



Jennifer MacDonald <macdonaldj@rochesterhills.org>

RE: 63131-85300-22 Rochester Hills Management

1 message

Gough, Stacey (MDOT) <goughs@michigan.gov>

Thu, Dec 8, 2022 at 6:27 AM

To: Keith Depp <deppk@rochesterhills.org>

Cc: "Patel, Kajal (MDOT)" <PatelK8@michigan.gov>, "Galindo, Steve (MDOT)" <GalindoS@michigan.gov>, "Thomas, Jesse (MDOT)" <ThomasJ19@michigan.gov>, "Adelman, Doug (MDOT)" <AdelmanD@michigan.gov>, "Pozolo, Thomas (MDOT)" <PozoloT@michigan.gov>, Chris McLeod <mcleodc@rochesterhills.org>, Jennifer MacDonald <macdonaldj@rochesterhills.org>, "Gough, Stacey (MDOT)" <goughs@michigan.gov>

Keith,

Attached is the latest review email that was sent to applicant (MDOT doesn't send a "formal" letter we just send review emails).

Please note also that MDOT doesn't perform a FULL permit review until the TIS and conceptual approach are approved(location, # of approaches, & geometrics only). Once those are approved MDOT will review the entire set of plans. Therefore, I imagine MDOT will have more comments once we are in that stage. This is noted in our review email to alert the applicant of our process.

Thanks,

Stacey

Stacey Gough

MDOT Bay Region

ITS, Mobility, & Safety Engineer

[5859 Sherman Rd](#)

[Saginaw, MI 48604](#)

Cell - 248-895-2558

1. Trip gen for steady state: per our previous meetings we discussed around 10 to 12% pass by rate was appropriate for trip gen. instead of that 30% pass by rate is used in the analysis.

Table 4: Trip Generation (Opening Day) Summary

Land Use	ITE Code	Amount	Units	AM Peak Hour (vph)			PM Peak Hour (vph)			SAT MD Peak Hour (vph)			SAT PM Peak Hour (vph)		
				In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Chick-fil-A	820	4,978	SF	54	55	109	162	161	323	190	195	385	156	156	312
Pass-By (10%)				5	5	10	16	16	32	19	19	38	15	15	30
New Trips				49	50	99	146	145	291	171	176	347	141	141	282
Strip Retail Plaza (<40k SF)	822	5,036	SF	7	5	12	24	24	48	17	16	33	17	16	33
Total Trips				61	60	121	186	185	371	207	211	418	173	172	345
Total Pass-By				5	5	10	16	16	32	19	19	38	15	15	30
Existing (Development) Volumes				9	5	14	17	13	30	16	24	40	18	15	33
Total Net New Trips				47	50	97	153	156	309	172	168	340	140	142	282

Table 5: Trip Generation (Steady State) Summary

Land Use	ITE Code	Amount	Units	AM Peak Hour (vph)			PM Peak Hour (vph)			SAT MD Peak Hour (vph)			SAT PM Peak Hour (vph)		
				In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Chick-fil-A	820	4,978	SF	54	55	109	162	161	323	190	195	385	156	156	312
Pass-By (30%)				16	16	32	48	48	96	58	58	116	47	47	94
New Trips				38	39	77	114	113	227	132	137	269	109	109	218
Strip Retail Plaza (<40k SF)	822	5,036	SF	7	5	12	24	24	48	17	16	33	17	16	33
Total Trips				61	60	121	186	185	371	207	211	418	173	172	345
Total Pass-By				16	16	32	48	48	96	58	58	116	47	47	94
Existing (Development) Volumes				9	5	14	17	13	30	16	24	40	18	15	33
Total Net New Trips				36	39	75	121	124	245	133	129	262	108	110	218

2. How vehicles are going to weave to exit with short queue for exiting vehicles at driveway. What impact does exiting backups have on service rate? Internal circulation comment has consistently not addressed since 1st review.
3. Right turn for the driveway needs to show existing crosswalk on Rochester Rd.
4. Queue analysis: Provide detailed calculations for queueing analysis. Provide sources used for data used in queueing analysis (e.g., time per vehicles) for Chick-fil-A. Random arrival analysis is missing and needed as a part of queueing analysis.

