

**RESOLUTION 2017-43**

**A RESOLUTION TO SELECT THE CORRIDOR DESIGN CONCEPT FOR THE COLUMBIA AVENUE WIDENING & IMPROVEMENTS PROJECT**

**WHEREAS**, on December 11, 2013, the Nashville Area Metropolitan Planning Organization (MPO) adopted the Transportation Improvement Program (TIP) for Fiscal Years 2014-2017, allocating \$6,000,000.00 in total funding to the Preliminary Engineering (Environmental), Design, and Right-of-Way phases of this project and reserves an additional \$15,000,000.00 in total funding for the Construction Phase; and

**WHEREAS**, the transportation improvements associated with the project will generally be funded with 80 percent Federal Funds and 20 percent State Funds; and

**WHEREAS**, on July 14, 2015, the City of Franklin Board of Mayor and Aldermen unanimously approved the Local Agency Project Agreement (COF Contract No. 2014-0289, TDOT Contract No. 140204), which formally began the Columbia Avenue Widening & Improvements Project; and

**WHEREAS**, the preliminary engineering/environmental phase includes preparation of a National Environmental Policy Act (NEPA) document, technical study determinations (Archaeological, Natural Resources, Noise, and Air Quality), and the development of functional level roadway concept designs, as required by the Federal Highways Administration (FHWA) and TDOT; and

**WHEREAS**, as part of the preliminary engineering phase, three public meetings were conducted (May 17, 2016; January 31, 2017; May 16, 2017; and August 30, 2017) to engage the corridor users, business owners, and other stakeholders to gather their input on the roadway design; and

**WHEREAS**, the roadway design concepts developed for Columbia Avenue generally include the following Options: Option 1— Five-Lane Concept (with Access Management) and Option 2—Roundabout Concept, as conceptual shown on Exhibit A; and

**WHEREAS**, roadway design concepts for Columbia Avenue Project were presented during a public meeting and special Board of Mayor and Aldermen work session on August 30, 2017.

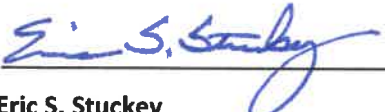
**NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF MAYOR AND ALDERMEN OF THE CITY OF FRANKLIN, TENNESSEE, AS FOLLOWS:**

**Section 1.** The Board of Mayor and Aldermen have selected Option 1 <sup>(one)</sup> as the preferred corridor design concept for the Columbia Ave Widening and Improvements Project as conceptually shown in Exhibit A.

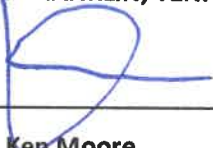
**Section 2.** City staff is directed to continue to work with impacted property owners and other stakeholders to further develop the preferred corridor design concept and develop recommendations on bike and pedestrian facilities, utility relocation, streetscape improvements, and transit facilities for the proposed project. These options shall be presented back to the Board of Mayor and Aldermen for a final determination prior to proceeding with the design phase of the project.

IT IS SO RESOLVED AND DONE on this 12<sup>th</sup> day of September, 2017

ATTEST:

By:   
Eric S. Stuckey  
City Administrator

CITY OF FRANKLIN, TENNESSEE:

By:   
Dr. Ken Moore  
Mayor

Approved as to Form:

By:   
Shauna R. Billingsley  
City Attorney



5-Lane Concept  
(Access Management)

Columbia Avenue Roadway Concept  
Franklin, Tennessee





Roundabout Concept

Columbia Avenue Roadway Concept  
Franklin, Tennessee



CITY OF FRANKLIN, TENNESSEE

# Columbia Avenue

Widening & Improvements Project

Special BOMA Work Session | August 30, 2017





# Regional Context



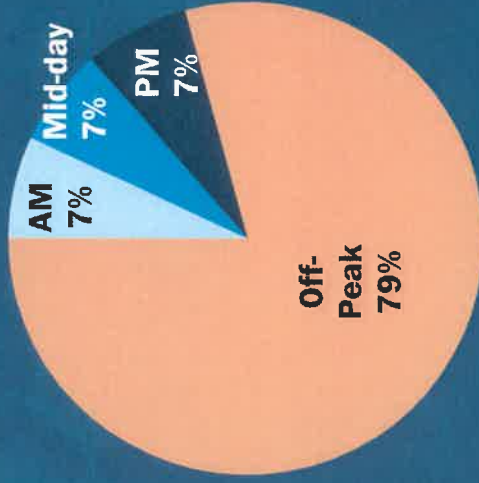
# Project Location

# May 2016

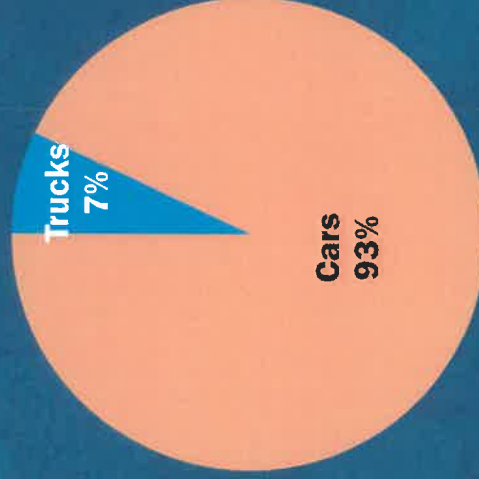
# 18,900

vehicles/day

DAILY TRAFFIC

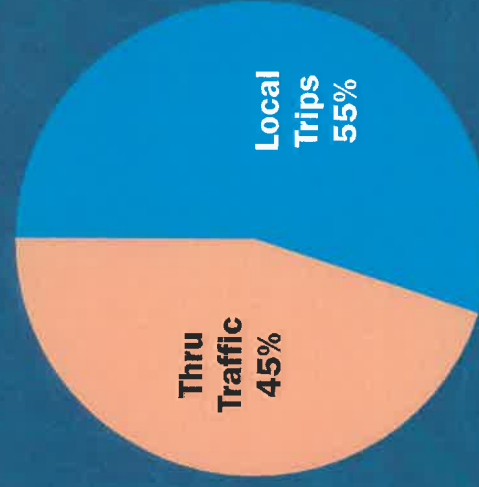


TRAFFIC COMPOSITION



1.1% Peak Trucks

TRAFFIC TYPE





# April 2016 travel time

from Battle Avenue to  
Winstead Elementary School,  
in minutes.

3:10  
with no traffic

5:10  
average day

10:20  
longest recorded

# Future Growth

**2016**

EXISTING  
CONDITIONS

based on data from City and  
TDOT count stations

**18,900**

vehicles/day

**2021**

BUILD  
YEAR

forecast conditions at  
project completion

**19,800**

vehicles/day

**2041**

DESIGN  
YEAR

improvements are designed to  
accommodate 20 years of growth

**25,400**

vehicles/day

# 3

components of  
comparison

Operations

Safety

Physical  
Impact

# Corridor Concepts

Example: Columbia Avenue at Southeast Parkway



**Five-Lane  
Concept**

(Traditional)



**Five-Lane  
Concept**

(Access Management)



**Roundabout  
Concept**

(Access Management)

# Operations

Anticipated Travel Time and Average Speed, 2041 Volumes (Columbia Avenue)

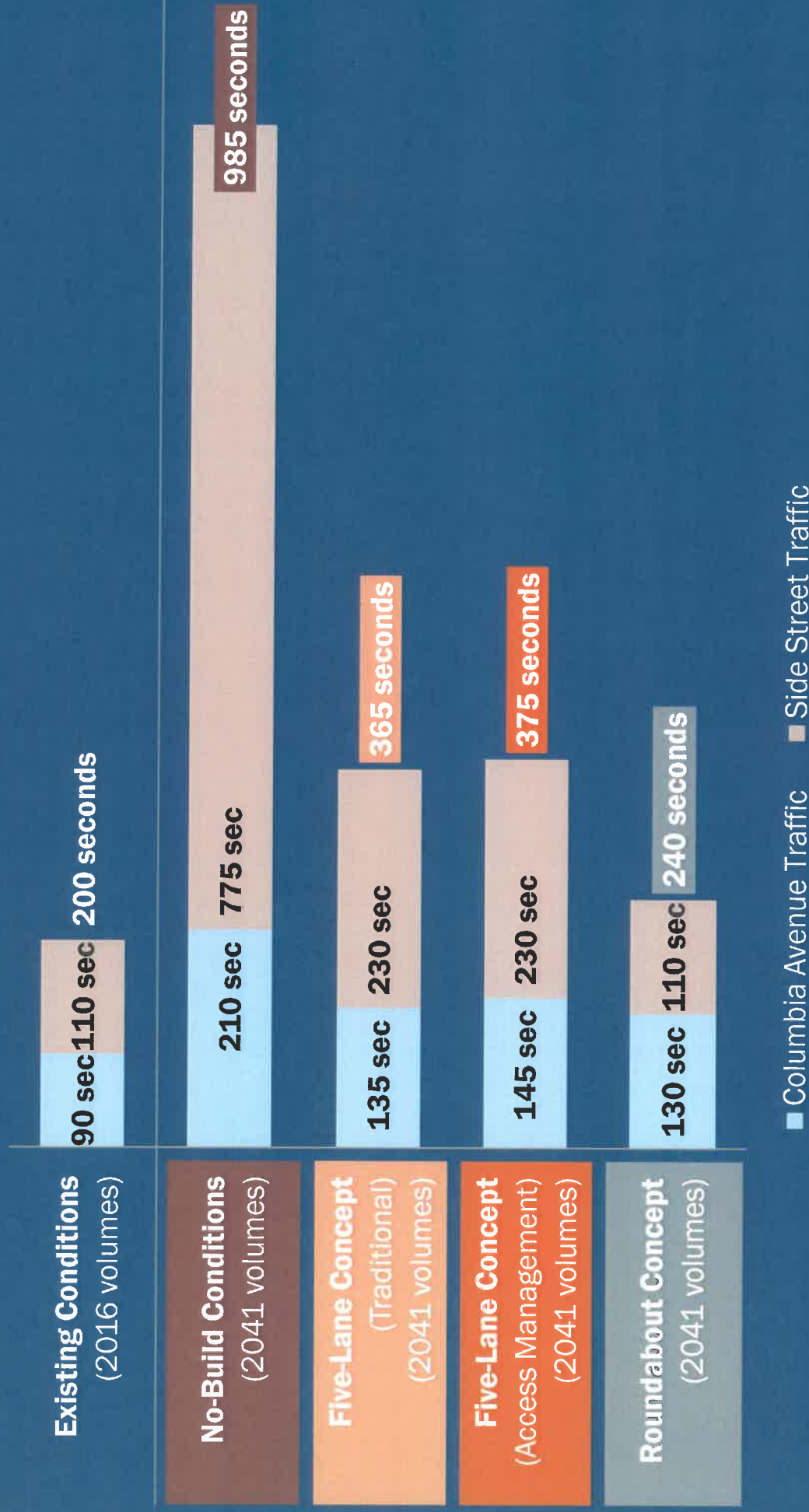
<b>No-Build Conditions</b>	<b>5:50</b> 14.5 mph
<b>Five-Lane Concept (Traditional)</b>	<b>4:30</b> 18.5 mph
<b>Five-Lane Concept (Access Mgmt.)</b>	<b>4:40</b> 18.1 mph
<b>Roundabout Concept</b>	<b>4:30</b> 18.5 mph

Covers one week of simulated rush hours (20 hours total)

Results are average travel time of all 35,000+ simulated vehicles between Fairground Street and Winstead Hill Park

# Operations

## Corridor Delay



# Operations

Delay, Level of Service (LOS), and Queue Length

Signalized Intersections		
Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	$\leq 10$	Free Flow
B	$>10 - 20$	Stable Flow (slight delays)
C	$>20 - 35$	Stable Flow (acceptable delays)
D	$>35 - 55$	Approaching Unstable Flow (tolerable delay, occasionally wait through more than one cycle before proceeding)
E	$>55 - 80$	Unstable Flow (intolerable delay)
F	$>80$	Forced Flow (congested and queues fail to clear)

