

Oak Tree

Traffic Analysis



Prepared For:

Pulte Group

City of Oakland Park

June 25, 2019

OAK TREE TRAFFIC ANALYSIS

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1.0 INTRODUCTION

McMahon Associates, Inc. (McMahon) has performed a traffic analysis for the redevelopment of a parcel of land located at 2400 Oak Tree Lane, in the City of Oakland Park. The site is currently an abandoned golf course. The proposed development will include 273 single-family dwelling units and 132 multi-family dwelling units. The conceptual master plan is included in **Appendix A**.

The following intersections were evaluated as part of this study:

- Prospect Road at NW 26th Terrace (Unsignalized)
- Prospect Road at Oak Tree (Unsignalized)
- Prospect Road at Project Driveway A (Unsignalized)
- Prospect Road at NW 21st Avenue (Signalized)
- NW 21st Avenue at NW 44th Street (Signalized)
- NW 44th Street at Project Driveway B/Bridgewater Place Apartments (Unsignalized)
- NW 44th Street at NW 31st Avenue (Signalized)

Figure 1 graphically depicts the site location, as well as the study intersection locations. This study evaluates the traffic impacts associated with the proposed development on the surrounding roadway network for three (3) scenarios:

- Existing (2018) Conditions
- Background (2024) Conditions: Future traffic without project traffic
- Total (2024) Conditions: Future traffic with project traffic

A traffic methodology meeting was held with City Staff. The approved traffic methodology is included in Appendix A.



Figure 1
Site Location Map
Oak Tree Traffic Analysis
Oakland Park, Florida

2.0 EXISTING (2018) CONDITIONS ANALYSIS

2.1 Roadway Characteristics

The impacts of the site redevelopment were evaluated on several nearby intersections. The characteristics of the nearby roadways are as follows:

NW 21st Avenue

NW 21st Avenue between Prospect Road and NW 44th Street has the following characteristics:

- Two-lane, undivided roadway
- Posted speed limit of 40 miles per hour
- Land uses include golf course and residential
- Sidewalk exists along the east side of the roadway
- No exclusive bicycle lanes
- No on street parking

Prospect Road

Prospect Road between Commercial Boulevard and NW 21st Avenue has the following characteristics:

- Four-lane, divided roadway
- Posted speed limit of 35 miles per hour
- Land uses include office, institutional, commercial, and golf course
- There is sidewalk along the east side of the roadway and a small portion of sidewalk on the west side of the roadway.
- No exclusive bicycle lanes
- No on-street parking

NW 44th Street

NW 44th Street between NW 31st Avenue and NW 21st Avenue has the following characteristics:

- Generally two-lane, undivided roadway. Between NW 31st Avenue and NW 29th Avenue, NW 44th Street transitions to four lanes with a median; however, one lane in each direction is marked for an exclusive turn lane.

- Posted speed limit of 35 miles per hour
- Land uses include mainly residential, golf course, school and commercial
- There is a sidewalk along the south side of the roadway
- No exclusive bicycle lanes
- No on-street parking

NW 31st Avenue

NW 31st Avenue between Commercial Boulevard and NW 39th Street has the following characteristics:

- Six-lane, divided roadway
- Posted speed limit of 45 miles per hour
- Land uses include residential, commercial, school and office
- Sidewalk exists along most of the west side and some of the east side of the roadway
- Exclusive bicycle lanes on the east and west sides of the roadway
- No on street parking

The existing lane geometry is shown on **Figure 2**.

2.2 Data Collection – Turning Movement Counts

Turning movement counts, included in **Appendix B**, were collected as follows:

Tuesday, October 31, 2017

- Prospect Road/NW 21st Avenue
- NW 21st Avenue/NW 44th Street

Tuesday, December 18, 2018

- Prospect Road/NW 26th Terrace
- Prospect Road/Oak Tree
- Prospect Road/Driveway A
- NW 44th Street/Driveway B/Bridgewater Place Apartments
- NW 44th Street/NW 31st Avenue

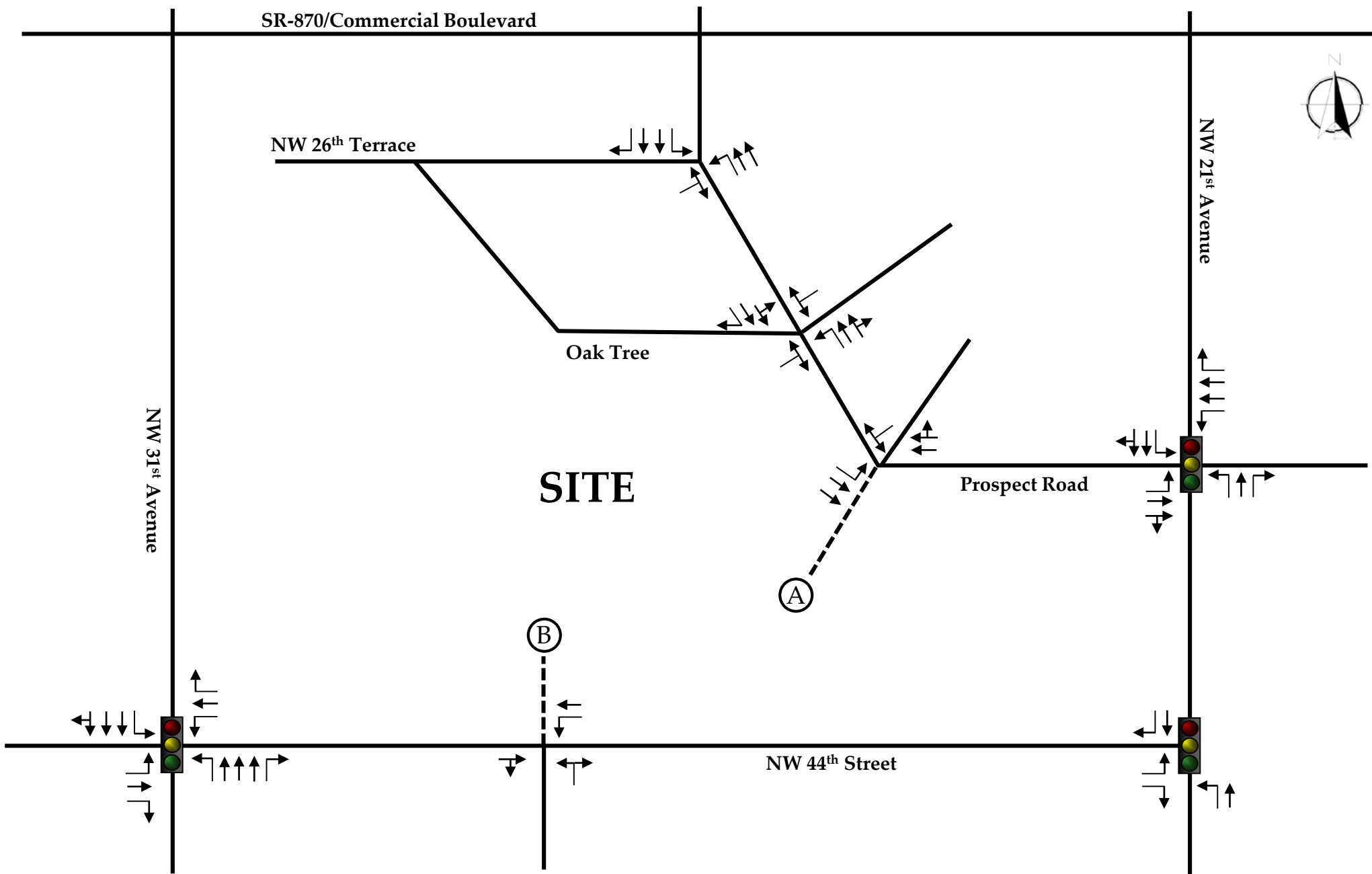


Figure 2
Existing Lane Geometry
Oak Tree Traffic Analysis
Oakland Park, Florida

Through traffic volumes for the intersections of Prospect Road/NW 26th Terrace, Prospect Road/Oak Tree and Prospect Road/Driveway A were based on data from the Prospect Road/NW 21st Avenue intersection. Turning movement data was collected during the morning and afternoon peak periods from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM, respectively. Westbound traffic at the NW 44th Street/NW 21st Avenue intersection was omitted from the analysis/figures as the westbound approach is stop controlled and traffic from this driveway is minimal. The intersection was analyzed as a signalized T-intersection.

2.3 Data Collection – Vehicular Queues

Vehicular queues, attached in Appendix B, were collected at several key intersections during the AM peak hour on Tuesday, November 7, 2017 and during the PM peak hour on Monday, November 6, 2017.

NW 21st Avenue/Prospect Road

Northbound left turn queues were collected at this intersection. Results indicate that the turn bay storage length is sufficient to accommodate existing traffic. The 95th percentile vehicular queues were determined to be six (6) vehicles during the morning peak hour and nine (9) vehicles during the afternoon peak hour. Northbound left turn queues were observed to have minimal gaps during the PM peak hour. Most northbound left turning vehicles were observed to complete their maneuver during the yellow and/or red signal indication. Westbound queues were observed to exceed the available storage by a significant amount during the PM peak hour. Westbound vehicles were observed to take several signal cycles to travel through the intersection.

NW 21st Avenue/NW 44th Street

Southbound right, eastbound left, eastbound right and northbound left turn queues were collected at this intersection. Results indicate that the turn bay storage lengths are sufficient to accommodate existing traffic, with the exception of the eastbound left turn storage. The southbound right 95th percentile vehicular queues were determined to be two (2) vehicles during the morning and afternoon peak hours. The eastbound left 95th percentile vehicular queues were determined to be 13 vehicles during the morning peak hour and seven (7) vehicles during the afternoon peak hour. The eastbound right 95th percentile vehicular queues were determined to be three (3) vehicles during the morning and afternoon peak hours. The

northbound left 95th percentile vehicular queues were determined to be four (4) vehicles during the morning peak hour and five (5) vehicles during the afternoon peak hour.

2.4 Traffic Volumes

A Peak Season Conversion Factor (PSCF) of 1.04 was applied to the turning movement counts collected on October 31, 2017 and a PSCF of 1.00 was applied to counts collected on December 18, 2018 to estimate peak season data. The PSCF data was obtained from the 2017 Florida Department of Transportation (FDOT) *Peak Season Factor Category Report*, attached in Appendix B. Table B-1 and Table B-2, included in Appendix B, summarize the AM and PM peak hour existing volume calculations, respectively. **Figure 3** graphically depicts the existing (2018) traffic volumes.

2.5 Intersection Capacity Analysis

Intersection capacity analysis was performed for AM and PM peak hour conditions at the study intersections. The analysis was performed using the Synchro 10 software; HCM 6th Edition was applied to unsignalized intersections and Synchro was applied to signalized intersections. The existing signal timings were obtained from Broward County and are included in **Appendix C**. Existing peak hour factors and truck factors were based on the collected data. For the NW 44th Street/NW 31st Avenue intersection, the truck factors along NW 44th Street were based on the adjacent NW 44th Street/Driveway B intersection. The truck factors along NW 31st Avenue were based on the truck factors from the 2017 Annual Average Daily Traffic Report for Site 7128: NW 31st Avenue, north of Prospect Road, which is attached in Appendix B.

The Synchro model queues were calibrated, where necessary, at the key intersections where field queues were collected or observed in order to simulate existing field observations. The calibration factors, included in Appendix B, include the Saturation Flow Rate and Lost Time Adjust. Queues were calibrated, as appropriate. Results of delays and queues for other movements were considered in the calibration. Results of the intersection capacity analysis, summarized in **Table 1**, indicate that all study intersections currently operate at an overall acceptable level of service (LOS) during the morning and afternoon peak hours. The adopted LOS for the City of Oakland Park is LOS D. The intersection capacity analysis worksheets are included in Appendix C.

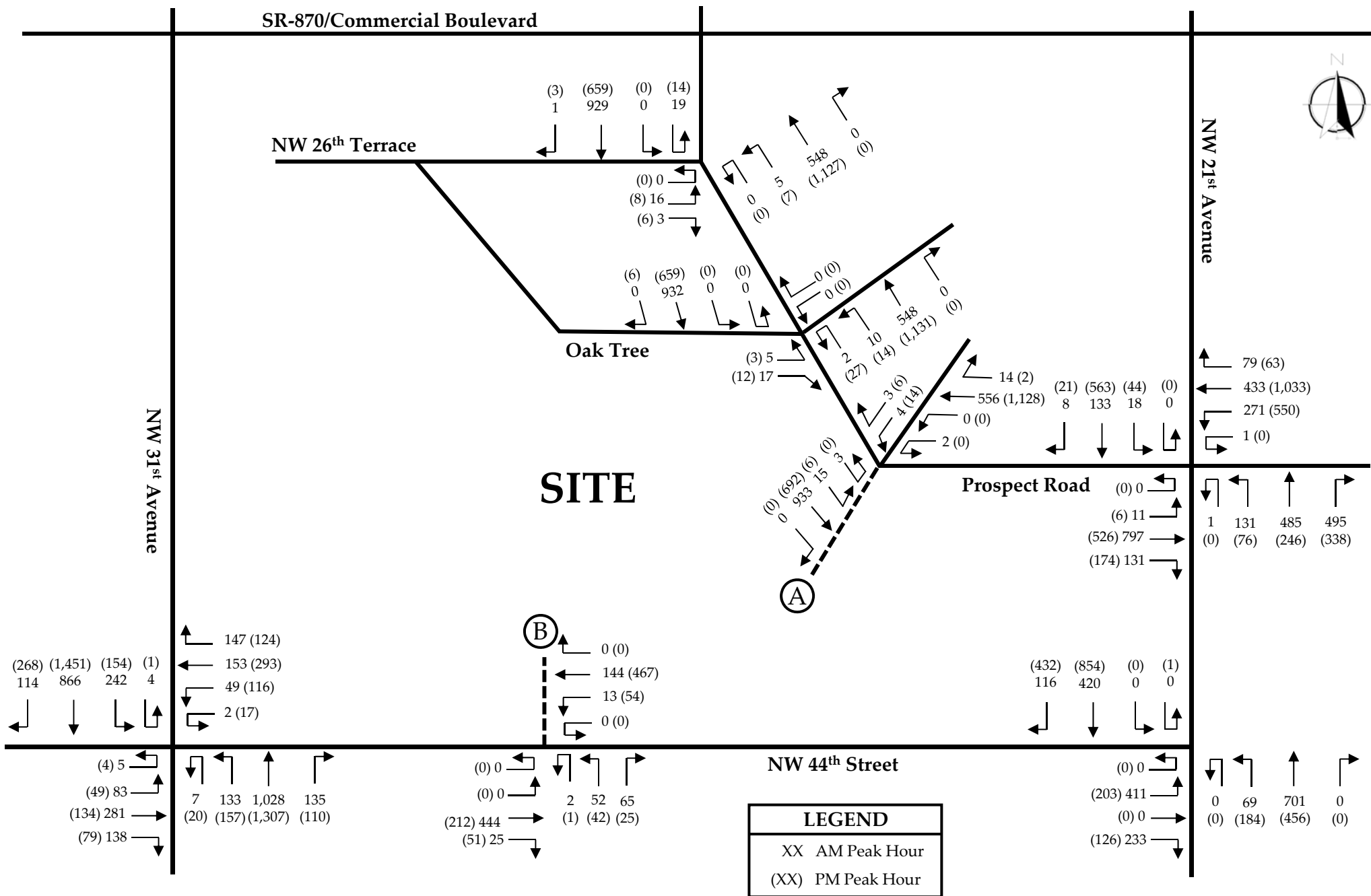


TABLE 1
EXISTING (2018) INTERSECTION CAPACITY ANALYSIS SUMMARY
OAK TREE TRAFFIC ANALYSIS

SCENARIO	TIME PERIOD	OVERALL		EB		WB		NB		SB	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Prospect Road at NW 26 th Terrace	AM	0.4	A	20.6	C	N/A	N/A	0.1	A	0.2	A
	PM	0.4	A	16.1	C	N/A	N/A	0.1	A	0.5	A
Prospect Road at Oak Tree	AM	0.3	A	14.5	B	N/A	N/A	0.3	A	0.0	A
	PM	0.4	A	12.7	B	N/A	N/A	0.4	A	0.0	A
Prospect Road at Driveway A	AM	0.2	A	N/A	N/A	14.3	B	0.1	A	0.2	A
	PM	0.3	A	N/A	N/A	22.8	C	0.0	A	0.1	A
Prospect Road at NW 21 st Avenue	AM	37.1	D	37.8	D	45.4	D	33.2	C	24.0	C
	PM	35.1	D	37.1	D	35.0	C	30.8	C	38.1	D
NW 21 st Avenue at NW 44 th Street	AM	21.0	C	26.7	C	N/A	N/A	19.7	B	15.7	B
	PM	22.3	C	35.2	D	N/A	N/A	12.0	B	23.4	C
NW 44 th Street at Driveway B	AM	2.9	A	0.0	A	0.7	A	16.2	C	N/A	N/A
	PM	1.8	A	0.0	A	0.8	A	16.3	C	N/A	N/A
NW 44 th Street at NW 31 st Avenue	AM	33.4	C	78.4	E	70.6	E	21.9	C	14.7	B
	PM	32.2	C	65.9	E	75.5	E	22.4	C	22.5	C



3.0 BACKGROUND (2024) CONDITIONS ANALYSIS

3.1 Background Growth Rate

Traffic volumes for background traffic conditions (future conditions without project traffic) were determined for 2024 by applying a growth rate to existing volumes and adding projected volumes from committed development projects. The growth rate applied to each study intersection was based on a review of 10-year historical traffic volumes from 2007 to 2017 for the following FDOT count stations near the study intersections: Stations 86-7784, 86-9407, and 86-7626. The historical volume data is included in Appendix B. A review of the data indicated a 0.07 percent compound growth rate. Therefore, a 1.00 percent compound growth rate was used for the analysis. Historical data for approximately five (5) years was reviewed and was determined to yield an unrealistically high growth rate for this area.

3.2 Committed Development Traffic

Based on coordination with the City of Oakland Park, anticipated traffic from the Residence Inn development project was included in the analysis. Excerpts from the study are attached in Appendix B. Assumptions were made, where necessary, as to the portion of committed trips that would travel through the study intersections. Based on the coordination with the City of Fort Lauderdale, no additional committed development projects were included. An email from the City of Fort Lauderdale is attached in Appendix B. Table B-1 and Table B-2, included in Appendix B, summarize the AM and PM peak hour background volume calculations, respectively. **Figure 4** graphically depicts the background (2024) traffic volumes.

3.3 Intersection Capacity Analysis

Intersection capacity analysis was performed for AM and PM peak hour conditions at the study intersections. Signal timings were optimized as necessary. Peak hour factors and truck factors were based on the collected data. The intersection capacity analysis worksheets are included in **Appendix D**. Results of the intersection capacity analysis, summarized in **Table 2**, indicate that all study intersections are expected to operate at an overall acceptable LOS during the morning and afternoon peak hours.

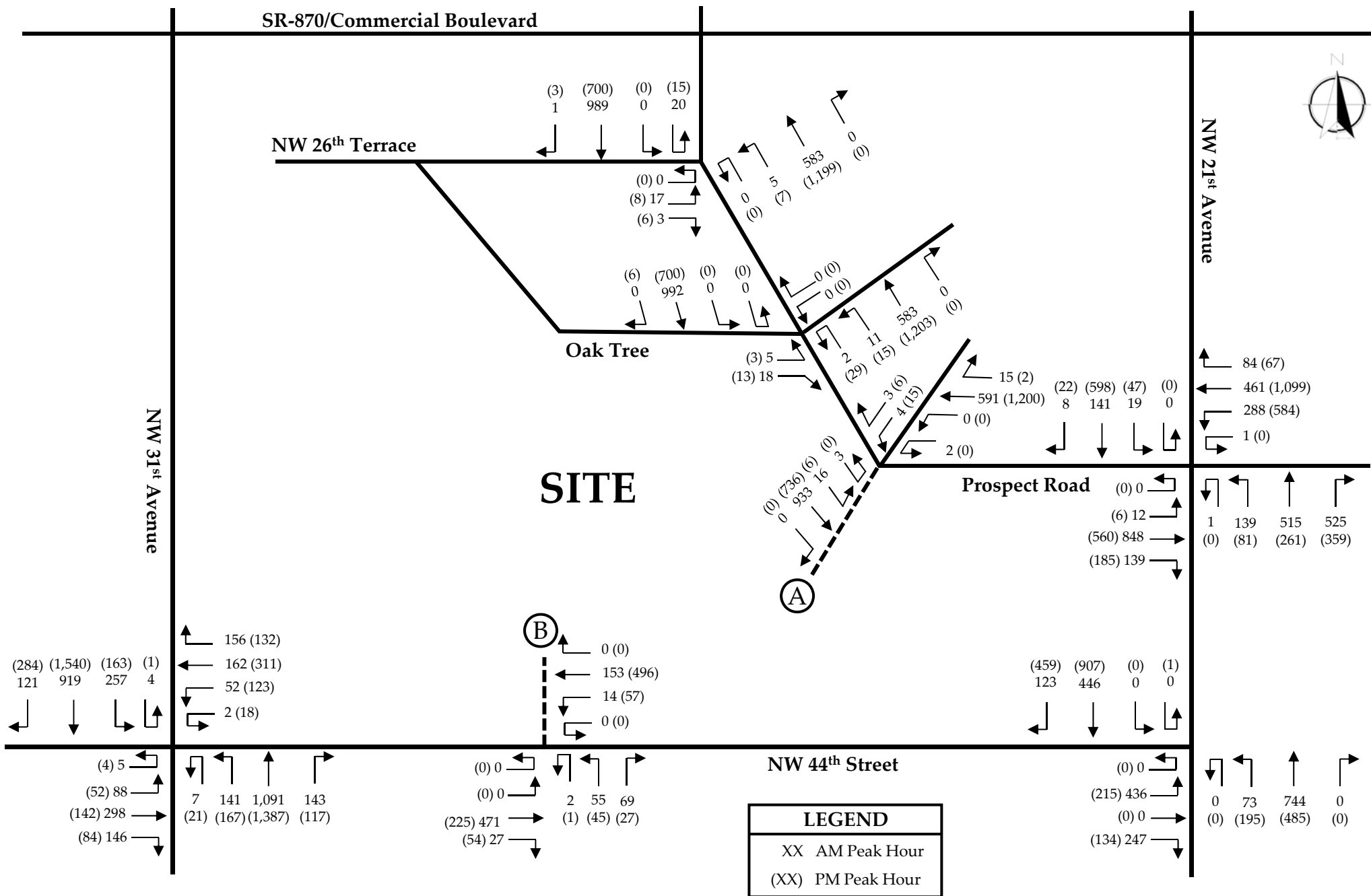


TABLE 2
BACKGROUND (2024) INTERSECTION CAPACITY ANALYSIS SUMMARY
OAK TREE TRAFFIC ANALYSIS

SCENARIO	TIME PERIOD	OVERALL		EB		WB		NB		SB	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Prospect Road at NW 26 th Terrace	AM	0.4	A	22.4	C	N/A	N/A	0.1	A	0.2	A
	PM	0.4	A	16.9	C	N/A	N/A	0.1	A	0.5	A
Prospect Road at Oak Tree	AM	0.3	A	15.1	C	N/A	N/A	0.3	A	0.0	A
	PM	0.4	A	13.0	B	N/A	N/A	0.4	A	0.0	A
Prospect Road at Driveway A	AM	0.2	A	N/A	N/A	14.9	B	0.1	A	0.2	A
	PM	0.3	A	N/A	N/A	25.0	C	0.0	A	0.1	A
Prospect Road at NW 21 st Avenue	AM	45.7	D	54.4	D	23.3	D	55.9	E	25.7	C
	PM	44.8	D	53.1	D	37.5	D	49.8	D	48.9	D
NW 21 st Avenue at NW 44 th Street	AM	22.8	C	26.3	C	N/A	N/A	22.8	C	18.4	B
	PM	27.7	C	36.8	D	N/A	N/A	16.9	B	30.1	C
NW 44 th Street at Driveway B	AM	3.1	A	0.0	A	0.7	A	17.5	C	N/A	N/A
	PM	1.9	A	0.0	A	0.8	A	17.4	C	N/A	N/A
NW 44 th Street at NW 31 st Avenue	AM	34.5	C	70.9	E	60.2	E	26.3	C	19.4	B
	PM	35.4	D	60.6	E	72.1	E	26.5	C	28.1	C



4.0 TOTAL (2024) CONDITIONS ANALYSIS

4.1 Project Trip Generation

The site is currently an abandoned golf course. The proposed development will include 273 single-family residential dwelling units and 132 multi-family dwelling units. Trips generated by the proposed development were estimated based on trip generation rates and equations published in the Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 10th Edition. Excerpts from ITE are attached in Appendix B. Results of the daily, AM peak hour and PM peak hour trip generation analysis, summarized in **Table 3**, indicate that the proposed development is expected to generate 3,576 daily trips, 261 AM peak hour trips and 342 PM peak hour trips.

4.2 Project Driveway Access

The proposed development will be served by one (1) full access driveway connection to Prospect Road (Driveway A), and one (1) full access driveway connection to NW 44th Street (Driveway B).

4.3 Project Trip Distribution

The project traffic distribution was based on the Southeast Florida Regional Planning Model (SERPM), attached in Appendix B, which was provided for this project by the Broward Metropolitan Planning Organization (MPO). The distribution was modified slightly based on coordination with City staff and to ensure proper balancing of distribution percentages. The project distribution is graphically shown on **Figure 5**.

4.4 Project Trip Assignment

The assignment of project trips, shown on **Figure 6**, was based on the project distribution and trip generation analyses. Detailed calculations of total traffic conditions for the AM and PM peak hours are summarized in Table B-1 and Table B-2, respectively, attached in Appendix B. Total (2024) traffic volumes are graphically depicted on **Figure 7**.

TABLE 3
TRIP GENERATION ANALYSIS
OAK TREE TRAFFIC ANALYSIS

LAND USE	ITE CODE	INTENSITY	TRIP GENERATION RATE ⁽¹⁾	IN	OUT	TOTAL TRIPS				
						IN	OUT	TOTAL		
DAILY										
PROPOSED USE										
Single-Family Detached Housing	210	273	DU	Ln(T)= 0.92 Ln(X)+ 2.71	50%	50%	1,310	1,309	2,619	
Multifamily Housing (Low-Rise)	220	132	DU	T= 7.56 (X)- 40.86	50%	50%	478	479	957	
TOTAL							1,788	1,788	3,576	
AM PEAK HOUR										
PROPOSED USE										
Single-Family Detached Housing	210	273	DU	T= 0.71 (X)+ 4.8	25%	75%	50	149	199	
Multifamily Housing (Low-Rise)	220	132	DU	Ln(T)= 0.95 Ln(X)- 0.51	23%	77%	14	48	62	
TOTAL							64	197	261	
PM PEAK HOUR										
PROPOSED USE										
Single-Family Detached Housing	210	273	DU	Ln(T)= 0.96 Ln(X)+ 0.2	63%	37%	168	98	266	
Multifamily Housing (Low-Rise)	220	132	DU	Ln(T)= 0.89 Ln(X)- 0.02	63%	37%	48	28	76	
TOTAL							216	126	342	

(1) Source: Institute of Transportation Engineers' Trip Generation Manual, 10th Edition.



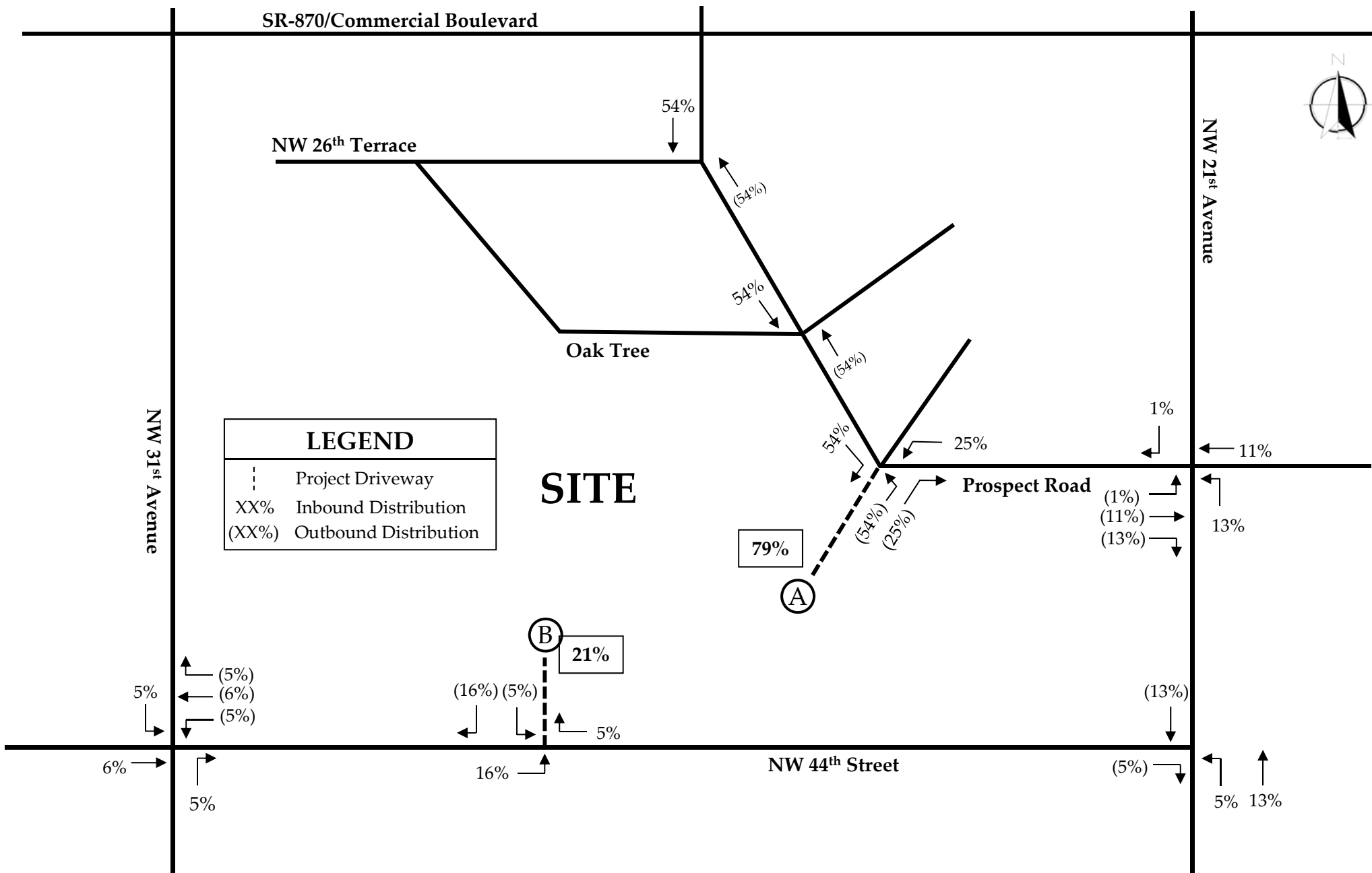


Figure 5
 Project Trip Distribution
Oak Tree Traffic Analysis
 Oakland Park, Florida

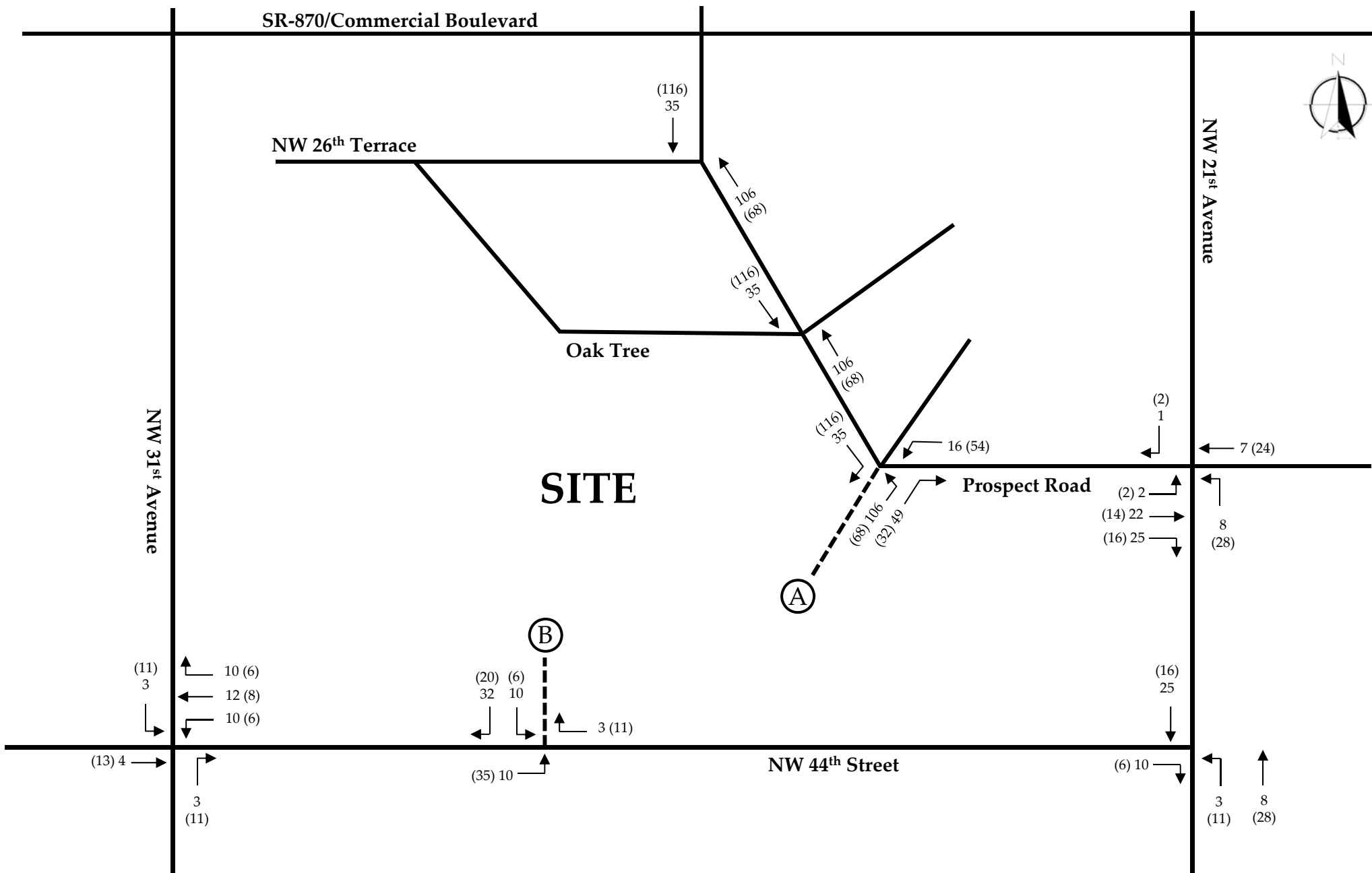
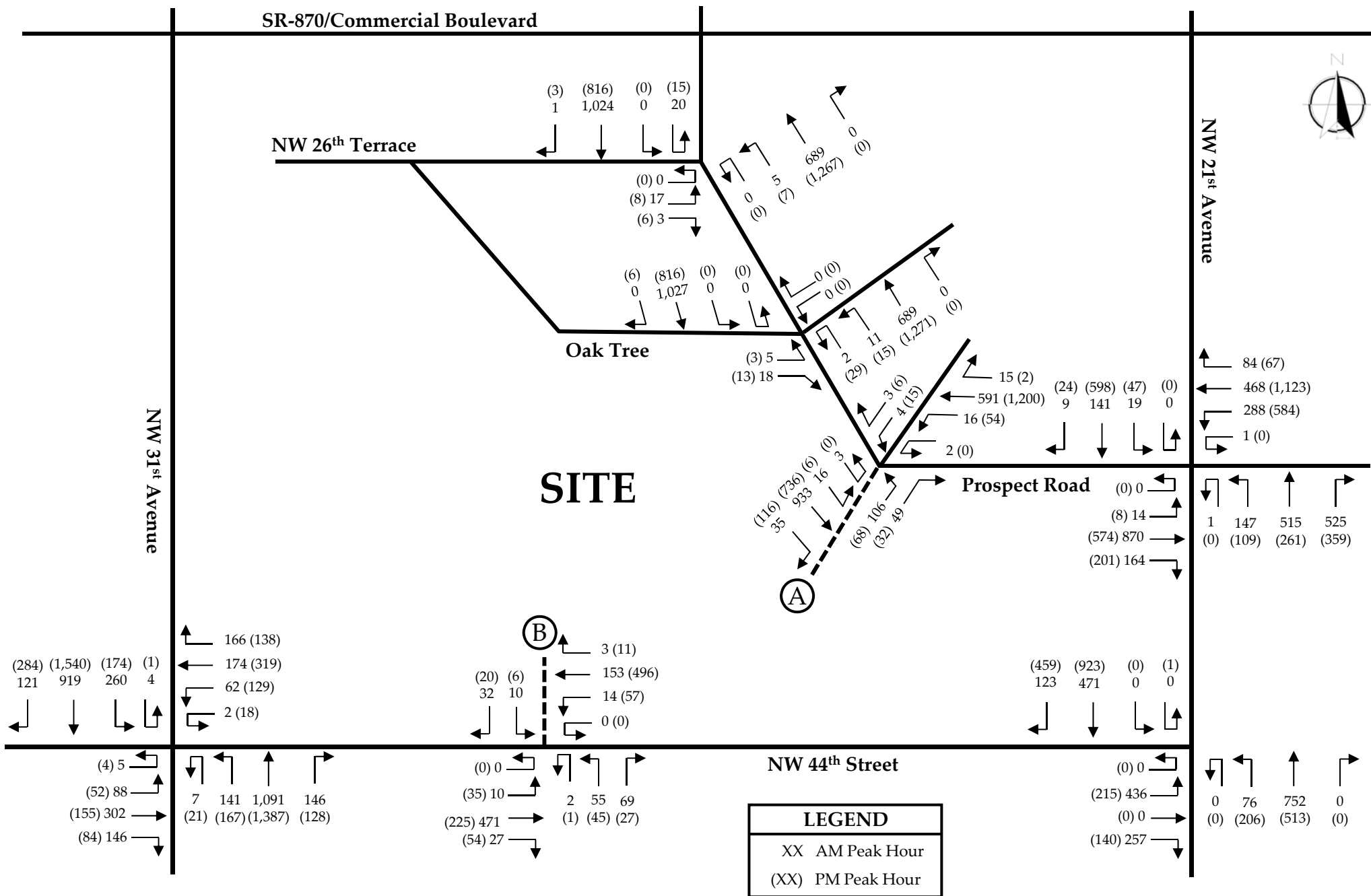


Figure 6
 Project Trip Assignment
Oak Tree Traffic Analysis
 Oakland Park, Florida



4.5 Intersection Capacity Analysis

Intersection capacity analysis was performed for AM and PM peak hour conditions at the study intersections. Signal timings were optimized as necessary. Peak hour factors and truck factors were based on the collected data. The intersection capacity analysis worksheets are included in **Appendix E**. Results of the intersection capacity analysis, summarized in **Table 4**, indicate that all study intersections are expected to operate at an overall acceptable LOS during the morning and afternoon peak hours.

4.6 Driveway Turn Lane Evaluation

Prospect Road is a Broward County maintained roadway. Based on Broward County requirements, the construction of an exclusive left-turn lane with 200 feet of storage and 50 feet of transition is necessary when the speed limit equals or exceeds 35 MPH or the average peak hour inbound left turn volume is 25 vehicles or more. Based on Broward County requirements, the construction of an exclusive right-turn lane with 150 feet of storage and 50 feet of transition is necessary when the driveway speed limit equals or exceeds 35 MPH or the peak hour inbound right turn volume is 100 vehicles or more. Exclusive left turn and right turn lanes are proposed at Driveway A along Prospect Road.

NW 44th Street is a City roadway. Exclusive left and right turn lanes are not proposed at Driveway B along NW 44th Street to allow for dedicated green space and a pedestrian trail. Based on the capacity analysis, Driveway B is expected to operate at LOS A for the eastbound and westbound turning movements during the morning and afternoon peak hours, without exclusive left or right turn lanes.

TABLE 4
TOTAL (2024) INTERSECTION CAPACITY ANALYSIS SUMMARY
OAK TREE TRAFFIC ANALYSIS

SCENARIO	TIME PERIOD	OVERALL		EB		WB		NB		SB	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Prospect Road at NW 26 th Terrace	AM	0.5	A	23.6	C	N/A	N/A	0.1	A	0.3	A
	PM	0.4	A	18.6	C	N/A	N/A	0.1	A	0.5	A
Prospect Road at Oak Tree	AM	0.3	A	15.6	C	N/A	N/A	0.2	A	0.0	A
	PM	0.4	A	14.1	B	N/A	N/A	0.5	A	0.0	A
Prospect Road at Driveway A	AM	4.4	A	49.4	E	17.4	C	0.4	A	0.2	A
	PM	2.0	A	30.5	D	36.2	E	0.4	A	0.1	A
Prospect Road at NW 21 st Avenue	AM	48.7	D	45.1	D	25.0	D	69.8	E	27.1	C
	PM	47.1	D	51.8	D	44.7	D	51.9	D	42.4	D
NW 21 st Avenue at NW 44 th Street	AM	23.3	C	26.4	C	N/A	N/A	23.4	C	19.3	B
	PM	29.7	C	37.5	D	N/A	N/A	17.4	B	33.5	C
NW 44 th Street at Driveway B	AM	4.1	A	0.1	A	0.7	A	20.8	C	12.2	B
	PM	3.1	A	1.0	A	0.8	A	24.7	C	14.8	B
NW 44 th Street at NW 31 st Avenue	AM	35.2	D	59.9	E	49.2	D	30.4	C	24.7	C
	PM	36.3	D	55.5	E	67.4	E	28.5	C	30.5	C
INTERSECTION CAPACITY WITH RECOMMENDED MITIGATION											
Prospect Road at NW 21 st Avenue (With Mitigation)	AM	32.8	C	38.2	D	28.6	C	31.6	C	29.4	C
	PM	31.2	C	34.5	C	29.9	C	20.9	C	43.2	D
NW 21 st Avenue at NW 44 th Street (With Mitigation)	AM	25.3	C	22.1	C	N/A	N/A	29.1	C	23.7	C
	PM	27.4	C	37.4	D	N/A	N/A	17.0	B	29.6	C



TABLE 5
INTERSECTION CAPACITY ANALYSIS SUMMARY COMPARISON
OAK TREE TRAFFIC ANALYSIS

SCENARIO	TIME PERIOD	OVERALL					
		BACKGROUND (2024)		TOTAL (2024)		TOTAL (2024) W/ MITIGATION	
		Delay	LOS	Delay	LOS	Delay	LOS
Prospect Road at NW 26 th Terrace	AM	0.4	A	0.5	A	-	-
	PM	0.4	A	0.4	A	-	-
Prospect Road at Oak Tree	AM	0.3	A	0.3	A	-	-
	PM	0.4	A	0.4	A	-	-
Prospect Road at Driveway A	AM	0.2	A	4.4	A	-	-
	PM	0.3	A	2.0	A	-	-
Prospect Road at NW 21 st Avenue	AM	45.7	D	48.7	D	32.8	C
	PM	44.8	D	47.1	D	31.2	C
NW 21 st Avenue at NW 44 th Street	AM	22.8	C	23.3	C	25.3	C
	PM	27.7	C	29.7	C	27.4	C
NW 44 th Street at Driveway B	AM	3.1	A	4.1	A	-	-
	PM	1.9	A	3.1	A	-	-
NW 44 th Street at NW 31 st Avenue	AM	34.6	C	36.8	D	-	-
	PM	34.9	C	36.1	D	-	-



5.0 SITE MITIGATION

5.1 Recommended Modifications

Based on the Oak Tree Land Use Plan Amendment Traffic Analysis, prepared by McMahon, dated December 5, 2018, and coordination with Broward County Traffic Engineering Division (BCTED) and the City of Oakland Park, the following, graphically depicted on **Figure 8**, summarizes the agreed upon geometric and signalization modifications at the intersection of Prospect Road and NW 21st Avenue:

- Construct a second westbound left-turn storage lane with at least 300 feet of storage.
 - Add corresponding signalization displays to accommodate this dual westbound left-turn.
- Install a corresponding protected-only eastbound left-turn phase. Alternatively, if a sufficient sightline offset can be achieved with respect to the new dual westbound left-turn lanes noted above, this may be omitted.
- Construct a 200-foot eastbound right-turn storage lane.
- Add a protected-to-permissive northbound left-turn signal phase and replace signalization display.
- Extend the two (2) existing southbound receiving lanes from the intersection of Prospect Road and NW 21st Avenue to NW 44th Street. Currently one (1) of the receiving lanes is eliminated before linking to NW 44th Street.

Transit stop enhancements are also proposed based on coordination with Broward County Transit. A bus stop landing pad is being proposed along the west side of Prospect Road just south of the proposed driveway connection. A bus stop landing pad is also proposed along the west side of NW 21st Avenue between Prospect Road and NW 44th Street. Traffic calming is also being considered along NW 44th Street generally between NW 21st Avenue and NW 31st Avenue. Concepts for traffic calming are in the process of being coordinated/discussed with City staff and Broward County.

There are programmed improvements for complete streets along NW 21st Avenue (FM 4366851) and Prospect Road (FM 4359251) that will include the addition of bicycle lanes. The recommended modifications can be accommodated, in addition to these programmed roadway improvements.

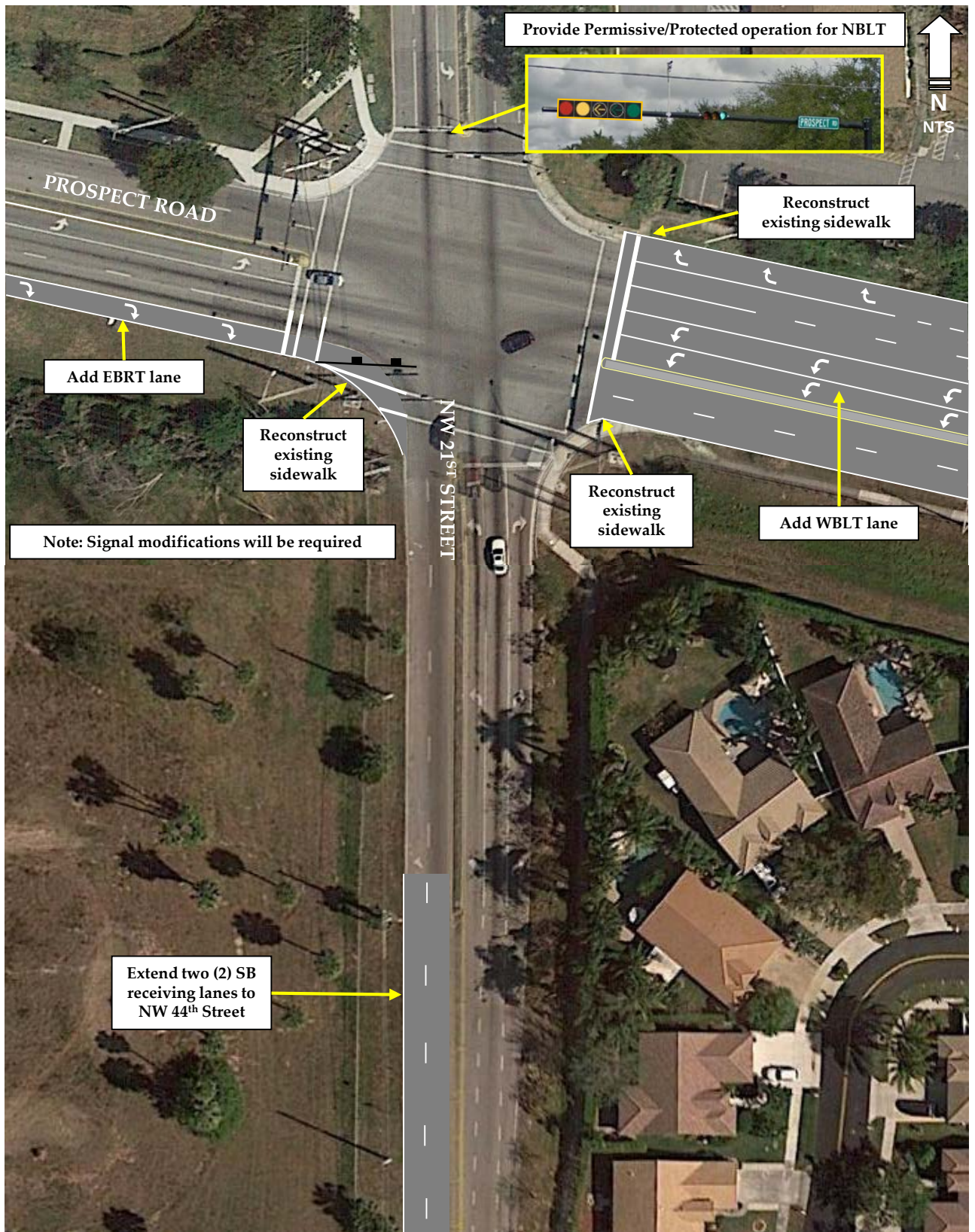


Figure 8
 Proposed Modifications
 Oak Tree Land Use Plan Amendment Traffic Analysis
 Oakland Park, FL



Figure 8 - Continued
Proposed Modifications
Oak Tree Land Use Plan Amendment Traffic Analysis
Oakland Park, FL

5.2 Intersection Capacity Analysis

Intersection capacity analyses were performed for AM and PM peak hour conditions at the study intersections affected by the proposed mitigations. The proposed lane geometry is shown on **Figure 9**. Signal timings were optimized as necessary. Peak hour factors and truck factors were based on the collected data. The intersection capacity analysis worksheets are included in **Appendix F**. Results of the intersection capacity analysis, summarized in Table 4, indicate that all study intersections are expected to operate at an overall acceptable LOS during the morning and afternoon peak hours. With the addition of a second westbound left turn lane, westbound left turn queues are expected to be contained within the available storage length. This represents a significant improvement as compared to existing queue observations and traffic conditions. With the signal phase modification to the northbound left turn movement, northbound left turning vehicles will be provided with a protected phase, in addition to a permitted phase, to complete their maneuvers.

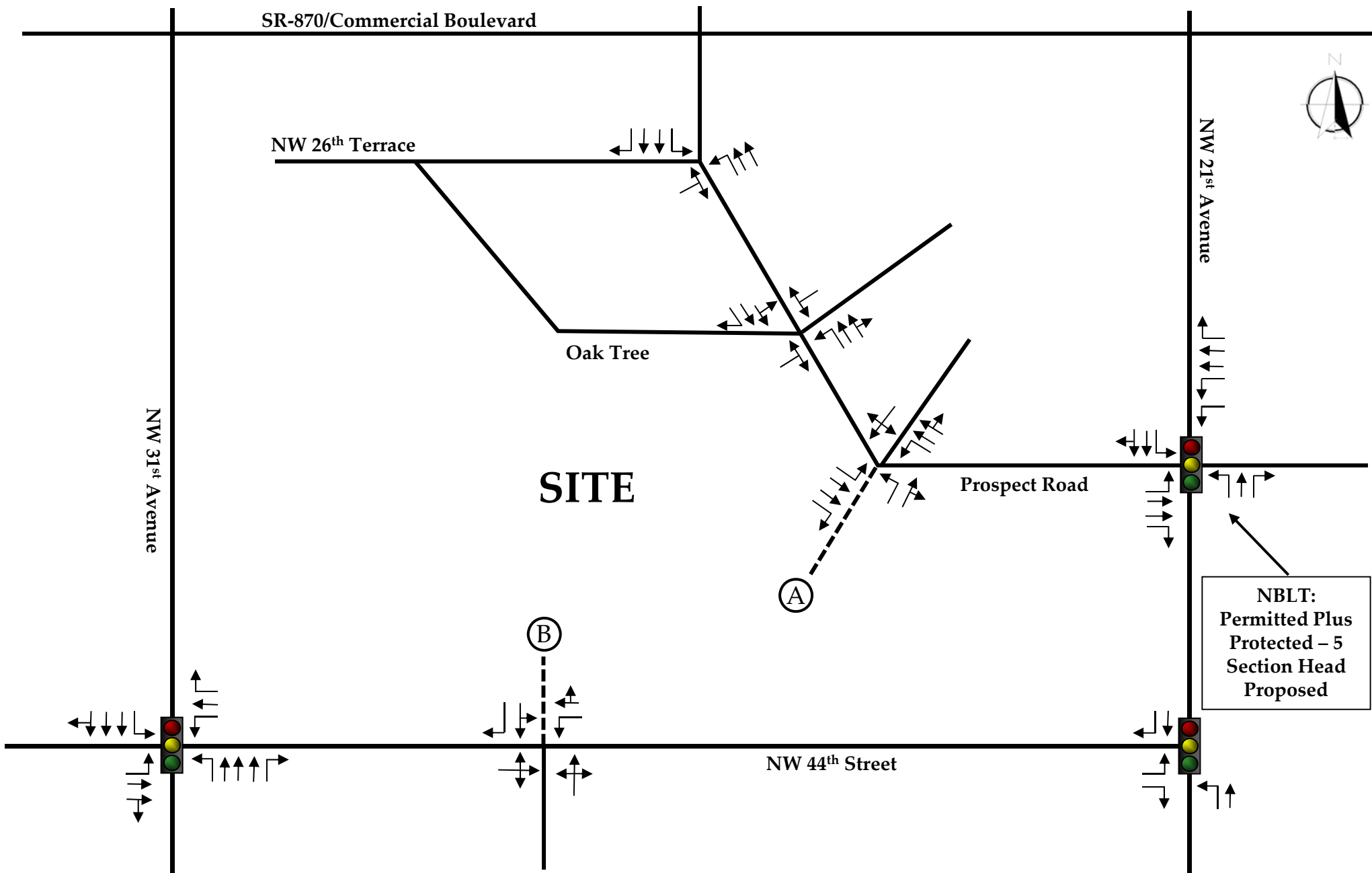


Figure 9
Proposed Lane Geometry
Oak Tree Traffic Analysis
Oakland Park, Florida

6.0 GATE QUEUEING ANALYSIS

Driveway A (Prospect Road) will serve as the main driveway connection for residents and will also serve as the only visitor entrance into the development. Driveway B (NW 44th Street) will serve as resident access only. The entrances will be gated and, therefore, a gate queueing analysis was performed to ensure that adequate stacking is provided within the site at the gate entrances to avoid any potential spillback onto Prospect Road or NW 44th Street.

