98.6	99.4	90.9	98.8	99
Trucks	0	3	12	8	0	23	0	11	151	6	1	169	0	16	7	11	0	34	0	9	154	18	1	182	408
% Trucks	0	0.2	0.5	0.5	0	0.4	0	0.5	1.5	0.3	11.1	1.2	0	0.8	0.3	0.6	0	0.6	0	0.5	1.4	0.6	9.1	1.2	1



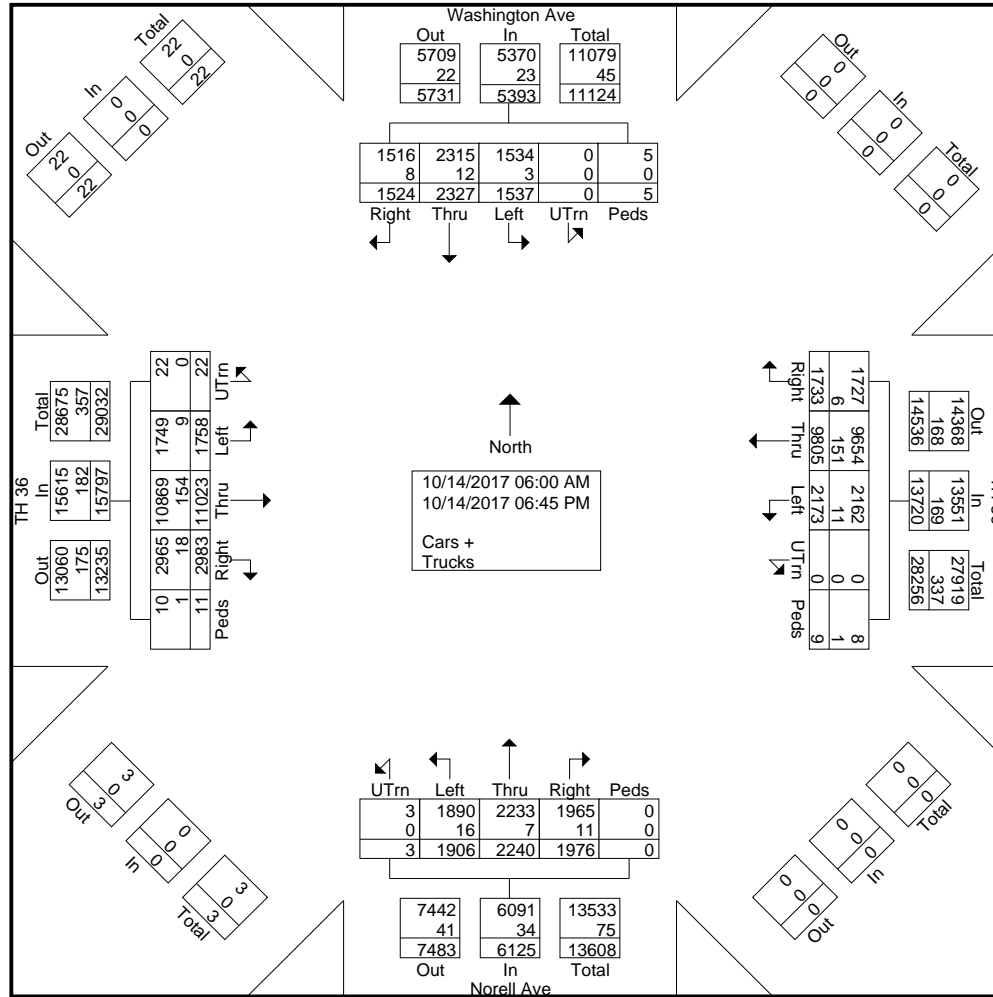
File Name : 2 - TH 36 & Norell-Washington Ave, 10-14-17, 6am-7pm

Site Code : 2

Start Date : 10/14/2017

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TH 36 & Norell-Washington Ave
Oak Park Heights, MN





File Name : 2 - TH 36 & Norell-Washington Ave, 10-14-17, 6am-7pm

Site Code : 2

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TH 36 & Norell-Washington Ave
Oak Park Heights, MN

Start Time	Washington Ave Southbound					TH 36 Westbound					Norell Ave Northbound					TH 36 Eastbound					Int. Total				
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left		Thru	Right	Peds	App. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:00 AM																									
09:00 AM	0	21	29	22	0	72	0	26	122	29	0	177	0	21	28	24	0	73	0	28	163	46	0	237	559
09:15 AM	0	23	39	24	0	86	0	34	145	24	0	203	0	12	26	26	0	64	3	34	208	54	0	299	652
09:30 AM	0	22	38	24	0	84	0	44	190	33	0	267	0	21	43	32	0	96	0	30	217	38	0	285	732
09:45 AM	0	32	58	35	0	125	0	54	173	43	0	270	1	21	43	35	0	100	0	38	235	44	0	317	812
Total Volume	0	98	164	105	0	367	0	158	630	129	0	917	1	75	140	117	0	333	3	130	823	182	0	1138	2755
% App. Total	0	26.7	44.7	28.6	0		0	17.2	68.7	14.1	0		0.3	22.5	42	35.1	0		0.3	11.4	72.3	16	0		
PHF	.000	.766	.707	.750	.000	.734	.000	.731	.829	.750	.000	.849	.250	.893	.814	.836	.000	.833	.250	.855	.876	.843	.000	.897	.848
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 01:00 PM																									
01:00 PM	0	35	80	34	0	149	0	80	248	52	0	380	0	35	63	60	0	158	0	65	302	68	0	435	1122
01:15 PM	0	34	81	56	0	171	0	80	242	52	0	374	0	67	54	59	0	180	1	47	293	80	0	421	1146
01:30 PM	0	43	61	40	0	144	0	62	228	41	1	332	0	62	78	58	0	198	1	55	319	88	0	463	1137
01:45 PM	0	44	72	32	0	148	0	76	238	44	0	358	0	66	73	44	0	183	0	70	302	96	0	468	1157
Total Volume	0	156	294	162	0	612	0	298	956	189	1	1444	0	230	268	221	0	719	2	237	1216	332	0	1787	4562
% App. Total	0	25.5	48	26.5	0		0	20.6	66.2	13.1	0.1		0	32	37.3	30.7	0		0.1	13.3	68	18.6	0		
PHF	.000	.886	.907	.723	.000	.895	.000	.931	.964	.909	.250	.950	.000	.858	.859	.921	.000	.908	.500	.846	.953	.865	.000	.955	.986
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 02:00 PM																									
02:00 PM	0	45	68	48	0	161	0	59	258	35	0	352	0	62	63	51	0	176	0	48	286	93	0	427	1116
02:15 PM	0	40	67	56	0	163	0	51	282	49	0	382	0	61	76	49	0	186	1	43	268	86	0	398	1129
02:30 PM	0	41	63	47	0	151	0	39	287	37	0	363	0	57	73	53	0	183	0	49	264	79	0	392	1089
02:45 PM	0	44	65	46	0	155	0	63	280	43	0	386	0	65	60	49	0	174	0	35	280	82	0	397	1112
Total Volume	0	170	263	197	0	630	0	212	1107	164	0	1483	0	245	272	202	0	719	1	175	1098	340	0	1614	4446
% App. Total	0	27	41.7	31.3	0		0	14.3	74.6	11.1	0		0	34.1	37.8	28.1	0		0.1	10.8	68	21.1	0		
PHF	.000	.944	.967	.879	.000	.966	.000	.841	.964	.837	.000	.960	.000	.942	.895	.953	.000	.966	.250	.893	.960	.914	.000	.945	.984