Table 12: Queue Length Calculations

Opening Day Operations		Normal Operations	
STACKING SPACE CALCULATOR		STACKING SPACE CALCULATOR	
Number of Arrivals	186	Number of Arrivals	133
Peak Period Time (minutes)	60	Peak Period Time (minutes)	60
% Arrivals during peak period	100%	% Arrivals during peak period	100%
Time per Vehicle (s)	36	Time per Vehicle (s)	36
Vehicle Stacking Length (FT)	25	Vehicle Stacking Length (FT)	25
Service Rate	100	Service Rate	100
Arrival Rate	186	Arrival Rate	133
TOTAL QUEUE (Veh)	86	TOTAL QUEUE (Veh)	33
TOTAL QUEUE (ft)	2,150	TOTAL QUEUE (ft)	825

Total vehicle queue = 33 (report even shows Kalamazoo has 41 vehicles). Random Google imagery shows 50+ cars for Novi Chick-fil-A and additional cars stacked on Mall Road.

5. How emergency is going to be handled due to lack of escape lane if someone in the queue has emergency and when they are trying to exit?

140s cycle length was used for all existing and future scenarios. Any final proposed timings need to be optimized, and not just using the max 140s cycle that SCATS allows. The backup timings for SCATS should come from optimized models.

Concern about accommodating total queue of 2150' on opening day with 1636' stacking.

Opening Day Operations		Normal Operations	
STACKING SPACE CALCULATOR		STACKING SPACE CALCULATOR	
Number of Arrivals	186	Number of Arrivals	133
Peak Period Time (minutes)	60	Peak Period Time (minutes)	60
% Arrivals during peak period	100%	% Arrivals during peak period	100%
Time per Vehicle (s)	36	Time per Vehicle (s)	36
Vehicle Stacking Length (FT)	25	Vehicle Stacking Length (FT)	25
Service Rate	100	Service Rate	100
Arrival Rate	186	Arrival Rate	133
TOTAL QUEUE (Veh)	86	TOTAL QUEUE (Veh)	33
TOTAL QUEUE (ft)	2,150	TOTAL QUEUE (ft)	825

- During peak time periods, Chick-fil-A utilizes employees stationed outside along the drive-through queue, with menu tablets to take patrons orders, eliminating the need for the menu kiosk and providing additional queueing storage space. This also helps to expedite the ordering and payment process, thus increasing the service rate.
- The opening day queueing can accommodate a minimum of 1,636-LF of stacking, with the option to expand further into the parking lot as necessary for additional storage as necessary to accommodate additional vehicle demand.

These models do provide a comparison:

1. First screen shot is Saturday mid-day with existing volumes and existing splits (assuming max 140s cycle):
 - a. 112s split for M-150
 - b. 28s split for driveway
 - c. Note natural cycle length is 80s
2. Second screen shot is Saturday mid-day with future volumes and existing splits (assuming max 140s cycle):
 - a. 112s split for M-150
 - b. 28s split for driveway
3. Third screen shot is Saturday mid-day with future volumes and improvements including N/S left turn phasing, a SBRT lane, and proposed splits (assuming max 140s cycle):
 - a. 83s split for M-150
 - b. 41s split for driveway
 - c. 16s for N/S Left turn phase
 - d. Note natural cycle length is 80s

Synchro 11 - C:\Users\... (10-19-22)\Chick-fil-A Rochester TIS.syn (read-only)

File Home Options Transfer Optimize Reports Help Existing SAT MD

Map View View Ports Lane Settings Merge Template Timing Settings Ring & Barrier Phasing Settings Signal Timing Detection HCM 6th Ed Int. Results HCM 2010 Int. Results Simulation Display Results