Driveway A will have one (1) inbound lane for residents and one (1) inbound lane for visitors with an available stacking distance of approximately 200 feet. Assuming a vehicle length of 25 feet, each stacking lane can accommodate approximately eight (8) vehicles before any spillback onto Prospect Road. Driveway B will have one (1) inbound lane for residents with a distance of approximately 50 feet. The stacking lane can accommodate approximately two (2) vehicles before any spillback onto NW 44th Street.

Trip generation analysis was performed for the peak hour of the generator during weekday AM, weekday PM, Saturday peak hour and Sunday peak hour conditions to determine the peak period for the site, based on the ITE, *Trip Generation Manual*, 10th Edition. Results of the analysis, summarized in **Table 5**, indicate that the highest inbound volume will occur during the PM peak hour, where 228 vehicles will be expected to enter the site. Based on the project distribution, 79 percent of the trips entering the site are anticipated to enter through Driveway A and 21 percent of the trips entering the site are anticipated to enter through Driveway B. Therefore, a maximum of 180 inbound vehicles ($228 * 0.79$) will be expected to enter through Driveway A, and a maximum of 48 inbound vehicles ($228 * 0.21$) are anticipated to enter through Driveway B during the weekday PM peak hour.

An assumption was made that 90 percent of the vehicles entering the development during the weekday PM peak period would be residents, and the remaining 10 percent would be visitors. Therefore, 23 visitor vehicles are expected to enter through Driveway A. Excerpts from ITE are attached in **Appendix G**.

Table 6 Trip Generation Analysis –Peak of the Generator

LAND USE	ITE CODE	INTENSITY	TRIP GENERATION RATE ⁽¹⁾	IN	OUT	TOTAL TRIPS		
						IN	OUT	TOTAL
AM PEAK GENERATOR								
Single-Family Detached Housing	210	273 DU	Ln(T)= 0.91 Ln(X) + 0.20	26%	74%	52	149	201
Multifamily Housing (Low-Rise)	220	132 DU	Ln(T)= 0.94 Ln(X) - 0.29	28%	72%	21	53	74
TOTAL						73	202	275
PM PEAK GENERATOR								
Single-Family Detached Housing	210	273 DU	Ln(T)= 0.94 Ln(X) + 0.34	64%	36%	175	99	274
Multifamily Housing (Low-Rise)	220	132 DU	T= 0.66 (X) + 1.41	59%	41%	53	36	89
TOTAL						228	135	363
SATURDAY GENERATOR								
Single-Family Detached Housing	210	273 DU	T= 0.84 (X) + 17.99	54%	46%	133	114	247
Multifamily Housing (Low-Rise) ⁽²⁾	220	132 DU	T= 1.08 (X) - 33.24	54%	46%	59	50	109
TOTAL						192	164	356
SUNDAY GENERATOR								
Single-Family Detached Housing	210	273 DU	T= 0.79 (X) + 11.02	53%	47%	120	107	227
Multifamily Housing (Low-Rise) ⁽²⁾	220	132 DU	T= 1.12 (X) - 40.41	53%	47%	57	50	107
TOTAL						177	157	334

(1) Source: ITE Trip Generation Manual, 10th Edition.

6.1 Gate Queue Methodology

The queue analysis was performed based on the methodology outlined in *Transportation and Land Development*, 1988, published by ITE, excerpts of which are attached in Appendix G. The required storage (M) in vehicles is determined by the following equation:

$$M = \frac{[\ln P(x > M) - \ln Q_M] - 1}{\ln \rho}$$

- $\rho = q/NQ$. ρ is the coefficient of utilization, which is the ratio of the demand rate to the service rate.
- q is the demand rate and is the peak vehicles per hour based on the trip generation analysis. For this analysis an assumption was made that 90 percent of the vehicles entering the development during the peak period would be residents, and the remaining 10 percent would be visitors. Of the total entering vehicles, 79 percent will use Driveway A. However, 100 percent of visitors will enter through Driveway A. Therefore, $q_{\text{resident}} = 157$ vehicles per hour and $q_{\text{visitor}} = 23$ vehicles per hour.
- N is the number of lanes. For this analysis, $N_{\text{resident}} = 1$ lane and $N_{\text{visitor}} = 1$ lane.
- Q is the processing rate per hour for each lane. Processing times were determined based on the processing rate for the resident lane and the processing rate for the visitor lane. The resident gate is anticipated to be an arm gate. Residents will be required to use a card reader to open the gate. The assumed processing time for residents is 15 seconds (0.25 minutes) per vehicle. Visitors will be allowed entry through a swing gate. They will be required to stop at an Envera virtual guard gate and show identification. Guards may be required to contact the resident if the visitor is not already on a list. The

assumed visitor processing time, based on actual processing times for a similar community utilizing Envera in Oakland Park, is 38.1 seconds (0.635 minutes). Processing times were calculated as follows:

Gate Processing Times

Residents:	0.25 min
Visitors:	0.635 min

For this analysis,

$$Q_{\text{resident}} = (1 \text{ process}/0.25 \text{ min}) * (60\text{min}/1\text{hr}). \quad Q_{\text{resident}} = 240 \text{ process/hr.}$$

$$Q_{\text{visitor}} = (1 \text{ process}/0.635 \text{ min}) * (60\text{min}/1\text{hr}). \quad Q_{\text{visitor}} = 94 \text{ process/hr.}$$

6.2 Gate Queueing for Prospect Road at Driveway A

- $\rho = q/NQ$.
 - o $\rho_{\text{resident}} = (157 \text{ vehicles/hr})/(1 * 240 \text{ process/hr}). \quad \rho_{\text{resident}} = 0.6542.$
 - o $\rho_{\text{visitor}} = (23 \text{ vehicles/hr})/(1 * 94 \text{ process/hr}). \quad \rho_{\text{visitor}} = .2447.$
- $P(x > M)$: In an effort to ensure that the available storage length for the entrance area is not exceeded, a 95 percent confidence level was used in ITE. Therefore, $P(x > M)$ is set to 5 percent, or 0.05.
- $Q_{M(\text{resident})}$ is a table value obtained from Table 8-11 based on ρ_{resident} and N_{resident} .
 - o From Table: $N_{\text{resident}} = 1$ and $\rho = 0.6 = 0.6000$
 - o From Table: $N_{\text{resident}} = 1$ and $\rho = 0.7 = 0.7000$
 - o $Q_{M(\text{resident})} = 0.6000 + \frac{(0.7000 - 0.6000) * (0.6542 - 0.6)}{(0.7 - 0.6)} = 0.6542$
- $M_{\text{resident}} = \frac{[\ln P(x > M_{\text{resident}}) - \ln Q_{M(\text{resident})}]}{\ln \rho_{\text{resident}}} - 1 = \frac{[\ln (0.05) - \ln (0.6542)]}{\ln (0.6542)} - 1 = 5 \text{ vehicles}$
- $Q_{M(\text{visitor})}$ is a table value obtained from Table 8-11 based on ρ_{visitor} and N_{visitor} .
 - o From Table: $N_{\text{visitor}} = 1$ and $\rho = 0.2 = 0.2000$
 - o From Table: $N_{\text{visitor}} = 1$ and $\rho = 0.3 = 0.3000$
 - o $Q_{M(\text{visitor})} = 0.2000 + \frac{(0.3000 - 0.2000) * (0.2447 - 0.2)}{(0.3 - 0.2)} = 0.2447$
- $M_{\text{visitor}} = \frac{[\ln P(x > M_{\text{visitor}}) - \ln Q_{M(\text{visitor})}]}{\ln \rho_{\text{visitor}}} - 1 = \frac{[\ln (0.05) - \ln (0.2447)]}{\ln (0.2447)} - 1 = 0 \text{ vehicles}$

The required storage, in addition to the vehicle being serviced at the virtual guard house, is five (5) vehicles for the resident lane and zero (0) vehicles for the visitor lane. As previously mentioned, the site will provide a stacking distance for approximately seven (7) vehicles in the resident and visitor lanes. Therefore, the site will accommodate the expected queue stacking from the gate without vehicles extending onto Prospect Road.

6.3 Gate Queueing for NW 44th Street at Driveway B

- $\rho = q/NQ$.
 - o $\rho_{\text{resident}} = (43 \text{ vehicles/hr}) / (1 * 240 \text{ process/hr})$. $\rho_{\text{resident}} = 0.2000$.
- $P(x > M)$: In an effort to ensure that the available storage length for the entrance area is not exceeded, a 95 percent confidence level was used in ITE. Therefore, $P(x > M)$ is set to 5 percent, or 0.05.
- $Q_{M(\text{resident})}$ is a table value obtained from Table 8-11 based on ρ_{resident} and N_{resident} .
 - o From Table: $N_{\text{resident}} = 1$ and $\rho = 0.2 = 0.2000$
 - o From Table: $N_{\text{resident}} = 1$ and $\rho = 0.3 = 0.3000$
 - o $Q_{M(\text{resident})} = 0.2000 + \frac{(0.3000 - 0.2000) * (0.2000 - 0.2)}{(0.3 - 0.2)} = 0.2000$
- $M_{\text{resident}} = \frac{[\ln P(x > M_{\text{resident}}) - \ln Q_{M(\text{resident})}] - 1}{\ln \rho_{\text{resident}}} = \frac{[\ln (0.05) - \ln (0.2000)] - 1}{\ln (0.2000)} = 0 \text{ vehicles}$

The required storage, in addition to the vehicle being serviced, is zero (0) vehicles for the resident lane. As previously mentioned, the site will provide a stacking distance for approximately two (2) vehicles. Therefore, the site will accommodate the expected queue stacking from the gate without vehicles extending onto NW 44th Street.

7.0 CONCLUSIONS AND RECOMMENDATIONS

McMahon has completed a traffic analysis for the redevelopment of a parcel of land located at 2400 Oak Tree Lane, in the City of Oakland Park. The site currently includes an abandoned golf course. The proposed development will include 273 single family dwelling units and 132 multi-family dwelling units.

Based on the analysis contained herein, the study intersections currently operate, and are expected to operate at an overall acceptable level of service during the morning and afternoon peak hours, with the addition of traffic from the proposed Oak Tree development. However, during existing field observations at the Prospect Road/NW 21st Avenue intersection, northbound left turn queues were observed to have minimal gaps during the PM peak hour. Most northbound left turning vehicles were observed to complete their maneuver during the yellow and/or red signal indication. In addition, westbound queues were observed to exceed the available storage by a significant amount during the PM peak hour. Westbound vehicles were observed to take several signal cycles to travel through the intersection. Roadway mitigation was proposed in coordination with the City of Oakland Park and Broward County Traffic Engineering Division. These included the construction of second westbound left-turn storage lane with at least 300 feet of storage (and corresponding signalization displays to accommodate this dual westbound left-turn), the installation of a corresponding protected-only eastbound left-turn phase, the construction of a 200-foot eastbound right-turn storage lane, the addition of a protected-to-permissive northbound left-turn signal phase, and the extension of the two (2) existing southbound receiving lanes from the intersection of Prospect Road and NW 21st Avenue to NW 44th Street. With the addition of a second westbound left turn lane, westbound left turn queues are expected to be contained within the available storage length. This represents a significant improvement as compared to existing queue observations and traffic conditions. With the signal phase modification to the northbound left turn movement, northbound left turning vehicles will be provided with a protected phase, in addition to a permitted phase, to complete their maneuvers.

The gate queueing analysis indicates that sufficient stacking will be provided at the driveway connections to Prospect Road and NW 44th Street to avoid any queue spillback onto the surrounding roadways.

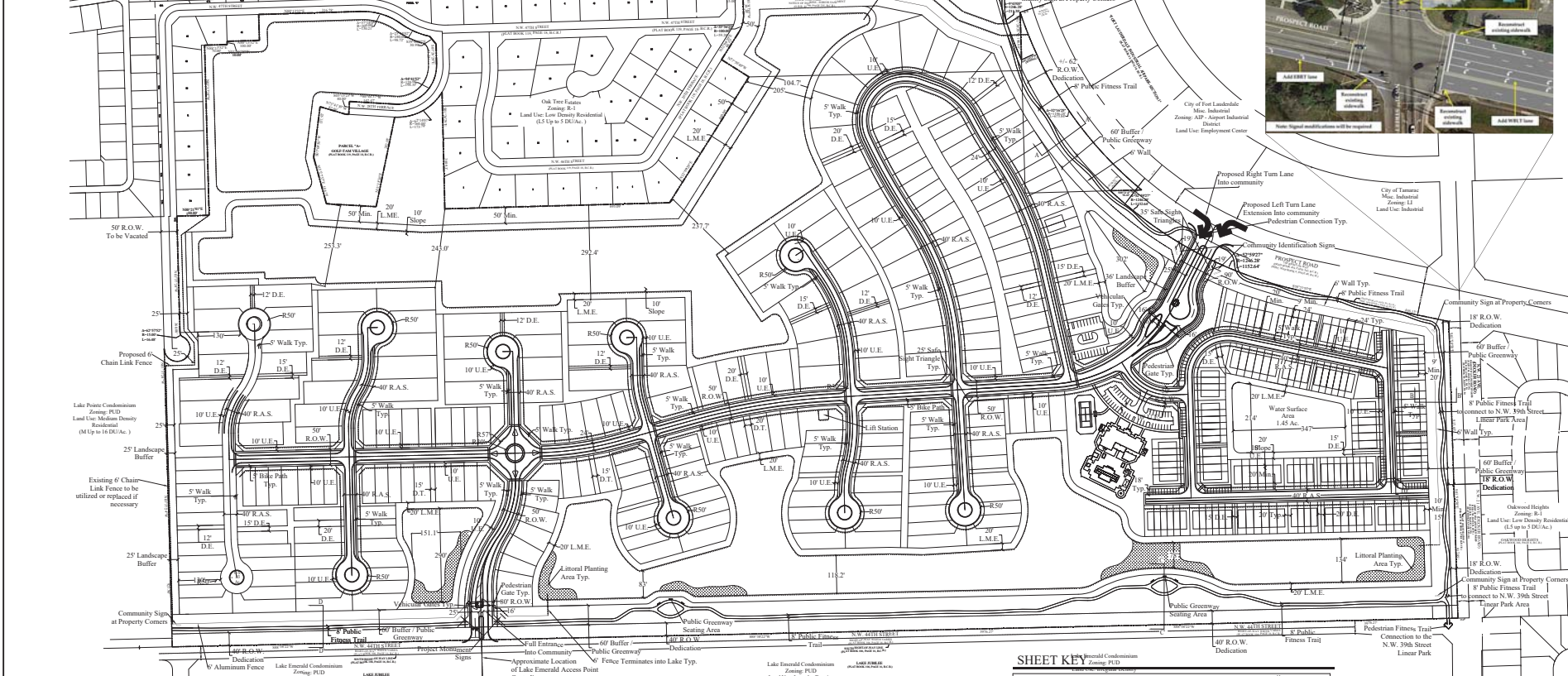
APPENDIX A

**CONCEPTUAL MASTER PLAN &
METHODOLOGY LETTER**

SITE DATA

Total Site Area - Net Acreage	139.16 AC. (6,061,809 S.F.)	Total Building Site Coverage Maximum - 30%	41.75 AC. (1,818,542.9 S.F.)
Total Site Area - Gross Acreage	140.70 AC. (6,128,992 S.F.)	Total Building Site Coverage Proposed	29.24 AC. (1,278,637 S.F. - 21%)
Existing Zoning Designation	Open Space / Recreation		
Proposed Zoning Designation	PUD - Planned Unit Development		
Existing Land Use Designation	P.R. - Parks and Recreation		
Proposed Land Use Designation	Irregular Residential (2.88 D.U./AC.)		
Current Use of Property	Vacant		
Water and Sewer Provider	City of Fort Lauderdale		
Total Number of Units	400 D.U.		
Single Family 70' x 130' (3 - 4 Bedrooms)	80 D.U.		
Single Family 50' x 120' (3 - 4 Bedrooms)	54 D.U.		
Single Family 40' x 120' (3 - 4 Bedrooms)	139 D.U.		
20' Townhomes (3 Bedrooms)	58 D.U.		
Net Density	2.91 Net D.U./AC.		
Gross Density	2.88 Gross D.U./AC.		
Total Drainage Area Proposed	± 24.02 AC. (1,046,311.2 S.F. - 17%)		
Total Lake Surface Residential Area	12.02 AC. (562,795.2 S.F.)		
Total Lake Surface North Open Space Area	11.10 AC. (483,516 S.F.)		
Include Drainage for Oak Tree Trunks			
Open Space Required (15%)	48.71 AC. (2,121,633.4 S.F.)		
Open Space Provided (See Exhibit for Details)	51.48 AC. (2,242,468.8 S.F. - 17%)		
Primary Rec Area	5.39 AC. (104,108.4 S.F. - 3%)		
Oak Tree Open Space Area / Buffer Area (North Area & North Lake Shore)	14.40 AC. (635,976 S.F. - 20%)		
Open Space Area (South Area & Internal Neighborhood Parks)	6.19 AC. (269,634 S.F. - 17%)		
Buffer Tract Areas (West Buffer Area & Entrance Buffers)	1.55 AC. (67,518 S.F. - 3%)		
Lake Tracts Along Public Linear Greenway Park*	17.38 AC. (757,072 S.F. - 54%) (59% of Tot. O.S.P.)		
Public Greenway Park Open Space Area (South & East Buffer Areas)	9.37 AC. (408,157.2 S.F. - 18%)		
Maximum Building Height	2 - Story		

* Per Article IV, Section 24-54.F.11, should project be rezoned to PUD depending on the characteristics of a planned unit development, the city may allow credits for lakes, lagoons or other waterways such credit not to exceed fifty (50) percent of the required open space.



PROJECT NOTES

- L.M.E. = Lake Maintenance Easement
- R.A.S. = Residential Access Street
- R.O.W. = Right of Way
- U.E. = Utility Easement
- Utilities are available to the site
- AC = Acres
- C.L. = Centerline
- Eas. = Easement
- Curbside refuse & recycling services will be provided by city
- D.E. = Drainage Easement
- D.T. = Drainage Tract
- F.P. = Foundation Planting
- S.W. = Sidewalk
- C.L.F. = Chain Link Fence
- Light poles located on residential lots along road right of way shall be located at property corners.
- M. Indicates Model Unit. Temporary sales center parking lot to be located on one of the model lots.
- Clubhouses include Kiosk box for emergency access.
- All internal residential vehicular access ways are private roadways & are the perpetual maintenance obligation of the new H.O.A.
- Public Greenway Open Space Park Area to be dedicated to City, shall count towards project concurrency requirements, per Article XIII, Section 24 - 175, including but not limited to credits towards the City Park Impact Fee calculation (Article XIII, Section 24 - 175.G).
- Fire Spigot/kiosk not required for residential homes.
- A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and that provides access to the interior of all residential homes.
- *R = Restricted lot in which only certain unit types can be constructed.
- All mechanical equipment shall be screened from view of the street or adjoining residential units with landscaping.

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DRAFT

Proposed Traffic Offsite Improvements



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1402 Royal Palm Beach Blvd., Suite 102
Royal Palm Beach, FL 33411
Tel: (561) 707-3410
Email: info@dek.us

DESIGN AND ENTITLEMENT CONSULTANTS, L.L.C.

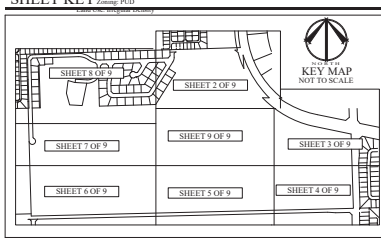
Oak Tree Property
PulteGroup
2400 Oak Tree Lane
Oakland Park, FL 33309

P.U.D.
Final Site Plan

SCALE: 1"=150'
CHECKED BY: K.D.D.
DRAWN BY: K.D.D.
DATE: 09.28.18
FILE: SP.1
SHEET
FSP.1
1 OF 6 SHEETS



SHEET KEY





McMAHON ASSOCIATES, INC.
2090 Palm Beach Lakes Boulevard, Suite 400
West Palm Beach, FL 33409
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Maureen Chlebek, P.E., PTOE
Dean A. Carr, P.E.

FOUNDER

Joseph W. McMahon, P.E.

December 13, 2018

VIA E-MAIL

Mr. Patrick Gonzalez, P.E.
Pulte Group
4400 PGA Blvd, Suite 700
Palm Beach Gardens, Florida 33410

**RE: Oak Tree Site Plan Traffic Methodology Letter
McMahon Project No. L17218.01**

Dear Patrick:

Please accept this letter as the proposed Traffic Analysis Methodology Letter for the Oak Tree project, located at 2400 Oak Tree Lane, in the City of Oakland Park. The site is currently an abandoned golf course. The proposed use for the site includes 405 dwelling units, with 273 single family dwelling units and 132 multi-family dwelling units.

Study Intersections

The study intersections for the project will include the following:

- Prospect Road at the project driveway (unsignalized)
- Prospect Road at NW 21st Avenue (signalized)
- Prospect Road at NW 26th Terrace (unsignalized)
- NW 44th Street at NW 21st Avenue (signalized)
- NW 44th Street at the project driveway/Bridgewater Place Apartments (unsignalized)
- NW 44th Street at NW 31st Avenue (signalized)

Analysis Scenarios

The analysis scenarios for this study are as follows:

- Existing Year: 2018
- Project buildout year (2024) without project trips (background traffic)
- Project buildout year (2024) with project trips (total traffic)

Data Collection – Turning Movement Counts

Turning movement counts were collected at the Prospect Road/NW 21st Avenue intersection and the NW 21st Avenue/NW 44th Street intersection on October 31, 2017 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Turning movement counts will be collected for the NW 44th Street/NW 31st Avenue intersection and for the driveways opposite the project driveways along Prospect Road and along NW 44th Street from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Through traffic data at the project driveways will be based on the data collected at nearby intersections.

Existing Conditions Capacity Analysis

Collected counts will be adjusted to reflect peak season, AM and PM peak hour traffic volumes by applying a peak season conversion factor obtained from the 2017 Florida Department of Transportation (FDOT) Peak Season Factor Category Report. Intersection capacity analyses will be evaluated for the study intersections using the Synchro Software, Synchro 10.

Future Conditions Analysis – Background Traffic Conditions

Future background traffic volumes will be determined by applying a compound growth rate to existing volumes and adding committed development traffic. The compound growth rate was based on a review of 10-year, historical traffic counts (2007 to 2017), for the following traffic count stations:

- Station 86-7784: Prospect Road, S of Commercial Boulevard
- Station 86-9407: NW 21st Avenue, N of Prospect Road
- Station 86-7626: NW 21st Avenue, S of Prospect Road

A review of the data, attached in Appendix A, indicates a 0.07 percent compound growth rate. Therefore, to provide a conservative analysis, a 1.0 percent compound growth rate will be used for the analysis. A 10-year historical growth was used to provide a reasonable growth rate. Historical data for approximately 5 years would yield an unrealistically high growth rate for the area.

Committed development trips will be added based on information obtained from the Residence Inn Traffic Study, prepared by Tinter Traffic LLC, dated September 4, 2014. The City of Fort Lauderdale will also be contacted to determine the need to add any committed development projects.

Intersection capacity analyses will be performed using the Synchro Software, Synchro 10. Truck factors and peak hour factors will be based on existing data, collected as part of the data collection effort. Signal timings may be optimized.

Project Trip Generation

Using information contained in the Institute of Transportation Engineer's (ITE), *Trip Generation Manual*, 10th Edition, trips associated with the proposed development will be estimated. The site is currently an abandoned golf course so no existing trips will be assumed for the analysis.

Project Access and Distribution

Access to the site will be provided via a full access connection to Prospect Road, which will be used by visitors and residents, and a full access connection to NW 44th Street, which will be used by residents.

Project trip distribution will be based on the model distribution provided by the Broward Metropolitan Planning Organization (MPO) to the Broward County Planning Council in the Land Use Plan Amendment process for the Oak Tree project. The distribution was modified slightly based on previous coordination with City staff and to ensure proper balancing of percentages. The MPO model output and proposed distribution at the study intersections are attached in Appendix A.

Future Conditions Analysis – Total Traffic Conditions

Future total traffic volumes will be determined by summing together project trips with background traffic volumes. Intersection capacity analyses will be performed using the Synchro Software, Synchro 10. Signal timings may be optimized. Truck factors and peak hour factors will be consistent with the background conditions analysis. If necessary, intersection improvements shall be recommended to mitigate the impacts of project trips from the proposed development.

Gate Analysis

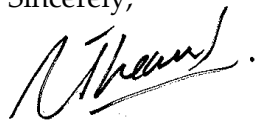
A gate analysis will be performed for the gated access connections to Prospect Road and to NW 44th Street based on the methodology outlined in *Transportation and Land Development*, 1988, published by ITE.

Turn Lane Evaluation

A turn lane evaluation will be performed at the driveway connections to the project site to determine the need for exclusive turn lanes.

If you have any questions regarding the information contained herein, please do not hesitate to contact me at (561) 840-8650.

Sincerely,



Natalia T. Lercari, P.E.
Senior Project Manager

NTL/cc

APPENDIX A

TRAFFIC METHODOLOGY BACKUP DATA

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2017 HISTORICAL AADT REPORT

COUNTY: 86 - BROWARD

SITE: 7784 - PROSPECT RD, S OF COMMERCIAL BLVD

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
* 2017	16500 F	N 8600	S 7900	9.00	51.90	6.20
2016	16500 C	N 8600	S 7900	9.00	54.10	2.90
2015	15000 V	0	0	9.00	54.00	3.40
2014	14500 R			9.00	54.20	7.40
2013	14500 T	0	0	9.00	53.60	7.60
2012	14500 S	0	0	9.00	52.20	5.90
2011	14500 F	0	0	9.00	52.50	6.30
2010	14500 C	N 7200	S 7300	8.35	52.69	9.30
2009	14900 F	N 8100	S 6800	8.53	53.89	5.30
2008	15300 C	N 8300	S 7000	8.81	54.16	6.50
* 2007	17300 C	N 8800	S 8500	8.63	55.75	4.80
2006	16300 C	N 8400	S 7900	8.40	55.34	2.90
2005	16800 C	N 8800	S 8000	8.20	51.70	0.00

10 years
 $2007: 17300 + 15500 + 7600 = 40400$
 $2017: 16500 + 17800 + 6400 = 40700$
 .07%.

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
 S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
 V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
 *K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2017 HISTORICAL AADT REPORT

COUNTY: 86 - BROWARD

SITE: 9407 - NW 21 AVENUE, N OF PROSPECT ROAD

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
----	-----	-----	-----	-----	-----	-----
* 2017	6400 S	N 3700	S 2700	9.00	51.90	6.20
2016	6400 F	N 3700	S 2700	9.00	54.10	2.90
2015	6400 C	N 3700	S 2700	9.00	54.00	3.40
2014	6000 X			9.00	54.20	7.40
2013	5900 X	0	0	9.00	53.60	7.60
2012	5900 T	0	0	9.00	52.20	5.90
2011	5900 S	0	0	9.00	52.50	6.30
2010	5900 F	N 3300	S 2600	8.35	52.69	9.30
2009	5900 C	N 3300	S 2600	8.53	53.89	5.30
2008	6800 C	N 3900	S 2900	8.81	54.16	6.50
* 2007	7600 C	N 4500	S 3100	8.63	55.75	4.80
2006	7800 C	N 4200	S 3600	8.40	55.34	2.90
2005	7500 C	N 4300	S 3200	8.20	51.70	0.00

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2017 HISTORICAL AADT REPORT

COUNTY: 86 - BROWARD

SITE: 7626 - NW 21 AVE, S OF PROSPECT RD

YEAR	AADT		DIRECTION 1		DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
----	-----		-----		-----	-----	-----	-----
*2017	17800 F	N	9100	S	8700	9.00	51.90	6.20
2016	17800 C	N	9100	S	8700	9.00	54.10	2.90
2015	14500 V		0		0	9.00	54.00	3.40
2014	14000 R					9.00	54.20	7.40
2013	14000 T		0		0	9.00	53.60	7.60
2012	14000 S		0		0	9.00	52.20	5.90
2011	14000 F		0		0	9.00	52.50	6.30
2010	14000 C	N	0	S	0	8.35	52.69	9.30
2009	14500 F		0		0	8.53	53.89	5.30
2008	15000 C	N	0	S	0	8.81	54.16	6.50
*2007	15500 C	N	0	S	0	8.63	55.75	4.80
2006	16000 C	N	0	S	0	8.40	55.34	2.90
2005	17000 C	N		S		8.20	51.70	0.00

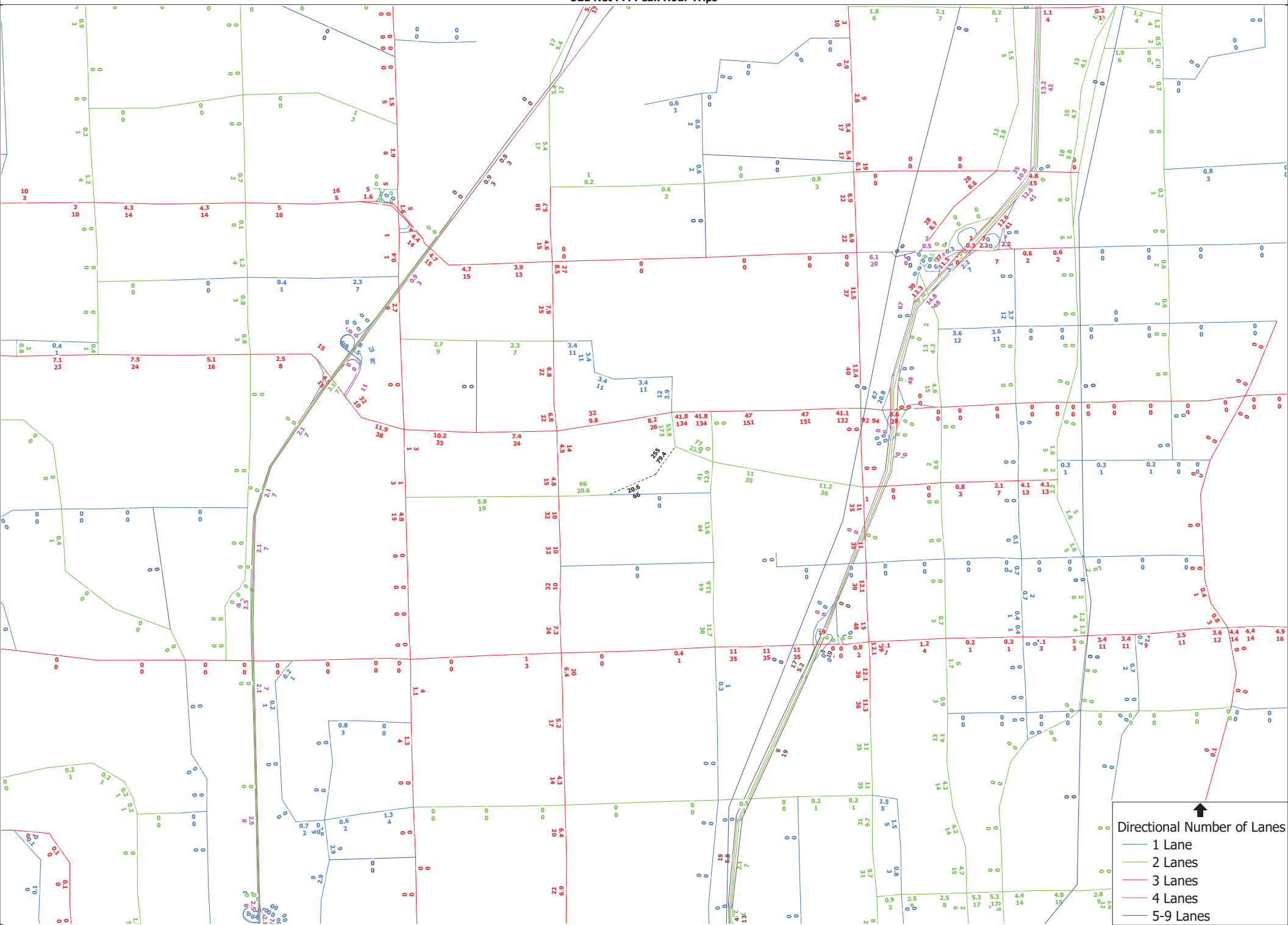
AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE

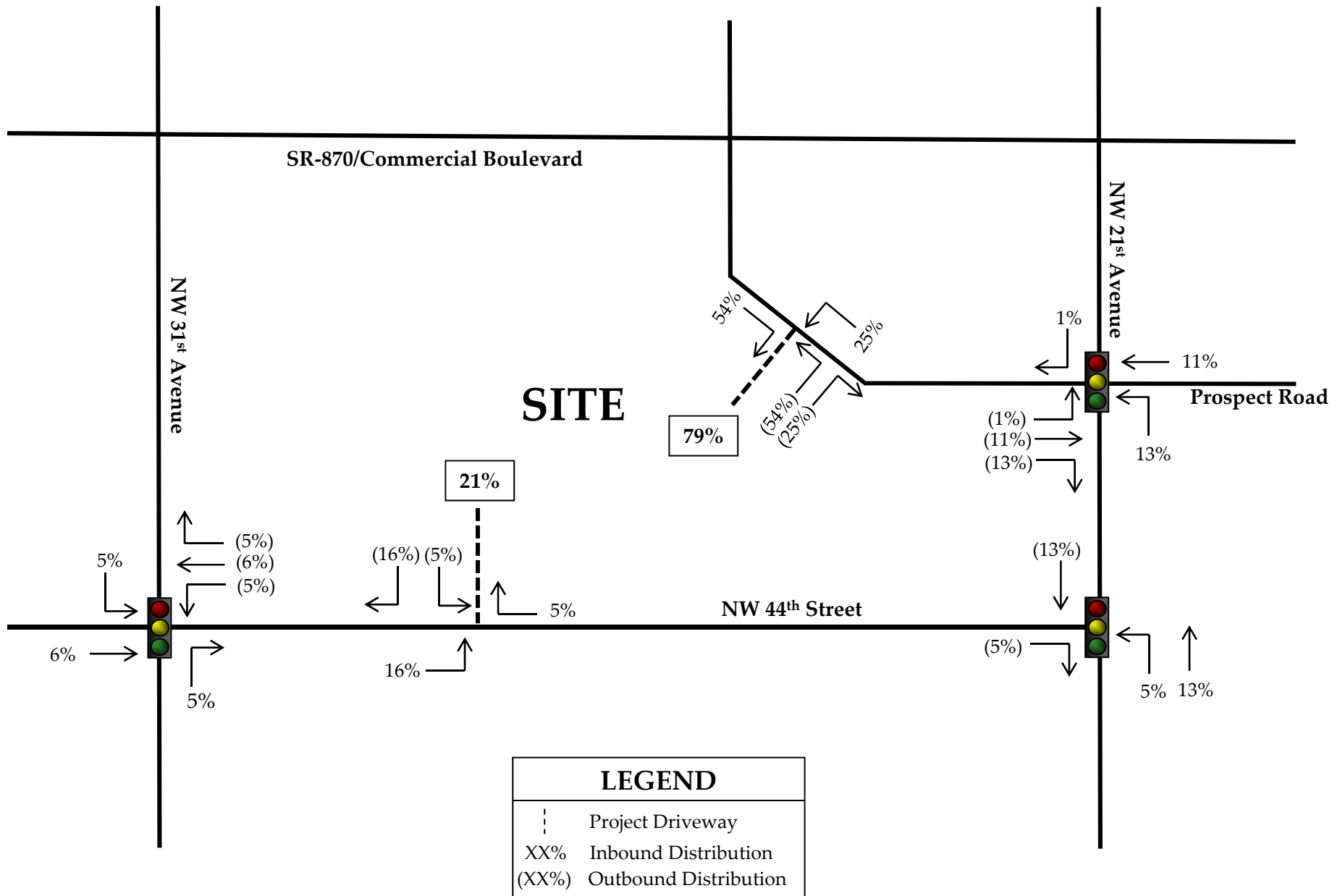
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE

V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN

*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

PC 19-2 Oakland Park
321 Net PM Peak Hour Trips





APPENDIX B

TRAFFIC VOLUME CALCULATIONS

TABLE B-1
AM TRAFFIC VOLUME CALCULATIONS
OAK TREE TRAFFIC ANALYSIS

INTERSECTION	SCENARIO	TRAFFIC VOLUMES															
		EBUT	EBLT	EBTH	EBRT	WBUT	WBLT	WBTH	WBRT	NBUT	NBLT	NBTH	NBRT	SBUT	SBLT	SBTH	SBRT
Prospect Road at NW 26 th Terrace	Collected Count (12/18/2018)	0	16	0	3	0	0	0	0	0	5	0	0	19	0	0	1
	Collected Count (10/31/2017) ⁽³⁾	-	-	-	-	-	-	-	-	-	-	555	-	-	-	936	-
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.04	1.00
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	16	0	3	0	0	0	0	0	5	548	0	19	0	929	1
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	17	0	3	0	0	0	0	0	5	582	0	20	0	986	1
	Committed Development	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
	2024 Background Peak-Season Traffic	0	17	0	3	0	0	0	0	0	5	583	0	20	0	989	1
	Project Trips	0	0	0	0	0	0	0	0	0	0	106	0	0	0	35	0
Prospect Road at Oak Tree	2024 Total Peak-Season Traffic	0	17	0	3	0	0	0	0	0	5	689	0	20	0	1,024	1
	Collected Count (12/18/2018)	0	5	0	17	0	0	0	0	2	10	0	0	0	0	0	0
	Collected Count (10/31/2017) ⁽³⁾	-	-	-	-	-	-	-	-	-	-	555	-	-	-	936	-
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.04	1.00
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	5	0	17	0	0	0	0	2	10	548	0	0	0	932	0
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	5	0	18	0	0	0	0	2	11	582	0	0	0	989	0
	Committed Development	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
	2024 Background Peak-Season Traffic	0	5	0	18	0	0	0	0	2	11	583	0	0	0	992	0
Prospect Road at Driveway A	Project Trips	0	0	0	0	0	0	0	0	0	0	106	0	0	0	35	0
	2024 Total Peak-Season Traffic	0	5	0	18	0	0	0	0	2	11	689	0	0	0	1,027	0
	Collected Count (12/18/2018)	0	0	0	0	0	4	0	3	2	0	0	14	3	15	0	0
	Collected Count (10/31/2017) ⁽³⁾	-	-	-	-	-	-	-	-	-	-	545	-	-	-	894	-
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.04	1.00
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	0	0	0	0	4	0	3	2	0	556	14	3	15	933	0
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	0	0	0	0	4	0	3	2	0	590	15	3	16	990	0
	Committed Development	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
Prospect Road at NW 21 st Avenue	2024 Background Peak-Season Traffic	0	0	0	0	0	4	0	3	2	0	591	15	3	16	993	0
	Project Trips	0	106	0	49	0	0	0	0	0	16	0	0	0	0	0	35
	2024 Total Peak-Season Traffic	0	106	0	49	0	4	0	3	2	16	591	15	3	16	993	35
	Collected Count (10/31/2017)	0	10	759	125	1	258	412	75	1	125	445	471	0	17	127	8
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	11	797	131	1	271	433	79	1	131	485	495	0	18	133	8
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	12	846	139	1	288	460	84	1	139	515	525	0	19	141	8
	Committed Development	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
Prospect Road at NW 21 st Avenue	2024 Background Peak-Season Traffic	0	12	848	139	1	288	461	84	1	139	515	525	0	19	141	8
	Project Trips	0	2	22	25	0	0	7	0	0	8	0	0	0	0	0	1
	2024 Total Peak-Season Traffic	0	14	870	164	1	288	468	84	1	147	515	525	0	19	141	9

TABLE B-1
AM TRAFFIC VOLUME CALCULATIONS
OAK TREE TRAFFIC ANALYSIS

INTERSECTION	SCENARIO	TRAFFIC VOLUMES															
		EBUT	EBLT	EBTH	EBRT	WBUT	WBLT	WBTH	WBRT	NBUT	NBLT	NBTH	NBRT	SBUT	SBLT	SBTH	SBRT
NW 21 st Avenue at NW 44 th Street	Collected Count (10/31/2017)	0	391	0	222	0	0	0	0	0	66	667	0	0	0	399	110
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	411	0	233	0	0	0	0	0	69	701	0	0	0	420	116
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	436	0	247	0	0	0	0	0	73	744	0	0	0	446	123
	Committed Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2024 Background Peak-Season Traffic	0	436	0	247	0	0	0	0	0	73	744	0	0	0	446	123
	Project Trips	0	0	0	10	0	0	0	0	0	3	8	0	0	0	25	0
	2024 Total Peak-Season Traffic	0	436	0	257	0	0	0	0	0	76	752	0	0	0	471	123
NW 44 th Street at Driveway B	Collected Count (12/18/2018)	0	0	444	25	0	13	144	0	2	52	0	65	0	0	0	0
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2018 Existing Peak-Season Traffic	0	0	444	25	0	13	144	0	2	52	0	65	0	0	0	0
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	0	471	27	0	14	153	0	2	55	0	69	0	0	0	0
	Committed Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2024 Background Peak-Season Traffic	0	0	471	27	0	14	153	0	2	55	0	69	0	0	0	0
	Project Trips	0	10	0	0	0	0	0	3	0	0	0	0	0	10	0	32
	2024 Total Peak-Season Traffic	0	10	471	27	0	14	153	3	2	55	0	69	0	10	0	32
	2024 Total Peak-Season Traffic	0	10	471	27	0	14	153	3	2	55	0	69	0	10	0	32
NW 44 th Street at NW 31 st Avenue	Collected Count (12/18/2018)	5	83	281	138	2	49	153	147	7	133	1,028	135	4	242	866	114
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2018 Existing Peak-Season Traffic	5	83	281	138	2	49	153	147	7	133	1,028	135	4	242	866	114
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	5	88	298	146	2	52	162	156	7	141	1,091	143	4	257	919	121
	Committed Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2024 Background Peak-Season Traffic	5	88	298	146	2	52	162	156	7	141	1,091	143	4	257	919	121
	Project Trips	0	0	4	0	0	10	12	10	0	0	0	3	0	3	0	0
	2024 Total Peak-Season Traffic	5	88	302	146	2	62	174	166	7	141	1,091	146	4	260	919	121
	2024 Total Peak-Season Traffic	5	88	302	146	2	62	174	166	7	141	1,091	146	4	260	919	121

(1) Peak Season Conversion Factor obtained from 2017 FDOT Peak Season Factor Category Report

(2) Compound growth rate of 1.00% was based on a review of 10-year historical traffic counts from 2007-2017 at stations 86-7784, 86-9407, and 86-7626

(3) Through volumes based on the NW 21st Avenue at Prospect Road collected count from 10/31/2017

Balanced Volumes



TABLE B-2
PM TRAFFIC VOLUME CALCULATIONS
OAK TREE TRAFFIC ANALYSIS

INTERSECTION	SCENARIO	TRAFFIC VOLUMES															
		EBUT	EBLT	EBTH	EBRT	WBUT	WBLT	WBTH	WBRT	NBUT	NBLT	NBTH	NBRT	SBUT	SBLT	SBTH	SBRT
Prospect Road at NW 26 th Terrace	Collected Count (12/18/2018)	0	8	0	6	0	0	0	0	0	7	0	0	14	0	0	3
	Collected Count (10/31/2017) ⁽³⁾	-	-	-	-	-	-	-	-	-	-	1,094	-	-	-	667	-
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.04	1.00
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	8	0	6	0	0	0	0	0	7	1,127	0	14	0	659	3
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	8	0	6	0	0	0	0	0	7	1,196	0	15	0	700	3
	Committed Development	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
	2024 Background Peak-Season Traffic	0	8	0	6	0	0	0	0	0	7	1,199	0	15	0	700	3
	Project Trips	0	0	0	0	0	0	0	0	0	0	68	0	0	0	116	0
	2024 Total Peak-Season Traffic	0	8	0	6	0	0	0	0	0	7	1,267	0	15	0	816	3
Prospect Road at Oak Tree	Collected Count (12/18/2018)	0	3	0	12	0	0	0	0	27	14	0	0	0	0	0	6
	Collected Count (10/31/2017) ⁽³⁾	-	-	-	-	-	-	-	-	-	-	1,094	-	-	-	667	-
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.04	1.00
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	3	0	12	0	0	0	0	27	14	1,131	0	0	0	659	6
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	3	0	13	0	0	0	0	29	15	1,201	0	0	0	700	6
	Committed Development	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
	2024 Background Peak-Season Traffic	0	3	0	13	0	0	0	0	29	15	1,203	0	0	0	700	6
	Project Trips	0	0	0	0	0	0	0	0	0	0	68	0	0	0	116	0
	2024 Total Peak-Season Traffic	0	3	0	13	0	0	0	0	29	15	1,271	0	0	0	816	6
Prospect Road at Driveway A	Collected Count (12/18/2018)	0	0	0	0	0	14	0	6	0	0	0	2	0	6	0	0
	Collected Count (10/31/2017) ⁽³⁾	-	-	-	-	-	-	-	-	-	-	1,075	-	-	-	672	-
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.04	1.00
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	0	0	0	0	14	0	6	0	0	1,128	2	0	6	692	0
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	0	0	0	0	15	0	6	0	0	1,197	2	0	6	735	0
	Committed Development	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
	2024 Background Peak-Season Traffic	0	0	0	0	0	15	0	6	0	0	1,200	2	0	6	736	0
	Project Trips	0	68	0	32	0	0	0	0	0	54	0	0	0	0	0	116
	2024 Total Peak-Season Traffic	0	68	0	32	0	15	0	6	0	54	1,200	2	0	6	736	116
Prospect Road at NW 21 st Avenue	Collected Count (10/31/2017)	0	6	500	166	0	524	983	60	0	72	218	322	0	42	536	20
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	6	526	174	0	550	1,033	63	0	76	246	338	0	44	563	21
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	6	558	185	0	584	1,097	67	0	81	261	359	0	47	598	22
	Committed Development	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
	2024 Background Peak-Season Traffic	0	6	560	185	0	584	1,099	67	0	81	261	359	0	47	598	22
	Project Trips	0	2	14	16	0	0	24	0	0	28	0	0	0	0	0	2
	2024 Total Peak-Season Traffic	0	8	574	201	0	584	1,123	67	0	109	261	359	0	47	598	24

TABLE B-2
PM TRAFFIC VOLUME CALCULATIONS
OAK TREE TRAFFIC ANALYSIS

INTERSECTION	SCENARIO	TRAFFIC VOLUMES															
		EBUT	EBLT	EBTH	EBRT	WBUT	WBLT	WBTH	WBRT	NBUT	NBLT	NBTH	NBRT	SBUT	SBLT	SBTH	SBRT
NW 21 st Avenue at NW 44 th Street	Collected Count (10/31/2017)	0	193	0	120	0	0	0	0	0	175	434	0	1	0	799	411
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	2018 Existing Peak-Season Traffic	0	203	0	126	0	0	0	0	0	184	456	0	1	0	854	432
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	215	0	134	0	0	0	0	0	195	484	0	1	0	907	459
	Committed Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2024 Background Peak-Season Traffic	0	215	0	134	0	0	0	0	0	195	485	0	1	0	907	459
	Project Trips	0	0	0	6	0	0	0	0	0	11	28	0	0	0	16	0
	2024 Total Peak-Season Traffic	0	215	0	140	0	0	0	0	0	206	513	0	1	0	923	459
NW 44 th Street at Driveway B	Collected Count (12/18/2018)	0	0	212	51	0	54	467	0	1	42	0	25	0	0	0	0
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2018 Existing Peak-Season Traffic	0	0	212	51	0	54	467	0	1	42	0	25	0	0	0	0
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	0	0	225	54	0	57	496	0	1	45	0	27	0	0	0	0
	Committed Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2024 Background Peak-Season Traffic	0	0	225	54	0	57	496	0	1	45	0	27	0	0	0	0
	Project Trips	0	35	0	0	0	0	0	11	0	0	0	0	0	6	0	20
	2024 Total Peak-Season Traffic	0	35	225	54	0	57	496	11	1	45	0	27	0	6	0	20
NW 44 th Street at NW 31 st Avenue	Collected Count (12/18/2018)	4	49	134	79	17	116	293	124	20	157	1,307	110	1	154	1,451	268
	Peak-Season Conversion Factor (PSCF) ⁽¹⁾	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2018 Existing Peak-Season Traffic	4	49	134	79	17	116	293	124	20	157	1,307	110	1	154	1,451	268
	Compound Growth Rate (CGR) ⁽²⁾	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	Existing plus CGR Increase	4	52	142	84	18	123	311	132	21	167	1,387	117	1	163	1,540	284
	Committed Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2024 Background Peak-Season Traffic	4	52	142	84	18	123	311	132	21	167	1,387	117	1	163	1,540	284
	Project Trips	0	0	13	0	0	6	8	6	0	0	0	11	0	11	0	0
	2024 Total Peak-Season Traffic	4	52	155	84	18	129	319	138	21	167	1,387	128	1	174	1,540	284

(1) Peak Season Conversion Factor obtained from 2017 FDOT Peak Season Factor Category Report

(2) Compound growth rate of 1.00% was based on a review of 10-year historical traffic counts from 2007-2017 at stations 86-7784, 86-9407, and 86-7626

(3) Through volumes based on the NW 21st Avenue at Prospect Road collected count from 10/31/2017

Balanced Volumes



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PROSPECT ROAD & NW 21ST AVENUE
FT LAUDERDALE, FLORIDA
COUNTED BY: M. CRUZ & L. PALOMINO
SIGNALIZED

File Name : PROS21AV
Site Code : 00170180
Start Date : 10/31/2017
Page No : 1

Groups Printed- LIGHT VEHICLES - HEAVY VEHICLES

	NW 21ST AVENUE From North				PROSPECT ROAD From East				NW 21ST AVENUE From South				PROSPECT ROAD From West				Int. Total
Start Time	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	
07:00	0	1	30	0	0	54	68	4	0	22	64	77	0	0	139	32	491
07:15	0	0	23	0	1	45	93	5	0	28	94	81	0	2	202	25	599
07:30	0	3	34	1	0	59	90	15	1	28	81	116	0	2	206	37	673
07:45	0	7	33	4	0	66	117	19	0	40	143	130	0	2	198	40	799
Total	0	11	120	5	1	224	368	43	1	118	382	404	0	6	745	134	2562
08:00	0	3	26	1	1	68	115	19	0	33	117	114	0	0	181	21	699
08:15	0	4	34	2	0	65	90	22	0	24	104	111	0	6	174	27	663
08:30	0	4	25	3	0	62	91	12	0	14	73	80	0	9	176	20	569
08:45	0	3	25	0	0	52	93	14	0	19	91	94	0	3	164	19	577
Total	0	14	110	6	1	247	389	67	0	90	385	399	0	18	695	87	2508
16:00	0	9	50	2	1	96	148	12	0	24	50	49	0	3	88	21	553
16:15	0	6	49	2	1	115	188	9	0	25	44	62	0	4	89	28	622
16:30	0	9	113	6	0	128	191	2	0	23	42	64	0	2	90	33	703
16:45	0	9	74	5	0	117	222	10	0	19	55	81	0	1	126	29	748
Total	0	33	286	15	2	456	749	33	0	91	191	256	0	10	393	111	2626
17:00	0	19	121	4	0	141	258	6	0	18	52	69	0	3	140	41	872
17:15	0	8	146	3	0	127	236	14	0	20	65	89	0	2	128	44	882
17:30	0	10	139	7	0	131	274	23	0	15	51	86	0	1	134	35	906
17:45	0	5	130	6	0	125	215	17	0	19	50	78	0	0	98	46	789
Total	0	42	536	20	0	524	983	60	0	72	218	322	0	6	500	166	3449
Grand Total	0	100	1052	46	4	1451	2489	203	1	371	1176	1381	0	40	2333	498	11145
Apprch %	0	8.3	87.8	3.8	0.1	35	60	4.9	0	12.7	40.2	47.1	0	1.4	81.3	17.3	
Total %	0	0.9	9.4	0.4	0	13	22.3	1.8	0	3.3	10.6	12.4	0	0.4	20.9	4.5	
LIGHT VEHICLES	0	94	1007	46	4	1392	2427	195	1	350	1152	1264	0	36	2239	480	10687
% LIGHT VEHICLES	0	94	95.7	100	100	95.9	97.5	96.1	100	94.3	98	91.5	0	90	96	96.4	95.9
HEAVY VEHICLES	0	6	45	0	0	59	62	8	0	21	24	117	0	4	94	18	458
% HEAVY VEHICLES	0	6	4.3	0	0	4.1	2.5	3.9	0	5.7	2	8.5	0	10	4	3.6	4.1