Norell Ave & 60th St N
 Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Norell Ave Southbound						60th St N Westbound						Norell Ave Northbound						60th St N Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	3	5	2	0	10	0	1	1	1	0	3	0	0	5	0	0	5	0	1	0	0	0	1	
06:15 AM	1	2	9	10	0	22	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	
06:30 AM	0	0	6	11	0	17	0	0	0	2	0	2	0	0	5	0	0	5	0	2	0	0	0	2	
06:45 AM	0	7	22	9	0	38	0	0	0	2	0	2	0	0	7	0	0	7	0	5	0	1	0	6	
Total	1	12	42	32	0	87	0	1	1	5	0	7	0	0	32	0	0	32	0	8	0	1	0	9	
07:00 AM	0	4	16	20	0	40	0	0	0	2	0	2	0	0	17	0	0	17	0	5	1	0	0	6	
07:15 AM	1	2	8	21	0	32	0	0	0	3	0	3	0	0	16	0	0	16	0	12	0	0	0	12	
07:30 AM	0	3	24	10	0	37	0	2	0	1	0	3	0	3	20	0	0	23	0	5	2	2	0	9	
07:45 AM	0	7	29	23	0	59	0	2	2	4	0	8	0	0	12	0	0	12	0	7	2	1	0	10	
Total	1	16	77	74	0	168	0	4	2	10	0	16	0	3	65	0	0	68	0	29	5	3	0	37	
08:00 AM	0	7	42	25	0	74	0	0	3	2	0	5	0	0	22	2	0	24	0	5	1	3	0	9	
08:15 AM	0	2	38	35	0	75	0	0	0	5	0	5	0	2	29	1	0	32	0	18	0	3	0	21	
08:30 AM	0	7	46	34	0	87	0	0	5	3	0	8	0	0	34	1	0	35	0	13	1	3	0	17	
08:45 AM	0	18	46	47	0	111	0	0	1	4	0	5	0	2	35	1	0	38	0	10	1	2	0	13	
Total	0	34	172	141	0	347	0	0	9	14	0	23	0	4	120	5	0	129	0	46	3	11	0	60	
09:00 AM	0	11	50	41	4	106	0	0	3	9	0	12	0	3	53	2	0	58	0	15	6	0	0	21	
09:15 AM	0	10	57	59	0	126	0	2	1	7	0	10	0	2	41	5	0	48	0	21	6	2	0	29	
09:30 AM	0	11	57	56	0	124	0	1	1	17	0	19	0	5	56	1	0	62	0	24	3	5	0	32	
09:45 AM	0	17	81	61	0	159	0	3	8	18	0	29	0	1	58	6	0	65	0	24	4	3	0	31	
Total	0	49	245	217	4	515	0	6	13	51	0	70	0	11	208	14	0	233	0	84	19	10	0	113	
10:00 AM	0	11	87	59	0	157	0	6	4	13	0	23	0	2	68	2	0	72	0	23	5	2	0	30	
10:15 AM	0	14	70	69	0	153	0	3	5	14	0	22	0	4	61	2	0	67	0	19	6	4	0	29	
10:30 AM	0	11	79	65	4	159	0	2	6	11	0	19	0	3	88	5	0	96	0	17	1	11	2	31	
10:45 AM	0	16	130	72	0	218	0	1	8	7	0	16	0	4	95	6	0	105	0	23	2	4	0	29	
Total	0	52	366	265	4	687	0	12	23	45	0	80	0	13	312	15	0	340	0	82	14	21	2	119	
11:00 AM	0	27	88	77	0	192	0	3	2	11	0	16	0	5	88	3	1	97	0	40	10	6	0	56	
11:15 AM	3	30	95	75	0	203	0	2	4	16	0	22	0	4	100	4	0	108	0	27	2	9	2	40	
11:30 AM	0	22	114	90	0	226	0	3	4	13	0	20	0	8	106	4	1	119	0	29	6	1	1	37	
11:45 AM	1	34	115	101	0	251	0	4	4	14	2	24	0	9	95	8	0	112	0	24	7	8	0	39	
Total	4	113	412	343	0	872	0	12	14	54	2	82	0	26	389	19	2	436	0	120	25	24	3	172	
12:00 PM	0	28	122	91	0	241	0	4	6	23	0	33	1	7	119	2	0	129	0	33	7	11	0	51	
12:15 PM	1	24	123	81	0	229	0	2	7	15	0	24	0	4	125	4	1	134	0	43	8	7	0	58	
12:30 PM	0	24	102	84	0	210	0	1	9	17	0	27	1	4	116	9	0	130	0	41	10	10	0	61	
12:45 PM	0	35	106	86	0	227	0	1	4	17	2	24	0	10	117	4	0	131	0	31	6	7	0	44	
Total	1	111	453	342	0	907	0	8	26	72	2	108	2	25	477	19	1	524	0	148	31	35	0	214	
01:00 PM	0	23	118	81	0	222	0	4	9	28	2	43	2	7	99	3	2	113	0	36	8	9	0	53	
01:15 PM	0	21	86	83	0	190	0	4	7	31	0	42	0	5	109	4	0	118	0	36	10	8	0	54	
01:30 PM	0	28	100	86	0	214	0	3	7	28	0	38	0	5	127	5	0	137	0	33	12	4	0	49	
01:45 PM	0	24	104	76	0	204	0	4	9	19	0	32	0	3	116	6	0	125	0	39	5	13	0	57	
Total	0	96	408	326	0	830	0	15	32	106	2	155	2	20	451	18	2	493	0	144	35	34	0	213	
02:00 PM	0	22	118	68	0	208	0	3	3	16	0	22	0	8	130	9	0	147	0	30	12	13	0	55	
02:15 PM	0	28	109	66	0	203	0	5	11	18	0	34	0	4	134	12	0	150	0	31	9	10	0	50	



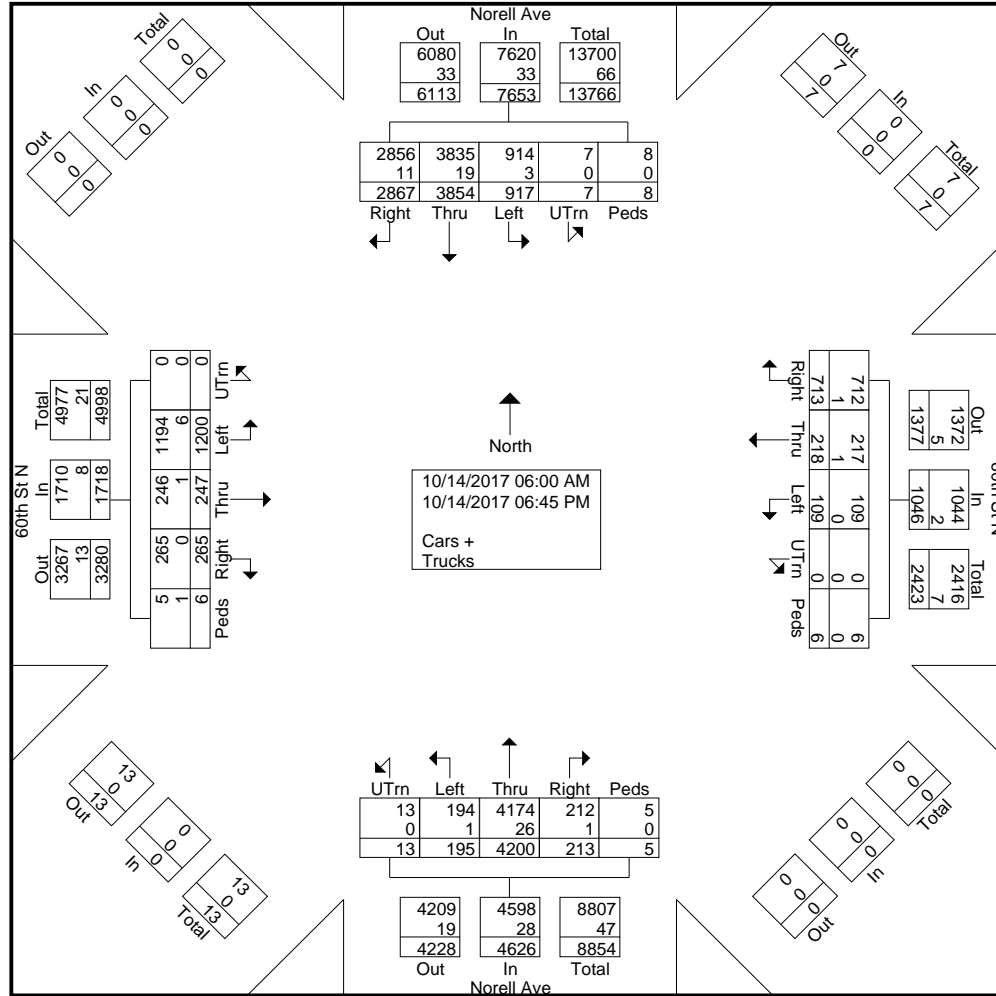
Norell Ave & 60th St N
Oak Park Heights, MN

