



Consolidated Traffic Impact Study

Developable Lands East of
Highway 406

Final

Prepared for:
The City of Welland

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CONSOLIDATED TRAFFIC IMPACT STUDY
DEVELOPABLE LANDS EAST OF HIGHWAY 406
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1.0 Introduction

R.V. Anderson Associates Limited (RVA) was retained by the City of Welland (the “City”) to complete a consolidated Traffic Impact Study (TIS) for the lands surrounding Daimler Parkway in northern Welland. The subject lands have existing residential land uses with the current draft plans consisting of primarily residential land uses with some portions of commercial land uses.

The subject area is bounded by Highway 406 to the west, East Main Street to the south, the Welland Canal to the east, and the Welland River to the north. The only vehicular access to these lands is provided through Daimler Parkway, which is a two-lane (one lane in each direction) collector roadway under jurisdiction of the City of Welland. The principal constraint within the existing road network is that Daimler Parkway travels underneath the Highway 406 overpass, which imposes constraints if additional capacity is required along Daimler Parkway. As shown in **Figure 1.1**, there are four development parcels: two of which (North Village and Central Village) are either under construction or completed, while the other two (Hunters Pointe and South Village) have yet to commence construction.



Figure 1.1 – Developable Lands East of Highway 406

The purpose of this study is to evaluate the degree to which the existing roadway network can accommodate new developments in the developable lands east of Highway 406.

1.1 Study Area

The study area encompasses a number of existing intersections along Woodlawn Road and Daimler Parkway. These intersections are as follows:

- Woodlawn Road and Primeway Drive/Brown Road
- Woodlawn Road and the Highway 406 Southbound Interchange
- Daimler Parkway and the Highway 406 Northbound Interchange

In addition, the analysis includes queueing analysis of the existing Gio Rail spur line that is situated approximately 50 metres east of the Daimler Parkway and Highway 406 Northbound Interchange intersection.

2.0 Study Methodology

The study undertakes the following three (3) analyses:

1. Corridor Capacity Analysis: a high-level network planning analysis considering mid-block (between intersections) volumes also called as link volumes against a defined typical roadway lane capacity.
2. Macroscopic Traffic Analysis: Synchro analysis based on deterministic relationships with macroscopic parameters such as peak hour flow, capacity, and speed.
3. Microscopic Traffic Analysis: Simulation analysis based on microscopic parameters such as space, time headway and queues.

These analyses are discussed further in subsequent sections.

2.1 Corridor Capacity Analysis

Given that Daimler Parkway is a City collector road, a corridor capacity of 700 vehicles/hour/lane has been selected, which is consistent with the City planning model for collector roadways. The link volumes for road segments between intersections were extracted from the existing and future traffic volume projections which represent the peak traffic volume at any point along Daimler Parkway, immediately east of the Highway 406 northbound interchange.

The traffic conditions associated with various volume to capacity ratios (V/C) values are briefly described in **Table 2.1**.

Table 2.1 – Midblock Volume to Capacity Descriptions

V/C	Description
0.60 or less	Uncongested operations; free-flow traffic
0.60 > 0.75	Very light congestion; stable traffic flow
0.75 > 0.85	Mild congestion; some delays and queueing expected
0.85 > 0.95	Moderate congestion; tolerable delays and queueing expected
0.95 > 1.00	Nearing capacity; longer delays and queueing expected
> 1.00	Over capacity; severe delays and queueing expected

For planning purposes, a common practice is to consider mitigation strategies when the volume to capacity ratio exceeds 0.95.

2.2 Intersection Performance Measures

Operational analysis for the study area intersections was completed through a combination of analysis software. Analysis was first undertaken using macroscopic traffic analysis software, Synchro 11, to identify critical movements and potential capacity constraints for individual intersection movements. Following the macroscopic analysis, a queueing analysis was undertaken utilizing microscopic traffic analysis software, PTV Vissim (2022). The intersection movement level of service (LOS) was quantified based on vehicle delays, as per the Highway Capacity Manual (2000) methodologies summarized in **Table 2.2**.

Table 2.2 – Characteristics of Level of Service at Intersections (HCM 2000)

Level of Service (LOS)	Control Delay (seconds/vehicle)	
	Unsignalized Intersection	Signalized Intersection
A	≤ 10	≤ 10
B	> 10 to 15	> 10 to 20
C	> 15 to 25	> 20 to 35
D	> 25 to 35	> 35 to 55
E	> 35 to 50	> 55 to 80

The study utilizes the analysis parameters outlined in the *Niagara Region Transportation Impact Assessment Guidelines (2023)* with respect to saturation flow rates for individual intersection movements. With respect to mitigation measures, the threshold for critical movements refers to the Ministry of Transportation's *General Guidelines for the Preparation of Traffic Impact Studies (2023)*. The guidelines state that for general movements at signalized intersections, the movement is deemed critical if the V/C ratio is 0.85 or greater and for ramp terminal movements, the movement is deemed critical if the V/C ratio is 0.75 or greater.

The primary concern for this area is the limited capacity along the Daimler Parkway corridor under the Highway 406 bridge. In particular, the analysis is focused on the two (2) Highway 406 interchange ramps since these are situated approximately 185 metres from one another, which may create possibility of queue spillback interfering with adjacent intersection operations including Highway 406 on and off-ramps.

2.2.1 Microscopic Traffic Analysis

Microscopic traffic operations analysis was completed for the study area intersections using the simulation software, PTV Vissim (2022). The model was formulated by completing a desktop review of existing roadway geometry (i.e., number of lanes, lane widths, turning radii, etc.) and traffic controls (i.e., intersection mode of control, posted speeds, etc.).

While the study forecasted traffic volumes for the 2031 and 2051 horizon years, microsimulation analysis was only completed for the ultimate 2051 horizon year, which represents build-out conditions for the Developable Lands. The analysis analyzed three (3) peak hours: the weekday AM (morning) peak hour, the weekday PM (afternoon) peak hour, and the Saturday mid-day peak hour.

3.0 Existing (2024) Traffic Conditions

3.1 Existing (2024) Traffic Volumes

The existing (2024) traffic volumes for the weekday and weekend mid-day peak hours were extracted from turning movement counts (TMCs) collected on various dates between April 2024 and June 2024, as provided by the City of Welland. The on-ramp traffic volumes have been estimated based on arrival patterns of the adjacent intersections. Weekday and weekend peak hours traffic volumes are summarized in **Figure 3.1**, with the raw counts provided in **Appendix 1**.

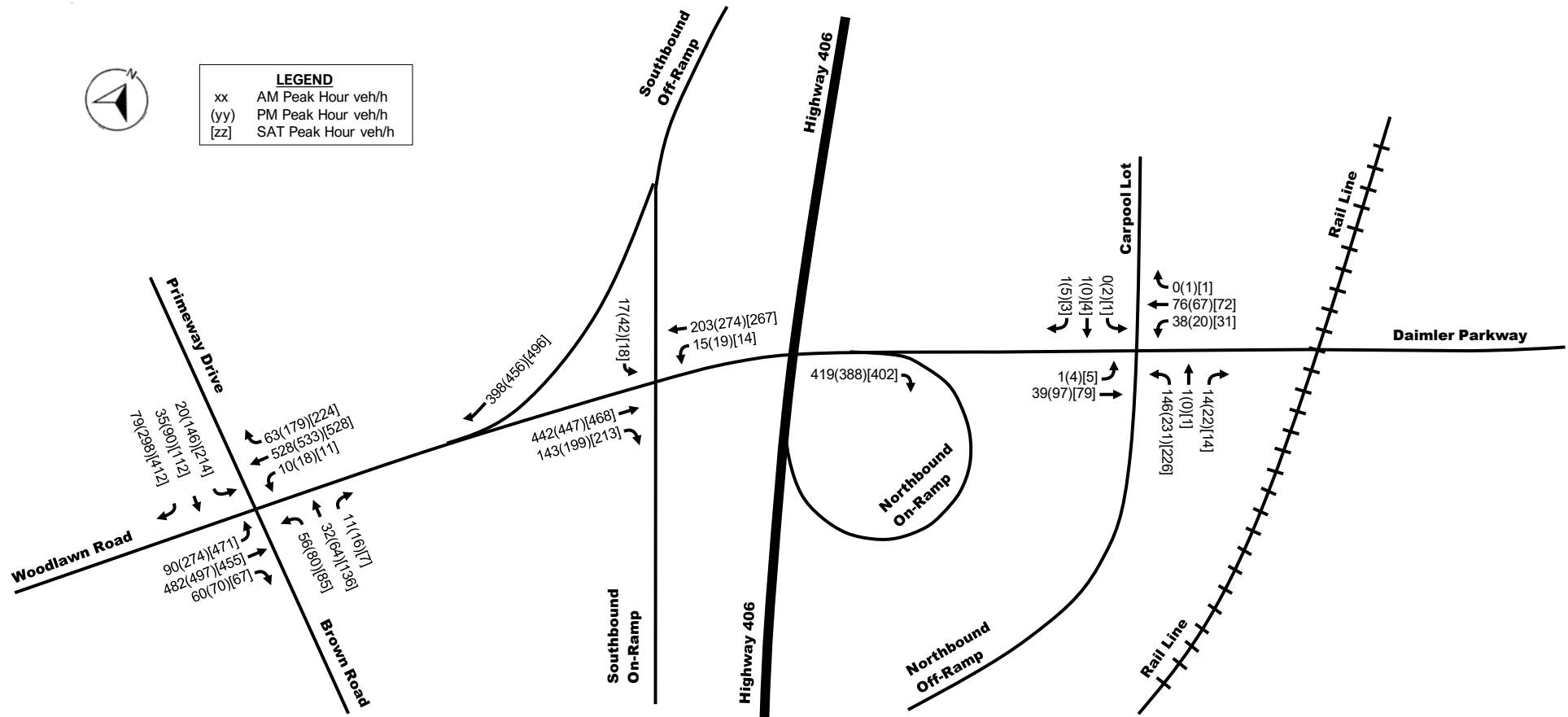


Figure 3.1 – Existing (2024) Traffic Volumes, Weekday and Weekend Mid-Day Peak Hours

3.2 Microscopic Model Calibration

The Vissim model was calibrated with reference to the *Florida Department of Transportation (FDOT) Traffic Analysis Handbook (2021)*, which is a widely utilized calibration methodology that is endorsed by PTV Group for model calibration. The calibration exercise consisted of traffic volume calibration for all of the existing intersections, in addition to a field-observed queueing calibration for the Woodlawn Road and Primeway Drive/Brown Road intersection.

The model utilizes the Wiedemann 74 Vehicle Following Model (i.e., driving behaviour for simulated vehicles), which is the general standard for arterial roadway sections. The Wiedemann model is derived from three (3) different parameters—all of which are inversely proportional to the saturation flow rate. The three parameters are as follows:

- Average standstill distance: the average desired distance maintained between stationary vehicles, measured in metres.
- Additive part of safety distance: an additive variable used in the computation of desired safety distance (i.e., the distance maintained between two vehicles travelling in the same lane and direction).
- Multiplicative part of safety distance: a multiplicative variable used in the computation of desired safety distance.

In simpler terms, there are three (3) parameters that impact driver behaviour within the model. For all three (3) parameters, a higher value elicits a more conservative driver behaviour, as the vehicles will maintain a greater distance between one another. In contrast, low values will elicit more aggressive driver behaviour, with modelled vehicles maintaining smaller separation between one another. The default values and suggested ranges for these parameters are summarized in **Table 3.1**.

Table 3.1 – Default Driving Behaviour Parameters for Vissim Analysis

Wiedemann 74 Calibration Parameter	Default Value	Suggested Range
Average standstill distance (Metres)	2.0m	>1.2m
Additive part of safety distance	2.0	1.0 to 3.5
Multiplicative part of safety distance	3.0	2.0 to 4.5

In terms of how these values impact performance of the model, conservative driving generally results in lower saturation flow rates, which in turn reduces capacity and increases congestion and queueing. Conversely, aggressive driving generally increases saturation flow rates, which increases capacity and alleviates congestion and queueing as more vehicles are cleared within each cycle. However, it should be noted that the Vissim model is stochastic in nature—and therefore, these generalized statements do not always apply and should only be interpreted as a “rule of thumb”.

3.2.1 Volume Calibration

The volume calibration was completed by comparing the input volumes (i.e., existing volumes from turning movement counts) with the simulated volumes. The simulated volumes for all movements and all scenarios fell within the desired range of adequate volume calibration. The summary of this calibration can be found in **Appendix 2**.

3.2.2 Queue Calibration

Vehicle queues at the Woodlawn Road and Primeway Drive/Brown Road intersection were observed during a field visit on Wednesday, November 13th, 2024, and Saturday, November 16th, 2024. The observed queue lengths were then compared to the simulated vehicle queues, with adjustments to the driver behaviour being made to bring the simulated queue lengths within an adequate calibration range. The adjustments to driver behavior are summarized in **Table 3.2**, and the queue calibration summary can be found in **Appendix 3**.

Table 3.2 – Calibrated Driver Behaviour Parameters

Period	Movement*	Wiedemann 74 Calibration Parameter		
		Average Standstill Distance	Additive Part of Safety Distance	Multiplicative Part of Safety Distance
AM and SAT Peak Hours	Global Values	1.2m	1.0	2.0
AM Peak Hour	EBL/SBL	2.5m	3.0	4.0
PM Peak Hour	EBT	3.0m	3.5	4.5
	SBT	1.3m	1.0	2.0
SAT Peak Hour	EBT	1.4m	1.5	2.5

*Where individual movements are listed, they are only associated with the Woodlawn Road and Primeway Drive/Brown Road intersection.

3.2.3 Railway Operations

A spur line operated by GIO Rail is situated approximately 50 metres east of the Daimler Parkway and Highway 406 Northbound Interchange intersection. This spur line was modelled within the Vissim network to quantify operational impacts of train movements on the surrounding road network including intersections.

As per correspondence with a GIO Rail representative in December 2024, the subject spur line encounters approximately one (1) train movement per week, with these trains being approximately 30 cars in length. Gio Rail indicated that these train movements could occur during both the weekday AM and weekday PM peak hours. Therefore, the weekday AM and weekday PM analysis periods both include a “train event” scenario.

The modelled train delay was calculated to be approximately 2:15 (min:sec), utilizing *Transport Canada Grade Crossing Standards/Guidelines (2019)* for clearance times, gate closing times, and gate opening times.

3.2.4 Iterations, Seeding and Peak Hour Factor (PHF)

As per *FDOT Traffic Analysis Handbook* methodology, the model was simulated ten (10) times for each scenario. This approach mitigates the impacts of “randomness” within the model results. Moreover, to eliminate the impacts that model start-up has on analysis results, each iteration was seeded for 15 minutes prior to the first analysis interval.

The model also incorporates the impacts of peak hour factor (PHF). The PHF is an effective method of modelling the “15-minute rush” that regularly occurs within the peak hour. Each analysis period adopted a peak hour factor (PHF) of 0.92, which is a typical PHF value for planning analysis.

3.3 Existing (2024) Traffic Conditions

3.3.1 Corridor Lane Capacity Analysis – Existing (2024) Conditions

Using the existing (2024) volumes presented in **Figure 3.1**, the total link volumes for Daimler Parkway, east of the Highway 406 Northbound Interchange intersection, have been extracted for link analysis. The resulting corridor capacity is presented in **Table 3.3**.

Table 3.3 – Corridor Lane Capacity Analysis – Existing (2024) Traffic Conditions

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	53	700	0.08
	Westbound	114		0.16
PM	Eastbound	121		0.17
	Westbound	88		0.13
SAT	Eastbound	94		0.13
	Westbound	104		0.15

As shown in **Table 3.3**, ample corridor capacity exists under existing (2024) conditions, with both directions operating under free-flow conditions during all analysis peak hours of the day.

3.3.2 Summary of Critical Movements at the Interchange Ramps – Existing (2024) Conditions

Under existing (2024) conditions, no critical movements are noted at the Highway 406 interchange ramp intersections. The Synchro output reports for existing (2024) conditions are provided in **Appendix 4**.

3.3.3 Microsimulation Queueing Analysis – Existing (2024) Conditions

The queue lengths for the ramp terminal intersection movements under existing (2024) traffic conditions are summarized in **Table 3.4**. The full analysis results for each intersection are provided in **Appendix 5**.

Table 3.4 – Existing (2024) Traffic Conditions – Vissim Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	11	440
			SBR	0	570
			SBL	9	140
			WBL	0	30
			WBT	0	185
		PM	EBTR	11	440
			SBR	0	570
			SBL	13	140
			WBL	0	30
			WBT	0	185
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBTR	13	440
			SBR	0	570
			SBL	10	140
			WBL	0	30
			WBT	0	185
		AM	EBT	0	185
			NBL	24	100
			NBTR	10	530
			WBL	0	80
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	PM	WBTR	0	40
			EBT	2	185
			NBL	32	100
			NBTR	11	530
			WBL	0	80
			WBTR	0	40
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBT	0	185
			NBL	31	100
			NBTR	10	530
			WBL	0	80
			WBTR	0	40
		AM	EBT	0	185
			NBL	32	100
			NBTR	11	530
			WBL	0	80
			WBTR	0	40
	Rail Crossing	AM	EBT	8	40
			WBT	15	~∞
			EBT	34	40
		PM	WBT	19	~∞

As seen in **Table 3.3**, the ramp terminal intersection movements are operating well under existing conditions, with all key queue lengths falling within their associated storage length. In the train scenario, the eastbound through movement falls within the available storage length and does not block the adjacent intersection.

4.0 Future Traffic Conditions

4.1 Proposed Development

Future development of the subject lands is comprised of three (3) separate developments: Hunters Pointe, South Village, and the remaining portion of North Village. The Draft Plan land use statistics for these developments have been confirmed with the City planning staff. The trip generation for each of the foregoing developments was estimated utilizing the Institute of Transportation Engineers (ITE) *Trip Generation Manual (11th Edition)*.

The development statistics and corresponding trip generation estimates are summarized in **Table 4.1**.

Table 4.1 – Trip Generation Summary

Development	Land Use	Magnitude	Peak Hour	Trip Equation	Directional Split (%) (In/Out)	New Trips	
						In	Out
Hunters Pointe	Single-Family Detached Dwelling	735 units	AM	$\text{Ln}(T) = 0.91\text{Ln}(x) + 0.12$	25 / 75	115	343
			PM	$\text{Ln}(T) = 0.94\text{Ln}(x) + 0.27$	63 / 37	408	240
			SAT	$T = 0.86(x) + 9.72$	54 / 46	347	295
	Single-Family Attached Dwelling	178 units	AM	$T = 0.52(x) - 5.70$	25 / 75	22	65
			PM	$T = 0.60(x) - 3.93$	59 / 41	61	42
			SAT	$\text{Ln}(T) = 0.82\text{Ln}(x) + 0.43$	48 / 52	52	56
	Multifamily Housing (Low-Rise)	72 units	AM	$T = 0.31(x) + 22.85$	24 / 76	11	34
			PM	$T = 0.43(x) + 20.55$	63 / 37	33	19
			SAT	$T = 0.41x$	51 / 49**	15	15
	Multifamily Housing (Mid-Rise)	170 units	AM	$T = 0.44(x) - 11.61$	23 / 77	14	49
			PM	$T = 0.39(x) + 0.34$	61 / 39	41	26
			SAT	$\text{Ln}(T) = 1.00(x) - 0.91$	51 / 49	35	33
	General Commercial	30,000ft² GFA	AM	$\text{Ln}(T) = 0.66\text{Ln}(x/1000) + 1.84$	60 / 40	35	24
			PM	$\text{Ln}(T) = 0.71\text{Ln}(x/1000) + 2.72$	50 / 50	85	85
			SAT	$6.57(x/1000)$	51 / 49	100	97
South Village	Single-Family Detached Dwelling	173 units	AM	$\text{Ln}(T) = 0.91\text{Ln}(x) + 0.12$	25 / 75	31	92
			PM	$\text{Ln}(T) = 0.94\text{Ln}(x) + 0.27$	63 / 37	105	61
			SAT	$T = 0.86(x) + 9.72$	54 / 46	86	73
Remainder of North Village (Post-dating TMC data from May 2024)	Single-Family Detached Dwelling	56 units	AM	$\text{Ln}(T) = 0.91\text{Ln}(x) + 0.12$	25 / 75	11	33
			PM	$\text{Ln}(T) = 0.94\text{Ln}(x) + 0.27$	63 / 37	37	21
			SAT	$T = 0.86(x) + 9.72$	54 / 46	31	27
	Multifamily Housing (Mid-Rise)	60 units*	AM	$T = 0.44(x) - 11.61$	23 / 77	3	12
			PM	$T = 0.39(x) + 0.34$	61 / 39	15	9
			SAT	$\text{Ln}(T) = 1.00(x) - 0.91$	51 / 49	12	12
Total Residential Growth		1,444 units	Total New Residential Trips		AM	207	628
					PM	700	418
					SAT	578	511
Total Commercial Growth		30,000ft² GFA	Total New Commercial Trips		AM	25	16
					PM	39	39
					SAT	70	68
Total New Trips for Developable Lands					AM	232	644
					PM	739	457
					SAT	648	579

*The number of units for Block 32 (currently zoned for an apartment building) in North Village is unconfirmed at the time of this study; a unit count of 60 has been assumed for analysis purposes.

**In absence of a directional split for low-rise apartments during the Saturday peak period, the low-rise directional split is set to match the mid-rise apartment directional split for the Saturday peak period.

4.1.1 Trip Distribution and Assignment

The trip distribution was estimated using the Transportation Tomorrow Survey (TTS) database in addition to local area knowledge and reference to the formerly completed TIS studies for the area. The trip distribution percentages are summarized in **Table 4.2**.

Table 4.2 – Trip Distribution Percentages

Direction (Route)	Residential Distribution	Commercial Distribution
West (Woodlawn Road)	36%	41%
North (Highway 406)	33%	19%
South (Highway 406)	31%	40%

4.2 Trip Assignment

The estimated trip assignment for the Developable Lands is illustrated in **Figure 4.1**.

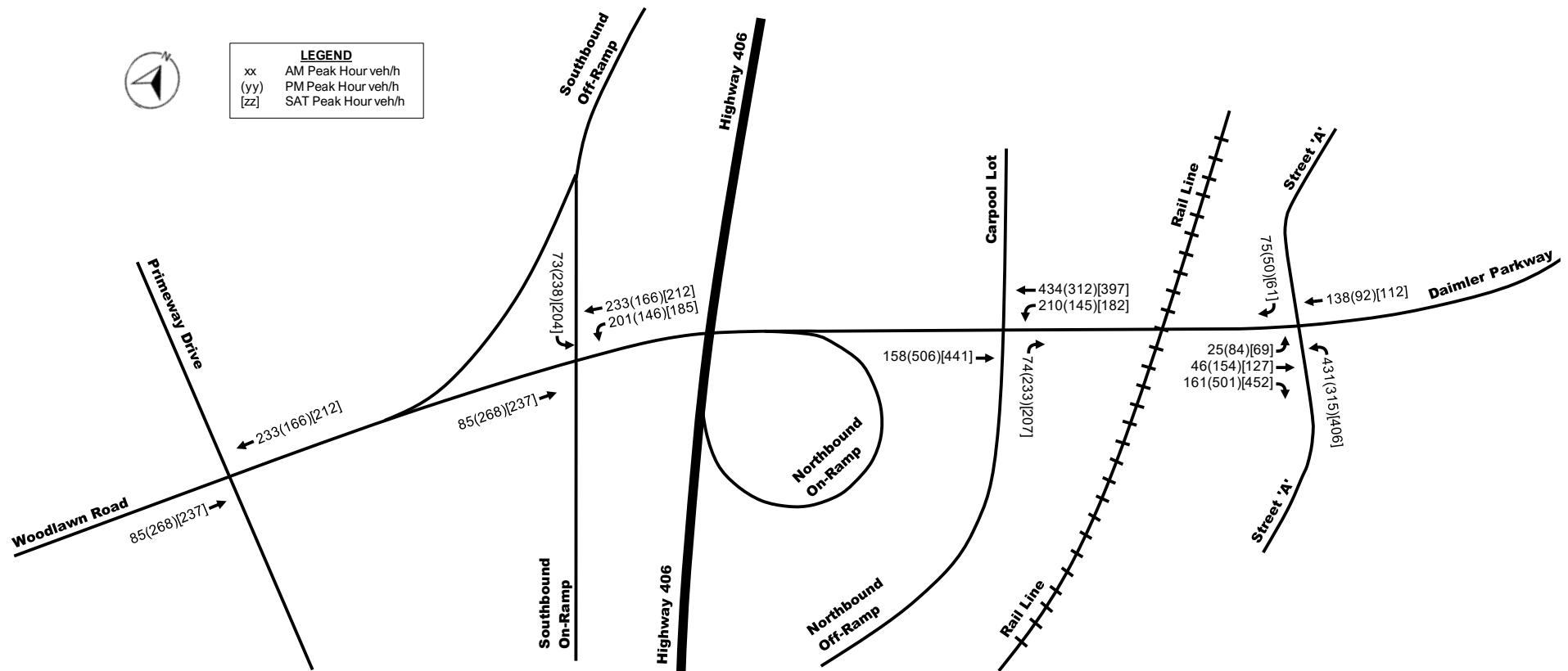


Figure 4.1 – Trip Assignment for the Developable Lands, Weekday and Weekend Mid-day Peak Hours

4.3 Traffic Growth Rate

The annualized growth rate for the area was calculated using EMME model outputs for the 2016 base year, along with the 2031, 2041, and 2051 future horizon years. The comparison considered total ramp volumes from the Woodlawn Road and Highway 406 interchange in the AM and PM peak hours to measure traffic growth in Welland that is not associated with the Developable Lands.

The exercise calculated the 2016 to 2031 annualized growth rate to be in the magnitude of approximately 1%, while the 2031 to 2051 annualized growth rate was in the magnitude of approximately 2%. These two (2) growth rates were applied to all intersection movements to forecast background traffic growth for each horizon year.

4.4 Future (2031) Total Traffic Volumes

The Future (2031) Traffic Volumes consider the 1% annualized growth rate applied to all intersection movements and the trip generation volumes from the three (3) developments. The resulting intersection volumes are illustrated in **Figure 4.2**.

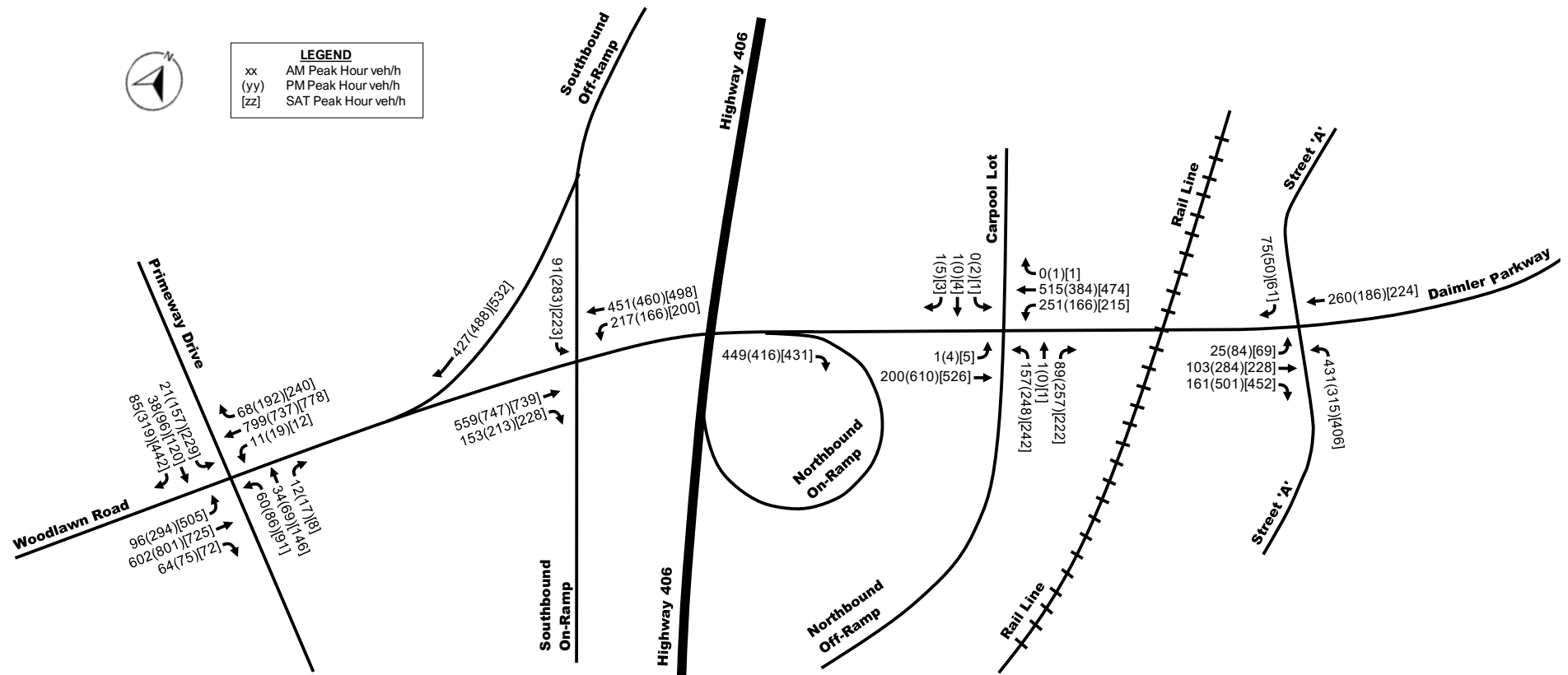


Figure 4.2 – Future (2031) Total Traffic Volumes, Weekday and Weekend Mid-day Peak Hours

4.5 Future (2051) Total Traffic Volumes

Utilizing the 2% annualized growth rate beyond 2031 and the Developable Lands Trip Assignment, the Future (2051) Total Traffic Volumes are summarized in **Figure 4.3**.

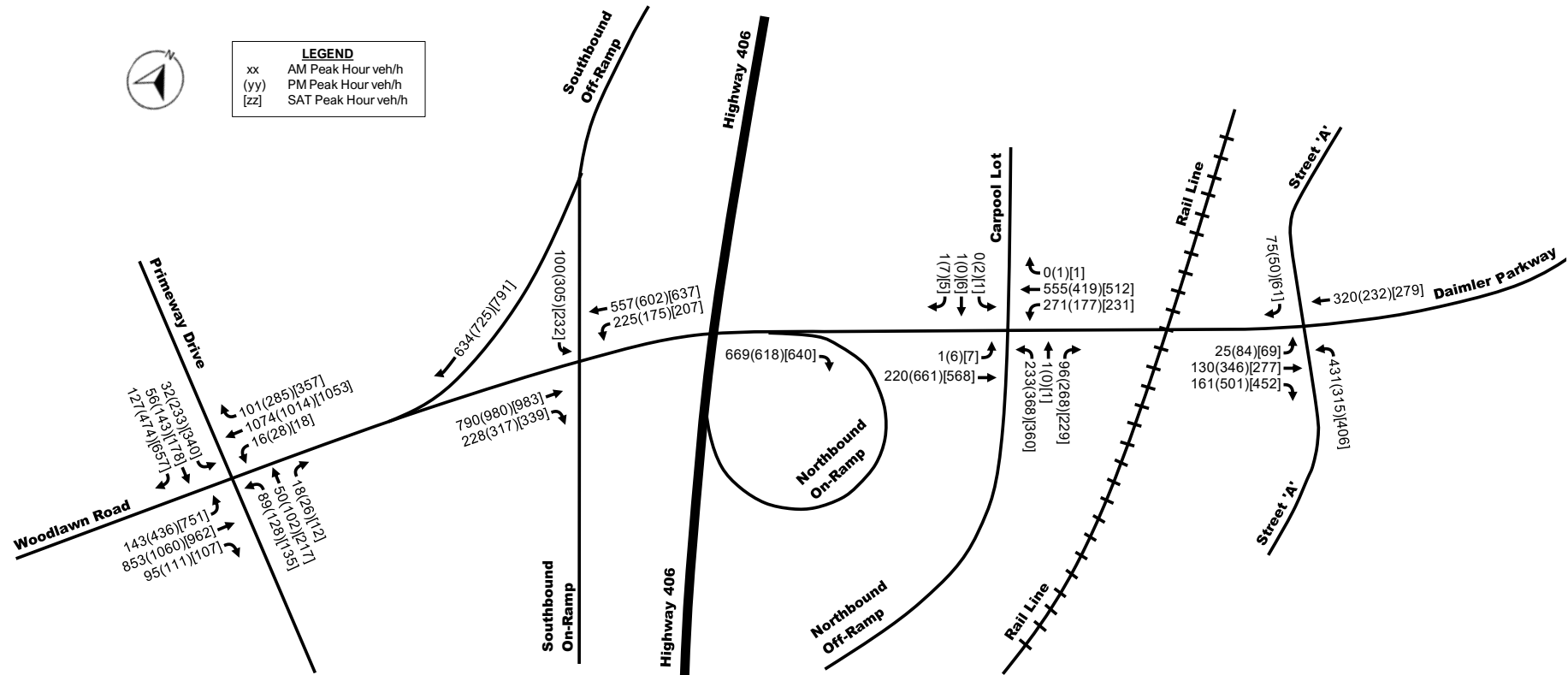


Figure 4.3 – Future (2051) Total Traffic Volumes, Weekday and Weekend Mid-day Peak Hours

4.6 Future (2051) Total Traffic Conditions

Analyses was undertaken utilizing the Future (2051) Total Traffic volumes illustrated in **Figure 4.3**. Signal timing plans and parameters for both the Highway 406 southbound and northbound interchanges were calculated using the methodologies outlined in the *Ontario Traffic Manual Book 12*. As for network changes, the analyses consider a new intersection that is proposed as part of the Hunters Pointe development, to be located approximately 85 metres east of the rail crossing.

4.6.1 Corridor Capacity Analysis – Future 2051 Conditions

The corridor capacity analysis for Daimler Parkway segment, east of the Highway 406 Northbound Interchange intersection, is summarized in **Table 4.3**.

Table 4.3 – Corridor Lane Capacity Analysis – Future (2051) Total Traffic Conditions

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	316	700	0.45
	Westbound	826		1.18
PM	Eastbound	931		1.33
	Westbound	597		0.81
SAT	Eastbound	798		1.14
	Westbound	744		1.06

At a link level, Daimler Parkway corridor is experiencing capacity constraints under Future (2051) Total Traffic conditions, under all analysis peak hours exceeding capacity along at least one direction during both AM and PM peak hours and along both the directions during Saturday peak mid-day hour. This indicates that midblock congestion is forecasted in the future build-out scenario.

4.6.2 Summary of Critical Movements at the Interchange Ramps – Future 2051 Conditions

The performance measures that were estimated using Synchro for the critical ramp terminal intersection movements under Future (2051) Total Traffic conditions are summarized in **Table 4.4**. Signal timing optimization has been implemented based on the adjusted volumes. The full Synchro output reports are available in **Appendix 6**.

Table 4.4 – Summary of Critical Movements at the Highway 406 Interchange Ramps – Future (2051) Total Traffic Conditions

Intersection	Period	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95 th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR SBL	0.85 0.87	30 61	C E	#174 #110
	SAT	EBTTR	0.90	34	C	#230
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	0.95	36	D	#208
		WBL	0.91	64	E	#64
		NBL	0.95	66	E	#124
	SAT	EBT NBL	0.85 0.96	24 71	C E	m39 #124

*Where “#” is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where “m” is denoted, the queue is metred by an upstream signal.

As shown in **Table 4.4**, the critical movements at the ramp terminal intersections include the eastbound through movement for both intersections, as well as the ramp-exiting movements. Optimal signal timings can keep these movements at approaching-capacity conditions; however, they still exceed the threshold established in the MTO guidelines. The queueing for each movement cannot be estimated through macroscopic methodology as the 95th percentile volume exceeds capacity.

4.6.3 Microsimulation Queueing Analysis – Future 2051 Conditions

Utilizing the calibration parameters outlined in Section 3.2, microsimulation analysis was completed for the future (2051) horizon year. A summary of analysis results is shown in **Table 4.5**, and the full results are shown in **Appendix 7**.

Table 4.5 – Future (2051) Total Traffic Conditions – Microscopic Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	130	440
			SBR	0	570
			SBL	33	140
			WBL	35	30
			WBT	68	185
		PM	EBTR	242	440
			SBR	0	570
			SBL	93	140
			WBL	47	30
			WBT	132	185
		SAT	EBTR	189	440
			SBR	0	570
			SBL	67	140
			WBL	39	30
			WBT	106	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	58	185
			NBL	49	100
			NBTR	14	530
			WBL	35	80
			WBTR	68	40
		PM	EBT	192	185
			NBL	107	100
			NBTR	52	530
			WBL	50	80
			WBTR	68	40
		SAT	EBT	130	185
			NBL	79	100
			NBTR	26	530
			WBL	49	80
			WBTR	68	40
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	131	440
			SBR	0	570
			SBL	33	140
			WBL	37	30
			WBT	91	185
		PM	EBTR	245	440
		SAT	SBR	0	570
			SBL	125	140
			WBL	46	30
			WBT	168	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	65	185
			NBL	49	100
			NBTR	17	~530
			WBL	62	80
			WBTR	69	40
		PM	EBT	217	185
		SAT	NBL	107	100
			NBTR	98	530
			WBL	58	80
			WBTR	68	40
	Rail Crossing	AM	EBT	60	40
		PM	WBT	130	85*
	Rail Crossing	AM	EBT	59	40
		PM	WBT	123	85*

*Storage length of 85 metres has been estimated based on the location of Street 'A' in the Hunters Pointe Draft Plan.

As shown in **Table 4.5**, the queue spillback at the Daimler Parkway and Highway 406 Northbound Interchange intersection exceeds the available storage length for the eastbound through movement. These results indicate that the queue spillback from the eastbound through movement will spillback into the Highway 406 Southbound Interchange intersection. However, due to the short amount of time that the intersection is blocked, the conflicting ramp movement (southbound left) is still contained within the available storage length.

During train events, the Daimler Parkway and Highway 406 Northbound Interchange Intersection will be blocked by queue spillback at the rail line. Moreover, with the proposed Street 'A' roundabout in the Hunters Pointe Draft plan being approximately 85 metres from the spur line, the new intersection will be impacted by spillback as well. In this scenario, the northbound left movement at the ramp terminal also exceeds the available storage; however, this is largely due to eastbound through vehicles blocking the intersection within the simulation. Additionally, the westbound approach queues of the Highway 406 Northbound Interchange intersection are generally exceeding storage length between the stop-bar and the rail line.

While the analysis focuses on the interchange ramps, analysis was also conducted for the Woodlawn Road and Primeway Drive/Brown Road intersection. This intersection recorded significant queueing and delays in the PM and SAT mid-day peak hours, particularly for the eastbound left-turn movement and southbound movements exiting the plaza. However, the analysis does not consider that traffic may elect to use River Road as the intersection becomes regularly congested, which may result in a volume reduction for the eastbound left-turn and plaza-exiting movements. Therefore, it is recommended that this intersection be monitored as the surrounding area reaches its full build-out scenario to determine if mitigation measures are required.

5.0 Sensitivity Analyses

To evaluate the network's sensitivity to various development densities and potential traffic volume reductions, a set of sensitivity analyses has been completed. This was undertaken to identify how much additional residential density can be accommodated or how much traffic volume can be diverted to another corridor to avoid congested conditions along the Daimler Parkway corridor. Subsequent sections present the following scenarios:

1. **Future (2051) Total Traffic volumes with a 10% increase in residential density**
 - a. With train event
 - b. Without train event
2. **Future (2051) Total Traffic volumes with a 25% increase in residential density.**
 - a. With train event
 - b. Without train event
3. **Future (2051) Total Traffic volumes with a 10% reduction in through traffic along Daimler Parkway.**
 - a. With train event
 - b. Without train event
4. **Future (2051) Total Traffic volumes with a 25% reduction in through traffic along Daimler Parkway.**
 - a. With train event
 - b. Without train event

The sensitivity analysis scenarios with residential density increases adopt the same trip distribution patterns as the original analysis, except with greater units counts. In contrast, the traffic volume reduction scenarios represent a sensitivity analysis where an additional non-emergency access to the Developable Lands (i.e., a flyover) is to be considered, and thus only constitute a reduction to the volumes along Daimler Parkway/Woodlawn Road (i.e., trips internal to Welland), not the volumes originating from/destined for Highway 406. The volumes for each of these scenarios are available in **Appendix 8**.

5.1 Sensitivity Analysis #1: Future (2051) Total Traffic Volumes with 10% Increase in Density

5.1.1 Corridor Capacity Analysis – Future 2051 Traffic Conditions with 10% Increase in Residential Density

The corridor capacity results for the sensitivity analysis are shown in **Table 5.1**.

Table 5.1 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 10% Increase in Residential Density

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	335	700	0.48
	Westbound	884		1.26
PM	Eastbound	996		1.42
	Westbound	636		0.91
SAT	Eastbound	852		1.22
	Westbound	793		1.13

As expected, the capacity constraints that exist under the base Future (2051) Traffic Conditions are amplified with increased density. Based on these results, congestion along Daimler Parkway is forecast under future (2051) traffic conditions.

5.1.2 Summary of Critical Movements at the Interchange Ramps – Future 2051 Conditions with 10% Increase in Residential Density

Based on the Synchro intersection operation analysis, a summary of critical movement operation for the interchange ramps under 10% residential density increase scenario, is provided in **Table 5.2**, and the full Synchro output reports are provided in **Appendix 9**.

Table 5.2 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 10% Increase in Residential Density

Intersection	Peak Hour	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95 th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR	0.88	32	C	#182
		WBL	0.90	57	E	#m56
		SBL	0.91	65	E	#123
	SAT	EBTTR	0.88	32	C	#199
		WBL	0.91	57	E	m#66
		SBL	0.82	58	E	#85
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	1.02	49	D	#220
		WBL	1.03	106	F	#78
		NBL	0.95	66	E	#124
	SAT	EBT	0.85	24	C	m115
		WBL	0.89	46	D	#70
		NBL	1.08	108	F	#139

*Where “#” is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where “m” is denoted, the queue is metred by an upstream signal.

As shown in **Table 5.2**, the capacity constraints for the eastbound through and off-ramp movements persist with increased density. In addition, the westbound left-turn movements begin to face capacity constraints at both the study intersections.

5.1.3 Microsimulation Queueing Analysis – Future 2051 Conditions with 10% Increase in Residential Density

With the application of a 10% increase in residential density, the queueing results for the key movements are summarized in **Table 5.3**, and the full results are available in **Appendix 10**.

**Table 5.3 – Future (2051) Traffic Conditions with 10% Increase in Residential Density –
Microscopic Analysis Queue Results**

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	129	440
			SBR	0	570
			SBL	35	140
			WBL	36	30
			WBT	70	185
		PM	EBTR	264	440
			SBR	0	570
			SBL	118	140
			WBL	54	30
			WBT	159	185
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBTR	233	440
			SBR	0	570
			SBL	60	140
			WBL	41	30
			WBT	105	185
		AM	EBT	64	185
			NBL	47	100
			NBTR	17	530
			WBL	49	80
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	PM	WBTR	70	40
			EBT	208	185
			NBL	104	100
			NBTR	66	530
			WBL	57	80
			WBTR	70	40
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBT	137	185
			NBL	84	100
			NBTR	32	530
			WBL	52	80
			WBTR	69	40
		AM	EBTR	132	440
			SBR	0	570
			SBL	35	140
			WBL	39	30
			WBT	94	185
	Rail Crossing	PM	EBTR	273	440
			SBR	0	570
			SBL	205	140
			WBL	55	30
			WBT	176	185
		AM	EBT	64	185
			NBL	51	100
			NBTR	20	530
			WBL	59	80
			WBTR	70	40
	Rail Crossing	PM	EBT	218	185
			NBL	108	100
			NBTR	102	530
			WBL	62	80
			WBTR	70	40
	Rail Crossing	AM	EBT	57	40
			WBT	130	85*
	Rail Crossing	PM	EBT	66	40
			WBT	118	85*

*Storage length of 85 metres has been estimated based on the location of Street 'A' in the Hunters Pointe Draft Plan.