# Operations

Delay, Level of Service (LOS), and Queue Length

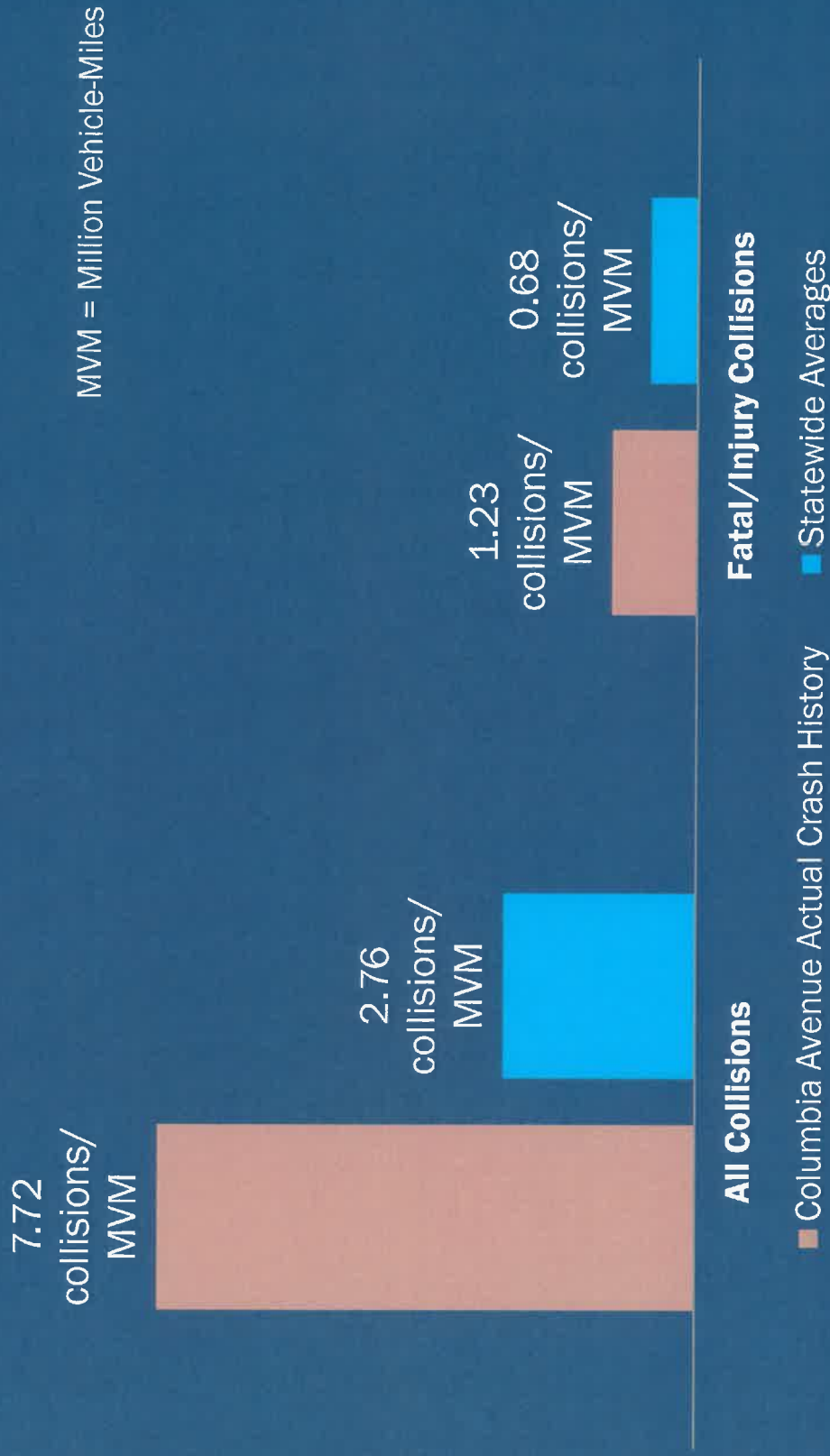
<b>Unsignalized Intersections</b> <i>(i.e. All-Way Stop, Two-Way Stop, Roundabout)</i>		
<b>Level of Service</b>	<b>Average Control Delay</b> (seconds/vehicle)	<b>General Description</b>
A	≤10	Free Flow
B	>10 - 15	Stable Flow (slight delays)
C	>15 – 25	Stable Flow (acceptable delays)
D	>25 – 35	Approaching Unstable Flow (tolerable delay, occasionally wait through more than one cycle before proceeding)
E	>35 – 50	Unstable Flow (intolerable delay)
F	>50	Forced Flow (congested and queues fail to clear)

\*NOTE: Two-way stop controlled intersections are defined in terms of individual movements



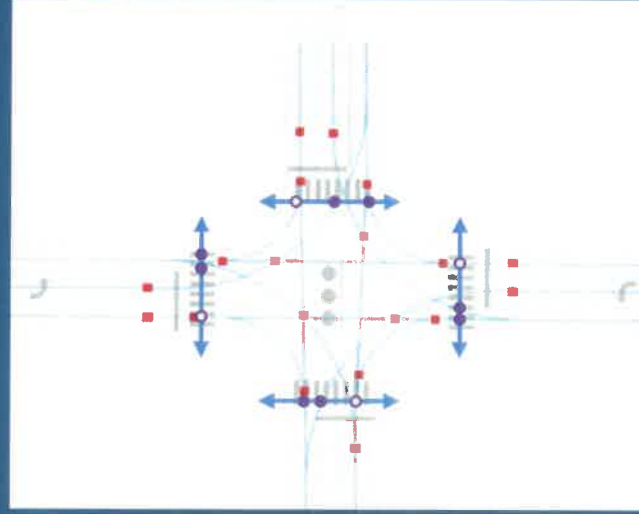
# Safety

## Collision Data (2013–2016)



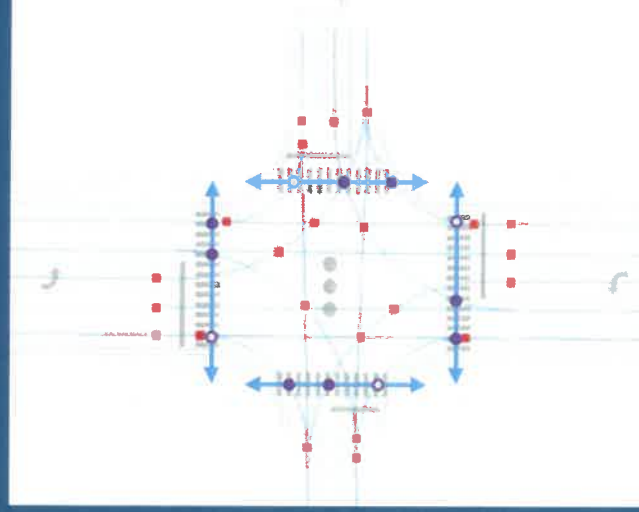
# Safety

## Columbia Avenue Conflict Points



**No-Build  
Conditions**

**504\***

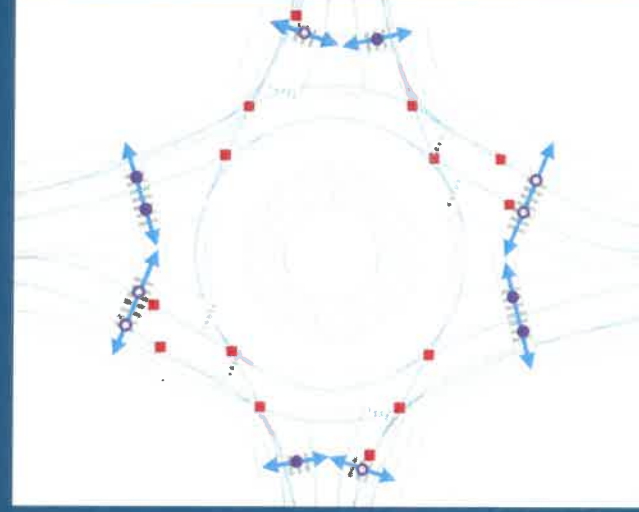


**Five-Lane Concepts**

(Traditional) (Acc. Mgmt.)

**583\***

**385\***



**Roundabout  
Concept**

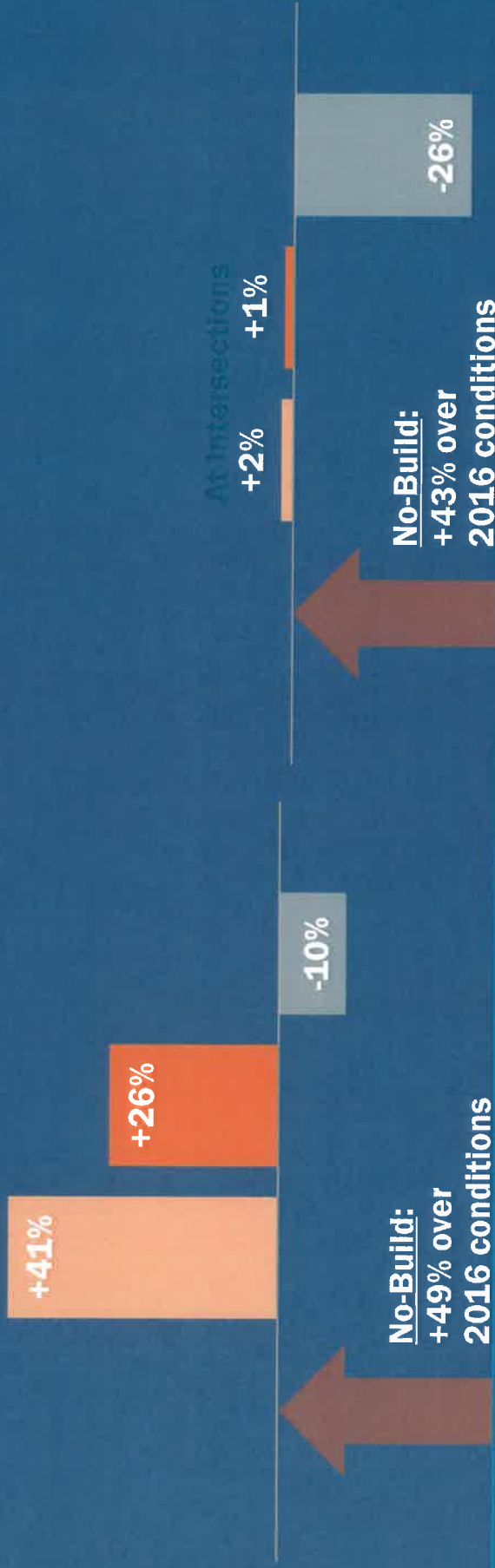
**258\***

\*NOTE: Vehicle Conflict Points

# Safety

## 2041 Anticipated Change in Traffic Collisions

Between Intersections  
At Intersections



No-Build Condition (2041)

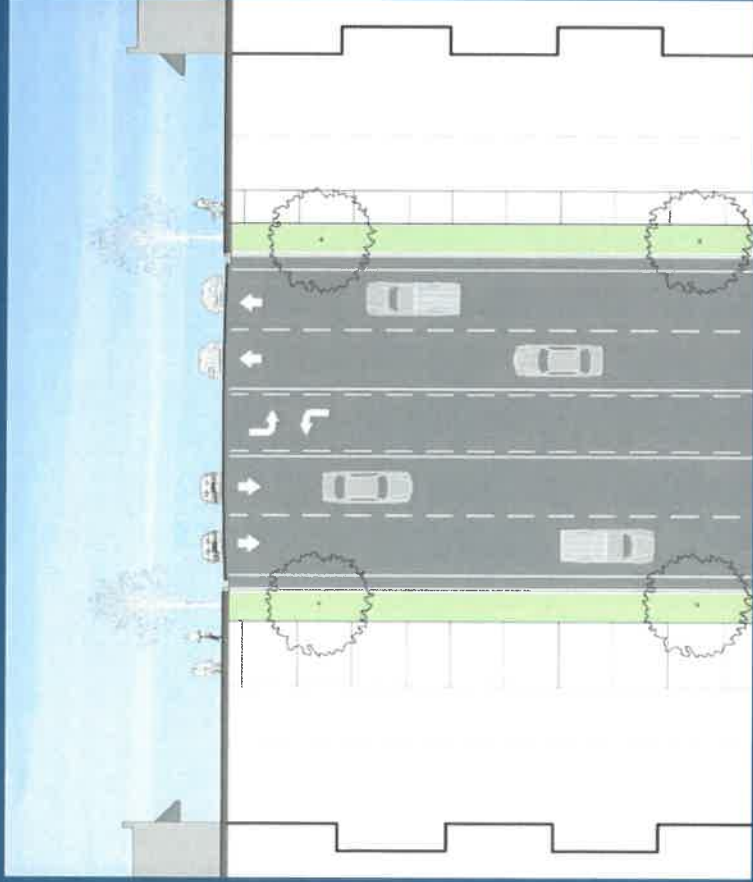
Five-Lane Concept (Traditional)

Five-Lane Concept (Access Management)

Roundabout Concept

# Physical Impact

## Typical Sections



### Five-Lane Concepts

**91'** wide (back of walk to back of walk)



### Roundabout Concept

**83'** wide (back of walk to back of walk)

# Physical Impact



**Five-Lane Concepts**



**Roundabout Concept**

# Data Summary

	No-Build Conditions (2041 volumes)	5-Lane Concept (Traditional)	5-Lane Concept (Access Mgmt.)	Roundabout Concept
Operational Performance	Through Traffic Delay	<b>210</b> (sec/veh)	<b>135</b> (sec/veh)	<b>145</b> (sec/veh)
	Side Street Delay	<b>775</b> (sec/veh)	<b>230</b> (sec/veh)	<b>110</b> (sec/veh)
	Average Travel Time	<b>5:50</b>	<b>4:30</b>	<b>4:30</b>
Safety Performance	Between Intersections	<b>BASELINE</b> (+49% from 2016)	<b>+41%</b> (from BASELINE)	<b>+26%</b> (from BASELINE)
	At Intersections	<b>BASELINE</b> (+43% from 2016)	<b>+2%</b> (from BASELINE)	<b>-26%</b> (from BASELINE)
Physical Impact	Between Intersections	<b>~70'</b> (ditch-to-ditch)	<b>91'</b> (total width)	<b>83'</b> (total width)
	At Intersections	<b>BASELINE</b> impact	<b>AVERAGE</b> footprint	<b>INCREASED</b> footprint

# next step

BOMA selects  
**preferred concept**  
to bring forward to  
detailed design.