Groups Printed- Cars + - Trucks

Start Time	Norell Ave Southbound						60th St N Westbound						Norell Ave Northbound						60th St N Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:30 PM	0	21	98	60	0	179	0	4	2	26	0	32	1	3	119	5	0	128	0	34	6	5	1	46	385
02:45 PM	0	25	118	72	0	215	0	4	5	26	0	35	3	10	115	8	0	136	0	29	4	7	0	40	426
Total	0	96	443	266	0	805	0	16	21	86	0	123	4	25	498	34	0	561	0	124	31	35	1	191	1680
03:00 PM	0	23	89	68	0	180	0	4	10	15	0	29	1	5	124	6	0	136	0	26	3	7	0	36	381
03:15 PM	0	16	97	60	0	173	0	2	4	21	0	27	0	5	122	4	0	131	0	22	6	10	0	38	369
03:30 PM	0	20	110	77	0	207	0	3	4	15	0	22	0	5	138	4	0	147	0	33	2	10	0	45	421
03:45 PM	0	26	112	54	0	192	0	2	6	17	0	25	0	0	132	2	0	134	0	28	5	5	0	38	389
Total	0	85	408	259	0	752	0	11	24	68	0	103	1	15	516	16	0	548	0	109	16	32	0	157	1560
04:00 PM	0	17	93	69	0	179	0	1	4	22	0	27	0	6	99	7	0	112	0	34	7	1	0	42	360
04:15 PM	0	30	86	59	0	175	0	5	5	18	0	28	0	2	110	9	0	121	0	24	6	3	0	33	357
04:30 PM	0	12	71	54	0	137	0	5	5	20	0	30	1	3	130	2	0	136	0	25	3	8	0	36	339
04:45 PM	0	21	70	49	0	140	0	0	4	10	0	14	1	1	110	4	0	116	0	35	6	6	0	47	317
Total	0	80	320	231	0	631	0	11	18	70	0	99	2	12	449	22	0	485	0	118	22	18	0	158	1373
05:00 PM	0	23	70	57	0	150	0	0	1	18	0	19	1	5	104	3	0	113	0	17	7	4	0	28	310
05:15 PM	0	20	70	38	0	128	0	2	5	14	0	21	0	7	92	7	0	106	0	29	8	7	0	44	299
05:30 PM	0	22	69	44	0	135	0	2	1	19	0	22	0	4	94	7	0	105	0	23	8	8	0	39	301
05:45 PM	0	26	51	50	0	127	0	2	2	14	0	18	0	4	93	5	0	102	0	23	7	4	0	34	281
Total	0	91	260	189	0	540	0	6	9	65	0	80	1	20	383	22	0	426	0	92	30	23	0	145	1191
06:00 PM	0	22	68	38	0	128	0	1	2	18	0	21	0	7	78	9	0	94	0	27	6	5	0	38	281
06:15 PM	0	25	73	48	0	146	0	2	11	19	0	32	0	9	77	4	0	90	0	19	4	4	0	27	295
06:30 PM	0	20	51	59	0	130	0	3	7	17	0	27	1	4	76	10	0	91	0	23	4	7	0	34	282
06:45 PM	0	15	56	37	0	108	0	1	6	13	0	20	0	1	69	6	0	76	0	27	2	2	0	31	235
Total	0	82	248	182	0	512	0	7	26	67	0	100	1	21	300	29	0	351	0	96	16	18	0	130	1093
Grand Total	7	917	3854	2867	8	7653	0	109	218	713	6	1046	13	195	4200	213	5	4626	0	1200	247	265	6	1718	15043
Apprch %	0.1	12	50.4	37.5	0.1		0	10.4	20.8	68.2	0.6		0.3	4.2	90.8	4.6	0.1		0	69.8	14.4	15.4	0.3		
Total %	0	6.1	25.6	19.1	0.1	50.9	0	0.7	1.4	4.7	0	7	0.1	1.3	27.9	1.4	0	30.8	0	8	1.6	1.8	0	11.4	
Cars +	7	914	3835	2856	8	7620	0	109	217	712	6	1044	13	194	4174	212	5	4598	0	1194	246	265	5	1710	14972
% Cars +	100	99.7	99.5	99.6	100	99.6	0	100	99.5	99.9	100	99.8	100	99.5	99.4	99.5	100	99.4	0	99.5	99.6	100	83.3	99.5	99.5
Trucks	0	3	19	11	0	33	0	0	1	1	0	2	0	1	26	1	0	28	0	6	1	0	1	8	71
% Trucks	0	0.3	0.5	0.4	0	0.4	0	0	0.5	0.1	0	0.2	0	0.5	0.6	0.5	0	0.6	0	0.5	0.4	0	16.7	0.5	0.5



Norell Ave & 60th St N
 Oak Park Heights, MN





File Name : 3 - Norell Ave & 60th St N, 10-14-17
 Site Code : 3
 Start Date : 10/14/2017
 Page No : 4

Norell Ave & 60th St N
 Oak Park Heights, MN

Start Time	Norell Ave Southbound						60th St N Westbound					Norell Ave Northbound					60th St N Eastbound					Int. Total			
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru		Right	Peds	App. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:00 AM																									
09:00 AM	0	11	50	41	4	106	0	0	3	9	0	12	0	3	53	2	0	58	0	15	6	0	0	21	197
09:15 AM	0	10	57	59	0	126	0	2	1	7	0	10	0	2	41	5	0	48	0	21	6	2	0	29	213
09:30 AM	0	11	57	56	0	124	0	1	1	17	0	19	0	5	56	1	0	62	0	24	3	5	0	32	237
09:45 AM	0	17	81	61	0	159	0	3	8	18	0	29	0	1	58	6	0	65	0	24	4	3	0	31	284
Total Volume	0	49	245	217	4	515	0	6	13	51	0	70	0	11	208	14	0	233	0	84	19	10	0	113	931
% App. Total	0	9.5	47.6	42.1	0.8		0	8.6	18.6	72.9	0		0	4.7	89.3	6	0		0	74.3	16.8	8.8	0		
PHF	.000	.721	.756	.889	.250	.810	.000	.500	.406	.708	.000	.603	.000	.550	.897	.583	.000	.896	.000	.875	.792	.500	.000	.883	.820

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:45 AM																									
11:45 AM	1	34	115	101	0	251	0	4	4	14	2	24	0	9	95	8	0	112	0	24	7	8	0	39	426
12:00 PM	0	28	122	91	0	241	0	4	6	23	0	33	1	7	119	2	0	129	0	33	7	11	0	51	454
12:15 PM	1	24	123	81	0	229	0	2	7	15	0	24	0	4	125	4	1	134	0	43	8	7	0	58	445
12:30 PM	0	24	102	84	0	210	0	1	9	17	0	27	1	4	116	9	0	130	0	41	10	10	0	61	428
Total Volume	2	110	462	357	0	931	0	11	26	69	2	108	2	24	455	23	1	505	0	141	32	36	0	209	1753
% App. Total	0.2	11.8	49.6	38.3	0		0	10.2	24.1	63.9	1.9		0.4	4.8	90.1	4.6	0.2		0	67.5	15.3	17.2	0		
PHF	.500	.809	.939	.884	.000	.927	.000	.688	.722	.750	.250	.818	.500	.667	.910	.639	.250	.942	.000	.820	.800	.818	.000	.857	.965

Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 02:00 PM																									
02:00 PM	0	22	118	68	0	208	0	3	3	16	0	22	0	8	130	9	0	147	0	30	12	13	0	55	432
02:15 PM	0	28	109	66	0	203	0	5	11	18	0	34	0	4	134	12	0	150	0	31	9	10	0	50	437
02:30 PM	0	21	98	60	0	179	0	4	2	26	0	32	1	3	119	5	0	128	0	34	6	5	1	46	385
02:45 PM	0	25	118	72	0	215	0	4	5	26	0	35	3	10	115	8	0	136	0	29	4	7	0	40	426
Total Volume	0	96	443	266	0	805	0	16	21	86	0	123	4	25	498	34	0	561	0	124	31	35	1	191	1680
% App. Total	0	11.9	55	33	0		0	13	17.1	69.9	0		0.7	4.5	88.8	6.1	0		0	64.9	16.2	18.3	0.5		
PHF	.000	.857	.939	.924	.000	.936	.000	.800	.477	.827	.000	.879	.333	.625	.929	.708	.000	.935	.000	.912	.646	.673	.250	.868	.961

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	43.3	43.2	0.0	0.2	10.4
Total Del/Veh (s)	281.7	329.6	2.9	25.5	82.8