As shown in **Table 5.3**, a 10% increase in residential density marginally amplifies the critical movements in each peak hour with no train events. For the eastbound through movement at the Daimler Parkway and Highway 406 Interchange intersection, the eastbound queue spillback is extended even further in the PM peak hour (208 metres), with the spillback now travelling beyond the adjacent intersection. Despite this added congestion, the southbound left-turn movement is still captured within its available storage length but is now approaching ramp capacity (118 metres of queue compared to 140 metres of storage length).

During a train event, the added traffic results in the southbound off-ramp exceeding its available storage length in the PM peak hour (205 metres of queue compared to 140 metres of storage length), thereby resulting in significant queueing and blocking of adjacent intersections.

5.2 Sensitivity Analysis #2: Future (2051) Traffic Volumes with 25% Increase in Density

5.2.1 Corridor Capacity Analysis – Future 2051 Conditions with 25% Increase in Residential Density

The corridor capacity results for the sensitivity analysis are shown in **Table 5.4**.

Table 5.4 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 25% Increase in Residential Density

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	365	700	0.52
	Westbound	971		1.39
PM	Eastbound	1091		1.56
	Westbound	696		0.99
SAT	Eastbound	935		1.34
	Westbound	866		1.24

As seen in **Table 5.4**, a residential density increase of 25% puts almost all directions for all periods at or over capacity. Significant mid-block congestion can be expected under this scenario.

5.2.2 Summary of Critical Movements at the Interchange Ramps – Future 2051 Conditions with 25% Increase in Residential Density

Using Synchro intersection operation analysis, a summary of the critical movement operations for the interchange ramps, under a 25% residential density increase scenario, is provided in **Table 5.5**, and the full Synchro reports are available in **Appendix 11**.

Table 5.5 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 25% Increase in Residential Density

Intersection	Period	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95 th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR	0.94	40	D	#203
		WBL	0.95	83	F	#m72
		SBL	0.94	70	E	#137
	SAT	EBTTR	0.92	36	D	#203
		WBL	0.95	64	E	m#71
		SBL	0.90	70	E	#110
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	1.11	83	F	#234
		WBL	1.14	139	F	#89
		NBL	0.95	66	E	#124
	SAT	EBT	0.90	23	C	m123
		WBL	1.10	112	F	#99
		NBL	1.12	125	F	#142

*Where “#” is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where “m” is denoted, the queue is metred by an upstream signal.

As shown in **Table 5.5**, multiple movements are operating at or over capacity under the 25% residential density increase scenario. The movements that experience capacity constraints include the eastbound movements, the off-ramp movements, and the westbound left-turn movement at each intersection.

5.2.3 Microsimulation Queueing Analysis – Future 2051 Traffic Conditions with 25% Increase in Residential Density

With the application of a 25% increase in residential density, the queueing results for the key movements are summarized in **Table 5.6**, and the full results are available in **Appendix 12**.

**Table 5.6 – Future (2051) Traffic Conditions with 25% Increase in Residential Density –
Microscopic Traffic Analysis Queue Results**

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	132	440
			SBR	0	570
			SBL	35	140
			WBL	40	30
			WBT	82	185
		PM	EBTR	453	440
			SBR	0	570
			SBL	298	140
			WBL	54	30
			WBT	193	185
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBTR	203	440
			SBR	0	570
			SBL	78	140
			WBL	54	30
			WBT	111	185
		AM	EBT	62	185
			NBL	51	100
			NBTR	20	530
			WBL	60	80
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	PM	WBTR	69	40
			EBT	219	185
			NBL	122	100
			NBTR	107	530
			WBL	68	80
			WBTR	70	40
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBT	158	185
			NBL	80	100
			NBTR	43	530
			WBL	60	80
			WBTR	70	40
		AM	EBTR	130	440
			SBR	0	570
			SBL	34	140
			WBL	41	30
			WBT	91	185
	Rail Crossing	PM	EBTR	484	440
			SBR	0	570
			SBL	368	140
			WBL	57	30
			WBT	202	185
		AM	EBT	63	185
			NBL	53	100
			NBTR	20	530
			WBL	62	80
			WBTR	70	40
	Rail Crossing	PM	EBT	220	185
			NBL	132	100
			NBTR	131	530
			WBL	68	80
			WBTR	70	40
		AM	EBT	55	40
			WBT	147	85*
			EBT	75	40
			WBT	130	85*

As shown in **Table 5.6**, a residential density increase of 25% results in significant queueing and blocking of adjacent intersections in the PM peak hour, regardless of a train event, thereby resulting in operational impacts to all neighbouring intersections.

5.3 Sensitivity Analysis #3: Future (2051) Traffic Volumes with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

This sensitivity analysis considers a new non-emergency access to the Developable Lands, which could result in a 10% decrease to through volumes along Woodlawn Road/Daimler Parkway. The assumption is that a new access would primarily service trips internal to the City of Welland, and that trips to and from the Highway 406 ramps would remain largely uninfluenced.

5.3.1 Corridor Capacity Analysis – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

With a 10% reduction in through volumes along Daimler Parkway, the corridor capacity is summarized in **Table 5.7**.

Table 5.7 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	294	700	0.42
	Westbound	770		1.10
PM	Eastbound	865		1.24
	Westbound	555		0.79
SAT	Eastbound	741		1.06
	Westbound	693		0.99

Despite the 10% reduction in through volumes, capacity conditions are still forecast under future (2051) traffic conditions. Therefore, congested mid-block operations may persist under this scenario.

5.3.2 Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Table 5.8 presents the critical movement operation results using Synchro at the interchange ramps under a 10% reduction to through volumes along Woodlawn Road/Daimler Parkway. The full Synchro results are available in Appendix 13.

Table 5.8 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Intersection	Peak Hour	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95 th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR	0.86	33	C	#205
		SBL	0.80	50	D	90
	SAT	SBL	0.82	60	E	#87
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	0.86	26	C	m#92
		NBL	0.95	66	E	#124
	SAT	NBL	0.93	62	E	#118

*Where “#” is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where “m” is denoted, the queue is metred by an upstream signal.

As shown in Table 5.8, capacity constraints still exist for certain movements under a 10% reduction in through volumes along Woodlawn Road/Daimler Parkway. While these movements still have excess capacity available, they exceed the capacity thresholds outlined in the MTO traffic impact study guidelines.

5.3.3 Microsimulation Queueing Analysis – Future 2051 Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

The queueing results of Sensitivity Analysis #3 are summarized in Table 5.9, and the full results are available in Appendix 14.

Table 5.9 – Future (2051) Conditions with 10% Reduction to Through Volumes Along Woodlawn Road/Daimler Parkway – Microscopic Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	127	440
			SBR	0	570
			SBL	32	140
			WBL	38	30
			WBT	63	185
		PM	EBTR	229	440
			SBR	0	570
			SBL	97	140
			WBL	46	30
			WBT	98	185
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBTR	175	440
			SBR	0	570
			SBL	68	140
			WBL	42	30
			WBT	85	185
		AM	EBT	58	185
			NBL	49	100
			NBTR	15	530
			WBL	40	80
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	PM	WBTR	66	40
			EBT	158	185
			NBL	100	100
			NBTR	44	530
			WBL	44	80
			WBTR	69	40
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBT	118	185
			NBL	72	100
			NBTR	33	530
			WBL	42	80
			WBTR	67	40
		AM	EBTR	126	440
			SBR	0	570
			SBL	34	140
			WBL	38	30
			WBT	82	185
	Rail Crossing	PM	EBTR	228	440
			SBR	0	570
			SBL	116	140
			WBL	47	30
			WBT	120	185
		AM	EBT	59	185
			NBL	49	100
			NBTR	16	530
			WBL	61	80
			WBTR	68	40
	Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	207	185
			NBL	103	100
			NBTR	75	530
			WBL	54	80
			WBTR	69	40
		AM	EBT	55	40
			WBT	98	85*
			EBT	61	40
			WBT	89	85*

As shown in **Table 5.9**, a 10% reduction in through volume along Woodlawn Road/Daimler Parkway has a notable impact on the eastbound through movement at the northbound Highway 406 interchange. In the “No Train Event” scenario, the eastbound through movement queue length drops from 192 metres to 158 metres, and as a result, no longer spills back into the adjacent intersection.

During a train event, the reduction reduces the eastbound through queue length by approximately 10 metres, but is still spilling back into the adjacent intersection.

5.4 Sensitivity Analysis #4: Future (2051) Traffic Volumes with 25% Decrease to Through Volumes Along Woodlawn Road/Daimler Parkway

The fourth sensitivity analysis considers a 25% decrease to through volumes along Woodlawn Road/Daimler Parkway. Similar to Sensitivity Analysis #3, the assumption is that a new access would primarily service trips internal to the City of Welland, and that trips to and from the Highway 406 ramps would remain largely uninfluenced.

5.4.1 Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

With a 25% reduction in through volumes along Daimler Parkway, the corridor capacity is summarized in **Table 5.10**.

Table 5.10 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	264	700	0.37
	Westbound	687		0.98
PM	Eastbound	766		1.09
	Westbound	492		0.70
SAT	Eastbound	656		0.94
	Westbound	616		0.88

With a 25% reduction in through volumes along Daimler Parkway/Woodlawn Road, majority of movements start to operate within or approaching capacity conditions, barring only the eastbound movement in the PM peak hour. Under this scenario, mid-block congestion is still forecast for the busiest peak hours of the day, albeit to a lesser extent.

5.4.2 Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Table 5.11 presents the critical movements Synchro analysis at the interchange ramps under a 25% reduction to through volumes along Woodlawn Road/Daimler Parkway. The full Synchro reports are provided in Appendix 15.

Table 5.11 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Intersection	Peak Hour	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95 th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBT	0.79	29	C	#174
		WBT	0.51	7	A	86
		SBL	0.80	50	D	91
	SAT	EBT	0.80	28	C	#197
		WBT	0.49	6	A	77
		SBL	0.74	50	D	73
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	0.77	31	C	m141
		WBT	0.43	18	B	66
		NBL	0.86	47	D	#104
	SAT	EBT	0.71	23	C	m57
		WBT	0.53	20	C	85
		NBL	0.84	45	D	99

*Where “#” is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where “m” is denoted, the queue is metred by an upstream signal.

As shown in Table 5.11, the 25% reduction in through volumes along Woodlawn Road/Daimler Parkway alleviates majority of capacity constraints for the Highway 406 ramp terminal movements, with many of the critical movements that were estimated under base Future (2051) Total Traffic conditions being mitigated. The results indicate that three (3) of left-turn scenarios will still exceed their V/C threshold of 0.75; however, the green time re-allocation brings them closer to their desired standard.

5.4.3 Microsimulation Queueing Analysis – Future 2051 Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

The queueing impacts of the 25% reduction to through volumes along Woodlawn Road/Daimler Parkway are summarized in Table 5.12, and the full results are available in Appendix 16.

Table 5.12 – Future (2051) Conditions with 25% Reduction to Through Volumes Along Woodlawn Road/Daimler Parkway – Microscopic Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	136	440
			SBR	0	570
			SBL	33	140
			WBL	33	30
			WBT	52	185
		PM	EBTR	175	440
			SBR	0	570
			SBL	91	140
			WBL	46	30
			WBT	101	185
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBTR	173	440
			SBR	0	570
			SBL	64	140
			WBL	41	30
			WBT	80	185
		AM	EBT	51	185
			NBL	46	100
			NBTR	15	530
			WBL	41	80
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	PM	WBTR	60	40
			EBT	153	185
			NBL	98	100
			NBTR	49	530
			WBL	44	80
			WBTR	54	40
	Daimler Parkway and Highway 406 Northbound Interchange	SAT	EBT	97	185
			NBL	72	100
			NBTR	30	530
			WBL	39	80
			WBTR	61	40
		AM	EBTR	135	440
			SBR	0	570
			SBL	33	140
			WBL	33	30
			WBT	61	185
	Rail Crossing	PM	EBTR	176	440
			SBR	0	570
			SBL	108	140
			WBL	45	30
			WBT	101	185
		AM	EBT	56	185
			NBL	46	100
			NBTR	15	530
			WBL	55	80
			WBTR	63	40
	Rail Crossing	PM	EBT	206	185
			NBL	98	100
			NBTR	84	530
			WBL	48	80
			WBTR	55	40
		AM	EBT	57	40
			WBT	90	85*
			EBT	59	40
			WBT	72	85*

As shown in **Table 5.12**, the 25% reduction results almost all movements operating within their available storage length under the “No Train Event” scenario. The only movement that is exceeding its storage capacity is the westbound left-turn movement at the Highway 406 Southbound off-ramp, which is exceeding its capacity by approximately three (3) vehicles in the PM peak hour and approximately two (2) vehicles in the Saturday peak hour.

Under the train event scenario, the eastbound through movement at the northbound interchange intersection is still spilling back into the southbound interchange intersection. However, similar to the base Future (2051) Total scenario and Sensitivity Analysis #3 scenario, the off-ramp storage is still contained within its storage length accommodation.

6.0 Summary of Analysis Conclusions

The findings of the Consolidated Traffic Study are summarized as follows:

- The traffic analysis was completed utilizing three sets of methodology: a corridor capacity analysis, macroscopic traffic analysis (Synchro 11), and microscopic traffic analysis (PTV Vissim). The macroscopic analysis conformed to the Niagara Region and Ministry of Transportation (MTO) guidelines for traffic impact studies. The Vissim model was calibrated as per the Florida Department of Transportation (FDOT) *Traffic Analysis Handbook (2021)*, which is endorsed by PTV Group for calibration methodology.
- Under existing (2024) conditions, all of the study area intersections are operating satisfactorily; no mitigation measures are required in response to delays or queueing.
- The Developable Lands considered in the future traffic analysis consist of a mix of residential and commercial land uses totalling 1,444 new residential dwelling units and 30,000ft² of commercial gross floor area (GFA). These lands are comprised of a portion of the North Village (under construction) and the future Hunter Pointe and South Village developments.
- The trip generation for the Developable lands was estimated utilizing the Institute of Transportation Engineers (ITE) *Trip Generation Manual (11th Edition)*. The trip generation was estimated to be 876 trips in the AM peak hour (232 in and 644 out), 1,196 trips in the PM peak hour (739 in and 457 out), and 1,227 trips in the Saturday peak hour (648 in and 570 out).
- The growth rate for the analysis was derived from Region of Niagara's EMME model plots from the 2016 base year, along with the future 2031, 2041, and 2051 horizon years. The growth rate was derived based on total ramp volume traffic that is not associated with the Developable Lands. The calculated growth rates were in the general magnitude of 1% per annum from 2024 to 2031, and 2% per annum from 2031 to 2051.
- A spur railway line operated by Gio Rail traverses Daimler Parkway, is located approximately 50 metres east of the Highway 406 Northbound Interchange intersection. Consultation with Gio Rail indicates that train movements generally occur weekly and can transpire during both the weekday AM and PM peak hour, with train lengths of approximately 30 cars. Therefore, each set of analyses

considers two (2) scenarios: a “With Train Event” scenario and a “No Train Event” scenario.

- The corridor capacity analysis and macroscopic traffic analysis using Synchro indicate that significant congestion is forecasted under Future (2051) Total Traffic Conditions, with capacity constraints forecasted at the link level in addition to individual intersection movements.
- Utilizing the methodology outlined in the report, the microsimulation analysis was completed for the ultimate Future (2051) horizon year. The results indicate that the estimated queues for the eastbound through and westbound left turn movements under the Highway 406 bridge will exceed their available storage length in the PM peak hour, regardless of a train event. The eastbound through movement queues spill back into the adjacent ramp intersection and result in blockages and lengthen queue on the Highway 406 off-ramp.
- In the “With Train Event” scenario for the 2051 horizon year, Damlier Parkway continues to experience queue spillback into Highway 406 Southbound off-ramp terminal intersection, and in addition the westbound and eastbound traffic queues from the rail crossing will spill back through the proposed new roundabout at Street A and Highway 406 Northbound off-ramp intersection, respectively.
- To evaluate the road network’s resilience, four (4) sets of sensitivity analyses were completed for the study area. The sensitivity analyses include:
 1. 10% increase to residential density in the Developable Lands
 2. 25% increase to residential density in the Developable Lands
 3. 10% decrease to the through volumes along Woodlawn Road/Daimler Parkway
 4. 25% decrease to the through volumes along Woodlawn Road/Daimler Parkway
- For Sensitivity Analysis #1, the critical movements at both the highway 406 ramps worsened relative to the base future (2051) total scenario and traffic spillback through these intersections continues to impact the off ramps operations with the southbound and northbound off-ramp left turn queue lengths approaching and exceeding available storage, respectively During train events result roadway operations worsened critical movements relating in increased blockages and congestion.

- For Sensitivity Analysis #2, the 25% increase in residential density results in significant increase network congestion, with or without train events. This scenario results in left turn queue lengths at the Highway 406 off-ramps which would exceed the available left turn storage capacity. Specifically for the southbound off ramp the left turn queue blocks the free flow right turn channelize lane and creates a scenario where the maximum ramp queue could extend beyond the ramp bull nose. Additionally eastbound through traffic queues at the same intersection spillback into the Woodlawn Road and Primeway Drive/Brown Road intersection.
- The corridor capacity analysis and macroscopic traffic analysis for both sensitivity # 1 and #2 using Synchro indicates that significant delays and capacity constraints are forecasted at the link level in addition to individual intersection movements.
- For Sensitivity Analysis #3, the 10% reduction to through volumes along Woodlawn Road/Daimler Parkway mitigates the queue spillback into the Highway 406 interchange intersections during the “No Train Event” scenario. Only the westbound left-turn movement at the Highway 406 Southbound off-ramp intersection exceeds its available storage. In the “With Train Event” scenario, the eastbound queues are forecast to spillback through the Highway 406 Southbound interchange intersection create blockages and delays. However, based on the capacity analysis methodology, constraints are still forecast at the link level and for individual intersection movements under this scenario. While queue spillback is expected to be improved, significant congestion is still forecasted within the network.
- For Sensitivity Analysis #4, the results are comparable to Sensitivity Analysis #3, with the 25% reduction mitigating queue spill into adjacent intersections. in the “No Train Event” scenario. Even with the 25% reduction, the “With Train Event” scenario still realizes queue spillback into the southbound off-ramp intersection. In this scenario, the capacity constraints are significantly improved but not entirely alleviated at both the ramp terminal intersections. The remaining critical movements include the left turns from both off ramps which are still above the desired MTO traffic impact study guidelines.

Based on the analysis completed, it is concluded that with the proposed new development in the lands east of Highway 406 (primarily South Village and Hunters Pointe), the existing Woodlawn Road/Daimler Parkway corridor will experience peak hour congestion and queueing resulting in undesirable operating conditions by 2051.

The sensitivity analysis shows a 10% reduction in through volumes (this represents a reduction of approximately 215 units assuming the same distribution of land uses) along Woodlawn Road/Daimler Parkway mitigates some of the roadway queueing concerns that are present under the base future (2051) total scenario, albeit the Highway 406 ramp intersections are still forecast to operate with critical movements and high levels of delay.

The sensitivity analysis for a 25% reduction in through volumes along Woodlawn Road/Daimler Parkway (this represents a reduction of approximately 549 units assuming the same distribution of land uses), mitigates the roadway queueing concerns that are present under the base future (2051) total scenario. The operational analysis indicated that all the Highway 406 ramp intersections will operate at good levels of service with only the left turn movements at both off ramps still exceeding the desired MTO traffic impact study guideline.

If the proposed magnitude of developments is to be implemented by the 2051 horizon, undesirable operating conditions are expected in the form of significant congestion along the Daimler Parkway corridor and queue spillback blocking adjacent intersections.

Therefore, it is recommended that an additional non-emergency access be provided for the lands east of Highway 406 to accommodate the development traffic demand. The additional access will add new transportation capacity to the roadway network allowing for diversion of traffic away from the Daimler Parkway corridor thus improving its operation under the future (2051) total traffic scenario. Additionally, there will be surplus capacity within the roadway system to consider the potential for increased densities if desired. This additional route choice will also reduce out of way travel and overall commute time for the traffic heading to the south and west.

APPENDIX 1

Turning Movement Counts (TMCs)



Woodlawn Rd @ Brown Rd / Primeway Dr

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Welland

Site #: 0000000004

Intersection: Woodlawn Rd & Brown Rd

TFR File #: 4

Count date: 23-Apr-2024

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 319

North Entering: 134

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	2	1	2	5
Trucks	2	1	1	4
Cars	75	33	17	125
Totals	79	35	20	

Heavys	4
Trucks	2
Cars	179
Totals	185

East Leg Total: 1114

East Entering: 601

East Peds: 0

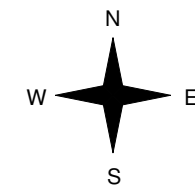
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
28	8	627	663



Woodlawn Rd

Heavys	Trucks	Cars	Totals
2	0	88	90
33	3	446	482
4	0	56	60
39	3	590	



Brown Rd

Primeway Dr



Cars	Trucks	Heavys	Totals
59	2	2	63
498	6	24	528
7	1	2	10
564	9	28	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
470	5	38	513

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 632

West Leg Total: 1295

Cars	96
Trucks	2
Heavys	7
Totals	105



Cars	54	32	7	93
Trucks	0	0	1	1
Heavys	2	0	3	5
Totals	56	32	11	

Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 99

South Leg Total: 204

Comments

Woodlawn Rd @ Brown Rd / Primeway Dr

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 11:30:00

To: 12:30:00

Municipality: Welland

Site #: 0000000004

Intersection: Woodlawn Rd & Brown Rd

TFR File #: 4

Count date: 23-Apr-2024

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 1040

North Entering: 513

North Peds: 1

Peds Cross: $\times$

	Heavys	Trucks	Cars	Totals
2	1	2	5	
1	1	1	3	
308	87	110	505	
311	89	113		

	Heavys	Trucks	Cars	Totals
5	1			
1				
521				
527				

East Leg Total: 912

East Entering: 471

East Peds: 1

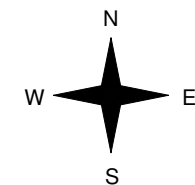
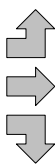
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
10	4	657	671



Woodlawn Rd

Heavys	Trucks	Cars	Totals
1	0	279	280
11	2	311	324
0	1	44	45
12	3	634	



Brown Rd



Cars	Trucks	Heavys	Totals
147	1	2	150
296	3	8	307
13	0	1	14
456	4	11	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
424	3	14	441

Peds Cross: $\times$

West Peds: 0

West Entering: 649

West Leg Total: 1320

Cars	Trucks	Heavys	Totals
144	2	2	148
53	0	0	53
95	0	2	97
3	0	1	4
151	0	3	

Peds Cross: $\times$

South Peds: 0

South Entering: 154

South Leg Total: 302

Comments

Woodlawn Rd @ Brown Rd / Primeway Dr

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Welland

Site #: 0000000004

Intersection: Woodlawn Rd & Brown Rd

TFR File #: 4

Count date: 23-Apr-2024

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 1051

North Entering: 534

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	6	1	0	7
Trucks	0	0	2	2
Cars	292	89	144	525
Totals	298	90	146	

Heavys	2
Trucks	0
Cars	515
Totals	517

East Leg Total: 1389

East Entering: 730

East Peds: 2

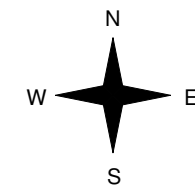
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
13	1	897	911



Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	274	274
11	1	485	497
0	0	70	70
11	1	829	



Brown Rd

Primeway Dr

Cars	Trucks	Heavys	Totals
177	0	2	179
525	1	7	533
17	1	0	18
719	2	9	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
645	3	11	659

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 841

West Leg Total: 1752

Cars	176
Trucks	1
Heavys	1
Totals	178

Cars	80	64	16	160
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	80	64	16	



Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 160

South Leg Total: 338

Comments

Woodlawn Rd @ Brown Rd / Primeway Dr

Total Count Diagram

Municipality: Welland
Site #: 0000000004
Intersection: Woodlawn Rd & Brown Rd
TFR File #: 4
Count date: 23-Apr-2024

Weather conditions:
 Cloudy/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 6522
 North Entering: 3244
 North Peds: 8
 Peds Cross: $\bowtie$

	Heavys	Trucks	Cars	Totals
24	4	10	38	
9	5	9	23	
1862	530	791	3183	
1895	539	810		



	Heavys	Trucks	Cars	Totals
26	18	3234	3278	

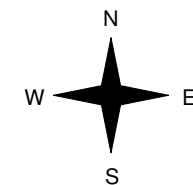
East Leg Total: 8427
 East Entering: 4369
 East Peds: 5
 Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
127	39	5468	5634



Woodlawn Rd

Heavys	Trucks	Cars	Totals
9	6	1692	1707
105	27	3043	3175
9	3	411	423
123	36	5146	



Primeway Dr



Cars	Trucks	Heavys	Totals
1013	8	15	1036
3113	30	97	3240
83	3	7	93
4209	41	119	

Woodlawn Rd



Brown Rd

Cars	Trucks	Heavys	Totals
3896	38	124	4058

Peds Cross: $\bowtie$
 West Peds: 3
 West Entering: 5305
 West Leg Total: 10939

Cars	Trucks	Heavys	Totals
1024	11	20	1055



Cars	Trucks	Heavys	Totals
493	0	6	499
529	4	2	535
62	2	9	73
1084	6	17	

Peds Cross: $\bowtie$
 South Peds: 0
 South Entering: 1107
 South Leg Total: 2162

Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Welland

Site #: 0000000001

Intersection: Woodlawn Rd & Hwy 406 SB Off Ramp

TFR File #: 1

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 17

North Entering: 17

North Peds: 3

Peds Cross: $\times$

Heavys	0	0	3	3
Trucks	0	0	0	0
Cars	0	0	14	14
Totals	0	0	17	



Heavys 0

Trucks 0

Cars 0

Totals 0

East Leg Total: 677

East Entering: 218

East Peds: 0

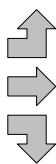
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
13	0	190	203

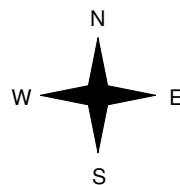


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	0	0
13	5	424	442
22	0	121	143
35	5	545	



Hwy 406 SB On Ramp



Hwy 406 SB Off Ramp



Cars	Trucks	Heavys	Totals
0	0	0	0
190	0	13	203
14	0	1	15
204	0	14	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
438	5	16	459

Peds Cross: $\times$

West Peds: 0

West Entering: 585

West Leg Total: 788

Cars	135
Trucks	0
Heavys	23
Totals	158



Cars	0	0	0	0
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	0	0

Peds Cross: $\times$

South Peds: 0

South Entering: 0

South Leg Total: 158

Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:00:00

To: 13:00:00

Municipality: Welland

Site #: 0000000001

Intersection: Woodlawn Rd & Hwy 406 SB Off Ramp

TFR File #: 1

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 24

North Entering: 24

North Peds: 6

Peds Cross: 2

Heavys	0	0	2	2
Trucks	0	0	0	0
Cars	0	0	22	22
Totals	0	0	24	



Heavys 0

Trucks 0

Cars 0

Totals 0

East Leg Total: 612

East Entering: 224

East Peds: 0

Peds Cross: 2

Heavys	Trucks	Cars	Totals
1	3	200	204

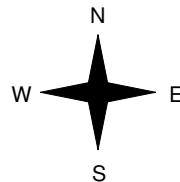


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	0	0
14	7	343	364
2	2	166	170
16	9	509	



Hwy 406 SB On Ramp



Hwy 406 SB Off Ramp



Cars	Trucks	Heavys	Totals
0	0	0	0
200	3	1	204
19	0	1	20
219	3	2	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
365	7	16	388

Peds Cross: 2

West Peds: 0

West Entering: 534

West Leg Total: 738

Cars	185
Trucks	2
Heavys	3
Totals	190



Cars	0	0	0	0
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	0	0

Peds Cross: 2

South Peds: 0

South Entering: 0

South Leg Total: 190

Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 15:45:00

To: 16:45:00

Municipality: Welland

Site #: 0000000001

Intersection: Woodlawn Rd & Hwy 406 SB Off Ramp

TFR File #: 1

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 42

North Entering: 42

North Peds: 1

Peds Cross: $\times$

Heavys	0	0	1	1
Trucks	0	0	1	1
Cars	0	0	40	40
Totals	0	0	42	



Heavys 0

Trucks 0

Cars 0

Totals 0

East Leg Total: 782

East Entering: 293

East Peds: 0

Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
8	0	266	274

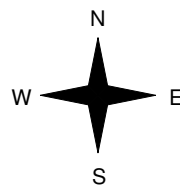


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	0	0
5	2	440	447
4	2	193	199
9	4	633	



Hwy 406 SB On Ramp



Hwy 406 SB Off Ramp



Cars	Trucks	Heavys	Totals
0	0	0	0
266	0	8	274
17	1	1	19
283	1	9	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
480	3	6	489

Peds Cross: $\times$

West Peds: 0

West Entering: 646

West Leg Total: 920

Cars	210
Trucks	3
Heavys	5
Totals	218



Cars	0	0	0	0
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	0	0

Peds Cross: $\times$

South Peds: 0

South Entering: 0

South Leg Total: 218

Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Total Count Diagram

Municipality: Welland

Site #: 0000000001

Intersection: Woodlawn Rd & Hwy 406 SB Off Ramp

TFR File #: 1

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 220

North Entering: 220

North Peds: 20

Peds Cross: $\bowtie$

Heavys	0	0	12	12
Trucks	0	0	5	5
Cars	0	2	201	203
Totals	0	2	218	



Heavys 0

Trucks 0

Cars 0

Totals 0

East Leg Total: 5070

East Entering: 1864

East Peds: 0

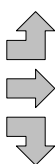
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
47	10	1667	1724

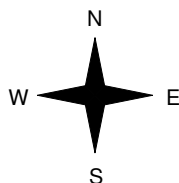


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	0	0
67	42	2879	2988
48	10	1272	1330
115	52	4151	



Hwy 406 SB On Ramp



Hwy 406 SB Off Ramp



Cars	Trucks	Heavys	Totals
0	0	0	0
1667	10	47	1724
129	3	8	140
1796	13	55	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
3080	47	79	3206

Peds Cross: $\bowtie$

West Peds: 0

West Entering: 4318

West Leg Total: 6042

Cars	1403
Trucks	13
Heavys	56
Totals	1472



Cars	0	0	0	0
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	0	0

Peds Cross: $\bowtie$

South Peds: 1

South Entering: 0

South Leg Total: 1472

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Welland

Site #: 0000000002

Intersection: Woodlawn Rd & Hwy 406 NB Off Ramp

TFR File #: 2

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 4

North Entering: 2

North Peds: 2

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	1	1	0	2
Totals	1	1	0	



Heavys 0

Trucks 0

Cars 2

Totals 2

East Leg Total: 167

East Entering: 114

East Peds: 0

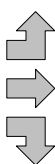
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
7	0	216	223

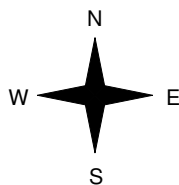


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	1	1
6	0	33	39
0	0	0	0
6	0	34	



Hwy 406 NB Off Ramp



Car Pool

Cars	Trucks	Heavys	Totals
0	0	0	0
75	0	1	76
35	1	2	38
110	1	3	



Woodlawn Rd



Cars	Trucks	Heavys	Totals
45	0	8	53

Peds Cross: $\times$

West Peds: 0

West Entering: 40

West Leg Total: 263

Cars	36	Cars	140	1	12	153
Trucks	1	Trucks	0	0	0	0
Heavys	2	Heavys	6	0	2	8
Totals	39	Totals	146	1	14	



Peds Cross: $\times$

South Peds: 0

South Entering: 161

South Leg Total: 200

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 13:00:00

To: 14:00:00

Municipality: Welland

Site #: 0000000002

Intersection: Woodlawn Rd & Hwy 406 NB Off Ramp

TFR File #: 2

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 19

North Entering: 9

North Peds: 5

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	6	2	1	9
Totals	6	2	1	



Heavys 0

Trucks 0

Cars 10

Totals 10

East Leg Total: 194

East Entering: 100

East Peds: 0

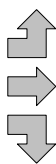
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
7	4	219	230

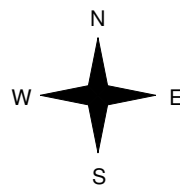


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	7	7
1	5	76	82
0	0	0	0
1	5	83	



Hwy 406 NB Off Ramp



Car Pool

Cars	Trucks	Heavys	Totals
0	0	0	0
66	2	1	69
28	2	1	31
94	4	2	



Woodlawn Rd



Cars	Trucks	Heavys	Totals
87	6	1	94

Peds Cross: $\times$

West Peds: 0

West Entering: 89

West Leg Total: 319

Cars	30	Cars	147	3	10	160
Trucks	2	Trucks	2	0	1	3
Heavys	1	Heavys	6	0	0	6
Totals	33	Totals	155	3	11	



Peds Cross: $\times$

South Peds: 0

South Entering: 169

South Leg Total: 202

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 15:15:00

To: 16:15:00

Municipality: Welland

Site #: 0000000002

Intersection: Woodlawn Rd & Hwy 406 NB Off Ramp

TFR File #: 2

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 12

North Entering: 7

North Peds: 2

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	5	0	2	7
Totals	5	0	2	



Heavys 0

Trucks 0

Cars 5

Totals 5

East Leg Total: 209

East Entering: 88

East Peds: 0

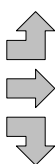
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
11	1	291	303

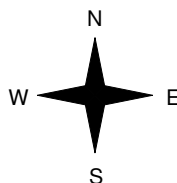


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	4	4
3	1	93	97
0	0	0	0
3	1	97	



Hwy 406 NB Off Ramp



Car Pool

Cars	Trucks	Heavys	Totals
1	0	0	1
63	1	3	67
18	1	1	20
82	2	4	



Woodlawn Rd



Cars	Trucks	Heavys	Totals
116	1	4	121

Peds Cross: $\times$

West Peds: 0

West Entering: 101

West Leg Total: 404

Cars	18	Cars	223	0	21	244
Trucks	1	Trucks	0	0	0	0
Heavys	1	Heavys	8	0	1	9
Totals	20	Totals	231	0	22	



Peds Cross: $\times$

South Peds: 0

South Entering: 253

South Leg Total: 273

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Total Count Diagram

Municipality: Welland

Site #: 0000000002

Intersection: Woodlawn Rd & Hwy 406 NB Off Ramp

TFR File #: 2

Count date: 29-May-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 97

North Entering: 49

North Peds: 21

Peds Cross: $\nlessgtr$

Heavys	1	0	0	1
Trucks	0	0	0	0
Cars	28	12	8	48
Totals	29	12	8	



Heavys 1

Trucks 0

Cars 47

Totals 48

East Leg Total: 1431

East Entering: 718

East Peds: 0

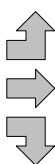
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
53	14	1796	1863

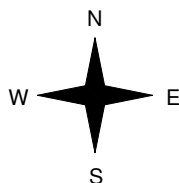


Woodlawn Rd

Heavys	Trucks	Cars	Totals
1	0	30	31
18	9	568	595
0	0	0	0
19	9	598	



Hwy 406 NB Off Ramp



Cars	Trucks	Heavys	Totals
5	0	0	5
507	5	9	521
179	4	9	192
691	9	18	



Woodlawn Rd



Cars	Trucks	Heavys	Totals
680	10	23	713

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 626

West Leg Total: 2489

Cars	191	Cars	1261	12	104	1377
Trucks	4	Trucks	9	0	1	10
Heavys	9	Heavys	43	0	5	48
Totals	204	Totals	1313	12	110	



Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 1435

South Leg Total: 1639

Comments

Woodlawn Rd @ Primeway Dr

Mid-day Peak Diagram

Specified Period

From: 10:00:00

To: 14:00:00

One Hour Peak

From: 10:45:00

To: 11:45:00

Municipality: Welland

Site #: 0000000001

Intersection: Woodlawn Rd & Primeway Dr

TFR File #: 1

Count date: 15-Jun-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 1569

North Entering: 738

North Peds: 0

Peds Cross: $\times$

Heavys	2	0	1	3
Trucks	1	0	1	2
Cars	409	112	212	733
Totals	412	112	214	



Heavys 0

Trucks 0

Cars 831

Totals 831

East Leg Total: 1439

East Entering: 763

East Peds: 0

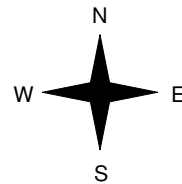
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
2	1	1022	1025



Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	471	471
2	2	451	455
0	0	67	67
2	2	989	



Primeway Dr



Cars	Trucks	Heavys	Totals
224	0	0	224
528	0	0	528
11	0	0	11
763	0	0	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
669	4	3	676

Peds Cross: $\times$

West Peds: 0

West Entering: 993

West Leg Total: 2018

Cars 190

Trucks 0

Heavys 0

Totals 190



Cars	85	136	6	227
Trucks	0	0	1	1
Heavys	0	0	0	0
Totals	85	136	7	

Peds Cross: $\times$

South Peds: 0

South Entering: 228

South Leg Total: 418

Brown Rd



Comments

Woodlawn Rd @ Primeway Dr

Total Count Diagram

Municipality: Welland
Site #: 0000000001
Intersection: Woodlawn Rd & Primeway Dr
TFR File #: 1
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry
Person(s) who counted:
Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 6258
North Entering: 2980
North Peds: 2
Peds Cross: $\bowtie$

Heavys	9	0	2	11
Trucks	5	1	2	8
Cars	1717	442	802	2961
Totals	1731	443	806	

Heavys	1
Trucks	4
Cars	3273
Totals	3278

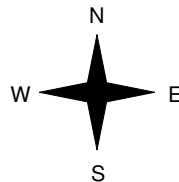
East Leg Total: 5448
East Entering: 2800
East Peds: 1
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
12	10	3854	3876



Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	1840	1840
3	10	1800	1813
0	0	229	229
3	10	3869	



Primeway Dr



Cars	Trucks	Heavys	Totals
900	4	1	905
1853	5	3	1861
33	0	1	34
2786	9	5	

Woodlawn Rd



Brown Rd



Peds Cross: $\bowtie$
West Peds: 0
West Entering: 3882
West Leg Total: 7758

Cars	704
Trucks	1
Heavys	1
Totals	706



Cars	284	533	25	842
Trucks	0	0	1	1
Heavys	0	0	3	3
Totals	284	533	29	

Peds Cross: $\bowtie$
South Peds: 0
South Entering: 846
South Leg Total: 1552

Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Mid-day Peak Diagram

Specified Period

From: 10:00:00

To: 14:00:00

One Hour Peak

From: 10:45:00

To: 11:45:00

Municipality: Welland

Site #: 0000000002

Intersection: Woodlawn Rd & Hwy 406 SB Ramp

TFR File #: 2

Count date: 15-Jun-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 510

North Entering: 510

North Peds: 0

Peds Cross: $\times$

	Heavys	Trucks	Cars	Totals
1	0	0	0	0
2	0	0	0	0
3	489	2	18	509
Totals	490	2	18	



Heavys 0

Trucks 0

Cars 0

Totals 0

East Leg Total: 767

East Entering: 281

East Peds: 1

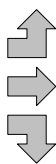
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
1	0	756	757

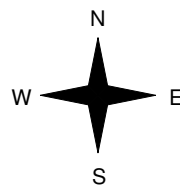


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	0	0
2	3	463	468
1	0	212	213
3	3	675	



Hwy 406 SB On Ramp



Hwy 406 SB Off Ramp



Cars	Trucks	Heavys	Totals
0	0	0	0
267	0	0	267
13	1	0	14
280	1	0	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
481	3	2	486

Peds Cross: $\times$

West Peds: 0

West Entering: 681

West Leg Total: 1438

Cars	Trucks	Heavys	Totals
227	1	1	229



Cars	Trucks	Heavys	Totals
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Peds Cross: $\times$

South Peds: 0

South Entering: 0

South Leg Total: 229

Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Total Count Diagram

Municipality: Welland
Site #: 0000000002
Intersection: Woodlawn Rd & Hwy 406 SB Ramp
TFR File #: 2
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry
Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 1872
North Entering: 1872
North Peds: 8
Peds Cross: $\times$

	Heavys	Trucks	Cars	Totals
2	0	0	2	2
6	0	3	9	9
1765	2	94	1861	1861
Totals	1773	2	97	



	Heavys	Trucks	Cars	Totals
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Totals	0	0	0	0

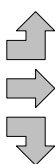
East Leg Total: 3031
East Entering: 1103
East Peds: 1
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
5	10	2807	2822

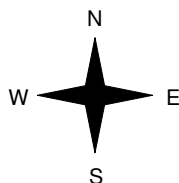


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	0	0
7	9	1815	1831
1	3	815	819
8	12	2630	



Hwy 406 SB On Ramp



Hwy 406 SB Off Ramp



Cars	Trucks	Heavys	Totals
0	0	0	0
1042	4	3	1049
52	2	0	54
1094	6	3	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
1909	12	7	1928

Peds Cross: $\times$
West Peds: 0
West Entering: 2650
West Leg Total: 5472

Cars	Trucks	Heavys	Totals
869	5	1	875



Cars	Trucks	Heavys	Totals
0	0	0	0
0	0	0	0
0	0	0	0
Totals	0	0	0

Peds Cross: $\times$
South Peds: 0
South Entering: 0
South Leg Total: 875

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Mid-day Peak Diagram

Specified Period

From: 10:00:00

To: 14:00:00

One Hour Peak

From: 10:30:00

To: 11:30:00

Municipality: Welland

Site #: 0000000003

Intersection: Woodlawn Rd & Hwy 406 NB Off Ramp

TFR File #: 3

Count date: 15-Jun-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Woodlawn Rd runs W/E

North Leg Total: 15

North Entering: 8

North Peds: 3

Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	0	0
3	4	1	8
3	4	1	8



Heavys 0

Trucks 0

Cars 7

Totals 7

East Leg Total: 198

East Entering: 104

East Peds: 1

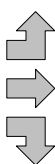
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
1	1	299	301

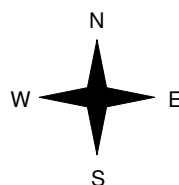


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	5	5
0	1	78	79
0	0	0	0
0	1	83	83



Hwy 406 NB Off Ramp



Car Pool

Cars	Trucks	Heavys	Totals
1	0	0	1
71	1	0	72
31	0	0	31
103	1	0	104



Woodlawn Rd



Cars	Trucks	Heavys	Totals
93	1	0	94

Peds Cross: $\times$

West Peds: 0

West Entering: 84

West Leg Total: 385

Cars	Trucks	Heavys	Totals
35	0	0	35
225	0	1	226
1	0	0	1
14	0	0	14
240	0	1	241



Peds Cross: $\times$

South Peds: 0

South Entering: 241

South Leg Total: 276

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Total Count Diagram

Municipality: Welland

Site #: 0000000003

Intersection: Woodlawn Rd & Hwy 406 NB Off Ramp

TFR File #: 3

Count date: 15-Jun-2024

Weather conditions:

Clear/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 33

North Entering: 17

North Peds: 16

Peds Cross: $\bowtie$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	10	5	2	17
Totals	10	5	2	



Heavys	0
Trucks	0
Cars	16
Totals	16

East Leg Total: 770

East Entering: 394

East Peds: 2

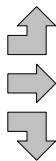
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
3	6	1096	1105

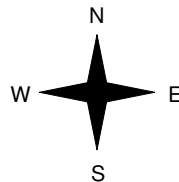


Woodlawn Rd

Heavys	Trucks	Cars	Totals
0	0	11	11
0	4	324	328
0	0	0	0
0	4	335	



Hwy 406 NB Off Ramp



Car Pool

Cars	Trucks	Heavys	Totals
2	0	0	2
283	2	0	285
107	0	0	107
392	2	0	

Woodlawn Rd



Cars	Trucks	Heavys	Totals
372	4	0	376

Peds Cross: $\bowtie$

West Peds: 0

West Entering: 339

West Leg Total: 1444

Cars	112	Cars	803	3	46	852
Trucks	0	Trucks	4	0	0	4
Heavys	0	Heavys	3	0	0	3
Totals	112	Totals	810	3	46	