### Level of Service (LOS) for No-Build Condition

Cross-Street	Traffic Control Device	Geometry	2016 Existing		2021 Future		2041 Design		2016 Existing		2021 Future		2041 Design		2016 Existing		2021 Future		2041 Design		2016 Existing		2021 Future		2041 Design											
			AM Peak Hour		PM Peak Hour		SAT Peak Hour		AM Peak Hour		PM Peak Hour		SAT Peak Hour		AM Peak Hour		PM Peak Hour		SAT Peak Hour		AM Peak Hour		PM Peak Hour		SAT Peak Hour		AM Peak Hour		PM Peak Hour		SAT Peak Hour					
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS		
1 Mack Hatcher Parkway / Hillview Lane	Signal	OVERALL	27.8	C	29.3	C	40.9	D	33.6	C	34.3	C	36.5	D	46.9	D	48.2	D	49.1	D	27.3	C	30.5	C	38.0	D	46.2	D	46.2	D	46.2	D	46.2	D		
		EASTBOUND (EB)	33.5	E	36.0	E	56.7	E	59.9	D	65.1	F	65.1	F	72.9	F	72.9	F	72.9	F	72.9	F	69.0	E	73.0	F	73.0	F	73.0	F	73.0	F	73.0	F	73.0	F
		EB Left	53.7	D	62.0	D	92.1	D	98.7	D	108.8	F	108.8	F	122.0	F	122.0	F	122.0	F	122.0	F	115.0	D	122.0	F	122.0	F	122.0	F	122.0	F	122.0	F	122.0	F
		EB Thru/Right	55.9	E	56.4	E	57.1	E	54.1	D	55.5	E	57.1	E	54.9	D	57.9	E	57.9	E	57.9	E	57.9	E	57.9	E	57.9	E	57.9	E	57.9	E	57.9	E	57.9	E
		WESTBOUND (WB)	36.7	D	37.2	D	40.1	D	31.2	C	29.7	C	31.9	C	28.0	C	29.5	C	28.0	C	29.5	C	29.5	C	20.9	C	20.3	C	21.5	C	21.5	C	21.5	C	21.5	C
		WB Left	42.5	D	43.0	D	44.1	D	34.4	C	34.8	C	36.2	D	35.7	D	36.6	D	34.4	C	34.4	C	34.4	C	24.1	C	24.1	C	25.4	C	25.4	C	25.4	C	25.4	C
		WB Thru	45.3	D	45.7	D	45.7	D	33.1	C	32.2	C	34.6	D	31.1	C	32.2	C	31.1	C	32.2	C	31.1	C	29.9	C	29.9	C	30.8	C	30.8	C	30.8	C	30.8	C
		WB Right	32.8	C	33.5	C	33.5	D	31.1	C	31.1	C	28.3	C	26.2	C	22.2	C	26.3	C	26.3	C	26.3	C	17.1	B	17.1	B	17.4	B	17.4	B	17.4	B	17.4	B
		NORTHBOUND (NB)	24.4	C	29.1	C	49.6	D	26.1	C	30.1	C	31.5	C	31.8	C	38.6	D	44.6	D	30.9	C	30.9	C	31.9	B	31.9	B	64.5	E	64.5	E	64.5	E	64.5	E
		NB Left	15.4	B	16.3	B	16.8	B	23.1	C	26.8	C	27.5	C	27.5	C	31.1	C	31.1	C	28.4	C	28.4	C	29.5	C	29.5	C	30.6	C	30.6	C	30.6	C	30.6	C
		NB Thru	22.2	C	25.6	D	69.6	E	29.5	C	35.5	C	35.5	C	35.5	C	43.3	D	51.3	D	35.5	C	35.5	C	35.5	C	35.5	C	48.7	D	48.7	D	48.7	D	48.7	D
		NB Right	9.3	A	11.0	B	11.0	B	16.0	B	11.0	B	11.0	B	11.0	B	11.0	B	11.0	B	17.0	B	17.0	B	18.0	B	18.0	B	19.1	B	19.1	B	19.1	B	19.1	B
		SOUTHBOUND (SB)	18.4	C	22.0	C	27.9	C	34.7	C	34.7	C	34.7	C	48.7	D	44.4	D	51.0	D	26.7	C	26.7	C	28.9	C	27.3	C	30.0	C	30.0	C	30.0	C	30.0	C
		SB Left	48.8	E	52.1	E	52.1	E	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D	36.6	D
		SB Thru	15.3	B	17.9	B	36.6	D	22.0	C	21.5	C	91.1	C	17.4	B	17.4	B	19.4	B	15.8	B	17.2	C	25.1	C	25.1	C	25.1	C	25.1	C	25.1	C	25.1	C
SB Right	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B	11.7	B		

Delay Reduction Color Code: Actuated Green Time Increases  
 Progression Factor Improves  
 NOTES: (1) No-Build results updated 8/25/2017 to assume consistent signal timings/offsets with 2016 existing conditions. Previous data had assumed improvements to signal timings in future conditions.  
 (2) Delay of 999.9+ seconds indicates maximum limit of model.



**Level of Service (LOS) for Five-Lane (Traditional) Concept**

Cross-Street	Traffic Control Device	Geometry	[AM] Peak Hour								[MID] Peak Hour								[PM] Peak Hour								[SAT] Peak Hour							
			2021 Future		2041 Design		2021 Future		2041 Design		2021 Future		2041 Design		2021 Future		2041 Design		2021 Future		2041 Design													
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS										
1 Mack Hatcher Parkway / Hillview Lane	Signal	OVERALL	20.5	C	23.2	C	21.8	C	22.7	C	23.1	C	30.3	C	21.8	C	23.6	C	21.8	C	23.6	C	21.8	C										
		EASTBOUND (EB)	42.0	D	38.1	D	32.8	C	30.5	C	35.1	D	35.7	D	30.8	C	30.8	C	30.8	C	30.8	C	30.8	C										
		EB Left																																
		EB Thru	45.0	D	41.2	D	35.7	B	33.5	B	38.5	D	39.0	D	31.9	C	31.9	C	31.9	C	31.9	C	31.9	C										
		EB Right																																
		WESTBOUND (WB)	25.8	C	24.8	C	25.1	C	21.7	C	26.0	C	29.5	C	18.8	B	19.0	B																
		WB Left					25.1	C	25.2	C	31.8	C	47.3	D	21.2	C	21.2	C																
		WB Thru	25.7	C	23.8	C	17.7	B	18.1	B	32.2	C	32.7	C	26.9	C	26.9	C																
		WB Right	25.7	C	23.8	C	18.2	B	18.4	B	21.0	C	21.4	C	15.8	B	15.9	B																
		NORTHBOUND (NB)	16.6	B	21.0	C	20.5	C	24.1	C	17.5	B	19.7	B	22.9	C	25.5	C																
		NB Left	11.8	B	13.7	B	16.1	B	18.5	B	23.2	C	18.6	B	18.7	B	21.6	C																
		NB Thru	19.1	B	24.5	C	22.7	C	28.8	C	10.0	B	21.2	C	25.4	C	28.4	C																
		NB Right	9.0	A	11.0	B	14.9	B	17.4	B	10.7	B	11.5	B	16.2	B	17.3	B																
		SOUTHBOUND (SB)	20.5	C	24.0	C	19.8	B	20.4	C	22.5	C	26.0	D	20.5	C	23.3	C																
		SB Left	25.1	C	27.2	C	31.9	C	32.5	C	48.8	D	25.2	C	25.2	C	28.8	C																
		SB Thru	16.9	B	21.7	C	8.5	A	9.3	A	17.7	B	31.6	C	17.2	B	19.6	B																
		SB Right	8.1	A	9.6	A	11.8	B	13.0	B	10.7	B	10.8	B	13.9	B	14.3	B																
		2 Parkway Commons / Cemetery	Signal	OVERALL	7.6	A	8.4	A	19.3	B	23.9	C	14.4	B	17.9	B	16.2	B	18.9	B														
EASTBOUND	87.0			E	83.2	D	36.9	D	42.6	D	33.7	C	33.8	C	33.4	C																		
EB Left							40.5	D	45.5	D	42.6	D	42.7	D	37.9	D																		
EB Thru/Right	21.2			C	21.2	C	32.5	C	31.7	C	37.1	C	26.9	C	24.3	C																		
WESTBOUND	41.9			D	41.9	D	43.9	D	41.0	D	41.9	D	41.9	D	41.7	D	41.8	D																
WB Left/Thru/Right	41.9			D	41.9	D	43.9	D	41.0	D	41.9	D	41.9	D	41.7	D	41.8	D																
NORTHBOUND	6.4			A	7.6	A	22.1	C	24.6	C	18.2	B	21.4	C	20.8	C	23.3	C																
NB Left	16.3			B	27.2	C	11.4	B	12.0	C	18.2	B	16.0	B	18.0	B	21.6	C																
NB Thru/Right	3.6			A	4.9	A	20.5	C	23.0	C	16.2	B	19.5	B	19.9	B	22.6	C																
SOUTHBOUND	4.1			A	4.6	A	10.6	B	16.7	B	6.2	A	11.1	B	6.8	A	10.5	B																
SB Left	29.3			C	28.8	C																												
SB Thru/Right	4.0			A	4.6	A	10.5	B	16.6	B	6.1	A	11.1	B	6.8	A	10.5	B																
OVERALL	14.5			B	17.6	B	16.4	B	19.2	B	16.8	B	19.2	B	14.8	B	16.2	B																
EASTBOUND	27.7			C	28.7	C	30.6	C	32.3	C	29.9	C	30.1	C	26.0	C	28.3	C																
EB Left	28.3			C	32.6	C	31.7	C			32.4	C	33.5	C	27.4	C	31.2	C																
EB Thru	11.7			C	11.7	C	32.3	C	32.6	C	35.3	D	35.4	D	30.5	C	32.1	C																
EB Right	25.8			C	25.8	C	29.1	C	29.4	C	27.8	C	27.8	C	24.7	C	26.3	C																
WESTBOUND	35.9			D	36.0	D	34.7	C	35.1	D	35.3	D	35.8	D	35.4	D	36.2	D																
WB Left	33.3	C	33.3	C	28.4	C	29.6	C	30.1	C	30.2	C																						
WB Thru/Right	36.2	D	36.3	D	37.0	D	37.6	D	36.6	D	37.1	D	35.9	D	36.9	D																		
NORTHBOUND	7.9	A	10.8	B	9.7	A	12.4	B	17.2	B	19.0	B	9.5	A	12.4	B																		
NB Left	3.8	A	4.5	A	8.2	A	22.0	C	27.8	C	45.1	D	15.8	B	29.4	C																		
NB Thru/Right	8.3	A	11.5	B	9.9	A	10.9	B					8.0	A	8.6	A																		
SOUTHBOUND	13.4	B	18.7	B	12.1	B	16.2	B	10.3	B	14.1	B	12.6	B	12.7	B																		
SB Left	16.3	B	27.2	C	11.4	B	20.0	C	7.5	A	8.5	A	8.4	A	10.5	B																		
SB Thru	13.2	B	17.6	B	15.3	B	18.8	B	11.7	B	16.0	B	13.4	B	14.3	B																		
SB Right	10.1	A	11.4	B	9.2	A	0.4	A	0.1	A	0.1	A																						
4 Alpha Drive	Two-Way Stop Control (TWSC)	EASTBOUND	14.6	B	16.4	C	12.6	B	13.9	B	14.9	B	17.1	C	15.2	C	18.0	C																
		EB Left/Thru/Right	14.6	B	16.4	C	12.6	B	13.9	B	14.9	B	17.1	C	15.2	C	18.0	C																
		WESTBOUND	12.8	B	14.7	B	16.8	C	22.4	C	17.7	C	24.1	C	12.8	B	14.4	B																
		WB Left/Thru/Right	12.8	B	14.7	B	16.8	C	22.4	C	17.7	C	24.1	C	12.8	B	14.4	B																
		NORTHBOUND	9.0	A	9.4	A	10.0	B	10.8	B	10.6	B	11.9	B	10.4	B	11.6	B																
		NB Left	9.0	A	9.4	A	10.0	B	10.8	B	10.6	B	11.9	B	10.4	B	11.6	B																
		NB Thru/Right	10.9	B	12.2	B	10.6	B	11.7	B	9.8	A	10.7	B	9.9	A	10.8	B																
		SOUTHBOUND	10.9	B	12.2	B	10.6	B	11.7	B	9.8	A	10.7	B	9.9	A	10.8	B																
		SB Left	10.9	B	12.2	B	10.6	B	11.7	B	9.8	A	10.7	B	9.9	A	10.8	B																
		OVERALL	7.7	A	9.6	A	7.6	A	9.6	A	6.1	A	7.1	A	4.1	A	5.3	A																
		EASTBOUND	35.8	D	36.3	D	36.1	D	36.8	D	36.4	D	36.1	D	38.7	D	35.5	D																
		EB Left	38.3	D	38.3	D	35.8	D	42.0	D	38.5	D	39.0	D	36.8	D	36.4	D																
		EB Thru/Right	12.0	C	11.6	C	32.7	C	32.1	C	34.5	C	33.9	C	36.8	D	36.3	D																
		WB Left/Thru/Right	12.0	C	11.6	C	32.7	C	32.1	C	34.5	C	33.9	C	36.8	D	36.3	D																
		NORTHBOUND	2.3	A	3.5	A	2.6	A	5.2	A	1.7	A	2.4	A	1.2	A	1.9	A																
		NB Left	2.8	A	11.1	B	5.1	A	38.5	D	2.1	A	4.9	A	2.5	A	3.3	A																
		NB Thru/Right	2.2	A	2.4	A	2.9	A	1.5	A	2.3	A	2.3	A	1.9	A	1.9	A																
		SOUTHBOUND	8.5	A	11.8	B	6.1	A	7.7	A	4.6	A	6.0	A	5.8	A	5.8	A																
SB Left	6.3	A	7.8	A	4.5	A	4.7	A	3.0	A	3.3	A	2.0	A	2.6	A																		
SB Thru/Right	8.5	A	11.8	B	6.1	A	7.7	A	4.6	A	6.0	A	5.8	A	5.8	A																		
6 Beasley Drive / Lumber Drive	TWSC	EASTBOUND	13.5	B	14.5	B	15.3	C	17.8	C	15.0	C	17.8	C	15.5	C	18.1	C																
		EB Left/Thru/Right	13.5	B	14.5	B	15.3	C	17.8	C	15.0	C	17.8	C	15.5	C	18.1	C																
		WESTBOUND	13.9	B	14.7	B	17.1	C	22.0	C	18.0	C	23.0	C	15.6	C	19.0	C																
		WB Left/Thru/Right	13.9	B	14.7	B	17.1	C	22.0	C	18.0	C	23.0	C	15.6	C	19.0	C																
		NORTHBOUND	10.3	B	11.4	B	10.6	B	11.8	B	10.4	B	11.5	B	10.5	B	11.6	B																
		NB Left	10.3	B	11.4	B	10.6	B	11.8	B	10.4	B	11.5	B	10.5	B	11.6	B																
		NB Thru/Right	10.6	B	11.7	B	10.8	B	12.0	B																								