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.1	4.2	0.2	0.0	0.4
Total Del/Veh (s)	120.9	94.0	25.5	2.0	27.9

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.8	0.6	0.2	0.3	0.6
Total Del/Veh (s)	53.9	36.2	55.8	49.8	48.1

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.1
Total Del/Veh (s)	4.2	0.6	1.5	1.6

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.4	0.2
Total Del/Veh (s)	3.5	6.5	0.6	0.5	1.2

Total Network Performance

Denied Del/Veh (s)	3.6
Total Del/Veh (s)	79.2

Queuing and Blocking Report
 Alternative 1 - Existing PM Peak

04/25/2018

Intersection: 2: Washington & W Frontage Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	UL	T
Maximum Queue (ft)	148	515	40	544	346	40	85	116	34	32	75	233
Average Queue (ft)	44	345	39	357	129	26	43	13	2	2	7	98
95th Queue (ft)	280	651	42	612	473	49	84	67	26	15	38	202
Link Distance (ft)	589	589		529	529			92	92			259
Upstream Blk Time (%)	3	21		23	15		1	0	0			0
Queuing Penalty (veh)	0	0		0	0		0	2	0			1
Storage Bay Dist (ft)			20			20	150			150	90	
Storage Blk Time (%)		11	90		7	7	1	0	0			19
Queuing Penalty (veh)		15	19		5	2	2	1	0			3

Intersection: 2: Washington & W Frontage Rd

Movement	SB
Directions Served	TR
Maximum Queue (ft)	250
Average Queue (ft)	103
95th Queue (ft)	216
Link Distance (ft)	259
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Norrell & 60th St N

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	TR	L	T	TR
Maximum Queue (ft)	355	79	40	28	230	46	145	269	237	67	44	15
Average Queue (ft)	152	26	24	7	72	32	10	115	103	25	2	1
95th Queue (ft)	346	59	50	25	244	52	70	249	221	58	23	7
Link Distance (ft)	635	635		481	481			269	269		94	94
Upstream Blk Time (%)					2			1	0	0	0	
Queuing Penalty (veh)					0			2	1	0	0	
Storage Bay Dist (ft)			20			20	90			100		
Storage Blk Time (%)		11	4		10	48		23		0	0	
Queuing Penalty (veh)		4	1		5	8		3		0	0	

Queuing and Blocking Report
 Alternative 1 - Existing PM Peak

04/25/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	256	450	857	841	350	198	324	421	448	350	128	113
Average Queue (ft)	109	201	483	502	218	92	119	257	270	79	101	88
95th Queue (ft)	199	442	793	802	464	173	233	403	425	273	131	127
Link Distance (ft)			3837	3837				3208	3208		94	94
Upstream Blk Time (%)											46	34
Queuing Penalty (veh)											93	68
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)	0	0	17	26				2	12			
Queuing Penalty (veh)	0	1	39	80				4	25			

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	148	94	111	112	136	92
Average Queue (ft)	106	83	90	85	103	79
95th Queue (ft)	143	109	120	125	127	112
Link Distance (ft)	94		92	92	92	
Upstream Blk Time (%)	39	12	42	33	45	8
Queuing Penalty (veh)	78	0	90	71	97	0
Storage Bay Dist (ft)		150				100
Storage Blk Time (%)	39	12			45	8
Queuing Penalty (veh)	74	15			108	10

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	NB	SB
Directions Served	R	T	TR	UL
Maximum Queue (ft)	68	26	41	71
Average Queue (ft)	39	1	2	30
95th Queue (ft)	60	17	21	61
Link Distance (ft)	291	341	341	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				90
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	L	R	UL	TR	L	T	TR
Maximum Queue (ft)	31	67	64	35	9	39	24	25
Average Queue (ft)	8	30	25	7	0	7	1	1
95th Queue (ft)	29	55	54	29	5	29	14	13
Link Distance (ft)	172	170	170		259		268	268
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				100		100		
Storage Blk Time (%)							0	
Queuing Penalty (veh)							0	

Network Summary

Network wide Queuing Penalty: 928

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	3.5	4.1	0.0	0.0	1.0
Total Del/Veh (s)	82.9	158.2	2.6	10.8	35.7

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	156.1	2.7	0.1	0.0	19.8
Total Del/Veh (s)	439.3	63.8	12.2	2.0	56.7

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.6	0.6	0.2	0.0	0.5
Total Del/Veh (s)	45.0	34.7	37.5	42.8	40.3

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.1
Total Del/Veh (s)	4.3	0.4	1.6	1.6

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.5	0.2
Total Del/Veh (s)	3.7	6.8	0.9	0.6	1.9

Total Network Performance

Denied Del/Veh (s)	8.0
Total Del/Veh (s)	71.2

Queuing and Blocking Report
 Alternative 1 - Existing Saturday Peak

04/06/2018

Intersection: 2: Washington & W Frontage Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	UL	T
Maximum Queue (ft)	28	404	40	456	326	40	88	111	43	15	36	132
Average Queue (ft)	6	158	39	215	38	22	49	9	2	1	8	40
95th Queue (ft)	23	352	42	468	189	47	85	54	27	8	27	109
Link Distance (ft)	589	589		529	529			92	92			259
Upstream Blk Time (%)		1		4	1		0	0	0			
Queuing Penalty (veh)		0		0	0		0	1	0			
Storage Bay Dist (ft)			20			20	150			150	90	
Storage Blk Time (%)		9	76		9	6	0	0	0			2
Queuing Penalty (veh)		15	13		4	2	1	0	0			1

Intersection: 2: Washington & W Frontage Rd

Movement	SB
Directions Served	TR
Maximum Queue (ft)	187
Average Queue (ft)	45
95th Queue (ft)	128
Link Distance (ft)	259
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Norrell & 60th St N

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	TR	L	T	TR
Maximum Queue (ft)	650	650	40	36	244	40	84	232	167	66	23	30
Average Queue (ft)	514	285	21	11	93	37	10	94	57	30	1	3
95th Queue (ft)	781	785	49	33	223	46	46	197	142	59	17	16
Link Distance (ft)	635	635		481	481			269	269		94	94
Upstream Blk Time (%)	43	31						0			0	
Queuing Penalty (veh)	0	0						1			0	
Storage Bay Dist (ft)			20			20	90			100		
Storage Blk Time (%)		12	4		24	52		14			0	
Queuing Penalty (veh)		5	1		22	17		3			0	

Queuing and Blocking Report
 Alternative 1 - Existing Saturday Peak

04/06/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	214	398	1186	518	350	176	210	331	357	294	116	114
Average Queue (ft)	100	128	335	319	162	93	114	223	235	51	105	87
95th Queue (ft)	182	277	849	478	373	157	188	313	331	170	124	127
Link Distance (ft)			3837	3837				3208	3208		94	94
Upstream Blk Time (%)			0								42	18
Queuing Penalty (veh)			0								105	44
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)	0	0	5	16	0			0	6			
Queuing Penalty (veh)	0	0	11	60	0			0	10			

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	121	94	112	114	127	92
Average Queue (ft)	99	80	88	85	98	76
95th Queue (ft)	128	115	122	118	127	113
Link Distance (ft)	94		92	92	92	
Upstream Blk Time (%)	24	4	26	21	31	4
Queuing Penalty (veh)	59	0	54	43	66	0
Storage Bay Dist (ft)		150				100
Storage Blk Time (%)	24	4			31	4
Queuing Penalty (veh)	48	6			58	6

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	NB	SB
Directions Served	R	T	TR	UL
Maximum Queue (ft)	72	11	5	71
Average Queue (ft)	41	0	0	33
95th Queue (ft)	63	8	5	60
Link Distance (ft)	291	341	341	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				90
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	L	R	UL	TR	L
Maximum Queue (ft)	40	91	50	35	23	39
Average Queue (ft)	16	41	22	9	2	8
95th Queue (ft)	42	69	47	32	12	30
Link Distance (ft)	172	170	170		259	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)				100		100
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 658

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	158.1	503.7	0.0	0.0	85.5
Total Del/Veh (s)	386.2	622.2	3.3	28.1	107.1

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	38.5	7.2	0.4	0.0	4.8
Total Del/Veh (s)	329.7	168.4	36.6	2.2	59.9

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.9	0.6	0.4	0.3	0.7
Total Del/Veh (s)	94.1	39.7	57.6	51.2	67.2

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.1
Total Del/Veh (s)	5.2	1.6	2.0	2.4