Peds Cross: $\bowtie$

South Peds: 0

South Entering: 859

South Leg Total: 971

Comments

APPENDIX 2

Vissim Model Volume Calibration



Existing Conditions Model No Train Volume Calibration										
Period	No.	Intersection	Movement	Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph
		Location		Hourly	Hourly	Volume	Abs. %	Volume	(<5)	(±100)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	90	91	1	1.1%	0.1	Yes	Yes
			EBT	482	487	5	1.0%	0.2	Yes	Yes
			EBR	60	59	-1	1.7%	0.1	Yes	Yes
			NBL	56	61	5	8.2%	0.7	Yes	Yes
			NBT	32	32	0	0.0%	0.0	Yes	Yes
			NBR	11	12	1	8.3%	0.3	Yes	Yes
			SBL	20	22	2	9.1%	0.4	Yes	Yes
			SBT	35	38	3	7.9%	0.5	Yes	Yes
			SBR	79	82	3	3.7%	0.3	Yes	Yes
			WBL	10	9	-1	10.0%	0.3	Yes	Yes
			WBT	528	549	21	3.8%	0.9	Yes	Yes
			WBR	63	68	5	7.4%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	143	126	-17	11.9%	1.5	Yes	Yes
			EBT	442	394	-48	10.9%	2.3	Yes	Yes
			SBL	17	19	2	10.5%	0.5	Yes	Yes
			WBL	15	15	0	0.0%	0.0	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	203	218	15	6.9%	1.0	Yes	Yes
			EBL	1	2	1	50.0%	0.8	Yes	Yes
			EBT	39	37	-2	5.1%	0.3	Yes	Yes
			EBR	419	375	-44	10.5%	2.2	Yes	Yes
			NBL	146	154	8	5.2%	0.7	Yes	Yes
			NBT	1	0	-1	100.0%	1.4	Yes	Yes
			NBR	14	16	2	12.5%	0.5	Yes	Yes
			SBL	0	0	0	-	-	-	Yes
			SBT	1	0	-1	100.0%	1.4	Yes	Yes
			SBR	1	2	1	50.0%	0.8	Yes	Yes
			WBL	38	40	2	5.0%	0.3	Yes	Yes
			WBT	76	76	0	0.0%	0.0	Yes	Yes
			WBR	0	0	0	-	-	-	Yes
	PM Peak Hour	1	EBL	274	279	5	1.8%	0.3	Yes	Yes
			EBT	497	505	8	1.6%	0.4	Yes	Yes
			EBR	70	68	-2	2.9%	0.2	Yes	Yes
			NBL	80	85	5	5.9%	0.6	Yes	Yes
			NBT	64	66	2	3.0%	0.2	Yes	Yes
			NBR	16	18	2	11.1%	0.5	Yes	Yes
			SBL	146	148	2	1.4%	0.2	Yes	Yes
			SBT	90	93	3	3.2%	0.3	Yes	Yes
			SBR	298	295	-3	1.0%	0.2	Yes	Yes
			WBL	18	17	-1	5.6%	0.2	Yes	Yes
			WBT	533	549	16	2.9%	0.7	Yes	Yes
			WBR	179	187	8	4.3%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	199	211	12	5.7%	0.8	Yes	Yes
			EBT	447	458	11	2.4%	0.5	Yes	Yes
			SBL	42	45	3	6.7%	0.5	Yes	Yes
			WBL	19	19	0	0.0%	0.0	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	274	289	15	5.2%	0.9	Yes	Yes
			EBL	4	2	-2	50.0%	1.2	Yes	Yes
			EBT	97	99	2	2.0%	0.2	Yes	Yes
			EBR	388	402	14	3.5%	0.7	Yes	Yes
			NBL	231	236	5	2.1%	0.3	Yes	Yes
			NBT	0	0	0	-	-	-	Yes
			NBR	22	22	0	0.0%	0.0	Yes	Yes
			SBL	2	2	0	0.0%	0.0	Yes	Yes
			SBT	0	0	0	-	-	-	Yes
			SBR	5	5	0	0.0%	0.0	Yes	Yes
			WBL	20	21	1	4.8%	0.2	Yes	Yes
			WBT	67	68	1	1.5%	0.1	Yes	Yes
			WBR	1	1	0	0.0%	0.0	Yes	Yes
	SAT Peak Hour	1	EBL	471	475	4	0.8%	0.2	Yes	Yes
			EBT	455	459	4	0.9%	0.2	Yes	Yes
			EBR	67	67	0	0.0%	0.0	Yes	Yes
			NBL	85	89	4	4.5%	0.4	Yes	Yes
			NBT	136	141	5	3.5%	0.4	Yes	Yes
			NBR	7	8	1	12.5%	0.4	Yes	Yes
			SBL	214	211	-3	1.4%	0.2	Yes	Yes
			SBT	112	113	1	0.9%	0.1	Yes	Yes
			SBR	412	417	5	1.2%	0.2	Yes	Yes
			WBL	11	11	0	0.0%	0.0	Yes	Yes
			WBT	528	542	14	2.6%	0.6	Yes	Yes
			WBR	224	234	10	4.3%	0.7	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	213	217	4	1.8%	0.3	Yes	Yes
			EBT	468	461	-7	1.5%	0.3	Yes	Yes
			SBL	18	19	1	5.3%	0.2	Yes	Yes
			WBL	14	14	0	0.0%	0.0	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	267	285	18	6.3%	1.1	Yes	Yes
			EBL	5	3	-2	40.0%	1.0	Yes	Yes
			EBT	79	76	-3	3.8%	0.3	Yes	Yes
			EBR	402	402	0	0.0%	0.0	Yes	Yes
			NBL	226	226	0	0.0%	0.0	Yes	Yes
			NBT	1	0	-1	100.0%	1.4	Yes	Yes
			NBR	14	22	8	36.4%	1.9	Yes	Yes
			SBL	1	1	0	0.0%	0.0	Yes	Yes
			SBT	4	4	0	0.0%	0.0	Yes	Yes
			SBR	3	2	-1	33.3%	0.6	Yes	Yes
			WBL	31	33	2	6.1%	0.4	Yes	Yes
			WBT	71	72	1	1.4%	0.1	Yes	Yes
			WBR	1	1	0	0.0%	0.0	Yes	Yes

Existing Conditions Model With Train Volume Calibration										
Period	Intersection		Movement	Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph
	No.	Location		Hourly	Hourly	Volume	Abs. %	Volume	(≤5)	(±100)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	90	91	1	1.1%	0.1	Yes	Yes
			EBT	482	487	5	1.0%	0.2	Yes	Yes
			EBR	60	59	-1	1.7%	0.1	Yes	Yes
			NBL	56	61	5	8.2%	0.7	Yes	Yes
			NBT	32	32	0	0.0%	0.0	Yes	Yes
			NBR	11	12	1	8.3%	0.3	Yes	Yes
			SBL	20	22	2	9.1%	0.4	Yes	Yes
			SBT	35	38	3	7.9%	0.5	Yes	Yes
			SBR	79	82	3	3.7%	0.3	Yes	Yes
			WBL	10	9	-1	10.0%	0.3	Yes	Yes
			WBT	528	549	21	3.8%	0.9	Yes	Yes
			WBR	63	68	5	7.4%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	143	126	-17	11.9%	1.5	Yes	Yes
			EBT	442	394	-48	10.9%	2.3	Yes	Yes
			SBL	17	19	2	10.5%	0.5	Yes	Yes
			WBL	15	15	0	0.0%	0.0	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	203	218	15	6.9%	1.0	Yes	Yes
			EBL	1	2	1	50.0%	0.8	Yes	Yes
			EBT	39	37	-2	5.1%	0.3	Yes	Yes
			EBR	419	375	-44	10.5%	2.2	Yes	Yes
			NBL	146	154	8	5.2%	0.7	Yes	Yes
			NBT	1	0	-1	100.0%	1.4	Yes	Yes
			NBR	14	16	2	12.5%	0.5	Yes	Yes
			SBL	0	0	0	-	-	-	Yes
			SBT	1	0	-1	100.0%	1.4	Yes	Yes
			SBR	1	2	1	50.0%	0.8	Yes	Yes
			WBL	38	40	2	5.0%	0.3	Yes	Yes
			WBT	76	76	0	0.0%	0.0	Yes	Yes
			WBR	0	0	0	-	-	-	Yes
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	274	279	5	1.8%	0.3	Yes	Yes
			EBT	497	505	8	1.6%	0.4	Yes	Yes
			EBR	70	68	-2	2.9%	0.2	Yes	Yes
			NBL	80	85	5	5.9%	0.6	Yes	Yes
			NBT	64	66	2	3.0%	0.2	Yes	Yes
			NBR	16	18	2	11.1%	0.5	Yes	Yes
			SBL	146	148	2	1.4%	0.2	Yes	Yes
			SBT	90	93	3	3.2%	0.3	Yes	Yes
			SBR	298	295	-3	1.0%	0.2	Yes	Yes
			WBL	18	17	-1	5.6%	0.2	Yes	Yes
			WBT	533	549	16	2.9%	0.7	Yes	Yes
			WBR	179	187	8	4.3%	0.6	Yes	Yes
			EBR	199	211	12	5.7%	0.8	Yes	Yes
			EBT	447	458	11	2.4%	0.5	Yes	Yes
			SBL	42	45	3	6.7%	0.5	Yes	Yes
			WBL	19	19	0	0.0%	0.0	Yes	Yes
			WBT	274	289	15	5.2%	0.9	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBL	4	2	-2	50.0%	1.2	Yes	Yes
			EBT	97	99	2	2.0%	0.2	Yes	Yes
			EBR	388	402	14	3.5%	0.7	Yes	Yes
			NBL	231	236	5	2.1%	0.3	Yes	Yes
			NBT	0	0	0	-	-	-	Yes
			NBR	22	22	0	0.0%	0.0	Yes	Yes
			SBL	2	2	0	0.0%	0.0	Yes	Yes
			SBT	0	0	0	-	-	-	Yes
			SBR	5	5	0	0.0%	0.0	Yes	Yes
			WBL	20	21	1	4.8%	0.2	Yes	Yes
			WBT	67	68	1	1.5%	0.1	Yes	Yes
			WBR	1	1	0	0.0%	0.0	Yes	Yes
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	274	279	5	1.8%	0.3	Yes	Yes
			EBT	497	505	8	1.6%	0.4	Yes	Yes
			EBR	70	68	-2	2.9%	0.2	Yes	Yes
			NBL	80	85	5	5.9%	0.6	Yes	Yes
			NBT	64	66	2	3.0%	0.2	Yes	Yes
			NBR	16	18	2	11.1%	0.5	Yes	Yes
			SBL	146	148	2	1.4%	0.2	Yes	Yes
			SBT	90	93	3	3.2%	0.3	Yes	Yes
			SBR	298	295	-3	1.0%	0.2	Yes	Yes
			WBL	18	17	-1	5.6%	0.2	Yes	Yes
			WBT	533	549	16	2.9%	0.7	Yes	Yes
			WBR	179	187	8	4.3%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	199	211	12	5.7%	0.8	Yes	Yes
			EBT	447	458	11	2.4%	0.5	Yes	Yes
			SBL	42	45	3	6.7%	0.5	Yes	Yes
			WBL	19	19	0	0.0%	0.0	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	274	289	15	5.2%	0.9	Yes	Yes
			EBL	4	2	-2	50.0%	1.2	Yes	Yes
			EBT	97	99	2	2.0%	0.2	Yes	Yes
			EBR	388	402	14	3.5%	0.7	Yes	Yes
			NBL	231	236	5	2.1%	0.3	Yes	Yes
			NBT	0	0	0	-	-	-	Yes
			NBR	22	22	0	0.0%	0.0	Yes	Yes
			SBL	2	2	0	0.0%	0.0	Yes	Yes
			SBT	0	0	0	-	-	-	Yes
			SBR	5	5	0	0.0%	0.0	Yes	Yes
			WBL	20	21	1	4.8%	0.2	Yes	Yes
			WBT	67	68	1	1.5%	0.1	Yes	Yes
			WBR	1	1	0	0.0%	0.0	Yes	Yes

Future Total (2051) Conditions Model No Train Volume Calibration												
Period	No.	Intersection		Movement	Input Volume Hour y	Simulated Volume Hour y	Difference Vo lume	Difference Abs %	GEH Vo lume	GEH (≤ 5)	Flow <700 vph (± 100)	700vph<Flow<2700 vph ($\pm 15\%$)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	Yes	-
			EBT	853	859	6	0.7%	0.2	Yes	Yes	-	Yes
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-	Yes
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-	-
			WBT	1074	1070	-4	0.4%	0.1	Yes	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	208	-20	8.8%	1.4	Yes	Yes	-	-
			EBT	790	700	-90	11.4%	3.3	Yes	-	-	Yes
			SBL	100	99	-1	1.0%	0.1	Yes	Yes	-	-
			WBL	225	215	-10	4.4%	0.7	Yes	Yes	-	-
			WBT	557	538	-19	3.4%	0.8	Yes	Yes	-	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-	-
			EBT	220	207	-13	5.9%	0.9	Yes	Yes	-	-
			EBR	667	595	-72	10.8%	2.9	Yes	Yes	-	-
			NBL	233	235	2	0.9%	0.1	Yes	Yes	-	-
			NBT	1	0	0	0.0%	0.0	Yes	Yes	-	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-	-
			SBL	0	2	2	-	-	-	Yes	-	-
			SBT	1	1	0	0.0%	-	-	Yes	-	-
			SBR	1	0	-1	100.0%	-	-	Yes	-	-
			WBL	271	256	-15	5.5%	0.9	Yes	Yes	-	-
			WBT	555	517	-38	6.8%	1.6	Yes	Yes	-	-
			WBR	0	0	0	-	-	-	Yes	-	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	24	28	4	14.3%	0.8	Yes	Yes	-	-
			EBT	98	101	3	3.0%	0.3	Yes	Yes	-	-
			EBR	163	178	15	8.4%	1.1	Yes	Yes	-	-
			NBL	437	441	4	0.9%	0.2	Yes	Yes	-	-
			NBT	0	0	0	-	-	-	Yes	-	-
			NBR	0	0	0	-	-	-	Yes	-	-
			SBL	0	0	0	-	-	-	Yes	-	-
			SBT	0	0	0	-	-	-	Yes	-	-
			SBR	70	74	4	5.4%	0.5	Yes	Yes	-	-
			WBL	0	0	0	-	-	-	Yes	-	-
			WBT	251	255	4	1.6%	0.3	Yes	Yes	-	-
			WBR	0	0	0	-	-	-	Yes	-	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	436	0	0.0%	0.0	Yes	Yes	Yes	-
			EBT	1060	1064	4	0.4%	0.1	Yes	Yes	Yes	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	Yes	-
			SBL	233	231	-2	0.9%	0.1	Yes	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	Yes	-
			SBR	474	483	9	1.9%	0.4	Yes	Yes	Yes	-
			WBL	28	25	-3	10.7%	0.6	Yes	Yes	Yes	-
			WBT	1014	1011	-3	0.3%	0.1	Yes	-	-	Yes
			WBR	285	286	1	0.3%	0.1	Yes	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	326	9	2.8%	0.5	Yes	Yes	Yes	-
			EBT	980	995	15	1.5%	0.5	Yes	Yes	Yes	-
			SBL	305	312	7	2.2%	0.4	Yes	Yes	Yes	-
			WBL	175	169	-6	3.4%	0.5	Yes	Yes	Yes	-
			WBT	602	589	-13	2.2%	0.5	Yes	Yes	Yes	-
			WBR	6	3	-3	50.0%	1.4	Yes	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	661	680	19	2.8%	0.7	Yes	Yes	Yes	-
			EBR	618	625	7	1.1%	0.3	Yes	Yes	Yes	-
			NBL	368	362	-6	1.6%	0.3	Yes	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-	-
			NBR	268	277	9	3.2%	0.5	Yes	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	Yes	-
			WBT	419	388	-31	7.4%	1.5	Yes	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	Yes	-
			EBL	79	91	12	13.2%	1.3	Yes	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBT	278	307	29	9.4%	1.7	Yes	Yes	Yes	-
			EBR	503	561	58	10.3%	2.5	Yes	Yes	Yes	-
			NBL	319	321	2	0.6%	0.1	Yes	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-	-
			NBR	0	0	0	-	-	-	Yes	-	-
			SBL	0	0	0	-	-	-	Yes	-	-
			SBT	0	0	0	-	-	-	Yes	-	-
			SBR	47	48	1	2.1%	0.1	Yes	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-	-
			WBT	179	183	4	2.2%	0.3	Yes	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-	-
			SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	714	-37	4.9%	1.4	Yes
EBT	962	924				-38	4.0%	1.2	Yes	-	-	Yes
EBR	107	108				1	0.9%	0.1	Yes	Yes	Yes	-
NBL	135	141				6	4.3%	0.5	Yes	Yes	Yes	-
NBT	217	218				1	0.5%	0.1	Yes	Yes	Yes	-
NBR	12	12				0	0.0%	0.0	Yes	Yes	Yes	-
SBL	340	324				-16	4.7%	0.9	Yes	Yes	Yes	-
SBT	178	181				3	1.7%	0.2	Yes	Yes	Yes	-
SBR	657	650				-7	1.1%	0.3	Yes	Yes	Yes	-
WBL	18	17				-1	5.6%	0.2	Yes	Yes	Yes	-
WBT	1053	1049				-4	0.4%	0.1	Yes	-	-	Yes
WBR	357	362				5	1.4%	0.3	Yes	Yes	Yes	-
2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR		339	325	-14	4.1%	0.8	Yes	Yes	Yes	-
		EBT		983	929	-54	5.5%	1.7	Yes	-	-	Yes
		SBL		232	236	4	1.7%	0.3	Yes	Yes	Yes	-
		WBL		207	204	-3	1.4%	0.2	Yes	Yes	Yes	-
		WBT		637	639	2	0.3%	0.1	Yes	Yes	Yes	-
		WBR		7	4	-3	42.9%	1.3	Yes	Yes	Yes	-
3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT		568	560	-8	1.4%	0.3	Yes	Yes	Yes	-
		EBR		640	602	-38	5.9%	1.5	Yes	Yes	Yes	-
		NBL		360	358	-2	0.6%	0.1	Yes	Yes	Yes	-
		NBT		1	0	0	0.0%	0.0	Yes	Yes	Yes	-
		NBR		229	235	6	2.6%	0.4	Yes	Yes	Yes	-
		SBL		1	1	0	0.0%	0.0	Yes	Yes	Yes	-
		SBT		6	6	0	0.0%	0.0	Yes	Yes	Yes	-
		SBR		5	5	0	0.0%	0.0	Yes	Yes	Yes	-
		WBL		231	217	-14	6.1%	0.9	Yes	Yes	Yes	-
		WBT		512	479	-33	6.4%	1.5	Yes	Yes	Yes	-
		WBR		1	1	0	0.0%	0.0	Yes	Yes	Yes	-
		EBL		65	71	6	8.5%	0.7	Yes	Yes	Yes	-
4	Daimler Parkway and Street 'A' / Street 'B'	EBT		223	220	-3	1.3%	0.2	Yes	Yes	Yes	-
		EBR		454	490	36	7.3%	1.7	Yes	Yes	Yes	-
		NBL		411	413	2	0.5%	0.1	Yes	Yes	Yes	-
		NBT		0	0	0	-	-	-	Yes	-	-
		NBR		0	0	0	-	-	-	Yes	-	-
		SBL		0	0	0	-	-	-	Yes	-	-
		SBT		0	0	0	-	-	-	Yes	-	-
		SBR		56	64	8	12.5%	1.0	Yes	Yes	Yes	-
		WBL		0	0	0	-	-	-	Yes	-	-
		WBT		216	234	18	7.7%	1.2	Yes	Yes	Yes	-
		WBR		0	0	0	-	-	-	Yes	-	-

Future Total (2051) Conditions Model With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Location	Movement	Hourly	Hourly	Volume	Abs %	Volume	(S)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	853	859	6	0.7%	0.2	Yes	-	Yes
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1074	1070	-4	0.4%	0.1	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	209	-19	8.3%	1.3	Yes	Yes	-
			EBT	790	701	-89	11.3%	3.3	Yes	-	Yes
			SBL	100	100	0	0.0%	0.0	Yes	Yes	-
			WBL	225	216	-9	4.0%	0.6	Yes	Yes	-
			WBT	557	539	-18	3.2%	0.8	Yes	Yes	-
			EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	220	207	-13	5.9%	0.9	Yes	Yes	-
			EBR	667	595	-72	10.8%	2.9	Yes	Yes	-
			NBL	233	236	3	1.3%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	271	255	-16	5.9%	1.0	Yes	Yes	-
			WBT	555	516	-39	7.0%	1.7	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	24	28	4	14.3%	0.8	Yes	Yes	-
			EBT	98	102	4	3.9%	0.4	Yes	Yes	-
			EBR	163	178	15	8.4%	1.1	Yes	Yes	-
			NBL	437	441	4	0.9%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	SBT	0	0	0	-	-	-	Yes	-
			SBR	70	74	4	5.4%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	251	255	4	1.6%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	434	-2	0.5%	0.1	Yes	Yes	-
			EBT	1060	1059	-1	0.1%	0.0	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	4	132	4	3.0%	0.4	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	232	-1	0.4%	0.1	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	485	11	2.3%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	1014	1009	-5	0.5%	0.2	Yes	-	Yes
			WBR	285	285	0	0.0%	0.0	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	325	9	2.8%	0.5	Yes	Yes	-
			EBT	980	997	17	1.7%	0.5	Yes	-	Yes
			SBL	305	311	6	1.9%	0.3	Yes	Yes	-
			WBL	175	169	-6	3.4%	0.5	Yes	Yes	-
			WBT	602	589	-13	2.2%	0.5	Yes	Yes	-
			EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	661	680	19	2.8%	0.7	Yes	Yes	-
			EBR	618	626	8	1.3%	0.3	Yes	Yes	-
			NBL	368	361	-7	1.9%	0.4	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	276	8	2.9%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	419	389	-30	7.2%	1.5	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBL	79	91	12	13.2%	1.3	Yes	Yes	-
			EBT	278	307	29	9.4%	1.7	Yes	Yes	-
			EBR	503	560	57	10.2%	2.5	Yes	Yes	-
			NBL	319	322	3	0.9%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	SBT	0	0	0	-	-	-	Yes	-
			SBR	47	48	1	2.1%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	179	183	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Increased Residential Density (+10%) No Train Volume Calibration											
Period	No.	Location	Intersection	Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
			Movement	Hourly	Hourly	Volume	Abs %	Vo/ume	(S)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	146	3	2.1%	0.2	Yes	Yes	-
			EBT	859	868	9	1.0%	0.3	Yes	-	Yes
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	-	-
			WBT	1095	1092	-3	0.3%	0.1	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-
			EBR	228	184	-44	19.3%	3.1	Yes	Yes	-
			EBT	796	732	-64	8.0%	2.3	Yes	-	Yes
			SBL	107	108	1	0.9%	0.1	Yes	Yes	-
			WBL	243	232	-11	4.5%	0.7	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	WBT	578	559	-19	3.3%	0.8	Yes	Yes	-
			EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	233	207	-26	11.2%	1.8	Yes	Yes	-
			EBR	667	634	-33	4.9%	1.3	Yes	Yes	-
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-
			NBT	1	0	0	0.0%	0.0	Yes	Yes	-
			NBR	102	107	5	4.7%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	290	272	-18	6.2%	1.1	Yes	Yes	-
			WBT	594	556	-38	6.4%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	27	30	3	10.0%	0.6	Yes	Yes	-
			EBT	103	102	-1	1.0%	0.1	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBR	174	182	8	4.4%	0.6	Yes	Yes	-
			NBL	469	473	4	0.8%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	82	84	2	2.4%	0.2	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	265	270	5	1.9%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	436	0	0.0%	0.0	Yes	Yes	-
			EBT	1084	1086	2	0.2%	0.1	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	230	-3	1.3%	0.2	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	484	10	2.1%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	1029	1025	-4	0.4%	0.1	Yes	-	Yes
			WBR	285	288	3	1.0%	0.2	Yes	Yes	-
			EBR	317	328	11	3.4%	0.6	Yes	Yes	-
			EBT	1003	1019	16	1.6%	0.5	Yes	Yes	-
			SBL	305	334	29	8.7%	1.6	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	WBL	186	181	-5	2.7%	0.4	Yes	Yes	-
			WBT	617	608	-9	1.5%	0.4	Yes	Yes	-
			EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	706	726	20	2.8%	0.7	Yes	Yes	-
			EBR	618	625	7	1.1%	0.3	Yes	Yes	-
			NBL	368	363	-5	1.4%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	288	295	7	2.4%	0.4	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	190	175	-15	7.9%	1.1	Yes	Yes	-
			WBT	445	418	-27	6.1%	1.3	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	92	106	14	13.2%	1.4	Yes	Yes	-
			EBT	289	316	27	8.5%	1.6	Yes	Yes	-
			EBR	544	604	60	9.9%	2.5	Yes	Yes	-
			NBL	341	347	6	1.7%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	55	56	1	1.8%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	189	193	4	2.1%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	716	-35	4.7%	1.3	Yes	Yes	Yes
			EBT	981	925	-56	5.7%	1.8	Yes	Yes	Yes
			EBR	107	107	0	0.0%	0.0	Yes	Yes	-
			NBL	135	142	7	4.9%	0.6	Yes	Yes	-
			NBT	217	220	3	1.4%	0.2	Yes	Yes	-
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-
			SBL	340	321	-19	5.6%	1.0	Yes	Yes	-
			SBT	178	180	2	1.1%	0.1	Yes	Yes	-
			SBR	657	649	-8	1.2%	0.3	Yes	Yes	-
			WBL	18	17	-1	5.6%	0.2	Yes	Yes	-
			WBT	1071	1078	7	0.6%	0.2	Yes	-	Yes
			WBR	357	373	16	4.3%	0.8	Yes	Yes	-
			EBR	339	327	-12	3.5%	0.7	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBT	1003	936	-67	6.7%	2.2	Yes	-	Yes
			SBL	250	242	-8	3.2%	0.5	Yes	Yes	-
			WBL	223	213	-10	4.5%	0.7	Yes	Yes	-
			WBT	655	669	14	2.1%	0.5	Yes	Yes	-
			EBL	4	4	-3	42.9%	1.3	Yes	Yes	-
			EBT	605	566	-39	6.4%	1.6	Yes	Yes	-
			EBR	640	608	-32	5.0%	1.3	Yes	Yes	-
			NBL	360	365	5	1.4%	0.3	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	246	243	-3	1.2%	0.2	Yes	Yes	-
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-
			WBL	247	232	-15	6.1%	1.0	Yes	Yes	-
			WBT	545	509	-36	6.6%	1.6	Yes	Yes	-
SAT Peak Hour	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBR	1	0	0	0.0%	0.0	Yes	Yes	-
			EBL	76	72	-4	5.3%	0.5	Yes	Yes	-
			EBT	233	228	-5	2.1%	0.3	Yes	Yes	-
			EBR	487	498	11	2.2%	0.5	Yes	Yes	-
			NBL	438	442	4	0.9%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	67	70	3	4.3%	0.4	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	227	238	11	4.6%	0.7	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Increased Residential Density (+10%) With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Location	Movement	Hourly	Hourly	Volume	Abs %	Volume	(S)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	146	3	2.1%	0.2	Yes	Yes	-
			EBT	859	869	9	1.0%	0.3	Yes	-	Yes
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1095	1091	-4	0.4%	0.1	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	184	-44	19.3%	3.1	Yes	Yes	-
			EBT	796	733	-63	7.9%	2.3	Yes	-	Yes
			SBL	107	108	1	0.9%	0.1	Yes	Yes	-
			WBL	243	232	-11	4.5%	0.7	Yes	Yes	-
			WBT	578	558	-20	3.5%	0.8	Yes	Yes	-
			EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	233	206	-27	11.6%	1.8	Yes	Yes	-
			EBR	667	634	-33	4.9%	1.3	Yes	Yes	-
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	102	107	5	4.7%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	290	272	-18	6.2%	1.1	Yes	Yes	-
			WBT	594	556	-38	6.4%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	27	30	3	10.0%	0.6	Yes	Yes	-
			EBT	103	102	-1	1.0%	0.1	Yes	Yes	-
			EBR	174	181	7	3.9%	0.5	Yes	Yes	-
			NBL	469	473	4	0.8%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	SBT	0	0	0	-	-	-	Yes	-
			SBR	82	84	2	2.4%	0.2	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	265	270	5	1.9%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	436	434	-2	0.5%	0.1	Yes	Yes	-
			EBT	1084	1084	0	0.0%	0.0	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	4	132	4	3.0%	0.4	Yes	Yes	-
			NBT	102	101	-1	1.0%	0.1	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	232	-1	0.4%	0.1	Yes	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	483	9	1.9%	0.4	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	1029	1027	-2	0.2%	0.1	Yes	-	Yes
			WBR	285	288	3	1.0%	0.2	Yes	Yes	-
			EBR	317	326	9	2.8%	0.5	Yes	Yes	-
			EBT	1003	1014	11	1.1%	0.3	Yes	Yes	-
			SBL	305	334	29	8.7%	1.6	Yes	Yes	-
			WBL	186	181	-5	2.7%	0.4	Yes	Yes	-
			WBT	617	607	-10	1.6%	0.4	Yes	Yes	-
			EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	706	724	18	2.5%	0.7	Yes	-	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	618	623	5	0.8%	0.2	Yes	Yes	-
			NBL	368	363	-5	1.4%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	288	295	7	2.4%	0.4	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	190	175	-15	7.9%	1.1	Yes	Yes	-
			WBT	445	418	-27	6.1%	1.3	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBL	92	106	14	13.2%	1.4	Yes	Yes	-
			EBT	289	315	26	8.3%	1.5	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBR	544	604	60	9.9%	2.5	Yes	Yes	-
			NBL	341	346	5	1.4%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	55	56	1	1.8%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	189	192	3	1.6%	0.2	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	92	106	14	13.2%	1.4	Yes	Yes	-
			EBT	289	315	26	8.3%	1.5	Yes	Yes	-
			EBR	544	604	60	9.9%	2.5	Yes	Yes	-
			NBL	341	346	5	1.4%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	55	56	1	1.8%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	189	192	3	1.6%	0.2	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Increased Residential Density (+25%) No Train Volume Calibration														
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph			
	No.	Location	Movement	Hour y	Hour y	Voume	Abs %	Voume	(<5)	(±100)	(±15%)			
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	144	1	0.7%	0.3	Yes	Yes	-			
			EBT	870	879	9	1.0%	0.1	Yes	Yes	Yes			
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-			
			NBL	89	93	4	4.3%	0.4	Yes	Yes	-			
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-			
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-			
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-			
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-			
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-			
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-			
			WBT	1126	1124	-2	0.2%	0.1	Yes	Yes	Yes			
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-			
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	209	-19	8.3%	1.3	Yes	Yes	-			
			EBT	807	722	-85	10.5%	3.1	Yes	-	Yes			
			SBL	116	116	0	0.0%	0.0	Yes	Yes	-			
			WBL	270	256	-14	5.2%	0.9	Yes	Yes	-			
			WBT	609	590	-19	3.1%	0.8	Yes	Yes	-			
			EBL	1	0	-1	100.0%	1.4	Yes	Yes	-			
			EBT	254	239	-15	5.9%	1.0	Yes	Yes	-			
			EBR	667	599	-68	10.2%	2.7	Yes	Yes	-			
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-			
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-			
			NBR	111	116	5	4.3%	0.5	Yes	Yes	-			
			SBL	0	2	2	-	-	-	Yes	-			
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	SBT	1	1	0	0.0%	-	-	Yes	-			
			SBR	1	0	-1	100.0%	-	-	Yes	-			
			WBL	319	301	-18	5.6%	1.0	Yes	Yes	-			
			WBT	652	611	-41	6.3%	1.6	Yes	Yes	-			
			WBR	0	0	0	-	-	-	Yes	-			
			EBL	31	36	5	13.9%	0.9	Yes	Yes	-			
			EBT	109	111	2	1.8%	0.2	Yes	Yes	-			
			EBR	194	209	15	7.2%	1.1	Yes	Yes	-			
			NBL	526	527	1	0.2%	0.0	Yes	Yes	-			
			NBT	0	0	0	-	-	-	Yes	-			
			NBR	0	0	0	-	-	-	Yes	-			
			SBL	0	0	0	-	-	-	Yes	-			
	4	Daimler Parkway and Street 'A' / Street 'B'	SBT	0	0	0	-	-	-	Yes	-			
			SBR	93	96	3	3.1%	0.3	Yes	Yes	-			
			WBL	0	0	0	-	-	-	Yes	-			
			WBT	284	289	5	1.7%	0.3	Yes	Yes	-			
			WBR	0	0	0	-	-	-	Yes	-			
EBL			436	435	-1	0.2%	0.0	Yes	Yes	-				
EBT			1118	1110	-8	0.7%	0.2	Yes	-	Yes				
EBR			111	112	1	0.9%	0.1	Yes	Yes	-				
NBL			128	131	3	2.3%	0.3	Yes	Yes	-				
NBT			102	101	-1	1.0%	0.1	Yes	Yes	-				
NBR			26	28	2	7.1%	0.4	Yes	Yes	-				
SBL			233	228	-5	2.1%	0.3	Yes	Yes	-				
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	SBT	143	144	1	0.7%	0.1	Yes	Yes	-			
			SBR	474	482	8	1.7%	0.4	Yes	Yes	-			
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-			
			WBT	1050	1047	-3	0.3%	0.1	Yes	-	Yes			
			WBR	285	288	3	1.0%	0.2	Yes	Yes	-			
			EBR	317	316	-1	0.3%	0.1	Yes	Yes	-			
			EBT	1038	1023	-15	1.4%	0.5	Yes	Yes	-			
			SBL	358	367	9	2.5%	0.5	Yes	Yes	-			
			WBL	205	197	-8	3.9%	0.6	Yes	Yes	-			
			WBT	638	627	-11	1.7%	0.4	Yes	Yes	-			
			EBL	6	3	-3	50.0%	1.4	Yes	Yes	-			
			EBT	771	782	11	1.4%	0.4	Yes	Yes	-			
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	618	604	-14	2.3%	0.6	Yes	Yes	-			
			NBL	368	360	-8	2.2%	0.4	Yes	Yes	-			
			NBT	0	0	0	-	-	-	Yes	-			
			NBR	318	327	9	2.8%	0.5	Yes	Yes	-			
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-			
			SBT	0	0	0	-	-	-	Yes	-			
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-			
			WBL	210	197	-13	6.2%	0.9	Yes	Yes	-			
			WBT	485	455	-30	6.2%	1.4	Yes	Yes	-			
			WBR	1	1	0	0.0%	0.0	Yes	Yes	-			
			EBL	103	116	13	11.2%	1.2	Yes	Yes	-			
			EBT	310	335	25	7.5%	1.4	Yes	Yes	-			
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBR	607	659	52	7.9%	2.1	Yes	Yes	-			
			NBL	380	385	5	1.3%	0.3	Yes	Yes	-			
			NBT	0	0	0	-	-	-	-	-			
			NBR	0	0	0	-	-	-	-	-			
			SBL	0	0	0	-	-	-	-	-			
			SBT	0	0	0	-	-	-	-	-			
			SBR	62	64	2	3.1%	0.3	Yes	-	-			
			WBL	0	0	0	-	-	-	Yes	-			
			WBT	202	204	2	1.0%	0.1	Yes	Yes	-			
			WBR	0	0	0	-	-	-	-	-			
			SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	707	-44	5.9%	1.6	Yes	-	Yes
						EBT	1011	973	-38	3.8%	1.2	Yes	-	Yes
	EBR	107				107	0	0.0%	0.0	Yes	Yes	-		
	NBL	135				142	7	4.9%	0.6	Yes	Yes	-		
	NBT	217				220	3	1.4%	0.2	Yes	Yes	-		
	NBR	12				12	0	0.0%	0.0	Yes	Yes	-		
	SBL	340				323	-17	5.0%	0.9	Yes	Yes	-		
SBT	178	179				1	0.6%	0.1	Yes	Yes	-			
SBR	657	648				-9	1.4%	0.4	Yes	Yes	-			
WBL	18	16				-2	11.1%	0.5	Yes	Yes	-			
WBT	1097	1081				-16	1.5%	0.5	Yes	-	Yes			
WBR	357	362				5	1.4%	0.3	Yes	Yes	-			
2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR		339	325	-14	4.1%	0.8	Yes	Yes	-			
		EBT		1032	979	-53	5.1%	1.7	Yes	-	Yes			
		SBL		277	283	6	2.1%	0.4	Yes	Yes	-			
		WBL		245	242	-3	1.2%	0.2	Yes	Yes	-			
		WBT		681	679	-2	0.3%	0.1	Yes	Yes	-			
		EBL		7	4	-3	42.9%	1.3	Yes	Yes	-			
		EBT		662	654	-8	1.2%	0.3	Yes	Yes	-			
		EBR		640	602	-38	5.9%	1.5	Yes	Yes	-			
		NBL		360	354	-6	1.7%	0.3	Yes	Yes	-			
		NBT		1	1	0	0.0%	0.0	Yes	Yes	-			
		NBR		272	281	9	3.2%	0.5	Yes	Yes	-			
		SBL		1	1	0	0.0%	0.0	Yes	Yes	-			
3	Daimler Parkway and Highway 406 NB Ramp Terminal	SBT		6	6	0	0.0%	0.0	Yes	Yes	-			
		SBR		5	5	0	0.0%	0.0	Yes	Yes	-			
		WBL		271	258	-13	4.8%	0.8	Yes	Yes	-			
		WBT		594	558	-36	6.1%	1.5	Yes	Yes	-			
		WBR		1	0	-1	0.0%	0.0	Yes	Yes	-			
		EBL		86	94	8	8.5%	0.8	Yes	Yes	-			
		EBT		251	246	-5	2.0%	0.3	Yes	Yes	-			
		EBR		542	578	36	6.2%	1.5	Yes	Yes	-			
		NBL		486	491	5	1.0%	0.2	Yes	Yes	-			
		NBT		0	0	0	-	-	-	Yes	-			
		NBR		0	0	0	-	-	-	Yes	-			
		SBL		0	0	0	-	-	-	Yes	-			
4	Daimler Parkway and Street 'A' / Street 'B'	SBT		0	0	0	-	-	-	Yes	-			
		SBR		76	80	4	5.0%	0.5	Yes	Yes	-			
		WBL		0	0	0	-	-	-	Yes	-			
		WBT		243	263	20	7.6%	1.3	Yes	Yes	-			
		WBR		0	0	0	-	-	-	Yes	-			