2 Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive

NODE SETTINGS		TIMING SETTINGS													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	PED	HOLD
Node #	2	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
ATMS.now Controller ID	0	13.0	13.0	13.0	13.0	13.0	13.0	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
Import from ATMS.now	Import	28.0	28.0	28.0	28.0	28.0	28.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0
Export to ATMS.now	Export	3.5	3.5	3.5	3.5	3.5	3.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Zone	A	2.5	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
X East (ft)	229190	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y North (ft)	188798														
Z Elevation (ft)	0														
Description															
Control Type	AcidCoord	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Cycle Length (s)	140.0	25	25	25	25	25	25	50	50	50	50	50	50	50	50
Lock Timings	<input checked="" type="checkbox"/>	21.8	21.8	21.8	21.8	21.8	21.8	105.9	105.9	105.9	105.9	105.9	105.9	105.9	105.9
Optimize Cycle Length	Optimize	0.16	0.16	0.16	0.16	0.16	0.16	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Optimize Splits	Optimize	0.07	0.06	0.06	0.04	0.24	0.04	0.54	0.09	0.59	0.59	0.59	0.59	0.59	0.59
Actuated Cycle(s)	140.0	51.4	26.1	104.2	14.8	5.8	10.9	1.9	17.5	5.2	0.0	0.0	0.0	0.1	0.1
Natural Cycle(s)	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max v/c Ratio	0.94	51.4	26.1	104.2	14.8	5.8	10.9	1.9	17.5	5.3	0.0	0.0	0.0	0.0	0.0
Intersection Delay (s)	14.0														
Intersection LOS	B														
ICU	0.63														
ICU LOS	E														
Offset (s)	114.0														
Referenced to	Begin of Green														
Recall Mode															
Speed Limit (mph)															
Actuated Effct. Green (s)															
Actuated g/C Ratio															
Volume to Capacity Ratio															
Control Delay (s)															
Queue Delay (s)															
Total Delay (s)															
Level of Service	D C														
Approach Delay (s)															
Approach LOS															
Queue Length 50th (ft)															
Queue Length 95th (ft)															
Stops (vph)															
Fuel Used (g/hr)															

Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive (229190 188798)

v/c ok Mins ok

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File Home Options Transfer Optimize Reports Help Future SAT MD - Opening Day (10% Pass-By)

Map View View Ports Lane Settings Merge Template Timing Settings Ring & Barrier Phasing Settings Signal Timing Detection HCM 6th Ed Int. Results HCM 2010 Int. Results Simulation Display Results

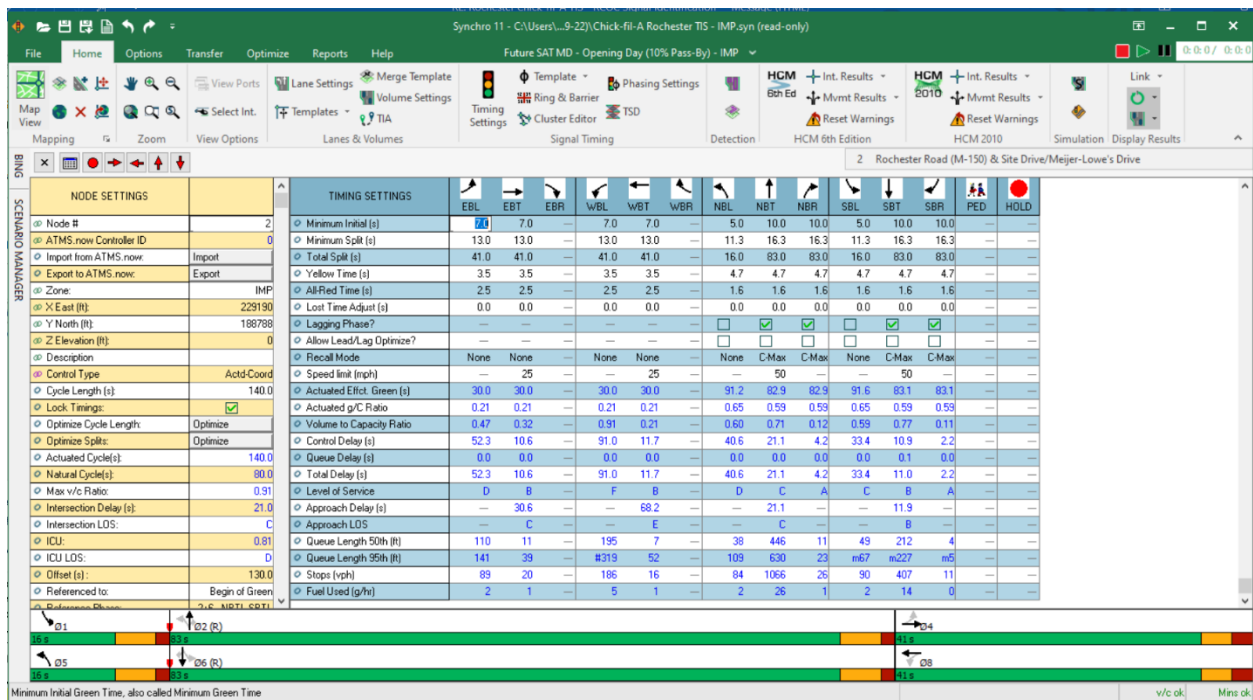
2 Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive

NODE SETTINGS		TIMING SETTINGS													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	PED	HOLD
Node #	2	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
ATMS.now Controller ID	0	13.0	13.0	13.0	13.0	13.0	13.0	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
Import from ATMS.now	Import	28.0	28.0	28.0	28.0	28.0	28.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0
Export to ATMS.now	Export	3.5	3.5	3.5	3.5	3.5	3.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Zone	A	2.5	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
X East (ft)	229190	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y North (ft)	188798														
Z Elevation (ft)	0														
Description															
Control Type	AcidCoord	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Cycle Length (s)	140.0	25	25	25	25	25	25	50	50	50	50	50	50	50	50
Lock Timings	<input checked="" type="checkbox"/>	22.0	22.0	22.0	22.0	22.0	22.0	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7
Optimize Cycle Length	Optimize	0.16	0.16	0.16	0.16	0.16	0.16	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Optimize Splits	Optimize	0.64	0.48	1.37	0.27	0.83	0.56	0.09	0.64	0.65	0.65	0.65	0.65	0.65	0.65
Actuated Cycle(s)	140.0	69.9	40.7	244.9	20.0	61.6	10.4	1.7	19.6	5.6	0.0	0.2	0.0	0.2	0.2
Natural Cycle(s)	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max v/c Ratio	1.37	69.9	40.7	244.9	20.0	61.6	10.4	1.7	19.6	5.8	0.0	0.2	0.0	0.2	0.2
Intersection Delay (s)	24.8														
Intersection LOS	C														
ICU	0.87														
ICU LOS	E														
Offset (s)	114.0														
Referenced to	Begin of Green														
Recall Mode															
Speed Limit (mph)															
Actuated Effct. Green (s)															
Actuated g/C Ratio															
Volume to Capacity Ratio															
Control Delay (s)															
Queue Delay (s)															
Total Delay (s)															
Level of Service	E D														
Approach Delay (s)															
Approach LOS															
Queue Length 50th (ft)															
Queue Length 95th (ft)															
Stops (vph)															
Fuel Used (g/hr)															

Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive (229190 188798)

Minimum Initial Green Time, also called Minimum Green Time

v/c > 1 Mins ok



- First screen shot is PM with existing volumes and existing splits (assuming max 140s cycle):
 - 100s split for M-150
 - 40s split for driveway
 - Note natural cycle length is 60s
- Second screen shot is PM with future volumes and existing splits (assuming max 140s cycle):
 - 100s split for M-150
 - 40 split for driveways
 - Note natural cycle length remains 60s
 - EB approach goes from C to D
 - WB approach goes from E to F
 - NBLT goes from A to E
- Third screen shot is PM with future volumes and improvements including N/S left turn phasing, a SBRT lane, and proposed splits (assuming max 140s cycle):
 - 85 to 88s split for M-150
 - 38s split for driveways
 - 14 to 17s for S/N Left turn phase
 - Note natural cycle length is 75s
 - EB approach remains D
 - WB approach goes from F to E (Not sure and we believe this result since they took 2s split time away)
 - NBLT goes from E to C
 - SB M150 goes from A to B

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Map View View Ports Lane Settings Merge Template Volume Settings Templates TIA Timing Settings Ring & Barrier Cluster Editor TSD Detection HCM 6th Ed Int. Results Mvmt Results Reset Warnings HCM 2010 Int. Results Mvmt Results Reset Warnings Simulation Display Results