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.4	0.2
Total Del/Veh (s)	4.3	7.5	0.6	0.7	1.4

Total Network Performance

Denied Del/Veh (s)	25.9
Total Del/Veh (s)	111.2

Intersection: 2: Washington & W Frontage Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	UL	T
Maximum Queue (ft)	380	604	40	544	545	40	91	150	42	26	94	263
Average Queue (ft)	78	426	39	452	326	19	48	25	2	1	10	117
95th Queue (ft)	393	750	43	667	737	46	88	104	21	12	58	236
Link Distance (ft)	589	589		529	529			92	92			259
Upstream Blk Time (%)	8	45		52	55		1	1	0			1
Queuing Penalty (veh)	0	0		0	0		0	4	0			3
Storage Bay Dist (ft)			20			20	150			150	90	
Storage Blk Time (%)		11	93		9	6	1	1	0			23
Queuing Penalty (veh)		17	22		6	2	2	2	0			4

Intersection: 2: Washington & W Frontage Rd

Movement	SB
Directions Served	TR
Maximum Queue (ft)	243
Average Queue (ft)	119
95th Queue (ft)	228
Link Distance (ft)	259
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Norrell & 60th St N

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	TR	L	T	TR
Maximum Queue (ft)	596	535	40	28	321	50	57	307	282	83	104	33
Average Queue (ft)	360	155	24	8	143	36	6	164	130	31	5	2
95th Queue (ft)	677	559	51	26	334	51	44	291	251	70	43	14
Link Distance (ft)	635	635		481	481			269	269		94	94
Upstream Blk Time (%)	20	17			4			4	1	0	0	
Queuing Penalty (veh)	0	0			0			11	2	0	1	
Storage Bay Dist (ft)			20			20	90			100		
Storage Blk Time (%)		15	4		12	76		40		0	0	
Queuing Penalty (veh)		6	2		8	15		5		0	0	

Queuing and Blocking Report
 Alternative 1 - Forecast PM Peak

05/20/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	217	450	1514	1508	350	222	414	539	562	350	116	112
Average Queue (ft)	132	297	902	915	246	103	142	313	326	113	105	85
95th Queue (ft)	212	555	1570	1584	472	182	297	493	513	340	124	127
Link Distance (ft)			3837	3837				3208	3208		94	94
Upstream Blk Time (%)											61	27
Queuing Penalty (veh)											134	59
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)		0	31	37	0		0	6	18			
Queuing Penalty (veh)		0	77	124	1		0	12	40			

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	141	94	112	112	138	92
Average Queue (ft)	108	82	91	86	104	75
95th Queue (ft)	130	108	122	127	130	117
Link Distance (ft)	94		92	92	92	
Upstream Blk Time (%)	48	11	41	30	48	8
Queuing Penalty (veh)	105	0	99	71	114	0
Storage Bay Dist (ft)		150				100
Storage Blk Time (%)	48	11			48	8
Queuing Penalty (veh)	100	14			128	12

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	NB	SB
Directions Served	R	T	TR	UL
Maximum Queue (ft)	93	116	55	115
Average Queue (ft)	46	8	1	39
95th Queue (ft)	78	52	14	84
Link Distance (ft)	291	341	341	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				90
Storage Blk Time (%)				0
Queuing Penalty (veh)				1

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	L	R	UL	TR	L	T	TR
Maximum Queue (ft)	35	66	55	40	5	47	42	16
Average Queue (ft)	10	33	24	9	0	9	2	1
95th Queue (ft)	33	56	52	33	4	33	21	10
Link Distance (ft)	172	170	170		259		268	268
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				100		100		
Storage Blk Time (%)							0	
Queuing Penalty (veh)							0	

Network Summary

Network wide Queuing Penalty: 1205

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	45.9	318.2	0.0	0.0	46.4
Total Del/Veh (s)	249.4	520.3	3.2	18.1	93.1

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	578.5	3.5	0.0	0.0	70.8
Total Del/Veh (s)	705.9	140.6	15.3	2.1	76.5

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.8	0.7	0.2	0.0	0.6
Total Del/Veh (s)	64.8	36.9	38.4	45.2	49.3

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.1
Total Del/Veh (s)	4.8	0.5	1.8	1.8

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.5	0.2
Total Del/Veh (s)	4.3	6.8	0.9	0.5	1.9

Total Network Performance

Denied Del/Veh (s)	39.3
Total Del/Veh (s)	101.9

Queuing and Blocking Report
 Alternative 1 - Forecast Saturday Peak

06/01/2018

Intersection: 2: Washington & W Frontage Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	UL	T
Maximum Queue (ft)	269	587	40	544	544	40	91	120	27	22	97	193
Average Queue (ft)	36	381	40	475	330	19	53	17	1	1	16	72
95th Queue (ft)	247	683	42	670	743	46	90	79	13	12	73	164
Link Distance (ft)	589	589		529	529			92	92			259
Upstream Blk Time (%)	2	22		59	49		1	1	0			0
Queuing Penalty (veh)	0	0		0	0		0	2	0			0
Storage Bay Dist (ft)			20			20	150			150	90	
Storage Blk Time (%)		14	92		7	4	1	1	0			11
Queuing Penalty (veh)		28	18		3	2	2	1	0			3

Intersection: 2: Washington & W Frontage Rd

Movement	SB
Directions Served	TR
Maximum Queue (ft)	200
Average Queue (ft)	70
95th Queue (ft)	173
Link Distance (ft)	259
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Norrell & 60th St N

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	TR	L	T	TR
Maximum Queue (ft)	650	650	40	130	401	40	95	243	211	84	116	36
Average Queue (ft)	629	550	18	18	178	38	15	119	74	33	5	3
95th Queue (ft)	718	914	47	97	407	46	66	225	177	66	43	15
Link Distance (ft)	635	635		481	481			269	269		94	94
Upstream Blk Time (%)	85	76		0	3			0	0	0	0	
Queuing Penalty (veh)	0	0		0	0			1	0	0	0	
Storage Bay Dist (ft)			20			20	90			100		
Storage Blk Time (%)		9	3		28	64		19		0	0	
Queuing Penalty (veh)		4	1		28	24		5		0	0	

Queuing and Blocking Report
 Alternative 1 - Forecast Saturday Peak

06/01/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	262	450	928	926	350	208	234	388	399	350	121	112
Average Queue (ft)	134	211	469	484	241	107	122	254	264	62	106	89
95th Queue (ft)	237	453	851	872	458	186	198	357	369	212	124	132
Link Distance (ft)			3837	3837				3208	3208		94	94
Upstream Blk Time (%)											47	25
Queuing Penalty (veh)											129	68
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)		0	17	30	0			1	9			
Queuing Penalty (veh)		0	46	123	0			2	18			

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	137	94	113	111	123	92
Average Queue (ft)	99	76	92	84	97	71
95th Queue (ft)	134	115	123	122	124	115
Link Distance (ft)	94		92	92	92	
Upstream Blk Time (%)	27	3	37	29	38	4
Queuing Penalty (veh)	74	0	85	66	87	0
Storage Bay Dist (ft)		150				100
Storage Blk Time (%)	27	3			38	4
Queuing Penalty (veh)	60	6			76	6

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	NB	SB
Directions Served	R	T	TR	UL
Maximum Queue (ft)	75	10	19	75
Average Queue (ft)	43	1	1	38
95th Queue (ft)	64	11	12	70
Link Distance (ft)	291	341	341	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				90
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LTR	L	R	UL	T	TR	L	TR
Maximum Queue (ft)	48	81	50	35	10	23	30	5
Average Queue (ft)	18	42	24	7	0	2	7	0
95th Queue (ft)	45	69	48	28	7	13	27	4
Link Distance (ft)	172	170	170		259	259		268
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				100			100	
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 969

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.9	0.3	0.0	1.4	0.7
Total Del/Veh (s)	135.0	12.4	2.4	32.1	28.2

6: Norrell & 60th Street Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.1
Total Del/Veh (s)	4.2	7.6	1.3	4.1

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.8	0.6	0.9	0.5	0.7
Total Del/Veh (s)	67.2	38.4	63.7	57.1	56.5

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.3	0.0	0.2
Total Del/Veh (s)	3.8	5.8	3.8	4.4

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.1	9.4	3.0
Total Del/Veh (s)	5.0	7.0	11.5	22.5	14.5