Future Total (2051) Conditions Model Increased Residential Density (+25%) With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Location	Movement	Hourly	Hourly	Volume	Abs. %	Volume	(S)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	870	878	8	0.9%	0.3	Yes	-	Yes
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-
			NBL	89	93	4	4.3%	0.4	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1126	1124	-2	0.2%	0.1	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	208	-20	8.8%	1.4	Yes	Yes	-
			EBT	807	722	-85	10.5%	3.1	Yes	-	Yes
			SBL	116	115	-1	0.9%	0.1	Yes	Yes	-
			WBL	270	256	-14	5.2%	0.9	Yes	Yes	-
			WBT	609	590	-19	3.1%	0.8	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	254	239	-15	5.9%	1.0	Yes	Yes	-
			EBR	667	599	-68	10.2%	2.7	Yes	Yes	-
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	111	116	5	4.3%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	319	301	-18	5.6%	1.0	Yes	Yes	-
			WBT	652	611	-41	6.3%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	31	36	5	13.9%	0.9	Yes	Yes	-
			EBT	109	111	2	1.8%	0.2	Yes	Yes	-
			EBR	194	209	15	7.2%	1.1	Yes	Yes	-
			NBL	526	527	1	0.2%	0.0	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	93	96	3	3.1%	0.3	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	284	288	4	1.4%	0.2	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	431	-5	1.1%	0.2	Yes	Yes	-
			EBT	1118	1077	-41	3.7%	1.2	Yes	-	Yes
			EBR	111	108	-3	2.7%	0.3	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	100	-2	2.0%	0.2	Yes	Yes	-
			NBR	26	27	1	3.7%	0.2	Yes	Yes	-
			SBL	233	222	-11	4.7%	0.7	Yes	Yes	-
			SBT	143	142	-1	0.7%	0.1	Yes	Yes	-
			SBR	474	479	5	1.0%	0.2	Yes	Yes	-
			WBL	28	25	-3	10.7%	0.6	Yes	Yes	-
			WBT	1050	1028	-22	2.1%	0.7	Yes	-	Yes
			WBR	285	281	-4	1.4%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	301	-16	5.0%	0.9	Yes	Yes	-
			EBT	1038	981	-57	5.5%	1.8	Yes	-	Yes
			SBL	358	343	-15	4.2%	0.8	Yes	Yes	-
			WBL	205	197	-8	3.9%	0.6	Yes	Yes	-
			WBT	638	625	-13	2.0%	0.5	Yes	Yes	-
			WBR	7	0	-7	100.0%	1.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	6	3	-3	50.0%	1.2	Yes	Yes	-
			EBR	771	737	-34	4.4%	1.2	Yes	-	Yes
			NBL	368	358	-10	2.7%	0.5	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	318	327	9	2.8%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	210	197	-13	6.2%	0.9	Yes	Yes	-
			WBT	485	456	-29	6.0%	1.3	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	103	111	8	7.2%	0.8	Yes	Yes	-
			EBT	310	322	12	3.7%	0.7	Yes	Yes	-
			EBR	607	636	29	4.6%	1.2	Yes	Yes	-
			NBL	380	383	3	0.8%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	62	64	2	3.1%	0.3	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	202	204	2	1.0%	0.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Bridge Adjustment (10%) No Train Volume Calibration													
Period	No.	Locat on	Intersection	Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph		
			Movement	Hour y	Hour y	Vo ume	Abs %	(±15%)	(≤5)	(±100)	(±15%)		
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	144	1	0.7%	0.1	Yes	Yes	-		
			EBT	831	835	4	0.5%	0.1	Yes	-	Yes		
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-		
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-		
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-		
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-		
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-		
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-		
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-		
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-		
			WBT	1018	1016	-2	0.2%	0.1	Yes	-	Yes		
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-		
			EBR	228	210	-18	7.9%	1.2	Yes	Yes	-		
			EBT	768	682	-86	11.2%	3.2	Yes	-	Yes		
			SBL	100	99	-1	1.0%	0.1	Yes	Yes	-		
			WBL	225	217	-8	3.6%	0.5	Yes	Yes	-		
	WBT	501	486	-15	3.0%	0.7	Yes	Yes	-				
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-		
			EBT	198	188	-10	5.1%	0.7	Yes	Yes	-		
			EBR	667	594	-73	10.9%	2.9	Yes	Yes	-		
			NBL	233	236	3	1.3%	0.2	Yes	Yes	-		
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-		
			NBR	96	100	4	4.0%	0.4	Yes	Yes	-		
			SBL	0	2	2	-	-	Yes	Yes	-		
			SBT	1	1	0	0.0%	0.0	Yes	Yes	-		
			SBR	1	0	-1	100.0%	1.4	Yes	Yes	-		
			WBL	271	252	-19	7.0%	1.2	Yes	Yes	-		
			WBT	499	463	-36	7.2%	1.6	Yes	Yes	-		
			WBR	0	0	0	-	-	Yes	Yes	-		
			EBL	25	30	5	16.7%	1.0	Yes	Yes	-		
			EBT	99	107	8	7.5%	0.8	Yes	Yes	-		
			EBR	139	152	13	8.6%	1.1	Yes	Yes	-		
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	NBL	375	381	6	1.6%	0.3	Yes	Yes	-		
			NBT	0	0	0	-	-	Yes	Yes	-		
			NBR	0	0	0	-	-	Yes	Yes	-		
			SBL	0	0	0	-	-	Yes	Yes	-		
			SBT	0	0	0	-	-	Yes	Yes	-		
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-		
			WBL	0	0	0	-	-	Yes	Yes	-		
			WBT	252	256	4	1.6%	0.3	Yes	Yes	-		
			WBR	0	0	0	-	-	Yes	Yes	-		
			EBL	436	437	1	0.2%	0.0	Yes	Yes	-		
			EBT	994	996	2	0.2%	0.1	Yes	-	Yes		
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-		
NBL			128	132	4	3.0%	0.4	Yes	Yes	-			
NBT			102	102	0	0.0%	0.0	Yes	Yes	-			
4	Daimler Parkway and Street 'A' / Street 'B'	NBR	26	28	2	7.1%	0.4	Yes	Yes	-			
		SBL	233	230	-3	1.3%	0.2	Yes	Yes	-			
		SBT	143	145	2	1.4%	0.2	Yes	Yes	-			
		SBR	474	484	10	2.1%	0.5	Yes	Yes	-			
		WBL	28	27	-1	3.6%	0.2	Yes	Yes	-			
		WBT	972	968	-4	0.4%	0.1	Yes	-	Yes			
		WBR	285	287	2	0.7%	0.1	Yes	Yes	-			
		EBR	317	324	7	2.2%	0.4	Yes	-	Yes			
		EBT	914	930	16	1.7%	0.5	Yes	-	Yes			
		SBL	305	313	8	2.6%	0.5	Yes	Yes	-			
		WBL	175	168	-7	4.0%	0.5	Yes	Yes	-			
		WBT	560	545	-15	2.7%	0.6	Yes	Yes	-			
		EBL	6	3	-3	50.0%	1.4	Yes	Yes	-			
5	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	595	608	13	2.1%	0.5	Yes	Yes	-			
		EBR	618	632	14	2.2%	0.6	Yes	Yes	-			
		NBL	368	362	-6	1.6%	0.3	Yes	Yes	-			
		NBT	0	0	0	-	-	Yes	Yes	-			
		NBR	268	277	9	3.2%	0.5	Yes	Yes	-			
		SBL	2	6	4	66.7%	2.0	Yes	Yes	-			
		SBT	0	0	0	-	-	Yes	Yes	-			
		SBR	7	2	-5	71.4%	2.4	Yes	Yes	-			
		WBL	177	164	-13	7.3%	1.0	Yes	Yes	-			
		WBT	377	347	-30	8.0%	1.6	Yes	Yes	-			
		WBR	1	0	-1	100.0%	1.4	Yes	Yes	-			
		EBL	84	98	14	14.3%	1.5	Yes	Yes	-			
6	Daimler Parkway and Street 'A' / Street 'B'	EBT	275	305	30	9.8%	1.8	Yes	Yes	-			
		EBR	435	484	49	10.1%	2.3	Yes	Yes	-			
		NBL	273	277	4	1.4%	0.2	Yes	Yes	-			
		NBT	0	0	0	-	-	Yes	Yes	-			
		NBR	0	0	0	-	-	Yes	Yes	-			
		SBL	0	0	0	-	-	Yes	Yes	-			
		SBT	0	0	0	-	-	Yes	Yes	-			
		SBR	50	51	1	2.0%	0.1	Yes	Yes	-			
		WBL	0	0	0	-	-	Yes	Yes	-			
		WBT	180	184	4	2.2%	0.3	Yes	Yes	-			
		WBR	0	0	0	-	-	Yes	Yes	-			
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	727	-24	3.2%	0.9	Yes	-	Yes		
			EBT	905	878	-27	3.0%	0.9	Yes	-	Yes		
			EBR	107	107	0	0.0%	0.0	Yes	Yes	-		
			NBL	135	142	7	4.9%	0.6	Yes	Yes	-		
			NBT	217	220	3	1.4%	0.2	Yes	Yes	-		
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-		
			SBL	340	321	-19	5.6%	1.0	Yes	Yes	-		
			SBT	178	176	-2	1.1%	0.2	Yes	Yes	-		
			SBR	657	643	-14	2.1%	0.5	Yes	Yes	-		
			WBL	18	16	-2	11.1%	0.5	Yes	Yes	-		
			WBT	1002	989	-13	1.3%	0.4	Yes	-	Yes		
			WBR	357	361	4	1.1%	0.2	Yes	Yes	-		
			EBR	339	328	-11	3.2%	0.6	Yes	-	Yes		
			EBT	926	881	-45	4.9%	1.5	Yes	-	Yes		
			SBL	232	235	3	1.3%	0.2	Yes	Yes	-		
			WBL	207	207	0	0.0%	0.0	Yes	Yes	-		
	WBT	586	587	1	0.2%	0.0	Yes	Yes	-				
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBL	7	4	-3	42.9%	1.3	Yes	Yes	-		
			EBT	511	505	-6	1.2%	0.3	Yes	Yes	-		
			EBR	640	609	-31	4.8%	1.2	Yes	Yes	-		
			NBL	360	356	-4	1.1%	0.2	Yes	Yes	-		
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-		
			NBR	229	235	6	2.6%	0.4	Yes	Yes	-		
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-		
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-		
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-		
			WBL	231	214	-17	7.4%	1.1	Yes	Yes	-		
			WBT	461	431	-30	6.5%	1.4	Yes	Yes	-		
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-		
			EBL	69	78	9	11.5%	1.0	Yes	Yes	-		
			EBT	221	219	-2	0.9%	0.1	Yes	Yes	-		
			EBR	395	432	37	8.6%	1.8	Yes	Yes	-		
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	NBL	355	361	6	1.7%	0.3	Yes	Yes	-		
			NBT	0	0	0	-	-	Yes	Yes	-		
			NBR	0	0	0	-	-	Yes	Yes	-		
			SBL	0	0	0	-	-	Yes	Yes	-		
			SBT	0	0	0	-	-	Yes	Yes	-		
			SBR	61	64	3	4.7%	0.4	Yes	-	Yes		
			WBL	0	0	0	-	-	Yes	Yes	-		
			WBT	216	233	17	7.3%	1.1	Yes	Yes	-		
			WBR	0	0	0	-	-	Yes	Yes	-		
			4	Daimler Parkway and Street 'A' / Street 'B'	EBL	751	727	-24	3.2%	0.9	Yes	-	Yes
					EBT	905	878	-27	3.0%	0.9	Yes	-	Yes
					EBR	107	107	0	0.0%	0.0	Yes	Yes	-
NBL					135	142	7	4.9%	0.6	Yes	Yes	-	
NBT	217	220			3	1.4%	0.2	Yes	Yes	-			
NBR	12	12			0	0.0%	0.0	Yes	Yes	-			
SBL	340	321			-19	5.6%	1.0	Yes	Yes	-			
SBT	178	176			-2	1.1%	0.2	Yes	Yes	-			
SBR	657	643			-14	2.1%	0.5	Yes	Yes	-			
WBL	18	16			-2	11.1%	0.5	Yes	Yes	-			
WBT	1002	989			-13	1.3%	0.4	Yes	-	Yes			
WBR	357	361			4	1.1%	0.2	Yes	Yes	-			
EBR	339	328			-11	3.2%	0.6	Yes	-	Yes			
EBT	926	881			-45	4.9%	1.5	Yes	-	Yes			
SBL	232	235			3	1.3%	0.2	Yes	Yes	-			
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0.6	Yes	-	Yes					
EBT	926	881	-45	4.9%	1.5	Yes	-	Yes					
SBL	232	235	3	1.3%	0.2	Yes	Yes	-					
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0.6	Yes	-	Yes					
EBT	926	881	-45	4.9%	1.5	Yes	-	Yes					
SBL	232	235	3	1.3%	0.2	Yes	Yes	-					
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0.6	Yes	-	Yes					
EBT	926	881	-45	4.9%	1.5	Yes	-	Yes					
SBL	232	235	3	1.3%	0.2	Yes	Yes	-					
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0.6	Yes	-	Yes					
EBT	926	881	-45	4.9%	1.5	Yes	-	Yes					
SBL	232	235	3	1.3%	0.2	Yes	Yes	-					
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0.6	Yes	-	Yes					
EBT	926	881	-45	4.9%	1.5	Yes	-	Yes					
SBL	232	235	3	1.3%	0.2	Yes	Yes	-					
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0.6	Yes	-	Yes					
EBT	926	881	-45	4.9%	1.5	Yes	-	Yes					
SBL	232	235	3	1.3%	0.2	Yes	Yes	-					
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0.6	Yes	-	Yes					
EBT	926	881	-45	4.9%	1.5	Yes	-	Yes					
SBL	232	235	3	1.3%	0.2	Yes	Yes	-					
WBL	207	207	0	0.0%	0.0	Yes	Yes	-					
WBT	586	587	1	0.2%	0.0	Yes	Yes	-					
WBR	357	361	4	1.1%	0.2	Yes	Yes	-					
EBR	339	328	-11	3.2%	0								

Future Total (2051) Conditions Model Bridge Adjustment (10%) With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Location	Movement	Hourly	Hourly	Volume	Abs. %	Volume	(S)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	144	1	0.7%	0.1	Yes	Yes	-
			EBT	831	835	4	0.5%	0.1	Yes	-	Yes
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1018	1017	-1	0.1%	0.0	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	210	-18	7.9%	1.2	Yes	Yes	-
			EBT	768	681	-87	11.3%	3.2	Yes	-	Yes
			SBL	100	99	-1	1.0%	0.1	Yes	Yes	-
			WBL	225	217	-8	3.6%	0.5	Yes	Yes	-
			WBT	501	487	-14	2.8%	0.6	Yes	Yes	-
			EBT	1	0	-1	100.0%	1.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	198	188	-10	5.1%	0.7	Yes	Yes	-
			EBR	667	593	-74	11.1%	2.9	Yes	Yes	-
			NBL	233	236	3	1.3%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	271	252	-19	7.0%	1.2	Yes	Yes	-
			WBT	499	463	-36	7.2%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	25	29	4	13.8%	0.8	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBT	99	107	8	7.5%	0.8	Yes	Yes	-
			EBR	139	152	13	8.6%	1.1	Yes	Yes	-
			NBL	375	380	5	1.3%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	252	256	4	1.6%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	436	437	1	0.2%	0.0	Yes	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBT	994	998	4	0.4%	0.1	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	230	-3	1.3%	0.2	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	484	10	2.1%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	972	968	-4	0.4%	0.1	Yes	-	Yes
			WBR	285	287	2	0.7%	0.1	Yes	Yes	-
			EBR	317	324	7	2.2%	0.4	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBT	914	930	16	1.7%	0.5	Yes	Yes	-
			SBL	305	312	7	2.2%	0.4	Yes	Yes	-
			WBL	175	168	-7	4.0%	0.5	Yes	Yes	-
			WBT	560	548	-12	2.1%	0.5	Yes	Yes	-
			EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	595	608	13	2.1%	0.5	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBR	618	630	12	1.9%	0.5	Yes	Yes	-
			NBL	368	362	-6	1.6%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	276	8	2.9%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	377	347	-30	8.0%	1.6	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBL	84	98	14	14.3%	1.5	Yes	Yes	-
			EBT	275	306	31	10.1%	1.8	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBR	435	485	50	10.3%	2.3	Yes	Yes	-
			NBL	273	277	4	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	50	51	1	2.0%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	180	184	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Bridge Adjustment (25%) No Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Volume	Abs. %	Volume	<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	798	802	4	0.5%	0.1	Yes	Yes	Yes
			EBR	95	94	-1	1.1%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	14	-2	12.5%	0.5	Yes	Yes	-
			WBT	935	931	-4	0.4%	0.1	Yes	Yes	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	207	-21	9.2%	1.4	Yes	Yes	-
			EBT	735	648	-87	11.8%	3.3	Yes	-	Yes
			SBL	100	100	0	0.0%	0.0	Yes	Yes	-
			WBL	225	208	-17	7.6%	1.2	Yes	Yes	-
			WBT	418	401	-17	4.1%	0.8	Yes	Yes	-
			WBR	0	0	0	0.0%	0.0	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	165	158	-7	4.2%	0.6	Yes	Yes	-
			EBR	667	592	-75	11.2%	3.0	Yes	Yes	-
			NBL	233	235	2	0.9%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	271	241	-30	11.1%	1.9	Yes	Yes	-
			WBT	416	371	-45	10.8%	2.3	Yes	Yes	-
			WBR	0	0	0	0.0%	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	25	30	5	16.7%	1.0	Yes	Yes	-
			EBT	99	109	10	9.2%	1.0	Yes	Yes	-
			EBR	106	120	14	11.7%	1.3	Yes	Yes	-
			NBL	292	297	5	1.7%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	252	235	-17	6.7%	1.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	437	1	0.2%	0.0	Yes	Yes	-
			EBT	895	895	0	0.0%	0.0	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	27	1	3.7%	0.2	Yes	Yes	-
			SBL	233	231	-2	0.9%	0.1	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	484	10	2.1%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	909	908	-1	0.1%	0.1	Yes	Yes	Yes
			WBR	285	285	0	0.0%	0.0	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	301	-16	5.0%	0.9	Yes	Yes	-
			EBT	815	856	41	4.8%	1.4	Yes	Yes	-
			SBL	305	312	7	2.2%	0.4	Yes	Yes	-
			WBL	175	168	-7	4.0%	0.5	Yes	Yes	-
			WBT	497	482	-15	3.0%	0.7	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	496	586	90	15.4%	3.9	Yes	Yes	-
			EBR	618	578	-40	6.5%	1.6	Yes	Yes	-
			NBL	368	360	-8	2.2%	0.4	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	277	9	3.2%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	314	284	-30	9.6%	1.7	Yes	Yes	-
			WBR	1	1	0	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	84	108	24	22.2%	2.4	Yes	Yes	-
			EBT	275	338	63	18.6%	3.6	Yes	Yes	-
			EBR	336	419	83	19.8%	4.3	Yes	Yes	-
			NBL	210	213	3	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	50	51	1	2.0%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	180	184	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	722	-29	3.9%	1.1	Yes	-	Yes
			EBT	820	863	43	5.0%	1.5	Yes	-	Yes
			EBR	107	104	-3	2.8%	0.3	Yes	Yes	-
			NBL	135	142	7	4.9%	0.6	Yes	Yes	-
			NBT	217	218	1	0.5%	0.1	Yes	Yes	-
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-
			SBL	340	328	-12	3.5%	0.7	Yes	Yes	-
			SBT	178	184	6	3.3%	0.4	Yes	Yes	-
			SBR	657	660	3	0.5%	0.1	Yes	Yes	-
			WBL	18	16	-2	11.1%	0.5	Yes	Yes	-
			WBT	925	965	40	4.1%	1.3	Yes	-	Yes
			WBR	357	348	-9	2.5%	0.5	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	339	351	12	3.4%	0.6	Yes	Yes	-
			EBT	841	850	9	1.1%	0.3	Yes	-	Yes
			SBL	232	237	5	2.1%	0.3	Yes	Yes	-
			WBL	207	192	-15	7.2%	1.1	Yes	Yes	-
			WBT	509	548	39	7.1%	1.7	Yes	Yes	-
			WBR	7	2	-5	71.4%	2.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	426	432	6	1.4%	0.3	Yes	Yes	-
			EBR	640	653	13	2.0%	0.5	Yes	Yes	-
			NBL	360	357	-3	0.8%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	229	236	7	3.0%	0.5	Yes	Yes	-
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-
			WBL	231	188	-43	18.6%	3.0	Yes	Yes	-
			WBT	384	377	-7	1.8%	0.4	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBL	69	70	1	1.4%	0.1	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBT	221	219	-2	0.9%	0.1	Yes	Yes	-
			EBR	310	390	80	20.5%	4.3	Yes	Yes	-
			NBL	278	282	4	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	61	64	3	4.7%	0.4	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	216	210	-6	2.8%	0.4	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Bridge Adjustment (25%) With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Location	Movement	Hourly	Hourly	Volume	Abs %	Volume	(≤5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	738	802	4	0.5%	0.1	Yes	-	Yes
			EBR	95	94	-1	1.1%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	14	-2	12.5%	0.5	Yes	Yes	-
			WBT	935	932	-3	0.3%	0.1	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	207	-21	9.2%	1.4	Yes	Yes	-
			EBT	735	647	-88	12.0%	3.3	Yes	-	Yes
			SBL	100	100	0	0.0%	0.0	Yes	Yes	-
			WBL	225	208	-17	7.6%	1.2	Yes	Yes	-
			WBT	418	401	-17	4.1%	0.8	Yes	Yes	-
			EBT	1	0	-1	100.0%	1.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	165	158	-7	4.2%	0.6	Yes	Yes	-
			EBR	667	591	-76	11.4%	3.0	Yes	Yes	-
			NBL	233	235	2	0.9%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	0.0	Yes	Yes	-
			SBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			WBL	271	240	-31	11.4%	1.9	Yes	Yes	-
			WBT	416	371	-45	10.8%	2.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	25	30	5	16.7%	1.0	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBT	99	110	11	10.0%	1.1	Yes	Yes	-
			EBR	106	121	15	12.4%	1.4	Yes	Yes	-
			NBL	292	296	4	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	252	235	-17	6.7%	1.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
			EBL	436	437	1	0.2%	0.0	Yes	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBT	895	896	1	0.1%	0.0	Yes	Yes	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	27	1	3.7%	0.2	Yes	Yes	-
			SBL	233	230	-3	1.3%	0.2	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	483	9	1.9%	0.4	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	909	909	0	0.0%	0.0	Yes	-	Yes
			WBR	285	286	1	0.3%	0.1	Yes	Yes	-
			EBR	317	300	-17	5.4%	1.0	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBT	815	858	43	5.0%	1.5	Yes	Yes	-
			SBL	305	311	6	1.9%	0.3	Yes	Yes	-
			WBL	175	168	-7	4.0%	0.5	Yes	Yes	-
			WBT	497	483	-14	2.8%	0.6	Yes	Yes	-
			EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	496	584	88	15.1%	3.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBR	618	579	-39	6.3%	1.6	Yes	Yes	-
			NBL	368	361	-7	1.9%	0.4	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	276	8	2.9%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	163	-14	7.9%	1.1	Yes	Yes	-
			WBT	314	284	-30	9.6%	1.7	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBL	84	107	23	21.5%	2.4	Yes	Yes	-
			EBT	275	337	62	18.4%	3.5	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBR	336	419	83	19.8%	4.3	Yes	Yes	-
			NBL	210	213	3	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	50	51	1	2.0%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	180	184	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

APPENDIX 3

Vissim Model Queue Calibration



Queue Calibration Existing (2024) Conditions								
Period	Intersection			Observed Max Queue	Simulated Max Queue	Difference	Difference	Within Target
	No.	Location	Movement	Metres	Metres	Metres	Abs. %	(±20%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	26	19	7	26.3%	No
			EBTR	33	36	-3	8.5%	Yes
			NBL	20	24	-4	17.9%	Yes
			NBTR	13	20	-7	34.1%	No
			SBL	20	13	7	34.2%	No
			SBT	20	17	2	11.0%	Yes
			SBR	13	14	-1	4.6%	Yes
			WBL	7	9	-3	30.6%	-
			WBT	46	38	7	15.5%	Yes
			WBR	13	13	0	3.3%	Yes
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	52	56	-4	6.5%	Yes
			EBTR	52	43	9	17.6%	Yes
			NBL	26	28	-2	8.1%	Yes
			NBTR	26	29	-3	11.8%	Yes
			SBL	39	41	-2	4.9%	Yes
			SBT	26	29	-3	10.9%	Yes
			SBR	33	32	0	1.2%	Yes
			WBL	7	11	-5	43.3%	-
			WBT	56	52	3	6.2%	Yes
			WBR	26	20	6	22.8%	No
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	65	109	-44	40.4%	No
			EBTR	46	44	1	2.2%	Yes
			NBL	26	30	-4	12.8%	Yes
			NBTR	33	51	-19	36.4%	No
			SBL	39	56	-17	30.8%	No
			SBT	33	43	-10	23.8%	No
			SBR	33	53	-21	38.8%	No
			WBL	7	9	-3	30.6%	-
			WBT	46	65	-19	29.6%	No
			WBR	20	29	-9	32.6%	No

APPENDIX 4

Existing (2024) Traffic Conditions – Synchro Analysis Results



Lands East of Hwy 406 Consolidated Traffic Study
1: Hwy 406 NB Off-Ramp/Carpool Lot & Daimler Pkwy

Existing (2024) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	39	419	38	76	0	146	1	14	0	1	1
Future Volume (Veh/h)	1	39	419	38	76	0	146	1	14	0	1	1
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	42	455	41	83	0	159	1	15	0	1	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	83			42			210	209	42	224	209	83
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	83			42			210	209	42	224	209	83
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			78	100	99	100	100	100
cM capacity (veh/h)	1514			1567			730	670	1029	705	670	976
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2			
Volume Total	1	42	455	41	83	159	16	0	2			
Volume Left	1	0	0	41	0	159	0	0	0			
Volume Right	0	0	455	0	0	0	15	0	1			
cSH	1514	1700	1700	1567	1700	730	995	1700	794			
Volume to Capacity	0.00	0.02	0.27	0.03	0.05	0.22	0.02	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0	0.6	0.0	6.3	0.4	0.0	0.1			
Control Delay (s)	7.4	0.0	0.0	7.4	0.0	11.3	8.7	0.0	9.5			
Lane LOS	A			A		B	A	A	A			
Approach Delay (s)	0.0			2.4		11.1		9.5				
Approach LOS						B		A				
Intersection Summary												
Average Delay	2.8											
Intersection Capacity Utilization	44.8%			ICU Level of Service					A			
Analysis Period (min)	15											

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Hwy 406 SB Off-Ramp

Existing (2024) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	442	143	15	203	0	0	0	0	17	0	398
Future Volume (Veh/h)	0	442	143	15	203	0	0	0	0	17	0	398
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	480	155	16	221	0	0	0	0	18	0	433
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	221			480			810	810	318	493	733	221
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	221			480			810	810	318	493	733	221
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	96	100	45
cM capacity (veh/h)	1345			1079			120	308	678	454	341	783
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2						
Volume Total	320	315	16	221	18	433						
Volume Left	0	0	16	0	18	0						
Volume Right	0	155	0	0	0	433						
cSH	1700	1700	1079	1700	454	783						
Volume to Capacity	0.19	0.19	0.01	0.13	0.04	0.55						
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.9	26.2						
Control Delay (s)	0.0	0.0	8.4	0.0	13.3	15.1						
Lane LOS			A		B	C						
Approach Delay (s)	0.0		0.6		15.1							
Approach LOS					C							
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			45.0%		ICU Level of Service		A					
Analysis Period (min)			15									

Lands East of Hwy 406 Consolidated Traffic Study
9: Brown Road/Primeway Drive & Woodlawn Road

Existing (2024) Traffic Conditions
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	90	482	10	528	63	56	32	20	35	79
Future Volume (vph)	90	482	10	528	63	56	32	20	35	79
Turn Type	pm+pt	NA	Perm	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4		8	1	5	2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	1	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	6.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	17.9	17.9	17.9	9.0	9.0	15.3	9.0	15.3	15.3
Total Split (s)	28.0	60.9	32.9	32.9	15.0	15.0	29.3	15.0	29.3	29.3
Total Split (%)	26.6%	57.9%	31.3%	31.3%	14.3%	14.3%	27.9%	14.3%	27.9%	27.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	3.0	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	0.0	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	3.0	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	32.9	31.2	22.5	22.5	32.5	17.1	11.3	15.4	10.5	10.5
Actuated g/C Ratio	0.62	0.59	0.42	0.42	0.61	0.32	0.21	0.29	0.20	0.20
v/c Ratio	0.18	0.31	0.04	0.41	0.09	0.15	0.15	0.06	0.11	0.26
Control Delay	7.7	9.6	18.5	19.2	2.7	16.1	22.0	15.6	27.9	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.7	9.6	18.5	19.2	2.7	16.1	22.0	15.6	27.9	6.5
LOS	A	A	B	B	A	B	C	B	C	A
Approach Delay		9.3		17.5			18.7		13.4	
Approach LOS		A		B			B		B	

Intersection Summary

Cycle Length: 105.2

Actuated Cycle Length: 53

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.41

Intersection Signal Delay: 13.7

Intersection LOS: B

Intersection Capacity Utilization 54.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 9: Brown Road/Primeway Drive & Woodlawn Road

		
15 s	29.3 s	60.9 s
		
15 s	29.3 s	28 s
		32.9 s

Lands East of Hwy 406 Consolidated Traffic Study
9: Brown Road/Primeway Drive & Woodlawn Road

Existing (2024) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	482	60	10	528	63	56	32	11	20	35	79
Future Volume (vph)	90	482	60	10	528	63	56	32	11	20	35	79
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3217		1486	3271	1234	1486	1431		1486	1722	1234
Flt Permitted	0.37	1.00		0.43	1.00	1.00	0.64	1.00		0.73	1.00	1.00
Satd. Flow (perm)	584	3217		672	3271	1234	1007	1431		1137	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	524	65	11	574	68	61	35	12	22	38	86
RTOR Reduction (vph)	0	9	0	0	0	42	0	11	0	0	0	77
Lane Group Flow (vph)	98	580	0	11	574	26	61	36	0	22	38	9
Turn Type	pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	27.5	27.5		17.9	17.9	21.0	10.5	6.6		8.9	5.8	5.8
Effective Green, g (s)	27.5	27.5		17.9	17.9	21.0	10.5	6.6		8.9	5.8	5.8
Actuated g/C Ratio	0.50	0.50		0.32	0.32	0.38	0.19	0.12		0.16	0.10	0.10
Clearance Time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.6	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	397	1596		217	1056	467	224	170		202	180	129
v/s Ratio Prot	0.03	c0.18			c0.18	0.00	c0.02	0.03		0.01	0.02	
v/s Ratio Perm	0.09			0.02		0.02	c0.03			0.01		0.01
v/c Ratio	0.25	0.36		0.05	0.54	0.06	0.27	0.21		0.11	0.21	0.07
Uniform Delay, d1	7.6	8.6		12.9	15.4	10.9	19.0	22.1		19.8	22.7	22.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1		0.1	0.5	0.0	0.5	0.5		0.2	0.4	0.2
Delay (s)	7.9	8.7		13.0	15.8	10.9	19.5	22.5		20.0	23.1	22.5
Level of Service	A	A		B	B	B	B	C		B	C	C
Approach Delay (s)		8.6			15.3			20.8			22.3	
Approach LOS		A			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			13.4									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			55.4									Sum of lost time (s) 21.2
Intersection Capacity Utilization			54.1%									ICU Level of Service A
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Hwy 406 NB Off-Ramp/Carpool Lot & Daimler Pkwy

Existing (2024) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	97	388	20	67	1	231	0	22	2	0	5
Future Volume (Veh/h)	4	97	388	20	67	1	231	0	22	2	0	5
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	105	422	22	73	1	251	0	24	2	0	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	74			105			235	231	105	254	230	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	74			105			235	231	105	254	230	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			64	100	97	100	100	99
cM capacity (veh/h)	1526			1486			706	657	949	672	658	988
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2			
Volume Total	4	105	422	22	74	251	24	2	5			
Volume Left	4	0	0	22	0	251	0	2	0			
Volume Right	0	0	422	0	1	0	24	0	5			
cSH	1526	1700	1700	1486	1700	706	949	672	988			
Volume to Capacity	0.00	0.06	0.25	0.01	0.04	0.36	0.03	0.00	0.01			
Queue Length 95th (m)	0.1	0.0	0.0	0.3	0.0	12.2	0.6	0.1	0.1			
Control Delay (s)	7.4	0.0	0.0	7.5	0.0	12.9	8.9	10.4	8.7			
Lane LOS	A			A		B	A	B	A			
Approach Delay (s)	0.1			1.7		12.5		9.2				
Approach LOS						B		A				
Intersection Summary												
Average Delay	4.1											
Intersection Capacity Utilization	42.8%			ICU Level of Service					A			
Analysis Period (min)	15											

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Hwy 406 SB Off-Ramp

Existing (2024) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	447	199	19	274	0	0	0	0	42	0	456
Future Volume (Veh/h)	0	447	199	19	274	0	0	0	0	42	0	456
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	486	216	21	298	0	0	0	0	46	0	496
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	298			486			934	934	351	583	826	298
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	298			486			934	934	351	583	826	298
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	88	100	29
cM capacity (veh/h)	1260			1073			63	259	645	390	300	698
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2						
Volume Total	324	378	21	298	46	496						
Volume Left	0	0	21	0	46	0						
Volume Right	0	216	0	0	0	496						
cSH	1700	1700	1073	1700	390	698						
Volume to Capacity	0.19	0.22	0.02	0.18	0.12	0.71						
Queue Length 95th (m)	0.0	0.0	0.5	0.0	3.0	45.3						
Control Delay (s)	0.0	0.0	8.4	0.0	15.5	21.8						
Lane LOS			A		C	C						
Approach Delay (s)	0.0		0.6		21.2							
Approach LOS					C							
Intersection Summary												
Average Delay			7.5									
Intersection Capacity Utilization			53.0%		ICU Level of Service		A					
Analysis Period (min)			15									

Lands East of Hwy 406 Consolidated Traffic Study
9: Brown Road/Primeway Drive & Woodlawn Road

Existing (2024) Traffic Conditions
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	274	497	18	533	179	80	64	146	90	298
Future Volume (vph)	274	497	18	533	179	80	64	146	90	298
Turn Type	pm+pt	NA	Perm	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4		8	1	5	2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	1	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	6.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	17.9	17.9	17.9	9.0	9.0	15.3	9.0	15.3	15.3
Total Split (s)	28.0	60.9	32.9	32.9	15.0	15.0	29.3	15.0	29.3	29.3
Total Split (%)	26.6%	57.9%	31.3%	31.3%	14.3%	14.3%	27.9%	14.3%	27.9%	27.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	3.0	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	0.0	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	3.0	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	45.3	40.0	17.9	17.9	38.7	20.5	11.3	25.4	12.7	12.7
Actuated g/C Ratio	0.58	0.51	0.23	0.23	0.50	0.26	0.14	0.33	0.16	0.16
v/c Ratio	0.59	0.37	0.13	0.77	0.28	0.26	0.40	0.43	0.35	0.69
Control Delay	15.1	12.4	31.2	38.1	3.8	22.4	37.1	25.0	37.4	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	12.4	31.2	38.1	3.8	22.4	37.1	25.0	37.4	12.7
LOS	B	B	C	D	A	C	D	C	D	B
Approach Delay		13.3		29.5			29.8		20.2	
Approach LOS		B		C			C		C	

Intersection Summary

Cycle Length: 105.2

Actuated Cycle Length: 78.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 21.3

Intersection LOS: C

Intersection Capacity Utilization 65.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 9: Brown Road/Primeway Drive & Woodlawn Road

 Ø1	 Ø2	 Ø4
15 s	29.3 s	60.9 s
 Ø5	 Ø6	 Ø7
15 s	29.3 s	28 s
		32.9 s

Lands East of Hwy 406 Consolidated Traffic Study
9: Brown Road/Primeway Drive & Woodlawn Road

Existing (2024) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	274	497	70	18	533	179	80	64	16	146	90	298
Future Volume (vph)	274	497	70	18	533	179	80	64	16	146	90	298
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3211		1486	3271	1234	1486	1445		1486	1722	1234
Flt Permitted	0.28	1.00		0.42	1.00	1.00	0.69	1.00		0.52	1.00	1.00
Satd. Flow (perm)	437	3211		655	3271	1234	1085	1445		813	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	298	540	76	20	579	195	87	70	17	159	98	324
RTOR Reduction (vph)	0	10	0	0	0	120	0	10	0	0	0	266
Lane Group Flow (vph)	298	606	0	20	579	75	87	77	0	159	98	58
Turn Type	pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	40.0	40.0		18.1	18.1	30.4	15.3	8.6		23.9	14.2	14.2
Effective Green, g (s)	40.0	40.0		18.1	18.1	30.4	15.3	8.6		23.9	14.2	14.2
Actuated g/C Ratio	0.51	0.51		0.23	0.23	0.38	0.19	0.11		0.30	0.18	0.18
Clearance Time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.6	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	471	1623		149	748	474	243	157		350	309	221
v/s Ratio Prot	c0.15	0.19			c0.18	0.02	0.03	0.05		c0.07	0.06	
v/s Ratio Perm	0.17			0.03		0.04	0.04			c0.07		0.05
v/c Ratio	0.63	0.37		0.13	0.77	0.16	0.36	0.49		0.45	0.32	0.26
Uniform Delay, d1	12.7	11.9		24.3	28.6	16.0	27.3	33.2		21.6	28.2	27.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.6	0.1		0.3	4.8	0.1	0.7	1.8		0.7	0.4	0.5
Delay (s)	15.4	12.0		24.6	33.4	16.1	28.0	35.0		22.4	28.7	28.4
Level of Service	B	B		C	C	B	C	C		C	C	C
Approach Delay (s)		13.1			28.9			31.5			26.8	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.7			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			79.1			Sum of lost time (s)			21.2			
Intersection Capacity Utilization			65.2%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Hwy 406 NB Off-Ramp/Carpool Lot & Daimler Pkwy

Existing (2024) Traffic Conditions
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	79	402	31	72	1	226	1	14	1	4	3
Future Volume (Veh/h)	5	79	402	31	72	1	226	1	14	1	4	3
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	86	437	34	78	1	246	1	15	1	4	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	79			86			247	243	86	258	242	78
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	79			86			247	243	86	258	242	78
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			64	100	98	100	99	100
cM capacity (veh/h)	1519			1510			687	642	973	670	642	982
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2			
Volume Total	5	86	437	34	79	246	16	1	7			
Volume Left	5	0	0	34	0	246	0	1	0			
Volume Right	0	0	437	0	1	0	15	0	3			
cSH	1519	1700	1700	1510	1700	687	942	670	754			
Volume to Capacity	0.00	0.05	0.26	0.02	0.05	0.36	0.02	0.00	0.01			
Queue Length 95th (m)	0.1	0.0	0.0	0.5	0.0	12.3	0.4	0.0	0.2			
Control Delay (s)	7.4	0.0	0.0	7.4	0.0	13.1	8.9	10.4	9.8			
Lane LOS	A			A		B	A	B	A			
Approach Delay (s)	0.1			2.2		12.9		9.9				
Approach LOS						B		A				
Intersection Summary												
Average Delay	4.1											
Intersection Capacity Utilization	43.7%			ICU Level of Service					A			
Analysis Period (min)	15											

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Hwy 406 SB Off-Ramp

Existing (2024) Traffic Conditions
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	468	213	14	267	0	0	0	0	18	0	496
Future Volume (Veh/h)	0	468	213	14	267	0	0	0	0	18	0	496
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	509	232	15	290	0	0	0	0	20	0	539
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	290			509			945	945	370	574	829	290
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	290			509			945	945	370	574	829	290
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	95	100	24
cM capacity (veh/h)	1269			1052			51	257	627	397	300	707
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2						
Volume Total	339	402	15	290	20	539						
Volume Left	0	0	15	0	20	0						
Volume Right	0	232	0	0	0	539						
cSH	1700	1700	1052	1700	397	707						
Volume to Capacity	0.20	0.24	0.01	0.17	0.05	0.76						
Queue Length 95th (m)	0.0	0.0	0.3	0.0	1.2	54.6						
Control Delay (s)	0.0	0.0	8.5	0.0	14.6	24.5						
Lane LOS			A		B	C						
Approach Delay (s)	0.0		0.4		24.2							
Approach LOS					C							
Intersection Summary												
Average Delay			8.5									
Intersection Capacity Utilization			55.3%		ICU Level of Service		B					
Analysis Period (min)			15									

Lands East of Hwy 406 Consolidated Traffic Study
9: Brown Road/Primeway Drive & Woodlawn Road

Existing (2024) Traffic Conditions
SAT Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	471	455	11	528	224	85	136	214	112	412
Future Volume (vph)	471	455	11	528	224	85	136	214	112	412
Turn Type	pm+pt	NA	Perm	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4		8	1	5	2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	1	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	6.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	17.9	17.9	17.9	9.0	9.0	15.3	9.0	15.3	15.3
Total Split (s)	28.0	60.9	32.9	32.9	15.0	15.0	29.3	15.0	29.3	29.3
Total Split (%)	26.6%	57.9%	31.3%	31.3%	14.3%	14.3%	27.9%	14.3%	27.9%	27.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	3.0	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	0.0	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	3.0	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effect Green (s)	53.9	49.0	20.6	20.6	40.3	27.9	14.6	32.7	19.4	19.4
Actuated g/C Ratio	0.58	0.52	0.22	0.22	0.43	0.30	0.16	0.35	0.21	0.21
v/c Ratio	0.98	0.34	0.08	0.80	0.36	0.26	0.68	0.62	0.34	0.73
Control Delay	56.5	13.6	31.8	44.0	4.1	23.1	52.3	31.8	37.4	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	13.6	31.8	44.0	4.1	23.1	52.3	31.8	37.4	11.7
LOS	E	B	C	D	A	C	D	C	D	B
Approach Delay		33.9		32.1			41.5		21.5	
Approach LOS		C		C			D		C	

Intersection Summary

Cycle Length: 105.2

Actuated Cycle Length: 93.6

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 30.7

Intersection LOS: C

Intersection Capacity Utilization 88.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 9: Brown Road/Primeway Drive & Woodlawn Road

 Ø1	 Ø2	 Ø4
15 s	29.3 s	60.9 s
 Ø5	 Ø6	 Ø7
15 s	29.3 s	28 s
		32.9 s

Lands East of Hwy 406 Consolidated Traffic Study
9: Brown Road/Primeway Drive & Woodlawn Road

Existing (2024) Traffic Conditions
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	471	455	67	11	528	224	85	136	7	214	112	412
Future Volume (vph)	471	455	67	11	528	224	85	136	7	214	112	412
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3208		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.25	1.00		0.44	1.00	1.00	0.68	1.00		0.54	1.00	1.00
Satd. Flow (perm)	395	3208		686	3271	1234	1062	1477		852	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	512	495	73	12	574	243	92	148	8	233	122	448
RTOR Reduction (vph)	0	11	0	0	0	160	0	2	0	0	0	356
Lane Group Flow (vph)	512	557	0	12	574	83	92	154	0	233	122	92
Turn Type	pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	48.9	48.9		20.6	20.6	32.2	23.0	15.4		30.0	19.4	19.4
Effective Green, g (s)	48.9	48.9		20.6	20.6	32.2	23.0	15.4		30.0	19.4	19.4
Actuated g/C Ratio	0.52	0.52		0.22	0.22	0.34	0.24	0.16		0.32	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.6	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	498	1667		150	716	422	293	241		349	355	254
v/s Ratio Prot	c0.28	0.17			0.18	0.02	0.03	0.10		c0.08	0.07	
v/s Ratio Perm	c0.26			0.02		0.04	0.05			c0.13		0.07
v/c Ratio	1.03	0.33		0.08	0.80	0.20	0.31	0.64		0.67	0.34	0.36
Uniform Delay, d1	21.5	13.1		29.2	34.8	21.8	28.6	36.8		26.0	31.9	32.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	47.7	0.1		0.2	6.3	0.2	0.5	5.1		4.4	0.4	0.6
Delay (s)	69.2	13.2		29.4	41.1	22.0	29.1	41.8		30.4	32.3	32.7
Level of Service	E	B		C	D	C	C	D		C	C	C
Approach Delay (s)		39.8			35.3			37.1			32.0	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			36.2			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			94.1			Sum of lost time (s)			21.2			
Intersection Capacity Utilization			88.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

APPENDIX 5

Existing (2024) Traffic Conditions – Queueing Analysis Results



Existing (2024) Conditions Model – No Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	19
			EBT	36
			EBR	34
			NBL	24
			NBT	20
			NBR	19
			SBL	13
			SBT	17
			SBR	14
			WBL	9
			WBT	38
			WBR	13
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	1
			EBT	11
			SBL	9
			WBL	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	0
			EBL	0
			EBT	0
			EBR	-
			NBL	24
			NBT	10
			NBR	10
			SBL	0
			SBT	0
			SBR	0
			WBL	0
			WBT	0
Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	WBR	0
			EBL	56
			EBT	43
			EBR	42
			NBL	28
			NBT	29
			NBR	29
			SBL	41
			SBT	29
			SBR	32
			WBL	11
			WBT	52
			WBR	20
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	2
			EBT	11
			SBL	13

PM Peak	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBL	0
			WBT	0
			EBL	0
			EBT	2
			EBR	-
			NBL	32
			NBT	11
			NBR	11
			SBL	6
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0
			EBL	109
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBT	44
			EBR	43
			NBL	30
			NBT	51
			NBR	51
			SBL	56
			SBT	43
			SBR	53
			WBL	9
			WBT	65
			WBR	29
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	0
			EBT	13
			SBL	10
			WBL	0
			WBT	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	0
			EBT	0
			EBR	-
			NBL	31
			NBT	10
			NBR	10
			SBL	4
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0

Existing (2024) Conditions Model – With Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	19
			EBT	36
			EBR	34
			NBL	24
			NBT	20
			NBR	19
			SBL	13
			SBT	17
			SBR	14
			WBL	9
			WBT	38
			WBR	13
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	1
			EBT	11
			SBL	9
			WBL	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	0
			EBL	0
			EBT	0
			EBR	-
			NBL	24
			NBT	10
			NBR	10
			SBL	0
			SBT	0
			SBR	0
			WBL	0
			WBT	0
		Rail Crossing	WBR	0
			EBT	8
			WBT	15
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	56
			EBT	43
			EBR	42
			NBL	28
			NBT	29
			NBR	29
			SBL	41
			SBT	29
			SBR	32
			WBL	11
			WBT	52
			WBR	20

PM Peak Hour	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	2
			EBT	11
			SBL	13
			WBL	0
			WBT	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	0
			EBT	2
			EBR	-
			NBL	32
			NBT	11
			NBR	11
			SBL	6
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0
		Rail Crossing	EBT	34
			WBT	19

APPENDIX 6

Future (2051) Total Traffic Conditions – Synchro Analysis Results



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	220	669	271	555	233	1	1
Future Volume (vph)	1	220	669	271	555	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	52.0	52.0		18.0	70.0	21.0	40.0	19.0
Total Split (%)	47.3%	47.3%		16.4%	63.6%	19.1%	36.4%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effect Green (s)	46.2	46.2	110.0	67.0	63.0	37.0	31.0	10.6
Actuated g/C Ratio	0.42	0.42	1.00	0.61	0.57	0.34	0.28	0.10
v/c Ratio	0.00	0.32	0.58	0.48	0.69	0.59	0.23	0.01
Control Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
LOS	A	A	A	B	C	D	A	D
Approach Delay		8.7			19.0		27.0	39.0
Approach LOS		A			B		C	D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 48 (44%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 15.8

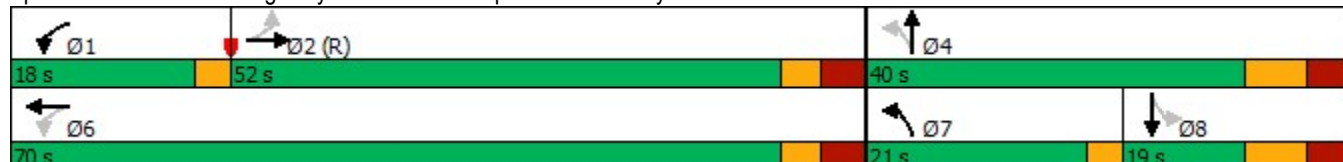
Intersection LOS: B

Intersection Capacity Utilization 89.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	239	727	295	603	253	105	2
v/c Ratio	0.00	0.32	0.58	0.48	0.69	0.59	0.23	0.01
Control Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
Queue Length 50th (m)	0.1	11.2	60.4	28.4	86.5	42.5	0.2	0.2
Queue Length 95th (m)	m0.1	m16.0	68.7	43.7	128.3	66.4	12.6	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	300	739	1262	628	871	435	451	153
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.32	0.58	0.47	0.69	0.58	0.23	0.01
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	220	669	271	555	0	233	1	96	0	1	1
Future Volume (vph)	1	220	669	271	555	0	233	1	96	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.44	1.00	1.00	0.54	1.00		0.59	1.00			1.00	
Satd. Flow (perm)	714	1761	1262	881	1522		997	1338			1578	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	239	727	295	603	0	253	1	104	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	75	0	0	1	0
Lane Group Flow (vph)	1	239	727	295	603	0	253	30	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	46.2	46.2	110.0	63.0	63.0		31.0	31.0			10.6	
Effective Green, g (s)	46.2	46.2	110.0	63.0	63.0		31.0	31.0			10.6	
Actuated g/C Ratio	0.42	0.42	1.00	0.57	0.57		0.28	0.28			0.10	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	299	739	1262	589	871		377	377			152	
v/s Ratio Prot		0.14		0.06	c0.40		c0.11	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.22			0.08					
v/c Ratio	0.00	0.32	0.58	0.50	0.69		0.67	0.08			0.01	
Uniform Delay, d1	18.5	21.4	0.0	12.6	16.6		33.7	29.0			44.9	
Progression Factor	0.22	0.27	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.8	1.4	0.7	2.4		4.6	0.1			0.1	
Delay (s)	4.2	6.6	1.4	13.3	19.0		38.4	29.1			45.0	
Level of Service	A	A	A	B	B		D	C			D	
Approach Delay (s)		2.7			17.1			35.7			45.0	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			13.9			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			89.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
AM Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	790	225	557	100	634
Future Volume (vph)	790	225	557	100	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	57.0	24.0	81.0	29.0	
Total Split (%)	51.8%	21.8%	73.6%	26.4%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effect Green (s)	44.7	65.9	62.1	31.9	110.0
Actuated g/C Ratio	0.41	0.60	0.56	0.29	1.00
v/c Ratio	0.83	0.80	0.62	0.22	0.49
Control Delay	33.6	42.9	13.0	34.6	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	42.9	13.0	34.6	1.2
LOS	C	D	B	C	A
Approach Delay	33.6		21.6		
Approach LOS	C		C		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 8:SBL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 21.9