# Level of Service (LOS) for Five-Lane (Access Management) Concept

Cross-Street	Traffic Control Device	Geometry	[AM] Peak Hour				[MID] Peak Hour				[PM] Peak Hour				[SAT] Peak Hour					
			2021 Future		2041 Design		2021 Future		2041 Design		2021 Future		2041 Design		2021 Future		2041 Design			
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS		
1 Mack Hatcher Parkway / Hillview Lane	Signal	OVERALL	20.5	C	33.2	C	21.8	C	22.7	C	39.1	C	30.2	C	21.7	C	23.6	C		
		EASTBOUND (EB)	42.0	D	30.7	D	12.4	C	10.5	C	35.1	D	35.7	D	30.8	C	30.8	C		
		EB Left	48.0	D	41.1	D	38.7	D	39.5	D	32.8	D	37.8	D	31.9	C	45.3	C		
		EB Thru	48.0	D	41.1	D	38.7	D	39.5	D	32.8	D	37.8	D	31.9	C	45.3	C		
		EB Right	48.0	D	41.1	D	38.7	D	39.5	D	32.8	D	37.8	D	31.9	C	45.3	C		
		WESTBOUND (WB)	25.8	C	24.8	C	21.5	C	21.7	C	26.0	C	29.6	C	18.8	B	19.0	B		
		WB Left	25.8	C	24.8	C	21.5	C	21.7	C	26.0	C	29.6	C	18.8	B	19.0	B		
		WB Thru	25.8	C	24.8	C	21.5	C	21.7	C	26.0	C	29.6	C	18.8	B	19.0	B		
		WB Right	25.8	C	24.8	C	21.5	C	21.7	C	26.0	C	29.6	C	18.8	B	19.0	B		
		NORTHBOUND (NB)	16.6	B	21.0	C	20.5	C	24.1	C	17.5	B	19.7	B	22.9	C	25.5	C		
		NB Left	11.8	B	23.2	B	16.1	B	18.5	B	15.2	B	18.6	B	18.7	B	21.6	C		
		NB Thru/Right	19.3	B	20.5	C	22.7	C	26.8	C	19.0	B	21.7	C	23.4	C	28.4	C		
		NB Right	8.0	A	11.0	B	14.9	B	17.4	B	10.7	B	11.5	B	16.2	B	23.3	C		
SOUTHBOUND (SB)	20.5	C	24.0	C	19.8	B	20.4	C	22.4	C	35.9	D	20.3	C	23.3	C				
SB Left	25.1	C	27.2	C	32.0	C	32.5	C	48.7	D	49.8	D	24.8	C	28.8	C				
SB Thru	16.9	B	21.6	C	8.5	A	9.3	A	12.7	B	11.6	C	17.2	B	19.6	B				
SB Right	8.3	A	9.6	A	11.8	B	15.0	B	10.7	B	10.8	B	13.9	B	14.3	B				
2 Parkway Commons / Cemetery	Signal	OVERALL	7.6	A	8.4	A	19.3	B	23.9	C	14.4	B	17.9	B	16.2	B	16.9	B		
		EASTBOUND	37.0	D	35.2	D	39.9	D	42.6	D	33.7	C	33.1	C	33.8	C	33.4	C		
		EB Left	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D		
		EB Thru/Right	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D	40.5	D		
		WESTBOUND	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D		
		WB Left/Thru/Right	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D	41.9	D		
		NORTHBOUND	6.4	A	7.6	A	22.1	C	24.6	C	18.2	B	24.1	C	20.8	C	23.9	C		
		NB Left	54.7	D	54.7	D	54.7	D	54.7	D	54.7	D	54.7	D	54.7	D	54.7	D		
		NB Thru/Right	3.6	A	4.9	A	20.5	C	23.0	C	16.2	B	19.5	B	18.9	B	22.6	C		
		SOUTHBOUND	4.1	A	4.6	A	10.6	B	16.7	B	6.1	A	11.1	B	6.8	A	10.5	B		
		SB Left	29.3	C	29.3	C	29.3	C	29.3	C	29.3	C	29.3	C	29.3	C	29.3	C		
		SB Thru/Right	4.0	A	4.6	A	10.5	B	16.6	B	6.1	A	11.0	B	6.8	A	10.5	B		
		SB Right	14.5	B	17.6	B	16.4	B	19.2	B	16.8	B	19.0	B	15.1	B	16.3	B		
3 Southeast Parkway / Shadow Green Drive	Signal	OVERALL	14.5	B	17.6	B	16.4	B	19.2	B	16.8	B	19.0	B	15.1	B	16.3	B		
		EASTBOUND	27.7	C	28.7	C	30.6	C	32.3	C	29.9	C	30.1	C	26.0	C	28.3	C		
		EB Left	29.3	C	32.6	C	31.7	C	36.0	D	32.4	C	33.5	C	27.4	C	31.2	C		
		EB Thru	11.6	C	11.7	C	11.6	C	11.6	C	35.3	D	35.4	D	30.5	C	32.1	C		
		EB Right	11.6	C	11.7	C	11.6	C	11.6	C	35.3	D	35.4	D	30.5	C	32.1	C		
		WESTBOUND	35.9	D	36.0	D	34.7	C	35.1	D	35.3	D	35.8	D	35.4	D	36.2	D		
		WB Left	33.3	C	33.3	C	29.4	C	29.6	C	30.1	C	30.2	C	28.3	C	28.3	C		
		WB Thru/Right	36.2	D	36.3	D	37.0	D	37.6	D	36.6	D	37.1	D	35.9	D	36.9	D		
		NORTHBOUND	7.9	A	10.8	B	9.7	A	12.4	B	17.2	B	19.0	B	9.5	A	12.4	B		
		NB Left	3.8	A	4.5	A	8.2	A	10.9	B	27.8	C	45.1	D	19.8	B	29.4	C		
		NB Thru/Right	8.3	A	11.5	B	8.9	A	10.9	B	10.9	B	10.9	B	8.0	A	8.6	A		
		NB Right	13.4	B	18.7	B	12.0	B	16.1	B	10.2	B	18.7	B	11.3	B	12.8	B		
		SB Left	16.7	B	27.9	C	11.3	B	20.0	C	7.5	A	8.3	A	8.8	A	10.6	B		
SB Thru	13.2	B	12.9	B	14.2	B	18.4	B	11.6	B	15.7	B	14.1	B	14.5	B				
SB Right	8.9	A	11.3	B	4.3	A	6.4	A	0.1	A	0.1	A	0.1	A	0.1	A				
4 Alpha Drive	Two-Way Stop Control (TWSC)	EASTBOUND	14.6	B	16.4	B	12.6	B	13.9	B	14.9	B	17.1	C	15.2	C	18.0	C		
		EB Left/Thru/Right	14.6	B	16.4	B	12.6	B	13.9	B	14.9	B	17.1	C	15.2	C	18.0	C		
		WESTBOUND	12.8	B	14.7	B	16.8	C	22.4	C	17.7	C	24.1	C	12.8	B	14.4	B		
		WB Left/Thru/Right	12.8	B	14.7	B	16.8	C	22.4	C	17.7	C	24.1	C	12.8	B	14.4	B		
		NORTHBOUND	9.0	A	9.4	A	10.0	B	10.8	B	10.6	B	11.9	B	10.4	B	11.6	B		
		NB Left	9.0	A	9.4	A	10.0	B	10.8	B	10.6	B	11.9	B	10.4	B	11.6	B		
		NB Thru/Right	9.0	A	9.4	A	10.0	B	10.8	B	10.6	B	11.9	B	10.4	B	11.6	B		
		SOUTHBOUND	10.9	B	12.2	B	10.6	B	11.7	B	9.8	A	10.7	B	9.9	A	10.8	B		
		SB Left	10.9	B	12.2	B	10.6	B	11.7	B	9.8	A	10.7	B	9.9	A	10.8	B		
		5 Century Court	Signal	OVERALL	7.7	A	8.6	A	7.7	A	9.6	A	6.2	A	7.2	A	4.0	A	5.2	A
				EASTBOUND	35.8	D	36.3	D	36.1	D	36.8	D	36.4	D	36.2	D	38.7	D	38.5	D
				EB Left	39.3	D	39.6	D	39.8	D	42.0	D	38.8	D	39.0	D	38.8	D	38.5	D
				EB Thru/Right	39.3	D	39.6	D	39.8	D	42.0	D	38.8	D	39.0	D	38.8	D	38.5	D
WESTBOUND	32.0			C	31.1	C	32.7	C	32.1	C	34.5	C	35.9	C	38.3	D	38.3	D		
WB Left/Thru/Right	32.0			C	31.1	C	32.7	C	32.1	C	34.5	C	35.9	C	38.3	D	38.3	D		
NORTHBOUND	2.3			A	3.5	A	2.6	A	5.2	A	1.7	A	2.4	A	1.2	A	1.9	A		
NB Left	1.9			A	12.2	B	1.2	A	13.5	B	2.1	A	4.4	A	1.5	A	3.2	A		
NB Thru/Right	1.9			A	12.2	B	1.2	A	13.5	B	2.1	A	4.4	A	1.5	A	3.2	A		
SOUTHBOUND	8.6			A	11.8	B	6.2	A	7.8	A	4.7	A	5.6	A	3.6	A	5.5	A		
SB Left	8.6			A	11.8	B	6.2	A	7.8	A	4.7	A	5.6	A	3.6	A	5.5	A		
SB Thru/Right	8.6			A	11.8	B	6.2	A	7.8	A	4.7	A	5.6	A	3.6	A	5.5	A		
SB Right	13.5			B	14.5	B	15.2	C	17.6	C	15.0	C	16.7	C	15.1	C	18.0	C		
6 Beasley Drive / Lumber Drive	TWSC	EASTBOUND	13.5	B	14.5	B	15.2	C	17.6	C	15.0	C	16.7	C	15.1	C	18.0	C		
		EB Left/Thru/Right	13.5	B	14.5	B	15.2	C	17.6	C	15.0	C	16.7	C	15.1	C	18.0	C		
		WESTBOUND	13.9	B	14.7	B	17.0	C	21.9	C	18.0	C	22.6	C	15.6	C	18.9	C		
		WB Left/Thru/Right	13.9	B	14.7	B	17.0	C	21.9	C	18.0	C	22.6	C	15.6	C	18.9	C		
		NORTHBOUND	10.3	B	11.4	B	10.6	B	11.7	B	10.4	B	11.4	B	10.4	B	11.5	B		
		NB Left	10.3	B	11.4	B	10.6	B	11.7	B	10.4	B	11.4	B	10.4	B	11.5	B		
		NB Thru/Right	10.3	B	11.4	B	10.6	B	11.7	B	10.4	B	11.4	B	10.4	B	11.5	B		
		SOUTHBOUND	10.6	B	11.7	B	10.8	B	12.0	B	10.1	B	11.2	B	10.6	B	11.9	B		
		SB Left	10.6	B	11.7	B	10.8	B	12.0	B	10.1	B	11.2	B	10.6	B	11.9	B		
		7 Franklin Business Park (North) / Future Werthan Circle	Signal	OVERALL	4.4	A	4.8	A	5.6	A	7.2	A	4.4	A	5.9	A	6.4	A	10.0	B
				EASTBOUND	41.4	D	41.7	D	39.1	D	38.1	D	41.8	D	38.8	D	37.8	D	38.8	D
				EB Left	42.8	D	43.5	D	40.6	D	40.6	D	39.8	D	38.9	D	38.7	D	39.2	D
				EB Thru/Right	40.3	D	40.4	D	39.2	D	39.2	D	39.8	D	38.9	D	38.9	D	39.1	D
NORTHBOUND	9.8			A	4.4	A	5.8	A	8.6	A	4.9	A	7.3	A	7.0	A	8.1	A		
NB Left	3.8			A	4.4	A	5.8	A	8.6	A	4.9	A	7.3	A	7.0	A	8.1	A		
NB Thru/Right	3.8			A	4.4	A	5.8	A	8.6	A	4.9	A	7.3	A	7.0	A	8.1	A		
SOUTHBOUND	1.2			A	3.1	A	2.9	A	2.6	A	1.7	A	2.4	A	4.1	A	5.8	A		
SB Left	4.1			A	5.0	A	2.3	A	2.8	A	1.9	A	2.2	A	5.0	A	16.5	B		
SB Thru	1.3			A	1.9	A	2.3	A	2.6	A	1.7	A	2.4	A	4.0	A	4.8	A		
SB Right	1.3			A	1.9	A	2.3	A	2.6	A	1.7	A	2.4	A	4.0	A	4.8	A		
SB Left	40.1			D	40															