Total Network Performance

Denied Del/Veh (s)	1.6
Total Del/Veh (s)	72.0

Intersection: 2: Washington & W Frontage Rd

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	R	LT	T	TR
Maximum Queue (ft)	407	145	164	76	41	131	309	310
Average Queue (ft)	202	51	18	5	2	58	146	199
95th Queue (ft)	467	105	101	43	24	124	357	366
Link Distance (ft)	595	535	103	103			262	262
Upstream Blk Time (%)	3		2	0	0		10	13
Queuing Penalty (veh)	0		7	1	0		35	47
Storage Bay Dist (ft)					150	90		
Storage Blk Time (%)				0	0	11	3	
Queuing Penalty (veh)				0	0	18	5	

Intersection: 6: Norrell & 60th Street

Movement	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	T	T	T	T	R
Maximum Queue (ft)	69	146	187	212	101	23	6	39
Average Queue (ft)	31	48	53	20	10	1	0	2
95th Queue (ft)	54	130	149	115	85	12	4	19
Link Distance (ft)	629			270	270	106	106	
Upstream Blk Time (%)				0	0			
Queuing Penalty (veh)				0	1			
Storage Bay Dist (ft)		100	100					150
Storage Blk Time (%)		4	5	0				
Queuing Penalty (veh)		6	8	0				

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	282	450	1088	1107	350	188	439	1087	550	350	174	175
Average Queue (ft)	160	220	589	595	197	96	114	307	292	88	150	151
95th Queue (ft)	264	508	1138	1143	444	169	269	748	455	286	201	207
Link Distance (ft)			3843	3843				3214	3214		106	106
Upstream Blk Time (%)								0			44	46
Queuing Penalty (veh)								0			68	71
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)	1	1	20	28	0		0	4	14			
Queuing Penalty (veh)	9	5	45	87	2		0	7	30			

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	144	175	158	157	156	103
Average Queue (ft)	59	101	136	107	120	87
95th Queue (ft)	118	176	167	161	183	130
Link Distance (ft)	106	106	103	103	103	
Upstream Blk Time (%)	3	17	48	29	34	10
Queuing Penalty (veh)	6	26	109	65	78	0
Storage Bay Dist (ft)						100
Storage Blk Time (%)					34	11
Queuing Penalty (veh)					82	14

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	SB
Directions Served	LR	TR	ULT
Maximum Queue (ft)	75	114	35
Average Queue (ft)	32	52	2
95th Queue (ft)	64	96	18
Link Distance (ft)	279	318	270
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	ULT	R	LTR
Maximum Queue (ft)	31	85	321	183	247
Average Queue (ft)	6	29	113	16	110
95th Queue (ft)	25	72	299	112	263
Link Distance (ft)	164	164	262	262	252
Upstream Blk Time (%)			7	0	14
Queuing Penalty (veh)			24	1	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 857

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	170.5	0.2	0.0	1.2	18.6
Total Del/Veh (s)	384.6	15.1	2.5	29.8	48.8

6: Norrell Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0
Total Del/Veh (s)	5.1	19.2	1.2	9.0

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.6	0.6	1.5	0.0	0.7
Total Del/Veh (s)	53.9	36.6	37.5	52.0	45.4

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.3	0.6	0.0	0.2
Total Del/Veh (s)	6.3	14.7	5.4	8.2

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.4	0.0	15.5	3.3
Total Del/Veh (s)	7.0	12.6	12.3	28.6	15.6

Total Network Performance

Denied Del/Veh (s)	8.3
Total Del/Veh (s)	72.5

Queuing and Blocking Report
 Alternative 2 - Existing Saturday Peak

05/22/2018

Intersection: 2: Washington & W Frontage Rd

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	R	T	T	TR
Maximum Queue (ft)	610	188	98	97	85	131	310	311
Average Queue (ft)	424	54	17	7	4	53	112	171
95th Queue (ft)	772	163	79	49	32	120	332	366
Link Distance (ft)	595	535	103	103			262	262
Upstream Blk Time (%)	44		2	1	0		10	13
Queuing Penalty (veh)	0		8	2	0		38	50
Storage Bay Dist (ft)					150	90		
Storage Blk Time (%)				1	0	7	1	
Queuing Penalty (veh)				1	0	10	1	

Intersection: 6: Norrell

Movement	EB	NB	NB	NB	NB	SB
Directions Served	R	T	T	T	T	T
Maximum Queue (ft)	88	135	180	312	301	6
Average Queue (ft)	40	97	104	94	59	0
95th Queue (ft)	71	166	220	297	231	5
Link Distance (ft)	628			266	266	106
Upstream Blk Time (%)				7	4	
Queuing Penalty (veh)				26	15	
Storage Bay Dist (ft)		90	90			
Storage Blk Time (%)		29	6	0		
Queuing Penalty (veh)		57	13	0		

Queuing and Blocking Report
 Alternative 2 - Existing Saturday Peak

05/22/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	307	336	630	624	350	206	289	358	362	196	136	162
Average Queue (ft)	156	142	332	335	140	86	134	234	237	40	113	102
95th Queue (ft)	306	335	635	636	328	164	237	341	344	124	126	160
Link Distance (ft)			3843	3843				3214	3214		106	106
Upstream Blk Time (%)											46	21
Queuing Penalty (veh)											90	41
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)	6	2	2	14	0		0	0	7			
Queuing Penalty (veh)	39	13	5	52	2		0	1	13			

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	121	110	117	116	142	103
Average Queue (ft)	73	76	106	69	109	77
95th Queue (ft)	125	122	131	127	135	129
Link Distance (ft)	106	106	103	103	103	
Upstream Blk Time (%)	7	6	37	9	46	4
Queuing Penalty (veh)	14	12	84	21	106	0
Storage Bay Dist (ft)						100
Storage Blk Time (%)					46	4
Queuing Penalty (veh)					88	6

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	SB	SB
Directions Served	LR	TR	UL	T
Maximum Queue (ft)	134	304	200	120
Average Queue (ft)	45	92	55	22
95th Queue (ft)	116	212	149	77
Link Distance (ft)	278	325	266	266
Upstream Blk Time (%)		1	0	0
Queuing Penalty (veh)		0	1	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	ULT	R	LTR
Maximum Queue (ft)	48	166	287	237	254
Average Queue (ft)	8	43	118	33	82
95th Queue (ft)	33	109	280	138	219
Link Distance (ft)	164	164	262	262	252
Upstream Blk Time (%)		1	4	1	12
Queuing Penalty (veh)		0	18	3	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 831

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	36.5	0.2	0.0	0.5	3.9
Total Del/Veh (s)	299.3	23.2	3.5	44.9	52.2

6: Norrell & 60th Street Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.1
Total Del/Veh (s)	4.4	17.4	1.3	8.3

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.9	0.6	1.3	1.1	0.9
Total Del/Veh (s)	104.0	40.2	72.6	55.4	73.7

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.4	0.1	0.2
Total Del/Veh (s)	5.2	8.6	4.6	5.9

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.2	34.5	11.5
Total Del/Veh (s)	14.6	12.9	19.1	45.5	27.2

Total Network Performance

Denied Del/Veh (s)	4.8
Total Del/Veh (s)	99.7

Intersection: 2: Washington & W Frontage Rd

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	R	LT	T	TR
Maximum Queue (ft)	598	206	199	125	61	229	312	253
Average Queue (ft)	423	72	50	17	6	112	249	219
95th Queue (ft)	732	158	176	88	41	230	411	304
Link Distance (ft)	583	535	103	103			253	
Upstream Blk Time (%)	31		5	0	0		26	9
Queuing Penalty (veh)	0		21	2	0		199	0
Storage Bay Dist (ft)					150	180		180
Storage Blk Time (%)				0	0	5	4	37
Queuing Penalty (veh)				1	0	28	23	140

Intersection: 6: Norrell & 60th Street

Movement	EB	NB	NB	NB	NB	SB	SB
Directions Served	R	T	T	T	T	T	R
Maximum Queue (ft)	71	147	193	287	257	11	17
Average Queue (ft)	33	72	90	66	36	0	1
95th Queue (ft)	58	171	216	234	180	8	15
Link Distance (ft)	629			270	270	106	
Upstream Blk Time (%)				2	2		
Queuing Penalty (veh)				7	8		
Storage Bay Dist (ft)		100	100				150
Storage Blk Time (%)		8	19	1			
Queuing Penalty (veh)		14	33	4			