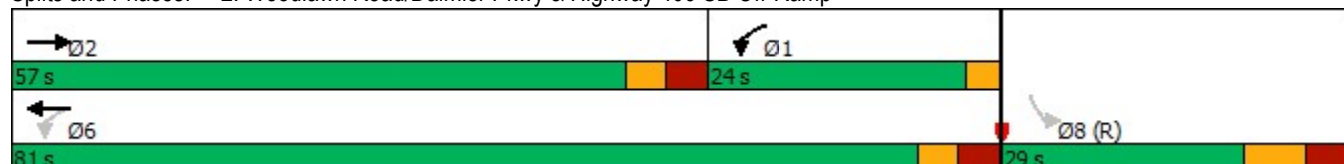
Intersection LOS: C

Intersection Capacity Utilization 64.2%

ICU Level of Service C

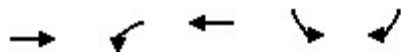
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
 AM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1107	245	605	109	689
v/c Ratio	0.83	0.80	0.62	0.22	0.49
Control Delay	33.6	42.9	13.0	34.6	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	42.9	13.0	34.6	1.2
Queue Length 50th (m)	104.7	29.3	53.9	17.8	0.0
Queue Length 95th (m)	121.4	49.3	54.8	36.7	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1498	400	1161	505	1415
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.74	0.61	0.52	0.22	0.49
Intersection Summary					

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	790	228	225	557	0	0	0	0	100	0	634
Future Volume (vph)	0	790	228	225	557	0	0	0	0	100	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3233		1555	1722					1743		1415
Flt Permitted		1.00		0.14	1.00					0.95		1.00
Satd. Flow (perm)		3233		221	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	859	248	245	605	0	0	0	0	109	0	689
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1080	0	245	605	0	0	0	0	109	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		44.7		65.9	62.1					31.9		110.0
Effective Green, g (s)		44.7		65.9	62.1					31.9		110.0
Actuated g/C Ratio		0.41		0.60	0.56					0.29		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1313		307	972					505		1415
v/s Ratio Prot		0.33		c0.10	0.35							
v/s Ratio Perm				c0.37						0.06		c0.49
v/c Ratio		0.82		0.80	0.62					0.22		0.49
Uniform Delay, d1		29.1		32.0	16.1					29.6		0.0
Progression Factor		1.00		0.87	0.70					1.00		1.00
Incremental Delay, d2		4.3		10.3	0.9					1.0		1.2
Delay (s)		33.4		38.2	12.2					30.6		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.4			19.7			0.0			5.2	
Approach LOS		C			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			21.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			64.2%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	853	16	1074	101	89	50	32	56	127
Future Volume (vph)	143	853	16	1074	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	15.0	71.0	56.0	56.0	56.0	9.0	18.5	10.5	20.0	20.0
Total Split (%)	15.0%	71.0%	56.0%	56.0%	56.0%	9.0%	18.5%	10.5%	20.0%	20.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.3	67.4	55.5	55.5	55.5	19.1	11.2	20.1	10.2	10.2
Actuated g/C Ratio	0.72	0.67	0.56	0.56	0.56	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.53	0.47	0.07	0.64	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.5		17.5			39.6		26.2	
Approach LOS		A		B			D		C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 16.2

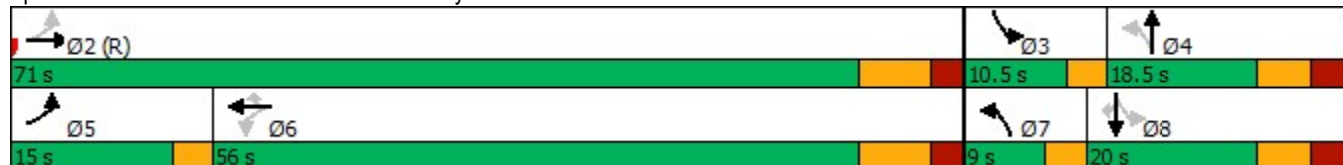
Intersection LOS: B

Intersection Capacity Utilization 69.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1030	17	1167	110	97	74	35	61	138
v/c Ratio	0.53	0.47	0.07	0.64	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
Queue Length 50th (m)	8.5	46.0	1.5	80.3	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	16.5	65.2	5.7	117.8	8.4	28.5	24.6	12.8	22.9	17.0
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	332	2179	241	1816	735	231	189	255	218	277
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	0.47	0.47	0.07	0.64	0.15	0.42	0.39	0.14	0.28	0.50
Intersection Summary										

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	853	95	16	1074	101	89	50	18	32	56	127
Future Volume (vph)	143	853	95	16	1074	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3222		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.16	1.00		0.28	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	255	3222		435	3271	1234	1082	1428		1109	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	927	103	17	1167	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	50	0	13	0	0	0	123
Lane Group Flow (vph)	155	1022	0	17	1167	60	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.2	66.2		54.3	54.3	54.3	16.0	11.2		15.2	10.8	10.8
Effective Green, g (s)	66.2	66.2		54.3	54.3	54.3	16.0	11.2		15.2	10.8	10.8
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	278	2132		236	1776	670	192	159		185	185	133
v/s Ratio Prot	c0.05	0.32			c0.36		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.32			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.56	0.48		0.07	0.66	0.09	0.51	0.38		0.19	0.33	0.11
Uniform Delay, d1	9.4	8.4		10.9	16.2	11.0	37.8	41.2		36.8	41.3	40.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.2	0.8		0.1	0.8	0.0	1.6	1.1		0.4	0.8	0.3
Delay (s)	11.6	9.1		11.0	17.0	11.0	39.5	42.3		37.2	42.0	40.5
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.5			16.4			40.7			40.4	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			17.0				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			21.2		
Intersection Capacity Utilization			69.2%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	661	618	177	419	368	0	2	0
Future Volume (vph)	6	661	618	177	419	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	0.95	0.53	0.88	0.55	0.84	0.48	0.02	0.02
Control Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
LOS	B	D	A	E	B	D	A	D	A
Approach Delay		20.0			31.0		30.3		9.3
Approach LOS		B			C		C		A

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 15 (14%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 25.1

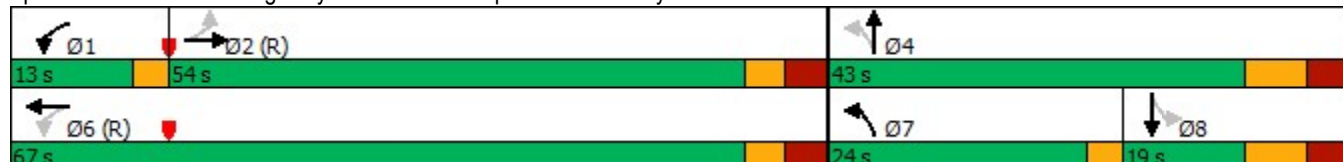
Intersection LOS: C

Intersection Capacity Utilization 95.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	718	672	192	456	400	291	2	8
v/c Ratio	0.02	0.95	0.53	0.88	0.55	0.84	0.48	0.02	0.02
Control Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
Queue Length 50th (m)	0.4	125.2	0.0	23.1	60.5	72.1	0.3	0.4	0.0
Queue Length 95th (m)	m0.5	m#208.1	m0.0	#63.7	89.8	#123.5	19.9	2.8	0.0
Internal Link Dist (m)	194.3				158.2		78.8		37.3
Turn Bay Length (m)	55.0						50.0		15.0
Base Capacity (vph)	349	752	1262	218	830	475	612	94	423
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	0.02	0.95	0.53	0.88	0.55	0.84	0.48	0.02	0.02
Intersection Summary									
# 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.									

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	661	618	177	419	1	368	0	268	2	0	7
Future Volume (vph)	6	661	618	177	419	1	368	0	268	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.50	1.00	1.00	0.10	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	818	1761	1262	157	1521		978	1336		1036	1450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	718	672	192	455	1	400	0	291	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	200	0	0	7	0
Lane Group Flow (vph)	7	718	672	192	456	0	400	91	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	349	752	1262	212	829		422	412		94	131	
v/s Ratio Prot		c0.41		c0.08	0.30		c0.18	0.07			0.00	
v/s Ratio Perm	0.01		0.53	0.41			c0.11			0.00		
v/c Ratio	0.02	0.95	0.53	0.91	0.55		0.95	0.22		0.02	0.01	
Uniform Delay, d1	18.2	30.5	0.0	26.9	16.2		35.6	28.2		45.5	45.5	
Progression Factor	0.72	0.69	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	14.9	0.8	36.7	2.6		30.5	0.3		0.4	0.1	
Delay (s)	13.1	35.8	0.8	63.6	18.9		66.1	28.5		46.0	45.6	
Level of Service	B	D	A	E	B		E	C		D	D	
Approach Delay (s)		18.9			32.1			50.3			45.6	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			30.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				22.0		
Intersection Capacity Utilization			95.3%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions

PM Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	980	175	602	305	725
Future Volume (vph)	980	175	602	305	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	59.6	15.0	74.6	35.4	
Total Split (%)	54.2%	13.6%	67.8%	32.2%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	55.3	73.7	69.9	24.1	110.0
Actuated g/C Ratio	0.50	0.67	0.64	0.22	1.00
v/c Ratio	0.86	0.81	0.60	0.87	0.56
Control Delay	30.2	42.5	10.5	64.4	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	30.2	42.5	10.7	64.4	1.6
LOS	C	D	B	E	A
Approach Delay	30.2		17.9		
Approach LOS	C		B		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 23.8

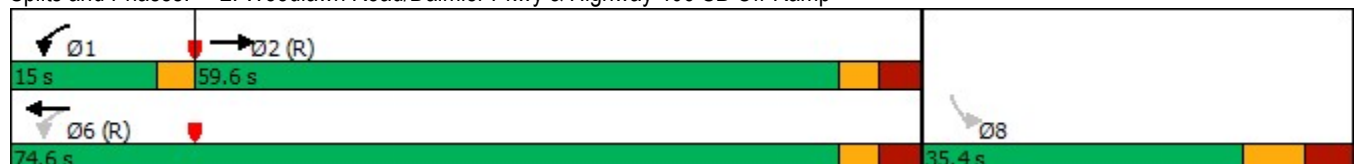
Intersection LOS: C

Intersection Capacity Utilization 82.8%

ICU Level of Service E

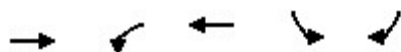
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
 PM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1410	190	654	332	788
v/c Ratio	0.86	0.81	0.60	0.87	0.56
Control Delay	30.2	42.5	10.5	64.4	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	30.2	42.5	10.7	64.4	1.6
Queue Length 50th (m)	136.3	22.9	80.6	67.4	0.0
Queue Length 95th (m)	#174.2	m#47.4	m95.0	#109.9	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1645	240	1094	415	1415
Starvation Cap Reductn	0	0	81	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.86	0.79	0.65	0.80	0.56

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	980	317	175	602	0	0	0	0	305	0	725
Future Volume (vph)	0	980	317	175	602	0	0	0	0	305	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3222		1555	1722					1743		1415
Flt Permitted		1.00		0.08	1.00					0.95		1.00
Satd. Flow (perm)		3222		127	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1065	345	190	654	0	0	0	0	332	0	788
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1383	0	190	654	0	0	0	0	332	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		55.3		69.9	69.9					24.1		110.0
Effective Green, g (s)		55.3		69.9	69.9					24.1		110.0
Actuated g/C Ratio		0.50		0.64	0.64					0.22		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1619		231	1094					381		1415
v/s Ratio Prot		0.43		c0.09	0.38							
v/s Ratio Perm				c0.44						c0.19		0.56
v/c Ratio		0.85		0.82	0.60					0.87		0.56
Uniform Delay, d1		23.8		27.9	11.8					41.5		0.0
Progression Factor		1.00		0.98	0.69					1.00		1.00
Incremental Delay, d2		6.0		15.6	1.8					19.1		1.6
Delay (s)		29.8		43.0	9.8					60.5		1.6
Level of Service		C		D	A					E		A
Approach Delay (s)		29.8			17.3			0.0			19.1	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			23.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			82.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	1060	28	1014	285	128	102	233	143	474
Future Volume (vph)	436	1060	28	1014	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.2	83.3	49.1	49.1	49.1	9.0	21.2	15.5	27.7	27.7
Total Split (%)	28.5%	69.4%	40.9%	40.9%	40.9%	7.5%	17.7%	12.9%	23.1%	23.1%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.1	76.2	41.2	41.2	41.2	23.4	13.1	32.9	19.6	19.6
Actuated g/C Ratio	0.68	0.64	0.34	0.34	0.34	0.20	0.11	0.27	0.16	0.16
v/c Ratio	1.05	0.62	0.26	0.98	0.50	0.62	0.84	0.90	0.55	0.87
Control Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
LOS	F	B	D	E	A	D	F	E	D	C
Approach Delay		34.8		49.7			69.1		42.1	
Approach LOS		C		D			E		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 43.4

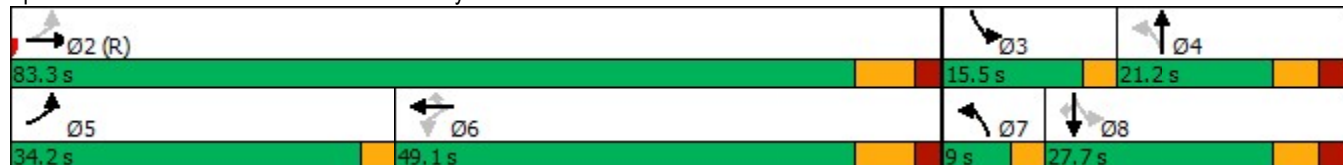
Intersection LOS: D

Intersection Capacity Utilization 100.6%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1273	30	1102	310	139	139	253	155	515
v/c Ratio	1.05	0.62	0.26	0.98	0.50	0.62	0.84	0.90	0.55	0.87
Control Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
Queue Length 50th (m)	~109.1	88.7	5.1	134.5	1.9	26.0	30.3	51.7	33.7	9.9
Queue Length 95th (m)	#173.4	109.2	13.8	#180.3	23.3	44.0	#63.7	#101.3	55.1	#72.9
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	453	2053	117	1123	619	224	175	281	292	597
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	1.05	0.62	0.26	0.98	0.50	0.62	0.79	0.90	0.53	0.86

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	1060	111	28	1014	285	128	102	26	233	143	474
Future Volume (vph)	436	1060	111	28	1014	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3225		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.22	1.00	1.00	0.66	1.00		0.48	1.00	1.00
Satd. Flow (perm)	142	3225		341	3271	1234	1031	1443		744	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	474	1152	121	30	1102	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	7	0	0	0	196	0	8	0	0	0	391
Lane Group Flow (vph)	474	1266	0	30	1102	114	139	131	0	253	155	124
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.2	76.2		41.2	41.2	41.2	19.1	13.1		28.6	19.6	19.6
Effective Green, g (s)	76.2	76.2		41.2	41.2	41.2	19.1	13.1		28.6	19.6	19.6
Actuated g/C Ratio	0.64	0.64		0.34	0.34	0.34	0.16	0.11		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	448	2047		117	1123	423	186	157		254	281	201
v/s Ratio Prot	c0.28	0.39			0.34		0.04	0.09		c0.10	0.09	
v/s Ratio Perm	c0.39			0.09		0.09	0.08			c0.13		0.10
v/c Ratio	1.06	0.62		0.26	0.98	0.27	0.75	0.83		1.00	0.55	0.62
Uniform Delay, d1	36.3	13.2		28.4	39.0	28.5	47.2	52.4		44.1	46.2	46.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	58.7	1.4		0.8	22.3	0.3	14.5	29.5		55.0	1.9	4.8
Delay (s)	95.0	14.6		29.2	61.3	28.8	61.7	81.9		99.1	48.0	51.5
Level of Service	F	B		C	E	C	E	F		F	D	D
Approach Delay (s)		36.4			53.7			71.8			64.0	
Approach LOS		D			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			50.1									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 21.2
Intersection Capacity Utilization			100.6%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	568	640	231	512	360	1	1	6
Future Volume (vph)	7	568	640	231	512	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	52.0	52.0		16.0	68.0	23.0	42.0	19.0	19.0
Total Split (%)	47.3%	47.3%		14.5%	61.8%	20.9%	38.2%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	45.4	45.4	110.0	65.0	61.0	39.0	33.0	10.0	10.0
Actuated g/C Ratio	0.41	0.41	1.00	0.59	0.55	0.35	0.30	0.09	0.09
v/c Ratio	0.03	0.85	0.55	0.82	0.66	0.85	0.43	0.01	0.08
Control Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
LOS	B	C	A	D	C	D	A	D	D
Approach Delay		13.7			26.4		32.7		37.2
Approach LOS		B			C		C		D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 21.9

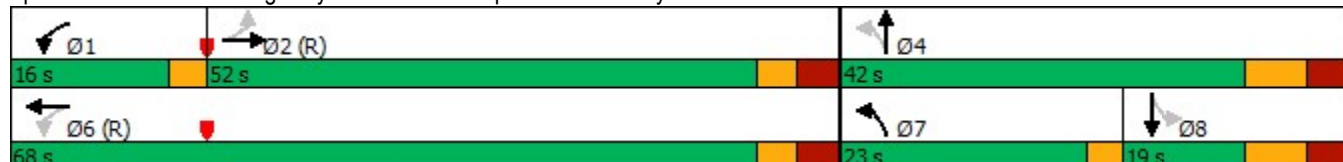
Intersection LOS: C

Intersection Capacity Utilization 94.7%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	617	696	251	558	391	250	1	12
v/c Ratio	0.03	0.85	0.55	0.82	0.66	0.85	0.43	0.01	0.08
Control Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
Queue Length 50th (m)	0.0	96.1	0.1	24.7	80.1	71.0	0.2	0.2	1.4
Queue Length 95th (m)	m0.4	m39.1	m32.7	#61.6	118.4	#123.8	18.2	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	307	726	1262	312	844	460	575	97	149
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	0.03	0.85	0.55	0.80	0.66	0.85	0.43	0.01	0.08

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Future (2051) Traffic Conditions
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	568	640	231	512	1	360	1	229	1	6	5
Future Volume (vph)	7	568	640	231	512	1	360	1	229	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.46	1.00	1.00	0.17	1.00		0.58	1.00		0.60	1.00	
Satd. Flow (perm)	745	1761	1262	273	1521		975	1337		1075	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	617	696	251	557	1	391	1	249	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	174	0	0	5	0
Lane Group Flow (vph)	8	617	696	251	558	0	391	76	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	45.4	45.4	110.0	61.0	61.0		33.0	33.0		10.0	10.0	
Effective Green, g (s)	45.4	45.4	110.0	61.0	61.0		33.0	33.0		10.0	10.0	
Actuated g/C Ratio	0.41	0.41	1.00	0.55	0.55		0.30	0.30		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	307	726	1262	298	843		407	401		97	145	
v/s Ratio Prot		0.35		c0.10	0.37		c0.17	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.37			c0.11			0.00		
v/c Ratio	0.03	0.85	0.55	0.84	0.66		0.96	0.19		0.01	0.05	
Uniform Delay, d1	19.2	29.2	0.0	19.2	17.2		36.4	28.6		45.5	45.7	
Progression Factor	0.51	0.57	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.0	1.0	18.9	4.1		34.4	0.2		0.2	0.7	
Delay (s)	9.8	23.5	1.0	38.2	21.3		70.8	28.8		45.7	46.3	
Level of Service	A	C	A	D	C		E	C		D	D	
Approach Delay (s)		11.5			26.5			54.4			46.3	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			25.9			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			94.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
SAT Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	983	207	637	232	791
Future Volume (vph)	983	207	637	232	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	48.8	18.0	66.8	43.2	
Total Split (%)	44.4%	16.4%	60.7%	39.3%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	53.6	76.3	72.5	21.5	110.0
Actuated g/C Ratio	0.49	0.69	0.66	0.20	1.00
v/c Ratio	0.90	0.78	0.61	0.74	0.61
Control Delay	35.9	38.0	9.7	54.5	1.9
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	35.9	38.0	10.0	54.5	1.9
LOS	D	D	B	D	A
Approach Delay	35.9		16.9		
Approach LOS	D		B		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 23.8

Intersection LOS: C

Intersection Capacity Utilization 81.0%

ICU Level of Service D

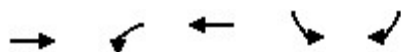
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
 SAT Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1436	225	692	252	860
v/c Ratio	0.90	0.78	0.61	0.74	0.61
Control Delay	35.9	38.0	9.7	54.5	1.9
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	35.9	38.0	10.0	54.5	1.9
Queue Length 50th (m)	140.2	26.2	57.4	51.4	0.0
Queue Length 95th (m)	#229.7	m52.7	m115.7	72.6	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1592	307	1135	538	1415
Starvation Cap Reductn	0	0	101	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.73	0.67	0.47	0.61

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Future (2051) Traffic Conditions
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	983	339	207	637	0	0	0	0	232	0	791
Future Volume (vph)	0	983	339	207	637	0	0	0	0	232	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3216		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3216		116	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1068	368	225	692	0	0	0	0	252	0	860
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1410	0	225	692	0	0	0	0	252	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		53.6		72.5	72.5					21.5		110.0
Effective Green, g (s)		53.6		72.5	72.5					21.5		110.0
Actuated g/C Ratio		0.49		0.66	0.66					0.20		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1567		284	1134					340		1415
v/s Ratio Prot		c0.44		c0.11	0.40							
v/s Ratio Perm				0.41						0.14		c0.61
v/c Ratio		0.90		0.79	0.61					0.74		0.61
Uniform Delay, d1		25.8		31.0	10.7					41.6		0.0
Progression Factor		1.00		1.00	0.67					1.00		1.00
Incremental Delay, d2		8.7		9.6	1.6					8.4		1.9
Delay (s)		34.4		40.7	8.7					50.1		1.9
Level of Service		C		D	A					D		A
Approach Delay (s)		34.4			16.6			0.0			12.9	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			22.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			81.0%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
SAT Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	962	18	1053	357	135	217	340	178	657
Future Volume (vph)	751	962	18	1053	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	44.0	86.0	42.0	42.0	42.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.8%	66.2%	32.3%	32.3%	32.3%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	34.1	34.1	34.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.26	0.26	0.26	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.56	0.60	0.20	1.33	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		129.8		151.1			174.7		99.6	
Approach LOS		F		F			F		F	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.56

Intersection Signal Delay: 132.2

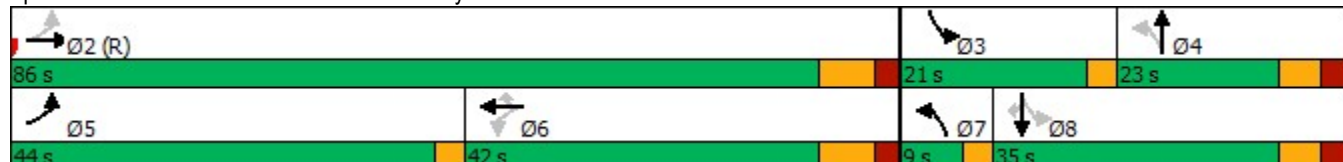
Intersection LOS: F

Intersection Capacity Utilization 135.1%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
SAT Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1162	20	1145	388	147	249	370	193	714
v/c Ratio	1.56	0.60	0.20	1.33	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
Queue Length 50th (m)	~282.5	91.3	4.0	~200.5	26.6	28.6	~84.7	~111.0	44.2	50.0
Queue Length 95th (m)	#358.7	111.3	11.7	#242.3	67.6	#48.6	#137.7	#172.1	68.6	#139.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	523	1942	100	858	525	221	180	265	366	715
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	1.56	0.60	0.20	1.33	0.74	0.67	1.38	1.40	0.53	1.00

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Future (2051) Traffic Conditions
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	962	107	18	1053	357	135	217	12	340	178	657
Future Volume (vph)	751	962	107	18	1053	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3222		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.11	1.00		0.24	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	169	3222		381	3271	1234	995	1477		335	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	816	1046	116	20	1145	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	6	0	0	0	202	0	2	0	0	0	452
Lane Group Flow (vph)	816	1156	0	20	1145	186	147	247	0	370	193	262
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.26	0.26	0.26	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	516	1935		99	858	323	188	178		253	366	262
v/s Ratio Prot	c0.50	0.36			0.35		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.45			0.05		0.15	0.09			c0.21		0.21
v/c Ratio	1.58	0.60		0.20	1.33	0.58	0.78	1.39		1.46	0.53	1.00
Uniform Delay, d1	37.5	16.2		37.4	48.0	41.7	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	270.8	1.4		0.7	158.5	2.0	18.3	205.8		228.6	1.0	54.7
Delay (s)	308.3	17.5		38.1	206.4	43.7	69.1	262.9		270.6	46.4	105.8
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		137.5			163.6			191.0			144.6	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		151.1			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.61										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			21.2				
Intersection Capacity Utilization		135.1%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

APPENDIX 7

Future (2051) Total Traffic Conditions – Queueing Analysis Results



Future Total (2051) Conditions Model – No Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	55
			EBR	54
			NBL	29
			NBT	27
			NBR	27
			SBL	18
			SBT	22
			SBR	17
			WBL	11
			WBT	74
			WBR	14
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	130
			EBT	130
			SBL	33
			WBL	35
			WBT	68
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	58
			EBR	-
			NBL	49
			NBT	14
			NBR	14
			SBL	0
			SBT	7
			SBR	7
			WBL	52
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	39
			EBT	39
			EBR	39
			NBL	30
			SBR	15
			WBT	27
			NBR	53
	1	Woodlawn Road and Primeway	EBL	121
			EBT	146
			EBR	146
			NBL	44
			NBT	53
			NBR	53

PM Peak Hour	1	Drive / Brown Road	SBL	54
			SBT	51
			SBR	68
			WBL	19
			WBT	130
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	WBR	41
			EBR	240
			EBT	242
			SBL	93
			WBL	47
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	132
			EBL	6
			EBT	192
			EBR	-
			NBL	107
			NBT	52
			NBR	52
			SBL	8
			SBT	9
			SBR	9
			WBL	50
			WBT	68
	4	Rail Crossing	WBR	68
			EBT	-
k Hour	5	Daimler Parkway and Street 'A'	WBT	-
			EBL	54
			EBT	54
			EBR	54
			NBL	74
	1	Woodlawn Road and Primeway Drive / Brown Road	SBR	10
			WBT	24
			EBL	270
			EBT	280
			EBR	280
			NBL	45
			NBT	77
			NBR	77
			SBL	99
			SBT	96
			SBR	98
			WBL	12
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	WBT	141
			WBR	43
			EBR	188
			EBT	189
			SBL	67
			WBL	39
			WBT	106
			EBL	8

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	130
			EBR	-
			NBL	79
			NBT	26
			NBR	26
			SBL	4
			SBT	9
			SBR	9
			WBL	49
			WBT	68
			WBR	68
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	123
			EBT	123
			EBR	123
			NBL	55
			SBR	12
			WBT	23

Future Total (2051) Conditions Model – With Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	55
			EBR	54
			NBL	29
			NBT	27
			NBR	27
			SBL	18
			SBT	22
			SBR	17
			WBL	10
			WBT	75
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	131
			EBT	131
			SBL	33
			WBL	37
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	91
			EBL	1
			EBT	65
			EBR	-
			NBL	49
			NBT	17
			NBR	17
			SBL	0
			SBT	7
			SBR	7
			WBL	62
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	60
			WBT	130
	5	Daimler Parkway and Street 'A'	EBL	40
			EBT	40
			EBR	40
			NBL	31
			SBR	15
			WBT	25
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	120
			EBT	146
			EBR	146
			NBL	46
			NBT	53
			NBR	53
			SBL	55

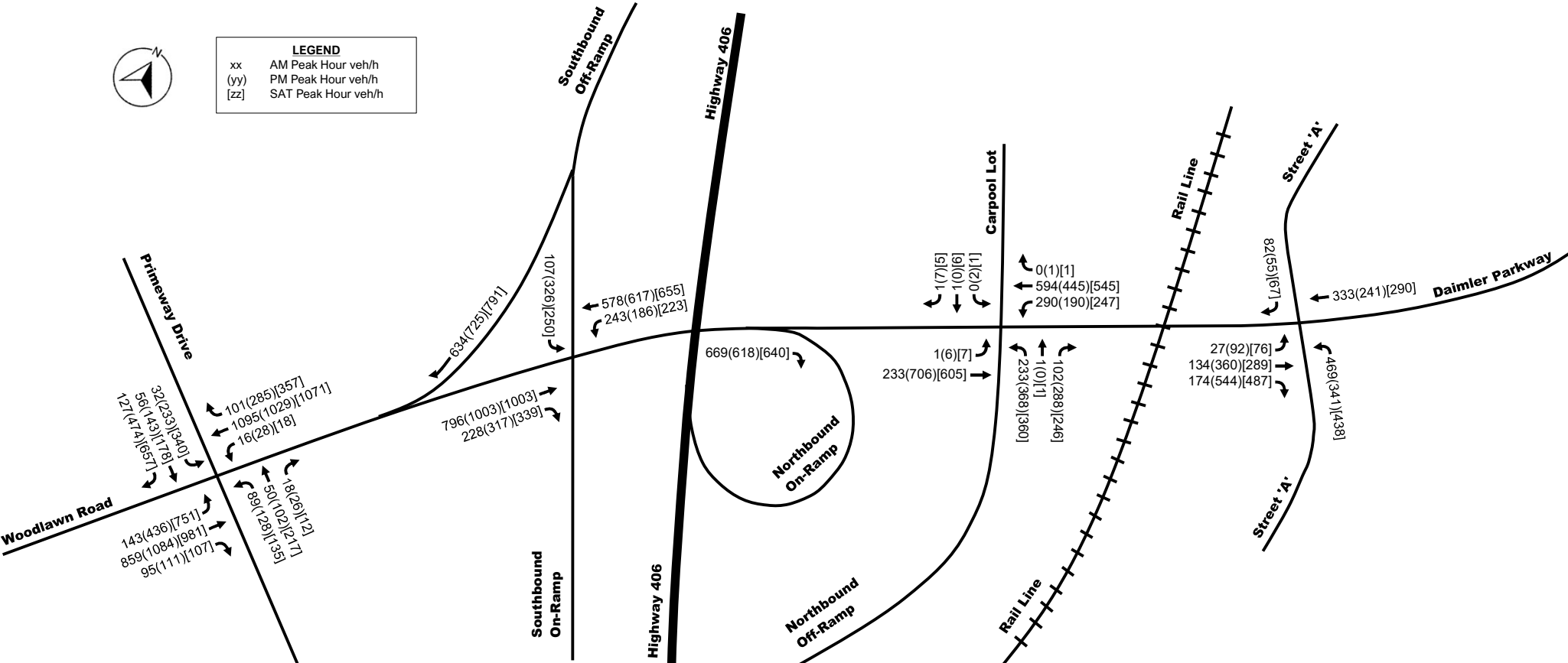
PM Peak Hour			SBT	52
			SBR	67
			WBL	17
			WBT	132
			WBR	42
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	241
			EBT	245
			SBL	125
			WBL	46
			WBT	168
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	217
			EBR	-
			NBL	107
			NBT	98
			NBR	98
			SBL	8
			SBT	9
			SBR	9
			WBL	58
			WBT	68
			WBR	68
	4	Rail Crossing	EBT	59
			WBT	123
	5	Daimler Parkway and Street 'A'	EBL	59
			EBT	59
			EBR	59
			NBL	76
			SBR	10
			WBT	23

APPENDIX 8

Sensitivity Analyses Volume Diagrams



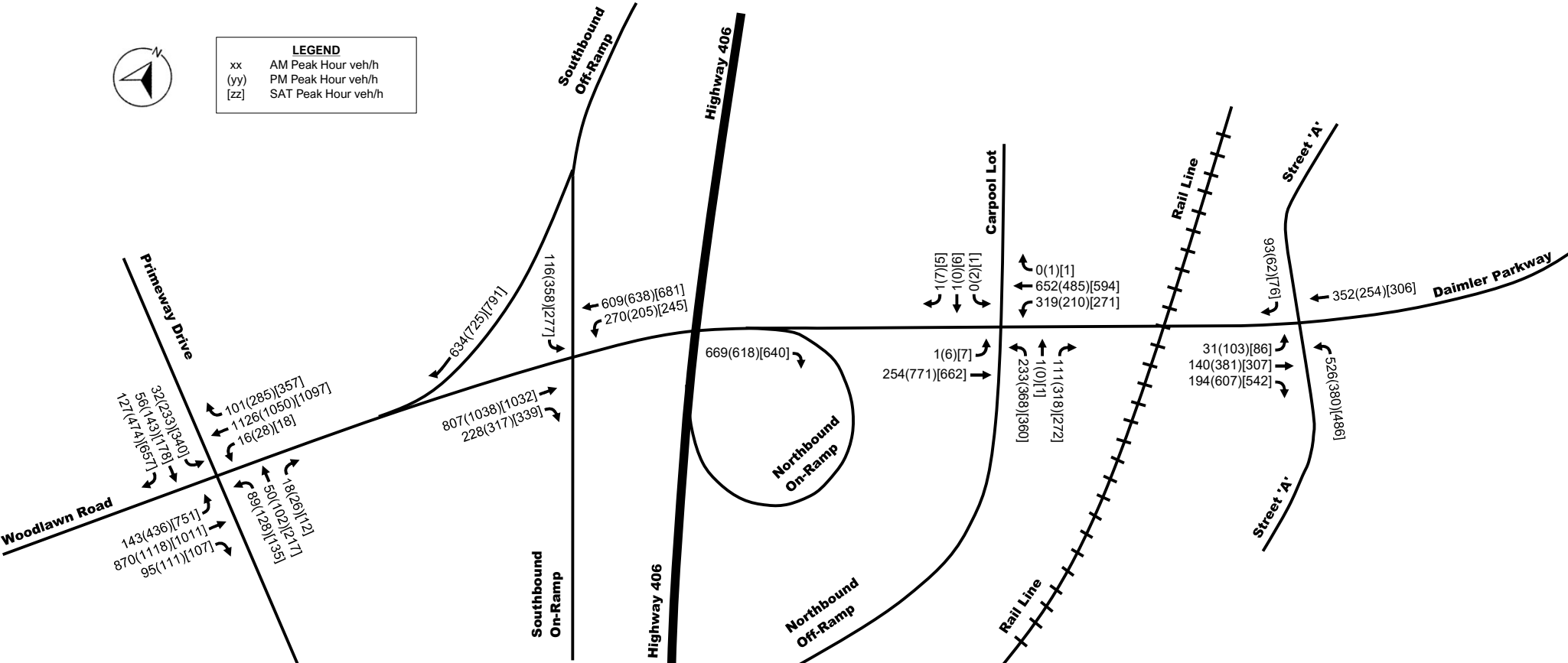
Sensitivity Analysis #1



Sensitivity Analysis #2



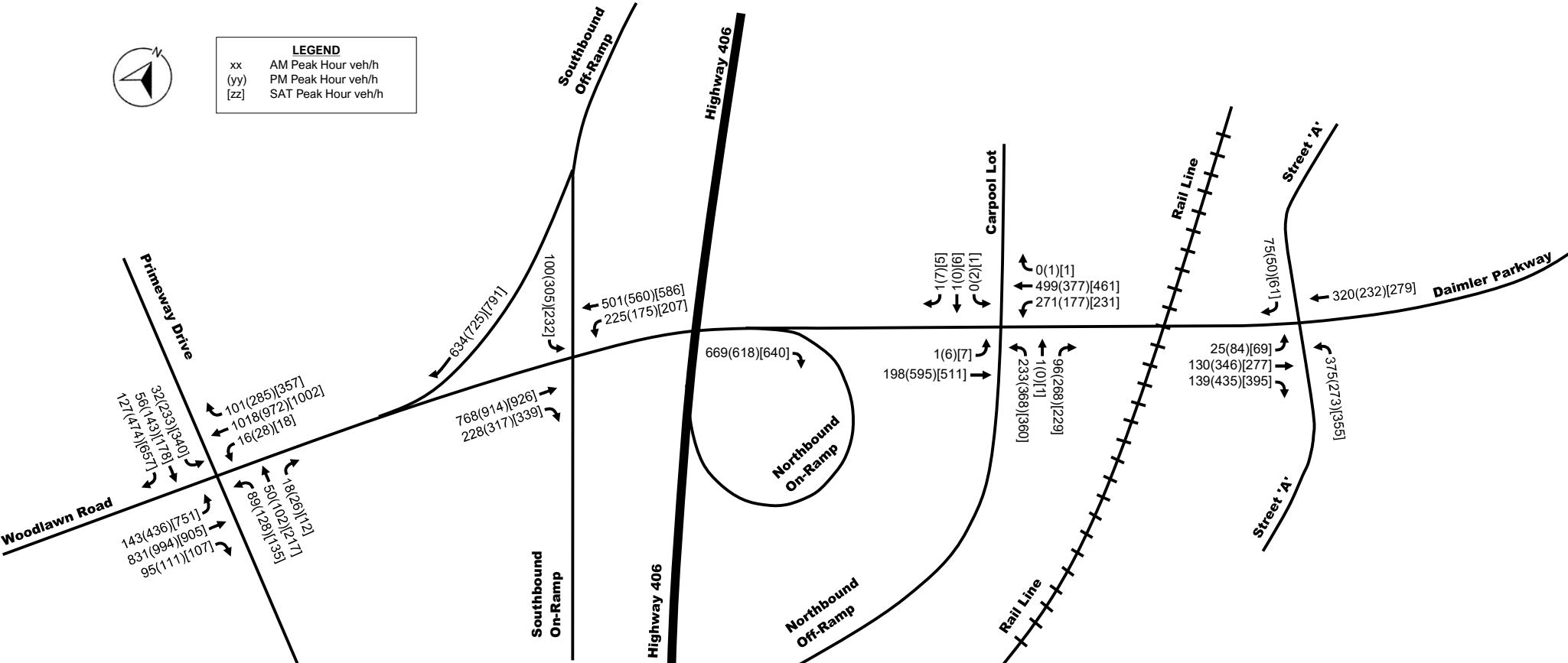
LEGEND	
xx	AM Peak Hour veh/h
(yy)	PM Peak Hour veh/h
[zz]	SAT Peak Hour veh/h



Sensitivity Analysis #3



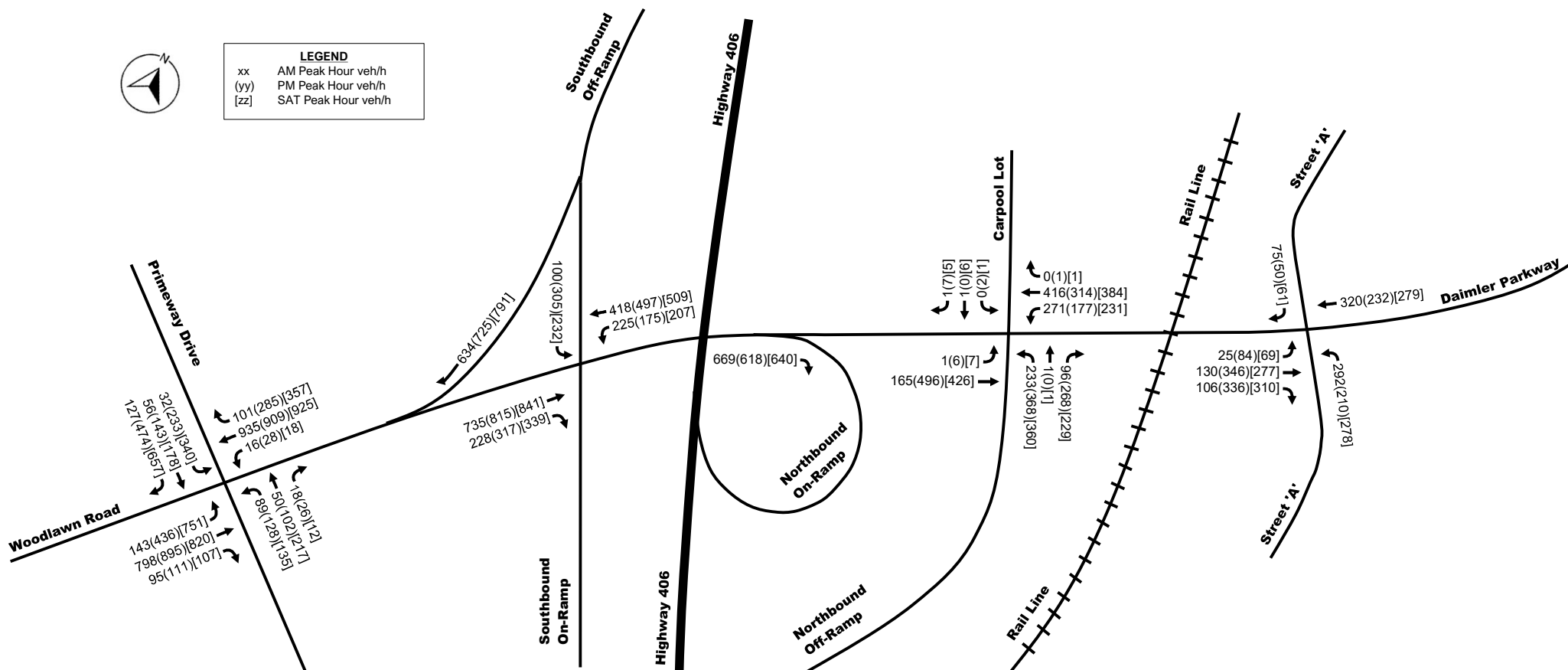
LEGEND	
xx	AM Peak Hour veh/h
(yy)	PM Peak Hour veh/h
[zz]	SAT Peak Hour veh/h



Sensitivity Analysis #4



LEGEND	
xx	AM Peak Hour veh/h
(yy)	PM Peak Hour veh/h
[zz]	SAT Peak Hour veh/h



APPENDIX 9

Sensitivity Analysis #1 – 10% Increase to Residential Density – Synchro Analysis Results



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	233	669	290	594	233	1	1
Future Volume (vph)	1	233	669	290	594	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	52.0	52.0		19.0	71.0	20.0	39.0	19.0
Total Split (%)	47.3%	47.3%		17.3%	64.5%	18.2%	35.5%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effect Green (s)	46.4	46.4	110.0	68.0	64.0	36.0	30.0	10.4
Actuated g/C Ratio	0.42	0.42	1.00	0.62	0.58	0.33	0.27	0.09
v/c Ratio	0.00	0.34	0.58	0.51	0.73	0.61	0.25	0.01
Control Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
LOS	A	A	A	B	C	D	A	D
Approach Delay		8.7			19.7		27.8	39.0
Approach LOS		A			B		C	D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 49 (45%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 16.3