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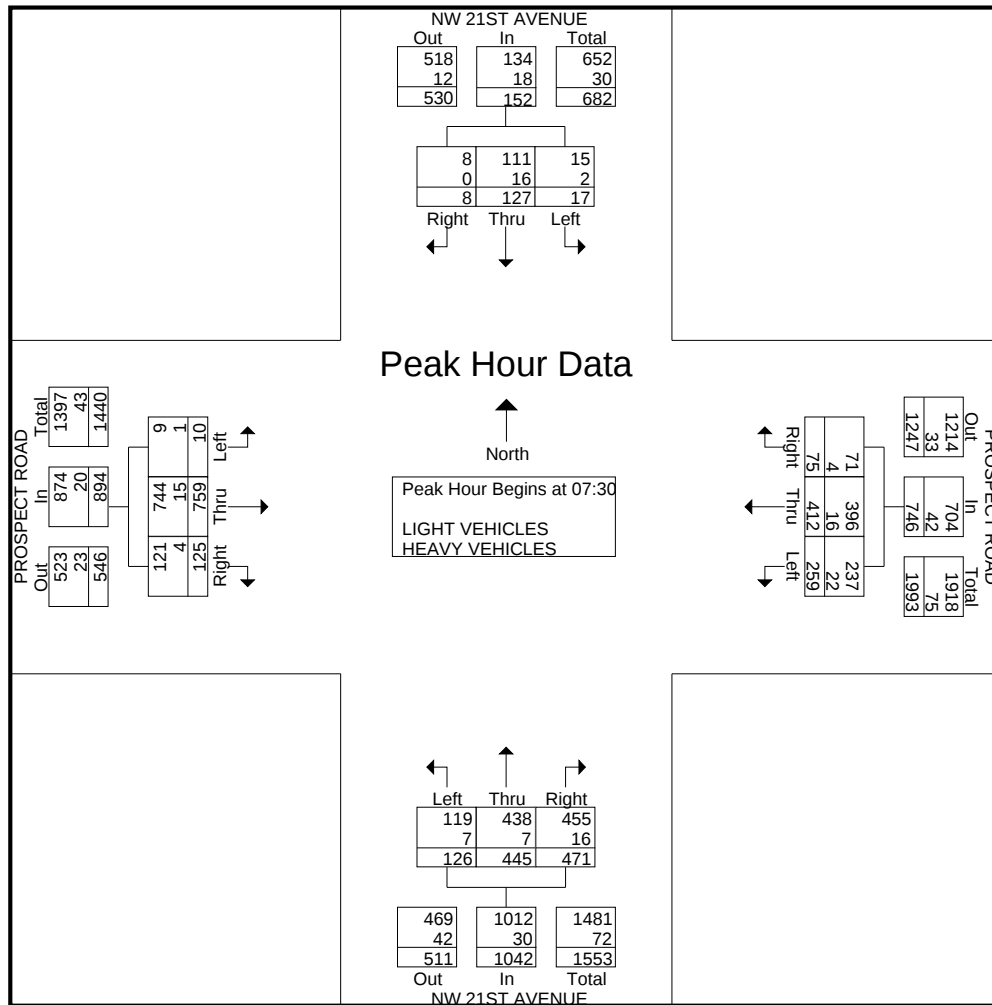
Delray Beach, Florida

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PROSPECT ROAD & NW 21ST AVENUE
FT LAUDERDALE, FLORIDA
COUNTED BY: M. CRUZ & L. PALOMINO
SIGNALIZED

File Name : PROS21AV
Site Code : 00170180
Start Date : 10/31/2017
Page No : 2

	NW 21ST AVENUE From North					PROSPECT ROAD From East					NW 21ST AVENUE From South					PROSPECT ROAD From West					
Start Time	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	0	3	34	1	38	0	59	90	15	164	1	28	81	116	226	0	2	206	37	245	673
07:45	0	7	33	4	44	0	66	117	19	202	0	40	143	130	313	0	2	198	40	240	799
08:00	0	3	26	1	30	1	68	115	19	203	0	33	117	114	264	0	0	181	21	202	699
08:15	0	4	34	2	40	0	65	90	22	177	0	24	104	111	239	0	6	174	27	207	663
Total Volume	0	17	127	8	152	1	258	412	75	746	1	125	445	471	1042	0	10	759	125	894	2834
% App. Total	0	11.2	83.6	5.3		0.1	34.6	55.2	10.1		0.1	12	42.7	45.2		0	1.1	84.9	14		
PHF	.000	.607	.934	.500	.864	.250	.949	.880	.852	.919	.250	.781	.778	.906	.832	.000	.417	.921	.781	.912	.887
LIGHT VEHICLES	0	15	111	8	134	1	236	396	71	704	1	118	438	455	1012	0	9	744	121	874	2724
% LIGHT VEHICLES	0	88.2	87.4	100	88.2	100	91.5	96.1	94.7	94.4	100	94.4	98.4	96.6	97.1	0	90.0	98.0	96.8	97.8	96.1
HEAVY VEHICLES	0	2	16	0	18	0	22	16	4	42	0	7	7	16	30	0	1	15	4	20	110
% HEAVY VEHICLES	0	11.8	12.6	0	11.8	0	8.5	3.9	5.3	5.6	0	5.6	1.6	3.4	2.9	0	10.0	2.0	3.2	2.2	3.9



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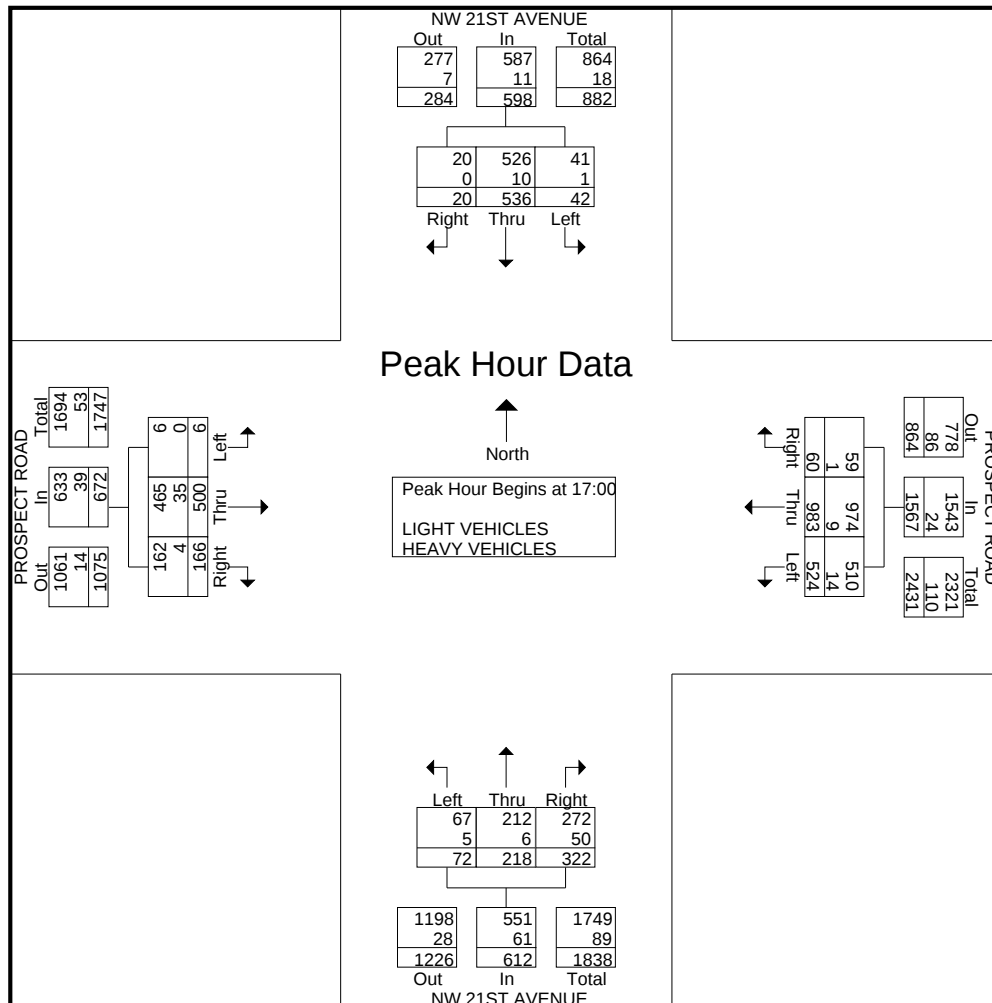
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PROSPECT ROAD & NW 21ST AVENUE
FT LAUDERDALE, FLORIDA
COUNTED BY: M. CRUZ & L. PALOMINO
SIGNALIZED

File Name : PROS21AV
Site Code : 00170180
Start Date : 10/31/2017
Page No : 3

	NW 21ST AVENUE From North					PROSPECT ROAD From East					NW 21ST AVENUE From South					PROSPECT ROAD From West					
Start Time	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	0	19	121	4	144	0	141	258	6	405	0	18	52	69	139	0	3	140	41	184	872
17:15	0	8	146	3	157	0	127	236	14	377	0	20	65	89	174	0	2	128	44	174	882
17:30	0	10	139	7	156	0	131	274	23	428	0	15	51	86	152	0	1	134	35	170	906
17:45	0	5	130	6	141	0	125	215	17	357	0	19	50	78	147	0	0	98	46	144	789
Total Volume	0	42	536	20	598	0	524	983	60	1567	0	72	218	322	612	0	6	500	166	672	3449
% App. Total	0	7	89.6	3.3		0	33.4	62.7	3.8		0	11.8	35.6	52.6		0	0.9	74.4	24.7		
PHF	.000	.553	.918	.714	.952	.000	.929	.897	.652	.915	.000	.900	.838	.904	.879	.000	.500	.893	.902	.913	.952
LIGHT VEHICLES	0	41	526	20	587	0	510	974	59	1543	0	67	212	272	551	0	6	465	162	633	3314
% LIGHT VEHICLES	0	97.6	98.1	100	98.2	0	97.3	99.1	98.3	98.5	0	93.1	97.2	84.5	90.0	0	100	93.0	97.6	94.2	96.1
HEAVY VEHICLES	0	1	10	0	11	0	14	9	1	24	0	5	6	50	61	0	0	35	4	39	135
% HEAVY VEHICLES	0	2.4	1.9	0	1.8	0	2.7	0.9	1.7	1.5	0	6.9	2.8	15.5	10.0	0	0	7.0	2.4	5.8	3.9



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NW 44TH STREET & NW 21ST AVENUE
FT LAUDERDALE, FLORIDA
COUNTED BY: SEBASTIAN SALVO
SIGNALIZED

File Name : 44ST21AV
Site Code : 00170180
Start Date : 10/31/2017
Page No : 1

Groups Printed- LIGHT VEHICLES - HEAVY VEHICLES

	NW 21ST AVENUE From North				NW 44TH STREET From East				NW 21ST AVENUE From South				NW 44TH STREET From West				
Start Time	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	Int. Total
07:00	0	0	80	33	0	0	0	1	0	16	100	0	0	62	0	51	343
07:15	0	1	74	25	0	0	0	0	0	16	123	0	0	82	0	70	391
07:30	0	0	96	30	0	0	1	2	0	13	160	0	0	81	0	71	454
07:45	0	0	110	29	0	0	0	1	0	20	193	0	0	117	0	60	530
Total	0	1	360	117	0	0	1	4	0	65	576	0	0	342	0	252	1718
08:00	0	0	95	20	0	0	0	1	0	17	180	0	0	94	0	46	453
08:15	0	0	98	31	0	0	0	0	0	16	134	0	0	99	0	45	423
08:30	0	1	78	28	0	0	0	1	0	20	98	0	0	75	1	40	342
08:45	0	0	71	24	0	0	0	1	0	11	138	0	0	65	0	29	339
Total	0	1	342	103	0	0	0	3	0	64	550	0	0	333	1	160	1557
16:00	0	0	121	43	0	0	0	0	0	19	93	0	0	33	0	26	335
16:15	0	1	136	58	1	0	0	1	0	39	108	0	0	37	0	20	401
16:30	0	1	179	76	0	0	0	0	0	21	95	0	0	35	0	23	430
16:45	0	0	154	81	0	1	0	2	0	45	109	0	0	44	0	20	456
Total	0	2	590	258	1	1	0	3	0	124	405	0	0	149	0	89	1622
17:00	0	0	184	83	0	0	0	0	0	46	108	0	0	46	0	23	490
17:15	0	0	202	113	0	0	0	0	0	47	107	0	0	54	0	25	548
17:30	1	0	202	105	0	0	2	2	0	42	108	0	0	59	0	38	559
17:45	0	0	211	110	0	0	0	0	0	40	111	0	0	34	0	34	540
Total	1	0	799	411	0	0	2	2	0	175	434	0	0	193	0	120	2137
Grand Total	1	4	2091	889	1	1	3	12	0	428	1965	0	0	1017	1	621	7034
Apprch %	0	0.1	70.1	29.8	5.9	5.9	17.6	70.6	0	17.9	82.1	0	0	62.1	0.1	37.9	
Total %	0	0.1	29.7	12.6	0	0	0	0.2	0	6.1	27.9	0	0	14.5	0	8.8	
LIGHT VEHICLES	0	4	1992	864	1	1	3	11	0	423	1847	0	0	981	1	611	6739
% LIGHT VEHICLES	0	100	95.3	97.2	100	100	100	91.7	0	98.8	94	0	0	96.5	100	98.4	95.8
HEAVY VEHICLES	1	0	99	25	0	0	0	1	0	5	118	0	0	36	0	10	295
% HEAVY VEHICLES	100	0	4.7	2.8	0	0	0	8.3	0	1.2	6	0	0	3.5	0	1.6	4.2

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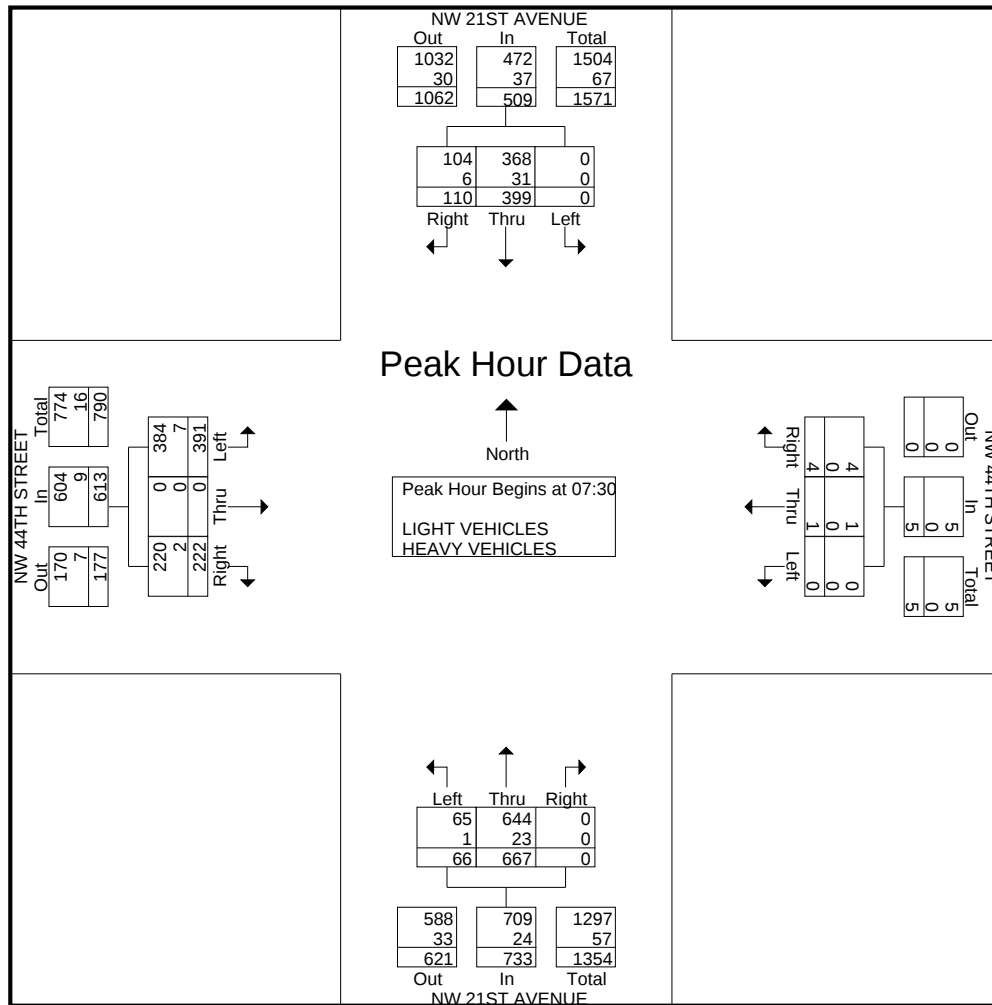
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NW 44TH STREET & NW 21ST AVENUE
FT LAUDERDALE, FLORIDA
COUNTED BY: SEBASTIAN SALVO
SIGNALIZED

File Name : 44ST21AV
Site Code : 00170180
Start Date : 10/31/2017
Page No : 2

	NW 21ST AVENUE From North					NW 44TH STREET From East					NW 21ST AVENUE From South					NW 44TH STREET From West					
Start Time	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	0	0	96	30	126	0	0	1	2	3	0	13	160	0	173	0	81	0	71	152	454
07:45	0	0	110	29	139	0	0	0	1	1	0	20	193	0	213	0	117	0	60	177	530
08:00	0	0	95	20	115	0	0	0	1	1	0	17	180	0	197	0	94	0	46	140	453
08:15	0	0	98	31	129	0	0	0	0	0	0	16	134	0	150	0	99	0	45	144	423
Total Volume	0	0	399	110	509	0	0	1	4	5	0	66	667	0	733	0	391	0	222	613	1860
% App. Total	0	0	78.4	21.6		0	0	20	80		0	9	91	0		0	63.8	0	36.2		
PHF	.000	.000	.907	.887	.915	.000	.000	.250	.500	.417	.000	.825	.864	.000	.860	.000	.835	.000	.782	.866	.877
LIGHT VEHICLES	0	0	368	104	472	0	0	1	4	5	0	65	644	0	709	0	384	0	220	604	1790
% LIGHT VEHICLES	0	0	92.2	94.5	92.7	0	0	100	100	100	0	98.5	96.6	0	96.7	0	98.2	0	99.1	98.5	96.2
HEAVY VEHICLES	0	0	31	6	37	0	0	0	0	0	0	1	23	0	24	0	7	0	2	9	70
% HEAVY VEHICLES	0	0	7.8	5.5	7.3	0	0	0	0	0	0	1.5	3.4	0	3.3	0	1.8	0	0.9	1.5	3.8



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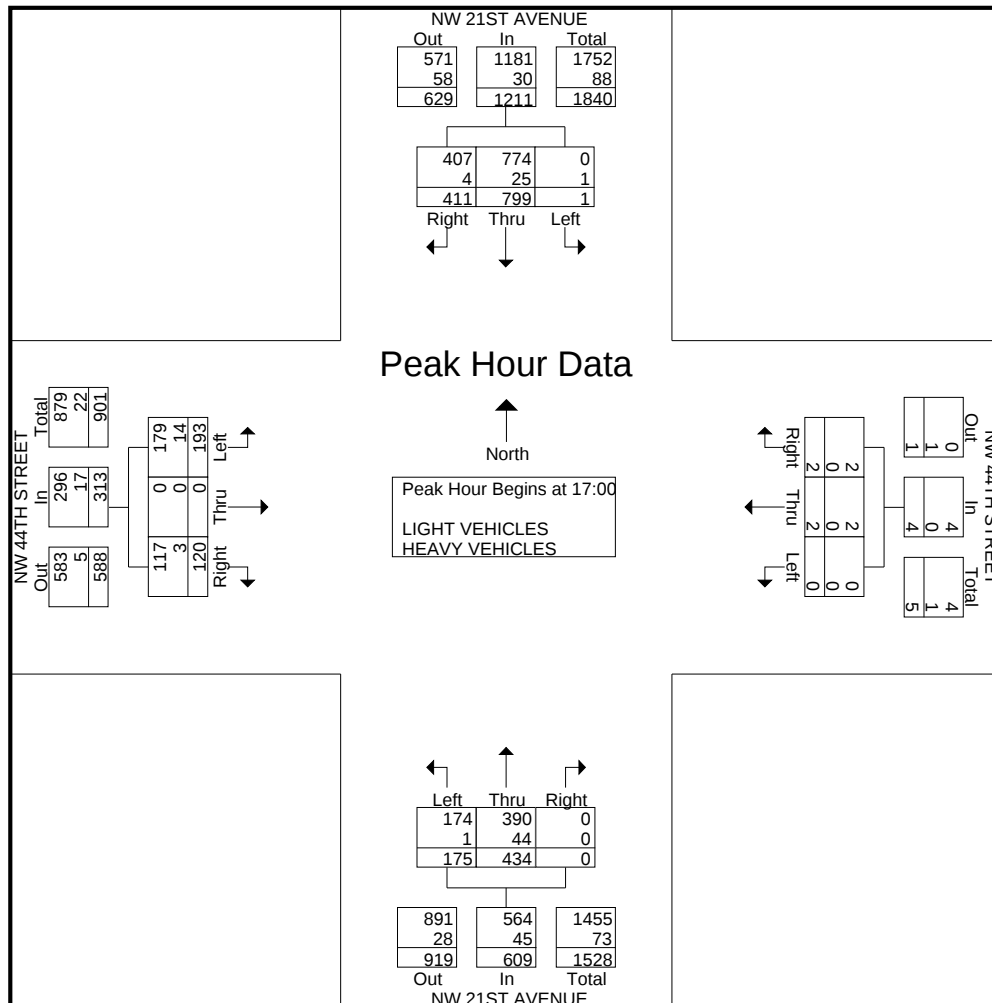
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NW 44TH STREET & NW 21ST AVENUE
FT LAUDERDALE, FLORIDA
COUNTED BY: SEBASTIAN SALVO
SIGNALIZED

File Name : 44ST21AV
Site Code : 00170180
Start Date : 10/31/2017
Page No : 3

	NW 21ST AVENUE From North					NW 44TH STREET From East					NW 21ST AVENUE From South					NW 44TH STREET From West					
Start Time	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	UTurn	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	0	0	184	83	267	0	0	0	0	0	0	46	108	0	154	0	46	0	23	69	490
17:15	0	0	202	113	315	0	0	0	0	0	0	47	107	0	154	0	54	0	25	79	548
17:30	1	0	202	105	308	0	0	2	2	4	0	42	108	0	150	0	59	0	38	97	559
17:45	0	0	211	110	321	0	0	0	0	0	0	40	111	0	151	0	34	0	34	68	540
Total Volume	1	0	799	411	1211	0	0	2	2	4	0	175	434	0	609	0	193	0	120	313	2137
% App. Total	0.1	0	66	33.9		0	0	50	50		0	28.7	71.3	0		0	61.7	0	38.3		
PHF	.250	.000	.947	.909	.943	.000	.000	.250	.250	.250	.000	.931	.977	.000	.989	.000	.818	.000	.789	.807	.956
LIGHT VEHICLES	0	0	774	407	1181	0	0	2	2	4	0	174	390	0	564	0	179	0	117	296	2045
% LIGHT VEHICLES	0	0	96.9	99.0	97.5	0	0	100	100	100	0	99.4	89.9	0	92.6	0	92.7	0	97.5	94.6	95.7
HEAVY VEHICLES	1	0	25	4	30	0	0	0	0	0	0	1	44	0	45	0	14	0	3	17	92
% HEAVY VEHICLES	100	0	3.1	1.0	2.5	0	0	0	0	0	0	0.6	10.1	0	7.4	0	7.3	0	2.5	5.4	4.3



File Name : Prospect_Rd@NW26th_Ter
Site Code : 00000000
Start Date : 12/18/2018
Page No : 1

2090 Palm Beach Lakes Blvd, Suite 400
West Palm Beach, FL 33409

File Name : Prospect_Rd@NW26th_Ter
Site Code : 00000000
Start Date : 12/18/2018
Page No : 2

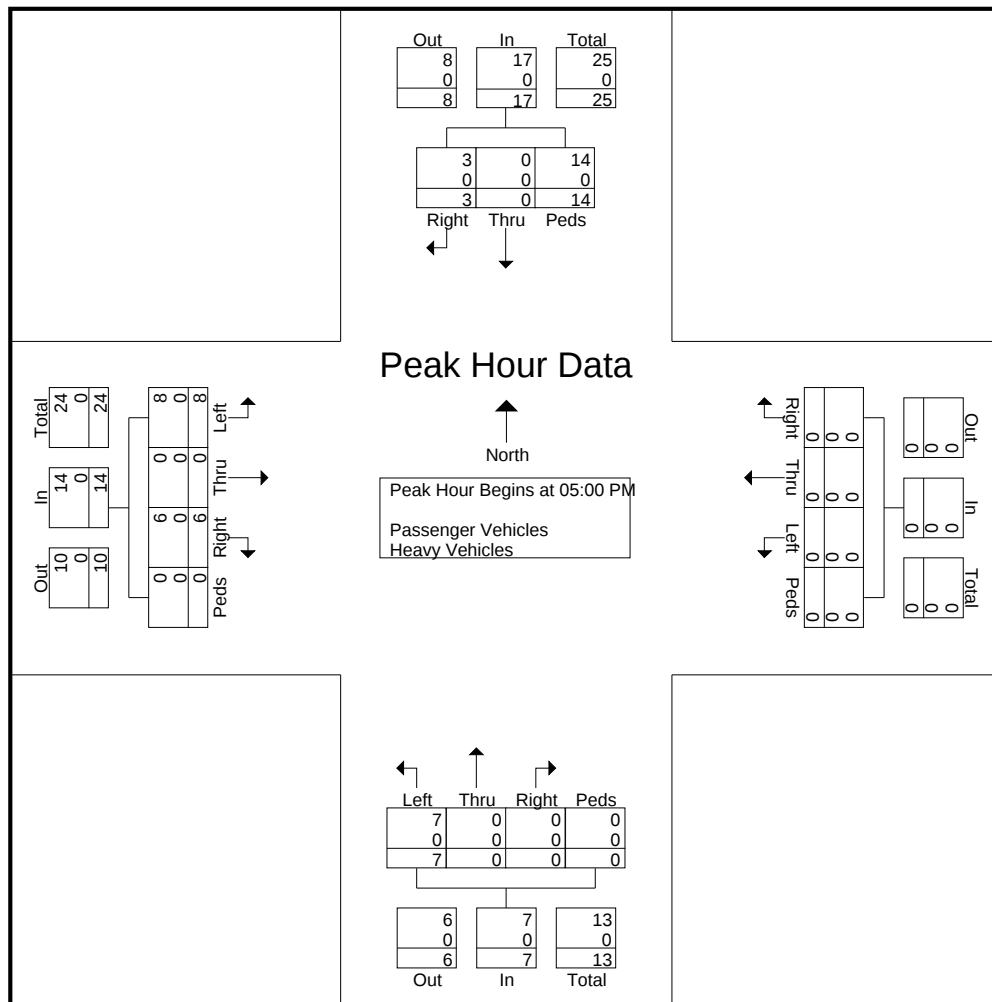
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McMahon Associates, Inc.
2090 Palm Beach Lakes Blvd, Suite 400
West Palm Beach, FL 33409

Turning Movement Counts

File Name : Prospect_Rd@NW26th_Ter
Site Code : 00000000
Start Date : 12/18/2018
Page No : 3

	Southbound					Westbound					Northbound					Eastbound					
Start Time	Right	Thru	U-Turn	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	5	0	5	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	7
05:15 PM	1	0	5	0	6	0	0	0	0	0	0	0	2	0	2	1	0	2	0	3	11
05:30 PM	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	5
05:45 PM	1	0	3	0	4	0	0	0	0	0	0	0	4	0	4	4	0	3	0	7	15
Total Volume	3	0	14	0	17	0	0	0	0	0	0	0	7	0	7	6	0	8	0	14	38
% App. Total	17.6	0	82.4	0		0	0	0	0		0	0	100	0		42.9	0	57.1	0		
PHF	.750	.000	.700	.000	.708	.000	.000	.000	.000	.000	.000	.000	.438	.000	.438	.375	.000	.667	.000	.500	.633
Passenger Vehicles																					
% Passenger Vehicles	100	0	100	0	100	0	0	0	0	0	0	0	100	0	100	100	0	100	0	100	100
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Prospect Road At Oak Tree (AM)

TIME	PROSPECT ROAD					OAK TREE		
	NORTHBOUND U-TURN VOLUME	NORTHBOUND LEFT TURN VOLUME	SOUTHBOUND U-TURN VOLUME	SOUTHBOUND LEFT TURN VOLUME	SOUTHBOUND RIGHT TURN VOLUME	EASTBOUND U-TURN VOLUME	EASTBOUND LEFT TURN VOLUME	EASTBOUND RIGHT TURN VOLUME
7:00-7:15 AM	0	1	0	0	0	0	2	2
7:15-7:30 AM	0	0	0	0	0	0	1	6
7:30-7:45 AM	0	1	0	0	0	0	2	5
7:45-8:00 AM	0	3	0	0	0	0	0	3
8:00-8:15 AM	2	5	0	0	0	0	2	3
8:15-8:30 AM	0	1	0	0	0	0	1	6
8:30-8:45 AM	0	0	0	0	0	0	1	6
8:45-9:00 AM	2	1	0	0	0	1	3	7

Prospect Road At Oak Tree (PM)

TIME	PROSPECT ROAD					OAK TREE		
	NORTHBOUND U-TURN VOLUME	NORTHBOUND LEFT TURN VOLUME	SOUTHBOUND U-TURN VOLUME	SOUTHBOUND LEFT TURN VOLUME	SOUTHBOUND RIGHT TURN VOLUME	EASTBOUND U-TURN VOLUME	EASTBOUND LEFT TURN VOLUME	EASTBOUND RIGHT TURN VOLUME
4:00-4:15 PM	0	3	1	0	0	0	1	1
4:15-4:30 PM	0	2	0	0	0	0	1	0
4:30-4:45 PM	1	0	0	1	0	0	2	2
4:45-5:00 PM	3	5	0	0	0	0	0	0
5:00-5:15 PM	4	4	0	0	2	0	0	1
5:15-5:30 PM	2	4	0	0	0	0	2	5
5:30-5:45 PM	6	2	0	0	3	0	1	3
5:45-6:00 PM	15	4	0	0	1	0	0	3

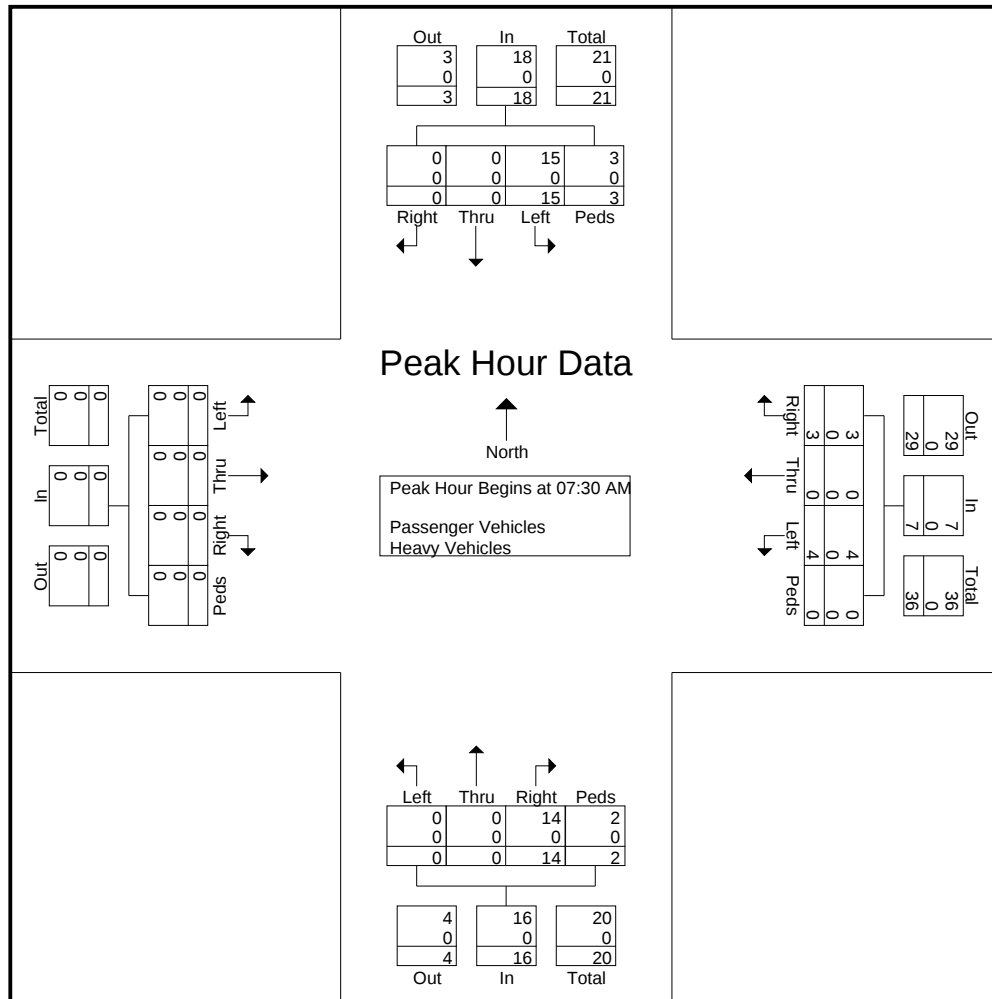
File Name : Prospect_Rd@Driveway_A
Site Code : 00000000
Start Date : 12/18/2018
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McMahon Associates, Inc.
2090 Palm Beach Lakes Blvd, Suite 400
West Palm Beach, FL 33409

Turning Movement Counts

File Name : Prospect_Rd@Driveway_A
Site Code : 00000000
Start Date : 12/18/2018
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	Southbound						Westbound					Northbound						Eastbound						
Start Time	Right	Thru	Left	U-Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total	
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																								
Peak Hour for Entire Intersection Begins at 07:30 AM																								
07:30 AM	0	0	2	0	0	2	1	0	1	0	2	6	0	0	0	0	6	0	0	0	0	0	10	
07:45 AM	0	0	4	0	0	4	0	0	0	0	0	5	0	0	0	0	5	0	0	0	0	0	9	
08:00 AM	0	0	4	0	0	4	0	0	2	0	2	2	0	0	0	0	2	0	0	0	0	0	8	
08:15 AM	0	0	5	3	0	8	2	0	1	0	3	1	0	0	2	0	3	0	0	0	0	0	14	
Total Volume	0	0	15	3	0	18	3	0	4	0	7	14	0	0	2	0	16	0	0	0	0	0	41	
% App. Total	0	0	83.3	16.7	0		42.9	0	57.1	0		87.5	0	0	12.5	0		0	0	0	0			
PHF	.000	.000	.750	.250	.000	.563	.375	.000	.500	.000	.583	.583	.000	.000	.250	.000	.667	.000	.000	.000	.000	.000	.732	
Passenger Vehicles	0	0	15	3	0	18	3	0	4	0	7	14	0	0	2	0	16	0	0	0	0	0	41	
% Passenger Vehicles	0	0	100	100	0	100	100	0	100	0	100	100	0	0	100	0	100	0	0	0	0	0	100	
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



Prospect Road At Driveway A (PM)

TIME	PROSPECT ROAD		DRIVEWAY	
	NORTHBOUND RIGHT TURN VOLUME	SOUTHBOUND LEFT TURN VOLUME	WESTBOUND LEFT TURN VOLUME	WESTBOUND RIGHT TURN VOLUME
4:00-4:15 PM	3	0	3	2
4:15-4:30 PM	0	1	1	1
4:30-4:45 PM	1	3	2	0
4:45-5:00 PM	0	3	2	2
5:00-5:15 PM	1	0	6	3
5:15-5:30 PM	0	0	4	1
5:30-5:45 PM	0	0	0	0
5:45-6:00 PM	0	0	0	0

McMahon Associates, Inc.
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West Palm Beach, FL 33409

Turning Movement Counts

File Name : Bridgewater@NW44th_St
Site Code : 00000000
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Groups Printed- Passenger Vehicles - Heavy Vehicles

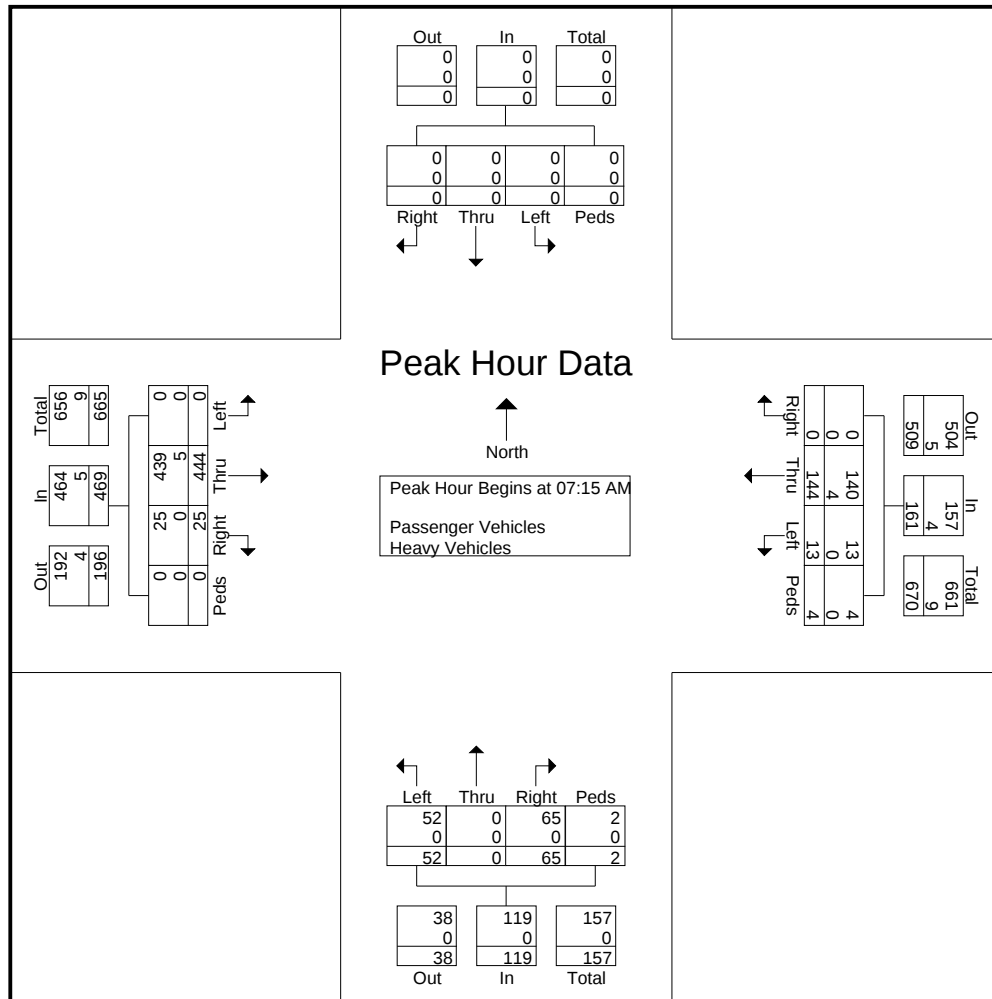
	Southbound					Westbound						Northbound						Eastbound						
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	26	3	0	0	29	15	0	24	0	0	39	2	49	0	0	0	51	119
07:15 AM	0	0	0	0	0	0	33	2	0	0	35	12	0	23	1	0	36	7	97	0	0	0	104	175
07:30 AM	0	0	0	0	0	0	30	7	0	0	37	20	0	10	0	0	30	2	120	0	0	0	122	189
07:45 AM	0	0	0	0	0	0	41	4	0	3	48	27	0	10	0	0	37	11	123	0	0	0	134	219
Total	0	0	0	0	0	0	130	16	0	3	149	74	0	67	1	0	142	22	389	0	0	0	411	702
08:00 AM	0	0	0	0	0	0	40	0	0	1	41	6	0	9	1	0	16	5	104	0	0	0	109	166
08:15 AM	0	0	0	0	0	0	43	7	0	0	50	6	0	12	0	0	18	8	97	0	0	0	105	173
08:30 AM	0	0	0	0	0	0	39	2	0	0	41	13	0	8	0	0	21	14	99	0	0	0	113	175
08:45 AM	0	0	0	0	0	0	29	2	0	1	32	5	0	7	0	0	12	8	65	0	0	0	73	117
Total	0	0	0	0	0	0	151	11	0	2	164	30	0	36	1	0	67	35	365	0	0	0	400	631
*** BREAK ***																								
04:00 PM	0	0	0	0	0	0	66	6	0	0	72	5	0	11	1	0	17	12	45	0	0	0	57	146
04:15 PM	0	0	0	0	0	0	76	6	0	1	83	10	0	9	0	0	19	17	40	0	0	0	57	159
04:30 PM	0	0	0	0	0	0	68	5	0	0	73	6	0	10	0	0	16	9	49	0	0	0	58	147
04:45 PM	0	0	0	0	0	0	103	7	1	0	111	6	0	6	0	0	12	6	37	0	0	0	43	166
Total	0	0	0	0	0	0	313	24	1	1	339	27	0	36	1	0	64	44	171	0	0	0	215	618
05:00 PM	0	0	0	0	0	0	121	6	0	0	127	7	0	9	0	0	16	8	43	0	0	0	51	194
05:15 PM	0	0	0	0	0	0	125	12	0	0	137	5	0	13	1	0	19	12	61	0	0	0	73	229
05:30 PM	0	0	0	0	0	0	110	17	0	3	130	6	0	10	0	0	16	20	56	0	0	0	76	222
05:45 PM	0	0	0	0	0	0	111	19	0	0	130	7	0	10	0	0	17	11	52	0	0	0	63	210
Total	0	0	0	0	0	0	467	54	0	3	524	25	0	42	1	0	68	51	212	0	0	0	263	855
Grand Total	0	0	0	0	0	0	1061	105	1	9	1176	156	0	181	4	0	341	152	1137	0	0	0	1289	2806
Apprch %	0	0	0	0		0	90.2	8.9	0.1	0.8		45.7	0	53.1	1.2	0		11.8	88.2	0	0	0		
Total %	0	0	0	0	0	0	37.8	3.7	0	0.3	41.9	5.6	0	6.5	0.1	0	12.2	5.4	40.5	0	0	0	45.9	
Passenger Vehicles	0	0	0	0	0	0	1045	104	1	9	1159	156	0	180	4	0	340	150	1116	0	0	0	1266	2765
% Passenger Vehicles	0	0	0	0	0	0	98.5	99	100	100	98.6	100	0	99.4	100	0	99.7	98.7	98.2	0	0	0	98.2	98.5
Heavy Vehicles	0	0	0	0	0	0	16	1	0	0	17	0	0	1	0	0	1	2	21	0	0	0	23	41
% Heavy Vehicles	0	0	0	0	0	0	1.5	1	0	0	1.4	0	0	0.6	0	0	0.3	1.3	1.8	0	0	0	1.8	1.5

McMahon Associates, Inc.
2090 Palm Beach Lakes Blvd, Suite 400
West Palm Beach, FL 33409

Turning Movement Counts

File Name : Bridgewater@NW44th_St
Site Code : 00000000
Start Date : 12/18/2018
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	Southbound					Westbound						Northbound						Eastbound						
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																								
Peak Hour for Entire Intersection Begins at 07:15 AM																								
07:15 AM	0	0	0	0	0	0	33	2	0	0	35	12	0	23	1	0	36	7	97	0	0	0	104	175
07:30 AM	0	0	0	0	0	0	30	7	0	0	37	20	0	10	0	0	30	2	120	0	0	0	122	189
07:45 AM	0	0	0	0	0	0	41	4	0	3	48	27	0	10	0	0	37	11	123	0	0	0	134	219
08:00 AM	0	0	0	0	0	0	40	0	0	1	41	6	0	9	1	0	16	5	104	0	0	0	109	166
Total Volume	0	0	0	0	0	0	144	13	0	4	161	65	0	52	2	0	119	25	444	0	0	0	469	749
% App. Total	0	0	0	0		0	89.4	8.1	0	2.5		54.6	0	43.7	1.7	0		5.3	94.7	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.878	.464	.000	.333	.839	.602	.000	.565	.500	.000	.804	.568	.902	.000	.000	.000	.875	.855
Passenger Vehicles	0	0	0	0	0	0	140	13	0	4	157	65	0	52	2	0	119	25	439	0	0	0	464	740
% Passenger Vehicles	0	0	0	0	0	0	97.2	100	0	100	97.5	100	0	100	100	0	100	100	98.9	0	0	0	98.9	98.8
Heavy Vehicles	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	9
% Heavy Vehicles	0	0	0	0	0	0	2.8	0	0	0	2.5	0	0	0	0	0	0	0	1.1	0	0	0	1.1	1.2

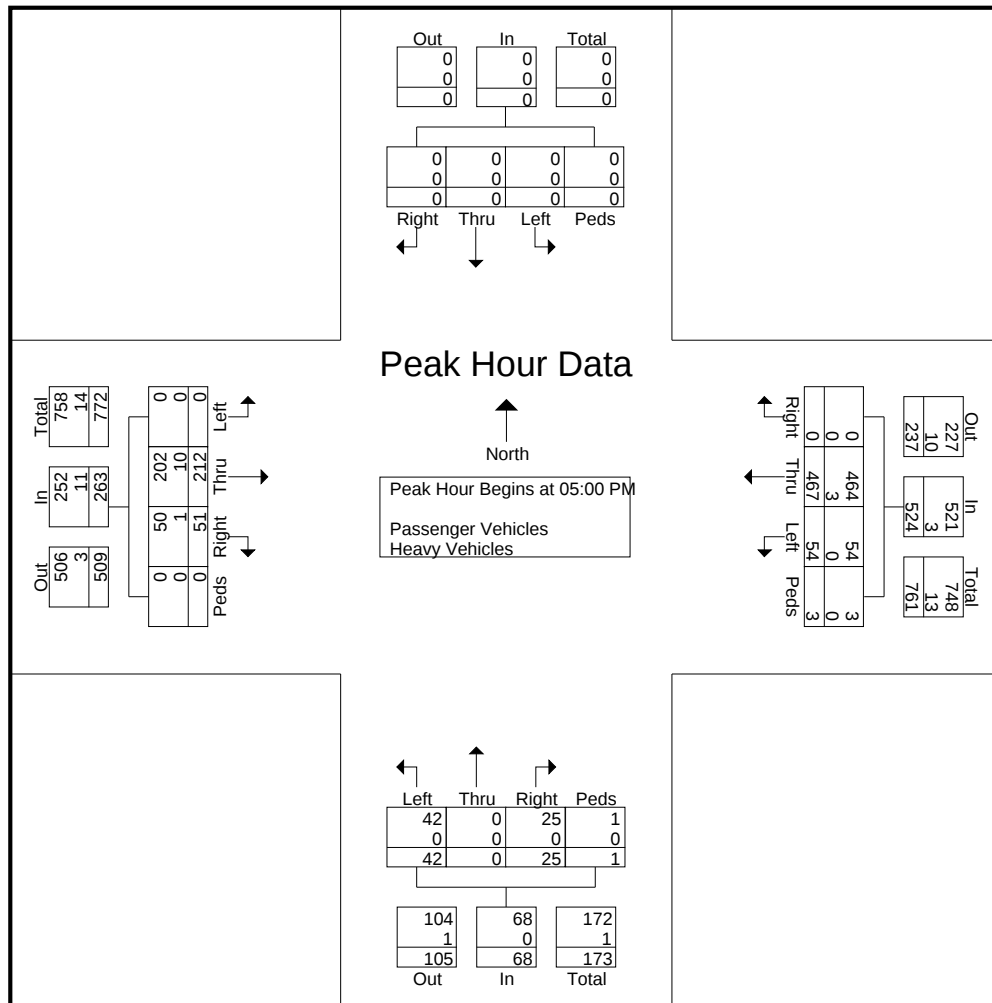


McMahon Associates, Inc.
2090 Palm Beach Lakes Blvd, Suite 400
West Palm Beach, FL 33409

Turning Movement Counts

File Name : Bridgewater@NW44th_St
Site Code : 00000000
Start Date : 12/18/2018
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	Southbound					Westbound						Northbound						Eastbound						
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																								
Peak Hour for Entire Intersection Begins at 05:00 PM																								
05:00 PM	0	0	0	0	0	0	121	6	0	0	127	7	0	9	0	0	16	8	43	0	0	0	51	194
05:15 PM	0	0	0	0	0	0	125	12	0	0	137	5	0	13	1	0	19	12	61	0	0	0	73	229
05:30 PM	0	0	0	0	0	0	110	17	0	3	130	6	0	10	0	0	16	20	56	0	0	0	76	222
05:45 PM	0	0	0	0	0	0	111	19	0	0	130	7	0	10	0	0	17	11	52	0	0	0	63	210
Total Volume	0	0	0	0	0	0	467	54	0	3	524	25	0	42	1	0	68	51	212	0	0	0	263	855
% App. Total	0	0	0	0		0	89.1	10.3	0	0.6		36.8	0	61.8	1.5	0		19.4	80.6	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.934	.711	.000	.250	.956	.893	.000	.808	.250	.000	.895	.638	.869	.000	.000	.000	.865	.933
Passenger Vehicles	0	0	0	0	0	0	464	54	0	3	521	25	0	42	1	0	68	50	202	0	0	0	252	841
% Passenger Vehicles	0	0	0	0	0	0	99.4	100	0	100	99.4	100	0	100	100	0	100	98.0	95.3	0	0	0	95.8	98.4
Heavy Vehicles	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	1	10	0	0	0	11	14
% Heavy Vehicles	0	0	0	0	0	0	0.6	0	0	0	0.6	0	0	0	0	0	0	2.0	4.7	0	0	0	4.2	1.6



TRAFFIC SURVEY SPECIALISTS, INC.