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	346	450	1947	1940	350	217	395	546	559	350	174	175
Average Queue (ft)	220	328	938	948	260	92	137	316	330	105	159	159
95th Queue (ft)	361	585	1778	1778	479	167	284	498	521	322	200	205
Link Distance (ft)			3843	3843				3214	3214		106	106
Upstream Blk Time (%)											51	61
Queuing Penalty (veh)											87	104
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)	8	6	28	35	0			7	19			
Queuing Penalty (veh)	70	49	69	116	0			13	43			

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	153	176	166	146	155	146
Average Queue (ft)	71	126	143	98	107	93
95th Queue (ft)	135	196	173	164	170	161
Link Distance (ft)	106	106	103	103	103	103
Upstream Blk Time (%)	7	28	58	20	28	18
Queuing Penalty (veh)	12	49	110	37	53	34
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	SB	SB
Directions Served	LR	TR	ULT	
Maximum Queue (ft)	109	216	172	74
Average Queue (ft)	39	65	18	3
95th Queue (ft)	85	151	110	43
Link Distance (ft)	279	318	270	270
Upstream Blk Time (%)		0	0	0
Queuing Penalty (veh)		0	1	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	ULT	R	LTR
Maximum Queue (ft)	35	108	340	205	294
Average Queue (ft)	8	39	186	35	187
95th Queue (ft)	29	91	390	173	345
Link Distance (ft)	164	164	253	253	252
Upstream Blk Time (%)		0	18	1	38
Queuing Penalty (veh)		0	71	5	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 1402

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	469.1	0.2	0.0	0.0	50.9
Total Del/Veh (s)	467.7	9.3	1.7	22.0	52.2

6: Norrell Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.1
Total Del/Veh (s)	9.9	35.0	1.8	16.2

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.7	0.6	1.2	0.0	0.7
Total Del/Veh (s)	96.2	38.6	36.8	53.9	62.7

10: Norrell & Walmart Driveway Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.3	25.9	0.0	7.2
Total Del/Veh (s)	10.6	50.3	13.6	22.9

11: Washington & Herbergers Driveway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.2	0.1	0.3	0.1
Total Del/Veh (s)	7.2	5.6	8.6	11.8	8.9

Total Network Performance

Denied Del/Veh (s)	21.6
Total Del/Veh (s)	94.8

Queuing and Blocking Report
 Alternative 2 - Forecast Saturday Peak

05/22/2018

Intersection: 2: Washington & W Frontage Rd

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	R	T	T	TR
Maximum Queue (ft)	598	155	99	58	27	242	302	252
Average Queue (ft)	549	51	9	2	1	112	101	124
95th Queue (ft)	727	108	54	28	11	221	316	289
Link Distance (ft)	583	535	103	103			253	
Upstream Blk Time (%)	77		1	0	0	0	6	3
Queuing Penalty (veh)	0		2	1	0	0	52	0
Storage Bay Dist (ft)					150	180		180
Storage Blk Time (%)				0	0	3	2	14
Queuing Penalty (veh)				0	0	21	15	49

Intersection: 6: Norrell

Movement	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	T	T	T	T	R
Maximum Queue (ft)	151	135	180	313	316	58	69	58
Average Queue (ft)	52	120	151	218	170	5	6	4
95th Queue (ft)	109	160	239	415	391	42	46	36
Link Distance (ft)	628			266	266	106	106	
Upstream Blk Time (%)				19	12	0	0	0
Queuing Penalty (veh)				81	53	2	2	0
Storage Bay Dist (ft)		90	90					150
Storage Blk Time (%)		51	16	1			0	0
Queuing Penalty (veh)		111	34	4			2	0

Queuing and Blocking Report
 Alternative 2 - Forecast Saturday Peak

05/22/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	372	450	1257	1264	350	200	272	447	444	300	125	163
Average Queue (ft)	267	295	607	609	252	98	135	263	271	72	114	92
95th Queue (ft)	437	558	1388	1393	453	166	221	382	392	243	122	160
Link Distance (ft)			3843	3843				3214	3214		106	106
Upstream Blk Time (%)											56	21
Queuing Penalty (veh)											122	45
Storage Bay Dist (ft)	350	350			250	350	350			250		
Storage Blk Time (%)	23	22	12	28	0			1	10	0		
Queuing Penalty (veh)	151	148	31	114	1			4	20	0		

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	113	111	120	125	121	112
Average Queue (ft)	64	77	112	87	102	77
95th Queue (ft)	117	128	120	132	129	124
Link Distance (ft)	106	106	103	103	103	103
Upstream Blk Time (%)	6	8	57	15	37	8
Queuing Penalty (veh)	13	18	107	28	69	15
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 10: Norrell & Walmart Driveway

Movement	WB	NB	SB	SB
Directions Served	LR	TR	UL	T
Maximum Queue (ft)	238	340	262	232
Average Queue (ft)	70	194	109	78
95th Queue (ft)	161	408	256	220
Link Distance (ft)	278	325	266	266
Upstream Blk Time (%)	0	32	3	2
Queuing Penalty (veh)	0	0	14	9
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: Washington & Herbergers Driveway

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	ULT	R	LTR
Maximum Queue (ft)	48	94	272	185	210
Average Queue (ft)	11	37	103	22	64
95th Queue (ft)	36	77	249	102	151
Link Distance (ft)	164	164	253	253	252
Upstream Blk Time (%)			1	0	1
Queuing Penalty (veh)			5	1	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 1346

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.3	0.1
Total Del/Veh (s)	3.6	3.8	10.2	5.6	7.1

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.3	0.0	0.1
Total Del/Veh (s)	3.8	3.9	5.4	7.6	6.1

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.8	0.5	0.0	0.0	0.5
Total Del/Veh (s)	53.7	37.2	61.6	53.6	49.5

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	55.2

Intersection: 2: Washington & W Frontage Rd

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	ULT	R	ULT	R
Maximum Queue (ft)	58	74	313	84	108	31
Average Queue (ft)	24	23	101	20	43	6
95th Queue (ft)	50	61	256	63	85	25
Link Distance (ft)	593	534	420	420	576	576
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Norrell & 60th St N

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	67	75	102	223	152
Average Queue (ft)	21	31	38	84	36
95th Queue (ft)	52	65	77	187	95
Link Distance (ft)	627	485	876	362	362
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report
 Alternative 3 - PM Peak

05/19/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	
Directions Served	UL	L	T	T	R	L	L	T	T	R	L	T	
Maximum Queue (ft)	223	450	774	818	350	212	421	482	496	350	299	305	
Average Queue (ft)	142	203	458	481	205	102	107	281	293	99	162	158	
95th Queue (ft)	217	466	782	805	456	181	259	432	450	320	278	262	
Link Distance (ft)			3837	3837				3208	3208			362	
Upstream Blk Time (%)												0	0
Queuing Penalty (veh)												0	0
Storage Bay Dist (ft)	350	350			250	350	350			250	340		
Storage Blk Time (%)		0	16	25			0	4	14		0	0	
Queuing Penalty (veh)		0	36	77			0	7	29		0	0	

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	L	T	T	R
Maximum Queue (ft)	328	219	269	312	342	200
Average Queue (ft)	126	98	145	133	122	112
95th Queue (ft)	252	179	240	231	246	202
Link Distance (ft)	362			420	420	
Upstream Blk Time (%)	0			0	0	
Queuing Penalty (veh)	0			0	0	
Storage Bay Dist (ft)		120	280			100
Storage Blk Time (%)	8	7	0	0	13	20
Queuing Penalty (veh)	16	9	0	0	31	23

Network Summary

Network wide Queuing Penalty: 231

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.9	0.2
Total Del/Veh (s)	10.2	20.7	3.3	1.5	8.0

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.4	0.0	0.2
Total Del/Veh (s)	28.4	24.2	1.1	3.9	9.3

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.7	0.6	0.0	0.0	0.5
Total Del/Veh (s)	45.9	32.6	40.2	39.2	39.9

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	46.6

Queuing and Blocking Report
 Alternative 3 - Existing Saturday Peak

04/06/2018

Intersection: 2: Washington & W Frontage Rd

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	UL	T	R	UL	T	TR
Maximum Queue (ft)	33	130	242	60	111	12	52	40	23	25
Average Queue (ft)	7	60	90	24	38	0	6	16	1	3
95th Queue (ft)	27	108	196	47	84	6	30	42	11	17
Link Distance (ft)	595	595	523	523		435			337	337
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)					150		150	90		
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 6: Norrell & 60th St N