2 Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive

SCENARIO MANAGER		TIMING SETTINGS													
NODE SETTINGS		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	PED	HOLD
Node #	2	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
ATMS now Controller ID	0	13.0	13.0	13.0	13.0	13.0	13.0	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
Import from ATMS now	Import	40.0	40.0	40.0	40.0	40.0	40.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Export to ATMS now	Export	3.5	3.5	3.5	3.5	3.5	3.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Zone	A	2.5	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
X East (ft)	229190	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y North (ft)	188788														
Z Elevation (ft)	0														
Description															
Control Type	Acid Coord														
Cycle Length (s)	140.0	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Lock Timing	<input checked="" type="checkbox"/>	25	25	25	25	25	25	50	50	50	50	50	50	50	50
Optimize Cycle Length	Optimize	20.4	20.4	20.4	20.4	20.4	20.4	107.3	107.3	107.3	107.3	107.3	107.3	107.3	107.3
Optimize Spilt	Optimize	0.15	0.15	0.15	0.15	0.15	0.15	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Actuated Cycle Length	140.0	0.04	0.05	0.74	0.25	0.05	0.59	0.07	0.42	0.58	0.07	0.42	0.58	0.07	0.42
Natural Cycle(s)	60.0	48.0	23.8	76.7	28.5	6.2	10.5	2.2	7.5	2.7	0.0	0.0	0.2	0.0	0.2
Max v/c Ratio	0.74	48.0	23.8	76.7	28.5	6.2	10.5	2.2	7.5	2.9	0.0	0.0	0.2	0.0	0.2
Intersection Delay (s)	10.2	48.0	23.8	76.7	28.5	6.2	10.5	2.2	7.5	2.9	0.0	0.0	0.2	0.0	0.2
ICU	0.75	48.0	23.8	76.7	28.5	6.2	10.5	2.2	7.5	2.9	0.0	0.0	0.2	0.0	0.2
ICU LOS	D	48.0	23.8	76.7	28.5	6.2	10.5	2.2	7.5	2.9	0.0	0.0	0.2	0.0	0.2
Offset (s)	1.0	48.0	23.8	76.7	28.5	6.2	10.5	2.2	7.5	2.9	0.0	0.0	0.2	0.0	0.2
Referenced to	Begin of Green	48.0	23.8	76.7	28.5	6.2	10.5	2.2	7.5	2.9	0.0	0.0	0.2	0.0	0.2

Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive (229190 188788) v/c ok Mins ok

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File Home Options Transfer Optimize Reports Help Future PM - Opening Day (10% Pass-By)

Map View View Ports Lane Settings Merge Template Volume Settings Templates TIA Timing Settings Ring & Barrier Cluster Editor TSD Detection HCM 6th Ed Int. Results Mvmt Results Reset Warnings HCM 2010 Int. Results Mvmt Results Reset Warnings Simulation Display Results

2 Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive

SCENARIO MANAGER		TIMING SETTINGS													
NODE SETTINGS		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	PED	HOLD
Node #	2	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
ATMS now Controller ID	0	13.0	13.0	13.0	13.0	13.0	13.0	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
Import from ATMS now	Import	40.0	40.0	40.0	40.0	40.0	40.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Export to ATMS now	Export	3.5	3.5	3.5	3.5	3.5	3.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Zone	A	2.5	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
X East (ft)	229190	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y North (ft)	188788														
Z Elevation (ft)	0														
Description															
Control Type	Acid Coord														
Cycle Length (s)	140.0	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Lock Timing	<input checked="" type="checkbox"/>	25	25	25	25	25	25	50	50	50	50	50	50	50	50
Optimize Cycle Length	Optimize	25.8	25.8	25.8	25.8	25.8	25.8	101.9	101.9	101.9	101.9	101.9	101.9	101.9	101.9
Optimize Spilt	Optimize	0.18	0.18	0.18	0.18	0.18	0.18	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Actuated Cycle Length	140.0	0.55	0.51	0.93	0.23	0.83	0.63	0.08	0.51	0.65	0.08	0.51	0.65	0.08	0.51
Natural Cycle(s)	60.0	58.6	43.9	105.7	28.7	62.4	13.9	2.5	12.2	3.6	0.0	0.0	0.5	0.0	0.5
Max v/c Ratio	0.93	58.6	43.9	105.7	28.7	62.4	13.9	2.5	12.2	4.1	0.0	0.0	0.5	0.0	0.5
Intersection Delay (s)	17.2	58.6	43.9	105.7	28.7	62.4	13.9	2.5	12.2	4.1	0.0	0.0	0.5	0.0	0.5
ICU	0.82	58.6	43.9	105.7	28.7	62.4	13.9	2.5	12.2	4.1	0.0	0.0	0.5	0.0	0.5
ICU LOS	E	58.6	43.9	105.7	28.7	62.4	13.9	2.5	12.2	4.1	0.0	0.0	0.5	0.0	0.5
Offset (s)	1.0	58.6	43.9	105.7	28.7	62.4	13.9	2.5	12.2	4.1	0.0	0.0	0.5	0.0	0.5
Referenced to	Begin of Green	58.6	43.9	105.7	28.7	62.4	13.9	2.5	12.2	4.1	0.0	0.0	0.5	0.0	0.5

Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive (229190 188788) v/c ok Mins ok

Synchro 11 - C:\Users\...-9-22\Chick-fil-A Rochester TIS - IMP.syn (read-only)

File Home Options Transfer Optimize Reports Help Future PM - Opening Day (10% Pass-By) - IMP

Map View View Ports Lane Settings Merge Template Volume Settings Phasing Settings HCM 6th Ed Int. Results HCM 2010 Int. Results

Mapping Zoom View Options Lanes & Volumes Timing Settings Ring & Barrier Cluster Editor TSD Detection HCM 6th Edition HCM 2010 Simulation Display Results

2 Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive

SCENARIO MANAGER

NODE SETTINGS		TIMING SETTINGS													
Node #		EBL	EBT	EBR	wBL	wBT	wBR	NBL	NBT	NBR	SBL	SBT	SBR	PED	HOLD
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	10.0	10.0	5.0	10.0	10.0	—	—
Minimum Split (s)	13.0	13.0	—	13.0	13.0	—	—	11.3	16.3	16.3	11.3	16.3	16.3	—	—
Total Split (s)	38.0	38.0	—	38.0	38.0	—	—	17.0	88.0	88.0	14.0	85.0	85.0	—	—
Yellow Time (s)	3.5	3.5	—	3.5	3.5	—	—	4.7	4.7	4.7	4.7	4.7	4.7	—	—
All-Red Time (s)	2.5	2.5	—	2.5	2.5	—	—	1.6	1.6	1.6	1.6	1.6	1.6	—	—
Lost Time Adjust (s)	0.0	0.0	—	0.0	0.0	—	—	0.0	0.0	0.0	0.0	0.0	0.0	—	—
Lagging Phase?	—	—	—	—	—	—	—	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	—	—
Allow Lead/Lag Optimize?	—	—	—	—	—	—	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	—	—
Recall Mode	None	None	—	None	None	—	—	None	C-Max	C-Max	None	C-Max	C-Max	—	—
Speed Limit (mph)	—	25	—	—	25	—	—	50	—	—	50	—	—	—	—
Actuated Elitot Green (s)	25.9	25.9	—	25.9	25.9	—	—	98.4	91.0	91.0	93.9	87.0	87.0	—	—
Actuated g/C Ratio	0.18	0.18	—	0.18	0.18	—	—	0.70	0.65	0.65	0.67	0.62	0.62	—	—
Volume to Capacity Ratio	0.55	0.43	—	0.92	0.21	—	—	0.51	0.71	0.08	0.39	0.72	0.09	—	—
Control Delay (s)	58.7	20.9	—	104.2	13.6	—	—	24.1	16.9	3.0	18.8	10.5	1.8	—	—
Queue Delay (s)	0.0	0.0	—	0.0	0.0	—	—	0.0	0.0	0.0	0.0	0.2	0.0	—	—
Total Delay (s)	58.7	20.9	—	104.2	13.6	—	—	24.1	16.9	3.0	18.8	10.7	1.8	—	—
Level of Service	E	C	—	F	B	—	—	C	B	A	B	B	A	—	—
Approach Delay (s)	—	37.7	—	—	74.8	—	—	16.6	—	—	10.5	—	—	—	—
Approach LOS	—	D	—	—	E	—	—	B	—	—	B	—	—	—	—
Queue Length 50th (ft)	118	49	—	145	7	—	—	22	653	9	11	212	2	—	—
Queue Length 95th (ft)	115	43	—	1249	51	—	—	m82	745	m20	m17	m230	m3	—	—
Stops (vph)	76	35	—	138	16	—	—	52	1226	10	33	396	7	—	—
Fuel Used (g/hr)	2	1	—	4	0	—	—	1	28	0	1	14	0	—	—