NW 44TH STREET & NW 31ST AVENUE
 FT LAUDERDALE, FLORIDA
 COUNTED BY: JOHN FLOOD
 SIGNALIZED

85 SE 4TH AVENUE, UNIT 109
 DELRAY BEACH, FLORIDA
 PHONE (561)272-3255

Site Code : 00180216
 Start Date: 12/18/18
 File I.D. : 44ST31AV
 Page : 1

ALL VEHICLES

NW 31ST AVENUE					NW 44TH STREET					NW 31ST AVENUE					NW 44TH STREET						
From North					From East					From South					From West						
UTurn	Left	Thru	Right		UTurn	Left	Thru	Right		UTurn	Left	Thru	Right		UTurn	Left	Thru	Right		Total	
Date 12/18/18																					
07:00	1	59	179	25		2	16	25	38		1	19	196	24		0	20	65	20		690
07:15	1	81	189	27		1	17	38	41		2	16	229	46		2	17	79	25		811
07:30	3	65	193	30		1	7	41	35		2	42	259	19		2	30	85	38		852
07:45	0	52	252	27		0	15	44	44		3	44	313	41		0	19	65	31		950
Hr Total	5	257	813	109		4	55	148	158		8	121	997	130		4	86	294	114		3303
08:00	0	44	232	30		0	10	30	27		0	31	227	29		1	17	52	44		774
08:15	0	32	252	28		0	12	26	35		3	18	264	35		0	19	54	24		802
08:30	2	30	260	23		0	13	23	21		2	21	304	34		0	14	45	20		812
08:45	1	30	250	20		0	18	11	25		1	15	297	22		0	20	34	17		761
Hr Total	3	136	994	101		0	53	90	108		6	85	1092	120		1	70	185	105		3149
* BREAK *																					
16:00	2	36	297	24		2	28	38	27		3	37	286	18		3	14	24	20		859
16:15	1	25	311	36		0	17	45	36		3	25	291	24		0	8	25	12		859
16:30	0	40	336	41		0	18	49	30		4	35	314	17		2	10	25	27		948
16:45	1	39	353	45		1	16	63	38		5	33	313	21		0	9	18	14		969
Hr Total	4	140	1297	146		3	79	195	131		15	130	1204	80		5	41	92	73		3635
17:00	0	41	363	72		5	26	70	30		4	44	341	19		0	10	32	24		1081
17:15	1	40	374	67		3	27	82	32		5	41	361	23		1	11	38	25		1131
17:30	0	41	376	68		5	33	64	25		5	37	321	44		0	14	32	18		1083
17:45	0	32	338	61		4	30	77	37		6	35	284	24		3	14	32	12		989
Hr Total	1	154	1451	268		17	116	293	124		20	157	1307	110		4	49	134	79		4284
TOTAL	13	687	4555	624		24	303	726	521		49	493	4600	440		14	246	705	371		14371

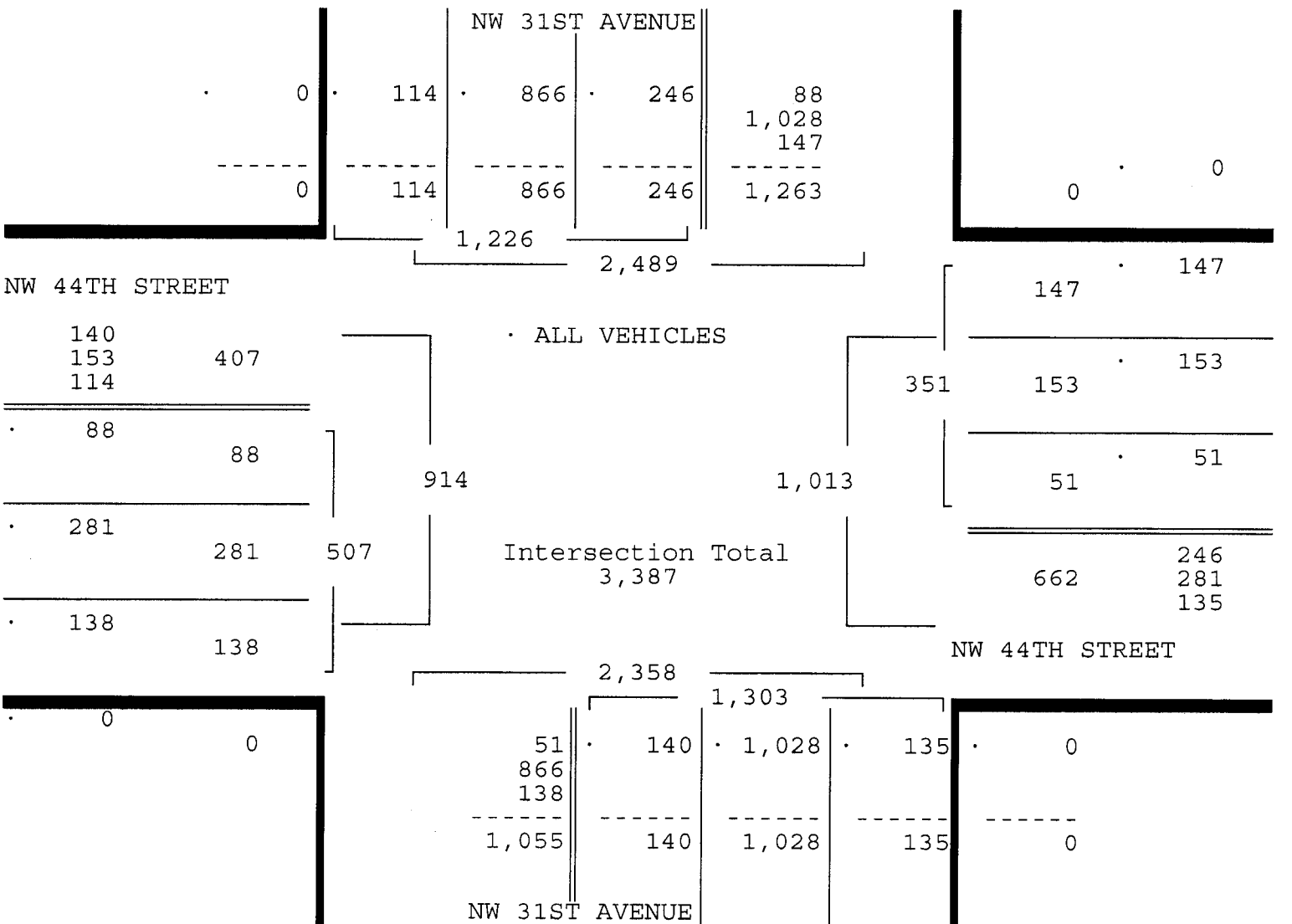
NW 44TH STREET & NW 31ST AVENUE
 FT LAUDERDALE, FLORIDA
 COUNTED BY: JOHN FLOOD
 SIGNALIZED

TRAFFIC SURVEY SPECIALISTS, INC.
 85 SE 4TH AVENUE, UNIT 109
 DELRAY BEACH, FLORIDA
 PHONE (561)272-3255

Site Code : 00180216
 Start Date: 12/18/18
 File I.D. : 44ST31AV
 Page : 2

ALL VEHICLES

NW 31ST AVENUE					NW 44TH STREET				NW 31ST AVENUE				NW 44TH STREET						
From North					From East				From South				From West						
UTurn	Left	Thru	Right		UTurn	Left	Thru	Right		UTurn	Left	Thru	Right		UTurn	Left	Thru	Right	Total
Date 12/18/18																			
Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 12/18/18																			
Peak start 07:15					07:15				07:15				07:15						
Volume	4	242	866	114	2	49	153	147	7	133	1028	135	5	83	281	138			
Percent	0%	20%	71%	9%	1%	14%	44%	42%	1%	10%	79%	10%	1%	16%	55%	27%			
Pk total	1226				351				1303				507						
Highest	07:45				07:45				07:45				07:30						
Volume	0	52	252	27	0	15	44	44	3	44	313	41	2	30	85	38			
Hi total	331				103				401				155						
PHF	.93				.85				.81				.82						



NW 44TH STREET & NW 31ST AVENUE
 FT LAUDERDALE, FLORIDA
 COUNTED BY: JOHN FLOOD
 SIGNALIZED

TRAFFIC SURVEY SPECIALISTS, INC.
 85 SE 4TH AVENUE, UNIT 109
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 Page : 3

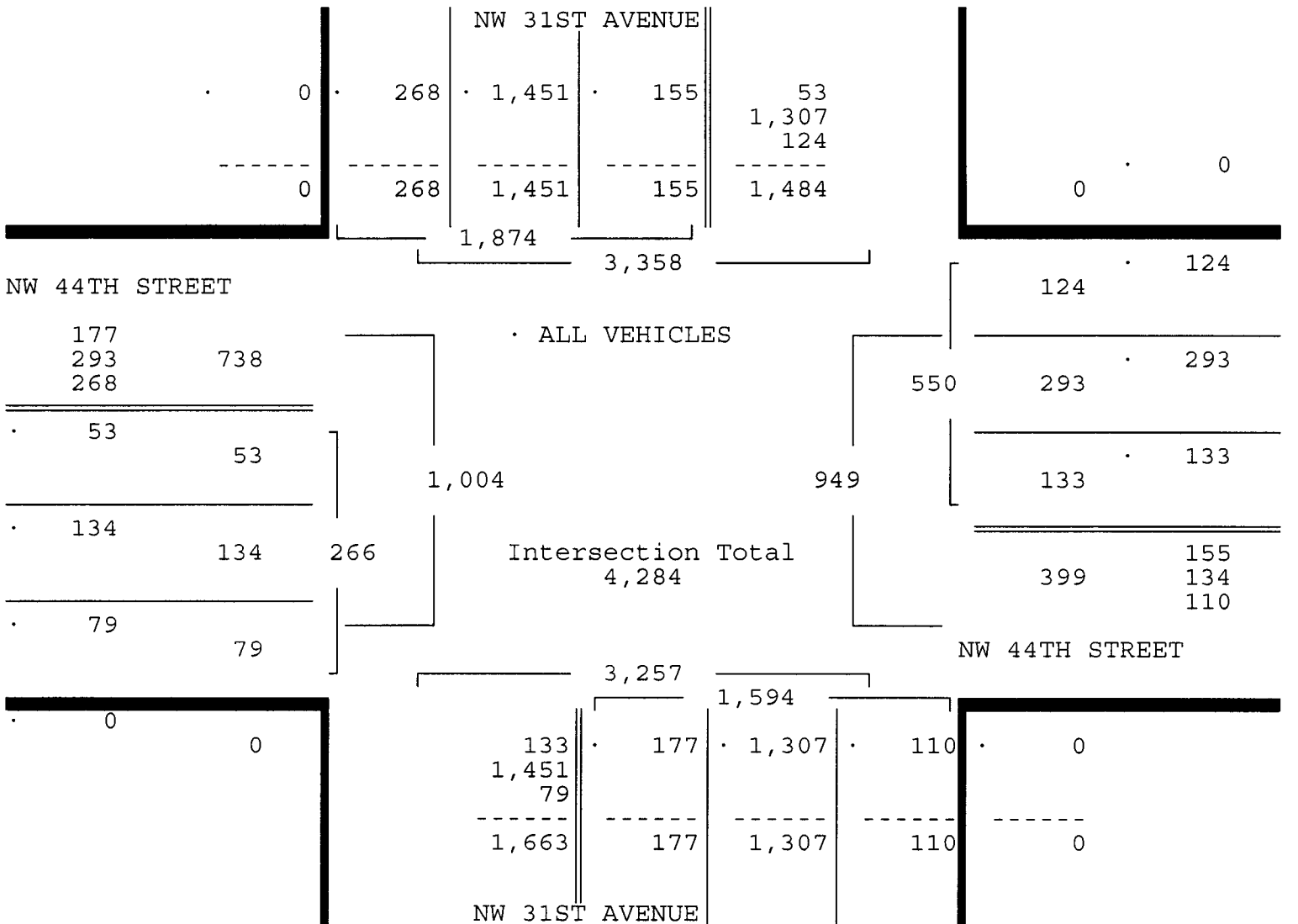
ALL VEHICLES

NW 31ST AVENUE From North				NW 44TH STREET From East				NW 31ST AVENUE From South				NW 44TH STREET From West				Total
UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	UTurn	Left	Thru	Right	

Date 12/18/18

Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 12/18/18

Peak start	17:00				17:00				17:00				17:00			
Volume	1	154	1451	268	17	116	293	124	20	157	1307	110	4	49	134	79
Percent	0%	8%	77%	14%	3%	21%	53%	23%	1%	10%	82%	7%	2%	18%	50%	30%
Pk total	1874				550				1594				266			
Highest	17:30				17:45				17:15				17:15			
Volume	0	41	376	68	4	30	77	37	5	41	361	23	1	11	38	25
Hi total	485				148				430				75			
PHF	.97				.93				.93				.89			



NW 21ST AVENUE AT PROSPECT ROAD
OAK TREE TRAFFIC ANALYSIS

QUEUE DATA - AM AND PM PEAK HOURS

SIGNAL CYCLES	NORTHBOUND LEFT TURN QUEUE AM PEAK HOUR (7:30 - 8:30 AM)	NORTHBOUND LEFT TURN QUEUE PM PEAK HOUR (5:00 - 6:00 PM)	NOTES
1	0	4	
2	3	1	
3	1	6	
4	4	6	
5	2	6	
6	5	7	
7	0	7	
8	6	5	
9	2	0	
10	0	3	
11	2	3	
12	1	2	
13	9	1	
14	3	1	
15	6	7	
16	3	10	
17	1	12	
18	3	7	
19	2	6	
20	3	8	
21	1	7	
22	5	8	
23	2	4	
24	7	7	
25	0	5	
26	2	7	
27	1	4	
28	2	4	
29	1	4	
30	2	3	
31	1	3	
32	3	2	
33	3	3	
34	0	2	
35	1	2	

95th Percentile Queue =

6

9

NW 21ST AVENUE AT NW 44TH STREET
OAK TREE TRAFFIC ANALYSIS

QUEUE DATA - AM PEAK HOUR (7:30 - 8:30 AM)

SIGNAL CYCLES	SOUTHBOUND RIGHT TURN QUEUE	EASTBOUND LEFT TURN QUEUE	EASTBOUND RIGHT TURN QUEUE	NORTHBOUND LEFT TURN QUEUE	NOTES
1	0	3	2	0	
2	2	1	1	0	
3	1	3	0	0	
4	0	2	0	1	
5	0	7	0	0	
6	0	2	0	0	
7	0	16	2	1	
8	0	3	1	0	
9	0	9	0	0	
10	0	9	0	0	
11	0	12	0	4	
12	0	12	0	2	
13	0	10	0	2	
14	2	9	2	1	
15	0	13	0	1	
16	0	14	3	1	
17	0	9	1	0	
18	1	10	1	0	
19	1	10	2	6	
20	0	7	0	0	
21	0	6	1	0	
22	0	4	0	3	
23	0	10	1	0	
24	0	9	0	0	
25	0	3	0	0	
26	0	12	1	0	
27	0	7	2	3	
28	0	8	0	0	
29	2	6	1	0	
30	0	10	0	3	
31	0	8	0	1	
32	0	8	3	4	
33	0	8	1	1	
34	0	6	0	0	
35	0	6	4	2	
36	0	5	0	1	
37	0	4	0	0	
38	3	4	1	0	
39	0	11	0	0	

95th Percentile Queue =

2

13

3

4

NW 21ST AVENUE AT NW 44TH STREET
OAK TREE TRAFFIC ANALYSIS

QUEUE DATA - PM PEAK HOUR (5:00 - 6:00 PM)

SIGNAL CYCLES	SOUTHBOUND RIGHT TURN QUEUE	EASTBOUND LEFT TURN QUEUE	EASTBOUND RIGHT TURN QUEUE	NORTHBOUND LEFT TURN QUEUE	NOTES
1	2	1	1	0	
2	0	3	3	3	
3	0	3	2	3	
4	1	5	2	3	
5	0	5	2	3	
6	0	1	1	6	
7	0	5	0	3	
8	0	6	5	4	
9	2	7	0	4	
10	0	3	0	5	
11	0	8	2	2	
12	0	2	0	5	
13	0	2	2	2	
14	2	3	2	0	
15	2	1	2	1	
16	0	3	2	1	
17	0	3	2	2	
18	0	5	3	2	
19	1	1	1	2	
20	0	4	0	2	
21	0	5	2	2	
22	5	2	2	0	
23	0	7	0	4	
24	1	2	0	0	
25	0	5	0	0	
26	0	0	2	0	
27	0	8	1	0	
28	0	1	0	2	
29	0	3	2	0	
30	2	6	0	3	
31	2	4	3	3	
32	2	6	3	5	
33	0	2	0	10	
34	2	4	2	8	
35	0	0	1	0	

95th Percentile Queue = 2 7 3 5

2017 PEAK SEASON FACTOR CATEGORY REPORT - REPORT TYPE: ALL
 CATEGORY: 8601 CEN.-W OF US1 TO SR7

WEEK	DATES	SF	MOCF: 0.97 PSCF
1	01/01/2017 - 01/07/2017	0.96	0.99
2	01/08/2017 - 01/14/2017	0.98	1.01
3	01/15/2017 - 01/21/2017	0.99	1.02
4	01/22/2017 - 01/28/2017	0.99	1.02
* 5	01/29/2017 - 02/04/2017	0.98	1.01
* 6	02/05/2017 - 02/11/2017	0.98	1.01
* 7	02/12/2017 - 02/18/2017	0.97	1.00
* 8	02/19/2017 - 02/25/2017	0.97	1.00
* 9	02/26/2017 - 03/04/2017	0.96	0.99
*10	03/05/2017 - 03/11/2017	0.96	0.99
*11	03/12/2017 - 03/18/2017	0.96	0.99
*12	03/19/2017 - 03/25/2017	0.96	0.99
*13	03/26/2017 - 04/01/2017	0.97	1.00
*14	04/02/2017 - 04/08/2017	0.97	1.00
*15	04/09/2017 - 04/15/2017	0.98	1.01
*16	04/16/2017 - 04/22/2017	0.98	1.01
*17	04/23/2017 - 04/29/2017	0.99	1.02
18	04/30/2017 - 05/06/2017	0.99	1.02
19	05/07/2017 - 05/13/2017	0.99	1.02
20	05/14/2017 - 05/20/2017	1.00	1.03
21	05/21/2017 - 05/27/2017	1.00	1.03
22	05/28/2017 - 06/03/2017	1.00	1.03
23	06/04/2017 - 06/10/2017	1.01	1.04
24	06/11/2017 - 06/17/2017	1.01	1.04
25	06/18/2017 - 06/24/2017	1.01	1.04
26	06/25/2017 - 07/01/2017	1.01	1.04
27	07/02/2017 - 07/08/2017	1.01	1.04
28	07/09/2017 - 07/15/2017	1.02	1.05
29	07/16/2017 - 07/22/2017	1.01	1.04
30	07/23/2017 - 07/29/2017	1.01	1.04
31	07/30/2017 - 08/05/2017	1.01	1.04
32	08/06/2017 - 08/12/2017	1.01	1.04
33	08/13/2017 - 08/19/2017	1.01	1.04
34	08/20/2017 - 08/26/2017	1.05	1.08
35	08/27/2017 - 09/02/2017	1.08	1.11
36	09/03/2017 - 09/09/2017	1.12	1.15
37	09/10/2017 - 09/16/2017	1.16	1.20
38	09/17/2017 - 09/23/2017	1.13	1.16
39	09/24/2017 - 09/30/2017	1.10	1.13
40	10/01/2017 - 10/07/2017	1.08	1.11
41	10/08/2017 - 10/14/2017	1.05	1.08
42	10/15/2017 - 10/21/2017	1.03	1.06
43	10/22/2017 - 10/28/2017	1.02	1.05
44	10/29/2017 - 11/04/2017	1.01	1.04
45	11/05/2017 - 11/11/2017	1.00	1.03
46	11/12/2017 - 11/18/2017	0.99	1.02
47	11/19/2017 - 11/25/2017	0.98	1.01
48	11/26/2017 - 12/02/2017	0.98	1.01
49	12/03/2017 - 12/09/2017	0.97	1.00
50	12/10/2017 - 12/16/2017	0.96	0.99
51	12/17/2017 - 12/23/2017	0.97	1.00
52	12/24/2017 - 12/30/2017	0.98	1.01
53	12/31/2017 - 12/31/2017	0.99	1.02

* PEAK SEASON

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FLORIDA DEPARTMENT OF TRANSPORTATION
2017 ANNUAL AVERAGE DAILY TRAFFIC REPORT - REPORT TYPE: ALL

COUNTY: 86 BROWARD

SITE =====	SITE TYPE =====	DESCRIPTION =====	DIRECTION 1 =====	DIRECTION 2 =====	AADT TWO-WAY =====	"K" FCTR =====	"D" FCTR =====	"T" FCTR =====
7092		BAILEY RD, W OF SR 7	E 10000E	W 8500E	18500 F	9.0	57.1F	6.3F
7094		SW 14 ST, W OF WESTON RD	E 12500E	W 12000E	24500 S	9.0	57.1F	6.3F
7099		COPANS RD, E OF DIXIE HWY	E 17500E	W 18000E	35500 S	9.0	51.9F	6.3F
7100		COPANS RD, W OF DIXIE HWY	E 21000E	W 17500E	38500 F	9.0	51.9F	6.3F
7101		COPANS RD, E OF POWERLINE RD	E 23000E	W 25000E	48000 F	9.0	51.9F	6.3F
7105		POWERLINE RD, N OF SAMPLE RD	N 20500	S 20500	41000 C	9.0	51.9F	10.2A
7107		COPANS RD, W OF POWERLINE RD	E 19000E	W 18500E	37500 S	9.0	51.9F	6.3F
7108		NW 38 ST, W OF US 1	E 4500E	W 3500E	8000 F	9.0	51.9F	6.3F
7109		NE 48 ST, E OF DIXIE HWY/POMPANO	E 8500E	W 8000E	16500 S	9.0	51.9F	6.3F
7110		NE 48 ST, W OF DIXIE HWY/POMPANO	E 9300E	W 9600E	18900 F	9.0	51.9F	4.9P
7115		HOLMBERG RD, W OF SR 7	E 7900E	W 8900E	16800 S	9.0	57.1F	6.3F
7116		WILES RD, W OF SR 7	E 19000E	W 15000E	34000 S	9.0	57.1F	4.3P
7119		HAMMONDVILLE RD, W OF POWERLINE RD	E 17000E	W 15000E	32000 S	9.0	51.9F	6.3F
7128		NW 31 AVE, N OF PROSPECT RD	N 19000E	S 17500E	36500 S	9.0	51.9F	6.3F
7129		UNIVERSITY DR, N OF BROWARD BLVD	N 24500	S 24500	49000 C	9.0	57.1F	2.7P
7132		ROCK ISLAND RD, N OF OAKLAND PARK BLVD	N 12500E	S 12500E	25000 F	9.0	57.1F	6.3F

SITE TYPE : BLANK= PORTABLE; T= TELEMETERED

"K" FACTOR : DEPARTMENT ADOPTED STANDARD K FACTOR BEGINING WITH COUNT YEAR 2011

AADT FLAGS : C= COMPUTED; E= MANUAL EST; F= FIRST YEAR EST; S= SECOND YEAR EST; T= THIRD YEAR EST; R= FOURTH YEAR EST;
V= FIFTH YEAR EST; 6= SIXTH YEAR EST; X= UNKNOWN

"D/T" FLAGS : A= ACTUAL; F= FACTOR CATG; D= DIST FUNCL; P= PRIOR YEAR; S= STATEWIDE DEFAULT; W= ONE-WAY ROAD; X= CROSS REF

13-MAR-2018 15:13:06

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SYNCHRO CALIBRATION NOTES
OAK TREE TRAFFIC ANALYSIS

Intersection (Movement)	Field Queue (ft)	Synchrho Queue Before Calibration (ft)	Calibrated Factor	Synchrho Queue After Calibration (ft)
<u>AM Peak</u>				
Prospect Rd @ NW 21st Ave (NBRT) ⁽¹⁾	150	284	Saturated Flow Rate (RTOR) 287 to 460	142
NW 44th St @ NW 21st Ave (EBLT)	260	432	Lost Time Adjust from 0 to -5	373
NW 44th St @ NW 21st Ave (NBLT)	80	33	Saturated Flow Rate (perm) 671 to 30	76
<u>PM Peak</u>				
NW 44th St @ NW 21st Ave (NBLT)	100	195	Ideal Satd. Flow from 1900 to 2200	141

(1) Field queue was based on field observations, not collected queue data

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2017 HISTORICAL AADT REPORT

COUNTY: 86 - BROWARD

SITE: 7784 - PROSPECT RD, S OF COMMERCIAL BLVD

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
* 2017	16500 F	N 8600	S 7900	9.00	51.90	6.20
2016	16500 C	N 8600	S 7900	9.00	54.10	2.90
2015	15000 V	0	0	9.00	54.00	3.40
2014	14500 R			9.00	54.20	7.40
2013	14500 T	0	0	9.00	53.60	7.60
2012	14500 S	0	0	9.00	52.20	5.90
2011	14500 F	0	0	9.00	52.50	6.30
2010	14500 C	N 7200	S 7300	8.35	52.69	9.30
2009	14900 F	N 8100	S 6800	8.53	53.89	5.30
2008	15300 C	N 8300	S 7000	8.81	54.16	6.50
* 2007	17300 C	N 8800	S 8500	8.63	55.75	4.80
2006	16300 C	N 8400	S 7900	8.40	55.34	2.90
2005	16800 C	N 8800	S 8000	8.20	51.70	0.00

10 years
 $2007: 17300 + 15500 + 7600 = 40400$
 $2017: 16500 + 17800 + 6400 = 40700$
 .07%.

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
 S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
 V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
 *K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2017 HISTORICAL AADT REPORT

COUNTY: 86 - BROWARD

SITE: 9407 - NW 21 AVENUE, N OF PROSPECT ROAD

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
----	-----	-----	-----	-----	-----	-----
* 2017	6400 S	N 3700	S 2700	9.00	51.90	6.20
2016	6400 F	N 3700	S 2700	9.00	54.10	2.90
2015	6400 C	N 3700	S 2700	9.00	54.00	3.40
2014	6000 X			9.00	54.20	7.40
2013	5900 X	0	0	9.00	53.60	7.60
2012	5900 T	0	0	9.00	52.20	5.90
2011	5900 S	0	0	9.00	52.50	6.30
2010	5900 F	N 3300	S 2600	8.35	52.69	9.30
2009	5900 C	N 3300	S 2600	8.53	53.89	5.30
2008	6800 C	N 3900	S 2900	8.81	54.16	6.50
* 2007	7600 C	N 4500	S 3100	8.63	55.75	4.80
2006	7800 C	N 4200	S 3600	8.40	55.34	2.90
2005	7500 C	N 4300	S 3200	8.20	51.70	0.00

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2017 HISTORICAL AADT REPORT

COUNTY: 86 - BROWARD

SITE: 7626 - NW 21 AVE, S OF PROSPECT RD

YEAR	AADT		DIRECTION 1		DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
----	-----		-----		-----	-----	-----	-----
*2017	17800 F	N	9100	S	8700	9.00	51.90	6.20
2016	17800 C	N	9100	S	8700	9.00	54.10	2.90
2015	14500 V		0		0	9.00	54.00	3.40
2014	14000 R					9.00	54.20	7.40
2013	14000 T		0		0	9.00	53.60	7.60
2012	14000 S		0		0	9.00	52.20	5.90
2011	14000 F		0		0	9.00	52.50	6.30
2010	14000 C	N	0	S	0	8.35	52.69	9.30
2009	14500 F		0		0	8.53	53.89	5.30
2008	15000 C	N	0	S	0	8.81	54.16	6.50
*2007	15500 C	N	0	S	0	8.63	55.75	4.80
2006	16000 C	N	0	S	0	8.40	55.34	2.90
2005	17000 C	N		S		8.20	51.70	0.00

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE

S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE

V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN

*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

Zaman, Nishat

From: Benjamin Restrepo <BRestrepo@fortlauderdale.gov>
Sent: Monday, December 10, 2018 2:57 PM
To: Lercari, Natalia
Cc: Christine Fanchi
Subject: RE: Committed Development projects

Hi Natalia, at the moment we do not have committed developments that would generate higher traffic volumes than the typical minimum 0.5% annual growth rate that would affect the intersections you listed below. Let me know if you need anything else.

Thank you.

Benjamin Restrepo, PE | Mobility Engineer
City of Fort Lauderdale | Transportation & Mobility
290 NE 3rd Ave, Fort Lauderdale, FL 33301
PH: 954-828-5216 | Fax: 954-828-3734

From: Christine Fanchi
Sent: Monday, December 10, 2018 12:46 PM
To: Benjamin Restrepo
Cc: Lercari, Natalia
Subject: FW: Committed Development projects

Benjamin-
Can you assist on the below request? Thanks so much!

Christine W. Fanchi, PE, PTP
Transportation Engineering Design Manager
City of Fort Lauderdale | Transportation & Mobility Department
290 N.E. 3rd Avenue | Fort Lauderdale, FL 33301
P 954-828-5226 | cfanchi@fortlauderdale.gov



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From: Lercari, Natalia [<mailto:nlercari@mcmahonassociates.com>]
Sent: Monday, December 10, 2018 12:35 PM
To: Christine Fanchi; Debora Griner (DGriner@fortlauderdale.gov)
Subject: Committed Development projects

Hi Christine,

Hope you had a Happy Thanksgiving!

Not sure if you are the correct person to ask. But, I am working on a project in the City of Oakland Park. I will be analyzing the following intersections as part of a traffic study:

- Prospect Road at NW 21st Avenue (signalized)
- NW 44th Street at NW 21st Avenue (signalized)
- NW 44th Street at NW 31st Avenue (signalized)

The City has asked me to reach out to the City of Fort Lauderdale to see if you have any projects that have been approved but not yet built that would put any trips at these intersections. If so, would you mind emailing me the PDF of the traffic studies?

Thanks,

Natalia Lercari, P.E., LEED Green Associate | Senior Project Manager
O: 561.840.8650 x 4105

2090 Palm Beach Lakes Blvd., Suite 400
West Palm Beach, FL 33409
nlercari@mcmahonassociates.com
www.mcmahonassociates.com

Traffic Impact Study

Residence Inn

Powerline Road @ NW 38th Street
Oakland Park, Florida



July 16, 2014
Revised September 4, 2014



Tinter Traffic, LLC
2857 N.E. 25 Street
Ft. Lauderdale, FL 33305-1722

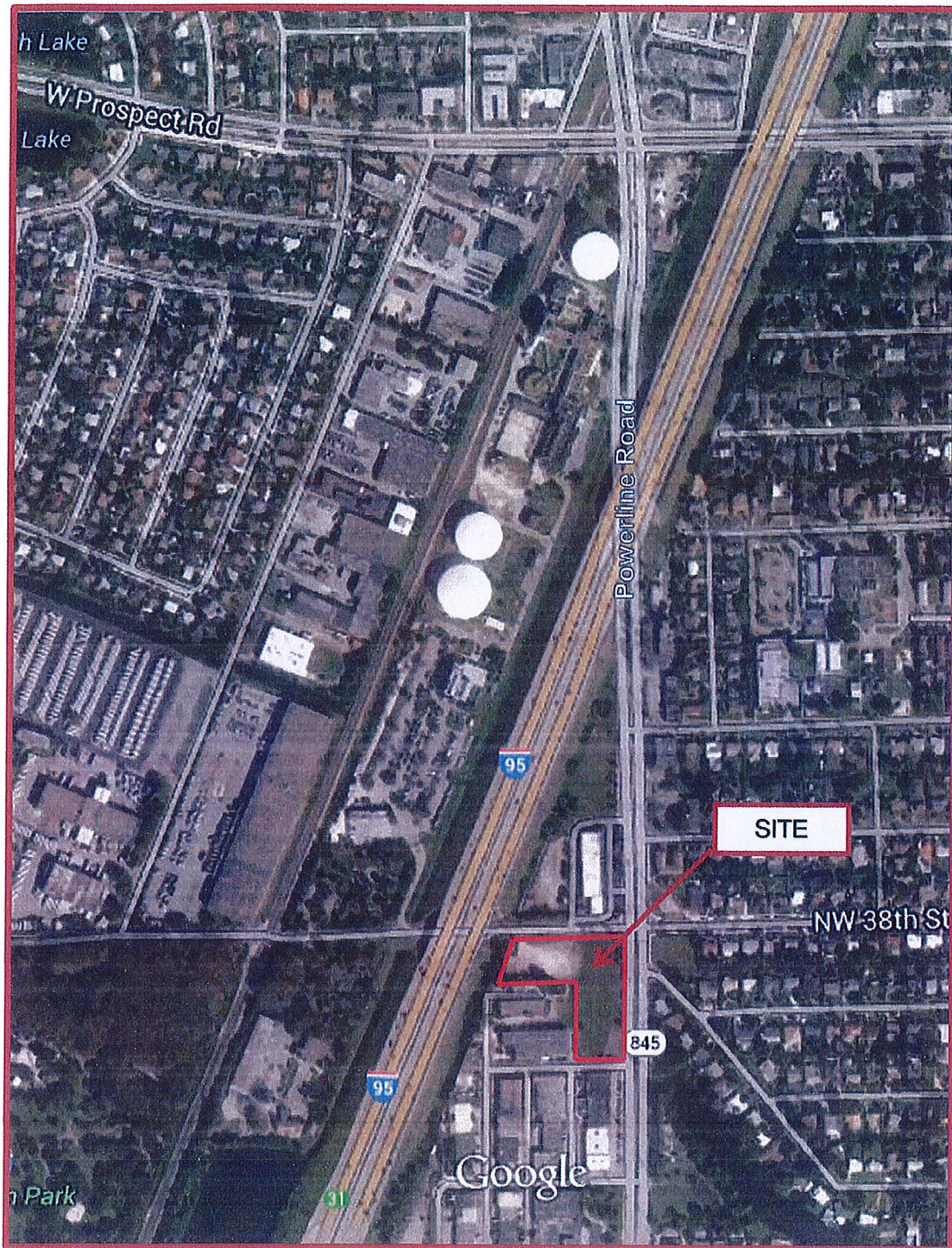


Figure 1
Residence Inn – Oakland Park

Site Location

Tinter Traffic, LLC



Figure 4
Residence Inn – Oakland Park
Site Traffic Distribution

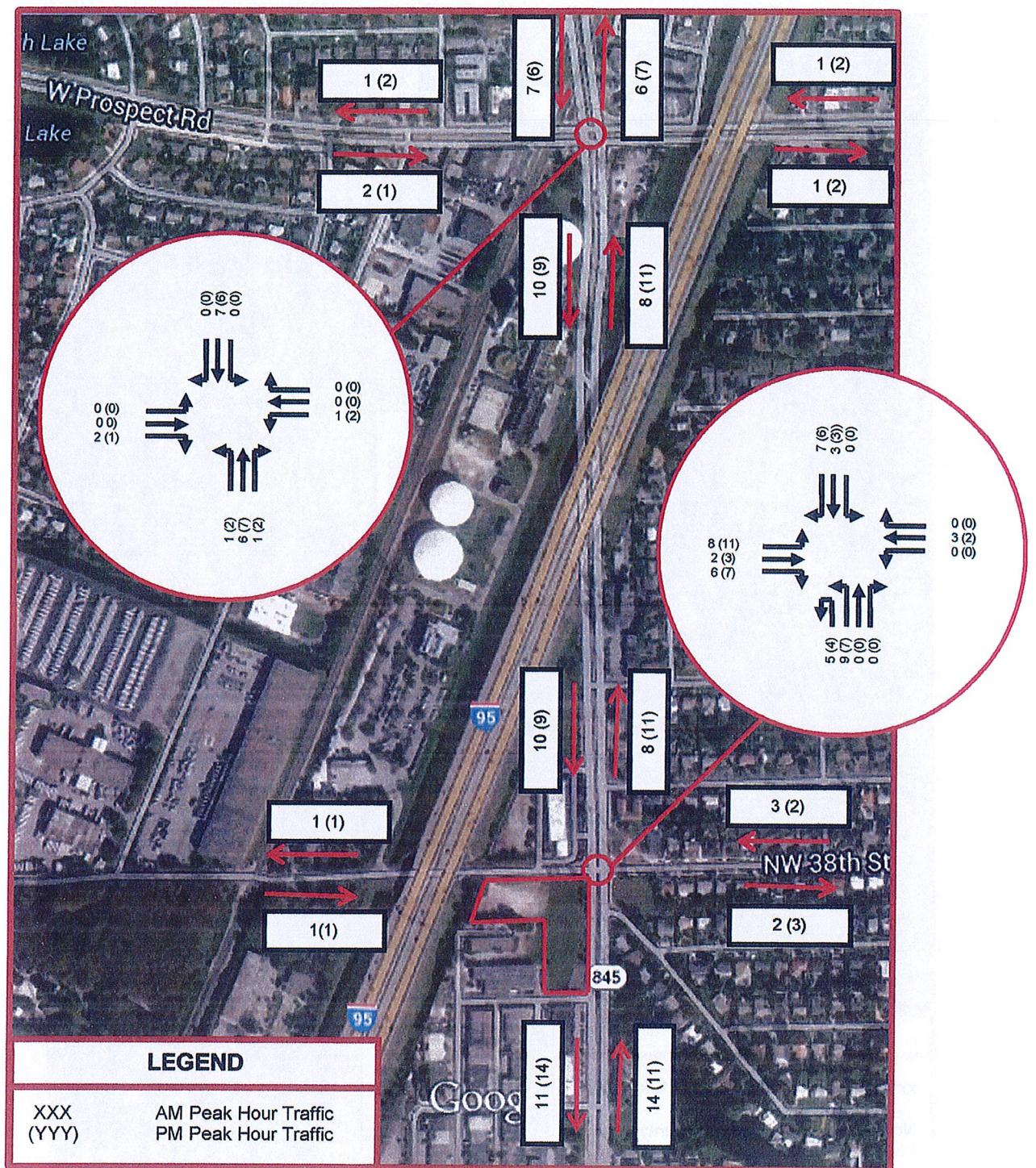
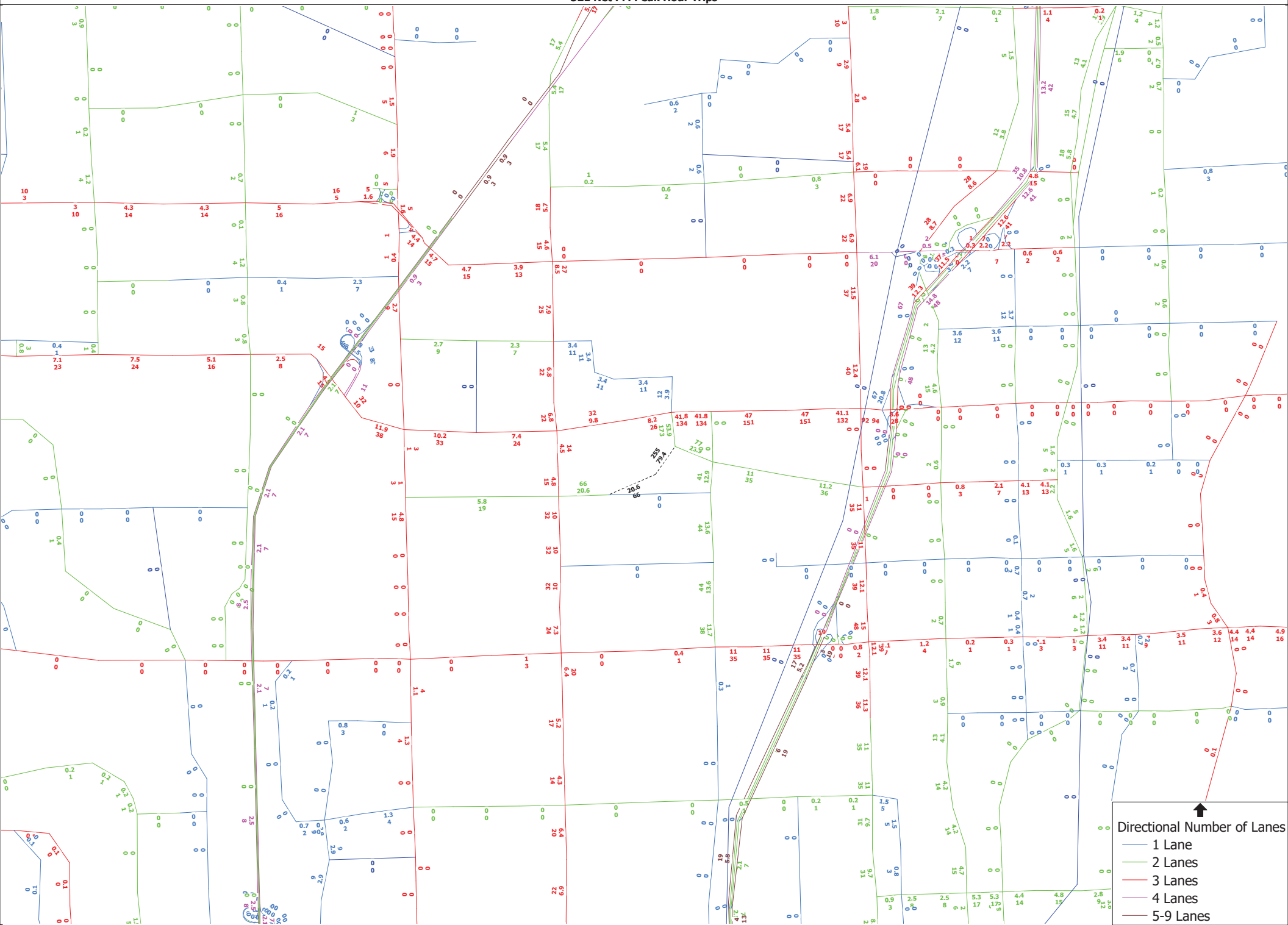


Figure 5
Residence Inn – Oakland Park

Peak Hour Site Traffic

PC 19-2 Oakland Park
321 Net PM Peak Hour Trips



Directional Number of Lanes

- 1 Lane
- 2 Lanes
- 3 Lanes
- 4 Lanes
- 5-9 Lanes

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 159

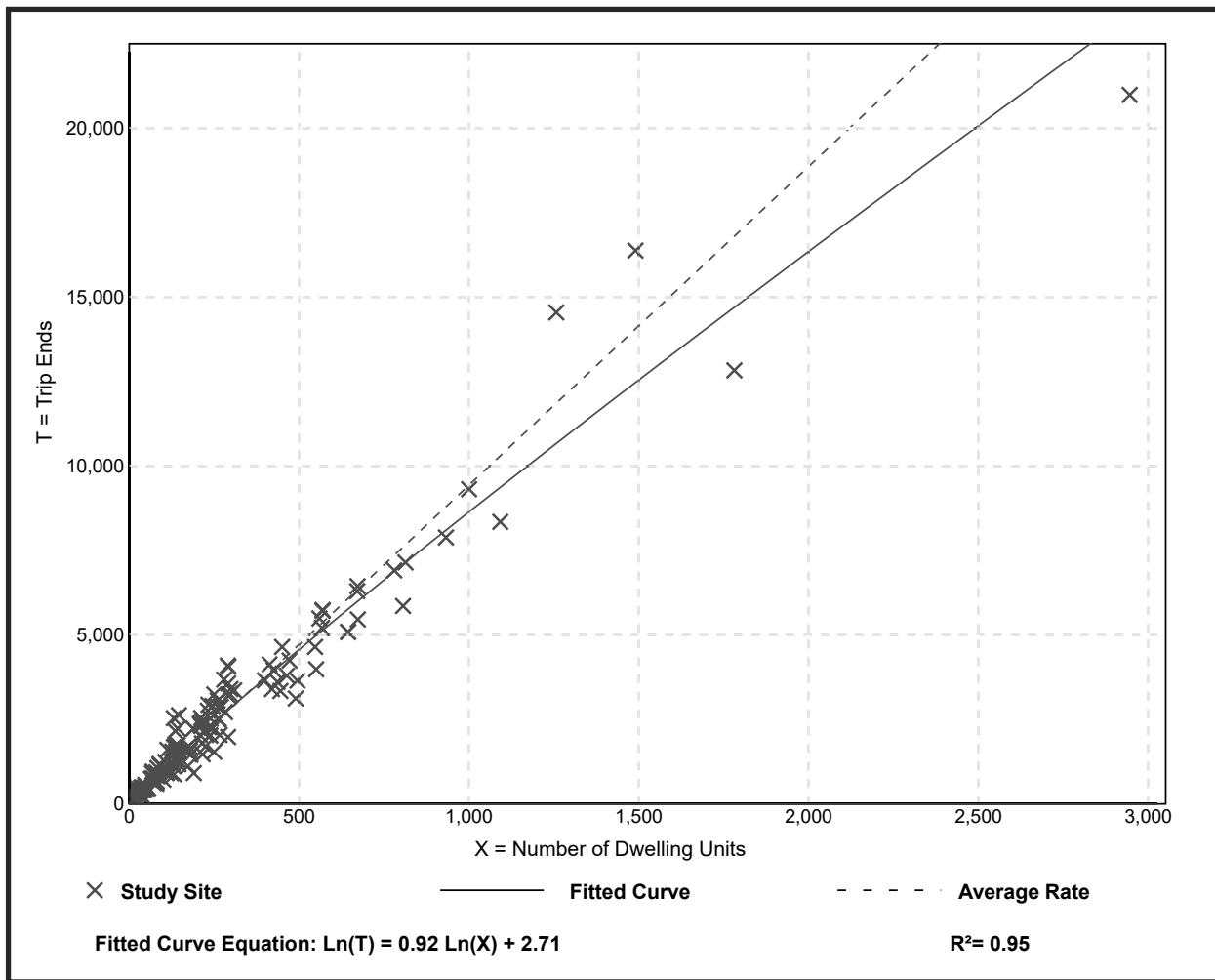
Avg. Num. of Dwelling Units: 264

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Single-Family Detached Housing

(210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 173

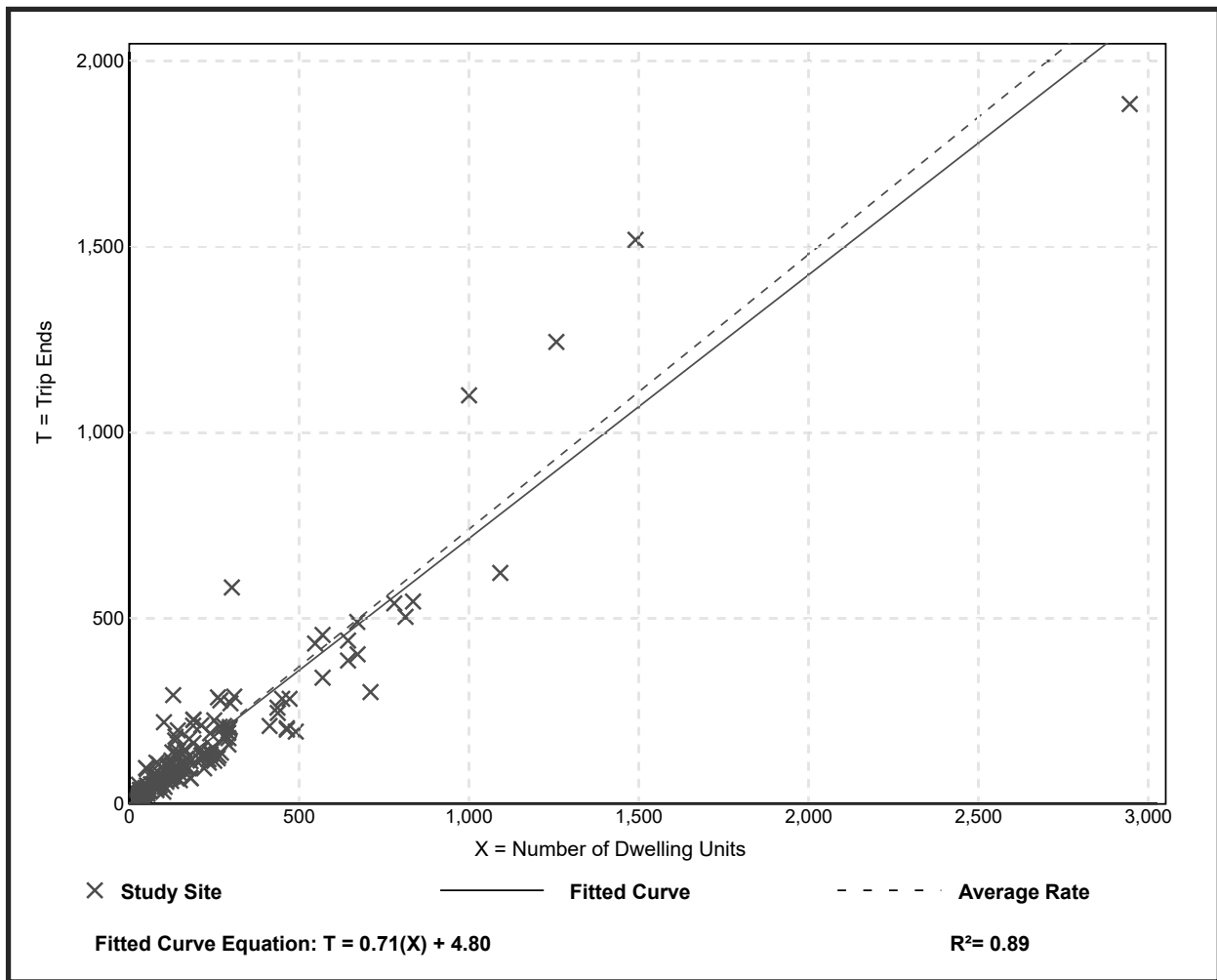
Avg. Num. of Dwelling Units: 219

Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 190

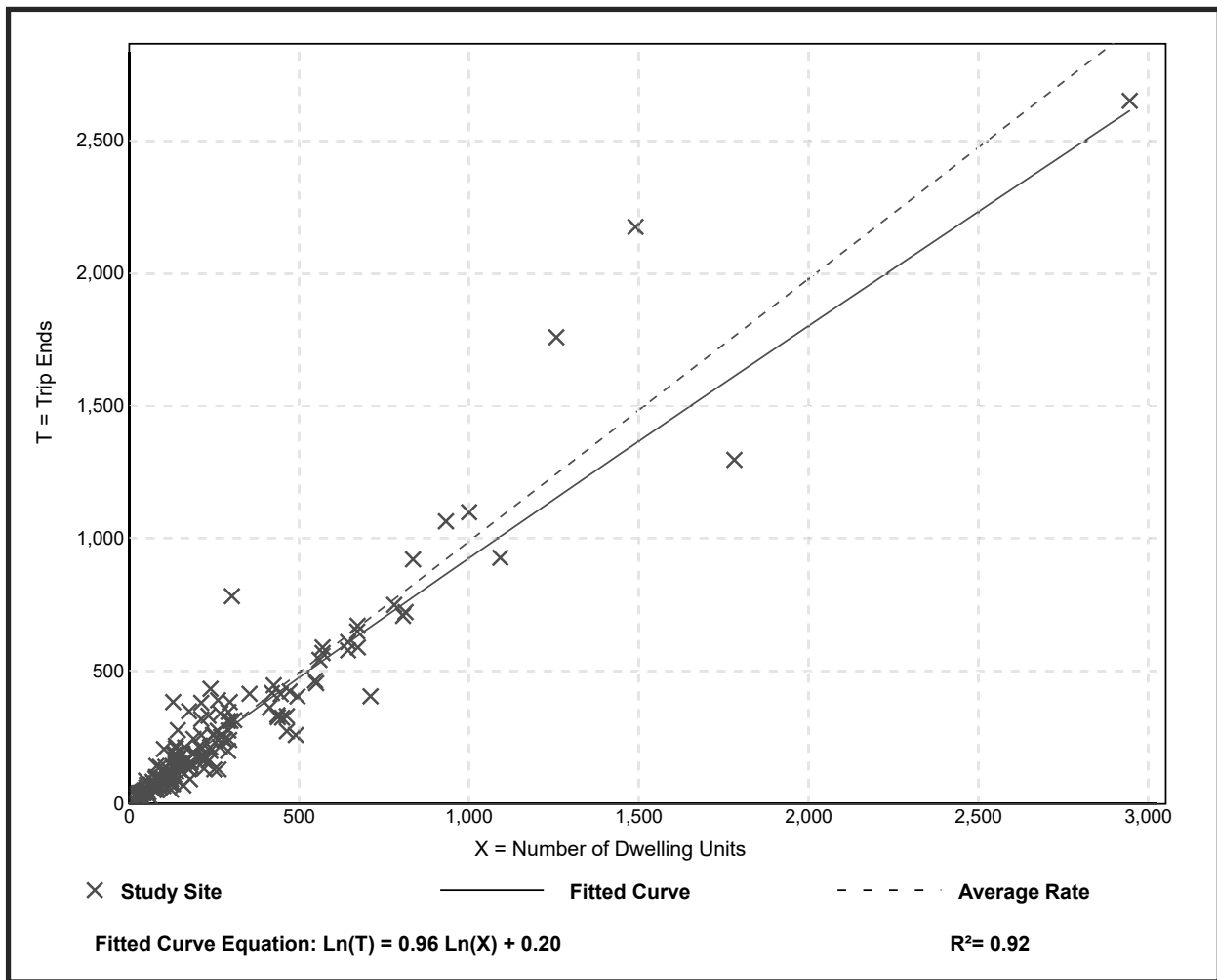
Avg. Num. of Dwelling Units: 242

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 29

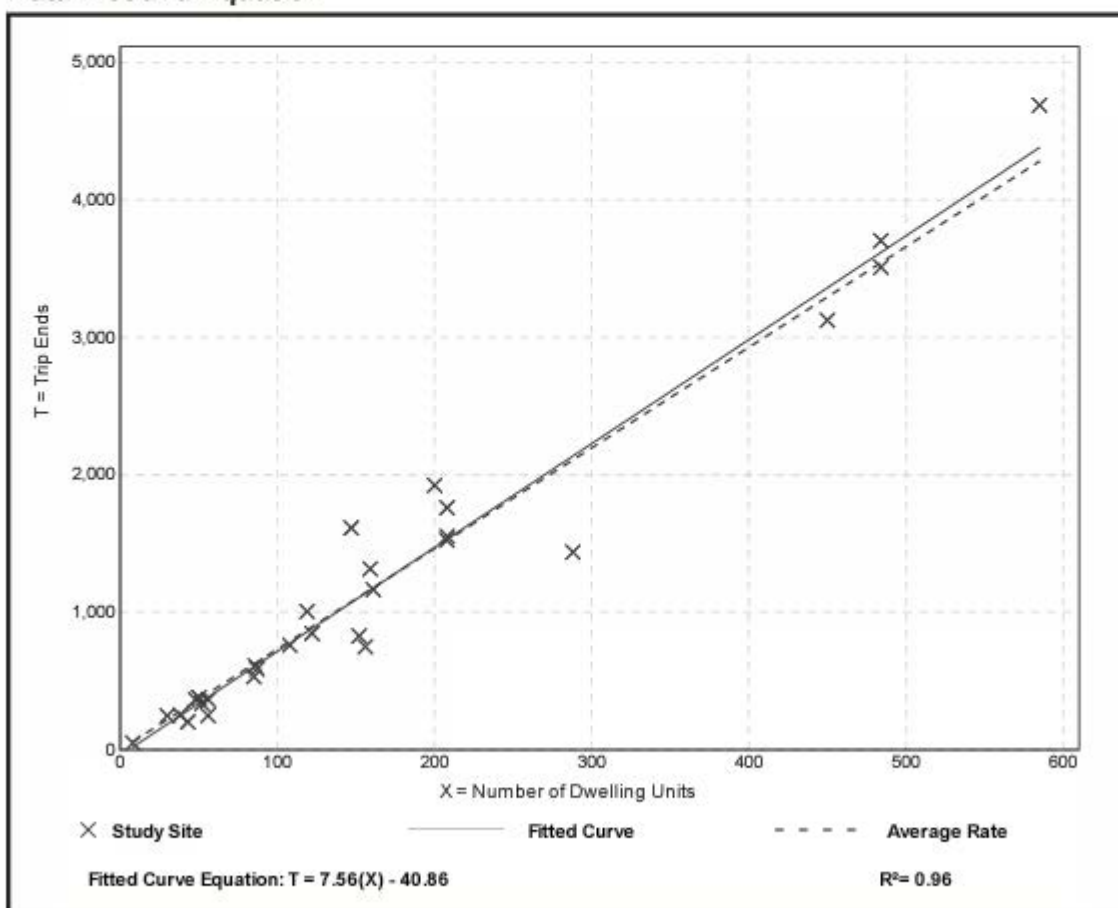
Avg. Num. of Dwelling Units: 168

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.32	4.45 - 10.97	1.31

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 42

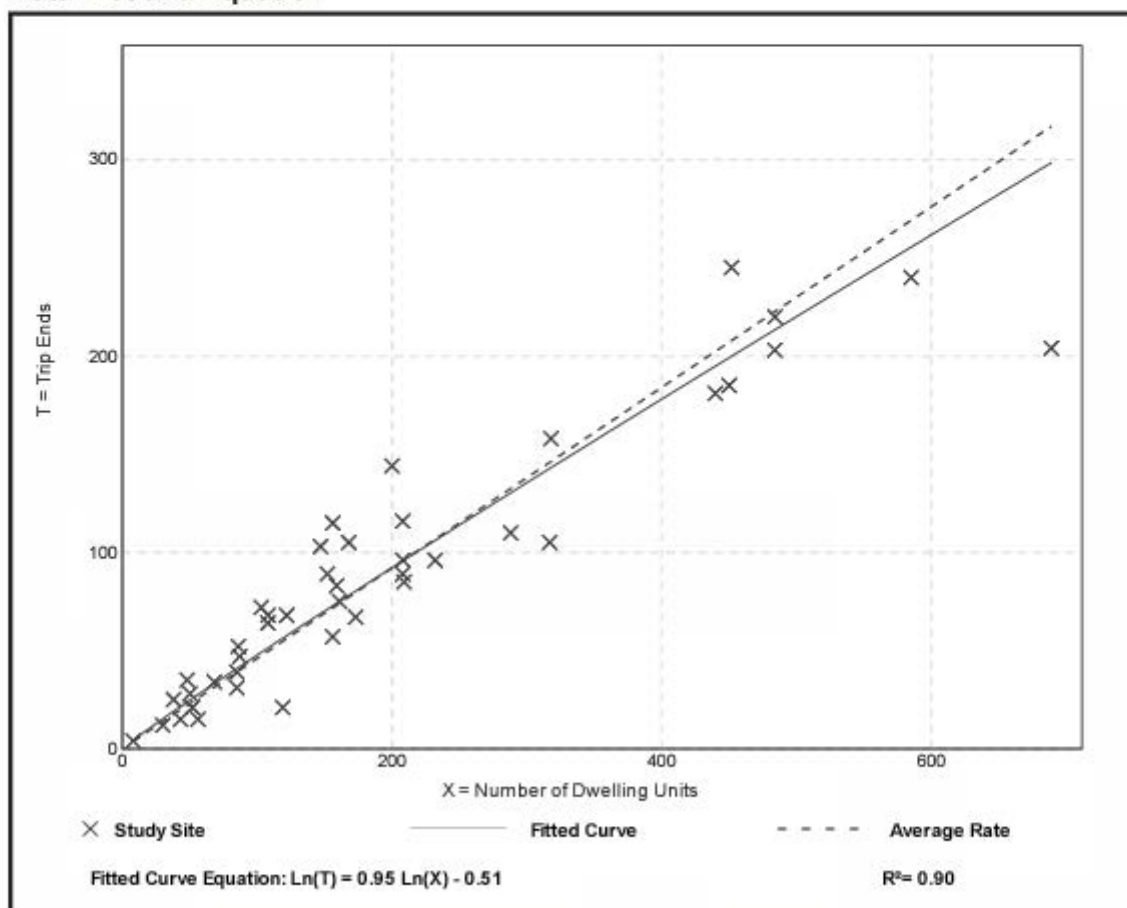
Avg. Num. of Dwelling Units: 199

Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 50

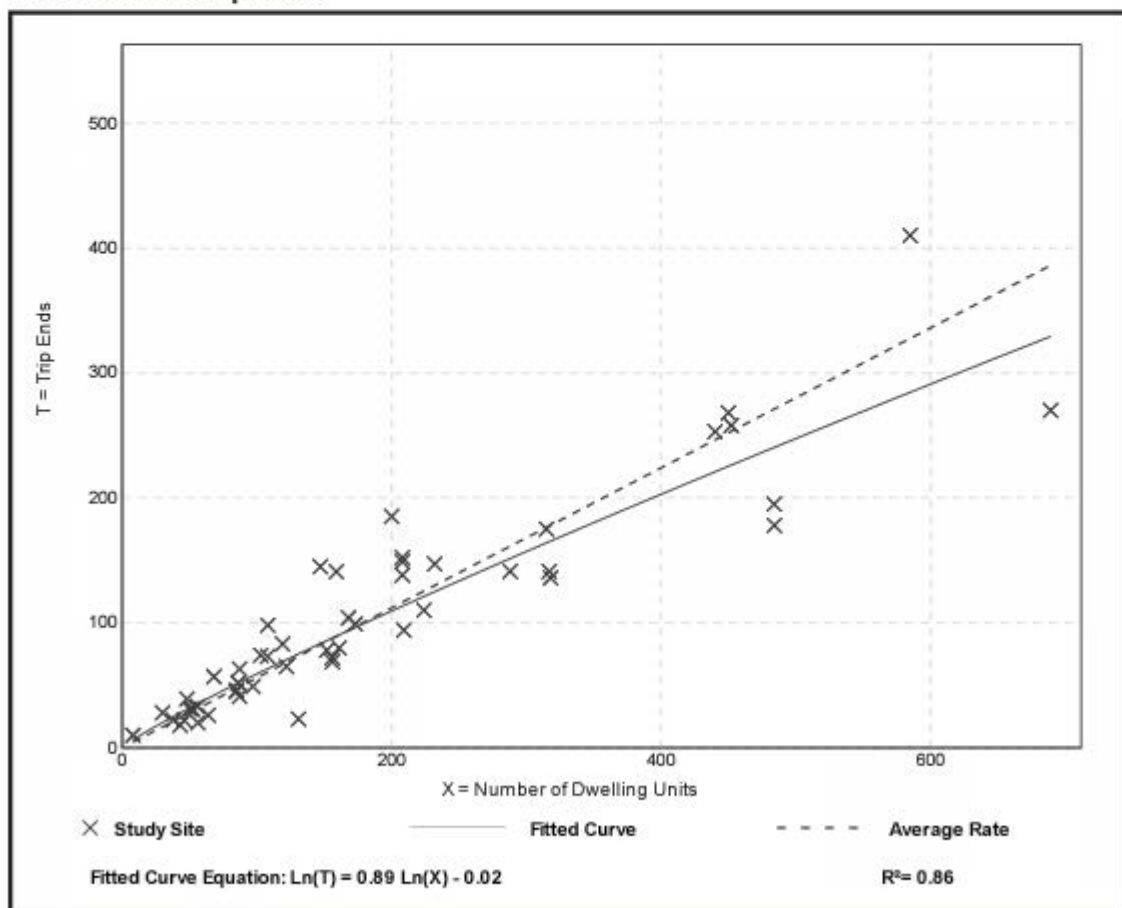
Avg. Num. of Dwelling Units: 187

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

Data Plot and Equation



APPENDIX C

EXISTING INTERSECTION CAPACITY ANALYSIS WORKSHEETS AND SIGNAL TIMINGS



BROWARD COUNTY TRAFFIC ENGINEERING
ACTUATED TRAFFIC SIGNAL TIMING SHEET

Intersection Number	1142	Initial Operation Date	6/15/70
Controller Type	2070 LN	System Number	1142
Modification Number	14	Modification Date	03/14/2018
Drawing/Project No	5384	FPL Grid Number	87484466108
Intersection	PROSPECT ROAD and NW 21 AVENUE		
Municipality	OAKLAND PARK		

Controller Phase	1	2	3	4	5	6	7	8
Face Number		2		4	5	6		8
Direction		WB		NB	WBL	EB		SB
Initial Green(MIN)		10		6	4	10		6
Vehicle Ext.(GAP)		3.0		2.0	1.5	3.0		2.0
Maximum Green I		40		40	20	40		40
Maximum Green II								
Yellow Clearance		5.0		4.0	5.0	5.0		4.0
All Red Clearance		2.0		2.0	2.0	2.0		2.0
Phase Recall		MIN		OFF	OFF	MIN		OFF
Detector Delay				20-RT				
Walk		7		7		7		7
Pedestrian Clearance		24		23		24		20
Permissive					5 SECT			
Flash Operation		YELLOW		RED		YELLOW		RED

Attachment

NOTES:

1. ANTI-BACKDOWN EAST/WEST: PHASES 2 + 6 ON ---> OMIT PHASE 5.
2. DUAL ENTRY HARDWIRED NORTH/SOUTH.
2. MOD. 14 UPDATES YELLOW AND ALL RED CLEARANCES.