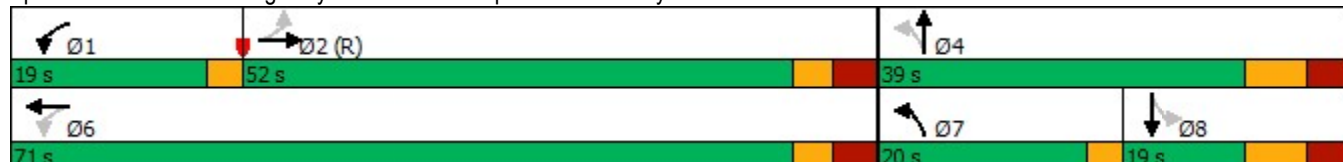
Intersection LOS: B

Intersection Capacity Utilization 91.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	253	727	315	646	253	112	2
v/c Ratio	0.00	0.34	0.58	0.51	0.73	0.61	0.25	0.01
Control Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
Queue Length 50th (m)	0.1	16.9	60.1	30.0	94.9	43.1	0.2	0.2
Queue Length 95th (m)	m0.1	m23.1	67.0	45.9	141.3	67.4	13.3	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	281	742	1262	631	885	419	445	150
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.34	0.58	0.50	0.73	0.60	0.25	0.01
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	233	669	290	594	0	233	1	102	0	1	1
Future Volume (vph)	1	233	669	290	594	0	233	1	102	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.41	1.00	1.00	0.52	1.00		0.59	1.00			1.00	
Satd. Flow (perm)	669	1761	1262	858	1522		993	1338			1578	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	253	727	315	646	0	253	1	111	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	81	0	0	1	0
Lane Group Flow (vph)	1	253	727	315	646	0	253	31	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	46.4	46.4	110.0	64.0	64.0		30.0	30.0			10.4	
Effective Green, g (s)	46.4	46.4	110.0	64.0	64.0		30.0	30.0			10.4	
Actuated g/C Ratio	0.42	0.42	1.00	0.58	0.58		0.27	0.27			0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	282	742	1262	591	885		363	364			149	
v/s Ratio Prot		0.14		0.07	c0.42		c0.11	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.24			0.08					
v/c Ratio	0.00	0.34	0.58	0.53	0.73		0.70	0.09			0.01	
Uniform Delay, d1	18.4	21.5	0.0	12.3	16.7		34.6	29.8			45.1	
Progression Factor	0.28	0.31	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.9	1.4	0.9	3.0		5.7	0.1			0.1	
Delay (s)	5.1	7.5	1.4	13.3	19.8		40.3	29.9			45.2	
Level of Service	A	A	A	B	B		D	C			D	
Approach Delay (s)		3.0			17.6			37.1			45.2	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			14.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			91.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

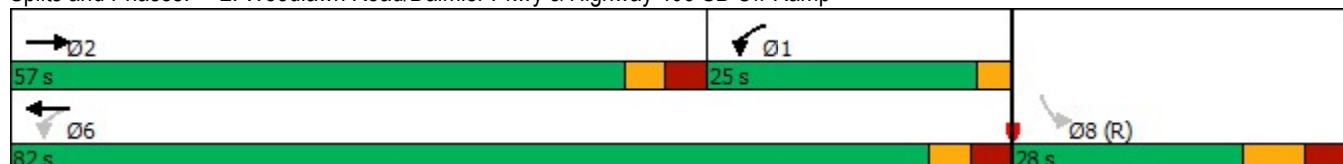
Sensitivity Analysis #1
AM Peak Hour

	→	↙	←	↘	↘
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	796	243	578	107	634
Future Volume (vph)	796	243	578	107	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	57.0	25.0	82.0	28.0	
Total Split (%)	51.8%	22.7%	74.5%	25.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effect Green (s)	45.0	67.4	63.6	30.4	110.0
Actuated g/C Ratio	0.41	0.61	0.58	0.28	1.00
v/c Ratio	0.83	0.81	0.63	0.24	0.49
Control Delay	33.3	41.8	12.2	36.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	33.3	41.8	12.4	36.2	1.2
LOS	C	D	B	D	A
Approach Delay	33.3		21.1		
Approach LOS	C		C		

Intersection Summary

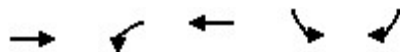
Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 8:SBL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 21.7
 Intersection LOS: C
 Intersection Capacity Utilization 66.0%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
 AM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1113	264	628	116	689
v/c Ratio	0.83	0.81	0.63	0.24	0.49
Control Delay	33.3	41.8	12.2	36.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	33.3	41.8	12.4	36.2	1.2
Queue Length 50th (m)	104.4	32.3	53.8	19.6	0.0
Queue Length 95th (m)	122.5	m48.8	54.1	39.5	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1500	415	1177	482	1415
Starvation Cap Reductn	0	0	94	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.74	0.64	0.58	0.24	0.49

Intersection Summary

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

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	796	228	243	578	0	0	0	0	107	0	634
Future Volume (vph)	0	796	228	243	578	0	0	0	0	107	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3233		1555	1722					1743		1415
Flt Permitted		1.00		0.13	1.00					0.95		1.00
Satd. Flow (perm)		3233		220	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	865	248	264	628	0	0	0	0	116	0	689
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1087	0	264	628	0	0	0	0	116	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		45.0		67.4	63.6					30.4		110.0
Effective Green, g (s)		45.0		67.4	63.6					30.4		110.0
Actuated g/C Ratio		0.41		0.61	0.58					0.28		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1322		324	995					481		1415
v/s Ratio Prot		0.34		c0.12	0.36							
v/s Ratio Perm				c0.38						0.07		c0.49
v/c Ratio		0.82		0.81	0.63					0.24		0.49
Uniform Delay, d1		28.9		31.4	15.4					30.9		0.0
Progression Factor		1.00		0.84	0.68					1.00		1.00
Incremental Delay, d2		4.3		10.7	0.9					1.2		1.2
Delay (s)		33.2		37.2	11.5					32.0		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.2			19.1			0.0			5.6	
Approach LOS		C			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			20.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			66.0%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	859	16	1095	101	89	50	32	56	127
Future Volume (vph)	143	859	16	1095	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	14.0	71.0	57.0	57.0	57.0	9.0	18.5	10.5	20.0	20.0
Total Split (%)	14.0%	71.0%	57.0%	57.0%	57.0%	9.0%	18.5%	10.5%	20.0%	20.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.3	67.4	55.7	55.7	55.7	19.1	11.2	20.1	10.2	10.2
Actuated g/C Ratio	0.72	0.67	0.56	0.56	0.56	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.54	0.48	0.07	0.65	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.6		17.5			39.6		26.2	
Approach LOS		A		B			D		C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 16.3

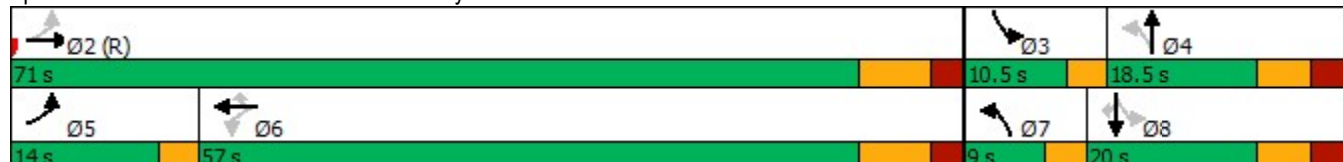
Intersection LOS: B

Intersection Capacity Utilization 69.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1037	17	1190	110	97	74	35	61	138
v/c Ratio	0.54	0.48	0.07	0.65	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
Queue Length 50th (m)	8.5	46.5	1.5	82.7	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	17.1	65.9	5.6	118.7	8.2	28.5	24.6	12.8	22.9	17.0
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	314	2179	240	1823	737	231	189	255	218	277
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	0.49	0.48	0.07	0.65	0.15	0.42	0.39	0.14	0.28	0.50
Intersection Summary										

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	859	95	16	1095	101	89	50	18	32	56	127
Future Volume (vph)	143	859	95	16	1095	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3223		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.16	1.00		0.28	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	246	3223		432	3271	1234	1082	1428		1109	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	934	103	17	1190	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	50	0	13	0	0	0	123
Lane Group Flow (vph)	155	1029	0	17	1190	60	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Effective Green, g (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	270	2133		235	1782	672	192	159		185	185	133
v/s Ratio Prot	c0.05	0.32			c0.36		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.33			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.57	0.48		0.07	0.67	0.09	0.51	0.38		0.19	0.33	0.11
Uniform Delay, d1	9.6	8.4		10.8	16.3	10.9	37.8	41.2		36.8	41.3	40.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.7	0.8		0.1	0.9	0.0	1.6	1.1		0.4	0.8	0.3
Delay (s)	12.3	9.2		10.9	17.1	10.9	39.5	42.3		37.2	42.0	40.5
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.6			16.5			40.7			40.4	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			17.0									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			100.0									Sum of lost time (s) 21.2
Intersection Capacity Utilization			69.8%									ICU Level of Service C
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	706	618	190	445	368	0	2	0
Future Volume (vph)	6	706	618	190	445	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	1.02	0.53	1.01	0.58	0.84	0.52	0.02	0.02
Control Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
LOS	B	D	A	F	C	D	A	D	A
Approach Delay		27.7			42.1		30.7		9.3
Approach LOS		C			D		C		A

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 17 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 31.9

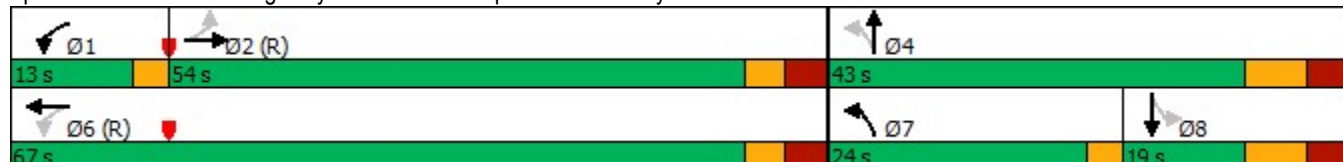
Intersection LOS: C

Intersection Capacity Utilization 98.7%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	767	672	207	485	400	313	2	8
v/c Ratio	0.02	1.02	0.53	1.01	0.58	0.84	0.52	0.02	0.02
Control Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
Queue Length 50th (m)	0.4	~176.6	0.0	~30.6	66.1	72.1	5.8	0.4	0.0
Queue Length 95th (m)	m0.4	m#220.3	m0.0	#77.8	98.1	#123.5	29.0	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	340	752	1262	205	830	475	602	92	406
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	0.02	1.02	0.53	1.01	0.58	0.84	0.52	0.02	0.02
Intersection Summary									
~ 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.									

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	706	618	190	445	1	368	0	288	2	0	7
Future Volume (vph)	6	706	618	190	445	1	368	0	288	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.49	1.00	1.00	0.08	1.00		0.58	1.00		0.57	1.00	
Satd. Flow (perm)	797	1761	1262	131	1521		978	1336		1015	1450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	767	672	207	484	1	400	0	313	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	190	0	0	7	0
Lane Group Flow (vph)	7	767	672	207	485	0	400	123	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	340	752	1262	200	829		422	412		92	131	
v/s Ratio Prot		0.44		c0.09	0.32		c0.18	0.09			0.00	
v/s Ratio Perm	0.01		0.53	c0.47			c0.11			0.00		
v/c Ratio	0.02	1.02	0.53	1.03	0.59		0.95	0.30		0.02	0.01	
Uniform Delay, d1	18.2	31.5	0.0	32.5	16.7		35.6	28.9		45.5	45.5	
Progression Factor	0.64	0.70	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	27.3	0.7	73.1	3.0		30.5	0.4		0.4	0.1	
Delay (s)	11.6	49.2	0.7	105.6	19.7		66.1	29.3		46.0	45.6	
Level of Service	B	D	A	F	B		E	C		D	D	
Approach Delay (s)		26.5			45.4			50.0			45.6	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			98.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
PM Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	1003	186	617	326	725
Future Volume (vph)	1003	186	617	326	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	60.0	15.0	75.0	35.0	
Total Split (%)	54.5%	13.6%	68.2%	31.8%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	54.6	73.1	69.3	24.7	110.0
Actuated g/C Ratio	0.50	0.66	0.63	0.22	1.00
v/c Ratio	0.88	0.89	0.62	0.91	0.56
Control Delay	32.1	54.7	10.4	68.9	1.6
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	32.1	54.7	10.7	68.9	1.6
LOS	C	D	B	E	A
Approach Delay	32.1		20.9		
Approach LOS	C		C		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 26.1

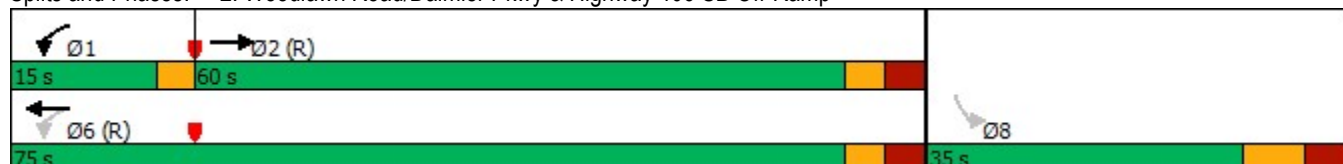
Intersection LOS: C

Intersection Capacity Utilization 85.5%

ICU Level of Service E

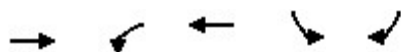
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
 PM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1435	202	671	354	788
v/c Ratio	0.88	0.89	0.62	0.91	0.56
Control Delay	32.1	54.7	10.4	68.9	1.6
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	32.1	54.7	10.7	68.9	1.6
Queue Length 50th (m)	139.9	24.9	80.9	73.4	0.0
Queue Length 95th (m)	#181.5	m#56.1	m96.5	#122.5	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1628	233	1084	408	1415
Starvation Cap Reductn	0	0	84	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.88	0.87	0.67	0.87	0.56

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1003	317	186	617	0	0	0	0	326	0	725
Future Volume (vph)	0	1003	317	186	617	0	0	0	0	326	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3224		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3224		114	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1090	345	202	671	0	0	0	0	354	0	788
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1408	0	202	671	0	0	0	0	354	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		54.6		69.3	69.3					24.7		110.0
Effective Green, g (s)		54.6		69.3	69.3					24.7		110.0
Actuated g/C Ratio		0.50		0.63	0.63					0.22		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1600		225	1084					391		1415
v/s Ratio Prot		0.44		c0.10	0.39							
v/s Ratio Perm				c0.47						c0.20		0.56
v/c Ratio		0.88		0.90	0.62					0.91		0.56
Uniform Delay, d1		24.8		31.7	12.3					41.5		0.0
Progression Factor		1.00		0.96	0.65					1.00		1.00
Incremental Delay, d2		7.3		26.1	1.9					23.8		1.6
Delay (s)		32.1		56.6	9.9					65.3		1.6
Level of Service		C		E	A					E		A
Approach Delay (s)		32.1			20.7			0.0			21.3	
Approach LOS		C			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			25.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			85.5%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	1084	28	1029	285	128	102	233	143	474
Future Volume (vph)	436	1084	28	1029	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.2	83.6	49.4	49.4	49.4	9.0	20.4	16.0	27.4	27.4
Total Split (%)	28.5%	69.7%	41.2%	41.2%	41.2%	7.5%	17.0%	13.3%	22.8%	22.8%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.1	76.2	41.5	41.5	41.5	22.9	12.6	32.9	19.6	19.6
Actuated g/C Ratio	0.68	0.64	0.35	0.35	0.35	0.19	0.10	0.27	0.16	0.16
v/c Ratio	1.05	0.63	0.26	0.99	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
LOS	F	B	D	E	A	D	F	E	D	C
Approach Delay		35.3		50.9			74.1		42.5	
Approach LOS		D		D			E		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 44.4

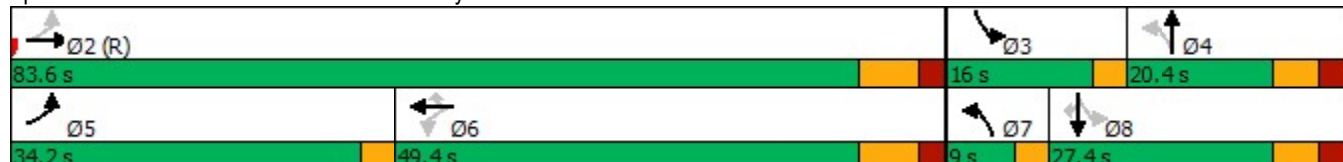
Intersection LOS: D

Intersection Capacity Utilization 101.0%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
PM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1299	30	1118	310	139	139	253	155	515
v/c Ratio	1.05	0.63	0.26	0.99	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
Queue Length 50th (m)	~108.9	91.1	5.1	136.8	2.3	26.1	30.8	51.9	33.8	10.6
Queue Length 95th (m)	#173.2	112.1	13.8	#183.4	23.9	44.2	#66.6	#101.9	55.3	#74.3
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	450	2054	114	1131	619	219	164	282	288	592
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	1.05	0.63	0.26	0.99	0.50	0.63	0.85	0.90	0.54	0.87

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	1084	111	28	1029	285	128	102	26	233	143	474
Future Volume (vph)	436	1084	111	28	1029	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3226		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.21	1.00	1.00	0.66	1.00		0.47	1.00	1.00
Satd. Flow (perm)	141	3226		332	3271	1234	1031	1443		731	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	474	1178	121	30	1118	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	6	0	0	0	193	0	7	0	0	0	388
Lane Group Flow (vph)	474	1293	0	30	1118	117	139	132	0	253	155	127
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Effective Green, g (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Actuated g/C Ratio	0.64	0.64		0.35	0.35	0.35	0.16	0.10		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	444	2048		114	1131	426	182	151		256	281	201
v/s Ratio Prot	c0.28	0.40			0.34		0.04	0.09		c0.11	0.09	
v/s Ratio Perm	c0.40			0.09		0.09	0.08			c0.13		0.10
v/c Ratio	1.07	0.63		0.26	0.99	0.27	0.76	0.87		0.99	0.55	0.63
Uniform Delay, d1	36.5	13.3		28.2	39.0	28.4	47.7	52.9		43.9	46.2	46.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	61.9	1.5		0.9	23.7	0.3	16.6	38.5		52.4	1.9	5.5
Delay (s)	98.3	14.8		29.1	62.7	28.6	64.3	91.4		96.3	48.0	52.4
Level of Service	F	B		C	E	C	E	F		F	D	D
Approach Delay (s)		37.2			54.8			77.9			63.7	
Approach LOS		D			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			51.0									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 21.2
Intersection Capacity Utilization			101.0%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	605	640	247	545	360	1	1	6
Future Volume (vph)	7	605	640	247	545	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	55.0	55.0		16.0	71.0	20.0	39.0	19.0	19.0
Total Split (%)	50.0%	50.0%		14.5%	64.5%	18.2%	35.5%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	48.2	48.2	110.0	68.0	64.0	36.0	30.0	10.0	10.0
Actuated g/C Ratio	0.44	0.44	1.00	0.62	0.58	0.33	0.27	0.09	0.09
v/c Ratio	0.03	0.85	0.55	0.86	0.67	0.94	0.48	0.01	0.08
Control Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
LOS	B	C	A	D	C	E	A	D	D
Approach Delay		13.3			27.1		42.4		37.2
Approach LOS		B			C		D		D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 24.1

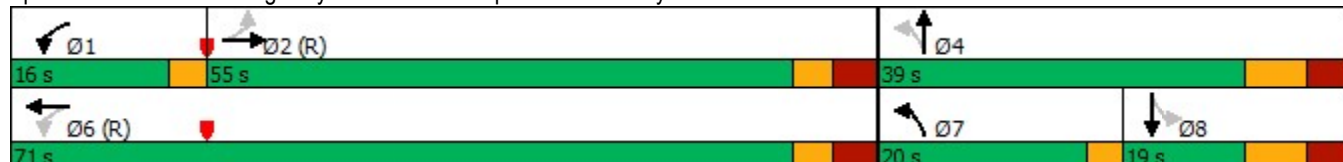
Intersection LOS: C

Intersection Capacity Utilization 96.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	658	696	268	593	391	268	1	12
v/c Ratio	0.03	0.85	0.55	0.86	0.67	0.94	0.48	0.01	0.08
Control Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
Queue Length 50th (m)	0.5	60.3	0.0	25.8	82.1	74.3	0.2	0.2	1.4
Queue Length 95th (m)	m0.6	m115.3	m6.4	#70.3	121.8	#139.1	20.0	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	316	771	1262	313	885	416	559	96	149
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	0.03	0.85	0.55	0.86	0.67	0.94	0.48	0.01	0.08
Intersection Summary									
# 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.									

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #1
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	605	640	247	545	1	360	1	246	1	6	5
Future Volume (vph)	7	605	640	247	545	1	360	1	246	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.44	1.00	1.00	0.16	1.00		0.58	1.00		0.59	1.00	
Satd. Flow (perm)	721	1761	1262	260	1521		975	1337		1058	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	658	696	268	592	1	391	1	267	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	194	0	0	5	0
Lane Group Flow (vph)	8	658	696	268	593	0	391	74	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	48.2	48.2	110.0	64.0	64.0		30.0	30.0		10.0	10.0	
Effective Green, g (s)	48.2	48.2	110.0	64.0	64.0		30.0	30.0		10.0	10.0	
Actuated g/C Ratio	0.44	0.44	1.00	0.58	0.58		0.27	0.27		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	315	771	1262	301	884		363	364		96	145	
v/s Ratio Prot		0.37		c0.10	0.39		c0.17	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.41			c0.13			0.00		
v/c Ratio	0.03	0.85	0.55	0.89	0.67		1.08	0.20		0.01	0.05	
Uniform Delay, d1	17.6	27.7	0.0	19.9	15.8		38.7	30.8		45.5	45.7	
Progression Factor	0.79	0.65	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	6.2	0.9	26.2	4.0		69.4	0.3		0.2	0.7	
Delay (s)	13.9	24.2	0.9	46.1	19.8		108.1	31.1		45.7	46.3	
Level of Service	B	C	A	D	B		F	C		D	D	
Approach Delay (s)		12.2			28.0			76.8			46.3	
Approach LOS		B			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			31.7				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			96.9%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
SAT Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	1003	223	655	250	791
Future Volume (vph)	1003	223	655	250	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	59.0	18.0	77.0	33.0	
Total Split (%)	53.6%	16.4%	70.0%	30.0%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	55.4	76.9	73.1	20.9	110.0
Actuated g/C Ratio	0.50	0.70	0.66	0.19	1.00
v/c Ratio	0.88	0.90	0.62	0.82	0.61
Control Delay	32.3	53.8	9.7	62.9	1.9
Queue Delay	0.0	0.0	0.4	0.0	0.0
Total Delay	32.3	53.8	10.1	62.9	1.9
LOS	C	D	B	E	A
Approach Delay	32.3		21.2		
Approach LOS	C		C		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 24.3

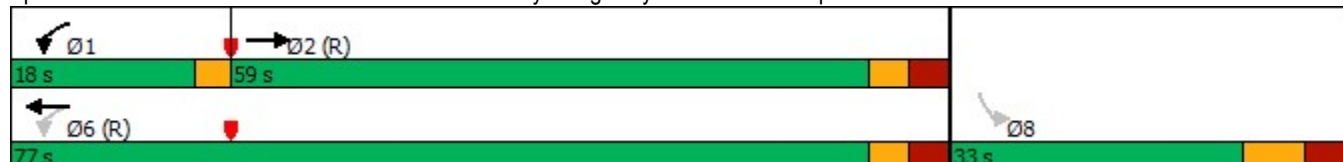
Intersection LOS: C

Intersection Capacity Utilization 83.7%

ICU Level of Service E

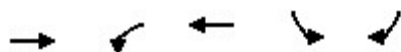
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
 SAT Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1458	242	712	272	860
v/c Ratio	0.88	0.90	0.62	0.82	0.61
Control Delay	32.3	53.8	9.7	62.9	1.9
Queue Delay	0.0	0.0	0.4	0.0	0.0
Total Delay	32.3	53.8	10.1	62.9	1.9
Queue Length 50th (m)	146.9	36.9	73.8	55.5	0.0
Queue Length 95th (m)	#198.5	m#66.3	m95.4	#85.4	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1649	281	1144	377	1415
Starvation Cap Reductn	0	0	108	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.88	0.86	0.69	0.72	0.61

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #1
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1003	339	223	655	0	0	0	0	250	0	791
Future Volume (vph)	0	1003	339	223	655	0	0	0	0	250	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3218		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3218		112	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1090	368	242	712	0	0	0	0	272	0	860
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1430	0	242	712	0	0	0	0	272	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		55.4		73.1	73.1					20.9		110.0
Effective Green, g (s)		55.4		73.1	73.1					20.9		110.0
Actuated g/C Ratio		0.50		0.66	0.66					0.19		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1620		267	1144					331		1415
v/s Ratio Prot		0.44		c0.12	0.41							
v/s Ratio Perm				c0.48						0.16		c0.61
v/c Ratio		0.88		0.91	0.62					0.82		0.61
Uniform Delay, d1		24.4		33.5	10.6					42.8		0.0
Progression Factor		1.00		1.04	0.70					1.00		1.00
Incremental Delay, d2		7.3		22.0	1.6					15.0		1.9
Delay (s)		31.7		57.0	9.0					57.8		1.9
Level of Service		C		E	A					E		A
Approach Delay (s)		31.7			21.2			0.0			15.4	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			23.7			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			83.7%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
SAT Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	981	18	1071	357	135	217	340	178	657
Future Volume (vph)	751	981	18	1071	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	44.0	86.0	42.0	42.0	42.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.8%	66.2%	32.3%	32.3%	32.3%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	34.1	34.1	34.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.26	0.26	0.26	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.56	0.61	0.20	1.36	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		128.8		158.4			174.7		99.6	
Approach LOS		F		F			F		F	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.56

Intersection Signal Delay: 134.0

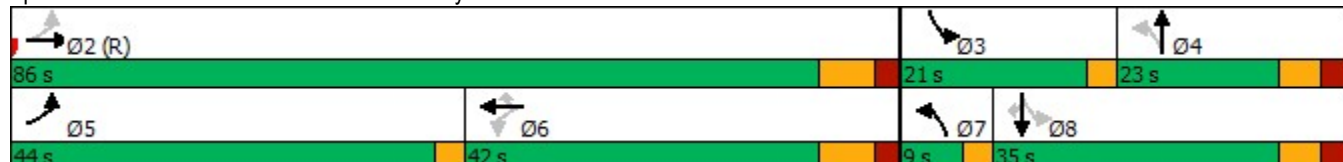
Intersection LOS: F

Intersection Capacity Utilization 135.6%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
SAT Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1182	20	1164	388	147	249	370	193	714
v/c Ratio	1.56	0.61	0.20	1.36	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
Queue Length 50th (m)	~282.5	93.8	4.0	~205.8	26.6	28.6	~84.7	~111.0	44.2	50.0
Queue Length 95th (m)	#358.7	114.3	11.7	#247.6	67.6	#48.6	#137.7	#172.1	68.6	#139.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	523	1942	98	858	525	221	180	265	366	715
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	1.56	0.61	0.20	1.36	0.74	0.67	1.38	1.40	0.53	1.00
Intersection Summary										
~ 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.										

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #1
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	981	107	18	1071	357	135	217	12	340	178	657
Future Volume (vph)	751	981	107	18	1071	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3223		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.11	1.00		0.24	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	169	3223		374	3271	1234	995	1477		335	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	816	1066	116	20	1164	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	6	0	0	0	202	0	2	0	0	0	452
Lane Group Flow (vph)	816	1176	0	20	1164	186	147	247	0	370	193	262
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.26	0.26	0.26	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	516	1936		98	858	323	188	178		253	366	262
v/s Ratio Prot	c0.50	0.36			0.36		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.45			0.05		0.15	0.09			c0.21		0.21
v/c Ratio	1.58	0.61		0.20	1.36	0.58	0.78	1.39		1.46	0.53	1.00
Uniform Delay, d1	37.5	16.3		37.4	48.0	41.7	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	270.8	1.4		0.8	168.1	2.0	18.3	205.8		228.6	1.0	54.7
Delay (s)	308.3	17.7		38.1	216.1	43.7	69.1	262.9		270.6	46.4	105.8
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		136.4			171.3			191.0			144.6	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			153.0			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.61									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			21.2			
Intersection Capacity Utilization			135.6%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

APPENDIX 10

Sensitivity Analysis #1 – 10% Increase to Residential Density – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (+10%) – No Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	38
			EBT	54
			EBR	53
			NBL	28
			NBT	26
			NBR	26
			SBL	18
			SBT	26
			SBR	16
			WBL	9
			WBT	76
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	128
			EBT	129
			SBL	35
			WBL	36
			WBT	70
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	2
			EBT	64
			EBR	-
			NBL	47
			NBT	17
			NBR	17
			SBL	0
			SBT	7
			SBR	7
			WBL	49
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	53
			EBT	53
			EBR	53
			NBL	35
			SBR	16
			WBT	27
			NBR	55
	1	Woodlawn Road and Primeway	EBL	114
			EBT	161
			EBR	161
			NBL	44
			NBT	55
			NBR	55

PM Peak Hour			Drive / Brown Road	SBL	60
				SBT	57
				SBR	65
				WBL	15
				WBT	145
				WBR	47
		2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	261
				EBT	264
				SBL	118
				WBL	54
				WBT	159
		3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7
				EBT	208
				EBR	-
				NBL	104
				NBT	66
				NBR	66
				SBL	8
				SBT	8
				SBR	8
				WBL	57
				WBT	70
				WBR	70
		4	Rail Crossing	EBT	-
				WBT	-
		5	Daimler Parkway and Street 'A'	EBL	64
				EBT	64
				EBR	64
				NBL	86
				SBR	14
				WBT	26
k Hour		1	Woodlawn Road and Primeway Drive / Brown Road	EBL	276
				EBT	315
				EBR	315
				NBL	44
				NBT	76
				NBR	75
				SBL	96
				SBT	92
				SBR	100
				WBL	12
				WBT	150
				WBR	47
		2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	220
				EBT	233
				SBL	60
				WBL	41
				WBT	105
				EBL	8

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	137
			EBR	-
			NBL	84
			NBT	32
			NBR	32
			SBL	4
			SBT	10
			SBR	10
			WBL	52
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	132
			EBT	132
			EBR	132
			NBL	55
			SBR	17
			WBT	30

Future Total (2051) Conditions Model – Bridge Adjustment (+10%) – With Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	38
			EBT	55
			EBR	54
			NBL	28
			NBT	26
			NBR	26
			SBL	18
			SBT	26
			SBR	16
			WBL	10
			WBT	83
			WBR	17
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	132
			EBT	132
			SBL	35
			WBL	39
			WBT	94
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	64
			EBR	-
			NBL	51
			NBT	20
			NBR	20
			SBL	0
			SBT	7
			SBR	7
			WBL	59
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	57
			WBT	130
	5	Daimler Parkway and Street 'A'	EBL	51
			EBT	51
			EBR	51
			NBL	34
			SBR	16
			WBT	28
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	116
			EBT	159
			EBR	159
			NBL	44
			NBT	55
			NBR	55
			SBL	60

PM Peak Hour			SBT	56
			SBR	67
			WBL	14
			WBT	145
			WBR	44
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	271
			EBT	273
			SBL	205
			WBL	55
			WBT	176
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	218
			EBR	-
			NBL	108
			NBT	102
			NBR	102
			SBL	8
			SBT	8
			SBR	8
			WBL	62
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	66
			WBT	118
	5	Daimler Parkway and Street 'A'	EBL	66
			EBT	66
			EBR	66
			NBL	90
			SBR	15
			WBT	26

APPENDIX 11

Sensitivity Analysis #2 – 25% Increase to Residential Density – Synchro Analysis Results



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	254	669	319	652	233	1	1
Future Volume (vph)	1	254	669	319	652	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	50.0	50.0		23.0	73.0	18.0	37.0	19.0
Total Split (%)	45.5%	45.5%		20.9%	66.4%	16.4%	33.6%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effect Green (s)	46.5	46.5	110.0	70.0	66.0	34.0	28.0	10.0
Actuated g/C Ratio	0.42	0.42	1.00	0.64	0.60	0.31	0.25	0.09
v/c Ratio	0.00	0.37	0.58	0.55	0.78	0.65	0.28	0.01
Control Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
LOS	A	A	A	B	C	D	A	D
Approach Delay		8.4			20.3		29.8	39.0
Approach LOS		A			C		C	D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 47 (43%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 16.9

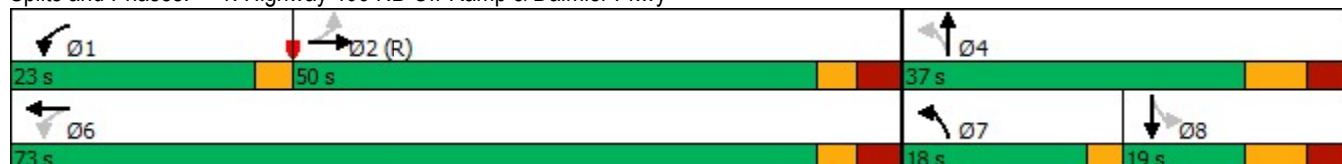
Intersection LOS: B

Intersection Capacity Utilization 95.7%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	276	727	347	709	253	122	2
v/c Ratio	0.00	0.37	0.58	0.55	0.78	0.65	0.28	0.01
Control Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
Queue Length 50th (m)	0.1	14.7	57.3	32.1	106.5	44.4	0.2	0.2
Queue Length 95th (m)	m0.1	m28.8	61.4	48.4	160.6	69.3	14.0	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	261	743	1262	654	913	388	430	144
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.37	0.58	0.53	0.78	0.65	0.28	0.01
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	254	669	319	652	0	233	1	111	0	1	1
Future Volume (vph)	1	254	669	319	652	0	233	1	111	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.38	1.00	1.00	0.50	1.00		0.58	1.00			1.00	
Satd. Flow (perm)	618	1761	1262	819	1522		984	1338			1578	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	276	727	347	709	0	253	1	121	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	90	0	0	1	0
Lane Group Flow (vph)	1	276	727	347	709	0	253	32	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	46.5	46.5	110.0	66.0	66.0		28.0	28.0			10.0	
Effective Green, g (s)	46.5	46.5	110.0	66.0	66.0		28.0	28.0			10.0	
Actuated g/C Ratio	0.42	0.42	1.00	0.60	0.60		0.25	0.25			0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	261	744	1262	601	913		335	340			143	
v/s Ratio Prot		0.16		0.09	c0.47		c0.10	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.26			0.09					
v/c Ratio	0.00	0.37	0.58	0.58	0.78		0.76	0.09			0.01	
Uniform Delay, d1	18.4	21.7	0.0	11.7	16.5		36.4	31.3			45.5	
Progression Factor	0.25	0.30	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	1.0	1.3	1.3	4.2		9.3	0.1			0.1	
Delay (s)	4.7	7.5	1.3	13.1	20.7		45.7	31.4			45.6	
Level of Service	A	A	A	B	C		D	C			D	
Approach Delay (s)		3.0			18.2			41.1			45.6	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			15.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			95.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2

AM Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	807	270	609	116	634
Future Volume (vph)	807	270	609	116	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	56.0	27.0	83.0	27.0	
Total Split (%)	50.9%	24.5%	75.5%	24.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effect Green (s)	44.9	69.1	65.3	28.7	110.0
Actuated g/C Ratio	0.41	0.63	0.59	0.26	1.00
v/c Ratio	0.84	0.85	0.65	0.28	0.49
Control Delay	34.2	43.2	11.3	38.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.2	43.2	11.5	38.2	1.2
LOS	C	D	B	D	A
Approach Delay	34.2		21.2		
Approach LOS	C		C		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 8:SBL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 22.2

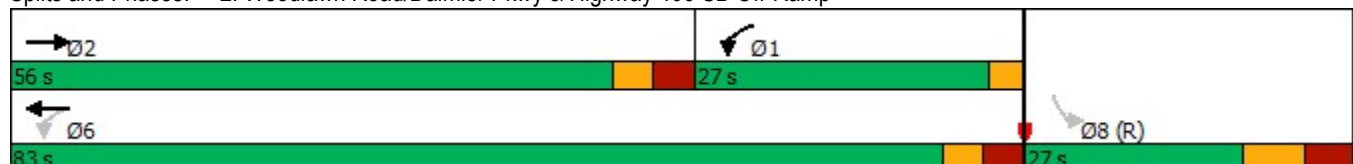
Intersection LOS: C

Intersection Capacity Utilization 68.6%

ICU Level of Service C

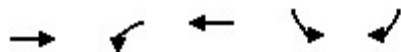
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
 AM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1125	293	662	126	689
v/c Ratio	0.84	0.85	0.65	0.28	0.49
Control Delay	34.2	43.2	11.3	38.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.2	43.2	11.5	38.2	1.2
Queue Length 50th (m)	106.3	38.8	51.8	22.1	0.0
Queue Length 95th (m)	127.0	m52.9	52.1	43.2	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1470	439	1192	454	1415
Starvation Cap Reductn	0	0	109	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.77	0.67	0.61	0.28	0.49

Intersection Summary

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

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	807	228	270	609	0	0	0	0	116	0	634
Future Volume (vph)	0	807	228	270	609	0	0	0	0	116	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3234		1555	1722					1743		1415
Flt Permitted		1.00		0.13	1.00					0.95		1.00
Satd. Flow (perm)		3234		213	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	877	248	293	662	0	0	0	0	126	0	689
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1100	0	293	662	0	0	0	0	126	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		44.9		69.2	65.4					28.6		110.0
Effective Green, g (s)		44.9		69.2	65.4					28.6		110.0
Actuated g/C Ratio		0.41		0.63	0.59					0.26		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1320		347	1023					453		1415
v/s Ratio Prot		0.34		c0.13	0.38							
v/s Ratio Perm				c0.40						0.07		c0.49
v/c Ratio		0.83		0.84	0.65					0.28		0.49
Uniform Delay, d1		29.2		31.0	14.7					32.5		0.0
Progression Factor		1.00		0.86	0.66					1.00		1.00
Incremental Delay, d2		4.7		11.7	0.9					1.5		1.2
Delay (s)		33.9		38.3	10.6					34.0		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.9			19.1			0.0			6.3	
Approach LOS		C			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			21.2			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			68.6%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	870	16	1126	101	89	50	32	56	127
Future Volume (vph)	143	870	16	1126	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	14.0	71.0	57.0	57.0	57.0	9.0	18.5	10.5	20.0	20.0
Total Split (%)	14.0%	71.0%	57.0%	57.0%	57.0%	9.0%	18.5%	10.5%	20.0%	20.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.3	67.4	55.7	55.7	55.7	19.1	11.2	20.1	10.2	10.2
Actuated g/C Ratio	0.72	0.67	0.56	0.56	0.56	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.56	0.48	0.07	0.67	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.9		18.0			39.6		26.2	
Approach LOS		A		B			D		C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 16.6

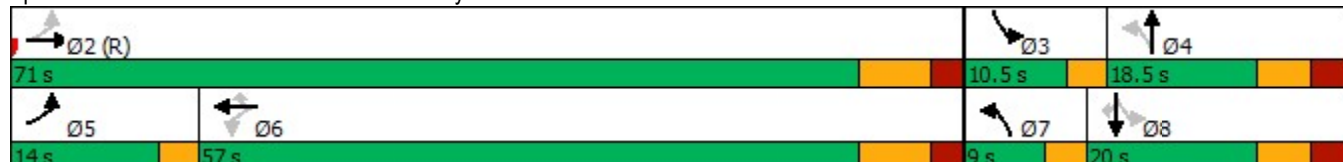
Intersection LOS: B

Intersection Capacity Utilization 70.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1049	17	1224	110	97	74	35	61	138
v/c Ratio	0.56	0.48	0.07	0.67	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
Queue Length 50th (m)	8.5	47.3	1.5	86.5	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	19.1	67.0	5.6	124.0	8.2	28.5	24.6	12.8	22.9	17.0
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	305	2178	238	1823	737	231	189	255	218	277
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	0.51	0.48	0.07	0.67	0.15	0.42	0.39	0.14	0.28	0.50
Intersection Summary										

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	870	95	16	1126	101	89	50	18	32	56	127
Future Volume (vph)	143	870	95	16	1126	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3223		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.15	1.00		0.27	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	231	3223		427	3271	1234	1082	1428		1109	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	946	103	17	1224	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	7	0	0	0	50	0	13	0	0	0	123
Lane Group Flow (vph)	155	1042	0	17	1224	60	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Effective Green, g (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	262	2133		232	1782	672	192	159		185	185	133
v/s Ratio Prot	c0.05	0.32			c0.37		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.34			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.59	0.49		0.07	0.69	0.09	0.51	0.38		0.19	0.33	0.11
Uniform Delay, d1	10.1	8.4		10.8	16.5	10.9	37.8	41.2		36.8	41.3	40.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.3	0.8		0.1	1.0	0.0	1.6	1.1		0.4	0.8	0.3
Delay (s)	13.4	9.2		10.9	17.6	10.9	39.5	42.3		37.2	42.0	40.5
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.8			16.9			40.7			40.4	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	771	618	210	485	368	0	2	0
Future Volume (vph)	6	771	618	210	485	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effect Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	1.11	0.53	1.11	0.64	0.84	0.59	0.02	0.02
Control Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
LOS	B	F	A	F	C	D	B	D	A
Approach Delay		46.9			52.4		31.7		9.4
Approach LOS		D			D		C		A

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 40 (36%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 44.4

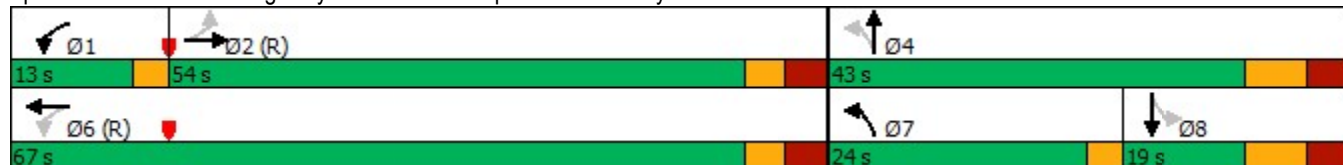
Intersection LOS: D

Intersection Capacity Utilization 103.6%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	838	672	228	528	400	346	2	8
v/c Ratio	0.02	1.11	0.53	1.11	0.64	0.84	0.59	0.02	0.02
Control Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
Queue Length 50th (m)	0.7	~206.5	0.0	~41.3	75.2	72.1	14.1	0.4	0.0
Queue Length 95th (m)	m0.8	m#234.0	m0.0	#89.2	111.3	#123.5	43.3	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	321	752	1262	205	830	475	590	89	384
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	0.02	1.11	0.53	1.11	0.64	0.84	0.59	0.02	0.02
Intersection Summary									
~ 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.									