Rochester Road (M-150) & Site Drive/Meijer-Lowe's Drive (229190 188788)

v/c ok Miss ok

Future AM Opening Day Improved: They used 140s cycle lengths (first screen shot) even though natural cycle lengths (2nd screen shot) range from 45 to 90s max.

Synchro T1 - C:\Users\...9-22)\Chick-fil-A Rochester TIS - IMP.syn (read-only)

File Home Options Transfer Optimize Reports Help Future AM - Opening Day (10% Pass-By) - IMP

Map View Mapping Zoom View Options Lanes & Volumes Merge Template Volume Settings Timing Settings Signal Timing Detection HCM 6th Edition Int. Results Mvmt Resu Reset Warn HCM 6th Edition

Scenario Manager

Future AM - Opening Day (10% Pass-By) - IMP Active

Name: Future AM - Opening Day (10% Pass-By) - IMP
 Description: Rochester Hills Chick-fil-A TIS
 Data Date/Time: 06/10/2021 8:00 AM
 Alternative: Future Conditions (Opening Day) w/ IMP
 Timing Plan ID: AM Peak Hour
 Analyst: Fleis & VandenBrink Engineering

Future AM - Steady State (30% Pass-By) - IMP
 Future PM - Opening Day (10% Pass-By) - IMP
 Future PM - Steady State (30% Pass-By) - IMP
 Future SAT MD - Opening Day (10% Pass-By) - IMP
 Future SAT MD - Steady State (30% Pass-By) - IMP
 Future SAT PM - Opening Day (10% Pass-By) - IMP
 Future SAT PM - Steady State (30% Pass-By) - IMP

Active Scenario: Future AM - Opening Day (10% Pass-By) - IMP Count: 8

Duplicate Future AM - Opening Day (10% Pass-By) - IMP Copy Data from Fut...

Name: Future AM - Opening Day (10% Pass-By) -
 Description:
 Data Date/Time: 10/29/2022 9:57 AM
 Alternative:
 Timing Plan ID:
 Analyst:

Duplicate

Generating Info Image

Synchro 11 - C:\Users\...9-22)\Chick-fil-A Rochester TIS - IMP.syn (read

File Home Options Transfer Optimize Reports Help Future AM - Opening Day (10% Pass-By) - IMP

Map View View Ports Lane Settings Merge Template Template Phasing Settings
 Select Int. Templates Volume Settings Ring & Barrier Timing Settings Cluster Editor TSD Detection

Mapping Zoom View Options Lanes & Volumes Signal Timing

Scenario Manager

Future AM - Opening Day (10% Pass-By) - IMP Active

Name: Future AM - Opening Day (10% Pass-By) - IMP
 Description: Rochester Hills Chick-fil-A TIS
 Data Date/Time: 06/10/2021 8:00 AM
 Alternative: Future Conditions (Opening Day) w/ IMP
 Timing Plan ID: AM Peak Hour
 Analyst: Fleis & VandenBrink Engineering

- Future AM - Steady State (30% Pass-By) - IMP
- Future PM - Opening Day (10% Pass-By) - IMP
- Future PM - Steady State (30% Pass-By) - IMP
- Future SAT MD - Opening Day (10% Pass-By) - IMP
- Future SAT MD - Steady State (30% Pass-By) - IMP
- Future SAT PM - Opening Day (10% Pass-By) - IMP
- Future SAT PM - Steady State (30% Pass-By) - IMP

Active Scenario: Future AM - Opening Day (10% Pass-By) - IMP Count: 8

Duplicate Future AM - Opening Day (10% Pass-By) - IMP Copy Data from Fut

Name: Future AM - Opening Day (10% Pass-By) -
 Description:
 Data Date/Time: 10/29/2022 9:59 AM
 Alternative:
 Timing Plan ID:
 Analyst:

Duplicate