Submitted By _____ Approved By _____

Station : 1142 - Prospect Rd & NW 21 Ave (Standard File)

Phase	1	2 (WT)	3	4 (NT)	5 (WL)	6 (ET)	7	8 (ST)	9	10	11	12	13	14	15	16
Walk		7		7		7		7								
Ped Clearance		24		23		24		20								
Min Green		10		6	4	10		6								
Gap Ext		3		2	1.5	3		2								
Max1		40		40	20	40		40								
Max2																
Yellow Clr	3.5	5	3.5	4	5	5	3.5	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clr		2		2	2	2	1.5	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Red Revert																
Added Initial																
Max Initial																
Time Before Reduce																
Cars Before Reduce																
Time To Reduce																
Reduce By																
Min Gap																
Dynamic Max Limit																
Dynamic Max Step																
Enable		ON		ON	ON	ON		ON								
Auto Flash Entry				ON				ON								
Auto Flash Exit		ON				ON										
Non-Actuated 1																
Non-Actuated 2																
Lock Call									ON	ON	ON	ON	ON	ON	ON	ON
Min Recall		ON				ON										
Max Recall																
Ped Recall																
Soft Recall																
Dual Entry				ON				ON								
Sim Gap Enable									ON	ON	ON	ON	ON	ON	ON	ON
Guar Passage																
Rest In Walk		ON				ON										
Cond Service																
Add Init Calc																
Concurrent Ps	1	1	1	1	2	2	2	2								

Preemption

Channel	1	2	3	4	5	6
Lock Input	ON	ON	ON	ON	ON	ON
Override Auto Flash			ON		ON	ON
Override Higher Preempt					ON	ON
Flash in Dwell						
Link to Preempt						
Delay						
Min Duration	20	15	15			
Min Green	6	6	4	6		
Min Walk	3	3	3	4		
Ped Clear	6	6	6	3		
Track Green				1		
Min Dwell	8	8		8		
Max Presence	60	50	50	40		
Track Veh 1						
Track Veh 2						
Track Veh 3						
Track Veh 4						
Dwell Cyc Veh 1	4	2	2	2		
Dwell Cyc Veh 2	8	6	5	5		
Dwell Cyc Veh 3						
Dwell Cyc Veh 4						
Dwell Cyc Veh 5						
Dwell Cyc Veh 6						
Dwell Cyc Veh 7						
Dwell Cyc Veh 8						
Dwell Cyc Veh 9						
Dwell Cyc Veh 10						
Dwell Cyc Veh 11						
Dwell Cyc Veh 12						
Dwell Cyc Ped1						
Dwell Cyc Ped2						
Dwell Cyc Ped3						
Dwell Cyc Ped4						
Dwell Cyc Ped5						
Dwell Cyc Ped6						
Dwell vPed7						
Dwell Cyc Ped8						
Exit 1	2	4	2	2		
Exit 2	5	8	6	6		
Exit 3						
Exit 4						

Preempt LP

Channel	1	2	3	4
Min				
Max				
Enable				
Lock Mode	MAX	MAX	MAX	MAX
Coord in Preempt				
No Skip				
Priority P1				
Priority P2				
Priority P3				
Priority P4				
Lock				
Headway				
Group Lock				
Queue Jump				
Free Mode				
Alt Table				

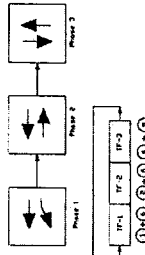
Coordination

[illegible]

[illegible][illegible]

User Comments:

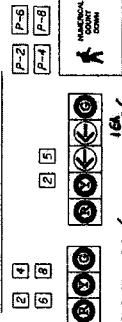
SIGNAL OPERATING PLAN NO. 11



AS-BUILT

HORSEPOWER ELECTRIC, INC.
8105 WEST 20TH AVENUE
HIALEAH, FLORIDA 33014

SIGNAL HEAD DETAILS



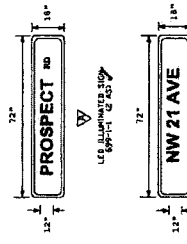
VIDEO DETECTOR ASSIGNMENTS

VIDEO DETECTOR	ASSIGNMENT
1	1
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3	3
4	4
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6	6
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10	10
11	11
12	12
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96	96
97	97
98	98
99	99
100	100

SIGNAL TIMING

CONTROLLER	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
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SIGN DETAILS



REVISIONS

NO.	DATE	DESCRIPTION
1	10/1/11	ISSUED FOR CONSTRUCTION
2	10/1/11	ISSUED FOR CONSTRUCTION
3	10/1/11	ISSUED FOR CONSTRUCTION
4	10/1/11	ISSUED FOR CONSTRUCTION
5	10/1/11	ISSUED FOR CONSTRUCTION
6	10/1/11	ISSUED FOR CONSTRUCTION
7	10/1/11	ISSUED FOR CONSTRUCTION
8	10/1/11	ISSUED FOR CONSTRUCTION
9	10/1/11	ISSUED FOR CONSTRUCTION
10	10/1/11	ISSUED FOR CONSTRUCTION
11	10/1/11	ISSUED FOR CONSTRUCTION
12	10/1/11	ISSUED FOR CONSTRUCTION
13	10/1/11	ISSUED FOR CONSTRUCTION
14	10/1/11	ISSUED FOR CONSTRUCTION
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17	10/1/11	ISSUED FOR CONSTRUCTION
18	10/1/11	ISSUED FOR CONSTRUCTION
19	10/1/11	ISSUED FOR CONSTRUCTION
20	10/1/11	ISSUED FOR CONSTRUCTION
21	10/1/11	ISSUED FOR CONSTRUCTION
22	10/1/11	ISSUED FOR CONSTRUCTION
23	10/1/11	ISSUED FOR CONSTRUCTION
24	10/1/11	ISSUED FOR CONSTRUCTION
25	10/1/11	ISSUED FOR CONSTRUCTION

BROWARD COUNTY TRAFFIC ENGINEERING DIVISION

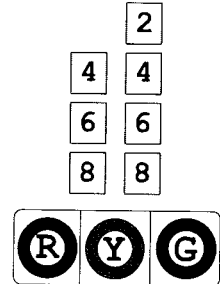
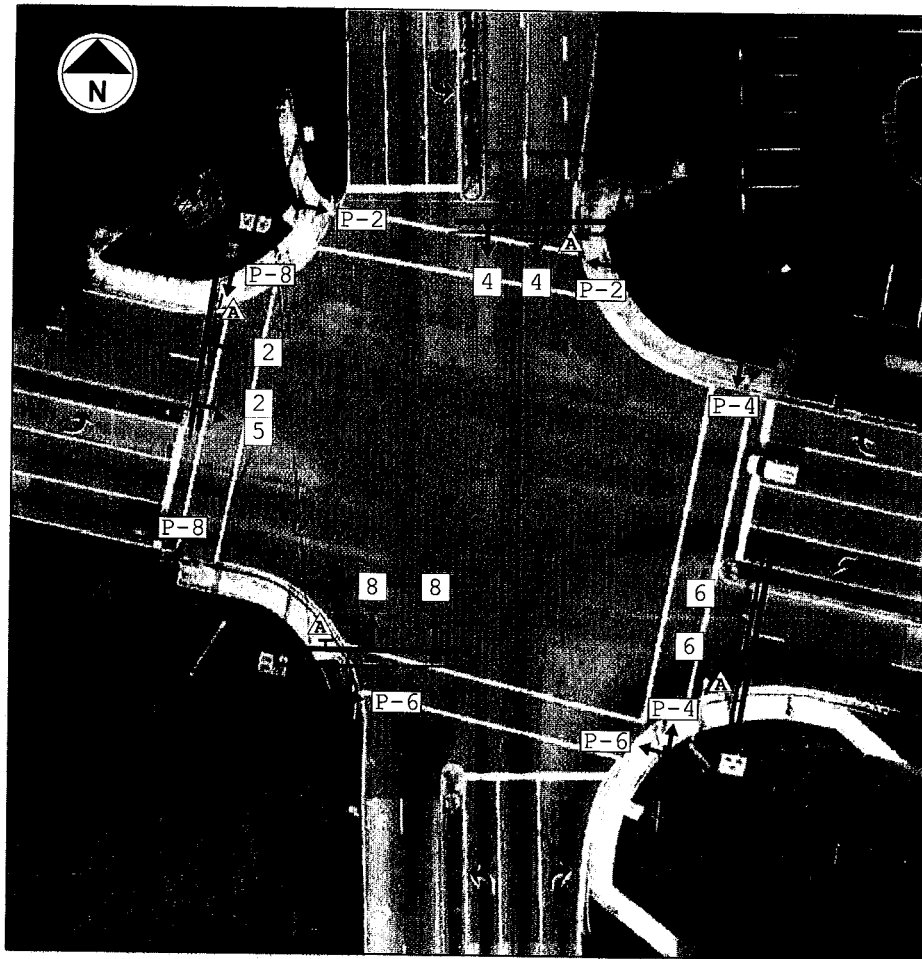
LOCATION Prospect Rd & NW 21 Ave

ORDER NO. _____ ISSUE DATE _____ REVISION NO. _____ COMPLETION DATE _____

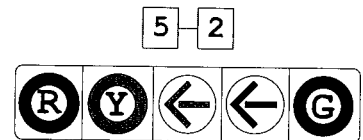
DWG. NO. _____ FILE NO. 1142 CITY OAKLAND PARK SCALE: 1" = 50'

NW 21 Ave

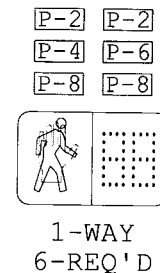
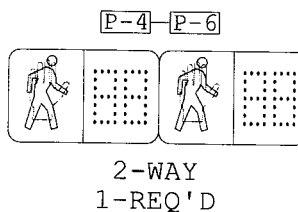
Prospect Rd



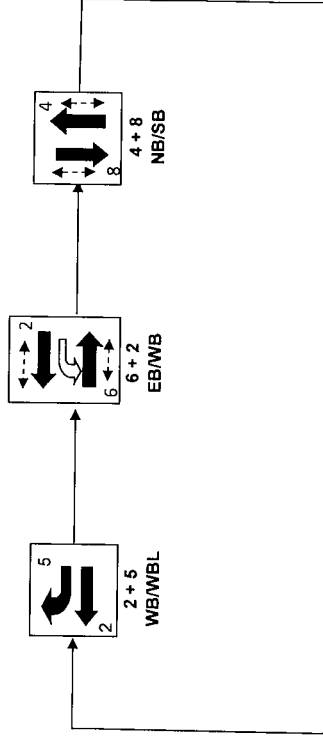
3-SECT
1-WAY
7-REQ'D



5-SECT
1-WAY
1-REQ'D



Sequence of Operation for (1142) Prospect Road and NW 21 Ave
Oakland Park





BROWARD COUNTY TRAFFIC ENGINEERING
ACTUATED TRAFFIC SIGNAL TIMING SHEET

Intersection Number	1565	Initial Operation Date	04/01/02
Controller Type	2070 LN	System Number	1565
Modification Number	3	Modification Date	04/01/2015
Drawing/Project No	00070601	FPL Grid Number	87484473708
Intersection	NW 21 AVENUE and NW 44 STREET		
Municipality	OAKLAND PARK		

Controller Phase	1	2	3	4	5	6	7	8
Face Number		2		4,4R	5	6		
Direction		NB		EB	NBL	SB		
Initial Green(MIN)		12		6	4	12		
Vehicle Ext.(GAP)		3.0		2.0	1.5	3.0		
Maximum Green I		80		20	15	80		
Maximum Green II								
Yellow Clearance		4.0		4.0	4.0	4.0		
All Red Clearance		1.0		1.0	1.0	1.0		
Phase Recall		MIN		OFF	OFF	MIN		
Detector Delay								
Walk				7				
Pedestrian Clearance				15				
Permissive					5 SECT			
Flash Operation		YELLOW		RED		YELLOW		

Attachment _____

NOTES:

1. ANTI-BACKDOWN NORTHBOUND: PHASES 2+6 ON--->OMIT PHASE 5.
2. HEAD 4R IS A 5-SECTION RIGHT TURN OVERLAP HARDWIRED TO PHASE 5 (NBL).
3. MOD. 3 DEPLOYS SIGNAL ONTO ATMS.NOW.

Submitted By _____ Approved By _____

Station : 1565 - NW 21 Ave & NW 44 St (Standard File)

Phase	1	2 (NT)	3	4 (ET)	5 (NL)	6 (ST)	7	8	9	10	11	12	13	14	15	16
Walk		7		7		7										
Ped Clearance				15												
Min Green		12		6	4	12										
Gap Ext		3		2	1.5	3										
Max1		80		20	15	80										
Max2																
Yellow Clr	4	4	4	4	4	4	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clr		1		1	1	1			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Red Revert																
Added Initial																
Max Initial																
Time Before Reduce																
Cars Before Reduce																
Time To Reduce																
Reduce By																
Min Gap																
Dynamic Max Limit																
Dynamic Max Step																
Enable		ON		ON	ON	ON										
Auto Flash Entry				ON		ON		ON								
Auto Flash Exit		ON				ON										
Non-Actuated 1																
Non-Actuated 2																
Lock Call									ON	ON	ON	ON	ON	ON	ON	ON
Min Recall		ON				ON										
Max Recall																
Ped Recall																
Soft Recall																
Dual Entry																
Sim Gap Enable									ON	ON	ON	ON	ON	ON	ON	ON
Guar Passage																
Rest In Walk		ON				ON										
Cond Service																
Add Init Calc																
Concurrent Ps	1	1	1	1	2	2	1	1								

Preemption

Channel	1	2	3	4	5	6
Lock Input	ON	ON	ON	ON	ON	ON
Override Auto Flash	ON	ON	ON	ON	ON	ON
Override Higher Preempt	ON	ON	ON	ON	ON	ON
Flash in Dwell	ON	ON	ON	ON	ON	ON
Link to Preempt						
Delay						
Min Duration						
Min Green						
Min Walk						
Ped Clear						
Track Green						
Min Dwell						
Max Presence						
Track Veh 1						
Track Veh 2						
Track Veh 3						
Track Veh 4						
Dwell Cyc Veh 1						
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Dwell Cyc Ped3						
Dwell Cyc Ped4						
Dwell Cyc Ped5						
Dwell Cyc Ped6						
Dwell vPed7						
Dwell Cyc Ped8						
Exit 1						
Exit 2						
Exit 3						
Exit 4						

Preempt LP

Channel	1	2	3	4
Min				
Max				
Enable				
Lock Mode	MAX	MAX	MAX	MAX
Coord in Preempt				
No Skip				
Priority P1				
Priority P2				
Priority P3				
Priority P4				
Lock				
Headway				
Group Lock				
Queue Jump				
Free Mode				
Alt Table				

Coordination

[illegible]

[illegible][illegible]

User Comments:

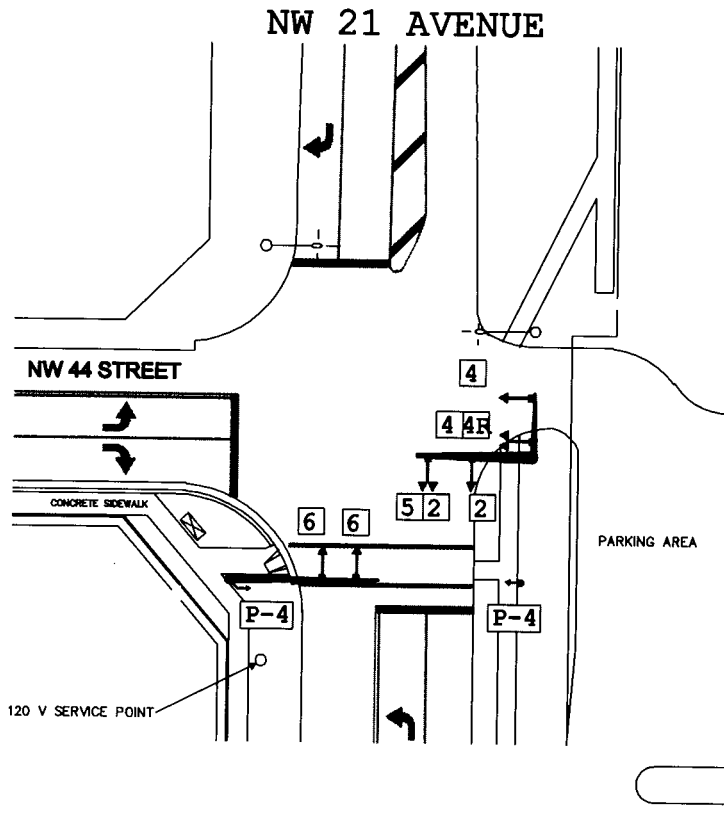
TRAFFIC ENGINEERING DIVISION SIGNALIZED INTERSECTION

LOCATION **NW 21 AVENUE AND NW 44 STREET**

ORDER NO **5** ISSUE DATE **1/29/01** REV NO. **0** COMPLETION DATE **04/01/02**

DWG. NO. **06-01-04-01** FILE NO. **A-565** CITY **OAKLAND PARK** SCALE: 1" = 50'

DWN BY: MS



2 4 6

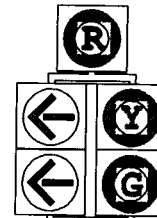


NORTH



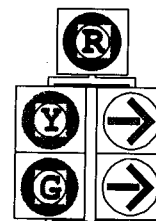
3-SECT
1-WAY
4-REQ'D

5 2



5-SECT
1-WAY
1-REQ'D

4 4R



5-SECT
1-WAY
1-REQ'D

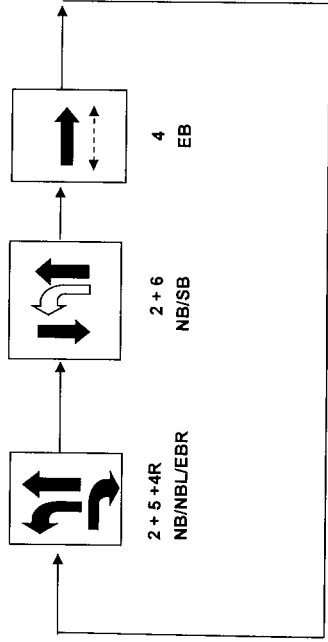
P-4



2-REQ'D

1. MICROWAVE DETECTION
2. OLD DRAWING NO. 00070601

Sequence of Operation for NW 21 Avenue and NW 44 Street (1565)
Oakland Park



NOTE: Head 4R is a five-section right turn overlap
hardwired to phase 5 (NBL)



BROWARD COUNTY TRAFFIC ENGINEERING
ACTUATED TRAFFIC SIGNAL TIMING SHEET

Intersection Number	1554	Initial Operation Date	10/19/00
Controller Type	2070 LN	System Number	1554
Modification Number	7	Modification Date	11/20/2014
Drawing/Project No	99100201	FPL Grid Number	87384354107
Intersection	NW 31 AVENUE and NW 44 STREET		
Municipality	OAKLAND PARK		

Controller Phase	1	2	3	4	5	6	7	8
Face Number	1,8R	2		4	5	6		8
Direction	SBL	NB		EB	NBL	SB		WB
Initial Green(MIN)	4	10		5	4	10		5
Vehicle Ext.(GAP)	1.5	3.0		2.0	1.5	3.0		2.0
Maximum Green I	12	50		30	12	50		30
Maximum Green II								
Yellow Clearance	4.0	4.0		4.0	4.0	4.0		4.0
All Red Clearance	2.0	2.0		2.0	2.0	2.0		2.0
Phase Recall	OFF	MIN		OFF	OFF	MIN		OFF
Detector Delay				20-RT				20-RT
Walk		7		5		7		5
Pedestrian Clearance		22		29		22		24
Permissive	5 SECT				5-SECT			
Flash Operation		YELLOW		RED		YELLOW		RED

Attachment _____

NOTES:

1. ANTI-BACKDOWN NORTH/SOUTH: PHASES 2+6 ON--->OMIT PHASES 1+5.
2. DUAL ENTRY HARDWIRED EAST/WEST.
3. HEAD 8R (WBR) HARDWIRED TO PHASE 1.
4. MOD. 7 DEPLOYS SIGNAL ONTO ATMS.NOW.

Submitted By _____ Approved By _____

Station : 1554 - NW 31 Ave & NW 44 St (Standard File)

Phase	1 (SL)	2 (NT)	3	4 (ET)	5 (NL)	6 (ST)	7	8 (WT)	9	10	11	12	13	14	15	16
Walk		7		5		7		5								
Ped Clearance		22		29		22		24								
Min Green	4	10		5	4	10		5								
Gap Ext	1.5	3		2	1.5	3		2								
Max1	12	50		30	12	50		30								
Max2																
Yellow Clr	4	4	4	4	4	4	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clr	2	2		2	2	2		2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Red Revert																
Added Initial																
Max Initial																
Time Before Reduce																
Cars Before Reduce																
Time To Reduce																
Reduce By																
Min Gap																
Dynamic Max Limit																
Dynamic Max Step																
Enable	ON	ON		ON	ON	ON		ON								
Auto Flash Entry				ON				ON								
Auto Flash Exit		ON				ON										
Non-Actuated 1																
Non-Actuated 2																
Lock Call									ON	ON	ON	ON	ON	ON	ON	ON
Min Recall		ON				ON										
Max Recall																
Ped Recall																
Soft Recall																
Dual Entry				ON				ON								
Sim Gap Enable									ON	ON	ON	ON	ON	ON	ON	ON
Guar Passage																
Rest In Walk		ON				ON										
Cond Service																
Add Init Calc																
Concurrent Ps	1	1	1	1	2	2	2	2								

Preemption

Channel	1	2	3	4	5	6
Lock Input	ON	ON	ON	ON	ON	ON
Override Auto Flash	ON	ON	ON	ON	ON	ON
Override Higher Preempt	ON	ON	ON	ON	ON	ON
Flash in Dwell	ON	ON	ON	ON	ON	ON
Link to Preempt						
Delay						
Min Duration						
Min Green						
Min Walk						
Ped Clear						
Track Green						
Min Dwell						
Max Presence						
Track Veh 1						
Track Veh 2						
Track Veh 3						
Track Veh 4						
Dwell Cyc Veh 1						
Dwell Cyc Veh 2						
Dwell Cyc Veh 3						
Dwell Cyc Veh 4						
Dwell Cyc Veh 5						
Dwell Cyc Veh 6						
Dwell Cyc Veh 7						
Dwell Cyc Veh 8						
Dwell Cyc Veh 9						
Dwell Cyc Veh 10						
Dwell Cyc Veh 11						
Dwell Cyc Veh 12						
Dwell Cyc Ped1						
Dwell Cyc Ped2						
Dwell Cyc Ped3						
Dwell Cyc Ped4						
Dwell Cyc Ped5						
Dwell Cyc Ped6						
Dwell vPed7						
Dwell Cyc Ped8						
Exit 1						
Exit 2						
Exit 3						
Exit 4						

Preempt LP

Channel	1	2	3	4
Min				
Max				
Enable				
Lock Mode	MAX	MAX	MAX	MAX
Coord in Preempt				
No Skip				
Priority P1				
Priority P2				
Priority P3				
Priority P4				
Lock				
Headway				
Group Lock				
Queue Jump				
Free Mode				
Alt Table				

Coordination

[illegible]

[illegible][illegible]

User Comments:

BROWARD COUNTY TRAFFIC ENGINEERING DIVISION

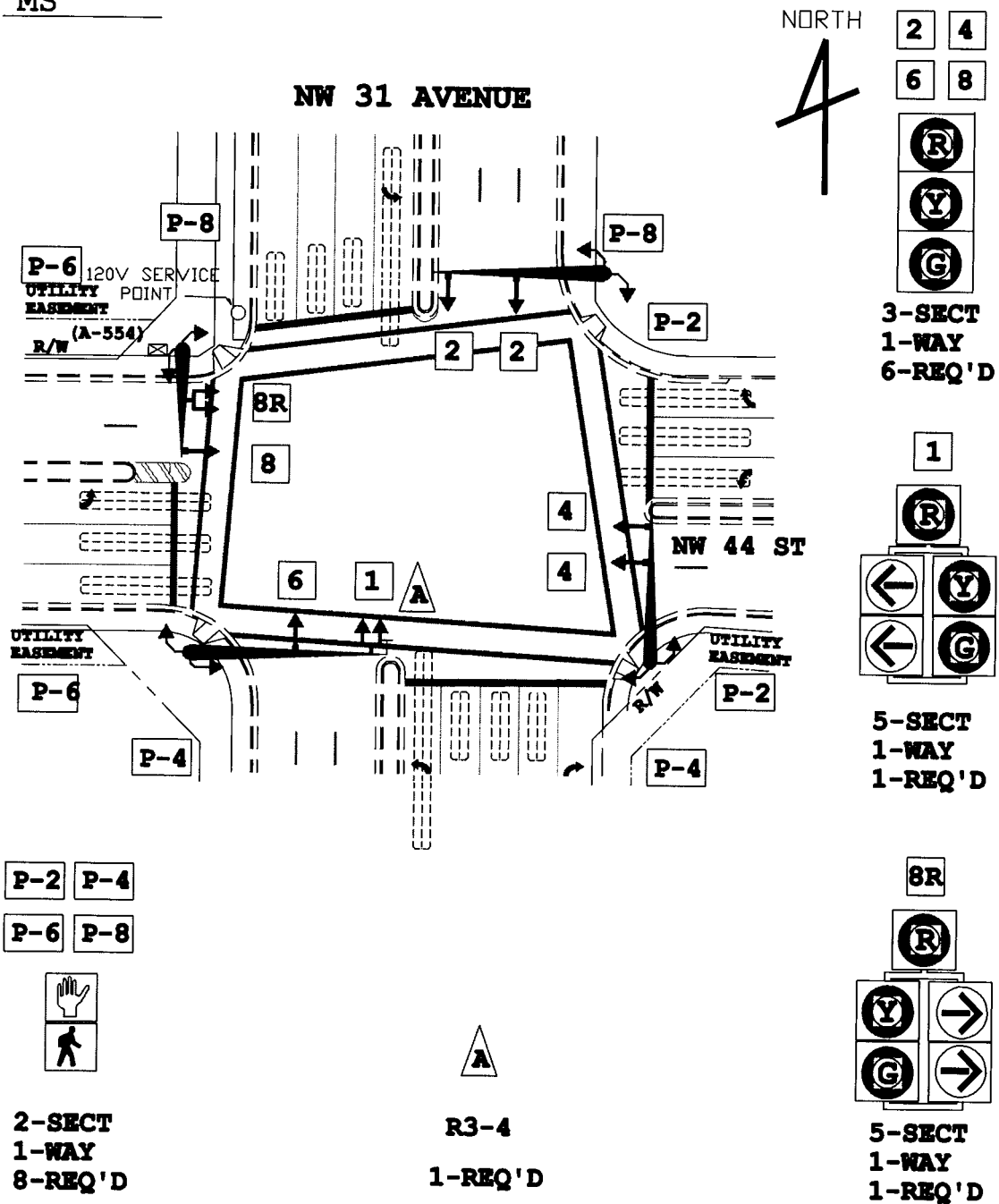
TRAFFIC SIGNAL INSTALLATION ORDER

LOCATION **NW 31 AVENUE & NW 44 STREET**

ORDER NO. -- ISSUE DATE ----- REV NO. 0 COMPLETION DATE 10/19/00

DWG. NO. 02-02-08-01 FILE NO. A-554 CITY OAKLAND PARK SCALE: 1' = 50'

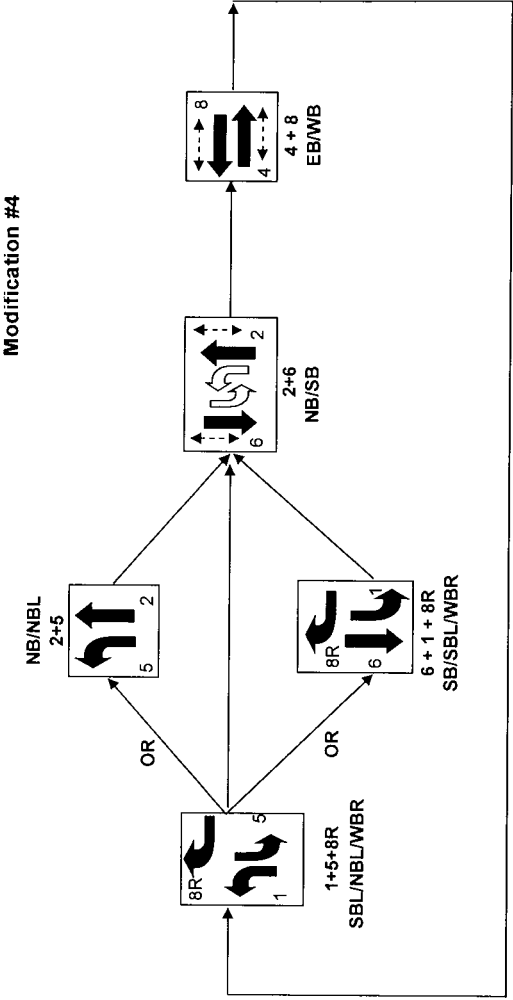
DWN BY: MS



REMARKS Drawn per BCTED Drawing No. 99100201

Sequence of Operation for NW 31 Avenue and NW 44 Street (1554)

Oakland Park



Oak Tree Traffic Analysis
1: Prospect Road & NW 26th Terrace

Existing (2018) Conditions
Timing Plan: AM

Intersection							
Int Delay, s/veh	0.4						
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	16	3	5	548	19	929	1
Future Vol, veh/h	16	3	5	548	19	929	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	90	-	155	-	130
Veh in Median Storage, #	1	-	-	0	-	0	-
Grade, %	0	-	-	0	-	0	-
Peak Hour Factor	92	92	85	85	91	91	91
Heavy Vehicles, %	2	2	4	4	2	2	2
Mvmt Flow	17	3	6	645	21	1021	1

Major/Minor	Minor2	Major1		Major2			
Conflicting Flow All	1398	511	1022	0	645	-	0
Stage 1	1063	-	-	-	-	-	-
Stage 2	335	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.18	-	6.44	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.24	-	2.52	-	-
Pot Cap-1 Maneuver	132	508	663	-	560	-	-
Stage 1	293	-	-	-	-	-	-
Stage 2	697	-	-	-	-	-	-
Platoon blocked, %				-		-	-
Mov Cap-1 Maneuver	126	508	663	-	560	-	-
Mov Cap-2 Maneuver	229	-	-	-	-	-	-
Stage 1	290	-	-	-	-	-	-
Stage 2	671	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.6	0.1	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR
Capacity (veh/h)	663	-	251	560	-	-
HCM Lane V/C Ratio	0.009	-	0.082	0.037	-	-
HCM Control Delay (s)	10.5	-	20.6	11.7	-	-
HCM Lane LOS	B	-	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	0.1	-	-

Oak Tree Traffic Analysis
2: Prospect Road & Oak Tree

Existing (2018) Conditions
Timing Plan: AM

Intersection								
Int Delay, s/veh	0.3							
Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	5	17	2	10	548	932	0	
Future Vol, veh/h	5	17	2	10	548	932	0	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	-	None	-	None	
Storage Length	0	-	-	210	-	-	110	
Veh in Median Storage, #	1	-	-	-	0	0	-	
Grade, %	0	-	-	-	0	0	-	
Peak Hour Factor	92	92	85	85	85	91	91	
Heavy Vehicles, %	2	2	4	4	4	2	2	
Mvmt Flow	5	18	2	12	645	1024	0	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1375	512	1024	1024	0	-	0	
Stage 1	1024	-	-	-	-	-	-	
Stage 2	351	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	6.48	4.18	-	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.54	2.24	-	-	-	
Pot Cap-1 Maneuver	136	507	315	662	-	-	-	
Stage 1	307	-	-	-	-	-	-	
Stage 2	684	-	-	-	-	-	-	
Platoon blocked, %					-	-	-	
Mov Cap-1 Maneuver	133	507	553	553	-	-	-	
Mov Cap-2 Maneuver	238	-	-	-	-	-	-	
Stage 1	299	-	-	-	-	-	-	
Stage 2	684	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	14.5	0.3		0				
HCM LOS	B							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR			
Capacity (veh/h)	553	-	403	-	-			
HCM Lane V/C Ratio	0.026	-	0.059	-	-			
HCM Control Delay (s)	11.7	-	14.5	-	-			
HCM Lane LOS	B	-	B	-	-			
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-			

Oak Tree Traffic Analysis
3: Prospect Road & Driveway A

Existing (2018) Conditions
Timing Plan: AM

Intersection														
Int Delay, s/veh	0.2													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEU	SEL	SET	SER	NWU	NWL	NWT	NWR
Lane Configurations					↕			↕	↕				↕	
Traffic Vol, veh/h	0	0	0	4	0	3	3	15	933	0	2	0	556	14
Future Vol, veh/h	0	0	0	4	0	3	3	15	933	0	2	0	556	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	215	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	1	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	91	91	91	91	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	4	4	4	4
Mvmt Flow	0	0	0	4	0	3	3	16	1025	0	2	0	654	16

Major/Minor	Minor2		Major1			Major2		
Conflicting Flow All	1217	1729	335	671	670	0	-	1025
Stage 1	666	666	-	-	-	-	-	-
Stage 2	551	1063	-	-	-	-	-	-
Critical Hdwy	6.84	6.54	6.94	6.44	4.14	-	-	6.48
Critical Hdwy Stg 1	5.84	5.54	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	5.54	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	2.52	2.22	-	-	2.54
Pot Cap-1 Maneuver	173	87	661	539	916	-	0	315
Stage 1	472	456	-	-	-	-	0	0
Stage 2	541	298	-	-	-	-	0	0
Platoon blocked, %						-		-
Mov Cap-1 Maneuver	167	0	661	820	820	-	-	315
Mov Cap-2 Maneuver	301	0	-	-	-	-	-	-
Stage 1	461	0	-	-	-	-	-	-
Stage 2	536	0	-	-	-	-	-	-

Approach	WB	SE	NW
HCM Control Delay, s	14.3	0.2	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NWT	NWRWBLn1	SEL	SET
Capacity (veh/h)	-	-	393	820
HCM Lane V/C Ratio	-	-	0.019	0.024
HCM Control Delay (s)	-	-	14.3	9.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Existing (2018) Conditions

Timing Plan: AM

												
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	11	797	131	1	271	433	79	1	131	485	495	18
Future Volume (vph)	11	797	131	1	271	433	79	1	131	485	495	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%				0%		
Storage Length (ft)	310		0		300		135		210		230	265
Storage Lanes	1		0		1		1		1		1	1
Taper Length (ft)	25				25				25			25
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.979					0.850				0.850	
Flt Protected	0.950				0.950				0.950			0.950
Satd. Flow (prot)	1770	3465	0	0	1703	3406	1524	0	1752	1845	1568	1612
Flt Permitted	0.482				0.101				0.648			0.123
Satd. Flow (perm)	898	3465	0	0	181	3406	1524	0	1195	1845	1568	209
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)		20					86				*460	
Link Speed (mph)		35				45				40		
Link Distance (ft)		843				1000				400		
Travel Time (s)		16.4				15.2				6.8		
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.83	0.83	0.83	0.83	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	6%	3%	3%	3%	3%	12%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%				0%		
Adj. Flow (vph)	12	876	144	1	295	471	86	1	158	584	596	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	1020	0	0	296	471	86	0	159	584	596	21
Turn Type	Perm	NA		pm+pt	pm+pt	NA	Perm	Perm	Perm	NA	Perm	Perm
Protected Phases		6		5	5	2				4		
Permitted Phases	6			2	2		2	4	4		4	8
Detector Phase	6	6		5	5	2	2	4	4	4	4	8
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	4.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	38.0	38.0		11.0	11.0	38.0	38.0	36.0	36.0	36.0	36.0	33.0
Total Split (s)	42.0	42.0		18.0	18.0	60.0	60.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	42.0%	42.0%		18.0%	18.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0			7.0	7.0	7.0		6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead	Lead							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	Min	Min		None	None	Min	Min	None	None	None	None	None
Act Effect Green (s)	32.5	32.5			50.6	50.6	50.6		32.5	32.5	32.5	32.5

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Existing (2018) Conditions
Timing Plan: AM



Lane Group	SBT	SBR
Lane Configurations	↑↑	
Traffic Volume (vph)	133	8
Future Volume (vph)	133	8
Ideal Flow (vphpl)	1900	1900
Lane Width (ft)	12	12
Grade (%)	0%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	0.95
Ped Bike Factor		
Frt	0.992	
Flt Protected		
Satd. Flow (prot)	3197	0
Flt Permitted		
Satd. Flow (perm)	3197	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	6	
Link Speed (mph)	40	
Link Distance (ft)	1710	
Travel Time (s)	29.1	
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor	0.86	0.86
Growth Factor	100%	100%
Heavy Vehicles (%)	12%	12%
Bus Blockages (#/hr)	0	0
Parking (#/hr)		
Mid-Block Traffic (%)	0%	
Adj. Flow (vph)	155	9
Shared Lane Traffic (%)		
Lane Group Flow (vph)	164	0
Turn Type	NA	
Protected Phases	8	
Permitted Phases		
Detector Phase	8	
Switch Phase		
Minimum Initial (s)	6.0	
Minimum Split (s)	33.0	
Total Split (s)	40.0	
Total Split (%)	40.0%	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.0	
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	
Act Effect Green (s)	32.5	

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Existing (2018) Conditions
Timing Plan: AM

												
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Actuated g/C Ratio	0.34	0.34			0.53	0.53	0.53		0.34	0.34	0.34	0.34
v/c Ratio	0.04	0.86			1.10	0.26	0.10		0.39	0.94	0.71	0.30
Control Delay	22.1	38.0			109.1	13.1	3.0		28.4	56.0	12.1	37.8
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	22.1	38.0			109.1	13.1	3.0		28.4	56.0	12.1	37.8
LOS	C	D			F	B	A		C	E	B	D
Approach Delay		37.8				45.4				33.2		
Approach LOS		D				D				C		
Queue Length 50th (ft)	5	304			~167	82	0		77	356	62	10
Queue Length 95th (ft)	18	390			#335	112	22		122	#493	142	33
Internal Link Dist (ft)		763				920				320		
Turn Bay Length (ft)	310				300		135		210		230	265
Base Capacity (vph)	328	1281			270	1888	883		425	656	853	74
Starvation Cap Reductn	0	0			0	0	0		0	0	0	0
Spillback Cap Reductn	0	0			0	0	0		0	0	0	0
Storage Cap Reductn	0	0			0	0	0		0	0	0	0
Reduced v/c Ratio	0.04	0.80			1.10	0.25	0.10		0.37	0.89	0.70	0.28

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 96.1

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 37.1

Intersection LOS: D

Intersection Capacity Utilization 98.6%

ICU Level of Service F

Analysis Period (min) 15

* User Entered Value

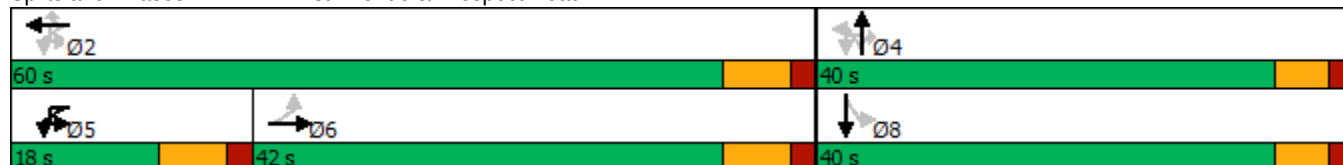
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: NW 21st Avenue & Prospect Road



Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Existing (2018) Conditions
Timing Plan: AM



Lane Group	SBT	SBR
Actuated g/C Ratio	0.34	
v/c Ratio	0.15	
Control Delay	22.2	
Queue Delay	0.0	
Total Delay	22.2	
LOS	C	
Approach Delay	24.0	
Approach LOS	C	
Queue Length 50th (ft)	36	
Queue Length 95th (ft)	57	
Internal Link Dist (ft)	1630	
Turn Bay Length (ft)		
Base Capacity (vph)	1140	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.14	
Intersection Summary		

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	411	233	69	701	420	116
Future Volume (vph)	411	233	69	701	420	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	230	0	120			230
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1752	1845	1776	1509
Flt Permitted	0.950		0.341			
Satd. Flow (perm)	1770	1583	*30	1845	1776	1509
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		268				126
Link Speed (mph)	35			40	40	
Link Distance (ft)	3035			1175	660	
Travel Time (s)	59.1			20.0	11.3	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.87	0.86	0.86	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	3%	3%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	472	268	80	815	457	126
Shared Lane Traffic (%)						
Lane Group Flow (vph)	472	268	80	815	457	126
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0
Total Split (s)	30.0	12.0	12.0	60.0	48.0	48.0
Total Split (%)	33.3%	13.3%	13.3%	66.7%	53.3%	53.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-5.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	0.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effect Green (s)	29.7	35.9	55.3	55.3	44.1	44.1

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.33	0.40	0.61	0.61	0.49	0.49
v/c Ratio	0.81	0.34	0.59	0.72	0.53	0.16
Control Delay	39.8	3.5	47.4	17.0	19.1	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	3.5	47.4	17.0	19.1	3.1
LOS	D	A	D	B	B	A
Approach Delay	26.7			19.7	15.7	
Approach LOS	C			B	B	
Queue Length 50th (ft)	227	0	35	327	190	0
Queue Length 95th (ft)	#373	40	76	400	265	28
Internal Link Dist (ft)	2955			1095	580	
Turn Bay Length (ft)	230		120			230
Base Capacity (vph)	603	805	153	1147	884	814
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.33	0.52	0.71	0.52	0.15

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 48 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 21.0

Intersection LOS: C

Intersection Capacity Utilization 67.2%

ICU Level of Service C

Analysis Period (min) 15

* User Entered Value

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



Oak Tree Traffic Analysis
6: NW 44th Street & Driveway B

Existing (2018) Conditions
Timing Plan: AM

Intersection													
Int Delay, s/veh	2.9												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱		↱	↱				↕				
Traffic Vol, veh/h	0	444	25	13	144	0	2	52	0	65	0	0	0
Future Vol, veh/h	0	444	25	13	144	0	2	52	0	65	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	170	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	16974	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	84	84	84	80	80	80	80	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	505	28	15	171	0	3	65	0	81	0	0	0

Major/Minor	Major1			Major2			Minor1			
Conflicting Flow All	-	0	0	533	0	0	0	720	720	519
Stage 1	-	-	-	-	-	-	0	519	519	-
Stage 2	-	-	-	-	-	-	0	201	201	-
Critical Hdwy	-	-	-	4.12	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1035	-	0	0	395	354	557
Stage 1	0	-	-	-	-	0	0	597	533	-
Stage 2	0	-	-	-	-	0	0	833	735	-
Platoon blocked, %		-	-		-		-			
Mov Cap-1 Maneuver	-	-	-	1035	-	-	0	389	0	557
Mov Cap-2 Maneuver	-	-	-	-	-	-	0	389	0	-
Stage 1	-	-	-	-	-	-	0	597	0	-
Stage 2	-	-	-	-	-	-	0	821	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	16.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	467	-	-	1035	-
HCM Lane V/C Ratio	0.313	-	-	0.015	-
HCM Control Delay (s)	16.2	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.3	-	-	0	-

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: AM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	5	83	281	138	2	49	153	147	7	133	1028	135
Future Volume (vph)	5	83	281	138	2	49	153	147	7	133	1028	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%				0%	
Storage Length (ft)		215		0		170		0		230		130
Storage Lanes		1		1		1		1		1		1
Taper Length (ft)		25				25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00
Ped Bike Factor												
Frt				0.850				0.850				0.850
Flt Protected		0.950				0.950				0.950		
Satd. Flow (prot)	0	1770	1863	1583	0	1770	1863	1583	0	1703	4893	1524
Flt Permitted		0.516				0.239				0.259		
Satd. Flow (perm)	0	961	1863	1583	0	445	1863	1583	0	464	4893	1524
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				138				56				104
Link Speed (mph)			35				35				45	
Link Distance (ft)			1000				930				1000	
Travel Time (s)			19.5				18.1				15.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.82	0.82	0.82	0.82	0.85	0.85	0.85	0.85	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%				0%				0%	
Adj. Flow (vph)	6	101	343	168	2	58	180	173	9	164	1269	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	107	343	168	0	60	180	173	0	173	1269	167
Turn Type	Perm	Perm	NA	Perm	Perm	Perm	NA	pm+ov	custom	pm+pt	NA	Perm
Protected Phases			4				8	1!		5	2	
Permitted Phases	4	4		4	8	8		8	5	2		2
Detector Phase	4	4	4	4	8	8	8	1	5	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	10.0	10.0
Minimum Split (s)	40.0	40.0	40.0	40.0	35.0	35.0	35.0	10.0	10.0	10.0	35.0	35.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	26.0	26.0	26.0	109.0	109.0
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	14.4%	14.4%	14.4%	60.6%	60.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag								Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	C-Min	C-Min
Act Effect Green (s)		45.2	45.2	45.2		45.2	45.2	76.7		102.2	91.3	91.3

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: AM



Lane Group	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Volume (vph)	4	242	866	114
Future Volume (vph)	4	242	866	114
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)			0%	
Storage Length (ft)		185		0
Storage Lanes		1		0
Taper Length (ft)		25		
Lane Util. Factor	0.91	1.00	0.91	0.91
Ped Bike Factor				
Frt			0.982	
Flt Protected		0.950		
Satd. Flow (prot)	0	1703	4805	0
Flt Permitted		0.141		
Satd. Flow (perm)	0	253	4805	0
Right Turn on Red				Yes
Satd. Flow (RTOR)			22	
Link Speed (mph)			45	
Link Distance (ft)			1000	
Travel Time (s)			15.2	
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)			0%	
Adj. Flow (vph)	4	260	931	123
Shared Lane Traffic (%)				
Lane Group Flow (vph)	0	264	1054	0
Turn Type	custom	pm+pt	NA	
Protected Phases		1	6	
Permitted Phases	1!	6		
Detector Phase	1	1	6	
Switch Phase				
Minimum Initial (s)	4.0	4.0	10.0	
Minimum Split (s)	10.0	10.0	35.0	
Total Split (s)	26.0	26.0	109.0	
Total Split (%)	14.4%	14.4%	60.6%	
Yellow Time (s)	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	
Total Lost Time (s)		6.0	6.0	
Lead/Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	
Recall Mode	None	None	C-Min	
Act Effect Green (s)		122.8	106.0	

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: AM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Actuated g/C Ratio		0.25	0.25	0.25		0.25	0.25	0.43		0.57	0.51	0.51
v/c Ratio		0.44	0.73	0.34		0.54	0.39	0.25		0.51	0.51	0.20
Control Delay		60.5	70.5	12.5		73.8	56.5	20.5		19.3	32.6	12.1
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		60.5	70.5	12.5		73.8	56.5	20.5		19.3	32.6	12.1
LOS		E	E	B		E	E	C		B	C	B
Approach Delay			53.0				43.9				29.0	
Approach LOS			D				D				C	
Queue Length 50th (ft)		106	370	27		61	175	84		71	371	39
Queue Length 95th (ft)		144	403	66		103	220	110		111	423	82
Internal Link Dist (ft)			920				850				920	
Turn Bay Length (ft)		215				170				230		130
Base Capacity (vph)		252	489	517		116	489	708		424	2863	935
Starvation Cap Reductn		0	0	0		0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0		0	0	0
Reduced v/c Ratio		0.42	0.70	0.32		0.52	0.37	0.24		0.41	0.44	0.18

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 31 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 32.3

Intersection LOS: C

Intersection Capacity Utilization 72.4%

ICU Level of Service C

Analysis Period (min) 15

! Phase conflict between lane groups.