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	771	618	210	485	1	368	0	318	2	0	7
Future Volume (vph)	6	771	618	210	485	1	368	0	318	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.46	1.00	1.00	0.08	1.00		0.58	1.00		0.55	1.00	
Satd. Flow (perm)	753	1761	1262	131	1521		978	1336		985	1450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	838	672	228	527	1	400	0	346	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	178	0	0	7	0
Lane Group Flow (vph)	7	838	672	228	528	0	400	168	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	321	752	1262	200	829		422	412		89	131	
v/s Ratio Prot		0.48		c0.10	0.35		c0.18	0.13			0.00	
v/s Ratio Perm	0.01		0.53	c0.52			c0.11			0.00		
v/c Ratio	0.02	1.11	0.53	1.14	0.64		0.95	0.41		0.02	0.01	
Uniform Delay, d1	18.2	31.5	0.0	33.0	17.4		35.6	30.1		45.5	45.5	
Progression Factor	0.67	0.76	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	58.7	0.6	106.4	3.7		30.5	0.7		0.5	0.1	
Delay (s)	12.3	82.6	0.6	139.4	21.1		66.1	30.7		46.0	45.6	
Level of Service	B	F	A	F	C		E	C		D	D	
Approach Delay (s)		45.9			56.8			49.7			45.6	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			49.6			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			103.6%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
PM Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	1038	205	638	358	725
Future Volume (vph)	1038	205	638	358	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	59.0	15.0	74.0	36.0	
Total Split (%)	53.6%	13.6%	67.3%	32.7%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	52.4	71.6	67.8	26.2	110.0
Actuated g/C Ratio	0.48	0.65	0.62	0.24	1.00
v/c Ratio	0.94	0.94	0.65	0.94	0.56
Control Delay	39.6	72.1	16.9	73.2	1.6
Queue Delay	0.0	0.0	0.6	0.0	0.0
Total Delay	39.6	72.1	17.6	73.2	1.6
LOS	D	E	B	E	A
Approach Delay	39.6		30.8		
Approach LOS	D		C		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 32.6

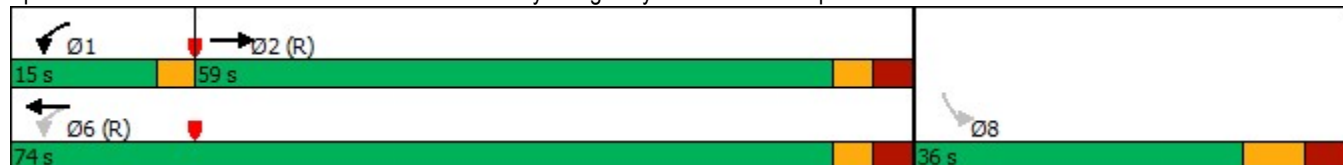
Intersection LOS: C

Intersection Capacity Utilization 89.8%

ICU Level of Service E

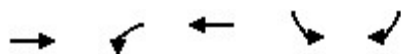
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
 PM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1473	223	693	389	788
v/c Ratio	0.94	0.94	0.65	0.94	0.56
Control Delay	39.6	72.1	16.9	73.2	1.6
Queue Delay	0.0	0.0	0.6	0.0	0.0
Total Delay	39.6	72.1	17.6	73.2	1.6
Queue Length 50th (m)	150.0	37.2	67.4	81.7	0.0
Queue Length 95th (m)	#202.6	m#71.7	m126.4	#136.9	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1565	238	1061	424	1415
Starvation Cap Reductn	0	0	118	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.94	0.94	0.73	0.92	0.56

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1038	317	205	638	0	0	0	0	358	0	725
Future Volume (vph)	0	1038	317	205	638	0	0	0	0	358	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3227		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3227		118	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1128	345	223	693	0	0	0	0	389	0	788
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1447	0	223	693	0	0	0	0	389	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		52.4		67.8	67.8					26.2		110.0
Effective Green, g (s)		52.4		67.8	67.8					26.2		110.0
Actuated g/C Ratio		0.48		0.62	0.62					0.24		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1537		234	1061					415		1415
v/s Ratio Prot		0.45		c0.11	0.40							
v/s Ratio Perm				c0.48						c0.22		0.56
v/c Ratio		0.94		0.95	0.65					0.94		0.56
Uniform Delay, d1		27.3		33.5	13.5					41.1		0.0
Progression Factor		1.00		1.40	1.04					1.00		1.00
Incremental Delay, d2		12.7		36.1	2.1					28.6		1.6
Delay (s)		40.0		83.0	16.2					69.7		1.6
Level of Service		D		F	B					E		A
Approach Delay (s)		40.0			32.4			0.0			24.1	
Approach LOS		D			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			32.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			89.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	1118	28	1050	285	128	102	233	143	474
Future Volume (vph)	436	1118	28	1050	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.2	83.6	49.4	49.4	49.4	9.0	20.4	16.0	27.4	27.4
Total Split (%)	28.5%	69.7%	41.2%	41.2%	41.2%	7.5%	17.0%	13.3%	22.8%	22.8%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.1	76.2	41.5	41.5	41.5	22.9	12.6	32.9	19.6	19.6
Actuated g/C Ratio	0.68	0.64	0.35	0.35	0.35	0.19	0.10	0.27	0.16	0.16
v/c Ratio	1.05	0.65	0.27	1.01	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
LOS	F	B	D	E	A	D	F	E	D	C
Approach Delay		35.2		54.9			74.1		42.5	
Approach LOS		D		D			E		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 45.6

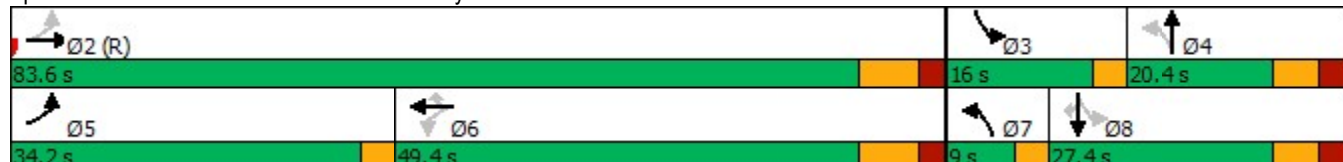
Intersection LOS: D

Intersection Capacity Utilization 101.6%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1336	30	1141	310	139	139	253	155	515
v/c Ratio	1.05	0.65	0.27	1.01	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
Queue Length 50th (m)	~108.9	95.7	5.1	~143.1	3.4	26.1	30.8	51.9	33.8	10.6
Queue Length 95th (m)	#173.2	117.8	14.0	#189.6	25.7	44.2	#66.6	#101.9	55.3	#74.3
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	450	2054	111	1131	615	219	164	282	288	592
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	1.05	0.65	0.27	1.01	0.50	0.63	0.85	0.90	0.54	0.87
Intersection Summary										
~ 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.										

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	1118	111	28	1050	285	128	102	26	233	143	474
Future Volume (vph)	436	1118	111	28	1050	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3227		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.20	1.00	1.00	0.66	1.00		0.47	1.00	1.00
Satd. Flow (perm)	141	3227		320	3271	1234	1031	1443		731	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	474	1215	121	30	1141	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	6	0	0	0	188	0	7	0	0	0	388
Lane Group Flow (vph)	474	1330	0	30	1141	122	139	132	0	253	155	127
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Effective Green, g (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Actuated g/C Ratio	0.64	0.64		0.35	0.35	0.35	0.16	0.10		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	444	2049		110	1131	426	182	151		256	281	201
v/s Ratio Prot	c0.28	0.41			0.35		0.04	0.09		c0.11	0.09	
v/s Ratio Perm	c0.40			0.09		0.10	0.08			c0.13		0.10
v/c Ratio	1.07	0.65		0.27	1.01	0.29	0.76	0.87		0.99	0.55	0.63
Uniform Delay, d1	36.5	13.6		28.3	39.2	28.5	47.7	52.9		43.9	46.2	46.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	61.9	1.6		1.0	28.9	0.3	16.6	38.5		52.4	1.9	5.5
Delay (s)	98.4	15.2		29.3	68.2	28.8	64.3	91.4		96.3	48.0	52.4
Level of Service	F	B		C	E	C	E	F		F	D	D
Approach Delay (s)		37.0			59.2			77.9			63.7	
Approach LOS		D			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			52.3									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 21.2
Intersection Capacity Utilization			101.6%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	662	640	271	594	360	1	1	6
Future Volume (vph)	7	662	640	271	594	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	57.0	57.0		15.0	72.0	19.0	38.0	19.0	19.0
Total Split (%)	51.8%	51.8%		13.6%	65.5%	17.3%	34.5%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	50.0	50.0	110.0	69.0	65.0	35.0	29.0	10.0	10.0
Actuated g/C Ratio	0.45	0.45	1.00	0.63	0.59	0.32	0.26	0.09	0.09
v/c Ratio	0.03	0.90	0.55	1.07	0.72	0.97	0.52	0.01	0.08
Control Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
LOS	B	C	A	F	C	E	A	D	D
Approach Delay		13.2			45.1		45.8		37.2
Approach LOS		B			D		D		D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 16 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 30.4

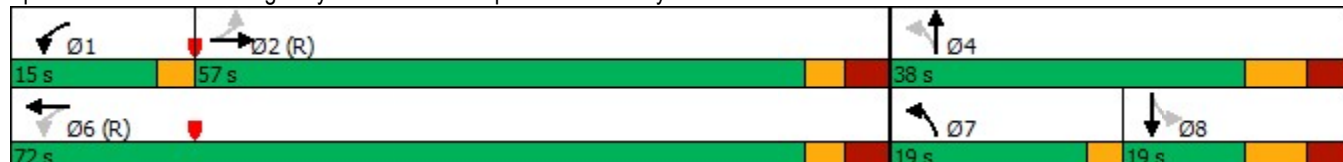
Intersection LOS: C

Intersection Capacity Utilization 100.8%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	720	696	295	647	391	297	1	12
v/c Ratio	0.03	0.90	0.55	1.07	0.72	0.97	0.52	0.01	0.08
Control Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
Queue Length 50th (m)	0.4	100.8	0.0	~45.6	92.7	75.3	0.2	0.2	1.4
Queue Length 95th (m)	m0.5	m123.1	m0.0	#98.5	137.7	#142.4	21.4	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	291	800	1262	276	899	402	570	93	149
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	0.03	0.90	0.55	1.07	0.72	0.97	0.52	0.01	0.08

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #2
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	662	640	271	594	1	360	1	272	1	6	5
Future Volume (vph)	7	662	640	271	594	1	360	1	272	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.39	1.00	1.00	0.13	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	641	1761	1262	206	1521		975	1337		1030	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	720	696	295	646	1	391	1	296	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	218	0	0	5	0
Lane Group Flow (vph)	8	720	696	295	647	0	391	79	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	50.0	50.0	110.0	65.0	65.0		29.0	29.0		10.0	10.0	
Effective Green, g (s)	50.0	50.0	110.0	65.0	65.0		29.0	29.0		10.0	10.0	
Actuated g/C Ratio	0.45	0.45	1.00	0.59	0.59		0.26	0.26		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	291	800	1262	268	898		348	352		93	145	
v/s Ratio Prot		0.41		c0.12	0.43		c0.16	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.53			c0.13			0.00		
v/c Ratio	0.03	0.90	0.55	1.10	0.72		1.12	0.22		0.01	0.05	
Uniform Delay, d1	16.6	27.7	0.0	27.0	16.0		39.2	31.7		45.5	45.7	
Progression Factor	0.59	0.59	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.0	0.7	84.6	5.0		86.0	0.3		0.2	0.7	
Delay (s)	9.9	23.2	0.7	111.6	21.0		125.3	32.0		45.7	46.3	
Level of Service	A	C	A	F	C		F	C		D	D	
Approach Delay (s)		12.1			49.4			85.0			46.3	
Approach LOS		B			D			F			D	
Intersection Summary												
HCM 2000 Control Delay			40.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			100.8%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
SAT Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	1032	245	681	277	791
Future Volume (vph)	1032	245	681	277	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	60.0	19.0	79.0	31.0	
Total Split (%)	54.5%	17.3%	71.8%	28.2%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	54.4	76.7	72.9	21.1	110.0
Actuated g/C Ratio	0.49	0.70	0.66	0.19	1.00
v/c Ratio	0.92	0.94	0.65	0.90	0.61
Control Delay	35.8	58.2	9.8	74.0	1.9
Queue Delay	1.2	0.0	0.5	0.0	0.0
Total Delay	37.0	58.2	10.2	74.0	1.9
LOS	D	E	B	E	A
Approach Delay	37.0		22.9		
Approach LOS	D		C		

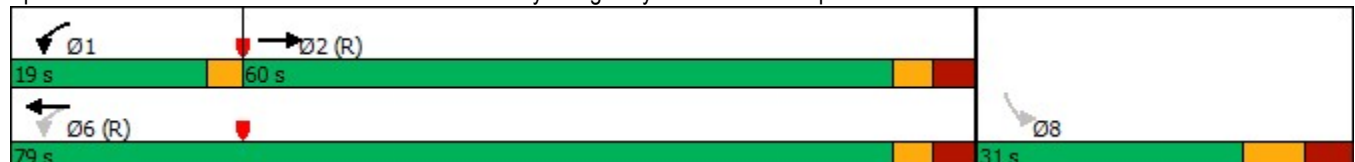
Intersection Summary

Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 27.9
 Intersection Capacity Utilization 87.7%
 Analysis Period (min) 15

Intersection LOS: C

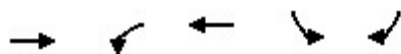
ICU Level of Service E

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
 SAT Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1490	266	740	301	860
v/c Ratio	0.92	0.94	0.65	0.90	0.61
Control Delay	35.8	58.2	9.8	74.0	1.9
Queue Delay	1.2	0.0	0.5	0.0	0.0
Total Delay	37.0	58.2	10.2	74.0	1.9
Queue Length 50th (m)	149.8	40.5	65.6	63.2	0.0
Queue Length 95th (m)	#202.9	m#71.2	m105.9	#109.8	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1619	289	1142	345	1415
Starvation Cap Reductn	0	0	116	0	0
Spillback Cap Reductn	38	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.94	0.92	0.72	0.87	0.61

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #2
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1032	339	245	681	0	0	0	0	277	0	791
Future Volume (vph)	0	1032	339	245	681	0	0	0	0	277	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3221		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3221		114	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1122	368	266	740	0	0	0	0	301	0	860
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1462	0	266	740	0	0	0	0	301	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		54.3		72.9	72.9					21.1		110.0
Effective Green, g (s)		54.3		72.9	72.9					21.1		110.0
Actuated g/C Ratio		0.49		0.66	0.66					0.19		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1590		279	1141					334		1415
v/s Ratio Prot		0.45		c0.13	0.43							
v/s Ratio Perm				c0.49						c0.17		0.61
v/c Ratio		0.92		0.95	0.65					0.90		0.61
Uniform Delay, d1		25.8		34.8	11.0					43.4		0.0
Progression Factor		1.00		1.02	0.70					1.00		1.00
Incremental Delay, d2		10.1		28.6	1.6					26.0		1.9
Delay (s)		35.9		64.0	9.3					69.5		1.9
Level of Service		D		E	A					E		A
Approach Delay (s)		35.9			23.7			0.0			19.5	
Approach LOS		D			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			27.3			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			87.7%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
SAT Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	1011	18	1097	357	135	217	340	178	657
Future Volume (vph)	751	1011	18	1097	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	43.0	86.0	43.0	43.0	43.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.1%	66.2%	33.1%	33.1%	33.1%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	35.1	35.1	35.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.27	0.27	0.27	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.60	0.62	0.21	1.35	0.73	0.67	1.38	1.40	0.53	1.01
Control Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		133.7		156.6			174.7		102.3	
Approach LOS		F		F			F		F	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.60

Intersection Signal Delay: 136.1

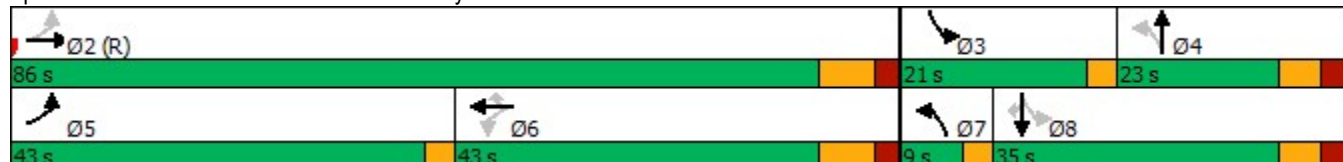
Intersection LOS: F

Intersection Capacity Utilization 136.4%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
SAT Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1215	20	1192	388	147	249	370	193	714
v/c Ratio	1.60	0.62	0.21	1.35	0.73	0.67	1.38	1.40	0.53	1.01
Control Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
Queue Length 50th (m)	~285.8	98.0	4.0	~210.2	25.9	28.6	~84.7	~111.0	44.2	~63.3
Queue Length 95th (m)	#362.0	119.3	11.7	#252.2	66.3	#48.6	#137.7	#172.1	68.6	#145.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	511	1944	97	883	533	221	180	265	366	704
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	1.60	0.63	0.21	1.35	0.73	0.67	1.38	1.40	0.53	1.01

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #2
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	1011	107	18	1097	357	135	217	12	340	178	657
Future Volume (vph)	751	1011	107	18	1097	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3225		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.10	1.00		0.23	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	164	3225		362	3271	1234	995	1477		335	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	816	1099	116	20	1192	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	6	0	0	0	201	0	2	0	0	0	441
Lane Group Flow (vph)	816	1209	0	20	1192	187	147	247	0	370	193	273
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		35.1	35.1	35.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		35.1	35.1	35.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.27	0.27	0.27	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	505	1937		97	883	333	188	178		253	366	262
v/s Ratio Prot	c0.50	0.37			0.36		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.47			0.06		0.15	0.09			c0.21		0.22
v/c Ratio	1.62	0.62		0.21	1.35	0.56	0.78	1.39		1.46	0.53	1.04
Uniform Delay, d1	37.9	16.6		36.7	47.5	40.8	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	286.2	1.5		0.8	165.0	1.8	18.3	205.8		228.6	1.0	66.5
Delay (s)	324.1	18.1		37.5	212.4	42.6	69.1	262.9		270.6	46.4	117.6
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		141.1			169.1			191.0			151.2	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		155.7			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.64										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			21.2				
Intersection Capacity Utilization		136.4%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

APPENDIX 12

Sensitivity Analysis #2 – 25% Increase to Residential Density – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (+25%) – No Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	37
			EBT	55
			EBR	53
			NBL	28
			NBT	28
			NBR	28
			SBL	20
			SBT	26
			SBR	16
			WBL	13
			WBT	87
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	132
			EBT	132
			SBL	35
			WBL	40
			WBT	82
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	2
			EBT	62
			EBR	-
			NBL	51
			NBT	20
			NBR	20
			SBL	0
			SBT	7
			SBR	7
			WBL	60
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	0
			WBT	34
	5	Daimler Parkway and Street 'A'	EBL	58
			EBT	58
			EBR	58
			NBL	40
			SBR	18
			WBT	31
	1	Woodlawn Road and Primeway	EBL	124
			EBT	222
			EBR	222
			NBL	43
			NBT	61
			NBR	61

PM Peak Hour		1	Drive / Brown Road	SBL	69
				SBT	67
				SBR	78
				WBL	16
				WBT	159
				WBR	38
				EBR	450
		2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBT	453
				SBL	298
				WBL	54
				WBT	193
				EBL	7
		3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	219
				EBR	-
				NBL	122
				NBT	107
				NBR	107
				SBL	8
				SBT	8
				SBR	8
				WBL	68
				WBT	70
				WBR	70
		4	Rail Crossing	EBT	75
				WBT	39
		5	Daimler Parkway and Street 'A'	EBL	75
				EBT	75
				EBR	75
				NBL	123
				SBR	14
				WBT	36
				EBL	275
k Hour		1	Woodlawn Road and Primeway Drive / Brown Road	EBT	323
				EBR	323
				NBL	44
				NBT	81
				NBR	80
				SBL	95
				SBT	99
				SBR	103
				WBL	13
				WBT	157
				WBR	49
		2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	202
				EBT	203
				SBL	78
				WBL	54
				WBT	111
				EBL	9

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	158
			EBR	-
			NBL	80
			NBT	43
			NBR	43
			SBL	4
			SBT	10
			SBR	10
			WBL	60
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	156
			EBT	156
			EBR	156
			NBL	71
			SBR	16
			WBT	37

Future Total (2051) Conditions Model – Bridge Adjustment (+25%) – With Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	36
			EBT	55
			EBR	53
			NBL	28
			NBT	28
			NBR	28
			SBL	20
			SBT	26
			SBR	16
			WBL	14
			WBT	89
			WBR	17
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	130
			EBT	130
			SBL	34
			WBL	41
			WBT	91
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	2
			EBT	63
			EBR	-
			NBL	53
			NBT	20
			NBR	20
			SBL	0
			SBT	7
			SBR	7
			WBL	62
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	55
			WBT	147
	5	Daimler Parkway and Street 'A'	EBL	63
			EBT	63
			EBR	63
			NBL	44
			SBR	20
			WBT	34
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	129
			EBT	286
			EBR	286
			NBL	46
			NBT	71
			NBR	71
			SBL	78

PM Peak Hour			SBT	76
			SBR	82
			WBL	15
			WBT	171
			WBR	37
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	483
			EBT	484
			SBL	368
			WBL	57
			WBT	202
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	220
			EBR	-
			NBL	132
			NBT	131
			NBR	131
			SBL	8
			SBT	8
			SBR	8
			WBL	68
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	75
			WBT	130
	5	Daimler Parkway and Street 'A'	EBL	75
			EBT	75
			EBR	75
			NBL	122
			SBR	13
			WBT	35

APPENDIX 13

Sensitivity Analysis #3 – 10% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Synchro Analysis Results



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	198	669	271	499	233	1	1
Future Volume (vph)	1	198	669	271	499	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	50.0	50.0		19.0	69.0	22.0	41.0	19.0
Total Split (%)	45.5%	45.5%		17.3%	62.7%	20.0%	37.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effect Green (s)	44.6	44.6	110.0	66.0	62.0	38.0	32.0	10.9
Actuated g/C Ratio	0.41	0.41	1.00	0.60	0.56	0.35	0.29	0.10
v/c Ratio	0.00	0.30	0.58	0.47	0.63	0.57	0.23	0.01
Control Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
LOS	A	A	A	B	C	C	A	D
Approach Delay		9.1			18.0		26.0	39.0
Approach LOS		A			B		C	D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 49 (45%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 15.5

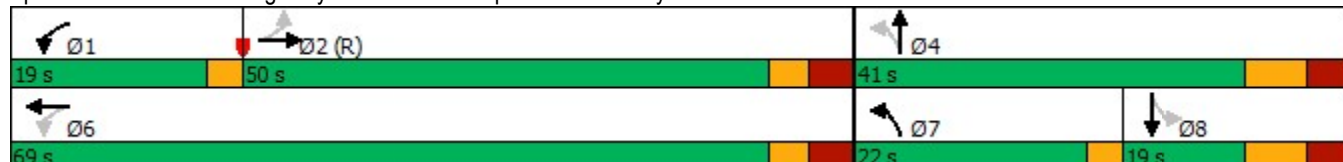
Intersection LOS: B

Intersection Capacity Utilization 85.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	215	727	295	542	253	105	2
v/c Ratio	0.00	0.30	0.58	0.47	0.63	0.57	0.23	0.01
Control Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
Queue Length 50th (m)	0.1	13.1	61.9	29.3	74.7	41.9	0.2	0.2
Queue Length 95th (m)	m0.1	m18.7	72.1	44.9	110.4	65.4	12.4	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	306	713	1262	643	857	450	462	157
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.30	0.58	0.46	0.63	0.56	0.23	0.01
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	198	669	271	499	0	233	1	96	0	1	1
Future Volume (vph)	1	198	669	271	499	0	233	1	96	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.46	1.00	1.00	0.56	1.00		0.59	1.00			1.00	
Satd. Flow (perm)	756	1761	1262	916	1522		1003	1338			1578	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	215	727	295	542	0	253	1	104	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	74	0	0	1	0
Lane Group Flow (vph)	1	215	727	295	542	0	253	31	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	44.6	44.6	110.0	62.0	62.0		32.0	32.0			10.9	
Effective Green, g (s)	44.6	44.6	110.0	62.0	62.0		32.0	32.0			10.9	
Actuated g/C Ratio	0.41	0.41	1.00	0.56	0.56		0.29	0.29			0.10	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	306	714	1262	599	857		391	389			156	
v/s Ratio Prot		0.12		0.06	c0.36		0.11	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.21			0.08					
v/c Ratio	0.00	0.30	0.58	0.49	0.63		0.65	0.08			0.01	
Uniform Delay, d1	19.5	22.1	0.0	13.1	16.3		32.9	28.3			44.7	
Progression Factor	0.24	0.30	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.8	1.4	0.6	1.5		3.7	0.1			0.1	
Delay (s)	4.7	7.4	1.4	13.7	17.8		36.5	28.4			44.8	
Level of Service	A	A	A	B	B		D	C			D	
Approach Delay (s)		2.8			16.4			34.2			44.8	
Approach LOS		A			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			13.4			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			85.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
AM Peak Hour

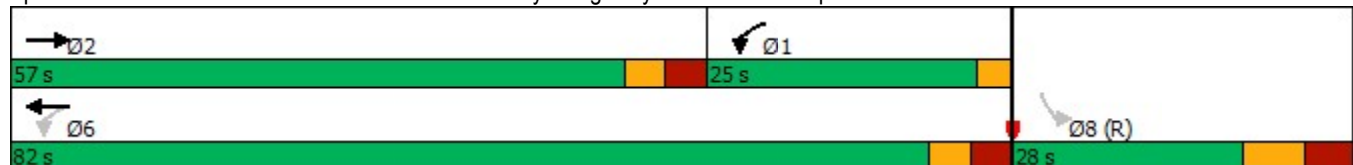
	→	↙	←	↘	↘
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	768	225	501	100	634
Future Volume (vph)	768	225	501	100	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	57.0	25.0	82.0	28.0	
Total Split (%)	51.8%	22.7%	74.5%	25.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effect Green (s)	43.9	64.9	61.1	32.9	110.0
Actuated g/C Ratio	0.40	0.59	0.56	0.30	1.00
v/c Ratio	0.82	0.80	0.57	0.21	0.49
Control Delay	33.8	45.0	13.2	33.9	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	45.0	13.2	33.9	1.2
LOS	C	D	B	C	A
Approach Delay	33.8		23.1		
Approach LOS	C		C		

Intersection Summary

Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 8:SBL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 22.2
 Intersection Capacity Utilization 63.6%
 Analysis Period (min) 15

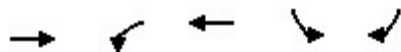
Intersection LOS: C
 ICU Level of Service B

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
 AM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1083	245	545	109	689
v/c Ratio	0.82	0.80	0.57	0.21	0.49
Control Delay	33.8	45.0	13.2	33.9	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	45.0	13.2	33.9	1.2
Queue Length 50th (m)	102.3	29.4	51.1	17.5	0.0
Queue Length 95th (m)	117.5	48.5	53.3	36.6	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1499	416	1177	521	1415
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.72	0.59	0.46	0.21	0.49
Intersection Summary					

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	768	228	225	501	0	0	0	0	100	0	634
Future Volume (vph)	0	768	228	225	501	0	0	0	0	100	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3230		1555	1722					1743		1415
Flt Permitted		1.00		0.14	1.00					0.95		1.00
Satd. Flow (perm)		3230		229	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	835	248	245	545	0	0	0	0	109	0	689
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1055	0	245	545	0	0	0	0	109	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		43.9		64.9	61.1					32.9		110.0
Effective Green, g (s)		43.9		64.9	61.1					32.9		110.0
Actuated g/C Ratio		0.40		0.59	0.56					0.30		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1289		306	956					521		1415
v/s Ratio Prot		0.33		c0.10	0.32							
v/s Ratio Perm				c0.37						0.06		c0.49
v/c Ratio		0.82		0.80	0.57					0.21		0.49
Uniform Delay, d1		29.5		32.1	15.9					28.8		0.0
Progression Factor		1.00		0.91	0.74					1.00		1.00
Incremental Delay, d2		4.2		11.3	0.7					0.9		1.2
Delay (s)		33.7		40.4	12.5					29.7		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.7			21.2			0.0			5.1	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			21.4			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			63.6%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	831	16	1018	101	89	50	32	56	127
Future Volume (vph)	143	831	16	1018	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	16.0	70.0	54.0	54.0	54.0	9.0	19.5	10.5	21.0	21.0
Total Split (%)	16.0%	70.0%	54.0%	54.0%	54.0%	9.0%	19.5%	10.5%	21.0%	21.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.1	67.2	55.2	55.2	55.2	19.3	11.4	20.3	10.4	10.4
Actuated g/C Ratio	0.72	0.67	0.55	0.55	0.55	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.50	0.46	0.07	0.61	0.15	0.42	0.42	0.14	0.34	0.55
Control Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.4		17.2			39.1		25.8	
Approach LOS		A		B			D		C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 16.0

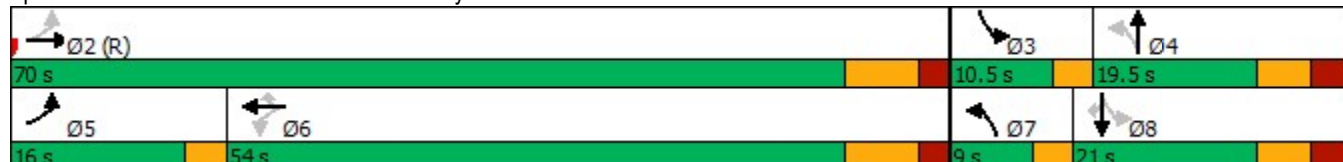
Intersection LOS: B

Intersection Capacity Utilization 67.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1006	17	1107	110	97	74	35	61	138
v/c Ratio	0.50	0.46	0.07	0.61	0.15	0.42	0.42	0.14	0.34	0.55
Control Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
Queue Length 50th (m)	8.5	44.4	1.5	74.0	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	17.1	65.0	5.9	113.3	8.7	28.1	24.3	12.6	22.7	16.8
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	359	2172	246	1804	731	233	201	257	235	288
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	0.43	0.46	0.07	0.61	0.15	0.42	0.37	0.14	0.26	0.48
Intersection Summary										

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	831	95	16	1018	101	89	50	18	32	56	127
Future Volume (vph)	143	831	95	16	1018	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3221		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.18	1.00		0.28	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	282	3221		446	3271	1234	1083	1428		1109	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	903	103	17	1107	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	51	0	13	0	0	0	123
Lane Group Flow (vph)	155	998	0	17	1107	59	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.0	66.0		54.0	54.0	54.0	16.2	11.4		15.4	11.0	11.0
Effective Green, g (s)	66.0	66.0		54.0	54.0	54.0	16.2	11.4		15.4	11.0	11.0
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	294	2125		240	1766	666	194	162		187	189	135
v/s Ratio Prot	c0.05	0.31			c0.34		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.30			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.53	0.47		0.07	0.63	0.09	0.50	0.37		0.19	0.32	0.11
Uniform Delay, d1	8.8	8.4		11.0	16.0	11.1	37.7	41.0		36.6	41.1	40.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.5	0.7		0.1	0.6	0.0	1.6	1.1		0.4	0.7	0.3
Delay (s)	10.4	9.1		11.1	16.6	11.2	39.2	42.1		37.0	41.8	40.4
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.3			16.0			40.5			40.2	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	595	618	177	377	368	0	2	0
Future Volume (vph)	6	595	618	177	377	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effect Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	0.86	0.53	0.72	0.50	0.84	0.46	0.02	0.02
Control Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
LOS	B	C	A	C	B	D	A	D	A
Approach Delay		14.7			21.5		29.7		9.3
Approach LOS		B			C		C		A

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 20.2

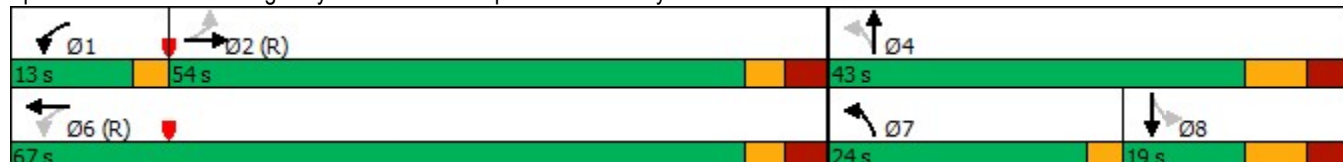
Intersection LOS: C

Intersection Capacity Utilization 91.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	647	672	192	411	400	291	2	8
v/c Ratio	0.02	0.86	0.53	0.72	0.50	0.84	0.46	0.02	0.02
Control Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
Queue Length 50th (m)	0.0	108.2	0.0	18.5	52.3	72.1	0.0	0.4	0.0
Queue Length 95th (m)	m0.0	m#91.7	m22.2	#35.9	78.2	#123.5	14.8	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	364	752	1262	266	830	475	629	94	451
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	0.02	0.86	0.53	0.72	0.50	0.84	0.46	0.02	0.02
Intersection Summary									
# 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.									

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	595	618	177	377	1	368	0	268	2	0	7
Future Volume (vph)	6	595	618	177	377	1	368	0	268	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.52	1.00	1.00	0.16	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	853	1761	1262	256	1521		978	1336		1036	1450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	647	672	192	410	1	400	0	291	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	201	0	0	7	0
Lane Group Flow (vph)	7	647	672	192	411	0	400	90	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	364	752	1262	257	829		422	412		94	131	
v/s Ratio Prot		c0.37		c0.07	0.27		c0.18	0.07			0.00	
v/s Ratio Perm	0.01		0.53	0.34			c0.11			0.00		
v/c Ratio	0.02	0.86	0.53	0.75	0.50		0.95	0.22		0.02	0.01	
Uniform Delay, d1	18.2	28.5	0.0	19.2	15.6		35.6	28.2		45.5	45.5	
Progression Factor	0.63	0.65	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.5	0.9	11.2	2.1		30.5	0.3		0.4	0.1	
Delay (s)	11.5	26.2	0.9	30.4	17.7		66.1	28.4		46.0	45.6	
Level of Service	B	C	A	C	B		E	C		D	D	
Approach Delay (s)		13.3			21.7			50.2			45.6	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			25.1				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			91.6%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
PM Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	914	175	560	305	725
Future Volume (vph)	914	175	560	305	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	48.8	18.0	66.8	43.2	
Total Split (%)	44.4%	16.4%	60.7%	39.3%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	51.9	71.7	67.9	26.1	110.0
Actuated g/C Ratio	0.47	0.65	0.62	0.24	1.00
v/c Ratio	0.87	0.75	0.57	0.80	0.56
Control Delay	34.0	35.5	10.9	53.9	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.0	35.5	11.1	53.9	1.6
LOS	C	D	B	D	A
Approach Delay	34.0		16.9		
Approach LOS	C		B		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 24.0

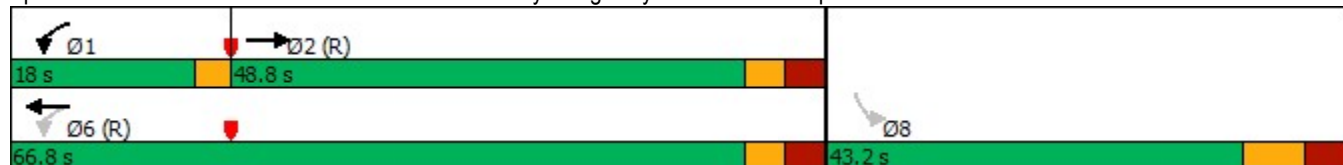
Intersection LOS: C

Intersection Capacity Utilization 80.8%

ICU Level of Service D

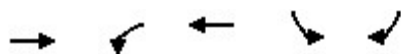
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
 PM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1338	190	609	332	788
v/c Ratio	0.87	0.75	0.57	0.80	0.56
Control Delay	34.0	35.5	10.9	53.9	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.0	35.5	11.1	53.9	1.6
Queue Length 50th (m)	127.8	19.1	75.2	67.2	0.0
Queue Length 95th (m)	#205.6	m42.2	m105.9	90.4	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1545	283	1062	538	1415
Starvation Cap Reductn	0	0	71	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.87	0.67	0.61	0.62	0.56

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	914	317	175	560	0	0	0	0	305	0	725
Future Volume (vph)	0	914	317	175	560	0	0	0	0	305	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3216		1555	1722					1743		1415
Flt Permitted		1.00		0.08	1.00					0.95		1.00
Satd. Flow (perm)		3216		131	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	993	345	190	609	0	0	0	0	332	0	788
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1311	0	190	609	0	0	0	0	332	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		52.0		67.9	67.9					26.1		110.0
Effective Green, g (s)		52.0		67.9	67.9					26.1		110.0
Actuated g/C Ratio		0.47		0.62	0.62					0.24		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1520		247	1062					413		1415
v/s Ratio Prot		c0.41		c0.09	0.35							
v/s Ratio Perm				0.38						c0.19		0.56
v/c Ratio		0.86		0.77	0.57					0.80		0.56
Uniform Delay, d1		25.8		26.9	12.5					39.5		0.0
Progression Factor		1.00		0.94	0.65					1.00		1.00
Incremental Delay, d2		6.7		10.3	1.7					10.8		1.6
Delay (s)		32.5		35.7	9.8					50.4		1.6
Level of Service		C		D	A					D		A
Approach Delay (s)		32.5			15.9			0.0			16.0	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			22.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			80.8%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	994	28	972	285	128	102	233	143	474
Future Volume (vph)	436	994	28	972	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.3	83.0	48.7	48.7	48.7	9.0	21.6	15.4	28.0	28.0
Total Split (%)	28.6%	69.2%	40.6%	40.6%	40.6%	7.5%	18.0%	12.8%	23.3%	23.3%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.0	76.1	40.8	40.8	40.8	23.6	13.3	33.0	19.7	19.7
Actuated g/C Ratio	0.68	0.63	0.34	0.34	0.34	0.20	0.11	0.28	0.16	0.16
v/c Ratio	1.04	0.59	0.24	0.95	0.50	0.62	0.83	0.90	0.55	0.86
Control Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
LOS	F	B	C	E	A	D	F	E	D	C
Approach Delay		34.5		44.8			67.8		41.4	
Approach LOS		C		D			E		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 41.5

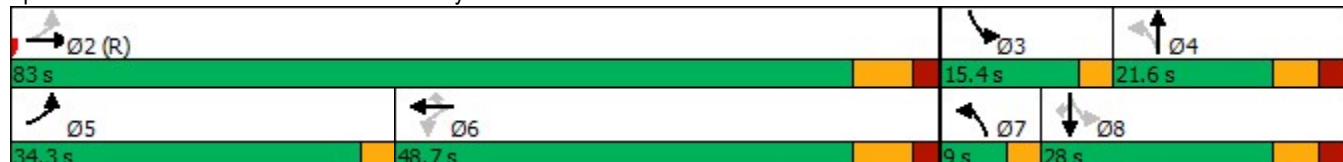
Intersection LOS: D

Intersection Capacity Utilization 99.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
PM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1201	30	1057	310	139	139	253	155	515
v/c Ratio	1.04	0.59	0.24	0.95	0.50	0.62	0.83	0.90	0.55	0.86
Control Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
Queue Length 50th (m)	~108.8	81.3	5.1	127.1	0.2	25.9	30.2	51.5	33.6	8.8
Queue Length 95th (m)	#173.1	100.5	13.6	#169.9	20.6	43.9	#62.5	#100.2	54.9	#70.6
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	457	2050	124	1112	623	225	180	282	297	603
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	1.04	0.59	0.24	0.95	0.50	0.62	0.77	0.90	0.52	0.85

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	994	111	28	972	285	128	102	26	233	143	474
Future Volume (vph)	436	994	111	28	972	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3222		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.23	1.00	1.00	0.66	1.00		0.48	1.00	1.00
Satd. Flow (perm)	143	3222		367	3271	1234	1031	1443		749	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	474	1080	121	30	1057	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	7	0	0	0	204	0	8	0	0	0	395
Lane Group Flow (vph)	474	1194	0	30	1057	106	139	131	0	253	155	120
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.1	76.1		40.8	40.8	40.8	19.3	13.3		28.7	19.7	19.7
Effective Green, g (s)	76.1	76.1		40.8	40.8	40.8	19.3	13.3		28.7	19.7	19.7
Actuated g/C Ratio	0.63	0.63		0.34	0.34	0.34	0.16	0.11		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	452	2043		124	1112	419	188	159		255	282	202
v/s Ratio Prot	c0.28	0.37			0.32		0.04	0.09		c0.10	0.09	
v/s Ratio Perm	c0.38			0.08		0.09	0.08			c0.13		0.10
v/c Ratio	1.05	0.58		0.24	0.95	0.25	0.74	0.82		0.99	0.55	0.60
Uniform Delay, d1	36.1	12.8		28.5	38.6	28.6	47.0	52.2		44.0	46.1	46.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	55.7	1.2		0.7	16.5	0.2	13.5	27.4		54.0	1.7	3.9
Delay (s)	91.8	14.0		29.2	55.1	28.8	60.5	79.6		97.9	47.8	50.4
Level of Service	F	B		C	E	C	E	E		F	D	D
Approach Delay (s)		36.0			48.7			70.1			63.0	
Approach LOS		D			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			48.2									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 21.2
Intersection Capacity Utilization			99.3%									ICU Level of Service F
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	511	640	231	461	360	1	1	6
Future Volume (vph)	7	511	640	231	461	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	51.0	51.0		16.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	46.4%	46.4%		14.5%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	44.6	44.6	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.41	0.41	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.03	0.78	0.55	0.74	0.60	0.82	0.43	0.01	0.08
Control Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
LOS	B	C	A	C	C	D	A	D	D
Approach Delay		12.1			22.5		30.4		37.2
Approach LOS		B			C		C		D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 21 (19%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 19.6

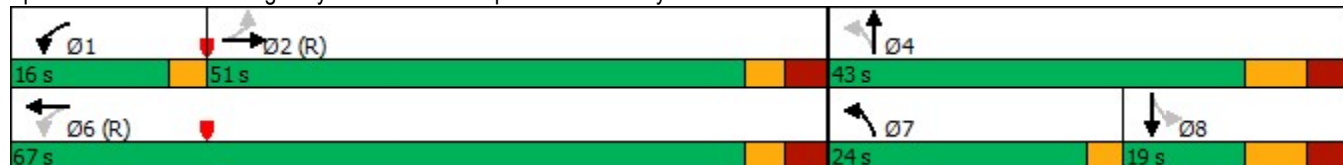
Intersection LOS: B

Intersection Capacity Utilization 91.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	555	696	251	502	391	250	1	12
v/c Ratio	0.03	0.78	0.55	0.74	0.60	0.82	0.43	0.01	0.08
Control Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
Queue Length 50th (m)	0.5	90.1	3.0	25.3	69.7	69.9	0.2	0.2	1.4
Queue Length 95th (m)	m0.6	m118.9	10.7	#43.0	103.2	#117.5	17.9	1.8	7.3
Internal Link Dist (m)	194.3				158.2		78.8		37.3
Turn Bay Length (m)	55.0						50.0		15.0
Base Capacity (vph)	317	713	1262	346	830	475	585	97	149
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	0.03	0.78	0.55	0.73	0.60	0.82	0.43	0.01	0.08
Intersection Summary									
# 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.									