## Level of Service (LOS) for Roundabout Concept

Cross-Street	Traffic Control Device	Geometry	[AM] Peak Hour				[MD] Peak Hour				[PM] Peak Hour				[SAT] Peak Hour					
			2021 Future		2041 Design		2021 Future		2041 Design		2021 Future		2041 Design		2021 Future		2041 Design			
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS		
1 Mack Hatcher Parkway / Hillview Lane	Signal	<b>OVERALL</b>	<b>20.7</b>	<b>C</b>	<b>22.6</b>	<b>C</b>	<b>23.6</b>	<b>C</b>	<b>25.0</b>	<b>C</b>	<b>25.7</b>	<b>C</b>	<b>33.9</b>	<b>C</b>	<b>25.3</b>	<b>C</b>	<b>28.4</b>	<b>C</b>		
		<b>EASTBOUND (EB)</b>	<b>41.7</b>	<b>D</b>	<b>38.5</b>	<b>D</b>	<b>32.7</b>	<b>C</b>	<b>30.4</b>	<b>C</b>	<b>35.1</b>	<b>D</b>	<b>36.7</b>	<b>D</b>	<b>28.7</b>	<b>C</b>	<b>28.9</b>	<b>C</b>		
		EB Left	27.9	D	28.1	D	22.9	C	25.9	C	32.8	C	33.7	C	27.5	C	27.5	C		
		EB Thru	44.5	D	40.2	D	36.4	D	34.2	D	39.5	D	42.7	D	32.0	C	32.6	C		
		EB Right	35.8	D	31.1	D	29.6	C	27.5	C	32.6	C	33.4	C	25.3	C	25.1	C		
		<b>WESTBOUND (WB)</b>	<b>25.8</b>	<b>C</b>	<b>24.6</b>	<b>C</b>	<b>21.7</b>	<b>C</b>	<b>21.7</b>	<b>C</b>	<b>26.0</b>	<b>C</b>	<b>31.3</b>	<b>C</b>	<b>18.9</b>	<b>B</b>	<b>19.1</b>	<b>B</b>		
		WB Left	30.1	C	28.7	C	25.1	C	25.1	C	31.8	C	45.3	D	21.2	C	21.3	C		
		WB Thru	33.6	C	31.7	C	31.3	C	31.5	C	32.2	C	33.6	C	27.0	C	27.0	C		
		WB Right	22.8	C	21.8	C	18.5	B	18.5	B	21.0	C	22.0	C	15.8	B	16.0	B		
		<b>NORTHBOUND (NB)</b>	<b>15.9</b>	<b>B</b>	<b>19.9</b>	<b>B</b>	<b>19.6</b>	<b>B</b>	<b>23.1</b>	<b>C</b>	<b>17.5</b>	<b>B</b>	<b>19.1</b>	<b>B</b>	<b>23.2</b>	<b>C</b>	<b>25.9</b>	<b>C</b>		
		NB Left	11.6	B	13.0	B	15.5	B	18.0	B	15.2	B	19.4	B	18.1	B	21.4	C		
		NB Thru	18.2	B	23.1	C	21.7	C	25.6	C	19.0	B	20.6	C	25.9	C	29.1	C		
		NB Right	8.8	A	10.8	B	14.4	B	16.9	B	10.7	B	11.1	B	16.4	B	17.4	B		
		<b>SOUTHBOUND (SB)</b>	<b>22.2</b>	<b>C</b>	<b>23.9</b>	<b>C</b>	<b>24.8</b>	<b>C</b>	<b>26.8</b>	<b>C</b>	<b>28.7</b>	<b>C</b>	<b>43.7</b>	<b>D</b>	<b>29.7</b>	<b>C</b>	<b>35.8</b>	<b>D</b>		
		SB Left	35.3	D	35.6	D	33.8	C	34.1	C	33.1	C	34.3	C	35.3	D	37.1	D		
		SB Thru	10.8	B	13.9	B	17.0	B	20.9	C	27.1	C	48.7	D	26.3	C	36.0	D		
		SB Right	8.0	A	9.6	B	11.7	B	12.9	B	17.1	C	10.4	B	14.9	B	15.4	B		
		2 Parkway Commons / Cemetery	Roundabout	<b>OVERALL</b>	<b>7.2</b>	<b>A</b>	<b>8.8</b>	<b>A</b>	<b>8.5</b>	<b>A</b>	<b>11.2</b>	<b>B</b>	<b>7.9</b>	<b>A</b>	<b>10.3</b>	<b>B</b>	<b>7.1</b>	<b>A</b>	<b>8.9</b>	<b>A</b>
				<b>EASTBOUND</b>	<b>7.0</b>	<b>A</b>	<b>8.5</b>	<b>A</b>	<b>11.9</b>	<b>B</b>	<b>18.5</b>	<b>C</b>	<b>11.2</b>	<b>B</b>	<b>17.0</b>	<b>C</b>	<b>9.3</b>	<b>A</b>	<b>13.1</b>	<b>B</b>
				EB Left/Thru/U-Turn	7.1	A	8.7	A	12.9	B	20.7	C	11.7	B	18.2	C	9.8	A	14.1	B
				EB Right	6.6	A	7.7	A	8.9	A	11.4	B	10.4	B	14.7	B	8.4	A	11.1	B
				<b>WESTBOUND</b>	<b>8.6</b>	<b>A</b>	<b>10.9</b>	<b>B</b>	<b>8.4</b>	<b>A</b>	<b>10.7</b>	<b>B</b>	<b>7.0</b>	<b>A</b>	<b>8.5</b>	<b>A</b>	<b>6.8</b>	<b>A</b>	<b>8.4</b>	<b>A</b>
WB Left/Thru/Right/U-Turn	6.6			A	10.9	B	8.4	A	10.7	B	7.0	A	8.5	A	6.8	A	8.4	A		
<b>NORTHBOUND</b>	<b>8.1</b>			<b>A</b>	<b>10.3</b>	<b>B</b>	<b>8.2</b>	<b>A</b>	<b>10.6</b>	<b>B</b>	<b>7.3</b>	<b>A</b>	<b>9.0</b>	<b>A</b>	<b>7.0</b>	<b>A</b>	<b>8.7</b>	<b>A</b>		
NB Left/Thru/U-Turn	8.1			A	10.3	B	8.2	A	10.6	B	7.3	A	9.0	A	7.0	A	8.7	A		
NB Thru/Right	8.1			A	10.3	B	8.2	A	10.6	B	7.3	A	9.0	A	7.0	A	8.7	A		
<b>SOUTHBOUND</b>	<b>5.9</b>			<b>A</b>	<b>6.8</b>	<b>A</b>	<b>7.7</b>	<b>A</b>	<b>9.3</b>	<b>A</b>	<b>7.6</b>	<b>A</b>	<b>9.5</b>	<b>A</b>	<b>6.6</b>	<b>A</b>	<b>7.8</b>	<b>A</b>		
SB Left/Thru/U-Turn	5.9			A	6.8	A	7.7	A	9.3	A	7.6	A	9.5	A	6.6	A	7.8	A		
SB Thru/Right	5.9			A	6.8	A	7.7	A	9.3	A	7.6	A	9.5	A	6.6	A	7.8	A		
3 Southeast Parkway / Shadow Green Drive	Roundabout			<b>OVERALL</b>	<b>10.3</b>	<b>B</b>	<b>15.0</b>	<b>C</b>	<b>13.0</b>	<b>B</b>	<b>20.9</b>	<b>C</b>	<b>10.7</b>	<b>B</b>	<b>15.8</b>	<b>C</b>	<b>10.0</b>	<b>B</b>	<b>14.2</b>	<b>B</b>
				<b>EASTBOUND</b>	<b>10.2</b>	<b>B</b>	<b>13.7</b>	<b>B</b>	<b>18.6</b>	<b>C</b>	<b>35.2</b>	<b>E</b>	<b>13.2</b>	<b>B</b>	<b>20.7</b>	<b>C</b>	<b>12.7</b>	<b>B</b>	<b>20.4</b>	<b>C</b>
				EB Left/Thru/U-Turn	10.5	B	14.2	B	19.9	C	39.0	E	13.3	B	20.0	C	12.0	B	18.2	C
		EB Right	10.0	B	13.3	B	17.4	C	31.8	D	13.2	B	21.2	C	13.1	B	21.9	C		
		<b>WESTBOUND</b>	<b>14.4</b>	<b>B</b>	<b>23.5</b>	<b>C</b>	<b>15.3</b>	<b>C</b>	<b>25.5</b>	<b>D</b>	<b>10.8</b>	<b>B</b>	<b>15.4</b>	<b>C</b>	<b>10.0</b>	<b>B</b>	<b>13.8</b>	<b>B</b>		
		WB Left/Thru/U-Turn	12.0	B	16.4	C	16.1	C	26.9	D	10.7	B	14.5	B	10.0	B	13.4	B		
		WB Right	15.1	C	25.3	D	14.6	B	24.3	C	11.0	B	15.9	C	10.0	B	14.1	B		
		<b>NORTHBOUND</b>	<b>12.1</b>	<b>B</b>	<b>18.8</b>	<b>C</b>	<b>11.7</b>	<b>B</b>	<b>17.7</b>	<b>C</b>	<b>8.2</b>	<b>A</b>	<b>10.4</b>	<b>B</b>	<b>9.0</b>	<b>A</b>	<b>12.1</b>	<b>B</b>		
		NB Left/Thru/U-Turn	12.1	B	18.8	C	11.7	B	17.7	C	8.2	A	10.4	B	9.0	A	12.1	B		
		NB Thru/Right	12.1	B	18.8	C	11.7	B	17.7	C	8.2	A	10.4	B	9.0	A	12.1	B		
		<b>SOUTHBOUND</b>	<b>7.0</b>	<b>A</b>	<b>8.5</b>	<b>A</b>	<b>11.4</b>	<b>B</b>	<b>17.2</b>	<b>C</b>	<b>12.1</b>	<b>B</b>	<b>19.0</b>	<b>C</b>	<b>9.9</b>	<b>A</b>	<b>14.0</b>	<b>B</b>		
		SB Left/Thru/U-Turn	7.0	A	8.5	A	11.4	B	17.2	C	12.1	B	19.0	C	9.9	A	14.0	B		
		SB Thru/Right	7.0	A	8.5	A	11.4	B	17.2	C	12.1	B	19.0	C	9.9	A	14.0	B		
		4 Alpha Drive	Two-Way Stop Control (TWSC)	<b>EASTBOUND</b>	<b>11.2</b>	<b>B</b>	<b>12.1</b>	<b>B</b>	<b>13.0</b>	<b>B</b>	<b>14.7</b>	<b>B</b>	<b>14.1</b>	<b>B</b>	<b>16.3</b>	<b>C</b>	<b>13.6</b>	<b>B</b>	<b>15.5</b>	<b>C</b>
				EB Left/Thru/Right	11.2	B	12.1	B	13.0	B	14.7	B	14.1	B	16.3	C	13.6	B	15.5	C
<b>WESTBOUND</b>	<b>15.0</b>			<b>C</b>	<b>18.4</b>	<b>C</b>	<b>17.9</b>	<b>C</b>	<b>26.5</b>	<b>D</b>	<b>14.8</b>	<b>B</b>	<b>18.7</b>	<b>C</b>	<b>14.5</b>	<b>B</b>	<b>17.9</b>	<b>C</b>		
WB Left/Thru/Right	15.0	C	18.4	C	17.9	C	26.5	D	14.8	B	18.7	C	14.5	B	17.9	C				
5 Century Court	Roundabout	<b>OVERALL</b>	<b>9.0</b>	<b>A</b>	<b>12.0</b>	<b>B</b>	<b>10.9</b>	<b>B</b>	<b>16.0</b>	<b>C</b>	<b>8.7</b>	<b>A</b>	<b>11.6</b>	<b>B</b>	<b>7.7</b>	<b>A</b>	<b>9.8</b>	<b>A</b>		
		<b>EASTBOUND</b>	<b>8.3</b>	<b>A</b>	<b>10.8</b>	<b>B</b>	<b>13.3</b>	<b>B</b>	<b>20.8</b>	<b>C</b>	<b>12.2</b>	<b>B</b>	<b>18.6</b>	<b>C</b>	<b>9.6</b>	<b>A</b>	<b>13.0</b>	<b>B</b>		
		EB Left/Thru/U-Turn	8.2	A	10.6	B	13.7	B	21.2	C	12.5	B	18.5	C	9.2	A	12.4	B		
		EB Right	8.5	A	11.0	B	13.0	B	20.6	C	12.1	B	18.7	C	10.2	B	13.9	B		
		<b>WESTBOUND</b>	<b>10.3</b>	<b>B</b>	<b>13.4</b>	<b>B</b>	<b>11.0</b>	<b>B</b>	<b>14.5</b>	<b>B</b>	<b>8.0</b>	<b>A</b>	<b>10.1</b>	<b>B</b>	<b>7.7</b>	<b>A</b>	<b>9.6</b>	<b>A</b>		
		WB Left/Thru/Right/U-Turn	10.3	B	13.4	B	11.0	B	14.5	B	8.0	A	10.1	B	7.7	A	9.6	A		
		<b>NORTHBOUND</b>	<b>10.0</b>	<b>B</b>	<b>13.8</b>	<b>B</b>	<b>11.2</b>	<b>B</b>	<b>16.7</b>	<b>C</b>	<b>7.9</b>	<b>A</b>	<b>10.1</b>	<b>B</b>	<b>7.6</b>	<b>A</b>	<b>9.5</b>	<b>A</b>		
		NB Left/Thru/U-Turn	10.0	B	13.8	B	11.2	B	16.7	C	7.9	A	10.1	B	7.6	A	9.5	A		
		NB Thru/Right	10.0	B	13.8	B	11.2	B	16.7	C	7.9	A	10.1	B	7.6	A	9.5	A		
		<b>SOUTHBOUND</b>	<b>7.8</b>	<b>A</b>	<b>9.7</b>	<b>A</b>	<b>10.0</b>	<b>B</b>	<b>14.1</b>	<b>B</b>	<b>8.8</b>	<b>A</b>	<b>11.8</b>	<b>B</b>	<b>7.7</b>	<b>A</b>	<b>9.7</b>	<b>A</b>		
		SB Left/Thru/U-Turn	7.8	A	9.7	A	10.0	B	14.1	B	8.8	A	11.8	B	7.7	A	9.7	A		
		SB Thru/Right	7.8	A	9.7	A	10.0	B	14.1	B	8.8	A	11.8	B	7.7	A	9.7	A		
		6 Beasley Drive / Lumber Drive	TWSC	<b>EASTBOUND</b>	<b>13.0</b>	<b>B</b>	<b>15.1</b>	<b>C</b>	<b>15.2</b>	<b>C</b>	<b>19.8</b>	<b>C</b>	<b>16.7</b>	<b>C</b>	<b>23.0</b>	<b>C</b>	<b>16.3</b>	<b>C</b>	<b>21.5</b>	<b>C</b>
				EB Right	13.0	B	15.1	C	15.2	C	19.8	C	16.7	C	23.0	C	16.3	C	21.5	C
				<b>WESTBOUND</b>	<b>13.3</b>	<b>B</b>	<b>15.1</b>	<b>C</b>	<b>14.9</b>	<b>B</b>	<b>18.2</b>	<b>C</b>	<b>13.5</b>	<b>B</b>	<b>15.7</b>	<b>C</b>	<b>14.6</b>	<b>B</b>	<b>17.5</b>	<b>C</b>
WB Right	13.3	B	15.1	C	14.9	B	18.2	C	13.5	B	15.7	C	14.6	B	17.5	C				
7 Franklin Business Park (North) / Future Werthan Circle	Roundabout	<b>OVERALL</b>	<b>7.4</b>	<b>A</b>	<b>9.1</b>	<b>A</b>	<b>7.6</b>	<b>A</b>	<b>9.4</b>	<b>A</b>	<b>6.8</b>	<b>A</b>	<b>8.0</b>	<b>A</b>	<b>7.9</b>	<b>A</b>	<b>10.3</b>	<b>B</b>		
		<b>WESTBOUND</b>	<b>9.7</b>	<b>A</b>	<b>12.9</b>	<b>B</b>	<b>10.5</b>	<b>B</b>	<b>14.5</b>	<b>B</b>	<b>7.7</b>	<b>A</b>	<b>9.4</b>	<b>A</b>	<b>12.2</b>	<b>B</b>	<b>20.0</b>	<b>C</b>		
		WB Left/Right/U-Turn	9.7	A	12.9	B	10.5	B	14.5	B	7.7	A	9.4	A	12.2	B	20.0	C		
		<b>NORTHBOUND</b>	<b>7.7</b>	<b>A</b>	<b>9.4</b>	<b>A</b>	<b>7.4</b>	<b>A</b>	<b>8.9</b>	<b>A</b>	<b>6.6</b>	<b>A</b>	<b>7.5</b>	<b>A</b>	<b>6.9</b>	<b>A</b>	<b>8.4</b>	<b>A</b>		
		NB Left/Thru/U-Turn	7.7	A	9.4	A	7.4	A	8.9	A	6.6	A	7.5	A	6.9	A	8.4	A		
		NB Thru/Right	7.7	A	9.4	A	7.4	A	8.9	A	6.6	A	7.5	A	6.9	A	8.4	A		
		<b>SOUTHBOUND</b>	<b>6.9</b>	<b>A</b>	<b>8.4</b>	<b>A</b>	<b>7.6</b>	<b>A</b>	<b>9.5</b>	<b>A</b>	<b>7.0</b>	<b>A</b>	<b>8.5</b>	<b>A</b>	<b>8.0</b>	<b>A</b>				