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	TR
Maximum Queue (ft)	191	65	47	294	35	12	34	131	42
Average Queue (ft)	80	32	11	106	11	0	6	60	6
95th Queue (ft)	152	59	36	238	35	6	25	108	26
Link Distance (ft)	629	629	487	487		392	392		370
Upstream Blk Time (%)				0					
Queuing Penalty (veh)				0					
Storage Bay Dist (ft)					90			100	
Storage Blk Time (%)								1	
Queuing Penalty (veh)								1	

Queuing and Blocking Report
 Alternative 3 - Existing Saturday Peak

04/06/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	154	380	497	502	350	193	210	354	354	247	288	229
Average Queue (ft)	91	130	314	329	158	93	93	216	226	33	172	109
95th Queue (ft)	151	261	434	451	368	168	165	318	325	116	272	184
Link Distance (ft)			3843	3843				3208	3208			370
Upstream Blk Time (%)												0
Queuing Penalty (veh)												0
Storage Bay Dist (ft)	350	350			250	350	350			250	340	
Storage Blk Time (%)		0	4	20				0	5		0	0
Queuing Penalty (veh)		0	10	72				0	9		0	0

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	204	196	210	193	174	156
Average Queue (ft)	109	81	112	105	96	58
95th Queue (ft)	179	148	200	174	162	115
Link Distance (ft)	370			435	435	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		150	280			100
Storage Blk Time (%)	3	1	0		12	2
Queuing Penalty (veh)	6	2	0		22	3

Network Summary

Network wide Queuing Penalty: 128

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.3	0.0	0.3	0.2
Total Del/Veh (s)	4.2	4.7	16.8	5.9	10.4

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.4	0.0	0.2
Total Del/Veh (s)	4.1	4.1	6.4	9.7	7.4

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.5	0.6	0.0	0.0	0.8
Total Del/Veh (s)	118.4	43.3	73.2	60.6	81.4

Total Network Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	86.5

Intersection: 2: Washington & W Frontage Rd

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	ULT	R	ULTR
Maximum Queue (ft)	72	77	434	293	114
Average Queue (ft)	30	37	199	47	47
95th Queue (ft)	60	71	392	146	89
Link Distance (ft)	593	534	420	420	567
Upstream Blk Time (%)			0	0	
Queuing Penalty (veh)			1	1	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Norrell & 60th St N

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	65	80	143	298	121
Average Queue (ft)	26	31	49	124	42
95th Queue (ft)	55	67	104	252	102
Link Distance (ft)	627	485	876	362	362
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report
 Alternative 3 - 2027 PM Peak

05/19/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	276	450	2124	2132	350	249	449	657	685	350	313	333
Average Queue (ft)	167	281	1122	1141	244	115	124	348	363	143	195	202
95th Queue (ft)	291	563	2643	2658	477	193	304	613	632	397	316	329
Link Distance (ft)			3837	3837				3208	3208			362
Upstream Blk Time (%)			2	2							0	1
Queuing Penalty (veh)			0	0							0	2
Storage Bay Dist (ft)	350	350			250	350	350			250	340	
Storage Blk Time (%)	4	5	29	35			0	9	21		0	1
Queuing Penalty (veh)	29	39	72	118			0	18	48		1	3

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	L	T	T	R
Maximum Queue (ft)	355	220	304	325	367	200
Average Queue (ft)	174	134	159	163	149	135
95th Queue (ft)	342	230	261	276	289	224
Link Distance (ft)	362			420	420	
Upstream Blk Time (%)	2			0	0	
Queuing Penalty (veh)	5			0	1	
Storage Bay Dist (ft)		120	280			100
Storage Blk Time (%)	16	17	1	0	20	24
Queuing Penalty (veh)	33	22	2	1	55	31

Network Summary

Network wide Queuing Penalty: 483

2: Washington & W Frontage Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.3	0.4	0.0	0.3	0.2
Total Del/Veh (s)	4.9	8.1	14.9	7.5	10.7

6: Norrell & 60th St N Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.3	0.5	0.0	0.2
Total Del/Veh (s)	5.2	4.8	7.9	13.7	9.9

8: Norrell/Washington & TH 36 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.7	0.6	0.1	0.0	0.5
Total Del/Veh (s)	83.4	36.2	44.0	65.6	59.8

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	66.0

Queuing and Blocking Report
 Alternative 3 - Forecast Saturday Peak

05/19/2018

Intersection: 2: Washington & W Frontage Rd

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	ULT	R	ULTR
Maximum Queue (ft)	97	178	345	209	126
Average Queue (ft)	36	63	156	78	47
95th Queue (ft)	76	150	296	158	112
Link Distance (ft)	595	536	436	436	319
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Norrell & 60th St N

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	95	104	170	355	303
Average Queue (ft)	39	42	70	167	71
95th Queue (ft)	74	77	133	299	179
Link Distance (ft)	629	487	377	370	370
Upstream Blk Time (%)				0	0
Queuing Penalty (veh)				1	1
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report
 Alternative 3 - Forecast Saturday Peak

05/19/2018

Intersection: 8: Norrell/Washington & TH 36

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	UL	L	T	T	R	L	L	T	T	R	UL	T
Maximum Queue (ft)	296	450	1045	1069	350	244	270	412	428	350	309	295
Average Queue (ft)	169	290	586	601	291	128	103	256	268	61	190	150
95th Queue (ft)	291	557	988	1008	474	215	210	373	386	223	295	248
Link Distance (ft)			3843	3843				3208	3208			370
Upstream Blk Time (%)											0	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	350	350			250	350	350			250	340	
Storage Blk Time (%)	1	1	27	40	1			1	9		0	0
Queuing Penalty (veh)	8	3	70	160	4			4	18		0	1

Intersection: 8: Norrell/Washington & TH 36

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	UL	T	T	R
Maximum Queue (ft)	238	190	291	355	384	200
Average Queue (ft)	111	89	140	186	164	100
95th Queue (ft)	201	157	262	348	357	195
Link Distance (ft)	370			436	436	
Upstream Blk Time (%)	0			1	2	
Queuing Penalty (veh)	0			4	6	
Storage Bay Dist (ft)		150	280			100
Storage Blk Time (%)	4	2	0	7	23	7
Queuing Penalty (veh)	9	2	0	13	47	11

Network Summary

Network wide Queuing Penalty: 362

Scheme Summary

Control Data

Control Data and Model Parameters

Norrel Ave	2038 Synthetic Flow Profile (veh)
Saturday Forecast	15 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
PM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	85% Confidence Level

Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	No
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

Operational Data

Traffic Flow Data (veh/hr)

2038 PM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows				Flow Modifiers	
		U-Turn	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor
1	Norell Avenue	0	404	44	0	2.0	1.00
2	60th Street	0	17	303	0	2.0	1.00
3	Norell Avenue	154	375	327	0	2.0	1.00

2038 PM Peak Synthetic Flow Profile - Timeslice 15 mins

Leg	Leg Names	Flow Ratios			Flow Times		
		Ratio 1	Ratio 2	Ratio 3	Time 1	Time 2	Time 3
1	Norell Avenue	0.750	0.891	0.750	0	30	60
2	60th Street	0.750	0.891	0.750	0	30	60
3	Norell Avenue	0.750	0.891	0.750	0	30	60

Operational Results

2038 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Exit Flow	Entry	Bypass	Entry
1	Norell Avenue	None	448		528		344	699		0.6527
2	60th Street	None	320		558		418	682		0.4754
3	Norell Avenue	None	856		17		861	978		0.8987

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Norell Avenue	None	13.18		13.18	4.89		B		B
2	60th Street	None	9.35		9.35	2.43		A		A
3	Norell Avenue	None	23.60		23.60	16.58		C		C

2038 PM Peak - 15 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Norell Avenue	None	467		548		357	688		0.6891
2	60th Street	None	334		580		434	670		0.5030
3	Norell Avenue	None	893		18		896	978		0.9356

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Norell Avenue	None	13.78		13.78	4.89		B		B
2	60th Street	None	9.59		9.59	2.43		A		A
3	Norell Avenue	None	25.46		25.46	16.58		D		D

Global Results

Performance and Accidents

2038 PM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	1624		1624
Capacity	veh/hr	2359		2359
Average Delay	sec/veh	17.92		17.92
L.O.S. (Signal)	A – F	B		B
L.O.S. (Unsig)	A – F	C		C
Total Delay	veh.hrs	8.08		8.08