Splits and Phases: 7: NW 31st Avenue & NW 44th Street

 Ø1	 Ø2 (R)	 Ø4
26 s	109 s	45 s
 Ø5	 Ø6 (R)	 Ø8
26 s	109 s	45 s

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: AM



Lane Group	SBU	SBL	SBT	SBR
Actuated g/C Ratio		0.68	0.59	
v/c Ratio		0.70	0.37	
Control Delay		29.8	21.1	
Queue Delay		0.0	0.0	
Total Delay		29.8	21.1	
LOS		C	C	
Approach Delay			22.9	
Approach LOS			C	
Queue Length 50th (ft)		124	235	
Queue Length 95th (ft)		256	326	
Internal Link Dist (ft)			920	
Turn Bay Length (ft)		185		
Base Capacity (vph)		380	2946	
Starvation Cap Reductn		0	0	
Spillback Cap Reductn		0	0	
Storage Cap Reductn		0	0	
Reduced v/c Ratio		0.69	0.36	
Intersection Summary				

Oak Tree Traffic Analysis
1: Prospect Road & NW 26th Terrace

Existing (2018) Conditions
Timing Plan: PM

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	8	6	7	1127	14	659	3
Future Vol, veh/h	8	6	7	1127	14	659	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	90	-	155	-	130
Veh in Median Storage, #	1	-	-	0	-	0	-
Grade, %	0	-	-	0	-	0	-
Peak Hour Factor	92	92	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	6	6	6
Mvmt Flow	9	7	8	1238	15	724	3

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1389	362	727
Stage 1	754	-	-
Stage 2	635	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	134	635	872
Stage 1	425	-	-
Stage 2	490	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	124	635	872
Mov Cap-2 Maneuver	253	-	-
Stage 1	421	-	-
Stage 2	457	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.1	0.1	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR
Capacity (veh/h)	872	-	341	225	-	-
HCM Lane V/C Ratio	0.009	-	0.045	0.068	-	-
HCM Control Delay (s)	9.2	-	16.1	22.2	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0.2	-	-

Oak Tree Traffic Analysis
2: Prospect Road & Oak Tree

Existing (2018) Conditions
Timing Plan: PM

Intersection								
Int Delay, s/veh	0.4							
Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	3	12	27	14	1131	659	6	
Future Vol, veh/h	3	12	27	14	1131	659	6	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	-	None	-	None	
Storage Length	0	-	-	210	-	-	110	
Veh in Median Storage, #	1	-	-	-	0	0	-	
Grade, %	0	-	-	-	0	0	-	
Peak Hour Factor	92	92	91	91	91	91	91	
Heavy Vehicles, %	2	2	2	2	2	6	6	
Mvmt Flow	3	13	30	15	1243	724	7	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1436	362	724	731	0	-	0	
Stage 1	724	-	-	-	-	-	-	
Stage 2	712	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	6.44	4.14	-	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.52	2.22	-	-	-	
Pot Cap-1 Maneuver	124	635	499	869	-	-	-	
Stage 1	441	-	-	-	-	-	-	
Stage 2	447	-	-	-	-	-	-	
Platoon blocked, %					-	-	-	
Mov Cap-1 Maneuver	114	635	576	576	-	-	-	
Mov Cap-2 Maneuver	246	-	-	-	-	-	-	
Stage 1	407	-	-	-	-	-	-	
Stage 2	447	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	12.7	0.4		0				
HCM LOS	B							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR			
Capacity (veh/h)	576	-	482	-	-			
HCM Lane V/C Ratio	0.078	-	0.034	-	-			
HCM Control Delay (s)	11.8	-	12.7	-	-			
HCM Lane LOS	B	-	B	-	-			
HCM 95th %tile Q(veh)	0.3	-	0.1	-	-			

Oak Tree Traffic Analysis
3: Prospect Road & Driveway A

Existing (2018) Conditions
Timing Plan: PM

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations					↕		↗	↕			↕	
Traffic Vol, veh/h	0	0	0	14	0	6	6	692	0	0	1128	2
Future Vol, veh/h	0	0	0	14	0	6	6	692	0	0	1128	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	215	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	6	6	6	2	2	2
Mvmt Flow	0	0	0	15	0	7	7	760	0	0	1240	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1635	2015	621	1242	0	-
Stage 1	1241	1241	-	-	-	-
Stage 2	394	774	-	-	-	-
Critical Hdwy	6.84	6.54	6.94	4.22	-	-
Critical Hdwy Stg 1	5.84	5.54	-	-	-	-
Critical Hdwy Stg 2	5.84	5.54	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	2.26	-	-
Pot Cap-1 Maneuver	92	58	430	535	-	0
Stage 1	236	245	-	-	-	0
Stage 2	650	406	-	-	-	0
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	91	0	430	535	-	-
Mov Cap-2 Maneuver	186	0	-	-	-	-
Stage 1	233	0	-	-	-	-
Stage 2	650	0	-	-	-	-

Approach	WB	SE	NW
HCM Control Delay, s	22.8	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NWT	NWRWBLn1	SEL	SET
Capacity (veh/h)	-	-	224	535
HCM Lane V/C Ratio	-	-	0.097	0.012
HCM Control Delay (s)	-	-	22.8	11.8
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	0.3	0

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Existing (2018) Conditions

Timing Plan: PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	526	174	550	1033	63	76	246	338	44	563	21
Future Volume (vph)	6	526	174	550	1033	63	76	246	338	44	563	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	310		0	300		135	210		230	265		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.963				0.850			0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3280	0	1770	3539	1583	1641	1727	1468	1770	3522	0
Flt Permitted	0.254			0.154			0.241			0.403		
Satd. Flow (perm)	455	3280	0	287	3539	1583	416	1727	1468	751	3522	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45				65			384			3
Link Speed (mph)		35			45			40			40	
Link Distance (ft)		843			1000			400			1710	
Travel Time (s)		16.4			15.2			6.8			29.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.88	0.88	0.88	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	10%	10%	10%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	7	578	191	598	1123	68	86	280	384	46	593	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	769	0	598	1123	68	86	280	384	46	615	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			4			8	
Permitted Phases	6			2		2	4		4	8		
Detector Phase	6	6		5	2	2	4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	38.0	38.0		11.0	38.0	38.0	36.0	36.0	36.0	33.0	33.0	
Total Split (s)	40.0	40.0		31.0	71.0	71.0	34.0	34.0	34.0	34.0	34.0	
Total Split (%)	38.1%	38.1%		29.5%	67.6%	67.6%	32.4%	32.4%	32.4%	32.4%	32.4%	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	Min	Min		None	Min	Min	None	None	None	None	None	
Act Effect Green (s)	26.8	26.8		58.3	58.3	58.3	22.7	22.7	22.7	22.7	22.7	

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Existing (2018) Conditions
Timing Plan: PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.28	0.28		0.62	0.62	0.62	0.24	0.24	0.24	0.24	0.24	
v/c Ratio	0.05	0.80		1.07	0.51	0.07	0.87	0.67	0.60	0.26	0.72	
Control Delay	28.3	37.2		82.6	11.6	2.5	97.7	41.8	7.5	34.0	38.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	
Total Delay	28.3	37.2		82.6	11.6	2.5	97.7	42.1	7.5	34.0	38.4	
LOS	C	D		F	B	A	F	D	A	C	D	
Approach Delay		37.1			35.0			30.8			38.1	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)	3	226		~378	206	1	50	155	0	23	181	
Queue Length 95th (ft)	m14	299		#620	263	17	#138	247	66	57	254	
Internal Link Dist (ft)		763			920			320			1630	
Turn Bay Length (ft)	310			300		135	210		230	265		
Base Capacity (vph)	162	1196		561	2444	1113	125	521	711	227	1066	
Starvation Cap Reductn	0	0		0	0	0	0	34	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.04	0.64		1.07	0.46	0.06	0.69	0.57	0.54	0.20	0.58	

Intersection Summary

Area Type: Other

Cycle Length: 105

Actuated Cycle Length: 94.2

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 35.1

Intersection LOS: D

Intersection Capacity Utilization 98.2%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: NW 21st Avenue & Prospect Road



Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: PM

							
Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	203	126	184	456	1	854	432
Future Volume (vph)	203	126	184	456	1	854	432
Ideal Flow (vphpl)	1900	1900	2200	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	0%			0%		0%	
Storage Length (ft)	230	0	120		0		230
Storage Lanes	1	1	1		0		1
Taper Length (ft)	25		25		25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							
Frt		0.850					0.850
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1719	1538	1953	1776	0	1845	1568
Flt Permitted	0.950		0.092				
Satd. Flow (perm)	1719	1538	189	1776	0	1845	1568
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		101					395
Link Speed (mph)	35			40		40	
Link Distance (ft)	3035			1175		660	
Travel Time (s)	59.1			20.0		11.3	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.81	0.81	0.99	0.99	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	7%	7%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%		0%	
Adj. Flow (vph)	251	156	186	461	1	909	460
Shared Lane Traffic (%)							
Lane Group Flow (vph)	251	156	186	461	0	910	460
Turn Type	Prot	pm+ov	pm+pt	NA	Perm	NA	Perm
Protected Phases	4	5	5	2		6	
Permitted Phases		4	2		6		6
Detector Phase	4	5	5	2	6	6	6
Switch Phase							
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0	17.0
Total Split (s)	30.0	12.0	12.0	65.0	53.0	53.0	53.0
Total Split (%)	31.6%	12.6%	12.6%	68.4%	55.8%	55.8%	55.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effect Green (s)	18.2	31.3	66.8	66.8		53.7	53.7

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: PM



Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Actuated g/C Ratio	0.19	0.33	0.70	0.70		0.57	0.57
v/c Ratio	0.77	0.27	0.66	0.37		0.87	0.43
Control Delay	51.2	9.4	23.2	7.4		30.9	3.8
Queue Delay	0.0	0.0	0.0	0.0		2.4	0.0
Total Delay	51.2	9.4	23.2	7.4		33.2	3.8
LOS	D	A	C	A		C	A
Approach Delay	35.2			12.0		23.4	
Approach LOS	D			B		C	
Queue Length 50th (ft)	145	22	32	96		454	17
Queue Length 95th (ft)	184	50	#141	186		#794	73
Internal Link Dist (ft)	2955			1095		580	
Turn Bay Length (ft)	230		120				230
Base Capacity (vph)	452	576	287	1249		1043	1058
Starvation Cap Reductn	0	0	0	0		58	0
Spillback Cap Reductn	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0		0	0
Reduced v/c Ratio	0.56	0.27	0.65	0.37		0.92	0.43

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 53 (56%), Referenced to phase 2:NBTL and 6:SBTU, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 22.3

Intersection LOS: C

Intersection Capacity Utilization 92.7%

ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



Oak Tree Traffic Analysis
6: NW 44th Street & Driveway B

Existing (2018) Conditions
Timing Plan: PM

Intersection

Int Delay, s/veh 1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶		↶	↶				↷				
Traffic Vol, veh/h	0	212	51	54	467	0	1	42	0	25	0	0	0
Future Vol, veh/h	0	212	51	54	467	0	1	42	0	25	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	170	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	16974	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	96	96	96	90	90	90	90	92	92	92
Heavy Vehicles, %	4	4	4	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	247	59	56	486	0	1	47	0	28	0	0	0

Major/Minor	Major1			Major2			Minor1					
Conflicting Flow All	-	0	0	306	0	0	0	875	875	277		
Stage 1	-	-	-	-	-	-	0	277	277	-		
Stage 2	-	-	-	-	-	-	0	598	598	-		
Critical Hdwy	-	-	-	4.12	-	-	-	6.42	6.52	6.22		
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.42	5.52	-		
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.42	5.52	-		
Follow-up Hdwy	-	-	-	2.218	-	-	-	3.518	4.018	3.318		
Pot Cap-1 Maneuver	0	-	-	1255	-	0	0	320	288	762		
Stage 1	0	-	-	-	-	0	0	770	681	-		
Stage 2	0	-	-	-	-	0	0	549	491	-		
Platoon blocked, %		-	-		-		-					
Mov Cap-1 Maneuver	-	-	-	1255	-	-	0	306	0	762		
Mov Cap-2 Maneuver	-	-	-	-	-	-	0	306	0	-		
Stage 1	-	-	-	-	-	-	0	770	0	-		
Stage 2	-	-	-	-	-	-	0	524	0	-		

Approach	EB			WB			NB		
HCM Control Delay, s	0			0.8			16.3		
HCM LOS							C		

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	394	-	-	1255	-
HCM Lane V/C Ratio	0.189	-	-	0.045	-
HCM Control Delay (s)	16.3	-	-	8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions

Timing Plan: PM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	4	49	134	79	17	116	293	124	20	157	1307	110
Future Volume (vph)	4	49	134	79	17	116	293	124	20	157	1307	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%				0%	
Storage Length (ft)		215		0		170		0		230		130
Storage Lanes		1		1		1		1		1		1
Taper Length (ft)		25				25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00
Ped Bike Factor												
Frt				0.850				0.850				0.850
Flt Protected		0.950				0.950				0.950		
Satd. Flow (prot)	0	1736	1827	1553	0	1770	1863	1583	0	1703	4893	1524
Flt Permitted		0.183				0.530				0.084		
Satd. Flow (perm)	0	334	1827	1553	0	987	1863	1583	0	151	4893	1524
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				89				40				66
Link Speed (mph)			35				35				45	
Link Distance (ft)			1000				930				1000	
Travel Time (s)			19.5				18.1				15.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%				0%				0%	
Adj. Flow (vph)	4	55	151	89	18	125	315	133	22	169	1405	118
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	59	151	89	0	143	315	133	0	191	1405	118
Turn Type	Perm	Perm	NA	Perm	Perm	Perm	NA	pm+ov	custom	pm+pt	NA	Perm
Protected Phases			4				8	1!		5	2	
Permitted Phases	4	4		4	8	8		8	5	2		2
Detector Phase	4	4	4	4	8	8	8	1	5	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	10.0	10.0
Minimum Split (s)	40.0	40.0	40.0	40.0	35.0	35.0	35.0	10.0	10.0	10.0	35.0	35.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	26.0	26.0	26.0	109.0	109.0
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	14.4%	14.4%	14.4%	60.6%	60.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag								Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	C-Min	C-Min
Act Effect Green (s)		36.1	36.1	36.1		36.1	36.1	54.3		127.8	113.7	113.7

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: PM



Lane Group	SBU	SBL	SBT	SBR
Lane Configurations		LA	LA	LA
Traffic Volume (vph)	1	154	1451	268
Future Volume (vph)	1	154	1451	268
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)			0%	
Storage Length (ft)		185		0
Storage Lanes		1		0
Taper Length (ft)		25		
Lane Util. Factor	0.91	1.00	0.91	0.91
Ped Bike Factor				
Frt			0.977	
Flt Protected		0.950		
Satd. Flow (prot)	0	1703	4781	0
Flt Permitted		0.150		
Satd. Flow (perm)	0	269	4781	0
Right Turn on Red				Yes
Satd. Flow (RTOR)			35	
Link Speed (mph)			45	
Link Distance (ft)			1000	
Travel Time (s)			15.2	
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)			0%	
Adj. Flow (vph)	1	159	1496	276
Shared Lane Traffic (%)				
Lane Group Flow (vph)	0	160	1772	0
Turn Type	custom	pm+pt	NA	
Protected Phases		1	6	
Permitted Phases	1!	6		
Detector Phase	1	1	6	
Switch Phase				
Minimum Initial (s)	4.0	4.0	10.0	
Minimum Split (s)	10.0	10.0	35.0	
Total Split (s)	26.0	26.0	109.0	
Total Split (%)	14.4%	14.4%	60.6%	
Yellow Time (s)	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	
Total Lost Time (s)		6.0	6.0	
Lead/Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	
Recall Mode	None	None	C-Min	
Act Effect Green (s)		123.9	111.7	

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: PM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Actuated g/C Ratio		0.20	0.20	0.20		0.20	0.20	0.30		0.71	0.63	0.63
v/c Ratio		0.88	0.41	0.23		0.72	0.84	0.26		0.83	0.45	0.12
Control Delay		149.4	64.5	10.2		86.5	88.3	31.8		56.8	19.0	7.8
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		149.4	64.5	10.2		86.5	88.3	31.8		56.8	19.0	7.8
LOS		F	E	B		F	F	C		E	B	A
Approach Delay			65.1				75.2				22.4	
Approach LOS			E				E				C	
Queue Length 50th (ft)		69	159	0		161	366	83		103	298	22
Queue Length 95th (ft)		#141	211	47		229	444	127		213	424	64
Internal Link Dist (ft)			920				850				920	
Turn Bay Length (ft)		215				170				230		130
Base Capacity (vph)		76	418	424		225	426	572		282	3117	995
Starvation Cap Reductn		0	0	0		0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0		0	0	0
Reduced v/c Ratio		0.78	0.36	0.21		0.64	0.74	0.23		0.68	0.45	0.12

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 41 (23%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 32.1

Intersection LOS: C

Intersection Capacity Utilization 83.4%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 7: NW 31st Avenue & NW 44th Street

 Ø1	 Ø2 (R)	 Ø4
26 s	109 s	45 s
 Ø5	 Ø6 (R)	 Ø8
26 s	109 s	45 s

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Existing (2018) Conditions
Timing Plan: PM



Lane Group	SBU	SBL	SBT	SBR
Actuated g/C Ratio		0.69	0.62	
v/c Ratio		0.57	0.59	
Control Delay		17.3	22.9	
Queue Delay		0.0	0.0	
Total Delay		17.3	22.9	
LOS		B	C	
Approach Delay			22.5	
Approach LOS			C	
Queue Length 50th (ft)		50	433	
Queue Length 95th (ft)		100	621	
Internal Link Dist (ft)			920	
Turn Bay Length (ft)		185		
Base Capacity (vph)		352	3031	
Starvation Cap Reductn		0	0	
Spillback Cap Reductn		0	0	
Storage Cap Reductn		0	0	
Reduced v/c Ratio		0.45	0.58	
Intersection Summary				

APPENDIX D

BACKGROUND INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Oak Tree Traffic Analysis

1: Prospect Road & NW 26th Terrace

Background (2024) Conditions
Timing Plan: AM

Intersection								
Int Delay, s/veh	0.4							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	17	3	5	583	20	989	1	
Future Vol, veh/h	17	3	5	583	20	989	1	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	-	None	
Storage Length	0	-	90	-	155	-	130	
Veh in Median Storage, #	1	-	-	0	-	0	-	
Grade, %	0	-	-	0	-	0	-	
Peak Hour Factor	92	92	85	85	91	91	91	
Heavy Vehicles, %	2	2	4	4	2	2	2	
Mvmt Flow	18	3	6	686	22	1087	1	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1486	544	1088	0	686	-	0	
Stage 1	1131	-	-	-	-	-	-	
Stage 2	355	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	4.18	-	6.44	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.24	-	2.52	-	-	
Pot Cap-1 Maneuver	115	483	625	-	527	-	-	
Stage 1	270	-	-	-	-	-	-	
Stage 2	681	-	-	-	-	-	-	
Platoon blocked, %				-		-	-	
Mov Cap-1 Maneuver	109	483	625	-	527	-	-	
Mov Cap-2 Maneuver	210	-	-	-	-	-	-	
Stage 1	267	-	-	-	-	-	-	
Stage 2	652	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	22.4	0.1		0.2				
HCM LOS	C							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR		
Capacity (veh/h)	625	-	229	527	-	-		
HCM Lane V/C Ratio	0.009	-	0.095	0.042	-	-		
HCM Control Delay (s)	10.8	-	22.4	12.1	-	-		
HCM Lane LOS	B	-	C	B	-	-		
HCM 95th %tile Q(veh)	0	-	0.3	0.1	-	-		

Oak Tree Traffic Analysis

2: Prospect Road & Oak Tree

Background (2024) Conditions

Timing Plan: AM

Intersection								
Int Delay, s/veh	0.3							
Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	5	18	2	11	583	992	0	
Future Vol, veh/h	5	18	2	11	583	992	0	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	-	None	-	None	
Storage Length	0	-	-	210	-	-	110	
Veh in Median Storage, #	1	-	-	-	0	0	-	
Grade, %	0	-	-	-	0	0	-	
Peak Hour Factor	92	92	85	85	85	91	91	
Heavy Vehicles, %	2	2	4	4	4	2	2	
Mvmt Flow	5	20	2	13	686	1090	0	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1463	545	1090	1090	0	-	0	
Stage 1	1090	-	-	-	-	-	-	
Stage 2	373	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	6.48	4.18	-	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.54	2.24	-	-	-	
Pot Cap-1 Maneuver	119	482	286	624	-	-	-	
Stage 1	284	-	-	-	-	-	-	
Stage 2	666	-	-	-	-	-	-	
Platoon blocked, %					-	-	-	
Mov Cap-1 Maneuver	116	482	522	522	-	-	-	
Mov Cap-2 Maneuver	219	-	-	-	-	-	-	
Stage 1	276	-	-	-	-	-	-	
Stage 2	666	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	15.1	0.3		0				
HCM LOS	C							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR			
Capacity (veh/h)	522	-	382	-	-			
HCM Lane V/C Ratio	0.029	-	0.065	-	-			
HCM Control Delay (s)	12.1	-	15.1	-	-			
HCM Lane LOS	B	-	C	-	-			
HCM 95th %tile O(veh)	0.1	-	0.2	-	-			

Oak Tree Traffic Analysis

3: Prospect Road & Driveway A

Background (2024) Conditions

Timing Plan: AM

Intersection														
Int Delay, s/veh	0.2													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEU	SEL	SET	SER	NWU	NWL	NWT	NWR
Lane Configurations														
Traffic Vol, veh/h	0	0	0	4	0	3	3	16	993	0	2	0	591	15
Future Vol, veh/h	0	0	0	4	0	3	3	16	993	0	2	0	591	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	215	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	1	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	91	91	91	91	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	4	4	4	4
Mvmt Flow	0	0	0	4	0	3	3	18	1091	0	2	0	695	18

Major/Minor	Minor2		Major1			Major2		
Conflicting Flow All	1296	1841	357	713	713	0	-	1091
Stage 1	708	708	-	-	-	-	-	-
Stage 2	588	1133	-	-	-	-	-	-
Critical Hdwy	6.84	6.54	6.94	6.44	4.14	-	-	6.48
Critical Hdwy Stg 1	5.84	5.54	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	5.54	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	2.52	2.22	-	-	2.54
Pot Cap-1 Maneuver	154	74	639	507	883	-	0	285
Stage 1	449	436	-	-	-	-	0	0
Stage 2	518	276	-	-	-	-	0	0
Platoon blocked, %						-		-
Mov Cap-1 Maneuver	148	0	639	790	790	-	-	285
Mov Cap-2 Maneuver	282	0	-	-	-	-	-	-
Stage 1	437	0	-	-	-	-	-	-
Stage 2	512	0	-	-	-	-	-	-

Approach	WB	SE	NW
HCM Control Delay, s	14.9	0.2	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NWT	NWRWBLn1	SEL	SET
Capacity (veh/h)	-	-	371	790
HCM Lane V/C Ratio	-	-	0.021	0.026
HCM Control Delay (s)	-	-	14.9	9.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1

Oak Tree Traffic Analysis

4: NW 21st Avenue & Prospect Road

Background (2024) Conditions

Timing Plan: AM

												
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	12	848	139	1	288	461	84	1	139	515	525	19
Future Volume (vph)	12	848	139	1	288	461	84	1	139	515	525	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%				0%		
Storage Length (ft)	310		0		300		135		210		230	265
Storage Lanes	1		0		1		1		1		1	1
Taper Length (ft)	25				25				25			25
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.979					0.850				0.850	
Flt Protected	0.950				0.950				0.950			0.950
Satd. Flow (prot)	1770	3465	0	0	1703	3406	1524	0	1752	1845	1568	1612
Flt Permitted	0.468				0.108				0.643			0.138
Satd. Flow (perm)	872	3465	0	0	194	3406	1524	0	1186	1845	1568	234
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)		20					73				*460	
Link Speed (mph)		35				45				40		
Link Distance (ft)		843				1000				400		
Travel Time (s)		16.4				15.2				6.8		
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.83	0.83	0.83	0.83	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	6%	3%	3%	3%	3%	12%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%				0%		
Adj. Flow (vph)	13	932	153	1	313	501	91	1	167	620	633	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	1085	0	0	314	501	91	0	168	620	633	22
Turn Type	Perm	NA		pm+pt	pm+pt	NA	Perm	Perm	Perm	NA	Perm	Perm
Protected Phases		6		5	5	2				4		
Permitted Phases	6			2	2		2	4	4		4	8
Detector Phase	6	6		5	5	2	2	4	4	4	4	8
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	4.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	38.0	38.0		11.0	11.0	38.0	38.0	36.0	36.0	36.0	36.0	33.0
Total Split (s)	37.0	37.0		23.0	23.0	60.0	60.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	38.9%	38.9%		24.2%	24.2%	63.2%	63.2%	36.8%	36.8%	36.8%	36.8%	36.8%
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0			7.0	7.0	7.0		6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead	Lead							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	Min	Min		None	None	Min	Min	None	None	None	None	None
Act Effect Green (s)	30.0	30.0			52.8	52.8	52.8		29.0	29.0	29.0	29.0

Oak Tree Traffic Analysis 4: NW 21st Avenue & Prospect Road

Background (2024) Conditions
Timing Plan: AM



Lane Group	SBT	SBR
Lane Configurations	↑↑	
Traffic Volume (vph)	141	8
Future Volume (vph)	141	8
Ideal Flow (vphpl)	1900	1900
Lane Width (ft)	12	12
Grade (%)	0%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	0.95
Ped Bike Factor		
Frt	0.992	
Flt Protected		
Satd. Flow (prot)	3197	0
Flt Permitted		
Satd. Flow (perm)	3197	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	6	
Link Speed (mph)	40	
Link Distance (ft)	1710	
Travel Time (s)	29.1	
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor	0.86	0.86
Growth Factor	100%	100%
Heavy Vehicles (%)	12%	12%
Bus Blockages (#/hr)	0	0
Parking (#/hr)		
Mid-Block Traffic (%)	0%	
Adj. Flow (vph)	164	9
Shared Lane Traffic (%)		
Lane Group Flow (vph)	173	0
Turn Type	NA	
Protected Phases	8	
Permitted Phases		
Detector Phase	8	
Switch Phase		
Minimum Initial (s)	6.0	
Minimum Split (s)	33.0	
Total Split (s)	35.0	
Total Split (%)	36.8%	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.0	
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	
Act Effect Green (s)	29.0	

Oak Tree Traffic Analysis 4: NW 21st Avenue & Prospect Road

Background (2024) Conditions
Timing Plan: AM

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Actuated g/C Ratio	0.32	0.32			0.56	0.56	0.56		0.31	0.31	0.31	0.31
v/c Ratio	0.05	0.98			0.87	0.26	0.10		0.46	1.10	0.79	0.31
Control Delay	23.3	54.8			48.2	11.4	3.7		31.8	100.9	16.7	39.2
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0	1.3	0.2	0.0
Total Delay	23.3	54.8			48.2	11.4	3.7		31.8	102.2	17.0	39.2
LOS	C	D			D	B	A		C	F	B	D
Approach Delay		54.4				23.3				55.9		
Approach LOS		D				C				E		
Queue Length 50th (ft)	5	333			134	77	5		82	~428	89	10
Queue Length 95th (ft)	19	#478			#285	106	26		131	#559	182	33
Internal Link Dist (ft)		763				920				320		
Turn Bay Length (ft)	310				300		135		210		230	265
Base Capacity (vph)	276	1109			362	1904	884		363	564	799	71
Starvation Cap Reductn	0	0			0	0	0		0	68	13	0
Spillback Cap Reductn	0	0			0	0	0		0	0	0	0
Storage Cap Reductn	0	0			0	0	0		0	0	0	0
Reduced v/c Ratio	0.05	0.98			0.87	0.26	0.10		0.46	1.25	0.81	0.31

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 94.8

Natural Cycle: 95

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 45.7

Intersection LOS: D

Intersection Capacity Utilization 103.1%

ICU Level of Service G

Analysis Period (min) 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: NW 21st Avenue & Prospect Road





Lane Group	SBT	SBR
Actuated g/C Ratio	0.31	
v/c Ratio	0.18	
Control Delay	23.9	
Queue Delay	0.0	
Total Delay	23.9	
LOS	C	
Approach Delay	25.7	
Approach LOS	C	
Queue Length 50th (ft)	38	
Queue Length 95th (ft)	61	
Internal Link Dist (ft)	1630	
Turn Bay Length (ft)		
Base Capacity (vph)	982	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.18	
Intersection Summary		

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Background (2024) Conditions
Timing Plan: AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	436	247	73	744	446	123
Future Volume (vph)	436	247	73	744	446	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	230	0	120			230
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1752	1845	1776	1509
Flt Permitted	0.950		0.300			
Satd. Flow (perm)	1770	1583	*30	1845	1776	1509
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		254				134
Link Speed (mph)	35			40	40	
Link Distance (ft)	3035			1175	660	
Travel Time (s)	59.1			20.0	11.3	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.87	0.86	0.86	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	3%	3%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	501	284	85	865	485	134
Shared Lane Traffic (%)						
Lane Group Flow (vph)	501	284	85	865	485	134
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0
Total Split (s)	32.0	14.0	14.0	58.0	44.0	44.0
Total Split (%)	35.6%	15.6%	15.6%	64.4%	48.9%	48.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-5.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	0.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effect Green (s)	31.3	38.3	53.7	53.7	41.7	41.7

Oak Tree Traffic Analysis 5: NW 21st Avenue & NW 44th Street

Background (2024) Conditions
Timing Plan: AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.35	0.43	0.60	0.60	0.46	0.46
v/c Ratio	0.82	0.35	0.56	0.79	0.59	0.17
Control Delay	38.8	4.1	43.8	20.8	22.5	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	4.1	43.8	20.8	22.5	3.5
LOS	D	A	D	C	C	A
Approach Delay	26.3			22.8	18.4	
Approach LOS	C			C	B	
Queue Length 50th (ft)	240	9	38	381	214	0
Queue Length 95th (ft)	#370	48	79	477	315	32
Internal Link Dist (ft)	2955			1095	580	
Turn Bay Length (ft)	230		120			230
Base Capacity (vph)	639	848	190	1112	826	773
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.33	0.45	0.78	0.59	0.17

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 48 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 22.8

Intersection LOS: C

Intersection Capacity Utilization 70.8%

ICU Level of Service C

Analysis Period (min) 15

* User Entered Value

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



Oak Tree Traffic Analysis
6: NW 44th Street & Driveway B

Background (2024) Conditions
Timing Plan: AM

Intersection													
Int Delay, s/veh	3.1												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱		↱	↱				↕				
Traffic Vol, veh/h	0	471	27	14	153	0	2	55	0	69	0	0	0
Future Vol, veh/h	0	471	27	14	153	0	2	55	0	69	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	170	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	16974	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	84	84	84	80	80	80	80	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	535	31	17	182	0	3	69	0	86	0	0	0
Major/Minor	Major1			Major2			Minor1						
Conflicting Flow All	-	0	0	566	0	0	0	767	767	551			
Stage 1	-	-	-	-	-	-	0	551	551	-			
Stage 2	-	-	-	-	-	-	0	216	216	-			
Critical Hdwy	-	-	-	4.12	-	-	-	6.42	6.52	6.22			
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.42	5.52	-			
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.42	5.52	-			
Follow-up Hdwy	-	-	-	2.218	-	-	-	3.518	4.018	3.318			
Pot Cap-1 Maneuver	0	-	-	1006	-	0	0	370	332	534			
Stage 1	0	-	-	-	-	0	0	577	515	-			
Stage 2	0	-	-	-	-	0	0	820	724	-			
Platoon blocked, %		-	-		-		-						
Mov Cap-1 Maneuver	-	-	-	1006	-	-	0	364	0	534			
Mov Cap-2 Maneuver	-	-	-	-	-	-	0	364	0	-			
Stage 1	-	-	-	-	-	-	0	577	0	-			
Stage 2	-	-	-	-	-	-	0	806	0	-			
Approach	EB			WB			NB						
HCM Control Delay, s	0			0.7			17.5						
HCM LOS	C												
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT								
Capacity (veh/h)	442	-	-	1006	-								
HCM Lane V/C Ratio	0.351	-	-	0.017	-								
HCM Control Delay (s)	17.5	-	-	8.6	-								
HCM Lane LOS	C	-	-	A	-								
HCM 95th %tile O(veh)	1.6	-	-	0.1	-								

Oak Tree Traffic Analysis

7: NW 31st Avenue & NW 44th Street

Background (2024) Conditions

Timing Plan: AM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	5	88	298	146	2	52	162	156	7	141	1091	143
Future Volume (vph)	5	88	298	146	2	52	162	156	7	141	1091	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%				0%	
Storage Length (ft)		215		0		170		0		230		130
Storage Lanes		1		1		1		1		1		1
Taper Length (ft)		25				25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00
Ped Bike Factor												
Frt				0.850				0.850				0.850
Flt Protected		0.950				0.950				0.950		
Satd. Flow (prot)	0	1770	1863	1583	0	1770	1863	1583	0	1703	4893	1524
Flt Permitted		0.500				0.215				0.240		
Satd. Flow (perm)	0	931	1863	1583	0	400	1863	1583	0	430	4893	1524
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				141				40				99
Link Speed (mph)			35				35				45	
Link Distance (ft)			1000				930				1000	
Travel Time (s)			19.5				18.1				15.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.82	0.82	0.82	0.82	0.85	0.85	0.85	0.85	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%				0%				0%	
Adj. Flow (vph)	6	107	363	178	2	61	191	184	9	174	1347	177
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	113	363	178	0	63	191	184	0	183	1347	177
Turn Type	Perm	Perm	NA	Perm	Perm	Perm	NA	pm+ov	custom	pm+pt	NA	Perm
Protected Phases			4				8	1!		5	2	
Permitted Phases	4	4		4	8	8		8	5	2		2
Detector Phase	4	4	4	4	8	8	8	1	5	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	10.0	10.0
Minimum Split (s)	40.0	40.0	40.0	40.0	35.0	35.0	35.0	10.0	10.0	10.0	35.0	35.0
Total Split (s)	48.0	48.0	48.0	48.0	48.0	48.0	48.0	27.0	27.0	27.0	105.0	105.0
Total Split (%)	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	15.0%	15.0%	15.0%	58.3%	58.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag								Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	C-Min	C-Min
Act Effect Green (s)		46.0	46.0	46.0		46.0	46.0	78.6		100.8	89.4	89.4

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Background (2024) Conditions
Timing Plan: AM



Lane Group	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Volume (vph)	4	257	919	121
Future Volume (vph)	4	257	919	121
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)			0%	
Storage Length (ft)		185		0
Storage Lanes		1		0
Taper Length (ft)		25		
Lane Util. Factor	0.91	1.00	0.91	0.91
Ped Bike Factor				
Frt			0.983	
Flt Protected		0.950		
Satd. Flow (prot)	0	1703	4810	0
Flt Permitted		0.122		
Satd. Flow (perm)	0	219	4810	0
Right Turn on Red				Yes
Satd. Flow (RTOR)			21	
Link Speed (mph)			45	
Link Distance (ft)			1000	
Travel Time (s)			15.2	
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)			0%	
Adj. Flow (vph)	4	276	988	130
Shared Lane Traffic (%)				
Lane Group Flow (vph)	0	280	1118	0
Turn Type	custom	pm+pt	NA	
Protected Phases		1	6	
Permitted Phases	1!	6		
Detector Phase	1	1	6	
Switch Phase				
Minimum Initial (s)	4.0	4.0	10.0	
Minimum Split (s)	10.0	10.0	35.0	
Total Split (s)	27.0	27.0	105.0	
Total Split (%)	15.0%	15.0%	58.3%	
Yellow Time (s)	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	
Total Lost Time (s)		6.0	6.0	
Lead/Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	
Recall Mode	None	None	C-Min	
Act Effect Green (s)		122.0	104.5	

Oak Tree Traffic Analysis 7: NW 31st Avenue & NW 44th Street

Background (2024) Conditions
Timing Plan: AM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Actuated g/C Ratio		0.26	0.26	0.26		0.26	0.26	0.44		0.56	0.50	0.50
v/c Ratio		0.47	0.76	0.35		0.62	0.40	0.26		0.57	0.55	0.22
Control Delay		61.3	71.6	13.4		82.4	56.2	23.8		21.6	34.5	13.8
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		61.3	71.6	13.4		82.4	56.2	23.8		21.6	34.5	13.8
LOS		E	E	B		F	E	C		C	C	B
Approach Delay			54.0				46.4				30.9	
Approach LOS			D				D				C	
Queue Length 50th (ft)		113	395	33		65	186	101		77	419	51
Queue Length 95th (ft)		151	422	72		111	229	134		120	444	94
Internal Link Dist (ft)			920				850				920	
Turn Bay Length (ft)		215				170				230		130
Base Capacity (vph)		253	507	533		108	507	713		412	2757	901
Starvation Cap Reductn		0	0	0		0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0		0	0	0
Reduced v/c Ratio		0.45	0.72	0.33		0.58	0.38	0.26		0.44	0.49	0.20

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 31 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 34.6

Intersection LOS: C

Intersection Capacity Utilization 75.4%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 7: NW 31st Avenue & NW 44th Street

 Ø1	 Ø2 (R)	 Ø4
27 s	105 s	48 s
 Ø5	 Ø6 (R)	 Ø8
27 s	105 s	48 s

↶

↷

↓

↷

Lane Group	SBU	SBL	SBT	SBR
Actuated g/C Ratio		0.68	0.58	
v/c Ratio		0.76	0.40	
Control Delay		41.0	22.5	
Queue Delay		0.0	0.0	
Total Delay		41.0	22.5	
LOS		D	C	
Approach Delay			26.2	
Approach LOS			C	
Queue Length 50th (ft)		172	258	
Queue Length 95th (ft)		#334	362	
Internal Link Dist (ft)			920	
Turn Bay Length (ft)		185		
Base Capacity (vph)		367	2894	
Starvation Cap Reductn		0	0	
Spillback Cap Reductn		0	0	
Storage Cap Reductn		0	0	
Reduced v/c Ratio		0.76	0.39	
Intersection Summary				

Oak Tree Traffic Analysis

1: Prospect Road & NW 26th Terrace

Background (2024) Conditions
Timing Plan: PM

Intersection								
Int Delay, s/veh	0.4							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	8	6	7	1199	15	700	3	
Future Vol, veh/h	8	6	7	1199	15	700	3	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	-	None	
Storage Length	0	-	90	-	155	-	130	
Veh in Median Storage, #	1	-	-	0	-	0	-	
Grade, %	0	-	-	0	-	0	-	
Peak Hour Factor	92	92	91	91	91	91	91	
Heavy Vehicles, %	2	2	2	2	6	6	6	
Mvmt Flow	9	7	8	1318	16	769	3	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1476	385	772	0	1318	-	0	
Stage 1	801	-	-	-	-	-	-	
Stage 2	675	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	4.14	-	6.52	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.22	-	2.56	-	-	
Pot Cap-1 Maneuver	117	613	839	-	199	-	-	
Stage 1	402	-	-	-	-	-	-	
Stage 2	467	-	-	-	-	-	-	
Platoon blocked, %				-		-	-	
Mov Cap-1 Maneuver	107	613	839	-	199	-	-	
Mov Cap-2 Maneuver	234	-	-	-	-	-	-	
Stage 1	398	-	-	-	-	-	-	
Stage 2	430	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	16.9	0.1		0.5				
HCM LOS	C							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR		
Capacity (veh/h)	839	-	318	199	-	-		
HCM Lane V/C Ratio	0.009	-	0.048	0.083	-	-		
HCM Control Delay (s)	9.3	-	16.9	24.7	-	-		
HCM Lane LOS	A	-	C	C	-	-		
HCM 95th %tile Q(veh)	0	-	0.1	0.3	-	-		

Oak Tree Traffic Analysis

2: Prospect Road & Oak Tree

Background (2024) Conditions

Timing Plan: PM

Intersection								
Int Delay, s/veh	0.4							
Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	3	13	29	15	1203	700	6	
Future Vol, veh/h	3	13	29	15	1203	700	6	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	-	None	-	None	
Storage Length	0	-	-	210	-	-	110	
Veh in Median Storage, #	1	-	-	-	0	0	-	
Grade, %	0	-	-	-	0	0	-	
Peak Hour Factor	92	92	91	91	91	91	91	
Heavy Vehicles, %	2	2	2	2	2	6	6	
Mvmt Flow	3	14	32	16	1322	769	7	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1526	385	769	776	0	-	0	
Stage 1	769	-	-	-	-	-	-	
Stage 2	757	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	6.44	4.14	-	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.52	2.22	-	-	-	
Pot Cap-1 Maneuver	108	613	467	836	-	-	-	
Stage 1	418	-	-	-	-	-	-	
Stage 2	424	-	-	-	-	-	-	
Platoon blocked, %					-	-	-	
Mov Cap-1 Maneuver	98	613	541	541	-	-	-	
Mov Cap-2 Maneuver	228	-	-	-	-	-	-	
Stage 1	381	-	-	-	-	-	-	
Stage 2	424	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	13	0.4		0				
HCM LOS	B							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR			
Capacity (veh/h)	541	-	466	-	-			
HCM Lane V/C Ratio	0.089	-	0.037	-	-			
HCM Control Delay (s)	12.3	-	13	-	-			
HCM Lane LOS	B	-	B	-	-			
HCM 95th %tile O(veh)	0.3	-	0.1	-	-			

Oak Tree Traffic Analysis

3: Prospect Road & Driveway A

Background (2024) Conditions

Timing Plan: PM

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations					↕		↵	↑↑			↑↑	
Traffic Vol, veh/h	0	0	0	15	0	6	6	736	0	0	1200	2
Future Vol, veh/h	0	0	0	15	0	6	6	736	0	0	1200	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	215	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	6	6	6	2	2	2
Mvmt Flow	0	0	0	16	0	7	7	809	0	0	1319	2
Major/Minor				Minor2		Major1		Major2				
Conflicting Flow All				1739	2143	661	1321	0	-	-	-	0
Stage 1				1320	1320	-	-	-	-	-	-	-
Stage 2				419	823	-	-	-	-	-	-	-
Critical Hdwy				6.84	6.54	6.94	4.22	-	-	-	-	-
Critical Hdwy Stg 1				5.84	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2				5.84	5.54	-	-	-	-	-	-	-
Follow-up Hdwy				3.52	4.02	3.32	2.26	-	-	-	-	-
Pot Cap-1 Maneuver				78	48	405	498	-	0	0	-	-
Stage 1				214	225	-	-	-	0	0	-	-
Stage 2				632	386	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver				77	0	405	498	-	-	-	-	-
Mov Cap-2 Maneuver				169	0	-	-	-	-	-	-	-
Stage 1				211	0	-	-	-	-	-	-	-
Stage 2				632	0	-	-	-	-	-	-	-
Approach				WB		SE		NW				
HCM Control Delay, s				25		0.1		0				
HCM LOS				D								
Minor Lane/Major Mvmt	NWT	NWR	WBLn1	SEL	SET							
Capacity (veh/h)	-	-	203	498	-							
HCM Lane V/C Ratio	-	-	0.112	0.013	-							
HCM Control Delay (s)	-	-	25	12.3	-							
HCM Lane LOS	-	-	D	B	-							
HCM 95th %tile O(veh)	-	-	0.4	0	-							

Oak Tree Traffic Analysis

4: NW 21st Avenue & Prospect Road

Background (2024) Conditions

Timing Plan: PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	560	185	584	1099	67	81	261	359	47	598	22
Future Volume (vph)	6	560	185	584	1099	67	81	261	359	47	598	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	310		0	300		135	210		230	265		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.963				0.850			0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3280	0	1770	3539	1583	1641	1727	1468	1770	3522	0
Flt Permitted	0.236			0.107			0.163			0.363		
Satd. Flow (perm)	423	3280	0	199	3539	1583	282	1727	1468	676	3522	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36				59			408		3	
Link Speed (mph)		35			45			40			40	
Link Distance (ft)		843			1000			400			1710	
Travel Time (s)		16.4			15.2			6.8			29.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.88	0.88	0.88	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	10%	10%	10%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	7	615	203	635	1195	73	92	297	408	55	695	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	818	0	635	1195	73	92	297	408	55	721	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			4			8	
Permitted Phases	6			2		2	4		4	8		
Detector Phase	6	6		5	2	2	4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	38.0	38.0		11.0	38.0	38.0	36.0	36.0	36.0	33.0	33.0	
Total Split (s)	43.0	43.0		44.0	87.0	87.0	38.0	38.0	38.0	38.0	38.0	
Total Split (%)	34.4%	34.4%		35.2%	69.6%	69.6%	30.4%	30.4%	30.4%	30.4%	30.4%	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	Min	Min		None	Min	Min	None	None	None	None	None	
Act Effect Green (s)	33.6	33.6		77.6	77.6	77.6	32.0	32.0	32.0	32.0	32.0	

Oak Tree Traffic Analysis 4: NW 21st Avenue & Prospect Road

Background (2024) Conditions
Timing Plan: PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.27	0.27		0.63	0.63	0.63	0.26	0.26	0.26	0.26	0.26	
v/c Ratio	0.06	0.89		1.06	0.53	0.07	1.26	0.66	0.60	0.31	0.78	
Control Delay	35.3	53.3		86.8	13.5	3.0	228.8	49.1	7.5	43.5	49.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	3.0	0.1	0.0	0.0	
Total Delay	35.3	53.3		86.8	13.5	3.0	228.8	52.1	7.7	43.5	49.3	
LOS	D	D		F	B	A	F	D	A	D	D	
Approach Delay		53.1			37.5			49.8			48.9	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	4	311		~511	257	4	~94	217	0	36	287	
Queue Length 95th (ft)	m16	395		#744	311	21	#202	309	75	73	340	
Internal Link Dist (ft)		763			920			320			1630	
Turn Bay Length (ft)	310			300		135	210		230	265		
Base Capacity (vph)	124	988		600	2309	1053	73	451	684	176	921	
Starvation Cap Reductn	0	0		0	0	0	0	77	21	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.06	0.83		1.06	0.52	0.07	1.26	0.79	0.62	0.31	0.78	

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 122.7

Natural Cycle: 125

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.26

Intersection Signal Delay: 44.8

Intersection LOS: D

Intersection Capacity Utilization 102.6%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: NW 21st Avenue & Prospect Road



Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Background (2024) Conditions

Timing Plan: PM

							
Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	215	134	195	485	1	907	459
Future Volume (vph)	215	134	195	485	1	907	459
Ideal Flow (vphpl)	1900	1900	2200	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	0%			0%		0%	
Storage Length (ft)	230	0	120		0		230
Storage Lanes	1	1	1		0		1
Taper Length (ft)	25		25		25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							
Frt		0.850					0.850
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1719	1538	1953	1776	0	1845	1568
Flt Permitted	0.950		0.069				
Satd. Flow (perm)	1719	1538	142	1776	0	1845	1568
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		91					403
Link Speed (mph)	35			40		40	
Link Distance (ft)	3035			1175		660	
Travel Time (s)	59.1			20.0		11.3	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.81	0.81	0.99	0.99	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	7%	7%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%		0%	
Adj. Flow (vph)	265	165	197	490	1	965	488
Shared Lane Traffic (%)							
Lane Group Flow (vph)	265	165	197	490	0	966	488
Turn Type	Prot	pm+ov	pm+pt	NA	Perm	NA	Perm
Protected Phases	4	5	5	2		6	
Permitted Phases		4	2		6		6
Detector Phase	4	5	5	2	6	6	6
Switch Phase							
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0	17.0
Total Split (s)	29.0	12.0	12.0	66.0	54.0	54.0	54.0
Total Split (%)	30.5%	12.6%	12.6%	69.5%	56.8%	56.8%	56.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effect Green (s)	18.6	31.7	66.4	66.4		53.3	53.3

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Background (2024) Conditions
Timing Plan: PM



Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Actuated g/C Ratio	0.20	0.33	0.70	0.70		0.56	0.56
v/c Ratio	0.79	0.29	0.78	0.39		0.93	0.46
Control Delay	52.7	11.2	39.6	7.8		38.2	4.2
Queue Delay	0.0	0.0	0.0	0.0		5.0	0.0
Total Delay	52.7	11.2	39.6	7.8		43.1	4.2
LOS	D	B	D	A		D	A
Approach Delay	36.8			16.9		30.1	
Approach LOS	D			B		C	
Queue Length 50th (ft)	152	30	59	108		540	24
Queue Length 95th (ft)	197	60	#193	196		#856	84
Internal Link Dist (ft)	2955			1095		580	
Turn Bay Length (ft)	230		120				230
Base Capacity (vph)	434	575	256	1241		1034	1056
Starvation Cap Reductn	0	0	0	0		45	0
Spillback Cap Reductn	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0		0	0
Reduced v/c Ratio	0.61	0.29	0.77	0.39		0.98	0.46

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 53 (56%), Referenced to phase 2:NBTL and 6:SBTU, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 27.7

Intersection LOS: C

Intersection Capacity Utilization 97.7%

ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



Oak Tree Traffic Analysis
6: NW 44th Street & Driveway B

Background (2024) Conditions
Timing Plan: PM

Intersection													
Int Delay, s/veh	1.9												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱		↱	↱				↲				
Traffic Vol, veh/h	0	225	54	57	496	0	1	45	0	27	0	0	0
Future Vol, veh/h	0	225	54	57	496	0	1	45	0	27	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	170	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	16974	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	96	96	96	90	90	90	90	92	92	92
Heavy Vehicles, %	4	4	4	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	262	63	59	517	0	1	50	0	30	0	0	0
Major/Minor	Major1			Major2			Minor1						
Conflicting Flow All	-	0	0	325	0	0	0	929	929	294			
Stage 1	-	-	-	-	-	-	0	294	294	-			
Stage 2	-	-	-	-	-	-	0	635	635	-			
Critical Hdwy	-	-	-	4.12	-	-	-	6.42	6.52	6.22			
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.42	5.52	-			
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.42	5.52	-			
Follow-up Hdwy	-	-	-	2.218	-	-	-	3.518	4.018	3.318			
Pot Cap-1 Maneuver	0	-	-	1235	-	0	0	297	268	745			
Stage 1	0	-	-	-	-	0	0	756	670	-			
Stage 2	0	-	-	-	-	0	0	528	472	-			
Platoon blocked, %		-	-		-		-						
Mov Cap-1 Maneuver	-	-	-	1235	-	-	0	283	0	745			
Mov Cap-2 Maneuver	-	-	-	-	-	-	0	283	0	-			
Stage 1	-	-	-	-	-	-	0	756	0	-			
Stage 2	-	-	-	-	-	-	0	503	0	-			
Approach	EB			WB			NB						
HCM Control Delay, s	0			0.8			17.4						
HCM LOS	C												
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT								
Capacity (veh/h)	369	-	-	1235	-								
HCM Lane V/C Ratio	0.217	-	-	0.048	-								
HCM Control Delay (s)	17.4	-	-	8.1	-								
HCM Lane LOS	C	-	-	A	-								
HCM 95th %tile O(veh)	0.8	-	-	0.2	-								

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Background (2024) Conditions

Timing Plan: PM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	4	52	142	84	18	123	311	132	21	167	1387	117
Future Volume (vph)	4	52	142	84	18	123	311	132	21	167	1387	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%				0%	
Storage Length (ft)		215		0		170		0		230		130
Storage Lanes		1		1		1		1		1		1
Taper Length (ft)		25				25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00
Ped Bike Factor												
Frt				0.850				0.850				0.850
Flt Protected		0.950				0.950				0.950		
Satd. Flow (prot)	0	1736	1827	1553	0	1770	1863	1583	0	1703	4893	1524
Flt Permitted		0.229				0.542				0.059		
Satd. Flow (perm)	0	418	1827	1553	0	1010	1863	1583	0	106	4893	1524
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				94				55				74
Link Speed (mph)			35				35				45	
Link Distance (ft)			1000				930				1000	
Travel Time (s)			19.5				18.1				15.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%				0%				0%	
Adj. Flow (vph)	4	58	160	94	19	132	334	142	23	180	1491	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	160	94	0	151	334	142	0	203	1491	126
Turn Type	Perm	Perm	NA	Perm	Perm	Perm	NA	pm+ov	custom	pm+pt	NA	Perm
Protected Phases			4				8	1!		5	2	
Permitted Phases	4	4		4	8	8		8	5	2		2
Detector Phase	4	4	4	4	8	8	8	1	5	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	10.0	10.0
Minimum Split (s)	40.0	40.0	40.0	40.0	35.0	35.0	35.0	10.0	10.0	10.0	35.0	35.0
Total Split (s)	44.0	44.0	44.0	44.0	44.0	44.0	44.0	20.0	29.0	29.0	116.0	116.0
Total Split (%)	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	11.1%	16.1%	16.1%	64.4%	64.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag								Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	C-Min	C-Min
Act Effect Green (s)		42.8	42.8	42.8		42.8	42.8	59.3		124.5	108.7	108.7

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Background (2024) Conditions
Timing Plan: PM



Lane Group	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Volume (vph)	1	163	1540	284
Future Volume (vph)	1	163	1540	284
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)			0%	
Storage Length (ft)		185		0
Storage Lanes		1		0
Taper Length (ft)		25		
Lane Util. Factor	0.91	1.00	0.91	0.91
Ped Bike Factor				
Frt			0.977	
Flt Protected		0.950		
Satd. Flow (prot)	0	1703	4781	0
Flt Permitted		0.135		
Satd. Flow (perm)	0	242	4781	0
Right Turn on Red				Yes
Satd. Flow (RTOR)			34	
Link Speed (mph)			45	
Link Distance (ft)			1000	
Travel Time (s)			15.2	
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)			0%	
Adj. Flow (vph)	1	168	1588	293
Shared Lane Traffic (%)				
Lane Group Flow (vph)	0	169	1881	0
Turn Type	custom	pm+pt	NA	
Protected Phases		1	6	
Permitted Phases	1!	6		
Detector Phase	1	1	6	
Switch Phase				
Minimum Initial (s)	4.0	4.0	10.0	
Minimum Split (s)	10.0	10.0	35.0	
Total Split (s)	20.0	20.0	107.0	
Total Split (%)	11.1%	11.1%	59.4%	
Yellow Time (s)	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	
Total Lost Time (s)		6.0	6.0	
Lead/Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	
Recall Mode	None	None	C-Min	
Act Effect Green (s)		111.7	101.2	