## Queue Length for No-Build Condition

Cross-Street	Traffic Control Device	Geometry	Storage Length	[AM] Peak Hour			[MID] Peak Hour			[PM] Peak Hour			[SAT] Peak Hour					
				Queue Length (Feet)			Queue Length (Feet)			Queue Length (Feet)			Queue Length (Feet)					
				2016	2021	2041	2016	2021	2041	2016	2021	2041	2016	2021	2041			
1 Mack Hatcher Parkway / Hillview Lane	Signal	EASTBOUND (EB)																
		EB Left	150' (6 veh)	13'	13'	15'	56'	62'	73'	28'	29'	32'	28'	29'	33'			
		EB Thru/Right	450' (18 veh)	58'	60'	68'	205'	266'	353'	211'	234'	321'	202'	212'	305'			
		WESTBOUND (WB)																
		WB Left	640' (25 veh)	147'	155'	185'	96'	107'	127'	214'	224'	349'	86'	89'	106'			
		WB Thru	999' (40 veh)	81'	86'	98'	110'	116'	139'	108'	112'	133'	109'	113'	136'			
		WB Right	325' (13 veh)	60'	116'	230'	39'	45'	154'	42'	79'	167'	32'	35'	73'			
		NORTHBOUND (NB)																
		NB Left	200' (8 veh)	36'	37'	44'	57'	55'	61'	53'	53'	61'	81'	84'	100'			
		NB Thru	775' (31 veh)	587'	678'	1012'	325'	362'	419'	416'	493'	643'	355'	468'	613'			
		NB Right	200' (8 veh)	15'	18'	27'	15'	16'	15'	14'	14'	19'	15'	15'	21'			
		SOUTHBOUND (SB)																
		SB Left	300' (12 veh)	161'	214'	277'	210'	252'	323'	164'	184'	214'	169'	194'	204'			
		SB Thru	560' (22 veh)	9'	17'	75'	392'	476'	556'	762'	823'	1117'	420'	474'	607'			
		SB Right	400' (16 veh)	0'	0'	0'	0'	1'	1'	0'	0'	0'	0'	1'	0'			
2 Parkway Commons / Cemetery	Signal	EASTBOUND																
		EB Left/Thru	175' (7 veh)	108'	112'	131'	292'	313'	413'	198'	218'	276'	176'	185'	224'			
		EB Right	175' (7 veh)	0'	0'	0'	21'	28'	38'	32'	36'	43'	25'	30'	33'			
		WESTBOUND																
		WB Left/Thru/Right	250' (10 veh)	12'	12'	12'	45'	47'	52'	12'	12'	12'	18'	18'	20'			
		NORTHBOUND																
		NB Left	50' (2 veh)	23'	23'	25'	41'	46'	55'	41'	42'	48'	25'	26'	27'			
		NB Thru/Right	150' (6 veh)	1003'	1188'	1530'	266'	306'	955'	245'	292'	1046'	217'	761'	900'			
		SOUTHBOUND																
		SB Left	150' (6 veh)	0'	4'	1'	7'	0'	0'	2'	0'	1'	4'	7'	3'			
		SB Thru/Right	150' (6 veh)	290'	354'	364'	385'	476'	589'	465'	656'	700'	378'	422'	519'			
		3 Southeast Parkway / Shadow Green Drive	Signal	EASTBOUND														
				EB Left	100' (4 veh)	83'	190'	208'	146'	227'	286'	77'	111'	123'	97'	132'	155'	
				EB Thru	200' (8 veh)	41'	68'	73'	44'	70'	77'	31'	47'	48'	35'	48'	52'	
				EB Right	75' (3 veh)	47'	66'	70'	53'	93'	186'	49'	57'	121'	53'	82'	157'	
WESTBOUND																		
WB Left	125' (5 veh)			35'	36'	41'	110'	114'	135'	62'	65'	75'	38'	38'	44'			
WB Thru/Right	300' (12 veh)			79'	86'	98'	112'	176'	262'	87'	164'	225'	66'	78'	87'			
NORTHBOUND																		
NB Left	150' (6 veh)			41'	51'	49'	20'	34'	41'	27'	82'	164'	87'	150'	161'			
NB Thru/Right	150' (6 veh)			612'	1030'	1360'	188'	382'	1131'	292'	349'	484'	602'	666'	856'			
SOUTHBOUND																		
SB Left	120' (4 veh)			9'	20'	101'	32'	29'	39'	22'	24'	22'	45'	44'	61'			
SB Thru	580' (23 veh)			96'	61'	58'	252'	273'	288'	250'	402'	447'	209'	233'	244'			
SB Right	100' (4 veh)			6'	4'	2'	21'	21'	13'	3'	25'	27'	29'	30'	26'			
4 Alpha Drive	Stop			WESTBOUND														
		WB Left/Thru/Right	200' (8 veh)	26'	43'	167'	116'	192'	457'	84'	158'	999'	37'	55'	174'			
		SOUTHBOUND																
		SB Left	75' (3 veh)	5'	9'	26'	6'	8'	22'	3'	4'	7'	3'	3'	7'			
5 Century Court	Signal	EASTBOUND																
		EB Left	125' (5 veh)	124'	151'	178'	121'	147'	172'	99'	114'	132'	59'	73'	82'			
		EB Thru/Right	225' (9 veh)	46'	47'	51'	59'	60'	66'	57'	57'	61'	32'	32'	34'			
		WESTBOUND																
		WB Left/Thru/Right	50' (2 veh)	11'	11'	11'	11'	11'	11'	11'	11'	11'	12'	12'	13'			
		NORTHBOUND																
		NB Left	75' (3 veh)	46'	44'	55'	43'	37'	93'	18'	18'	22'	6'	6'	6'			
		NB Thru/Right	200' (8 veh)	590'	676'	677'	583'	702'	953'	533'	616'	974'	120'	158'	174'			
		SOUTHBOUND																
		SB Left	100' (4 veh)	1'	1'	0'	2'	1'	2'	1'	1'	1'	1'	0'	1'			
		SB Thru/Right	225' (9 veh)	227'	482'	1111'	821'	1048'	1399'	957'	1204'	1640'	171'	1014'	1390'			
		6 Beasley Drive / Lumber Drive	Two-Way Stop Control (TWSC)	EASTBOUND														
				EB Left/Thru/Right	325' (13 veh)	16'	19'	999'	30'	55'	101'	42'	64'	151'	29'	44'	183'	
				WESTBOUND														
				WB Left/Thru/Right	200' (8 veh)	3'	4'	15'	35'	68'	104'	26'	52'	82'	23'	49'	999'	
NORTHBOUND																		
SB Left	75' (3 veh)	9'	10'	18'	9'	11'	32'	4'	5'	13'	3'	4'	10'					
7 Franklin Business Park (North) / Future Werthan Circle	Signal	WESTBOUND																
		WB Left	150' (6 veh)	33'	33'	37'	62'	66'	76'	48'	50'	58'	124'	129'	153'			
		WB Right	150' (6 veh)	30'	31'	34'	33'	33'	37'	31'	31'	34'	41'	42'	46'			
		NORTHBOUND																
		NB Thru/Right	275' (11 veh)	363'	556'	1328'	638'	795'	1325'	696'	817'	1156'	503'	651'	1158'			
8 Confederate Drive / Werthan Circle	TWSC	WESTBOUND																
		WB Left	100' (4 veh)	16'	61'	999'	0'	18'	78'	3'	10'	21'	0'	20'	75'			
		EB Thru/Right	150' (6 veh)	5'	18'	175'	2'	13'	35'	1'	8'	14'	1'	16'	34'			
		WESTBOUND																
		WB Left	100' (4 veh)	17'	32'	117'	15'	26'	81'	5'	7'	17'	5'	10'	37'			
9 Carr Avenue	Stop	WESTBOUND																
		WB Left/Thru/Right	175' (7 veh)	9'	11'	20'	22'	29'	64'	20'	27'	59'	20'	26'	58'			
		SOUTHBOUND																
		SB Left	150' (6 veh)	3'	3'	5'	3'	4'	6'	3'	3'	5'	2'	3'	4'			
10 Downs Boulevard	Signal	EASTBOUND																
		EB Left/Thru	350' (14 veh)	104'	107'	119'	101'	105'	120'	113'	114'	132'	108'	113'	135'			
		EB Right	350' (14 veh)	107'	111'	274'	92'	96'	104'	95'	99'	107'	101'	149'	412'			
		WESTBOUND																
		WB Left/Thru/Right	50' (2 veh)	14'	14'	16'	23'	23'	27'	22'	22'	26'	21'	21'	25'			
		NORTHBOUND																
		NB Left	150' (6 veh)	166'	195'	245'	148'	198'	303'	311'	387'	586'	289'	347'	464'			
		NB Thru/Right	175' (7 veh)	490'	572'	627'	425'	493'	674'	355'	414'	581'	316'	350'	552'			
		SOUTHBOUND																
		SB Left	50' (2 veh)	5'	5'	8'	6'	8'	10'	7'	9'	10'	7'	8'	8'			
		SB Thru/Right	125' (5 veh)	301'	374'	596'	460'	685'	1031'	554'	826'	1093'	418'	493'	716'			
		11 James Avenue	Stop	WESTBOUND														
				WB Left/Thru/Right	125' (5 veh)	7'	9'	15'	8'	10'	16'	8'	9'	14'	9'	11'	17'	
				SOUTHBOUND														
		SB Left	200' (8 veh)	0'	0'	1'	1'	1'	1'	1'	1'	1'	1'	1'	2'			

Queue Reduction Color Code: Actuated Green Time Increases  
 Progression Factor Improves  
 Approach Volumes Metered by Upstream Signal

NOTES: (1) No-Build results updated 8/25/2017 to assume consistent signal timings/offsets with 2016 existing conditions. Previous data had assumed improvements to signal timings in future conditions.