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #3
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	511	640	231	461	1	360	1	229	1	6	5
Future Volume (vph)	7	511	640	231	461	1	360	1	229	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.48	1.00	1.00	0.22	1.00		0.58	1.00		0.60	1.00	
Satd. Flow (perm)	784	1761	1262	352	1521		975	1337		1075	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	555	696	251	501	1	391	1	249	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	172	0	0	5	0
Lane Group Flow (vph)	8	555	696	251	502	0	391	78	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	44.6	44.6	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	44.6	44.6	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.41	0.41	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	714	1262	327	829		421	413		97	145	
v/s Ratio Prot		0.32		c0.09	0.33		c0.18	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.33			c0.11			0.00		
v/c Ratio	0.03	0.78	0.55	0.77	0.61		0.93	0.19		0.01	0.05	
Uniform Delay, d1	19.6	28.4	0.0	17.9	17.0		35.3	27.9		45.5	45.7	
Progression Factor	0.59	0.66	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	4.9	1.0	10.3	3.3		26.6	0.2		0.2	0.7	
Delay (s)	11.7	23.7	1.0	28.2	20.2		61.8	28.1		45.7	46.3	
Level of Service	B	C	A	C	C		E	C		D	D	
Approach Delay (s)		11.1			22.9			48.7			46.3	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			23.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			91.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
SAT Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	926	207	586	232	791
Future Volume (vph)	926	207	586	232	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	60.7	19.0	79.7	30.3	
Total Split (%)	55.2%	17.3%	72.5%	27.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	57.5	78.4	74.6	19.4	110.0
Actuated g/C Ratio	0.52	0.71	0.68	0.18	1.00
v/c Ratio	0.80	0.78	0.55	0.82	0.61
Control Delay	26.0	33.7	7.0	65.3	1.9
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	26.0	33.7	7.2	65.3	1.9
LOS	C	C	A	E	A
Approach Delay	26.0		14.1		
Approach LOS	C		B		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 19.7

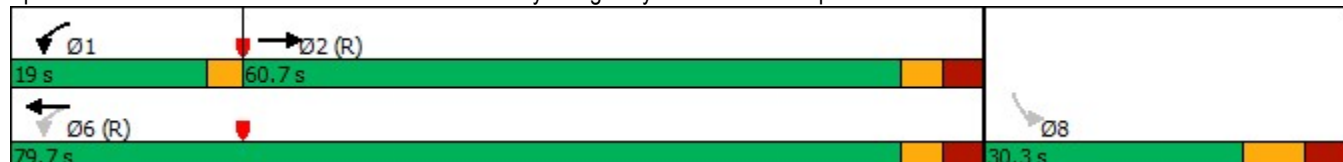
Intersection LOS: B

Intersection Capacity Utilization 79.3%

ICU Level of Service D

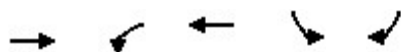
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
 SAT Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1375	225	637	252	860
v/c Ratio	0.80	0.78	0.55	0.82	0.61
Control Delay	26.0	33.7	7.0	65.3	1.9
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	26.0	33.7	7.2	65.3	1.9
Queue Length 50th (m)	126.7	20.8	44.8	51.6	0.0
Queue Length 95th (m)	159.4	m42.7	m77.5	#86.8	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1709	313	1168	334	1415
Starvation Cap Reductn	0	0	121	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.72	0.61	0.75	0.61

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #3
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	926	339	207	586	0	0	0	0	232	0	791
Future Volume (vph)	0	926	339	207	586	0	0	0	0	232	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3211		1555	1722					1743		1415
Flt Permitted		1.00		0.09	1.00					0.95		1.00
Satd. Flow (perm)		3211		154	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1007	368	225	637	0	0	0	0	252	0	860
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1343	0	225	637	0	0	0	0	252	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		57.4		74.6	74.6					19.4		110.0
Effective Green, g (s)		57.4		74.6	74.6					19.4		110.0
Actuated g/C Ratio		0.52		0.68	0.68					0.18		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1675		285	1167					307		1415
v/s Ratio Prot		0.42		c0.10	0.37							
v/s Ratio Perm				c0.43						0.14		c0.61
v/c Ratio		0.80		0.79	0.55					0.82		0.61
Uniform Delay, d1		21.6		25.3	9.0					43.6		0.0
Progression Factor		1.00		1.00	0.58					1.00		1.00
Incremental Delay, d2		4.2		9.9	1.3					16.0		1.9
Delay (s)		25.8		35.3	6.6					59.6		1.9
Level of Service		C		D	A					E		A
Approach Delay (s)		25.8			14.1			0.0			15.0	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			19.2		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			110.0		Sum of lost time (s)					19.0		
Intersection Capacity Utilization			79.3%		ICU Level of Service					D		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
SAT Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	905	18	1002	357	135	217	340	178	657
Future Volume (vph)	751	905	18	1002	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	44.0	86.0	42.0	42.0	42.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.8%	66.2%	32.3%	32.3%	32.3%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	34.1	34.1	34.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.26	0.26	0.26	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.56	0.57	0.19	1.27	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		133.0		130.1			174.7		99.6	
Approach LOS		F		F			F		F	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.56

Intersection Signal Delay: 127.0

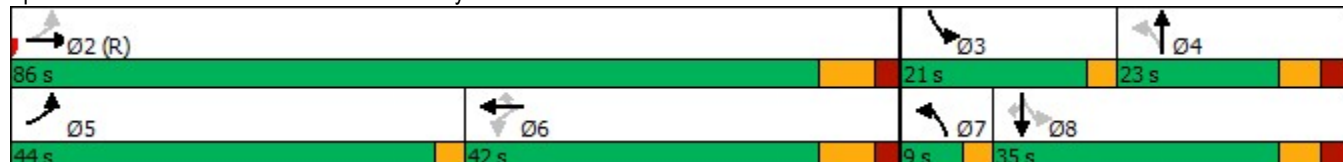
Intersection LOS: F

Intersection Capacity Utilization 133.6%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
SAT Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1100	20	1089	388	147	249	370	193	714
v/c Ratio	1.56	0.57	0.19	1.27	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
Queue Length 50th (m)	~282.5	83.7	4.0	~184.8	26.6	28.6	~84.7	~111.0	44.2	50.0
Queue Length 95th (m)	#358.7	102.5	11.6	#226.6	67.6	#48.6	#137.7	#172.1	68.6	#139.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	523	1940	106	858	525	221	180	265	366	715
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	1.56	0.57	0.19	1.27	0.74	0.67	1.38	1.40	0.53	1.00

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #3
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	905	107	18	1002	357	135	217	12	340	178	657
Future Volume (vph)	751	905	107	18	1002	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3220		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.11	1.00		0.26	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	169	3220		406	3271	1234	995	1477		335	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	816	984	116	20	1089	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	7	0	0	0	202	0	2	0	0	0	452
Lane Group Flow (vph)	816	1093	0	20	1089	186	147	247	0	370	193	262
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.26	0.26	0.26	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	516	1934		106	858	323	188	178		253	366	262
v/s Ratio Prot	c0.50	0.34			0.33		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.45			0.05		0.15	0.09			c0.21		0.21
v/c Ratio	1.58	0.57		0.19	1.27	0.58	0.78	1.39		1.46	0.53	1.00
Uniform Delay, d1	37.5	15.7		37.2	48.0	41.7	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	270.8	1.2		0.6	130.3	2.0	18.3	205.8		228.6	1.0	54.7
Delay (s)	308.3	16.9		37.8	178.3	43.7	69.1	262.9		270.6	46.4	105.8
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		141.0			141.5			191.0			144.6	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		145.9			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.61										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			21.2				
Intersection Capacity Utilization		133.6%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

APPENDIX 14

Sensitivity Analysis #3 – 10% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (-10%) – No Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	53
			EBR	51
			NBL	26
			NBT	28
			NBR	27
			SBL	18
			SBT	25
			SBR	16
			WBL	9
			WBT	72
			WBR	16
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	126
			EBT	127
			SBL	32
			WBL	38
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	WBT	63
			EBL	1
			EBT	58
			EBR	-
			NBL	49
			NBT	15
			NBR	15
			SBL	0
			SBT	6
			SBR	6
			WBL	40
			WBT	66
			WBR	66
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	31
			EBT	31
			EBR	31
			NBL	26
			SBR	10
			WBT	31
	1	Woodlawn Road and Primeway	EBL	118
			EBT	126
			EBR	126
			NBL	43
			NBT	56
			NBR	56

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	118
			EBR	-
			NBL	72
			NBT	33
			NBR	33
			SBL	4
			SBT	10
			SBR	10
			WBL	42
			WBT	67
			WBR	67
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	99
			EBT	99
			EBR	99
			NBL	38
			SBR	10
			WBT	24

Future Total (2051) Conditions Model – Bridge Adjustment (-10%) – With Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	53
			EBR	51
			NBL	26
			NBT	28
			NBR	27
			SBL	18
			SBT	25
			SBR	16
			WBL	9
			WBT	72
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	125
			EBT	126
			SBL	34
			WBL	38
			WBT	82
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	59
			EBR	-
			NBL	49
			NBT	16
			NBR	16
			SBL	0
			SBT	6
			SBR	6
			WBL	61
			WBT	68
			WBR	68
	4	Rail Crossing	EBT	55
			WBT	98
	5	Daimler Parkway and Street 'A'	EBL	33
			EBT	33
			EBR	33
			NBL	27
			SBR	11
			WBT	29
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	118
			EBT	129
			EBR	129
			NBL	43
			NBT	56
			NBR	56
			SBL	59

PM Peak Hour			SBT	53
			SBR	67
			WBL	17
			WBT	128
			WBR	39
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	225
			EBT	228
			SBL	116
			WBL	47
			WBT	120
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	207
			EBR	-
			NBL	103
			NBT	75
			NBR	75
			SBL	8
			SBT	8
			SBR	8
			WBL	54
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	61
			WBT	89
	5	Daimler Parkway and Street 'A'	EBL	61
			EBT	61
			EBR	61
			NBL	53
			SBR	10
			WBT	21

APPENDIX 15

Sensitivity Analysis #4 – 25% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Synchro Analysis Results



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	165	669	271	416	233	1	1
Future Volume (vph)	1	165	669	271	416	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	44.0	44.0		22.0	66.0	25.0	44.0	19.0
Total Split (%)	40.0%	40.0%		20.0%	60.0%	22.7%	40.0%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effct Green (s)	40.0	40.0	110.0	63.0	59.0	41.0	35.0	12.1
Actuated g/C Ratio	0.36	0.36	1.00	0.57	0.54	0.37	0.32	0.11
v/c Ratio	0.00	0.28	0.58	0.46	0.55	0.52	0.21	0.01
Control Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
LOS	A	B	A	B	C	C	A	D
Approach Delay		10.4			18.1		23.3	39.0
Approach LOS		B			B		C	D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 85 (77%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 15.6

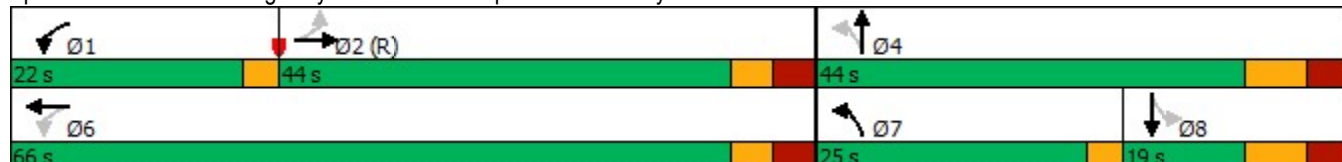
Intersection LOS: B

Intersection Capacity Utilization 80.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
AM Peak Hour

								
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	179	727	295	452	253	105	2
v/c Ratio	0.00	0.28	0.58	0.46	0.55	0.52	0.21	0.01
Control Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
Queue Length 50th (m)	0.1	20.0	63.5	31.6	61.1	40.0	0.2	0.2
Queue Length 95th (m)	m0.1	m30.9	74.4	48.4	90.9	62.4	11.9	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	299	640	1262	653	816	498	496	174
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.28	0.58	0.45	0.55	0.51	0.21	0.01
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	165	669	271	416	0	233	1	96	0	1	1
Future Volume (vph)	1	165	669	271	416	0	233	1	96	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.50	1.00	1.00	0.59	1.00		0.61	1.00			1.00	
Satd. Flow (perm)	821	1761	1262	963	1522		1025	1338			1578	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	179	727	295	452	0	253	1	104	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	71	0	0	1	0
Lane Group Flow (vph)	1	179	727	295	452	0	253	34	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	40.0	40.0	110.0	59.0	59.0		35.0	35.0			12.1	
Effective Green, g (s)	40.0	40.0	110.0	59.0	59.0		35.0	35.0			12.1	
Actuated g/C Ratio	0.36	0.36	1.00	0.54	0.54		0.32	0.32			0.11	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	298	640	1262	602	816		431	425			173	
v/s Ratio Prot		0.10		0.07	0.30		0.11	0.03			0.00	
v/s Ratio Perm	0.00		c0.58	0.19			0.08					
v/c Ratio	0.00	0.28	0.58	0.49	0.55		0.59	0.08			0.01	
Uniform Delay, d1	22.3	24.8	0.0	14.7	16.8		30.4	26.2			43.6	
Progression Factor	0.40	0.44	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.8	1.5	0.6	0.8		2.0	0.1			0.1	
Delay (s)	8.9	11.7	1.5	15.3	17.6		32.4	26.3			43.7	
Level of Service	A	B	A	B	B		C	C			D	
Approach Delay (s)		3.5			16.7			30.6			43.7	
Approach LOS		A			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			13.3				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			80.3%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

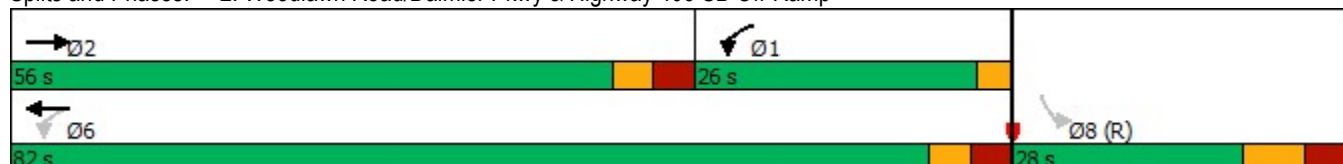
Sensitivity Analysis #4
AM Peak Hour

	→	↙	←	↘	↘
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	735	225	418	100	634
Future Volume (vph)	735	225	418	100	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	56.0	26.0	82.0	28.0	
Total Split (%)	50.9%	23.6%	74.5%	25.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effect Green (s)	42.7	63.5	59.7	34.3	110.0
Actuated g/C Ratio	0.39	0.58	0.54	0.31	1.00
v/c Ratio	0.82	0.80	0.49	0.20	0.49
Control Delay	34.2	45.8	13.1	32.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	45.8	13.1	32.7	1.2
LOS	C	D	B	C	A
Approach Delay	34.2		24.5		
Approach LOS	C		C		

Intersection Summary

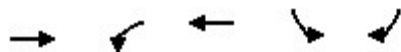
Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 27 (25%), Referenced to phase 8:SBL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 22.6
 Intersection LOS: C
 Intersection Capacity Utilization 62.6%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4
 AM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1047	245	454	109	689
v/c Ratio	0.82	0.80	0.49	0.20	0.49
Control Delay	34.2	45.8	13.1	32.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	45.8	13.1	32.7	1.2
Queue Length 50th (m)	99.2	29.2	46.5	17.2	0.0
Queue Length 95th (m)	113.7	48.3	51.3	36.0	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1468	433	1177	543	1415
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.71	0.57	0.39	0.20	0.49
Intersection Summary					

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	735	228	225	418	0	0	0	0	100	0	634
Future Volume (vph)	0	735	228	225	418	0	0	0	0	100	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3226		1555	1722					1743		1415
Flt Permitted		1.00		0.15	1.00					0.95		1.00
Satd. Flow (perm)		3226		241	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	799	248	245	454	0	0	0	0	109	0	689
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1018	0	245	454	0	0	0	0	109	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		42.7		63.5	59.7					34.3		110.0
Effective Green, g (s)		42.7		63.5	59.7					34.3		110.0
Actuated g/C Ratio		0.39		0.58	0.54					0.31		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1252		306	934					543		1415
v/s Ratio Prot		0.32		c0.10	0.26							
v/s Ratio Perm				c0.36						0.06		c0.49
v/c Ratio		0.81		0.80	0.49					0.20		0.49
Uniform Delay, d1		30.1		32.3	15.6					27.8		0.0
Progression Factor		1.00		0.90	0.78					1.00		1.00
Incremental Delay, d2		4.1		12.1	0.3					0.8		1.2
Delay (s)		34.2		41.1	12.5					28.6		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		34.2			22.5			0.0			4.9	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			21.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			62.6%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	798	16	935	101	89	50	32	56	127
Future Volume (vph)	143	798	16	935	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	15.1	68.6	53.5	53.5	53.5	10.0	20.9	10.5	21.4	21.4
Total Split (%)	15.1%	68.6%	53.5%	53.5%	53.5%	10.0%	20.9%	10.5%	21.4%	21.4%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	71.6	66.7	54.8	54.8	54.8	20.4	11.9	20.0	10.1	10.1
Actuated g/C Ratio	0.72	0.67	0.55	0.55	0.55	0.20	0.12	0.20	0.10	0.10
v/c Ratio	0.46	0.45	0.07	0.57	0.15	0.41	0.40	0.14	0.35	0.56
Control Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
LOS	A	A	B	B	A	D	D	C	D	B
Approach Delay		9.4		16.4			37.8		26.2	
Approach LOS		A		B			D		C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 15.7

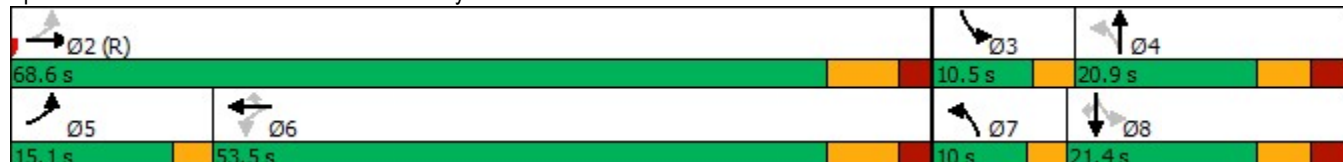
Intersection LOS: B

Intersection Capacity Utilization 66.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
AM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	970	17	1016	110	97	74	35	61	138
v/c Ratio	0.46	0.45	0.07	0.57	0.15	0.41	0.40	0.14	0.35	0.56
Control Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
Queue Length 50th (m)	8.5	42.2	1.5	65.2	0.0	15.5	11.1	5.4	11.4	0.0
Queue Length 95th (m)	18.0	64.5	6.0	101.7	8.9	27.5	23.9	12.3	22.5	16.7
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	374	2155	253	1793	727	239	219	254	242	292
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	0.41	0.45	0.07	0.57	0.15	0.41	0.34	0.14	0.25	0.47
Intersection Summary										

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	798	95	16	935	101	89	50	18	32	56	127
Future Volume (vph)	143	798	95	16	935	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3219		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.21	1.00		0.30	1.00	1.00	0.64	1.00		0.71	1.00	1.00
Satd. Flow (perm)	327	3219		462	3271	1234	1009	1428		1109	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	867	103	17	1016	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	51	0	13	0	0	0	123
Lane Group Flow (vph)	155	962	0	17	1016	59	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	65.5	65.5		53.6	53.6	53.6	17.5	11.9		15.1	10.7	10.7
Effective Green, g (s)	65.5	65.5		53.6	53.6	53.6	17.5	11.9		15.1	10.7	10.7
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.18	0.12		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	317	2108		247	1753	661	203	169		184	184	132
v/s Ratio Prot	c0.04	0.30			c0.31		c0.03	0.04		0.01	0.04	
v/s Ratio Perm	0.28			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.49	0.46		0.07	0.58	0.09	0.48	0.36		0.19	0.33	0.11
Uniform Delay, d1	8.3	8.5		11.2	15.6	11.3	36.4	40.5		36.9	41.3	40.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	0.7		0.1	0.4	0.0	1.4	1.0		0.4	0.8	0.3
Delay (s)	9.4	9.2		11.3	16.0	11.3	37.8	41.5		37.3	42.1	40.6
Level of Service	A	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.2			15.5			39.4			40.5	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			16.6				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			21.2		
Intersection Capacity Utilization			66.8%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	496	618	177	314	368	0	2	0
Future Volume (vph)	6	496	618	177	314	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	51.0	51.0		13.0	64.0	27.0	46.0	19.0	19.0
Total Split (%)	46.4%	46.4%		11.8%	58.2%	24.5%	41.8%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effect Green (s)	44.0	44.0	110.0	61.0	57.0	43.0	37.0	10.3	10.3
Actuated g/C Ratio	0.40	0.40	1.00	0.55	0.52	0.39	0.34	0.09	0.09
v/c Ratio	0.02	0.77	0.53	0.62	0.43	0.77	0.43	0.02	0.02
Control Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
LOS	B	C	A	C	B	D	A	D	A
Approach Delay		15.1			19.8		23.8		9.2
Approach LOS		B			B		C		A

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 16 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 18.6

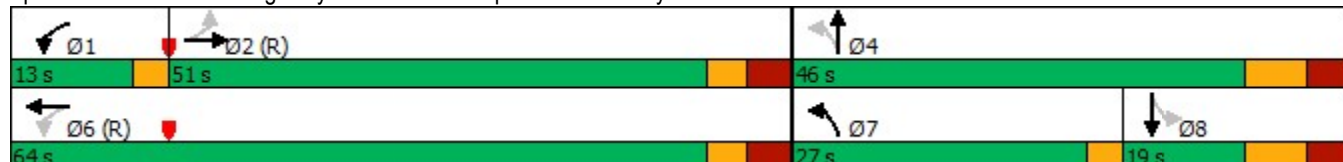
Intersection LOS: B

Intersection Capacity Utilization 86.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	539	672	192	342	400	291	2	8
v/c Ratio	0.02	0.77	0.53	0.62	0.43	0.77	0.43	0.02	0.02
Control Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
Queue Length 50th (m)	0.7	113.6	0.7	19.9	43.8	68.6	0.0	0.4	0.0
Queue Length 95th (m)	m0.6	m140.7	20.3	32.4	66.3	#104.2	7.8	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	363	704	1262	311	788	520	684	96	488
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	0.02	0.77	0.53	0.62	0.43	0.77	0.43	0.02	0.02

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	496	618	177	314	1	368	0	268	2	0	7
Future Volume (vph)	6	496	618	177	314	1	368	0	268	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.56	1.00	1.00	0.22	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	909	1761	1262	368	1521		985	1336		1036	1450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	539	672	192	341	1	400	0	291	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	193	0	0	7	0
Lane Group Flow (vph)	7	539	672	192	342	0	400	98	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	44.0	44.0	110.0	57.0	57.0		37.0	37.0		10.3	10.3	
Effective Green, g (s)	44.0	44.0	110.0	57.0	57.0		37.0	37.0		10.3	10.3	
Actuated g/C Ratio	0.40	0.40	1.00	0.52	0.52		0.34	0.34		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	363	704	1262	298	788		465	449		97	135	
v/s Ratio Prot		c0.31		0.06	0.22		c0.19	0.07			0.00	
v/s Ratio Perm	0.01		c0.53	0.28			c0.10			0.00		
v/c Ratio	0.02	0.77	0.53	0.64	0.43		0.86	0.22		0.02	0.01	
Uniform Delay, d1	20.0	28.5	0.0	18.1	16.5		32.4	26.1		45.3	45.2	
Progression Factor	0.78	0.89	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	5.1	1.0	4.7	1.7		14.9	0.2		0.4	0.1	
Delay (s)	15.6	30.6	1.0	22.9	18.2		47.3	26.4		45.7	45.3	
Level of Service	B	C	A	C	B		D	C		D	D	
Approach Delay (s)		14.2			19.9			38.5			45.4	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			22.4			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			86.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4
PM Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	815	175	497	305	725
Future Volume (vph)	815	175	497	305	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	50.0	17.0	67.0	43.0	
Total Split (%)	45.5%	15.5%	60.9%	39.1%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	51.9	71.7	67.9	26.1	110.0
Actuated g/C Ratio	0.47	0.65	0.62	0.24	1.00
v/c Ratio	0.80	0.69	0.51	0.80	0.56
Control Delay	29.8	25.4	8.2	54.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	25.4	8.2	54.0	1.6
LOS	C	C	A	D	A
Approach Delay	29.8		12.6		
Approach LOS	C		B		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 21.1

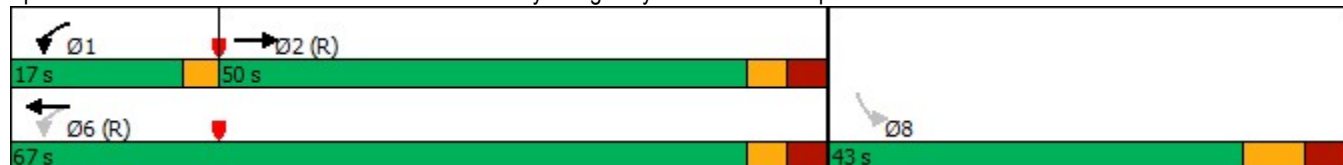
Intersection LOS: C

Intersection Capacity Utilization 77.9%

ICU Level of Service D

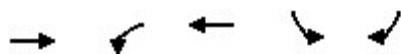
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4
 PM Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1231	190	540	332	788
v/c Ratio	0.80	0.69	0.51	0.80	0.56
Control Delay	29.8	25.4	8.2	54.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	25.4	8.2	54.0	1.6
Queue Length 50th (m)	110.8	10.0	33.5	67.2	0.0
Queue Length 95th (m)	#174.3	m34.8	85.6	90.7	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1545	298	1063	535	1415
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.64	0.51	0.62	0.56

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	815	317	175	497	0	0	0	0	305	0	725
Future Volume (vph)	0	815	317	175	497	0	0	0	0	305	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3204		1555	1722					1743		1415
Flt Permitted		1.00		0.11	1.00					0.95		1.00
Satd. Flow (perm)		3204		177	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	886	345	190	540	0	0	0	0	332	0	788
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1199	0	190	540	0	0	0	0	332	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		51.9		67.9	67.9					26.1		110.0
Effective Green, g (s)		51.9		67.9	67.9					26.1		110.0
Actuated g/C Ratio		0.47		0.62	0.62					0.24		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1511		272	1062					413		1415
v/s Ratio Prot		c0.37		c0.08	0.31							
v/s Ratio Perm				0.35						c0.19		0.56
v/c Ratio		0.79		0.70	0.51					0.80		0.56
Uniform Delay, d1		24.5		18.6	11.7					39.5		0.0
Progression Factor		1.00		0.93	0.51					1.00		1.00
Incremental Delay, d2		4.4		6.1	1.4					10.8		1.6
Delay (s)		28.9		23.4	7.4					50.4		1.6
Level of Service		C		C	A					D		A
Approach Delay (s)		28.9			11.6			0.0			16.0	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			20.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			77.9%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
PM Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	895	28	909	285	128	102	233	143	474
Future Volume (vph)	436	895	28	909	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	36.0	82.4	46.4	46.4	46.4	9.0	22.6	15.0	28.6	28.6
Total Split (%)	30.0%	68.7%	38.7%	38.7%	38.7%	7.5%	18.8%	12.5%	23.8%	23.8%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effect Green (s)	80.9	76.0	38.5	38.5	38.5	24.1	13.8	33.1	19.8	19.8
Actuated g/C Ratio	0.67	0.63	0.32	0.32	0.32	0.20	0.12	0.28	0.16	0.16
v/c Ratio	0.98	0.54	0.23	0.94	0.51	0.61	0.80	0.90	0.55	0.83
Control Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
LOS	E	B	D	E	A	D	E	E	D	B
Approach Delay		30.3		44.7			65.0		38.6	
Approach LOS		C		D			E		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 39.2

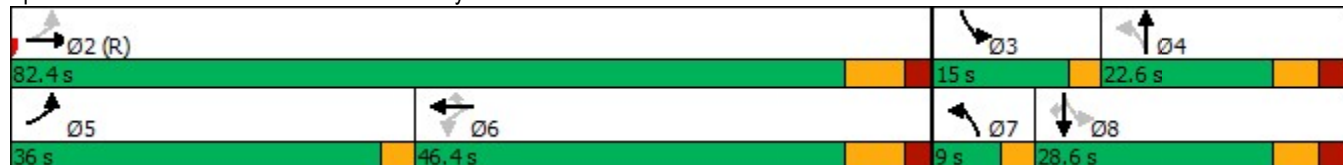
Intersection LOS: D

Intersection Capacity Utilization 97.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
PM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1094	30	988	310	139	139	253	155	515
v/c Ratio	0.98	0.54	0.23	0.94	0.51	0.61	0.80	0.90	0.55	0.83
Control Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
Queue Length 50th (m)	~100.3	71.3	5.2	118.7	0.0	25.7	29.9	51.2	33.3	2.8
Queue Length 95th (m)	#167.6	88.4	13.7	#159.6	21.2	43.6	#59.5	#98.4	54.6	#58.2
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	485	2044	130	1049	606	229	191	282	305	631
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	0.98	0.54	0.23	0.94	0.51	0.61	0.73	0.90	0.51	0.82

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	895	111	28	909	285	128	102	26	233	143	474
Future Volume (vph)	436	895	111	28	909	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3217		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.10	1.00		0.26	1.00	1.00	0.66	1.00		0.49	1.00	1.00
Satd. Flow (perm)	151	3217		408	3271	1234	1031	1443		760	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	474	973	121	30	988	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	8	0	0	0	211	0	8	0	0	0	418
Lane Group Flow (vph)	474	1086	0	30	988	99	139	131	0	253	155	97
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.0	76.0		38.5	38.5	38.5	19.8	13.8		28.8	19.8	19.8
Effective Green, g (s)	76.0	76.0		38.5	38.5	38.5	19.8	13.8		28.8	19.8	19.8
Actuated g/C Ratio	0.63	0.63		0.32	0.32	0.32	0.17	0.12		0.24	0.17	0.17
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	479	2037		130	1049	395	192	165		255	284	203
v/s Ratio Prot	c0.28	0.34			0.30		0.04	0.09		c0.10	0.09	
v/s Ratio Perm	c0.34			0.07		0.08	0.08			c0.14		0.08
v/c Ratio	0.99	0.53		0.23	0.94	0.25	0.72	0.79		0.99	0.55	0.48
Uniform Delay, d1	35.1	12.2		29.9	39.7	30.1	46.5	51.7		44.0	46.0	45.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.0	1.0		0.7	15.7	0.2	12.1	21.9		54.0	1.7	1.3
Delay (s)	73.0	13.2		30.6	55.4	30.4	58.6	73.6		98.0	47.7	46.7
Level of Service	E	B		C	E	C	E	E		F	D	D
Approach Delay (s)		31.3			49.0			66.1			60.9	
Approach LOS		C			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			46.1									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 21.2
Intersection Capacity Utilization			97.5%									ICU Level of Service F
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	426	640	231	384	360	1	1	6
Future Volume (vph)	7	426	640	231	384	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	47.0	47.0		17.0	64.0	27.0	46.0	19.0	19.0
Total Split (%)	42.7%	42.7%		15.5%	58.2%	24.5%	41.8%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	41.0	41.0	110.0	61.0	57.0	43.0	37.0	10.4	10.4
Actuated g/C Ratio	0.37	0.37	1.00	0.55	0.52	0.39	0.34	0.09	0.09
v/c Ratio	0.03	0.71	0.55	0.67	0.53	0.75	0.41	0.01	0.08
Control Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
LOS	B	C	A	C	C	D	A	D	D
Approach Delay		12.2			21.3		25.3		37.1
Approach LOS		B			C		C		D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 11 (10%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 18.1

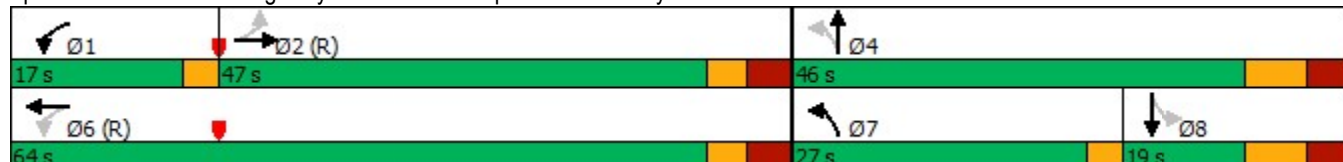
Intersection LOS: B

Intersection Capacity Utilization 86.4%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy



Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
SAT Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	463	696	251	418	391	250	1	12
v/c Ratio	0.03	0.71	0.55	0.67	0.53	0.75	0.41	0.01	0.08
Control Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
Queue Length 50th (m)	0.7	84.8	0.0	27.2	57.2	66.6	0.2	0.2	1.4
Queue Length 95th (m)	m0.6	m57.2	67.4	42.6	85.3	98.8	17.0	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	316	656	1262	388	788	520	615	101	155
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	0.03	0.71	0.55	0.65	0.53	0.75	0.41	0.01	0.08

Intersection Summary

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

Lands East of Hwy 406 Consolidated Traffic Study
1: Highway 406 NB Off-Ramp & Daimler Pkwy

Sensitivity Analysis #4
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	426	640	231	384	1	360	1	229	1	6	5
Future Volume (vph)	7	426	640	231	384	1	360	1	229	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.52	1.00	1.00	0.27	1.00		0.58	1.00		0.60	1.00	
Satd. Flow (perm)	848	1761	1262	445	1521		984	1337		1075	1599	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	463	696	251	417	1	391	1	249	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	165	0	0	5	0
Lane Group Flow (vph)	8	463	696	251	418	0	391	85	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	41.0	41.0	110.0	57.0	57.0		37.0	37.0		10.4	10.4	
Effective Green, g (s)	41.0	41.0	110.0	57.0	57.0		37.0	37.0		10.4	10.4	
Actuated g/C Ratio	0.37	0.37	1.00	0.52	0.52		0.34	0.34		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	316	656	1262	361	788		464	449		101	151	
v/s Ratio Prot		0.26		c0.08	0.27		c0.18	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.28			c0.10			0.00		
v/c Ratio	0.03	0.71	0.55	0.70	0.53		0.84	0.19		0.01	0.05	
Uniform Delay, d1	21.8	29.4	0.0	17.8	17.6		32.1	25.9		45.1	45.3	
Progression Factor	0.59	0.65	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	4.2	1.2	5.7	2.5		13.1	0.2		0.2	0.6	
Delay (s)	12.9	23.4	1.2	23.6	20.2		45.1	26.1		45.3	45.9	
Level of Service	B	C	A	C	C		D	C		D	D	
Approach Delay (s)		10.1			21.4			37.7			45.9	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			20.4			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			86.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4
SAT Peak Hour

	→	↖	←	↘	↙
Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	841	207	509	232	791
Future Volume (vph)	841	207	509	232	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	47.0	20.0	67.0	43.0	
Total Split (%)	42.7%	18.2%	60.9%	39.1%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effect Green (s)	53.8	76.3	72.5	21.5	110.0
Actuated g/C Ratio	0.49	0.69	0.66	0.20	1.00
v/c Ratio	0.80	0.72	0.49	0.74	0.61
Control Delay	29.4	27.7	7.1	54.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	27.7	7.1	54.5	1.9
LOS	C	C	A	D	A
Approach Delay	29.4		13.0		
Approach LOS	C		B		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 19.9

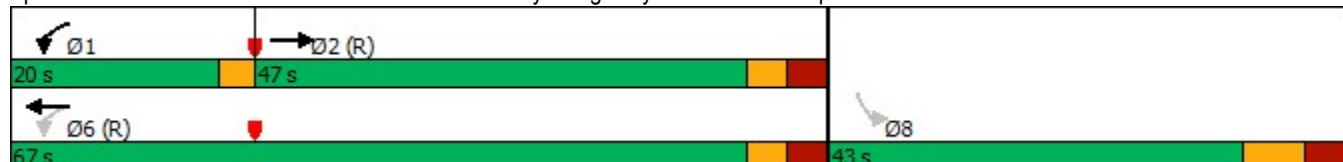
Intersection LOS: B

Intersection Capacity Utilization 76.8%

ICU Level of Service D

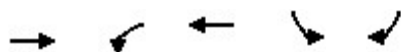
Analysis Period (min) 15

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp



Lands East of Hwy 406 Consolidated Traffic Study
 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4
 SAT Peak Hour



Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1282	225	553	252	860
v/c Ratio	0.80	0.72	0.49	0.74	0.61
Control Delay	29.4	27.7	7.1	54.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	27.7	7.1	54.5	1.9
Queue Length 50th (m)	111.6	18.5	33.7	51.4	0.0
Queue Length 95th (m)	#197.1	m46.5	76.8	72.6	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1596	348	1135	535	1415
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.65	0.49	0.47	0.61

Intersection Summary

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.

Lands East of Hwy 406 Consolidated Traffic Study
2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

Sensitivity Analysis #4
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	841	339	207	509	0	0	0	0	232	0	791
Future Volume (vph)	0	841	339	207	509	0	0	0	0	232	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3201		1555	1722					1743		1415
Flt Permitted		1.00		0.10	1.00					0.95		1.00
Satd. Flow (perm)		3201		167	1722					1743		1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	914	368	225	553	0	0	0	0	252	0	860
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1250	0	225	553	0	0	0	0	252	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		53.7		72.5	72.5					21.5		110.0
Effective Green, g (s)		53.7		72.5	72.5					21.5		110.0
Actuated g/C Ratio		0.49		0.66	0.66					0.20		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1562		309	1134					340		1415
v/s Ratio Prot		c0.39		c0.10	0.32							
v/s Ratio Perm				0.38						0.14		c0.61
v/c Ratio		0.80		0.73	0.49					0.74		0.61
Uniform Delay, d1		23.6		23.0	9.4					41.6		0.0
Progression Factor		1.00		0.98	0.56					1.00		1.00
Incremental Delay, d2		4.4		6.5	1.2					8.4		1.9
Delay (s)		28.1		29.0	6.4					50.1		1.9
Level of Service		C		C	A					D		A
Approach Delay (s)		28.1			12.9			0.0			12.9	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			19.0			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			76.8%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
SAT Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	820	18	925	357	135	217	340	178	657
Future Volume (vph)	751	820	18	925	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	45.0	84.0	39.0	39.0	39.0	9.0	24.0	22.0	37.0	37.0
Total Split (%)	34.6%	64.6%	30.0%	30.0%	30.0%	6.9%	18.5%	16.9%	28.5%	28.5%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.0	76.1	31.1	31.1	31.1	27.0	16.7	43.0	29.7	29.7
Actuated g/C Ratio	0.62	0.59	0.24	0.24	0.24	0.21	0.13	0.33	0.23	0.23
v/c Ratio	1.53	0.53	0.19	1.29	0.76	0.64	1.30	1.35	0.49	0.96
Control Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
LOS	F	B	D	F	C	D	F	F	D	C
Approach Delay		132.8		133.8			153.6		86.3	
Approach LOS		F		F			F		F	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.53

Intersection Signal Delay: 122.7

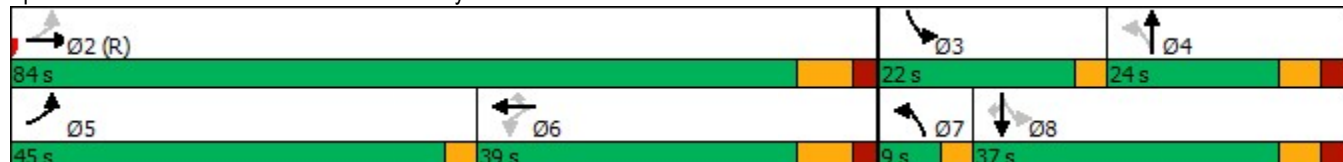
Intersection LOS: F

Intersection Capacity Utilization 131.3%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
SAT Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1007	20	1005	388	147	249	370	193	714
v/c Ratio	1.53	0.53	0.19	1.29	0.76	0.64	1.30	1.35	0.49	0.96
Control Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
Queue Length 50th (m)	~279.2	76.4	4.1	~171.9	24.6	27.9	~81.6	~108.2	43.3	34.1
Queue Length 95th (m)	#355.4	94.0	11.8	#212.7	66.5	45.8	#134.6	#169.3	67.1	#126.9
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	534	1890	106	782	511	229	191	275	393	747
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	1.53	0.53	0.19	1.29	0.76	0.64	1.30	1.35	0.49	0.96

Intersection Summary

~ 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.

Lands East of Hwy 406 Consolidated Traffic Study
3: Brown Road/Primeway Drive & Woodlawn Road

Sensitivity Analysis #4
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	820	107	18	925	357	135	217	12	340	178	657
Future Volume (vph)	751	820	107	18	925	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3215		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.12	1.00		0.28	1.00	1.00	0.64	1.00		0.20	1.00	1.00
Satd. Flow (perm)	184	3215		445	3271	1234	995	1477		318	1722	1234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	816	891	116	20	1005	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	8	0	0	0	216	0	2	0	0	0	466
Lane Group Flow (vph)	816	999	0	20	1005	172	147	247	0	370	193	248
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.1	76.1		31.1	31.1	31.1	22.7	16.7		38.7	29.7	29.7
Effective Green, g (s)	76.1	76.1		31.1	31.1	31.1	22.7	16.7		38.7	29.7	29.7
Actuated g/C Ratio	0.59	0.59		0.24	0.24	0.24	0.17	0.13		0.30	0.23	0.23
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	528	1882		106	782	295	196	189		265	393	281
v/s Ratio Prot	c0.50	0.31			0.31		0.03	0.17		c0.20	0.11	
v/s Ratio Perm	c0.41			0.04		0.14	0.10			c0.21		0.20
v/c Ratio	1.55	0.53		0.19	1.29	0.58	0.75	1.31		1.40	0.49	0.88
Uniform Delay, d1	37.0	16.2		39.4	49.4	43.7	49.8	56.6		40.5	43.6	48.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	254.8	1.1		0.6	138.0	2.4	14.3	171.4		199.7	0.7	26.0
Delay (s)	291.7	17.3		40.0	187.4	46.1	64.1	228.1		240.2	44.3	74.4
Level of Service	F	B		D	F	D	E	F		F	D	E
Approach Delay (s)		140.1			146.5			167.2			117.9	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		138.4				HCM 2000 Level of Service		F				
HCM 2000 Volume to Capacity ratio		1.56										
Actuated Cycle Length (s)		130.0				Sum of lost time (s)		21.2				
Intersection Capacity Utilization		131.3%				ICU Level of Service		H				
Analysis Period (min)		15										
c Critical Lane Group												

APPENDIX 16

Sensitivity Analysis #4 – 25% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (-25%) – No Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	33
			EBT	54
			EBR	52
			NBL	26
			NBT	25
			NBR	24
			SBL	20
			SBT	27
			SBR	17
			WBL	10
			WBT	68
			WBR	17
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	135
			EBT	136
			SBL	33
			WBL	33
			WBT	52
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	51
			EBR	-
			NBL	46
			NBT	15
			NBR	15
			SBL	0
			SBT	6
			SBR	6
			WBL	41
			WBT	60
			WBR	60
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	28
			EBT	28
			EBR	28
			NBL	15
			SBR	11
			WBT	20
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	123
			EBT	109
			EBR	109
			NBL	40
			NBT	53
			NBR	53
			SBL	53

PM Peak Hour			SBT	49
			SBR	63
			WBL	17
			WBT	121
			WBR	36
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	175
			EBT	175
			SBL	91
			WBL	46
			WBT	101
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	8
			EBT	153
			EBR	-
			NBL	98
			NBT	49
			NBR	49
			SBL	8
			SBT	9
			SBR	9
			WBL	44
			WBT	54
			WBR	54
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	7
			EBT	7
			EBR	7
			NBL	42
			SBR	8
			WBT	19
Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	216
			EBT	105
			EBR	105
			NBL	45
			NBT	78
			NBR	77
			SBL	89
			SBT	92
			SBR	98
			WBL	13
			WBT	133
			WBR	43
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	173
			EBT	173
			SBL	64
			WBL	41
			WBT	80
			EBL	5
			EBT	97

SAT P	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBR	-
			NBL	72
			NBT	30
			NBR	30
			SBL	4
			SBT	9
			SBR	9
			WBL	39
			WBT	61
			WBR	61
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	76
			EBT	76
			EBR	76
			NBL	33
			SBR	10
			WBT	24

Future Total (2051) Conditions Model – Bridge Adjustment (-25%) – With Train – Microsimulation Results

Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	33
			EBT	54
			EBR	52
			NBL	26
			NBT	25
			NBR	24
			SBL	20
			SBT	27
			SBR	17
			WBL	9
			WBT	68
			WBR	16
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	134
			EBT	135
			SBL	33
			WBL	33
			WBT	61
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	56
			EBR	-
			NBL	46
			NBT	15
			NBR	15
			SBL	0
			SBT	6
			SBR	6
			WBL	55
			WBT	63
			WBR	63
	4	Rail Crossing	EBT	57
			WBT	90
	5	Daimler Parkway and Street 'A'	EBL	34
			EBT	34
			EBR	34
			NBL	17
			SBR	11
			WBT	21
	1	Woodlawn Road and Primeway	EBL	123
			EBT	109
			EBR	109
			NBL	40
			NBT	53
			NBR	53

PM Peak Hour	1	Drive / Brown Road	SBL	55
			SBT	49
			SBR	65
			WBL	17
			WBT	122
			WBR	37
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	175
			EBT	176
			SBL	108
			WBL	45
			WBT	101
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	8
			EBT	206
			EBR	-
			NBL	98
			NBT	84
			NBR	84
			SBL	8
			SBT	9
			SBR	9
			WBL	48
			WBT	55
			WBR	55
	4	Rail Crossing	EBT	59
			WBT	72
	5	Daimler Parkway and Street 'A'	EBL	59
			EBT	59
			EBR	59
			NBL	43
			SBR	9
			WBT	20