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Background (2024) Conditions
Timing Plan: PM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Actuated g/C Ratio		0.24	0.24	0.24		0.24	0.24	0.33		0.69	0.60	0.60
v/c Ratio		0.63	0.37	0.21		0.63	0.76	0.25		0.88	0.50	0.13
Control Delay		88.5	59.8	10.3		74.1	75.0	26.8		76.8	21.6	7.3
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		88.5	59.8	10.3		74.1	75.0	26.8		76.8	21.6	7.3
LOS		F	E	B		E	E	C		E	C	A
Approach Delay			50.7				63.9				26.8	
Approach LOS			D				E				C	
Queue Length 50th (ft)		63	151	0		153	350	69		165	397	27
Queue Length 95th (ft)		#147	238	51		257	#511	136		255	400	57
Internal Link Dist (ft)			920				850				920	
Turn Bay Length (ft)		215				170				230		130
Base Capacity (vph)		101	444	448		245	452	587		277	3054	979
Starvation Cap Reductn		0	0	0		0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0		0	0	0
Reduced v/c Ratio		0.61	0.36	0.21		0.62	0.74	0.24		0.73	0.49	0.13

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 31 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 34.9

Intersection LOS: C

Intersection Capacity Utilization 87.0%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 7: NW 31st Avenue & NW 44th Street



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Lane Group	SBU	SBL	SBT	SBR
Actuated g/C Ratio		0.62	0.56	
v/c Ratio		0.72	0.70	
Control Delay		32.8	30.5	
Queue Delay		0.0	0.0	
Total Delay		32.8	30.5	
LOS		C	C	
Approach Delay			30.7	
Approach LOS			C	
Queue Length 50th (ft)		73	630	
Queue Length 95th (ft)		113	635	
Internal Link Dist (ft)			920	
Turn Bay Length (ft)		185		
Base Capacity (vph)		268	2798	
Starvation Cap Reductn		0	0	
Spillback Cap Reductn		0	0	
Storage Cap Reductn		0	0	
Reduced v/c Ratio		0.63	0.67	
Intersection Summary				

APPENDIX E

**TOTAL INTERSECTION CAPACITY ANALYSIS
WORKSHEETS**

Oak Tree Traffic Analysis
1: Prospect Road & NW 26th Terrace

Total (2024) Conditions
Timing Plan: AM

Intersection								
Int Delay, s/veh	0.5							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	17	3	5	689	20	1024	1	
Future Vol, veh/h	17	3	5	689	20	1024	1	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	-	None	
Storage Length	0	-	90	-	155	-	130	
Veh in Median Storage, #	1	-	-	0	-	0	-	
Grade, %	0	-	-	0	-	0	-	
Peak Hour Factor	92	92	85	85	91	91	91	
Heavy Vehicles, %	2	2	4	4	2	2	2	
Mvmt Flow	18	3	6	811	22	1125	1	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1587	563	1126	0	811	-	0	
Stage 1	1169	-	-	-	-	-	-	
Stage 2	418	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	4.18	-	6.44	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.24	-	2.52	-	-	
Pot Cap-1 Maneuver	99	470	605	-	439	-	-	
Stage 1	258	-	-	-	-	-	-	
Stage 2	632	-	-	-	-	-	-	
Platoon blocked, %				-		-	-	
Mov Cap-1 Maneuver	93	470	605	-	439	-	-	
Mov Cap-2 Maneuver	196	-	-	-	-	-	-	
Stage 1	255	-	-	-	-	-	-	
Stage 2	600	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	23.6	0.1		0.3				
HCM LOS	C							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR		
Capacity (veh/h)	605	-	215	439	-	-		
HCM Lane V/C Ratio	0.01	-	0.101	0.05	-	-		
HCM Control Delay (s)	11	-	23.6	13.6	-	-		
HCM Lane LOS	B	-	C	B	-	-		
HCM 95th %tile Q(veh)	0	-	0.3	0.2	-	-		

Oak Tree Traffic Analysis

2: Prospect Road & Oak Tree

Total (2024) Conditions
Timing Plan: AM

Intersection								
Int Delay, s/veh	0.3							
Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	5	18	2	11	689	1027	0	
Future Vol, veh/h	5	18	2	11	689	1027	0	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	-	None	-	None	
Storage Length	0	-	-	210	-	-	110	
Veh in Median Storage, #	1	-	-	-	0	0	-	
Grade, %	0	-	-	-	0	0	-	
Peak Hour Factor	92	92	85	85	85	91	91	
Heavy Vehicles, %	2	2	4	4	4	2	2	
Mvmt Flow	5	20	2	13	811	1129	0	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1565	565	1129	1129	0	-	0	
Stage 1	1129	-	-	-	-	-	-	
Stage 2	436	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	6.48	4.18	-	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.54	2.24	-	-	-	
Pot Cap-1 Maneuver	102	468	269	603	-	-	-	
Stage 1	271	-	-	-	-	-	-	
Stage 2	619	-	-	-	-	-	-	
Platoon blocked, %					-	-	-	
Mov Cap-1 Maneuver	99	468	501	501	-	-	-	
Mov Cap-2 Maneuver	204	-	-	-	-	-	-	
Stage 1	263	-	-	-	-	-	-	
Stage 2	619	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	15.6	0.2		0				
HCM LOS	C							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR			
Capacity (veh/h)	501	-	365	-	-			
HCM Lane V/C Ratio	0.031	-	0.068	-	-			
HCM Control Delay (s)	12.4	-	15.6	-	-			
HCM Lane LOS	B	-	C	-	-			
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-			

Oak Tree Traffic Analysis

3: Prospect Road & Driveway A

Total (2024) Conditions
Timing Plan: AM

Intersection														
Int Delay, s/veh	4.4													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEU	SEL	SET	SER	NWU	NWL	NWT	NWR
Lane Configurations														
Traffic Vol, veh/h	106	0	49	4	0	3	3	16	993	35	2	16	591	15
Future Vol, veh/h	106	0	49	4	0	3	3	16	993	35	2	16	591	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	0	-	-	-	-	-	-	215	-	150	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	91	91	91	91	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	4	4	4	4
Mvmt Flow	115	0	53	4	0	3	3	18	1091	38	2	19	695	18
Major/Minor	Minor1		Minor2		Major1				Major2					
Conflicting Flow All	1523	1888	546	1334	1917	357	713	713	0	0	1091	1129	0	0
Stage 1	1133	1133	-	746	746	-	-	-	-	-	-	-	-	-
Stage 2	390	755	-	588	1171	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	6.44	4.14	-	-	6.48	4.18	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.52	2.22	-	-	2.54	2.24	-	-
Pot Cap-1 Maneuver	~ 81	70	482	112	67	639	507	883	-	-	285	603	-	-
Stage 1	216	276	-	372	419	-	-	-	-	-	-	-	-	-
Stage 2	606	415	-	462	265	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	~ 77	65	482	95	63	639	790	790	-	-	524	524	-	-
Mov Cap-2 Maneuver	165	172	-	212	162	-	-	-	-	-	-	-	-	-
Stage 1	210	269	-	362	402	-	-	-	-	-	-	-	-	-
Stage 2	579	398	-	400	258	-	-	-	-	-	-	-	-	-
Approach	EB		WB		SE				NW					
HCM Control Delay, s	49.4		17.4		0.2				0.4					
HCM LOS	E		C											
Minor Lane/Major Mvmt	NWL	NWT	NWR	EBLn1	EBLn2	WBLn1	SEL	SET	SER					
Capacity (veh/h)	524	-	-	165	482	297	790	-	-					
HCM Lane V/C Ratio	0.04	-	-	0.698	0.11	0.026	0.026	-	-					
HCM Control Delay (s)	12.2	-	-	66	13.4	17.4	9.7	-	-					
HCM Lane LOS	B	-	-	F	B	C	A	-	-					
HCM 95th %tile Q(veh)	0.1	-	-	4.2	0.4	0.1	0.1	-	-					
Notes														
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon					

Oak Tree Traffic Analysis

4: NW 21st Avenue & Prospect Road

Total (2024) Conditions
Timing Plan: AM

												
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	14	870	164	1	288	468	84	1	147	515	525	19
Future Volume (vph)	14	870	164	1	288	468	84	1	147	515	525	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%				0%		
Storage Length (ft)	310		0		300		135		210		230	265
Storage Lanes	1		0		1		1		1		1	1
Taper Length (ft)	25				25				25			25
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.976					0.850				0.850	
Flt Protected	0.950				0.950				0.950			0.950
Satd. Flow (prot)	1770	3454	0	0	1703	3406	1524	0	1752	1845	1568	1612
Flt Permitted	0.465				0.101				0.642			0.148
Satd. Flow (perm)	866	3454	0	0	181	3406	1524	0	1184	1845	1568	251
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)		25					59				*460	
Link Speed (mph)		35				45				40		
Link Distance (ft)		843				1000				400		
Travel Time (s)		16.4				15.2				6.8		
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.83	0.83	0.83	0.83	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	6%	3%	3%	3%	3%	12%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%				0%		
Adj. Flow (vph)	15	956	180	1	313	509	91	1	177	620	633	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	1136	0	0	314	509	91	0	178	620	633	22
Turn Type	Perm	NA		pm+pt	pm+pt	NA	Perm	Perm	Perm	NA	Perm	Perm
Protected Phases		6		5	5	2				4		
Permitted Phases	6			2	2		2	4	4		4	8
Detector Phase	6	6		5	5	2	2	4	4	4	4	8
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	4.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	38.0	38.0		11.0	11.0	38.0	38.0	36.0	36.0	36.0	36.0	33.0
Total Split (s)	40.0	40.0		22.0	22.0	62.0	62.0	33.0	33.0	33.0	33.0	33.0
Total Split (%)	42.1%	42.1%		23.2%	23.2%	65.3%	65.3%	34.7%	34.7%	34.7%	34.7%	34.7%
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0			7.0	7.0	7.0		6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead	Lead							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	Min	Min		None	None	Min	Min	None	None	None	None	None
Act Effect Green (s)	32.6	32.6			54.6	54.6	54.6		27.0	27.0	27.0	27.0

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Total (2024) Conditions
Timing Plan: AM



Lane Group	SBT	SBR
Lane Configurations	↑↑	
Traffic Volume (vph)	141	9
Future Volume (vph)	141	9
Ideal Flow (vphpl)	1900	1900
Lane Width (ft)	12	12
Grade (%)	0%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	0.95
Ped Bike Factor		
Frt	0.991	
Flt Protected		
Satd. Flow (prot)	3194	0
Flt Permitted		
Satd. Flow (perm)	3194	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	6	
Link Speed (mph)	40	
Link Distance (ft)	1710	
Travel Time (s)	29.1	
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor	0.86	0.86
Growth Factor	100%	100%
Heavy Vehicles (%)	12%	12%
Bus Blockages (#/hr)	0	0
Parking (#/hr)		
Mid-Block Traffic (%)	0%	
Adj. Flow (vph)	164	10
Shared Lane Traffic (%)		
Lane Group Flow (vph)	174	0
Turn Type	NA	
Protected Phases	8	
Permitted Phases		
Detector Phase	8	
Switch Phase		
Minimum Initial (s)	6.0	
Minimum Split (s)	33.0	
Total Split (s)	33.0	
Total Split (%)	34.7%	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.0	
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	
Act Effect Green (s)	27.0	

Oak Tree Traffic Analysis 4: NW 21st Avenue & Prospect Road

Total (2024) Conditions
Timing Plan: AM

												
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Actuated g/C Ratio	0.34	0.34			0.58	0.58	0.58		0.29	0.29	0.29	0.29
v/c Ratio	0.05	0.94			0.91	0.26	0.10		0.53	1.18	0.82	0.31
Control Delay	21.4	45.4			54.8	10.4	4.2		35.3	131.2	18.6	40.5
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0	0.7	0.0	0.0
Total Delay	21.4	45.4			54.8	10.4	4.2		35.3	131.9	18.6	40.5
LOS	C	D			D	B	A		D	F	B	D
Approach Delay		45.1				25.0				69.8		
Approach LOS		D				C				E		
Queue Length 50th (ft)	6	338			136	74	8		90	~453	93	10
Queue Length 95th (ft)	20	#475			#296	102	28		144	#584	189	33
Internal Link Dist (ft)		763				920				320		
Turn Bay Length (ft)	310				300		135		210		230	265
Base Capacity (vph)	301	1221			346	1979	910		337	526	775	71
Starvation Cap Reductn	0	0			0	0	0		0	43	0	0
Spillback Cap Reductn	0	0			0	0	0		0	0	0	0
Storage Cap Reductn	0	0			0	0	0		0	0	0	0
Reduced v/c Ratio	0.05	0.93			0.91	0.26	0.10		0.53	1.28	0.82	0.31

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 94.6

Natural Cycle: 95

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.18

Intersection Signal Delay: 48.7

Intersection LOS: D

Intersection Capacity Utilization 104.5%

ICU Level of Service G

Analysis Period (min) 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: NW 21st Avenue & Prospect Road



Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Total (2024) Conditions
Timing Plan: AM

↓ ↙

Lane Group	SBT	SBR
Actuated g/C Ratio	0.29	
v/c Ratio	0.19	
Control Delay	25.4	
Queue Delay	0.0	
Total Delay	25.4	
LOS	C	
Approach Delay	27.1	
Approach LOS	C	
Queue Length 50th (ft)	40	
Queue Length 95th (ft)	64	
Internal Link Dist (ft)	1630	
Turn Bay Length (ft)		
Base Capacity (vph)	916	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.19	
Intersection Summary		

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	436	257	76	752	471	123
Future Volume (vph)	436	257	76	752	471	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	230	0	120			230
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1752	1845	1776	1509
Flt Permitted	0.950		0.278			
Satd. Flow (perm)	1770	1583	*30	1845	1776	1509
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		233				134
Link Speed (mph)	35			40	40	
Link Distance (ft)	3035			1175	660	
Travel Time (s)	59.1			20.0	11.3	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.87	0.86	0.86	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	3%	3%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	501	295	88	874	512	134
Shared Lane Traffic (%)						
Lane Group Flow (vph)	501	295	88	874	512	134
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0
Total Split (s)	32.0	14.0	14.0	58.0	44.0	44.0
Total Split (%)	35.6%	15.6%	15.6%	64.4%	48.9%	48.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-5.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	0.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effect Green (s)	31.3	38.4	53.7	53.7	41.6	41.6

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.35	0.43	0.60	0.60	0.46	0.46
v/c Ratio	0.82	0.36	0.57	0.79	0.62	0.17
Control Delay	38.8	5.2	44.6	21.2	23.5	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	5.2	44.6	21.2	23.5	3.5
LOS	D	A	D	C	C	A
Approach Delay	26.4			23.4	19.3	
Approach LOS	C			C	B	
Queue Length 50th (ft)	240	19	40	388	231	0
Queue Length 95th (ft)	#370	60	82	488	338	32
Internal Link Dist (ft)	2955			1095	580	
Turn Bay Length (ft)	230		120			230
Base Capacity (vph)	639	837	190	1112	825	772
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.35	0.46	0.79	0.62	0.17

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 48 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 23.3

Intersection LOS: C

Intersection Capacity Utilization 71.2%

ICU Level of Service C

Analysis Period (min) 15

* User Entered Value

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



Oak Tree Traffic Analysis
6: NW 44th Street & Driveway B

Total (2024) Conditions
Timing Plan: AM

Intersection													
Int Delay, s/veh	4.1												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	10	471	27	14	153	3	2	55	0	69	10	0	32
Future Vol, veh/h	10	471	27	14	153	3	2	55	0	69	10	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	170	-	-	-	-	-	-	80	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	84	84	84	80	80	80	80	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	535	31	17	182	4	3	69	0	86	11	0	35
Major/Minor	Major1			Major2			Minor1			Minor2			
Conflicting Flow All	186	0	0	566	0	0	0	809	793	551	834	806	184
Stage 1	-	-	-	-	-	-	0	573	573	-	218	218	-
Stage 2	-	-	-	-	-	-	0	236	220	-	616	588	-
Critical Hdwy	4.12	-	-	4.12	-	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1388	-	-	1006	-	-	0	299	321	534	288	316	858
Stage 1	-	-	-	-	-	-	0	505	504	-	784	723	-
Stage 2	-	-	-	-	-	-	0	767	721	-	478	496	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1388	-	-	1006	-	-	0	280	312	534	236	307	858
Mov Cap-2 Maneuver	-	-	-	-	-	-	0	280	312	-	236	307	-
Stage 1	-	-	-	-	-	-	0	499	498	-	775	711	-
Stage 2	-	-	-	-	-	-	0	723	709	-	396	490	-
Approach	EB			WB			NB			SB			
HCM Control Delay, s	0.1			0.7			20.8			12.2			
HCM LOS							C			B			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2				
Capacity (veh/h)	381	1388	-	-	1006	-	-	236	858				
HCM Lane V/C Ratio	0.407	0.008	-	-	0.017	-	-	0.046	0.041				
HCM Control Delay (s)	20.8	7.6	0	-	8.6	-	-	21	9.4				
HCM Lane LOS	C	A	A	-	A	-	-	C	A				
HCM 95th %tile Q(veh)	1.9	0	-	-	0.1	-	-	0.1	0.1				

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: AM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	5	88	302	146	2	62	174	166	7	141	1091	146
Future Volume (vph)	5	88	302	146	2	62	174	166	7	141	1091	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%				0%	
Storage Length (ft)		215		0		170		0		230		130
Storage Lanes		1		1		1		1		1		1
Taper Length (ft)		25				25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00
Ped Bike Factor												
Frt				0.850				0.850				0.850
Flt Protected		0.950				0.950				0.950		
Satd. Flow (prot)	0	1770	1863	1583	0	1770	1863	1583	0	1703	4893	1524
Flt Permitted		0.507				0.270				0.230		
Satd. Flow (perm)	0	944	1863	1583	0	503	1863	1583	0	412	4893	1524
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				140				23				91
Link Speed (mph)			35				35				45	
Link Distance (ft)			1000				930				1000	
Travel Time (s)			19.5				18.1				15.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.82	0.82	0.82	0.82	0.85	0.85	0.85	0.85	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%				0%				0%	
Adj. Flow (vph)	6	107	368	178	2	73	205	195	9	174	1347	180
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	113	368	178	0	75	205	195	0	183	1347	180
Turn Type	Perm	Perm	NA	Perm	Perm	Perm	NA	pm+ov	custom	pm+pt	NA	Perm
Protected Phases			4				8	1!		5	2	
Permitted Phases	4	4		4	8	8		8	5	2		2
Detector Phase	4	4	4	4	8	8	8	1	5	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	10.0	10.0
Minimum Split (s)	40.0	40.0	40.0	40.0	35.0	35.0	35.0	10.0	10.0	10.0	35.0	35.0
Total Split (s)	49.0	49.0	49.0	49.0	49.0	49.0	49.0	40.0	25.0	25.0	91.0	91.0
Total Split (%)	27.2%	27.2%	27.2%	27.2%	27.2%	27.2%	27.2%	22.2%	13.9%	13.9%	50.6%	50.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag								Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	C-Min	C-Min
Act Effect Green (s)		53.1	53.1	53.1		53.1	53.1	85.6		94.5	82.4	82.4

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: AM



Lane Group	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Volume (vph)	4	260	919	121
Future Volume (vph)	4	260	919	121
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)			0%	
Storage Length (ft)		185		0
Storage Lanes		1		0
Taper Length (ft)		25		
Lane Util. Factor	0.91	1.00	0.91	0.91
Ped Bike Factor				
Frt			0.983	
Flt Protected		0.950		
Satd. Flow (prot)	0	1703	4810	0
Flt Permitted		0.111		
Satd. Flow (perm)	0	199	4810	0
Right Turn on Red				Yes
Satd. Flow (RTOR)			21	
Link Speed (mph)			45	
Link Distance (ft)			1000	
Travel Time (s)			15.2	
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)			0%	
Adj. Flow (vph)	4	280	988	130
Shared Lane Traffic (%)				
Lane Group Flow (vph)	0	284	1118	0
Turn Type	custom	pm+pt	NA	
Protected Phases		1	6	
Permitted Phases	1!	6		
Detector Phase	1	1	6	
Switch Phase				
Minimum Initial (s)	4.0	4.0	10.0	
Minimum Split (s)	10.0	10.0	35.0	
Total Split (s)	40.0	40.0	106.0	
Total Split (%)	22.2%	22.2%	58.9%	
Yellow Time (s)	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	
Total Lost Time (s)		6.0	6.0	
Lead/Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	
Recall Mode	None	None	C-Min	
Act Effect Green (s)		114.9	96.8	

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: AM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Actuated g/C Ratio		0.30	0.30	0.30		0.30	0.30	0.48		0.52	0.46	0.46
v/c Ratio		0.41	0.67	0.32		0.51	0.37	0.26		0.61	0.60	0.24
Control Delay		54.6	61.8	12.9		64.6	51.6	24.1		25.4	39.4	17.0
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		54.6	61.8	12.9		64.6	51.6	24.1		25.4	39.4	17.0
LOS		D	E	B		E	D	C		C	D	B
Approach Delay			47.4				42.4				35.6	
Approach LOS			D				D				D	
Queue Length 50th (ft)		105	374	32		72	188	114		89	450	63
Queue Length 95th (ft)		155	441	76		127	253	148		114	462	108
Internal Link Dist (ft)			920				850				920	
Turn Bay Length (ft)		215				170				230		130
Base Capacity (vph)		280	552	568		149	552	830		368	2408	796
Starvation Cap Reductn		0	0	0		0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0		0	0	0
Reduced v/c Ratio		0.40	0.67	0.31		0.50	0.37	0.23		0.50	0.56	0.23

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 31 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 36.8

Intersection LOS: D

Intersection Capacity Utilization 75.8%

ICU Level of Service D

Analysis Period (min) 15

! Phase conflict between lane groups.

Splits and Phases: 7: NW 31st Avenue & NW 44th Street



Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: AM

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Lane Group	SBU	SBL	SBT	SBR
Actuated g/C Ratio		0.64	0.54	
v/c Ratio		0.82	0.43	
Control Delay		51.8	26.1	
Queue Delay		0.0	0.0	
Total Delay		51.8	26.1	
LOS		D	C	
Approach Delay			31.3	
Approach LOS			C	
Queue Length 50th (ft)		208	293	
Queue Length 95th (ft)		317	345	
Internal Link Dist (ft)			920	
Turn Bay Length (ft)		185		
Base Capacity (vph)		411	2750	
Starvation Cap Reductn		0	0	
Spillback Cap Reductn		0	0	
Storage Cap Reductn		0	0	
Reduced v/c Ratio		0.69	0.41	
Intersection Summary				

Oak Tree Traffic Analysis
1: Prospect Road & NW 26th Terrace

Total (2024) Conditions
Timing Plan: PM

Intersection								
Int Delay, s/veh	0.4							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	8	6	7	1267	15	816	3	
Future Vol, veh/h	8	6	7	1267	15	816	3	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	-	None	
Storage Length	0	-	90	-	155	-	130	
Veh in Median Storage, #	1	-	-	0	-	0	-	
Grade, %	0	-	-	0	-	0	-	
Peak Hour Factor	92	92	91	91	91	91	91	
Heavy Vehicles, %	2	2	2	2	6	6	6	
Mvmt Flow	9	7	8	1392	16	897	3	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1641	449	900	0	1392	-	0	
Stage 1	929	-	-	-	-	-	-	
Stage 2	712	-	-	-	-	-	-	
Critical Hdwy	6.84	6.94	4.14	-	6.52	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.22	-	2.56	-	-	
Pot Cap-1 Maneuver	91	557	751	-	178	-	-	
Stage 1	345	-	-	-	-	-	-	
Stage 2	447	-	-	-	-	-	-	
Platoon blocked, %				-		-	-	
Mov Cap-1 Maneuver	82	557	751	-	178	-	-	
Mov Cap-2 Maneuver	203	-	-	-	-	-	-	
Stage 1	341	-	-	-	-	-	-	
Stage 2	407	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	18.6	0.1		0.5				
HCM LOS	C							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR		
Capacity (veh/h)	751	-	279	178	-	-		
HCM Lane V/C Ratio	0.01	-	0.055	0.093	-	-		
HCM Control Delay (s)	9.8	-	18.6	27.3	-	-		
HCM Lane LOS	A	-	C	D	-	-		
HCM 95th %tile Q(veh)	0	-	0.2	0.3	-	-		

Oak Tree Traffic Analysis

2: Prospect Road & Oak Tree

Total (2024) Conditions
Timing Plan: PM

Intersection							
Int Delay, s/veh	0.4						
Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	3	13	29	15	1271	816	6
Future Vol, veh/h	3	13	29	15	1271	816	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	None
Storage Length	0	-	-	210	-	-	110
Veh in Median Storage, #	1	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	6	6
Mvmt Flow	3	14	32	16	1397	897	7
Major/Minor	Minor2	Major1		Major2			
Conflicting Flow All	1692	449	897	904	0	-	0
Stage 1	897	-	-	-	-	-	-
Stage 2	795	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	6.44	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.52	2.22	-	-	-
Pot Cap-1 Maneuver	84	557	387	748	-	-	-
Stage 1	358	-	-	-	-	-	-
Stage 2	405	-	-	-	-	-	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	75	557	455	455	-	-	-
Mov Cap-2 Maneuver	197	-	-	-	-	-	-
Stage 1	320	-	-	-	-	-	-
Stage 2	405	-	-	-	-	-	-
Approach	EB	NB		SB			
HCM Control Delay, s	14.1	0.5		0			
HCM LOS	B						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR		
Capacity (veh/h)	455	-	415	-	-		
HCM Lane V/C Ratio	0.106	-	0.042	-	-		
HCM Control Delay (s)	13.9	-	14.1	-	-		
HCM Lane LOS	B	-	B	-	-		
HCM 95th %tile Q(veh)	0.4	-	0.1	-	-		

Oak Tree Traffic Analysis

3: Prospect Road & Driveway A

Total (2024) Conditions
Timing Plan: PM

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Vol, veh/h	68	0	32	15	0	6	6	736	116	54	1200	2
Future Vol, veh/h	68	0	32	15	0	6	6	736	116	54	1200	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	215	-	150	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	6	6	6	2	2	2
Mvmt Flow	74	0	35	16	0	7	7	809	127	59	1319	2
Major/Minor	Minor1		Minor2		Major1		Major2					
Conflicting Flow All	1601	2262	405	1857	2388	661	1321	0	0	936	0	0
Stage 1	823	823	-	1438	1438	-	-	-	-	-	-	-
Stage 2	778	1439	-	419	950	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.22	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.26	-	-	2.22	-	-
Pot Cap-1 Maneuver	~ 71	40	595	45	34	405	498	-	-	727	-	-
Stage 1	334	386	-	140	197	-	-	-	-	-	-	-
Stage 2	355	197	-	582	337	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 65	36	595	39	31	405	498	-	-	727	-	-
Mov Cap-2 Maneuver	176	123	-	109	113	-	-	-	-	-	-	-
Stage 1	329	381	-	138	181	-	-	-	-	-	-	-
Stage 2	321	181	-	540	332	-	-	-	-	-	-	-
Approach	EB		WB		SE		NW					
HCM Control Delay, s	30.5		36.2		0.1		0.4					
HCM LOS	D		E									
Minor Lane/Major Mvmt	NWL	NWT	NWR	EBLn1	EBLn2	WBLn1	SEL	SET	SER			
Capacity (veh/h)	727	-	-	176	595	138	498	-	-			
HCM Lane V/C Ratio	0.082	-	-	0.42	0.058	0.165	0.013	-	-			
HCM Control Delay (s)	10.4	-	-	39.5	11.4	36.2	12.3	-	-			
HCM Lane LOS	B	-	-	E	B	E	B	-	-			
HCM 95th %tile Q(veh)	0.3	-	-	1.9	0.2	0.6	0	-	-			
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon			

Oak Tree Traffic Analysis

4: NW 21st Avenue & Prospect Road

Total (2024) Conditions

Timing Plan: PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	574	201	584	1123	67	109	261	359	47	598	24
Future Volume (vph)	8	574	201	584	1123	67	109	261	359	47	598	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	310		0	300		135	210		230	265		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.961				0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3273	0	1770	3539	1583	1641	1727	1468	1770	3518	0
Flt Permitted	0.230			0.103			0.218			0.375		
Satd. Flow (perm)	412	3273	0	192	3539	1583	377	1727	1468	699	3518	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		43				61			408			3
Link Speed (mph)		35			45			40			40	
Link Distance (ft)		843			1000			400			1710	
Travel Time (s)		16.4			15.2			6.8			29.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.88	0.88	0.88	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	10%	10%	10%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	9	631	221	635	1221	73	124	297	408	49	629	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	852	0	635	1221	73	124	297	408	49	654	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			4				8
Permitted Phases	6			2		2	4		4	8		
Detector Phase	6	6		5	2	2	4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	38.0	38.0		11.0	38.0	38.0	36.0	36.0	36.0	33.0	33.0	
Total Split (s)	40.0	40.0		39.0	79.0	79.0	36.0	36.0	36.0	36.0	36.0	
Total Split (%)	34.8%	34.8%		33.9%	68.7%	68.7%	31.3%	31.3%	31.3%	31.3%	31.3%	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	Min	Min		None	Min	Min	None	None	None	None	None	
Act Effect Green (s)	31.7	31.7		70.7	70.7	70.7	30.0	30.0	30.0	30.0	30.0	

Oak Tree Traffic Analysis 4: NW 21st Avenue & Prospect Road

Total (2024) Conditions
Timing Plan: PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.28	0.28		0.62	0.62	0.62	0.26	0.26	0.26	0.26	0.26	
v/c Ratio	0.08	0.90		1.13	0.56	0.07	1.25	0.65	0.59	0.27	0.70	
Control Delay	33.5	52.0		109.5	13.6	2.9	209.5	45.4	7.3	38.6	42.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	
Total Delay	33.5	52.0		109.5	13.6	2.9	209.5	47.3	7.3	38.6	42.7	
LOS	C	D		F	B	A	F	D	A	D	D	
Approach Delay		51.8			44.7			51.9			42.4	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	5	301		~497	252	3	~115	197	0	29	231	
Queue Length 95th (ft)	m18	#412		#724	309	21	#231	287	72	66	297	
Internal Link Dist (ft)		763			920			320			1630	
Turn Bay Length (ft)	310			300		135	210		230	265		
Base Capacity (vph)	119	980		563	2241	1024	99	455	687	184	930	
Starvation Cap Reductn	0	0		0	0	0	0	61	5	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.08	0.87		1.13	0.54	0.07	1.25	0.75	0.60	0.27	0.70	

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 113.7

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.25

Intersection Signal Delay: 47.1

Intersection LOS: D

Intersection Capacity Utilization 103.5%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: NW 21st Avenue & Prospect Road



Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: PM

							
Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	215	140	206	513	1	923	459
Future Volume (vph)	215	140	206	513	1	923	459
Ideal Flow (vphpl)	1900	1900	2200	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	0%			0%		0%	
Storage Length (ft)	230	0	120		0		230
Storage Lanes	1	1	1		0		1
Taper Length (ft)	25		25		25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							
Frt		0.850					0.850
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1719	1538	1953	1776	0	1845	1568
Flt Permitted	0.950		0.069				
Satd. Flow (perm)	1719	1538	142	1776	0	1845	1568
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		92					405
Link Speed (mph)	35			40		40	
Link Distance (ft)	3035			1175		660	
Travel Time (s)	59.1			20.0		11.3	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.81	0.81	0.99	0.99	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	7%	7%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%		0%	
Adj. Flow (vph)	265	173	208	518	1	982	488
Shared Lane Traffic (%)							
Lane Group Flow (vph)	265	173	208	518	0	983	488
Turn Type	Prot	pm+ov	pm+pt	NA	Perm	NA	Perm
Protected Phases	4	5	5	2		6	
Permitted Phases		4	2		6		6
Detector Phase	4	5	5	2	6	6	6
Switch Phase							
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0	17.0
Total Split (s)	28.0	12.0	12.0	67.0	55.0	55.0	55.0
Total Split (%)	29.5%	12.6%	12.6%	70.5%	57.9%	57.9%	57.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effect Green (s)	18.3	31.9	66.7	66.7		53.1	53.1

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: PM



Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Actuated g/C Ratio	0.19	0.34	0.70	0.70		0.56	0.56
v/c Ratio	0.80	0.30	0.79	0.42		0.95	0.46
Control Delay	54.2	11.8	41.4	7.8		41.5	4.1
Queue Delay	0.0	0.0	0.0	0.0		6.6	0.0
Total Delay	54.2	11.8	41.4	7.8		48.1	4.1
LOS	D	B	D	A		D	A
Approach Delay	37.5			17.4		33.5	
Approach LOS	D			B		C	
Queue Length 50th (ft)	153	32	65	116		~586	24
Queue Length 95th (ft)	200	65	#209	204		#866	80
Internal Link Dist (ft)	2955			1095		580	
Turn Bay Length (ft)	230		120				230
Base Capacity (vph)	416	578	264	1246		1030	1054
Starvation Cap Reductn	0	0	0	0		42	0
Spillback Cap Reductn	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0		0	0
Reduced v/c Ratio	0.64	0.30	0.79	0.42		0.99	0.46

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 53 (56%), Referenced to phase 2:NBT and 6:SBTU, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 29.7

Intersection LOS: C

Intersection Capacity Utilization 100.0%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



Oak Tree Traffic Analysis
6: NW 44th Street & Driveway B

Total (2024) Conditions
Timing Plan: PM

Intersection													
Int Delay, s/veh	3.1												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕				↕			↕	↕
Traffic Vol, veh/h	35	225	54	57	496	11	1	45	0	27	6	0	20
Future Vol, veh/h	35	225	54	57	496	11	1	45	0	27	6	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	170	-	-	-	-	-	-	80	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	96	96	96	90	90	90	90	92	92	92
Heavy Vehicles, %	4	4	4	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	262	63	59	517	11	1	50	0	30	7	0	22
Major/Minor	Major1			Major2			Minor1			Minor2			
Conflicting Flow All	528	0	0	325	0	0	0	1028	1022	294	1032	1048	523
Stage 1	-	-	-	-	-	-	0	376	376	-	641	641	-
Stage 2	-	-	-	-	-	-	0	652	646	-	391	407	-
Critical Hdwy	4.14	-	-	4.12	-	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.236	-	-	2.218	-	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1029	-	-	1235	-	-	0	212	236	745	211	228	554
Stage 1	-	-	-	-	-	-	0	645	616	-	463	469	-
Stage 2	-	-	-	-	-	-	0	457	467	-	633	597	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1029	-	-	1235	-	-	0	189	214	745	188	206	554
Mov Cap-2 Maneuver	-	-	-	-	-	-	0	189	214	-	188	206	-
Stage 1	-	-	-	-	-	-	0	613	586	-	440	446	-
Stage 2	-	-	-	-	-	-	0	418	445	-	578	568	-
Approach	EB			WB			NB			SB			
HCM Control Delay, s	1			0.8			24.7			14.8			
HCM LOS							C			B			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2				
Capacity (veh/h)	262	1029	-	-	1235	-	-	188	554				
HCM Lane V/C Ratio	0.305	0.04	-	-	0.048	-	-	0.035	0.039				
HCM Control Delay (s)	24.7	8.6	0	-	8.1	-	-	24.8	11.8				
HCM Lane LOS	C	A	A	-	A	-	-	C	B				
HCM 95th %tile Q(veh)	1.2	0.1	-	-	0.2	-	-	0.1	0.1				

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: PM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	4	52	155	84	18	129	319	138	21	167	1387	128
Future Volume (vph)	4	52	155	84	18	129	319	138	21	167	1387	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%				0%	
Storage Length (ft)		215		0		170		0		230		130
Storage Lanes		1		1		1		1		1		1
Taper Length (ft)		25				25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00
Ped Bike Factor												
Frt				0.850				0.850				0.850
Flt Protected		0.950				0.950				0.950		
Satd. Flow (prot)	0	1736	1827	1553	0	1770	1863	1583	0	1703	4893	1524
Flt Permitted		0.213				0.516				0.060		
Satd. Flow (perm)	0	389	1827	1553	0	961	1863	1583	0	108	4893	1524
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				94				32				73
Link Speed (mph)			35				35				45	
Link Distance (ft)			1000				930				1000	
Travel Time (s)			19.5				18.1				15.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%				0%				0%	
Adj. Flow (vph)	4	58	174	94	19	139	343	148	23	180	1491	138
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	174	94	0	158	343	148	0	203	1491	138
Turn Type	Perm	Perm	NA	Perm	Perm	Perm	NA	pm+ov	custom	pm+pt	NA	Perm
Protected Phases			4				8	1!		5	2	
Permitted Phases	4	4		4	8	8		8	5	2		2
Detector Phase	4	4	4	4	8	8	8	1	5	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	10.0	10.0
Minimum Split (s)	40.0	40.0	40.0	40.0	35.0	35.0	35.0	10.0	10.0	10.0	35.0	35.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	26.0	28.0	28.0	109.0	109.0
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	14.4%	15.6%	15.6%	60.6%	60.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag								Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	C-Min	C-Min
Act Effect Green (s)		42.7	42.7	42.7		42.7	42.7	62.0		123.2	106.0	106.0

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: PM



Lane Group	SBU	SBL	SBT	SBR
Lane Configurations		←	↑↑↑	→
Traffic Volume (vph)	1	174	1540	284
Future Volume (vph)	1	174	1540	284
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)			0%	
Storage Length (ft)		185		0
Storage Lanes		1		0
Taper Length (ft)		25		
Lane Util. Factor	0.91	1.00	0.91	0.91
Ped Bike Factor				
Frt			0.977	
Flt Protected		0.950		
Satd. Flow (prot)	0	1703	4781	0
Flt Permitted		0.128		
Satd. Flow (perm)	0	229	4781	0
Right Turn on Red				Yes
Satd. Flow (RTOR)			34	
Link Speed (mph)			45	
Link Distance (ft)			1000	
Travel Time (s)			15.2	
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)			0%	
Adj. Flow (vph)	1	179	1588	293
Shared Lane Traffic (%)				
Lane Group Flow (vph)	0	180	1881	0
Turn Type	custom	pm+pt	NA	
Protected Phases		1	6	
Permitted Phases	1!	6		
Detector Phase	1	1	6	
Switch Phase				
Minimum Initial (s)	4.0	4.0	10.0	
Minimum Split (s)	10.0	10.0	35.0	
Total Split (s)	26.0	26.0	107.0	
Total Split (%)	14.4%	14.4%	59.4%	
Yellow Time (s)	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	
Total Lost Time (s)		6.0	6.0	
Lead/Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	
Recall Mode	None	None	C-Min	
Act Effect Green (s)		114.9	101.6	

Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: PM

												
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Actuated g/C Ratio		0.24	0.24	0.24		0.24	0.24	0.34		0.68	0.59	0.59
v/c Ratio		0.67	0.40	0.21		0.69	0.78	0.26		0.88	0.52	0.15
Control Delay		95.6	60.5	10.2		78.8	76.5	33.0		78.7	23.4	9.0
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		95.6	60.5	10.2		78.8	76.5	33.0		78.7	23.4	9.0
LOS		F	E	B		E	E	C		E	C	A
Approach Delay			52.7				67.1				28.5	
Approach LOS			D				E				C	
Queue Length 50th (ft)		63	165	0		162	361	91		164	412	36
Queue Length 95th (ft)		#153	256	51		#281	#523	156		#271	432	70
Internal Link Dist (ft)			920				850				920	
Turn Bay Length (ft)		215				170				230		130
Base Capacity (vph)		95	449	453		236	458	624		269	2915	937
Starvation Cap Reductn		0	0	0		0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0		0	0	0
Reduced v/c Ratio		0.65	0.39	0.21		0.67	0.75	0.24		0.75	0.51	0.15

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 41 (23%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 36.1

Intersection LOS: D

Intersection Capacity Utilization 87.5%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 7: NW 31st Avenue & NW 44th Street



Oak Tree Traffic Analysis
7: NW 31st Avenue & NW 44th Street

Total (2024) Conditions
Timing Plan: PM

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Lane Group	SBU	SBL	SBT	SBR
Actuated g/C Ratio		0.64	0.56	
v/c Ratio		0.71	0.69	
Control Delay		32.0	30.3	
Queue Delay		0.0	0.0	
Total Delay		32.0	30.3	
LOS		C	C	
Approach Delay			30.5	
Approach LOS			C	
Queue Length 50th (ft)		79	633	
Queue Length 95th (ft)		134	635	
Internal Link Dist (ft)			920	
Turn Bay Length (ft)		185		
Base Capacity (vph)		317	2809	
Starvation Cap Reductn		0	0	
Spillback Cap Reductn		0	0	
Storage Cap Reductn		0	0	
Reduced v/c Ratio		0.57	0.67	
Intersection Summary				

APPENDIX F

TOTAL (WITH MITIGATION) INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Total (2024) Conditions with Mitigation

Timing Plan: AM

												
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	14	870	164	1	288	468	84	1	147	515	525	19
Future Volume (vph)	14	870	164	1	288	468	84	1	147	515	525	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%				0%		
Storage Length (ft)	310		200		300		135		210		230	265
Storage Lanes	1		1		2		1		1		1	1
Taper Length (ft)	25				25				25			25
Lane Util. Factor	1.00	0.95	1.00	0.95	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850				0.850				0.850	
Flt Protected	0.950				0.950				0.950			0.950
Satd. Flow (prot)	1770	3539	1583	0	3303	3406	1524	0	1752	1845	1568	1612
Flt Permitted	0.950				0.950				0.544			0.159
Satd. Flow (perm)	1770	3539	1583	0	3303	3406	1524	0	1003	1845	1568	270
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)			207				131				*460	
Link Speed (mph)		35				45				40		
Link Distance (ft)		843				1000				1060		
Travel Time (s)		16.4				15.2				18.1		
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.83	0.83	0.83	0.83	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	6%	3%	3%	3%	3%	12%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%				0%		
Adj. Flow (vph)	15	956	180	1	313	509	91	1	177	620	633	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	956	180	0	314	509	91	0	178	620	633	22
Turn Type	Prot	NA	Perm	Prot	Prot	NA	Perm	pm+pt	pm+pt	NA	Perm	Perm
Protected Phases	1	6		5	5	2		7	7	4		
Permitted Phases			6				2	4	4		4	8
Detector Phase	1	6	6	5	5	2	2	7	7	4	4	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	4.0	4.0	10.0	10.0	5.0	5.0	6.0	6.0	6.0
Minimum Split (s)	9.5	38.0	38.0	11.0	11.0	38.0	38.0	9.5	9.5	36.0	36.0	33.0
Total Split (s)	9.5	37.0	37.0	20.5	20.5	48.0	48.0	9.5	9.5	42.5	42.5	33.0
Total Split (%)	9.5%	37.0%	37.0%	20.5%	20.5%	48.0%	48.0%	9.5%	9.5%	42.5%	42.5%	33.0%
Yellow Time (s)	3.5	5.0	5.0	5.0	5.0	5.0	5.0	3.5	3.5	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0		7.0	7.0	7.0		4.5	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes
Recall Mode	None	Min	Min	None	None	Min	Min	None	None	None	None	None
Act Effect Green (s)	5.0	28.9	28.9		12.0	44.3	44.3		36.1	34.6	34.6	25.0

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Total (2024) Conditions with Mitigation
Timing Plan: AM



Lane Group	SBT	SBR
Lane Configurations	↑↑	
Traffic Volume (vph)	141	9
Future Volume (vph)	141	9
Ideal Flow (vphpl)	1900	1900
Lane Width (ft)	12	12
Grade (%)	0%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	0.95
Ped Bike Factor		
Frt	0.991	
Flt Protected		
Satd. Flow (prot)	3194	0
Flt Permitted		
Satd. Flow (perm)	3194	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	6	
Link Speed (mph)	40	
Link Distance (ft)	1710	
Travel Time (s)	29.1	
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor	0.86	0.86
Growth Factor	100%	100%
Heavy Vehicles (%)	12%	12%
Bus Blockages (#/hr)	0	0
Parking (#/hr)		
Mid-Block Traffic (%)	0%	
Adj. Flow (vph)	164	10
Shared Lane Traffic (%)		
Lane Group Flow (vph)	174	0
Turn Type	NA	
Protected Phases	8	
Permitted Phases		
Detector Phase	8	
Switch Phase		
Minimum Initial (s)	6.0	
Minimum Split (s)	33.0	
Total Split (s)	33.0	
Total Split (%)	33.0%	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.0	
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	
Act Effect Green (s)	25.0	

Oak Tree Traffic Analysis 4: NW 21st Avenue & Prospect Road

Total (2024) Conditions with Mitigation
Timing Plan: AM

												
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Actuated g/C Ratio	0.05	0.30	0.30		0.13	0.46	0.46		0.38	0.36	0.36	0.26
v/c Ratio	0.16	0.89	0.29		0.76	0.32	0.12		0.43	0.93	0.74	0.31
Control Delay	49.6	44.5	3.8		53.7	18.0	1.6		25.2	52.3	13.1	43.1
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	49.6	44.5	3.8		53.7	18.0	1.6		25.2	52.3	13.1	43.1
LOS	D	D	A		D	B	A		C	D	B	D
Approach Delay	38.2						28.6				31.6	
Approach LOS	D						C				C	
Queue Length 50th (ft)	9	305	0		100	95	0		77	372	84	11
Queue Length 95th (ft)	31	#424	35		146	158	14		117	#510	167	34
Internal Link Dist (ft)	763						920				980	
Turn Bay Length (ft)	310		200		300		135		210		230	265
Base Capacity (vph)	93	1119	642		469	1587	780		418	709	886	76
Starvation Cap Reductn	0	0	0		0	0	0		0	0	0	0
Spillback Cap Reductn	0	0	0		0	0	0		0	0	0	0
Storage Cap Reductn	0	0	0		0	0	0		0	0	0	0
Reduced v/c Ratio	0.16	0.85	0.28		0.67	0.32	0.12		0.43	0.87	0.71	0.29

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 95.6

Natural Cycle: 95

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 32.8

Intersection LOS: C

Intersection Capacity Utilization 91.5%

ICU Level of Service F

Analysis Period (min) 15

* User Entered Value

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: NW 21st Avenue & Prospect Road

 Ø1	 Ø2	 Ø4
9.5 s	48 s	42.5 s
 Ø5	 Ø6	 Ø7
20.5 s	37 s	9.5 s
		 Ø8
		33 s

Oak Tree Traffic Analysis
4: NW 21st Avenue & Prospect Road

Total (2024) Conditions with Mitigation

Timing Plan: AM



Lane Group	SBT	SBR
Actuated g/C Ratio	0.26	
v/c Ratio	0.21	
Control Delay	27.7	
Queue Delay	0.0	
Total Delay	27.7	
LOS	C	
Approach Delay	29.4	
Approach LOS	C	
Queue Length 50th (ft)	43	
Queue Length 95th (ft)	67	
Internal Link Dist (ft)	1630	
Turn Bay Length (ft)		
Base Capacity (vph)	913	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.19	
Intersection Summary		

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions with Mitigation
Timing Plan: AM

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	436	257	76	752	471	123
Future Volume (vph)	436	257	76	752	471	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	230	0	120			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1752	1845	1776	1509
Flt Permitted	0.950		0.251			
Satd. Flow (perm)	1770	1583	*30	1845	1776	1509
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		154				134
Link Speed (mph)	35			40	40	
Link Distance (ft)	3035			1175	1060	
Travel Time (s)	59.1			20.0	18.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.87	0.86	0.86	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	3%	3%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	501	295	88	874	512	134
Shared Lane Traffic (%)						
Lane Group Flow (vph)	501	295	88	874	512	134
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0
Total Split (s)	40.0	14.0	14.0	50.0	36.0	36.0
Total Split (%)	44.4%	15.6%	15.6%	55.6%	40.0%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-5.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	0.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effect Green (s)	34.3	41.5	50.7	50.7	38.5	38.5

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions with Mitigation
Timing Plan: AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.38	0.46	0.56	0.56	0.43	0.43
v/c Ratio	0.74	0.36	0.57	0.84	0.67	0.19
Control Delay	30.9	7.3	44.9	27.5	28.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	7.3	44.9	27.5	28.7	4.6
LOS	C	A	D	C	C	A
Approach Delay	22.1			29.1	23.7	
Approach LOS	C			C	C	
Queue Length 50th (ft)	237	44	40	395	234	0
Queue Length 95th (ft)	306	76	84	#664	#438	37
Internal Link Dist (ft)	2955			1095	980	
Turn Bay Length (ft)	230		120			
Base Capacity (vph)	786	842	190	1039	759	722
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.35	0.46	0.84	0.67	0.19

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 48 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 25.3

Intersection LOS: C

Intersection Capacity Utilization 71.2%

ICU Level of Service C

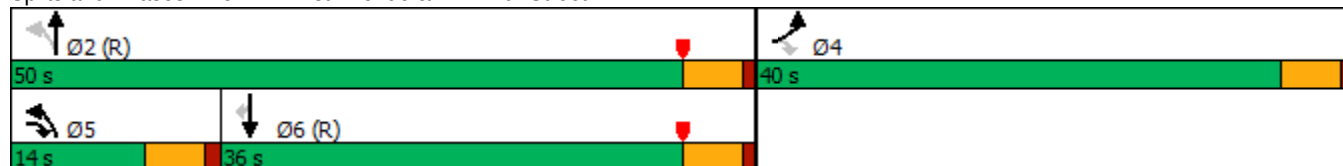
Analysis Period (min) 15

* User Entered Value

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



Oak Tree Traffic Analysis

4: NW 21st Avenue & Prospect Road

Total (2024) Conditions with Mitigation

Timing Plan: PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	574	201	584	1123	67	109	261	359	47	598	24
Future Volume (vph)	8	574	201	584	1123	67	109	261	359	47	598	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	310		200	300		135	210		230	265		0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850			0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3406	1524	3433	3539	1583	1641	1727	1468	1770	3518	0
Flt Permitted	0.950			0.950			0.151			0.579		
Satd. Flow (perm)	1703	3406	1524	3433	3539	1583	261	1727	1468	1079	3518	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			197			125			408		4	
Link Speed (mph)		35			45			40			40	
Link Distance (ft)		843			1000			1060			1710	
Travel Time (s)		16.4			15.2			18.1			29.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.88	0.88	0.88	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	10%	10%	10%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	9	631	221	635	1221	73	124	297	408	49	629	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	631	221	635	1221	73	124	297	408	49	654	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6			2	4		4	8		
Detector Phase	1	6	6	5	2	2	7	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	4.0	10.0	10.0	5.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	9.5	38.0	38.0	11.0	38.0	38.0	9.5	36.0	36.0	33.0	33.0	
Total Split (s)	9.5	32.5	32.5	30.0	53.0	53.0	10.0	42.5	42.5	32.5	32.5	
Total Split (%)	9.0%	31.0%	31.0%	28.6%	50.5%	50.5%	9.5%	40.5%	40.5%	31.0%	31.0%	
Yellow Time (s)	3.5	5.0	5.0	5.0	5.0	5.0	3.5	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	7.0	7.0	7.0	7.0	7.0	4.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Act Effect Green (s)	5.1	22.8	22.8	20.5	48.7	48.7	33.6	32.1	32.1	21.9	21.9	

Oak Tree Traffic Analysis 4: NW 21st Avenue & Prospect Road

Total (2024) Conditions with Mitigation
Timing Plan: PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.05	0.24	0.24	0.21	0.51	0.51	0.35	0.34	0.34	0.23	0.23	
v/c Ratio	0.10	0.78	0.43	0.86	0.68	0.08	0.72	0.51	0.53	0.20	0.81	
Control Delay	50.9	42.8	9.9	50.4	21.0	0.8	49.7	30.1	5.4	33.3	43.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.9	42.8	9.9	50.4	21.0	0.8	49.7	30.1	5.4	33.3	43.9	
LOS	D	D	A	D	C	A	D	C	A	C	D	
Approach Delay	34.5			29.9			20.9			43.2		
Approach LOS	C			C			C			D		
Queue Length 50th (ft)	6	201	13	204	278	0	57	156	0	26	211	
Queue Length 95th (ft)	m22	275	77	#299	450	6	#126	231	58	58	277	
Internal Link Dist (ft)	763			920			980			1630		
Turn Bay Length (ft)	310	200		300	135		210	230		265		
Base Capacity (vph)	90	922	556	837	1874	897	172	669	818	303	992	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.10	0.68	0.40	0.76	0.65	0.08	0.72	0.44	0.50	0.16	0.66	

Intersection Summary

Area Type: Other

Cycle Length: 105

Actuated Cycle Length: 95.7

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 31.2

Intersection LOS: C

Intersection Capacity Utilization 81.4%

ICU Level of Service D

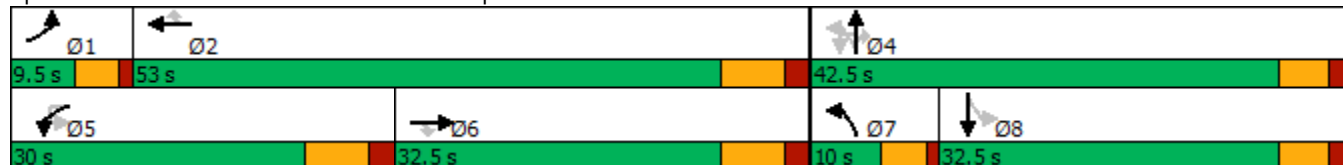
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: NW 21st Avenue & Prospect Road



Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions with Mitigation
Timing Plan: PM

							
Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	215	140	206	513	1	923	459
Future Volume (vph)	215	140	206	513	1	923	459
Ideal Flow (vphpl)	1900	1900	2200	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	0%			0%		0%	
Storage Length (ft)	230	0	120		0		0
Storage Lanes	1	1	1		0		1
Taper Length (ft)	25		25		25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							
Frt		0.850					0.850
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1719	1538	1953	1776	0	1845	1568
Flt Permitted	0.950		0.069				
Satd. Flow (perm)	1719	1538	142	1776	0	1845	1568
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		96					447
Link Speed (mph)	35			40		40	
Link Distance (ft)	3035			1175		1060	
Travel Time (s)	59.1			20.0		18.1	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.81	0.81	0.99	0.99	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	7%	7%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%		0%	
Adj. Flow (vph)	265	173	208	518	1	982	488
Shared Lane Traffic (%)							
Lane Group Flow (vph)	265	173	208	518	0	983	488
Turn Type	Prot	pm+ov	pm+pt	NA	Perm	NA	Perm
Protected Phases	4	5	5	2		6	
Permitted Phases		4	2		6		6
Detector Phase	4	5	5	2	6	6	6
Switch Phase							
Minimum Initial (s)	6.0	4.0	4.0	12.0	12.0	12.0	12.0
Minimum Split (s)	27.0	9.0	9.0	17.0	17.0	17.0	17.0
Total Split (s)	28.0	11.0	11.0	67.0	56.0	56.0	56.0
Total Split (%)	29.5%	11.6%	11.6%	70.5%	58.9%	58.9%	58.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effect Green (s)	18.3	32.3	66.7	66.7		52.7	52.7

Oak Tree Traffic Analysis
5: NW 21st Avenue & NW 44th Street

Total (2024) Conditions with Mitigation
Timing Plan: PM



Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Actuated g/C Ratio	0.19	0.34	0.70	0.70		0.55	0.55
v/c Ratio	0.80	0.29	0.77	0.42		0.96	0.46
Control Delay	54.2	11.6	39.6	7.8		42.6	3.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	54.2	11.6	39.6	7.8		42.6	3.2
LOS	D	B	D	A		D	A
Approach Delay	37.4			17.0		29.6	
Approach LOS	D			B		C	
Queue Length 50th (ft)	153	31	66	116		556	11
Queue Length 95th (ft)	200	65	#220	204		#853	59
Internal Link Dist (ft)	2955			1095		980	
Turn Bay Length (ft)	230		120				
Base Capacity (vph)	416	587	271	1246		1022	1068
Starvation Cap Reductn	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0		0	0
Reduced v/c Ratio	0.64	0.29	0.77	0.42		0.96	0.46

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 53 (56%), Referenced to phase 2:NBTL and 6:SBTU, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 27.4

Intersection LOS: C

Intersection Capacity Utilization 100.0%

ICU Level of Service G

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: NW 21st Avenue & NW 44th Street



APPENDIX G

GATE QUEUING ANALYSIS INFORMATION

Transportation and Land Development

Vergil C. Stover / Frank J. Koppke



Institute of Transportation Engineers

TABLE 8-1

Design-Hour Lobby Traffic Generation for Banks with Drive-In Windows

<i>Gross Floor Area Used by Bank</i>	<i>Hourly One-Way Traffic Generation (per 1,000 sq. ft.)</i>
5,000 to 20,000 sq. ft.	15 to 20 vehicles
20,000 to 40,000 sq. ft.	10 to 15 vehicles
Over 40,000 sq. ft.	5 to 10 vehicles

SOURCE: Peter N. Scifres [8].