(2) Queue length of '9999' feet indicates maximum limit of model.

### Queue Length for Five-Lane (Traditional) Concept

Cross-Street	Traffic Control Device	Geometry	Storage Length	[AM] Peak Hour		[MD] Peak Hour		[PM] Peak Hour		[SA] Peak Hour			
				Queue Length (Feet)		Queue Length (Feet)		Queue Length (Feet)		Queue Length (Feet)			
				2021	2041	2021	2041	2021	2041	2021	2041		
1 Mack Hatcher Parkway / Hillview Lane	Signal	EASTBOUND (EB)											
		EB Left	150' (6 veh)	10'	11'	44'	52'	23'	26'	27'	80'		
		EB Thru	450' (18 veh)	38'	43'	106'	126'	85'	99'	118'	141'		
		EB Right	40' (1 veh)	0'	0'	0'	0'	17'	34'	0'	0'		
		WESTBOUND (WB)											
		WB Left	640' (25 veh)	109'	129'	75'	89'	178'	198'	82'	97'		
		WB Thru	999' (40 veh)	64'	73'	87'	104'	91'	107'	104'	124'		
		WB Right	325' (13 veh)	109'	182'	66'	145'	87'	161'	74'	144'		
		NORTHBOUND (NB)											
		NB Left	200' (8 veh)	20'	24'	27'	32'	22'	26'	42'	50'		
		NB Thru	775' (31 veh)	228'	291'	155'	182'	160'	196'	157'	190'		
		NB Right	40' (1 veh)	40'	57'	6'	17'	1'	8'	11'	23'		
		SOUTHBOUND (SB)											
		SB Left	300' (12 veh)	153'	175'	100'	114'	116'	127'	91'	140'		
SB Thru	560' (22 veh)	265'	315'	184'	242'	603'	804'	418'	509'				
SB Right	400' (16 veh)	0'	0'	0'	0'	0'	0'	0'	0'				
2 Parkway Commons / Cemetery	Signal	EASTBOUND											
		EB Left	175' (7 veh)	102'	120'	229'	308'	175'	242'	183'	244'		
		EB Thru/Right	175' (7 veh)	0'	0'	0'	0'	0'	9'	0'	8'		
		WESTBOUND											
		WB Left/Thru/Right	250' (10 veh)	10'	10'	35'	39'	10'	10'	17'	18'		
		NORTHBOUND											
		NB Left	150' (6 veh)	74'	74'	93'	119'	105'	140'	80'	92'		
		NB Thru/Right	150' (6 veh)	95'	125'	234'	274'	275'	315'	254'	291'		
		SOUTHBOUND											
		SB Left	150' (6 veh)	1'	1'	5'	3'	0'	1'	2'	2'		
		SB Thru/Right	150' (6 veh)	52'	57'	132'	448'	60'	78'	79'	98'		
		3 Southeast Parkway / Shadow Green Drive	Signal	EASTBOUND									
				EB Left	100' (4 veh)	99'	124'	121'	137'	78'	86'	105'	119'
				EB Thru	200' (8 veh)	48'	52'	47'	52'	35'	37'	40'	43'
EB Right	75' (3 veh)			46'	48'	82'	124'	50'	80'	78'	121'		
WESTBOUND													
WB Left	125' (5 veh)			24'	28'	70'	89'	46'	54'	32'	36'		
WB Thru/Right	300' (12 veh)			66'	73'	86'	104'	87'	103'	68'	75'		
NORTHBOUND													
NB Left	200' (8 veh)			4'	4'	24'	61'	102'	177'	70'	120'		
NB Thru/Right	385' (15 veh)			50'	59'	92'	113'	32'	44'	72'	91'		
SOUTHBOUND													
SB Left	100' (4 veh)			75'	114'	48'	73'	21'	22'	32'	46'		
SB Thru	580' (23 veh)			147'	205'	148'	193'	113'	176'	101'	127'		
SB Right	100' (4 veh)			0'	0'	0'	0'	1'	1'	7'	7'		
4 Alpha Drive	Two-Way Stop Control (TWSC)	EASTBOUND											
		EB Left/Thru/Right	50' (2 veh)	1'	1'	2'	3'	2'	4'	2'	3'		
		WESTBOUND											
		WB Left/Thru/Right	200' (8 veh)	11'	16'	43'	74'	34'	60'	16'	23'		
		NORTHBOUND											
		NB Left	175' (7 veh)	1'	1'	2'	2'	2'	3'	0'	1'		
5 Century Court	Signal	EASTBOUND											
		EB Left	125' (5 veh)	107'	124'	107'	125'	84'	98'	64'	70'		
		EB Thru/Right	225' (9 veh)	37'	40'	50'	54'	47'	52'	29'	31'		
		WESTBOUND											
		WB Left/Thru/Right	50' (2 veh)	8'	8'	9'	9'	9'	9'	11'	12'		
		NORTHBOUND											
		NB Left	75' (3 veh)	23'	47'	37'	66'	8'	15'	4'	8'		
		NB Thru/Right	200' (8 veh)	71'	82'	82'	137'	48'	100'	45'	111'		
		SOUTHBOUND											
		SB Left	100' (4 veh)	1'	0'	2'	2'	1'	1'	1'	1'		
6 Bessley Drive / Lumber Drive	TWSC	EASTBOUND											
		EB Left/Thru/Right	325' (13 veh)	11'	15'	18'	24'	23'	31'	14'	25'		
		WESTBOUND											
		WB Left/Thru/Right	200' (8 veh)	2'	3'	20'	32'	14'	24'	13'	20'		
		NORTHBOUND											
		NB Left	25' (1 veh)	10'	14'	10'	14'	4'	6'	3'	4'		
7 Franklin Business Park (North) / Future Werthan Circle	Signal	WESTBOUND											
		WB Left	150' (6 veh)	26'	28'	48'	55'	37'	43'	108'	128'		
		WB Right	150' (6 veh)	25'	28'	27'	30'	25'	28'	37'	41'		
		NORTHBOUND											
		NB Thru/Right	275' (11 veh)	72'	170'	235'	358'	118'	255'	137'	193'		
		SOUTHBOUND											
		SB Left	150' (6 veh)	9'	9'	4'	4'	9'	12'	23'	55'		
		SB Thru	599' (40 veh)	90'	91'	70'	76'	50'	69'	121'	137'		
8 Confederate Drive / Werthan Circle	Signal	EASTBOUND											
		EB Left	100' (4 veh)	62'	68'	36'	36'	35'	37'	39'	39'		
		EB Thru/Right	150' (6 veh)	37'	39'	35'	36'	26'	27'	34'	34'		
		WESTBOUND											
		WB Left	100' (4 veh)	47'	55'	52'	60'	28'	31'	26'	30'		
		WB Thru/Right	200' (8 veh)	29'	31'	36'	39'	25'	26'	31'	32'		
		NORTHBOUND											
		NB Left	100' (4 veh)	0'	0'	8'	7'	3'	3'	3'	3'		
		NB Thru/Right	115' (4 veh)	8'	12'	78'	95'	84'	96'	101'	128'		
		SOUTHBOUND											
SB Left	100' (4 veh)	6'	10'	5'	10'	7'	7'	7'	7'				
9 Carr Avenue	Stop	WESTBOUND											
		WB Left/Thru/Right	175' (7 veh)	6'	8'	13'	20'	13'	20'	11'	15'		
		SOUTHBOUND											
SB Left	150' (6 veh)	3'	4'	4'	5'	3'	5'	2'	4'				
10 Downs Boulevard	Signal	EASTBOUND											
		EB Left	150' (6 veh)	85'	100'	76'	89'	86'	102'	100'	119'		
		EB Thru	350' (14 veh)	8'	10'	5'	5'	8'	10'	5'	5'		
		EB Right	350' (14 veh)	192'	334'	115'	218'	163'	269'	279'	503'		
		WESTBOUND											
		WB Left	100' (4 veh)	8'	10'	9'	11'	12'	13'	14'	16'		
		WB Thru/Right	250' (10 veh)	9'	10'	14'	18'	13'	15'	11'	14'		
		NORTHBOUND											
		NB Left	300' (12 veh)	94'	102'	134'	195'	103'	159'	145'	184'		
		NB Thru/Right	175' (7 veh)	32'	38'	106'	569'	75'	98'	108'	366'		
SOUTHBOUND													
SB Left	150' (6 veh)	5'	7'	5'	7'	6'	7'	7'	8'				
SB Thru	450' (18 veh)	282'	418'	848'	852'	377'	551'	370'	529'				
SB Right	300' (12 veh)	24'	28'	21'	23'	24'	27'	27'	29'				
11 James Avenue	Stop	WESTBOUND											
		WB Right	125' (5 veh)	9'	15'	9'	15'	8'	12'	10'	16'		

## Queue Length for Five-Lane (Access Management) Concept

Cross-Street	Traffic Control Device	Geometry	Storage Length	[AM] Peak Hour		[MID] Peak Hour		[PM] Peak Hour		[SAT] Peak Hour			
				Queue Length (Feet)		Queue Length (Feet)		Queue Length (Feet)		Queue Length (Feet)			
				2021	2041	2021	2041	2021	2041	2021	2041		
1 Mack Hatcher Parkway / Hillview Lane	Signal	EASTBOUND (EB)											
		EB Left	150' (6 veh)	10'	11'	44'	52'	23'	26'	27'	30'		
		EB Thru	430' (18 veh)	38'	43'	106'	126'	85'	99'	118'	141'		
		EB Right	40' (1 veh)	0'	0'	0'	0'	17'	34'	0'	0'		
		WESTBOUND (WB)											
		WB Left	640' (25 veh)	109'	129'	75'	89'	178'	198'	82'	97'		
		WB Thru	999' (40 veh)	64'	73'	87'	104'	91'	107'	104'	124'		
		WB Right	825' (13 veh)	109'	182'	66'	145'	87'	161'	74'	144'		
		NORTHBOUND (NB)											
		NB Left	200' (8 veh)	20'	24'	27'	32'	22'	26'	42'	50'		
		NB Thru	775' (31 veh)	228'	291'	135'	162'	160'	196'	157'	190'		
		NB Right	40' (1 veh)	40'	57'	6'	17'	1'	8'	11'	23'		
SOUTHBOUND (SB)													
SB Left	300' (12 veh)	153'	175'	100'	114'	116'	127'	91'	140'				
SB Thru	560' (22 veh)	265'	314'	184'	243'	603'	804'	418'	509'				
SB Right	400' (16 veh)	0'	0'	0'	0'	0'	0'	0'	0'				
2 Parkway Commons / Cemetery	Signal	EASTBOUND											
		EB Left	175' (7 veh)	102'	120'	229'	308'	175'	242'	183'	244'		
		EB Thru/Right	175' (7 veh)	0'	0'	0'	0'	0'	9'	0'	8'		
		WESTBOUND											
		WB Left/Thru/Right	250' (10 veh)	10'	10'	35'	39'	10'	10'	17'	18'		
		NORTHBOUND											
		NB Left	150' (6 veh)	74'	74'	99'	119'	105'	140'	80'	92'		
		NB Thru/Right	150' (6 veh)	95'	125'	234'	274'	275'	315'	254'	291'		
		SOUTHBOUND											
		SB Left	150' (6 veh)	1'	1'	3'	3'	0'	1'	2'	2'		
		SB Thru/Right	150' (6 veh)	52'	57'	132'	148'	60'	78'	79'	98'		
		3 Southeast Parkway / Shadow Green Drive	Signal	EASTBOUND									
EB Left	100' (4 veh)			99'	124'	121'	137'	78'	86'	105'	119'		
EB Thru	200' (8 veh)			48'	52'	47'	52'	35'	37'	40'	43'		
EB Right	75' (3 veh)			46'	48'	82'	124'	50'	80'	78'	123'		
WESTBOUND													
WB Left	125' (5 veh)			24'	28'	70'	83'	46'	54'	32'	36'		
WB Thru/Right	300' (12 veh)			66'	73'	86'	104'	87'	103'	68'	75'		
NORTHBOUND													
NB Left	200' (8 veh)			4'	4'	24'	61'	102'	177'	70'	120'		
NB Thru/Right	385' (15 veh)			50'	59'	92'	113'	32'	44'	72'	91'		
SOUTHBOUND													
SB Left	100' (4 veh)			75'	114'	43'	79'	21'	21'	34'	46'		
SB Thru	580' (23 veh)	147'	205'	143'	193'	112'	174'	116'	127'				
SB Right	100' (4 veh)	0'	0'	0'	0'	1'	1'	7'	7'				
4 Alpha Drive	Two-Way Stop Control (TWSC)	EASTBOUND											
		EB Left/Thru/Right	50' (2 veh)	1'	1'	2'	3'	2'	4'	2'	3'		
		WESTBOUND											
		WB Left/Thru/Right	200' (8 veh)	11'	16'	43'	74'	34'	60'	16'	23'		
		NORTHBOUND											
		NB Left	175' (7 veh)	1'	1'	2'	2'	2'	3'	0'	1'		
SOUTHBOUND													
SB Left	75' (3 veh)	4'	6'	5'	7'	3'	4'	2'	3'				
5 Century Court	Signal	EASTBOUND											
		EB Left	125' (5 veh)	107'	124'	107'	125'	84'	98'	64'	70'		
		EB Thru/Right	225' (9 veh)	37'	40'	50'	54'	47'	52'	29'	31'		
		WESTBOUND											
		WB Left/Thru/Right	50' (2 veh)	8'	8'	9'	9'	9'	9'	11'	12'		
		NORTHBOUND											
		NB Left	75' (3 veh)	23'	47'	37'	66'	8'	15'	4'	8'		
		NB Thru/Right	200' (8 veh)	71'	82'	82'	137'	43'	100'	45'	111'		
		SOUTHBOUND											
		SB Left	100' (4 veh)	1'	0'	1'	2'	1'	1'	0'	1'		
		SB Thru/Right	225' (9 veh)	261'	325'	131'	153'	99'	130'	259'	374'		
		6 Beasley Drive / Lumber Drive	TWSC	EASTBOUND									
EB Left/Thru/Right	525' (13 veh)			11'	15'	18'	24'	22'	29'	14'	25'		
WESTBOUND													
WB Left/Thru/Right	200' (8 veh)			2'	3'	20'	32'	14'	23'	13'	20'		
NORTHBOUND													
NB Left	25' (1 veh)			10'	14'	10'	14'	4'	6'	3'	4'		
SOUTHBOUND													
SB Left	200' (8 veh)	1'	2'	5'	8'	3'	4'	4'	5'				
7 Franklin Business Park (North) / Future Werthan Circle	Signal	EASTBOUND											
		EB Left	150' (6 veh)	38'	37'	55'	62'	45'	52'	132'	157'		
		EB Right	150' (6 veh)	25'	28'	27'	29'	25'	28'	37'	41'		
		NORTHBOUND											
		NB Thru/Right	275' (11 veh)	72'	170'	252'	359'	118'	260'	137'	193'		
		SOUTHBOUND											
		SB Left	150' (6 veh)	9'	9'	6'	6'	10'	14'	24'	65'		
		SB Thru	999' (40 veh)	89'	91'	70'	76'	49'	68'	121'	136'		
		8 Confederate Drive / Werthan Circle	Signal	EASTBOUND									
				EB Left	100' (4 veh)	62'	68'	36'	36'	35'	37'	39'	39'
				EB Thru/Right	150' (6 veh)	37'	39'	35'	36'	26'	27'	34'	34'
				WESTBOUND									
WB Left	100' (4 veh)			47'	55'	52'	60'	28'	31'	26'	30'		
WB Thru/Right	200' (8 veh)			29'	31'	36'	39'	25'	26'	31'	32'		
NORTHBOUND													
NB Left	100' (4 veh)			0'	0'	8'	8'	2'	2'	8'	8'		
NB Thru/Right	115' (4 veh)			8'	12'	78'	106'	84'	100'	101'	128'		
SOUTHBOUND													
SB Left	100' (4 veh)			6'	10'	5'	10'	2'	1'	5'	4'		
SB Thru/Right	325' (13 veh)			154'	224'	116'	193'	116'	155'	135'	223'		
9 Carr Avenue	Stop	WESTBOUND											
		WB Left/Thru/Right	175' (7 veh)	6'	8'	13'	20'	13'	20'	11'	15'		
		SOUTHBOUND											
SB Left	150' (6 veh)	3'	4'	4'	5'	3'	5'	2'	4'				
10 Downs Boulevard	Signal	EASTBOUND											
		EB Left	150' (6 veh)	85'	100'	76'	89'	85'	102'	100'	119'		
		EB Thru	350' (14 veh)	8'	10'	5'	5'	8'	10'	5'	5'		
		EB Right	350' (14 veh)	192'	334'	115'	218'	163'	269'	279'	503'		
		WESTBOUND											
		WB Left	100' (4 veh)	8'	10'	9'	11'	12'	13'	14'	16'		
		WB Thru/Right	250' (10 veh)	9'	10'	14'	18'	13'	15'	11'	14'		
		NORTHBOUND											
		NB Left	300' (12 veh)	94'	102'	137'	195'	104'	159'	144'	184'		
		NB Thru/Right	175' (7 veh)	32'	38'	106'	169'	78'	100'	109'	166'		
		SOUTHBOUND											
		SB Left	150' (6 veh)	5'	7'	5'	7'	6'	7'	7'	8'		
SB Thru	450' (18 veh)	292'	416'	346'	482'	377'	551'	370'	529'				
SB Right	300' (12 veh)	24'	28'	21'	29'	24'	27'	27'	29'				
11 James Avenue	Stop	WESTBOUND											
		WB Left/Thru/Right	125' (5 veh)	5'	9'	6'	9'	4'	7'	6'	9'		

## Queue Length for Roundabout Concept

Cross-Street	Traffic Control Device	Geometry	Storage Length	[AM] Peak Hour		[MID] Peak Hour		[PM] Peak Hour		[SAT] Peak Hour	
				Queue Length (Feet)	2021	2041	Queue Length (Feet)	2021	2041	Queue Length (Feet)	2021
1 Mack Hatcher Parkway / Hillview Lane	Signal	EASTBOUND (EB)									
		EB Left	150' (6 veh)	10'	11'	43'	51'	23'	26'	27'	30'
		EB Thru	450' (18 veh)	38'	43'	104'	123'	85'	101'	121'	144'
		EB Right	40' (1 veh)	0'	0'	0'	0'	17'	34'	6'	19'
		WESTBOUND (WB)									
		WB Left	640' (25 veh)	108'	128'	73'	87'	178'	215'	83'	99'
		WB Thru	999' (40 veh)	64'	73'	86'	102'	91'	108'	106'	126'
		WB Right	325' (13 veh)	106'	176'	61'	134'	87'	163'	82'	155'
		NORTHBOUND (NB)									
		NB Left	200' (8 veh)	20'	24'	26'	31'	22'	25'	43'	53'
		NB Thru	999' (40 veh)	223'	282'	131'	158'	160'	192'	162'	196'
		NB Right	40' (1 veh)	40'	56'	5'	16'	1'	8'	12'	24'
		SOUTHBOUND (SB)									
SB Left	300' (12 veh)	130'	153'	152'	182'	114'	135'	158'	189'		
SB Thru	560' (22 veh)	182'	222'	267'	333'	547'	784'	358'	513'		
SB Right	400' (16 veh)	0'	0'	0'	0'	0'	0'	0'	0'		
2 Parkway Commons / Cemetery	Roundabout	EASTBOUND									
		EB Left/Thru/U-Turn	175' (7 veh)	13'	18'	47'	78'	35'	57'	33'	52'
		EB Right	175' (7 veh)	4'	6'	13'	19'	19'	30'	16'	23'
		WESTBOUND									
		WB Left/Thru/Right/U-Turn	250' (10 veh)	1'	1'	5'	7'	1'	1'	2'	2'
		NORTHBOUND									
		NB Left/Thru/U-Turn	150' (6 veh)	70'	99'	53'	79'	55'	74'	52'	71'
		NB Thru/Right	150' (6 veh)	70'	99'	53'	79'	55'	74'	52'	71'
		SOUTHBOUND									
		SB Left/Thru/U-Turn	150' (6 veh)	40'	52'	63'	86'	73'	104'	60'	83'
SB Thru/Right	150' (6 veh)	40'	52'	63'	86'	73'	104'	60'	83'		
3 Southeast Parkway / Shadow Green Drive	Roundabout	EASTBOUND									
		EB Left/Thru/U-Turn	200' (8 veh)	27'	37'	55'	93'	23'	36'	32'	49'
		EB Right	200' (8 veh)	29'	41'	54'	87'	32'	50'	48'	77'
		WESTBOUND									
		WB Left/Thru/U-Turn	125' (5 veh)	8'	12'	32'	53'	16'	24'	11'	16'
		WB Right	300' (12 veh)	31'	52'	34'	56'	25'	40'	18'	28'
		NORTHBOUND									
		NB Left/Thru/U-Turn	450' (18 veh)	102'	185'	89'	153'	65'	95'	71'	119'
		NB Thru/Right	450' (18 veh)	102'	185'	89'	153'	65'	95'	71'	119'
		SOUTHBOUND									
SB Left/Thru/U-Turn	450' (18 veh)	48'	66'	96'	175'	123'	230'	92'	164'		
SB Thru/Right	450' (18 veh)	48'	66'	96'	175'	123'	230'	92'	164'		
4 Alpha Drive	Two-Way Stop Control (TWSC)	EASTBOUND									
		EB Left/Thru/Right	50' (2 veh)	0'	0'	2'	3'	2'	3'	1'	2'
5 Century Court	Roundabout	WESTBOUND									
		WB Left/Thru/Right	150' (6 veh)	13'	21'	46'	87'	27'	44'	19'	31'
		EASTBOUND									
		EB Left/Thru/U-Turn	125' (5 veh)	17'	23'	24'	39'	17'	27'	10'	14'
		EB Right	225' (9 veh)	13'	19'	29'	47'	23'	38'	8'	12'
		WESTBOUND									
		WB Left/Thru/Right/U-Turn	50' (2 veh)	1'	1'	1'	1'	1'	1'	1'	1'
		NORTHBOUND									
		NB Left/Thru/U-Turn	200' (8 veh)	90'	146'	98'	187'	71'	101'	71'	101'
		NB Thru/Right	200' (8 veh)	90'	146'	98'	187'	71'	101'	71'	101'
SOUTHBOUND											
SB Left/Thru/U-Turn	275' (11 veh)	56'	76'	79'	141'	85'	128'	82'	120'		
SB Thru/Right	275' (11 veh)	56'	76'	79'	141'	85'	128'	82'	120'		
6 Bessley Drive / Lumber Drive	TWSC	EASTBOUND									
		EB Right	325' (13 veh)	16'	24'	30'	52'	39'	70'	29'	50'
		WESTBOUND									
		WB Right	200' (8 veh)	2'	3'	16'	25'	9'	14'	12'	18'
7 Franklin Business Park (North) / Future Werthan Circle	Roundabout	WESTBOUND									
		WB Left/Right/U-Turn	150' (6 veh)	9'	13'	15'	22'	9'	13'	39'	66'
		NORTHBOUND									
		NB Thru/U-Turn	275' (11)	73'	103'	70'	97'	59'	75'	63'	88'
		NB Thru/Right	275' (11)	73'	103'	70'	97'	59'	75'	63'	88'
		SOUTHBOUND									
		SB Left/Thru/U-Turn	999' (40 veh)	50'	69'	55'	76'	60'	83'	71'	102'
SB Thru	999' (40 veh)	50'	69'	55'	76'	60'	83'	71'	102'		
8 Confederate Drive / Werthan Circle	Roundabout	EASTBOUND									
		EB Left/Thru/Right/U-Turn	150' (6 veh)	17'	23'	11'	14'	7'	9'	11'	11'
		WESTBOUND									
		WB Left/Thru/Right/U-Turn	200' (8 veh)	14'	21'	19'	30'	9'	12'	9'	13'
		NORTHBOUND									
		NB Left/Thru/U-Turn	115' (4 veh)	71'	100'	66'	90'	54'	73'	65'	90'
		NB Thru/Right	115' (4 veh)	71'	100'	66'	90'	54'	73'	65'	90'
SOUTHBOUND											
SB Left/Thru/U-Turn	325' (13 veh)	56'	76'	54'	74'	59'	80'	66'	71'		
SB Thru/Right	325' (13 veh)	56'	76'	54'	74'	59'	80'	66'	71'		
9 Carr Avenue	Stop	WESTBOUND									
		WB Right	175' (7 veh)	2'	3'	6'	9'	5'	7'	6'	9'
10 Downs Boulevard	Signal	EASTBOUND									
		EB Left	150' (6 veh)	82'	94'	76'	88'	83'	96'	100'	116'
		EB Thru	150' (6 veh)	7'	9'	5'	5'	7'	9'	5'	5'
		EB Right	350' (14 veh)	203'	237'	101'	191'	152'	257'	283'	517'
		WESTBOUND									
		WB Left	80' (3 veh)	7'	9'	9'	11'	11'	12'	13'	16'
		WB Thru/Right	80' (3 veh)	8'	10'	14'	17'	12'	14'	11'	14'
		NORTHBOUND									
		NB Left	900' (36 veh)	100'	106'	138'	167'	175'	252'	182'	227'
		NB Thru/Right	900' (36 veh)	192'	287'	176'	264'	150'	217'	198'	283'
		SOUTHBOUND									
		SB Left	150' (6 veh)	6'	9'	5'	7'	5'	7'	7'	8'
		SB Thru	450' (18 veh)	332'	547'	327'	433'	359'	480'	377'	541'
SB Right	300' (12 veh)	27'	36'	20'	23'	23'	25'	27'	29'		
11 James Avenue	Roundabout	WESTBOUND									
		WB Left/Thru/Right	125' (5 veh)	5'	9'	5'	8'	4'	7'	6'	10'