Parking. It is desirable to have as much traffic as possible use the drive-in windows. Petersen [7] reported a 50-50 split between lobby and drive-thru customers when the drive-thru facilities are not unduly congested. Customer parking duration averages about 15 to 20 minutes. During the peak period, parking demand should not exceed 90% of the parking capacity if customers are to be able to find a parking space without excessive delay. Scifres [8] reported customer parking requirements as given in Table 8-2.

TABLE 8-2

Design-Hour Lobby Customer Parking Requirements for Banks with Drive-In Windows

<i>Gross Floor Area Used by Bank</i>	<i>Customer Parking Requirements (per 1,000 sq. ft.)</i>
5,000 to 20,000 sq. ft.	2.0 to 2.5 Spaces
20,000 to 40,000 sq. ft.	1.5 to 2.0 Spaces
Over 40,000 sq. ft.	1.0 to 1.5 Spaces

SOURCE: Peter N. Scifres [8].

Drive-In Window Requirements. The number of service positions required is a function of the average service time and the demand. The technique contained in the section "Analysis of Service Times," presented later in this chapter, can be used to calculate the average time in the system and the average time in the queue for different operating conditions (number of service positions, number of tellers, average service time, and demand) in order to help evaluate proposed designs.

Bank officials commonly underestimate service and waiting time; therefore the average service time should be obtained through observation of similar facilities in the local area, since wait time and, theoretically, storage requirements are fairly sensitive to the parameter.

Table 8-3 gives guidelines for the number of drive-in windows as a function of lobby size. These guidelines assume an average service time of approximately 2 minutes and that 50% of the bank customers will use the drive-in windows. These typical values might be used where a more detailed (and expensive) analysis is not warranted.

TABLE 8-3

Lobby Size Versus Drive-In Window Requirements

<i>Lobby Sizes (sq. ft.)</i>	<i>Number of Drive-In Windows</i>
5,000 to 10,000	2 to 3
10,000 to 20,000	3 to 4
20,000 to 30,000	4 to 5
30,000 to 40,000	6 to 8
40,000 to 50,000	8 to 10

SOURCE: Peter N. Scifres [8].

APPLICATIONS OF QUEUEING ANALYSIS

Providing an adequate and well-defined storage area for drive-thru traffic is particularly critical, especially at fast-food restaurants and drive-thru bank facilities where queues can, and do, become quite long. Waiting vehicles should be stored on private property clear of driveways so that traffic back-up does not interfere with movement on the arterial street. At fast-food restaurants, the menu board should be installed upstream of the service window to permit drive-thru customers to place their orders prior to their arrival at the service window. Preparation of their order can then begin before they reach the service window, thus minimizing their time at the service window. A well-defined storage area for the waiting traffic should be located so that the waiting vehicles do not block or impede the movement of driveway traffic.

Where a single service position is involved, the situation is referred to as a *single-channel problem*. *Multiple-channel problems* arise when two or more service positions are available. Such problems commonly arise with bank tellers (indoor as well as drive-in windows), entrances and exits at large parking lots and garages, at passenger pick-up areas at transit stations and taxi stands, truck terminals or loading/unloading areas, supermarket checkout counters, telephone calls, building entrances, and transit-station turnstiles. The assumptions of Poisson arrivals and negative exponential service time are commonly acceptable and used for both single- and multiple-channel problems. Thurgood [11] found these assumptions to be representative of drive-in facilities.

Customers arriving randomly at a drive-in facility may enter into service immediately or may have to enter the queue until they can be served. Waiting lines occur whenever the immediate demand for service exceeds the current capacity of the facility providing that service.

Basic Notation and Terminology

The following notation is employed throughout this section:

- n = number of customers in the drive-in system
- M = number of customers in the queue waiting to be served (number of customers in the system minus the number being served)
- $P(n)$ = steady-state probability that exactly n customers are in the queueing system
- $P(0)$ = probability that zero vehicles are in the queueing system
- N = number of parallel service positions
- q = mean average arrival rate of vehicles into the system (vehicles/hour)
- Q = mean average service rate per service position (vehicles/hour/position)
- $\text{Avg } (t) = 60/Q =$ mean service time expressed in minutes per vehicle
- $\rho = q/Q =$ coefficient of utilization
- $E(m)$ = expected (average) number of customers in the system
- $E(n)$ = expected (average) number of customers waiting in the queue
- $E(t)$ = expected (average) waiting time in system (includes service time)
- $E(w)$ = expected (average) waiting time in queue (excludes service time)

The equations employed in the analysis of queueing problems are given in Table 8-10.

Jones, Woods, and Thurgood [4] have developed a graph (Figure 8-6) for determining the probability that there will be no customers in the system—values for $P(0)$. They also developed graphs for determining the average number of waiting customers (Figure 8-7), the average waiting time (Figure 8-8), and average queue length (Figure 8-9). These figures avoid the necessity to perform the time-consuming, although simple, queueing-analysis calculations. See pp. 228–30.

TABLE 8-10
Queuing System Equations

Equation Number	Variable	Equation
(8-1)	Coefficient of utilization	$\rho = \frac{q}{NQ}$
(8-2)	Probability of no customers in the system	$P(0) = \left[\sum_{n=0}^{N-1} \frac{\left(\frac{q}{Q}\right)^n}{n!} + \frac{\left(\frac{q}{Q}\right)^N}{N!(1-\rho)} \right]^{-1}$
(8-3)	Mean number in the queue	$E(m) = \left[\frac{\rho \left(\frac{q}{Q}\right)^N}{N!(1-\rho)^2} \right] P(0)$
(8-4)	Mean number in the system	$E(n) = E(m) + \frac{q}{Q}$
(8-5)	Mean wait time in queue (hours)	$E(w) = \frac{E(m)}{q}$
(8-6)	Mean time in the system (hours)	$E(t) = E(w) + \frac{1}{Q}$ $= E(w) + \text{Avg } (t)$
(8-7)	Proportion of customers who wait	$P[E(w) > 0] = \left[\frac{\left(\frac{q}{Q}\right)^N}{N!(1-\rho)} \right] P(0)$
(8-8)	Probability of a queue exceeding a length M	$P(x > M) = (\rho^{N+1}) P[E(w) > 0]$
(8-9a)	Queue storage required	$M = \left[\frac{\ln P(x > M) - \ln E(w) > 0}{\ln \rho} \right] - 1$
(8-9b)*	Queue storage required	$M = \left[\frac{\ln P(x > M) - \ln Q_M}{\ln \rho} \right] - 1$

* Q_M is a statistic which is a function of the utilization rate and the number of service channels (service positions); see Table 8-11. The table of Q_M values and use of Equation (8-9b) greatly simplifies the calculations compared to those using Equations (8-9a).

Use of the equations and the graphs may be illustrated by the following example of a drive-in bank.

Conditions:

Number of drive-in windows, $N = 3$

Demand on the system, $q = 70$

Service capacity per channel, $Q = 28.6$ for an average service time, $\text{Avg } (t) = 2.1$ minutes

Solution Using Graphs:

- Coefficient of utilization $= 70/(3)(28.6) = 0.816$
- Probability that there are customers waiting in the system, Figure 8-6:
 $P(0) = 0.05$
- Expected average number of customers waiting in the queue, Figure 8-7:
 $E(m)/N = 1.0$; and the average number $E(m) = (3)(1.0) = 3$

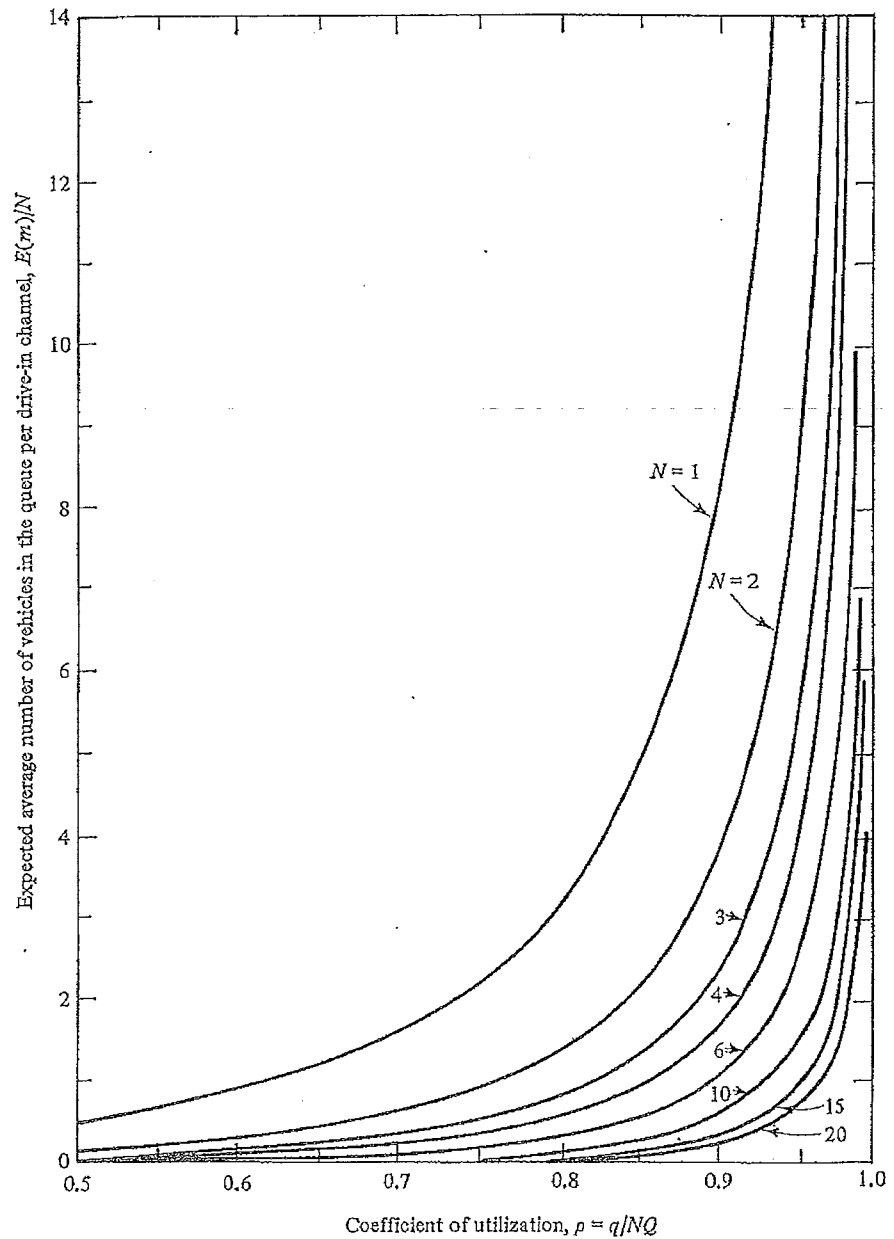


Figure 8-9 Average queue length per service position $[E(m)/N]$ values]. SOURCE: Jones, Woods, and Thurgood [4].

Comparison:

Variable	Graphs	Equations
$P(0)$	0.05	0.0505
$E(m)$	3	2.97
$E(w)$	2.5	2.55

**Example and Case Studies of Required Storage
at a Drive-In Bank**

Consider the following example of a drive-in bank facility as a demonstration of the use of queueing analysis. Review of a site plan for a proposed bank shows there are six drive-in window positions plus space to store 18 vehicles waiting to be served. In view of its

location, a 5% probability of back-up onto the adjacent street is judged to be acceptable. Demand on the system for design is expected to be 110 vehicles in a 45-minute period. Average service time was expected to be 2.2 minutes. Is the queue storage adequate?

Such problems can be quickly solved using Equation (8-9b) given in Table 8-10 and repeated below for convenience.

$$M = \left[\frac{\ln P(x > M) - \ln Q_M}{\ln \rho} \right] - 1$$

where:

M = queue length which is exceeded p percent of the time

N = number of service channels (drive-in positions)

Q = service rate per channel (vehicles per hour)

$\rho = \frac{\text{demand rate}}{\text{service rate}} = \frac{q}{NQ}$ = utilization factor

q = demand rate on the system (vehicles per hour)

Q_M = tabled values of the relationship between queue length, number of channels, and utilization factor (see Table 8.11)



TABLE 8-11

Table of Q_M Values

	$N = 1$	2	3	4	6	8	10
0.0	0.0000	0.0000	0.0000	0.0000			
0.1	.1000	.0182	.0037	.0008	.0000	0.0000	0.0000
.2	.2000	.0666	.0247	.0096	.0015	.0002	.0000
.3	.3000	.1385	.0700	.0370	.0111	.0036	.0011
.4	.4000	.2286	.1411	.0907	.0400	.0185	.0088
.5	.5000	.3333	.2368	.1739	.0991	.0591	.0360
.6	.6000	.4501	.3548	.2870	.1965	.1395	.1013
.7	.7000	.5766	.4923	.4286	.3359	.2706	.2218
.8	.8000	.7111	.6472	.5964	.5178	.4576	.4093
.9	.9000	.8526	.8172	.7878	.7401	.7014	.6687
1.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$$\rho = \frac{q}{NQ} = \frac{\text{arrival rate, total}}{(\text{number of channels})(\text{service rate per channel})}$$

N = number of channels (service positions)

Solution

Step 1: $Q = \frac{60 \text{ min/hr}}{2.2 \text{ min/service}} = 27.3 \text{ services per hour}$

Step 2: $q = (110 \text{ veh/45 min}) \times (60 \text{ min/hr}) = 146.7 \text{ vehicles per hour}$

Step 3: $\rho = \frac{q}{NQ} = \frac{146.7}{(6)(27.3)} = 0.8956$

Step 4: $Q_M = 0.7303$ by interpolation between 0.8 and 0.9 for $N = 6$ from the table of Q_M values (see Table 8-11).

Step 5: The acceptable probability of the queue, M , being longer than the storage, 18 spaces in this example, was stated to be 5%. $P(x > M) = 0.05$, and:

$$M = \left[\frac{\ln 0.05 - \ln 0.7303}{\ln 0.8956} \right] - 1 = \left[\frac{-2.996 - (-0.314)}{-0.110} \right] - 1$$

$$= 24.38 - 1 = 23.38, \text{ say } 23 \text{ vehicles.}$$

The number of vehicles in the queue would be expected to exceed 23 more than 5% of the time. Since the site plan will accommodate a queue of 18 vehicles, the storage is not sufficient for the conditions stated.

It is important to realize that, for any $P(x > M)$ value, the queue length required increases very rapidly for values of $\rho > 0.85$ (see Figure 8-9). When $\rho > 1.0$, the solution is indeterminate and the queue length theoretically becomes infinite.

Analysis of Service Times. In many instances it is effective to demonstrate that a proposed design not only is inadequate to store vehicles waiting for service but will result in unacceptable wait times as well. The necessary equations are given in Table 8-10.

For purposes of checking computations it is convenient to know that the limit of $P(0)$, as the number of channels approaches infinity (in practical terms when $N > 10$), is;

$$\lim_{N \rightarrow \infty} P(0) = e^{-\lambda} \quad \text{where } \lambda = q/Q$$

Drive-In Bank Example: Under the site-development approval requirements, representatives of a bank presented a site plan for the construction of a new bank having three service positions. Information provided by bank officials and observations at other local banks provided the following data:

- Expected average arrival rate during the design hour (4:30–5:30 p.m. on Fridays) = 70 vehicles per hour (vph)
- Average service time per customer = 2.1 minutes

Does the site plan provide for sufficient storage to accommodate all vehicles arriving 95% of the time?

$$q = 70 \text{ vph arrival rate}$$

$$Q = \frac{60 \text{ minutes per hour}}{2.1 \text{ minutes per service}} = 28.6 \text{ vph service rate}$$

$$\rho = \frac{70}{(3)(28.6)} = 0.816$$

$$\frac{q}{Q} = \frac{70}{28.6} = 2.45$$

$$Q_M = 0.674 \text{ by interpolation from Table 8-11}$$

$$P(x > M) = 1.00 - 0.95 = 0.05$$

By Equation (8-9b)

$$M = \left[\frac{\ln 0.05 - \ln 0.674}{\ln 0.816} \right] - 1 = \left[\frac{-2.996 - (-0.396)}{-0.203} \right] - 1 = 11.8, \text{ say } 12$$

Thus, it would be necessary to store 12 vehicles, exclusive of the three service positions, in order to accommodate the arriving vehicles 95% of the time; or alternatively, to have waiting vehicles extending back into the adjacent street no more than 5% of the time between 4:30 and 5:30 p.m. on Fridays. Since the site plan provides for six spaces, the site plan as submitted is inadequate and should be disapproved.

A solution to this problem would be to increase the storage, or if this is not possible add a service position in order to reduce the average service time.

Addition of a service position would reduce the number of storage spaces needed to three (three storage plus four service positions)—assuming the same arrival rate and service time:

$$M = \left[\frac{\ln 0.05 - \ln 0.301}{\ln 0.612} \right] - 1 = 2.7, \text{ say } 3$$

A redesign to provide four service positions would have the additional benefit of substantially reducing the expected waiting time (from over 4 minutes to less than $\frac{1}{2}$ minute) for the bank customers using the drive-in windows:

With Three Service Positions:

$$q = 70 \text{ vph}$$

$$Q = 28.6 \text{ vph}$$

$$\frac{q}{Q} = 2.45$$

$$\rho = \frac{70}{(3)(28.6)} = 0.816$$

$$P(0) = \left[\frac{(2.45)^0}{0!} + \frac{(2.45)^1}{1!} + \frac{(2.45)^2}{2!} + \frac{(2.45)^3}{3! \left[1 - \left(\frac{2.45}{3} \right) \right]} \right]^{-1}$$

$$= [1 + 2.45 + 3.00 + 13.37]^{-1} = 0.0505$$

$$E(n) = \left[\frac{(0.816) \left(\frac{70}{28.6} \right)^3}{3!(1 - 0.816)^2} \right] 0.0505 = 2.97$$

$$E(n) = 2.97 + 70/28.6 = 5.42$$

$$E(t) = \frac{2.97}{70} = 0.0424 \text{ hours or 2.55 minutes}$$

$$E(w) = 0.0424 + \frac{1}{28.6} = 0.0774 \text{ hours or 4.64 minutes}$$

With Four Service Positions:

$$q = 70 \text{ vph}$$

$$Q = 28.6 \text{ vph}$$

$$\frac{q}{Q} = 2.45$$

$$\rho = \frac{70}{(4)(28.6)} = 0.612$$

$$P(0) = \left[\frac{(2.45)^0}{0!} + \frac{(2.45)^1}{1!} + \frac{(2.45)^2}{2!} + \frac{(2.45)^3}{3!} + \frac{(2.45)^4}{4! \left[1 - \left(\frac{2.45}{4} \right) \right]} \right]^{-1}$$

$$= 0.0783$$

$$E(n) = \left[\frac{(0.612)(2.45)^4}{4!(1 - 0.612)^2} \right] 0.0783 = 0.48$$

$$E(n) = 0.48 + 2.45 = 2.93$$

$$E(t) = 0.007 + \frac{1}{28.6} = 0.042 \text{ hours or 2.51 minutes}$$

$$E(w) = \frac{0.48}{70} = 0.007 \text{ hours or 0.41 minutes}$$

However, the service time would increase somewhat unless an additional teller were also added. Nevertheless, an increase to 2.5 minutes, or more, would still reduce the storage space required and result in better service (less time in the system). Besides, time spent being served is less irritating to the customer than an equal time spent waiting.

Single-Family Detached Housing (210)

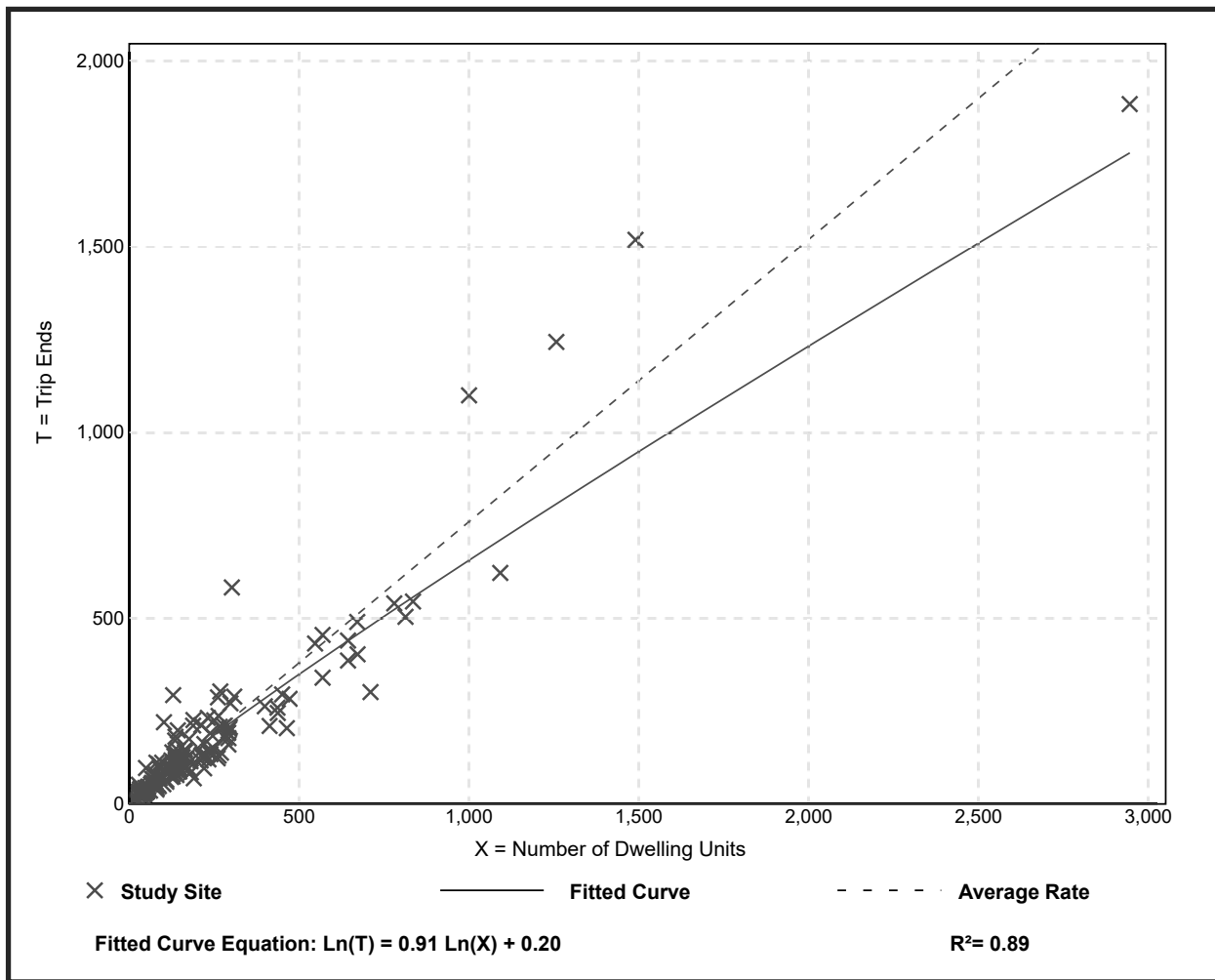
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 157
Avg. Num. of Dwelling Units: 231
Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.76	0.36 - 2.27	0.26

Data Plot and Equation



Single-Family Detached Housing (210)

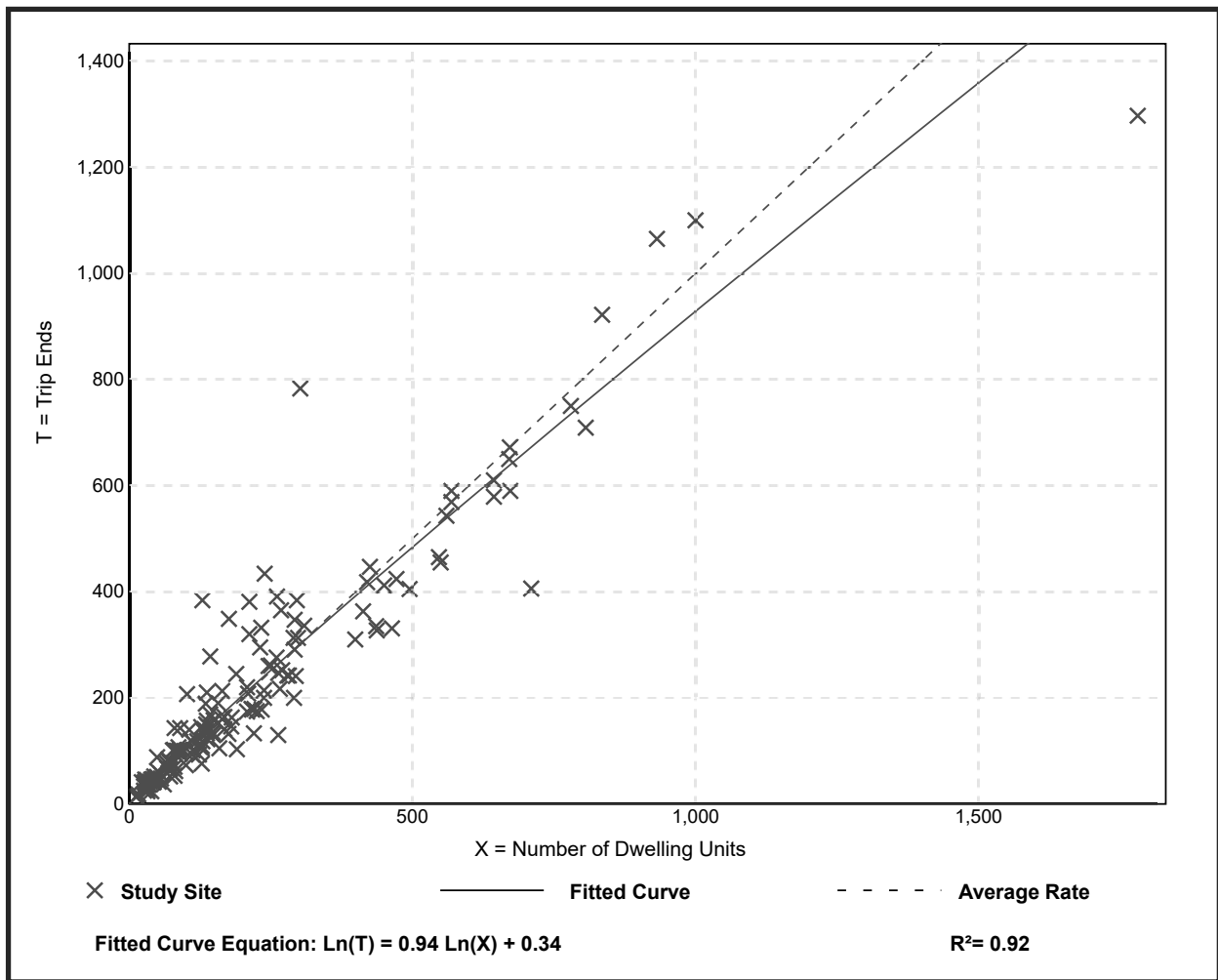
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 165
Avg. Num. of Dwelling Units: 217
Directional Distribution: 64% entering, 36% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
1.00	0.49 - 2.98	0.31

Data Plot and Equation



Single-Family Detached Housing (210)

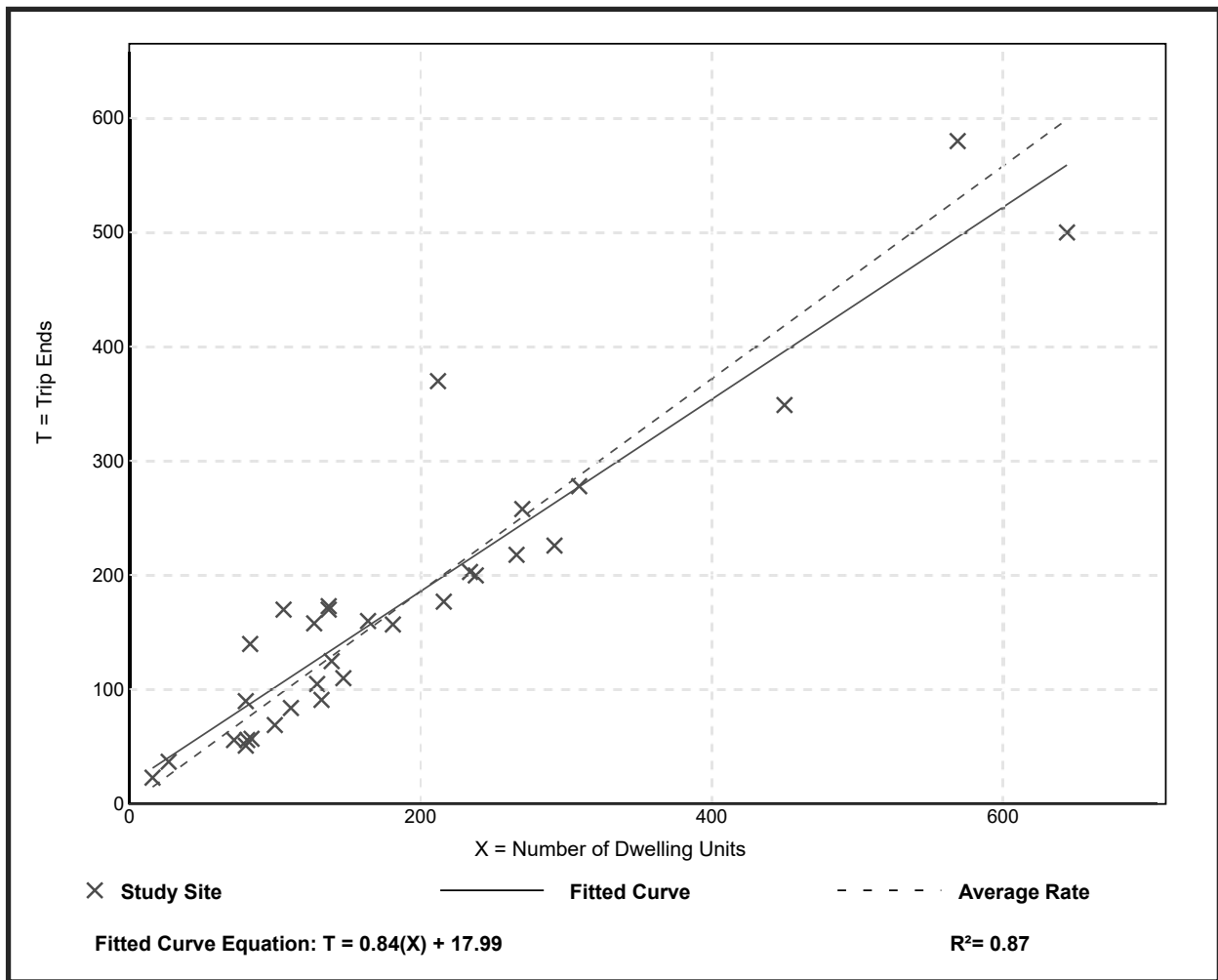
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Dwelling Units: 188
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.93	0.64 - 1.75	0.26

Data Plot and Equation



Single-Family Detached Housing (210)

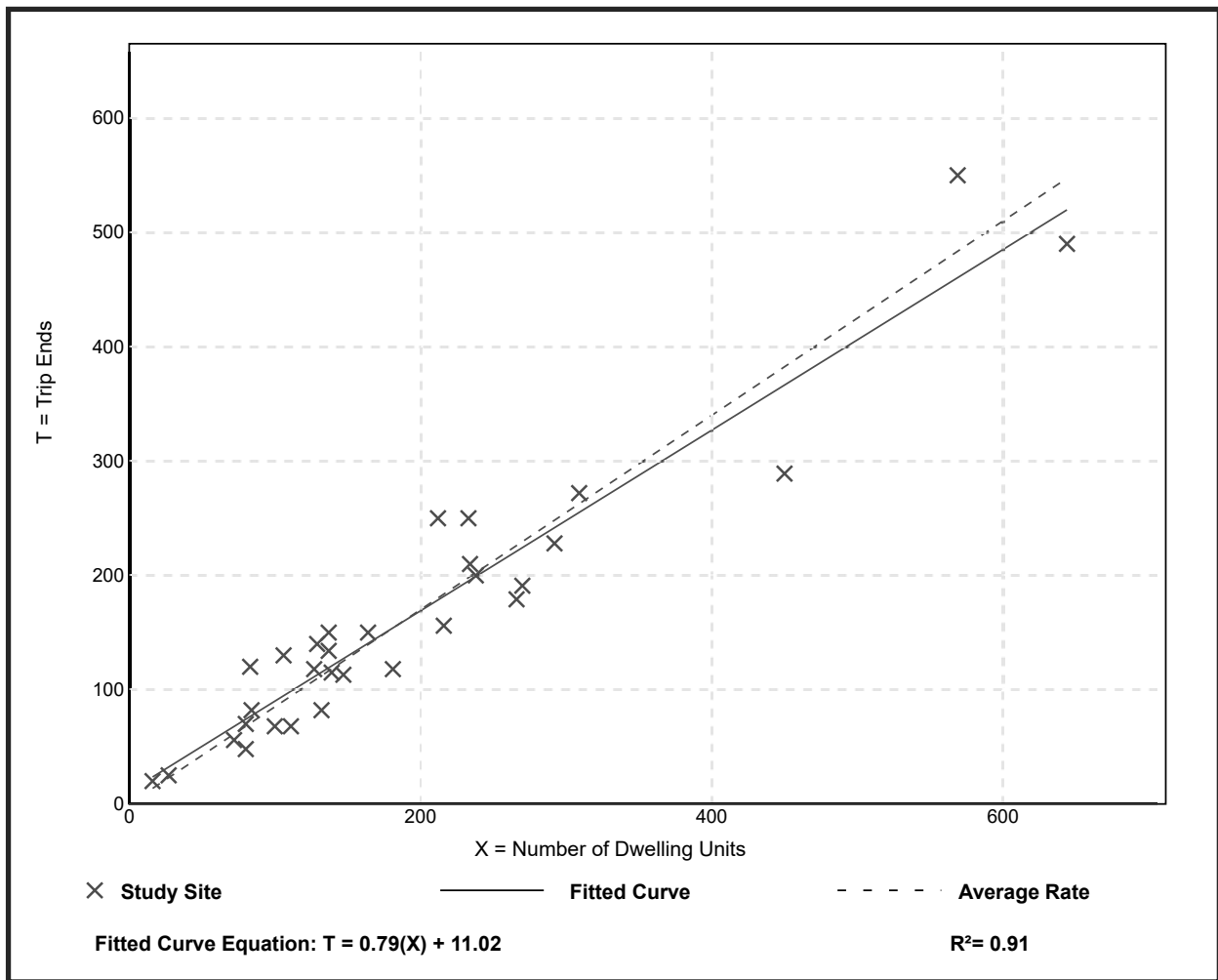
Vehicle Trip Ends vs: Dwelling Units
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Dwelling Units: 193
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.85	0.60 - 1.45	0.18

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

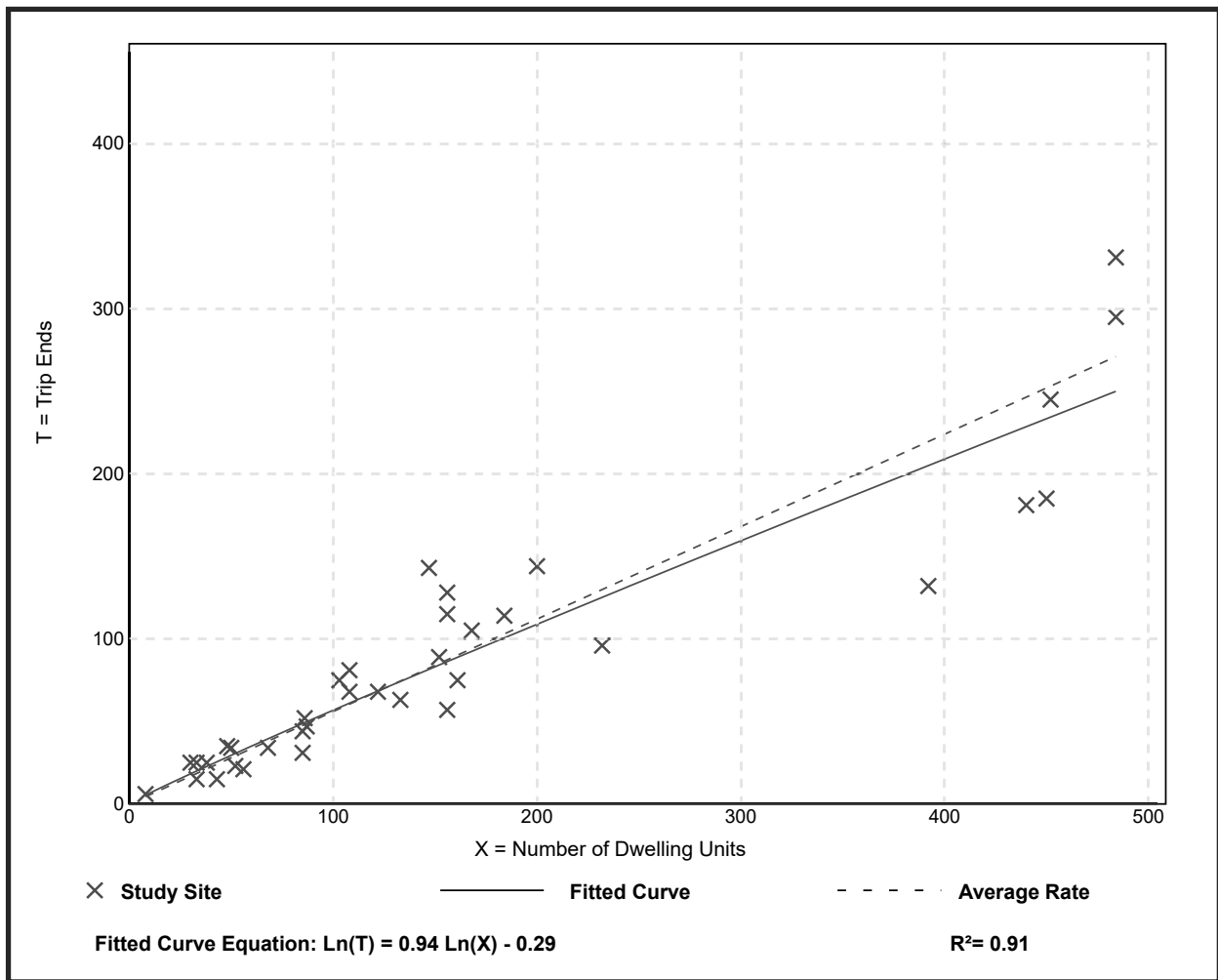
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 36
Avg. Num. of Dwelling Units: 161
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.34 - 0.97	0.15

Data Plot and Equation



Multifamily Housing (Low-Rise)

(220)

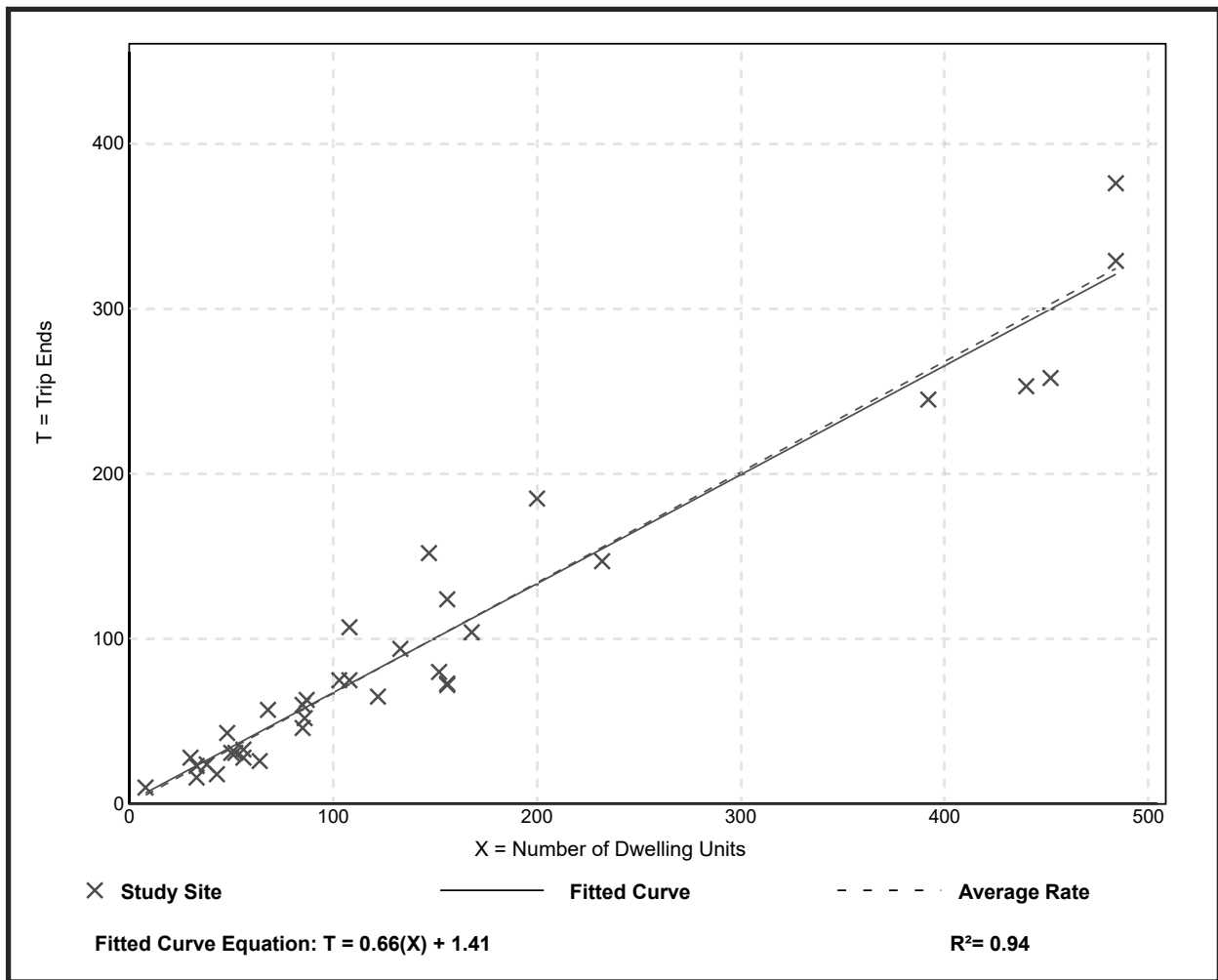
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 35
Avg. Num. of Dwelling Units: 146
Directional Distribution: 59% entering, 41% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.67	0.41 - 1.25	0.14

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 5

Avg. Num. of Dwelling Units: 89

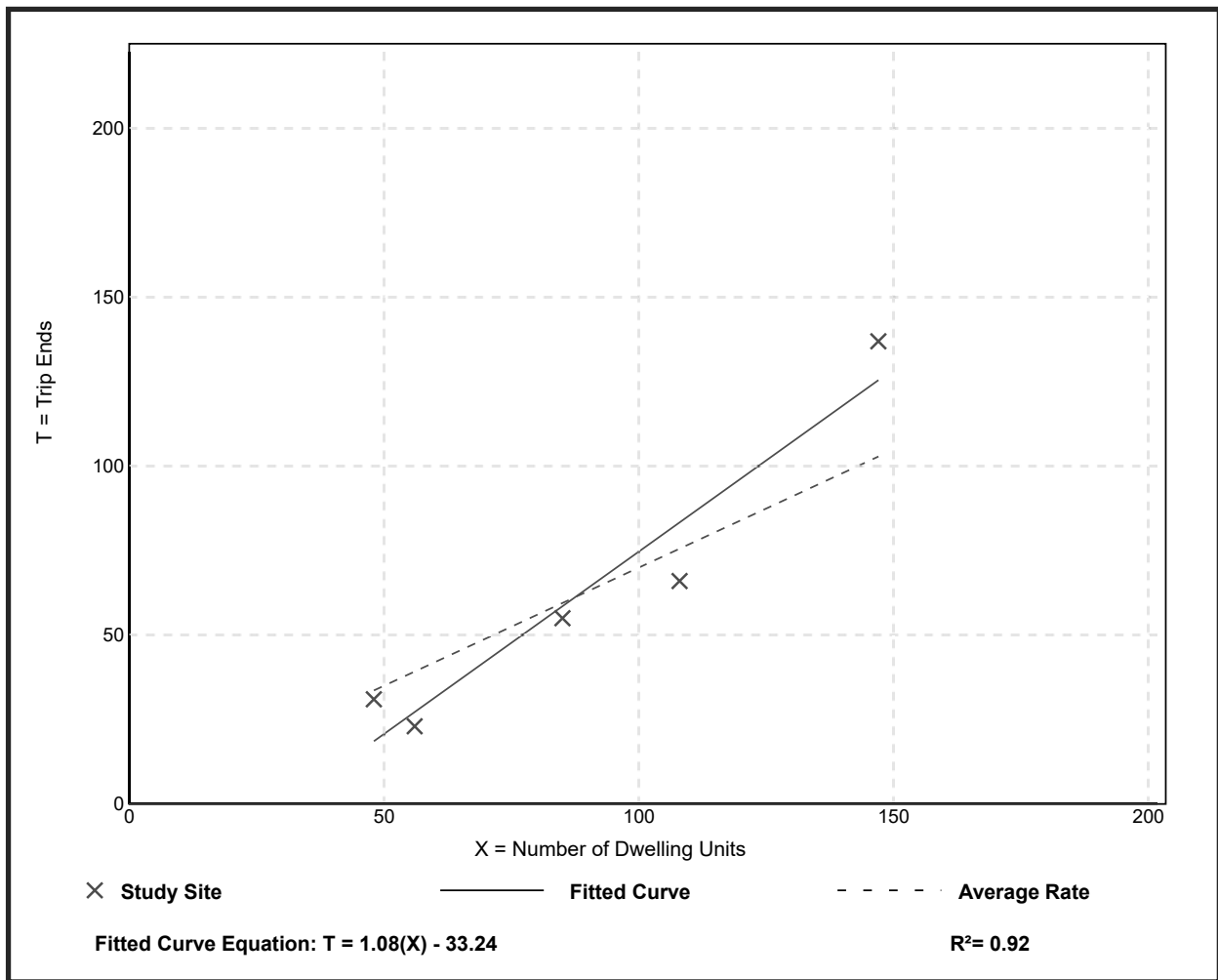
Directional Distribution: Not Available

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.41 - 0.93	0.20

Data Plot and Equation

Caution – Small Sample Size



Multifamily Housing (Low-Rise)

(220)

Vehicle Trip Ends vs: Dwelling Units

On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 5

Avg. Num. of Dwelling Units: 89

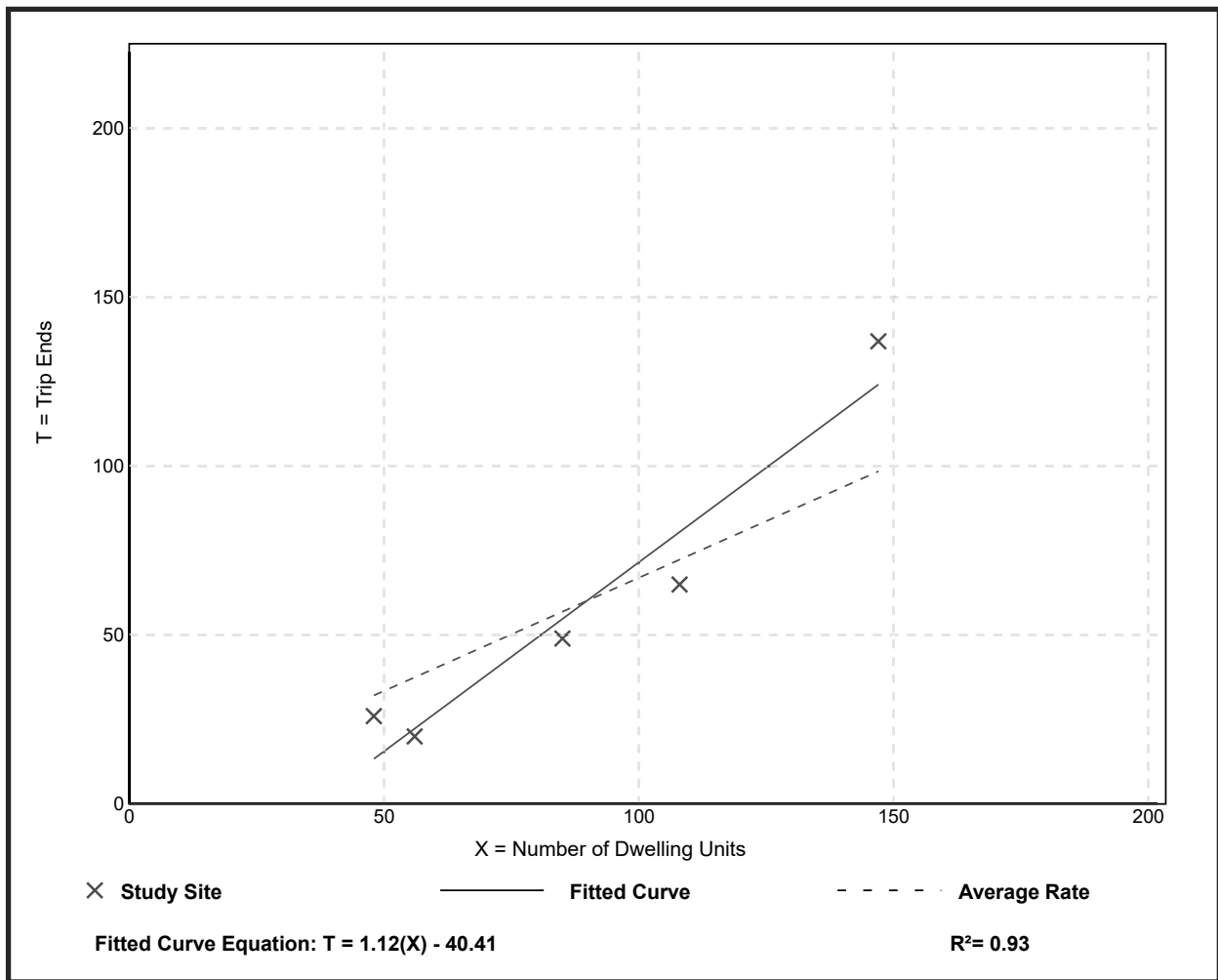
Directional Distribution: Not Available

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.67	0.36 - 0.93	0.22

Data Plot and Equation

Caution – Small Sample Size



Thanks,

Natalia Lercari, P.E., LEED Green Associate
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O: 561.840.8650 x 4105
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From: Claudia Cantero <ccantero@enverasystems.com>
Sent: Wednesday, February 13, 2019 2:00 PM
To: Patrick Gonzalez <Patrick.Gonzalez@Pulte.com>
Cc: Lercari, Natalia <nlercari@mcmahonassociates.com>
Subject: RE: Envera processing time

Hello Patrick,

This is actual processing information for a community in Oakland Park for the last 2 full months.

Total	ASA	AHT
11730	5.1	33.0

Total-Total Kiosk Transactions

ASA-Average speed of answer in seconds (From activation to guard answer)

AHT-Average Handle Time in Seconds (From answer to denial or gate open)

Regards,

Claudia Cantero
Security Consultant
Envera Systems | Next Generation Security



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CCantero@EnveraSystems.com
www.enverasystems.com



From: Patrick Gonzalez [<mailto:Patrick.Gonzalez@Pulte.com>]
Sent: Monday, February 11, 2019 7:07 PM
To: Claudia Cantero <ccantero@enverasystems.com>